

2001 — ANNUAL ENERGY REVIEW



JANUARY 2002



EUROPEAN
COMMISSION



European Commission
Directorate-General for Energy and Transport

2001 — ANNUAL ENERGY REVIEW

JANUARY 2002



**Includes a CD-ROM with global
energy balances and indicators
for 135 countries in the world**

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A great deal of additional information on the European Union is available on the Internet. It can be accessed through the Europa server (<http://europa.eu.int>).

Any comments and questions on this publication may be sent to: tren-info@cec.eu.int

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**FOREWORD BY VICE-PRESIDENT de PALACIO del VALLE-LERSUNDI
(RELATIONS WITH THE EUROPEAN PARLIAMENT, TRANSPORT AND ENERGY)**

The European Council in Lisbon in March 2000 asked the Member States, the Council and the Commission to complete the internal energy market. The Commission believes that a fully operational internal energy market is essential to guarantee a competitive service for European industry and citizens. The Commission presented the Parliament and the Council a proposal in March 2001 to complete the process started in 1996/1997.

The question of security of energy supply continues to be high on the European energy agenda, and the sad events of 2001 served to emphasise the short-term risks of a break down in supply. The debate on the Green Paper on the security of energy supplies, launched in late 2000, continued throughout the year, and now we need to draw our conclusions. In 2001, the Commission adopted its White Paper on the Common Transport Policy. From the analysis of the White Paper emerges a clear conclusion: energy, transport and sustainable development have strong and indissoluble linkages, and the current challenges can be tackled only by means of concerted action in energy, transport and other policy areas.

The major policy challenges I outlined above have many things in common and one of them is the need for reliable analysis and precise factual information. Energy and transport investments have long lead times and once the investments are in place, they may be operated for as long as a century. Policy decisions in these sectors need to be robust to change and capable of adaptation to new circumstances. Decisions do not have effect overnight, but once investments are in service options are frozen for a long period.

This edition of the Annual Energy Review marks also an end of an era. For the last ten years Annual Energy Review has reported on energy issues in Europe and in the world. The next edition will see substantial changes, and its title - Annual Energy and Transport Review - gives an unmistakable clue on what to expect for the future. I am convinced that the editions to come will serve established readers as well as before, but will also appeal to a completely new readership.

I would like to extend once again my invitation of last year regarding your comments and suggestions. Our electronic letterbox (tren-info@cec.eu.int) remains at your service, and our Internet site (http://europa.eu.int/comm/dgs/energy_transport/index_en.html) provides you with detailed information on energy and transport policy and markets. Finally, I hope all our readers constructive and interesting reading with the present volume.



Highlights	1
Executive Summary	2
Sources and Methods	7

PART I

THE WORLD	13
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PART II

EUROPEAN UNION	35
Austria	81
Belgium	82
Denmark	83
Finland	84
France	85
Germany	86
Greece	87
Ireland	88
Italy	89
Luxembourg	90
Netherlands	91
Portugal	92
Spain	93
Sweden	94
United Kingdom	95

PART III

EUROPEAN UNION ENLARGEMENT	97
Candidate countries	106
Eur-28	108

PART IV

OTHER OECD COUNTRIES	111
NAFTA	128
United States	130
OECD Pacific	131
Japan	133
EFTA	134
Norway	136
Turkey	137



PART V	CENTRAL AND EASTERN EUROPE	139
	Bulgaria	153
	Czech Republic	154
	Hungary	155
	Poland	156
	Romania	157
	Slovakia	158
	Slovenia	159
	Baltic Countries	166
PART VI	CIS	169
	Russia	186
	Ukraine	187
PART VII	AFRICA	189
	North Africa	201
	Sub-Saharan Africa	203
PART VIII	MIDDLE EAST	205
	Saudi Arabia	217
	Iran	218
PART IX	ASIA	219
	NICs	235
	China	236
	India	237
PART X	LATIN AMERICA	239
	Brazil	251
	Venezuela	252

ABBREVIATIONS, DEFINITIONS AND UNITS

CEEC	Central and Eastern European Countries
CIS	Community of Independent States
DGTREN	Directorate-General for Energy and Transport of the European Commission
EFTA	European Free Trade Association
Energy Intensity	Ratio of Energy Consumption to GDP
EU	European Union
GCC	Gulf Co-operation Council
GDP	Gross Domestic Product
GIC	Gross Inland Consumption
GW	GigaWatt, or 10^9 Watt
GWh	GigaWatt.hour or 10^9 Watt.hour
IEA	International Energy Agency
IMF	International Monetary Fund
Kgoe	Kilogram oil equivalent
kl	Thousand litre
km	Kilometer
ktoe	Thousand toe
kWh	Thousand Watt.hour
l	Litre
MEUR	Million EURO
Mt	Million metric tonne
Mtoe	Million toe
NAFTA	North American Free Trade Agreement
OECD	Organisation for Economic Co-operation and Development (excluding Hungary, Czech Republic and Poland)
OLADE	Organizacion Latinoamericana de Energia
SOEC	Statistical Office of the European Communities
t	Metric tonne, or 1.000 kilograms
toe	Tonne of oil equivalent, or 10^7 kilocalories, or 41.86 GJ
TWh	Tera Watt.hour, or 10^{12} Watt.hour
UN	United Nations
WB	World Bank



ENERGY HIGHLIGHTS...

... IN THE EUROPEAN UNION:

- Gross energy consumption increased by only 0.4% in 1999 despite the relatively robust economic growth of 2.5%. Besides structural changes taking place in the energy mix, the main factor was warm weather - heating requirements were down by 0.8% compared to 1998;
- Energy intensity the ratio of energy consumption to economic output - improved consequently by 2.1%, markedly above the average for the 1990s of 0.7% p.a.;
- Notwithstanding the relatively slow growth of overall energy consumption, natural gas use increased as much as 4.1%, while coal (-6.0%) and also oil (-1.0%) demand decreased;
- Total renewable energy production increased in line with overall energy use (+0.4%) in 1999, while wind energy production grew 17.8%;
- After two years of decline, indigenous energy production increased 2.2%, oil production being the key driver with 3.8% growth in 1999. This eased temporarily EU dependency on external energy supply;
- International oil prices continued to fluctuate widely: from late 1998 levels of 10 \$/bbl up to 30\$/bbl in 2000 and finally back to below 20 \$/bbl in 2001. Gas prices moved in a comparable way;
- Carbon dioxide emissions from energy production and use were 0.5% higher in 1999 compared with 1990. First indications for 2000 suggest that EU carbon emissions were slightly higher than in 1990.

... AND IN THE WORLD:

- Growth of energy demand resumed in 1999 (+0.5%) after the decrease of 1998. Worldwide solid fuel use decreased more than 5%, while oil use remained practically constant. Natural gas gained market share by continuing its growth (+1.6%);
- Utilisation of renewable energies in total grew in 1999, and biomass continues to be by far the largest renewable energy source in the world, covering almost four fifths of all renewable energy use;
- Overall economic growth was 2.8% in 1999, notably higher than in the previous year (2.0%);
- Energy use per capita increased during the late 1980s and early 1990s, but it has recently returned to levels recorded in mid-1980s: in 1999 it was 1606 kilograms of oil equivalent per capita;
- Energy use in relation to economic growth shows some encouraging trends, and economic growth over the 1990s was on average 1% faster than energy use;
- Global carbon emissions were some 6% higher in 1999 than in 1990.

WORLD

PRIMARY ENERGY CONSUMPTION INCREASED BY 0.6% IN 1999

- Between 1990 and 1999 world primary energy consumption grew by 1.5% per year on average. In 1999 world energy consumption grew by 0.6% driven by the increasing demand in the NAFTA region, by far the largest energy-consuming region. But, since 1997, uncertainty exists about the real consumption of solids in China: it concerns about 100 Mtoe in 1999 related to the possible non-implementation of the programme of mine closures.
- Energy developments since 1980 were characterised by faster growth in the non-OECD area during the 1980s (2.7% per year against 0.9% in the OECD), driven by the Middle East (+6.0% per year on average), Asia (+4.2%) and Africa (+3.3%). However, while the OECD area continued to increase its energy needs by 1.6% per year on average since 1990 driven by the NAFTA and OECD Pacific regions, the non-OECD world had slower growth in energy demand - limited to 0.7% annually;
- The drop in non-OECD demand resulted from the significant decreases in central and Eastern Europe (-2.8% per year on average) and in the former USSR (-4.3% per year on average). But, for the first time since 1990, energy demand increased by 1.3% in the CIS whose economy was boosted by high energy prices on the international market. This trend would be confirmed in 2000;
- Sustained by impressive economic growth, energy demand grew rapidly in all developing regions since 1990: 5.2% in the Middle East, 3.3% in Latin America, 2.6% in Asia and 2.5% in Africa;
- Regionally, the weight of Asia increased substantially since 1980 to represent 22.9% of world energy consumption in 1999 against only 15.8% in 1980. On the contrary, the share of the CIS declined from 15.5% to 9.4% and that of the CEEC from 4.8% to 2.9%, while the share of the OECD as a whole decreased from 52.9% in 1980 to 50.5% in 1999.

FINAL ENERGY CONSUMPTION, DRIVEN BY TRANSPORT AND TERTIARY-DOMESTIC, INCREASED BY 1.1% SINCE 1980

- Final energy consumption increased by 1.1% per year since 1980 but with marked contrasts between sectors:
 - Energy consumption for transport increased steadily since 1980 by about 2.0% per year in the OECD and by 2.6% in the non-OECD region, the share of OECD still reaching two-thirds in 1998. The near future will be marked by three major elements:

the increasing contribution of transport in final energy demand (from 22.1% in 1980 to 26.7% in 1998); the advent of increasing demand in both CIS and Central and Eastern countries since 1998 after 7 years of contraction; and the very sustained growth in emerging regions where the potential for development remained enormous (6.4% increase per year since 1990 in Asia, 6.3% in the Middle East and 4.7% in Latin America).

- Energy consumption in the tertiary and domestic sector depends on climatic conditions, increasing living standards around the world and the rising share of services in economic activities. It increased on average by 1.4% since 1980, with a contrasting evolution between the OECD region (+0.9% per year) and the non-OECD region (+1.7% per year) caused by increasing living standards and growing urbanisation in emerging regions. Consequently, the share of the OECD region declined from 44% in 1980 to 40% in 1998. But this evolution was not uniform. Between 1990 and 1997, substantially warmer in the Western Hemisphere, energy consumption by the tertiary-domestic sector increased faster in the OECD region (+1.4% per year on average) than in the rest of the world (+0.8%) – the latter marked by the fall in consumption observed in the Central and Eastern countries (-2.0% per year on average since 1990) and in the CIS (-1.6%).
- Energy consumption by industry was at the same level as in 1980 and still 7.5% below the peak reached in 1988. Even though this is the consequence of the sharp decline in the CEEC and CIS the long-term evolution also reflects the efforts made by industry to reduce specific energy consumption and to increase their competitiveness. Although consumption declined in the OECD region by 0.9% on average per year since 1980 as a consequence of these efforts, it grew by 0.7% in non-OECD regions, pushed by rapid industrial development over the last 20 years. The non-OECD share rose from 52% in 1980 to 59% in 1998. The growth was spectacular in Asia, driven by China and South East Asia, reaching 3.5% per year on average since 1980 but only 1.5% per year since 1990. It was followed by the Middle East with 3.4% per year on average and by Latin America with 2.5%, these two regions demonstrating accelerating growth during the 1990s.

THE FUEL MIX IS CHANGING IN FAVOUR OF GAS, BUT OIL STILL REMAINS DOMINANT

- Oil remains the predominant energy source, keeping its share of 36% since 1990. Oil demand increased twice as fast as total energy demand in 1999 despite the rapid increase of crude oil prices



from \$9.4 per barrel in December 1998 to \$24.4 in December 1999. Since 1990, oil consumption increased by 1.2% per year on average at the world level. Developing regions - Asia, Latin America, the Middle East and Africa which increased their share of world oil consumption from 25.1% in 1990 to 33.0% in 1999 - propelled oil consumption. The near future will be marked by the increasing contribution of transport in final demand, sustained by the enormous potential for growth in the emerging regions;

- Since 1990, natural gas consumption has grown faster than overall energy consumption despite the limited growth registered in 1997 and 1998, following major increases in 1995 and 1996. But in 1999 it rose again by 3.3%, taking advantage of its increased competitiveness in the context of a rapid rise in crude oil prices. In recent years the bulk of increased gas consumption arose from power generation that increased by 2.6% per year on average since 1990 to represent 40% of additional consumption since 1990. The gas contribution in final energy demand increased at 0.8% per year since 1990, at the same rate as total energy consumption. Gas demand accelerated in developing countries, mainly in Asia (+7.8% per year on average since 1990), in the Middle East (+7.7%) and Latin America (+5.5%), but also in the European Union (+4.4%);

- Coal's role in energy use worldwide has changed substantially over the last two decades, from a fuel used extensively in all sectors of the economy to one now used primarily for electricity production and in a few key industrial sectors, such as steel and building materials. Solid fuels have been steadily losing market share since 1990, principally in the European Union. This trend was confirmed in 1998 and 1999 by the marked decline (respectively -3.3% and -5.1%) stemming from the steep contraction reported by official Chinese statistics;

- The carbon-free energy sources (nuclear and renewables) increased by 2.0% per year on average since 1990. The bulk of biomass production and consumption concerned non-commercial uses mainly located in Asia (52% of total biomass production), Africa (22%), NAFTA (9%) and Latin America (7%). Since 1980, the contribution of biomass to world energy production has remained stable at about 11%. Low fossil fuel prices continued to constrain development of the world's renewable energy sources dedicated to commercial uses. Nevertheless wind energy has enjoyed rapid development in recent years, mostly in the industrialised countries with Germany, the United States, Spain and Denmark emerging as the fastest growing wind markets worldwide in 1999. The total increase is the largest addition to global wind capacity ever seen in a single year, a 36% increase from 1998.

WORLD POWER MARKET CHARACTERISED BY PRIVATISATION, LIBERALISATION, TRADE AND FOREIGN INVESTMENT

- Throughout the world electricity is the fastest growing component of final energy demand. Electricity's share in final energy consumption increased from 11.4% in 1980 to 16.1% in 1998. In the OECD region, electricity demand showed strong growth since 1980 at 2.7% per year on average in contrast to 0.7% annual growth in total final energy demand. This demand was driven by economic growth and growing electrical applications in both industry and tertiary-domestic sectors. Electricity consumption in the rest of the world grew by 3.9% per year since 1980 although total final demand increased by only 1.5%. Rapid population and economic growth, along with greater industrialisation and more widespread household electrification, were responsible for this increase;

- Thermal power production continued to dominate total electricity generation. Since 1990 two thirds of additional production has been met by thermal units, with nuclear and hydro contributing equally to the rest. Stabilisation of nuclear's contribution is expected in the short to medium term: reactor decommissioning in industrialised countries being just compensated by new investments in developing countries;

- The scope of many electricity companies has become increasingly global. Through mergers, acquisitions, joint ventures and strategic alliances, many of the world's electricity companies have become more integrated and much larger. Several companies have also chosen to specialise and some electricity companies have shed their generation assets to become "wires only" businesses. Others have chosen to focus solely on generation;

- Two regions, developing Asia and South America, have been particularly active in attracting foreign investment in their electricity sectors, which will have profound impacts on the landscape of their electric power industries;

- Deregulation, privatisation and liberalisation leading to lower prices continued to be one of the major worldwide developments in the electricity industry. The strengthening of pool and system interconnections should increase electricity trade substantially in the near term;

- Technological advances have greatly improved the position of natural gas as a fuel for electricity generation; and continued improvement in thermal efficiency is expected.

NAFTA AND ASIA REGIONS DOMINATE WORLD ENERGY PRODUCTION

- World primary energy production increased since 1980 by about 1.4% year but only by 1.0% during the 1990s, its evolution being determined by gross world energy consumption;
- The evolution during the 1990s has been marked by the large fall of energy production in the CIS (-456 Mtoe) and CEEC (-57 Mtoe) compensated by increases in all other regions, mainly in the Middle East (+320 Mtoe), Asia (+248 Mtoe), Latin America (+186 Mtoe), Africa (+171 Mtoe), NAFTA (+158 Mtoe), EFTA (+93 Mtoe), OECD Pacific (+86 Mtoe) and the European Union (+62 Mtoe);
- While during the 1980s the non-OECD regions increased their energy production three times faster than the OECD, in contrast, since 1990 primary energy production increased 40% faster in the OECD region than in the non-OECD area. Consequently the share of the OECD in world energy production reached 37% in 1999, as in 1980.
- In 1999 primary energy production remained stable in the OECD region but declined by 1.2% in the non-OECD region, influenced by Asia for solid production and the Middle East for oil production. The major increases of production came from natural gas (+45 Mtoe) supported by the growing demand from the power sector, nuclear (+30 Mtoe) and non-fossil fuels (+25 Mtoe). Solid fuel production decreased sharply (-117 Mtoe) to retrieve a level comparable with that of 1993, and crude oil production declined (-61 Mtoe) because of higher prices on the international market;
- The main energy producer in 1999 remained the NAFTA region with about 24% of total world energy production, followed by Asia with 20%, the Middle East with 13%, the CIS with 13% and Western Europe with 10%. For the first time since 1990 energy production again increased in the CIS.

OECD, DRIVEN BY THE EUROPEAN UNION, ABSORBED 80% OF WORLD INTERREGIONAL EXCHANGES OF ENERGY:

- The European Union remains by far the largest net energy importer with a steady annual growth of 2.1% since 1985, reaching a new peak of 724 Mtoe in 1998. NAFTA is the second ranking with a faster growth rate: 13% per year on average since 1985. The OECD Pacific region is the third ranking with a relatively stable level since 1980;
- In 1999, the OECD absorbed about 80% of world inter-regional net exchanges but all these exchanges represented only 20% of total world energy consumption - the same share as in 1980;

- Asia continuously increased its imports starting from a negligible level in 1980 to reach 303 Mtoe in 1999, 35 Mtoe below the peak reached in 1997. As a result of recent trends, Asia is soon likely to become the second largest importer of energy, ahead of OECD Pacific, amongst the main world regions;
- Net exporters remained, as traditionally, the Middle East (867 Mtoe in 1999), Africa (355 Mtoe), the CIS (306 Mtoe) and EFTA (167 Mtoe), all four mainly exporters of hydrocarbons;
- Oil accounted for 80% of interregional energy exchanges in 1999, natural gas for 13% and solids for 7%;
- OPEC continued to dominate the oil market and - with Russia - the gas market.

WORLD ENERGY INTENSITY IMPROVED SUBSTANTIALLY IN THE LAST THREE YEARS

- World energy intensity showed a slight but continuous downward trend by 1.2% a year since 1980. The limited decline in the early 1990s was compensated by spectacular improvements in the last three years with respectively -2.4% in 1997, -2.0% in 1998 and -2.2% in 1999;
- OECD regions with the lowest energy intensity improved their performance marginally (-0.6%) since 1990 despite marked improvement in 1997 and 1998: 2.0% and 1.1% respectively. In the OECD Pacific region energy intensity increased since 1990 due to the difficult economic situation in Japan. In industrialised countries major improvements of energy intensity were in all cases associated with sustained economic growth, as was the case in 1997 and 1998;
- The rest of the world was characterised by a stabilisation of its energy intensity during the 1980s followed by a sustained reduction since then (-2.2% per year on average since 1990) despite the substantial increase in the CIS (+1.8% per year) and in the Middle East (+2.3% per year). Asia experienced the major improvement since 1990, at about 3.8% per year on average with a marked acceleration since 1997.
- As regards energy intensity by sector, improvements occurred in all final sectors but at different rates: by 2.5% per year since 1980 in industry under the pressure of OECD countries; by 1.3% in the tertiary-domestic sector with very varied evolution by regions; and by 0.2% in transport demonstrating that the development of more efficient vehicles is able to offset rapid motorization in developing regions. Energy intensity in the power sector increased by 1.3% per year between 1980 and 1985 but remained stable since then, benefiting from higher nuclear production,



development of cogeneration, and conversion to natural gas involving advanced technologies with higher efficiencies.

WORLDWIDE CO₂ EMISSIONS INCREASED BY 6% SINCE 1990 WHILE EUROPEAN UNION EMISSIONS STABILISED

- Worldwide emissions of CO₂ increased steadily by 1.4% per year during the 1980s and by 0.6% per year since then, leading to a global increase by 6% in 1999 compared to the 1990 level;
- Since 1990, CO₂ emissions have increased in almost all regions of the world, in some cases substantially: +5.3% per year in the Middle East, +3.9% in Latin America, +2.6% in Africa and +2.5% in Asia, with the exception of former Centrally Planned Economies due to the sharp reduction of energy consumption observed in these countries since 1990;
- The European Union stabilised its emissions, benefiting from reduced coal use and energy efficiency improvements as the climatic conditions of 1990 and 1999 were similar. Since 1990 CO₂ emissions increased by 15% in the OECD Pacific and NAFTA regions and by 18% in EFTA;
- The power generation sector remained by far the largest emitter of CO₂, representing about 35% of total world emissions in 1998 against 28% in 1980. Within the final demand sectors, CO₂ emissions from transport have increased since 1980 at an average growth rate of 2.1%; and emissions from the tertiary-domestic sector fluctuated in a limited range to be at their minimum in 1998, taking advantage of warmer climatic conditions. Industry experienced the largest fall in CO₂ emissions between 1980 and 1998 (-0.8% per year) but a stabilisation occurred between 1992 and 1998 reflecting the increasing energy consumption of this sector at the world level;
- CO₂ emissions per capita fell by 0.8% a year on average since 1990 at the world level with a recent acceleration in the last two years caused by the particular situation in China. Carbon intensity declined steadily, the main improvement being observed in the tertiary-domestic sector (-15% since 1990) and in industry (-7%).

EUROPEAN UNION

SINCE 1990 FINAL ENERGY DEMAND, DRIVEN BY GDP GROWTH, INCREASED BY 1.1% PER YEAR

- In 1999, with climatic conditions similar to those of 1998, final energy demand increased by 0.9% in response to the 2.5% growth of GDP.

• With the exception of solid fuels, which declined by 5.5% in line with the average reduction observed since 1990, and renewable energy sources falling by 1.2%, all the other fuels experienced rising consumption in 1999: oil products by 0.2%, electricity by 2.0%, heat by 2.4% and natural gas by 2.8%;

• Since 1990, final energy demand has increased on average by 1.1% per year while GDP increased by 1.8% - implying an elasticity of about 0.6. But excluding the effects of the German reunification, final energy consumption increased in the European Union at 1.6% per year, a little less than GDP;

• Between 1994 and 1997 industrial consumption of energy has grown at 1.5% per year on average while industrial production has increased by 2.6% on average. Since 1997, benefiting from the energy savings associated with the conversion of the iron and steel sector to electric arc furnaces, energy consumption remained stable while industrial production increased by 2.8% per year. Consequently energy intensity of industry fell by 1.9% per year on average since 1990. This was also a result of new investment generated by the high level of economic activity, higher capacity utilisation rates and continued development of small to medium-sized enterprises dedicated to high value-added products;

• Transport energy demand grew between 1985 and 1998 at an average annual rate of 3.0% but, in the period 1990-98, growth remained limited to 2.1% per year despite jumps of 2.8% in 1996 and 3.7% in 1998. Consumption growth reached 2.1% in 1999 in line with the decade average. In 1999, transport energy demand represented 32.0% of total energy demand compared with only 24.6% in 1985. Between 1985 and 1999 transport consumption increased by 50% and contributed no less than 79% of the total increase of final energy demand. But since 1990 it contributed only 57% of the total increase, the rest being absorbed by the tertiary-domestic sector. Since 1994 energy intensity, measured against GDP, stabilised as a result of several factors: slower growth of passenger traffic, improvements in the car fleet, and the larger contribution of road vehicles for goods transportation which was compensated by better utilisation of these vehicles and by technological improvements...;

• Energy consumption in the domestic and tertiary sector increased by 0.6% annually on average since 1985, but by 1.3% per year since 1990 which experienced similar climatic conditions to those in 1999. Demand increased under the pressure of continual increases of specific uses (electrical appliances...) and living standards (central heating and house size). Year-to-year changes of energy demand in this sector continue to be strongly

tied to the weather. Influenced by higher energy prices, energy consumption increased by only 0.2% in 1999 while degree-days grew by only 1.0%;

NATURAL GAS MET 86% OF ADDITIONAL GROSS INLAND CONSUMPTION SINCE 1990

- Natural gas demand increased by about 4.4% per year on average since 1990, demonstrating continuous growth. Increases were spectacular in the three main markets: +159% in the power sector, +38% for the tertiary-domestic sector and +27% in industry. In 1999, sustained by increasing oil prices, overall gas consumption rose by 4.1%, but by +13.6% in power generation and only +2.0% in final demand. Well-developed infrastructures provide natural gas the opportunity to compete in all markets and to take advantage of competitive prices reinforced by liberalisation and increasing environmental pressures;

- Due to higher oil prices on the international market, oil consumption rose by only 0.2% in 1999. Since 1990, oil product consumption increased by 1.1% per year on average with important structural changes: consumption of kerosene grew regularly by 4.7% per year, diesel oil by 3.6% and LPG by 1.0%. Heating gas oil and gasoline remained stable while residual fuel oil declined by 4.7% per year due to environmental considerations. At the same time consumption of naphtha as a raw material increased by 3.3%. Consequently the European oil market became increasingly captive to specific markets (transport and petrochemicals), which together absorbed 64% of total oil demand in 1999 against 58% in 1990 and 50% in 1985;

- Solid fuels steadily lost major shares in all markets between 1990 and 1999, particularly in Germany and the United Kingdom. The heavy restructuring of the mining industry has reduced market protection in producing countries and opened the door for competition with gas, oil products and even imported coal. Across the European Union, consumption of solid fuels is increasingly concentrated in power generation, whose share reached 69% in 1999; and the energy branch, principally the coke oven industry;

- Electricity consumption continued to grow more rapidly than final demand, at about 1.9% per year on average since 1990. Electricity's share reached 29.2% in industry and 26.8% in the tertiary-domestic sector although growth caused by new applications was partly offset by the introduction of more energy-efficient equipment to replace obsolete appliances. Electricity growth was largely driven by the tertiary sector. Since 1990 growth of electricity use in services reached 2.9% per year, while domestic consumption grew by 2.2% and industry by only 1.2%;

- With no concrete plans for new projects, nuclear's contribution was near its maximum in 1999. Possible expansion of nuclear capacity is now limited to France (but without any specific projects at present) and to a lesser extent to Finland, with a de facto moratorium on new ordering in all other EU countries. Additionally a progressive phase-out of the nuclear contribution was decided in Germany in early 2000 and is also under consideration in Belgium. In the near future, as the prospects for new hydro capacity are also heavily constrained, incremental generation requirements will be mainly met by thermal units with all the energy and environmental impacts this implies;

- The opening of European electricity and gas markets through the EU Directives was the first stage of a three-part process to liberalisation. All Member States, except Luxembourg, had adopted national legislation implementing the provision of the Directive concerning common rules for the internal market of electricity at the beginning of 2000.

INDIGENOUS PRODUCTION PEAKED IN 1999

- Indigenous production of primary energy, pushed by nuclear, oil and natural gas, increased by 2.3% in 1999 to reach a new peak of 770 Mtoe;

- Oil production showed an average annual increase of 6.2% between 1990 and 1995, driven by the application of more efficient and economical methods for offshore exploitation and reached a new peak in 1995. In 1996 and 1997 production remained stable but increased again in 1998 and 1999 to reach a new peak of 168 Mtoe. Virtually all the production was located in the North Sea where the two main producers operated: the United Kingdom (83% of EU production) and Denmark (9%);

- Natural gas became the second largest energy source and contributed 24% of total primary production in 1999 with a continuous increase of 3.8% a year over the period 1990-99. This trend was mainly sustained by the United Kingdom, the largest European gas producer since 1995, which has doubled its production since 1990. The Netherlands, which played the role of swing producer with its major Groningen gas field characterised by very low production costs, has reduced its production since 1996;

- Solid fuels output declined very quickly until 1995 with a reduction of about 47% since 1990, with production both of steam coal and lignite falling at similar rates;

- Nuclear still remained the main energy source in the European Union, with an increase of 2.2% a year over the period 1990-99 but the prospects for further increases now seem very limited. A first



decline in capacity and output was observed in 1998, which is expected to continue given the projected plant decommissioning programme;

- In 1999, considering the spectacular 11% jump observed in 1997 (related to statistical accounting changes for biomass in Germany and Italy), the contribution of renewable energy sources represented 11.2% of total primary energy production and 6.0% of gross inland energy consumption;
- Total energy import dependency remained unchanged at around 48% since 1990. The overall net import of energy was 705 Mtoe in 1999, and this had increased by 1.0% per year on average since 1990.

CONTRASTED EVOLUTION OF ENERGY PRICES IN 1999

- More cohesion between OPEC and non-OPEC producers led to a doubling of crude oil prices during 1999 with a target price for crude oil between \$22/bbl and \$28/bbl for the near future;
- Oil product prices in the EU market increased substantially in 1999: by 4.5% for unleaded gasoline, 6.1% for diesel, 10.4% for heating oil and 20% for heavy fuel oil;
- Natural gas prices, benefiting from the substantial decline of oil prices in 1998 and delayed indexation rules, declined by 11.5% in industrial markets and by 5.2% in the heating market;
- Electricity prices decreased by 4.5% in industrial markets and by 1.9% for tertiary-domestic uses as a result of increasing competition between producers and technological improvements;

ENERGY INTENSITY IMPROVED BY 0.8% PER YEAR SINCE 1990, BUT BY 2.1% IN 1999

- Overall energy intensity improved by 0.8% per year on average between 1990 and 1999, being favourably influenced by the 2.1% improvement in 1999. The comparison between 1990 and 1999 is particularly pertinent as these years were characterised by similar weather conditions;
- Intensity improvements in industry since 1990 (-1.9% per year on average) and power generation (-0.6%) were the main drivers in reducing overall energy intensity. Technological improvements are increasingly becoming the driving force for energy saving in both industry and the power sector;
- On the other hand, the energy intensity of the tertiary-domestic sector decreased slowly since 1990 (-0.5% per year on average) with two contrasting trends: a reduction in the domestic sector

mainly since 1996 and a stabilisation of energy intensity in services since 1990. The increasing commercial and services floor area and the growing number of households, combined with the reduced price incentives to use energy rationally, together offset much of the gains provided by technological improvements;

- Although the energy intensity of the transport sector still increased by 0.3% per year on average in the period 1990-99, the first signs of stabilisation appeared in 1993. Energy intensity fell by 2.5% in 1994 and has remained broadly stable since then. Initial analysis suggests this improvement is associated with the improved efficiency of new vehicles, in particular passenger cars, and better management of traffic flows.

NO GROWTH OF CO₂ EMISSIONS IN THE EUROPEAN UNION BETWEEN 1990 AND 1999

- With weather conditions in 1999 similar to those in 1998 and 1990, CO₂ emissions declined by 0.7% in 1999 to reach a level close to that of 1990. In the period 1990-99 CO₂ emissions, influenced by weather conditions, fluctuated between 2995 and 3115 million tons, demonstrating a remarkable stability while economic activity increased by 17%. This resulted from three main factors: the continuous improvement of technologies reducing specific energy consumption; the growing contribution of non-fossil fuels, mainly nuclear together with some wind energy and biomass; and greater penetration of natural gas in substitution of solid fuels and oil products;
- The reduction of CO₂ emissions by industry (-13% since 1990) and by the power sector (-5%) largely offset the increase from the transport sector (+21%), while emissions from the tertiary-domestic sector and the energy branch remained stable. Consequently the transport sector, soon to become the largest single contributor to CO₂ emissions, accounted for 29% of total CO₂ emissions in 1999.

The World is divided into the following regions:

EUROPEAN UNION

Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden and the United Kingdom;

EFTA

Iceland, Norway and Switzerland;

NAFTA

Canada, Mexico and the United States of America;

OECD PACIFIC

Australia, Japan and New Zealand;

OTHER OECD COUNTRIES

Include EFTA, NAFTA, OECD Pacific regions and Turkey;

Rem : The new members (Czech Republic, Hungary, Poland and South Korea) are still considered in their original region to respect the coherence of the analysis;

CENTRAL AND EASTERN EUROPE

Albania, Bulgaria, Czech Republic, Hungary, Poland, Romania, Slovakia and former Yugoslavia;

BALTIC STATES

Estonia, Latvia and Lithuania;

CIS

Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine and Uzbekistan;

AFRICA

North Africa (Algeria, Egypt, Libya, Morocco and Tunisia) and Sub-Saharan Africa including all other African countries;

MIDDLE EAST

Bahrain, Israel, Iran, Iraq, Lebanon, Kuwait, Oman, Qatar, Saudi Arabia, Syria, United Arab Emirates and Yemen;

ASA

China, Newly Industrialising Economies (Hong Kong, Singapore, South Korea and Taiwan) and all other Asian countries not included elsewhere and the Pacific islands;

LATIN AMERICA

Brazil, Venezuela and all other Central and South American countries.

Data cover the period from 1980 to 1999 for the OECD Countries and up to 1998 for all non-OECD Countries. Data for 1999 in non-OECD Countries are shown wherever provisional figures were available.

FOLLOWING SOURCES ARE USED:

ENERGY DATA

- Statistical Office of the European Communities (SOEC) for EU statistics;
- International Energy Agency (IEA) for OECD statistics (non-EU countries), non-OECD statistics.
- PlanEcon for additional energy statistics on CEI and CEEC.
- Olade for additional energy statistics on Latin America.
- United Nations for biomass and generating capacities statistics.
- ESAP (Belgium) for generating capacities - EPIC data base
- Energy Information Administration, US Department of energy for provisional data for 1998 in non-OECD countries
- BP Statistical Review of World Energy for provisional data for 1998 in non-OECD countries;

PRICE DATA

- IEA for all average price fuels in the European Union's countries
- European Commission Directorate General for Energy and Transport for oil price statistics;

MACROECONOMIC AND POPULATION DATA

- Eurostat for European Union
- United Nations, World Bank, IMF and Planecon for the rest of the world.

Data for non-OECD Countries should be used with caution. Comparisons between series of absolute values are only indicative.

The editor is pleased to acknowledge the support and contribution of the International Energy Agency. The IEA, an autonomous body within the framework of the Organisation for Economic Cooperation and Development, provides a large share of the statistics presented here – for OECD Member countries other than the European Union and for non-Members throughout the world.



A FEW WORDS ON METHODOLOGY AND DEFINITIONS ARE NECESSARY.

GENERAL

- **Primary hydro-electricity** production is considered in terms of net calorific value (1 GWh = 86 toe) and **primary nuclear** production is calculated as fuel equivalent to produce the same amount of electricity in a power station with a thermal efficiency of 33%.
- **Biomass** data for OECD Countries (excluding European Union Member States) correspond to what the IEA shows in its energy balances under "Other Solid Fuels". Data for all non-OECD Countries correspond to IEA and UN data under the designation of "Vegetal Fuels". These data have been deeply revised for the present edition. In the case of the European Union see below.
- **Primary heat** (geothermal energy) is considered as being exclusively used for power generation. **Heat** shown in the final demand section is exclusively derived from other fuels (power generation and district heating). In the case of the European Union see below.
- In the **World Summary Energy Balance**, **gross energy consumption** corresponds to the total primary energy consumed including quantities delivered to marine bunkers. **Total final energy consumption** (TFEC) does not include any quantities used for non-energy purposes.
- **Energy intensity** is defined as the ratio of energy consumption to an economic activity indicator. In the case of total energy intensity, the ratio is between the Gross Inland Consumption and GDP.
- **CO₂ emissions** are given only on an indicative basis and were calculated using common emission factors across all countries. At world level, CO₂ emissions resulting from bunker fuels were included in the tables similarly to those resulting from fuels sold to airline transport.

EUROPEAN UNION

- The SOEC energy balance now available includes additional information on **renewable energy sources** (biomass, solar, wind and geothermal). The data related to renewable energy sources are available since 1985. This limits the analysis for Member States to the period 1985-1995 to ensure consistency in the times series.
- Data for **Germany** include both the former West Germany and the former German Democratic Republic.

More detailed definitions are shown in SOEC and IEA publications.

ADDITIONAL INFORMATION ABOUT THE PRINCIPAL SOURCES

The mission of the Energy Unit of Eurostat is to provide the European Union with a high-quality statistical service in the field of energy. In particular, the actions implemented by the Unit aim to:

1. Provide the European Commission with the harmonised, reliable and relevant statistical information needed to define, implement, follow and evaluate the Commission policies in the energy sector.
2. Provide the EU institutions, national administrations, enterprises, professional associations and EU citizens with high quality statistical services and products in the field of energy.
3. Improve the national statistical systems of the Member States in the field of energy.
4. Assist Candidate Countries in developing and harmonising their national statistical systems in accordance with EU standards in the field of energy statistics.

Eurostat collects statistics on energy from the Member States and the Candidate Countries. Statistics of the flows of energy commodities are collected on an annual and monthly basis. Price statistics are also collected. These statistics are available in both paper and electronic formats from the Eurostat Data Shops.

The results of specific projects implemented within the Member States (renewables, co-generation, energy efficiency, energy consumption in households/services) and the Candidate Countries are also available from the Eurostat Data Shops.

For further information contact the Eurostat Data Shop network or visit us on the Internet (<http://europa.eu.int/eurostat.html>).

The Paris-based International Energy Agency was founded in 1974, in the wake of the first oil-shock. Its core mission is to promote the security of energy supplies at reasonable prices. Its 25 member countries include most of the world's industrialised democracies, including all 15 members of the European Union. The IEA is convinced that energy security is best served where markets are both free and transparent. To that end, the Agency has developed an authoritative statistical service on global energy supply and demand.

The IEA's Energy Statistics Division gathers basic energy data from national administrations, from international and regional organisations and from an extensive network of industry officials, experts and consultants. Data from more than 140 countries and regions are published in Energy Statistics of OECD Countries and Energy Statistics of non-OECD Countries, and in Energy Balances for both OECD and non-OECD countries. The IEA also publishes yearly compendia of statistics on coal, natural gas, oil and electricity, and a book on worldwide CO₂ emissions.

Most IEA data are available on diskettes or CD-ROM or over the Internet. For more information, call the IEA's Energy Statistics Division at (33) 1 40 57 66 25 or fax to (33) 1 40 57 66 49. The IEA's World Wide Web site is at <http://www.iea.org>







World: Major trends (1980-1999)

- Total gross energy consumption increased by 0.6% in 1999 with some uncertainty about solids consumption in Asia
- Growth of world energy consumption limited during the 1990s by the contraction which occurred in the CIS and Eastern countries
- Final energy consumption, driven by transport and domestic sectors, increased by 1.2% annually since 1980
- World primary energy production determined by the evolution of world energy consumption
- World energy production still dominated by oil, representing 37% of energy production since 1990
- Primary energy production rebounded in the CIS
- OPEC continued to satisfy more than 40% of world oil supply
- Potential of production reinforced around the world but OPEC market share expected to increase
- Production cutbacks provoked a doubling of crude oil prices in 1999
- Increasing share of developing regions in gas production, peaking at 27% in 1999
- Major development of gas infrastructure completed or planned around the world
- Solids production, pushed by Chinese restructuring, declined by 9% since the peak reached in 1997
- Prospects for an increased nuclear contribution are dimming, even in developing countries
- Contribution of biomass to world energy production remained stable at 11% since 1980
- Electricity's share in final energy consumption reached 16% but potential for large increase still exists
- World power market characterised by privatisation, liberalisation, trade and foreign investment
- Power generation dominated by thermal production that reinforced its share recently
- Inputs for electricity generation increasingly dominated by solid fuels, except in the European Union
- Refinery capacities, after major restructuring, increased again all over the world since 1995
- OECD continued to represent more than three-quarters of world GDP
- World energy intensity improved on average by 1.2% per year since 1980
- Major energy intensity improvement occurred in industry, mainly in the OECD region
- World energy consumption per capita stable but future trends will depend on the CIS and Asia
- World CO₂ emissions grew by 6% since 1990 but European Union emissions stabilised
- The share of CO₂ emissions from power generation and transport reached 58% in 1998 against 48% in 1980
- The OECD absorbed 80% of world interregional exchanges of energy, 80% of which were met by oil

ENERGY OUTLOOK

Total gross energy consumption increased by 0.6% in 1999 with some uncertainty about solids consumption in Asia...

Total gross energy consumption in the world as a whole increased by about 1.5% per year from 1980 to 1999, but by only 1.2% annually since 1990. In 1998, for the first time since 1982, energy demand contracted at the world level. The economic crisis in East Asia, which began in the summer of 1997 and continued to deepen into the winter of 1998 with some extensions to Latin America and CIS, was the main cause. In 1999, world energy consumption grew by 0.6% driven by increasing demand in the NAFTA region, by far the largest energy-consuming region in the world. But some uncertainty exists about the real consumption of solids in Asia. Major sources of energy data, based on official Chinese data, recorded a major reduction of solid consumption in 1998 and 1999 in line with the programme of mine closures. But the latest available OECD data indicate an increase of solids consumption by 10% in 1998 and by 26% in 1999, or about 100

Mtoe, compared to the average of other sources given that the mines concerned were continuing to produce. If these numbers are confirmed in the future, the analysis of Chinese energy consumption, energy intensities and CO₂ emissions will be drastically modified.

Growth of world energy consumption limited during the 1990s by the contraction which occurred in the CIS and Eastern countries...

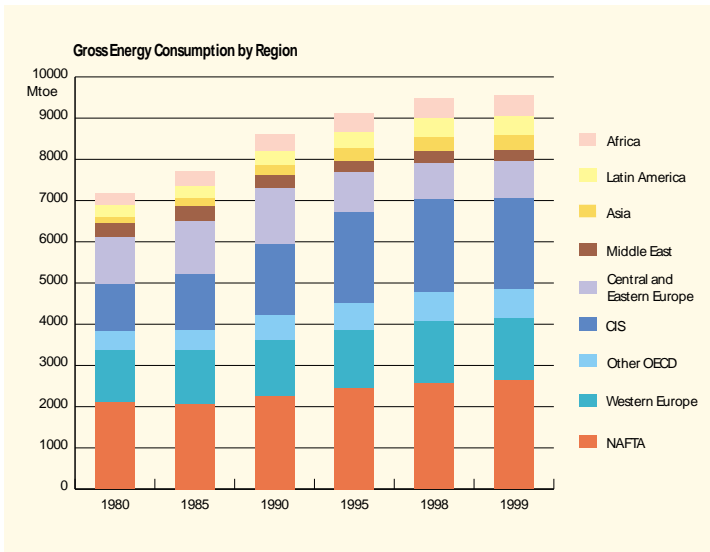
Energy developments since 1980 are characterised by faster growth in the non-OECD area during the 1980s (2.7% per year against 0.9% per year in the OECD) driven by the Middle East (+6.0% per year on average), Asia (+4.2%) and Africa (3.3%). However, while the OECD area continued to increase its energy needs by 1.6% per year on average since 1990, driven by the NAFTA and OECD Pacific regions, the non-OECD world had a slower growth in demand limited on average to 0.7% annually. This drop in non-OECD demand resulted from the significant decreases in Central and Eastern Europe (-2.8% per year on average) and the former USSR (-4.3% per year on average). These falls





TOTAL GROSS INLAND ENERGY CONSUMPTION : TOTAL BY REGION												
Mtoe	1980	1985	1990	1995	1997	1998	1999	85/80	90/85	97/90	98/97	99/98
								Annual % Change				
World	7293.7	7802.2	8700.2	9210.0	9588.0	9579.8	9624.4	1.4%	2.2%	1.6%	-0.1%	0.5%
Bunkers	109.0	83.6	94.6	94.6	92.5	94.2	94.7	-5.2%	2.5%	-0.4%	1.8%	0.5%
Western Europe	1281.9	1287.0	1367.9	1414.7	1463.3	1491.6	1498.9	0.1%	1.2%	1.1%	1.9%	0.5%
European Union	1240.8	1241.9	1319.2	1363.8	1410.3	1436.9	1442.4	0.0%	1.2%	1.1%	1.9%	0.4%
EFTA	41.1	45.1	48.6	50.9	53.0	54.7	56.5	1.9%	1.5%	1.4%	3.2%	3.2%
Rest of OECD	2565.3	2576.8	2851.9	3120.3	3268.2	3295.4	3372.6	0.1%	2.0%	2.3%	0.8%	2.3%
NAFTA	2103.6	2086.5	2258.9	2450.6	2557.7	2591.0	2660.8	-0.2%	1.6%	2.1%	1.3%	2.7%
OECD Pacific	430.3	451.2	540.3	608.3	639.9	632.7	641.6	1.0%	3.7%	2.9%	-1.1%	1.4%
Central and Eastern Europe	353.7	369.3	335.5	283.5	287.3	274.9	260.4	0.9%	-1.9%	-2.5%	-4.3%	-5.3%
CIS(1)	1131.9	1272.4	1347.8	966.0	914.1	893.7	905.6	2.4%	1.2%	-6.3%	-2.2%	1.3%
Africa	286.3	352.0	399.7	447.3	474.6	483.6	493.3	4.2%	2.6%	2.9%	1.9%	2.0%
Middle East	133.3	186.5	229.6	306.4	342.6	355.7	355.7	6.9%	4.3%	6.9%	3.8%	0.0%
Asia	1140.4	1368.1	1735.4	2185.1	2318.2	2246.3	2191.1	3.7%	4.9%	4.9%	-3.1%	-2.5%
Latin America	291.9	306.6	337.8	392.1	427.1	444.5	452.1	1.0%	2.0%	4.0%	4.1%	1.7%
of which (%)												
European Union	17.0	15.9	15.2	14.8	14.7	15.0	15.0	-1.3%	-1.0%	-0.5%	2.0%	-0.1%
OECD	52.7	49.5	48.5	49.2	49.3	50.0	50.6	-1.3%	-0.4%	0.3%	1.3%	1.3%

(1) Including Baltic countries for statistical reasons



were just about compensated by the buoyant demand in the Middle East (+5.2% per year on average), Latin America (+3.3%) and Asia (+2.6%). Since 1990 total gross energy consumption has been greatly affected by developments in the region comprising the CIS and Central and Eastern countries. In 1990 they represented about 19% of world energy consumption. Since then energy demand in this region has fallen by 31% with the major contraction in the CIS (-33%), while energy consumption in the rest of the world increased by about 21%. Consequently world energy consumption grew by only 10% since 1990. But this contraction

of energy demand in these two regions will end at some point. Already in 1999, the economy of the CIS region has been stimulated by high energy prices on international energy markets. Energy consumption for the first time since the creation of independent states has grown by 1.3% and first indicative numbers revealed an amplification of this trend in 2000. This will reinforce the potential for increasing energy consumption in the near future.

Regionally, the share of Asia has increased substantially since 1980 to represent 22.9% of world consumption in 1999, after a peak of 24.3% in 1997 against only 15.8% in 1980. On the other hand, the share of the CIS declined from 15.5% to 9.4%, and that of Central and Eastern Europe from 4.8% to 2.9%; while the contribution of the OECD as a whole to world energy consumption decreased from 52.9% in 1980 to 50.5% in 1999 after the minimum of 48.5% observed in 1991. The European Union represented about 15% of world consumption, a stable share since 1985.

Final energy consumption, driven by transport and domestic sectors, increased by 1.2% annually since 1980...

Final energy consumption increased in the OECD region by 0.7% per year annually since 1980. Though final consumption stagnated between 1980 and 1985 as a consequence of the energy savings measures adopted principally in industry in response to increasing energy prices, it grew regularly since then with some





Main items

Growing evidence of man-made environmental degradation, as well as the more recent concerns triggered by terrorist activity, continue to focus attention upon global inter-dependence. Both require concerted international action. Clearly, globalisation has many more complex dimensions than simply improved communication, investment, transportation and trade. The OECD member countries account for some three-quarters of global GDP. Huge inequalities in both income and life chances remain to be tackled, particularly inadequate access to basic essentials such as food, water, shelter, education and health care. Many commitments have been made to increase funds for aid and development programmes. Yet, for many global citizens, sheer survival still remains the overwhelming imperative. One-third of the world's population has no access to the commercial energy supplies taken for granted by consumers in industrialised countries. Continued economic and population growth is driving global energy consumption - particularly in the developing countries. Rapid expansion of both electricity and transport demand is a key feature of most regions, reflecting industrialisation and rising living standards. Energy use in central and Eastern Europe fell steeply in the 1990s. These regions persevere, with some difficulty, to adjust their economies via market reforms and structural change. Whilst global carbon and energy intensities are declining, energy use remains largely based (some 81%) upon fossil fuels. The carbon-free sources - renewables and nuclear power - provide the balance. Reducing such heavy dependence on fossil fuels will take many decades. Public opposition is likely to limit the future role of nuclear power; as is the reluctance to fund new nuclear investment in competitive, liberalised electricity markets. Renewable energy sources are being re-assessed, in terms of their environmental, diversity and supply security benefits. Ensuring long-term sustainable development features more centrally in market-based decision making poses genuine challenges. New governance and regulatory frameworks appear necessary, such as to stimulate research on novel energy technologies and oversee carbon-trading regimes. Progressive ratification of the Kyoto Protocol suggests that sustainability is achieving greater prominence in public attitudes and policy responses. But, to date, significant progress remains elusive.

acceleration in the 1990s. Non-OECD regions demonstrated sustained growth of 5.3% per year on average since 1980 in the Middle East, 2.9% in Asia, 2.5% in Africa and 2.2% in Latin America where demand accelerated substantially during the 1990s (+3.2% per year). Final energy consumption continued to increase in the CIS during the 1980s (+1.3% per year) but declined by about 5% per year between 1990 and 1998. First signs of recovery occurred in 1999 and 2000 with the rebound of CIS economies driven by increasing oil prices on the international market. The restructuring of their economies having started earlier in the central and eastern countries, final energy demand decreased continuously since 1980: by 1.3% per year during the 1980s and by 3.3% in the 1990s.

The evolution of final energy consumption varied substantially between regions and sectors. Energy consumption for **transport** has increased steadily since 1980 by about 2% per annum in the OECD region and 2.6% in the non-OECD region as a whole, the share of OECD still reaching two-thirds in 1998. Since 1990 major annual increases occurred in Asia (+6.4% per year on average), the Middle East (+6.3%) and Latin America (+4.7%). At the same time it increased by 2.1% per year on average in the European Union and by 2% in the rest of the OECD. In the CIS - which represented 10% of world energy use for transport in 1990 - energy demand declined by 8.5% per year between 1990 and 1997 but increased by 4.0% in 1998, a premonition of the expected economic recovery. The near future will be marked by three major factors: the increasing contribution of transport in final energy demand (from 22.1% in 1980 to 26.7% in 1998); the advent of increasing demand in both CIS and Central and Eastern countries since 1998 after at least 7 years of contraction; and the very sustained growth in emerging regions where the potential for development remained enormous with an average transport energy consumption per inhabitant ranging from 62 kgoe in Africa, 76 kgoe in Asia and 250 kgoe in Latin America to an average of 1110 kgoe for the OECD as a whole and a maximum of 1692 kgoe in the NAFTA region. Since 1990, energy consumption per capita for transport has increased by 10% in the OECD region and by 32% in developing regions (Africa, Asia, Middle East and Latin America). Consequently the share of these regions in total consumption reached 27.5% in 1998 against 18.4% in 1980.

Energy consumption by the **tertiary and domestic** sector depends upon three main factors: the climatic conditions, the increasing living standards around the world and the rising share





TOTAL ENERGY CONSUMPTION BY INDUSTRY : TOTAL BY REGION

Mtoe	1980	1985	1990	1995	1997	1998	1999	85/80	90/85	97/90	98/97	99/98
Annual % Change												
World	1929.3	1916.6	2025.4	1964.3	1948.2	1906.1	na	-0.1%	1.1%	-0.6%	-2.2%	na
Western Europe	321.5	276.2	275.9	269.5	273.7	272.9	274.8	-3.0%	0.0%	-0.1%	-0.3%	0.7%
European Union	310.7	264.9	266.0	259.3	263.4	262.1	263.5	-3.1%	0.1%	-0.1%	-0.5%	0.5%
EFTA	10.8	11.4	9.9	10.2	10.2	10.7	11.4	1.0%	-2.7%	0.5%	5.2%	5.8%
Rest of OECD	612.7	565.3	535.2	528.8	539.4	528.7	534.4	-1.6%	-1.1%	0.1%	-2.0%	1.1%
NAFTA	478.1	431.4	385.5	374.5	377.5	369.9	373.1	-2.0%	-2.2%	-0.3%	-2.0%	0.9%
OECD Pacific	127.4	125.4	137.7	141.0	144.7	141.1	144.9	-0.3%	1.9%	0.7%	-2.5%	2.7%
Central and Eastern Europe	127.5	122.2	103.7	72.1	68.7	62.1	na	-0.9%	-3.2%	-5.7%	-9.6%	na
CIS(1)	383.5	376.5	405.3	250.7	225.1	211.4	na	-0.4%	1.5%	-8.1%	-6.1%	na
Africa	56.9	59.3	66.4	64.9	70.5	75.5	na	0.8%	2.3%	0.9%	7.1%	na
Middle East	36.4	41.3	33.5	55.8	62.4	67.7	na	2.6%	-4.1%	9.3%	8.5%	na
Asia	313.9	393.6	514.1	616.8	591.6	568.4	na	4.6%	5.5%	2.0%	-3.9%	na
Latin America	76.9	82.3	91.3	105.6	116.9	119.5	na	1.4%	2.1%	3.6%	2.2%	na
of which (%)												
European Union	16.1	13.8	13.1	13.2	13.5	13.8	na	-3.0%	-1.0%	0.4%	1.7%	na
OECD	48.4	43.9	40.0	40.6	41.7	42.1	na	-1.9%	-1.8%	0.6%	0.8%	na

TOTAL ENERGY CONSUMPTION BY TRANSPORT : TOTAL BY REGION

Mtoe	1980	1985	1990	1995	1997	1998	1999	85/80	90/85	97/90	98/97	99/98
Annual % Change												
World	1134.4	1212.4	1412.6	1543.0	1643.1	1673.5	na	1.3%	3.1%	2.2%	1.8%	na
Western Europe	197.1	211.5	264.6	286.9	300.6	311.5	318.2	1.4%	4.6%	1.8%	3.6%	2.1%
European Union	189.2	202.6	253.8	275.7	288.9	299.5	305.8	1.4%	4.6%	1.9%	3.7%	2.1%
EFTA	7.8	8.9	10.8	11.1	11.7	12.0	12.4	2.5%	4.0%	1.2%	2.5%	3.0%
Rest of OECD	583.5	602.2	687.7	757.3	790.6	806.1	829.4	0.6%	2.7%	2.0%	2.0%	2.9%
NAFTA	502.2	515.5	577.7	628.8	655.1	670.5	691.7	0.5%	2.3%	1.8%	2.4%	3.2%
OECD Pacific	75.7	80.1	100.5	116.3	123.3	124.2	125.8	1.1%	4.7%	3.0%	0.7%	1.3%
Mediterranean	5.6	6.7	9.6	12.2	12.2	11.4	11.9	3.4%	7.6%	3.5%	-6.7%	4.3%
Central and Eastern Europe	26.3	23.7	27.6	24.4	29.6	29.7	na	-2.1%	3.0%	1.0%	0.4%	na
CIS(1)	123.8	134.1	139.9	77.8	75.0	78.0	na	1.6%	0.9%	-8.5%	4.0%	na
Africa	31.5	36.8	39.8	43.5	46.8	47.0	na	3.2%	1.6%	2.3%	0.5%	na
Middle East	28.5	40.3	39.2	57.2	61.5	63.8	na	7.2%	-0.5%	6.6%	3.7%	na
Asia	80.2	101.4	143.7	207.9	242.3	236.3	na	4.8%	7.2%	7.7%	-2.5%	na
Latin America	63.5	62.4	70.0	87.9	96.7	101.0	na	-0.3%	2.3%	4.7%	4.4%	na
of which (%)												
European Union	16.7	16.7	18.0	17.9	17.6	17.9	na	0.0%	1.5%	-0.3%	1.8%	na
OECD	68.8	67.1	67.4	67.7	66.4	66.8	na	-0.5%	0.1%	-0.2%	0.6%	na

TOTAL ENERGY CONSUMPTION BY TERTIARY-DOMESTIC SECTOR : TOTAL BY REGION

Mtoe	1980	1985	1990	1995	1997	1998	1999	85/80	90/85	97/90	98/97	99/98
Annual % Change												
World	2058.0	2255.9	2422.5	2603.3	2644.8	2617.0	na	1.9%	1.4%	1.3%	-1.1%	na
Western Europe	359.3	371.9	359.7	381.1	396.8	402.8	403.4	0.7%	-0.7%	1.4%	1.5%	0.1%
European Union	344.9	356.3	343.4	363.9	379.5	384.8	385.6	0.7%	-0.7%	1.4%	1.4%	0.2%
EFTA	14.4	15.5	16.3	17.1	17.3	18.0	17.8	1.5%	1.0%	0.8%	4.2%	-0.9%
Rest of OECD	549.1	564.8	593.5	653.1	674.6	660.5	674.6	0.6%	1.0%	1.8%	-2.1%	2.1%
NAFTA	464.7	467.0	476.3	516.2	533.8	518.7	532.1	0.1%	0.4%	1.6%	-2.8%	2.6%
OECD Pacific	70.9	82.6	100.3	117.4	119.7	121.0	121.4	3.1%	3.9%	2.6%	1.1%	0.3%
Central and Eastern Europe	97.9	103.0	89.0	76.4	77.5	75.6	na	1.0%	-2.9%	-2.0%	-2.4%	na
CIS(1)	266.3	318.9	338.6	347.7	305.7	296.4	na	3.7%	1.2%	-1.5%	-3.0%	na
Africa	142.6	163.6	188.3	218.3	229.4	232.8	na	2.8%	2.9%	2.9%	1.5%	na
Middle East	24.1	39.3	77.9	80.0	93.0	94.0	na	10.3%	14.7%	2.6%	1.1%	na
Asia	546.4	619.1	693.9	755.6	773.2	759.1	na	2.5%	2.3%	1.6%	-1.8%	na
Latin America	72.5	75.3	81.5	91.2	94.7	95.6	na	0.8%	1.6%	2.2%	0.9%	na
of which (%)												
European Union	16.8	15.8	14.2	14.0	14.4	14.7	na	-1.2%	-2.1%	0.2%	2.5%	na
OECD	44.1	41.5	39.3	39.7	40.5	40.6	na	-1.2%	-1.1%	0.4%	0.3%	na

(1) Including Baltic countries for statistical reasons





of services in economic activities. Energy consumption grew on average by 1.4% since 1980 with a contrasted evolution between the OECD region (+0.9% per year on average) and the non-OECD region (+1.7% per year) due to increasing living standards and growing urbanisation in major emerging countries. As a consequence, the share of the OECD region declined from 44% in 1980 to 40% in 1998. Nevertheless this evolution was not uniform. Between 1990 and 1998, substantially warmer in the Western Hemisphere, energy consumption by the tertiary-domestic sector increased faster in the OECD region (1.4% per year on average) than in the rest of the world (+0.8%). This resulted from the reduction of consumption observed in the Central and Eastern countries (-2.0% per year on average since 1990) and in the CIS (-1.6%) for the same reasons linked to the restructuring of these economies; and the substantial slowdown of demand which occurred in the Middle East (+2.4% per year since 1990 against +7.9% in the 1980s) and Asia (+1.2% against +1.9%). The comparison of energy consumption per capita demonstrates very large variations, a ratio higher than 3 between the OECD region and the non-OECD region. This ratio will decline in future with the improvement of living standards in developing regions and a progressive saturation of the demand in developed countries - already observable since 1990 in the NAFTA region with the highest consumption per inhabitant.

Energy consumption by industry was at the same level as in 1980 and still 7.5% below the peak reached in 1988. Even though this resulted from the sharp decline in Eastern Countries, the long-term evolution reflects the efforts made by industrialists to reduce

specific energy consumption per unit produced and to increase their competitiveness. Although consumption declined in the OECD region by 0.9% on average per year since 1980 as a result of these efforts, it grew by 0.7% in non-OECD regions, pushed by the rapid industrial development which has occurred over the last 20 years. The non-OECD region increased its share from 52% in 1980 to 59% in 1998. The growth was spectacular in Asia, driven by China and South East Asia, reaching 3.5% per year on average since 1980 but only 1.5% per year since 1990. It was followed by the Middle East with 3.4% per year on average and by Latin America with 2.5%. These two regions demonstrated accelerating growth during the 1990s: +9.2% per year for the Middle East and +3.4% for Latin America. In 1998, Asia, excluding Japan and New Zealand, absorbed 30% of world energy consumption by industry. As the OECD region demonstrated a relative stability since 1990 in each of its main components, the European Union and NAFTA region, it is clear that the expected growth in non-OECD regions resulting from their progressive industrialisation will be the driving force for the future in this sector.

World primary energy production determined by the evolution of world energy consumption...

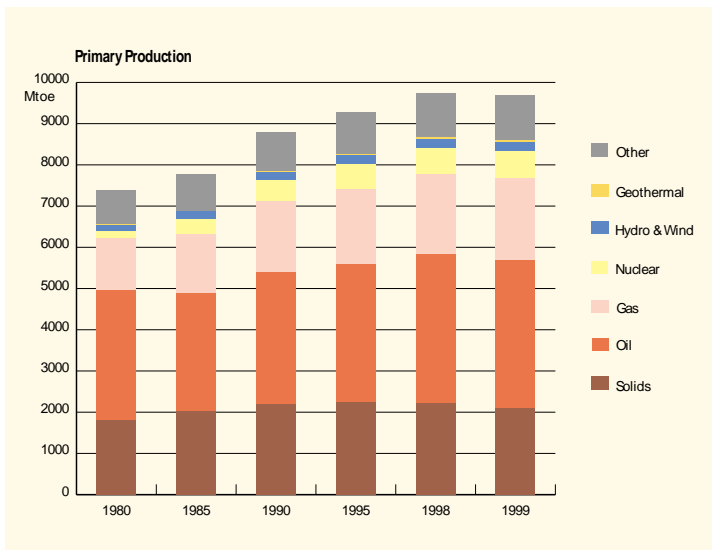
World primary energy production (equivalent to gross energy consumption aside from some stock variations and statistical errors) increased from 1980 to 1998 by about 1.4% per year, but only by 1.0% during the 1990s - its evolution being determined by gross world energy consumption, since world energy markets were still driven by the demand in absence of any constraints on

TOTAL PRIMARY ENERGY PRODUCTION : TOTAL BY REGION

Mtoe	1980	1985	1990	1995	1997	1998	1999	85/80	90/85	97/90	98/97	99/98
Annual % Change												
World	7375.9	7784.9	8807.6	9285.0	9680.9	9732.1	9687.9	1.1%	2.5%	1.4%	0.5%	-0.5%
Western Europe	671.6	820.7	839.5	934.2	987.7	973.1	994.3	4.1%	0.5%	2.3%	-1.5%	2.2%
European Union	608.0	737.3	708.3	739.4	762.4	753.4	770.5	3.9%	-0.8%	1.1%	-1.2%	2.3%
EFTA	63.6	83.4	131.3	194.8	225.3	219.7	223.8	5.6%	9.5%	8.0%	-2.5%	1.9%
Rest of OECD	2066.2	2229.1	2389.4	2538.4	2622.8	2662.7	2634.7	1.5%	1.4%	1.3%	1.5%	-1.1%
NAFTA	1910.0	2005.5	2118.4	2213.1	2271.8	2297.2	2276.2	1.0%	1.1%	1.0%	1.1%	-0.9%
OECD Pacific	139.1	202.0	245.6	299.3	323.6	337.0	331.6	7.7%	4.0%	4.0%	4.1%	-1.6%
Central and Eastern Europe	266.8	285.7	237.3	213.1	211.2	194.6	180.4	1.4%	-3.6%	-1.7%	-7.8%	-7.3%
CIS(1)	1357.8	1512.9	1624.6	1205.4	1168.9	1173.8	1211.9	2.2%	1.4%	-4.6%	0.4%	3.2%
Africa	557.8	595.1	695.9	773.5	842.3	847.4	862.5	1.3%	3.2%	2.8%	0.6%	1.8%
Middle East	993.1	588.0	916.6	1111.4	1188.1	1271.4	1271.4	-10.0%	9.3%	3.8%	7.0%	0.0%
Asia	1133.4	1396.3	1682.3	1991.2	2066.2	2000.4	1924.7	4.3%	3.8%	3.0%	-3.2%	-3.8%
Latin America	329.2	356.9	421.9	517.8	593.7	608.6	608.0	1.6%	3.4%	5.0%	2.5%	-0.1%
of which (%)												
European Union	8.2	9.5	8.0	8.0	7.9	7.7	8.0	2.8%	-3.2%	-0.3%	-1.7%	2.7%
OECD	37.1	39.2	36.7	37.4	37.3	37.4	37.5	1.1%	-1.3%	0.2%	0.2%	0.3%

(1) Including Baltic countries for statistical reasons





supply for any kind of energy. The evolution during the 1990s has been marked by the large fall of energy production in the CIS (-456 Mtoe or a reduction of 28% between 1990 and 1996 but production increased again since 1997) and CEEC (-57 Mtoe or a reduction of 21%) compensated by increases in all other regions of the world, mainly in the Middle East (+320 Mtoe or +35%), Asia (+248 Mtoe or +15% considering official statistics incorporating significant reduction of coal production in the last three years), Latin America (+186 Mtoe or +44%), Africa (+171 Mtoe or 25%), NAFTA (+158 Mtoe or +7%), EFTA (+93 Mtoe or +71%), OECD Pacific (+86 Mtoe or +35%) and the European Union (+62 Mtoe or +12%).

The share of the OECD in world energy production remained stable since 1980 at around 37%, substantially less than its contribution to world energy consumption. Between 1980 and 1999, the OECD and non-OECD areas had approximately the same growth in total energy production (about 1.4% per year), but the evolution was slightly different over time and by regions. While between 1980 and 1990 the non-OECD world increased its production about three times faster than the OECD. In contrast, between 1990 and 1999, primary energy production increased 40% faster in the OECD region than in the non-OECD area. In 1999 primary energy production remained stable in the OECD region but declined by 1.2% in the non-OECD region, influenced mainly by Asia for solid production and the Middle East for oil production.

World energy production still dominated by oil, representing 37% of total energy production since 1990...

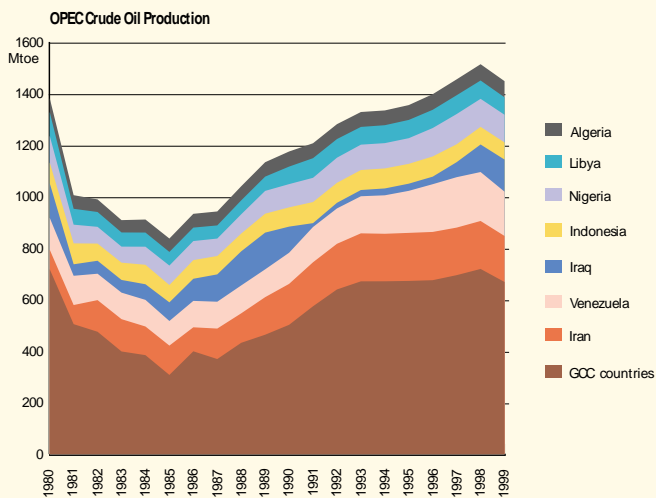
In 1999, oil was still the most important single fuel with 37% of world primary energy production, a stable share since 1990 (com-

pared with 43% in 1980). Oil production and consumption growth reached only 40% of total incremental energy demand growth since 1980; but their growth accelerated significantly since 1990 to evolve in phase with total gross inland energy consumption. The second most important fuel remained solid fuels which kept a share of 21.7% - slowly declining since 1985 from a peak of 25.9% and losing about 1% market share every four years. This decline accelerated substantially in the last two years as a result of the 9% decline of world production deriving from the Chinese situation. Natural gas ranked third in meeting world needs with 20.7% in 1999 (17% in 1980). Gas experienced accelerating growth since 1980, excluding a relative slowdown between 1990 and 1995 due to the particular economic situation in the CIS where gas production and consumption have declined by about 15% since 1990. Renewable energy sources (hydro, geothermal, biomass and wind) come fourth in satisfying world energy consumption with a share of almost 12% in 1999, a marginal increase compared to 1980, growing globally by 1.9% per year on average. Finally, nuclear energy grew the fastest in the period, mainly up to 1988 (13% per year). Its rate of growth has slowed down progressively since then and, for the first time since 1980, nuclear production diminished in 1997 but it rebounded in 1998 and reached a new peak in 1999. Nevertheless, considering the prospects for future nuclear generation capacity in developing countries, nuclear's contribution will slow down in the near future.

Primary energy production rebounded in the CIS...

In 1999, marked by substantial reductions of oil stocks, primary energy production declined by 0.8% while energy consumption increased by 0.6%. The major increases of production came from natural gas (+45 Mtoe) supported by growing demand from the power sector, nuclear (+30 Mtoe) and non-fossil fuels (+25 Mtoe); while solid fuel production decreased sharply (-117 Mtoe) to retrieve a level comparable with that in 1993, and crude oil production declined (-61 Mtoe) in response to higher prices on the international market. For the first time since 1990 production rebounded in the CIS, which accounted for 12.5% of world production against 18.5% in 1980, but it continued to decline in Central and Eastern countries. Other reductions were observed in Asia (-3.7%), the Middle East (-2.7%), OECD Pacific (-1.6%) and the NAFTA region (-1.9%). In 1999 the European Union's production increased by 2.3%, the second increase after the CIS (+3.2%) but ahead of EFTA (+1.9%) and Africa (+1.7%). The main contributor to energy production in 1999 remained the NAFTA region with about 24% of total world primary energy production (26% in 1980), followed by Asia with 20% (15% in 1980), the Middle East with 13% (14% in 1980), the CIS also with 13% (18% in 1980) and Western Europe with 10% (9% in 1980).



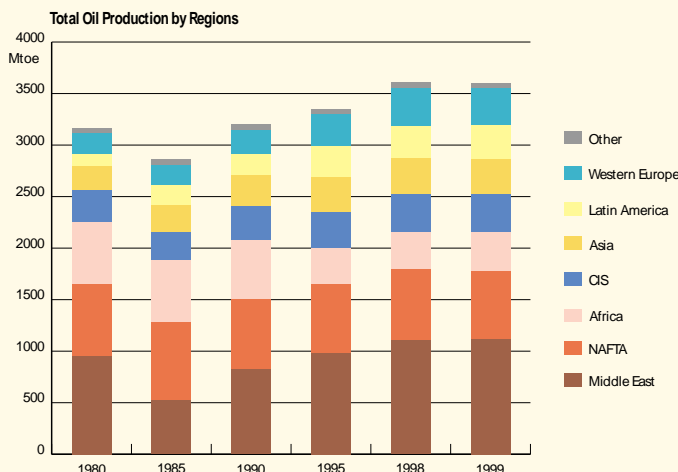


while western European production increased on average by 5.3% per year, the bulk of the growth occurring between 1990 and 1995 driven by production jumps in the North Sea. Since 1990 production losses in CIS (-191 Mtoe) and NAFTA countries (-24 Mtoe) have been compensated mainly by the Middle East (+239 Mtoe), Latin America (+124 Mtoe) and Western Europe (+119 Mtoe). Over the last three years, the rise in production in the Middle East was very impressive (+80 Mtoe) and corresponded to 73% of the total increase in world production. The CIS is the second increasing contributor with about 30 Mtoe, confirming the rebound first seen in 1998.

Potential of production reinforced around the world but OPEC market share expected to increase...

Some key oil supply developments in 1999 included¹:

- Greater cohesion between OPEC and non-OPEC producers led to a doubling of crude oil prices during 1999 with a target price for crude oil between \$22/bbl and \$28/bbl for the near future;
- Economic development in Asia is crucial to long-term growth in oil markets. The projected growth of oil demand will strengthen economic ties between the Middle East and Asian markets;
- Deepwater exploration and development initiatives are generally expected to be sustained worldwide, with offshore West Africa emerging as a major future source of oil production with economic resources at prices ranging between \$18 and \$22 per barrel. Technology and resource availability can sustain large increments in oil production capability;
- The low price environment of 1998 and early 1999 slowed the pace of development in some prospective production areas, especially the Caspian Basin region. Additionally there still remains a great deal of uncertainty regarding export routes from the Caspian Basin region;
- With large reserves and relatively low costs for expanding production capacity, OPEC members are expected to increase their market share significantly over the next decade. Competitive forces are expected to remain strong enough to forestall efforts to escalate real oil prices significantly for any prolonged period. Competitive forces operate within OPEC, between OPEC and non-OPEC sources of supply, and between oil and other sources of energy, particularly natural gas;
- During 1999 Iraqi production capacity expanded to 2.8 million barrels per day in order to reach slightly more than \$5.2 billion in oil exports allowed by United Nations Security Council resolutions. Iraq has indicated a desire to expand its production capacity aggressively to about 6 million barrels per day, once United Nations' sanctions are lifted. Such a significant increase in Iraqi oil exports would offset a significant portion of the price stimulus associated with current OPEC production cutbacks;



OPEC continued to satisfy more than 40% of world oil supply...

Oil remains the dominant fuel in world production and consumption although, as stated above, it has lost share in total energy production despite a sustained growth in 1997 (+2.9%) and 1998 (+2.0%). This was followed by a decline by 1.7% in 1999 induced by stock reduction given increasing crude oil prices which doubled between the beginning and the end of the year. OPEC as a whole remains the major oil producer, but its share of total world oil production fell from 44% in 1980 (54% in 1973) to 41% in 1999, with a minimum share of 29% in 1985. Between 1990 and 1998 its share increased regularly by 1.7% per year on average but it declined by 2.7% in 1999. Non-OPEC production remained largely dominated by the NAFTA region (18.5% of world production), followed by the CIS (10.7%), Western Europe (9.0%), Asia (7.8%), Africa (6.7%) and Latin America (5.3%). Between 1990 and 1999 production in the NAFTA region fluctuated in a limited range

¹ International Energy Outlook 2000, Energy Information Administration, US Department of Energy, 2000.



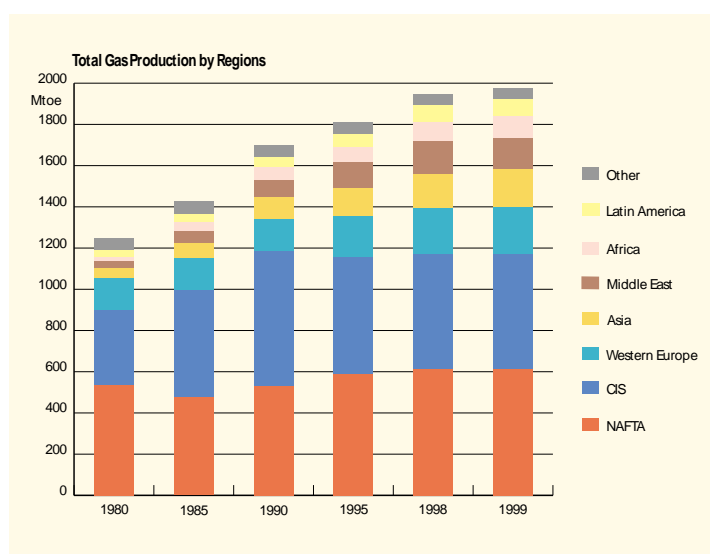


- The rebound in near-term oil prices, coupled with enhanced subsea and recovery technologies, may postpone the expected peak for North Sea production till 2004-2005;
- Oil producers in Central and South America have significant potential for increasing output over the next decade. Brazil has recently become a million barrel per day producer and has considerable production potential waiting to be tapped.

Production cutbacks provoked a doubling of crude oil prices in 1999...

The crude oil market rebounded dramatically in 1999. Prices rose from the low monthly average of \$9.4 per barrel in December 1998 to \$24.4 in December 1999, an increase of \$15 a barrel. Prices were influenced by the successful adherence to announced cutbacks in production by members of OPEC as well as several non-OPEC countries, notably Mexico and Norway. In addition, the price decline in 1998 significantly dampened the annual production growth that non-OPEC suppliers had provided since the mid-1990s, and petroleum demand in Southeast Asia began to recover from the severe recession of 1997-98. After the approval of cutbacks at the March 23rd meeting, OPEC's production management efforts have been successful, and their goal of raising prices above \$20 per barrel has been met.

At the beginning of 1999, constraints on worldwide oil supplies were becoming evident as the low oil price environment prevailed. Stripper production in the United States was in decline. Exploration and development spending was being slashed. Rig utilisation rates, especially for onshore equipment, had fallen by 30%. Previously announced spending plans worldwide were reduced. Oil-producing countries faced severe fiscal deficits, causing national oil companies to cut capital spending. Private-sector restructuring entered a new stage as mergers involving leading multinational oil companies were announced or completed. A prime objective of the mergers was to rationalise corporate operations, reducing employment and eliminating investment activities with low profit prospects. The oil market pessimism prevalent at the beginning of 1999 had however disappeared by the end of the year but many questions retained their pertinence: will prices remain above \$20 per barrel even when the production targets of OPEC producers are raised and significant increases in non-OPEC production are once again expected? Will technology guarantee that oil supply development moves forward even in a low world oil price environment? For the near future OPEC producers are expected to be the major beneficiaries of increased production requirements, but non-OPEC supply is expected to remain competitive, with major additional contributions coming from offshore



Increasing share of developing regions in gas production, peaking at 27% in 1999...

Amongst the fossil fuels, natural gas production showed the largest increase between 1980 and 1990 with a total gain of 37% or a growth by 3.2% per year on average. But since 1990, production rose by only 17% following the 15% reduction observed in CIS production (and consumption), the second largest world producer. The share of natural gas in world energy production grew from 17% in 1980 to 19% in 1990 and reached 21% in 1999. The two major contributors during this period were the CIS (360 Mtoe in 1980 and 561 Mtoe in 1999, with a peak of 656 Mtoe in 1990) and the NAFTA region (540 Mtoe in 1980 compared to 613 Mtoe in 1999). Their combined global share in total gas production fell from 72% in 1980 to 59% in 1999. Though production stagnated in the last two years in the NAFTA region, it increased again in the CIS by respectively 2.4% in 1998 and 1.1% in 1999. Since 1990 gas production increased rapidly in all developing regions: Africa at 9.1% per year on average, the Middle East at 8.3%, Asia at 7.4% and Latin America at 5.4%. In 1999 these four regions accounted for 27% of total world production against only 11% in 1980 and 18% in 1990. Since 1990 gas production in Western Europe increased by 4.3% per year on average but since 1996 Norway contributed alone to the growth, as gas production stagnated in the European Union where the reduction of Dutch gas production (20%) has been compensated by additional output from the United Kingdom. Since 1990, additional contributions have been made respectively by the NAFTA region (+83 Mtoe), the Middle East (+81 Mtoe), Asia (+78 Mtoe), Western Europe (+73 Mtoe), Africa (+44 Mtoe) and Latin America (+34 Mtoe) both to offset the cutback in the CIS (-96 Mtoe) and cover additional demand (294 Mtoe).





TOTAL SOLID PRODUCTION : TOTAL BY REGION												
Mtoe	1980	1985	1990	1995	1997	1998	1999	85/80	90/85	97/90	98/97	99/98
Annual % Change												
World	1807.6	2028.5	2217.3	2261.2	2315.7	2225.8	2108.3	2.3%	1.8%	0.6%	-3.9%	-5.3%
Western Europe	257.8	239.8	210.1	138.2	126.5	114.8	110.5	-1.4%	-2.6%	-7.0%	-9.2%	-3.8%
European Union	257.6	239.4	209.9	138.0	126.3	114.6	110.2	-1.5%	-2.6%	-7.0%	-9.2%	-3.9%
EFTA	0.2	0.4	0.2	0.2	0.3	0.2	0.3	11.9%	-10.6%	3.5%	-15.1%	49.1%
Rest of OECD	541.0	605.2	704.8	722.2	767.4	786.0	774.1	2.3%	3.1%	1.2%	2.4%	-1.5%
NAFTA	470.2	502.5	580.2	576.7	609.2	618.8	603.2	1.3%	2.9%	0.7%	1.6%	-2.5%
OECD Pacific	64.6	92.1	112.3	133.4	145.1	153.2	157.7	7.3%	4.0%	3.7%	5.6%	2.9%
Central and Eastern Europe	187.8	198.7	164.4	146.7	147.1	131.7	119.2	1.1%	-3.7%	-1.6%	-10.5%	-9.5%
CIS(1)	338.7	312.5	300.5	194.8	177.5	170.5	181.0	-1.6%	-0.8%	-7.2%	-4.0%	6.1%
Africa	71.4	104.9	107.7	124.1	130.9	133.3	133.9	8.0%	0.5%	2.8%	1.9%	0.5%
Middle East	0.6	0.8	0.8	0.8	0.7	0.8	0.8	6.8%	1.5%	-2.1%	6.6%	0.0%
Asia	404.0	556.2	709.8	911.8	937.4	858.4	758.9	6.6%	5.0%	4.1%	-8.4%	-11.6%
Latin America	6.3	10.5	19.1	22.7	28.1	30.2	29.9	10.8%	12.7%	5.7%	7.7%	-1.0%
of which (%)												
European Union	14.3	11.8	9.5	6.1	5.5	5.1	5.2	-3.7%	-4.3%	-7.6%	-5.6%	1.5%
OECD	43.9	41.1	40.7	37.5	38.0	39.8	41.3	-1.3%	-0.2%	-1.0%	4.8%	3.7%
TOTAL OIL PRODUCTION : TOTAL BY REGION												
Mtoe	1980	1985	1990	1995	1997	1998	1999	85/80	90/85	97/90	98/97	99/98
Annual % Change												
World	3166.6	2859.8	3205.2	3348.7	3539.6	3609.3	3589.3	-2.0%	2.3%	1.4%	2.0%	-0.6%
Western Europe	119.4	190.5	202.0	301.5	318.9	315.6	321.2	9.8%	1.2%	6.7%	-1.0%	1.8%
European Union	94.4	151.0	117.6	159.2	158.1	161.6	167.8	9.8%	-4.9%	4.3%	2.3%	3.8%
EFTA	25.0	39.5	84.4	142.3	160.8	153.9	153.4	9.6%	16.4%	9.7%	-4.3%	-0.3%
Rest of OECD	721.7	789.0	716.1	702.5	725.1	724.2	688.0	1.8%	-1.9%	0.2%	-0.1%	-5.0%
NAFTA	697.2	757.1	680.8	668.0	689.4	686.5	657.0	1.7%	-2.1%	0.2%	-0.4%	-4.3%
OECD Pacific	22.2	29.7	31.6	31.1	32.3	34.5	28.1	6.0%	1.2%	0.3%	7.0%	-18.6%
Central and Eastern Europe	20.9	19.1	14.9	13.3	12.7	12.5	11.9	-1.8%	-4.9%	-2.2%	-2.1%	-4.8%
CIS(1)	606.2	598.2	573.5	355.3	361.3	362.7	382.4	-0.3%	-0.8%	-6.4%	0.4%	5.4%
Africa	311.3	270.0	323.2	347.8	380.0	371.8	369.5	-2.8%	3.7%	2.3%	-2.2%	-0.6%
Middle East	954.8	531.0	831.0	983.4	1036.5	1111.0	1111.0	-11.1%	9.4%	3.2%	7.2%	0.0%
Asia	230.1	264.4	306.4	335.4	342.2	342.6	343.0	2.8%	3.0%	1.6%	0.1%	0.1%
Latin America	202.1	197.6	238.2	309.5	362.9	368.9	362.3	-0.5%	3.8%	6.2%	1.7%	-1.8%
of which (%)												
European Union	3.0	5.3	3.7	4.8	4.5	4.5	4.7	12.1%	-7.0%	2.8%	0.3%	4.4%
OECD	26.5	34.2	28.5	29.9	29.4	28.7	28.0	5.2%	-3.5%	0.4%	-2.3%	-2.4%
TOTAL GAS PRODUCTION : TOTAL BY REGION												
Mtoe	1980	1985	1990	1995	1997	1998	1999	85/80	90/85	97/90	98/97	99/98
Annual % Change												
World	1244.7	1427.2	1700.3	1812.4	1905.0	1946.8	1984.8	2.8%	3.6%	1.6%	2.2%	2.0%
Western Europe	156.1	155.3	157.0	194.8	223.1	222.8	229.6	-0.1%	0.2%	5.1%	-0.1%	3.0%
European Union	133.3	131.9	132.9	166.6	182.1	181.5	185.5	-0.2%	0.2%	4.6%	-0.4%	2.2%
EFTA	22.8	23.4	24.1	28.3	41.0	41.3	44.1	0.6%	0.6%	7.9%	0.8%	6.7%
Rest of OECD	549.9	496.2	553.5	621.2	640.8	649.4	647.7	-2.0%	2.2%	2.1%	1.3%	-0.3%
NAFTA	539.7	480.0	530.5	590.3	608.3	616.2	613.2	-2.3%	2.0%	2.0%	1.3%	-0.5%
OECD Pacific	10.2	16.2	22.8	30.8	32.3	32.8	33.9	9.7%	7.1%	5.1%	1.5%	3.5%
Central and Eastern Europe	43.6	44.2	32.0	24.3	20.9	19.6	18.6	0.3%	-6.2%	-5.9%	-5.8%	-5.4%
CIS(1)	359.6	520.1	656.3	569.0	541.4	554.4	560.6	7.7%	4.8%	-2.7%	2.4%	1.1%
Africa	20.3	42.4	61.8	75.2	89.7	94.9	105.7	15.9%	7.8%	5.5%	5.8%	11.4%
Middle East	36.1	54.3	82.2	124.4	147.9	156.6	156.6	8.5%	8.7%	8.8%	5.9%	0.0%
Asia	47.5	73.5	105.9	140.0	166.4	168.7	180.5	9.1%	7.6%	6.7%	1.3%	7.0%
Latin America	31.6	41.3	51.7	63.5	74.8	80.4	85.6	5.5%	4.6%	5.4%	7.5%	6.4%
of which (%)												
European Union	10.7	9.2	7.8	9.2	9.6	9.3	9.3	-2.9%	-3.3%	2.9%	-2.5%	0.2%
OECD	56.7	45.6	41.8	45.0	45.3	44.8	44.2	-4.3%	-1.8%	1.2%	-1.2%	-1.4%

(1) Including Baltic countries for statistical reasons





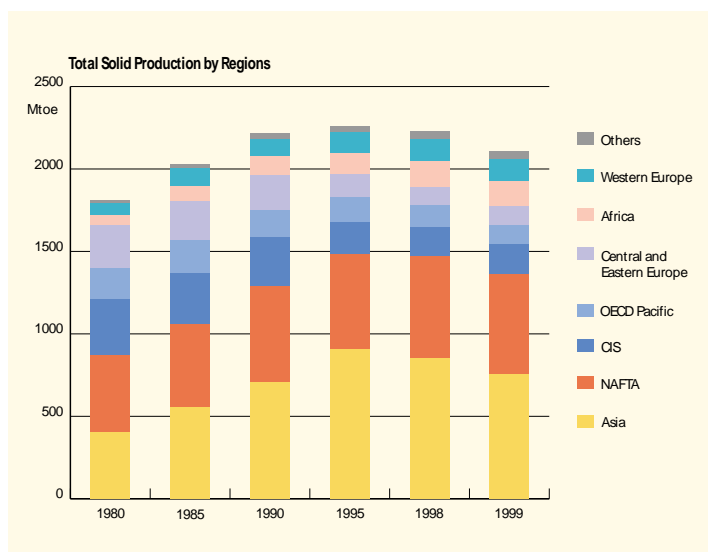
Major development of gas infrastructure completed or planned around the world...

Some important gas market developments in 1999 included²:

- The completion of several major international pipelines and firming up of plans for other new pipelines in South America. Pipelines from Bolivia and from Argentina to Chile (the GasAtacama and the Norandino) were completed in 1999. Steady growth in pipelines infrastructure is leading to increased trade which will facilitate a more mature gas market on the whole continent;
- Growth of Western Europe's gas infrastructure continued apace in 1999. The completion of the Europipe II from Norway to Germany will lead to an expanded role for North Sea gas in Germany. A new leg of the Yamal-Europe pipeline was also completed in Germany in September and will expand delivery capacity of Russian gas to Germany and West European consumers. On the southern side of Europe, Italy moved forward with plans to build a new pipeline for imports of Libyan gas;
- Completion in Asia of several major international pipelines and plans for additional lines confirmed the future potential of natural gas. The new pipeline from Myanmar to Thailand began building up deliveries to contracted volumes, more than a year behind schedule. Contracts were signed for two new pipelines to carry Indonesian gas exports to Singapore, and plans move forward for a pipeline from Papua New Guinea to Australia, with finalisation of gas sales contracts;
- Significant pipeline construction both within Canada and between the United States and Canada was underway to accommodate US import demand. By the end of 2000, five major new natural gas pipeline projects and an upgrade of a sixth are expected to be completed, allowing a considerable increase of trade between the two countries.
- Three greenfield natural gas liquefaction facilities came on stream in Trinidad and Tobago, Nigeria and Qatar. Both India and China also progressed plans to begin importing gas, which involve a host of projects and potential LNG terminals;
- Non-payment for gas supplies continued to be an issue throughout the CIS, both within and between countries. This situation contributed to lower gas demand inside these countries.

Solids production, pushed by Chinese restructuring, declined by 9% since the peak reached in 1997...

Coal's role in energy use worldwide has changed substantially over the decades, from a fuel used extensively in all sectors of the economy to one that is now used primarily for electricity genera-



tion and in a few key industrial sectors, such as steel, cement and building materials. Despite declines in some regions, world coal production increased from 2026 Mtoe in 1985 to 2105 Mtoe in 1999 with a peak of 2313 Mtoe in 1997. Although coal has lost market share to petroleum products and natural gas, it continues to be a key source of energy because of the dominant role it has maintained in its core markets and its success in penetrating markets in emerging economies. In 1999, coal accounted for 21.8% of world primary energy production but was experiencing a marked decline after its 1997 peak. The largest producer in 1999 remained Asia despite the declines by respectively 8.4% and 11.6% registered in 1998 and 1999, related to the closure of uneconomic mines of limited size in China as reported in Chinese official statistics. But as mentioned earlier, uncertainty exists about the reality of this restructuring so that the effective Asian production could be some 100 Mtoe higher in 1999. Based on the official data Asian production still represented 36% of total world production in 1999 against 22% in 1980 and a peak of 41% in 1996. Asia was followed by NAFTA (29% in 1999, a limited increase from the 26% reached in 1980), the CIS (9% in 1999), OECD Pacific (8%) and by Africa, Central and Eastern Europe and Western Europe (6% each). Since 1980 increased production in Asia (+355 Mtoe), NAFTA (+133 Mtoe), OECD Pacific (+93 Mtoe) and Africa (+61 Mtoe) compensated for declines in the CIS (-158 Mtoe), European Union (-147 Mtoe) and Central and Eastern Europe (-69 Mtoe) as well as covering incremental demand (+300 Mtoe). In 1999, the two biggest coal producers were the United States (559 Mtoe) and China (507 Mtoe), followed by Australia (153 Mtoe), India (152 Mtoe) and South Africa (131 Mtoe). The two major producers accounted for 51% of total world production against 54% in 1997.

² International Energy Outlook 2000, Energy Information Administration, US Department of Energy, 2000.





Prospects for an increased nuclear contribution are dimming, even in developing countries...

Even as the performance of nuclear reactors improves worldwide, the prospects for increased reliance on nuclear power for electricity generation are dimming. Public concern about the safety of nuclear reactor operation, plant decommissioning and the disposal of nuclear waste makes the ordering of new nuclear facilities difficult, in particular in the developing countries. The key developments affecting the nuclear power industry in 1999 include:

- Nuclear safety moved to the forefront in Asia after several leaks at nuclear power plants in Japan and China and an accident at a fuel reprocessing plant in Japan. These events are likely to cause further public concern about the ambitious plans for nuclear capacity expansion in the Far East. In 1996 Japan joined the ranks of countries in which local voting initiatives recorded strong public opposition to the construction of new nuclear facilities.
- Competition in the US electric industry led to sales of existing nuclear plants. Plant sales could lead to a consolidation of the US nuclear electricity industry, with a few large companies owning and operating a large number of plants. As a result, better management could lower costs and make nuclear plants more competitive in the deregulated electricity industry. At the same time, the potential market power of large nuclear generating companies could raise concerns about the pricing of nuclear electricity;
- Nuclear issues dominated accession talks in the European Union. The safety of older, Soviet-designed nuclear reactors in some candidate countries (Bulgaria, Lithuania and the Slovak Republic) dominated the negotiations for enlargement and the Commission made further negotiations contingent on commitments to close such reactors. All three candidate countries proposed to close reactors and they will receive financial aid from the European Union and the European Bank for Reconstruction and Development to assist with decommissioning efforts;
- Debate continued in Germany over phaseout schedules for nuclear plants. The new coalition of Social Democrats and Greens included in its platform a pledge to remove from service all nuclear plants, with no compensation to the operators. Discussions with the utilities to agree a limit on the plants' lifetimes initially failed to produce an agreement; but negotiations continued and a final agreement was reached in 2000 requiring the decommissioning of nuclear unit after 32 years of use. A further issue is the transport of spent nuclear fuel, which has been blocked since 1998, requiring all spent fuel from reactors to be stored on site.

Contribution of biomass to world energy production remained stable at 11% since 1980...

The contribution of renewable energy sources (hydro, biomass, geothermal, wind...) must be analysed from two perspectives: commercial and non-commercial energy sources. The bulk of biomass production and consumption concerned non-commercial uses mainly located in Asia (52% of total biomass production), Africa (22%), NAFTA (9%) and Latin America (7%). Since 1980, the contribution of biomass to world energy production has remained stable at about 11%. With the exception of Africa, where biomass production increased faster, the average growth rate since 1980 was similar amongst the major contributors.

Although energy prices rebounded in 1999, it remained difficult for renewable energy to compete economically with fossil fuels. While the costs of installing and generating electricity with renewable resources continue to fall, and technological advances improve generating efficiencies, they have not been able to keep pace with the declining costs of energy from fossil fuels, especially crude oil and oil products. Nevertheless, large-scale hydroelectric projects are still being planned and built in the developing countries, particularly in developing Asia, where the fastest development of hydroelectricity is projected to occur. The controversial Three Gorges Dam project in China has continued apace despite international protests from environmental groups and a temporary suspension of work after the devastating flooding on the Yangtze River in the summer of 1998. But, in contrast, the 1999 drought in many Latin American countries may deter future growth of hydroelectricity. Countries historically dependent on hydroelectricity for their electricity supplies were hit by a drought that some analysts depicted as the worst of the century. The lack of water affected many of these countries, in particular Mexico and Chile. In terms of other renewable resources well developed at an industrial level, wind energy has enjoyed rapid development in recent years, mostly in the industrialised world, with Germany, the United States, Spain and Denmark emerging as the fastest growing wind markets worldwide in 1999. The total increase is the largest addition to global wind capacity ever in a single year, a 36% increase from 1998.

Electricity's share in final energy consumption reached 16% but potential for large increase still exists...

Throughout the world, electricity is - and is likely to remain - the fastest growing component of final energy demand. Electricity's share in final energy consumption increased by about 42% since 1980, from 11.4% to 16.1%. In the OECD region, electricity showed



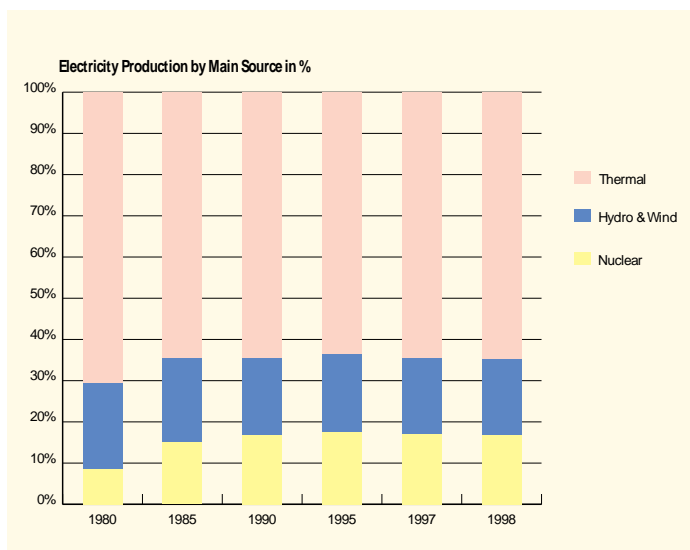


strong growth between 1980 and 1998, at 2.7% per year on average, in contrast to 0.7% annual growth in total final energy demand - or some four times faster! In the industrialised world, where electrification is well established in all economic sectors, increased demand was driven by economic growth and growing electrical applications in industry as well as for computers, communications and other electronic applications for home and business uses. This demand growth is tempered by increases in energy efficiency encouraged by both regulation and technological innovation. Electricity consumption in the rest of the world grew by 3.9% per year on average since 1980 although total final energy demand increased by only 1.5% in the same period. Nevertheless, although non-OECD electricity consumption grew by 4.7% per year on average during the 1980s, the growth rate slowed down to only 2.8% per year since 1990. Rapid population and economic growth, along with greater industrialisation and more widespread household electrification, were responsible for this increase. Because much of the world's population still has limited access to electricity, future growth in electricity consumption will depend in large part on progress in connecting more of the world's population to the electricity grid. High value-added applications, such as refrigeration and communication, are the reasons why the provision of electricity to the wider population is a priority for most political leaders in the developing world.

World power market characterised by privatisation, liberalisation, trade and foreign investment...

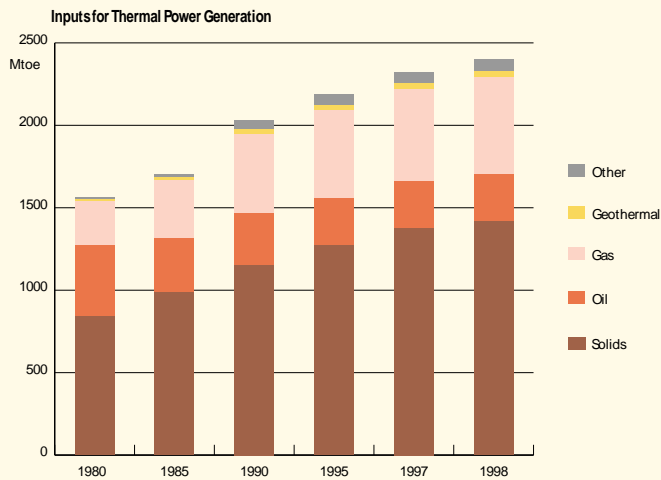
Highlights of recent developments in electricity markets around the world are:

- Electricity demand and investment in electric power infrastructure have been positively affected by the recent improvement in global economic conditions. Economic difficulties that started in Asia in 1997 and then moved to South America and Russia have begun to recede in developing Asia but continue in many of the economies of Central and South America;
- The scope of many electricity companies has become increasingly global. Through mergers, acquisitions, joint ventures, and strategic alliances, many of the world's electricity companies have also become more integrated and much larger. Regional electricity companies have become multinational electricity companies. Electricity companies have become natural gas companies, and vice versa. Several companies have also chosen to specialise, and some electricity companies have shed their generation assets to become "wires only" businesses. Others have chosen to focus solely on generation. Some have even decided to focus on nuclear power. Electricity companies have



also made acquisitions of companies wholly outside the energy arena, in areas such as telecommunications, water, cable television...;

- Two regions of the world, developing Asia and South America, have been particularly active in attracting foreign investment in their electricity sectors, which will have profound impacts on the landscape of their electric power industries. In developing Asia, foreign participation in the electric power industry is largely restricted to greenfield generation projects and joint ventures. Although the emerging economies of developing Asia are currently attracting the largest amount of foreign investment, privatisation of the electric power industry in many South American countries has made the region, in some ways, a more attractive market for international companies;
- The industrialised world has also seen a surge in cross-border electricity investments. Since the mid-1990s the United Kingdom and Australia, in particular, have been the most frequent targets of foreign investment in electricity. During the late 1990s, the United States also saw some sizeable acquisitions of electric companies by overseas companies;
- Deregulation leading to lower prices continued to be one of the major worldwide developments in the electricity industry;
- Electricity trade accounted for a relatively small share of overall electricity supply. The strengthening of pool and system interconnections should increase such trade substantially in the medium term. Such developments are underway in Central and South America, the Indian subcontinent, Europe, North America, parts of Asia and southern Africa;
- Technological advances have greatly improved the position of natural gas as a fuel for electricity generation and improvements in thermal efficiency are expected to continue.



Power generation dominated by thermal production that reinforced its share recently...

Thermal production continued to dominate total electricity generation, although its share decreased from 70% in 1980 to 65% in 1998. Nuclear's share doubled from 9% in 1980 to 17% in 1998. This growth occurred principally during the 1980s. After 1990, the expansion in nuclear production has slowed down considerably due to lack of investment mainly in Western Europe and North America, increases being mainly located in Asia and in Japan. Stabilisation of nuclear's contribution is expected in the short to medium term: decommissioning in industrialised countries being just compensated by new investments in developing countries. Since 1990, two thirds of incremental production has been met by thermal plants, with nuclear and hydro contributing equally to the rest. But in the last two years thermal units have met more than 88% of additional production as a result of the stagnation of both nuclear and hydro generation capacity. Hydro-power output, depending on new investments and hydraulic conditions, grew steadily on average by 2.6% per year since 1980, but this growth was limited to 1.9% on average in the 1990s.

Total world installed generating capacity reached 3259 GWe in 1998, compared with 1979 GWe in 1980, or an average increase of about 2.8% per year since 1980. Thermal units, which represented 60% of additional capacity since 1980 (73% since 1990), grew by about 2.5% per year over this period. Since 1990 the expansion of nuclear capacity has slowed down, and hydro capacity expanded a little slower than thermal capacity.

Inputs for electricity generation increasingly dominated by solid fuels, except in the European Union...

Solid fuels increasingly dominated inputs for electricity generation. While these represented 54% of total fuel inputs in 1980,

they reached 59% in 1998. The consumption of solids was mainly located in NAFTA with 37% of world consumption, a constant share since 1980, and Asia that absorbed 30% of world consumption in 1998 against 10% in 1980. In these two regions consumption of solids increased substantially: 70% since 1980 in NAFTA and a five-fold rise in Asia. The third region in importance was the European Union where consumption increased slowly during the 1980s but decreased more rapidly in the 1990s, with the exception of the 1998 rebound, due to the restructuring of coal industries and growing environmental concerns. It was the only part of the world, except for the CIS for other reasons, in which this downward trend was observed. Despite the growing consumption of developing regions, the OECD region still represented in 1997 54% of global solid fuels consumption for power generation. Oil use has declined slowly since 1985 but rebounded by 3.9% in 1997 and 1.4% in 1998. Consequently its market share was only 12% in 1998 against 19% in 1985 and 27% in 1980. The utilisation of gas has more than doubled since 1980 as power generation technologies have evolved to favour natural gas use. The main gas consumers are respectively: the CIS (160 Mtoe or 27% of world gas consumption for power generation); NAFTA (155 Mtoe or 26%); and the European Union (76 Mtoe or 13%). Almost all regions of the world, except the CIS since 1990, were increasing the use of natural gas to generate electricity.

Refinery capacities, after heavy restructuring, increased again all over the world since 1995...

Refinery capacities increased slowly by 0.8% per year on average since 1985 but in fact they remained relatively stable between 1985 and 1992, and increased by 1.5% per year on average since then to retrieve a level close to that of 1980. In the OECD region, heavy restructuring led to a stabilisation of installed capacity between 1985 and 1995 but since then it has increased by 1.5% per





year. At the same time the capacity utilisation rate increased steadily from 72% in 1985 to 91% in 1999. This has boosted the profitability of the refinery sector and enabled further costly investment in conversion units to adapt production to changing oil product demand and to provide cleaner fuels. In the non-OECD region refinery capacity grew by about 10% since 1985, the main investments being located in the Middle East (+61%) to increase the value-added of crude production, and Southeast Asia (+84%) and China (+133%) - driven by buoyant internal demand. At the same time, the refinery utilisation rate in the non-OECD region fell from 80% in 1985 to only 74% in 1999 with very varied experience by region. Although capacities were quite saturated in the Middle East and Asia, on the other hand utilisation rates remained too low in China (62%), Japan (81%) and Africa (81%) to ensure profitability; and an urgent restructuring was needed in the CIS where utilisation rates fell below 45%.

COMPETITIVENESS

OECD continued to represent more than three-quarters of world GDP...

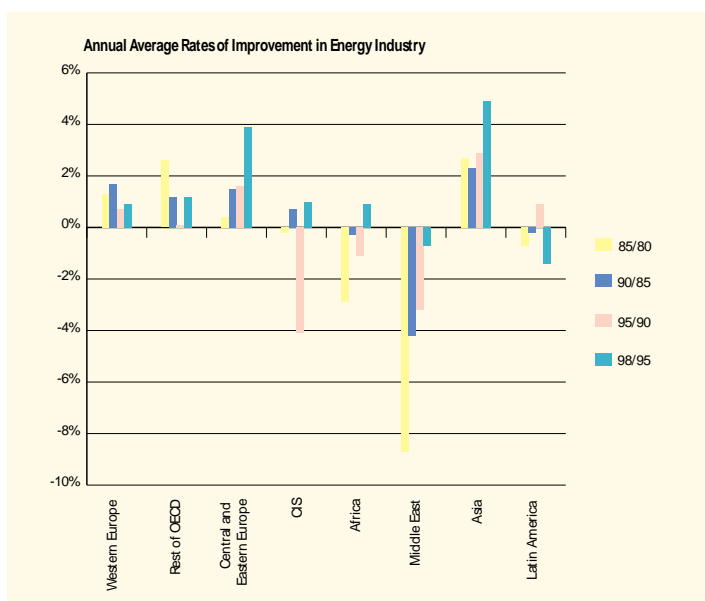
Economic growth, together with population increase, is the main factor driving growth in energy demand, excluding variations associated with climatic conditions in industrialised regions. While the world population grew regularly by 1.6% per annum since 1980, world GDP increased by 2.5% per year on average. Economic activity was more sustained during the second part of the 1980s followed by a relative slow down, between 1990 and 1993, mainly in the OECD countries. Since 1994, world GDP accelerated to reach an average growth of 3.0% per year driven by the developing countries. In 1998, despite the economic slowdown in South East Asia and later in Latin America and the CIS, world GDP still increased by 2.0% and it rebounded to 2.8% in 1999. Asia is indisputably the main driver with an average growth rate of 6.8% per year since 1980 and still 6.7% since 1990 despite a limited growth of 1.2% in 1998. As a consequence, Asia more than doubled its share of world GDP to reach 10.9% in 1999. During the 1980s economic activity expanded at the same rate in the OECD and non-OECD regions. But since 1990 developing regions, driven by Asia, Latin America and the Middle East, have been developing more rapidly: 2.9% per year on average against 2.2% in the OECD region. Even so, in 1999 the OECD region still accounted for more than three-quarters of total world GDP.

World energy intensity improved on average by 1.2% per year since 1980...

Economic growth and energy demand are linked, but the strength of that link varies among regions and stages of economic deve-

lopment. In the industrialised countries, the link is now a relatively weak one, the increase in energy demand being slower than economic growth. In developing countries, energy demand and economic growth have been more closely related in recent decades with energy demand tending to track the rate of economic expansion. But in the last few years this relationship has also tended to weaken significantly.

The stage of economic development and the standards of living in each region strongly condition the link between economic growth and energy demand. Advanced economies with high living standards tend to have relatively high energy use per capita, but they also tend to be economies where per capita energy use is relatively stable or changes very slowly. In this context, rising energy demand tends to track employment and population growth. In industrialised countries, use of modern appliances and personal transport is widespread. As a result, increments to personal income tend to result in spending on goods and services that are not very energy intensive. To the extent that spending is directed at energy-using goods, it essentially involves purchases of new equipment to replace old capital stock. The new stock is often more efficient than the equipment it is replacing, so that the relation between income and energy demand is weaker. In developing countries, standards of living, while rising, tend to be low compared to those in more advanced economies. As a result, many energy-using devices are being widely adopted for the first time, causing energy use to track rising income levels more closely. Many areas in these countries are now gaining access to electricity for the first time. Those that have electricity are expanding the variety of appliances they use. At the same time, personal car ownership is becoming an important component of consumer demand in newly industrialising areas. Double-digit growth rates





ENERGY INTENSITY : TOTAL BY REGION

toe/1990 MEUR	1980	1985	1990	1995	1997	1998	1999	Annual % Change				
								85/80	90/85	97/90	98/97	99/98
World	553	533	507	490	476	466	455	-0.7%	-1.0%	-0.9%	-2.1%	-2.2%
Western Europe	286	267	245	237	235	233	229	-1.3%	-1.7%	-0.6%	-0.8%	-1.9%
European Union	291	272	248	240	238	236	231	-1.4%	-1.8%	-0.6%	-0.9%	-2.1%
EFTA	185	184	177	174	173	175	178	-0.1%	-0.8%	-0.3%	1.1%	1.8%
Rest of OECD	447	392	369	367	354	350	349	-2.6%	-1.2%	-0.6%	-1.1%	-0.2%
NAFTA	541	476	450	441	420	410	406	-2.6%	-1.1%	-1.0%	-2.5%	-0.9%
OECD Pacific	242	216	208	216	213	215	217	-2.3%	-0.7%	0.4%	0.9%	0.7%
Mediterranean	442	433	445	443	442	437	452	-0.4%	0.5%	-0.1%	-1.0%	3.3%
Central and Eastern Europe	1622	1594	1481	1365	1307	1223	1162	-0.4%	-1.5%	-1.8%	-6.4%	-5.0%
CIS(1)	1846	1867	1807	2206	2147	2151	2120	0.2%	-0.7%	2.5%	0.2%	-1.4%
Africa	932	1074	1092	1152	1129	1115	1110	2.9%	0.3%	0.5%	-1.2%	-0.5%
Middle East	370	560	688	806	834	847	828	8.7%	4.2%	2.8%	1.6%	-2.3%
Asia	1756	1528	1357	1174	1094	1047	960	-2.7%	-2.3%	-3.0%	-4.3%	-8.4%
Latin America	470	486	492	469	472	485	495	0.7%	0.2%	-0.6%	2.7%	2.1%

(1) Including Baltic countries for statistical reasons

in car ownership are evident in many countries, particularly in Asia.

Total world energy intensity showed a slight but continuous downward trend by 1.2% a year since 1980 - a steady improvement over the last two decades. The limited decline in the early 1990s was compensated by spectacular improvements in the last three years with respectively -2.4% in 1997, -2.0% in 1998 and -2.2% in 1999. The OECD regions, which had by far the lowest energy intensity, improved their performance by 1.7% per year on average during the 1980s. But the gains have remained marginal since the beginning of the 1990s, reaching only 0.6% per year on average despite substantial improvements in 1997 and 1998: 2.0% and 1.1% respectively. Inside the OECD the best performances

were achieved by NAFTA and the European Union, whilst energy intensity increased in the OECD Pacific region since 1990 as a consequence of the economic situation in Japan. It should be observed that in the industrialised countries, major improvements of energy intensity were in all cases associated with sustained economic growth as was the case in 1997 and 1998. On the other hand, the non-OECD part of the world saw a stabilisation of its energy intensity during the 1980s, followed by a sustained reduction since then (-2.2% per annum on average since 1990). This is despite the marked increase in the CIS (+1.8% per year) and the Middle East (+2.3% per year) and stabilisation in Latin America. Asia demonstrated the best improvement since 1980, at about 3.8% per year with a marked acceleration since 1997. In the case of the Middle East, GDP is directly dependent on oil market reve-

GROSS DOMESTIC PRODUCT PER CAPITA : TOTAL BY REGION

Thousand 1990 EUR/ inhabitant	1980	1985	1990	1995	1997	1998	1999	Annual % Change				
								85/80	90/85	97/90	98/97	99/98
World	2.95	3.02	3.25	3.31	3.46	3.48	3.53	0.5%	1.5%	0.9%	0.7%	1.3%
Western Europe	12.25	13.02	14.88	15.58	16.13	16.55	16.88	1.2%	2.7%	1.2%	2.6%	2.0%
European Union	11.99	12.74	14.58	15.28	15.82	16.23	16.57	1.2%	2.7%	1.2%	2.6%	2.1%
EFTA	20.73	22.39	24.54	25.07	26.05	26.49	26.69	1.6%	1.8%	0.9%	1.7%	0.8%
Rest of OECD	11.53	12.43	13.83	14.37	15.30	15.44	15.68	1.5%	2.1%	1.5%	0.9%	1.6%
NAFTA	12.21	12.97	13.96	14.51	15.52	15.95	16.34	1.2%	1.5%	1.5%	2.7%	2.5%
OECD Pacific	13.18	14.97	18.05	19.10	20.19	19.71	19.78	2.6%	3.8%	1.6%	-2.4%	0.4%
Central and Eastern Europe	1.85	1.91	1.84	1.71	1.81	1.85	1.84	0.6%	-0.8%	-0.2%	2.2%	-0.4%
CIS(1)	2.31	2.45	2.58	1.50	1.46	1.42	1.47	1.2%	1.0%	-7.8%	-2.3%	2.9%
Africa	0.66	0.61	0.59	0.56	0.58	0.58	0.58	-1.6%	-0.6%	-0.4%	0.6%	-0.1%
Middle East	3.93	3.01	2.56	2.55	2.63	2.63	2.62	-5.2%	-3.2%	0.4%	-0.1%	-0.1%
Asia	0.28	0.35	0.46	0.62	0.69	0.68	0.72	4.7%	5.4%	5.8%	-0.2%	4.9%
Latin America	2.14	1.96	1.95	2.18	2.28	2.28	2.23	-1.7%	-0.1%	2.3%	-0.2%	-2.0%

(1) Including Baltic countries for statistical reasons





GROSS INLAND ENERGY CONSUMPTION PER CAPITA : TOTAL BY REGION

toe/inhabitant	1980	1985	1990	1995	1997	1998	1999	85/80	90/85	97/90	98/97	99/98
	Annual % Change											
World	1.63	1.61	1.65	1.62	1.64	1.62	1.60	-0.3%	0.5%	0.0%	-1.5%	-0.9%
Western Europe	3.51	3.48	3.64	3.69	3.79	3.86	3.86	-0.1%	0.9%	0.6%	1.7%	0.1%
European Union	3.50	3.46	3.62	3.67	3.77	3.83	3.83	-0.2%	0.9%	0.6%	1.7%	0.0%
EFTA	3.84	4.12	4.34	4.36	4.51	4.63	4.75	1.4%	1.0%	0.5%	2.8%	2.6%
Rest of OECD	5.16	4.88	5.10	5.27	5.41	5.40	5.47	-1.1%	0.9%	0.9%	-0.1%	1.3%
NAFTA	6.61	6.17	6.28	6.39	6.52	6.54	6.64	-1.4%	0.4%	0.5%	0.2%	1.5%
OECD Pacific	3.20	3.23	3.75	4.13	4.31	4.25	4.29	0.2%	3.1%	2.0%	-1.5%	1.1%
Central and Eastern Europe	3.01	3.05	2.73	2.34	2.37	2.26	2.14	0.3%	-2.2%	-2.0%	-4.3%	-5.3%
CIS (1)	4.26	4.58	4.66	3.30	3.13	3.06	3.11	1.5%	0.4%	-5.5%	-2.1%	1.4%
Africa	0.62	0.66	0.65	0.64	0.65	0.65	0.64	1.3%	-0.3%	0.1%	-0.6%	-0.6%
Middle East	1.45	1.68	1.76	2.05	2.19	2.22	2.17	3.0%	0.9%	3.2%	1.5%	-2.3%
Asia	0.49	0.54	0.63	0.73	0.75	0.72	0.69	1.9%	3.0%	2.6%	-4.5%	-3.9%
Latin America	1.00	0.95	0.96	1.02	1.08	1.10	1.10	-1.1%	0.1%	1.7%	2.4%	0.1%

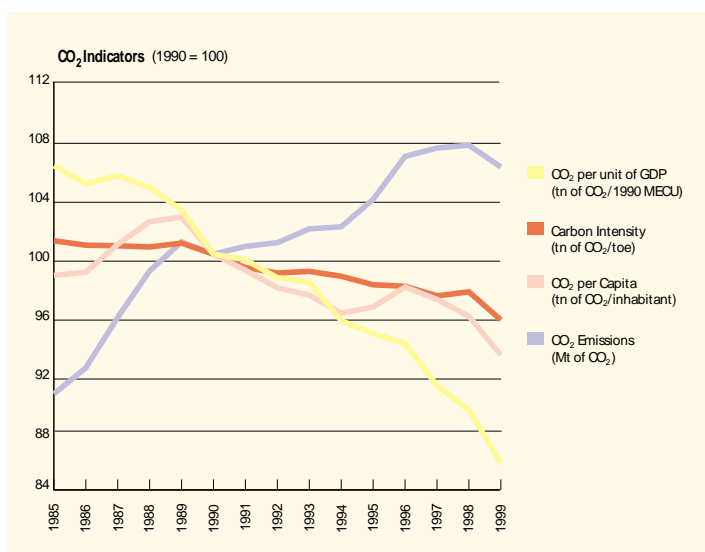
(1) Including Baltic countries for statistical reasons

nues. Fluctuations in export volumes and oil prices led to GDP growth of only 19% since 1980, the lowest growth by far around the world (excluding in-depth restructuring of the CIS and Central and Eastern Europe). As a result, observed increases in energy intensity resulted in fact from this particular evolution of GDP, which does not reflect less efficient use of energy by final consumers. In 1998, energy intensity was a little less than three times higher in the non-OECD region than in the OECD region, excluding the CIS and CEEC (where energy intensity was five times higher than the OECD level).

Major energy intensity improvement occurred in industry, mainly in the OECD region...

As regards energy intensity by sector at the world level, improvements occurred in all final sectors but at different rates. The major improvement was observed in industry with a reduction of 37% since 1980, or 2.5% per year on average. The leading regions were Central and Eastern Europe with a reduction by 4.1% per year on average since 1980 (6.1% since 1990), NAFTA with a reduction by 4.0% per year, and Asia with -3.2% per year. It improved by 3.3% per year on average in the OECD region and by only 2.1% in the non-OECD region. The energy intensity of the tertiary-domestic sector improved about 1.3% per year on average since 1980. This is the result of contrasting trends: an evolution in all the OECD regions close to the world average with the exception of the OECD Pacific region where intensity remained stable since 1980; a marked decline (-57%) in Asia; a slow decline - about 10% - in Latin America; moderate growth (+15%) in Africa; a significant increase (+64%) in the CIS where energy consumption in the tertiary-domestic sector grew slowly to cover basic needs while GDP decli-

ned by 43% since 1990; and a massive jump (+234%) in the Middle East due to the stagnation of GDP caused by lower oil prices in the international market. The transport sector slowly but regularly reduced its energy intensity by 0.2% annually since 1985, demonstrating that the development of improved vehicles is partly able to offset rapid motorization in developing regions. But the evolution by regions was very different. During the 1980s transport energy intensity declined by 0.7% per year on average in the OECD region while it remained stable during the 1990s, a result of the slight increase registered in the last two years. On the contrary, non-OECD transport energy intensity remained stable during the 1980s but improved by 0.4% per year on average since then. Energy intensity of the power sector increased by 1.3% per year between 1980 and 1985 but remained relatively stable since





CO ₂ EMISSIONS : TOTAL BY REGION (INCLUDING BUNKERS)												
Mt of CO ₂	1980	1985	1990	1995	1997	1998	1999(2)	85/80	90/85	97/90	98/97	99/98
								Annual % Change				
World	18191	18769	20771	21550	22278	22326	22026	0.6%	2.0%	1.0%	0.2%	-1.3%
Western Europe	3504	3153	3266	3238	3263	3330	3304	-2.1%	0.7%	0.0%	2.1%	-0.8%
European Union	3431	3078	3188	3155	3176	3239	3211	-2.1%	0.7%	-0.1%	2.0%	-0.9%
EFTA	73	75	77	83	87	91	93	0.6%	0.6%	1.7%	4.3%	1.9%
Rest of OECD	6713	6631	7240	7678	8118	8214	8322	-0.2%	1.8%	1.6%	1.2%	1.3%
NAFTA	5506	5392	5774	6067	6435	6531	6606	-0.4%	1.4%	1.6%	1.5%	1.2%
OECD Pacific	1136	1145	1337	1456	1502	1501	1533	0.2%	3.2%	1.7%	-0.1%	2.1%
Central and Eastern Europe	1078	1114	983	798	799	763	706	0.7%	-2.5%	-2.9%	-4.6%	-7.5%
CIS(1)	3203	3357	3521	2401	2184	2136	2180	0.9%	1.0%	-6.6%	-2.2%	2.0%
Africa	443	510	584	661	694	721	757	2.9%	2.7%	2.5%	3.9%	4.9%
Middle East	379	532	620	817	912	951	956	7.0%	3.1%	5.7%	4.3%	0.6%
Asia	2305	2921	3930	5210	5472	5348	4916	4.8%	6.1%	4.8%	-2.3%	-8.1%
Latin America	567	551	627	747	836	863	886	-0.6%	2.6%	4.2%	3.2%	2.6%
of which (%)												
European Union	18.9	16.4	15.4	14.6	14.3	14.5	14.6	-2.8%	-1.3%	-1.1%	1.8%	0.5%
OECD	55.8	51.6	50.0	49.9	50.3	50.9	51.9	-1.5%	-0.7%	0.1%	1.2%	2.1%

(1) Including Baltic countries for statistical reasons

(2) estimated values for non-OECD regions

then, taking advantage of the increasing contribution of nuclear production, development of cogeneration and the use of natural gas involving advanced technologies with higher efficiencies.

World energy consumption per capita stable but future trends will depend on the CIS and Asia...

Comparing energy consumption per capita in 1999 across regions, it is clear that NAFTA showed by far the highest levels with 6.6 toe/inhabitant, although the inclusion of Mexico lowered this to some extent. At the other extreme, Africa and Asia have the lowest levels, about one-tenth that of NAFTA, significantly below the world average. At a world level, energy consumption per capita has remained stable since 1980. The growth in both developing regions (mainly located in Asia and the Middle East) and the OECD region (mainly the OECD Pacific region) was offset since 1988 by the slowdown in the CIS (-36%) and CEEC (-29%). But, for the first time, CIS energy consumption per inhabitant again increased in 1999 opening the way for future increases at the world level. To appreciate these trends it must be stressed that Asia, which represented more than 50% of the world population in 1999, has seen its consumption per capita grow by 48% between 1980 and 1997 but it has declined since then given the reduction of solids use recorded in official Chinese statistics.

ENVIRONMENT

World CO₂ emissions grew by 6% since 1990 but European Union emissions stabilised...

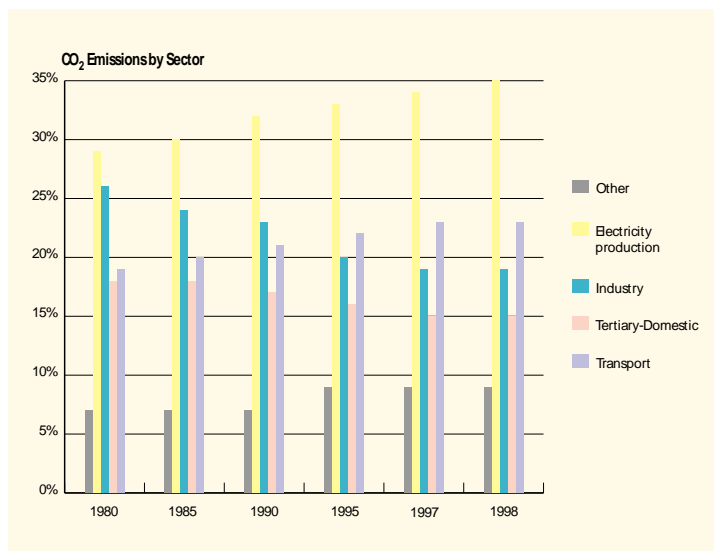
CO₂ emission indicators are of prime importance in the post-Kyoto debate as the Kyoto Protocol adopted on 11 December 1997 may signal a significant change in the level of effort among industrialised countries to reduce greenhouse gas emissions. The agreed objectives, if realised, will markedly reduce or change energy use among the signatory nations. Substantial shifts in the composition of energy supply away from high-carbon fuels, major reductions in energy intensity, or some combination of both, will have to be achieved in developed countries.

CO₂ emissions are given here on an indicative basis, and are calculated using common emission factors by energy aggregates across all countries in the world. World-wide emissions of CO₂ increased steadily by 1.4% per year during the 1980s and by 0.6% per year since then, leading to a global increase by 6% in 1999 compared to the 1990 level. Since 1990, CO₂ emissions have increased in almost all regions in the world, in some cases substantially, +5.3% per year in the Middle East, +3.9% in Latin America, +2.6% in Africa and +2.5% in Asia, with the exception of former Centrally Planned Economies due to the drastic reduction of energy consumption observed, mainly in the CIS, since 1990. The European Union stabilised its emissions, benefiting from reduced coal use and energy efficiency improvements (as the di-





WORLD : CO ₂ Emissions by sector													
Mt of CO ₂	1980	1985	1990	1995	1997	1998	1999	85/80	90/85	95/90	97/96	98/97	98/90
								Annual % Change					
Total	18191	18769	20771	21550	22278	22326	22026	0.6%	2.0%	0.7%	0.6%	0.2%	0.9%
Bunkers	331	277	341	359	374	384	426	-3.5%	4.2%	1.0%	2.8%	2.8%	1.5%
Transformation	6362	6900	7934	8815	9378	9631	na	1.6%	2.8%	2.1%	1.7%	2.7%	2.5%
Power Generation	5110	5554	6464	6944	7407	7621	na	1.7%	3.1%	1.4%	1.5%	2.9%	2.1%
Energy sector	1252	1346	1470	1871	1971	2010	na	1.5%	1.8%	4.9%	2.6%	2.0%	4.0%
Final Demand sectors	11499	11591	12497	12376	12526	12312	na	0.2%	1.5%	-0.2%	-0.3%	-1.7%	-0.2%
Industry	4716	4516	4762	4340	4222	4088	na	-0.9%	1.1%	-1.8%	-1.2%	-3.2%	-1.9%
Transport	3480	3659	4254	4628	4935	5026	na	1.0%	3.1%	1.7%	2.5%	1.9%	2.1%
Domestic and Tertiary	3303	3416	3481	3407	3370	3197	na	0.7%	0.4%	-0.4%	-3.2%	-5.1%	-1.1%



The share of CO₂ emissions from power generation and transport reached 58% in 1998 against 48% in 1980...

Looking at global CO₂ emissions by sector, the first conclusion is that the power generation sector remained by far the largest emitter. CO₂ emissions from the power sector grew by 2.2% on average since 1980, while thermal electricity production increased by 2.6% per year, to represent about 35% of total world emissions in 1999 against 28% in 1980. This is a consequence of rapid electrification in developing regions, a trend which will continue in the near future. The growing share of solid fuels for thermal power generation accentuated this trend but the increasing substitution by natural gas - mainly in developed countries - limited the growth of CO₂ emissions from the power sector to 1.8% since 1990. Within the final demand sectors, CO₂ emissions from transport have increased since 1980 at an average growth rate of 2.1% despite a relative stability between 1990 and 1994 resulting from the particular situation in the CIS and CEEC. Transport's share at the level of final energy consumption increased from 30% in 1980 to 41% in 1998. The domestic and tertiary sectors CO₂ emissions fluctuated between 3550 and 3200 millions tons between 1980 and 1998, being at their minimum in 1998 with favourable climatic conditions in western continents. This evolution, excluding any correction for climatic conditions, is largely due to the penetration of natural gas and distributed heat in heating markets in place of heating oil and solids. Industry experienced the greatest fall in CO₂ emissions between 1980 and 1998 (-0.8% per year) but a stabilisation of emissions has occurred between 1992 and 1998, reflecting the increased energy consumption of this sector at the global level. Further improvement occurred in 1999 but needs to be confirmed.

matic conditions of 1990 and 1999 were similar). Within the OECD region the European Union was by far the best performer as CO₂ emissions increased by 15% in both the OECD Pacific and the NAFTA regions and by 18% in EFTA since 1990. In developing regions the rise in CO₂ emissions since 1990 was much more substantial: 25% in Asia, 26% in Africa, 42% in Latin America and 59% in the Middle East. At the same time, CO₂ emissions per capita at the world level showed a reduction of 0.8% a year on average since 1990 (3.6 tons of CO₂ per capita in 1998 compared to 3.9 in 1980) with a recent acceleration in the last two years caused by the particular situation in China. Carbon intensity (tn of CO₂ emitted per toe of energy consumed) declined steadily, the main improvements being observed in the tertiary-domestic sector (-15% since 1990) and industry (-7%). Both were benefiting from the increasing contribution of electricity and the substitution of high CO₂ content fuels by natural gas.

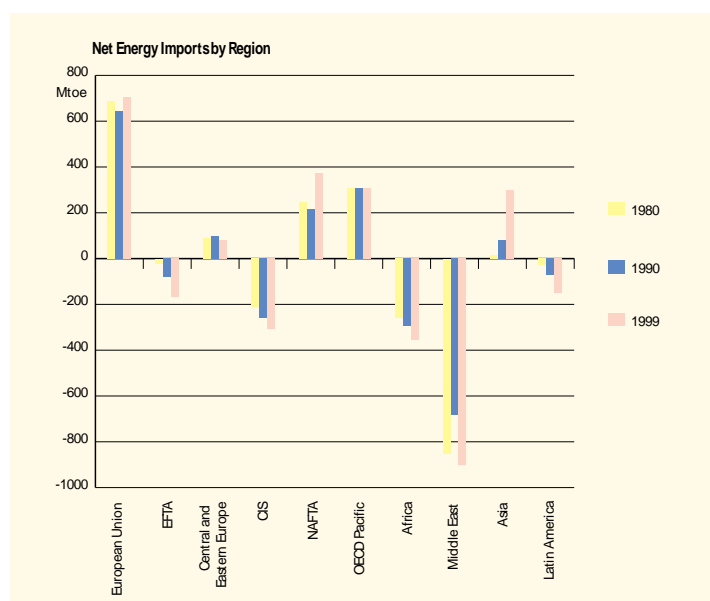




GLOBAL MARKETS

The OECD absorbed 80% of world interregional exchanges of energy, 80% of which were met by oil...

World energy trade between the main regions considered in this study (net energy imports) shows that the European Union is by far the largest net importer with a steady annual growth of 2.1% since 1985, reaching a new peak of 724 Mtoe in 1998. NAFTA is the second ranking with a faster growth rate between 1985 and 1998 (+13% per year on average). OECD Pacific is also an important importer with a relatively stable level since 1980, except for the drop observed in the mid-1980s. As a consequence of these trends, the OECD absorbed about 80% of world net energy exchanges in 1999. Amongst the non-OECD regions, although Central and Eastern Europe stabilised their imports at about 65 Mtoe, mainly of oil and gas from the CIS, Asia was continuously increasing its imports starting from a negligible level in 1980 to reach 303 Mtoe in 1999. As a result of these recent trends, Asia will rapidly become the second largest importer of energy amongst the main world regions. The net exporters remained the Middle East (867 Mtoe in 1999), Africa (355 Mtoe), the CIS (306 Mtoe) and EFTA (167 Mtoe), all four mainly exporters of hydrocarbons. Oil, both crude and oil products, accounted for 80% of interregional energy exchanges in 1999, natural gas for 13% and solids for 7%. OPEC continued to dominate the oil market and - - with Russia - the gas market. Finally interregional exchanges of energy represented in 1999 only 20% of total world energy consumption, about the same level as in 1980.



NET ENERGY IMPORT : TOTAL BY REGION

Mtoe	1980	1985	1990	1995	1997	1998	1999	85/80	90/85	97/90	98/97	99/98
	Annual % Change											
Western Europe	671.6	488.3	563.4	508.3	521.1	559.5	538.4	-6.2%	2.9%	-1.1%	7.4%	-3.8%
European Union	688.4	526.7	643.8	651.3	692.7	723.7	705.5	-5.2%	4.1%	1.1%	4.5%	-2.5%
EFTA	-21.4	-38.5	-80.4	-142.9	-171.6	-164.2	-167.1	12.4%	15.9%	11.4%	-4.3%	1.7%
Rest of OECD	566.1	342.3	548.8	603.7	675.8	676.4	725.4	-9.6%	9.9%	3.0%	0.1%	7.2%
NAFTA	246.0	68.9	214.3	248.0	305.3	334.8	372.4	-22.5%	25.5%	5.2%	9.6%	11.3%
OECD Pacific	305.7	255.9	306.4	319.1	327.9	298.2	309.6	-3.5%	3.7%	1.0%	-9.0%	3.8%
Central and Eastern Europe	73.1	67.3	79.3	60.7	68.6	67.0	66.0	-1.6%	3.3%	-2.1%	-2.2%	-1.5%
CIS(1)	-212.2	-219.2	-260.0	-225.2	-266.5	-278.3	-306.3	0.6%	3.5%	0.4%	4.4%	10.1%
Africa	-260.4	-240.6	-294.6	-309.2	-352.0	-346.1	-353.8	-1.6%	4.1%	2.6%	-1.7%	2.2%
Middle East	-851.0	-391.2	-682.9	-798.9	-833.4	-897.6	-909.8	-14.4%	11.8%	2.9%	7.7%	1.4%
Asia	16.0	-2.9	82.6	221.6	299.9	277.2	300.0	-	-	20.2%	-7.6%	8.2%
Latin America	-29.5	-44.6	-71.6	-119.1	-159.3	-156.9	-148.5	8.6%	9.9%	12.1%	-1.6%	-5.3%
of which (%)												
OECD	1237.7	830.6	1112.2	1112.1	1196.9	1235.8	1263.8	-7.7%	6.0%	1.1%	3.3%	2.3%

(1) Including Baltic countries for statistical reasons





WORLD : SUMMARY ENERGY BALANCE											
Mtoe	1980	1985	1990	1997	1998	1999(3)	85/80	90/85	97/90	98/97	98/98
							Annual % Change				
Primary Production	7374	7785	8808	9681	9732	9690	1.1%	2.5%	1.4%	0.5%	-0.4%
Solids	1808	2029	2217	2316	2226	2108	2.3%	1.8%	0.6%	-3.9%	-5.3%
Oil	3167	2860	3205	3540	3609	3599	-2.0%	2.3%	1.4%	2.0%	-0.3%
Natural gas	1245	1427	1700	1905	1947	1978	2.8%	3.6%	1.6%	2.2%	1.6%
Nuclear	187	387	519	613	624	654	15.6%	6.0%	2.4%	1.9%	4.8%
Hydro & Wind	150	172	189	224	226	231	2.9%	1.8%	2.5%	1.1%	2.3%
Geothermal	12	20	32	37	40	42	10.9%	10.0%	2.3%	6.3%	5.5%
Other renewable energy sources	807	890	945	1047	1060	1078	2.0%	1.2%	1.5%	1.2%	1.7%
Net Imports(1)	-16	15	-16	-32	-85	-65	-	-	10.3%	167.0%	-22.9%
Solids	5	4	0	1	-2	4	-0.8%	-35.2%	12.0%	-	-
Oil	-19	15	-13	-29	-78	-65	-	-	12.0%	170.2%	-16.3%
Crude oil	16	72	48	62	6	na	35.0%	-7.9%	3.7%	-89.8%	na
Oil products	-36	-57	-61	-91	-84	na	10.0%	1.3%	5.9%	-7.0%	na
Natural gas	-2	-5	-3	-4	-5	-5	14.2%	-5.2%	1.2%	21.1%	16.2%
Electricity	1	0	0	0	0	1	-24.3%	-15.1%	-	-94.6%	-
Gross Inland Consumption	7185	7719	8606	9496	9486	9541	1.4%	2.2%	1.4%	-0.1%	0.6%
Solids	1792	2034	2189	2318	2242	2128	2.6%	1.5%	0.8%	-3.3%	-5.1%
Oil	2995	2793	3063	3352	3368	3430	-1.4%	1.9%	1.3%	0.5%	1.8%
Natural gas	1241	1421	1669	1905	1925	1976	2.8%	3.3%	1.9%	1.1%	2.6%
Other (2)	1156	1470	1685	1920	1950	2007	4.9%	2.8%	1.9%	1.5%	2.9%
Electricity Generation in Twh	8291	9806	11835	13977	14333	na	3.4%	3.8%	2.4%	2.5%	na
Nuclear	713	1492	2013	2393	2443	na	15.9%	6.2%	2.5%	2.1%	na
Hydro & wind	1734	2000	2185	2591	2611	na	2.9%	1.8%	2.5%	0.8%	na
Thermal	5844	6314	7637	8993	9278	na	1.6%	3.9%	2.4%	3.2%	na
Generation Capacity in GWe	1979	2430	2763	3221	3259	na	4.2%	2.6%	2.2%	1.2%	na
Nuclear	142	253	330	360	361	na	12.2%	5.5%	1.3%	0.0%	na
Hydro & wind	472	566	649	741	755	na	3.7%	2.8%	1.9%	1.9%	na
Thermal	1365	1611	1784	2119	2144	na	3.4%	2.1%	2.5%	1.1%	na
Average Load Factor in %	47.8	46.1	48.9	49.5	50.2	na	-0.7%	1.2%	0.2%	1.3%	na
Fuel Inputs for Thermal Power Generation	1564	1700	2031	2324	2399	na	1.7%	3.6%	1.9%	3.2%	na
Solids	848	993	1153	1377	1419	na	3.2%	3.0%	2.6%	3.0%	na
Oil	426	326	319	287	291	na	-5.2%	-0.4%	-1.5%	1.4%	na
Gas	270	350	476	559	583	na	5.4%	6.3%	2.3%	4.3%	na
Geothermal	11	19	31	36	38	na	11.1%	9.8%	2.2%	6.5%	na
Biomass	9	12	53	65	68	na	6.6%	33.9%	3.1%	4.0%	na
Average Thermal Efficiency in %	32.1	32.0	32.4	33.3	33.3	na	-0.1%	0.3%	0.4%	-0.1%	na
Non-Energy Uses	343	355	428	531	525	na	0.7%	3.8%	3.1%	-1.0%	na
Total Final Energy Demand	5151	5423	5905	6292	6252	na	1.0%	1.7%	0.9%	-0.6%	na
Solids	796	860	881	703	652	na	1.5%	0.5%	-3.2%	-7.3%	na
Oil	2047	1987	2181	2363	2375	na	-0.6%	1.9%	1.2%	0.5%	na
Gas	804	845	941	1018	1000	na	1.0%	2.2%	1.1%	-1.8%	na
Electricity	586	692	831	989	1002	na	3.4%	3.7%	2.5%	1.3%	na
Heat	120	161	178	238	231	na	6.1%	2.0%	4.3%	-2.8%	na
Renewable energy sources	798	878	893	981	992	na	1.9%	0.3%	1.4%	1.2%	na
CO₂ Emissions in Mt of CO₂	17861	18492	20431	21905	21943	21640	0.7%	2.0%	1.0%	0.2%	-1.4%
Indicators											
Population (Million)	4408	4797	5224	5778	5857	5940	1.7%	1.7%	1.5%	1.4%	1.4%
GDP (index 1985=100)	89.7	100.0	117.1	137.9	140.7	144.6	2.2%	3.2%	2.4%	2.0%	2.8%
Gross Inl Cons./GDP (toe/1985 MEUR)	553.2	532.8	507.3	475.5	465.6	455.7	-0.7%	-1.0%	-0.9%	-2.1%	-2.1%
Gross Inl Cons./Capita (toe/inhabitant)	1.63	1.61	1.65	1.64	1.62	1.61	-0.3%	0.5%	0.0%	-1.5%	-0.8%
Electricity Generated/Capita (kWh/inhabitant)	1881	2044	2266	2419	2447	na	1.7%	2.1%	0.9%	1.2%	na
CO ₂ Emissions/Capita (t of CO ₂ /inhabitant)	4.05	3.85	3.91	3.79	3.75	3.64	-1.0%	0.3%	-0.4%	-1.2%	-2.8%

(1) corresponds to statistical errors

(2) Includes nuclear, hydro and wind, net imports of electricity, and other energy sources.

(3) Estimates



WORLD : MAIN INDICATORS

	1980	1985	1990	1997	1998	1998	85/80	90/85	97/90	98/97	99/98
	Annual % Change										
Gross Inland Consumption (Mtoe)	7184.7	7718.6	8605.6	9495.5	9485.6	9541.2	1.4%	2.2%	1.4%	-0.1%	0.6%
Power Generation	1542.3	1830.4	2184.1	2504.0	2573.9	na	3.5%	3.6%	2.0%	2.8%	na
Energy Branch	406.0	462.6	522.8	579.5	591.6	na	2.6%	2.5%	1.5%	2.1%	na
Final Energy Consumption	5122.5	5384.9	5860.5	6236.1	6196.6	na	1.0%	1.7%	0.9%	-0.6%	na
Industry	1929.3	1916.6	2025.4	1948.2	1906.1	na	-0.1%	1.1%	-0.6%	-2.2%	na
Transport	1134.4	1212.4	1412.6	1643.1	1673.5	na	1.3%	3.1%	2.2%	1.8%	na
Tertiary-Domestic	2058.0	2255.9	2422.5	2644.8	2617.0	na	1.9%	1.4%	1.3%	-1.1%	na
Energy Intensity (toe/1990 MEUR)	553.2	532.8	507.3	475.5	465.6	455.7	-0.7%	-1.0%	-0.9%	-2.1%	-2.1%
Power Generation	118.7	126.4	128.7	125.4	126.3	na	1.3%	0.4%	-0.4%	0.7%	na
Final Energy Consumption	394.4	371.7	345.5	312.3	304.1	na	-1.2%	-1.5%	-1.4%	-2.6%	na
Industry	148.5	132.3	119.4	97.6	93.6	na	-2.3%	-2.0%	-2.8%	-4.1%	na
Transport	87.3	83.7	83.3	82.3	82.1	na	-0.9%	-0.1%	-0.2%	-0.2%	na
Tertiary-Domestic	158.5	155.7	142.8	132.4	128.4	na	-0.3%	-1.7%	-1.1%	-3.0%	na
Energy per capita (Kgoe/inhabitant)	1630	1609	1647	1643	1619	1606	-0.3%	0.5%	0.0%	-1.5%	-0.8%
Power Generation	350	382	418	433	439	na	1.8%	1.8%	0.5%	1.4%	na
Final Energy Consumption	1162	1123	1122	1079	1058	na	-0.7%	0.0%	-0.6%	-2.0%	na
Industry	438	400	388	337	325	na	-1.8%	-0.6%	-2.0%	-3.5%	na
Transport	257	253	270	284	286	na	-0.4%	1.4%	0.7%	0.5%	na
Tertiary-Domestic	467	470	464	458	447	na	0.1%	-0.3%	-0.2%	-2.4%	na
Electricity Share (%)											
Final Energy Consumption	11.4%	12.9%	14.2%	15.9%	16.2%	na	2.4%	2.0%	1.6%	2.0%	na
Industry	15.4%	17.4%	19.1%	21.7%	22.0%	na	2.4%	1.9%	1.9%	1.4%	na
Transport	1.2%	1.3%	1.3%	1.2%	1.1%	na	1.1%	-0.5%	-0.9%	-2.7%	na
Tertiary-Domestic	13.3%	15.2%	17.6%	20.6%	21.5%	na	2.7%	3.0%	2.3%	4.1%	na
Total Renewable consumption (Mtoe)	968.2	1081.7	1165.1	1305.7	1323.8	na	2.2%	1.5%	1.6%	1.4%	na
Hydro	149.7	172.0	187.7	221.7	222.9	na	2.8%	1.8%	2.4%	0.5%	na
Biomass	806.6	889.4	944.4	1044.4	1057.6	na	2.0%	1.2%	1.4%	1.3%	na
Other renewable energy source	11.9	20.3	33.0	39.6	43.3	na	11.3%	10.2%	2.6%	9.3%	na
Renewable Intensity (toe/1990 MEUR)	74.5	74.7	68.7	65.4	65.0	na	0.0%	-1.7%	-0.7%	-0.6%	na
Renewable per capita (kgoe/inhabitant)	219.6	225.5	223.0	226.0	226.0	na	0.5%	-0.2%	0.2%	0.0%	na
CO₂ Emissions (Mt of CO₂)	17861	18492	20431	21905	21943	21640	0.7%	2.0%	1.0%	0.2%	-1.4%
Power Generation	5110	5554	6464	7407	7621	na	1.7%	3.1%	2.0%	2.9%	na
Energy Branch	917	910	1013	1167	1192	na	-0.2%	2.2%	2.0%	2.2%	na
Final Energy Consumption	11499	11591	12497	12526	12312	na	0.2%	1.5%	0.0%	-1.7%	na
Industry	4716	4516	4762	4222	4088	na	-0.9%	1.1%	-1.7%	-3.2%	na
Transport	3480	3659	4254	4935	5026	na	1.0%	3.1%	2.1%	1.9%	na
Tertiary-Domestic	3303	3416	3481	3370	3197	na	0.7%	0.4%	-0.5%	-5.1%	na
Carbon (tn of CO₂/toe)	2.5	2.4	2.4	2.3	2.3	2.3	-0.7%	-0.2%	-0.4%	0.3%	-2.0%
Power Generation	3.3	3.0	3.0	3.0	3.0	na	-1.7%	-0.5%	0.0%	0.1%	na
Energy Branch	2.3	2.0	1.9	2.0	2.0	na	-2.7%	-0.3%	0.5%	0.1%	na
Final Energy Consumption	2.2	2.2	2.1	2.0	2.0	na	-0.8%	-0.2%	-0.9%	-1.1%	na
Industry	2.4	2.4	2.4	2.2	2.1	na	-0.7%	0.0%	-1.2%	-1.0%	na
Transport	3.1	3.0	3.0	3.0	3.0	na	-0.3%	0.0%	0.0%	0.0%	na
Tertiary-Domestic	1.6	1.5	1.4	1.3	1.2	na	-1.2%	-1.0%	-1.7%	-4.1%	na
CO₂ per capita (kg of CO₂/inhabitant)	4052	3855	3911	3791	3746	3643	-1.0%	0.3%	-0.4%	-1.2%	-2.8%
Final Energy Consumption	2608	2416	2392	2168	2102	na	-1.5%	-0.2%	-1.4%	-3.0%	na
Industry	1070	941	912	731	698	na	-2.5%	-0.6%	-3.1%	-4.5%	na
Transport	789	763	814	854	858	na	-0.7%	1.3%	0.7%	0.5%	na
Tertiary-Domestic	749	712	666	583	546	na	-1.0%	-1.3%	-1.9%	-6.4%	na
CO₂ per unit of GDP (tn of CO₂/1990 MEUR)	1375	1277	1204	1097	1077	1033	-1.5%	-1.2%	-1.3%	-1.8%	-4.0%
Power Generation	393	383	381	371	374	na	-0.5%	-0.1%	-0.4%	0.8%	na
Public Thermal Power Generation	371	360	356	334	336	na	-0.6%	-0.2%	-0.9%	0.5%	na
Autoprod. Thermal Power Generation	23	24	25	37	38	na	0.8%	0.9%	5.9%	3.9%	na
Energy Branch	71	63	60	58	59	na	-2.3%	-1.0%	-0.3%	0.2%	na
Final Energy Consumption	885	800	737	627	604	na	-2.0%	-1.6%	-2.3%	-3.7%	na
Industry	363	312	281	211	201	na	-3.0%	-2.1%	-4.0%	-5.1%	na
Transport	268	253	251	247	247	na	-1.2%	-0.1%	-0.2%	-0.2%	na
Tertiary-Domestic	254	236	205	169	157	na	-1.5%	-2.7%	-2.8%	-7.0%	na







ENERGY OUTLOOK – Energy Demand: Recent evolution (1985-1999)

- Average annual GDP growth reached 2.6% since 1996
- European policies start to bear fruit in a buoyant macroeconomic setting
- Risks and uncertainties with any steep rise in oil prices
- The introduction of the Euro will generate a continued appropriate policy mix

FINAL ENERGY DEMAND

- Final energy demand increased in 1999 by only 0.9% against a GDP growth of 2.5%
- With a stable 46% share of final energy demand since 1990, oil remained the largest energy source
- Excluding transport energy consumption, distributed energy networks covered 67% of final energy demand

INDUSTRY

- Stable industrial energy consumption reduced industrial energy intensity by 27% since 1985
- Growth of industrial production driven by Nordic countries and Ireland
- Gas and electricity together contributed 64% of total consumption in 1999 against 48% in 1985
- Improvements in energy intensity driven by the emergence of high added-value industries and policy measures
- Energy prices heavily influenced by the recent fluctuations of crude oil prices on the international market

TRANSPORT

- Transport sector responsible for 79% of final energy demand increase since 1985, but only 57% since 1990
- Passenger traffic, driven by leisure-time travel, has grown at the same rate as economic growth since 1990
- Goods transport demand accelerated since 1990 as a consequence of just-in-time industrial organisation
- Vehicle fleets, both cars and trucks, continued to increase
- Diesel oil became the most popular fuel in 1999 with half of total road fuel consumption
- Demand for air transport pushed by the liberalisation of air markets
- Transport energy intensity stabilised since 1994
- Prices for transport fuels largely determined by the level of taxes

TERTIARY-DOMESTIC

- Driven by southern countries, energy consumption increased by 12% since 1990
- Gas and electricity markedly increased their market shares
- Energy intensity, corrected for climatic effects, declined by only 0.8% per year since 1985
- Competitiveness of natural gas reinforced by less price volatility than heating oil

The European Union is one of the largest energy consuming regions in the world. In 1999 it consumed 1442 Mtoe, about 30% of total OECD primary energy consumption and about 15% of world consumption. Although examined as a whole region, the European Union is in fact marked by contrasts, ranging from countries with cold climates such as those in Scandinavia to those with milder climates in the Mediterranean. Similarly, there are substantial differences in national gross production and in income levels. All of these factors result in widely differing patterns of living standards and energy consumption.

Average annual GDP growth reached 2.6% since 1996...

Despite a relative stagnation of activities in the beginning of the last two decades, the European Union's GDP has increased substantially since 1980. During the 1980s, GDP grew on average by

2.3% per annum with a marked acceleration in the period 1985-1989 (3.3% per year). Following a subdued economic performance during 1991-96, the EU has experienced a strong pick-up in economic growth during the past three years. After a temporary and mild slowdown in the wake of the Asian and Russian economic and financial crises, the recovery gained significant momentum from the second half of 1999, with growth reaching a high level of 3.5% in the first half of 2000. A distinctive and welcome feature of this upswing has been the strong gains in employment and the substantial decline in the unemployment rate. Core inflation has remained low, reflecting both continued wage moderation and better functioning of product and services markets. The average GDP growth between 1996 and 2000 reached 2.6% per year.

1 To avoid a break in the time series, the analysis of the European Union includes all data regarding the former German Democratic Republic since 1985.

2 Readers interested in a more complete and updated analysis of the economic situation of the European Union should consult the internet site of the DG Economic and Financial Affairs: http://europa.eu.int/comm/economy_finance/about/activities_en.htm





European policies start to bear fruit in a buoyant macroeconomic setting...

While this performance has clearly benefited from a supportive macroeconomic policy mix and a favorable external environment, it is also increasingly the result of the structural policies that have been in place for some time and which are now bearing fruit in a buoyant macroeconomic setting. However, since the summer of 2000, there is mounting evidence that the pace of economic growth is moderating somewhat as the prolonged surge in oil prices is having more substantial effects than initially expected. Furthermore, with the economy growing above potential and a resurgence of inflationary risks due to higher import prices, the European Central Bank and other European central banks raised interest rates with a view to preventing negative spillover effects from higher import prices into domestically generated inflation. Other reasons why the pace of economic growth in the EU is expected to remain robust are the demand stimulus, stemming from tax reductions and some additional government spending in response to the strong growth of tax revenues, and the supply boost provided by structural reforms.

Risks and uncertainties with any steep rise in oil prices...

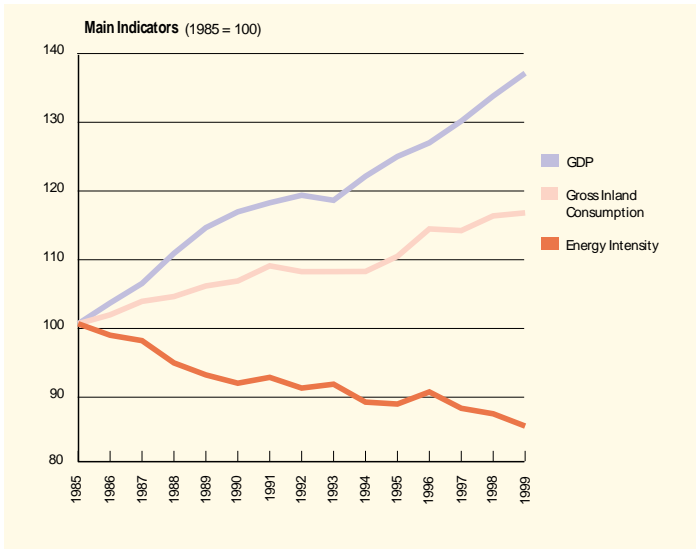
While the overall outlook remains broadly encouraging, there are significant risks and uncertainties. Whereas at the beginning of this year upside risks were seen to be predominant, now the uncertainties surrounding economic prospects are rather more evenly distributed. A major uncertainty at this juncture concerns the future evolution of oil prices and their likely impact on economic activity in the EU. Oil prices have more than tripled since the low point reached in late 1998 and they have been extremely volatile since the summer. With many oil producers facing capacity constraints, relatively low stocks and the continued strength of global demand, upward pressures on oil prices will remain strong in the near future. However, in the absence of major supply disruptions, expectations center on a gradual decline in oil prices from the spring of 2001, falling gradually to well below US\$ 30 per barrel in 2002.

The introduction of the Euro will generate a continued appropriate policy mix

Following the successful convergence process and the launch of the euro on 1 January 1999, economic conditions have improved significantly in the euro area. Indeed, the economy seems to have entered a new phase of strong growth and enjoys favourable

Main items

The European Union is now the world's largest economic and political bloc. Pending further negotiations and final political agreement with a large number of potential accession countries, the prospects are for continued expansion. The European Union includes many of the earliest industrialising countries, which are now relatively mature economies. The most significant structural changes in recent years have included the rapid growth of a wide range of service sectors and the shift to less energy-intensive manufacturing. Rising personal incomes have permitted higher standards of living, associated with widespread ownership of private cars and domestic appliances. Space heating requirements, influenced by the varied climatic conditions in the European Union, are generally high and also very temperature dependent. These factors have influenced the broad evolution of EU energy demand and will continue to do so in future. More recently, they have been accompanied by fuel substitution away from coal and oil products towards gas and electricity use in final markets (other than transport). Rapid growth has continued in the transport sector, which now accounts for much of total oil demand. Structural changes, combined with saturation in some final markets, are leading to slower growth in energy use. But lower energy prices have weakened incentives for investment in energy efficiency. If the Kyoto Protocol targets are to be achieved, much greater effort will be required to exploit cost-effective energy savings.





GROSS DOMESTIC PRODUCT (BILLIONS 1990 EUR)

	1980	1985	1990	1995	1997	1998	1999	80/85	90/85	95/90	97/95	98/97	99/98	99/90
	Annual % Change													
Austria	100.0	107.3	125.6	138.5	144.2	149.0	152.4	1.4%	3.2%	2.0%	2.1%	3.3%	2.3%	2.2%
Belgium	128.4	133.1	154.5	164.8	171.9	176.9	180.3	0.7%	3.0%	1.3%	2.1%	2.9%	1.9%	1.7%
Denmark	80.5	91.7	101.6	114.8	122.4	125.7	127.8	2.6%	2.1%	2.5%	3.2%	2.7%	1.7%	2.6%
Finland	78.1	89.9	106.2	103.3	113.4	119.4	123.8	2.8%	3.4%	-0.5%	4.8%	5.3%	3.7%	1.7%
France	758.3	811.0	940.0	987.1	1022.7	1055.4	1079.7	1.4%	3.0%	1.0%	1.8%	3.2%	2.3%	1.6%
Germany	1045.1	1124.0	1297.4	1405.4	1454.7	1495.5	1520.9	1.5%	2.9%	1.6%	1.7%	2.8%	1.7%	1.8%
Greece	55.6	59.5	65.3	69.4	73.3	76.0	78.6	1.3%	1.9%	1.2%	2.8%	3.6%	3.4%	2.1%
Ireland	24.2	27.4	35.9	48.3	57.8	64.7	70.7	2.5%	5.5%	6.1%	9.4%	11.9%	9.3%	7.8%
Italy	690.6	744.0	861.2	910.6	930.4	943.4	958.5	1.5%	3.0%	1.1%	1.1%	1.4%	1.6%	1.2%
Luxembourg	6.0	7.0	8.5	10.2	10.9	11.6	11.9	3.3%	3.9%	3.9%	3.3%	6.1%	2.6%	3.9%
Netherlands	180.3	192.0	222.5	247.0	264.0	273.7	280.0	1.3%	3.0%	2.1%	3.4%	3.7%	2.3%	2.6%
Portugal	39.8	41.6	54.3	59.1	63.1	65.6	67.7	0.9%	5.5%	1.7%	3.3%	4.0%	3.2%	2.5%
Spain	290.5	313.3	398.2	425.7	450.1	467.2	482.6	1.5%	4.9%	1.3%	2.8%	3.8%	3.3%	2.2%
Sweden	148.2	161.5	180.8	185.1	190.8	196.3	200.6	1.7%	2.3%	0.5%	1.5%	2.9%	2.2%	1.2%
United Kingdom	590.7	650.6	763.1	814.1	861.1	880.9	890.6	1.9%	3.2%	1.3%	2.8%	2.3%	1.1%	1.7%
EUROPEAN UNION	4216.2	4553.7	5315.0	5683.2	5930.8	6101.3	6226.1	1.6%	3.1%	1.3%	2.2%	2.9%	2.0%	1.8%

medium-term prospects. Furthermore, recent and prospective developments indicate an expansion more broadly based across the Member States with a gradual convergence of economic growth at a high rate. Domestic demand has been the main engine of economic growth in the euro area over the last couple of years, expanding at a steady annual rate of 3%, and this is expected to continue for some time. The strength of domestic demand reveals both the suitability of the macroeconomic policy mix and the progress made on structural reforms in recent years. With domestic demand providing a solid underlying base, movements in the pace of economic growth in the euro area in recent years have largely reflected changing conditions in global demand.

However, an adequate macroeconomic policy mix is a pre-requisite for keeping the economy on a growth path of at least 3%, in a setting of continued price stability. In light of the experience of the late 1980s, when an unbalanced macroeconomic policy mix choked off the recovery, the current and prospective policy mixes raise two concerns. Firstly, monetary conditions have remained accommodating, as the tightening stance of interest-rate policy has been entirely offset by a protracted weakening of the euro. But this configuration carries the risk of creating an unbalanced growth pattern with exports rather than domestic demand being the most dynamic component of final demand. Secondly, tax cuts and additional government spending, in response to buoyant tax revenues, risk generating a fiscal stimulus at a time of already robust demand growth.

FINAL ENERGY CONSUMPTION

Final energy demand increased in 1999 by only 0.9% against a GDP growth of 2.5%...

1999, as was the case in 1997 and 1998, is of particular interest as it presents climatic conditions, as measured by degree-days, close to those of 1990. Since 1985, annual degree-days have varied from 2136 to 2642, with a 1990 value close to the minimum and 11% below the long-term average value. In 1999, degree-days declined by 0.8% compared to 1998 but remained 8% below the long-term average. Compared to 1990, 1999 was only 3.7% colder. As a result, many comparisons, mainly regarding energy and environment indicators, can be made without having to correct substantially for climatic variations. In 1999, **final energy demand** in the European Union (955 Mtoe) increased by 0.9% in response to the 2.5% growth of GDP. With the exception of solid fuels that declined by 5.5%, in line with the average reduction observed since 1990, and renewable energy sources slowing down by 1.2%, all the other fuels experienced rising consumption: oil products by 0.2%, electricity by 2.0%, heat by 2.4% and natural gas by 2.8%. Since 1990, final energy demand has increased on average by 1.1% per year while GDP increased by 1.8% implying an elasticity of about 0.6. This performance resulted mainly from the stabilisation of final energy consumption in Germany since 1990 as a consequence of the improved energy efficiency in the new Länder. Excluding Germany, final energy consumption increased in the EU at 1.6% per year on average since 1990 while GDP grew at 1.9%.



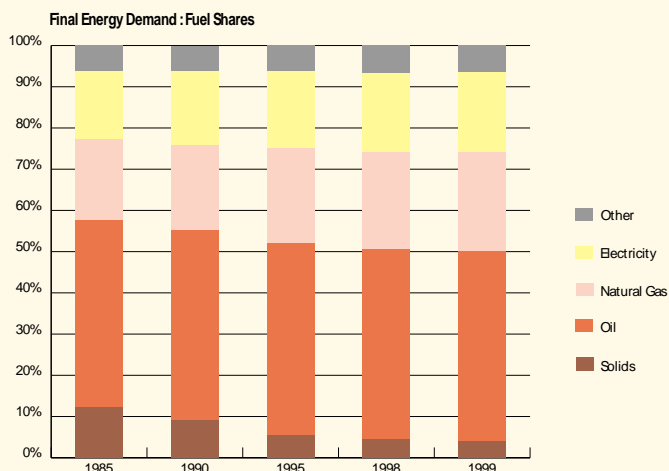


With a stable 46% share of final energy demand since 1990, oil remained the largest energy source...

Oil remained the largest energy source with around 46% of total EU demand since 1990. But this apparent stability hides big structural changes in oil product consumption. Although demand for oil products increased as a whole by 1.1% on average since 1990, consumption of kerosene grew regularly by 4.7% per year on average, diesel oil by 3.6% and LPG by 1.0%. Heating gas oil consumption increased by 10% between 1990 and 1996, marked by cold weather conditions, but declined regularly since then to be in 1999 1% below the 1990 level. Gasoline consumption remained remarkably stable since 1990. Residual fuel oil consumption declined by 4.7% per year on average under the pressure of environmental considerations. In 1999, oil product consumption increased by only 0.9 Mtoe or 0.2% but transportation fuels increased by 6.3 Mtoe or 2.1%. A major reduction occurred in the tertiary-domestic sector (4.6 Mtoe or 4.6% with similar weather conditions) and to a lesser extent in industry (-0.9 Mtoe or 2%). Gas consumption grew by 2.8% per year on average since 1990 as it did in 1999. Its share in total final consumption increased substantially from 19.6% in 1985 to 21.6% in 1990 and 23.9% in 1999. Gas gained market share in both industry (from 25.1% in 1985 to 29.0% in 1990 and 34.6% in 1999) and the tertiary-domestic sectors (from 26.5% in 1985 to 29.4% in 1990 and 35.4% in 1999), a similar evolution in both sectors. Electricity demand (19.4% share in 1999 against 18.1% in 1990 and 16.6% in 1985) increased by 1.9% a year since 1990, corresponding to an elasticity against GDP still above 1, but this ratio declined to reach only 0.89 in 1998 and 0.80 in 1999. At the same time, distributed heat demand, pushed by the development of combined heat and power in both industry and tertiary sectors, increased annually by 2.9% on average, with a major development between 1990 and 1997 but with more limited growth since then.

Excluding transport energy consumption, distributed energy networks covered 67% of final energy demand...

As a consequence, the contribution of distributed energy networks (electricity, natural gas and distributed heat) reached 45.5% of total final energy demand in 1999 (40.7% in 1990) and 67.0% excluding transport energy consumption (57.7% in 1990). Since 1990 the consumption of solid fuels has halved, their share dropping from 9.3% to only 4.2%. By fuels, lignite consumption fell by 87%, steam coal consumption declined by 34% and coke by 34%. The declining contribution of solid fuels is linked to the steady conversion of the iron and steel sectors to electric arc furnaces

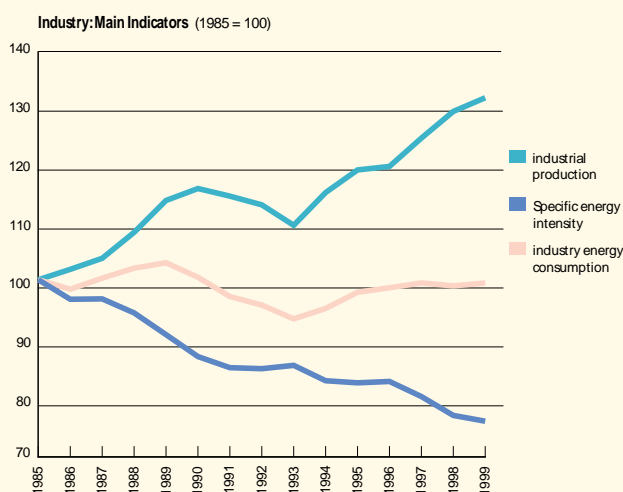


and the continuing closure of mines - limiting deliveries to their local mineworkers and industrial markets. This evolution was reinforced by the increasing standards of living in the new German Länder where historically the consumption of lignite by final consumers was significant, but it had become marginal by 1997. The contribution of renewable energy forms (biomass, wind, photovoltaics...) increased substantially with a major jump of 12% in 1997, followed by 3.3% growth in 1998; and their share was comparable with that of solid fuels in 1999. The 1997 increase was related to some adjustment in renewable statistics accounting in Italy (+3.16 Mtoe) and Germany (+1.35 Mtoe). Excluding these adjustments renewable consumption has remained stable since 1991.

INDUSTRY

Stable industrial energy consumption reduced industrial energy intensity by 27% since 1985...

Masked by its apparent stability since 1985 **energy consumption in industry** has shown a contrasted evolution within four specific periods. Between 1985 and 1989 energy consumption increased slowly, the 12% increase of industrial production being compensated for by the energy savings generated by rational use of energy measures, dictated by high energy prices prevailing in 1985, and continued industrial restructuring. Between 1989 and 1993 energy consumption declined by 2.4% per year on average, influenced by saving measures and depressed industrial production that fell by about 4% in 4 years. Between 1994 and 1997, energy



consumption has grown at 1.5% per year on average while industrial production has increased by 2.6% on average. Since 1997, benefiting from energy savings associated with the conversion of the iron and steel sector to electric arcs furnaces, energy consumption in industry remained stable while industrial production increased by 2.8% per year on average. Consequently the specific energy intensity (or energy consumption per unit of industrial output) has improved by about 27.2% since 1985, of which 3.2% occurred in 1998 and 1.9% in 1999. The analysis of long-term trends demonstrated that sustained industrial production favours additional intensity gains. This can be a consequence of new investment, especially investment in rational use of energy, favoured by improved financial capabilities of companies, higher

capacity utilisation rates and the continued development of small to medium-sized enterprises dedicated to high value-added products (electronics, telecomms, bioengineering...). Analysis of the specific energy intensity ratio is complex: technological improvements have occurred, but at the same time as structural changes. The accelerated restructuring of European industry, which commenced after the second oil shock, has continued, inducing a further reduction of activity in energy-intensive sectors, such as iron and steel, chemicals and non-metallic minerals. In addition the last few years have been marked by the decline of manufacturing industries, including textiles, penalised by high labour costs. It is remarkable to observe that the improvement of energy efficiency accelerated in 1998 despite declining energy prices. This suggests strongly that energy efficiency has been effectively integrated into industrial management, partly because of tighter environmental regulations.

Growth of industrial production driven by Nordic countries and Ireland...

The indices of industrial production reflect the 1993 recession with a slow-down of 3.2% in the European Union as a whole, followed by sustained recovery since then, particularly marked in 1997 (+4.0%) and 1998 (+3.7%). Output growth was limited to only 1.4% in 1999. The period 1990-99 demonstrated an increase by 1.4% per year on average, and 2.5% per year since 1995. But the trends vary significantly across Member States: the highest growth since 1990 occurred in Ireland (+9.6% per

INDICES OF INDUSTRIAL PRODUCTION (1990=100) (1)

	1980	1985	1990	1995	1997	1998	1999	80/85	90/85	95/90	97/95	98/97	99/98	99/90
	Annual % Change													
Austria	75.9	82.3	100.0	112.3	119.8	123.8	131.2	1.6%	4.0%	2.3%	3.3%	3.4%	6.0%	3.1%
Belgium	81.5	84.9	100.0	101.0	106.6	112.2	113.2	0.8%	3.3%	0.2%	2.7%	5.2%	0.9%	1.4%
Denmark	76.4	92.5	100.0	115.8	123.9	126.6	128.9	3.9%	1.6%	3.0%	3.4%	2.1%	1.8%	2.9%
Finland	73.6	88.1	100.0	114.5	129.5	139.4	147.9	3.7%	2.6%	2.7%	6.3%	7.6%	6.1%	4.4%
France	89.3	87.1	100.0	99.7	103.6	108.2	110.5	-0.5%	2.8%	-0.1%	1.9%	4.5%	2.1%	1.1%
Germany	82.5	85.5	100.0	95.9	99.9	104.4	106.1	0.7%	3.2%	-0.8%	2.1%	4.5%	1.5%	0.7%
Greece	90.9	97.2	100.0	97.4	100.1	108.4	112.1	1.4%	0.6%	-0.5%	1.4%	8.3%	3.4%	1.3%
Ireland	54.2	69.6	100.0	158.5	197.3	228.2	228.2	5.1%	7.5%	9.7%	11.6%	15.7%	0.0%	9.6%
Italy	87.5	84.8	100.0	107.9	109.9	111.0	111.0	-0.6%	3.3%	1.5%	0.9%	1.1%	0.0%	1.2%
Luxembourg	69.9	84.9	100.0	101.3	107.7	112.4	112.4	4.0%	3.3%	0.3%	3.1%	4.4%	0.0%	1.3%
Netherlands	85.3	90.8	100.0	108.3	115.5	116.7	119.2	1.3%	1.9%	1.6%	3.2%	1.0%	2.2%	2.0%
Portugal	62.5	73.9	100.0	99.7	107.9	113.5	116.9	3.4%	6.2%	-0.1%	4.0%	5.2%	3.0%	1.7%
Spain	82.9	86.0	100.0	103.3	109.3	115.2	118.1	0.7%	3.1%	0.6%	2.9%	5.3%	2.6%	1.9%
Sweden	78.1	86.6	100.0	112.8	122.8	127.9	130.5	2.1%	2.9%	2.4%	4.4%	4.1%	2.0%	3.0%
United Kingdom	85.8	88.9	100.0	107.3	109.7	110.6	111.2	0.7%	2.4%	1.4%	1.1%	0.9%	0.6%	1.2%
EUROPEAN UNION	80.4	86.6	100.0	102.7	107.4	111.3	113.4	1.5%	2.9%	0.5%	2.3%	3.7%	1.8%	1.4%

(1) Excluding construction





year on average) followed by the Nordic countries (between 2.9% and 4.4%). Conversely industrial production growth was lower in the four main countries: Italy and the United Kingdom with 1.2% per year on average, France with 1.1% and Germany with 0.7% (which experienced the weakest growth due to reunification).

Gas and electricity together contributed 64% of total consumption in 1999 against 48% in 1985...

In terms of the **fuel mix**, significant changes have occurred since 1985 with the declining contribution of solids and oil products balanced by the increasing use of gas and electricity. Solids consumption declined by 28% both in the coke and steam coal markets since 1990. Consumption is increasingly concentrated in the iron and steel sector that now absorbs 67% of industrial solids consumption against 46% in 1985, despite the recent growth of electric arc furnaces. Since 1990 steam coal use has been halved in the building materials sector, where it competes with petrole-

um coke and industrial wastes, but use has doubled in iron & steel which now constitutes its largest final market (for direct injection in blast furnaces). Consequently coke use has decreased by about 42% since 1985, but has been stable since 1996. Lignite consumption, mainly located in Germany, has disappeared given mine closures. Oil consumption declined continuously, except during the recession period in the beginning of the 1990s when it stabilised, falling by 25% since 1985. The reduction of residual fuel oil use, about 16 Mtoe since 1985, halving its consumption, exceeded the total reduction in industrial energy demand. This was partly compensated by an increase of petroleum coke consumption. Overall, use of other products, in particular LPG and gas oil, remained constant. Consequently, the share of heavy products (residual fuel oil and petroleum coke) has declined from 64% in 1985 to 56% in 1999. Gas and electricity, with an average growth rate of about 1.9% and 1.2% respectively per annum since 1990, largely dominated the industrial energy market. Since 1985, they

EUROPEAN UNION : INDUSTRY - FINAL ENERGY CONSUMPTION

Mtoe	1985	1990	1995	1997	1998	1999	90/85	95/90	98/95	99/98	99/90
							Annual % Change				
Total consumption	264.9	266.0	259.3	263.4	262.1	263.5	0.1%	-0.5%	0.4%	0.5%	-0.1%
Iron & Steel	61.6	56.1	54.2	55.0	52.5	50.8	-1.8%	-0.7%	-1.0%	-3.3%	-1.1%
Chemicals	49.2	50.6	44.6	42.8	41.1	41.6	0.6%	-2.5%	-2.7%	1.2%	-2.2%
Building Materials	35.1	35.7	32.6	32.5	31.9	34.8	0.4%	-1.8%	-0.8%	9.1%	-0.3%
Other	119.1	123.5	127.9	133.2	136.6	136.3	0.7%	0.7%	2.2%	-0.3%	1.1%
Solids	63.9	53.9	39.2	37.7	36.0	34.3	-3.4%	-6.2%	-2.8%	-4.8%	-4.9%
Iron & Steel	29.5	26.1	24.7	24.9	23.5	22.8	-2.5%	-1.1%	-1.7%	-2.7%	-1.5%
Chemicals	7.8	6.3	2.7	2.5	1.8	1.7	-4.3%	-15.4%	-13.0%	-3.1%	-13.3%
Building Materials	12.9	10.3	6.9	5.9	5.1	5.3	-4.4%	-7.7%	-9.5%	3.1%	-7.2%
Other	13.7	11.3	4.9	4.4	5.6	4.4	-3.8%	-15.3%	4.6%	-21.1%	-9.9%
Oil	56.7	49.5	49.2	46.1	43.7	42.8	-2.7%	-0.1%	-3.9%	-2.0%	-1.6%
Iron & Steel	4.1	3.7	3.8	3.6	3.6	3.1	-2.1%	0.3%	-1.7%	-14.0%	-2.0%
Chemicals	10.9	10.7	9.3	7.2	5.7	4.8	-0.4%	-2.7%	-15.3%	-15.8%	-8.6%
Building Materials	8.9	9.6	8.6	8.9	8.6	9.9	1.5%	-2.1%	-0.1%	15.4%	0.4%
Other	32.8	25.5	27.5	26.3	25.9	25.1	-4.9%	1.5%	-2.0%	-3.1%	-0.2%
Gas	66.7	77.2	82.5	87.1	88.4	91.3	3.0%	1.4%	2.3%	3.2%	1.9%
Iron & Steel	19.2	18.0	17.1	17.6	16.7	16.2	-1.3%	-1.0%	-0.9%	-3.0%	-1.2%
Chemicals	15.0	16.8	17.8	17.8	18.1	19.6	2.3%	1.1%	0.7%	8.3%	1.8%
Building Materials	8.7	10.8	11.7	12.1	12.6	13.3	4.3%	1.7%	2.4%	6.1%	2.4%
Other	23.8	31.6	35.9	39.5	41.1	42.1	5.8%	2.6%	4.5%	2.6%	3.2%
Electricity	61.9	69.3	71.4	74.3	76.0	77.0	2.3%	0.6%	2.1%	1.4%	1.2%
Iron & Steel	8.5	8.2	8.6	8.9	8.8	8.7	-0.8%	0.9%	0.8%	-0.7%	0.7%
Chemicals	14.6	16.1	14.2	14.6	14.8	14.7	1.9%	-2.5%	1.6%	-1.2%	-1.0%
Building Materials	4.3	5.0	5.3	5.5	5.5	5.7	3.0%	1.2%	1.3%	3.9%	1.5%
Other	34.4	40.0	43.3	45.3	46.8	47.9	3.0%	1.6%	2.6%	2.3%	2.0%
Heat	3.3	3.8	3.1	4.2	3.9	4.3	2.9%	-4.2%	7.8%	11.2%	1.3%
Industrial Production Index (1990=100)	86.6	100.0	102.7	107.4	111.3	113.4	2.9%	0.5%	2.7%	1.8%	1.4%
Industrial Energy Intensity (1990=100)	115.0	100.0	94.9	92.2	88.5	87.4	-2.8%	-1.0%	-2.3%	-1.3%	-1.5%





INDUSTRIAL ENERGY CONSUMPTION

	1985	1990	1995	1997	1998	1999	90/85	95/90	98/95	99/98	99/90
	Annual % Change										
Austria											
Total Consumption (Mtoe)	5.9	5.8	5.9	7.1	6.9	6.3	-0.4%	0.4%	5.6%	-8.9%	1.0%
Share in European Union (%)	2.2%	2.2%	2.3%	2.7%	2.6%	2.4%	-0.5%	0.9%	5.2%	-9.4%	1.1%
Specific Industrial Energy Intensity (1990=100)	123.9	100.0	90.7	102.1	96.8	83.2	-4.2%	-1.9%	2.2%	-14.0%	-2.0%
Belgium											
Total Consumption (Mtoe)	10.9	11.9	12.1	13.0	13.0	13.5	1.7%	0.3%	2.5%	4.0%	1.5%
Share in European Union (%)	4.1%	4.5%	4.7%	4.9%	5.0%	5.1%	1.6%	0.8%	2.1%	3.5%	1.6%
Specific Industrial Energy Intensity (1990=100)	108.3	100.0	100.6	102.3	97.6	100.6	-1.6%	0.1%	-1.0%	3.1%	0.1%
Denmark											
Total Consumption (Mtoe)	2.9	2.9	3.1	3.1	3.1	3.0	-0.2%	1.2%	0.0%	-1.9%	0.4%
Share in European Union (%)	1.1%	1.1%	1.2%	1.2%	1.2%	1.1%	-0.3%	1.7%	-0.4%	-2.4%	0.5%
Specific Industrial Energy Intensity (1990=100)	109.2	100.0	91.6	87.8	83.8	80.7	-1.7%	-1.7%	-2.9%	-3.7%	-2.4%
Finland											
Total Consumption (Mtoe)	8.4	9.2	10.0	10.8	11.4	12.0	1.8%	1.6%	4.5%	5.0%	2.9%
Share in European Union (%)	3.2%	3.5%	3.9%	4.1%	4.4%	4.5%	1.7%	2.2%	4.1%	4.5%	3.1%
Specific Industrial Energy Intensity (1990=100)	103.7	100.0	94.7	90.6	88.7	87.8	-0.7%	-1.1%	-2.2%	-1.0%	-1.4%
France											
Total Consumption (Mtoe)	38.1	37.0	37.2	36.6	37.1	36.4	-0.5%	0.1%	-0.1%	-1.8%	-0.2%
Share in European Union (%)	14.4%	13.9%	14.4%	13.9%	14.2%	13.8%	-0.6%	0.6%	-0.5%	-2.3%	-0.1%
Specific Industrial Energy Intensity (1990=100)	117.9	100.0	100.8	95.4	92.5	89.0	-3.2%	0.2%	-2.8%	-3.8%	-1.3%
Germany											
Total Consumption (Mtoe)	78.9	71.5	62.0	58.4	57.6	56.4	-1.9%	-2.8%	-2.4%	-2.1%	-2.6%
Share in European Union (%)	29.8%	26.9%	23.9%	22.2%	22.0%	21.4%	-2.0%	-2.3%	-2.7%	-2.6%	-2.5%
Specific Industrial Energy Intensity (1990=100)	128.9	100.0	90.3	81.7	77.2	74.4	-5.0%	-2.0%	-5.1%	-3.6%	-3.2%
Greece											
Total Consumption (Mtoe)	3.7	3.9	4.1	4.3	4.4	4.2	1.0%	0.8%	2.6%	-6.0%	0.6%
Share in European Union (%)	1.4%	1.5%	1.6%	1.6%	1.7%	1.6%	1.0%	1.3%	2.2%	-6.5%	0.7%
Specific Industrial Energy Intensity (1990=100)	97.6	100.0	106.8	110.2	103.6	94.2	0.5%	1.3%	-1.0%	-9.1%	-0.7%
Ireland											
Total Consumption (Mtoe)	1.8	1.8	1.8	1.8	1.9	2.0	0.2%	-0.2%	2.5%	3.5%	1.1%
Share in European Union (%)	0.7%	0.7%	0.7%	0.7%	0.7%	0.8%	0.1%	0.4%	2.2%	2.9%	1.2%
Specific Industrial Energy Intensity (1990=100)	142.1	100.0	62.6	52.0	46.8	48.5	-6.8%	-8.9%	-9.2%	3.5%	-7.7%
Italy											
Total Consumption (Mtoe)	31.5	36.9	37.1	37.4	36.6	39.2	3.2%	0.1%	-0.4%	7.0%	0.7%
Share in European Union (%)	11.9%	13.9%	14.3%	14.2%	14.0%	14.9%	3.1%	0.6%	-0.8%	6.5%	0.8%
Specific Industrial Energy Intensity (1990=100)	100.7	100.0	93.3	92.3	89.4	95.7	-0.1%	-1.4%	-1.4%	7.0%	-0.5%
Luxembourg											
Total Consumption (Mtoe)	1.8	1.7	1.2	1.0	0.9	0.9	-0.6%	-7.2%	-9.9%	9.4%	-6.4%
Share in European Union (%)	0.7%	0.6%	0.5%	0.4%	0.3%	0.4%	-0.7%	-6.7%	-10.2%	8.9%	-6.3%
Specific Industrial Energy Intensity (1990=100)	121.5	100.0	67.9	55.8	44.7	48.9	-3.8%	-7.5%	-13.0%	9.4%	-7.6%
Netherlands											
Total Consumption (Mtoe)	13.8	13.2	12.7	13.2	13.1	12.8	-0.9%	-0.8%	1.1%	-2.3%	-0.3%
Share in European Union (%)	5.2%	5.0%	4.9%	5.0%	5.0%	4.9%	-1.0%	-0.3%	0.7%	-2.8%	-0.2%
Specific Industrial Energy Intensity (1990=100)	115.0	100.0	88.7	86.7	85.2	81.4	-2.8%	-2.4%	-1.4%	-4.4%	-2.3%
Portugal											
Total Consumption (Mtoe)	3.7	4.0	4.3	5.1	5.2	5.3	1.6%	1.3%	7.2%	0.4%	3.1%
Share in European Union (%)	1.4%	1.5%	1.6%	1.9%	2.0%	2.0%	1.5%	1.8%	6.8%	-0.1%	3.2%
Specific Industrial Energy Intensity (1990=100)	125.0	100.0	106.9	117.5	115.6	112.8	-4.4%	1.3%	2.6%	-2.5%	1.3%
Spain											
Total Consumption (Mtoe)	18.8	19.8	20.4	21.6	22.5	22.4	1.0%	0.6%	3.3%	-0.4%	1.4%
Share in European Union (%)	7.1%	7.4%	7.9%	8.2%	8.6%	8.5%	0.9%	1.2%	2.9%	-0.9%	1.5%
Specific Industrial Energy Intensity (1990=100)	110.9	100.0	100.0	100.0	98.8	95.9	-2.0%	0.0%	-0.4%	-2.9%	-0.5%
Sweden											
Total Consumption (Mtoe)	11.9	11.8	12.6	12.6	12.4	11.7	-0.1%	1.3%	-0.5%	-6.3%	-0.2%
Share in European Union (%)	4.5%	4.4%	4.9%	4.8%	4.7%	4.4%	-0.2%	1.8%	-0.9%	-6.8%	-0.1%
Specific Industrial Energy Intensity (1990=100)	115.9	100.0	94.7	87.1	82.2	75.5	-2.9%	-1.1%	-4.6%	-8.2%	-3.1%
United Kingdom											
Total Consumption (Mtoe)	32.9	34.6	34.9	37.3	35.9	37.4	1.0%	0.2%	0.9%	4.0%	0.9%
Share in European Union (%)	12.4%	13.0%	13.5%	14.2%	13.7%	14.2%	0.9%	0.7%	0.6%	3.5%	1.0%
Specific Industrial Energy Intensity (1990=100)	106.9	100.0	94.1	98.3	93.9	97.1	-1.3%	-1.2%	-0.1%	3.5%	-0.3%
European Union											
Total Consumption (Mtoe)	264.89	266.01	259.26	263.44	262.12	263.46	0.1%	-0.5%	0.4%	0.5%	-0.1%
Specific Industrial Energy Intensity (1990=100)	115.0	100.0	94.9	92.2	88.5	87.4	-2.8%	-1.0%	-2.3%	-1.3%	-1.5%





ENERGY PRICES TO INDUSTRIAL CONSUMERS IN CONSTANT 1990 EUR PER TOE (1)(2)

		1985	1990	1995	1997	1998	1999	90/85	97/90	98/97	99/98	99/90
		Annual % Change										
Austria	Steam Coal	154.6	91.7	72.4	66.9	67.1	na	-9.9%	-4.4%	0.2%	na	na
	Heavy fuel oil 3.5 % S	310.5	98.7	84.1	79.0	72.8	na	-20.5%	-3.1%	-7.9%	na	na
	Natural gas	269.3	122.7	102.4	114.8	108.5	104.7	-14.5%	-1.0%	-5.5%	-3.5%	-1.7%
	Electricity	726.2	598.2	561.2	656.3	639.9	630.5	-3.8%	1.3%	-2.5%	-1.5%	0.6%
Belgium	Steam Coal	120.6	62.4	na	na	na	na	-12.3%	na	na	na	na
	Heavy fuel oil 3.5 % S	270.5	102.6	98.7	106.3	87.9	97.8	-17.6%	0.5%	-17.4%	11.3%	-0.5%
	Natural gas	273.6	113.7	87.2	94.6	87.0	70.5	-16.1%	-2.6%	-8.1%	-19.0%	-5.2%
	Electricity	775.2	584.7	487.2	461.6	465.1	438.0	-5.5%	-3.3%	0.7%	-5.8%	-3.2%
Denmark	Steam Coal	191.4	134.9	78.5	na	na	na	-6.7%	na	na	na	na
	Heavy fuel oil 3.5 % S	286.2	na	na	na	na	na	na	na	na	na	na
	Electricity	875.7	569.8	521.1	545.1	577.5	566.0	-8.2%	-0.6%	5.9%	-2.0%	-0.1%
Finland	Steam Coal	128.7	78.7	107.5	128.0	127.7	118.9	-9.4%	7.2%	-0.3%	-6.9%	4.7%
	Heavy fuel oil 3.5 % S	345.5	144.9	na	na	na	na	-15.9%	na	na	na	na
	Natural gas	270.8	97.3	117.2	134.6	131.9	125.8	-18.5%	4.7%	-2.0%	-4.7%	2.9%
	Electricity	765.6	578.4	561.9	564.7	555.2	523.8	-5.5%	-0.3%	-1.7%	-5.6%	-1.1%
France	Steam Coal	144.6	106.1	97.8	95.0	96.4	99.0	-6.0%	-1.6%	1.5%	2.7%	-0.8%
	Heavy fuel oil 3.5 % S	288.2	110.2	96.3	98.4	79.6	96.5	-17.5%	-1.6%	-19.1%	21.2%	-1.5%
	Natural gas	271.1	122.2	104.2	111.9	106.9	103.3	-14.7%	-1.2%	-4.5%	-3.4%	-1.9%
	Electricity	599.3	516.5	452.5	415.3	398.7	384.9	-2.9%	-3.1%	-4.0%	-3.5%	-3.2%
Germany	Steam Coal (3)	209.0	202.8	189.7	67.5	na	na	-0.6%	-14.5%	na	na	na
	Heavy fuel oil 3.5 % S	284.5	115.0	na	na	na	na	-16.6%	na	na	na	na
	Natural gas	284.0	147.7	123.8	133.0	123.1	100.2	-12.3%	-1.5%	-7.4%	-18.6%	-4.2%
	Electricity	833.2	835.3	694.2	584.7	551.0	522.3	0.0%	-5.0%	-5.8%	-5.0%	-5.1%
Greece	Heavy fuel oil 3.5 % S	284.9	129.3	na	na	na	na	-14.6%	na	na	na	na
	Natural gas	na	na	na	na	258.5	220.6	na	na	na	-14.7%	na
	Electricity	775.4	593.3	431.0	388.1	368.5	367.9	-5.2%	-5.9%	-5.1%	-0.2%	-5.2%
Ireland	Heavy fuel oil 3.5 % S	328.2	129.9	129.7	148.7	127.3	140.0	-16.9%	1.9%	-14.4%	1.9%	0.8%
	Natural gas	389.0	260.8	228.5	221.5	216.7	211.4	-7.7%	-2.3%	-2.2%	-2.5%	-2.3%
	Electricity	965.7	619.5	547.3	542.1	530.4	517.4	-8.5%	-1.9%	-2.2%	-2.5%	-2.0%
	Electricity											
Italy	Steam Coal	131.9	65.8	68.5	63.0	54.5	46.1	-13.0%	-0.6%	-13.6%	-0.6%	-3.9%
	Heavy fuel oil 3.5 % S	303.0	150.9	149.0	143.3	126.5	156.6	-13.0%	-0.7%	-11.7%	23.8%	0.4%
	Natural gas	271.7	123.7	145.6	158.4	141.7	118.4	-14.6%	3.6%	-10.6%	-16.4%	-0.5%
	Electricity	1183.0	893.9	903.5	903.6	911.0	848.7	-5.4%	0.2%	0.8%	-6.8%	-0.6%
Luxembourg	Heavy fuel oil 3.5 % S	287.6	106.7	na	na	na	na	-18.0%	na	na	na	na
	Electricity	739.6	na	na	na	na	na	na	na	na	na	na
Netherlands	Steam Coal	129.1	70.6	na	na	na	na	-11.4%	na	na	na	na
	Heavy fuel oil 3.5 % S	275.3	147.5	119.1	na	na	na	-11.7%	na	na	na	na
	Natural gas	234.9	98.6	89.6	93.1	86.1	71.9	-15.9%	-0.8%	-7.6%	-16.4%	-3.4%
	Electricity	690.4	479.3	522.5	513.3	507.4	520.2	-7.0%	1.0%	-1.2%	2.5%	0.9%
Portugal	Heavy fuel oil 3.5 % S	294.9	147.8	105.5	114.4	97.9	107.8	-12.9%	-3.6%	-14.5%	10.2%	-3.4%
	Electricity	1050.7	1059.7	830.9	740.8	712.0	627.7	0.2%	-5.0%	-3.9%	-11.8%	-5.7%
Spain	Heavy fuel oil 3.5 % S	365.8	119.9	139.4	151.9	112.7	131.3	-20.0%	3.4%	-25.8%	16.5%	1.0%
	Natural gas	359.5	129.0	119.2	129.8	115.0	112.2	-18.5%	0.1%	-11.4%	-2.4%	-1.5%
	Electricity	969.3	892.7	705.6	624.6	571.1	553.3	-1.6%	-5.0%	-8.6%	-3.1%	-5.2%
Sweden	Steam Coal	145.6	98.2	na	na	na	na	-7.6%	na	na	na	na
	Electricity	503.6	456.2	354.3	325.8	288.2	257.6	-2.0%	-4.7%	-11.5%	-10.6%	-6.2%
United Kingdom	Steam Coal	151.3	99.5	70.2	61.4	60.6	59.1	-8.1%	-6.7%	-1.2%	-2.4%	-5.6%
	Heavy fuel oil 3.5 % S	293.4	108.1	107.2	106.3	88.0	100.7	-18.1%	-0.2%	-17.2%	14.5%	-0.8%
	Natural gas	212.3	124.9	95.5	69.8	71.2	70.3	-10.1%	-8.0%	2.0%	-1.2%	-6.2%
	Electricity	777.3	648.1	597.9	515.0	494.2	485.1	-3.6%	-3.2%	-4.0%	-1.8%	-3.2%
European Union	Steam Coal (3)	158.2	123.8	115.4	73.1	75.3	75.1	-4.8%	-7.2%	2.9%	-0.2%	-5.4%
	Heavy fuel oil 3.5 % S	304.6	123.2	120.4	122.7	102.0	122.4	-16.6%	-0.1%	-16.9%	20.0%	-0.1%
	Natural gas	262.6	127.6	116.2	118.9	110.7	97.9	-13.4%	-1.0%	-6.9%	-11.5%	-2.9%
	Electricity	739.1	642.1	567.8	515.3	498.1	475.5	-2.8%	-3.1%	-3.4%	-4.5%	-3.3%

(1) Excluding Refundable VAT

(2) Estimates marked in bold

(3) marked by the suppression of te kohlpfennig in Germany in 1996





have both increased their market share to reach 35% for natural gas against 25% in 1985 and 29% for electricity against 23%. Their progression is partly related to the reduced share of energy-intensive industries (iron & steel, chemicals, building materials...); this share declined from 55% in 1985 to 48% in 1999. Iron & steel energy consumption declined by 18% since 1985 and that by the chemical industry by 15%. In addition, excluding substitution induced by new environmental concerns, gas consumption benefited from the significant improvements in all gas-based technologies (gas turbines, gas engines...) over the last few years, resulting in higher efficiencies and reduced environmental impacts. Electricity also benefited from the development of a large range of new electro-technologies, ever more widely utilised in industrial applications.

Improvements in energy intensity driven by the emergence of high added-value industries and policy measures...

The improvement of energy intensity at the European level (-1.9% per year on average since 1990) has been driven by the gains observed in Sweden (-1.6%), France (-1.7%), Denmark (-2.0%), the Netherlands (-3.1%), Germany (-4.1%), Ireland (-5.9%) and Luxembourg (-10.6%). In the particular case of Luxembourg this improvement arose from the complete conversion to electrical arc furnaces in iron & steel, the major industrial sector of the country. All other countries were very active in implementing more sustainable development and giving specific attention, often through policy measures, to the reduction of industrial energy consumption. This suggests that a co-ordinated policy at the European level could help other Member States to continue to improve the energy performance of industry even though significant progress has already occurred since the early 1980s. Intensity performances also depend upon local situations: structure of industrial production, objectives of energy policy, energy prices, energy and environmental taxation... In addition, major improvements are always associated with high economic growth that facilitates industrial diversification, revamping of processes, and implementation of energy savings programmes... The performance of the five major Member States (France, Germany, Italy, Spain and the United Kingdom) was more mixed. Between 1985 and 1990, all of them registered a growth of industrial production of about 11%-18% accompanied by a reduction in energy intensity ranging from 1% in Italy to 23% in Germany. Since 1990, the evolution has been even more varied. The changes in industrial production ranged from a limited 6% increase in Germany, heavily influenced between 1990 and 1996 by the industrial restructuring in the new Länder, to an increase of about 11% in France, Italy, and the United Kingdom and of 18% in Spain. At the same time,

the range for energy intensity varied from -31% in Germany to -6% in Italy. If we exclude Germany, where energy intensity gains are mainly due to the restructuring and the closing of old industries in the new Länder, intensity improvements (of about 6% to 15%) were limited in other Member States. These occurred principally in the last two years, except in Italy where energy intensity increased a little since 1997. These five Member States represented just under three-quarters of the European Union's total energy consumption in industry. Since 1990, energy intensity has increased in only two countries: Portugal (+0.5% per year on average) and Finland (+1.1%).

Energy prices heavily influenced by the recent fluctuations of crude oil prices on the international market...

The average **prices of energy for industrial consumers** (1990 EUR per toe) over the 1990-1999 period show an average yearly decrease of 5.4% for steam coal, largely influenced by the ending of the kohlpfennig in Germany in 1996; only 0.1% for heavy fuel oil as prices increased by 20% in 1999 following moves on the world oil market; 2.9% for natural gas which whilst generally indexed to oil prices (with a delay of between three and six months) still benefited from the major fall in oil prices during the fourth quarter of 1998; and 3.3% for electricity based on the weighted average at the European level. This evolution was heavily influenced by the reduction of crude oil prices on the international market observed in 1998, followed by a vigorous rebound in 1999. Nevertheless the increasing competitiveness of natural gas against oil reinforced its environmental advantages, both underpinning its growing market share. The sustained and continuous decline of electricity prices also favoured electricity use, further increasing the competitiveness of many electro-technologies. Between Member States, the prices for the different energy sources show important variations in both levels and trends depending on supply conditions, market liberalisation and taxation. The ranges between the extreme prices remained considerable: from 96 EUR/toe (France) to 157 EUR/toe (Italy) for heavy fuel oil; from 70 EUR/toe (the United Kingdom) to 221 ECU/toe (Greece) for natural gas; and from 368 EUR/toe (Greece) to 849 EUR/toe (Italy) for electricity. It must be stressed that liberalisation of the electricity and gas markets in the United Kingdom resulted in impressive price reductions both for gas and electricity: 26% for gas in only four years and 19% for electricity. In the same way, progressive liberalisation of the gas and electricity sectors at the EU level will increase their competitiveness and consequently their market shares in the near future.





EUROPEAN UNION : TRANSPORT - FINAL ENERGY CONSUMPTION											
Mtoe	1985	1990	1995	1997	1998	1999	90/85	95/90	98/95	99/98	99/90
	Annual % Change										
Total consumption	202.62	253.84	275.74	288.86	299.53	305.83	4.6%	1.7%	2.8%	2.1%	2.1%
Solids	0.18	0.03	0.01	0.01	0.00	0.00	-28.8%	-15.0%	-48.4%	-65.9%	-35.0%
Oil	198.82	249.60	270.77	283.67	294.36	300.68	4.7%	1.6%	2.8%	2.1%	2.1%
of which:											
Road	169.96	212.25	228.77	238.33	245.71	250.20	4.5%	1.5%	2.4%	1.8%	1.8%
Motor Gasoline	105.38	121.79	120.48	122.02	122.61	121.77	2.9%	-0.2%	0.6%	-0.7%	0.0%
Diesel Oil	62.26	87.77	105.50	113.40	120.10	125.65	7.1%	3.7%	4.4%	4.6%	4.1%
Air	21.10	27.82	32.54	36.06	39.52	41.91	5.7%	3.2%	6.7%	6.1%	4.7%
Jet Fuel	20.98	27.70	32.41	35.96	39.40	41.77	5.7%	3.2%	6.7%	6.0%	4.7%
Gas	0.24	0.21	0.27	0.30	0.29	0.30	-2.9%	5.1%	3.0%	2.4%	4.1%
Electricity	3.39	4.00	4.69	4.89	4.87	4.85	3.4%	3.2%	1.3%	-0.4%	2.2%
Transport Energy Intensity (toe/1990 MEJR)	44.33	47.76	48.52	48.81	49.22	49.03	1.5%	0.3%	0.5%	-0.4%	0.3%
Transport Energy Intensity (1990=100)	92.82	100.00	101.59	102.19	103.06	102.66	1.5%	0.3%	0.5%	-0.4%	0.3%
Nb. of Vehicles (millions)	135.00	159.45	176.90	184.72	188.91	193.64	3.4%	2.1%	2.2%	2.5%	2.2%
Specific Consumption in Road Traffic (toe/vehicle)	1.26	1.33	1.29	1.29	1.30	1.29	1.1%	-0.6%	0.2%	-0.7%	-0.3%

TRANSPORT

Transport sector responsible for 79% of final energy demand increase since 1985, but only 57% since 1990...

Energy consumption in transport grew between 1985 and 1999 at an average annual rate of 3.0% but, in the period 1990-99, growth remained limited to 2.1% per year despite jumps of 2.8% in 1996 and 3.7% in 1998. Consumption growth reached 2.1% in 1999, in line with the decade average. This must be compared to the 4.6% average growth registered during the second part of the 1980s. In 1999, total energy demand in the transport sector (excluding marine bunkers) reached 306 Mtoe or 32% of total final energy demand compared with only 24.6% in 1985. These trends underline the predominant contribution of the transport sector in the growth of total EU final energy demand. Between 1985 and 1999 the increase of energy consumption for transport, about 103 Mtoe or half of the 1985 consumption level, represented 79% of the total increase in final energy demand. But, between 1990 and 1999, transport contributed only 57% of the total increase of final energy demand, the rest arising from the tertiary-domestic sector.

Passenger traffic, driven by leisure-time travel, has grown at the same rate as economic growth since 1990...

The volume of passenger traffic in the European Union has grown more rapidly than economic growth over the past two decades. During the 1980s passenger traffic increased on average by 3.0% per year against 2.3% GDP growth. Between 1990 and 1999 this growth rate fell to 1.9% per year on average, close to GDP growth of 1.8%. Growth averaged 1.7% per year between 1990 and 1997 but increased again in the last two years: +2.0% in 1998 and +3.0%

in 1999. This evolution has been relatively uniform across most of the European countries. Southern countries (Portugal, Greece, Italy and Spain) showed above-average growth in passenger traffic volume; while in Germany, Austria and the United Kingdom growth was significantly below average. The rise in overall European passenger traffic volume reached 18.5% since 1990 for all transportation modes considered together. But the relative proportion of rail (6.1% in 1999) and bus traffic (8.4%) has declined continuously in favour of air traffic (5.4%) while passenger cars stabilised at 79.1%. During the 1990s traffic volume by passenger cars increased on average by 1.9% per year, buses by 1.0%, railways by 0.9% and air transport by 5.7%. Even though air transport growth was impressive, it experienced a progressive slowdown as air transportation increased by 8.4% per year on average during the 1970s and by 7.8% during the 1980s. The volume of work-related traffic (journeys between home and workplace, university or school as well as business trips) has remained remarkably constant. By contrast, leisure-time travel (attending leisure-time events, weekend excursions, holiday trips...) has risen significantly in just a few years. Globally passenger transport reached 4,791 billion passenger-kilometres in 1999, or 12,728 passenger-kilometres per person/year, equivalent to 35 passenger-kilometres per person per day. Since 1990, the demand for mobility per person has increased on average by 1.4%, half of the growth rate registered during the 1980s. This seems to herald the possible saturation of passenger traffic in the short-medium term.

Although improvements in the fuel efficiency of vehicles have been made in recent years, this has been more than outweighed by the fact that Europeans now have more and larger cars, with bigger engines, more air conditioning.... The growth of urban res-





idential areas, with their associated services (out-of-town shopping centres are a good example), has encouraged more frequent and longer trips by car. This has led to the decline of less oil-dependent, less polluting modes of transport, such as buses, trains and trams. The overall effect on the quality of life in urban areas has been negative. Many European cities now recognise the need to revive their urban transport systems to provide effective alternatives to private car use.

Goods transport demand accelerated since 1990 as a consequence of just-in-time industrial organisation...

Goods transport evolved differently from passenger traffic. During the 1980s, goods traffic increased on average by 1.9% per year with a major expansion of road traffic that reached 4.1% per year on average. Since 1990, as a consequence especially of just-in-time industrial organisation to reduce stocks and working capital, and also specialisation within the EU, goods transport has increased by 2.9% per year on average with acceleration in 1997 (+5.0%) and 1998 (+3.8%) and growth of 3.1% in 1999, near to the decade's average. Road transport grew by 41% between 1990 and 1999 followed by sea (intra EU) with a 30% increase and inland waterways with a 12% increase. At the same time the contribution of rail declined by 7%. In 1999, the respective shares by mode were 44.5% for road transport (40.7% in 1990), 40.4% for sea (40.1%), 8.0% for rail (11.1%) and 4.1% for inland waterways (4.7%). In addition large differences existed in modal split by countries: the share of road transport varied from 39.8% in Austria to 98.3% in Ireland; rail from 1.7% in Ireland to 36.9% in Austria; and inland waterways, having only a representative share in six countries, peaked at 41.6% in the Netherlands. Transportation of agricultural products absorbed 29% of the total goods traffic, followed by machinery and manufactured articles (26%) and building materials (20%). In 1999, goods transport demand was 2,960 billion ton-kilometres or 7,863 ton-kilometres per person/year, corresponding to 21.5 ton-kilometres per person per day.

Vehicle fleets, both cars and trucks, continued to increase...

Within the transport sector, road transport is by far the largest energy user, accounting for about 82% of total energy demand in 1999 against 84% in 1985. The energy and environmental impacts of road transport are increasing because the growth in traffic volumes has largely offset the energy efficiency improvements in vehicle performance for both cars and trucks. Also, the rate of car ownership is steadily increasing with the number of cars in the European Union having risen by about 3.3% per year on average since 1980, but by only 2.1% since 1990. In the last two years this growth rate accelerated a little: +2.2% in 1998 and +2.4% in 1999. In addition, larger cars (over 1500cc) have increased their share of

new registrations at the expense of smaller cars. In 1999, marked differences in car ownership rates still existed between countries: Greece had the lowest ownership with 275 passenger cars per 1000 inhabitants and Luxembourg the highest with 610. The European average reached 460 cars per 1000 inhabitants, a 17% increase since 1990. Variations in income levels and fuel prices, and different tax regimes for the purchase, ownership and use of cars, are part of the explanation for these differences. The goods vehicle fleet was increasing even more rapidly: by some 50% during the 1980s and about 28% between 1990 and 1999, with substantial differences between Member States.

Diesel oil became the most popular fuel in 1999 with half of total road fuel consumption...

The share of diesel in total road fuel consumption has increased continuously since 1980, growing from 36.7% to reach 50.2% in 1999 and becoming the most popular fuel. This evolution is the result of two main phenomena: the increasing volume of goods transported by road and the progressive dieselisation of the car fleet. As mentioned earlier, the number of goods vehicles, consuming most of the diesel fuel, increased by 28% since 1990. In addition, although the utilisation rate (ton-kilometres per vehicle) of the goods vehicle fleet remained stable during the 1980s, it has increased by 11% since 1990. On the other hand, the share of diesel cars increased regularly to reach 16.5% of the European Union car fleet as a whole in 1995 but with a very wide range between countries: from only 1% in Greece to 34% in Belgium. This share has increased significantly in the last four years.

Demand for air transport pushed by the liberalisation of air markets...

The demand for aviation fuel grew on average by 5.0% per annum since 1985, with a jump by 9.8% in 1998 and 6.0% in 1999. This was a result of rising real incomes leading to increased leisure air travel, combined with the recent liberalisation of air markets that induced spectacular reductions in fares. This trend was initiated by low-cost airlines and followed by the major companies. Since the market opened, output has risen significantly in terms of passengers and passenger-kilometres (up 65% since 1990).

Transport energy intensity stabilised since 1994...

Transport energy intensity grew continuously by 1.6% between 1985 and 1993 but has declined since then by 0.4% per year on average. In fact it declined by 2.6% in 1994 and has remained stable since then. This stabilisation constitutes a significant modification of the historical trend and needs further explanation. Unfortunately, without statistical disaggregation between private travel and freight transport, it is not currently possible to analyse





TRANSPORT ENERGY CONSUMPTION											
Mtoe	1985	1990	1995	1997	1998	1999	90/85	95/90	98/95	99/98	99/90
	Annual % Change										
Austria	4.52	5.40	6.23	6.37	6.03	6.16	3.6%	2.9%	-1.1%	2.1%	1.5%
Transport Energy Intensity (toe/1990 MEUR)	42.09	42.98	44.99	44.54	40.79	40.52	0.4%	0.9%	-3.2%	-0.7%	-0.7%
Road Consumption	4.02	4.75	5.39	5.49	5.28	5.43	3.4%	2.6%	-0.7%	2.9%	1.5%
Specific consumption in (toe/vehicle)	1.46	1.46	1.38	1.34	1.26	1.25	0.0%	-1.1%	-3.2%	-0.1%	-1.7%
Belgium	6.14	7.70	8.48	9.19	9.57	9.57	4.7%	1.9%	4.1%	0.0%	2.4%
Transport Energy Intensity (toe/1990 MEUR)	46.12	49.87	51.47	53.32	54.21	52.77	1.6%	0.6%	1.7%	-2.6%	0.6%
Road Consumption	5.12	6.44	7.08	7.28	7.50	7.60	4.7%	1.9%	1.9%	1.2%	1.8%
Specific consumption in (toe/vehicle)	1.39	1.53	1.51	1.50	1.51	1.49	1.9%	-0.2%	0.1%	-1.5%	-0.3%
Denmark	3.63	4.50	4.64	4.78	4.78	4.89	4.4%	0.6%	1.0%	2.4%	0.9%
Transport Energy Intensity (toe/1990 MEUR)	39.63	44.30	40.40	39.45	38.37	38.46	2.3%	-1.8%	-1.7%	0.2%	-1.6%
Road Consumption	2.80	3.20	3.54	3.69	3.71	3.78	2.7%	2.0%	1.6%	1.8%	1.9%
Specific consumption in (toe/vehicle)	1.58	1.70	1.76	1.73	1.71	1.72	1.5%	0.7%	-1.0%	1.1%	0.2%
Finland	3.35	4.27	4.11	4.24	4.30	4.40	5.0%	-0.8%	1.5%	2.4%	0.3%
Transport Energy Intensity (toe/1990 MEUR)	37.24	40.17	39.75	37.14	35.72	35.10	1.5%	-0.2%	-3.5%	-1.7%	-1.5%
Road Consumption	2.90	3.63	3.50	3.60	3.64	3.70	4.6%	-0.7%	1.2%	1.7%	0.2%
Specific consumption in (toe/vehicle)	1.55	1.64	1.61	1.62	1.57	1.54	1.2%	-0.4%	-0.7%	-2.2%	-0.7%
France	33.53	41.91	43.97	46.85	49.39	50.37	4.6%	1.0%	3.9%	2.0%	2.1%
Transport Energy Intensity (toe/1990 MEUR)	41.34	44.58	44.55	46.06	46.96	46.55	1.5%	0.0%	1.8%	-0.9%	0.5%
Road Consumption	29.39	36.17	37.30	39.60	41.02	41.80	4.2%	0.6%	3.2%	1.9%	1.6%
Specific consumption in (toe/vehicle)	1.21	1.33	1.30	1.34	1.35	1.35	1.9%	-0.5%	1.5%	-0.3%	0.2%
Germany	47.99	58.82	62.88	63.70	64.78	66.80	4.2%	1.3%	1.0%	3.1%	1.4%
Transport Energy Intensity (toe/1990 MEUR)	42.07	45.33	44.74	44.36	44.21	44.88	1.5%	-0.3%	-0.4%	1.5%	-0.1%
Road Consumption	40.67	50.42	54.21	54.74	55.77	57.54	4.4%	1.5%	0.9%	3.2%	1.5%
Specific consumption in (toe/vehicle)	1.29	1.35	1.27	1.25	1.26	1.28	0.9%	-1.3%	-0.1%	1.5%	-0.6%
Greece	4.68	5.82	6.43	6.73	7.29	7.45	4.5%	2.0%	4.3%	2.2%	2.8%
Transport Energy Intensity (toe/1990 MEUR)	78.62	89.13	92.64	91.43	96.20	95.13	2.5%	0.8%	1.3%	-1.1%	0.7%
Road Consumption	3.06	3.90	4.58	4.92	5.16	5.26	5.0%	3.3%	4.1%	1.8%	3.4%
Specific consumption in (toe/vehicle)	1.64	1.56	1.47	1.41	1.40	1.33	-1.0%	-1.2%	-1.7%	-4.9%	-1.7%
Ireland	1.69	1.97	2.18	2.92	3.29	3.68	3.1%	2.1%	14.7%	11.6%	7.2%
Transport Energy Intensity (toe/1990 MEUR)	61.61	54.82	45.26	50.79	52.74	53.60	-2.3%	-3.8%	5.2%	1.6%	-0.2%
Road Consumption	1.43	1.55	1.73	2.36	2.71	2.99	1.6%	2.3%	16.1%	10.5%	7.6%
Specific consumption in (toe/vehicle)	1.63	1.52	1.43	1.72	1.93	1.92	-1.3%	-1.3%	10.6%	-0.9%	2.6%
Italy	27.75	33.40	37.64	38.67	40.92	40.99	3.8%	2.4%	2.8%	0.2%	2.3%
Transport Energy Intensity (toe/1990 MEUR)	37.30	38.79	41.33	41.17	42.80	42.18	0.8%	1.3%	1.2%	-1.4%	0.9%
Road Consumption	24.99	30.39	33.94	34.64	36.67	36.66	4.0%	2.2%	2.6%	0.0%	2.1%
Specific consumption in (toe/vehicle)	1.02	1.02	1.03	1.03	1.07	1.07	-0.1%	0.3%	1.1%	-0.4%	0.5%
Luxembourg	0.60	1.01	1.30	1.47	1.55	1.71	10.9%	5.3%	6.0%	9.9%	6.0%
Transport Energy Intensity (toe/1990 MEUR)	85.61	118.98	127.48	129.84	130.89	133.69	6.8%	1.4%	0.9%	2.1%	1.3%
Road Consumption	0.51	0.87	1.11	1.20	1.26	1.36	11.2%	4.9%	4.3%	8.0%	5.1%
Specific consumption in (toe/vehicle)	3.08	4.47	4.52	4.74	4.64	4.80	7.7%	0.2%	0.9%	3.4%	0.8%
Netherlands	8.80	10.32	12.40	13.52	13.64	13.77	3.2%	3.8%	3.2%	0.9%	3.3%
Transport Energy Intensity (toe/1990 MEUR)	45.85	46.36	50.23	51.17	49.59	48.20	0.2%	1.6%	-0.4%	-2.8%	0.4%
Road Consumption	7.47	8.04	8.95	9.66	9.54	9.54	1.5%	2.2%	2.2%	-0.1%	1.9%
Specific consumption in (toe/vehicle)	0.14	1.33	1.44	1.48	1.43	1.35	57.8%	1.6%	-0.3%	-5.5%	0.2%
Portugal	2.66	3.73	4.85	5.27	5.70	6.04	7.0%	5.4%	5.5%	5.9%	5.5%
Transport Energy Intensity (toe/1990 MEUR)	63.97	68.74	82.17	82.81	86.40	88.59	1.4%	3.6%	1.7%	2.5%	2.9%
Road Consumption	2.06	3.03	4.10	4.54	4.93	5.18	8.0%	6.3%	6.3%	5.1%	6.2%
Specific consumption in (toe/vehicle)	1.28	1.25	1.19	1.14	1.17	1.17	-0.5%	-1.0%	-0.5%	-0.1%	-0.7%
Spain	15.06	22.33	26.07	28.01	30.46	31.89	8.2%	3.1%	5.3%	4.7%	4.0%
Transport Energy Intensity (toe/1990 MEUR)	48.08	56.06	61.24	61.81	64.43	64.85	3.1%	1.8%	1.7%	0.7%	1.6%
Road Consumption	11.81	17.68	20.47	21.95	24.03	25.31	8.4%	3.0%	5.5%	5.3%	4.1%
Specific consumption in (toe/vehicle)	1.09	1.23	1.19	1.18	1.23	1.24	2.5%	-0.7%	1.2%	1.0%	0.1%
Sweden	6.43	7.23	7.66	7.69	7.78	7.74	2.4%	1.2%	0.5%	-0.5%	0.8%
Transport Energy Intensity (toe/1990 MEUR)	39.83	40.00	41.40	40.26	39.33	37.57	0.1%	0.7%	-1.7%	-4.5%	-0.7%
Road Consumption	5.37	6.07	6.43	6.42	6.51	6.41	2.5%	1.2%	0.4%	-1.6%	0.6%
Specific consumption in (toe/vehicle)	1.59	1.55	1.63	1.59	1.57	1.50	-0.6%	1.0%	-1.2%	-4.3%	-0.3%
United Kingdom	35.80	45.45	46.89	49.45	50.05	50.37	4.9%	0.6%	2.2%	0.7%	1.1%
Transport Energy Intensity (toe/1990 MEUR)	55.02	59.56	57.60	57.22	56.42	55.52	1.6%	-0.7%	-0.7%	-1.6%	-0.8%
Road Consumption	28.62	36.31	36.69	38.52	38.26	37.96	4.9%	0.2%	1.4%	-0.8%	0.5%
Specific consumption in (toe/vehicle)	1.44	1.56	1.49	1.47	1.43	1.37	1.7%	-0.9%	-1.4%	-3.9%	-1.4%
European Union	202.62	253.84	275.74	288.86	299.53	305.83	4.6%	1.7%	2.8%	2.1%	2.1%
Transport Energy Intensity (toe/1990 MEUR)	44.3	47.8	48.5	48.8	49.2	49.0	1.5%	0.3%	0.5%	-0.4%	0.3%
Road Consumption	170.0	212.2	228.8	238.3	245.7	250.2	4.5%	1.5%	2.4%	1.8%	1.8%
Specific consumption in (toe/vehicle)	1.26	1.33	1.29	1.29	1.30	1.29	1.1%	-0.6%	0.2%	-0.7%	-0.3%



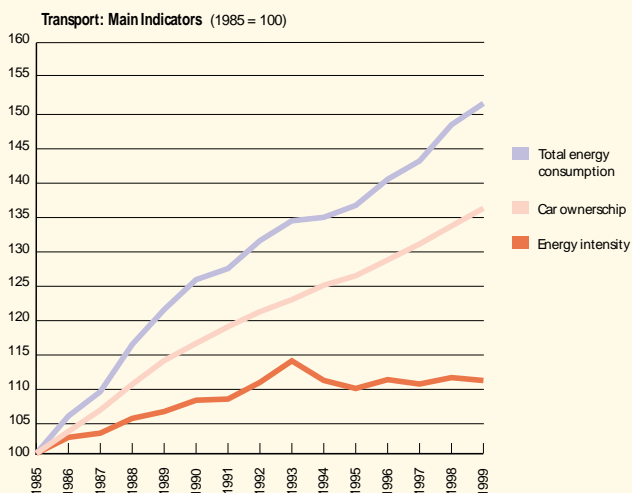


ENERGY PRICES OF TRANSPORT FUELS IN CONSTANT 1990 EUR PER TOE (1)

	1985	1990	1995	1997	1998	1999	90/85	95/90	98/95	99/98	99/90
	Annual % Change										
Austria											
Premium leaded gasoline	1258.7	978.6	na	na	na	na	-4.9%	na	na	na	na
Premium Unleaded gasoline (95)	na	940.6	915.5	929.9	869.1	866.7	na	-0.5%	-1.7%	-0.3%	-0.9%
Diesel	831.1	600.9	509.5	543.3	494.8	495.3	-6.3%	-3.2%	-1.0%	0.1%	-2.1%
Belgium											
Premium leaded gasoline	1278.8	1038.4	1025.3	1168.0	1098.2	1111.3	-4.1%	-0.3%	2.3%	1.2%	0.8%
Premium Unleaded gasoline (95)	na	975.1	923.4	1079.3	1009.5	1035.0	na	-1.1%	3.0%	2.5%	0.7%
Diesel	637.6	499.1	502.5	532.7	482.1	496.3	-4.8%	0.1%	-1.4%	3.0%	-0.1%
Denmark											
Premium leaded gasoline	1298.8	1096.9	964.7	na	na	na	-3.3%	-2.5%	na	na	na
Premium Unleaded gasoline (98)	na	1022.0	959.8	1032.4	979.6	1073.6	na	-1.2%	0.7%	9.6%	0.5%
Diesel	522.6	289.4	450.9	518.1	539.1	575.3	-11.2%	9.3%	6.1%	6.7%	7.9%
Finland											
Premium leaded gasoline	1390.2	1179.1	na	na	na	na	-3.2%	na	na	na	na
Premium Unleaded gasoline (95)	na	1087.8	1225.9	1365.6	1356.6	1427.4	na	2.4%	3.4%	5.2%	3.1%
Diesel	881.8	921.4	637.4	676.7	667.2	703.8	0.9%	-7.1%	1.5%	5.5%	-2.9%
France											
Premium leaded gasoline	1291.6	1059.7	1042.8	1106.8	1074.3	1111.4	-3.9%	-0.3%	1.0%	3.5%	0.5%
Premium Unleaded gasoline (95)	na	1035.3	999.7	1063.4	1030.4	1060.1	na	-0.7%	1.0%	2.9%	0.3%
Diesel	802.7	521.0	502.0	555.2	524.3	553.7	-8.3%	-0.7%	1.5%	5.6%	0.7%
Germany											
Premium leaded gasoline	1066.5	885.9	1001.2	na	na	na	-3.6%	2.5%	na	na	na
Premium Unleaded gasoline (95)	na	817.5	917.7	957.8	904.1	964.0	na	2.3%	-0.5%	6.6%	1.8%
Diesel	739.4	512.6	489.0	524.0	473.5	517.6	-7.1%	-0.9%	-1.1%	9.3%	0.1%
Greece											
Premium leaded gasoline	1038.6	783.2	724.7	708.4	653.8	659.7	-5.5%	-1.5%	-3.4%	0.9%	-1.9%
Premium Unleaded gasoline (95)	na	738.9	675.4	662.7	609.6	613.6	na	-1.8%	-3.4%	0.7%	-2.0%
Diesel	472.2	290.7	368.9	371.1	331.7	368.7	-9.2%	4.9%	-3.5%	11.2%	2.7%
Ireland											
Premium leaded gasoline	1395.7	1125.7	957.0	1021.5	1034.5	1025.2	-4.2%	-3.2%	2.6%	-0.9%	-1.0%
Premium Unleaded gasoline (95)	na	1086.4	888.2	921.3	880.3	863.1	na	-3.9%	-0.3%	-2.0%	-2.5%
Diesel	833.5	680.4	612.1	744.0	602.5	584.2	-4.0%	-2.1%	-0.5%	-3.0%	-1.7%
Electricity											
Italy											
Premium leaded gasoline	1653.8	1400.5	1362.4	1345.2	1280.9	1311.8	-3.3%	-0.5%	-2.0%	2.4%	-0.7%
Premium Unleaded gasoline (95)	na	1382.4	1281.3	1282.1	1212.7	1253.7	na	-1.5%	-1.8%	3.4%	-1.1%
Diesel	656.5	670.3	723.8	730.1	680.2	714.2	0.4%	1.5%	-2.0%	5.0%	0.7%
Luxembourg											
Premium leaded gasoline	961.4	740.1	789.6	835.4	783.8	na	-5.1%	1.3%	-0.2%	na	na
Premium Unleaded gasoline (95)	na	705.0	698.8	744.1	694.7	746.9	na	-0.2%	-0.2%	7.5%	0.6%
Diesel	585.4	374.6	430.2	466.5	427.0	443.9	-8.5%	2.8%	-0.2%	3.9%	1.9%
Netherlands											
Premium leaded gasoline	1259.4	1126.4	1118.6	na	na	na	-2.2%	-0.1%	na	na	na
Premium Unleaded gasoline (95)	1219.6	1077.6	1026.4	1106.7	1077.4	1106.0	-2.4%	-1.0%	1.6%	2.7%	0.3%
Diesel	593.7	500.5	616.5	573.8	538.0	558.3	-3.4%	4.3%	-4.4%	3.8%	1.2%
Portugal											
Premium leaded gasoline	1467.5	1077.2	869.8	894.0	869.6	851.6	-6.0%	-4.2%	0.0%	-2.1%	-2.6%
Premium Unleaded gasoline (95)	na	1032.0	858.7	867.4	838.6	816.1	na	-3.6%	-0.8%	-2.7%	-2.6%
Diesel	762.9	586.2	477.7	449.1	427.9	409.2	-5.1%	-4.0%	-3.6%	-4.4%	-3.9%
Spain											
Premium leaded gasoline	1349.6	877.6	930.8	940.0	894.9	919.2	-8.2%	1.2%	-1.3%	2.7%	0.5%
Premium Unleaded gasoline (95)	na	na	881.0	907.6	848.4	872.6	na	na	-1.2%	2.8%	na
Diesel	789.3	517.8	511.5	550.3	511.5	531.8	-8.1%	-0.2%	0.0%	4.0%	0.3%
Sweden											
Premium leaded gasoline	1149.5	1179.5	1173.4	1263.4	1243.4	1278.9	0.5%	-0.1%	1.9%	2.9%	0.9%
Premium Unleaded gasoline (95)	na	na	1116.3	1209.8	1188.1	1223.7	na	na	2.1%	3.0%	na
Diesel	664.6	634.2	662.6	689.9	652.6	685.2	-0.9%	0.9%	-0.5%	5.0%	0.9%
United Kingdom											
Premium leaded gasoline	1166.8	911.6	1025.6	1092.5	1117.7	1197.3	-4.8%	2.4%	2.9%	7.1%	3.1%
Premium Unleaded gasoline (95)	na	852.8	924.2	1004.7	1018.6	1087.2	na	1.6%	3.3%	6.7%	2.7%
Diesel	834.8	603.8	670.5	730.7	739.7	808.4	-6.3%	2.1%	3.3%	9.3%	3.3%
European Union											
Premium leaded gasoline	1244.7	1008.4	1061.9	1123.4	1098.2	1140.3	-4.1%	1.0%	1.1%	3.8%	1.4%
Premium Unleaded gasoline (95)	1219.6	960.9	989.7	1037.7	999.5	1044.7	-4.7%	0.6%	0.3%	4.5%	0.9%
Diesel	735.4	555.5	558.2	593.7	558.4	592.4	-5.5%	0.1%	0.0%	6.1%	0.7%

(1) Excluding refundable VAT only for Diesel





in detail the determinants of this new trend. Many factors already described above have contributed to this evolution: the slow-down of the growth of passenger traffic associated with a stabilisation of the road contribution; technological improvements in the car fleet; the accelerated contribution of road vehicles for goods transportation compensated by better utilisation of these goods vehicles; and also technological improvement to increase efficiencies and reduce emissions. This evolution was confirmed in eleven Member States, with reductions ranging from 1% in Belgium and Luxembourg to 12% in Austria and 18% in Finland since 1993. Italian intensity remained stable while Ireland, Portugal and Spain still show increases in transport energy intensity.

Prices for transport fuels largely determined by the level of taxes...

Transport fuel prices have increased steadily between 1990 and 1999 by a yearly average of about 0.9%. This growth accelerated in 1996 and 1997 as a consequence of higher crude oil prices, even though the share of raw materials in final prices declined continuously given tax increases. For this reason depressed crude oil prices in 1998 had a limited impact on final prices of gasoline and diesel which fell by 3.7% and 6% respectively. For the same reason price increases in 1999 were limited respectively to 4.5% for gasoline and 6.1% for diesel when the crude oil price expressed in US\$ increased by about 40%. Between 1990 and 1998 the share of tax in diesel prices increased from 52% to 65% for the European Union as a whole. For unleaded gasoline, taxes rose from 65% of the final price in 1990 to 76% in 1998. In addition, the relative prices of gasoline versus diesel differed greatly between countries, largely explaining the differences in the dieselisation rate of the car fleets. In 1999, leaded gasoline prices ranged between 660 (Greece) and 1312 EUR/toe (Italy); unleaded gasoline between 614

(Greece) and 1427 EUR/toe (Finland); and diesel prices ranged between 369 (Greece) and 808 EUR/toe (the United Kingdom). The differentials between leaded and unleaded gasoline in the same country ranged, in 1999, between 162 (Ireland) and 36 (Portugal) EUR/toe, with an average difference of 74 EUR/toe. This differential has increased year by year to favour the use of unleaded gasoline. Comparing unleaded gasoline and diesel, the difference in price ranged between 723 (Finland) and 245 (Greece) EUR/toe, with an average value of 437 EUR/toe across all the Member States.

DOMESTIC AND TERTIARY

Driven by southern countries, energy consumption increased by 12% since 1990...

In 1999, the domestic and tertiary sectors represented around 40% of final energy demand against 43% in 1985 with warmer climatic conditions. **Energy consumption in the domestic and tertiary sectors** increased by 0.6% annually on average since 1985, but by 1.3% since 1990 which had similar climatic conditions as those in the last three years. Marked by increasing energy prices, energy consumption increased by only 0.2% in 1999 while average degree-days were 1% warmer than in 1998. Energy consumption increased given the continual increase of specific uses (electrical appliances, IT and cooking) and living standards (more central heating and increasing house size). The number of households also increased more rapidly than the population, as the number of inhabitants per household declined from 2.6 to 2.4 between 1990 and 1999. Construction technologies, design techniques, materials and equipment have evolved rapidly in Europe, allowing plenty of scope for incorporating energy efficiency features into new buildings and appliances. However, because only a tiny percentage of Europe's buildings is replaced each year, it is essential that these technologies are also retrofitted to existing buildings. Renovation offers some of the best opportunities for the rapid diffusion of more energy efficient technologies. Such a policy needs to be favoured to curb further growth in energy consumption, which has increased by 12% overall since 1990. This growth varied widely across the EU with only four countries below the European average: Germany with 1%, Denmark with 4%, Finland with 5% and the United Kingdom with 11%. Six countries demonstrated a strong increase above 20%: Italy (20%), Belgium (21%), Ireland (23%), Greece (+38%), Spain (+39%) and Portugal (+40%). All the southern countries belonged to those with the most rapid growth; higher living standards and the rapid development of services favoured installation of air-conditioning systems. Available statistics indicate that the energy consumption of



EUROPEAN UNION : DOMESTIC AND TERTIARY - FINAL ENERGY CONSUMPTION

Mtoe	1985	1990	1995	1997	1998	1999	90/85	95/90	98/95	99/98	99/90
							Annual % Change				
Total consumption	356.34	343.41	363.93	379.54	384.79	385.56	-0.7%	1.2%	1.9%	0.2%	1.3%
Solids	37.78	26.61	9.83	8.75	6.87	6.23	-6.8%	-18.1%	-11.3%	-9.4%	-14.9%
Oil	118.32	98.58	99.86	101.23	100.00	95.43	-3.6%	0.3%	0.0%	-4.6%	-0.4%
of which:											
Gas Oil	95.86	79.74	81.18	83.43	82.55	77.47	-3.6%	0.4%	0.6%	-6.2%	-0.3%
Gas	94.44	100.87	123.47	129.32	133.24	136.60	1.3%	4.1%	2.6%	2.5%	3.4%
Electricity	71.06	82.68	93.32	97.90	100.59	103.25	3.1%	2.5%	2.5%	2.6%	2.5%
of which :											
Residential	40.50	44.62	50.05	52.15	53.33	54.46	2.0%	2.3%	2.1%	2.1%	2.2%
Commercial & Public Services	28.09	35.37	40.31	42.74	44.17	45.72	4.7%	2.7%	3.1%	3.5%	2.9%
Heat	12.38	12.57	16.00	16.35	16.98	17.05	0.3%	4.9%	2.0%	0.4%	3.4%
Renewable (1)	22.37	22.11	21.45	26.00	27.10	27.00	-0.2%	-0.6%	8.1%	-0.3%	2.2%
Total consumption per Capita (toe/inhabitant)	1.00	0.95	0.99	1.02	1.03	1.03	-0.9%	0.7%	1.5%	-0.1%	0.9%
Absolute Degree Days (Eur12)	2642	2141	2219	2226	2240	2221	-4.1%	0.7%	0.3%	-0.8%	0.4%
Difference to Average in %	9.8%	-11.0%	-7.8%	-7.5%	-6.9%	-7.7%	-	-6.7%	-3.9%	11.4%	-3.9%

(1) Geothermal heat, solar heat, biomass

the domestic sector increased by 10.4% since 1990 while tertiary consumption grew by 17.5%. In 1999, domestic sector consumption remained stable while that in the tertiary sector increased by 1%

Gas and electricity markedly increased their market shares..

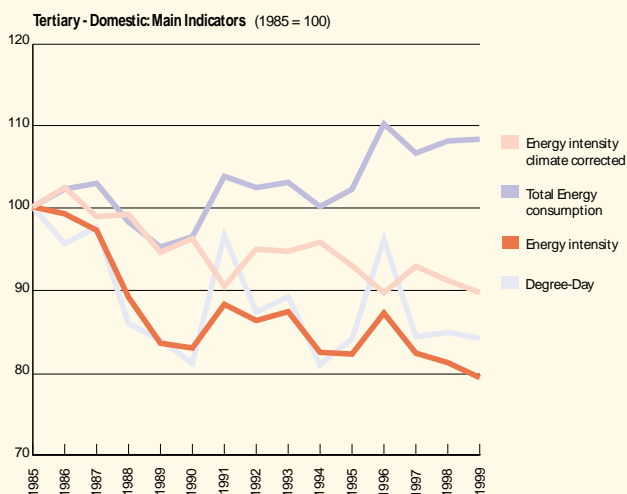
In terms of **fuel mix**, solid fuel consumption has dropped by 83% since 1985, and now represents less than 2% of total energy demand in these two sectors. Oil demand fell throughout the 1980s. But since 1990 it has experienced wide fluctuations related to weather conditions, and still represented 25% of total demand in 1999 against 34% in 1985 with a level of consumption similar to that in 1990. Nevertheless, as a result of the declining competitiveness of oil products compared with natural gas, oil products consumption fell regularly since 1996 with a marked reduction of 4.6% in 1999. Gas and electricity steadily increased their market share to reach 35% and 27% of total energy demand respectively in 1999 (27% and 20% respectively in 1985). Since 1990, gas consumption has increased by 3.4% per year on average, gaining substantial market share in the heating market to the detriment of heating gas oil and solid fuels. The growth of gas use in the domestic market has been 2.9% per year on average since 1990, and 5.1% in the tertiary market. Although this corresponds to growing demand (measured in square metres of buildings), in particular in services, consumer behaviour in responses to lower

energy prices must also be a factor. Relatively low energy prices since the early 1980s have changed the behaviour of building owners vis-à-vis investment regarding energy savings, insulation and heating controls, and also reduced the vigilance of building occupants over the control of temperature. Energy consumption per inhabitant increased by 7% in the domestic sector since 1990. Electricity demand grew during the second part of the 1980s at the same rate as GDP, but since 1990 it has grown 40% faster than GDP. Between 1985 and 1990, electricity demand from services increased by 26% compared with 10% for the domestic sector; but growth rates have been more similar in these two sub-sectors since 1990, around 2.5% per year on average. Distributed heat has progressively increased its market share, now representing more than 4% of total energy demand. The renewable energy contribution has remained almost stable since 1985, at around 6%, but with some increase in the last three years. The jump registered in 1997, mainly located in Italy and Germany, still requires further statistical explanation.

Energy intensity, corrected for climatic effects, declined by only 0.8% per year since 1985...

Measuring energy intensity evolution in the domestic and tertiary sectors is a very difficult task as the classical intensity indicator, related to GDP, aggregates GDP-sensitive commercial activities (tertiary sector) and non-commercial activities (domestic sec-





tor). Additionally the impact of climatic conditions may largely swamp the effect of economic conditions. The classical ratio of energy consumption to GDP has demonstrated an overall improvement of about 20.8% since 1985 with a substantial gain of 2.2% in 1999. But, at the same time, more favourable climatic conditions in 1997 versus 1985 reduced heating requirements by an estimated 15%. Correcting total energy demand to take into account standard climatic conditions³, it appears that the revised calculated energy intensity has only declined by 10% since 1985, and by 6% since 1990. This limited reduction, about 0.8% per year on average, considering climate corrected energy consumption, suggests that increased standards of living, reduced price incentives for energy savings and temperature control, and the growth of the services sector have partly offset all the technological and other efficiency improvements introduced since 1985. The total consumption per capita, which has increased by 0.9% per year on average since 1990, seems to confirm this impression.

Competitiveness of natural gas reinforced by less price volatility than heating oil...

Average **energy prices for the tertiary-domestic sector** broadly fell since 1990 in the European Union as a whole, but at contrasting rates depending on the fuels. Electricity and coal demonstrated regular decreases of respectively 1.5% and 1.2% per year on average. For electricity the variations by country ranged from +1.9% in Denmark to -5.1% in Greece, with a general increase in all Scandinavian countries. Prices of oil products and natural gas were fluctuating in relation to the international crude oil market

with the highest prices in 1991 and lowest in 1998 for oil products, and 1999 for natural gas, a consequence of the price indexation delay included in most gas supply contracts. Heating oil prices declined by 1.7% per year since 1990, but increased by 10.4% in 1999 after a decline by 14.1% in 1998 -demonstrating a marked volatility. The most extreme variations since 1990 occurred in Austria (-4.3% per year on average) and Finland (+1.2%). Heating oil prices are more sensitive to variations on the international crude oil market than transportation fuels, as the tax component is much less important than for transportation fuels. The price of natural gas varied less with an average decline between 1990 and 1999 limited to 1.1% with extremes of between -2.7% in France and +3.0% in Finland.

Heating oil prices in 1999 showed large variations amongst Member States: 182 EUR/toe in the United Kingdom compared to 818 EUR/toe in Italy, with a European average price of 325 EUR/toe. Natural gas prices ranged between 153 EUR/toe in Finland and 543 EUR/toe in Italy, with a European average price of 298 EUR/toe. The minimum price for electricity was 673 EUR/toe in Greece and the maximum price was 1790 EUR/toe in Denmark, with a European average of 1060 EUR/toe.

³ This estimation is made considering that, for the European Union as a whole, about 70% of total EU domestic-tertiary energy consumption is sensitive to climatic conditions. SOEC is analysing the possibilities of weather corrections for energy statistics. Our estimates given here are only broad and qualitative statements.





ENERGY PRICES TO DOMESTIC CONSUMERS IN CONSTANT 1990 EUR PER TOE (1)

		1985	1990	1995	1997	1998	1999	90/85	97/90	98/97	99/98	99/90
		Annual % Change										
Austria	Steam Coal	572.0	417.6	353.5	361.5	357.1	357.9	-6.1%	-2.0%	-1.2%	0.2%	-1.7%
	Heating Oil	660.3	413.9	310.8	309.5	261.0	279.6	-8.9%	-4.1%	-15.7%	7.1%	-4.3%
	Natural gas	597.5	308.5	273.7	300.9	291.4	286.5	-12.4%	-0.4%	-3.2%	-1.7%	-0.8%
	Electricity	1569.0	1425.4	1326.8	1373.8	1368.6	1358.1	-1.9%	-0.5%	-0.4%	-0.8%	-0.5%
Belgium	Steam Coal	395.2	338.6	318.1	305.8	303.5	302.1	-3.0%	-1.4%	-0.8%	-0.5%	-1.3%
	Heating Oil	522.2	244.6	176.8	223.5	174.8	194.6	-14.1%	-1.3%	-21.8%	11.3%	-2.5%
	Natural gas	516.2	327.4	300.2	297.7	296.7	270.4	-8.7%	-1.4%	-0.3%	-8.9%	-2.1%
	Electricity	1832.2	1560.2	1454.7	1403.7	1402.3	1365.2	-3.2%	-1.5%	-0.1%	-2.6%	-1.5%
Denmark	Steam Coal	385.1	439.2	432.5	469.8	522.9	531.9	2.7%	1.0%	11.3%	1.7%	2.2%
	Heating Oil	686.4	657.5	563.8	601.9	565.0	614.6	-0.9%	-1.3%	-6.1%	8.8%	-0.7%
	Natural gas	609.6	529.9	447.5	495.2	469.3	486.5	-2.8%	-1.0%	-5.2%	3.7%	-0.9%
	Electricity	1635.3	1506.0	1569.9	1659.4	1803.2	1790.4	-1.6%	1.4%	8.7%	-0.7%	1.9%
Finland	Heating Oil	531.1	336.9	316.7	392.2	336.3	374.8	-8.7%	2.2%	-14.2%	11.4%	1.2%
	Natural gas	270.8	117.3	142.9	159.6	160.9	153.4	-15.4%	4.5%	0.8%	-4.7%	3.0%
	Electricity	988.3	941.7	1016.2	1094.3	1083.8	1043.6	-1.0%	2.2%	-1.0%	-3.7%	1.1%
France	Steam Coal	654.1	467.0	441.5	436.3	434.1	433.0	-6.5%	-1.0%	-0.5%	-0.3%	-0.8%
	Heating Oil	608.7	380.1	311.7	347.5	296.1	316.0	-9.0%	-1.3%	-14.8%	6.7%	-2.0%
	Natural gas	565.5	373.7	323.8	312.5	319.6	293.2	-8.0%	-2.5%	2.3%	-8.3%	-2.7%
	Electricity	1527.9	1374.3	1253.5	1141.8	1101.9	1048.1	-2.1%	-2.6%	-3.5%	-4.9%	-3.0%
Germany	Steam Coal	583.2	543.6	na	na	na	na	-1.4%	na	na	na	na
	Heating Oil	496.6	281.4	203.0	239.0	194.5	240.4	-10.7%	-2.3%	-18.6%	23.5%	-1.7%
	Natural gas	460.6	312.3	285.1	291.8	282.5	266.3	-7.5%	-1.0%	-3.2%	-5.7%	-1.8%
	Electricity	1460.2	1500.0	1411.7	1297.7	1300.7	1340.4	0.5%	-2.0%	0.2%	3.1%	-1.2%
Greece	Heating Oil	489.3	324.2	356.8	399.0	295.5	291.6	-7.9%	3.0%	-25.9%	-1.3%	-1.2%
	Electricity	1103.5	1081.6	792.5	737.2	730.7	672.7	-0.4%	-5.3%	-0.9%	-7.9%	-5.1%
Ireland	Steam Coal	300.8	274.3	na	na	na	na	-1.8%	na	na	na	na
	Heating Oil	543.6	395.9	332.0	353.0	324.1	330.7	-6.1%	-1.6%	-8.2%	2.0%	-2.0%
	Natural gas	620.2	379.3	340.0	329.6	322.5	312.3	-9.4%	-2.0%	-2.2%	-3.1%	-2.1%
	Electricity	1493.0	1202.6	1102.6	1118.0	1098.9	1076.9	-4.2%	-1.0%	-1.7%	-2.0%	-1.2%
Italy	Heating Oil	714.7	745.2	820.2	837.7	790.3	818.2	0.8%	1.7%	-5.7%	3.5%	1.0%
	Natural gas (2)	529.5	505.6	559.3	576.7	571.0	543.0	-0.9%	1.9%	-1.0%	-4.9%	0.8%
	Electricity	1692.4	1435.7	1649.7	1530.2	1531.5	1456.5	-3.2%	0.9%	0.1%	-4.9%	0.2%
Luxembourg	Steam Coal	409.4	392.2	366.3	355.8	357.1	361.5	-0.9%	-1.4%	0.4%	1.2%	-0.9%
	Heating Oil	471.8	254.7	191.1	228.4	185.1	200.7	-11.6%	-1.5%	-19.0%	8.4%	-2.6%
	Natural gas	355.3	194.5	180.6	212.0	197.2	181.5	-11.3%	1.2%	-7.0%	-8.0%	-0.8%
	Electricity	1189.1	1134.8	1029.4	1029.2	1024.3	1018.9	-0.9%	-1.4%	-0.5%	-0.5%	-1.2%
Netherlands	Heating Oil	523.2	353.4	236.6	339.4	313.5	354.0	-7.5%	-0.6%	-7.6%	12.9%	0.0%
	Natural gas	366.7	264.2	217.4	252.5	249.9	234.1	-6.3%	-0.6%	-1.0%	-6.3%	-1.3%
	Electricity	1522.3	1072.8	945.4	1057.2	1040.6	1100.7	-6.8%	-0.2%	-1.6%	5.8%	0.3%
Portugal	Heating Oil	762.9	608.7	501.5	471.5	449.3	428.3	-4.4%	-3.6%	-4.7%	-4.7%	-3.8%
	Electricity	1431.7	1346.8	1233.1	1186.5	1171.3	1093.1	-1.2%	-1.8%	-1.3%	-6.7%	-2.3%
Spain	Heating Oil	576.3	364.1	291.9	334.2	286.8	313.1	-8.8%	-1.2%	-14.2%	9.2%	-1.7%
	Natural gas	745.3	482.4	456.8	456.6	445.2	410.5	-8.3%	-0.8%	-2.5%	-7.8%	-1.8%
	Electricity	1794.7	1739.9	1700.0	1583.5	1495.1	1421.6	-0.6%	-1.3%	-5.6%	-4.9%	-2.2%
Sweden	Heating Oil	587.7	559.3	501.9	576.5	531.3	553.5	-1.0%	0.4%	-7.8%	4.2%	-0.1%
	Electricity	708.4	804.1	849.9	964.9	976.8	923.4	2.6%	2.6%	1.2%	-5.5%	1.5%
United Kingdom	Steam Coal	313.7	264.7	262.5	260.7	255.0	256.5	-3.3%	-0.2%	-2.2%	0.6%	-0.3%
	Heating Oil	492.7	250.7	201.0	211.9	165.3	181.8	-12.6%	-2.4%	-22.0%	9.9%	-3.5%
	Natural gas	305.6	259.5	247.0	231.7	216.5	212.2	-3.2%	-1.6%	-6.6%	-2.0%	-2.2%
	Electricity	1165.9	1086.1	1110.5	996.2	919.1	895.6	-1.4%	-1.2%	-7.7%	-2.6%	-2.1%
European Union	Steam Coal	396.6	333.0	304.5	307.1	296.9	297.6	-3.4%	-1.1%	-3.3%	0.2%	-1.2%
	Heating Oil	559.3	379.6	311.7	342.4	294.0	324.7	-7.5%	-1.5%	-14.1%	10.4%	-1.7%
	Natural gas	425.7	330.5	315.6	319.3	314.4	298.2	-4.9%	-0.5%	-1.5%	-5.2%	-1.1%
	Electricity	1287.0	1211.0	1180.6	1104.7	1081.3	1060.2	-1.2%	-1.3%	-2.1%	-1.9%	-1.5%

(1) Including all taxes

(2) 1997 estimates



**ENERGY OUTLOOK – Energy supply: Recent evolution (1985-1999)****POWER GENERATION**

- Electricity demand, driven by services consumption, grew in line with GDP at the EU level since 1994
- The gap between lowest and highest electricity consuming countries diminished
- Electricity's market share increased significantly in both industrial and tertiary-domestic markets
- With no concrete plans for new projects, the nuclear contribution was near its maximum
- Wind power has become a mature technology with impressive prospects for the medium term
- Anticipated increase in the share of thermal power in new investments
- Since 1990 combined cycle units accounted for about one third of new investment
- Combined heat and power reinforced its contribution mainly in Northern Europe
- Gas consumption increased by 10% per year on average since 1990
- Political emphasis to promote renewable energy sources in power production
- Liberalisation of the electricity market becoming a reality throughout the European Union
- But key barriers to competition still exist
- Cross-border transmission capacities were not designed to facilitate bulk power trade

GAS MARKET

- Creation of the single gas market decided in 1998
- Implementation in three phases scheduled by 2008

REFINERY SECTOR

- Crude distillation capacity fluctuated since 1994 at around 640 million tons/year
- The Auto Oil Programme, a common framework to reflect on EU energy policies in the oil sector

GROSS INLAND CONSUMPTION

- Gross inland consumption increase since 1990 limited to 55% of GDP growth
- Natural gas covered 86% of additional gross inland consumption since 1990
- Preliminary balance for 2000 confirmed this recent evolution, except for solids
- Marked differences between Member States for specific reasons
- Power generation absorbed about 70% of solid fuels consumption in 1999, and the energy branch 19%
- Motor fuels and petrochemical feedstock accounted for two thirds of total oil consumption in 1999
- Natural gas, the emerging fuel of the 1990s, was gaining market shares in all Member States
- All renewable energy forms increased substantially since 1990

INDIGENOUS PRODUCTION

- Indigenous production, pushed by nuclear, oil and natural gas, peaked at 770 Mtoe in 1999
- United Kingdom and Denmark, contributed 91% of EU crude oil production
- Higher United Kingdom gas production largely compensated for a reduction in the Netherlands
- Renewable energy covered 11% of primary production and 6% of gross inland consumption

ELECTRICITY SECTOR

Electricity demand, driven by services consumption, grew in line with GDP at the EU level since 1994...

Electricity consumption since 1985 has shown an average increase of 2.2% per year, but the more recent trends clearly indicated a progressive slowdown with only 1.9% per year since 1990, the year 1999 being in line with this average. During the second part of the 1980s, electricity growth still reached 2.7% per year on average but this expansion was related to an average GDP growth of about 3.1% per year. In the beginning of the 1990s, a slower growth (1.2% per year between 1990 and 1994) was registered due to the economic slow-down of 1992-93. Since 1994, sustained by economic activity and colder weather conditions in 1995 and 1996, electricity demand growth reached 2.5% per year

on average, close to the GDP growth. The electricity growth was largely driven by the tertiary sector. In the period 1985-90, electricity demand from the services sector grew by 4.7% per year on average followed by industry with 2.3% and the domestic sector with 2.0%. The pattern changed perceptibly during the 1990s. Growth of services still reached 2.9% per year on average while domestic consumption grew by 2.2% and industry by only 1.2%. In 1999, with similar climatic conditions to those in 1998, industrial demand grew by 1.4%, domestic demand by 2.1% and services by 3.5%.

The gap between lowest and highest electricity consuming countries diminished...

Additionally, large variations exist between Member States even though electricity demand growth was slowing down in all of





Main items

Indigenous energy production in the European Union was equivalent to 52% of total requirements in 1999. Coal production has declined steadily given high costs, cuts in state aids, intense competition from lower-cost imports and environmental concerns. In contrast oil and gas production has grown rapidly over the past 20 years. North Sea oil output is now reaching a peak, with much smaller fields being discovered. But the competitiveness of offshore oil production has generally been maintained - despite weaker international oil prices - by considerable technological change. Gas production has been very buoyant but has only partly satisfied the very rapid increase in gas demand, particularly in power generation. In recent years, new additions to nuclear capacity have slowed because of public opposition and the completion of EU reactor construction programmes in 1999. Even so, nuclear output has risen given the substantial improvements in nuclear plant operating performance. But the scope for further incremental contributions from nuclear power is now very limited. Of the renewable sources, the scope for further large-scale hydro production in the EU is constrained by geographical factors. Biomass use is already quite significant in some countries. Wind energy is now seen as broadly competitive and is growing very quickly - although from a low base. In future, coal production will continue to fall, and - on the basis of present trends - EU oil, gas and nuclear output will also decline progressively over the next 5-20 years. This could lead to a marked further increase in import dependence, perhaps to 70% by 2020. Should new nuclear investment prove financially or politically unattractive, then the only indigenous, low-carbon resource in the longer term is renewable energy. Both the supply security and the environmental imperatives explain stronger public and policy support for renewable technologies, which is now matched by growing interest amongst investors in their rapid deployment.

them with the exceptions of Ireland, given the impressive acceleration of GDP growth there, and of Luxembourg due to the electrification of the iron & steel industry, the principal industrial activity of the country. Over the period 1990-99, electricity demand growth rates ranged from 0.5% per year on average in Sweden and Germany to 4.9% in Portugal and 5.2% in Ireland. Only five Member States were well below the European average growth rate of 1.9% per year. By country, the short-term elasticity (1990-99) versus GDP presented extremes ranging from 0.3 in Sweden and Germany to 1.9 in Portugal and 2.0 in Greece. Eight countries were below the European average: Germany (0.31), Sweden (0.33),

ELECTRICITY : FINAL DEMAND GROWTH RATE

Annual Average Growth Rate	1985-1990	1990-1999
Austria	3.1%	1.6%
Belgium	3.7%	2.8%
Denmark	2.9%	1.0%
Finland	4.0%	2.6%
France	3.6%	2.4%
Germany	1.0%	0.5%
Greece	3.6%	4.1%
Ireland	4.0%	5.2%
Italy	4.3%	2.2%
Luxembourg	1.7%	3.3%
Netherlands	3.7%	2.9%
Portugal	6.2%	4.9%
Spain	4.1%	3.9%
Sweden	1.2%	0.5%
United Kingdom	2.5%	1.7%
European Union	2.7%	1.9%

Denmark (0.40), Luxembourg and Ireland (0.70), Austria (0.75), the United Kingdom (0.89) and the Netherlands (1.02). All these Member States have a ratio below or close to 1. Other European countries were situated well above the European average: Finland (1.39), France (1.54), Belgium (1.57), Spain (1.64), Italy (1.65), Portugal (1.90) and Greece (2.00); but all of them saw their elasticity declining in 1999. Electricity consumption varied from 4,246 kWh per inhabitant in Portugal to 16,678 kWh per inhabitant in Sweden. The lowest per capita consumption occurred in southern countries (Portugal, Greece, Italy and Spain), all below 5,500 kWh per inhabitant. The other Member States ranged between 5,500 kWh and 8,400 kWh with the exception of three countries where it was virtually double this maximum. The highest consumption per capita was in the two northern countries, Finland and Sweden, ranging respectively from 15,590 to 16,680 kWh per inhabitant. In these two countries electrical heating based on low-cost hydro electricity covered a large part of heat-

ELECTRICITY : CONSUMPTION PER INHABITANT

Kwh/inhabitant	1985	1990	1999	Annual Average Growth Rate	
				85-90	90-99
Austria	5687	6517	7225	2.8%	1.2%
Belgium	5809	6733	8347	3.0%	2.4%
Denmark	5769	6377	6871	2.0%	0.8%
Finland	11096	13036	15591	3.3%	2.0%
France	5805	6604	7786	2.6%	1.8%
Germany	6741	6923	6781	0.5%	-0.2%
Greece	2866	3514	4741	4.2%	3.4%
Ireland	3414	4140	5952	3.9%	4.1%
Italy	3699	4434	5336	3.7%	2.1%
Luxembourg	12203	13842	15223	2.6%	1.1%
Netherlands	4696	5419	6646	2.9%	2.3%
Portugal	2132	2883	4246	6.2%	4.4%
Spain	3287	3894	5448	3.5%	3.8%
Sweden	16241	16908	16678	0.8%	-0.2%
United Kingdom	5258	5748	6403	1.8%	1.2%
European Union	5386	5988	6787	2.1%	1.4%





ing requirements. The last exception was Luxembourg, where the recent installation of electric arc furnaces and the predominant contribution of services to the GDP boosted consumption. As a consequence of the more sustained development of southern countries, the gap between lowest and highest consuming countries has halved since 1985 but still reached a factor of about 4.

Electricity's market share increased significantly in both industrial and tertiary-domestic markets...

The share of electricity in final demand increased significantly in all sectors. In industry it grew at the European level from 23.4% in 1985 to 26.1% in 1990 and 29.2% in 1999. In fact electricity gained substantial market share during the 1980s as a result of the restructuring and modernisation of industrial processes. It progressed more slowly during the 1990s, by only 0.6% per year on average, but it accelerated again after 1995 to reach 1.9% per year as electricity's competitiveness increased and new electricity-based technologies penetrated all markets. The highest shares occurred in Sweden (39%) where electricity prices are relatively low thanks to the major contribution of hydro. Germany, France and Ireland and Luxembourg followed; they are also characterised by the biggest increase of industrial electricity share over the last 15 years. Countries with higher prices, such as Austria or Portugal, are well below the European average and even experienced some market share decline since 1990. Surprisingly the electricity share remained stable in the United Kingdom despite the significant reduction of prices resulting from electricity market liberalisation (but gas prices also fell sharply in the UK).

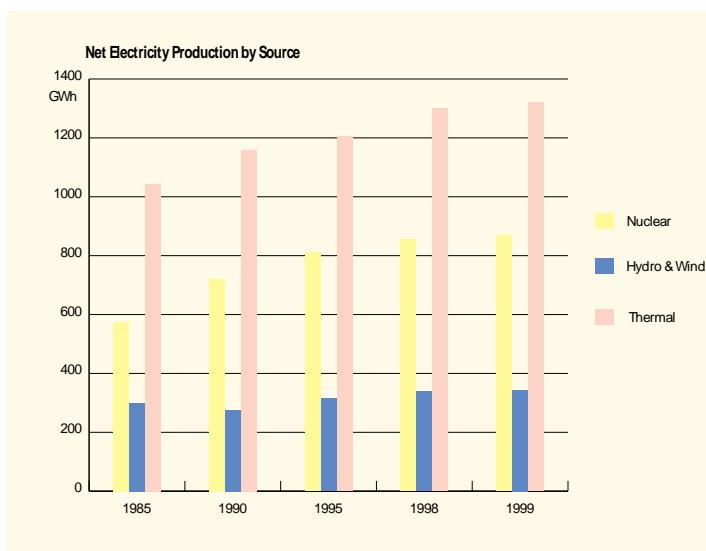
In the tertiary-domestic sector the share of electricity increased on average from 20.0% in 1985 to 24.1% in 1990 and 26.8% in 1999. The sustained economic activity of services throughout the European Union together with the development of electricity-related applications such as air conditioning, lighting, IT equipment..., were the major reasons for this increase. The gap between the minimum share (20.8% in the Netherlands) and the maximum (45.2% in Sweden) is more important than in industry for a number of reasons related to varied climatic conditions and gas availability between Member States. In southern Europe (Spain, Portugal and Greece), as energy demand for heating is limited, the weight of electrical appliances increased proportionally more rapidly and explained penetration rates of between 36% and 42%. Additionally, electrically-based air conditioning has recently expanded rapidly in these countries given increasing incomes and higher living standards. In mid Europe, the increasing energy demand for heating induced a share between 20.8% and 27.8%, depending on the contribution of electricity to heating requirements. On the other hand, the major contribution of

	Industry			Tertiary-Domestic		
	1985	1990	1999	1985	1990	1999
Austria	22.4%	27.1%	22.9%	19.1%	21.9%	25.7%
Belgium	20.2%	22.1%	23.9%	14.8%	19.3%	21.5%
Denmark	22.3%	26.1%	28.4%	19.3%	25.1%	25.9%
Finland	27.9%	30.3%	29.8%	25.2%	28.6%	33.8%
France	22.7%	26.6%	31.3%	20.9%	26.9%	30.4%
Germany	22.0%	25.0%	31.4%	16.8%	20.0%	21.5%
Greece	25.3%	26.5%	26.7%	26.8%	29.2%	36.3%
Ireland	17.5%	21.6%	31.6%	19.3%	19.0%	24.2%
Italy	25.3%	25.8%	29.3%	17.5%	20.8%	21.3%
Luxembourg	12.2%	13.1%	33.6%	17.8%	21.1%	21.0%
Netherlands	17.6%	21.7%	26.9%	13.8%	17.3%	20.8%
Portugal	21.1%	26.3%	24.7%	21.8%	28.3%	38.0%
Spain	25.9%	27.5%	29.4%	27.4%	35.0%	41.7%
Sweden	35.4%	39.2%	39.3%	41.5%	48.3%	45.2%
United Kingdom	23.0%	25.0%	25.0%	22.0%	25.6%	27.8%
European Union	23.4%	26.0%	29.2%	19.9%	24.1%	26.8%

electric heating in France, Finland and Sweden was responsible for the respective shares of 30.4%, 33.8% and 45.2% observed in 1999.

With no concrete plans for new projects, the nuclear contribution was near its maximum...

In 1999 electricity generation in the European Union reached 2531 TWh, an average growth of 1.8% per year since 1990. Net imports (23.6 TWh) continued to grow in 1999 to retrieve a level comparable to that in 1990. Despite a limited increase in generating capacity since 1990, arising partly from capacity extension in existing units when replacing steam generators, nuclear production still increased by 2.1% on average since 1990. Its contribution reached 34% of total electricity production in 1999 compared to only 30% in 1985. The utilisation factor of nuclear units has been increasing continuously over the past ten years to reach about





80% on average at the European level. In 1998, for the first time since nuclear power was exploited in the EU, both installed capacity and generation fell - by respectively 0.7% and 1.4%. But this evolution was reversed in 1999 with an increase of both capacity and production by respectively 1.7% and 1.6%. The commissioning of the last unit still under construction in the European Union occurred in 1999. Possible expansion of nuclear capacity is now limited to France, but without any specific projects at present, and Finland where the construction of a new unit is under consideration. But there is a de facto moratorium on new ordering in all other EU countries. Additionally a progressive phase-out of the nuclear contribution was decided in Germany in early 2000 and this move is also under consideration in Belgium where nuclear still contributed 60% of electricity production. Consequently it will be difficult in future for nuclear to continue to meet 40% of total EU incremental electricity production as it has since 1990.

Wind power has become a mature technology with impressive prospects for the medium term...

Hydro and wind power together increased their output by 2.4% per year on average since 1990 to generate 13.6% of the total in 1999. Wind production reached 14 TWh in 1999 or 0.5% of total production but demonstrated an impressive development since 1990. New investments in 1999, with 3,859 MWe, were equivalent to 40% of the installed wind capacity at the beginning of the year. With 9,392 MWe installed at end 1999, the European Union accounted for 69% of world installed capacity. This impressive advance continued in 2000 with additional capacity of 3,031 MWe to cross the symbolic threshold of 10,000 MWe, a level that was the EU goal for 2003. Germany remained the leading country in this market both for annual installed capacity (5,432 MWe) and for the overall level of wind power output. Denmark, the pioneer country for wind development in Europe, continued its expansion and held on to its second position ahead of Spain. Recent forecasts predict an installed capacity of about 30,000 MWe in 2004 and 80,000 MWe in 2010, twice the target anticipated in the European Commission's White Paper. Experts are more convinced that the future of wind power will be played out at sea. When the additional costs due to marine requirements have been reduced, and some planning issues resolved, nothing else will prevent the erection of wind plants representing several hundred megawatts. The British Wind Energy Association estimated that most coastal European countries have sufficient economically-exploitable resources to cover at least 25% of their electricity needs in the long term. Hydro production stagnated in 1999 after two years of substantial increase despite the commissioning of 2 GWe of additional capacity. This stabilisation resulted from hydraulic conditions related to drier weather conditions.

Anticipated increase in the share of thermal power in new investments...

Thermal electricity production showed a slower annual growth of 1.5% on average since 1990 but with a jump by 4.6% in 1998 to compensate for the contraction of nuclear generation. Thermal generation represented 56% of total electricity generation in 1999 against 54% in 1990. Between 1990 and 1997 nuclear accounted for 21% of the incremental production followed by hydro and wind (25%) and thermal (54%). The pattern was very different in the last two years, with thermal generation contributing 55% of incremental generation and renewables 42%. This is an early indication of the future pattern of new investment when it will be necessary to compensate decommissioning of nuclear units. In the near future, as the prospects for both new nuclear capacity and for hydro are strongly limited, incremental generation requirements will necessarily be met by wind but mainly by thermal units, with all the energy and environmental impacts that the latter implies.

Since 1990 combined cycle units accounted for about one third of new investment...

In 1998, the installed capacity for electricity generation was about 575 GWe, of which 56% was thermal capacity, the remainder comprising almost equally nuclear power stations, and hydro and wind power stations. Since 1990, after allowing for closure of older plants, installed capacity has increased by 52 GWe, 70% of this being added in the last four years. Over the same period new capacity, excluding repowering and conversion of existing units, was about 125 GWe in more than 5,000 units, of which: 10 GWe of nuclear units, 40 GWe of combined cycle units, 38 GWe of conventional steam turbine units, 15 GWe of gas turbines, 5 GWe of internal combustion engines mainly based on natural gas, 8.5 GWe for hydro power and 8.5 GWe for wind power. About 50% of combined cycle capacity is located in the United Kingdom (19 GWe installed by end 1999) but this technology is also expanding in many other Member States: Italy (6.0 GWe), the Netherlands (5.3 GWe), Germany (3.4 GWe), Belgium (2.0 GWe) and Portugal (1.0 GWe). In addition, the progressive deregulation of electricity markets will favour the use of gas in power generation, especially in combined cycle units, as smaller companies entering the market favour plants with shorter lead times, lower capital costs and higher efficiency leading to lower fuel costs.

Combined heat and power reinforced its contribution mainly in Northern Europe...

The last decade was also marked by the development of combined heat and power (CHP) generation. CHP electricity generation increased significantly, from 205 TWh in 1994 to 274 TWh in

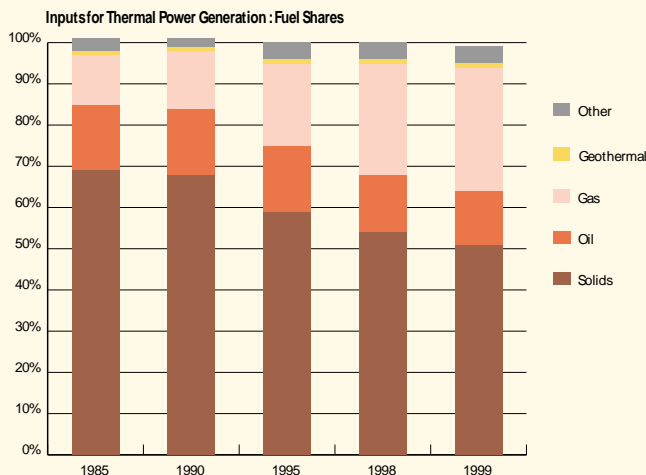




1998, an increase of 34%⁴. The share of CHP electricity in total electricity generation increased at the same time from 9.0% to 11.0%. In absolute terms CHP generation in 1998 was highest in the Netherlands (48 TWh), in Italy (46 TWh) and in Germany (42 TWh). These three countries accounted for half of total EU CHP electricity production. Denmark, Finland, Spain and the United Kingdom were also major producers, each producing more than 20 TWh in 1998 (from 21 TWh to 26 TWh). Compared with the total electricity production, the European leaders are Denmark (62% of electricity cogenerated) followed by the Netherlands (53%), Finland (36%) and Austria (25%). Cogeneration was sustained by district heating networks, industrial on-site combined heat and power production, and more recently by the rapid expansion of smaller-scale cogeneration in buildings. The installed capacity in 1998 was estimated at about 72 GWe or 22% of total thermal capacity in the European Union. The Commission took an important initiative in the field of cogeneration in its Communication on the promotion of CHP, issued in October 1997. Cogeneration has been identified as a high priority measure to reduce CO₂ emissions and the Commission has proposed a doubling of its contribution to total electricity production by 2010. It has a key role in ensuring the development of the internal market for energy, European Union competitiveness and sustainable development through the most efficient use of fossil fuels.

Gas consumption increased by 10% per year on average since 1990...

As regards the fuel mix in thermal power stations, solid fuels remain the major contributor (51% of total energy consumed in 1999 from 67% in 1990) even though their share decreased steadily by 2.5% a year on average since 1990, with a maximum reduction of 7.1% in 1997. The expected decline of the nuclear contribution could impact increasingly on solid fuel consumption in the near future. Oil consumption, slowly increasing over the period 1990-95, declined by 4.5% in 1996 and by 7.7% in 1997, stabilised in 1998 as heavy fuel oil prices fell by about 15% on average in the European Union but decreased again by 2.5% in 1999 given higher oil prices. Oil's contribution declined from 15.8% in 1990 to 13.2% in 1999. Italy accounted for 50% of total EU oil consumption for power generation in 1999, the same share as in 1990. The growth of gas consumption has been very spectacular since 1990. Its share in fuel inputs more than doubled in eight years, growing from 13.5% in 1990 to 30.3% in 1999. Gas consumption grew by 4.0% per year on average between 1985 and 1990 and by 10.0% per year since 1990, with a jump of 13.6% in 1999. Between 1990 and 1997 the overall fuel input in thermal power stations has remained quite stable, meaning that about 33 Mtoe of solid fuels



have been substituted by gas since 1990. But in 1998 all the fossil fuels contributed to the increasing production from thermal stations: 55% of this being covered by solid fuels, 36% by gas and 7% by oil products. In 1999 fuel inputs for thermal power generation again remained stable but 10 Mtoe of solids were substituted by natural gas. Although the share of other sources (mainly urban and industrial waste) remained small (about 4.5% of total input in 1999), their consumption, constant over the period 1985-90, increased sharply since 1992 due to the development of incinerators in some Member States. Replacement of old-fashioned units and the development of new technologies such as combined cycles, supercritical units and gas turbines, underpinned a continuous improvement of thermal efficiency in the power sector. This average efficiency, 39.9% in 1999, has increased by 0.9% per year on average since 1990.

Political emphasis to promote renewable energy sources in power production...

The potential for the exploitation of renewable energy sources (other than hydro) was largely unexploited in the Community until recently. The European Commission has recognised the need to promote renewable energy sources as a priority measure given that their exploitation contributes to environmental protection and sustainable development. It is therefore necessary to ensure that this potential is better exploited within the framework of the internal electricity market. The promotion of electricity produced from renewable energy sources is a high Community priority as outlined in the White Paper on Renewable Energy Sources (hereinafter referred to as 'the White Paper') for reasons of security and diversification of energy supply, of environmental protection and of social and economic cohesion.





Liberalisation of the electricity market becoming a reality throughout the European Union⁵...

All Member States, except Luxembourg, have adopted national legislation implementing the provisions of the Directive concerning common rules for the internal market in electricity at the beginning of 2000. However, some Member States (France and Belgium) have yet to adopt the secondary legislation (implementing decrees) needed to apply the laws. The Directive sets minimum targets for the opening of the market which correspond to 30% of consumption in 2000 and 35% in 2003. This opens up the possibility for the biggest consumers to choose their suppliers freely. All Member States except France, Portugal and Greece envisage full market opening in a legal sense before 2008. As a result, implementation of the Directive has opened up two thirds of the consumer market for electricity in the European Union.

Whilst the Directive left Member States the choice between comparable mechanisms, most States have opted for the approach likely to create the most positive effects in terms of the functioning of the market. For instance, regulated third-party access, the authorisation procedure for new generating capacity, full legal unbundling of operation of the network from production/distribution and putting in place independent regulatory authorities are the options most Member States have chosen. These systems are the most appropriate to avoid discrimination against new market entrants. As a result, one of the most visible effects, lower electricity prices, is becoming a reality. European statistics on electricity price trends in the European Union from 1996 until 1999 show that prices have fallen by around 6% on average and by up to 20% in some cases⁶. All electricity consumers - households, small businesses and industry - are benefiting from this trend, which gained strength significantly in 1999.

But key barriers to competition still exist...

However, the final objective of a fully integrated market has not yet been achieved. Indeed, all market participants recognise that two issues must be re-examined in order to create a real internal market:

– *Unbundling of operation of the network from production/distribution.* Market access, in particular of new entrants, is only possible when access to the network is granted on the basis of fair and non-discriminatory rules. Experience shows that it is very much easier to achieve this goal when operation of the transmission and distribution systems (in practice, often by incumbent, vertically integrated companies) is unbundled from the other activities of the industry, in particular production and distribution/trading.

– *Regulated third-party access.* Experience so far has confirmed that the system of regulated third-party access on the basis of published prices is the method of access to the network most appropriate to avoid any discrimination. This system not only prevents discrimination, but also allows companies to plan their electricity purchases, knowing the tariffs in advance. By contrast, in the negotiated access system, the obligation to renegotiate prices and conditions of access each time the contract comes to an end places a burden on companies.

Cross-border transmission capacities were not designed to facilitate bulk power trade...

In the context of the creation of an internal European electricity market, the existence of sufficient cross-border transmission capacities and their efficient utilisation gain crucial importance. Historically, transmission system operators (TSOs) have not designed the interconnections between their networks primarily to facilitate bulk power trade, but rather to achieve better reliability and efficiency of supply through co-operation amongst themselves. Hence, the introduction of open access to transmission networks has made a number of bottlenecks in cross-border transmission capacity visible. These can have an adverse effect upon competition and thus on the integration of the internal market.

It is difficult, if not "impossible", to define standardised "ideal" levels of interconnection capacity. This depends on the cost of interconnection and the relative competitiveness of generation between areas. However, analysis carried out by the European Commission suggested that a certain minimum level of interconnection capacity between Member States in terms of total import capacity in relation to the total installed generation capacity in each Member State would be justified. This is not only in terms of enhancing security of supply but also from a purely economic point of view. A minimum level requirement would suggest network reinforcements on the borders of Ireland, the UK, Spain, Portugal, Italy and France. Achieving such minimum levels of interconnection would obviously require efforts on both sides of the borders in question. Additional interconnection capacities between France and Italy and France and Spain would, in particular, be highly cost-effective. For transit countries (Belgium, the Netherlands, Denmark, Sweden, Germany, Austria and France) additional criteria would have to be applied in order to define an appropriate level of interconnection to ensure that the network capacity in the transit countries is not weaker than the capacity in the neighbouring countries. In this respect the network capacity is relatively low in Belgium and Switzerland.

⁵ Based on the Communication from the Commission to the Council and the European Parliament on "Recent progress with building the internal electricity market" available on the web site of DG TREN: http://europa.eu.int/comm/energy/en/elec_single_market/index_en.html

⁶ Simple arithmetical average. Source: Eurostat.





GAS MARKET

Creation of the single gas market decided in 1998...

The single market for gas will, progressively, produce a competitive and vibrant gas market across the European Union. It will contribute to the achievement of the three main EU energy policy objectives of increased competitiveness through better service for energy consumers, security of supply, and protection of the environment including meeting the Kyoto commitments to reduce emissions of greenhouse gases such as CO₂. The gas directive, adopted in June 1998, has provided the basis for these profound changes in the European gas sector and the creation of a single market for gas. The key features of the gas directive include abolition of exclusive rights, non-discriminatory rights to build new gas infrastructure facilities, non-discriminatory access to the gas system and unbundling of the internal accounts of vertically integrated companies. Over the period 2000–08, the gas directive will allow at least all gas-fired power generators and all large and medium sized industrial gas consumers freely to choose their gas supplier from anywhere in the EU and to have such gas transported through the gas network of third parties to their site of consumption.

Implementation in three phases scheduled by 2008...

The minimum requirements of the gas directive with regard to market opening are the following. At least all gas-fired power generators, irrespective of their annual consumption level, and all other final customers consuming more than 25 million m³ per year shall be specified as eligible customers as from **10 August 2000**. Market opening in phase 1 shall be at least 20%. At least all gas-fired power generators, irrespective of their annual consumption level, and all other final customers consuming more than 15 million m³ per year shall be specified as eligible customers as from **10 August 2003**. Market opening in phase 2 shall be at least 28%. At least all gas-fired power generators, irrespective of their annual consumption level, and all other final customers consuming more than 5 million m³ per year shall be specified as eligible customers as from **10 August 2008**. Market opening in phase 3 shall be at least 33%.

Member States may decide whether gas distribution companies shall be eligible. Distributors shall, however, always have the right to have third-party access for volumes contracted for the supply of eligible customers within their distribution system. In exceptional circumstances, in order to safeguard the balance of the electricity market, for example in case of safety or security of supply risks, Member States may introduce a threshold for the eligibility of combined heat and power producers (CHP). The gas directive

also allows Member States to introduce a 'ceiling' on market opening, if the definition of eligible customers as referred to above results in a market opening which is higher than 30% in phase 1, 38% in phase 2 and 43% in phase 3. Member States may then limit market opening in a balanced manner to this ceiling level. In the light of experience gained, the application of the directive shall be reviewed for the period after August 2008.

REFINERY SECTOR

Crude distillation capacity fluctuated since 1994 at around 640 million tons/year...

Total crude oil distillation capacity as reported by Member States for 1998 was 642 million tons/year. Since 1994 European capacity has fluctuated around 640 million tons/year. Distillation capacity has increased in Spain (3.1 million tons/year), France (3.1), Denmark (2.7) and Greece (1.0) but has declined in Germany (-3.2), Italy (-2.5) and Finland (-1.0). In 1998, the utilisation rate continued to increase to reach 97% (91% in 1996) and followed the more or less steady rise in utilisation observed since 1985 when it was only 69%. This increase reflects the programme of crude distillation capacity reductions undertaken by many refiners over the period, but also better economic conditions, notably increasing margins, moderate crude prices and increasing consumption of oil products. During 1996–1998 a number of mergers, acquisitions and alliances took place in the petroleum industry. In the energy market, characterised at that time by exceptionally low petroleum prices, these operations were all aimed at profiting from synergies, avoidance of duplication and cost minimisation. They also reflected the historic weakness of the European Union's refinery margins arising from the excess conversion capacity and the imbalance of domestic supply and demand for particular products. In addition, some refineries were closed down during the period 1996–98. Conversion capacity amounted to 207 million tons/year in 1997, expressed in terms of catalytic cracking equivalent, up 42% compared to 1985. Since 1995, in the European Union as a whole, visbreaking and thermal cracking unit capacity fell respectively by 8% and 11%. On the other hand, hydrocracking capacity increased by 25% in the last three years. Total conversion capacity accounted for about 32% of distillation capacity. Investment in these units increased to satisfy by 2005 the tightening Community fuel standards and product specifications.

The Auto Oil Programme, a common framework to reflect on EU energy policies in the oil sector....

The Auto Oil Programme was established in 1993 to agree a set of Air Quality Standards, derived from the World Health





Organisation, and examine a range of possible methods to find the most cost effective way of achieving the required improvements in air quality. The parties in this research were the Commission, the Refining Industry via their trade organisation Europa, and the Car Industry, via their trade organisation ACEA. The Auto Oil Programme was designed to provide policy-makers with an objective assessment of the most effective measures to reduce emissions from the road transport sector. Two Directives resulting from the programme went into effect in late 1999. The first stated that the sale of leaded gasoline in the European Union should be phased out. The second defined stricter specifications for motor fuels: gasoline should have a sulphur content of not more than 150 milligrams per kilogram, a maximum benzene content of 1%, and a limit for aromatics of 42% by volume of vapour; and diesel should have a sulphur content of not more than 350 milligrams per kilogram.

The aims of the second phase of the Auto Oil Programme were to make an assessment of the future trends in emissions and air quality and establish a consistent framework within which different policy options to reduce emissions can be assessed using the principles of cost-effectiveness, sound science and transparency; and to provide a foundation for the transition towards longer term air quality studies covering all emission sources. In particular the European motor industry has committed to reduce CO₂ emissions from new vehicles by 25% by 2008. There is considerable interest in developing technologies to improve the fuel efficiency of the European automotive fleet, such as direct injection gasoline engines, fuel cells, and hybrid vehicles powered with batteries and conventional engines.

GROSS INLAND CONSUMPTION GROWTH IN 2000

	Solid Fuels	Oil Products	Natural Gas	Total
Austria	10%	-1.9%	-6.4%	-0.6%
Belgium	8.2%	14.6%	3.7%	8.0%
Denmark	-13.9%	-5.2%	-0.9%	-4.5%
Finland	-37.9%	-0.8%	2.2%	-4.1%
France	-7.1%	-2.6%	6.8%	0.2%
Germany	-0.1%	-2.8%	2.8%	-0.6%
Greece	1.7%	4.3%	42.0%	4.8%
Ireland	-2.4%	-7.8%	16.3%	-1.7%
Italy	13.2%	-1.0%	11.5%	4.3%
Luxembourg	10.9%	5.8%	2.1%	4.9%
Netherlands	8.8%	2.4%	0.2%	2.2%
Portugal	1.5%	-3.8%	7.9%	0.5%
Spain	4.3%	1.7%	7.3%	3.4%
Sweden	3.5%	-3.5%	-2.1%	-6.5%
United Kingdom	0.9%	-2.5%	3.7%	-0.5%
European Union	0.9%	-0.9%	4.9%	0.8%

GROSS INLAND CONSUMPTION

Gross inland consumption increase since 1990 limited to 55% of GDP growth...

The gross inland energy consumption of the European Union (1442 Mtoe in 1999) increased slightly by 1.0% over the period 1990-99, notwithstanding a relative stabilisation between 1990-94 as a consequence of the economic recession in 1992-93. Driven by final demand that increased by 0.9% in 1999, gross inland energy consumption grew by 0.4%. Compared to 1995, which had the same climatic conditions, 1999 demand had increased by 5.8%. This comparison can be extended to the year 1990, 5% warmer than the years 1995 and 1999. Over the period 1990-99 gross inland consumption increased rather more slowly than GDP, presenting an implicit elasticity of about 0.55.

Natural gas covered 86% of additional gross inland consumption since 1990...

The pattern of energy consumption, which changed slowly over the period 1985-90, has been significantly modified since then. Since 1990 solid fuels have experienced a continuous decrease by about 3.9% per year on average, resulting from a 40 Mtoe fall in consumption by final users, a 37 Mtoe reduction by power generation and a 14 Mtoe reduction by the energy branch. After the stabilisation observed in 1998 due to a limited rebound of solid consumption in power stations, solid fuels consumption declined again by 6.0% in 1999; with reductions of 9.5 Mtoe or 6.2% in power stations and 2.5 Mtoe or 5.5% by final users. Their share in gross inland consumption was therefore reduced from 25.5% in 1985 to 22.8% in 1990 and only 14.5% in 1999. Oil products, driven by increasing consumption for transportation, showed an average yearly increase of 1.0% since 1990, signifying a stabilisation of their share at about 42%. After an increase by 2.3% in 1998 facilitated by lower oil prices, oil consumption declined by 1.0% in 1999 in reaction to increasing prices on international markets with the reduction of consumption mainly located in power stations and the energy branch. Natural gas consumption increased on average by 4.4% per year since 1990. Consequently its share grew to 22.7% in 1999 against only 16.9% in 1990. In 1999 gas consumption increased by 4.1% with 81% of additional consumption absorbed by power stations where consumption jumped by 13.6%! The other sources of energy, including nuclear, hydro, wind, net imports of electricity and other energy sources, increased steadily from 17.3% of total gross inland consumption in 1985 to 18.7% in 1990 and 21.4% in 1999, of which 15.3% for nuclear and 6.1% for renewables. But, since 1990, the contribution





GROSS INLAND CONSUMPTION

Mtoe	1985	1990	1995	1999	90/85	95/90	99/95	99/90	1985	1990	1995	1999
					Annual % change				Share in %			
Austria	23.7	25.7	26.4	28.4	1.6%	0.6%	1.8%	1.1%	1.9%	1.9%	1.9%	2.0%
of which Solids	4.0	4.2	3.2	3.0	1.0%	-5.0%	-1.5%	-3.5%	1.3%	1.4%	1.4%	1.4%
Oil	9.6	10.5	10.9	12.0	1.8%	0.7%	2.4%	1.5%	1.9%	1.9%	1.9%	2.0%
Natural Gas	4.6	5.2	6.3	6.8	2.6%	3.9%	1.9%	3.0%	2.3%	2.4%	2.3%	2.1%
Belgium	43.8	47.3	50.5	56.8	1.5%	1.3%	3.0%	2.1%	3.5%	3.6%	3.7%	3.9%
of which Solids	9.9	10.2	8.6	7.4	0.7%	-3.5%	-3.5%	-3.5%	3.1%	3.4%	3.6%	3.5%
Oil	17.3	17.7	19.8	22.5	0.4%	2.2%	3.3%	2.7%	3.4%	3.2%	3.4%	3.8%
Natural Gas	7.3	8.2	10.6	13.3	2.2%	5.4%	5.9%	5.6%	3.7%	3.7%	3.9%	4.1%
Denmark	19.6	18.2	20.6	20.4	-1.5%	2.5%	-0.3%	1.3%	1.6%	1.4%	1.5%	1.4%
of which Solids	7.4	6.1	6.4	4.6	-3.7%	1.1%	-7.9%	-3.0%	2.3%	2.0%	2.7%	2.2%
Oil	10.7	8.6	9.6	9.6	-4.3%	2.3%	0.2%	1.3%	2.1%	1.6%	1.7%	1.6%
Natural Gas	0.6	1.8	3.1	4.4	25.8%	11.8%	9.1%	10.6%	0.3%	0.8%	1.1%	1.3%
Finland	26.7	28.5	28.8	32.7	1.3%	0.3%	3.2%	1.6%	2.2%	2.2%	2.1%	2.3%
of which Solids	4.9	5.1	5.9	5.3	0.7%	3.2%	-3.0%	0.4%	1.5%	1.7%	2.5%	2.5%
Oil	10.2	9.9	8.3	9.9	-0.6%	-3.5%	4.4%	0.0%	2.0%	1.8%	1.4%	1.7%
Natural Gas	0.8	2.3	2.8	3.3	23.1%	4.7%	4.1%	4.4%	0.4%	1.0%	1.0%	1.0%
France	204.0	223.2	235.7	249.9	1.8%	1.1%	1.5%	1.3%	16.4%	16.9%	17.3%	17.3%
of which Solids	24.4	20.0	15.3	15.2	-3.9%	-5.2%	-0.2%	-3.0%	7.7%	6.6%	6.4%	7.2%
Oil	83.9	87.7	85.5	89.9	0.9%	-0.5%	1.3%	0.3%	16.4%	16.1%	14.9%	15.1%
Natural Gas	24.2	24.6	29.0	34.5	0.3%	3.3%	4.5%	3.8%	12.2%	11.1%	10.6%	10.5%
Germany	359.3	354.5	337.1	339.4	-0.3%	-1.0%	0.2%	-0.5%	28.9%	26.9%	24.7%	23.5%
of which Solids	148.0	131.5	92.2	80.6	-2.3%	-6.9%	-3.3%	-5.3%	46.8%	43.7%	38.8%	38.4%
Oil	120.5	124.0	133.6	132.9	0.6%	1.5%	-0.1%	0.8%	23.6%	22.7%	23.2%	22.3%
Natural Gas	49.6	55.0	66.4	72.0	2.1%	3.8%	2.0%	3.0%	25.0%	24.8%	24.3%	21.9%
Greece	18.3	22.2	24.1	26.8	3.9%	1.6%	2.6%	2.1%	1.5%	1.7%	1.8%	1.9%
of which Solids	6.1	8.1	8.8	8.5	5.9%	1.7%	-0.7%	0.6%	1.9%	2.7%	3.7%	4.1%
Oil	11.0	12.8	14.0	15.6	3.1%	1.7%	2.8%	2.1%	2.2%	2.4%	2.4%	2.6%
Natural Gas	0.1	0.1	0.0	1.2	14.0%	-20.4%	129.5%	27.4%	0.0%	0.1%	0.0%	0.4%
Ireland	8.8	10.3	11.0	13.9	3.0%	1.5%	6.0%	3.4%	0.7%	0.8%	0.8%	1.0%
of which Solids	2.6	3.5	2.9	2.5	6.5%	-3.9%	-3.3%	-3.6%	0.8%	1.2%	1.2%	1.2%
Oil	4.1	4.7	5.6	8.1	2.3%	3.7%	9.8%	6.3%	0.8%	0.9%	1.0%	1.4%
Natural Gas	1.9	1.9	2.3	3.0	-0.5%	4.3%	6.5%	5.2%	1.0%	0.9%	0.9%	0.9%
Italy	136.1	154.8	162.7	175.2	2.6%	1.0%	1.9%	1.4%	11.0%	11.7%	11.9%	12.1%
of which Solids	15.2	14.6	12.3	11.8	-0.7%	-3.4%	-1.1%	-2.4%	4.8%	4.9%	5.2%	5.6%
Oil	81.0	89.8	93.4	90.5	2.1%	0.8%	-0.8%	0.1%	15.8%	16.5%	16.2%	15.2%
Natural Gas	27.2	39.0	44.7	55.6	7.5%	2.7%	5.6%	4.0%	13.7%	17.6%	16.3%	16.9%
Luxembourg	3.1	3.6	3.3	3.4	2.5%	-1.2%	0.8%	-0.4%	0.3%	0.3%	0.2%	0.2%
of which Solids	1.4	1.1	0.5	0.1	-4.5%	-14.6%	-31.5%	-22.6%	0.4%	0.4%	0.2%	0.1%
Oil	1.1	1.6	1.8	2.1	8.8%	2.1%	4.7%	3.3%	0.2%	0.3%	0.3%	0.4%
Natural Gas	0.3	0.4	0.6	0.7	7.2%	5.3%	4.2%	4.8%	0.2%	0.2%	0.2%	0.2%
Netherlands	61.6	66.8	73.3	74.4	1.6%	1.9%	0.4%	1.2%	5.0%	5.1%	5.4%	5.2%
of which Solids	6.6	9.1	9.1	7.5	6.6%	-0.2%	-4.7%	-2.2%	2.1%	3.0%	3.8%	3.6%
Oil	20.4	24.4	27.2	28.0	3.7%	2.2%	0.7%	1.5%	4.0%	4.5%	4.7%	4.7%
Natural Gas	32.3	30.8	34.1	34.6	-1.0%	2.0%	0.4%	1.3%	16.3%	13.9%	12.5%	10.5%
Portugal	12.4	16.7	19.6	24.0	6.3%	3.2%	5.1%	4.1%	1.0%	1.3%	1.4%	1.7%
of which Solids	0.7	2.6	3.5	3.8	31.2%	6.3%	2.1%	4.4%	0.2%	0.9%	1.5%	1.8%
Oil	8.4	11.6	13.4	15.6	6.7%	3.0%	3.8%	3.3%	1.6%	2.1%	2.3%	2.6%
Natural Gas	0.0	0.0	0.0	1.9	0.0%	0.0%	-	-	0.0%	0.0%	0.0%	0.6%
Spain	73.9	89.1	102.3	117.5	3.8%	2.8%	3.5%	3.1%	6.0%	6.8%	7.5%	8.1%
of which Solids	19.5	18.9	19.5	20.1	-0.6%	0.6%	0.7%	0.7%	6.2%	6.3%	8.2%	9.6%
Oil	38.3	45.5	54.6	62.2	3.5%	3.7%	3.3%	3.5%	7.5%	8.3%	9.5%	10.4%
Natural Gas	2.4	5.0	7.7	13.3	16.1%	9.2%	14.5%	11.5%	1.2%	2.2%	2.8%	4.0%
Sweden	46.9	46.9	49.9	50.4	0.0%	1.2%	0.3%	0.8%	3.8%	3.6%	3.7%	3.5%
of which Solids	2.8	2.7	2.9	2.4	-0.5%	1.2%	-5.0%	-1.6%	0.9%	0.9%	1.2%	1.1%
Oil	17.6	14.5	15.7	15.6	-3.8%	1.6%	-0.1%	0.8%	3.4%	2.7%	2.7%	2.6%
Natural Gas	0.1	0.5	0.7	0.7	47.8%	5.0%	1.4%	3.4%	0.0%	0.2%	0.2%	0.2%
United Kingdom	203.6	211.5	218.5	229.2	0.8%	0.6%	1.2%	0.9%	16.4%	16.0%	16.0%	15.9%
of which Solids	62.8	63.3	46.6	36.9	0.2%	-5.9%	-5.7%	-5.8%	19.9%	21.0%	19.6%	17.6%
Oil	77.3	82.3	82.3	80.7	1.3%	0.0%	-0.5%	-0.2%	15.1%	15.1%	14.3%	13.6%
Natural Gas	46.6	47.2	65.0	82.9	0.2%	6.6%	6.3%	6.5%	23.6%	21.3%	23.8%	25.3%
European Union	1241.9	1319.2	1363.8	1442.4	1.2%	0.7%	1.4%	1.0%	100.0%	100.0%	100.0%	100.0%
of which Solids	316.1	301.2	237.7	209.7	-1.0%	-4.6%	-3.1%	-3.9%	100.0%	100.0%	100.0%	100.0%
Oil	511.4	545.8	575.6	595.3	1.3%	1.1%	0.8%	1.0%	100.0%	100.0%	100.0%	100.0%
Natural Gas	198.0	222.1	273.4	328.3	2.3%	4.2%	4.7%	4.4%	100.0%	100.0%	100.0%	100.0%





from renewables (2.3% per year for hydro and wind, 3.3% for biomass and 3.5% for geothermal) was growing more rapidly than nuclear (+2.3%). In the near future all the increase in the other sources of energy will be met only by renewables.

Preliminary balance for 2000 confirmed this recent evolution, except for solids...

Gross inland consumption increased by 0.9% in 2000 in line with the last decade's trend⁷. Of the five biggest energy-consuming Member States, gross inland consumption decreased in Germany (-0.6%) and in the United Kingdom (-0.5%); but increased in Italy (+4.3%), in Spain (+3.4%) and slightly in France (+0.2%) compared to 1999. In all remaining Member States gross inland energy consumption varied between -6.4% in Sweden and +8.0% in Belgium. The main trends included:

- an increase in hard coal consumption of 1.2%, contrary to the steady decrease observed in recent years;
- a decrease, for a second year in a row, in oil consumption of 0.9%;
- a substantial increase in natural gas of 4.9% due to the extension of the natural distribution network and greater use in electricity generation;
- a decrease in nuclear energy output of 2.0%.

Marked differences between Member States for specific reasons...

When looking at their energy consumption over the period 1990-99, Member States presented a very diverse pattern depending upon their economic activities, structural moves, policy measures, energy prices... The fastest growth in gross inland consumption - with annual rates above 2.1% over the period - was in Belgium and Greece (2.1%), Spain (3.1%), Ireland (3.4%) and Portugal (4.1%). But this observation must be correlated with the fact that GDP growth was in these countries, except Belgium, also higher than the European average, especially in the case of Ireland. Those with very modest growth, below the European average of 1.0%, were limited to the United Kingdom (0.9%), Sweden (0.8%), Luxembourg (-0.4%) and Germany (-0.5%). The last two reduced their consumption for specific reasons. The German situation is relatively atypical with a continuous slow decrease of about 0.4% in gross inland consumption since 1985 as a result of the restructuring of the economy with the reunification of the new Länder and a continuous effort to promote the rational use of energy. Luxembourg benefited from the conversion of its main industry, iron and steel, to a less energy consuming process - the electric arc furnace - combined with the fact that the major part of its electricity has been imported until now.

Power generation absorbed about 70% of solid fuels consumption in 1999, and the energy branch 19%...

The **use of solid fuels** decreased in most Member States and sectors over the period 1990-99. The slow-down was particularly noticeable in Germany and the United Kingdom with respective reductions of 67 Mtoe and 26 Mtoe. Both are historically identified as major coal mining countries and absorbed about 67% of total European consumption in 1985 and still 65% in 1990. The in-depth restructuring of the mining industry has reduced market protection in these countries and opened the door for competition with gas, oil products, and even imported coal. As a consequence, the reduction of consumption has reached 44% in these two countries since 1985 and, in 1999, their share was limited to 56% of total European consumption. On the contrary, since 1990, coal consumption has slightly increased in Finland (+0.4% per year on average), Greece (+0.6%), Spain (0.7%) and Portugal (+4.4%) with growth mainly located in the power sector. In 1999, major increases occurred in Spain (+13.0%) and Portugal (+19.5%). Across the European Union, the consumption of solid fuels is increasingly concentrated in power generation whose share increased from 54% in 1985 to 60% in 1990 and 69% in 1999. The energy branch, principally the coke oven industry, absorbed the remaining 19% and final consumers 12%.

Motor fuels and petrochemical feedstock accounted for two thirds of total oil consumption in 1999...

Total oil demand has steadily increased by 1.0% yearly since 1990, a little slower than between 1985 and 1990. The consumption growth between 1990-99 reached 51 Mtoe in the transport sector, an increase equal to the total increase of oil consumption. Non-energy uses also increased substantially with the development of petrochemical industries: 13 Mtoe since 1990. Other changes were more marginal with a limited increase from the energy branch (+2 Mtoe) but reductions in all other sectors: tertiary-domestic (-3 Mtoe), power generation sector (-5 Mtoe) and industry (-7 Mtoe). Consumption of heating gas oil, declining since 1996, remained stable compared to the 1990 level. Although demand for LPG and gasoline also remained stable since 1990, kerosene increased by 16 Mtoe or 50%, naphtha by 8 Mtoe or 25%, diesel oil by 37 Mtoe or 38% whilst residual fuel oil declined by 18 Mtoe or 21%. This means that the European oil market is becoming increasingly captive, with specific markets (transport and petrochemicals) accounting for 64% of total oil demand in 1999 against 58% in 1990 and only 50% in 1985.

⁷ Simple arithmetical average. Source: Eurostat.





Natural gas, the emerging fuel of the 1990s, was gaining market shares in all Member States...

Primary consumption of natural gas increased by about 4.4% per year since 1990, demonstrating continuous growth. Increases were spectacular in the three main markets: the power sector (+159% or +49 Mtoe), the tertiary-domestic market (+38% or +38 Mtoe) and industry (+27% or +18 Mtoe). Since 1990 natural gas demand grew the fastest amongst the primary fossil fuels and in all Member States, except Ireland and the Netherlands where oil products came first. Excepting Greece and Portugal, where the development of gas use was just commencing, the fastest growth in 1999 occurred in countries where the natural gas market was already mature: Spain (+11.5%), Denmark (+10.6%), the United Kingdom (+6.5%) and Belgium (+5.6%). Well-developed infrastructures provide natural gas the opportunity to compete in all markets and to take advantage of competitive prices and increasing environmental pressures.

All renewable energy forms increased substantially since 1990...

Other fuels increased regularly by 2.4% per year since 1990 against a 2.9% growth between 1985 and 1990. Before 1990, the major growth was provided by nuclear supported by a rapid rise of installed capacity. Since 1990, increasing capacity utilisation rates of existing reactor units have compensated for limited new nuclear investment. But, in 1998, the first reduction of nuclear capacity at the EU level caused a significant break with this historic trend. Even the jump by 5.2% observed in 1999 will not offset the expected decline of the nuclear contribution in the near future as the utilisation factor is near to its maximum and no new investments have been announced to offset future reactor decommissioning. Although the contribution of hydro increased slowly over this period depending on rainfall, other renewable energy sources have increased substantially since 1990. The most spectacular growth concerned wind, even though its overall contribution still remained marginal. The biomass contribution grew by 3.3% per year on average over the period 1990-99, the two main markets being power generation and direct use in the tertiary-domestic sector.

INDIGENOUS PRODUCTION

Indigenous production, pushed by nuclear, oil and natural gas, peaked at 770 Mtoe in 1999...

Domestic production of primary energy in the European Union as a whole increased by 2.3% in 1999. After a continuous decrease between 1986 and 1992, production rebounded sharply with an accelerating growth rate: 2.1% in 1994, 2.5% in 1995 and 3.7% in

1996. Primary production declined slowly in 1997 and 1998, the reduction of solids and natural gas production not being compensated by oil and other non-fossil production. In 1999, primary production, pushed by nuclear, oil and natural gas, reached a new peak since 1985 of 770 Mtoe. In 1999 four countries contributed 78% of total primary energy production: the United Kingdom with 36%, Germany with 18%, France with 16% and the Netherlands with 8%.

Solid fuels output has declined quite rapidly with a reduction of about 47% since 1990, the production both of steam coal and lignite falling at similar rates. Major producers were Germany (57% of the European production in 1999) and the United Kingdom (21%), followed by much smaller producers: Spain, Greece and France.

United Kingdom and Denmark contributed 91% of EU crude oil production

Oil production, marked by a significant decline between 1985 and 1990, showed an annual increase of 6.2% between 1990 and 1995 (driven by the application of more efficient and economical methods for offshore exploitation) and reached a new peak in 1995 at 159 Mtoe. In 1996 and 1997 production remained stable but increased again in 1998 and 1999 to reach a new peak of 168 Mtoe. Despite a period of low oil prices, technological changes leading to reduced costs have made small field development profitable. The use of floating platforms, instead of fixed steel ones, is an example of such cost reduction. Consequently, satellite developments from existing fields have been a significant contributor to enlarged European production in the North Sea. Virtually all the production was located in the North Sea where the two main producers operated: the United Kingdom (83% of European Union production) and Denmark (9%).

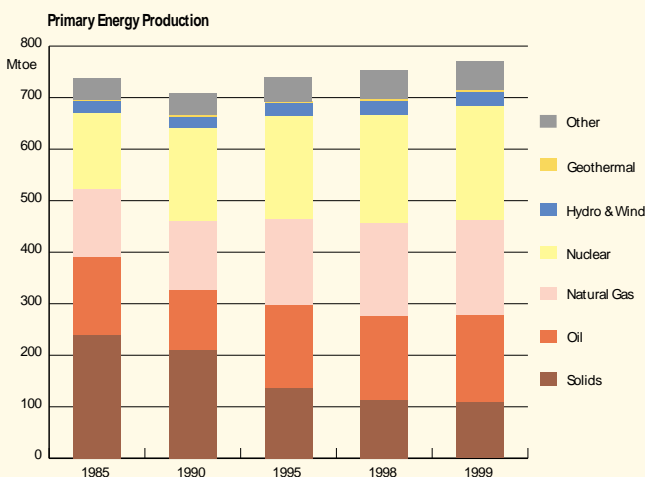
Higher United Kingdom gas production largely compensated for a reduction in the Netherlands...

Natural gas became the second energy source in Europe and contributed 24% of total primary production in 1999 with a continuous increase of 3.8% a year over the period 1990-99. The increase in natural gas production was impressive, particularly with a rise of 4.4% in 1995 and 13.2% in 1996. This trend was mainly sustained by the United Kingdom, the largest European gas producer since 1995, which has more than doubled its production since 1990. The Netherlands, which played the role of swing producer with its major Groningen gas field, characterised by very low production costs, reduced its production since 1996 when it peaked at 68.34 Mtoe. In the last three years, faced with warmer weather conditions limiting demand for heating and



increasing competition from other gas suppliers, the Netherlands played this swing role by reducing its export deliveries to other European countries by respectively 18.3%, 10.1% and 13.9%. The two main producers in 1999 were the United Kingdom (48% of total European production) and the Netherlands (29%). Germany contributed 9% of EU production in 1999, increasing its production by 2.2% a year since 1990; Italy contributed 8% having stabilised its production since 1990; and Denmark accounted for 4% with production growing on average by 11% a year since 1990 in parallel with the development of oil production in North Sea.

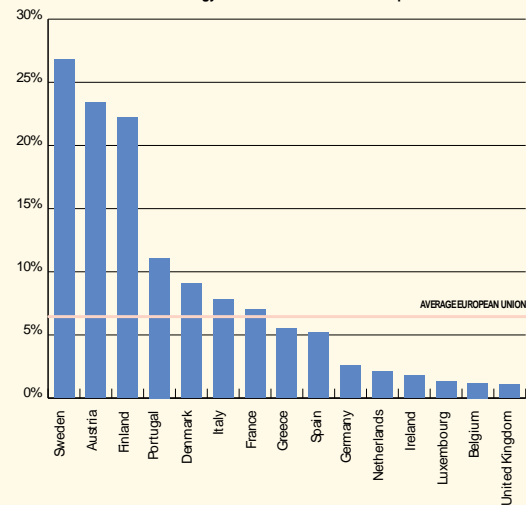
Nuclear still remained the main energy source in Europe (29.0% total primary production), with an increase of 2.2% a year over the period 1990-99; but the prospects for further increases are very limited. A first decline in capacity and output was observed in 1998, which is expected to continue given the projected plant decommissioning programmes.



Renewable energy covered 11% of primary production and 6% of gross inland consumption...

In 1999, considering the spectacular 11% jump observed in 1997 (related to some statistical accounting changes regarding biomass production in Italy and Germany), the contribution of **renewable energy** sources represented 11.2% of total EU primary energy production and 6.0% of gross inland consumption. Hydroelectricity and wind energy output both increased regularly since 1990 but in particular in 1997 and 1998, representing 3.6% of primary production in 1999 against 3.2% in 1990. Geothermal energy remained marginal but the prospects for the near future were favourable with Italian production expected to almost double. Finally, biomass - use of which grew both for power generation mainly in the northern countries and for direct use mainly in

Shares of Renewable Energy Sources in Gross Inland Consumption - 1999



the domestic sector - showed an acceleration in output since 1990 to reach 7.3% of total primary production in 1999. The situation varies widely between Member States. Renewable energy sources are mainly used in Sweden, Austria, Finland and Portugal with a national share of gross inland consumption ranging between 13.1% and 26.9%. They are also used significantly in Denmark, Italy, France, Spain and Greece, with a share of between 5% and 9%. Their use remained almost negligible in the other Member States.

Current trends show that considerable progress in renewable energy technologies has been achieved in recent years, in particular for wind. Costs are falling rapidly and many renewables, under the right conditions, have reached or are approaching economic viability. Some technologies - in particular biomass, small hydro and wind - are currently fairly competitive and economically viable compared with other decentralised applications that are becoming more strategic in the context of a liberalised energy market. The Commission adopted a Community Strategy and Action Plan directed towards the goal of achieving a 12% share of renewables in European Union primary energy consumption by 2010, an ambitious but perhaps realistic approach. This overall target of doubling the share of renewables could be an important route to securing CO₂ emissions reduction, lowering energy import dependence, developing new industries and creating jobs.





RENEWABLE ENERGY SOURCES IN 1999

Ktoe	Hydro	Wind	Solar	Geoth	Biomass	Other	Total	Contribution of Renewable
Production = Gross Inland Consumption								
Austria	3496	4	62	12	3068	0	6643	23.3%
Belgium	29	1	1	2	673	133	839	1.5%
Denmark	3	260	8	1	1576	0	1848	8.6%
Finland	1099	4	0	0	6158	65	7326	22.5%
France	6262	3	18	117	11153	0	17553	7.2%
Germany	1689	475	78	10	6479	1211	9942	2.9%
Greece	416	14	124	2	913	0	1470	5.7%
Ireland	73	16	0	0	167	0	257	2.1%
Italy	3901	35	11	2801	6904	55	13706	8.2%
Luxembourg	8	2	0	0	36	0	46	1.4%
Netherlands	8	55	7	0	1476	254	1801	2.4%
Portugal	625	11	18	70	1933	81	2737	13.1%
Spain	1966	236	29	5	3894	75	6205	5.8%
Sweden	6166	32	5	0	7272	81	13556	26.9%
United Kingdom	460	77	7	1	2035	46	2626	1.2%
European Union	26202	1225	369	3021	53735	2000	86553	6.1%
Inputs to Power Generation Production								
Austria	3496	4	0	0	589	60	4149	54.0%
Belgium	29	1	0	0	349	133	512	2.7%
Denmark	3	260	0	0	1118	0	1381	13.6%
Finland	1099	4	0	0	1607	56	2767	19.3%
France	6262	3	0	0	1745	0	8011	7.4%
Germany	1689	475	0	0	1825	1211	5200	4.2%
Greece	416	14	0	0	2	0	432	4.6%
Ireland	73	16	0	0	32	0	121	2.8%
Italy	3901	35	0	2588	541	55	7119	15.1%
Luxembourg	8	2	0	0	20	0	30	29.0%
Netherlands	8	55	0	0	1160	254	1477	7.9%
Portugal	625	11	0	70	242	81	1029	18.0%
Spain	1966	236	0	0	501	75	2777	7.3%
Sweden	6166	32	0	0	2817	81	9096	33.9%
United Kingdom	460	77	0	0	1170	0	1707	2.4%
European Union	26202	1225	0	2658	13718	2007	45810	10.9%
Final Energy Consumption								
Austria	0	0	62	12	2479	-60	2494	10.9%
Belgium	0	0	1	2	324	0	326	0.9%
Denmark	0	0	8	1	458	0	467	3.1%
Finland	0	0	0	0	4550	9	4559	19.7%
France	0	0	18	117	9407	0	9542	6.6%
Germany	0	0	78	10	4654	0	4742	2.1%
Greece	0	0	124	2	911	0	1037	6.0%
Ireland	0	0	0	0	135	0	136	1.6%
Italy	0	0	11	213	6363	0	6587	5.4%
Luxembourg	0	0	0	0	15	0	15	0.5%
Netherlands	0	0	7	0	316	0	323	0.7%
Portugal	0	0	18	0	1690	0	1708	11.6%
Spain	0	0	29	5	3394	0	3428	5.1%
Sweden	0	0	5	0	4455	0	4460	13.3%
United Kingdom	0	0	7	1	866	46	919	0.6%
European Union	0	0	369	363	40017	-6	40744	4.4%





COMPETITIVENESS: Recent evolution (1985-1999)

- Energy intensity improved by 0.8% per year between 1990 and 1999, with similar weather conditions
- Major gains originated from industry and power generation...
- ...but individual activities (heating, transport...) did not contribute to the overall improvement
- Large variations between Member States for various reasons
- Energy consumption per capita continued to increase by 0.7% per year since 1990, mainly in southern countries
- European energy prices, especially tax levels, penalised competitiveness compared to the United States

COMPETITIVENESS

Energy intensity improved by 0.8% per year between 1990 and 1999, with similar weather conditions...

The European Union continuously improved its overall energy intensity (as measured by energy use per unit of GDP) over the period 1985-1999 (-1.8% per year between 1985 and 1990 and -0.8% annually between 1990 and 1998) with a marked improvement by 2.1% in 1999. As already mentioned, the comparison between 1990 and these last three years is of particular interest as these three years were characterised by similar weather conditions. On the contrary, the degree-days were 32% higher in 1985 than in 1990, meaning that the energy intensity improvement over this period was heavily influenced by the significant reduction of heating requirements in 1990 compared to 1985.

Major gains originated from industry and power generation...

Intensity improvements in industry since 1990 (-1.9% per year on average) and power generation (-0.6% per year on average) were the main drivers in reducing the overall energy intensity. The performance of industry is particularly surprising as it had already made major contributions during the 1980s as a result of the restructuring from energy-intensive industry to small and medium companies characterised by higher added-value and less energy content. This phenomenon has continued in the present decade but to a lesser extent. Technological improvements are increasingly becoming the driving force for energy savings in industry. This also applies to the power sector which, despite a continuous increase in its output, succeeded in improving its energy intensity since 1990 thanks to spectacular efficiency gains. These are linked to the technological improvement of conventional units (supercritical units...), the emergence of combined cycle units and continuous development of combined heat and power production that permitted an increase in the average ther-

Main items

Energy costs within the European Union remain high compared with those enjoyed by many of its international trading competitors. The progressive liberalisation of electricity and gas markets is exerting downward pressure on prices, as is the growing use of imported coal. Much oil is now consumed in the transport sector where taxes and excise duties account for a high proportion of final product prices, especially for road transport fuels. The power generation sector has significantly improved its thermal efficiency over the past decade. Energy intensity continues to decline, though at a somewhat slower rate in some final use sectors given lower energy prices and thus reduced market incentives. But the scope for cost-effective energy efficiency improvements remains large. In the future progress will be propelled by competition, technological change and by the steady replacement of existing, less-efficient, energy-using equipment - particularly, but not only, in the likely accession countries.

mal efficiency from 36.9% in 1990 to 39.9% in 1999. It must be stressed that the major intensity improvements have occurred in sectors where competitiveness was playing a major role.

...but individual activities (heating, transport...) did not contribute to the overall improvement

On the other hand, the energy intensity of the tertiary-domestic sector decreased slowly (-0.5% per year on average) between 1990 and 1999 with two contrasting trends: a reduction of energy intensity in the domestic sector mainly since 1996 and a stabilisation of energy intensity in services since 1990. The increasing commercial and services floor area arising from the sustained economic growth of all parts of the services sector (market services, non market services and trade) largely explains why energy con-





sumption grew at the same rate as total GDP. Given that services activity has grown much more rapidly than GDP as a whole since 1990 (3.2% per year on average against 1.8%), this means in fact that the energy intensity of services related to their own activity improved by 1.4 % per year since 1990. On the other hand, household incomes increased by only 2.1% since 1990, a little faster than GDP as a whole. Energy intensity of households related to household incomes improved by 1% per year since 1990. The growing number of households (as the average family size was declining), combined with the reduction of price incentives to use energy rationally, together offset part of the gains provided by technological improvements (computer optimised building services, high efficiency boilers, improved thermal characteristics of new buildings, reduction in the specific consumption of all electrical appliances...). In many cases, returns on energy savings investment became too low, in a context of low energy prices, to incentivise decisions by a large number of individual consumers.

The conclusion is quite similar for the transport sector. Although energy intensity still increased by 0.3% per year on average in the period 1990-99, the first signs of stabilisation appeared in 1993. Energy intensity declined by 2.5% in 1994 and has remained broadly stable since then. This occurred despite an increase in goods transport (about 2.9% per year on average with a marked acceleration in the last two years). This coincided with a stabilisation of the road contribution and, on the other hand, a growth of passenger traffic (about 2.0% per year on average with a jump by 3.0% in 1999). The number of passenger cars also continued to grow by 1.9% per year on average between 1990 and 1999 but the average mileage per vehicle remained stable. In the absence of statistical information of energy consumption by use (goods transport vs. passenger transport), the improvement can be associated in a first approximation to the improved efficiency of new

vehicles, in particular passenger cars, and better management of traffic flows.

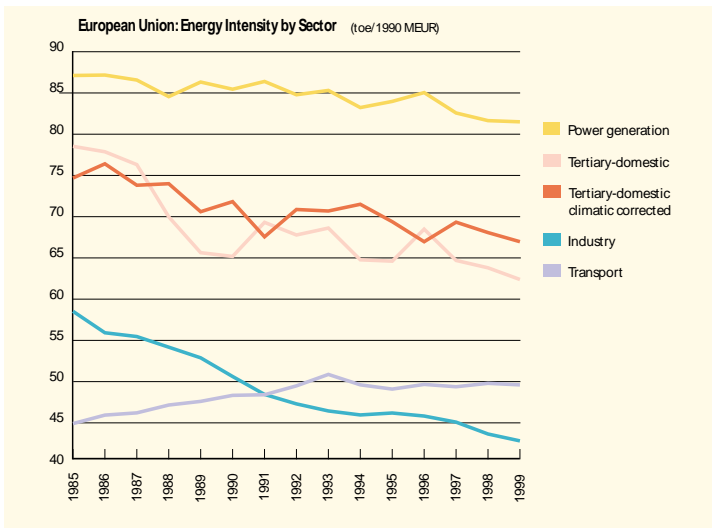
Large variations between Member States for various reasons...

Between 1990 and 1999, which have the advantage of offering comparable climatic conditions at the European level, (very warm weather), five Member States, four of which are located in the extreme south of Europe (Greece, Portugal, Spain and Italy), showed increasing or stable energy intensity. For these southern countries this evolution is the result of higher economic growth mainly based on strong industrialisation and improved living standards. In the case of Belgium, the fifth one, it is associated with poor performance in the transport sector and tertiary-domestic sectors even though major improvements occurred in 1999. At the same time, other Member States reduced their energy intensity. Luxembourg, helped by the conversion of its steel industry to electric arc furnaces, Ireland sustained by strong industrial growth oriented to high added value industries, and Germany assisted by the restructuring of the new Länder, are the best performers in both the short and long term.

Energy consumption per capita continued to increase by 0.6% per year since 1990, mainly in southern countries...

Considering the differences in living standards and space heating requirements (where geography is the key element), Portugal had the lowest **energy consumption per capita** in 1999 with 2.40 toe/inhabitant; while Finland had the highest with 6.33 toe/inhabitant, or just under three times more. This was excluding Luxembourg whose data is not representative due to the weight of the iron and steel industry in this small country and the importance of motor fuel purchases by drivers from neighbouring Member States. Over the period 1990-99, energy consumption per capita was increasing in all Member States, with the exception of Germany and Luxembourg. The European average growth reached 0.6% per year. Portugal has been increasing its per capita consumption three times faster than Finland, reducing the gap between extremes. In recent years energy consumption per capita grew faster in southern countries as well as in Ireland and Belgium.

Oil consumption per capita is characterised by a convergence between all the Member States, except Belgium, Ireland and Luxembourg, to the European average (1.58 toe per capita) which increased by 0.6% per year since 1990. This resulted from the progressive concentration of oil consumption on its captive markets: motor fuels and petrochemicals. Per capita gas consumption has been increasing significantly in all Member States driven by demand from power generation, industry and the tertiary-domes-





MAIN INDICATORS

	1985	1990	1995	1997	1998	1999	90/85	95/90	98/95	99/98	99/90
							Annual % Change				
Austria											
Gross inl. Cons./GDP (toe/1990 MEUR)	220,5	204,3	190,4	199,0	194,8	186,6	-1,5%	-1,4%	0,8%	-4,2%	-1,0%
Gross Inl. Cons./Capita (Kgoe/inhabitant)	3123,7	3319,0	3277,1	3528,5	3563,5	3504,3	1,2%	-0,3%	2,8%	-1,7%	0,6%
Electricity Generated/Capita (Kwh/inhabitant)	5913,9	6576,6	7031,2	7041,6	7108,0	7458,8	2,1%	1,3%	0,4%	4,9%	1,4%
Belgium											
Gross inl. Cons./GDP (toe/1990 MEUR)	329,6	305,9	306,2	319,7	318,3	313,3	-1,5%	0,0%	1,3%	-1,6%	0,3%
Gross Inl. Cons./Capita (Kgoe/inhabitant)	4447,9	4741,9	4977,5	5413,7	5509,1	5558,8	1,3%	1,0%	3,4%	0,9%	1,8%
Electricity Generated/Capita (Kwh/inhabitant)	5813,5	7106,5	7341,1	7747,4	8157,0	8263,8	4,1%	0,7%	3,6%	1,3%	1,7%
Denmark											
Gross inl. Cons./GDP (toe/1990 MEUR)	213,8	179,2	179,2	178,2	169,8	160,2	-3,5%	0,0%	-1,8%	-5,7%	-1,2%
Gross Inl. Cons./Capita (Kgoe/inhabitant)	3833,8	3541,7	3936,3	4086,6	3988,3	3829,6	-1,6%	2,1%	0,4%	-4,0%	0,9%
Electricity Generated/Capita (Kwh/inhabitant)	5679,6	5010,4	7036,0	8383,6	7751,4	7305,9	-2,5%	7,0%	3,3%	-5,7%	4,3%
Finland											
Gross inl. Cons./GDP (toe/1990 MEUR)	297,2	268,1	279,2	285,1	275,2	261,2	-2,0%	0,8%	-0,5%	-5,1%	-0,3%
Gross Inl. Cons./Capita (Kgoe/inhabitant)	5448,6	5708,1	5647,0	6333,2	6423,0	6334,9	0,9%	-0,2%	4,4%	-1,4%	1,2%
Electricity Generated/Capita (Kwh/inhabitant)	10139,7	10903,0	12505,1	13456,2	13613,5	13439,3	1,5%	2,8%	2,9%	-1,3%	2,4%
France											
Gross inl. Cons./GDP (toe/1990 MEUR)	251,5	237,4	238,8	239,1	238,4	230,9	-1,1%	0,1%	-0,1%	-3,1%	-0,3%
Gross Inl. Cons./Capita (Kgoe/inhabitant)	3689,9	3933,9	4054,0	4148,6	4260,0	4229,5	1,3%	0,6%	1,7%	-0,7%	0,8%
Electricity Generated/Capita (Kwh/inhabitant)	6226,7	7404,2	8507,6	8593,1	8670,6	8856,8	3,5%	2,8%	0,6%	2,1%	2,0%
Germany											
Gross inl. Cons./GDP (toe/1990 MEUR)	315,0	273,2	239,8	240,4	235,2	228,1	-2,8%	-2,6%	-0,7%	-3,0%	-2,0%
Gross Inl. Cons./Capita (Kgoe/inhabitant)	4626,5	4466,8	4127,6	4207,6	4201,5	4136,3	-0,7%	-1,6%	0,6%	-1,6%	-0,9%
Electricity Generated/Capita (Kwh/inhabitant)	6706,5	6913,5	6565,5	6721,0	6786,4	6768,4	0,6%	-1,0%	1,1%	-0,3%	-0,2%
Greece											
Gross inl. Cons./GDP (toe/1990 MEUR)	308,4	340,9	347,7	348,1	354,9	341,9	2,0%	0,4%	0,7%	-3,7%	0,0%
Gross Inl. Cons./Capita (Kgoe/inhabitant)	1845,9	2189,3	2309,1	2439,1	2556,5	2538,0	3,5%	1,1%	3,5%	-0,7%	1,7%
Electricity Generated/Capita (Kwh/inhabitant)	2791,8	3444,2	3973,9	4143,2	4402,6	4725,6	4,3%	2,9%	3,5%	7,3%	3,6%
Ireland											
Gross inl. Cons./GDP (toe/1990 MEUR)	322,4	285,9	228,5	212,8	208,7	202,7	-2,4%	-4,4%	-3,0%	-2,9%	-3,8%
Gross Inl. Cons./Capita (Kgoe/inhabitant)	2494,6	2924,0	3061,2	3345,6	3506,1	3712,9	3,2%	0,9%	4,6%	5,9%	2,7%
Electricity Generated/Capita (Kwh/inhabitant)	3414,1	4139,5	4958,2	5452,0	5686,8	5887,5	3,9%	3,7%	4,7%	3,5%	4,0%
Italy											
Gross inl. Cons./GDP (toe/1990 MEUR)	182,9	179,7	178,7	178,9	180,5	180,3	-0,3%	-0,1%	0,3%	-0,1%	0,0%
Gross Inl. Cons./Capita (Kgoe/inhabitant)	2404,0	2729,1	2839,0	2922,1	2996,9	3038,7	2,6%	0,8%	1,8%	1,4%	1,2%
Electricity Generated/Capita (Kwh/inhabitant)	3281,4	3823,3	4213,5	4371,5	4510,3	4607,6	3,1%	2,0%	2,3%	2,2%	2,1%
Luxembourg											
Gross inl. Cons./GDP (toe/1990 MEUR)	448,1	419,7	325,8	296,7	276,0	269,6	-1,3%	-4,9%	-5,4%	-2,3%	-4,8%
Gross Inl. Cons./Capita (Kgoe/inhabitant)	8548,5	9300,5	8140,5	7960,2	7677,3	7953,6	1,7%	-2,6%	-1,9%	3,6%	-1,7%
Electricity Generated/Capita (Kwh/inhabitant)	2560,2	3610,7	3028,5	2992,3	3057,2	2374,1	7,1%	-3,5%	0,3%	-22,3%	-4,6%
Netherlands											
Gross inl. Cons./GDP (toe/1990 MEUR)	320,9	300,2	297,0	284,0	272,7	260,6	-1,3%	-0,2%	-2,8%	-4,5%	-1,6%
Gross Inl. Cons./Capita (Kgoe/inhabitant)	4250,2	4468,9	4744,7	4806,3	4775,6	4707,2	1,0%	1,2%	0,2%	-1,4%	0,6%
Electricity Generated/Capita (Kwh/inhabitant)	4342,1	4803,8	5243,2	5550,3	5800,4	5480,9	2,0%	1,8%	3,4%	-5,5%	1,5%
Portugal											
Gross inl. Cons./GDP (toe/1990 MEUR)	297,2	308,2	332,1	328,8	337,2	351,3	0,7%	1,5%	0,5%	4,2%	1,5%
Gross Inl. Cons./Capita (Kgoe/inhabitant)	1234,2	1691,6	1978,1	2102,5	2233,1	2399,3	6,5%	3,2%	4,1%	7,4%	4,0%
Electricity Generated/Capita (Kwh/inhabitant)	1908,3	2879,5	3353,9	3438,8	3910,0	4331,7	8,6%	3,1%	5,2%	10,8%	4,6%
Spain											
Gross inl. Cons./GDP (toe/1990 MEUR)	235,9	223,7	240,3	234,1	235,0	238,9	-1,1%	1,4%	-0,7%	1,6%	0,7%
Gross Inl. Cons./Capita (Kgoe/inhabitant)	1923,8	2292,9	2608,6	2698,2	2822,1	2980,1	3,6%	2,6%	2,7%	5,6%	3,0%
Electricity Generated/Capita (Kwh/inhabitant)	3314,4	3905,0	4260,1	4837,2	4974,2	5302,4	3,3%	1,8%	5,3%	6,6%	3,5%
Sweden											
Gross inl. Cons./GDP (toe/1990 MEUR)	290,6	259,6	269,7	263,6	243,8	244,8	-2,2%	0,8%	-3,3%	0,4%	-0,6%
Gross Inl. Cons./Capita (Kgoe/inhabitant)	5621,6	5484,8	5655,4	5691,4	5449,1	5694,2	-0,5%	0,6%	-1,2%	4,5%	0,4%
Electricity Generated/Capita (Kwh/inhabitant)	16421,4	17114,7	16804,1	16882,0	17879,0	17535,3	0,8%	-0,4%	2,1%	-1,9%	0,3%
United Kingdom											
Gross inl. Cons./GDP (toe/1990 MEUR)	312,9	277,2	268,3	257,5	259,2	252,6	-2,4%	-0,6%	-1,1%	-2,6%	-1,0%
Gross Inl. Cons./Capita (Kgoe/inhabitant)	3591,8	3675,0	3734,2	3777,8	3889,1	3852,2	0,5%	0,3%	1,4%	-0,9%	0,5%
Electricity Generated/Capita (Kwh/inhabitant)	5257,7	5540,5	5709,2	5862,2	6121,5	6163,5	1,1%	0,6%	2,4%	0,7%	1,2%
European Union											
Gross inl. Cons./GDP (toe/1990 MEUR)	271,7	248,2	240,0	238,3	236,1	231,3	-1,8%	-0,7%	-0,5%	-2,1%	-0,8%
Gross Inl. Cons./Capita (Kgoe/inhabitant)	3461,3	3619,2	3666,2	3770,3	3832,9	3832,0	0,9%	0,3%	1,5%	0,0%	0,6%
Electricity Generated/Capita (Kwh/inhabitant)	5342,8	5914,0	6258,6	6485,9	6651,1	6725,0	2,1%	1,1%	2,0%	1,1%	1,4%





tic sectors. Between 1990 and 1999 this per capita consumption increased by 43% at the European level. It compensated the 32% decline in per capita solid fuels consumption since 1990.

European energy prices, especially tax levels, penalised competitiveness compared to the United States...

As already mentioned, the average prices of energy for industry since 1990 show an average yearly decrease of 5.4% for steam coal, 0.1% for heavy oil, 2.9% for natural gas and 3.3% for electricity using a weighted average at the European level. Prices of heavy fuel oil and natural gas were heavily influenced by the evolution of crude oil prices on international markets. In addition very large variations exist between Member States as a result of differences in taxation regimes, excise duties and VAT. Compared with the prices of the main competitors inside the OECD - the United States and Japan - it is clear that US prices are well below Europe's. Japanese prices are closer to those in the EU for heavy

fuel oil but twice those for gas and electricity. If the European average for heavy fuel oil equalled 100 in 1999, the US value was 55 (a marked accentuation of the difference since 1990), and the Japanese 83, closer to the European average but now well below while it was 37% higher in 1990. For natural gas, the respective ratios were 72 for the United States, stable since 1996, and 223 for Japan. Finally, for electricity the ratios were 59 for the United States, declining since 1992 as a result of the progressive liberalisation in the USA, and 198 for Japan as in 1998. US figures reflect low prices observed in liberalised and competitive markets, especially for gas and electricity. Additionally, tax levels are also considerably lower in the USA - the opposite of the Japanese situation.

INDUSTRIAL CONSUMERS - ENERGY PRICES COMPARISON (1)

	1985	1988	1990	1997	1998	1999	90/85	97/90	98/97	99/98	99/90
EUR90/toe							Annual % Change				
Heavy fuel oil											
France	288.2	98.7	110.2	98.4	79.6	96.5	-17.5%	-1.6%	-19.1%	21.2%	-1.5%
Germany	284.5	96.1	115.0	na	na	na	-16.6%	na	na	na	na
Italy	131.9	74.6	65.8	63.0	54.5	46.1	-13.0%	-0.6%	-13.6%	-15.4%	-3.9%
United Kingdom	293.4	109.6	108.1	106.3	88.0	100.7	-18.1%	-0.2%	-17.2%	14.5%	-0.8%
European Union average	304.6	108.6	123.2	122.7	102.0	122.4	-16.6%	-0.1%	-16.9%	20.0%	-0.1%
United States	157.9	74.0	89.3	78.6	55.8	67.4	-10.8%	-1.8%	-29.0%	20.8%	-3.1%
Japan	337.2	149.5	155.8	115.1	105.3	101.4	-14.3%	-4.2%	-8.6%	-3.7%	-4.7%
Natural gas											
France	271.1	123.2	122.2	111.9	106.9	103.3	-14.7%	-1.2%	-4.5%	-3.4%	-1.9%
Germany	284.0	127.8	147.7	133.0	123.1	100.2	-12.3%	-1.5%	-7.4%	-18.6%	-4.2%
Italy	303.0	88.3	150.9	143.3	126.5	156.6	-13.0%	-0.7%	-11.7%	23.8%	0.4%
United Kingdom	212.3	152.2	124.9	69.8	71.2	70.3	-10.1%	-8.0%	2.0%	-1.2%	-6.2%
European Union average	262.6	121.0	127.6	118.9	110.7	97.9	-13.4%	-1.0%	-6.9%	-11.5%	-2.9%
United States	145.2	99.0	87.5	86.7	75.1	70.5	-9.6%	-0.1%	-13.4%	-6.1%	-2.4%
Japan	580.9	351.9	325.1	279.8	230.7	218.5	-11.0%	-2.1%	-17.6%	-5.3%	-4.3%
Electricity											
France	599.3	517.2	516.5	415.3	398.7	384.9	-2.9%	-3.1%	-4.0%	-3.5%	-3.2%
Germany	833.2	880.0	835.3	584.7	551.0	522.3	0.0%	-5.0%	-5.8%	-5.2%	-5.1%
Italy	271.7	86.9	123.7	158.4	141.7	118.4	-14.6%	3.6%	-10.6%	-16.4%	-0.5%
United Kingdom	777.3	711.0	648.1	515.0	494.2	485.1	-3.6%	-3.2%	-4.0%	-1.8%	-3.2%
European Union average	739.1	669.2	642.1	515.3	498.1	475.5	-2.8%	-3.1%	-3.4%	-4.5%	-3.3%
United States	577.1	464.2	438.4	327.1	292.8	279.3	-5.3%	-4.1%	-10.5%	-4.6%	-4.9%
Japan	1536.2	1248.0	1120.1	1023.2	964.6	941.4	-6.1%	-1.3%	-5.7%	-2.4%	-1.9%

(1) Excluding Refundable VAT





ENVIRONMENT: Recent evolution (1985-1999)

- No growth of CO₂ emissions in the European Union between 1990 and 1999
- Major improvements in Germany and the United Kingdom offset increases in other Member States
- Climatic conditions were not uniform across the European Union
- Improvements in industry and power sector offset increases in the transport sector
- New trends emerging in the last two years
- Transport, about to become the largest contributor, accounted for 29% of total CO₂ emissions in 1999
- SO₂ (-52%) and NO_x (-20%) emissions declined substantially between 1990 and 1997

ENVIRONMENT

No growth of CO₂ emissions in the European Union between 1990 and 1999...

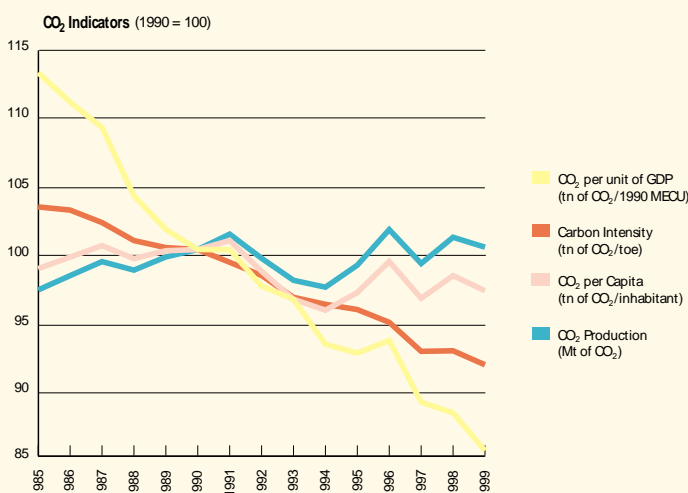
CO₂ emissions indicators are of foremost importance in the current political debate. To facilitate international comparisons, the calculation of total emissions was done on an indicative basis, using common emissions factors by energy aggregate. This could explain some small differences, below 0.1%, with the latest figures from the European Statistical Office (Eurostat). In general terms, CO₂ emissions in the European Union declined by 0.7% in 1999 to reach a level close to the 1990 level. In the period 1990-99, excluding weather variations, CO₂ emissions fluctuated between 2995 and 3115 million tons of CO₂, demonstrating a remarkable stability while economic activity increased by 17%. Since 1990 per capita CO₂ emissions showed a reduction of 0.3% per year on average to about 8.2 tons. The CO₂ emitted per unit of GDP demonstrated a more sustained reduction as it declined by about 1.7% per year on average since 1990. These trends were favoured by the fact that the carbon intensity (ton of CO₂/toe) also declined by about 1.0% per year on average since 1990 thanks to conversion from oil and solid fuels to natural gas and increasing consumption of CO₂-free energies (nuclear, wind, biomass...).

Main items

Energy production, transportation and use give rise to a range of environmental impacts. These include land use, noise, visual impacts, radioactivity, water pollution and a range of gaseous emissions. Over the past decade, the European Union has made substantial progress in reducing particulates, lead use in petrol, and the precursors of acid rain (such as sulphur dioxide). Especially since the Kyoto Protocol of 1997, much more emphasis has been placed on the basket of greenhouse gases – particularly CO₂. The main routes to lower CO₂ emissions are: improved energy efficiency; switching to less carbon-intensive fossil fuels, especially natural gas; and increasing the use of carbon-free energy, such as renewable sources and nuclear power. Member States and the Commission are now focusing greater policy attention on identifying, and progressively implementing, a range of measures to reduce such emissions further, including energy or carbon taxes, and emission trading schemes.

Major improvements in Germany and the United Kingdom offset increases in other Member States...

By country, Germany ranks first in terms of CO₂ emissions in spite of an average yearly decline of 1.8% between 1990 and 1999. Its share of total European CO₂ emissions reached 26% in 1999 (34% in 1985 and 31% in 1990). The second Member State by far remained the United Kingdom with a yearly reduction of 0.6% per year on average and its share declined slowly to reach 17% in 1999. Italy comes third with a share of about 13% but a yearly increase of 0.6% on average since 1990; and France fourth with a share of 12% and a yearly growth of 0.7%. These four Member States together accounted for 69% of total European CO₂ emissions in 1999 against 75% in 1985. Since 1990 CO₂ emissions have declined in four Member States (Luxembourg, Germany, the United Kingdom and Sweden) and offset increases occurring in all other Member States: from 0.5% per year on average in Finland to 4.6% per year in Portugal.





CO ₂ EMISSIONS (1) (TRADITIONAL CALCULATION)											
	1985	1990	1995	1997	1998	1999	90/85	95/90	98/95	99/98	99/90
	Million tonnes of CO ₂						Annual % Change				
Austria	51.2	55.0	56.7	60.1	60.2	60.0	1.5%	0.6%	2.0%	-0.2%	1.0%
Belgium	99.1	105.9	112.0	117.5	118.9	115.8	1.3%	1.1%	2.0%	-2.6%	1.0%
Denmark	61.3	52.7	60.1	64.5	60.4	57.2	-3.0%	2.7%	0.1%	-5.2%	0.9%
Finland	48.5	53.4	56.5	59.4	56.0	55.8	1.9%	1.2%	-0.3%	-0.3%	0.5%
France	360.0	352.4	343.6	355.1	379.1	375.7	-0.4%	-0.5%	3.3%	-0.9%	0.7%
Germany	990.1	946.9	863.9	827.4	823.9	801.8	-0.9%	-1.8%	-1.6%	-2.7%	-1.8%
Greece	56.7	70.9	77.9	78.7	85.2	82.2	4.6%	1.9%	3.0%	-3.5%	1.6%
Ireland	26.0	29.8	33.3	36.3	38.3	39.5	2.8%	2.2%	4.8%	3.1%	3.2%
Italy	337.6	388.6	403.2	400.2	409.4	411.8	2.8%	0.7%	0.5%	0.6%	0.6%
Luxembourg	10.0	10.6	8.7	8.5	7.9	8.3	1.2%	-3.9%	-3.4%	5.8%	-2.7%
Netherlands	141.4	152.9	167.2	169.2	169.5	164.0	1.6%	1.8%	0.5%	-3.3%	0.8%
Portugal	25.1	39.1	48.2	48.4	52.5	58.8	9.2%	4.3%	2.9%	12.0%	4.6%
Spain	177.4	202.0	224.0	239.4	246.3	268.5	2.6%	2.1%	3.2%	9.0%	3.2%
Sweden	58.0	50.6	53.7	52.2	52.3	49.3	-2.7%	1.2%	-0.9%	-5.7%	-0.3%
United Kingdom	545.6	568.2	535.7	531.9	547.6	536.5	0.8%	-1.2%	0.7%	-2.0%	-0.6%
EUROPEAN UNION	2989.5	3080.0	3045.0	3048.6	3107.4	3085.3	0.6%	-0.2%	0.7%	-0.7%	0.0%

CO ₂ EMISSIONS (1) (TOTAL INCLUDING BUNKER)											
	1985	1990	1995	1997	1998	1999	90/85	95/90	98/95	99/98	99/90
	Million tonnes of CO ₂						Annual % Change				
Austria	51.2	55.0	56.7	60.1	60.2	60.0	1.5%	0.6%	2.0%	-0.2%	1.0%
Belgium	106.4	119.0	124.4	133.6	136.1	129.7	2.3%	0.9%	3.0%	-4.7%	1.0%
Denmark	62.6	55.7	65.2	69.1	64.7	61.2	-2.3%	3.2%	-0.2%	-5.3%	1.1%
Finland	49.9	55.1	57.6	60.7	57.7	57.6	2.0%	0.9%	0.1%	-0.1%	0.5%
France	367.6	360.5	351.5	364.3	388.2	384.9	-0.4%	-0.5%	3.4%	-0.8%	0.7%
Germany	1001.0	954.7	870.4	834.1	830.3	808.4	-0.9%	-1.8%	-1.6%	-2.6%	-1.8%
Greece	60.2	78.9	89.1	88.6	96.2	92.0	5.6%	2.4%	2.6%	-4.4%	1.7%
Ireland	26.1	29.9	33.6	36.7	38.8	40.1	2.7%	2.4%	4.9%	3.2%	3.3%
Italy	348.5	397.0	410.9	407.7	417.7	419.4	2.6%	0.7%	0.5%	0.4%	0.6%
Luxembourg	10.0	10.6	8.7	8.5	7.9	8.3	1.2%	-3.9%	-3.4%	5.8%	-2.7%
Netherlands	168.9	187.3	202.8	207.7	208.3	204.1	2.1%	1.6%	0.9%	-2.0%	1.0%
Portugal	26.6	41.0	49.7	49.9	53.7	60.6	9.0%	4.0%	2.6%	12.9%	4.4%
Spain	185.7	214.0	234.0	257.4	265.2	287.0	2.9%	1.8%	4.3%	8.2%	3.3%
Sweden	59.7	52.7	57.0	56.3	57.3	54.1	-2.5%	1.6%	0.2%	-5.5%	0.3%
United Kingdom	552.2	576.0	543.3	541.0	557.1	543.7	0.8%	-1.2%	0.8%	-2.4%	-0.6%
EUROPEAN UNION	3078.1	3188.4	3155.1	3175.9	3239.3	3211.1	0.7%	-0.2%	0.9%	-0.9%	0.1%

CO ₂ EMISSIONS (1) (EXCLUDING BUNKERS AND AIR TRANSPORT)											
	1985	1990	1995	1997	1998	1999	90/85	95/90	98/95	99/98	99/90
	Million tonnes of CO ₂						Annual % Change				
Austria	50.6	54.1	55.3	58.6	58.5	58.4	1.4%	0.5%	1.9%	-0.1%	0.9%
Belgium	97.4	103.1	109.2	113.5	114.2	111.1	1.1%	1.2%	1.5%	-2.6%	0.8%
Denmark	59.6	50.6	57.9	62.1	57.9	54.6	-3.2%	2.7%	0.0%	-5.7%	0.8%
Finland	47.7	52.0	55.3	58.1	54.6	54.3	1.7%	1.3%	-0.4%	-0.5%	0.5%
France	352.1	341.0	329.6	339.8	361.1	356.5	-0.6%	-0.7%	3.1%	-1.3%	0.5%
Germany	977.8	930.2	846.2	808.3	804.2	781.0	-1.0%	-1.9%	-1.7%	-2.9%	-1.9%
Greece	53.2	67.1	74.2	75.2	81.6	78.4	4.8%	2.0%	3.2%	-4.0%	1.7%
Ireland	25.4	28.7	32.2	35.0	37.0	38.0	2.5%	2.3%	4.8%	2.6%	3.1%
Italy	332.4	383.0	396.0	392.1	400.0	402.1	2.9%	0.7%	0.3%	0.5%	0.5%
Luxembourg	9.8	10.2	8.1	7.7	7.0	7.3	0.9%	-4.5%	-4.8%	4.4%	-3.6%
Netherlands	137.7	148.1	159.5	160.3	159.8	153.9	1.5%	1.5%	0.1%	-3.7%	0.4%
Portugal	23.7	37.3	46.4	46.6	50.5	56.6	9.5%	4.4%	2.9%	11.9%	4.7%
Spain	171.6	194.7	214.8	228.6	234.5	256.0	2.6%	2.0%	3.0%	9.2%	3.1%
Sweden	56.3	48.4	51.2	49.6	49.7	46.6	-3.0%	1.1%	-1.0%	-6.3%	-0.4%
United Kingdom	530.2	548.0	512.5	506.4	519.5	506.2	0.7%	-1.3%	0.5%	-2.6%	-0.9%
EUROPEAN UNION	2927.0	2997.6	2948.6	2941.7	2990.2	2961.0	0.5%	-0.3%	0.5%	-1.0%	-0.1%

(1) CO₂ emissions given on an indicative basis being calculated using common emissions factors by energy aggregate





Climatic conditions were not uniform across the European Union...

The short-term evolution of CO₂ emissions clearly illustrates their sensitivity to climatic conditions. 1994, similar to 1990, was the warmest of the last 15 years with weather conditions 13.4% warmer than the 25-year average. In 1999, degree-days, (indicators of heating requirements), were only 4% higher than the values registered in 1990 and 1994. By comparison, in 1996 degree days were 18% higher and in 1985 23% higher. Average weather conditions were very similar in the last three years. It is worth repeating that weather variations were not uniform across the European Union. For example, 1990 and 1998 - whilst apparently similar at the European level - presented large variations across Europe with central countries characterised by weather 10% colder in 1998 than in 1990 and, conversely, southern countries having warmer weather conditions. These variations diminished substantially in 1999.

Improvements in industry and power sector offset increases in the transport sector...

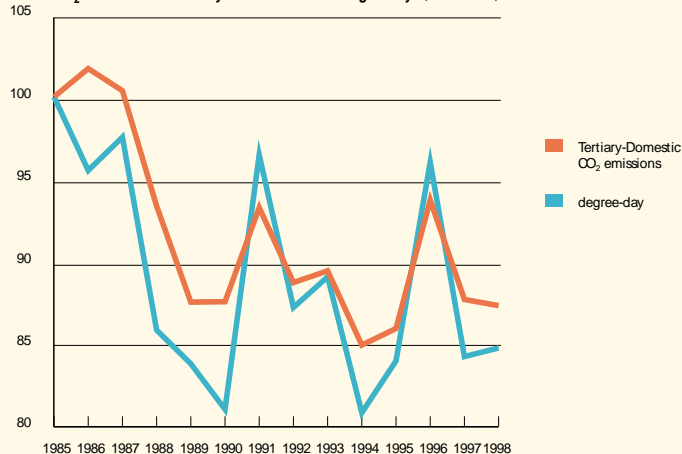
In fact, between 1990 and 1999, total CO₂ emissions, including bunkers have increased by only 0.7%. The reductions in industry (-13.0% in nine years) and the power sector (-5.0%) largely offset the increases from the transport sector (+21.0% including air transport) and bunkers (+16.0%); while emissions from the tertiary-domestic sector and from the energy branch remained stable. CO₂ emissions from all the sectors, with the exception of the tertiary-domestic sector, are almost independent of climatic conditions. On the contrary, in the tertiary-domestic sector where energy consumption for heating dominates, CO₂ emissions are directly correlated with degree-days. It appears that the impact of temperature variations on CO₂ emissions in the tertiary-domestic

sector can be estimated at +/-6% following colder or warmer temperature extremes. As tertiary-domestic CO₂ emissions accounted in 1999 for 21% of total emissions, this means that the weather effect on total CO₂ emissions can be estimated to be +/-1.2% compared to an average climate. This is important in the context of the EU's political objective of stabilising CO₂ emissions in 2000 compared to the 1990 level.

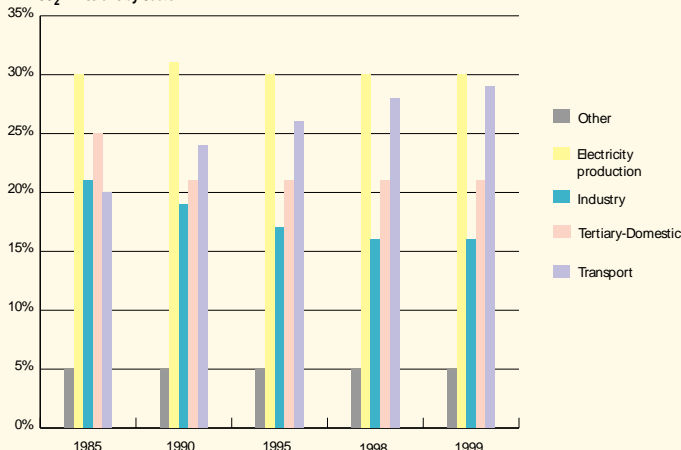
New trends emerging in the last two years...

The relative stabilisation of CO₂ emissions between 1990 and 1999 is the result of three main factors: the continuous improvement of technologies reducing specific energy consumption; the increasing contribution of non-fossil fuels, mainly nuclear together with some wind energy and biomass; and greater penetration of natural gas both for power generation and in final markets in substitution of solid fuels and oil products. It is important to underline that the contribution of these latter two factors could be modified in the near future as illustrated by the situation in the last two years. The potential for new nuclear power plants is very limited and the load factor of existing units is already so high that it will now be difficult to increase nuclear's contribution. The contribution of renewable energy sources is increasing very slowly even though the European Union has proposed the goal of a 12% share of renewables by the year 2010. The substitution limits for natural gas in final markets will be progressively reached. This means that, to reduce CO₂ emissions in the near future, it will be necessary to substantially increase the contribution of renewable energy and to promote rational use of energy to reduce energy intensity in the Union. In 1998 and 1999 incremental emissions came from the power sector (17 million tons of CO₂ in two years), and transport (52 million tons of CO₂) being partly offset by the reduction from industry (17 million tons of CO₂) and from the ter-

CO₂ Emissions from Tertiary Domestic Sector vs. degree-days (1985 = 100)



CO₂ Emissions by Sector





CO ₂ EMISSIONS (INLAND EMISSIONS)											
	1985	1990	1995	1997	1998	1999	90/85	95/90	98/95	99/98	99/90
	Millions tons of CO ₂						Annual % Change				
Austria											
Total CO ₂ emissions	51.21	55.04	56.70	60.13	60.16	60.04	1.5%	0.6%	2.0%	-0.2%	1.0%
of which power generation	7.00	12.13	11.26	12.04	11.62	11.53	11.6%	-1.5%	1.1%	-0.7%	-0.6%
of which final markets	40.55	39.57	41.58	45.09	44.24	44.48	-0.5%	1.0%	2.1%	0.6%	1.3%
Belgium											
Total CO ₂ emissions	99.10	105.93	112.04	117.50	118.88	115.75	1.3%	1.1%	2.0%	-2.6%	1.0%
of which power generation	17.41	21.83	23.02	21.12	22.86	20.05	4.6%	1.1%	-0.2%	-12.3%	-0.9%
of which final markets	77.18	78.81	83.91	90.50	90.20	89.53	0.4%	1.3%	2.4%	-0.7%	1.4%
Denmark											
Total CO ₂ emissions	61.27	52.67	60.14	64.47	60.35	57.19	-3.0%	2.7%	0.1%	-5.2%	0.9%
of which power generation	26.87	22.99	29.08	33.50	30.01	26.77	-3.1%	4.8%	1.1%	-10.8%	1.7%
of which final markets	33.44	27.38	28.24	28.35	27.81	27.86	-3.9%	0.6%	-0.5%	0.2%	0.2%
Finland											
Total CO ₂ emissions	48.48	53.35	56.53	59.43	56.03	55.83	1.9%	1.2%	-0.3%	-0.3%	0.5%
of which power generation	12.81	15.65	20.63	24.29	19.09	19.75	4.1%	5.7%	-2.6%	3.4%	2.6%
of which final markets	30.94	34.91	32.74	31.86	33.64	33.52	2.4%	-1.3%	0.9%	-0.3%	-0.5%
France											
Total CO ₂ emissions	360.05	352.43	343.61	355.05	379.11	375.72	-0.4%	-0.5%	3.3%	-0.9%	0.7%
of which power generation	47.29	40.02	27.52	29.57	42.64	38.11	-3.3%	-7.2%	15.7%	-10.6%	-0.5%
of which final markets	297.61	296.45	297.84	306.24	316.96	318.27	-0.1%	0.1%	2.1%	0.4%	0.8%
Germany											
Total CO ₂ emissions	990.09	946.85	863.92	827.35	823.89	801.81	-0.9%	-1.8%	-1.6%	-2.7%	-1.8%
of which power generation	342.19	342.33	318.09	297.42	299.80	288.20	0.0%	-1.5%	-2.0%	-3.9%	-1.9%
of which final markets	589.59	548.23	499.83	498.75	492.20	481.65	-1.4%	-1.8%	-0.5%	-2.1%	-1.4%
Greece											
Total CO ₂ emissions	56.69	70.92	77.89	78.72	85.19	82.17	4.6%	1.9%	3.0%	-3.5%	1.6%
of which power generation	25.15	34.34	38.92	35.90	40.20	38.04	6.4%	2.5%	1.1%	-5.4%	1.1%
of which final markets	30.19	34.56	36.74	40.11	42.21	41.45	2.7%	1.2%	4.7%	-1.8%	2.0%
Ireland											
Total CO ₂ emissions	26.03	29.82	33.28	36.26	38.34	39.53	2.8%	2.2%	4.8%	3.1%	3.2%
of which power generation	8.27	10.26	13.44	14.24	14.92	15.23	4.4%	5.5%	3.6%	2.1%	4.5%
of which final markets	17.67	19.37	19.64	21.77	23.14	23.99	1.9%	0.3%	5.6%	3.7%	2.4%
Italy											
Total CO ₂ emissions	337.64	388.56	403.23	400.18	409.39	411.79	2.8%	0.7%	0.5%	0.6%	0.6%
of which power generation	90.16	118.64	125.86	122.65	125.71	123.78	5.6%	1.2%	0.0%	-1.5%	0.5%
of which final markets	229.50	252.61	259.96	260.96	264.90	276.42	1.9%	0.6%	0.6%	4.3%	1.0%
Luxembourg											
Total CO ₂ emissions	10.02	10.62	8.71	8.46	7.86	8.31	1.2%	-3.9%	-3.4%	5.8%	-2.7%
of which power generation	0.53	0.72	0.38	0.24	0.10	0.10	6.4%	-11.8%	-37.2%	3.6%	-19.8%
of which final markets	9.49	9.90	8.32	8.22	7.76	8.21	0.8%	-3.4%	-2.3%	5.8%	-2.1%
Netherlands											
Total CO ₂ emissions	141.37	152.91	167.17	169.23	169.52	163.99	1.6%	1.8%	0.5%	-3.3%	0.8%
of which power generation	35.38	43.30	49.07	49.06	50.67	49.28	4.1%	2.5%	1.1%	-2.7%	1.4%
of which final markets	97.10	95.97	102.35	105.15	104.12	101.46	-0.2%	1.3%	0.6%	-2.6%	0.6%
Portugal											
Total CO ₂ emissions	25.13	39.06	48.21	48.37	52.46	58.77	9.2%	4.3%	2.9%	12.0%	4.6%
of which power generation	5.76	14.81	19.17	16.07	18.17	23.27	20.8%	5.3%	-1.8%	28.1%	5.2%
of which final markets	18.44	22.74	26.82	30.41	32.17	33.17	4.3%	3.4%	6.3%	3.1%	4.3%
Spain											
Total CO ₂ emissions	177.42	202.00	224.03	239.39	246.25	268.50	2.6%	2.1%	3.2%	9.0%	3.2%
of which power generation	60.08	63.23	68.23	76.55	74.70	92.86	1.0%	1.5%	3.1%	24.3%	4.4%
of which final markets	108.70	127.25	142.85	149.22	158.09	162.15	3.2%	2.3%	3.4%	2.6%	2.7%
Sweden											
Total CO ₂ emissions	57.98	50.64	53.69	52.20	52.32	49.35	-2.7%	1.2%	-0.9%	-5.7%	-0.3%
of which power generation	7.71	4.07	6.09	5.79	5.94	4.55	-12.0%	8.4%	-0.9%	-23.4%	1.2%
of which final markets	45.59	42.62	44.12	43.20	42.97	41.52	-1.3%	0.7%	-0.9%	-3.4%	-0.3%
United Kingdom											
Total CO ₂ emissions	545.57	568.18	535.73	531.90	547.64	536.53	0.8%	-1.2%	0.7%	-2.0%	-0.6%
of which power generation	203.85	216.43	174.20	157.63	173.87	161.40	1.2%	-4.2%	-0.1%	-7.2%	-3.2%
of which final markets	311.64	323.50	329.22	340.22	337.16	340.14	0.7%	0.4%	0.8%	0.9%	0.6%
European Union											
Total CO ₂ emissions	2989.52	3080.01	3045.04	3048.61	3107.38	3085.25	0.6%	-0.2%	0.7%	-0.7%	0.0%
of which power generation	891.52	961.79	925.60	896.62	930.93	913.56	1.5%	-0.8%	0.2%	-1.9%	-0.6%
of which final markets	1937.96	1953.81	1953.78	1999.59	2017.08	2023.34	0.2%	0.0%	1.1%	0.3%	0.4%



EUROPEAN UNION : CO₂ EMISSIONS BY SECTORS

European Union	1985	1990	1995	1997	1998	1999	90/85	97/90	98/95	99/98	99/90
Millions tonnes of CO ₂							Annual % Change				
Total (including bunker)	3078.1	3188.4	3155.1	3175.9	3239.3	3211.1	0.7%	-0.1%	0.9%	-0.9%	0.1%
Bunkers	88.6	108.4	110.1	127.3	131.9	125.8	4.1%	2.3%	6.2%	-4.6%	1.7%
Air Transport	62.5	82.4	96.5	106.9	117.1	124.2	5.7%	3.8%	6.7%	6.1%	4.7%
Transformation	1051.6	1126.2	1091.3	1049.0	1090.3	1061.9	1.4%	-1.0%	0.0%	-2.6%	-0.7%
Power Generation	891.5	961.8	925.6	896.6	930.9	913.6	1.5%	-1.0%	0.2%	-1.9%	-0.6%
Energy sector	160.0	164.4	165.7	152.4	159.4	148.4	0.5%	-1.1%	-1.3%	-6.9%	-1.1%
Final Demand sectors	1875.4	1871.4	1857.3	1892.7	1899.9	1899.1	0.0%	0.2%	0.8%	0.0%	0.2%
Industry	615.3	571.7	519.8	513.7	500.9	496.9	-1.5%	-1.5%	-1.2%	-0.8%	-1.5%
Transport	524.9	656.1	706.9	735.3	757.4	769.7	4.6%	1.6%	2.3%	1.6%	1.8%
Domestic and Tertiary	735.2	643.6	630.7	643.7	641.6	632.5	-2.6%	0.0%	0.6%	-1.4%	-0.2%

tiary-domestic sector (11 million tons of CO₂). These emerging trends will determine the future course of CO₂ emissions: a growing contribution of fossil fuels for power generation, continuing growth of transport demand, rational use of energy confirmed in industry and beginning to grow in tertiary-domestic sectors.

Transport, about to become the largest contributor, accounted for 29% of total CO₂ emissions in 1999...

The share of emissions from the power sector declined regularly from 31.2% in 1990 to 29.6% in 1999 despite a marked jump in 1998 when CO₂ emissions from this sector increased by 4%. Within the final demand sectors, transport was the only one with steadily increasing emissions since 1990 (2.1% per year on aver-

age). The contribution of this sector grew from 24% in 1990 (19% in 1985) to 29% in 1999. The domestic and tertiary sectors reduced their emissions a little with constant climatic conditions thanks to the development of natural gas and distributed heat in the heating market in place of heating gas oil and solids. In fact the development of low CO₂ content fuels (natural gas, electricity and renewables) largely offset the increasing floor area and the increasing number of households as average household size was diminishing. Consequently the share of the tertiary-domestic sector remained stable at about 21%. Industry experienced the greatest fall in CO₂ emissions since 1990 (-1.5% per year) that reduced its contribution in total emissions to only 16% in 1999 compared to 18.5% in 1990 and 20.5% in 1985.

SO₂ AND NO_x EMISSIONS

Kton/year	SO ₂ Emissions						NO _x Emissions					
	1990	1992	1994	1996	1997	96/90	1990	1992	1994	1996	1997	96/90
Austria	91	63	57	55	49	-40%	193	187	182	170	171	-12%
Belgium	371	318	253	240	221	-35%	339	342	343	315	306	-7%
Denmark	180	189	156	186	109	3%	269	274	272	288	247	7%
Finland	260	140	114	105	99	-60%	284	284	282	268	260	-5%
France	1268	1200	985	905	764	-29%	1875	1877	1736	1693	1640	-10%
Germany	5322	3307	2473	1477	1359	-72%	2708	2311	2042	1918	1846	-29%
Greece	506	555	526	542	528	7%	326	333	343	358	362	10%
Ireland	186	172	175	147	166	-21%	118	130	115	120	119	2%
Italy	1654	1395	1272	1123	1021	-32%	1938	2008	1791	1756	1685	-9%
Luxembourg	15	14	13	8	6	-47%	23	23	23	22	18	-3%
Netherlands	203	172	146	135	118	-33%	580	556	510	501	453	-14%
Portugal	343	397	321	334	na	-3%	306	347	354	375	na	22%
Spain	2048	2041	1875	1497	na	-27%	1156	1239	1212	1192	na	3%
Sweden	132	102	96	83	52	-37%	398	390	392	302	270	-24%
United Kingdom	3736	3462	2689	2017	1647	-46%	2788	2587	2302	2054	1868	-26%
European Union	16314	13527	11150	8854	na	-46%	13302	12888	11900	11332	na	-15%

Source : EMEP/Corinair





SO₂ (-52%) and NO_x (-20%) emissions declined substantially between 1990 and 1997...

In the absence of complete statistical data for the last few years, the European situation concerning other polluting emissions, SO₂ and NO_x in particular, can be considered to be generally improving. SO₂ emissions are declining significantly as a result of several different actions: improvement of fuel quality to reduce sulphur content in oil products, regulation of large industrial combustion installations, and substitution of solid fuels and oil products by natural gas. Between 1990 and 1996 SO₂ emissions were reduced by 46% and preliminary numbers for 1997 indicated a further improvement by 12%. If confirmed SO₂ emissions will have halved in only seven years. NO_x emissions are also decreasing, but to a lesser extent than SO₂ emissions, given both regulation of large industrial combustion installations and regulations concerning catalytic converters for new cars. NO_x emissions have declined by 15% between 1990 and 1996 and a further reduction by 5% was expected in 1997.



GLOBAL MARKETS: Recent evolution (1985-1999)

- Energy self-sufficiency declined slowly but steadily
- Diversified and stable sources for solid fuels dominated by South Africa, Australia and the United States
- OPEC contributed 50% of external oil supplies to the European Union
- The interconnection of the European gas transport network continued to expand
- Green Paper on security of supply adopted by the Commission in November 2000

SELF-SUFFICIENCY

Energy self-sufficiency declined slowly but steadily...

The degree of self-sufficiency of the European Union as a whole has fluctuated since 1985 in parallel with indigenous production. From 58.5% in 1985, it declined to 50.4% in 1992 to reach a level of 52.4% in 1999. Denmark, the Netherlands and the United Kingdom have the highest degrees of self-sufficiency, due to the exploitation of their large gas and oil reserves. In the cases of Sweden, Finland, France, Germany, Spain and Belgium the levels of self-sufficiency are mainly related to the use of nuclear energy and, except for Belgium, to hydropower. The contributions of each Member State to European Union domestic production were quite varied, depending on reserves, implementation of nuclear programmes, and acceptance and promotion of renewable energy sources, especially biomass. Since 1990, although self-sufficiency declined only marginally at the overall European level, the trends in the Member States were more varied. Major increases, above 2% per year on average, occurred in Luxembourg (11.7%), Denmark (8.9%), Finland (2.7%), and the United Kingdom (2.5%). Major falls, by more than 2% per year on average, were in Portugal

(-2.5%), Germany (-3.0%), Spain (-4.5%) and Ireland (-6.5%), due especially to coal mine closures in Germany and Spain and expansion of energy demand in Portugal and Ireland.

EXTERNAL SUPPLIES

To close the gap between domestic production and gross consumption, the European Union obtained about 48% of its total energy needs from third countries in 1999 (from 42% in 1985 with a peak of 50% in 1992). The **net import of energy** in the Union was 705 Mtoe in 1999 and has increased, in absolute terms, by 1.0% per year on average since 1990 with a marked acceleration in 1998 (+4.5%).

Diversified and stable sources for solid fuels dominated by South Africa, Australia and the United States...

For solid fuels some 47% of total needs came from external suppliers in 1999 (24% in 1985 and 29% in 1990). 22% of these imports came from South Africa or a constant level since 1996, 16% from Australia with a steady increase, 13% came from United

DEGREE OF SELF-SUFFICIENCY IN ENERGY SUPPLY (Total Domestic Production / Gross Consumption)

%	1985	1990	1995	1997	1998	1999	Annual % Change				
							90/85	95/90	98/95	99/98	99/90
Austria	34.71	32.65	33.97	33.68	31.11	33.92	-1.2%	0.8%	-2.9%	9.0%	0.4%
Belgium	30.72	24.34	19.63	21.79	18.88	23.53	-4.6%	-4.2%	-1.3%	24.7%	-0.4%
Denmark	22.40	52.62	64.27	81.78	91.89	113.58	18.6%	4.1%	12.7%	23.6%	8.9%
Finland	40.75	37.87	47.15	43.76	45.49	48.26	-1.5%	4.5%	-1.2%	6.1%	2.7%
France	45.86	46.94	51.59	50.39	48.11	48.07	0.5%	1.9%	-2.3%	-0.1%	0.3%
Germany	57.87	53.70	42.45	40.02	38.63	40.76	-1.5%	-4.6%	-3.1%	5.5%	-3.0%
Greece	39.26	37.94	34.22	33.18	30.50	33.91	-0.7%	-2.0%	-3.8%	11.2%	-1.2%
Ireland	39.93	31.03	31.81	23.47	19.50	16.88	-4.9%	0.5%	-15.1%	-13.4%	-6.5%
Italy	17.96	16.19	18.42	21.24	19.89	19.07	-2.1%	2.6%	2.6%	-4.1%	1.8%
Luxembourg	1.02	1.00	2.34	1.63	0.45	2.69	-0.5%	18.6%	-42.2%	496.1%	11.7%
Netherlands	94.21	77.60	80.68	73.94	73.10	70.30	-3.8%	0.8%	-3.2%	-3.8%	-1.1%
Portugal	24.84	12.59	11.04	13.87	14.22	10.05	-12.7%	-2.6%	8.8%	-29.3%	-2.5%
Spain	39.42	35.57	28.47	28.23	25.22	23.43	-2.0%	-4.4%	-4.0%	-7.1%	-4.5%
Sweden	57.82	62.57	62.49	61.32	59.81	64.91	1.6%	0.0%	-1.5%	8.5%	0.4%
United Kingdom	115.38	96.57	116.35	115.07	115.62	120.28	-3.5%	3.8%	-0.2%	4.0%	2.5%
EUROPEAN UNION	58.52	52.43	53.43	52.24	51.05	52.40	-2.2%	0.4%	-1.5%	2.6%	0.0%





States declining regularly, 10% from Poland stable since 1996 and 10% from Colombia. In 1998 Australian and Colombian supplies increased respectively by 15% and 11% to compensate the reduction by 15% of imports from the United States. South Africa with a stable contribution in 1999 remained easily the largest single supplier of the European Union, ahead of Australia and the United States. Although the shares varied a little from year to year between these main sources, depending on market conditions and long term contracts, they have the advantages of being well diversified and politically stable.

OPEC contributed 50% of external oil supplies to the European Union...

In terms of crude oil, the European Union depended on external supplies for as much as 81% in 1999 (75% in 1985 and 85% in 1990), including requirements for marine bunkers. These mainly concerned crude oil, as net imports of oil products remained marginal in 1999. Of these external supplies, 50% came from OPEC (55% in 1998 and 57% in 1997), 22% from Norway (22% in 1998 and 25% in 1997) and 18% from the CIS (15% in 1998 and 20% in 1997). Inside OPEC the three main suppliers in 1998 were: Saudi Arabia (13% of total EU imports), Libya (10%) and Iran (9%). Since the mid-1980s OPEC has regained some of the share lost to new non-OPEC producers following the earlier oil price shocks.. However, in recent years, technology and cost reduction advances in oil exploration and production, notably in the North Sea, have resulted in OPEC taking a lower than expected share of the growing demand for oil. In 1999, the three main suppliers remained unchanged: respectively Norway with 108 Mtoe, the CIS with 87 Mtoe and Saudi Arabia with 61 Mtoe but the CIS had taken the second place ahead of Saudi Arabia. They accounted for more than 50% of imports from other third-party countries.

The interconnection of the European gas transport network continued to expand...

The external dependency of the European Union in terms of natural gas was 45% in 1999 (35% in 1985 and 42% in 1990). The shares of the three major suppliers were 44% for the CIS, 30% for Algeria, 25% for Norway, with only 1% from all other sources (Libya, UAE, Trinidad and Tobago and Qatar). The market shares of each supplier remained stable over the last four years.

In addition, five major European pipelines began operating commercially in 1998: the NorFra pipeline linking directly Norway and France, the world's longest subsea pipeline; the connection between the NorFra terminal at Dunkirk to the French pipeline system near the Gournay-sur-Aronde storage facility; the inter-

Main items

In 1999 imports met some 49% of the European Union's total energy requirements. Whilst the EU as a whole remains the largest net energy importer in the world, import dependence varies considerably between Member States. Considerable efforts are being made to diversify the sources of oil, gas and coal imports. Over the next 20 years, import dependence (particularly upon the Middle East and Russia) is expected to increase steadily as indigenous fossil fuel production and nuclear output decline. Greater emphasis is being placed on overseas direct investment in energy exporting regions; as well as upon diplomatic measures to engage in dialogue with the major exporting nations to ensure free international trade in energy.

connector linking Bacton, England and Zeebrugge; Distrigaz's new VTR-RTR transit network which runs across Belgium; and Wingas's Wedal pipeline running from Bielefeld to Aachen. 1999 saw the completion and commissioning on schedule of the Europepe II. The 420-mile Europepe II, operated by Statoil, links Norway's west coast to Dornum in north-west Germany. With its commissioning, imports from Norway could supply up to 30% of Germany's gas use until 2010.

Green Paper on security of supply adopted by the Commission in November 2000...

The European Union is consuming more and more energy and also importing ever more energy products. Community production is insufficient for the Union's energy requirements. As a result, external dependence for energy is constantly increasing. If no measures are taken, in the next 20 to 30 years 70% of the Union's energy requirements, as opposed to the current 50%, will be covered by imported products. This dependence can be witnessed in all sectors of the economy. For example transport, the domestic sector and the electricity industry depend largely on oil and gas and are vulnerable to erratic variations in international prices. Enlargement will exacerbate these trends. The European Union's long-term strategy for energy supply security must be geared to ensuring, for the well-being of its citizens and the proper functioning of the economy, the uninterrupted physical availability of energy products on the market, at a price which is affordable for all consumers (private and industrial), while respecting environmental concerns and looking towards sustainable development.



The Green Paper on security of supply adopted by the European Commission in November 2000 sketches out some key themes of a long-term energy strategy, according to which:

- The European Union must rebalance its supply policy by clear action in favour of a demand policy. The margins for manoeuvre for any increase in Community supply are limited in view of its requirements, while the scope for action to address demand appears more promising.
- With regard to demand, the Green Paper is calling for a real change in consumer behaviour. It highlights the value of taxation measures to steer demand towards more efficient consumption which is also more respectful of the environment. Taxation or parafiscal levies are advocated with a view to penalising the harmful environmental impact of energy use. The transport and construction industries will have to apply an active energy savings policy and diversification in favour of non-polluting energy.
- With regard to supply, priority must be given to the fight against global warming. The development of new and renewable energies (including biofuels) is the key to change. Doubling their share in the energy supply mix from 6 to 12% and raising their share in electricity production from 14 to 22% are objectives to be attained between now and 2010. If current conditions apply, the overall share of renewables might stagnate at around 7% in 10 years. Only financial measures (tax deductions and financial support) would be able to buttress such an ambitious aim. One way which could be explored is that profitable energies such as oil, gas and nuclear energy could finance the development of renewable energies which, unlike traditional energy sources, have not benefited from substantial support in the past.
- The contribution of nuclear energy in the medium term must, in its turn, be analysed. Among the issues which will certainly form part of the debate will be the decision by most Member States to abandon this option. Whatever the conclusions of this reflection, research on waste management technologies and its implementation in the safest possible ways must be actively pursued.





EUROPEAN UNION : SUMMARY ENERGY BALANCE

Mtoe	1985	1990	1995	1997	1998	1999	90/85	97/90	98/97	99/98	99/90
							Annual % Change				
Primary Production	737.33	708.27	739.44	762.41	753.45	770.47	-0.8%	1.1%	-1.2%	2.3%	0.9%
Solids	239.43	209.87	138.02	126.27	114.62	110.17	-2.6%	-7.0%	-9.2%	-3.9%	-6.9%
Oil	150.97	117.65	159.22	158.07	161.65	167.77	-4.9%	4.3%	2.3%	3.8%	4.0%
Natural gas	131.87	132.87	166.60	182.12	181.47	185.47	0.2%	4.6%	-0.4%	2.2%	3.8%
Nuclear	147.38	181.44	201.24	212.61	209.66	220.50	4.2%	2.3%	-1.4%	5.2%	2.2%
Hydro & Wind	24.41	22.34	25.30	26.08	27.30	27.43	-1.8%	2.2%	4.7%	0.5%	2.3%
Geothermal	1.79	2.22	2.52	2.82	3.00	3.02	4.4%	3.5%	6.5%	0.7%	3.5%
Other renewable energy sources	41.48	41.88	46.55	54.43	55.74	56.10	0.2%	3.8%	2.4%	0.6%	3.3%
Net Imports	526.72	643.77	651.26	692.71	723.67	705.48	4.1%	1.1%	4.5%	-2.5%	1.0%
Solids	74.50	88.28	94.43	98.48	101.47	99.16	3.5%	1.6%	3.0%	-2.3%	1.3%
Oil	382.29	460.86	446.71	469.39	489.59	456.99	3.8%	0.3%	4.3%	-6.7%	-0.1%
Crude oil	343.71	436.75	434.71	465.19	483.94	441.57	4.9%	0.9%	4.0%	-8.8%	0.1%
Oil products	38.58	24.11	11.99	4.20	5.65	15.42	-9.0%	-22.1%	34.7%	173.0%	-4.8%
Natural gas	68.61	92.30	108.63	124.17	131.49	147.31	6.1%	4.3%	5.9%	12.0%	5.3%
Electricity	1.33	2.33	1.50	0.67	1.13	2.03	12.0%	-16.3%	68.5%	79.8%	-1.5%
Gross Inland Consumption	1241.93	1319.24	1363.80	1410.32	1436.91	1442.43	1.2%	1.0%	1.9%	0.4%	1.0%
Solids	316.15	301.18	237.74	223.51	223.15	209.71	-1.0%	-4.2%	-0.2%	-6.0%	-3.9%
Oil	511.43	545.79	575.60	587.65	601.42	595.31	1.3%	1.1%	2.3%	-1.0%	1.0%
natural gas	197.97	222.06	273.35	302.54	315.50	328.30	2.3%	4.5%	4.3%	4.1%	4.4%
Other (1)	216.38	250.21	277.10	296.62	296.84	309.11	2.9%	2.5%	0.1%	4.1%	2.4%
Electricity Generation in TWh	1917.01	2155.71	2328.19	2426.17	2493.48	2531.33	2.4%	1.7%	2.8%	1.5%	1.8%
Nuclear	574.92	720.06	810.12	859.74	854.03	868.24	4.6%	2.6%	-0.7%	1.7%	2.1%
Hydro & wind (including pumping)	299.19	276.44	314.08	323.50	339.22	343.26	-1.6%	2.3%	4.9%	1.2%	2.4%
Thermal	1042.90	1159.21	1204.00	1242.94	1300.23	1319.84	2.1%	1.0%	4.6%	1.5%	1.5%
Generation Capacity in GWe	480.95	522.98	538.85	558.81	561.60	574.64	1.7%	1.0%	0.5%	2.3%	1.1%
Nuclear	87.04	116.65	119.56	124.18	122.77	124.70	6.0%	0.9%	-1.1%	1.6%	0.7%
Hydro & wind	103.48	111.73	117.70	120.59	122.17	127.19	1.5%	1.1%	1.3%	4.1%	1.5%
Thermal	290.43	294.59	301.59	314.05	316.66	322.75	0.3%	0.9%	0.8%	1.9%	1.0%
Average Load Factor in %	45.5	47.1	49.3	49.6	50.7	50.3	0.7%	0.7%	2.3%	-0.8%	0.7%
Fuel Inputs for Thermal Power Generation	248.30	269.86	272.82	272.77	283.78	284.42	1.7%	0.2%	4.0%	0.2%	0.6%
Solids	170.39	182.24	161.93	149.38	154.35	144.81	1.4%	-2.8%	3.3%	-6.2%	-2.5%
Oil	39.83	42.48	43.71	38.49	38.71	37.75	1.3%	-1.4%	0.6%	-2.5%	-1.3%
Gas	29.90	36.53	54.64	70.73	76.05	86.43	4.1%	9.9%	7.5%	13.6%	10.0%
Geothermal	1.70	1.88	2.15	2.44	2.64	2.66	2.0%	3.9%	8.0%	0.7%	3.9%
Biomass	6.48	6.73	10.39	11.72	12.02	12.77	0.8%	8.3%	2.6%	6.2%	7.4%
Average Thermal Efficiency in %	36.1	36.9	38.0	39.2	39.4	39.9	0.5%	0.8%	0.6%	1.3%	0.9%
Non-Energy Uses	74.39	84.04	93.68	96.02	93.39	92.41	2.5%	1.9%	-2.7%	-1.0%	1.1%
Total Final Energy Demand	823.95	863.60	899.31	932.20	946.81	955.17	0.9%	1.1%	1.6%	0.9%	1.1%
Solids	101.90	80.55	49.07	46.45	42.85	40.49	-4.6%	-7.6%	-7.8%	-5.5%	-7.4%
Oil	373.84	397.64	419.86	430.95	438.07	438.93	1.2%	1.2%	1.7%	0.2%	1.1%
Gas	161.39	178.23	206.27	216.67	221.98	228.16	2.0%	2.8%	2.5%	2.8%	2.8%
Electricity	136.31	155.97	169.37	177.05	181.43	185.11	2.7%	1.8%	2.5%	2.0%	1.9%
Heat	15.79	16.74	19.46	20.88	21.22	21.73	1.2%	3.2%	1.6%	2.4%	2.9%
Renewable energy sources	34.71	34.47	35.28	40.20	41.25	40.77	-0.1%	2.2%	2.6%	-1.2%	1.9%
CO₂ Emissions in Mt of CO₂ (2)	2989.5	3080.0	3045.0	3048.6	3107.4	3085.3	0.6%	-0.1%	1.9%	-0.7%	0.0%
Indicators											
Population (Million)	358.80	364.51	372.00	374.06	374.89	376.42	0.3%	0.4%	0.2%	0.4%	0.4%
GDP (bil. EUR 1990)	4570.5	5315.0	5683.2	5918.6	6085.6	6237.4	3.1%	1.5%	2.8%	2.5%	1.8%
Gross Inl Cons./GDP (toe/1990 MEUR)	271.7	248.2	240.0	238.3	236.1	231.3	-1.8%	-0.6%	-0.9%	-2.1%	-0.8%
Gross Inl Cons./Capita (Kgoe/inhabitant)	3461.3	3619.2	3666.2	3770.3	3832.9	3832.0	0.9%	0.6%	1.7%	0.0%	0.6%
Electricity Generated/Capita (kWh/inhabitant)	5342.8	5914.0	6258.6	6485.9	6651.1	6725.0	2.1%	1.3%	2.5%	1.1%	1.4%
CO ₂ Emissions/Capita (kg of CO ₂ /inhabitant)	8332.0	8449.8	8185.7	8150.0	8288.8	8196.4	0.3%	-0.5%	1.7%	-1.1%	-0.3%
Import Dependency %	41.5	47.6	46.6	47.8	48.9	47.6	2.8%	0.1%	2.5%	-2.7%	0.0%

(1) Includes nuclear, hydro and wind, net imports of electricity, and other energy sources.

(2) Given on an indicative basis; calculated using common emission factors across all countries in the world





EUROPEAN UNION : MAIN INDICATORS

	1985	1990	1997	1998	1999	90/85	97/90	98/97	99/98	99/90
	Annual % Change									
Gross Inland Consumption (Mtoe)	1241.9	1319.2	1410.3	1436.9	1442.4	1.2%	1.0%	1.9%	0.4%	1.0%
Public Thermal Power Generation	356.1	411.1	443.1	448.6	457.7	2.9%	1.1%	1.2%	2.0%	1.2%
Autoprod. Thermal Power Generation	39.5	40.1	42.2	44.9	47.2	0.3%	0.7%	6.2%	5.2%	1.8%
Energy Branch	60.6	63.2	69.4	72.2	68.8	0.8%	1.3%	4.1%	-4.7%	0.9%
Final Energy Consumption	823.9	863.3	931.8	946.4	954.8	0.9%	1.1%	1.6%	0.9%	1.1%
Industry	264.9	266.0	263.4	262.1	263.5	0.1%	-0.1%	-0.5%	0.5%	-0.1%
Transport	202.6	253.8	288.9	299.5	305.8	4.6%	1.9%	3.7%	2.1%	2.1%
Tertiary-Domestic	356.3	343.4	379.5	384.8	385.6	-0.7%	1.4%	1.4%	0.2%	1.3%
Energy Intensity (toe/1990 MEUR)	271.7	248.2	238.3	236.1	231.3	-1.8%	-0.6%	-0.9%	-2.1%	-0.8%
Public Thermal Power Generation	77.9	77.3	74.9	73.7	73.4	-0.1%	-0.5%	-1.6%	-0.5%	-0.6%
Autoprod. Thermal Power Generation	8.7	7.5	7.1	7.4	7.6	-2.7%	-0.8%	3.3%	2.6%	0.0%
Industry	58.0	50.0	44.5	43.1	42.2	-2.9%	-1.7%	-3.2%	-1.9%	-1.9%
Transport	44.3	47.8	48.8	49.2	49.0	1.5%	0.3%	0.8%	-0.4%	0.3%
Tertiary-Domestic	78.0	64.6	64.1	63.2	61.8	-3.7%	-0.1%	-1.4%	-2.2%	-0.5%
Energy per Capita (Kgoe/inhabitant)	3461	3619	3770	3833	3832	0.9%	0.6%	1.7%	0.0%	0.6%
Industry	738	730	704	699	700	-0.2%	-0.5%	-0.7%	0.1%	-0.5%
Transport	565	696	772	799	812	4.3%	1.5%	3.5%	1.7%	1.7%
Tertiary-Domestic	993	942	1015	1026	1024	-1.0%	1.1%	1.2%	-0.2%	0.9%
Electricity Share (%)										
Final Energy Consumption	16.5%	18.1%	19.0%	19.2%	19.4%	1.8%	0.7%	0.9%	1.1%	0.8%
Industry	23.4%	26.0%	28.2%	29.0%	29.2%	2.2%	1.1%	2.8%	0.8%	1.3%
Transport	1.7%	1.6%	1.7%	1.6%	1.6%	-1.2%	1.0%	-3.9%	-2.5%	0.1%
Tertiary-Domestic	19.9%	24.1%	25.8%	26.1%	26.8%	3.8%	1.0%	5.4%	3.8%	0.3%
Total Renewable Consumption (Mtoe)	67.0	65.7	81.4	84.3	84.6	-0.4%	3.1%	11.3%	3.8%	0.0%
Hydro	24.4	22.3	25.5	26.3	26.2	-1.8%	1.9%	5.8%	2.9%	0.0%
Biomass	40.7	41.0	52.2	53.6	53.7	0.1%	3.5%	13.0%	2.9%	0.0%
Other renewable energy sources	1.9	2.4	3.8	4.4	4.6	5.3%	6.4%	26.9%	22.5%	0.6%
Renewable Intensity (toe/1990MEUR)	14.7	12.4	13.8	13.8	13.6	-3.4%	1.5%	5.6%	-1.5%	-0.2%
Renewable per capita (Kgoe/inhabitant)	186.8	180.2	217.7	224.8	224.6	-0.7%	2.7%	10.7%	3.2%	0.0%
CO₂ Emissions (Mt of CO₂)	2989.5	3080.0	3048.6	3107.4	3085.3	0.6%	-0.1%	1.9%	-0.7%	0.0%
Public Thermal Power Generation	760.2	837.2	790.8	818.0	799.5	1.9%	-0.8%	3.4%	-2.3%	-0.5%
Autoprod. Thermal Power Generation	131.3	124.6	105.8	112.9	114.0	-1.1%	-2.3%	6.7%	1.0%	-1.0%
Energy Branch	124.1	127.4	142.9	149.8	139.8	0.5%	1.6%	4.9%	-6.7%	1.0%
Industry	615.3	571.7	513.7	500.9	496.9	-1.5%	-1.5%	-2.5%	-0.8%	-1.5%
Transport	587.4	738.5	842.2	874.5	893.9	4.7%	1.9%	3.8%	2.2%	2.1%
Tertiary-Domestic	735.2	643.6	643.7	641.6	632.5	-2.6%	0.0%	-0.3%	-1.4%	-0.2%
Carbon Intensity (tn of CO₂/toe)	2.4	2.3	2.2	2.2	2.1	-0.6%	-1.1%	0.0%	-1.1%	-1.0%
Public Thermal Power Generation	3.6	3.6	3.4	3.4	3.4	0.0%	-0.9%	-0.2%	-1.5%	-0.9%
Autoprod. Thermal Power Generation	3.3	3.1	2.5	2.5	2.4	-1.3%	-3.0%	0.5%	-4.0%	-2.7%
Energy Branch	2.0	2.0	2.1	2.1	2.0	-0.3%	0.3%	0.7%	-2.0%	0.1%
Industry	2.3	2.1	1.9	1.9	1.9	-1.5%	-1.4%	-2.0%	-1.3%	-1.4%
Transport	2.9	2.9	2.9	2.9	2.9	0.1%	0.0%	0.1%	0.1%	0.1%
Tertiary-Domestic	2.1	1.9	1.7	1.7	1.6	-1.9%	-1.4%	-1.7%	-1.6%	-1.5%
CO₂ per Capita (kg of CO₂/inhabitant)	8332	8450	8150	8289	8196	0.3%	-0.5%	1.7%	-1.1%	-0.3%
Industry	1715	1568	1373	1336	1320	-1.8%	-1.9%	-2.7%	-1.2%	-1.9%
Transport	1637	2026	2252	2333	2375	4.4%	1.5%	3.6%	1.8%	1.8%
Tertiary-Domestic	2049	1766	1721	1712	1680	-2.9%	-0.4%	-0.5%	-1.8%	-0.5%
CO₂ per unit of GDP (tn of CO₂/1990 MEUR)	654	579	515	511	495	-2.4%	-1.7%	-0.9%	-3.1%	-1.7%
Public Thermal Power Generation	166	158	134	134	128	-1.1%	-2.3%	0.6%	-4.6%	-2.3%
Autoprod. Thermal Power Generation	29	23	18	19	18	-4.0%	-3.8%	3.8%	-1.5%	-2.7%
Energy Branch	27	24	24	25	22	-2.5%	0.1%	2.0%	-8.9%	-0.7%
Industry	135	108	87	82	80	-4.4%	-3.0%	-5.2%	-3.2%	-3.3%
Transport	129	139	142	144	143	1.6%	0.3%	1.0%	-0.3%	0.3%
Tertiary-Domestic	161	121	109	105	101	-5.5%	-1.5%	-3.1%	-3.8%	-2.0%





AUSTRIA : SUMMARY ENERGY BALANCE

Mtoe	1985	1990	1995	1997	1998	1999	90/85	97/90	98/97	99/98	99/90
Annual % Change											
Primary Production	8.44	8.71	8.74	9.11	9.10	9.37	0.6%	0.7%	-0.2%	2.9%	0.8%
Solids	0.63	0.64	0.30	0.26	0.27	0.24	0.6%	-11.9%	0.8%	-10.5%	-10.4%
Oil	1.15	1.19	1.06	0.98	0.99	1.01	0.5%	-2.7%	1.2%	1.6%	-1.8%
Natural gas	1.01	1.11	1.26	1.22	1.33	1.48	1.9%	1.3%	9.8%	10.8%	3.3%
Nuclear	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-
Hydro & Wind	2.66	2.71	3.19	3.09	3.20	3.50	0.4%	1.9%	3.3%	9.5%	2.9%
Geothermal	0.00	0.00	0.00	0.01	0.01	0.01	-	14.9%	28.6%	82.7%	22.5%
Other renewable energy sources	2.99	3.06	2.92	3.56	3.31	3.13	0.5%	2.2%	-7.0%	-5.3%	0.2%
Net Imports	15.46	17.28	17.41	18.89	19.83	18.74	2.3%	1.3%	5.0%	-5.5%	0.9%
Solids	3.57	3.12	2.52	3.16	2.97	2.66	-2.7%	0.2%	-5.7%	-10.5%	-1.7%
Oil	8.39	9.71	9.69	10.67	11.58	11.05	3.0%	1.4%	8.5%	-4.5%	1.4%
Crude oil	6.68	7.80	8.05	8.96	9.16	8.26	3.1%	2.0%	2.2%	-9.8%	0.6%
Oil products	1.71	1.91	1.64	1.71	2.42	2.78	2.2%	-1.6%	41.3%	15.2%	4.3%
Natural gas	3.64	4.49	5.42	5.13	5.30	5.19	4.3%	1.9%	3.3%	-2.0%	1.6%
Electricity	-0.15	-0.04	-0.21	-0.07	-0.01	-0.16	-23.2%	7.6%	-78.8%	1065.0%	17.1%
Gross Inland Consumption	23.67	25.65	26.37	28.48	28.79	28.36	1.6%	1.5%	1.1%	-1.5%	1.1%
Solids	3.96	4.16	3.22	3.67	3.14	3.03	1.0%	-1.8%	-14.6%	-3.3%	-3.5%
Oil	9.61	10.52	10.92	11.68	12.43	12.01	1.8%	1.5%	6.4%	-3.3%	1.5%
natural gas	4.60	5.24	6.33	6.54	6.73	6.83	2.6%	3.2%	2.9%	1.5%	3.0%
Other (1)	5.50	5.73	5.90	6.59	6.49	6.48	0.8%	2.0%	-1.5%	-0.2%	1.4%
Electricity Generation in TWh	44.82	50.83	56.58	56.84	57.43	60.36	2.6%	1.6%	1.0%	5.1%	1.9%
Nuclear	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-
Hydro & wind (including pumping)	31.89	32.91	38.47	37.29	38.71	41.74	0.6%	1.8%	3.8%	7.8%	2.7%
Thermal	12.93	17.92	18.11	19.55	18.72	18.62	6.7%	1.3%	-4.3%	-0.5%	0.4%
Generation Capacity in GWe	15.25	16.69	17.44	17.86	17.46	17.73	1.8%	1.0%	-2.3%	1.5%	0.7%
Nuclear	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-
Hydro & wind	10.17	10.95	11.31	11.55	11.47	11.57	1.5%	0.8%	-0.7%	0.8%	0.6%
Thermal	5.08	5.74	6.13	6.31	5.98	6.16	2.5%	1.4%	-5.2%	3.0%	0.8%
Average Load Factor in %	33.5	34.8	37.0	36.3	37.6	38.9	0.7%	0.6%	3.4%	3.5%	1.2%
Fuel Inputs for Thermal Power Generation	2.57	4.12	4.02	4.59	4.42	4.31	9.9%	1.6%	-3.8%	-2.4%	0.5%
Solids	0.66	1.46	1.04	1.15	0.86	0.93	17.2%	-3.4%	-24.8%	7.6%	-4.9%
Oil	0.33	0.45	0.58	0.55	0.78	0.69	6.1%	3.1%	42.0%	-11.7%	5.0%
Gas	1.31	1.97	2.11	2.30	2.30	2.26	8.5%	2.3%	-0.2%	-1.8%	1.5%
Geothermal	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-
Biomass	0.26	0.24	0.28	0.59	0.47	0.43	-1.9%	13.8%	-20.3%	-8.4%	6.8%
Average Thermal Efficiency in %	43.3	37.4	38.7	36.6	36.5	37.2	-2.9%	-0.3%	-0.5%	1.9%	-0.1%
Non-Energy Uses	1.52	1.57	1.03	1.36	1.95	1.35	0.5%	-2.0%	42.5%	-30.8%	-1.7%
Total Final Energy Demand	19.20	19.94	21.22	22.91	22.62	22.82	0.8%	2.0%	-1.2%	0.9%	1.5%
Solids	2.47	1.76	1.39	1.74	1.50	1.36	-6.5%	-0.2%	-13.6%	-9.2%	-2.8%
Oil	7.43	8.12	8.82	9.23	9.25	9.39	1.8%	1.8%	0.2%	1.5%	1.6%
Gas	2.98	3.03	3.65	3.96	4.03	4.19	0.3%	3.9%	1.8%	4.0%	3.7%
Electricity	3.18	3.71	4.01	4.20	4.19	4.28	3.1%	1.8%	-0.2%	2.1%	1.6%
Heat	0.44	0.57	0.79	0.99	1.01	1.04	5.4%	8.2%	2.5%	2.1%	6.9%
Renewable energy sources	2.71	2.75	2.56	2.79	2.63	2.55	0.3%	0.2%	-5.8%	-2.8%	-0.8%
CO₂ Emissions in Mt of CO₂ (2)	51.2	55.0	56.7	60.1	60.2	60.0	1.5%	1.3%	0.0%	-0.2%	1.0%
Indicators											
Population (Million)	7.58	7.73	8.05	8.07	8.08	8.09	0.4%	0.6%	0.1%	0.2%	0.5%
GDP (bil. EUR 1990)	107.3	125.6	138.5	143.1	147.8	151.9	3.2%	1.9%	3.3%	2.8%	2.1%
Gross Inl Cons./ GDP (toe/1990 MEUR)	220.5	204.3	190.4	199.0	194.8	186.6	-1.5%	-0.4%	-2.1%	-4.2%	-1.0%
Gross Inl Cons./ Capita (Kgoe/inhabitant)	3123.7	3319.0	3277.1	3528.5	3563.5	3504.3	1.2%	0.9%	1.0%	-1.7%	0.6%
Electricity Generated/ Capita (kWh/inhabitant)	5913.9	6576.6	7031.2	7041.6	7108.0	7458.8	2.1%	1.0%	0.9%	4.9%	1.4%
CO ₂ Emissions/ Capita (kg of CO ₂ /inhabitant)	6758.1	7121.1	7046.0	7449.1	7446.4	7420.0	1.1%	0.6%	0.0%	-0.4%	0.5%
Import Dependency %	65.3	67.4	66.0	66.3	68.9	66.1	0.6%	-0.2%	3.9%	-4.1%	-0.2%

(1) Includes nuclear, hydro and wind, net imports of electricity, and other energy sources.

(2) Given on an indicative basis; calculated using common emission factors across all countries in the world



BELGIUM : SUMMARY ENERGY BALANCE

Mtoe	1985	1990	1995	1997	1998	1999	90/85	97/90	98/97	99/98	99/90
Annual % Change											
Primary Production	13.69	12.54	11.42	12.93	12.37	13.65	-1.7%	0.4%	-4.3%	10.3%	0.9%
Solids	4.38	1.08	0.27	0.18	0.13	0.15	-24.4%	-22.6%	-26.9%	16.7%	-19.5%
Oil	0.00	0.00	0.00	0.00	0.01	0.01	-	-	-	10.0%	-
Natural gas	0.03	0.01	0.00	0.00	0.00	0.00	-22.3%	-46.0%	-100.0%	-	-30.5%
Nuclear	8.70	10.71	10.34	11.96	11.39	12.64	4.2%	1.6%	-4.7%	11.0%	1.9%
Hydro & Wind	0.02	0.02	0.03	0.03	0.03	0.03	-0.7%	1.9%	27.8%	-11.5%	2.9%
Geothermal	0.00	0.00	0.00	0.00	0.00	0.00	24.6%	8.4%	2.6%	-2.6%	6.5%
Other renewable energy sources	0.55	0.71	0.78	0.76	0.80	0.81	5.4%	1.0%	5.4%	0.6%	1.4%
Net Imports	31.97	38.86	43.69	47.07	49.98	46.81	4.0%	2.8%	6.2%	-6.4%	2.1%
Solids	5.57	9.49	9.34	8.09	8.54	7.34	11.3%	-2.2%	5.5%	-14.1%	-2.8%
Oil	19.13	21.47	23.58	27.41	28.89	25.91	2.3%	3.6%	5.4%	-10.3%	2.1%
Crude oil	20.35	26.12	25.67	31.86	33.47	31.03	5.1%	2.9%	5.0%	-7.3%	1.9%
Oil products	-1.23	-4.65	-2.10	-4.45	-4.58	-5.11	30.5%	-0.6%	2.8%	11.7%	1.1%
Natural gas	7.29	8.22	10.42	11.28	12.43	13.48	2.4%	4.6%	10.2%	8.5%	5.7%
Electricity	0.00	-0.32	0.35	0.28	0.12	0.07	140.8%	-	-57.4%	-38.8%	-
Gross Inland Consumption	43.85	47.26	50.46	55.12	56.21	56.84	1.5%	2.2%	2.0%	1.1%	2.1%
Solids	9.90	10.24	8.55	8.36	8.44	7.42	0.7%	-2.9%	0.9%	-12.1%	-3.5%
Oil	17.35	17.73	19.79	22.46	22.95	22.53	0.4%	3.4%	2.1%	-1.8%	2.7%
natural gas	7.33	8.17	10.61	11.26	12.47	13.34	2.2%	4.7%	10.7%	6.9%	5.6%
Other (1)	9.27	11.12	11.50	13.03	12.35	13.56	3.7%	2.3%	-5.2%	9.8%	2.2%
Electricity Generation in TWh	57.31	70.83	74.42	78.88	83.23	84.51	4.3%	1.5%	5.5%	1.5%	2.0%
Nuclear	34.59	42.71	41.35	47.40	46.16	49.01	4.3%	1.5%	-2.6%	6.2%	1.5%
Hydro & wind (including pumping)	1.35	0.90	1.24	1.28	1.51	1.50	-7.7%	5.1%	17.4%	-0.4%	5.8%
Thermal	21.37	27.21	31.83	30.19	35.56	34.00	5.0%	1.5%	17.8%	-4.4%	2.5%
Generation Capacity in GWe	14.17	14.14	14.92	14.69	15.40	15.57	0.0%	0.5%	4.8%	1.1%	1.1%
Nuclear	5.48	5.50	5.63	5.71	5.71	5.71	0.1%	0.5%	0.0%	0.0%	0.4%
Hydro & wind	1.33	1.41	1.41	1.41	1.41	1.41	1.2%	0.0%	0.1%	0.3%	0.1%
Thermal	7.36	7.24	7.88	7.57	8.27	8.44	-0.3%	0.7%	9.2%	2.1%	1.7%
Average Load Factor in %	46.2	57.2	57.0	61.3	61.7	62.0	4.4%	1.0%	0.7%	0.4%	0.9%
Fuel Inputs for Thermal Power Generation	5.11	6.58	7.21	6.90	7.66	7.02	5.2%	0.7%	11.0%	-8.3%	0.7%
Solids	2.83	3.87	3.76	3.12	3.04	2.25	6.5%	-3.0%	-2.6%	-26.1%	-5.9%
Oil	0.81	0.32	0.22	0.26	0.39	0.16	-17.1%	-3.1%	52.3%	-58.1%	-7.2%
Gas	1.24	1.98	2.72	2.97	3.66	4.13	9.9%	5.9%	23.2%	12.9%	8.5%
Geothermal	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-
Biomass	0.23	0.40	0.50	0.55	0.57	0.48	11.5%	4.6%	2.5%	-15.0%	2.0%
Average Thermal Efficiency in %	36.0	35.6	38.0	37.6	39.9	41.6	-0.2%	0.8%	6.1%	4.2%	1.8%
Non-Energy Uses	2.71	2.74	3.29	4.36	4.35	4.63	0.2%	6.9%	-0.4%	6.4%	6.0%
Total Final Energy Demand	29.58	31.30	34.46	36.93	37.32	37.31	1.1%	2.4%	1.1%	0.0%	2.0%
Solids	4.46	3.79	3.31	3.71	3.27	3.27	-3.2%	-0.3%	-11.9%	0.1%	-1.6%
Oil	13.46	14.76	16.26	17.85	17.93	17.45	1.9%	2.8%	0.5%	-2.7%	1.9%
Gas	6.96	7.25	8.52	8.72	9.20	9.47	0.8%	2.7%	5.6%	2.9%	3.0%
Electricity	4.16	4.99	5.88	6.18	6.36	6.41	3.7%	3.1%	3.0%	0.7%	2.8%
Heat	0.22	0.21	0.22	0.27	0.32	0.39	-0.6%	3.5%	19.3%	19.4%	6.8%
Renewable energy sources	0.31	0.31	0.28	0.21	0.24	0.33	-0.3%	-5.3%	12.9%	37.7%	0.6%
CO₂ Emissions in Mt of CO₂ (2)	99.1	105.9	112.0	117.5	118.9	115.8	1.3%	1.5%	1.2%	-2.6%	1.0%
Indicators											
Population (Million)	9.86	9.97	10.14	10.18	10.20	10.23	0.2%	0.3%	0.2%	0.2%	0.3%
GDP (bil. EUR 1990)	133.1	154.5	164.8	172.4	176.6	181.4	3.0%	1.6%	2.4%	2.7%	1.8%
Gross Inl Cons./GDP (toe/1990 MEUR)	329.6	305.9	306.2	319.7	318.3	313.3	-1.5%	0.6%	-0.4%	-1.6%	0.3%
Gross Inl Cons./Capita (Kgoe/inhabitant)	4447.9	4741.9	4977.5	5413.7	5509.1	5558.8	1.3%	1.9%	1.8%	0.9%	1.8%
Electricity Generated/Capita (kWh/inhabitant)	5813.5	7106.5	7341.1	7747.4	8157.0	8263.8	4.1%	1.2%	5.3%	1.3%	1.7%
CO ₂ Emissions/Capita (kg of CO ₂ /inhabitant)	10052.7	10628.0	11052.7	11540.6	11651.6	11319.7	1.1%	1.2%	1.0%	-2.8%	0.7%
Import Dependency %	69.3	75.7	80.4	78.2	81.1	76.5	1.8%	0.5%	3.7%	-5.7%	0.1%

(1) Includes nuclear, hydro and wind, net imports of electricity, and other energy sources.

(2) Given on an indicative basis; calculated using common emission factors across all countries in the world





DENMARK : SUMMARY ENERGY BALANCE											
Mtoe	1985	1990	1995	1997	1998	1999	90/85	97/90	98/97	99/98	99/90
							Annual % Change				
Primary Production	4.85	9.94	15.46	20.27	20.20	23.55	15.4%	10.7%	-0.3%	16.6%	10.1%
Solids	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-
Oil	2.92	6.06	9.31	11.59	11.66	14.76	15.7%	9.7%	0.6%	26.6%	10.4%
Natural gas	0.97	2.74	4.65	6.96	6.76	6.94	23.1%	14.3%	-2.8%	2.6%	10.9%
Nuclear	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-
Hydro & Wind	0.01	0.05	0.10	0.17	0.24	0.26	51.1%	17.4%	45.8%	7.5%	19.1%
Geothermal	0.00	0.00	0.00	0.00	0.00	0.00	0.5%	0.6%	8.0%	0.0%	1.3%
Other renewable energy sources	0.96	1.09	1.40	1.55	1.53	1.58	2.7%	5.1%	-1.4%	3.8%	4.2%
Net Imports	15.53	9.08	7.92	4.20	1.83	-2.97	-10.2%	-10.4%	-56.6%	-	-
Solids	7.70	6.23	7.65	8.00	4.74	4.18	-4.1%	3.6%	-40.8%	-11.8%	-4.3%
Oil	8.19	3.16	1.83	-0.39	-0.04	-4.40	-17.3%	-	-90.4%	114.8%	6.1%
Crude oil	4.03	2.03	0.80	-2.74	-3.62	-6.38	-12.8%	-	32.2%	76.4%	-
Oil products	4.16	1.13	1.03	2.34	3.58	1.99	-23.0%	11.0%	52.9%	-44.5%	6.5%
Natural gas	-0.40	-0.93	-1.49	-2.78	-2.51	-2.55	18.5%	17.0%	-9.9%	1.9%	11.9%
Electricity	0.04	0.61	-0.07	-0.62	-0.37	-0.20	72.6%	-	-40.4%	-46.5%	-
Gross Inland Consumption	19.60	18.20	20.58	21.59	21.14	20.37	-1.5%	2.5%	-2.1%	-3.7%	1.3%
Solids	7.38	6.11	6.44	6.66	5.64	4.64	-3.7%	1.2%	-15.2%	-17.8%	-3.0%
Oil	10.65	8.55	9.58	9.98	9.88	9.63	-4.3%	2.2%	-1.1%	-2.4%	1.3%
natural gas	0.57	1.79	3.12	3.86	4.22	4.42	25.8%	11.7%	9.4%	4.7%	10.6%
Other (1)	1.00	1.76	1.44	1.09	1.40	1.67	11.8%	-6.5%	28.1%	19.6%	-0.5%
Electricity Generation in TWh	29.04	25.73	36.78	44.30	41.09	38.86	-2.4%	8.1%	-7.2%	-5.4%	4.7%
Nuclear	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-
Hydro & wind (including pumping)	0.08	0.64	1.21	1.95	2.85	3.06	51.1%	17.4%	45.8%	7.5%	19.1%
Thermal	28.96	25.10	35.58	42.35	38.25	35.80	-2.8%	7.8%	-9.7%	-6.4%	4.0%
Generation Capacity in GWe	8.57	9.13	10.69	11.81	12.54	12.73	1.3%	3.7%	6.2%	1.5%	3.8%
Nuclear	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-
Hydro & wind	0.06	0.35	0.63	1.14	1.45	1.78	43.5%	18.2%	27.5%	22.6%	19.7%
Thermal	8.52	8.78	10.06	10.67	11.09	10.95	0.6%	2.8%	3.9%	-1.3%	2.5%
Average Load Factor in %	38.7	32.2	39.3	42.8	37.4	34.9	-3.6%	4.2%	-12.6%	-6.8%	0.9%
Fuel Inputs for Thermal Power Generation	7.27	6.35	8.54	9.95	9.22	8.55	-2.7%	6.6%	-7.3%	-7.2%	3.4%
Solids	6.49	5.55	6.05	6.29	5.29	4.42	-3.1%	1.8%	-16.0%	-16.3%	-2.5%
Oil	0.35	0.25	0.97	1.63	1.50	1.44	-6.1%	30.6%	-8.2%	-4.0%	21.3%
Gas	0.08	0.14	0.91	1.49	1.88	2.03	12.5%	40.7%	26.4%	8.3%	35.0%
Geothermal	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-
Biomass	0.36	0.41	0.60	0.54	0.56	0.66	3.0%	3.8%	3.6%	17.9%	5.3%
Average Thermal Efficiency in %	34.3	34.0	35.8	36.6	35.7	36.0	-0.2%	1.1%	-2.5%	0.9%	0.6%
Non-Energy Uses	0.35	0.30	0.29	0.31	0.28	0.29	-2.8%	0.2%	-9.8%	4.6%	-0.5%
Total Final Energy Demand	14.41	14.34	15.14	15.25	15.21	15.14	-0.1%	0.9%	-0.3%	-0.4%	0.6%
Solids	0.77	0.46	0.39	0.37	0.33	0.30	-9.6%	-3.1%	-9.4%	-9.7%	-4.6%
Oil	9.60	7.59	7.57	7.54	7.48	7.53	-4.6%	-0.1%	-0.8%	0.6%	-0.1%
Gas	0.51	1.13	1.67	1.81	1.72	1.74	17.5%	6.9%	-4.7%	1.2%	4.9%
Electricity	2.18	2.52	2.69	2.74	2.76	2.76	2.9%	1.2%	0.7%	-0.1%	1.0%
Heat	0.87	2.10	2.23	2.27	2.41	2.32	19.2%	1.1%	6.2%	-3.7%	1.1%
Renewable energy sources	0.48	0.54	0.59	0.52	0.50	0.49	2.4%	-0.6%	-3.6%	-1.8%	-1.0%
CO₂ Emissions in Mt of CO₂ (2)	61.3	52.7	60.1	64.5	60.4	57.2	-3.0%	2.9%	-6.4%	-5.2%	0.9%
Indicators											
Population (Million)	5.11	5.14	5.23	5.28	5.30	5.32	0.1%	0.4%	0.3%	0.3%	0.4%
GDP (bil. EUR 1990)	91.7	101.6	114.8	121.2	124.5	127.2	2.1%	2.6%	2.8%	2.1%	2.5%
Gross Inl Cons./GDP (toe/1990 MEUR)	213.8	179.2	179.2	178.2	169.8	160.2	-3.5%	-0.1%	-4.7%	-5.7%	-1.2%
Gross Inl Cons./Capita (Kgoe/inhabitant)	3833.8	3541.7	3936.3	4086.6	3988.3	3829.6	-1.6%	2.1%	-2.4%	-4.0%	0.9%
Electricity Generated/Capita (kWh/inhabitant)	5679.6	5010.4	7036.0	8383.6	7751.4	7305.9	-2.5%	7.6%	-7.5%	-5.7%	4.3%
CO ₂ Emissions/Capita (kg of CO ₂ /inhabitant)	11982.3	10247.9	11503.2	12201.3	11384.2	10751.9	-3.1%	2.5%	-6.7%	-5.6%	0.5%
Import Dependency %	77.6	47.4	35.7	18.2	8.1	-13.6	-9.4%	-12.8%	-55.5%	-	-

(1) Includes nuclear, hydro and wind, net imports of electricity, and other energy sources.

(2) Given on an indicative basis, calculated using common emission factors across all countries in the world





FINLAND : SUMMARY ENERGY BALANCE

Mtoe	1985	1990	1995	1997	1998	1999	90/85	97/90	98/97	99/98	99/90
	Annual % Change										
Primary Production	11.16	11.74	13.19	14.79	13.18	15.22	1.0%	3.4%	-10.9%	15.5%	2.9%
Solids	0.76	1.46	2.06	2.66	0.43	1.97	13.8%	9.0%	-83.9%	357.0%	3.4%
Oil	0.00	0.00	0.00	0.00	0.07	0.00	-	-	-	-	-
Natural gas	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-
Nuclear	4.97	5.01	4.96	5.39	5.37	5.93	0.2%	1.1%	-0.4%	10.4%	1.9%
Hydro & Wind	1.06	0.93	1.11	1.05	1.30	1.10	-2.5%	1.7%	23.0%	-14.9%	1.9%
Geothermal	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-
Other renewable energy sources	4.37	4.34	5.06	5.68	6.02	6.22	-0.2%	3.9%	5.9%	3.4%	4.1%
Net Imports	16.10	18.03	15.42	18.53	18.32	17.22	2.3%	0.4%	-1.1%	-6.0%	-0.5%
Solids	4.02	4.38	3.77	4.65	3.15	2.63	1.7%	0.9%	-32.2%	-16.6%	-5.5%
Oil	10.87	10.48	8.21	10.32	11.04	10.29	-0.7%	-0.2%	6.9%	-6.8%	-0.2%
Crude oil	9.99	8.89	8.55	10.43	12.27	11.69	-2.3%	2.3%	17.6%	-4.7%	3.1%
Oil products	0.88	1.59	-0.34	-0.11	-1.23	-1.40	12.6%	-	983.6%	13.9%	-
Natural gas	0.80	2.26	2.84	2.91	3.34	3.34	23.1%	3.7%	14.8%	0.1%	4.4%
Electricity	0.40	0.92	0.60	0.66	0.80	0.96	17.8%	-4.6%	21.6%	19.5%	0.5%
Gross Inland Consumption	26.71	28.46	28.84	32.55	33.10	32.72	1.3%	1.9%	1.7%	-1.1%	1.6%
Solids	4.89	5.07	5.95	6.71	5.45	5.27	0.7%	4.1%	-18.9%	-3.2%	0.4%
Oil	10.22	9.94	8.33	10.15	10.84	9.90	-0.6%	0.3%	6.8%	-8.6%	0.0%
natural gas	0.80	2.26	2.84	2.91	3.34	3.34	23.1%	3.7%	14.8%	0.1%	4.4%
Other (1)	10.80	11.19	11.73	12.78	13.48	14.21	0.7%	1.9%	5.5%	5.4%	2.7%
Electricity Generation in TWh	49.71	54.37	63.87	69.16	70.16	69.42	1.8%	3.5%	1.4%	-1.1%	2.8%
Nuclear	19.06	19.21	19.21	20.89	21.85	22.97	0.2%	1.2%	4.6%	5.1%	2.0%
Hydro & wind (including pumping)	12.33	10.86	12.92	12.26	15.07	12.83	-2.5%	1.7%	23.0%	-14.9%	1.9%
Thermal	18.32	24.30	31.74	36.02	33.24	33.62	5.8%	5.8%	-7.7%	1.2%	3.7%
Generation Capacity in GWe	11.32	13.22	14.43	15.70	16.14	16.16	3.2%	2.5%	2.8%	0.1%	2.3%
Nuclear	2.30	2.36	2.31	2.55	2.64	2.64	0.5%	1.1%	3.5%	0.0%	1.3%
Hydro & wind	2.51	2.62	2.78	2.87	2.90	2.92	0.9%	1.3%	0.9%	0.7%	1.2%
Thermal	6.51	8.24	9.34	10.27	10.61	10.61	4.8%	3.2%	3.2%	0.0%	2.8%
Average Load Factor in %	50.1	46.9	50.5	50.3	49.6	49.0	-1.3%	1.0%	-1.4%	-1.2%	0.5%
Fuel Inputs for Thermal Power Generation	4.41	5.41	6.91	7.89	6.72	7.10	4.1%	5.5%	-14.8%	5.6%	3.1%
Solids	2.76	3.01	3.88	4.80	3.36	3.30	1.8%	6.9%	-30.0%	-1.7%	1.0%
Oil	0.17	0.29	0.26	0.28	0.24	0.51	11.6%	-0.5%	-16.9%	114.9%	6.3%
Gas	0.41	1.02	1.58	1.52	1.81	1.82	19.9%	5.9%	18.9%	0.6%	6.7%
Geothermal	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-
Biomass	1.07	1.09	1.19	1.29	1.32	1.47	0.3%	2.4%	2.4%	11.7%	3.4%
Average Thermal Efficiency in %	35.7	38.6	39.5	39.3	42.5	40.7	1.6%	0.2%	8.3%	-4.2%	0.6%
Non-Energy Uses	0.94	1.41	0.83	1.24	1.32	0.90	8.4%	-1.8%	6.8%	-31.7%	-4.8%
Total Final Energy Demand	18.89	21.30	22.07	23.16	24.12	24.57	2.4%	1.2%	4.1%	1.9%	1.6%
Solids	1.66	1.57	1.30	1.04	1.29	1.20	-1.1%	-5.6%	23.0%	-6.7%	-2.9%
Oil	7.33	8.06	7.73	7.49	7.69	7.78	1.9%	-1.0%	2.7%	1.2%	-0.4%
Gas	0.61	1.51	1.51	1.77	1.85	1.88	19.6%	2.3%	4.2%	1.8%	2.5%
Electricity	4.17	5.07	5.62	6.05	6.26	6.38	4.0%	2.6%	3.5%	1.9%	2.6%
Heat	1.87	1.91	2.13	2.70	2.52	2.78	0.5%	5.0%	-6.7%	10.4%	4.2%
Renewable energy sources	3.25	3.18	3.79	4.11	4.52	4.55	-0.4%	3.7%	10.1%	0.6%	4.1%
CO₂ Emissions in Mt of CO₂ (2)	48.5	53.4	56.5	59.4	56.0	55.8	1.9%	1.6%	-5.7%	-0.3%	0.5%
Indicators											
Population (Million)	4.90	4.99	5.11	5.14	5.15	5.17	0.3%	0.4%	0.3%	0.2%	0.4%
GDP (bil. EUR 1990)	89.9	106.2	103.3	114.2	120.3	125.3	3.4%	1.0%	5.3%	4.2%	1.9%
Gross Inl Cons./GDP (toe/1990 MEUR)	297.2	268.1	279.2	285.1	275.2	261.2	-2.0%	0.9%	-3.5%	-5.1%	-0.3%
Gross Inl Cons./Capita (Kgoe/inhabitant)	5448.6	5708.1	5647.0	6333.2	6423.0	6334.9	0.9%	1.5%	1.4%	-1.4%	1.2%
Electricity Generated/Capita (kWh/inhabitant)	10139.7	10903.0	12505.1	13456.2	13613.5	13439.3	1.5%	3.1%	1.2%	-1.3%	2.4%
CO ₂ Emissions/Capita (kg of CO ₂ /inhabitant)	9889.1	10699.8	11067.7	11562.2	10871.5	10808.9	1.6%	1.1%	-6.0%	-0.6%	0.1%
Import Dependency %	59.2	62.1	52.9	56.2	54.5	51.7	1.0%	-1.4%	-3.1%	-5.1%	-2.0%

(1) Includes nuclear, hydro and wind, net imports of electricity, and other energy sources.

(2) Given on an indicative basis; calculated using common emission factors across all countries in the world





FRANCE : SUMMARY ENERGY BALANCE

Mtoe	1985	1990	1995	1997	1998	1999	90/85	97/90	98/97	99/98	99/90
							Annual % Change				
Primary Production	91.85	108.40	123.40	124.11	120.90	122.48	3.4%	2.0%	-2.6%	1.3%	1.4%
Solids	10.45	7.63	5.36	4.09	3.42	3.18	-6.1%	-8.5%	-16.4%	-7.0%	-9.3%
Oil	3.36	3.49	3.29	2.48	2.11	1.88	0.8%	-4.7%	-14.8%	-11.1%	-6.6%
Natural gas	4.54	2.42	2.79	2.13	1.84	1.67	-11.8%	-1.8%	-13.6%	-9.1%	-4.0%
Nuclear	57.27	79.13	93.99	98.77	96.64	98.19	6.7%	3.2%	-2.2%	1.6%	2.4%
Hydro & Wind	5.38	4.64	6.32	5.40	5.39	6.27	-2.9%	2.2%	-0.2%	16.2%	3.4%
Geothermal	0.08	0.12	0.13	0.13	0.12	0.12	9.2%	0.8%	-10.7%	0.0%	-0.7%
Other renewable energy sources	10.78	10.97	11.52	11.11	11.38	11.17	0.4%	0.2%	2.4%	-1.9%	0.2%
Net Imports	111.73	119.75	115.30	122.07	131.55	131.27	1.4%	0.3%	7.8%	-0.2%	1.0%
Solids	12.55	13.00	9.01	9.68	13.06	12.16	0.7%	-4.1%	34.9%	-6.9%	-0.7%
Oil	81.08	86.55	85.41	88.66	93.32	89.74	1.3%	0.3%	5.2%	-3.8%	0.4%
Crude oil	75.98	76.00	78.81	87.95	89.98	81.25	0.0%	2.1%	2.3%	-9.7%	0.7%
Oil products	5.10	10.55	6.60	0.72	3.34	8.48	15.7%	-31.9%	366.3%	154.0%	-2.4%
Natural gas	20.11	24.10	26.88	29.35	30.13	34.81	3.7%	2.9%	2.7%	15.5%	4.2%
Electricity	-2.01	-3.91	-6.01	-5.62	-4.95	-5.43	14.2%	5.3%	-12.0%	9.7%	3.7%
Gross Inland Consumption	203.99	223.19	235.70	243.15	250.69	249.91	1.8%	1.2%	3.1%	-0.3%	1.3%
Solids	24.40	19.96	15.29	14.58	17.16	15.17	-3.9%	-4.4%	17.7%	-11.6%	-3.0%
Oil	83.90	87.67	85.50	87.44	91.54	89.95	0.9%	0.0%	4.7%	-1.7%	0.3%
natural gas	24.19	24.61	28.96	31.34	33.41	34.48	0.3%	3.5%	6.6%	3.2%	3.8%
Other (1)	71.50	90.95	105.95	109.79	108.58	110.32	4.9%	2.7%	-1.1%	1.6%	2.2%
Electricity Generation in TWh	344.24	420.08	494.63	503.63	510.24	523.17	4.1%	2.6%	1.3%	2.5%	2.5%
Nuclear	224.06	314.02	377.16	395.41	387.92	394.17	7.0%	3.3%	-1.9%	1.6%	2.6%
Hydro & wind (including pumping)	64.25	57.91	78.01	68.01	66.66	77.53	-2.1%	2.3%	-2.0%	16.3%	3.3%
Thermal	55.92	48.14	39.45	40.21	55.66	51.47	-3.0%	-2.5%	38.4%	-7.5%	0.7%
Generation Capacity in GWe	86.56	103.41	107.61	113.91	112.34	114.58	3.6%	1.4%	-1.4%	2.0%	1.1%
Nuclear	37.49	55.75	58.52	62.88	61.68	63.18	8.3%	1.7%	-1.9%	2.4%	1.4%
Hydro & wind	21.83	24.99	25.23	25.10	25.11	25.19	2.7%	0.1%	0.0%	0.3%	0.1%
Thermal	27.24	22.67	23.87	25.93	25.56	26.21	-3.6%	1.9%	-1.4%	2.6%	1.6%
Average Load Factor in %	45.4	46.4	52.5	50.5	51.8	52.1	0.4%	1.2%	2.7%	0.6%	1.3%
Fuel Inputs for Thermal Power Generation	13.38	11.60	8.85	9.45	12.96	11.82	-2.8%	-2.9%	37.1%	-8.8%	0.2%
Solids	9.32	7.37	5.43	5.28	7.95	6.70	-4.6%	-4.6%	50.4%	-15.7%	-1.1%
Oil	1.61	1.84	0.61	1.17	1.84	1.67	2.8%	-6.3%	58.1%	-9.5%	-1.1%
Gas	1.53	1.42	1.22	1.50	1.62	2.06	-1.5%	0.8%	7.8%	27.3%	4.2%
Geothermal	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-
Biomass	0.92	0.96	1.59	1.50	1.55	1.39	0.9%	6.6%	3.4%	-10.1%	4.2%
Average Thermal Efficiency in %	36.0	35.7	38.3	36.6	36.9	37.5	-0.1%	0.4%	1.0%	1.4%	0.5%
Non-Energy Uses	11.91	13.08	16.59	18.54	16.48	16.51	1.9%	5.1%	-11.1%	0.2%	2.6%
Total Final Energy Demand	131.18	136.19	141.51	145.60	150.63	152.24	0.8%	1.0%	3.5%	1.1%	1.2%
Solids	10.89	9.05	6.90	7.04	6.75	5.96	-3.6%	-3.5%	-4.2%	-11.7%	-4.5%
Oil	65.83	67.57	68.21	69.06	72.38	72.96	0.5%	0.3%	4.8%	0.8%	0.9%
Gas	22.70	23.69	27.10	29.43	30.22	31.44	0.9%	3.1%	2.7%	4.0%	3.2%
Electricity	21.75	25.96	29.46	30.54	31.57	32.22	3.6%	2.3%	3.4%	2.0%	2.4%
Heat	0.08	0.12	0.13	0.13	0.12	0.12	9.2%	0.8%	-10.7%	0.0%	-0.7%
Renewable energy sources	9.94	9.79	9.71	9.40	9.60	9.54	-0.3%	-0.6%	2.2%	-0.6%	-0.3%
CO₂ Emissions in Mt of CO₂ (2)	360.0	352.4	343.6	355.1	379.1	375.7	-0.4%	0.1%	6.8%	-0.9%	0.7%
Indicators											
Population (Million)	55.28	56.74	58.14	58.61	58.85	59.09	0.5%	0.5%	0.4%	0.4%	0.5%
GDP (bil. EUR 1990)	811.0	940.0	987.1	1017.0	1051.6	1082.2	3.0%	1.1%	3.4%	2.9%	1.6%
Gross Inl Cons./GDP (toe/1990 MEUR)	251.5	237.4	238.8	239.1	238.4	230.9	-1.1%	0.1%	-0.3%	-3.1%	-0.3%
Gross Inl Cons./Capita (Kgoe/inhabitant)	3689.9	3933.9	4054.0	4148.6	4260.0	4229.5	1.3%	0.8%	2.7%	-0.7%	0.8%
Electricity Generated/Capita (kWh/inhabitant)	6226.7	7404.2	8507.6	8593.1	8670.6	8856.8	3.5%	2.2%	0.9%	2.1%	2.0%
CO ₂ Emissions/Capita (kg of CO ₂ /inhabitant)	6512.6	6211.9	5910.1	6058.0	6442.3	6358.7	-0.9%	-0.4%	6.3%	-1.3%	0.3%
Import Dependency %	54.1	53.1	48.4	49.6	51.9	51.9	-0.4%	-1.0%	4.6%	0.1%	-0.2%

(1) Includes nuclear, hydro and wind, net imports of electricity, and other energy sources.

(2) Given on an indicative basis; calculated using common emission factors across all countries in the world





GERMANY : SUMMARY ENERGY BALANCE

Mtoe	1985	1990	1995	1997	1998	1999	90/85	97/90	98/97	99/98	99/90
Annual % Change											
Primary Production	210.04	186.39	141.31	139.45	133.24	136.76	-2.4%	-4.1%	-4.5%	2.6%	-3.4%
Solids	148.32	125.04	78.80	70.64	65.69	63.30	-3.4%	-7.8%	-7.0%	-3.6%	-7.3%
Oil	4.44	3.75	3.21	3.04	3.18	2.96	-3.3%	-3.0%	4.6%	-6.7%	-2.6%
Natural gas	16.30	13.73	14.81	16.08	15.67	16.71	-3.4%	2.3%	-2.5%	6.6%	2.2%
Nuclear	34.87	37.67	37.32	41.11	38.91	43.85	1.6%	1.3%	-5.4%	12.7%	1.7%
Hydro & Wind	1.35	1.39	1.85	1.75	1.91	2.16	0.5%	3.4%	8.7%	13.6%	5.0%
Geothermal	0.01	0.01	0.01	0.01	0.01	0.01	0.2%	4.9%	0.0%	-1.7%	3.6%
Other renewable energy sources	4.75	4.80	5.31	6.82	7.88	7.77	0.2%	5.2%	15.4%	-1.4%	5.5%
Net Imports	152.84	165.28	195.15	208.35	212.74	202.29	1.6%	3.4%	2.1%	-4.9%	2.3%
Solids	-0.07	3.27	10.99	14.86	17.32	17.10	-	24.2%	16.6%	-1.2%	20.2%
Oil	118.24	120.13	130.81	135.53	139.44	127.80	0.3%	1.7%	2.9%	-8.3%	0.7%
Crude oil	84.09	88.51	101.17	98.06	109.09	103.37	1.0%	1.5%	11.2%	-5.2%	1.7%
Oil products	34.15	31.62	29.64	37.48	30.35	24.43	-1.5%	2.5%	-19.0%	-19.5%	-2.8%
Natural gas	34.44	41.82	52.93	58.16	56.04	57.30	4.0%	4.8%	-3.6%	2.2%	3.6%
Electricity	0.23	0.07	0.41	-0.20	-0.05	0.09	-21.6%	-	-72.8%	-	3.1%
Gross Inland Consumption	359.34	354.51	337.06	345.24	344.62	339.41	-0.3%	-0.4%	-0.2%	-1.5%	-0.5%
Solids	148.01	131.52	92.17	86.72	85.58	80.60	-2.3%	-5.8%	-1.3%	-5.8%	-5.3%
Oil	120.55	124.05	133.57	137.07	137.66	132.93	0.6%	1.4%	0.4%	-3.4%	0.8%
natural gas	49.58	55.00	66.42	71.95	72.73	72.00	2.1%	3.9%	1.1%	-1.0%	3.0%
Other (1)	41.20	43.94	44.90	49.50	48.65	53.88	1.3%	1.7%	-1.7%	10.8%	2.3%
Electricity Generation in TWh	520.89	548.69	536.15	551.49	556.68	555.43	1.0%	0.1%	0.9%	-0.2%	0.1%
Nuclear	138.62	152.44	154.06	170.30	161.61	169.97	1.9%	1.6%	-5.1%	5.2%	1.2%
Hydro & wind (including pumping)	17.82	18.63	25.93	23.95	26.21	29.17	0.9%	3.7%	9.5%	11.3%	5.1%
Thermal	364.46	377.62	356.16	357.24	368.86	356.28	0.7%	-0.8%	3.3%	-3.4%	-0.6%
Generation Capacity in GWe	114.67	121.17	115.28	113.98	113.62	114.69	1.1%	-0.9%	-0.3%	0.9%	-0.6%
Nuclear	17.92	24.24	22.71	22.31	22.31	22.33	6.2%	-1.2%	0.0%	0.1%	-0.9%
Hydro & wind	8.54	8.76	9.95	10.81	11.53	12.99	0.5%	3.1%	6.7%	12.7%	4.5%
Thermal	88.21	88.18	82.62	80.86	79.78	79.37	0.0%	-1.2%	-1.3%	-0.5%	-1.2%
Average Load Factor in %	51.9	51.7	53.1	55.2	55.9	55.3	-0.1%	1.0%	1.3%	-1.2%	0.7%
Fuel Inputs for Thermal Power Generation	88.66	90.23	86.11	81.01	81.42	78.49	0.4%	-1.5%	0.5%	-3.6%	-1.5%
Solids	77.50	75.54	69.22	64.10	65.15	62.35	-0.5%	-2.3%	1.6%	-4.3%	-2.1%
Oil	2.14	2.87	2.08	1.32	1.24	1.12	6.0%	-10.5%	-6.4%	-9.3%	-9.9%
Gas	7.38	10.09	12.19	13.28	12.61	12.64	6.5%	4.0%	-5.0%	0.2%	2.5%
Geothermal	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-
Biomass	1.64	1.73	2.61	2.30	2.42	2.38	1.1%	4.1%	5.3%	-1.8%	3.6%
Average Thermal Efficiency in %	35.4	36.0	35.6	37.9	39.0	39.0	0.4%	0.8%	2.7%	0.2%	0.9%
Non-Energy Uses	20.29	22.80	22.82	23.86	24.98	24.46	2.4%	0.7%	4.7%	-2.1%	0.8%
Total Final Energy Demand	233.92	227.29	221.35	224.01	223.91	221.34	-0.6%	-0.2%	0.0%	-1.1%	-0.3%
Solids	48.60	37.14	14.89	13.36	11.78	10.82	-5.2%	-13.6%	-11.8%	-8.2%	-12.8%
Oil	94.67	96.81	104.25	105.38	104.59	101.14	0.4%	1.2%	-0.8%	-3.3%	0.5%
Gas	41.52	42.72	51.85	52.74	53.84	55.69	0.6%	3.1%	2.1%	3.4%	3.0%
Electricity	36.51	38.39	38.91	39.70	40.11	40.20	1.0%	0.5%	1.0%	0.2%	0.5%
Heat	9.51	9.16	8.75	8.75	8.75	8.75	-0.7%	-0.7%	0.0%	0.0%	-0.5%
Renewable energy sources	3.12	3.07	2.70	4.08	4.84	4.74	-0.3%	4.1%	18.6%	-2.0%	4.9%
CO₂ Emissions in Mt of CO₂ (2)	990.1	946.9	863.9	827.4	823.9	801.8	-0.9%	-1.9%	-0.4%	-2.7%	-1.8%
Indicators											
Population (Million)	77.67	79.36	81.66	82.05	82.02	82.06	0.4%	0.5%	0.0%	0.0%	0.4%
GDP (bil. EUR 1990)	1140.8	1297.4	1405.4	1435.9	1465.4	1488.2	2.6%	1.5%	2.1%	1.6%	1.5%
Gross Inl Cons./GDP (toe/1990 MEUR)	315.0	273.2	239.8	240.4	235.2	228.1	-2.8%	-1.8%	-2.2%	-3.0%	-2.0%
Gross Inl Cons./Capita (Kgoe/inhabitant)	4626.5	4466.8	4127.6	4207.6	4201.5	4136.3	-0.7%	-0.9%	-0.1%	-1.6%	-0.9%
Electricity Generated/Capita (kWh/inhabitant)	6706.5	6913.5	6565.5	6721.0	6786.4	6768.4	0.6%	-0.4%	1.0%	-0.3%	-0.2%
CO ₂ Emissions/Capita (kg of CO ₂ /inhabitant)	12747.2	11930.4	10579.3	10083.3	10044.5	9771.4	-1.3%	-2.4%	-0.4%	-2.7%	-2.2%
Import Dependency %	42.1	46.3	57.5	60.0	61.4	59.2	1.9%	3.8%	2.3%	-3.5%	2.8%

(1) Includes nuclear, hydro and wind, net imports of electricity, and other energy sources.

(2) Given on an indicative basis; calculated using common emission factors across all countries in the world





GREECE : SUMMARY ENERGY BALANCE

Mtoe	1985	1990	1995	1997	1998	1999	90/85	97/90	98/97	99/98	99/90
Annual % Change											
Primary Production	7.34	9.15	9.71	9.95	10.06	9.49	4.5%	1.2%	1.2%	-5.7%	0.4%
Solids	4.84	7.08	7.91	8.07	8.35	8.00	7.9%	1.9%	3.5%	-4.2%	1.4%
Oil	1.32	0.83	0.46	0.47	0.32	0.02	-8.8%	-7.9%	-32.2%	-94.9%	-35.5%
Natural gas	0.07	0.14	0.04	0.04	0.04	0.00	14.0%	-14.8%	-10.2%	-93.8%	-35.9%
Nuclear	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-
Hydro & Wind	0.24	0.15	0.31	0.34	0.33	0.43	-8.8%	12.0%	-3.3%	32.1%	12.2%
Geothermal	0.00	0.00	0.00	0.00	0.00	0.00	14.9%	-1.4%	7.1%	-16.2%	-2.2%
Other renewable energy sources	0.86	0.95	0.98	1.02	1.03	1.04	1.9%	1.1%	0.2%	1.0%	1.0%
Net Imports	11.81	15.37	18.21	19.19	21.11	19.74	5.4%	3.2%	10.0%	-6.5%	2.8%
Solids	1.23	0.99	0.92	0.76	0.85	0.73	-4.3%	-3.6%	11.2%	-13.8%	-3.3%
Oil	10.52	14.32	17.21	18.10	19.43	17.78	6.4%	3.4%	7.3%	-8.5%	2.4%
Crude oil	10.54	14.71	16.95	18.40	19.28	17.23	6.9%	3.2%	4.8%	-10.6%	1.8%
Oil products	-0.02	-0.39	0.26	-0.29	0.15	0.55	83.4%	-3.9%	-	270.7%	-
Natural gas	0.00	0.00	0.00	0.13	0.69	1.22	-	-	433.7%	76.2%	-
Electricity	0.06	0.06	0.07	0.20	0.14	0.01	-0.7%	18.2%	-29.8%	-89.8%	-15.0%
Gross Inland Consumption	18.34	22.24	24.14	25.61	26.90	26.79	3.9%	2.0%	5.0%	-0.4%	2.1%
Solids	6.08	8.09	8.78	8.82	9.16	8.52	5.9%	1.2%	3.8%	-6.9%	0.6%
Oil	11.01	12.85	13.95	15.06	15.53	15.56	3.1%	2.3%	3.1%	0.2%	2.1%
natural gas	0.07	0.14	0.04	0.17	0.73	1.22	14.0%	3.1%	324.2%	67.9%	27.4%
Other (1)	1.17	1.17	1.36	1.56	1.49	1.48	-0.1%	4.3%	-4.4%	-0.6%	2.7%
Electricity Generation in TWh	27.74	34.99	41.54	43.50	46.32	49.87	4.8%	3.2%	6.5%	7.7%	4.0%
Nuclear	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-
Hydro & wind (including pumping)	2.80	2.00	3.82	4.13	3.94	5.24	-6.6%	10.9%	-4.7%	33.1%	11.3%
Thermal	24.93	33.00	37.73	39.37	42.39	44.63	5.8%	2.6%	7.7%	5.3%	3.4%
Generation Capacity in GWe	7.13	8.51	8.94	9.58	10.02	10.90	3.6%	1.7%	4.6%	8.9%	2.8%
Nuclear	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-
Hydro & wind	2.03	2.41	2.55	2.76	2.89	3.21	3.5%	1.9%	5.0%	11.0%	3.2%
Thermal	5.10	6.10	6.39	6.82	7.12	7.69	3.7%	1.6%	4.4%	8.0%	2.6%
Average Load Factor in %	44.4	46.9	53.0	51.9	52.8	52.2	1.1%	1.4%	1.8%	-1.1%	1.2%
Fuel Inputs for Thermal Power Generation	6.44	8.72	9.88	9.15	10.29	9.98	6.2%	0.7%	12.5%	-3.0%	1.5%
Solids	4.81	6.89	7.79	7.11	8.03	7.23	7.5%	0.5%	12.9%	-9.9%	0.5%
Oil	1.63	1.80	2.08	1.96	1.90	1.88	1.9%	1.3%	-3.0%	-1.5%	0.5%
Gas	0.00	0.03	0.01	0.07	0.35	0.87	-	12.3%	402.1%	145.8%	44.7%
Geothermal	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-
Biomass	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-
Average Thermal Efficiency in %	33.3	32.5	32.8	37.0	35.4	38.5	-0.4%	1.9%	-4.3%	8.6%	1.9%
Non-Energy Uses	0.54	0.64	0.44	0.49	0.58	0.56	3.2%	-3.8%	19.3%	-4.0%	-1.5%
Total Final Energy Demand	12.52	14.54	15.82	17.28	18.19	18.19	3.0%	2.5%	5.2%	0.0%	2.5%
Solids	1.28	1.07	1.08	0.96	0.96	0.77	-3.5%	-1.5%	0.0%	-20.2%	-3.6%
Oil	8.29	10.05	10.80	12.02	12.67	12.63	3.9%	2.6%	5.4%	-0.3%	2.6%
Gas	0.01	0.01	0.01	0.08	0.14	0.20	11.2%	27.2%	77.8%	41.6%	33.6%
Electricity	2.05	2.45	2.93	3.19	3.38	3.51	3.6%	3.8%	6.0%	4.0%	4.1%
Heat	0.00	0.00	0.00	0.00	0.00	0.03	14.9%	-1.4%	7.1%	1034.3%	30.6%
Renewable energy sources	0.89	0.95	0.99	1.03	1.03	1.04	1.4%	1.1%	0.2%	0.8%	1.0%
CO₂ Emissions in Mt of CO₂ (2)	56.7	70.9	77.9	78.7	85.2	82.2	4.6%	1.5%	8.2%	-3.5%	1.6%
Indicators											
Population (Million)	9.93	10.16	10.45	10.50	10.52	10.55	0.5%	0.5%	0.2%	0.3%	0.4%
GDP (bil. EUR 1990)	59.5	65.3	69.4	73.6	75.8	78.3	1.9%	1.7%	3.0%	3.4%	2.1%
Gross Inl Cons./GDP (toe/1990 MEUR)	308.4	340.9	347.7	348.1	354.9	341.9	2.0%	0.3%	1.9%	-3.7%	0.0%
Gross Inl Cons./Capita (Kgoe/inhabitant)	1845.9	2189.3	2309.1	2439.1	2556.5	2538.0	3.5%	1.6%	4.8%	-0.7%	1.7%
Electricity Generated/Capita (kWh/inhabitant)	2791.8	3444.2	3973.9	4143.2	4402.6	4725.6	4.3%	2.7%	6.3%	7.3%	3.6%
CO ₂ Emissions/Capita (kg of CO ₂ /inhabitant)	5706.6	6979.6	7450.6	7497.5	8096.0	7785.8	4.1%	1.0%	8.0%	-3.8%	1.2%
Import Dependency %	60.7	62.1	65.8	66.8	69.5	66.1	0.4%	1.1%	4.0%	-4.9%	0.7%

(1) Includes nuclear, hydro and wind, net imports of electricity, and other energy sources.

(2) Given on an indicative basis; calculated using common emission factors across all countries in the world



IRELAND : SUMMARY ENERGY BALANCE

Mtoe	1985	1990	1995	1997	1998	1999	90/85	97/90	98/97	99/98	99/90
	Annual % Change										
Primary Production	2.86	3.50	4.26	2.84	2.48	2.61	4.1%	-2.9%	-12.8%	5.3%	-3.2%
Solids	0.76	1.43	1.78	0.74	0.81	1.25	13.4%	-9.0%	9.9%	54.0%	-1.5%
Oil	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-
Natural gas	1.94	1.89	2.25	1.91	1.41	1.10	-0.5%	0.1%	-26.2%	-21.6%	-5.8%
Nuclear	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-
Hydro & Wind	0.07	0.06	0.06	0.06	0.09	0.09	-3.4%	0.6%	49.0%	-4.8%	4.5%
Geothermal	0.00	0.00	0.00	0.00	0.00	0.00	-	-	0.0%	250.3%	-
Other renewable energy sources	0.08	0.11	0.16	0.14	0.17	0.17	5.2%	3.3%	22.5%	1.1%	5.0%
Net Imports	5.32	7.08	7.60	9.49	10.62	11.70	5.9%	4.3%	12.0%	10.1%	5.7%
Solids	1.26	2.08	1.83	1.95	1.82	1.52	10.5%	-0.9%	-6.9%	-16.5%	-3.4%
Oil	4.06	5.00	5.68	6.67	7.40	8.26	4.3%	4.2%	11.0%	11.7%	5.7%
Crude oil	1.25	2.02	2.26	2.92	3.15	2.86	10.0%	5.4%	8.2%	-9.4%	3.9%
Oil products	2.81	2.99	3.43	3.75	4.25	5.40	1.2%	3.3%	13.2%	27.3%	6.8%
Natural gas	0.00	0.00	0.08	0.87	1.40	1.89	-	-	61.3%	35.7%	-
Electricity	0.00	0.00	0.00	0.00	0.01	0.02	-	-	-	205.1%	-
Gross Inland Consumption	8.83	10.25	11.02	12.25	13.04	13.90	3.0%	2.6%	6.5%	6.6%	3.4%
Solids	2.58	3.53	2.90	2.87	2.85	2.54	6.5%	-2.9%	-0.7%	-10.9%	-3.6%
Oil	4.15	4.65	5.57	6.41	7.12	8.09	2.3%	4.7%	11.1%	13.6%	6.3%
natural gas	1.95	1.89	2.33	2.77	2.80	3.00	-0.5%	5.6%	1.1%	6.9%	5.2%
Other (1)	0.15	0.17	0.22	0.20	0.27	0.28	1.6%	2.3%	35.0%	4.3%	5.7%
Electricity Generation in TWh	12.09	14.51	17.86	19.96	21.15	22.05	3.7%	4.7%	6.0%	4.2%	4.8%
Nuclear	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-
Hydro & wind (including pumping)	1.18	0.98	0.98	0.99	1.36	1.28	-3.6%	0.1%	36.9%	-6.0%	3.0%
Thermal	10.91	13.53	16.87	18.97	19.79	20.77	4.4%	4.9%	4.4%	4.9%	4.9%
Generation Capacity in GWe	3.19	3.82	4.39	4.29	4.46	4.35	3.7%	1.7%	3.9%	-2.5%	1.4%
Nuclear	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-
Hydro & wind	0.51	0.52	0.52	0.57	0.59	0.59	0.4%	1.3%	2.5%	1.2%	1.5%
Thermal	2.68	3.30	3.87	3.72	3.87	3.75	4.2%	1.7%	4.1%	-3.0%	1.4%
Average Load Factor in %	43.2	43.4	46.4	53.1	54.2	57.9	0.1%	2.9%	2.0%	6.9%	3.3%
Fuel Inputs for Thermal Power Generation	2.63	2.95	3.92	4.28	4.50	4.71	2.3%	5.5%	5.3%	4.5%	5.3%
Solids	0.82	1.78	2.15	2.07	2.04	1.81	16.8%	2.2%	-1.8%	-11.3%	0.2%
Oil	0.54	0.33	0.61	0.79	1.09	1.36	-9.3%	13.3%	37.3%	24.7%	17.0%
Gas	1.27	0.84	1.15	1.39	1.35	1.51	-7.9%	7.4%	-2.9%	12.0%	6.7%
Geothermal	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-
Biomass	0.00	0.00	0.00	0.02	0.03	0.03	-	-	38.5%	6.4%	-
Average Thermal Efficiency in %	35.7	39.5	37.0	38.1	37.8	38.0	2.1%	-0.5%	-0.9%	0.4%	-0.4%
Non-Energy Uses	0.53	0.66	0.61	0.80	0.72	0.70	4.5%	2.8%	-9.3%	-3.9%	0.6%
Total Final Energy Demand	6.20	7.09	7.75	8.63	9.22	9.74	2.7%	2.9%	6.8%	5.6%	3.6%
Solids	1.77	1.56	0.88	0.86	0.86	0.57	-2.4%	-8.1%	-1.0%	-33.0%	-10.5%
Oil	3.23	3.83	4.70	5.35	5.75	6.38	3.5%	4.9%	7.5%	11.0%	5.9%
Gas	0.29	0.57	0.73	0.87	0.96	1.04	14.9%	6.1%	10.7%	7.5%	6.8%
Electricity	0.84	1.02	1.28	1.44	1.52	1.62	4.0%	5.0%	5.9%	6.4%	5.2%
Heat	0.00	0.00	0.00	0.00	0.00	0.00	-	-	0.0%	250.3%	-
Renewable energy sources	0.08	0.11	0.16	0.11	0.14	0.14	5.2%	0.7%	19.4%	0.1%	2.6%
CO₂ Emissions in Mt of CO₂ (2)	26.0	29.8	33.3	36.3	38.3	39.5	2.8%	2.8%	5.8%	3.1%	3.2%
Indicators											
Population (Million)	3.54	3.51	3.60	3.66	3.72	3.74	-0.2%	0.6%	1.6%	0.7%	0.7%
GDP (bil. EUR 1990)	27.4	35.9	48.3	57.5	62.5	68.6	5.5%	7.0%	8.6%	9.8%	7.5%
Gross Inl Cons./GDP (toe/1990 MEUR)	322.4	285.9	228.5	212.8	208.7	202.7	-2.4%	-4.1%	-1.9%	-2.9%	-3.8%
Gross Inl Cons./Capita (Kgoe/inhabitant)	2494.6	2924.0	3061.2	3345.6	3506.1	3712.9	3.2%	1.9%	4.8%	5.9%	2.7%
Electricity Generated/Capita (kWh/inhabitant)	3414.1	4139.5	4958.2	5452.0	5686.8	5887.5	3.9%	4.0%	4.3%	3.5%	4.0%
CO ₂ Emissions/Capita (kg of CO ₂ /inhabitant)	7354.1	8505.8	9242.2	9904.2	10309.3	10556.2	3.0%	2.2%	4.1%	2.4%	2.4%
Import Dependency %	60.1	69.0	68.2	76.5	80.5	83.1	2.8%	1.5%	5.2%	3.3%	2.1%

(1) Includes nuclear, hydro and wind, net imports of electricity, and other energy sources.

(2) Given on an indicative basis; calculated using common emission factors across all countries in the world





ITALY : SUMMARY ENERGY BALANCE											
Mtoe	1985	1990	1995	1997	1998	1999	90/85	97/90	98/97	99/98	99/90
							Annual % Change				
Primary Production	24.94	27.41	30.78	35.16	34.58	33.07	1.9%	3.6%	-1.7%	-4.4%	2.1%
Solids	0.33	0.34	0.10	0.03	0.01	0.00	0.3%	-30.7%	-76.5%	-20.8%	-37.6%
Oil	2.41	4.70	5.29	6.00	5.67	5.05	14.3%	3.5%	-5.5%	-10.9%	0.8%
Natural gas	11.54	14.03	16.35	15.78	15.57	14.31	4.0%	1.7%	-1.3%	-8.1%	0.2%
Nuclear	1.98	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-
Hydro & Wind	3.53	2.72	3.25	3.59	3.56	3.94	-5.1%	4.0%	-0.6%	10.4%	4.2%
Geothermal	1.70	2.07	2.32	2.61	2.80	2.80	4.1%	3.4%	7.3%	0.0%	3.4%
Other renewable energy sources	3.44	3.55	3.48	7.16	6.97	6.97	0.6%	10.5%	-2.6%	0.0%	7.8%
Net Imports	114.41	131.96	134.69	134.23	140.37	143.73	2.9%	0.2%	4.6%	2.4%	1.0%
Solids	14.77	13.79	12.99	10.64	11.55	11.85	-1.4%	-3.6%	8.6%	2.6%	-1.7%
Oil	81.57	89.88	89.95	88.28	90.43	87.78	2.0%	-0.3%	2.4%	-2.9%	-0.3%
Crude oil	75.20	84.28	82.83	88.08	92.35	88.90	2.3%	0.6%	4.8%	-3.7%	0.6%
Oil products	6.36	5.60	7.13	0.20	-1.92	-1.12	-2.5%	-37.9%	-	-41.6%	-
Natural gas	16.04	25.31	28.53	31.98	34.89	40.49	9.6%	3.4%	9.1%	16.0%	5.4%
Electricity	2.04	2.98	3.22	3.34	3.50	3.61	7.9%	1.6%	4.9%	3.1%	2.2%
Gross Inland Consumption	136.05	154.79	162.67	168.06	172.58	175.17	2.6%	1.2%	2.7%	1.5%	1.4%
Solids	15.16	14.64	12.33	11.22	11.71	11.77	-0.7%	-3.7%	4.4%	0.5%	-2.4%
Oil	81.01	89.81	93.43	92.66	92.91	90.52	2.1%	0.4%	0.3%	-2.6%	0.1%
natural gas	27.20	39.02	44.65	47.49	51.13	55.57	7.5%	2.8%	7.7%	8.7%	4.0%
Other (1)	12.69	11.32	12.27	16.70	16.84	17.32	-2.3%	5.7%	0.8%	2.9%	4.8%
Electricity Generation in TWh	185.71	216.86	241.45	251.43	259.76	265.61	3.1%	2.1%	3.3%	2.3%	2.3%
Nuclear	7.02	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-
Hydro & wind (including pumping)	44.59	35.08	41.92	46.68	47.60	52.17	-4.7%	4.2%	2.0%	9.6%	4.5%
Thermal	134.10	181.78	199.53	204.76	212.15	213.44	6.3%	1.7%	3.6%	0.6%	1.8%
Generation Capacity in GWe	55.51	56.56	65.91	70.25	72.35	73.68	0.4%	3.1%	3.0%	1.8%	3.0%
Nuclear	1.15	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-
Hydro & wind	17.82	18.77	19.87	20.07	20.22	20.67	1.0%	1.0%	0.8%	2.2%	1.1%
Thermal	36.54	37.79	46.04	50.19	52.13	53.01	0.7%	4.1%	3.9%	1.7%	3.8%
Average Load Factor in %	38.2	43.8	41.8	40.9	41.0	41.1	2.8%	-1.0%	0.3%	0.4%	-0.7%
Fuel Inputs for Thermal Power Generation	30.07	39.77	42.89	43.47	44.78	44.99	5.8%	1.3%	3.0%	0.5%	1.4%
Solids	5.94	7.07	5.34	4.51	5.10	5.18	3.6%	-6.2%	13.0%	1.5%	-3.4%
Oil	16.20	21.53	25.01	23.26	21.93	19.04	5.8%	1.1%	-5.7%	-13.2%	-1.4%
Gas	5.92	8.90	10.16	12.52	14.58	17.60	8.5%	5.0%	16.5%	20.7%	7.9%
Geothermal	1.70	1.87	2.11	2.40	2.59	2.59	2.0%	3.6%	7.9%	0.0%	3.7%
Biomass	0.31	0.40	0.27	0.78	0.59	0.59	5.2%	10.1%	-24.7%	0.0%	4.4%
Average Thermal Efficiency in %	38.4	39.3	40.0	40.5	40.7	40.8	0.5%	0.4%	0.6%	0.1%	0.4%
Non-Energy Uses	8.41	9.84	13.88	14.00	10.55	10.06	3.2%	5.2%	-24.6%	-4.6%	0.2%
Total Final Energy Demand	96.54	110.62	116.84	121.43	123.74	128.47	2.8%	1.3%	1.9%	3.8%	1.7%
Solids	5.12	4.28	4.14	3.87	3.94	3.72	-3.6%	-1.4%	1.8%	-5.4%	-1.5%
Oil	52.61	54.69	54.12	54.42	54.50	57.60	0.8%	-0.1%	0.1%	5.7%	0.6%
Gas	20.74	29.68	34.51	35.03	36.59	37.90	7.4%	2.4%	4.5%	3.6%	2.8%
Electricity	14.93	18.41	20.44	21.31	21.90	22.44	4.3%	2.1%	2.8%	2.5%	2.2%
Heat	0.00	0.20	0.21	0.21	0.21	0.21	#DIV/0!	0.9%	0.0%	0.0%	0.7%
Renewable energy sources	3.13	3.35	3.41	6.58	6.59	6.59	1.4%	10.1%	0.0%	0.0%	7.8%
CO₂ Emissions in Mt of CO₂ (2)	337.6	388.6	403.2	400.2	409.4	411.8	2.8%	0.4%	2.3%	0.6%	0.6%
Indicators											
Population (Million)	56.59	56.72	57.30	57.51	57.59	57.65	0.0%	0.2%	0.1%	0.1%	0.2%
GDP (bil. EUR 1990)	744.0	861.2	910.6	939.2	956.2	971.6	3.0%	1.2%	1.8%	1.6%	1.3%
Gross Inl Cons./GDP (toe/1990 MEUR)	182.9	179.7	178.7	178.9	180.5	180.3	-0.3%	-0.1%	0.9%	-0.1%	0.0%
Gross Inl Cons./Capita (Kgoe/inhabitant)	2404.0	2729.1	2839.0	2922.1	2996.9	3038.7	2.6%	1.0%	2.6%	1.4%	1.2%
Electricity Generated/Capita (kWh/inhabitant)	3281.4	3823.3	4213.5	4371.5	4510.3	4607.6	3.1%	1.9%	3.2%	2.2%	2.1%
CO ₂ Emissions/Capita (kg of CO ₂ /inhabitant)	5966.1	6850.6	7037.1	6958.2	7108.9	7143.4	2.8%	0.2%	2.2%	0.5%	0.5%
Import Dependency %	82.0	83.8	81.6	78.8	80.1	80.9	0.4%	-0.9%	1.7%	1.0%	-0.4%

(1) Includes nuclear, hydro and wind, net imports of electricity, and other energy sources.

(2) Given on an indicative basis, calculated using common emission factors across all countries in the world



LUXEMBOURG : SUMMARY ENERGY BALANCE

Mtoe	1985	1990	1995	1997	1998	1999	90/85	97/90	98/97	99/98	99/90
Annual % Change											
Primary Production	0.05	0.05	0.05	0.05	0.05	0.05	-1.2%	0.1%	7.5%	-9.6%	-0.3%
Solids	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-
Oil	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-
Natural gas	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-
Nuclear	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-
Hydro & Wind	0.01	0.01	0.01	0.01	0.01	0.01	-2.2%	2.9%	51.8%	-9.5%	5.9%
Geothermal	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-
Other renewable energy sources	0.04	0.04	0.04	0.04	0.04	0.04	-1.0%	-0.4%	-0.4%	-9.7%	-1.5%
Net Imports	3.10	3.52	3.26	3.30	3.26	3.35	2.5%	-0.9%	-1.1%	2.7%	-0.5%
Solids	1.42	1.13	0.51	0.31	0.11	0.11	-4.5%	-16.8%	-63.9%	0.6%	-22.6%
Oil	1.07	1.62	1.76	1.91	2.05	2.10	8.6%	2.4%	7.1%	2.5%	2.9%
Crude oil	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-
Oil products	1.07	1.62	1.76	1.91	2.05	2.10	8.6%	2.4%	7.1%	2.5%	2.9%
Natural gas	0.30	0.43	0.56	0.63	0.63	0.66	7.2%	5.5%	1.0%	3.7%	4.8%
Electricity	0.30	0.34	0.43	0.45	0.47	0.48	2.0%	4.1%	4.4%	2.6%	4.0%
Gross Inland Consumption	3.13	3.55	3.34	3.35	3.27	3.44	2.5%	-0.8%	-2.3%	5.1%	-0.4%
Solids	1.42	1.13	0.51	0.31	0.11	0.11	-4.5%	-16.8%	-63.9%	0.6%	-22.6%
Oil	1.06	1.61	1.79	1.92	2.01	2.15	8.8%	2.6%	4.8%	6.7%	3.3%
natural gas	0.30	0.43	0.56	0.63	0.63	0.66	7.2%	5.5%	1.0%	3.7%	4.8%
Other (1)	0.35	0.38	0.48	0.49	0.52	0.52	1.6%	3.7%	4.7%	1.4%	3.5%
Electricity Generation in TWh	0.94	1.38	1.24	1.26	1.30	1.03	8.0%	-1.3%	3.5%	-20.9%	-3.2%
Nuclear	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-
Hydro & wind (including pumping)	0.50	0.82	0.83	0.94	1.05	0.78	10.4%	1.9%	12.6%	-26.4%	-0.6%
Thermal	0.44	0.56	0.41	0.32	0.25	0.26	5.0%	-7.5%	-22.9%	2.8%	-8.3%
Generation Capacity in GWe	1.24	1.24	1.26	1.28	1.21	1.22	0.0%	0.4%	-5.3%	0.5%	-0.2%
Nuclear	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-
Hydro & wind	1.13	1.13	1.14	1.14	1.15	1.15	0.0%	0.2%	0.7%	-0.3%	0.2%
Thermal	0.11	0.11	0.12	0.14	0.06	0.07	0.0%	3.0%	-56.3%	15.3%	-5.2%
Average Load Factor in %	8.6	12.7	11.3	11.3	12.3	9.6	8.0%	-1.7%	9.3%	-21.6%	-3.0%
Fuel Inputs for Thermal Power Generation	0.15	0.20	0.13	0.10	0.06	0.06	5.4%	-9.5%	-32.9%	-3.6%	-11.9%
Solids	0.01	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-
Oil	0.00	0.01	0.00	0.00	0.00	0.00	7.0%	-	-	-	-
Gas	0.10	0.16	0.11	0.07	0.04	0.04	9.3%	-10.7%	-44.7%	3.6%	-13.9%
Geothermal	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-
Biomass	0.03	0.03	0.02	0.02	0.02	0.02	-1.5%	-1.3%	4.4%	-15.7%	-2.4%
Average Thermal Efficiency in %	25.2	24.6	27.3	28.7	33.0	35.2	-0.4%	2.2%	14.9%	6.6%	4.0%
Non-Energy Uses	0.02	0.02	0.02	0.01	0.02	0.02	2.9%	-6.2%	20.1%	21.8%	-0.7%
Total Final Energy Demand	2.97	3.32	3.15	3.23	3.18	3.36	2.2%	-0.4%	-1.6%	5.4%	0.1%
Solids	0.99	0.75	0.37	0.24	0.11	0.11	-5.4%	-15.2%	-54.3%	0.2%	-19.3%
Oil	1.02	1.58	1.75	1.91	1.99	2.12	9.0%	2.8%	4.2%	6.7%	3.4%
Gas	0.61	0.62	0.58	0.62	0.59	0.61	0.2%	-0.1%	-4.4%	3.6%	-0.2%
Electricity	0.33	0.35	0.43	0.44	0.46	0.47	1.7%	3.2%	3.2%	4.0%	3.3%
Heat	0.00	0.00	0.00	0.01	0.02	0.02	-	-	78.3%	-1.9%	-
Renewable energy sources	0.02	0.02	0.02	0.02	0.02	0.02	-0.2%	0.0%	0.0%	-0.2%	0.0%
CO₂ Emissions in Mt of CO₂ (2)	10.0	10.6	8.7	8.5	7.9	8.3	1.2%	-3.2%	-7.1%	5.8%	-2.7%
Indicators											
Population (Million)	0.37	0.38	0.41	0.42	0.43	0.43	0.8%	1.4%	1.3%	1.4%	1.4%
GDP (bil. EUR 1990)	7.0	8.5	10.2	11.3	11.9	12.8	3.9%	4.2%	5.0%	7.6%	4.7%
Gross Inl Cons./GDP (toe/1990 MEUR)	448.1	419.7	325.8	296.7	276.0	269.6	-1.3%	-4.8%	-7.0%	-2.3%	-4.8%
Gross Inl Cons./Capita (Kgoe/inhabitant)	8548.5	9300.5	8140.5	7960.2	7677.3	7953.6	1.7%	-2.2%	-3.6%	3.6%	-1.7%
Electricity Generated/Capita (kWh/inhabitant)	2560.2	3610.7	3028.5	2992.3	3057.2	2374.1	7.1%	-2.6%	2.2%	-22.3%	-4.6%
CO ₂ Emissions/Capita (kg of CO ₂ /inhabitant)	27328.4	27814.0	21249.3	20094.9	18420.3	19209.0	0.4%	-4.5%	-8.3%	4.3%	-4.0%
Import Dependency %	99.0	99.0	97.7	98.4	99.5	97.3	0.0%	-0.1%	1.2%	-2.2%	-0.2%

(1) Includes nuclear, hydro and wind, net imports of electricity, and other energy sources.

(2) Given on an indicative basis; calculated using common emission factors across all countries in the world





NETHERLANDS : SUMMARY ENERGY BALANCE

Mtoe	1985	1990	1995	1997	1998	1999	90/85	97/90	98/97	99/98	99/90
							Annual % Change				
Primary Production	65.47	60.29	65.99	65.75	63.01	59.51	-1.6%	1.2%	-4.2%	-5.6%	-0.1%
Solids	0.07	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-
Oil	4.09	4.03	3.56	2.96	2.76	2.60	-0.3%	-4.3%	-6.9%	-5.6%	-4.7%
Natural gas	59.52	54.61	60.46	60.59	57.61	54.12	-1.7%	1.5%	-4.9%	-6.1%	-0.1%
Nuclear	0.98	0.88	1.04	0.59	0.94	0.99	-2.1%	-5.5%	58.6%	5.5%	1.3%
Hydro & Wind	0.00	0.01	0.03	0.05	0.06	0.06	116.0%	22.0%	31.6%	-1.5%	20.1%
Geothermal	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-
Other renewable energy sources	0.81	0.76	0.90	1.56	1.64	1.74	-1.4%	10.9%	5.1%	5.8%	9.7%
Net Imports	4.07	17.39	16.33	22.71	23.46	25.85	33.7%	3.9%	3.3%	10.2%	4.5%
Solids	6.64	9.52	8.90	10.40	8.66	7.20	7.5%	1.3%	-16.7%	-16.9%	-3.1%
Oil	24.19	30.88	32.82	36.46	36.47	36.61	5.0%	2.4%	0.0%	0.4%	1.9%
Crude oil	38.30	47.96	59.27	60.74	62.16	59.41	4.6%	3.4%	2.3%	-4.4%	2.4%
Oil products	-14.12	-17.08	-26.45	-24.28	-25.69	-22.80	3.9%	5.2%	5.8%	-11.2%	3.3%
Natural gas	-27.21	-23.80	-26.37	-25.25	-22.69	-19.54	-2.6%	0.8%	-10.1%	-13.9%	-2.2%
Electricity	0.44	0.79	0.98	1.09	1.02	1.59	12.4%	4.6%	-6.5%	56.1%	8.0%
Gross Inland Consumption	61.59	66.82	73.35	75.03	75.00	74.43	1.6%	1.7%	0.0%	-0.8%	1.2%
Solids	6.64	9.15	9.08	9.12	9.25	7.49	6.6%	0.0%	1.3%	-19.0%	-2.2%
Oil	20.40	24.41	27.23	27.28	27.15	27.99	3.7%	1.6%	-0.5%	3.1%	1.5%
natural gas	32.32	30.81	34.09	35.33	34.95	34.58	-1.0%	2.0%	-1.1%	-1.0%	1.3%
Other (1)	2.23	2.44	2.95	3.29	3.66	4.37	1.8%	4.3%	11.3%	19.6%	6.7%
Electricity Generation in TWh	62.92	71.82	81.06	86.65	91.10	86.67	2.7%	2.7%	5.1%	-4.9%	2.1%
Nuclear	3.90	3.50	4.02	2.41	3.81	3.83	-2.1%	-5.2%	58.4%	0.5%	1.0%
Hydro & wind (including pumping)	0.00	0.14	0.41	0.57	0.75	0.74	116.0%	22.1%	31.6%	-1.1%	20.2%
Thermal	59.02	68.18	76.63	83.67	86.54	82.10	2.9%	3.0%	3.4%	-5.1%	2.1%
Generation Capacity in GWe	17.05	17.56	18.99	20.09	20.16	20.62	0.6%	1.9%	0.3%	2.3%	1.8%
Nuclear	0.51	0.51	0.51	0.45	0.45	0.45	0.0%	-1.8%	0.0%	0.0%	-1.4%
Hydro & wind	0.00	0.09	0.29	0.37	0.40	0.45	#DIV/0!	22.4%	7.6%	12.1%	19.5%
Thermal	16.54	16.96	18.20	19.27	19.31	19.72	0.5%	1.8%	0.2%	2.1%	1.7%
Average Load Factor in %	42.1	46.7	48.7	49.2	51.6	48.0	2.1%	0.8%	4.8%	-7.0%	0.3%
Fuel Inputs for Thermal Power Generation	12.85	14.53	16.87	18.05	18.61	18.60	2.5%	3.1%	3.1%	-0.1%	2.8%
Solids	3.17	5.70	5.90	5.16	5.42	4.46	12.5%	-1.4%	5.2%	-17.7%	-2.7%
Oil	0.69	0.70	0.88	0.73	0.71	1.47	0.4%	0.7%	-3.5%	107.4%	8.6%
Gas	8.56	7.65	9.47	10.88	11.13	11.25	-2.2%	5.2%	2.3%	1.1%	4.4%
Geothermal	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-
Biomass	0.43	0.48	0.63	1.28	1.35	1.41	2.3%	14.9%	5.5%	4.8%	12.7%
Average Thermal Efficiency in %	39.5	40.3	39.1	39.9	40.0	38.0	0.4%	-0.2%	0.3%	-5.1%	-0.7%
Non-Energy Uses	7.99	9.33	9.33	8.66	8.35	8.84	3.2%	-1.1%	-3.5%	5.9%	-0.6%
Total Final Energy Demand	42.63	42.94	47.40	49.13	49.26	48.48	0.1%	1.9%	0.3%	-1.6%	1.4%
Solids	2.08	1.71	1.41	1.58	1.48	1.45	-3.8%	-1.2%	-6.0%	-2.4%	-1.8%
Oil	12.07	13.12	14.68	15.89	16.05	16.03	1.7%	2.8%	1.0%	-0.1%	2.3%
Gas	22.57	21.24	22.52	21.93	21.48	20.39	-1.2%	0.5%	-2.0%	-5.1%	-0.5%
Electricity	5.28	6.32	7.14	7.70	7.97	8.14	3.7%	2.9%	3.6%	2.1%	2.9%
Heat	0.25	0.27	1.38	1.76	1.98	2.14	1.3%	30.7%	12.9%	7.9%	25.9%
Renewable energy sources	0.38	0.28	0.27	0.28	0.29	0.32	-6.3%	0.4%	3.3%	10.2%	1.8%
CO₂ Emissions in Mt of CO₂ (2)	141.4	152.9	167.2	169.2	169.5	164.0	1.6%	1.5%	0.2%	-3.3%	0.8%
Indicators											
Population (Million)	14.49	14.95	15.46	15.61	15.71	15.81	0.6%	0.6%	0.6%	0.7%	0.6%
GDP (bil. EUR 1990)	192.0	222.5	247.0	264.2	275.0	285.6	3.0%	2.5%	4.1%	3.9%	2.8%
Gross Inl Cons./GDP (toe/1990 MEUR)	320.9	300.2	297.0	284.0	272.7	260.6	-1.3%	-0.8%	-3.9%	-4.5%	-1.6%
Gross Inl Cons./Capita (Kgoe/inhabitant)	4250.2	4468.9	4744.7	4806.3	4775.6	4707.2	1.0%	1.0%	-0.6%	-1.4%	0.6%
Electricity Generated/Capita (kWh/inhabitant)	4342.1	4803.8	5243.2	5550.3	5800.4	5480.9	2.0%	2.1%	4.5%	-5.5%	1.5%
CO ₂ Emissions/Capita (kg of CO ₂ /inhabitant)	9755.6	10227.2	10813.5	10840.9	10793.4	10371.3	0.9%	0.8%	-0.4%	-3.9%	0.2%
Import Dependency %	5.8	22.4	19.3	26.1	26.9	29.7	31.1%	2.2%	3.2%	10.4%	3.2%

(1) Includes nuclear, hydro and wind, net imports of electricity, and other energy sources.

(2) Given on an indicative basis, calculated using common emission factors across all countries in the world





PORTUGAL : SUMMARY ENERGY BALANCE

Mtoe	1985	1990	1995	1997	1998	1999	90/85	97/90	98/97	99/98	99/90
							Annual % Change				
Primary Production	3.20	2.66	2.61	3.21	3.04	2.74	-3.6%	2.7%	-5.5%	-9.8%	0.3%
Solids	0.10	0.12	0.00	0.00	0.00	0.00	3.4%	-	-	-	-
Oil	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-
Natural gas	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-
Nuclear	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-
Hydro & Wind	0.93	0.79	0.72	1.13	1.12	0.64	-3.2%	5.3%	-0.5%	-43.4%	-2.3%
Geothermal	0.00	0.00	0.04	0.04	0.05	0.07	-	45.8%	13.2%	37.2%	40.8%
Other renewable energy sources	2.17	1.75	1.85	2.04	1.86	2.03	-4.2%	2.2%	-8.7%	9.2%	1.7%
Net Imports	9.64	15.16	17.88	18.44	19.42	22.08	9.5%	2.8%	5.3%	13.7%	4.3%
Solids	0.94	2.79	3.80	3.62	3.20	3.74	24.4%	3.8%	-11.6%	16.6%	3.3%
Oil	8.51	12.37	14.00	14.46	15.50	16.46	7.8%	2.3%	7.1%	6.2%	3.2%
Crude oil	7.19	11.36	13.55	13.51	13.84	13.75	9.6%	2.5%	2.5%	-0.6%	2.1%
Oil products	1.31	1.01	0.45	0.96	1.66	2.71	-5.2%	-0.7%	73.2%	63.7%	11.6%
Natural gas	0.00	0.00	0.00	0.10	0.70	1.95	-	-	602.6%	180.2%	-
Electricity	0.19	0.00	0.08	0.25	0.02	-0.07	-56.0%	86.5%	-90.5%	-	-
Gross Inland Consumption	12.36	16.74	19.62	20.91	22.26	23.97	6.3%	3.2%	6.5%	7.7%	4.1%
Solids	0.66	2.58	3.49	3.49	3.17	3.79	31.2%	4.4%	-9.2%	19.5%	4.4%
Oil	8.40	11.61	13.44	13.87	15.33	15.57	6.7%	2.6%	10.5%	1.6%	3.3%
natural gas	0.00	0.00	0.00	0.09	0.70	1.94	-	-	704.4%	178.2%	-
Other (1)	3.29	2.55	2.69	3.46	3.06	2.66	-5.0%	4.5%	-11.6%	-12.9%	0.5%
Electricity Generation in TWh	19.10	28.50	33.26	34.20	38.98	43.27	8.3%	2.6%	14.0%	11.0%	4.8%
Nuclear	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-
Hydro & wind (including pumping)	10.85	9.30	8.47	13.21	13.14	7.74	-3.0%	5.1%	-0.5%	-41.1%	-2.0%
Thermal	8.26	19.19	24.79	20.99	25.84	35.53	18.4%	1.3%	23.1%	37.5%	7.1%
Generation Capacity in GWe	6.01	7.39	9.32	9.47	9.78	10.75	4.2%	3.6%	3.3%	9.9%	4.3%
Nuclear	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-
Hydro & wind	3.06	3.34	4.42	4.47	4.55	4.58	1.8%	4.2%	1.8%	0.8%	3.6%
Thermal	2.95	4.05	4.90	5.00	5.24	6.17	6.5%	3.1%	4.7%	17.8%	4.8%
Average Load Factor in %	36.3	44.0	40.7	41.2	45.5	45.9	3.9%	-0.9%	10.3%	1.0%	0.5%
Fuel Inputs for Thermal Power Generation	1.86	4.30	5.49	4.58	5.38	7.28	18.3%	0.9%	17.5%	35.2%	6.0%
Solids	0.22	2.03	2.92	2.84	2.65	3.26	56.0%	5.0%	-7.0%	23.1%	5.4%
Oil	1.51	2.10	2.37	1.45	2.11	2.23	6.9%	-5.2%	46.1%	5.7%	0.7%
Gas	0.02	0.02	0.02	0.08	0.41	1.39	4.3%	21.6%	441.8%	238.0%	60.9%
Geothermal	0.00	0.00	0.04	0.04	0.05	0.07	-	45.8%	13.2%	37.2%	40.8%
Biomass	0.11	0.15	0.15	0.17	0.16	0.32	5.4%	1.5%	-4.8%	105.6%	9.0%
Average Thermal Efficiency in %	38.2	38.4	38.8	39.4	41.3	42.0	0.1%	0.4%	4.7%	1.7%	1.0%
Non-Energy Uses	1.01	2.10	1.88	1.90	2.16	2.33	15.8%	-1.4%	13.7%	7.9%	1.2%
Total Final Energy Demand	9.54	11.07	13.05	14.72	15.36	15.97	3.0%	4.2%	4.4%	3.9%	4.2%
Solids	0.43	0.62	0.55	0.49	0.41	0.40	7.5%	-3.3%	-15.2%	-2.5%	-4.6%
Oil	5.42	6.69	8.19	9.41	9.92	10.09	4.3%	5.0%	5.4%	1.7%	4.7%
Gas	0.09	0.10	0.10	0.13	0.34	0.59	1.7%	3.7%	156.5%	73.0%	21.4%
Electricity	1.50	2.02	2.48	2.75	2.91	3.11	6.2%	4.5%	6.0%	6.7%	4.9%
Heat	0.03	0.03	0.04	0.07	0.07	0.08	-2.8%	13.1%	11.5%	0.4%	11.4%
Renewable energy sources	2.06	1.60	1.70	1.87	1.70	1.71	-4.9%	2.2%	-9.0%	0.3%	0.7%
CO₂ Emissions in Mt of CO₂ (2)	25.1	39.1	48.2	48.4	52.5	58.8	9.2%	3.1%	8.5%	12.0%	4.6%
Indicators											
Population (Million)	10.01	9.90	9.92	9.95	9.97	9.99	-0.2%	0.1%	0.2%	0.2%	0.1%
GDP (bil. EUR 1990)	41.6	54.3	59.1	63.6	66.0	68.2	5.5%	2.3%	3.8%	3.3%	2.6%
Gross Inl Cons./GDP (toe/1990 MEUR)	297.2	308.2	332.1	328.8	337.2	351.3	0.7%	0.9%	2.5%	4.2%	1.5%
Gross Inl Cons./Capita (Kgoe/inhabitant)	1234.2	1691.6	1978.1	2102.5	2233.1	2399.3	6.5%	3.2%	6.2%	7.4%	4.0%
Electricity Generated/Capita (kWh/inhabitant)	1908.3	2879.5	3353.9	3438.8	3910.0	4331.7	8.6%	2.6%	13.7%	10.8%	4.6%
CO ₂ Emissions/Capita (kg of CO ₂ /inhabitant)	2509.7	3946.5	4862.1	4863.5	5262.5	5883.4	9.5%	3.0%	8.2%	11.8%	4.5%
Import Dependency %	75.2	87.4	89.0	86.1	85.8	89.9	3.1%	-0.2%	-0.4%	4.9%	0.3%

(1) Includes nuclear, hydro and wind, net imports of electricity, and other energy sources.

(2) Given on an indicative basis; calculated using common emission factors across all countries in the world





SPAIN : SUMMARY ENERGY BALANCE

Mtoe	1985	1990	1995	1997	1998	1999	90/85	97/90	98/97	99/98	99/90
Annual % Change											
Primary Production	30.24	33.41	31.44	30.88	31.47	30.39	2.0%	-1.1%	1.9%	-3.4%	-1.0%
Solids	13.94	11.68	10.17	9.89	9.31	8.57	-3.5%	-2.3%	-5.9%	-7.9%	-3.4%
Oil	2.17	0.79	0.78	0.37	0.52	0.30	-18.2%	-10.4%	42.1%	-43.4%	-10.4%
Natural gas	0.23	1.27	0.38	0.16	0.10	0.13	40.9%	-25.5%	-37.1%	27.8%	-22.3%
Nuclear	7.38	13.70	14.30	13.51	14.42	15.18	13.2%	-0.2%	6.7%	5.3%	1.1%
Hydro & Wind	2.69	2.19	2.01	3.05	3.11	2.20	-4.1%	4.9%	1.9%	-29.2%	0.1%
Geothermal	0.00	0.00	0.01	0.01	0.01	0.00	22.9%	15.3%	0.0%	-26.0%	8.0%
Other renewable energy sources	3.84	3.77	3.79	3.88	4.00	4.00	-0.4%	0.4%	2.9%	0.0%	0.6%
Net Imports	46.37	59.85	75.41	80.23	87.55	94.41	5.2%	4.3%	9.1%	7.8%	5.2%
Solids	5.23	7.04	9.15	7.04	8.79	11.88	6.1%	0.0%	24.8%	35.1%	6.0%
Oil	39.10	49.16	58.36	61.91	66.40	68.13	4.7%	3.3%	7.3%	2.6%	3.7%
Crude oil	43.95	53.25	55.36	56.37	60.18	58.54	3.9%	0.8%	6.8%	-2.7%	1.1%
Oil products	-4.85	-4.09	3.00	5.54	6.22	9.59	-3.4%	-	12.3%	54.2%	-
Natural gas	2.14	3.69	7.52	11.54	12.06	13.90	11.5%	17.7%	4.5%	15.3%	15.9%
Electricity	-0.09	-0.04	0.39	-0.26	0.29	0.49	-17.1%	32.9%	-	68.1%	-
Gross Inland Consumption	73.91	89.08	102.28	106.10	111.11	117.47	3.8%	2.5%	4.7%	5.7%	3.1%
Solids	19.48	18.94	19.52	18.52	17.77	20.09	-0.6%	-0.3%	-4.0%	13.0%	0.7%
Oil	38.27	45.54	54.55	56.09	59.90	62.21	3.5%	3.0%	6.8%	3.9%	3.5%
natural gas	2.35	4.97	7.72	11.31	11.61	13.29	16.1%	12.5%	2.7%	14.5%	11.5%
Other (1)	13.81	19.63	20.49	20.19	21.82	21.88	7.3%	0.4%	8.1%	0.2%	1.2%
Electricity Generation in TWh	127.34	151.71	167.04	190.22	195.84	209.03	3.6%	3.3%	3.0%	6.7%	3.6%
Nuclear	28.04	54.26	55.45	55.29	58.98	58.84	14.1%	0.3%	6.7%	-0.2%	0.9%
Hydro & wind (including pumping)	33.03	26.18	24.84	36.71	37.95	28.19	-4.5%	5.0%	3.4%	-25.7%	0.8%
Thermal	66.27	71.28	86.76	98.22	98.91	121.99	1.5%	4.7%	0.7%	23.3%	6.2%
Generation Capacity in GWe	39.61	43.42	45.85	48.59	50.01	52.41	1.9%	1.6%	2.9%	4.8%	2.1%
Nuclear	5.55	6.97	7.07	7.25	7.30	7.35	4.7%	0.6%	0.7%	0.7%	0.6%
Hydro & wind	14.53	16.24	16.90	17.15	17.47	19.42	2.2%	0.8%	1.9%	11.2%	2.0%
Thermal	19.53	20.21	21.88	24.19	25.24	25.64	0.7%	2.6%	4.3%	1.6%	2.7%
Average Load Factor in %	36.7	39.9	41.6	44.7	44.7	45.5	1.7%	1.6%	0.0%	1.8%	1.5%
Fuel Inputs for Thermal Power Generation	15.65	16.51	18.76	21.62	20.97	26.23	1.1%	3.9%	-3.0%	25.1%	5.3%
Solids	12.86	13.76	13.59	15.26	14.65	17.34	1.4%	1.5%	-4.0%	18.3%	2.6%
Oil	1.97	2.17	3.65	2.72	3.28	4.98	1.9%	3.3%	20.7%	51.9%	9.7%
Gas	0.76	0.49	0.99	3.05	2.44	3.33	-8.5%	30.0%	-20.1%	36.8%	23.9%
Geothermal	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-
Biomass	0.06	0.09	0.53	0.59	0.60	0.58	9.5%	30.2%	0.2%	-3.4%	22.3%
Average Thermal Efficiency in %	36.4	37.1	39.8	39.1	40.6	40.0	0.4%	0.7%	3.8%	-1.4%	0.8%
Non-Energy Uses	4.87	5.85	8.01	7.65	8.66	8.44	3.7%	3.9%	13.3%	-2.6%	4.2%
Total Final Energy Demand	47.52	56.53	63.47	67.69	71.68	74.30	3.5%	2.6%	5.9%	3.7%	3.1%
Solids	4.25	3.52	2.23	2.03	1.81	1.70	-3.7%	-7.6%	-10.4%	-6.4%	-7.8%
Oil	28.10	33.60	38.97	40.47	42.97	43.86	3.6%	2.7%	6.2%	2.1%	3.0%
Gas	2.55	4.90	6.84	8.16	9.13	10.00	13.9%	7.5%	12.0%	9.4%	8.2%
Electricity	8.84	10.82	12.12	13.67	14.27	15.24	4.1%	3.4%	4.4%	6.8%	3.9%
Heat	0.00	0.00	0.05	0.08	0.08	0.08	22.9%	63.6%	0.3%	4.1%	47.3%
Renewable energy sources	3.78	3.68	3.26	3.29	3.41	3.43	-0.5%	-1.6%	3.5%	0.5%	-0.8%
CO₂ Emissions in Mt of CO₂ (2)	177.4	202.0	224.0	239.4	246.3	268.5	2.6%	2.5%	2.9%	9.0%	3.2%
Indicators											
Population (Million)	38.42	38.85	39.21	39.32	39.37	39.42	0.2%	0.2%	0.1%	0.1%	0.2%
GDP (bil. EUR 1990)	313.3	398.2	425.7	453.2	472.8	491.8	4.9%	1.9%	4.3%	4.0%	2.4%
Gross Inl Cons./GDP (toe/1990 MEUR)	235.9	223.7	240.3	234.1	235.0	238.9	-1.1%	0.7%	0.4%	1.6%	0.7%
Gross Inl Cons./Capita (Kgoe/inhabitant)	1923.8	2292.9	2608.6	2698.2	2822.1	2980.1	3.6%	2.4%	4.6%	5.6%	3.0%
Electricity Generated/Capita (kWh/inhabitant)	3314.4	3905.0	4260.1	4837.2	4974.2	5302.4	3.3%	3.1%	2.8%	6.6%	3.5%
CO ₂ Emissions/Capita (kg of CO ₂ /inhabitant)	4617.9	5199.4	5713.7	6087.7	6254.7	6811.6	2.4%	2.3%	2.7%	8.9%	3.0%
Import Dependency %	60.6	64.4	71.5	71.8	74.8	76.6	1.2%	1.6%	4.2%	2.4%	1.9%

(1) Includes nuclear, hydro and wind, net imports of electricity, and other energy sources.

(2) Given on an indicative basis, calculated using common emission factors across all countries in the world





SWEDEN : SUMMARY ENERGY BALANCE

Mtoe	1985	1990	1995	1997	1998	1999	90/85	97/90	98/97	99/98	99/90
							Annual % Change				
Primary Production	26.73	29.61	31.14	31.73	30.32	32.65	2.1%	1.0%	-4.4%	7.7%	1.1%
Solids	0.10	0.27	0.31	0.28	0.34	0.21	21.8%	0.4%	24.3%	-37.2%	-2.4%
Oil	0.01	0.00	0.00	0.00	0.00	0.00	-17.8%	-	-	-	-
Natural gas	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-
Nuclear	15.26	17.76	18.04	18.04	16.17	18.88	3.1%	0.2%	-10.4%	16.8%	0.7%
Hydro & Wind	6.11	6.23	5.86	5.95	6.42	6.20	0.4%	-0.7%	7.8%	-3.4%	-0.1%
Geothermal	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-
Other renewable energy sources	5.26	5.33	6.91	7.46	7.40	7.36	0.3%	4.9%	-0.9%	-0.5%	3.6%
Net Imports	20.03	17.82	19.11	19.98	20.01	18.23	-2.3%	1.6%	0.2%	-8.9%	0.3%
Solids	3.08	2.33	2.66	2.48	2.26	2.06	-5.4%	0.9%	-8.8%	-9.1%	-1.4%
Oil	17.01	15.11	15.93	17.01	17.96	16.11	-2.3%	1.7%	5.5%	-10.3%	0.7%
Crude oil	14.06	16.93	17.81	20.10	19.85	19.27	3.8%	2.5%	-1.3%	-2.9%	1.4%
Oil products	2.95	-1.82	-1.89	-3.09	-1.89	-3.16	-	7.8%	-38.7%	67.3%	6.3%
Natural gas	0.07	0.53	0.68	0.72	0.71	0.71	47.8%	4.5%	-0.9%	0.2%	3.4%
Electricity	-0.13	-0.15	-0.14	-0.23	-0.92	-0.65	3.2%	6.3%	295.0%	-29.0%	17.6%
Gross Inland Consumption	46.94	46.94	49.92	50.35	48.23	50.44	0.0%	1.0%	-4.2%	4.6%	0.8%
Solids	2.80	2.73	2.90	2.64	2.70	2.37	-0.5%	-0.5%	2.4%	-12.4%	-1.6%
Oil	17.58	14.50	15.67	15.77	15.75	15.58	-3.8%	1.2%	-0.1%	-1.1%	0.8%
natural gas	0.07	0.53	0.68	0.72	0.71	0.71	47.8%	4.5%	-0.9%	0.2%	3.4%
Other (1)	26.49	29.18	30.67	31.22	29.06	31.78	2.0%	1.0%	-6.9%	9.4%	1.0%
Electricity Generation in TWh	137.13	146.48	148.33	149.34	158.25	155.33	1.3%	0.3%	6.0%	-1.8%	0.7%
Nuclear	58.55	68.17	69.92	69.92	73.57	73.17	3.1%	0.4%	5.2%	-0.5%	0.8%
Hydro & wind (including pumping)	71.59	73.03	68.25	69.25	74.68	72.14	0.4%	-0.8%	7.8%	-3.4%	-0.1%
Thermal	6.98	5.28	10.15	10.18	10.00	10.01	-5.4%	9.8%	-1.8%	0.2%	7.4%
Generation Capacity in GWe	33.18	34.19	33.62	34.54	33.03	33.59	0.6%	0.1%	-4.4%	1.7%	-0.2%
Nuclear	9.46	9.97	10.06	10.08	10.08	10.08	1.1%	0.2%	0.0%	-0.1%	0.1%
Hydro & wind	15.70	16.34	16.22	16.58	16.44	16.64	0.8%	0.2%	-0.9%	1.2%	0.2%
Thermal	8.02	7.88	7.35	7.87	6.51	6.87	-0.4%	0.0%	-17.3%	5.6%	-1.5%
Average Load Factor in %	47.2	48.9	50.4	49.4	54.7	52.8	0.7%	0.1%	10.8%	-3.5%	0.9%
Fuel Inputs for Thermal Power Generation	2.93	1.47	3.00	2.82	3.07	3.16	-12.9%	9.8%	8.8%	2.9%	8.9%
Solids	0.89	0.63	0.69	0.61	0.65	0.42	-6.6%	-0.5%	7.6%	-35.9%	-4.4%
Oil	1.15	0.23	0.67	0.61	0.63	0.50	-27.8%	15.2%	4.0%	-20.5%	9.3%
Gas	0.13	0.25	0.39	0.45	0.41	0.40	14.9%	8.6%	-7.5%	-2.4%	5.4%
Geothermal	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-
Biomass	0.76	0.36	1.25	1.16	1.37	1.83	-13.9%	18.1%	18.2%	33.6%	19.7%
Average Thermal Efficiency in %	20.5	30.9	29.1	31.0	28.0	27.3	8.6%	0.0%	-9.7%	-2.6%	-1.4%
Non-Energy Uses	1.51	1.87	1.96	2.35	2.28	2.29	4.4%	3.3%	-2.9%	0.6%	2.3%
Total Final Energy Demand	31.17	30.43	33.67	33.44	33.36	32.57	-0.5%	1.4%	-0.2%	-2.4%	0.8%
Solids	1.15	1.23	1.32	1.13	1.07	1.02	1.4%	-1.1%	-5.6%	-5.0%	-2.1%
Oil	13.13	12.00	12.38	12.26	12.29	11.90	-1.8%	0.3%	0.3%	-3.2%	-0.1%
Gas	0.33	0.59	0.58	0.65	0.63	0.65	11.9%	1.6%	-4.1%	3.3%	1.1%
Electricity	9.77	10.35	10.71	10.56	10.62	10.78	1.2%	0.3%	0.6%	1.5%	0.5%
Heat	2.51	1.71	3.54	3.64	3.71	3.78	-7.4%	11.5%	1.9%	1.6%	9.2%
Renewable energy sources	4.28	4.57	5.15	5.19	5.04	4.46	1.3%	1.8%	-2.9%	-11.5%	-0.3%
CO₂ Emissions in Mt of CO₂ (2)	58.0	50.6	53.7	52.2	52.3	49.3	-2.7%	0.4%	0.2%	-5.7%	-0.3%
Indicators											
Population (Million)	8.35	8.56	8.83	8.85	8.85	8.86	0.5%	0.5%	0.1%	0.1%	0.4%
GDP (bil. EUR 1990)	161.5	180.8	185.1	191.0	197.8	206.0	2.3%	0.8%	3.6%	4.1%	1.5%
Gross Inl Cons./GDP (toe/1990 MEUR)	290.6	259.6	269.7	263.6	243.8	244.8	-2.2%	0.2%	-7.5%	0.4%	-0.6%
Gross Inl Cons./Capita (Kgoe/inhabitant)	5621.6	5484.8	5655.4	5691.4	5449.1	5694.2	-0.5%	0.5%	-4.3%	4.5%	0.4%
Electricity Generated/Capita (kWh/inhabitant)	16421.4	17114.7	16804.1	16882.0	17879.0	17535.3	0.8%	-0.2%	5.9%	-1.9%	0.3%
CO ₂ Emissions/Capita (kg of CO ₂ /inhabitant)	6943.9	5916.7	6083.1	5901.4	5910.9	5571.3	-3.2%	0.0%	0.2%	-5.7%	-0.7%
Import Dependency %	42.2	37.4	37.5	38.7	40.2	35.1	-2.4%	0.5%	3.9%	-12.7%	-0.7%

(1) Includes nuclear, hydro and wind, net imports of electricity, and other energy sources.

(2) Given on an indicative basis; calculated using common emission factors across all countries in the world





UNITED KINGDOM : SUMMARY ENERGY BALANCE

Mtoe	1985	1990	1995	1997	1998	1999	90/85	97/90	98/97	99/98	99/90
Annual % Change											
Primary Production	236.47	204.49	249.96	262.18	269.45	278.94	-2.9%	3.6%	2.8%	3.5%	3.5%
Solids	54.74	53.11	30.96	29.43	25.87	23.29	-0.6%	-8.1%	-12.1%	-10.0%	-8.8%
Oil	129.10	92.80	132.26	130.19	134.36	139.19	-6.4%	5.0%	3.2%	3.6%	4.6%
Natural gas	35.72	40.92	63.60	77.26	81.13	89.00	2.8%	9.5%	5.0%	9.7%	9.0%
Nuclear	15.98	16.57	21.25	23.25	25.83	24.84	0.7%	5.0%	11.1%	-3.9%	4.6%
Hydro & Wind	0.35	0.44	0.45	0.41	0.53	0.54	4.4%	-0.8%	27.6%	2.2%	2.3%
Geothermal	0.00	0.00	0.00	0.00	0.00	0.00	0.0%	9.5%	-2.9%	3.0%	7.3%
Other renewable energy sources	0.58	0.64	1.45	1.64	1.74	2.09	2.2%	14.3%	5.7%	20.2%	14.0%
Net Imports	-31.65	7.34	-36.11	-33.97	-36.38	-46.95	-	-	7.1%	29.0%	-
Solids	6.59	9.12	10.38	12.83	14.43	14.00	6.7%	5.0%	12.5%	-3.0%	4.9%
Oil	-49.62	-8.99	-48.53	-47.63	-50.26	-56.63	-28.9%	26.9%	5.5%	12.7%	22.7%
Crude oil	-47.91	-3.11	-36.36	-29.44	-37.21	-47.62	-42.1%	37.9%	26.4%	28.0%	35.4%
Oil products	-1.71	-5.88	-12.17	-18.19	-13.05	-9.01	28.0%	17.5%	-28.2%	-30.9%	4.9%
Natural gas	11.39	6.18	0.64	-0.59	-1.63	-5.54	-11.5%	-	176.5%	240.5%	-
Electricity	0.00	1.03	1.40	1.43	1.07	1.22	-	4.8%	-24.8%	14.2%	2.0%
Gross Inland Consumption	203.60	211.54	218.45	222.53	229.95	229.21	0.8%	0.7%	3.3%	-0.3%	0.9%
Solids	62.77	63.31	46.61	39.82	41.03	36.90	0.2%	-6.4%	3.0%	-10.1%	-5.8%
Oil	77.28	82.34	82.30	79.80	80.42	80.69	1.3%	-0.4%	0.8%	0.3%	-0.2%
natural gas	46.64	47.20	65.00	76.18	79.34	82.93	0.2%	7.1%	4.2%	4.5%	6.5%
Other (1)	16.91	18.68	24.55	26.73	29.17	28.69	2.0%	5.3%	9.1%	-1.6%	4.9%
Electricity Generation in TWh	298.04	318.92	333.99	345.32	361.95	366.73	1.4%	1.1%	4.8%	1.3%	1.6%
Nuclear	61.08	65.74	88.95	98.13	100.12	96.26	1.5%	5.9%	2.0%	-3.9%	4.3%
Hydro & wind (including pumping)	6.93	7.06	6.78	6.28	7.74	9.15	0.4%	-1.7%	23.3%	18.3%	2.9%
Thermal	230.03	246.12	238.26	240.91	254.09	261.32	1.4%	-0.3%	5.5%	2.8%	0.7%
Generation Capacity in GWe	67.43	73.02	70.13	72.79	72.99	75.66	1.6%	0.0%	0.3%	3.7%	0.4%
Nuclear	7.07	11.35	12.76	12.95	12.60	12.96	9.9%	1.9%	-2.7%	2.9%	1.5%
Hydro & wind	4.19	4.18	4.42	4.60	4.59	4.62	0.0%	1.4%	-0.2%	0.6%	1.1%
Thermal	56.17	57.49	52.95	55.24	55.80	58.08	0.5%	-0.6%	1.0%	4.1%	0.1%
Average Load Factor in %	50.5	49.9	54.4	54.2	56.6	55.3	-0.2%	1.2%	4.5%	-2.3%	1.2%
Fuel Inputs for Thermal Power Generation	54.33	57.12	50.24	48.92	53.72	52.12	1.0%	-2.2%	9.8%	-3.0%	-1.0%
Solids	42.13	47.58	34.15	27.07	30.17	25.17	2.5%	-7.7%	11.5%	-16.6%	-6.8%
Oil	10.72	7.59	3.73	1.75	1.07	0.70	-6.7%	-18.9%	-39.2%	-34.5%	-23.3%
Gas	1.20	1.57	11.62	19.17	21.46	25.08	5.5%	43.0%	12.0%	16.9%	36.1%
Geothermal	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-	-
Biomass	0.29	0.38	0.74	0.93	1.02	1.17	5.7%	13.7%	10.0%	14.6%	13.4%
Average Thermal Efficiency in %	36.4	37.1	40.8	42.3	40.7	43.1	0.4%	1.9%	-3.9%	6.0%	1.7%
Non-Energy Uses	11.80	11.85	12.69	10.49	10.71	11.03	0.1%	-1.7%	2.0%	3.0%	-0.8%
Total Final Energy Demand	127.68	136.72	142.42	148.79	148.99	150.68	1.4%	1.2%	0.1%	1.1%	1.1%
Solids	15.99	12.04	8.90	8.03	7.28	7.83	-5.5%	-5.6%	-9.3%	7.5%	-4.7%
Oil	51.65	59.20	61.43	62.66	62.61	62.06	2.8%	0.8%	-0.1%	-0.9%	0.5%
Gas	38.92	41.17	46.10	50.79	51.24	52.37	1.1%	3.0%	0.9%	2.2%	2.7%
Electricity	20.81	23.60	25.27	26.59	27.14	27.55	2.5%	1.7%	2.1%	1.5%	1.7%
Heat	0.01	0.45	0.00	0.00	0.00	0.00	104.0%	-59.4%	-2.9%	3.0%	-50.4%
Renewable energy sources	0.29	0.27	0.71	0.72	0.72	0.87	-1.8%	15.2%	0.0%	21.7%	14.1%
CO₂ Emissions in Mt of CO₂ (2)	545.6	568.2	535.7	531.9	547.6	536.5	0.8%	-0.9%	3.0%	-2.0%	-0.6%
Indicators											
Population (Million)	56.69	57.56	58.50	58.91	59.13	59.50	0.3%	0.3%	0.4%	0.6%	0.4%
GDP (bil. EUR 1990)	650.6	763.1	814.1	864.2	887.0	907.3	3.2%	1.8%	2.6%	2.3%	1.9%
Gross Inl Cons./GDP (toe/1990 MEUR)	312.9	277.2	268.3	257.5	259.2	252.6	-2.4%	-1.0%	0.7%	-2.6%	-1.0%
Gross Inl Cons./Capita (Kgoe/inhabitant)	3591.8	3675.0	3734.2	3777.8	3889.1	3852.2	0.5%	0.4%	2.9%	-0.9%	0.5%
Electricity Generated/Capita (kWh/inhabitant)	5257.7	5540.5	5709.2	5862.2	6121.5	6163.5	1.1%	0.8%	4.4%	0.7%	1.2%
CO ₂ Emissions/Capita (kg of CO ₂ /inhabitant)	9624.6	9871.0	9157.7	9029.8	9262.0	9017.1	0.5%	-1.3%	2.6%	-2.6%	-1.0%
Import Dependency %	-15.4	3.4	-16.3	-15.1	-15.6	-20.3	-	-	3.6%	29.9%	-

(1) Includes nuclear, hydro and wind, net imports of electricity, and other energy sources.

(2) Given on an indicative basis; calculated using common emission factors across all countries in the world







THE ENLARGMENT PROCESS

- A new challenge for the European Union at the beginning of the new Millennium
- Accession criteria laid down at the Copenhagen European Council in 1993
- Negotiations opened with the first six candidate countries in March 1998...
- ... and six others followed in February 2000 but Turkey is still waiting
- The target date for membership of the most advanced candidate countries is 2004

THE ACQUIS COMMUNAUTAIRE IN THE ENERGY SECTOR

- European energy policy is based on three European Treaties
- The *acquis communautaire* for the energy sector requires adequate legislation and functioning institutions

THE ACQUIS COMMUNAUTAIRE IN THE TRANSPORT SECTOR

- Transport law represents about 10% of the total EU *acquis*

ADOPTION OF THE ACQUIS

- Principle of differentiation based on each candidate country's own merits
- Mixed performance of candidate countries to transpose the *acquis communautaire*
- Energy sector concerns are security of supply, internal energy market and nuclear safety
- Some transitional periods accepted in the transport sector
- Pre-accession economic programmes designed to develop a sustainable knowledge-based economy

ENERGY OUTLOOK OF ENLARGED EUROPEAN UNION

- Energy profile of candidate countries far from the European Union average
- Candidate countries' energy balances largely based on solid fuels, both at production and consumption level
- The enlarged European Union will reinforce its weight on the energy scene
- Energy intensity of candidate countries four times higher than in the European Union
- CO₂ emissions per unit of GDP in candidate countries five times higher than in the European Union
- The enlargement will contribute to reduced CO₂ emissions

THE ENLARGEMENT PROCESS

A new challenge for the European Union at the beginning of the new Millennium...

With the new Millennium the European Union is preparing for the biggest expansion in its history. On the basis of shared ideals and agreed common rules of political, economic and social behaviour the current Member States and candidate countries will be able to choose to join together in a wider Union. The countries of Central and Eastern Europe, Malta, Cyprus and Turkey have already shown their determination and their capacity for change. Since the invitation to the candidate countries to become part of the European Union, the enlargement process has contributed decisively to achieving political stability, economic progress and social justice. Stable institutions, changes of government on the basis of free and democratic elections, reinforced protection of human rights, including rights of minorities, and market economy principles are now common features. The enlargement process makes Europe a safer place for its citizens and contributes to conflict prevention and control in the wider world.

A strong and united Europe is more important than ever before, against the background of the terrorist attacks of 11 September and subsequent developments. The candidates for European Union membership have aligned themselves with the EU's condemnation of terrorism and associated themselves immediately and fully with the Conclusions and Plan of Action of the extraordinary European Council on 21 September 2001. The Commission renews its commitment to making a success of enlargement. This will enhance security and stability not only in Europe but also in neighbouring regions and further afield.

Accession criteria laid down at the Copenhagen European Council in 1993...

The fifth enlargement will change the face of Europe and will affect all European Union institutions and areas of policy. In order to maintain the stability and prosperity of the entire European continent, an efficient and credible enlargement process must be sustained. Therefore the substantive preparedness of the candidates will be the overriding principle in deciding on the dates of entry, and not political pressures. The candidate states must share

¹ This chapter is largely based on the documents elaborated by the DG Enlargement and the European Parliament. Readers interested in enlargement questions will find complete information and updates related to the ongoing process on the following two internet sites: <http://europa.eu.int/comm/enlargement/index.htm> and <http://www.europarl.eu.int/enlargement>





the values and objectives of the European Union as set out in the Treaties. Compliance with political criteria laid down at **the Copenhagen European Council of December 1993**, the so-called "Copenhagen Criteria", is the starting point for accession to the Union. The conditions governing accession are still relevant: institutional stability and respect for human rights, the existence of a functioning market economy, the capacity to cope with competitive pressures of market forces and the ability to take on all the obligations of Economic and Monetary Union in connection with compliance with the *acquis communautaire*. Membership also requires that the candidate country has created the conditions for its integration through the adjustment of its administrative structures, so that European Community legislation can be transposed into national legislation and implemented effectively through appropriate administrative and judicial structures.

Negotiations opened with the first six Candidate Countries in March 1998...

The Luxembourg European Council of December 1997 established the accession and negotiation process. Negotiations with the Czech Republic, Cyprus, Estonia, Hungary, Poland and Slovenia were opened on 31 March 1998. The Luxembourg European Council also underlined that "as a prerequisite for enlargement of the Union, the operation of the institutions must be strengthened and improved in keeping with the institutional provisions of the Amsterdam Treaty".

The negotiations are conducted in bilateral *accession conferences* between the Member States and each of the applicants, on the basis of 31 chapters covering all areas of the *acquis communautaire*. They started on 10 November 1998 at Ministerial level on seven of the 31 chapters: science & research, education & training, small & medium-sized enterprises, culture & audio-visual policy, telecommunications, industrial policy, and common foreign & security policy. During the first semester of 1999, eight additional negotiating chapters were opened: on company law, statistics, consumer and health protection, fisheries, competition policy, free movement of goods, customs union and external relations. The Presidency of the Council opened negotiations on the following eight chapters at the end of 1999: social policy, EMU, free movement of capital, energy, transport, taxation, freedom to provide services and the environment. The remaining seven chapters were considered in June 2000: agriculture, regional policy, free movement of persons, justice and home affairs, financial control, financial and budgetary provisions and institutions. The last chapter can only be considered after the EU's internal institutional reform has taken place.

Main items

The complex processes of enlargement, and effective assimilation of new Member States over the next decade, pose perhaps the most profound political and economic challenges facing the European Union and the 13 possible candidate countries. Negotiations with the first six accession countries – the Czech Republic, Cyprus, Estonia, Hungary, Poland and Slovenia – commenced in late 1997. Those with six more – Bulgaria, Latvia, Lithuania, Malta, Romania and Slovakia – began in early 2000, whilst the position of Turkey remains under active review. If all applicants eventually joined then the EU's existing population would rise by 45%. On the basis of current data, the EU's present energy consumption would increase by 23%, CO₂ emissions by 28% but its GDP by only 6%. The European Council and the Commission are engaged in detailed negotiations with each of the applicants to resolve outstanding issues and conclude the accession process. The policy dilemmas are formidable and are particularly associated with the creation of new frameworks covering administrative, financial, juridical and market reforms. But these issues are not insurmountable. If accession succeeds, huge new economic opportunities are created by the expansion of the internal market. Modernisation and restructuring of the accession countries will, over time, reduce their heavy dependence upon carbon-intensive solid fuels, permit the adoption of best-practice technologies, and hence lower their energy intensity. In turn these will provide important routes to improved environmental performance and to more sustainable development.

... and six others followed in February 2000 but Turkey is still waiting

The Helsinki European Council of December 1999 decided to open negotiations also with Bulgaria, Latvia, Lithuania, Malta, Romania and Slovakia in February 2000. The principle of differentiation among the candidates and the catch-up principle were agreed. The status of Turkey as a candidate country with all rights and duties and its full participation in the accession process was recognised, although there was no decision on opening negotiations. In its 2000 Report, the Commission concluded that **Turkey** did not meet the Copenhagen political criteria. Despite a number of positive developments, this assessment still remains valid and further efforts are needed. Turkey's national programme for the adoption of the *acquis* sets the scene for a major constitutional reform package, building on the work of the Parliament's Conciliation Commission. This package was adopted in record



time on 3 October 2001 with an overwhelming majority, showing the Parliament's determination to bring Turkey closer to EU standards. This is a significant step towards strengthening guarantees in the field of human rights and fundamental freedoms and limiting capital punishment. In particular, the amendments have narrowed the grounds for introducing limitations to freedom of expression and communication, freedom of the press and freedom of association. Attention has now turned to the effective implementation of these important changes. Implementing legislation is under preparation. Despite these changes, restrictions on the exercise of fundamental freedoms remain. The extent to which individuals in Turkey will actually enjoy an improvement in the exercise of fundamental freedoms will depend on the interpretation given to the constitutional amendments, the details of implementing legislation and the practical application of the law by the authorities. The Commission strongly encourages Turkey to bring about substantial improvements, not only in the constitutional provisions and the laws concerning the protection of human rights, but above all in the human rights situation in practice.

The target date for membership of the most advanced candidate countries is 2004...

The Nice European Council of December 2000 endorsed the strategy proposed by the Commission in its Strategy Paper and the target date for membership of the most advanced candidate countries in 2004. It insisted that no further obstacle should now be put in the way of the enlargement process. It further endorsed the differentiation amongst the candidates and confirmed the catch-up principle. On the basis of the progress made to date, the Commission considers that the time has come to outline a strategy to take the negotiations into a more substantial phase and point the way towards their conclusion. This strategy would enable the Member States and the candidates to take up in the accession conferences the key issues which need to be resolved to bring the negotiations to a satisfactory conclusion. The main elements of the strategy put forward in detail below are:

- An invitation to the Member States and the candidates to take up in the negotiations the substantial issues raised by requests for transitional measures
- An analysis of such requests, distinguishing between cases that the Commission considers to be acceptable, negotiable or unacceptable
- A detailed road map providing a clear sequence for tackling these issues in the course of 2001 and 2002
- A proposal to facilitate negotiations by 'setting-aside' chapters with a limited number of remaining problems
- An indication of the time needed to complete the negotiations

This strategy is based on the principles laid down at the outset of the negotiations and the progress already achieved. It would confirm the Union's determination to inject new momentum into the negotiations and to move them forward according to an ambitious but realistic timetable. This will encourage the candidates to intensify their preparations and enhance confidence in the accession process.

THE ACQUIS COMMUNAUTAIRE IN THE ENERGY SECTOR

European energy policy is based on three European Treaties...

European energy policy is based on the three European Treaties and special provisions apply for individual sources of energy. The European Coal and Steel Community Treaty of 18 April 1951 contains provisions for the coal sector. It created the first common energy market for coal and steel with common objectives and institutions. It also marked the start of European integration. The objectives included ensuring that consumers had equal access to production sources, offering undertaking incentives to improve their production potential and promoting the development of international trade. The aim of the European Atomic Energy Community Treaty of 25 March 1957 was to bring together the efforts which had previously been made by the individual Member States to promote nuclear power; and to facilitate the development of an effective nuclear industry by creating new institutions on the territory of the Member States. The other sources of energy (oil, natural gas, electricity) are covered by the EC Treaty where there are no other specific provisions for them.

The acquis communautaire for the energy sector requires adequate legislation and functioning institutions...

The energy acquis represents the body of all energy related EU law, regulation and policies. Implementing the acquis requires not only adequate legislation but also well functioning institutions (for example a regulatory body as required in the electricity and gas directives, a nuclear safety authority etc). Candidate countries need in the energy field notably to:

- decide on an overall energy policy with clear timetables for restructuring the sector;
- prepare for the internal energy market (gas and electricity directives; the forthcoming Directive on electricity produced from renewable energy sources);
- improve energy networks in order to create a real European market;
- prepare for crisis situations through notably the constitution of 90 days of oil stocks;





- address the social, regional and environmental consequences of the restructuring of coal mines;
- waste less energy and increase the use of renewable energies such as wind, hydro, solar and biomass in their energy balance;
- improve the safety of nuclear power plants in order to ensure that electricity is produced according to a high level of nuclear safety;
- ensure that nuclear waste is handled in a responsible manner; and to prepare for the implementation of Euratom Safeguards on nuclear materials.

THE ACQUIS COMMUNAUTAIRE IN THE TRANSPORT SECTOR

Transport law represents about 10% of the total EU acquis...

In the transport sector the candidate countries face the challenge of taking over and implementing a very substantial body of transport law, which represents about 10% of the total EU acquis. The acquis in Chapter 9 "Transport policy" is based on Articles 70-80 of the EC Treaty. The transport acquis consists mainly of secondary legislation, i.e. several hundreds of Regulations, Directives and Decisions. Implementing the acquis does not only require the adoption of legislation, but also an adequate level of administrative capacity. The road transport-related acquis covers a vast area of social, technical, fiscal, safety and environmental requirements. The railway acquis has recently been the subject of substantial amendments and the liberalisation of this sector will call for an even further opening of national railway markets to competing railway undertakings from other Member States. In aviation, issues of market access, safety and infrastructure organisation have to be addressed. In maritime transport the enforcement of the maritime safety acquis forms one of the biggest challenges. Across all sectors there is an economic need to promote, develop and upgrade the transport infrastructure in the candidate countries, also with financial assistance from the EU. Upon accession the main infrastructures will form part of the enlarged Trans-European transport network.

ADOPTION OF THE ACQUIS

Enormous changes have taken place in the political and economic situations of the candidate countries in the last decade. Governments, and the population at large, have taken difficult and courageous decisions to give up the old certainties in favour of liberalisation and open markets in the belief that the sacrifices which are being made in the short term represent a long-term investment in a better future. The structural reforms which are

being made constitute a very real preparation for accession but are not sufficient in themselves to guarantee that these countries will be able to function as Member States in the early years of this century.

Principle of differentiation based on each candidate country's own merits

The pace of the negotiations with each candidate reflects, above all, the pace of its own preparations for membership. The application of the principle of differentiation based on each candidate country's own merits, together with the vigorous pursuit of preparations for membership backed up by the EU's pre-accession instruments, is also enabling candidates which began negotiations at a later stage to catch up. The enlargement strategy now in place provides a sound basis for completing the negotiations, on schedule, with the candidates that are sufficiently prepared.

In accordance with the guidelines for the negotiations approved by the Luxembourg European Council and confirmed by the Helsinki European Council, each candidate proceeds at its own pace, depending on its degree of preparedness. Each candidate is assessed on its own merits and will join the European Union when it is able to meet the obligations of membership. The negotiations are conducted in bilateral accession conferences between the Member States and each applicant. After three years of negotiation with the six first countries, 29 chapters (all chapters dealing with the *acquis* except 'institutional questions' and 'other questions') have been opened and 18 to 23 chapters have been provisionally closed. By the end of 2001, from 17 to 29 chapters have been opened with the countries which started negotiations in 2000 and 8 to 20 chapters have been provisionally closed. The less advanced countries were Bulgaria and Romania. Provisional closure depends on credible commitments concerning the alignment of legislation with the *acquis* and the administrative capacity to apply it properly. Such commitments are monitored closely by the Commission. So far, this has not led it to recommend the reopening of any chapters. Certain chapters remain open in the absence of sufficient commitments or because of requests for transitional measures. The negotiations follow the principle of differentiation and give a possibility for those countries that joined the negotiations at a later stage to catch up.

Mixed performance of candidate countries to transpose the acquis communautaire...

The 2001 Strategy Paper notes significant progress in the adoption of legislation for alignment with the *acquis* in most candidate countries and for most areas. In a number of areas, such as transport, telecommunications, energy and justice and home affairs,



however, important elements of new Community legislation have been or will be adopted shortly, in most cases building on previous Community law. Some countries still have difficulties in transposing parts of the *acquis*. Nevertheless, despite the progress made over the past year, the major need now consists of building up adequate administrative structures and strengthening of administrative capacity to implement the *acquis*. For most or all of the candidate countries, the Regular Reports and the proposed revised Accession Partnerships identify:

- in the field of the **internal market**, the need to establish or reinforce horizontal administrative infrastructures related to standardisation, accreditation, certification, conformity assessment, market surveillance, mutual recognition of qualifications, the supervision of financial services and to strengthen the enforcement of industrial and intellectual property rights;
- in the field of **competition**, the need to develop or strengthen enforcement capacity for state aid rules and anti-trust provisions;
- in the field of **transport** and **energy**, the need to strengthen or set up appropriate regulatory structures (also in view of forthcoming new *acquis*) and inspection arrangements, in particular to ensure road and maritime safety;
- in the field of **telecommunications** and **culture and audio-visual policy** the need to set-up or strengthen independent regulatory structures, for telecommunications especially also in view of the forthcoming new *acquis*;
- in the field of **environment**, the need to further strengthen administrative, monitoring and enforcement capacity, in particular in the field of waste, water and chemicals;
- in the field of **social policy and employment**, the need, in particular, to ensure the enforcement of occupational health and safety rules and to strengthen labour inspectorates;
- in the field of **justice and home affairs**, the overall need to strengthen the judicial system, the need to strengthen border management, most urgently at future EU external borders, and to prepare for the participation in the Schengen information system, as well as the need to ensure better co-operation of all actors to fight organised crime;
- in the field of **customs** and **taxation**, the need to develop IT-systems to allow for the exchange of electronic data with the Community and its Member States and the capacity of the tax and customs administration to enforce and control Community legislation, including external border controls;
- in the field of **agriculture**, the need to upgrade inspection arrangements according to veterinary and phyto-sanitary legislation, in particular to ensure food safety, and the capacity to implement and enforce the management mechanisms of the Common Agricultural Policy, in particular the Integrated Administration and Control System and the Paying Agency (for

which, in the field of rural development, the respective SAPARD agency may be a precursor);

- in the field of **structural policy**, the need to strengthen administrative capacity in key ministries and to build up the appropriate administrative structures for programming, managing and controlling structural funds;
- in the field of **financial control**, the need to strengthen administrative capacity for public internal financial control and for the fight against fraud.

In a number of other areas, individual candidate countries equally need to improve administrative capacity. This can be the case in the chapters mentioned above, for example the need, for a number of countries, to establish or reinforce independent supervisory authorities for data protection, or in other chapters such as, for instance, **fisheries, statistics or economic and monetary union**. These priorities are specifically identified in each Regular Report and taken up in the proposed revised Accession Partnerships for each candidate country.

Energy sector concerns are security of supply, internal energy market and nuclear safety...

The energy chapter has been opened with all countries except Bulgaria and Romania. It has been provisionally closed with Hungary, Poland, Slovenia, Cyprus and Malta. Generally, negotiations *sensu stricto* in the energy chapter concentrate, depending on the country concerned, on the constitution of emergency oil stocks, the internal energy market (gas and electricity directives) and nuclear safety. Candidate countries have made considerable progress over the past years and the above-mentioned issues are to a varying degree applicable to the candidate countries. More is however necessary and this will evidently require large amounts of investment funding. Although the EU will help with Pre-accession aid, the bulk will have to be financed by candidate countries themselves. Private investments have here an important role to play and require a stable investment climate.

As regards the issue of **nuclear energy**, the European Union has repeatedly emphasised the importance of a high level of nuclear safety in candidate countries. Ensuring high standards of nuclear safety throughout the European continent is a top priority for the EU, and in particular the need, as early as possible, to close the oldest Soviet designed reactors which cannot be upgraded to European safety levels. There are non-upgradeable reactors in three candidate countries – Units 1 and 2 at Ignalina in Lithuania, Units 1-2 at Bohunice in Slovakia





and Units 1-4 at Kozloduy in Bulgaria. The Commission has been involved in an intensive dialogue with each of these countries with the aim of securing agreement on closure dates for these reactors. The Commission has stressed the willingness of the EU and wider international community to provide financial and technical help to decommission these units. In June 2001, the Council of the European Union took note of a Report on Nuclear Safety in the Context of Enlargement. The Council then also reconfirmed the objective of a high level of nuclear safety in the candidate countries. This report contains findings on the situation and perspective of nuclear safety in each candidate country as well as recommendations for specific improvements. The EU envisages for monitoring purposes a so-called "Peer Review" mechanism under the auspices of the EU's Council Working Group on Atomic Questions. The Commission will take its full responsibilities in the monitoring exercise. In July 2001, the Commission, at the invitation of the Council, conveyed this report to the candidate countries. Candidate countries should indicate whether the recommendations made in the report are acceptable. Moreover, candidate countries should indicate envisaged time schedules for implementing each of the recommendations.

Some transitional periods accepted in the transport sector...

The transport chapter has been opened with all countries. It has been provisionally closed with Latvia, Lithuania, Hungary, Slovenia, Malta and Cyprus. The Union has proposed provisional closure of the chapter to Estonia, Slovakia and the Czech Republic. The chapter has been opened with Romania and Bulgaria.

Road transport market integration is one of the most sensitive issues in the context of the accession negotiations under the transport chapter. The EU proposes to grant access to the intra EU road haulage market, provided that candidate countries effectively implement the *acquis* in the road transport field and, where relevant, accept the EU position on their requests for transitional periods. Thereby all candidate countries would upon accession be granted access to the market in the carriage of goods by road within the EU to or from the territory of a Member State, or passing across the territory of one or more Member States, even if in some areas transitional arrangements are accepted in accordance with the Union's general negotiating principles. However, there are specific sensitivities over the issue of an immediate national cabotage market opening upon accession. In order to achieve a smooth integration, and in light of the experience of the EU, the EU has therefore proposed a transitional arrangement entailing that access of non-resident hauliers to the national road transport market of other Member States should, in certain cases, be phased in gradually. The proposal is to reciprocally restrict the access to the national transport markets between current and new Member

States for an initial period of two years for those candidate countries which have requested no or only limited transitional periods in the area of road transport; and for an initial period of three years for those candidate countries which have requested more substantial transitional periods, causing additional disruptions, in the area of road transport. In addition, Member States may notify to the Commission a prolongation of this initial transitional period for a maximum period of two years. In the road transport sector, some requests for limited transitional periods have been accepted in the case of Latvia, Lithuania, Hungary, Malta and Cyprus.

In the maritime sector no candidate country has requested a transitional period. The importance of legal harmonisation and the strengthening of administrative structures in the maritime sector, especially with a view to improving the safety performance of the fleets of candidate countries, is underlined in the Common Positions. In the rail sector, except for Hungary, all countries for whom the EU has proposed provisional closure of the transport chapter are in a position to implement the recently substantially revised railway *acquis* as of accession. For Hungary a limited transitional period for market access has been accepted. Adoption and implementation of the *acquis* in the area of inland waterways is expected to be unproblematic. In the aviation sector, Lithuania and Hungary have been granted limited transitional periods in order to phase out the operation of noisy aircraft by third countries.

Pre-accession economic programmes designed to develop a sustainable knowledge-based economy...

To intensify preparations for enlargement, candidate countries are being increasingly associated with EU programmes and activities. Pre-accession economic programmes have been designed bearing in mind the requirements for economic and monetary union, and national employment strategies are being developed. The Göteborg European Council conclusions invited the candidate countries to translate the Union's economic, social and environmental objectives into their national policies. The candidate countries should be associated as far as possible with the Lisbon process, which focuses on the strategic goal for the Union to develop a sustainable, highly competitive, knowledge-based economy.

Transposing, implementing and applying the *acquis* are not only matters for governments and administrations, but also for business, regional and local bodies and professional organisations. The European Parliament, the Economic and Social Committee and the Committee of Regions have called for the closer involvement of civil society in the process. The candi-



date countries' national authorities need to enhance dialogue with representative institutions to explain the *acquis* and to facilitate its countrywide implementation.

ENERGY OUTLOOK OF ENLARGED EUROPEAN UNION

Energy profile of the candidate countries far from the European Union average...

The aggregate energy balance of all the candidate countries demonstrates major differences with that of the European Union. The population of candidate countries approximates to 45% of the EU population while the GDP of all the candidate countries reached only 6% of EU GDP, and their gross inland energy consumption was 23% that of the EU. These three numbers together reveal the extreme differences still existing between candidate countries and the present European Union. Excluding Turkey, Cyprus and Malta, they reflect the situation of Eastern and Central countries: restructuring economies characterised by very high energy intensity as described in the relevant chapter of this Review.

Candidate countries' energy balances largely based on solid fuels, both at production and consumption level...

By way of comparison with the European Union energy balance, the main differences characterising the candidate countries concern mainly:

- The higher self-sufficiency of these countries that reached 60.9% in 1999 against 52.4% in the European Union, even though this self-sufficiency has declined steadily since 1985 when it was close to 74%;
- This resulted from the importance of primary energy production, largely dominated by solid fuels. In 1999, solid fuels production, mainly located in Poland, exceeded EU production by 12%. It represented 63% of the primary production in candidate countries against only 14% in the European Union. The rationalisation of the mining industry, started in 1985 and involving a reduction of production by about 35%, will continue in the near future leading to the continued reduction of total primary energy production;
- The contribution of other energy sources to total primary production remained marginal, below 10% of the EU levels especially for crude oil, natural gas and nuclear;
- Net imports were dominated by oil and natural gas, essentially supplied by CIS, the same profile as for the EU except for the fact that candidate countries remained a marginal net exporter of solid fuels;

- The structure of gross inland energy consumption was largely dominated by solid fuels which contributed 38% of all energy needs followed by oil with 29%, natural gas 19% and nuclear 6%. This differed markedly from the EU pattern where oil contributed 41%, natural gas 23%, nuclear 15% and solid fuels 14%. The prevalence of heavy industries largely based on coal and the still limited contribution of the transport sector to final demand in candidate countries explained this situation. But the restructuring and modernisation of these economies will in the near future intensify the major role of hydrocarbons, as in the European Union;
- Thermal power generation contributed 69% of total electricity production against 52% in the European Union as a result of the limited share of both nuclear and renewables. Decisions to close old units in the candidate countries will reinforce this situation. In thermal power solids fuels were the largest input with 76% of total consumption against 51% in the European Union. In particular the role played by natural gas remained quite low with only 14% of total consumption as the commissioning of new combined cycle units has been limited until now to some partnerships with foreign utilities. In contrast, gas now represents 30% of input fuels in EU power generation and this contribution continues to increase rapidly. Additionally the average efficiency of thermal units in candidate countries remained close to 30%, increasing from 27% in 1990 and demonstrating the necessity to pursue the modernisation of these power plants;
- The structure of final consumption confirmed the observations made earlier. Since the early 1990s oil products have been the largest contributor with 31% of total consumption in 1998 against 46% in the European Union. Solid fuels were second with 19% against a marginal contribution of 4% in the European Union. But their contribution was declining rapidly as observed earlier in the European Union since it still reached 31% in 1985 and 24% in 1990. They are followed by natural gas with 17%, a little less than the 24% in the European Union; and by electricity with 15% against 19% in the European Union. The contribution of heat, produced from combined heat and power units and centralised boilers, was 11% but only 2% in the European Union. But this contribution has been declining since 1990 (-40%) with the closure of old units combined with the reduction of demand arising from higher prices and energy efficiency measures.

The enlarged European Union will reinforce its weight on the energy scene...

The enlarged European Union will reinforce its weight on the energy scene. With a total gross inland consumption of 1768 Mtoe in 1999 it absorbed 18% of world energy consumption, the third major actor after the NAFTA region led by the United States





(2270 Mtoe), and Asia driven by China (944 Mtoe). But the EU remains the largest energy importer as its primary energy production represents only 10% of world energy supply. With 236 Mtoe in 1999, or 11% of world solid production, the enlarged European Union will be the third largest producer of solid fuels, behind the United States (559 Mtoe) and China (507 Mtoe). Though a major oil consumer with 20% of world oil consumption, the EU will remain a marginal producer with only 5% of world production or less than half that of the USA or Russia. The situation is similar but less uncomfortable for natural gas with a similar 20% of world consumption but about 10% of world production. It will also account for 37% of world nuclear production, 15% of hydro and only 7% of other renewables.

Energy intensity of candidate countries four times higher than in the European Union...

One of the most significant indicators of the energy situation of the candidate countries is that for energy intensity. For all candidate countries considered as a whole the energy intensity was 5 times higher than that of the European Union in 1990. Progress made in the candidate countries reduced this divergence to 4 in 1999. But large discrepancies exist between candidate countries. The best performances were in Slovenia, Cyprus, Malta and Turkey which are close to the poorer performing EU Member States. In Central and Eastern Europe, Latvia and Hungary had energy intensities a little lower than the average of all the candidate countries but all the others were well above this average. Four of the larger countries, the Czech Republic, Poland, Bulgaria and Romania, still had energy intensities 6 to 8 times higher than the European Union average. Since 1990, major progress has been made by the worst performers with the exception of Bulgaria. Estonia improved its energy intensity by 6.7% per year on average, Poland by 4.1%, Romania and Slovakia by 3.1%, Lithuania by 2.9%, Slovenia by 2.0% and the Czech Republic by 1.5%.

CO₂ emissions per unit of GDP in candidate countries five times higher than in the European Union...

As a consequence of the high energy intensity of candidate countries, coupled with the major contribution of solid fuels, CO₂ emissions were particularly high as they represented in 1999 about 28% of EU CO₂ emissions. The carbon intensity, pushed by solid fuels, was 29% higher. The very low GDP of candidate countries, as a group, has two consequences: CO₂ emissions per capita were 39% lower than those of the European Union in 1999 but CO₂ emissions per unit of GDP were 5 times higher, despite major improvement in energy intensity registered since 1990. Overall candidate countries have reduced their CO₂ emissions by 20% since 1990.

The enlargement will contribute to reduced CO₂ emissions

The continuation of the restructuring and modernisation of the candidate countries' economies will offer the enlarged European Union an opportunity to improve significantly its overall energy intensity and, consequently, to limit its gross inland energy consumption growth: a phenomena similar to that observed during the reunification of Germany since 1990. Combined with the continuing decline of solid consumption this will contribute to the further reduction of CO₂ emissions, which in the enlarged European Union fell by 5.3% since 1990.



CANDIDATE COUNTRIES : SUMMARY ENERGY BALANCE

Mtoe	1980	1985	1990	1997	1998	1999(2)	85/80	90/85	97/90	98/97	98/98
	Annual % Change										
Primary Production	263.7	284.8	249.4	229.0	212.7	199.6	1.5%	-2.6%	-1.2%	-7.1%	-6.2%
Solids	185.3	194.8	167.0	152.3	136.3	126.3	1.0%	-3.0%	-1.3%	-10.5%	-7.4%
Oil	16.9	15.8	14.1	13.5	13.0	12.4	-1.3%	-2.2%	-0.6%	-4.0%	-4.4%
Natural gas	41.5	41.9	29.8	19.1	18.2	17.5	0.2%	-6.6%	-6.2%	-4.6%	-3.9%
Nuclear	2.8	11.7	19.5	20.3	20.7	19.6	33.3%	10.7%	0.6%	2.4%	-5.5%
Hydro & Wind	3.6	3.4	4.3	6.5	7.1	6.2	-1.2%	4.7%	6.3%	8.4%	-12.3%
Geothermal	0.0	0.0	0.1	0.2	0.2	0.2	-	76.2%	11.2%	26.3%	-10.6%
Other	13.6	17.2	14.6	17.1	17.2	17.4	4.8%	-3.2%	2.3%	0.3%	1.5%
Net Imports	102.7	101.3	135.1	127.5	126.9	128.0	-0.3%	5.9%	-0.8%	-0.5%	0.8%
Solids	-8.5	-7.7	-3.2	-3.5	-3.4	-2.8	-2.0%	-16.1%	1.4%	-4.1%	-17.0%
Oil	89.9	82.2	92.7	84.9	85.3	85.1	-1.8%	2.4%	-1.2%	0.5%	-0.2%
Crude oil	86.0	92.3	88.3	75.3	77.2	na	1.4%	-0.9%	-2.2%	2.5%	na
Oil products	3.9	-10.1	4.4	9.6	8.0	na	-	-	11.7%	-15.8%	na
Natural gas	20.6	25.9	44.7	46.4	46.1	45.9	4.6%	11.5%	0.5%	-0.7%	-0.5%
Electricity	0.7	0.9	0.9	-0.2	-1.0	-0.1	3.9%	1.4%	-	359.6%	-87.6%
Gross Inland Consumption	364.6	387.2	383.3	350.0	337.9	325.8	1.2%	-0.2%	-1.3%	-3.4%	-3.6%
Solids	177.2	188.7	165.8	145.6	134.5	123.5	1.3%	-2.6%	-1.8%	-7.6%	-8.2%
Oil	105.1	98.3	104.5	96.0	95.8	95.5	-1.3%	1.2%	-1.2%	-0.3%	-0.3%
Natural gas	61.6	67.0	73.8	64.8	63.8	63.4	1.7%	1.9%	-1.8%	-1.5%	-0.7%
Other (1)	20.7	33.1	39.3	43.6	43.8	43.5	9.9%	3.5%	1.5%	0.6%	-0.8%
Electricity Generation in TWh	387.7	447.3	480.7	513.0	523.0	na	2.9%	1.4%	0.9%	1.9%	na
Nuclear	10.7	44.9	74.7	77.5	79.3	na	33.3%	10.7%	0.5%	2.4%	na
Hydro & wind	41.7	39.3	49.2	74.4	80.6	na	-1.2%	4.6%	6.1%	8.2%	na
Thermal	335.3	363.0	356.8	361.1	363.1	na	1.6%	-0.3%	0.2%	0.5%	na
Generation Capacity in GWe	67.8	85.2	122.8	131.8	132.9	na	4.7%	7.6%	1.0%	0.9%	na
Nuclear	1.8	5.6	11.1	12.6	12.9	na	26.0%	14.6%	1.8%	2.5%	na
Hydro & wind	10.1	13.6	21.4	27.0	28.0	na	6.1%	9.6%	3.3%	3.7%	na
Thermal	55.9	66.1	90.3	92.3	92.1	na	3.4%	6.4%	0.3%	-0.2%	na
Average Load Factor in %	65.3	59.9	44.7	44.4	44.9	na	-1.7%	-5.7%	-0.1%	1.1%	na
Fuel Inputs for Thermal Power Generation	98.1	114.0	115.0	105.0	103.2	na	3.0%	0.2%	-1.3%	-1.7%	na
Solids	74.1	83.7	82.5	80.0	78.4	na	2.5%	-0.3%	-0.4%	-2.1%	na
Oil	15.1	15.1	13.5	10.0	9.4	na	0.0%	-2.2%	-4.2%	-6.2%	na
Gas	8.6	14.7	18.5	14.4	14.9	na	11.1%	4.8%	-3.5%	3.5%	na
Geothermal	0.0	0.0	0.1	0.1	0.1	na	-	69.0%	0.4%	2.8%	na
Other	0.3	0.6	0.5	0.5	0.5	na	13.0%	-4.5%	1.7%	-6.5%	na
Average Thermal Efficiency in %	29.4	27.4	26.7	29.6	30.3	na	-1.4%	-0.5%	1.5%	2.3%	na
Non-Energy Uses	12.8	14.2	16.4	18.4	18.8	na	2.1%	2.9%	1.7%	2.3%	na
Total Final Energy Demand	269.3	269.2	257.9	221.8	212.9	na	0.0%	-0.9%	-2.1%	-4.0%	na
Solids	81.4	84.2	62.2	46.1	40.0	na	0.7%	-5.9%	-4.2%	-13.3%	na
Oil	71.1	61.3	68.2	66.9	66.3	na	-2.9%	2.2%	-0.3%	-0.8%	na
Gas	46.5	44.2	44.2	36.8	35.4	na	-1.0%	0.0%	-2.6%	-3.8%	na
Electricity	25.9	29.8	32.2	31.9	32.1	na	2.8%	1.6%	-0.1%	0.6%	na
Heat	31.1	33.2	37.0	23.6	22.4	na	1.3%	2.2%	-6.2%	-4.9%	na
Other	13.3	16.6	14.1	16.5	16.5	na	4.6%	-3.1%	2.2%	0.3%	na
CO₂ Emissions in Mt of CO₂	1103.8	1132.4	1082.5	944.6	903.2	858.8	0.5%	-0.9%	-1.9%	-4.4%	-4.9%
Indicators											
Population (Million)	147.41	155.95	163.26	169.84	170.73	171.7	1.1%	0.9%	0.6%	0.5%	0.5%
GDP (index 1985=100)	87.1	100.0	120.7	136.5	139.9	138.5	2.8%	3.8%	1.8%	2.5%	-1.0%
Gross Inl Cons./GDP (toe/1990 MEUR)	1587.6	1468.4	1204.7	972.1	916.2	906.0	-1.5%	-3.9%	-3.0%	-5.7%	-1.1%
Gross Inl Cons./Capita (toe/inhabitant)	2.47	2.48	2.35	2.06	1.98	1.90	0.1%	-1.1%	-1.8%	-3.9%	-4.1%
Electricity Generated/Capita (kWh/inhabitant)	2630	2868	2944	3021	3063	na	1.7%	0.5%	0.4%	1.4%	na
CO ₂ Emissions/Capita (t of CO ₂ /inhabitant)	7.5	7.3	6.6	5.6	5.3	5.0	-0.6%	-1.8%	-2.5%	-4.9%	-5.4%
Import Dependency %	28.1	26.1	35.2	36.3	37.3	39.1	-1.5%	6.1%	0.5%	2.8%	4.9%

(1) Includes nuclear, hydro and wind, net imports of electricity, and other energy sources.

(2) Estimates





CANDIDATE COUNTRIES : MAIN INDICATORS											
	1980	1985	1990	1995	1997	1998	85/80	90/85	95/90	97/95	98/97
	Annual % Change										
Gross Inland Consumption (Mtoe)	364.6	387.2	383.3	340.4	350.0	337.9	1.2%	-0.2%	-2.3%	1.4%	-3.4%
Public Thermal Power Generation	84.1	98.0	101.0	93.4	95.9	94.0	3.1%	0.6%	-1.6%	1.4%	-2.0%
Autoprod. Thermal Power Generation	14.0	16.0	14.0	9.8	9.0	9.1	2.6%	-2.6%	-6.9%	-3.9%	1.3%
Energy Branch	15.4	16.5	18.6	21.6	22.7	21.6	1.3%	2.5%	3.1%	2.3%	-4.7%
Final Energy Consumption	269.3	269.3	257.9	215.9	221.1	212.2	0.0%	-0.9%	-3.5%	1.2%	-4.0%
Industry	129.4	124.4	113.8	84.4	83.8	77.7	-0.8%	-1.8%	-5.8%	-0.3%	-7.3%
Transport	29.3	28.0	36.5	37.5	41.2	40.9	-0.9%	5.5%	0.5%	4.9%	-0.9%
Tertiary-Domestic	110.6	116.9	107.6	94.1	96.0	93.6	1.1%	-1.6%	-2.6%	1.0%	-2.6%
Energy Intensity (toe/1990 MEUR)	1587.6	1468.4	1204.7	1038.1	972.1	916.2	-1.5%	-3.9%	-2.9%	-3.2%	-5.7%
Public Thermal Power Generation	366.2	371.6	317.3	284.7	266.5	254.9	0.3%	-3.1%	-2.1%	-3.3%	-4.4%
Autoprod. Thermal Power Generation	61.1	60.6	43.9	29.8	25.1	24.8	-0.2%	0.8%	-0.1%	-0.4%	-0.4%
Industry	563.6	471.8	357.7	257.3	232.8	210.7	-3.5%	-5.4%	-6.4%	-4.9%	-9.5%
Transport	127.7	106.1	114.7	114.2	114.6	110.8	-3.6%	1.6%	-0.1%	0.2%	-3.3%
Tertiary-Domestic	481.4	443.1	338.0	286.9	266.8	253.7	-1.6%	-5.3%	-3.2%	-3.6%	-4.9%
Energy per Capita (Kgoe/inhabitant)	2473	2483	2348	2026	2061	1979	0.1%	-1.1%	-2.9%	0.8%	-3.9%
Industry	878	798	697	502	493	455	-1.9%	-2.7%	-6.3%	-0.9%	-7.7%
Transport	199	179	224	223	243	239	-2.0%	4.5%	-0.1%	4.4%	-1.4%
Tertiary-Domestic	750	749	659	560	565	548	0.0%	-2.5%	-3.2%	0.5%	-3.1%
Electricity Share (%)											
Final Energy Consumption	9.6%	11.1%	12.5%	13.8%	14.4%	15.1%	2.8%	2.4%	2.0%	2.4%	4.8%
Industry	12.3%	14.0%	15.2%	16.5%	18.1%	18.8%	2.5%	1.7%	1.6%	5.0%	3.7%
Transport	3.9%	4.6%	3.8%	3.1%	2.6%	2.6%	3.6%	-3.6%	-4.3%	-7.5%	-1.5%
Tertiary-Domestic	8.0%	9.5%	12.5%	15.6%	16.3%	17.6%	3.6%	5.7%	4.5%	2.1%	7.8%
Total Renewable Consumption (Mtoe)	17.2	20.5	18.9	22.0	23.5	24.1	3.7%	-1.6%	3.1%	3.5%	2.5%
Hydro	3.6	3.4	4.2	5.9	6.4	6.9	-1.2%	4.6%	7.0%	3.8%	8.2%
Biomass	13.6	17.2	14.6	15.9	16.8	16.8	4.8%	-3.2%	1.7%	3.1%	0.0%
Other	0.0	0.0	0.1	0.2	0.3	0.4	-	84.2%	12.4%	25.0%	23.9%
Renewable intensity (toe/1990MEUR)	74.7	77.9	59.4	67.1	65.4	65.4	0.8%	-5.3%	2.4%	-1.2%	0.1%
Renewable per capita (Kgoe/inhabitant)	116.5	131.7	115.9	130.9	138.6	141.4	2.5%	-2.5%	2.5%	2.9%	2.0%
CO₂ Emissions (Mt of CO₂)	1103.8	1132.4	1082.5	929.2	944.6	903.2	0.5%	-0.9%	-3.0%	0.8%	-4.4%
Public Thermal Power Generation	307.6	354.0	362.2	342.9	352.7	345.3	2.8%	0.5%	-1.1%	1.4%	-2.1%
Autoprod. Thermal Power Generation	52.0	58.4	50.3	31.4	29.1	29.3	2.3%	-2.9%	-9.0%	-3.8%	0.6%
Energy Branch	26.5	26.3	30.6	36.7	40.6	38.7	-0.1%	3.1%	3.7%	5.1%	-4.5%
Industry	319.3	303.2	257.2	203.2	203.2	186.9	-1.0%	-3.2%	-4.6%	0.0%	-8.0%
Transport	88.4	82.8	107.8	111.4	123.2	122.1	-1.3%	5.4%	0.6%	5.2%	-0.9%
Tertiary-Domestic	247.9	244.4	200.3	157.4	152.8	140.9	-0.3%	-3.9%	-4.7%	-1.5%	-7.8%
Carbon Intensity (tn of CO₂/toe)	3.0	2.9	2.8	2.7	2.7	2.7	-0.7%	-0.7%	-0.7%	-0.6%	-1.0%
Public Power Generation	3.4	3.1	2.9	2.9	2.9	2.8	-1.6%	-1.5%	0.0%	-0.5%	-1.3%
Public Thermal Power Generation	3.7	3.6	3.6	3.7	3.7	3.7	-0.3%	-0.1%	0.5%	0.0%	-0.1%
Autoprod. Power Generation	3.7	3.6	3.6	3.2	3.2	3.2	-0.3%	-0.3%	-2.2%	0.0%	-0.7%
Autoprod. Thermal Power Generation	3.7	3.7	3.6	3.2	3.2	3.2	-0.3%	-0.3%	-2.2%	0.1%	-0.7%
Energy Branch	3.5	3.5	3.4	3.2	3.2	3.1	-0.3%	-0.6%	-1.0%	-0.6%	-1.3%
Industry	1.7	1.6	1.6	1.7	1.8	1.8	-1.4%	0.6%	0.6%	2.7%	0.1%
Transport	2.5	2.4	2.3	2.4	2.4	2.4	-0.2%	-1.5%	1.3%	0.3%	-0.8%
Tertiary-Domestic	3.0	3.0	3.0	3.0	3.0	3.0	-0.4%	0.0%	0.1%	0.2%	0.0%
CO₂ per Capita (kg of CO₂/inhabitant)	7488	7261	6631	5530	5561	5290	-0.6%	-1.8%	-3.6%	0.3%	-4.9%
Industry	2166	1944	1575	1210	1196	1095	-2.1%	-4.1%	-5.1%	-0.6%	-8.5%
Transport	599	531	660	663	725	715	-2.4%	4.5%	0.1%	4.6%	-1.4%
Tertiary-Domestic	1682	1567	1227	937	899	825	-1.4%	-4.8%	-5.3%	-2.0%	-8.3%
CO₂ per unit of GDP (tn of CO₂/1990 MEUR)	4806	4294	3402	2833	2624	2449	-2.2%	-4.6%	-3.6%	-3.8%	-6.7%
Public Thermal Power Generation	1340	1342	1138	1046	980	936	0.0%	-3.2%	-1.7%	-3.2%	-4.4%
Autoprod. Thermal Power Generation	226	221	158	96	81	79	-0.4%	-6.5%	-9.5%	-8.2%	-1.8%
Energy Branch	271	240	233	141	120	108	-2.4%	-0.6%	-9.6%	-7.7%	-9.5%
Industry	115	100	96	112	113	105	-2.8%	-0.7%	3.1%	0.3%	-6.8%
Transport	1390	1150	808	620	564	507	-3.7%	-6.8%	-5.2%	-4.6%	-10.2%
Tertiary-Domestic	385	314	339	340	342	331	-4.0%	1.5%	0.0%	0.4%	-3.3%





EUR-28 : SUMMARY ENERGY BALANCE

Mtoe	1980	1985	1990	1997	1998	1999(2)	85/80	90/85	97/90	98/97	98/98
Annual % Change											
Primary Production	871.8	1023.7	958.2	991.6	966.1	970.1	3.3%	-1.3%	0.5%	-2.6%	0.4%
Solids	444.6	435.9	377.4	277.9	250.9	236.4	-0.4%	-2.8%	-4.3%	-9.7%	-5.8%
Oil	111.5	166.8	131.9	171.6	174.6	180.2	8.4%	-4.6%	3.8%	1.7%	3.2%
Natural gas	174.8	173.8	162.7	201.2	199.7	203.0	-0.1%	-1.3%	3.1%	-0.8%	1.6%
Nuclear	58.6	159.1	200.9	232.9	230.4	240.1	22.1%	4.8%	2.1%	-1.1%	4.2%
Hydro & Wind	27.5	27.8	26.6	32.5	34.4	33.6	0.2%	-0.9%	2.9%	5.7%	-2.2%
Geothermal	1.9	1.8	2.3	3.0	3.2	3.2	-1.0%	5.1%	3.8%	7.7%	-0.1%
Other renewable energy sources	52.9	58.6	56.5	72.4	72.9	73.5	2.0%	-0.7%	3.6%	0.7%	0.8%
Net Imports	788.9	626.0	776.3	821.1	850.6	833.6	-4.5%	4.4%	0.8%	3.6%	-2.0%
Solids	54.2	64.4	82.9	94.0	98.1	96.4	3.5%	5.2%	1.8%	4.4%	-1.8%
Oil	661.6	464.9	553.2	556.2	574.9	542.2	-6.8%	3.5%	0.1%	3.4%	-5.7%
Crude oil	629.5	435.8	524.7	541.7	561.2	na	-7.1%	3.8%	0.5%	3.6%	na
Oil products	32.1	29.2	28.5	14.4	13.7	na	-1.9%	-0.5%	-9.3%	-5.0%	na
Natural gas	71.2	94.5	137.0	170.5	177.6	193.2	5.8%	7.7%	3.2%	4.1%	8.8%
Electricity	1.9	2.2	3.3	0.4	0.1	1.9	2.9%	8.3%	-24.8%	-79.0%	1932.7%
Gross Inland Consumption	1605.9	1629.2	1700.1	1761.2	1774.8	1768.2	0.3%	0.9%	0.5%	0.8%	-0.4%
Solids	488.6	504.0	464.6	367.5	357.7	333.2	0.6%	-1.6%	-3.3%	-2.7%	-6.8%
Oil	729.6	610.7	650.2	685.4	697.2	690.8	-3.5%	1.3%	0.8%	1.7%	-0.9%
Natural gas	244.8	265.0	295.8	367.3	379.3	391.7	1.6%	2.2%	3.1%	3.3%	3.3%
Other (1)	142.9	249.4	289.5	341.0	340.7	352.6	11.8%	3.0%	2.4%	-0.1%	3.5%
Electricity Generation in Twh	2066.9	2364.3	2635.9	2938.2	3016.5	na	2.7%	2.2%	1.6%	2.7%	na
Nuclear	222.2	619.8	794.7	937.2	933.4	na	22.8%	5.1%	2.4%	-0.4%	na
Hydro & wind	327.7	338.5	325.2	396.9	419.8	na	0.7%	-0.8%	2.9%	5.8%	na
Thermal	1517.0	1405.9	1516.0	1604.1	1663.3	na	-1.5%	1.5%	0.8%	3.7%	na
Generation Capacity in GWe	484.1	566.6	646.1	689.8	694.5	na	3.2%	2.7%	0.9%	0.7%	na
Nuclear	44.5	92.6	127.7	136.7	135.6	na	15.8%	6.6%	1.0%	-0.8%	na
Hydro & wind	101.0	117.4	133.4	147.1	150.1	na	3.1%	2.6%	1.4%	2.1%	na
Thermal	338.5	356.7	384.9	406.0	408.8	na	1.0%	1.5%	0.8%	0.7%	na
Average Load Factor in %	48.7	47.6	46.6	48.6	49.6	na	-0.5%	-0.4%	0.6%	2.0%	na
Fuel Inputs for Thermal Power Generation	382.9	361.3	383.8	376.3	387.0	na	-1.2%	1.2%	-0.3%	2.8%	na
Solids	240.9	253.1	263.8	228.3	232.7	na	1.0%	0.8%	-2.0%	1.9%	na
Oil	91.2	54.9	56.0	48.9	48.1	na	-9.7%	0.4%	-1.9%	-1.8%	na
Gas	43.6	44.6	54.9	84.3	91.0	na	0.4%	4.2%	6.3%	7.9%	na
Geothermal	1.9	1.7	1.9	2.5	2.7	na	-2.0%	2.7%	3.7%	7.9%	na
Biomass	5.3	7.0	7.2	12.2	12.5	na	5.9%	0.4%	7.9%	2.2%	na
Average Thermal Efficiency in %	34.1	33.5	34.0	36.7	37.0	na	-0.4%	0.3%	1.1%	0.8%	na
Non-Energy Uses	88.4	88.2	100.5	114.4	112.2	na	-0.1%	2.7%	1.9%	-1.9%	na
Total Final Energy Demand	1117.1	1095.2	1121.3	1156.2	1159.7	na	-0.4%	0.5%	0.4%	0.3%	na
Solids	177.8	187.0	142.2	92.8	82.8	na	1.0%	-5.3%	-5.9%	-10.8%	na
Oil	505.5	436.5	465.8	497.0	504.4	na	-2.9%	1.3%	0.9%	1.5%	na
Gas	196.7	205.6	222.1	253.9	257.4	na	0.9%	1.6%	1.9%	1.4%	na
Electricity	147.2	166.0	188.1	208.9	213.6	na	2.4%	2.5%	1.5%	2.2%	na
Heat	42.5	49.0	54.4	46.0	43.7	na	2.9%	2.1%	-2.4%	-5.2%	na
Renewable energy sources	47.6	51.2	48.6	57.6	57.8	na	1.5%	-1.0%	2.4%	0.4%	na
CO₂ Emissions in Mt of CO₂	4444	4126	4155	3988	4011	3944	-1.5%	0.1%	-0.6%	0.6%	-1.7%
Indicators											
Population (Million)	503	515	528	544	546	548	0.5%	0.5%	0.4%	0.3%	0.5%
GDP (index 1985=100)	92.9	100.0	116.5	130.0	133.6	136.7	1.5%	3.1%	1.6%	2.8%	2.3%
Gross Inl Cons./GDP (toe/1985 MEUR)	358.0	337.6	302.3	280.8	275.2	268.0	-1.2%	-2.2%	-1.1%	-2.0%	-2.6%
Gross Inl Cons./Capita (toe/inhabitant)	3.19	3.17	3.22	3.24	3.25	3.23	-0.2%	0.4%	0.1%	0.5%	-0.8%
Electricity Generated/Capita (kWh/inhabitant)	4111	4593	4995	5402	5529	na	2.2%	1.7%	1.1%	2.3%	na
CO ₂ Emissions/Capita (t of CO ₂ /inhabitant)	8.84	8.01	7.87	7.33	7.35	7.20	-1.9%	-0.4%	-1.0%	0.2%	-2.1%
Import Dependency %	48.2	37.8	44.7	45.6	46.8	46.0	-4.8%	3.5%	0.3%	2.7%	-1.6%

(1) Includes nuclear, hydro and wind, net imports of electricity, and other energy sources.

(2) Estimates





EUR-28 : MAIN INDICATORS											
	1980	1985	1990	1996	1997	1998	85/80	90/85	96/90	97/96	98/97
	Annual % Change										
Gross Inland Consumption (Mtoe)	1605.9	1629.2	1700.1	1770.4	1761.2	1768.2	0.3%	0.9%	0.7%	-0.5%	0.4%
Power Generation	371.3	509.6	566.1	596.1	590.3	596.6	6.5%	2.1%	0.9%	-1.0%	1.1%
Energy Branch	77.6	77.1	81.8	92.3	92.0	93.9	-0.1%	1.2%	2.0%	-0.3%	2.0%
Final Energy Consumption	1115.0	1093.1	1121.1	1162.1	1152.9	1158.6	-0.4%	0.5%	0.6%	-0.8%	0.5%
Industry	440.1	389.3	379.8	347.5	347.2	339.8	-2.4%	-0.5%	-1.5%	-0.1%	-2.1%
Transport	218.6	230.6	290.3	324.6	330.1	340.4	1.1%	4.7%	1.9%	1.7%	3.1%
Tertiary-Domestic	455.4	473.2	451.0	489.9	475.6	478.4	0.8%	-1.0%	1.4%	-2.9%	0.6%
Energy Intensity (toe/1990 MEUR)	358.0	337.6	302.3	289.6	280.8	268.0	-1.2%	-2.2%	-0.7%	-3.1%	-4.5%
Power Generation	82.8	105.6	100.7	97.5	94.1	90.4	5.0%	-1.0%	-0.5%	-3.5%	-3.9%
Final Energy Consumption	248.6	226.5	199.4	190.1	183.8	175.6	-1.8%	-2.5%	-0.8%	-3.3%	-4.4%
Industry	98.1	80.7	67.5	56.9	55.4	51.5	-3.8%	-3.5%	-2.8%	-2.6%	-6.9%
Transport	48.7	47.8	51.6	53.1	52.6	51.6	-0.4%	1.6%	0.5%	-0.9%	-1.9%
Tertiary-Domestic	101.5	98.1	80.2	80.1	75.8	72.5	-0.7%	-3.9%	0.0%	-5.4%	-4.4%
Energy per capita (Kgoe/inhabitant)	3194	3165	3221	3267	3238	3226	-0.2%	0.4%	0.2%	-0.9%	-0.4%
Power Generation	738	990	1073	1100	1085	1089	6.0%	1.6%	0.4%	-1.3%	0.3%
Final Energy Consumption	2217	2124	2124	2144	2120	2114	-0.9%	0.0%	0.2%	-1.1%	-0.3%
Industry	875	756	720	641	638	620	-2.9%	-1.0%	-1.9%	-0.4%	-2.9%
Transport	435	448	550	599	607	621	0.6%	4.2%	1.4%	1.3%	2.3%
Tertiary-Domestic	906	919	854	904	874	873	0.3%	-1.5%	0.9%	-3.3%	-0.2%
Electricity Share (%)											
Final Energy Consumption	13.2%	15.2%	16.8%	17.7%	18.1%	18.4%	2.8%	2.0%	0.9%	2.6%	1.7%
Industry	17.1%	20.4%	22.8%	24.9%	25.8%	26.7%	3.5%	2.3%	1.5%	3.7%	3.5%
Transport	1.9%	2.0%	1.9%	1.8%	1.8%	1.7%	1.1%	-1.7%	-0.1%	-2.1%	-3.7%
Tertiary-Domestic	14.8%	17.4%	21.3%	23.1%	23.9%	24.5%	3.2%	4.2%	1.3%	3.5%	2.5%
Total Renewable consumption (Mtoe)	82.4	87.6	84.6	98.1	105.0	108.4	1.2%	-0.7%	2.5%	7.0%	3.3%
Hydro	27.5	27.8	26.5	31.0	31.9	33.2	0.2%	-0.9%	2.7%	2.7%	4.2%
Biomass	53.0	57.9	55.5	63.4	69.0	70.5	1.8%	-0.8%	2.2%	8.9%	2.0%
Other renewable energy source	1.9	1.9	2.5	3.7	4.1	4.8	0.0%	6.1%	6.5%	9.5%	17.1%
Renewable Intensity (toe/1990 MEUR)	18.4	18.1	15.0	16.1	16.7	16.4	-0.2%	-3.7%	1.1%	4.3%	-1.8%
Renewable per capita (kgoe/inhabitant)	163.8	170.1	160.3	181.0	193.0	197.8	0.8%	-1.2%	2.0%	6.6%	2.5%
CO₂ Emissions (Mt of CO₂)	4444	4126	4155	4099	3988	3944	-1.5%	0.1%	-0.2%	-2.7%	-1.1%
Power Generation	1396	1304	1374	1328	1278	1306	-1.4%	1.1%	-0.6%	-3.7%	2.1%
Energy Branch	171	62	68	52	50	48	-18.3%	1.7%	-4.3%	-3.4%	-3.6%
Final Energy Consumption	2798	2568	2519	2514	2479	2467	-1.7%	-0.4%	0.0%	-1.4%	-0.5%
Industry	1075	918	829	720	717	688	-3.1%	-2.0%	-2.3%	-0.4%	-4.0%
Transport	688	670	846	949	965	997	-0.5%	4.8%	1.9%	1.8%	3.2%
Tertiary-Domestic	1035	980	844	845	796	782	-1.1%	-2.9%	0.0%	-5.8%	-1.8%
Carbon (tn of CO₂/toe)	2.8	2.5	2.4	2.3	2.3	2.2	-1.8%	-0.7%	-0.9%	-2.2%	-1.5%
Power Generation	3.8	2.6	2.4	2.2	2.2	2.2	-7.4%	-1.0%	-1.4%	-2.8%	1.1%
Energy Branch	2.2	0.8	0.8	0.6	0.5	0.5	-18.2%	0.5%	-6.2%	-3.1%	-5.5%
Final Energy Consumption	2.5	2.3	2.2	2.2	2.1	2.1	-1.3%	-0.9%	-0.6%	-0.6%	-1.0%
Industry	2.4	2.4	2.2	2.1	2.1	2.0	-0.7%	-1.5%	-0.9%	-0.3%	-2.0%
Transport	3.1	2.9	2.9	2.9	2.9	2.9	-1.6%	0.1%	0.0%	0.1%	0.1%
Tertiary-Domestic	2.3	2.1	1.9	1.7	1.7	1.6	-1.8%	-2.0%	-1.3%	-2.9%	-2.3%
CO₂ per capita (kg of CO₂/inhabitant)	8838	8015	7873	7563	7332	7196	-1.9%	-0.4%	-0.7%	-3.1%	-1.9%
Final Energy Consumption	5564	4990	4773	4638	4557	4501	-2.2%	-0.9%	-0.5%	-1.7%	-1.2%
Industry	2137	1784	1571	1328	1318	1255	-3.5%	-2.5%	-2.8%	-0.8%	-4.8%
Transport	1369	1302	1604	1750	1775	1818	-1.0%	4.3%	1.5%	1.4%	2.4%
Tertiary-Domestic	2058	1903	1599	1560	1464	1428	-1.5%	-3.4%	-0.4%	-6.1%	-2.5%
CO₂ per unit of GDP (tn of CO₂/1990 MEUR)	991	855	739	671	636	598	-2.9%	-2.9%	-1.6%	-5.2%	-6.0%
Power Generation	311	270	244	217	204	198	-2.8%	-2.0%	-1.9%	-6.2%	-2.9%
Public Thermal Power Generation	282	231	213	195	182	176	-3.9%	-1.6%	-1.5%	-6.6%	-3.3%
Autoprod. Thermal Power Generation	29	39	31	22	22	22	6.3%	-4.6%	-5.5%	-2.6%	0.2%
Energy Branch	38	13	12	8	8	7	-19.5%	-1.4%	-5.6%	-5.9%	-8.3%
Final Energy Consumption	624	532	448	411	395	374	-3.1%	-3.4%	-1.4%	-3.9%	-5.4%
Industry	240	190	147	118	114	104	-4.5%	-5.0%	-3.7%	-2.9%	-8.8%
Transport	153	139	151	155	154	151	-2.0%	1.6%	0.5%	-0.8%	-1.8%
Tertiary-Domestic	231	203	150	138	127	119	-2.5%	-5.9%	-1.4%	-8.2%	-6.6%







Other OECD countries: Major trends (1985-1999)

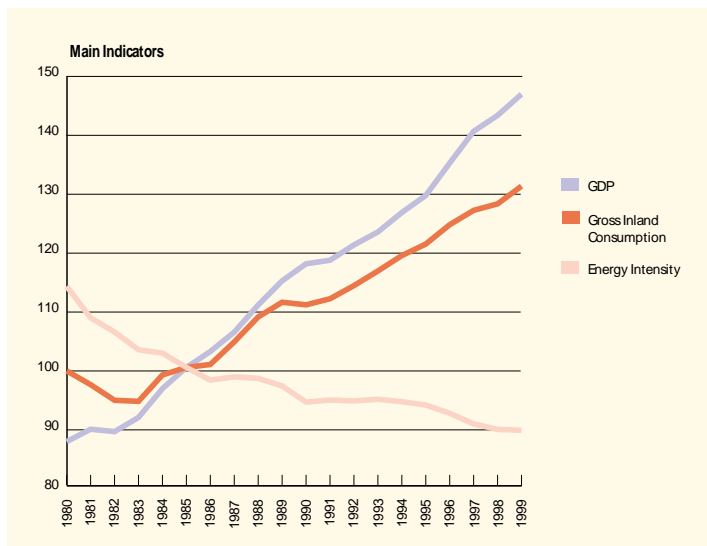
- Sustained economic growth since 1996 driven by the United States...
- ... while the recovery of the Japanese economy from recession remained halting
- Final energy demand growth slowed down in 1997 and 1998 but rebounded in 1999
- Statistical disruptions complicated analysis of the United States' final energy demand
- Hydrocarbons, with a stable 72% market share, dominated final energy demand
- Electricity satisfied 63% of incremental total final demand since 1980
- Transport contributed 40% of final energy demand and about 80% of final oil consumption
- Electricity's share continued to increase but slowly both in industry and tertiary-domestic sector
- Gross inland energy use increased regularly by 1.9% since 1985 with contrasted evolution by regions
- All fossil fuels and nuclear met incremental gross inland consumption since 1985, but oil dominated
- Indigenous energy production declined by 0.8% in 1999, caused by a 4.2% reduction of oil production
- Reinforcement of gas infrastructure in both NAFTA and EFTA regions to meet increasing demand
- First decline since 1985 of coal production, confronted with low oil prices on main competitive markets
- Nuclear production continued to increase in Japan but prospects seem less favourable in the NAFTA region
- No growth of the renewables energy share since 1980
- The whole region represented 25% of the world's fossil fuel reserves, principally solid fuels
- Heavy investment continued in thermal power plants with varying growth rates between regions
- Solid fuels defended their major role in thermal power stations, but gas was gaining market share
- Generalised deregulation of electricity markets, responsible for increasing mergers and acquisitions in US
- First steps to electricity market deregulation in Canada, Mexico and Japan
- NAFTA refinery capacity is well adapted to the regional markets, unlike that in Japan
- Energy intensity improved at about 1.1% per year on average in the last five years
- All final energy demand sectors, driven by industry, contributed to the reduction of energy intensity
- Energy consumption per capita peaked in the United States, at twice the Japanese level
- All final energy demand sectors, driven by industry, contributed to the reduction of energy intensity
- CO₂ emissions have increased by 13% since 1990
- Transport and power generation sectors were responsible for about two thirds of CO₂ emissions
- The region remained a net importer of hydrocarbons but a net exporter of solid fuels

"Other OECD countries" is a global heading embracing: the NAFTA region of the USA, Canada and Mexico; the EFTA region comprising Norway, Switzerland and Iceland; the OECD Pacific region covering Australia, Japan and New Zealand; and Turkey. However, the new members (the Czech Republic, Hungary, Poland and South Korea) are examined in their original region to improve the coher-

ence of the analysis. Each of these groups is rather heterogeneous from a sociological, political and macro-economic point of view.

Sustained economic growth since 1996 driven by the United States...

The GDP in these countries increased by about 3% during the 1980s, falling under 2% on average between 1990 and 1995 as a consequence of the short recession experienced in the NAFTA region in 1991, to rebound well above 4% in 1996 and 1997 and finally slowed down to 1.5% in 1998 and 2.5% in 1999 caused by the Japanese recession. The NAFTA region justified its position as the world economy's leader, being the major actor behind this sustained growth. The economic activity of the NAFTA region is largely dominated by the United States, contributing some 88% of the region's GDP in 1999, with only 8% by Canada and 4% by Mexico. This region was characterised by a very long-term growth cycle producing an average growth of 3.1% per year on average since 1982 and only a single recession year in 1991. In the last four years, the region's economic growth increased by 4.0%, 5.2%, 3.8% and 3.6% respectively. In particular the US economy continued to expand rapidly. After a brief slowing in the second quarter





of 1999, annualised GDP growth bounced back in the second half of the year. Private domestic demand continues to drive growth, with consumer confidence remaining strong and business investment still increasing rapidly. In 1999 as a whole, real GDP rose by 3.6% and real domestic demand by 4.4%, continuing the pattern seen since 1996 of the growth of demand outstripping that of domestic supply. In Canada, the long period of expansion that began in 1992 has also continued, and activity strengthened in 1999 when GDP growth accelerated to 4.6%. The recent strengthening in activity has been driven both by strong external demand - particularly from the United States and from the global pickup in demand for commodities - and by robust domestic sales.

... while the recovery of the Japanese economy from recession remained halting...

Given the size of its economy, population and energy needs, Japan dominated the OECD Pacific region. In 1999, Japan contributed 88% of this region's GDP. Japanese GDP growth, above 4% per year on average during the 1980s, was hit by a severe slowdown since 1991. During the first part of the 1990s Japanese economic growth was only 1.6% per year on average. The recent Asian financial crisis cut Japanese economic growth to 1.4% in 1997 and additional financial troubles (shortage of credit, bad loans, troubled financial institutions) induced a decline by 2.8% in 1998. In 1999 the recovery of the Japanese economy from recession remained halting. GDP rebounded in the first half of 1999, with private sector demand being buoyed by government spending; but, in the second half of the year, this process went into reverse with a decline in government investment being associated with a fall in private domestic spending. Finally GDP increased by only 0.2% for the whole year, as private consumption remained depressed by falling real earnings and uncertainty about employment prospects, although private business investment rebounded strongly in the second half of the year. The current Japanese situation can be considered as an historic and perhaps inevitable stage in its economic development. As a result of their earlier successes and in response to protectionist pressures from other countries, Japanese manufacturers have now located factories in Asia, Europe and the Americas, and they are still being expanded. Inevitably, they reduce the potential for growth at home. At the same time, physical limitations come into play. Japan's land area is only two thirds that of France, and consists of hundreds of islands. American style homes of more than 200 square metres are out of the question for the vast majority of Japanese. Consumption, accordingly, is modest by American standards. At the same time, there are constraints on the amount of infrastructure that can be economically justified. These developments were, inevitably, going to affect growth at home. Exports from Japan now compete with exports from Japanese plants located

Main items

The 'Other OECD' countries, as defined in this section, include nearly all the most advanced industrialised economies outside the European Union - particularly the USA and Japan. Together with the EU Member States these economies have a significant leadership role in global diplomacy. With the EU they also dominate world trade, overseas direct investment, and currency and financial markets. By funding and undertaking much of the total global research and development effort they also play a crucial role in determining the pace and direction of technological change. Over the past decade the economic fortunes of these other OECD countries have varied considerably. In particular the NAFTA region - led by the USA - has experienced a prolonged period of sustained economic growth. But, in contrast, Japan continues to suffer from poor growth, high corporate indebtedness, deflation and rising unemployment. Progress is being made in liberalising energy markets, leading to significant structural changes in the electricity and gas sectors. On the other hand, overall import dependency for oil and gas is increasing. Coupled with an uncertain outlook for new nuclear construction, and progressive decommissioning of existing nuclear units, security of supply issues will assume a higher profile. These 'Other OECD' countries have some of the highest average incomes and vehicle ownership levels in the world; and thus they also have amongst the largest per capita levels of energy consumption and CO₂ emissions. Partly because of low energy prices in some of them, such as the USA, these countries' overall CO₂ emissions have risen by 15% since 1990. Such factors are important in explaining the reluctance of some of these countries to participate fully in efforts to secure more sustainable development, especially to support the ratification of the Kyoto Protocol. In the longer term, reflecting their economic maturity, the 'Other OECD' countries will experience relatively modest growth rates. As a consequence their currently significant shares of global economic output, energy use and emissions will continue to decline steadily.

abroad. These plants will earn profits for Japanese manufacturers but they will create few jobs at home. Retail sales volume in Japan has been stagnant for at least six years, not just the past few months. With rising unemployment and falling profits, this pattern is likely to persist.

The economic environment of the EFTA region was marked by GDP growth on average of 2.0% in the last five years, led by Norway which increased its GDP by 3.1% per year in the same period - benefiting from the increasing production of hydrocar-





REGIONAL GDP EVOLUTION											
Billions 1990 EUR	1980	1985	1990	1995	1998	1999	85/80	90/85	95/90	98/95	99/98
							Annual % Change				
EFTA	221.8	244.7	275.0	292.5	313.0	317.2	2.0%	2.4%	1.2%	2.3%	1.3%
NAFTA	3887.3	4387.8	5019.2	5561.0	6319.5	6549.9	2.5%	2.7%	2.1%	4.4%	3.6%
OECD Pacific	1774.8	2092.7	2599.2	2814.0	2936.6	2956.8	3.3%	4.4%	1.6%	1.4%	0.7%
Turkey	71.2	90.3	118.4	138.6	164.0	155.7	4.9%	5.6%	3.2%	5.8%	-5.0%
Total	5955.1	6815.5	8011.8	8806.2	9733.1	9979.6	2.7%	3.3%	1.9%	3.4%	2.5%

bons in the North Sea. In 1999 GDP growth was limited to only 1.3% as low oil prices on the world market contracted Norwegian GDP to only 0.9%. Turkey, which had remarkable annual GDP growth above 7% between 1995 and 1997, rebounded successfully after the 1994 recession caused by internal political problems. Within the space of a year, the Turkish economy was affected by two major shocks: the Russian crisis of August 1998 and the Marmara earthquake of August 1999. The former contributed to a deep recession at the start of 1999; the latter inflicted severe economic disruption, loss of life, and homelessness. As a result, GDP growth was limited to 2.8% in 1998 and fell by 5% in 1999. Turkish GDP is projected to rebound in 2000. Contributing to this turnaround are an expected recovery in exports and tourism receipts, post-earthquake reconstruction, lower real interest rates, and a general improvement in confidence.

ENERGY OUTLOOK

Final energy demand growth slowed down in 1997 and 1998 but rebounded in 1999...

Final energy demand, mainly driven by the NAFTA region absorbing 77% of consumption in 1998 (81% in 1980), demonstrated an accelerating growth rate since 1980: stable between 1980 and 1985, increasing by 1.0% on average between 1985 and 1990, and growing by 1.6% on average between 1990 and 1996. In 1997, all regions benefited from warmer climatic conditions resulting in reduced heating requirements of more than 2% that limited the

growth of final energy demand to 0.5% for the region as a whole. Similarly, warmer climatic conditions, coupled with the low economic activity in the OECD Pacific region, resulted in a decrease by 0.2% in 1998. Sustained by declining world energy prices, final energy demand increased by 2.1% in 1999. The NAFTA region followed this evolution closely but the profile was quite different for the OECD Pacific region where the increase peaked during the second part of the 1980s but slowed down during the 1990s due to the poor performance of the Japanese economy.

Statistical disruptions complicated analysis of the United States' final energy demand...

Some disruption of statistical series has complicated the analysis of consumption. In the USA's statistics before 1988, electricity generated by autoproducers, mainly combined heat and power production, was accounted for at the final consumption stage in terms of fuel inputs, rather than as generated electricity and heat. Between 1989 and 1993 these inputs were progressively better identified statistically and allocated to electricity production. Consequently consumption of associate input fuels by thermal power stations has been allocated to the power sector and the consumption of heat and electricity produced by this kind of unit has been registered at the final stage. This means that final energy demand in the United States was over-estimated (by up to 15-20 Mtoe) before 1993 and, as a consequence, the growth rate of final energy demand was under-estimated mainly during the transition period between 1989 and 1993.

FINAL ENERGY DEMAND BY REGION											
Mtoe	1980	1985	1990	1995	1998	1999	85/80	90/85	95/90	98/95	99/98
							Annual % Change				
EFTA	33.0	35.7	37.0	38.6	40.8	41.6	1.6%	0.7%	0.8%	1.9%	1.9%
NAFTA	1445.1	1413.8	1440.0	1520.9	1560.7	1598.4	-0.4%	0.4%	1.1%	0.9%	2.4%
OECD Pacific	274.0	288.0	338.5	374.8	386.5	392.3	1.0%	3.3%	2.1%	1.0%	1.5%
Turkey	26.3	30.4	38.5	44.9	50.1	49.4	3.0%	4.8%	3.1%	3.7%	-1.3%
Total	1778.3	1768.0	1854.1	1979.3	2038.1	2081.8	-0.1%	1.0%	1.3%	1.0%	2.1%





Hydrocarbons, with a stable 72% market share, dominated final energy demand...

Final energy demand is largely dominated by hydrocarbons that contributed about 72% since 1980 with a stable distribution between oil (50%) and gas (20%). The share of oil products in total final demand remained stable in the NAFTA region - contributing half of the final energy demand as in the United States; the decline in oil's share in Canada (from 49% in 1980 to 39% in 1999) being compensated by some gains in Mexico (62% in 1999 against 60% in 1980). In other regions oil's share declined regularly: from 57% in 1980 to 53% in 1998 in the OECD Pacific region following the pattern observed in Japan where it represented only 54% in 1998 against 58% in 1980; and from 60% in 1980 to 49% in 1999 in the EFTA region as a consequence of the stabilisation of oil consumption in all countries even though total final consumption continued to grow. The gas market share declined slowly in NAFTA, from 26% in 1980 to 24% in 1999 despite the 1992 liberalisation of the gas market in the United States. From 1992 to 1996, natural gas consumption in the United States increased by 12%. Lower costs resulting from greater competition and deregulation in the gas industry, and an expanding transmission and distribution network, have helped expand its use. In 1997 and 1998, natural gas consumption fell substantially to equal the 1990 level. Relatively mild weather throughout these years was the primary cause for the reduced demand in the residential and commercial sectors. The net fall in consumption, along with abundant foreign supplies to the United States and competition driven by the overall slump in petroleum prices, resulted in a significant drop in natural gas prices during 1998 which favoured the rebound of natural gas consumption in 1999. A similar evolution of consumption occurred in Canada but the fall in consumption was less marked in 1997 and 1998. This contrasts with the evolution in the OECD Pacific region where the gas market is still under development. The gas share in this region reached only 8% of total final demand in 1999 (5.5% in 1980). In particular, the gas share remained low in Japan despite the high density of population. But, as in Australia, gas competition on the Japanese market was affected by the additional costs related to LNG infrastructures.

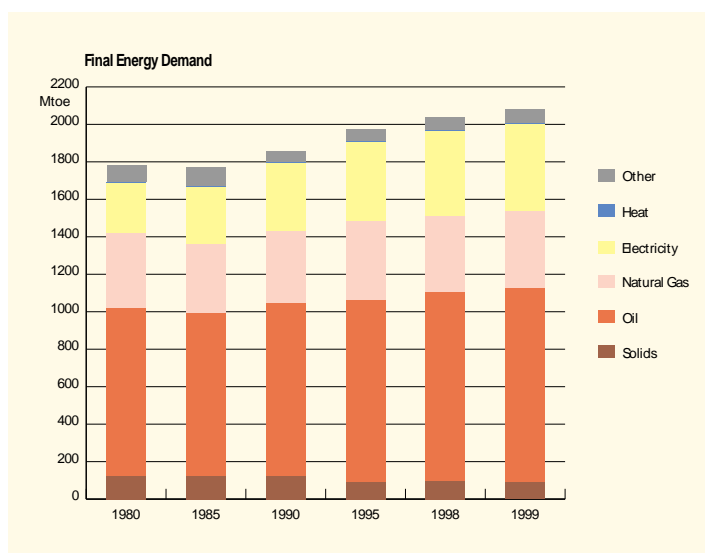
Electricity satisfied 63% of incremental total final demand since 1980...

Electricity consumption grew by about 2.9% per year on average since 1980, the growth rate being more sustained in the OECD Pacific region (+3.4% on average) than in NAFTA (+2.7% despite the favourable effect of statistical disruptions) or EFTA (+2.1%). Thus 63% of the incremental demand for energy by final consumers since 1980 was met by electricity which increased its

share from 15% in 1980 to 22% in 1999 as a result of the high level of industrialisation of these regions. The contributions of solid fuels and biomass remained quite marginal: their share declining from 11.7% in 1980 to only 7.9% in 1999 with a more marked decline for solid fuels penalised by environmental considerations. Moreover as these fuels were mainly consumed in the United States by industrial electricity autoproducers, the modification of statistical allocations pushed down their apparent consumption between 1991 and 1993.

Transport contributed 40% of final energy demand and about 80% of final oil consumption...

Industry made the major contribution to final energy demand in 1980 with a 35% share, but this declined regularly to reach only 26% in 1999 even though the absolute level of consumption remained unchanged since 1990. Consequently industry was a less important contributor to final demand since the beginning of the 1990s. But industrial shares varied significantly from region to region: 23.4% in NAFTA with a minimum of 21.6% in the United States, 27.4% in EFTA and 37.0% in OECD Pacific. These contrasted patterns not only reflected very different levels of industrialisation but were also a result of different lifestyles influencing the weight of the domestic sector (from 812 Kgoe/inhabitant for the OECD Pacific region to 1501 Kgoe/inhabitant for EFTA) and of transport (from 842 Kgoe/inhabitant for the OECD Pacific region to 1725 Kgoe/inhabitant for NAFTA). Despite sustained economic activity except in Japan, industrial energy consumption remained stable since 1995. The increasing predominance of less energy-intensive and high technology industries contributed to this evolution, as well as the declining trend of energy intensities in many heavy industrial sectors. These two elements offset the continued increase of industrial production.





Over the same period, transport climbed from 33% of final energy consumption in 1980 to 40% in 1998, becoming by far the major energy-consuming sector in this region. This was mainly under the pressure of NAFTA, where transport represented 43% of total final demand in 1999 against 32% in OECD Pacific and only 30% in EFTA. Per capita energy use in the North American transportation sector is among the highest in the world and currently accounts for about 40% of the energy consumed for transportation worldwide. Canada and the United States are large geographic areas, where goods and people are often transported over long distances - compared with Japan where public transport networks are well established in major urban areas. Vehicle ownership is also very high: in 1999, 779 vehicles per thousand persons in the United States, 607 in Canada, 603 in Japan and 528 in Western Europe. Pushed by economic growth and increasing living standards, car ownership is continuing to grow. In the OECD Pacific region, in particular Japan, a recent switch to larger cars has also been observed. As a consequence, the increasing contribution of transport to oil consumption by final consumers reached 79% in the OECD region as a whole in 1999 (73% in 1990) with a maximum of 85% in NAFTA (79% in 1990) compared to only 59% in both OECD Pacific and EFTA. The share of the tertiary and domestic sector in final energy demand was essentially unchanged, at between 32% and 34% of the total over the whole period. The highest contribution occurred in EFTA for climatic reasons (43% of final consumption in 1999) and the lowest in the OECD Pacific region (31% of final consumption) due to the limited size of households.

Electricity's share continued to increase but slowly both in industry and tertiary-domestic sector...

Electricity's share in final consumption reached 20% in 1990 from 15% in 1980 and continued to increase slowly to reach 22% in 1999. EFTA, benefiting from much low-cost hydro power, had the largest contribution from electricity with about 35% even though this share remained stable since the beginning of the 1990s, followed by the OECD Pacific region with 25% and finally NAFTA with only 21% (as a result of the larger contribution of the transport sector). On a sectoral basis the highest contributions of electricity occurred in the EFTA region with 53% in industry, slowly declining since 1990, and 44% in the tertiary-domestic sector, as a result of low electricity prices and the predominance of electrical heating related to dispersed habitat and difficult weather conditions. The two other regions were relatively homogeneous: about 30%-32% for industry and 41%-44% for tertiary-domestic. The increasing contribution of electricity in industry resulted from improved automation and control, development of electro-technologies and an industrial production mix more oriented to high added-value products. In the tertiary-domestic sector, driven by

high living standards, electricity's contribution continued to grow in line with the development of services activities because - even though the market for classical appliances was close to saturation - other markets such as air conditioning and micro-computers were developing rapidly.

Gross inland energy use increased regularly by 1.9% since 1985 with contrasted evolution by regions...

Gross inland energy consumption showed a steady annual increase of about 1.9% from 1985 to 1999 after the recession observed during the first part of the 1980s. In 1998, affected by the Japanese recession which induced a contraction by 1.1% in the OECD Pacific region, GDP grew by only 0.9% for the whole region. In 1999 the rapid expansion of the NAFTA region offset the slow increase in the OECD Pacific region, the regional gross inland energy consumption growing by 2.4%. The United States, the largest economy in the world (27% of world GDP) with about 24% of world energy consumption and 66% of the region's energy consumption, largely dictated this evolution. Furthermore, this development was not equally spread over all primary fuels and regions. During the second part of the 1980s, the NAFTA and EFTA regions grew at about 1.5% per year on average while the growth reached 3.7% in the OECD Pacific region. In the first half of the 1990s the NAFTA region continued to grow at a regular rhythm of 1.6% per year while growth slowed down to 2.4% per year in the OECD Pacific region with the first indications of breathlessness of the Japanese economy, and to 0.9% in the EFTA region also marked by a slowing down of GDP growth. Since 1995 the lowest growth occurred in the OECD Pacific region, at only 1.3% per year, with a decline by 1.1% in 1998 followed by a slow recovery by 1.4% in 1999. The Japanese economic recession starting in the second part of 1997 with the Asian crisis, and continuing since then, was solely responsible of this situation. Oil (48% in 1999) and solid fuels (21%) dominated the energy market in this region, but the major growth since 1985 was experienced by natural gas (5.4% per year on average) and nuclear energy (5.0%) even though nuclear electricity production contracted by 4.7% in 1999, the first slowdown since 1987. The NAFTA region followed, with growth of its gross inland energy consumption of 2.1% per year on average since 1995, even though it slowed down to 1.3% in 1998 given the favourable climatic conditions which reduced the demand for heating by about 4%. In 1999, the buoyant economic situation pushed gross inland energy consumption except in Mexico, which can still be associated with developing countries, where growth was limited to only 0.7% compared to GDP growth of 3.7% thanks to major improvements which occurred in the industrial sectors. Gross inland energy consumption of the NAFTA region was dominated by oil products (40% in 1999), followed by natural gas (23%) and solid fuels (22%) whose consumption stag-





nated since 1997. Since 1990, oil consumption grew by 1.5% per year on average, solid fuels by 1.9% and natural gas by 2.3%. In the EFTA region, despite a GDP growth limited to 2% per year in the last four years, gross inland energy consumption grew at 2.6% per year. The major energy sources in this region were oil (41% in 1999) and hydro (25%) but the largest increase concerned gas: 8% per year on average since 1990. Finally Turkey, a country still under rapid development, increased its energy consumption by 84% between 1985 and 1998 or an annual average growth of 4.8% with all kinds of energy, except nuclear, contributing to this growth. But in 1999, the consequences of the Russian crisis of August 1998 and the Marmara earthquake of August 1999 contributed to a reduction of both GDP (-5.0%) and gross inland energy consumption (-1.9%).

All fossil fuels and nuclear met incremental gross inland consumption since 1985, but oil dominated...

Solid fuel demand increased by about 50% since 1980 but its growth rate declined regularly: from 2.9% in the first part of the 1980s, to 1.4% during the second part and 1.1% during the first half of the 1990s. Large variations were observed in the last four years: a jump by 4.8% in 1996 and by 6.3% in 1997 followed by more limited growth of 1.1% in 1998 and only 0.6% in 1999. This recent evolution resulted from increasing demand from the US power sector: an additional 25 Mtoe in 1996 and 22 Mtoe in 1997. Solid fuels represented about 21% of total gross inland consumption, a constant share since 1990. Coal consumption is concentrated in the United States, which has accounted for about three-quarters of the regional total since 1980. With its substantial reserves, the United States has come to rely heavily on coal for electricity generation and will continue to do so in the near future. Japan contributed to 12% of total solid consumption and Australia, another important producer, to 6% only. Although there was a drop in demand for oil and gas between 1980 and 1985, the use of both these energy sources has increased regularly since then. Oil demand grew on average by 1.5% per year since 1985 to contribute 41% of total consumption in 1999 (49% in 1980) under the pressure of the OECD Pacific region (+2.0% per year on aver-

age), despite a decline in absolute terms in 1997 and 1998 caused by the reduction of consumption in Japan (-5% in two years). In 1999 oil consumption retrieved its 1995 level. Major consumers in 1999 were: the United States with 881 Mtoe or 62% of the whole region's consumption, Canada with 86 Mtoe and Japan with 36 Mtoe. Since 1985, the annual growth of gas consumption reached an average of 2.2% with a peak of 4.0% in the OECD Pacific where gas use increased both for final energy uses (4.0% per year) and power generation (3.8% per year). In the United States, which absorbed about 72% of the whole region's gas consumption and 26% of total world consumption in 1999, gas use grew by 2.1% per year on average between 1985 and 1995, remained stable between 1995 and 1997 and fell by 2.4% in 1998 given favourable climatic conditions that reduced the demand of the tertiary-domestic sector by as much as 15 Mtoe; but again rebounded in 1999 by 4.4% in the context of declining hydrocarbon prices. Canada, with 70 Mtoe, was the second market in importance for natural gas while the consumption in Japan remained low. About 96% of Japan's gas is imported, all in the form of liquefied natural gas incurring additional costs for transportation and infrastructure. Most of the LNG is used either for electric power generation or as feedstock for petrochemical plants. Only about 5% of Japan's urban area is served by a gas distribution system. With plans to increase the natural gas portion of its primary energy supply to 13% by 2010, however, Japan is considering expansion of its internal gas pipeline system. Many analysts cite the absence of an effective gas distribution system as the key reason for Japan's high retail energy prices. Final gas consumption in cities has increased by 70% in the last decade due to a 25% increase in natural gas customers and also to a large rise in consumption by industry. Non-fossil fuels grew continuously to reach 16% of total consumption in 1999 against 10% in 1980 but the fortunes of particular non-fossil fuels varied markedly: geothermal increased by 113% since 1985 but remained marginal, nuclear by 85% with a sustained growth by 4.4% in 1998 and 1999, biomass by 22% and hydro by only 15%. Nuclear output increased by 17% as a whole in these last two years in the United States but declined by 11% in Canada and 1% in Japan. Since 1985, incremental gross inland

GROSS INLAND CONSUMPTION BY REGION

Mtoe	1980	1985	1990	1995	1998	1999	85/80	90/85	95/90	98/95	99/98
Change.....							Annual %				
EFTA	41.1	45.1	48.6	50.9	54.7	56.5	1.9%	1.5%	0.9%	2.4%	3.2%
NAFTA	2103.6	2086.5	2258.9	2450.6	2591.0	2660.8	-0.2%	1.6%	1.6%	1.9%	2.7%
OECD Pacific	430.3	451.2	540.3	608.3	632.7	641.6	1.0%	3.7%	2.4%	1.3%	1.4%
Turkey	31.5	39.1	52.7	61.4	71.7	70.3	4.5%	6.1%	3.1%	5.3%	-1.9%
Total	2606.5	2621.9	2900.5	3171.2	3350.1	3429.1	0.1%	2.0%	1.8%	1.8%	2.4%





energy consumption has been met as follows: 33% by oil, 23% by gas, 20% by solid fuels, 18% by nuclear and 6% by renewable sources.

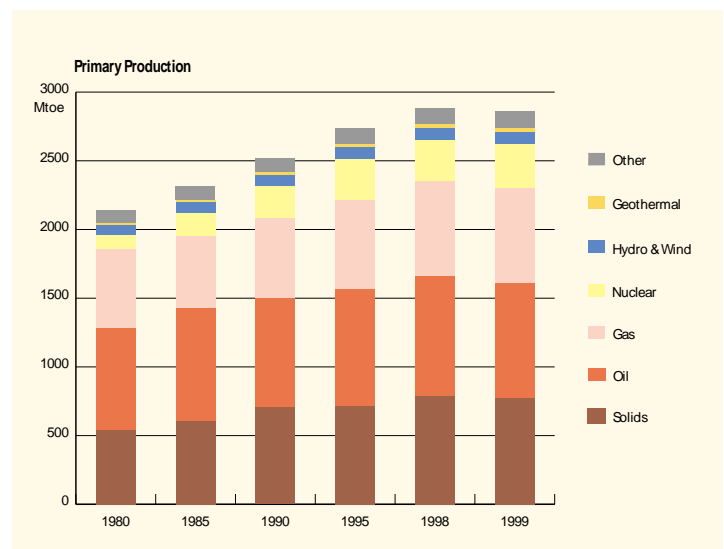
Indigenous energy production declined by 0.8% in 1999, caused by a 4.2% reduction of oil production...

Indigenous energy production, showing significant improvement in the three main regions, increased at the same rate as gross inland consumption between 1990 and 1998 but declined by 0.8% in 1999 while gross inland consumption increased by 2.4%. Oil contributed 841 Mtoe or 29% of all energy produced in the whole region in 1998, a 5% reduction on the 1997 peak. In absolute terms, oil production in the NAFTA region peaked in 1985 at 757 Mtoe but declined substantially over the following five years as a result of lower oil prices to reach only 681 Mtoe in 1990. Between 1990 and 1998 oil production fluctuated between 671 Mtoe and 691 Mtoe but it declined by 4.3% in 1999 to reach only 657 Mtoe, the lowest production level since 1980. United States' production fell by 16% between 1985 and 1990 due to the closure of numerous small independent producers whose profitability was threatened by declining oil prices. After 1990 the reduction of US production (-65 Mtoe) was partly compensated by Canada (+29 Mtoe, or a 31% increase since 1990), and Mexico (+17 Mtoe) which both saw peaks in their production in 1998. Over the past few years, US oil companies have shifted their focus away from the United States (a mature oil region for the most part), and towards newer, potentially larger prospects abroad. In addition, oil exploration and production in the United States is relatively expensive compared to places like Africa, Asia, South America and the Middle East. The Mexican state oil company, Pemex, is one of the world's largest oil companies, the single most important entity in the Mexican economy, and a symbol of Mexican sovereignty and independence. Pemex is the only company in the Mexican oil market, upstream and downstream. While the company is criticised widely as being bloated and inefficient, privatisation is not on the agenda. In Canada, an increasing share of oil production is now coming from "synthetic crude". In the future much of the exploration in Alberta will be for heavy crude and oil sands, as conventional oil reserves are being depleted. Unlike conventional oil, oil sands are a mixture of bitumen, sand, water and clay. The bitumen, a thick and tar-like hydrocarbon, surrounds the sand and water. To develop oil sands, bitumen is separated from the sand, water and clay. Once separated, bitumen can be upgraded into a high-quality oil called "synthetic crude." Operating costs with current technology stand at \$8/bbl, although companies are expecting costs of \$6/bbl to \$7/bbl for new projects. In EFTA, the major evolution occurred in Norway where oil production has quadrupled since 1985, making it the eighth largest world producer even though oil production has

declined slowly since 1996. The oil price collapse in late 1997-98 had an adverse effect on North Sea production. Since 1997 Norwegian oil production declined slowly, whereas previous years had experienced strong increases. The North Sea is considered a "mature" area, with few new large discoveries likely to be made. Only a few frontier areas hold the possibility of further discoveries of large oil and gas fields. Of 130 known deposits of oil and gas on the Norwegian continental shelf, about 40 are estimated to be economically viable for development in the next decade. Because the region is believed to be nearing its peak production, in both of the major North Sea producing nations, Norway and the United Kingdom, governments and industry are taking steps to restructure their oil and gas sectors to make them more internationally competitive. Oil production in the OECD Pacific region, mainly located in Australia, remained marginal.

Reinforcement of gas infrastructure in both NAFTA and EFTA regions to meet increasing demand...

Natural gas production fell between 1980 and 1985 by 1.9% per year on average but since then it has increased continuously to reach a peak of 692 Mtoe in 1999. Gas production was mainly located in the United States (438 Mtoe) and Canada (145 Mtoe), the second and third largest world producers respectively. Although North America accounted for only 5% of the world's total proved gas reserves at the end of 1999, it accounted for 32% of the world's total production, most of which was consumed internally. Growing US demand for Canadian natural gas has been a dominant factor underlying many of the pipeline expansion projects in the last decade. The US and Canadian gas grids are highly interconnected and Canadian natural gas has become an increasingly important component of the total gas supply for the United States, contributing to 14% of total US consumption in 1998. Currently, significant pipeline construction both within





PRIMARY ENERGY PRODUCTION BY REGION

Mtoe	1980	1985	1990	1995	1998	1999	85/80	90/85	95/90	98/95	99/98
Annual % Change											
EFTA	63.6	83.4	131.3	194.8	219.7	223.8	5.6%	9.5%	8.2%	4.1%	1.9%
NAFTA	1910.0	2005.5	2118.4	2213.1	2297.2	2276.2	1.0%	1.1%	0.9%	1.3%	-0.9%
OECD Pacific	139.1	202.0	245.6	299.3	337.0	331.6	7.7%	4.0%	4.0%	4.0%	-1.6%
Turkey	17.1	21.6	25.5	26.0	28.5	26.9	4.8%	3.4%	0.4%	3.1%	-5.7%
Total	2129.8	2312.5	2520.7	2733.2	2882.4	2858.5	1.7%	1.7%	1.6%	1.8%	-0.8%

Canada and between the United States and Canada is underway to accommodate US import demand. By the end of 2000, five major new natural gas pipeline projects and an upgrade on a sixth are expected to be completed, allowing a considerable increase in trade between the two countries. Substantial pipeline construction is also underway within the United States. Several major projects will provide access to new sources of both supply and demand and increase capacity along pipeline routes where utilisation rates are already high during peak periods. Although Mexico has considerable gas resources that could be developed, Mexico has not emphasized natural gas development and exploration until recently, and most of its current gas production is "wet" gas, associated with oil production. Natural gas is expected to play a more important role in the future as demand rises quickly, especially in the power sector. In response to anticipated demand growth, Pemex plans to increase Mexican-US border infrastructure and capacity, and to focus more on gas exploration activities. But production is not expected to keep pace with rising internal demand and Mexico is thus likely to remain a net importer of natural gas. Australian and Norwegian gas production also continued to grow: Australian production steadily increased at an average rate of 5.2% per year since 1990 but exportation to Japan stagnated since 1995; Norwegian production only grew since 1990 with spectacular jumps by 30% in 1996, 12% in 1997 and 7% in 1999. Gas accounts for about 60% of Norway's overall offshore energy reserves, and it is expected to account for an increasing portion of Norway's energy exports in coming years. Statoil expects Norway's share of gas deliveries to continental Europe to rise from 14% in 1996 to 20% by 2005. Norway is interested in natural gas because it will allow the country to be less reliant on oil exports (and less sensitive to oil prices), and it will help reduce greenhouse gas emissions. The Troll field contains 60% of Norwegian gas reserves. It has a production capacity of 33 Mtoe per year and production in 1998 was 20 billion cubic metres. Troll A is the tallest structure ever moved by humans. Its concrete gravity base structure has been built for a lifetime of 70 years. Troll gas sales agreements, first signed in the late 1980s, led to a doubling in Norwegian gas exports. Norway is

developing more natural gas resources, especially in the Norwegian Sea, and it is considering developments in the Barents Sea.

First decline since 1985 of coal production, confronted with low oil prices on main competitive markets...

Solid fuel production grew on average by 1.8% a year since 1985 but the growth rate slowed down progressively to reach a first net decline in 1999. The slowdown of oil prices on world market substantially increased the competitiveness of oil products and natural gas compared with coal in major energy markets. The reduction of demand in internal markets pushed down production levels mainly in the United States (-2.5%). Since 1985 additional contributions came mainly from the United States (+93 Mtoe) and Australia (+71 Mtoe), the second and the fourth world producers respectively. In the United States, the production level is directly related to the demand arising from the power sector and from exports: after relative stagnation between 1990 and 1995, production increased by 2.9% in 1996, 2.6% in 1997 and 2.1% in 1998 to cover additional demand. Australian production increased on average by 4.6% per year since 1985. These two countries were both net exporters of solids fuels. Exports represented 5.6% of US production in 1999 (against 9.2% in 1995) and 71.2% of Australian production. In the future, environmental regulation, in particular the application of the Kyoto Protocol in industrialised countries, will represent a major challenge for coal markets in many areas of the world, especially in the OECD countries that have agreed to reduce their greenhouse gas emissions.

Nuclear production continued to increase in Japan but prospects seem less favourable in the NAFTA region...

Nuclear energy accounted for 11% of total energy production in 1999 against 5% in 1980. Nuclear output grew in the United States and Japan during the 1980s showing, respectively, a 8.7% and a 9.4% annual increase in its contribution. Since 1990 its use in Japan has increased at about 5.1% a year taking into account the first decline observed in 1999 (-4.7%). During the past few



years, public opposition to Japan's nuclear power programme has increased in reaction to a series of accidents at Japanese nuclear plants, most recently the accident at the Tokaimura uranium processing plant in September 1999. Other problems for Japan's nuclear power programme have included rising costs of nuclear reactors and fuel, the huge investments necessary for fuel enrichment and reprocessing plants, several reactor failures, and the question of nuclear waste disposal. Current plans call for an increase in the proportion of electricity generated by nuclear power plants to 42% by 2010. By raising its reliance on nuclear-generated electricity, Japan is hoping to reduce its carbon dioxide emissions in accordance with the Kyoto Protocol. Since 1990 nuclear's contribution has increased by only 2.5% per year in the NAFTA region. In the United States nuclear production grew regularly by 1.6% per year between 1990 and 1996 but slowed down to 6.8% in 1997 before a strong rebound in 1998 (+7.2%) and 1999 (+8.9%). The deregulation of the electricity industry in the United States is affecting the nuclear industry in different ways: some units have been shut down prematurely; others have been sold; and still others are expected to continue operating beyond their currently scheduled retirement dates. In 1998 three reactors were shut down permanently. Plant sales could lead to a consolidation of the US nuclear electricity industry, with a few large companies owning and operating many nuclear plants. As a result, better management could lower operating costs and make nuclear plants more competitive in the deregulated electricity market. In Canada nuclear production peaked in 1994 but has declined by 32% since then. Ontario Hydro, the utility owning the majority of the nuclear units, has begun an extensive programme to improve the performance of its nuclear plants. Seven of the oldest units have been shut down, five of them in 1997 and two in 1998. The units may be refurbished and brought back on line eventually.

No growth of the renewables energy share since 1980...

The renewables energy contribution has increased regularly since 1980 but their share has remained stable since then. Hydro and wind have grown very slowly since 1985, despite the impressive development of wind energy in the United States, especially in California. In the United States, hydroelectricity has become more controversial in recent years, with fears about environmental damage. Closure of some limited-size dams has been decided. On the other hand, wind made dramatic gains in the United States in 1998 and early 1999, for the most part because wind energy producers rushed to install wind facilities before the expiry of the Federal production tax credit for wind turbines. Plans for wind projects have been hampered in Australia by complaints and protests from local residents who dislike the noise and visual intrusion of wind farms. In Japan, the installed wind capacity

reached only 200 MW in 1998, only one quarter of the capacity installed in the US during 1998 alone. The contribution of geothermal energy in the whole region multiplied by three during the 1980s but has grown very slowly since then. More than half of the geothermal energy originated from the United States. Other sources, mainly biomass, increased regularly since 1980: 1.7% per year on average. Two thirds of biomass production was located in the United States and is used mainly to supply electricity producers.

The whole region represented 25% of the world's fossil fuel reserves, principally solid fuels...

In late 1999, all these other OECD regions' oil reserves amounted to about 7.1% of world reserves, mostly (6.1%) located in the NAFTA region but the oil reserves/production ratio was only 14 years, significantly below the 40 years world average. The situation for gas reserves was quite similar, with about 6.5% of world reserves, also concentrated in the NAFTA region (4.9%). Finally, coal reserves, mainly located in the United States (24.0%) and Australia (9.2%), accounted for 34.4% of world reserves. As a result of this, the region represented 24.5% of total world fossil fuel reserves.

Heavy investment continued in thermal power plants with varying growth rates between regions...

Electricity generation grew at an annual average rate of 3.0% since 1985. But the growth declined from 3.9% per year on average during the second part of the 1980s to 2.4% during the 1990s even though demand rebounded in 1998 (+2.8%) and 1999 (+3.0%). Thermal power stations covered 65% of the production in 1999 (68% in 1980), with nuclear and hydro accounting for 19% and 16% of total production respectively. These shares have remained stable since 1990, with nuclear becoming more important than hydro in the late 1980s. Since 1985, thermal units have covered 68% of the incremental production, nuclear 26% and renewables (hydro and wind) only 6%. But since 1995, 88% of the production growth (555 TWh) was covered by thermal, the balance being covered by nuclear thanks to the production jump which occurred in the United States in 1998 and 1999. This predominance of thermal power stations will continue or even be reinforced in the near future. The installed capacity reached 1306 GWe in 1999 compared to 916 GWe in 1980 and 1163 GWe in 1990. Since 1980 nuclear capacity has doubled but, for the first time, total installed nuclear capacity declined in 1998 and 1999 (-3.0%) as new commissioning in Japan did not compensate for plant closures in Canada. Hydro and wind capacity expanded by 2% per year on average between 1985 and 1995 but remained stable since then. In particular the development of wind power in





the United States, the second largest world market after Germany, has slowed since 1996 despite the increasing cumulative impact of new commissioning with new plants being partly offset by the closure of old or inefficient units. On the other hand, thermal power capacity increased by 1.2% per year on average since 1985. But this growth was accelerating during the 1990s due to the limited investment in nuclear and hydro combined with the growing demand. The growth of power capacity is not uniform across the whole region. The fastest increase occurred in Turkey with about 9.1% per year on average since 1985, the bulk of it being concentrated during the second part of the 1980s. The OECD Pacific, largely dominated by Japan, grew at 2.6% per year and NAFTA at only 0.9% with two extremes: Mexico at 3.7% since 1985 and the United States at only 0.8%. The EFTA region grew at the same rate as the NAFTA region.

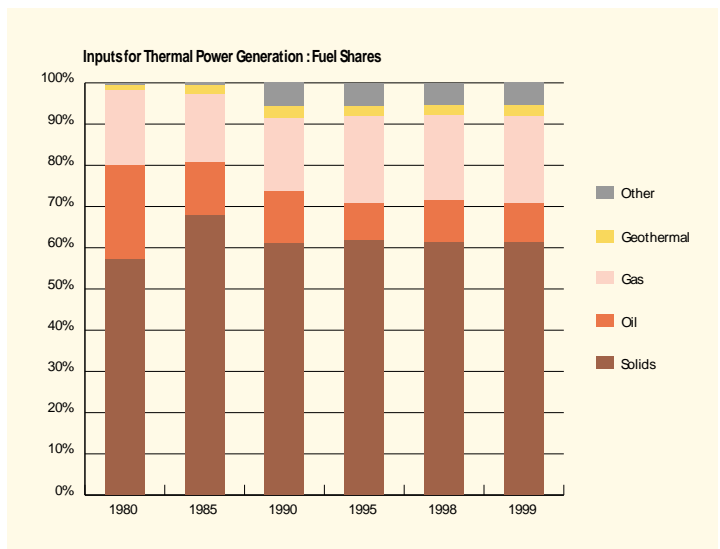
Solid fuels defended their major role in thermal power stations, but gas was gaining market share...

Solid fuels remain the main energy source for thermal power stations (61% of thermal input in 1999 versus 57% in 1980) as a result of the fuel preferences of US electricity producers. The contribution of oil (9.5% in 1999) fluctuated under the pressure of oil price competitiveness and environmental considerations. It declined by about 45% during the oil crisis in the early 1980s, to the benefit of other fossil fuels. Since 1985 it fluctuated between 80 and 100 Mtoe. The development of gas use has indeed been very important since 1985. Gas consumption doubled since 1985 to reach 210 Mtoe in 1999, and growth was accelerating in the last three years. Gas contributed to 19% of all power plant fuel inputs in the NAFTA region thanks to the large indigenous gas production and the liberalisation of the gas market in the United States at the beginning of the 1990s. Since 1990 it increased by 35% in the OECD Pacific region to account in 1999 for 28% of thermal units' inputs despite the lack of competitiveness of imported LNG on the Japanese electricity market. But environmental concerns sustained gas use when oil consumption by the Japanese electricity sector declined by 12% in 1997 and 11% in 1998. In the EFTA region, the share of gas in thermal power stations remained marginal; but in Turkey it was increasing rapidly to reach one third of all inputs in 1999 even though natural gas use only commenced in 1986.

Generalised deregulation of electricity markets, responsible for increasing mergers and acquisitions in US...

Electric utility regulatory reform is underway throughout North America. In the United States and Canada the driving force for reform is the expectation that increased competition will lower costs of electricity supply. In the United States, reforms are being

carried out at both the federal and state levels. The latest regulations concern open access, additional guidelines for the recovery of stranded costs and the establishment of electronic trading systems for the availability of transmission capacity. The reforms should also serve to integrate more closely the US and Canadian electricity markets. A corporate response to this deregulation was an acceleration of mergers and acquisitions between electric but also gas companies. During 1999, approximately 55 GWe of capacity was sold to non-utility companies. On March 31, 1998, retail customers of investor-owned utilities in California (approximately three-quarters of the state's customers) were allowed direct access to an alternative energy service provider. Also during 1998, Massachusetts and Rhode Island opened their retail electricity markets. Meanwhile, legislatures and/or public utility commissions in 18 other states have also approved or implemented plans to move toward retail competition. In response, many electric utilities began restructuring their companies and selling their generating assets primarily to non-utility companies, causing a shift in the ownership patterns of power plants. Consequently independent power producers grew rapidly, favoured by the more competitive environment in generation. In 1998, there were 109 independent power producers active in the United States, accounting for about 7% of existing capacity. More than half of all new capacity additions in the United States are expected to be supplied by such independent power producers.



First steps to electricity market deregulation in Canada, Mexico and Japan...

Under Canada's constitution, electricity is primarily within the jurisdiction of the provinces. In most provinces, the bulk of generation, transmission and distribution is provided by a few dominant utilities. Although some of these utilities are privately owned, most are owned by the provinces. There is also limited





independent power producer (IPP) generation, mostly for sales to the larger utilities. Two provinces, Alberta and Ontario, have introduced legislation to deregulate their power sectors. Mexico's electricity sector is at a crossroads. Although generation has increased rapidly over the past decade, supply is not expected to meet demand growth over the next two decades. Given current grid capacity constraints, shortages could result; regular shortfalls resulting in nationwide blackouts are predicted within the next two years. Failure to make substantial investments in generation capacity and infrastructure could adversely affect the international competitiveness of key northern industrial regions. To combat impending capacity shortages, President Zedillo has pledged to have 30 major power generation projects underway soon to add 11.5 GWe. Privatisation of the electricity sector, one means of promoting investment in the sector, is a contentious issue in Mexico, and legislation to change the constitution to allow private investment in the sector will most likely be voted on before the end of 2000. Reforms instituted in 1992 allow independent power producers and cogenerators to build and own power generation facilities. The power can be used at related industrial companies or sold under long term contracts to the public utilities.

Japan's electricity prices are currently the highest in the OECD, and Japan has begun a programme of reforms designed to make its electric utility sector more efficient. Currently, Japan is served by 10 vertically integrated utilities which each serve a specific geographic zone. The Japanese Diet passed a bill in May 1999 which amended the Electric Utilities Industry Law (EUIL) to allow a partial opening to competition. Beginning in March 2000, large Japanese electric power consumers - comprising roughly one-third of the Japanese power market - have been able to choose their electricity suppliers. Regional utilities are currently obligated to allow power from other suppliers to transit their grids to these large consumers. While a small percentage of Japan's electricity has been provided by independent power producers since 1995, the new deregulation is expected to generate much more investor interest in developing independent power producers.

NAFTA refinery capacity is well adapted to the regional markets, unlike that in Japan...

The refinery capacity increased slowly in the whole region since 1985. The United States has experienced a steep decline in refining capacity since 1981. Between 1981 and 1989, the number of US refineries fell from 324 to 204, representing a loss of 3 million bbl/d in operable capacity, and leading to a concomitant increase in refining capacity utilisation from 69% to 86%. Much of this decline resulted from the 1981 deregulation (elimination of price controls and allocations), which effectively removed the major prop from underneath many marginally profitable, often smaller,

refineries. Between 1989 and 1992, refining capacity remained roughly stable. Since 1992, over 30 additional, mainly small US refineries have shut down, for a wide variety of reasons including environmental regulations to a minor extent. This, combined with higher refinery runs, raised average weekly capacity utilisation to 96% in 1998, before falling off to an average of 92.7% in 1999. Although financial, environmental and legal considerations make it unlikely that new refineries will be built in the United States, expansion at existing refineries is likely to increase total US refining capacity in the long run. The EIA reports that nameplate refining capacity has increased by about 700,000 bbl/d between 1997 and 1999. At end 1999, Japan had 5.0 million bbl/d of oil refining capacity in 35 refineries. In recent years, as Japan's petroleum product consumption has been in gradual decline, the country's refining industry has suffered from overcapacity. Japan also began to allow imports of petroleum products in the mid-1990s, putting additional pressure on Japanese refiners to cut costs and become internationally competitive. In response to these problems, Japan's refining industry has been undergoing a period of cost-cutting and industry consolidation. While many regulatory restrictions on Japanese refiners have been removed over the last few years, the refiners remained saddled with a requirement to maintain mandatory large petroleum stocks. This requirement permits Japan to maintain a strategic reserve without having to build a government-run storage facility like the US Strategic Petroleum Reserve, but it also imposes significant additional capital costs on refiners operating in Japan.

COMPETITIVENESS

Energy intensity improved at about -1.1% per year on average over the last five years..

The energy intensity of the region as a whole improved significantly (-1.9% per year on average) during the 1980s, remained stable between 1990 and 1994 due to the economic slowdown, and improved again after this. This gain averaged -1.1% per year over the last five years. Since 1990, however, this is the result of very contrasting regional trends. Since 1993, energy intensity improved in the NAFTA region by 1.8% per year on average under the lead of the United States (-1.9%) and Canada (-1.5%); and even Mexico contributed (-1.1%) although it was still a country undergoing rapid development. The recent high economic growth favoured replacement of obsolete equipment, investment in new technologies, improvement of production processes, construction of new houses... that all enabled more efficient use of energy. Even the climate of low energy prices in 1999 did not reduce intensity gains: -2.8% in Mexico, -2.6% in Canada but only -0.6% in the United States. The EFTA region, already characterised by a low





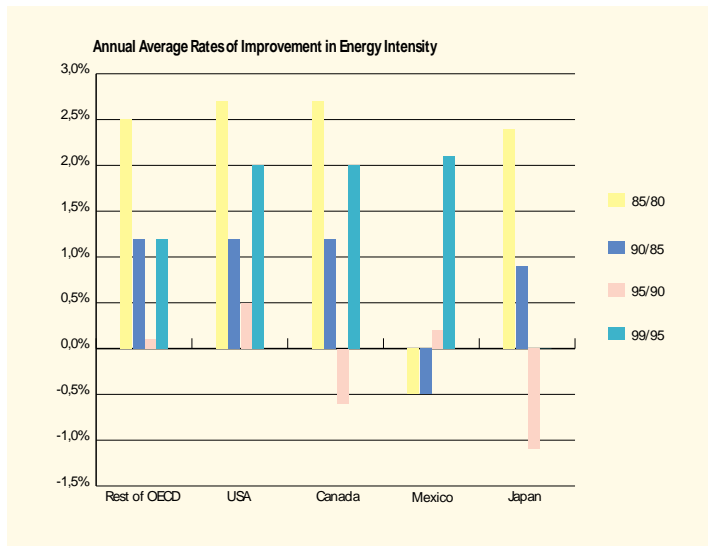
level of energy intensity, well below half of the NAFTA level, still improved its performance by 0.3% per year on average between 1990 and 1997 but energy intensity rebounded by 1.1% in 1998 and 1.8% in 1999. On the other hand, energy intensity increased in the OECD Pacific region by 0.8% per year on average since 1991 under Japan's leadership. The depressed economic climate since the early 1990s led to lower utilisation rates of industrial capacities and limited new gross fixed capital formation. This induced increasing specific energy consumption per unit of production and less investment in the rational use of energy. Consequently energy intensity has increased by 7% in Japan since 1991, while it remained stable in New Zealand and declined by 9% in Australia. Despite the more difficult economic situation and surging industrial production, energy intensity in Turkey remained stable between 1990 and 1998 but the slow down of the economy in 1999 induced an increase by 3.3%.

Compared to other OECD countries, the United States and Canada have high energy intensity, 70-85% higher than the EU average. This is due to many factors. Amongst the most important are low energy prices, high incomes per capita, increased demand for transportation due to large distances between centres of population, and extreme climatic conditions in both winter and summer. In contrast, Japan has a low energy intensity, some 20% lower than that of the EU partly due to the higher contribution of energy-efficient industry in final energy consumption, the smaller size of dwellings, the country's limited energy resources and traditionally high energy prices.

All final energy demand sectors, driven by industry, contributed to the reduction of energy intensity...

By sector, the energy intensity of industry has been continuously improving since 1980, falling about 48% for the region as a whole. The best performance occurred in the United States where the intensity that continued to improve at a sustained rate during the 1990s has fallen by 58% since 1980. The improvement of the Japanese industrial energy intensity, limited to 33% since 1980, reflected the stability observed since 1992. In Canada, the gain

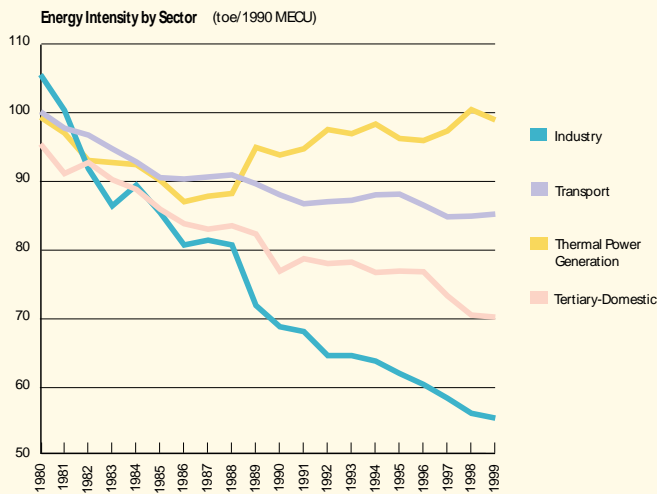
was limited to 32% due to the stabilisation of energy intensity between 1990 and 1996 but it improved again by respectively 3.1% in 1997, 4.0% in 1998 and 2.7% in 1999. It is only in Turkey, characterised by rapid industrialisation, that energy intensity in industry has increased a little since 1980. The tertiary-domestic sector also improved its energy intensity by about 20% during the 1980s despite the improvement in living standards and the development of new appliances such as air conditioning in the NAFTA countries. Between 1990 and 1996, it has fluctuated around the 1990 level, with improvements in Turkey (-5%) and in the United States (-2%) being compensated by poorer performance in Canada (+3%) and Japan (+8%). But, in 1997 and 1998, characterised by favourable climatic conditions, it improved respectively by 4.6% and 3.8% as a whole with contrasted evolution by regions: -12% in the NAFTA region, -8.3% in Turkey, -4.6% in the EFTA region but a stabilisation in the OECD Pacific region. In 1999 improvements were more limited: 2.2% in the EFTA region and 1.0% in the NAFTA region. But intensity increased by 6.2% in Turkey. Even the transport sector improved its energy intensity by about 12% during the 1980s and by 3.2% since 1990, driven by Canada (-25% since 1980) and the US (-18%), while energy intensity was stable in Japan and increased in the EFTA region (+10%



ENERGY INTENSITY BY REGION

toe/1990 MEUR	1980	1985	1990	1995	1998	1999	85/80	90/85	95/90	98/95	99/98
							Annual % Change				
EFTA	35.4	36.2	39.3	38.1	38.4	39.0	0.5%	1.6%	-0.6%	0.2%	1.7%
NAFTA	129.2	117.5	115.1	113.1	106.1	105.6	-1.9%	-0.4%	-0.4%	-2.1%	-0.5%
OECD Pacific	42.6	38.3	38.7	41.3	42.3	42.6	-2.1%	0.2%	1.3%	0.8%	0.6%
Turkey	78.9	73.7	80.9	88.0	69.4	76.2	-1.4%	1.9%	1.7%	-7.6%	9.8%
Total	99.3	89.7	87.2	87.3	84.1	84.4	-2.0%	-0.6%	0.0%	-1.2%	0.3%





since 1980). In contrast, the energy intensity of power generation, driven by the increasing contribution of electricity to final energy demand, has grown by about 10% since 1985.

Energy consumption per capita peaked in the United States, at twice the Japanese level...

The gross inland consumption per capita increased slowly by 0.8% since 1985 to reach an average value of 5.5 toe/inhabitant in 1999. But this average masks large variations between regions and countries depending mainly upon living standards and, to a lesser extent, the industrialisation level. Absolute values varied from 1.1 toe/inhabitant in Turkey, to 4.3 in the OECD Pacific, 4.8 in EFTA, and 6.6 toe/inhabitant in NAFTA, with a peak of 8.3 toe/inhabitant in the United States, the highest per capita consumption in the world. The energy consumption per inhabitant was twice as high in the United States as in Japan, the first and the second industrialised countries in the world respectively. Although per capita consumption remained stable in NAFTA since 1980, it increased in all the other regions since 1980: by 63% in Turkey, 34% in the OECD Pacific region and 24% in EFTA.

The United States had, by far, the lowest energy prices in OECD, helped by low tax levels...

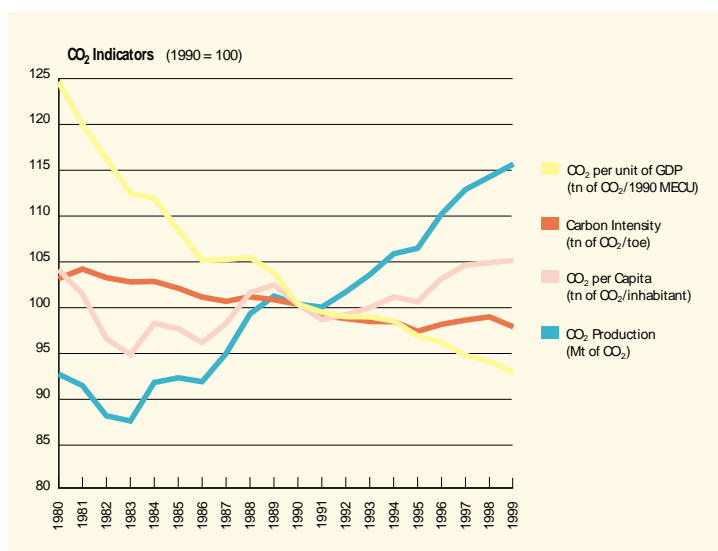
If energy efficiency is a major factor influencing competitiveness, energy prices are even more important, to the exclusion of any consideration of labour costs, fiscal systems and regulation. Comparing energy prices within the main competitors inside the OECD - the United States, Japan and the European Union - it is clear that US prices are the lowest, followed by the European and the Japanese. In 1999 prices of industrial heavy fuel oil ranged from 67 EUR90/toe in the United States, to 101 EUR90/toe in Japan and 122 EUR90/toe for the European average. For natural

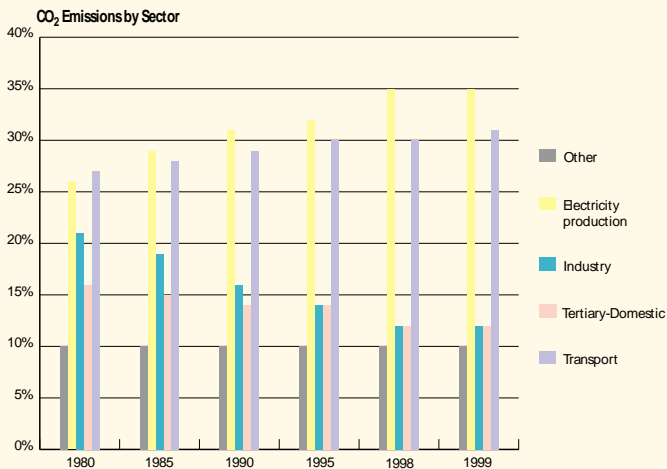
gas deliveries to industry the respective prices were 71 EUR90/toe in the US, 98 EUR90/toe in the European Union and 220 EUR90/toe in Japan. Finally, for electricity the prices were 24 EUR90/MWh in the United States, 41 EUR90/MWh in European Union and 81 EUR90/MWh in Japan.

ENVIRONMENT

CO₂ emissions increased by 15% since 1990...

CO₂ emissions have increased continuously since 1985 (+25%), driven by the OECD Pacific (+38%) and the NAFTA region (+20%). Since 1990 CO₂ emissions for the region as a whole have grown by 15%. This is despite a continuous slow decline until 1995 of the carbon intensity of the fuel mix due to the increasing contribution of non-fossil fuels and switching from solids fuels and oil products to natural gas. Over the last three years this indicator has been negatively influenced by the reduced contribution of non-fossil fuels, mainly compensated by coal in the United States, and the increased competitiveness of oil products due to depressed prices on the international market. It must be stressed that CO₂ emissions per unit of GDP, generally slowing down in other parts of the world, were only declining by 0.9% per year in this region since 1990 thanks to major gains registered in 1995 (-1.7%), 1997 (-1.5%) and 1999 (-1.3%). They were declining in the NAFTA region (-1.4% per year) but increasing slowly in both the EFTA and OECD Pacific regions. The level of CO₂ emissions per capita reflects living standards and the industrialisation levels as well as the efforts to reduce energy intensity. The range was very large inside the region with 2.8 tn of CO₂/capita in Turkey, 3.7 tn in Mexico, 9.1 tn in Japan, 16.6 tn in Canada and 20.7 tn in the United States.





Transport and power generation were responsible for two thirds of CO₂ emissions..

Since 1990 the main contributor to CO₂ emissions has been power generation. Its share of total emissions grew from 27% in 1980 to 35% in 1999. In the last four years, the large increase of solid fuel consumption by US electricity producers, and to a less extent of oil products, induced a jump of about 18% in power generation CO₂ emissions. The second contributor by far was the transport sector with a share of about 31% in 1999 against 27% in 1980. These emissions increased by 2.1% per year on average since 1990 but by 2.9% in 1999. Since 1992 CO₂ emissions from transport have overtaken those of the tertiary-domestic sector and industry combined. Emissions from the tertiary and domestic sectors (12% of total emissions in 1999 against 16% in 1980) remained almost constant since 1980, fluctuating in accordance with climatic conditions. Finally, CO₂ emissions from industry, still declining substantially in 1998 (-3.8%), have fallen by about 29% since 1980, their share in total CO₂ emissions being reduced from 20% in 1980 to only 12% in 1997.

GLOBAL MARKETS

The region remained a net importer of hydrocarbons but a net exporter of solid fuels..

The region is a net importer of energy. Although its import dependency index dropped to 11% in 1985, it has increased since then to reach 16% in 1990, and has subsequently fluctuated between 14% and 16%. The region imported mainly crude oil and oil products, covering almost all of its total fuel imports. Although the NAFTA region diversified its suppliers in 1999 between Latin America (136 Mtoe), the Middle East (124 Mtoe), Africa (79 Mtoe)

and the North Sea (62 Mtoe), the OECD Pacific region relied almost entirely on the Middle East (216 Mtoe). For its part the EFTA region remained a net exporter of both crude oil (130 Mtoe) and natural gas (37 Mtoe) while Japan remained by far the largest importer of LNG, absorbing 55% of world LNG trade. Since the mid-1980s, Australia has been the world's largest coal exporter. Exports have doubled during this period, from 55 Mtoe in 1985 to 110 Mtoe in 1999. Over 70% of Australia's total coal production is exported, with around 70% bound for Japan and the rest to other Asian markets. The United States is the third largest coal exporter in the world, behind Australia and South Africa. US coal exports have fallen precipitously since 1995 due mainly to lower world coal prices and increased competition from other coal-producing nations (i.e., Australia, South Africa, Indonesia, Venezuela and Colombia), plus greater natural gas use -- especially in Europe. Both steam coal and metallurgical coal exports declined sharply in 1999, by 15% and 32%, respectively. Export markets for metallurgical coal have been declining over the past few years because of the deployment of new steel-making technologies requiring less high-grade coking coal. Consequently many US metallurgical coal operations have closed, and increased amounts of metallurgical coal have been sold into the domestic utility steam coal market. Due to strong competition from other coal-exporting countries and limited or negative growth in import demand in Europe and the Americas, the US share of the world coal trade is expected to decline in the near future.

The situation differs between regions and countries. Inside NAFTA, the United States was the only net importer of oil (522 Mtoe in 1999), the two other members being net exporters (Mexico with 74 Mtoe and Canada with 36 Mtoe). The United States remained the largest world importer of oil, absorbing 26% of interregional exchanges, just ahead of Western Europe. NAFTA countries are self-sufficient in natural gas even though significant trade took place between Canada and the United States. The import dependency of NAFTA remained limited to about 14% but increased regularly since 1990. Conversely, the OECD Pacific region depended for 48% on energy imports in 1999 (70% in 1980), declining regularly since 1990 due to rising exports from Australia and the increasing contribution of non-fossil fuels, mainly nuclear, in Japan. But Japan's import dependency reached 80% in 1999 against 88% in 1980, as it is totally dependent on imports for all fossil fuels consumed in the country. At the same time, Australia, one of the world's largest solid fuel producers, exported about 51% of its total primary energy production. Finally the EFTA region, led by Norway, became a larger net exporter of energy. In 1999, about 85% of both crude oil and natural gas produced in the region was exported, mainly to the European Union.





OTHER OECD COUNTRIES: SUMMARY ENERGY BALANCE

Mtoe	1980	1985	1990	1997	1998	1999	85/80	90/85	97/90	98/97	99/98
							Annual % Change				
Primary Production	2129.8	2312.5	2520.7	2848.1	2882.4	2858.5	1.7%	1.7%	1.8%	1.2%	-0.8%
Solids	541.2	605.6	705.0	767.7	786.2	774.4	2.3%	3.1%	1.2%	2.4%	-1.5%
Oil	746.6	828.5	800.4	885.9	878.1	841.5	2.1%	-0.7%	1.5%	-0.9%	-4.2%
Natural gas	572.7	519.7	577.6	681.8	690.7	691.8	-1.9%	2.1%	2.4%	1.3%	0.2%
Nuclear	105.0	169.8	238.4	287.7	300.5	313.7	10.1%	7.0%	2.7%	4.4%	4.4%
Hydro & Wind	68.6	75.8	77.6	88.9	85.7	87.1	2.0%	0.5%	2.0%	-3.6%	1.7%
Geothermal	7.8	13.0	23.1	24.7	25.5	27.7	10.9%	12.1%	1.0%	3.3%	8.4%
Other	87.8	100.2	98.4	111.4	115.6	122.3	2.7%	-0.4%	1.8%	3.8%	5.8%
Net Imports	544.7	303.8	468.4	504.2	512.2	558.3	-11.0%	9.0%	1.1%	1.6%	9.0%
Solids	-35.2	-54.7	-70.2	-63.2	-66.6	-59.2	9.2%	5.1%	-1.5%	5.3%	-11.2%
Oil	581.1	348.1	517.7	547.0	558.1	591.6	-9.7%	8.3%	0.8%	2.0%	6.0%
Crude oil	501.2	272.0	428.6	483.0	489.3	509.4	-11.5%	9.5%	1.7%	1.3%	4.1%
Oil products	79.9	76.1	89.1	63.9	68.8	82.2	-1.0%	3.2%	-4.6%	7.6%	19.5%
Natural gas	-0.6	11.0	22.5	20.5	20.5	26.8	-	15.4%	-1.3%	-0.2%	30.5%
Electricity	-0.6	-0.6	-1.6	-0.1	0.1	-0.8	-1.8%	22.9%	-34.7%	-	-
Gross Inland Consumption	2606.5	2621.9	2900.5	3321.2	3350.1	3429.1	0.1%	2.0%	2.0%	0.9%	2.4%
Solids	496.2	571.3	612.4	719.1	727.0	731.1	2.9%	1.4%	2.3%	1.1%	0.6%
Oil	1268.8	1155.2	1266.5	1388.0	1399.0	1421.9	-1.9%	1.9%	1.3%	0.8%	1.6%
Natural gas	572.9	537.2	585.6	701.5	696.6	726.2	-1.3%	1.7%	2.6%	-0.7%	4.2%
Other (1)	268.6	358.3	436.0	512.6	527.5	550.0	5.9%	4.0%	2.3%	2.9%	4.3%
Electricity Generation in TWh	3724.8	4184.7	5061.8	5946.2	6109.7	6291.4	2.4%	3.9%	2.3%	2.8%	3.0%
Nuclear	401.2	649.4	913.4	1103.9	1153.1	1203.8	10.1%	7.1%	2.7%	4.5%	4.4%
Hydro & wind	797.8	880.3	901.4	1031.2	983.3	1000.9	2.0%	0.5%	1.9%	-4.6%	1.8%
Thermal	2525.9	2655.0	3247.0	3811.0	3973.3	4086.7	1.0%	4.1%	2.3%	4.3%	2.9%
Generation Capacity in GWe	916.1	1082.4	1163.0	1297.7	1303.0	1306.4	3.4%	1.4%	1.6%	0.4%	0.3%
Nuclear	80.0	120.3	148.5	165.0	163.5	158.2	8.5%	4.3%	1.5%	-0.9%	-3.3%
Hydro & wind	204.1	233.0	255.4	282.2	283.5	283.7	2.7%	1.9%	1.4%	0.4%	0.1%
Thermal	632.0	729.1	759.2	850.5	856.1	864.6	2.9%	0.8%	1.6%	0.7%	1.0%
Average Load Factor in %	46.4	44.1	49.7	52.3	53.5	55.0	-1.0%	2.4%	0.7%	2.3%	2.7%
Fuel Inputs for Thermal Power Generation	593.6	620.9	766.5	944.0	993.1	1004.7	0.9%	4.3%	3.0%	5.2%	1.2%
Solids	339.8	422.6	468.9	592.4	611.9	617.9	4.5%	2.1%	3.4%	3.3%	1.0%
Oil	136.6	78.6	97.4	89.5	99.6	95.7	-10.5%	4.4%	-1.2%	11.2%	-3.9%
Gas	107.7	103.9	133.8	188.9	205.4	210.5	-0.7%	5.2%	5.0%	8.8%	2.5%
Geothermal	7.3	12.4	22.0	23.3	24.0	26.1	11.3%	12.2%	0.8%	3.3%	8.8%
Other	2.2	3.4	44.3	50.0	52.2	54.4	9.3%	67.2%	1.7%	4.4%	4.3%
Average Thermal Efficiency in %	36.6	36.8	36.4	34.7	34.4	35.0	0.1%	-0.2%	-0.7%	-0.9%	1.7%
Non-Energy Uses	147.8	141.0	172.6	219.9	212.6	224.4	-0.9%	4.1%	3.5%	-3.3%	5.5%
Total Final Energy Demand	1778.3	1768.0	1854.1	2045.8	2038.1	2081.8	-0.1%	1.0%	1.4%	-0.4%	2.1%
Solids	122.9	122.9	123.4	101.1	96.3	93.9	0.0%	0.1%	-2.8%	-4.7%	-2.5%
Oil	900.6	869.8	925.4	1002.8	1012.1	1031.6	-0.7%	1.2%	1.2%	0.9%	1.9%
Gas	398.1	367.7	380.5	429.8	402.7	415.3	-1.6%	0.7%	1.8%	-6.3%	3.1%
Electricity	269.2	307.5	366.2	439.1	451.3	460.4	2.7%	3.6%	2.6%	2.8%	2.0%
Heat	1.8	3.2	3.8	10.5	10.3	10.6	12.3%	3.7%	15.5%	-1.6%	3.1%
Other	85.7	96.9	54.7	62.4	65.3	69.9	2.5%	-10.8%	1.9%	4.6%	7.1%
CO₂ Emissions in Mt of CO₂	6654.2	6624.8	7203.7	8105.0	8204.4	8305.4	-0.1%	1.7%	1.7%	1.2%	1.2%
Indicators											
Population (Million)	508.12	539.35	570.83	616.03	621.94	628.08	1.2%	1.1%	1.1%	1.0%	1.0%
GDP (index 1985=100)	87.4	100.0	117.6	140.1	142.8	146.4	2.7%	3.3%	2.5%	1.9%	2.5%
Gross Inl Cons./GDP (toe/1990 MEUR)	437.7	384.7	362.0	347.8	344.2	343.6	-2.5%	-1.2%	-0.6%	-1.0%	-0.2%
Gross Inl Cons./Capita (toe/inhabitant)	5.13	4.86	5.08	5.39	5.39	5.46	-1.1%	0.9%	0.8%	-0.1%	1.4%
Electricity Generated/Capita (kWh/inhabitant)	7331	7759	8868	9652	9824	10017	1.1%	2.7%	1.2%	1.8%	2.0%
CO ₂ Emissions/Capita (t of CO ₂ /inhabitant)	13.1	12.3	12.6	13.2	13.2	13.2	-1.3%	0.5%	0.6%	0.3%	0.2%
Import Dependency %	20.6	11.5	15.9	15.0	15.1	16.1	-11.0%	6.8%	-0.8%	0.7%	6.4%

(1) Includes nuclear, hydro and wind, net imports of electricity, and other energy sources.





OTHER OECD COUNTRIES : MAIN INDICATORS											
	1980	1985	1990	1995	1998	1999	85/80	90/85	95/90	98/95	99/98
	Annual % Change										
Gross Inland Consumption (Mtoe)	2606.5	2621.9	2900.5	3171.2	3350.1	3429.1	0.1%	2.0%	1.8%	1.8%	2.4%
Public Thermal Power Generation	568.6	594.5	660.2	696.2	780.9	768.2	0.9%	2.1%	1.1%	3.9%	-1.6%
Autoprod. Thermal Power Generation	17.7	14.0	84.5	143.5	188.6	210.8	-4.6%	43.3%	11.2%	9.5%	11.8%
Energy Branch	154.8	159.3	187.4	195.9	210.1	207.1	0.6%	3.3%	0.9%	2.4%	-1.5%
Final Energy Consumption	1778.3	1768.0	1853.4	1977.6	2036.1	2080.1	-0.1%	0.9%	1.3%	1.0%	2.2%
Industry	623.5	576.6	545.1	539.0	539.4	545.8	-1.6%	-1.1%	-0.2%	0.0%	1.2%
Transport	591.4	611.1	698.5	768.4	818.1	841.8	0.7%	2.7%	1.9%	2.1%	2.9%
Tertiary-Domestic	563.4	580.3	609.8	670.2	678.5	692.5	0.6%	1.0%	1.9%	0.4%	2.1%
Energy Intensity (toe/1990 MEUR)	437.7	384.7	362.0	360.1	344.2	343.6	-2.5%	-1.2%	-0.1%	-1.5%	-0.2%
Public Thermal Power Generation	95.5	87.2	82.4	79.1	80.2	77.0	-1.8%	-1.1%	-0.8%	0.5%	-4.1%
Autoprod. Thermal Power Generation	3.0	2.0	10.5	16.3	19.4	21.1	-7.2%	38.8%	9.1%	5.9%	9.0%
Industry	104.7	84.6	68.0	61.2	55.4	54.7	-4.2%	-4.3%	-2.1%	-3.3%	-1.3%
Transport	99.3	89.7	87.2	87.3	84.1	84.4	-2.0%	-0.6%	0.0%	-1.2%	0.3%
Tertiary-Domestic	94.6	85.1	76.1	76.1	69.7	69.4	-2.1%	-2.2%	0.0%	-2.9%	-0.5%
Energy per Capita (Kgoe/inhabitant)	5130	4861	5081	5251	5387	5460	-1.1%	0.9%	0.7%	0.9%	1.4%
Industry	1227	1069	955	892	867	869	-2.7%	-2.2%	-1.3%	-0.9%	0.2%
Transport	1164	1133	1224	1272	1315	1340	-0.5%	1.6%	0.8%	1.1%	1.9%
Tertiary-Domestic	1109	1076	1068	1110	1091	1102	-0.6%	-0.1%	0.8%	-0.6%	1.1%
Electricity Share (%)											
Final Energy Consumption	15.1%	17.4%	19.8%	21.2%	22.2%	22.1%	2.8%	2.6%	1.4%	1.5%	-0.1%
Industry	18.6%	21.1%	25.7%	29.9%	31.3%	31.6%	2.6%	4.0%	3.0%	1.6%	1.0%
Transport	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	1.7%	1.1%	-0.2%	0.2%	-2.4%
Tertiary-Domestic	26.9%	31.6%	36.6%	38.1%	41.1%	41.1%	3.3%	3.0%	0.8%	2.6%	-0.1%
Total Renewable Consumption (Mtoe)	164.2	189.0	199.2	220.5	226.8	237.0	2.9%	1.1%	2.1%	0.9%	4.5%
Hydro	68.6	75.7	77.3	86.0	84.2	85.6	2.0%	0.4%	2.2%	-0.7%	1.6%
Biomass	87.8	100.2	98.4	109.9	115.6	122.2	2.7%	-0.4%	2.2%	1.7%	5.7%
Other	7.8	13.1	23.5	24.6	27.0	29.2	11.0%	12.4%	0.9%	3.2%	8.3%
Renewable intensity (toe/1990MEUR)	27.6	27.7	24.9	25.0	23.3	23.8	0.1%	-2.2%	0.1%	-2.4%	1.9%
Renewable per capita (Kgoe/inhabitant)	323.2	350.4	348.9	365.1	364.7	377.4	1.6%	-0.1%	0.9%	0.0%	3.5%
CO₂ Emissions (Mt of CO₂)	6654.2	6624.8	7203.7	7642.9	8204.4	8305.4	-0.1%	1.7%	1.2%	2.4%	1.2%
Public Thermal Power Generation	1708.2	1870.1	2092.6	2183.6	2474.3	2423.9	1.8%	2.3%	0.9%	4.3%	-2.0%
Autoprod. Thermal Power Generation	51.1	37.7	117.3	295.5	419.1	490.3	-5.9%	25.5%	20.3%	12.4%	17.0%
Energy Branch	378.2	381.7	440.4	444.6	476.9	471.8	0.2%	2.9%	0.2%	2.4%	-1.1%
Industry	1409.7	1229.9	1177.7	1037.3	1012.0	1007.1	-2.7%	-0.9%	-2.5%	-0.8%	-0.5%
Transport	1799.4	1860.4	2124.6	2330.5	2483.7	2555.1	0.7%	2.7%	1.9%	2.1%	2.9%
Tertiary-Domestic	1038.6	986.6	979.1	1036.8	1001.3	1016.5	-1.0%	-0.2%	1.2%	-1.2%	1.5%
Carbon Intensity (tn of CO₂/toe)	2.6	2.5	2.5	2.4	2.4	2.4	-0.2%	-0.3%	-0.6%	0.5%	-1.1%
Public Power Generation	2.3	2.2	2.1	2.0	2.1	2.1	-0.8%	-0.8%	-1.1%	1.5%	-1.7%
Public Thermal Power Generation	3.0	3.1	3.2	3.1	3.2	3.2	0.9%	0.2%	-0.2%	0.3%	-0.4%
Autoprod. Power Generation	2.3	2.0	1.2	1.9	2.1	2.1	-2.6%	-9.4%	8.8%	3.5%	1.7%
Autoprod. Thermal Power Generation	2.9	2.7	1.4	2.1	2.2	2.3	-1.3%	-12.5%	8.2%	2.6%	4.6%
Energy Branch	0.0	2.5	2.1	3.0	2.9	2.9	-	-3.9%	7.8%	-1.0%	0.8%
Industry	2.4	2.4	2.4	2.3	2.3	2.3	-0.4%	-0.4%	-0.7%	0.0%	0.4%
Transport	2.3	2.1	2.2	1.9	1.9	1.8	-1.2%	0.3%	-2.3%	-0.8%	-1.6%
Tertiary-Domestic	3.0	3.0	3.0	3.0	3.0	3.0	0.0%	0.0%	-0.1%	0.0%	0.0%
CO₂ per Capita (kg of CO₂/inhabitant)	13096	12283	12620	12655	13192	13223	-1.3%	0.5%	0.1%	1.4%	0.2%
Industry	2774	2280	2063	1718	1627	1603	-3.8%	-2.0%	-3.6%	-1.8%	-1.5%
Transport	3541	3449	3722	3859	3993	4068	-0.5%	1.5%	0.7%	1.1%	1.9%
Tertiary-Domestic	2044	1829	1715	1717	1610	1618	-2.2%	-1.3%	0.0%	-2.1%	0.5%
CO₂ per unit of GDP (tn of CO₂/1990 MEUR)	1117	972	899	868	843	832	-2.7%	-1.5%	-0.7%	-1.0%	-1.3%
Public Thermal Power Generation	287	274	261	248	254	243	-0.9%	-1.0%	-1.0%	0.8%	-4.5%
Autoprod. Thermal Power Generation	9	6	15	34	43	49	-8.4%	21.5%	18.0%	8.7%	14.1%
Energy Branch	0	0	0	1	1	1	-	2.4%	67.4%	-11.9%	11.3%
Industry	64	56	55	50	49	47	-2.5%	-0.4%	-1.7%	-1.0%	-3.5%
Transport	237	180	147	118	104	101	-5.3%	-4.0%	-4.3%	-4.1%	-2.9%
Tertiary-Domestic	302	273	265	265	255	256	-2.0%	-0.6%	0.0%	-1.2%	0.3%





NAFTA : SUMMARY ENERGY BALANCE

Mtoe	1980	1985	1990	1997	1998	1999	85/80	90/85	97/90	98/97	99/98
	Annual % Change										
Primary Production	1910.0	2005.5	2118.4	2271.8	2297.2	2276.2	1.0%	1.1%	1.0%	1.1%	-0.9%
Solids	470.2	502.5	580.2	609.2	618.8	603.2	1.3%	2.9%	0.7%	1.6%	-2.5%
Oil	697.2	757.1	680.8	689.4	686.5	657.0	1.7%	-2.1%	0.2%	-0.4%	-4.3%
Natural gas	539.7	480.0	530.5	608.3	616.2	613.2	-2.3%	2.0%	2.0%	1.3%	-0.5%
Nuclear	79.8	122.3	179.5	197.9	207.2	224.5	8.9%	8.0%	1.4%	4.7%	8.4%
Hydro & Wind	47.0	52.8	51.3	61.2	56.3	57.9	2.3%	-0.6%	2.6%	-8.1%	2.9%
Geothermal	5.4	9.9	18.2	17.5	18.1	19.8	13.0%	12.9%	-0.5%	3.2%	9.4%
Other	70.7	80.9	77.9	88.3	94.2	100.7	2.8%	-0.8%	1.8%	6.8%	6.8%
Net Imports	246.0	68.9	214.3	305.3	334.8	372.4	-22.5%	25.5%	5.2%	9.6%	11.3%
Solids	-56.0	-64.9	-76.5	-60.4	-52.7	-41.2	3.0%	3.3%	-3.3%	-12.8%	-21.8%
Oil	301.1	134.8	289.8	365.3	389.4	411.4	-14.8%	16.5%	3.4%	6.6%	5.6%
Crude oil	265.3	108.3	267.8	352.6	365.2	384.7	-16.4%	19.8%	4.0%	3.6%	5.3%
Oil products	35.9	26.5	21.9	12.7	24.2	26.6	-5.9%	-3.7%	-7.5%	90.4%	10.2%
Natural gas	0.9	-1.0	1.0	0.5	-2.1	2.2	-	-	-10.7%	-	-
Electricity	0.0	0.0	0.0	0.0	0.1	0.1	41.3%	-11.8%	-	-	-28.0%
Gross Inland Consumption	2103.6	2086.5	2258.9	2557.7	2591.0	2660.8	-0.2%	1.6%	1.8%	1.3%	2.7%
Solids	399.9	454.5	484.1	563.6	573.4	573.8	2.6%	1.3%	2.2%	1.7%	0.1%
Oil	959.3	880.5	930.7	1021.3	1042.2	1060.9	-1.7%	1.1%	1.3%	2.1%	1.8%
Natural gas	541.5	485.5	517.2	608.0	599.6	623.2	-2.2%	1.3%	2.3%	-1.4%	4.0%
Other (1)	202.9	266.0	326.9	364.8	375.8	402.8	5.6%	4.2%	1.6%	3.0%	7.2%
Electricity Generation in TWh	2867.6	3173.8	3786.2	4417.8	4544.9	4679.4	2.1%	3.6%	2.2%	2.9%	3.0%
Nuclear	304.2	467.2	687.5	759.3	794.9	861.4	9.0%	8.0%	1.4%	4.7%	8.4%
Hydro & wind	546.8	613.9	596.4	711.5	653.8	672.5	2.3%	-0.6%	2.6%	-8.1%	2.9%
Thermal	2016.5	2092.7	2502.3	2946.9	3096.3	3145.6	0.7%	3.6%	2.4%	5.1%	1.6%
Generation Capacity in GWe	700.9	822.5	865.1	942.1	939.7	934.5	3.3%	1.0%	1.2%	-0.2%	-0.6%
Nuclear	62.4	92.7	113.9	119.3	115.2	109.8	8.3%	4.2%	0.7%	-3.4%	-4.7%
Hydro & wind	130.4	147.5	159.6	175.5	175.9	175.4	2.5%	1.6%	1.4%	0.2%	-0.3%
Thermal	508.2	582.3	591.7	647.3	648.7	649.3	2.8%	0.3%	1.3%	0.2%	0.1%
Average Load Factor in %	46.7	44.0	50.0	53.5	55.2	57.2	-1.2%	2.6%	1.0%	3.1%	3.5%
Fuel Inputs for Thermal Power Generation	476.5	498.3	609.1	759.9	805.2	807.3	0.9%	4.1%	3.2%	6.0%	0.3%
Solids	307.1	374.1	408.9	509.0	522.2	524.1	4.0%	1.8%	3.2%	2.6%	0.4%
Oil	73.5	39.3	46.9	49.4	63.4	59.6	-11.8%	3.6%	0.7%	28.3%	-6.0%
Gas	90.2	74.3	95.1	139.9	154.6	154.7	-3.8%	5.0%	5.7%	10.5%	0.1%
Geothermal	5.4	9.9	18.2	17.5	18.1	19.8	13.0%	12.9%	-0.5%	3.2%	9.4%
Other	0.3	0.7	40.0	44.1	47.0	49.1	15.5%	124.7%	1.4%	6.5%	4.5%
Average Thermal Efficiency in %	36.4	36.1	35.3	33.3	33.1	33.5	-0.2%	-0.4%	-0.8%	-0.8%	1.3%
Non-Energy Uses	112.6	105.3	125.8	162.1	156.5	167.2	-1.3%	3.6%	3.7%	-3.4%	6.8%
Total Final Energy Demand	1445.1	1413.8	1440.0	1568.0	1560.7	1598.4	-0.4%	0.4%	1.2%	-0.5%	2.4%
Solids	74.8	71.5	68.1	44.7	42.1	41.0	-0.9%	-1.0%	-5.8%	-5.9%	-2.5%
Oil	711.5	680.7	705.6	753.3	764.6	780.6	-0.9%	0.7%	0.9%	1.5%	2.1%
Gas	382.2	347.2	354.5	392.7	364.4	376.0	-1.9%	0.4%	1.5%	-7.2%	3.2%
Electricity	205.2	232.0	271.1	324.3	333.8	340.1	2.5%	3.2%	2.6%	2.9%	1.9%
Heat	1.0	2.2	2.3	8.2	8.0	8.2	16.3%	1.0%	19.9%	-3.0%	2.6%
Other	70.3	80.2	38.4	44.8	48.0	52.5	2.7%	-13.7%	2.3%	7.0%	9.5%
CO₂ Emissions in Mt of CO₂	5414.6	5336.1	5681.6	6357.6	6454.3	6520.2	-0.3%	1.3%	1.6%	1.5%	1.0%
Indicators											
Population (Million)	318.34	338.31	359.43	392.06	396.33	400.92	1.2%	1.2%	1.2%	1.1%	1.2%
GDP (index 1985=100)	88.6	100.0	114.4	138.7	144.0	149.3	2.5%	2.7%	2.8%	3.8%	3.6%
Gross Inl Cons./GDP (toe/1990 MEUR)	541.1	475.5	450.0	420.3	410.0	406.2	-2.6%	-1.1%	-1.0%	-2.5%	-0.9%
Gross Inl Cons./Capita (toe/inhabitant)	6.61	6.17	6.28	6.52	6.54	6.64	-1.4%	0.4%	0.5%	0.2%	1.5%
Electricity Generated/Capita (kWh/inhabitant)	9008	9382	10534	11268	11468	11672	0.8%	2.3%	1.0%	1.8%	1.8%
CO ₂ Emissions/Capita (t of CO ₂ /inhabitant)	17.0	15.8	15.8	16.2	16.3	16.3	-1.5%	0.0%	0.4%	0.4%	-0.1%
Import Dependency %	11.5	3.3	9.4	11.8	12.8	13.9	-22.3%	23.4%	3.4%	8.3%	8.2%

(1) Includes nuclear, hydro and wind, net imports of electricity, and other energy sources.





NAFTA : MAIN INDICATORS											
	1980	1985	1990	1995	1998	1999	85/80	90/85	95/90	98/95	99/98
	Annual % Change										
Gross Inland Consumption (Mtoe)	2103.6	2086.5	2258.9	2450.6	2591.0	2660.8	-0.2%	1.6%	1.6%	1.9%	2.7%
Public Thermal Power Generation	470.1	487.1	526.2	551.8	629.9	608.6	0.7%	1.6%	1.0%	4.5%	-3.4%
Autoprod. Thermal Power Generation	1.0	1.3	64.9	119.2	157.5	179.4	5.7%	118.1%	12.9%	9.7%	13.9%
Energy Branch	130.6	132.1	155.9	159.3	171.6	168.6	0.2%	3.4%	0.4%	2.5%	-1.8%
Final Energy Consumption	1445.1	1413.8	1439.5	1519.5	1559.1	1597.0	-0.4%	0.4%	1.1%	0.9%	2.4%
Industry	478.1	431.4	385.5	374.5	369.9	373.1	-2.0%	-2.2%	-0.6%	-0.4%	0.9%
Transport	502.2	515.5	577.7	628.8	670.5	691.7	0.5%	2.3%	1.7%	2.2%	3.2%
Tertiary-Domestic	464.7	467.0	476.3	516.2	518.7	532.1	0.1%	0.4%	1.6%	0.2%	2.6%
Energy Intensity (toe/1990 MEUR)	541.1	475.5	450.0	440.7	410.0	406.2	-2.6%	-1.1%	-0.4%	-2.4%	-0.9%
Public Thermal Power Generation	120.9	111.0	104.8	99.2	99.7	92.9	-1.7%	-1.1%	-1.1%	0.2%	-6.8%
Autoprod. Thermal Power Generation	0.3	0.3	12.9	21.4	24.9	27.4	3.2%	112.3%	10.6%	5.2%	9.9%
Industry	123.0	98.3	76.8	67.3	58.5	57.0	-4.4%	-4.8%	-2.6%	-4.6%	-2.7%
Transport	129.2	117.5	115.1	113.1	106.1	105.6	-1.9%	-0.4%	-0.4%	-2.1%	-0.5%
Tertiary-Domestic	119.5	106.4	94.9	92.8	82.1	81.2	-2.3%	-2.3%	-0.4%	-4.0%	-1.0%
Energy per Capita (Kgoe/inhabitant)	6608	6167	6285	6393	6537	6637	-1.4%	0.4%	0.3%	0.7%	1.5%
Industry	1502	1275	1073	977	933	931	-3.2%	-3.4%	-1.8%	-1.5%	-0.3%
Transport	1578	1524	1607	1640	1692	1725	-0.7%	1.1%	0.4%	1.0%	2.0%
Tertiary-Domestic	1460	1380	1325	1347	1309	1327	-1.1%	-0.8%	0.3%	-0.9%	1.4%
Electricity Share (%)											
Final Energy Consumption	14.2%	16.4%	18.8%	20.4%	21.4%	21.3%	2.9%	2.8%	1.6%	1.6%	-0.5%
Industry	16.4%	19.3%	24.3%	29.7%	31.6%	32.1%	3.3%	4.6%	4.1%	2.1%	1.5%
Transport	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	4.3%	-0.1%	-0.5%	3.8%	-4.3%
Tertiary-Domestic	27.2%	31.7%	37.1%	38.4%	41.6%	41.2%	3.1%	3.2%	0.7%	2.7%	-0.9%
Total Renewable Consumption (Mtoe)	123.1	143.6	147.3	164.5	168.6	178.3	3.1%	0.5%	2.2%	0.8%	5.8%
Hydro	47.0	52.8	51.0	58.3	55.9	57.3	2.3%	-0.7%	2.7%	-1.4%	2.6%
Biomass	70.7	80.9	77.9	88.2	94.2	100.6	2.8%	-0.8%	2.5%	2.2%	6.8%
Other	5.4	9.9	18.4	18.1	18.5	20.3	13.0%	13.2%	-0.4%	0.7%	10.0%
Renewable intensity (toe/1990MEUR)	31.7	32.7	29.4	29.6	26.7	27.2	0.7%	-2.2%	0.2%	-3.4%	2.0%
Renewable per capita (Kgoe/inhabitant)	386.6	424.6	409.9	429.2	425.3	444.7	1.9%	-0.7%	0.9%	-0.3%	4.5%
CO₂ Emissions (Mt of CO₂)	5414.6	5336.1	5681.6	5974.5	6454.3	6520.2	-0.3%	1.3%	1.0%	2.6%	1.0%
Public Thermal Power Generation	1433.2	1592.0	1752.6	1817.4	2091.1	2025.8	2.1%	1.9%	0.7%	4.8%	-3.1%
Autoprod. Thermal Power Generation	2.1	2.6	63.6	228.8	329.1	399.3	4.7%	89.0%	29.2%	12.9%	21.3%
Energy Branch	315.8	313.9	365.2	359.5	389.2	384.5	-0.1%	3.1%	-0.3%	2.7%	-1.2%
Industry	1057.3	882.4	809.0	668.3	636.3	627.1	-3.6%	-1.7%	-3.7%	-1.6%	-1.5%
Transport	1530.7	1572.4	1760.4	1909.3	2038.4	2102.4	0.5%	2.3%	1.6%	2.2%	3.1%
Tertiary-Domestic	850.2	787.8	754.9	784.8	752.6	772.1	-1.5%	-0.9%	0.8%	-1.4%	2.6%
Carbon Intensity (tn of CO₂/toe)	2.6	2.6	2.5	2.4	2.5	2.5	-0.1%	-0.3%	-0.6%	0.7%	-1.6%
Public Power Generation	2.4	2.4	2.3	2.2	2.3	2.3	-0.1%	-0.8%	-0.9%	2.0%	-2.1%
Public Thermal Power Generation	3.0	3.3	3.3	3.3	3.3	3.3	1.4%	0.4%	-0.2%	0.3%	0.3%
Autoprod. Power Generation	0.6	0.7	0.9	1.7	1.9	2.0	3.3%	4.9%	15.2%	3.7%	3.0%
Autoprod. Thermal Power Generation	2.1	2.0	1.0	1.9	2.1	2.2	-1.0%	-13.3%	14.4%	2.9%	6.5%
Energy Branch	0.0	0.0	0.0	3.1	3.1	3.1	-	-	-	0.0%	0.0%
Industry	2.4	2.4	2.3	2.3	2.3	2.3	-0.4%	-0.3%	-0.7%	0.2%	0.6%
Transport	2.2	2.0	2.1	1.8	1.7	1.7	-1.5%	0.5%	-3.2%	-1.2%	-2.3%
Tertiary-Domestic	3.0	3.1	3.0	3.0	3.0	3.0	0.0%	0.0%	-0.1%	0.0%	0.0%
CO₂ per Capita (kg of CO₂/inhabitant)	17009	15773	15807	15586	16285	16263	-1.5%	0.0%	-0.3%	1.5%	-0.1%
Industry	3321	2608	2251	1743	1606	1564	-4.7%	-2.9%	-5.0%	-2.7%	-2.6%
Transport	4808	4648	4898	4981	5143	5244	-0.7%	1.1%	0.3%	1.1%	2.0%
Tertiary-Domestic	2671	2329	2100	2047	1899	1926	-2.7%	-2.0%	-0.5%	-2.5%	1.4%
CO₂ per unit of GDP (tn of CO₂/1990 MEUR)	1393	1216	1132	1074	1021	995	-2.7%	-1.4%	-1.0%	-1.7%	-2.5%
Public Thermal Power Generation	369	363	349	327	331	309	-0.3%	-0.8%	-1.3%	0.4%	-6.5%
Autoprod. Thermal Power Generation	1	1	13	41	52	61	2.2%	84.0%	26.6%	8.2%	17.1%
Energy Branch	0	0	0	1	1	1	-	-	-	-14.9%	11.0%
Industry	81	72	73	65	62	59	-2.5%	0.3%	-2.3%	-1.6%	-4.7%
Transport	272	201	161	120	101	96	-5.9%	-4.3%	-5.7%	-5.7%	-4.9%
Tertiary-Domestic	394	358	351	343	323	321	-1.9%	-0.4%	-0.4%	-2.1%	-0.5%



UNITED STATES : SUMMARY ENERGY BALANCE

Mtoe	1980	1985	1990	1997	1998	1999	85/80	90/85	97/90	98/97	99/98
	Annual % Change										
Primary Production	1553.3	1570.2	1650.1	1683.7	1700.2	1687.9	0.2%	1.0%	0.3%	1.0%	-0.7%
Solids	447.9	465.9	539.1	561.2	572.8	558.7	0.8%	3.0%	0.6%	2.1%	-2.5%
Oil	498.3	514.3	432.6	394.8	383.1	366.8	0.6%	-3.4%	-1.3%	-3.0%	-4.3%
Natural gas	454.6	385.9	419.2	442.1	443.5	437.6	-3.2%	1.7%	0.8%	0.3%	-1.3%
Nuclear	69.4	106.0	159.4	173.7	186.1	202.7	8.8%	8.5%	1.2%	7.2%	8.9%
Hydro & Wind	24.0	24.4	23.7	28.7	25.6	25.3	0.4%	-0.6%	2.8%	-11.1%	-1.1%
Geothermal	4.6	8.5	13.8	12.8	13.2	14.9	13.1%	10.1%	-1.0%	3.1%	13.1%
Other	54.5	65.1	62.3	70.4	75.9	81.8	3.6%	-0.9%	1.8%	7.8%	7.8%
Net Imports	307.3	201.8	343.4	507.7	543.9	572.5	-8.1%	11.2%	5.7%	7.1%	5.3%
Solids	-57.0	-57.3	-64.8	-46.0	-42.3	-31.1	0.1%	2.5%	-4.8%	-8.0%	-26.5%
Oil	340.3	235.3	374.9	484.8	514.4	521.8	-7.1%	9.8%	3.7%	6.1%	1.4%
Crude oil	299.0	202.9	348.9	473.3	493.6	496.6	-7.5%	11.5%	4.5%	4.3%	0.6%
Oil products	41.3	32.4	26.0	11.5	20.8	25.2	-4.7%	-4.3%	-11.0%	80.8%	21.3%
Natural gas	21.7	20.3	33.2	65.9	69.5	79.3	-1.3%	10.3%	10.3%	5.5%	14.2%
Electricity	2.3	3.5	0.2	2.9	2.3	2.5	8.9%	-45.4%	50.1%	-21.4%	8.3%
Gross Inland Consumption	1811.7	1781.7	1925.6	2176.5	2205.6	2270.0	-0.3%	1.6%	1.8%	1.3%	2.9%
Solids	376.2	425.7	456.7	529.5	537.9	539.4	2.5%	1.4%	2.1%	1.6%	0.3%
Oil	803.9	736.8	770.2	850.6	864.9	881.4	-1.7%	0.9%	1.4%	1.7%	1.9%
Natural gas	476.8	411.7	439.4	508.0	499.8	522.0	-2.9%	1.3%	2.1%	-1.6%	4.4%
Other (1)	154.7	207.5	259.3	288.5	303.0	327.2	6.0%	4.6%	1.5%	5.0%	8.0%
Electricity Generation in TWh	2427.3	2621.9	3181.5	3669.2	3801.6	3910.2	1.6%	3.9%	2.1%	3.6%	2.9%
Nuclear	266.2	406.7	611.6	666.4	714.1	777.9	8.8%	8.5%	1.2%	7.2%	8.9%
Hydro & wind	278.8	284.0	273.2	330.1	293.2	288.5	0.4%	-0.8%	2.7%	-11.2%	-1.6%
Thermal	1882.4	1931.3	2296.8	2672.8	2794.3	2843.8	0.5%	3.5%	2.2%	4.5%	1.8%
Generation Capacity in GWe	603.1	701.9	733.3	788.3	788.7	786.1	3.1%	0.9%	1.0%	0.0%	-0.3%
Nuclear	56.5	81.6	99.6	101.6	100.5	97.9	7.6%	4.1%	0.3%	-1.1%	-2.6%
Hydro & wind	76.7	85.0	92.4	99.9	99.1	98.5	2.1%	1.7%	1.1%	-0.8%	-0.6%
Thermal	470.0	535.3	541.3	586.9	589.1	589.7	2.6%	0.2%	1.2%	0.4%	0.1%
Average Load Factor in %	45.9	42.6	49.5	53.1	55.0	56.8	-1.5%	3.0%	1.0%	3.6%	3.2%
Fuel Inputs for Thermal Power Generation	442.9	458.8	558.1	695.4	730.8	733.3	0.7%	4.0%	3.2%	5.1%	0.3%
Solids	292.0	353.7	387.6	481.9	493.5	495.7	3.9%	1.9%	3.2%	2.4%	0.4%
Oil	60.6	25.1	27.3	26.7	37.4	34.8	-16.2%	1.7%	-0.3%	40.0%	-6.9%
Gas	85.6	71.2	89.7	130.4	140.7	140.3	-3.6%	4.7%	5.5%	7.9%	-0.3%
Geothermal	4.6	8.5	13.8	12.8	13.2	14.9	13.1%	10.1%	-1.0%	3.1%	13.1%
Other	0.1	0.4	39.7	43.6	45.9	47.6	26.6%	157.0%	1.4%	5.3%	3.7%
Average Thermal Efficiency in %	36.6	36.2	35.4	33.0	32.9	33.3	-0.2%	-0.5%	-1.0%	-0.5%	1.4%
Non-Energy Uses	96.2	82.4	101.5	135.5	131.6	141.2	-3.0%	4.3%	4.2%	-2.9%	7.3%
Total Final Energy Demand	1235.1	1203.1	1213.2	1313.7	1309.4	1343.2	-0.5%	0.2%	1.1%	-0.3%	2.6%
Solids	67.5	64.2	62.7	38.6	35.9	35.1	-1.0%	-0.5%	-6.7%	-6.9%	-2.4%
Oil	601.5	582.4	596.3	636.1	645.5	660.3	-0.6%	0.5%	0.9%	1.5%	2.3%
Gas	337.4	296.6	303.0	330.9	307.9	318.3	-2.5%	0.4%	1.3%	-7.0%	3.4%
Electricity	174.2	193.8	226.5	273.0	282.2	287.0	2.2%	3.2%	2.7%	3.4%	1.7%
Heat	0.0	1.4	1.7	7.6	7.3	7.4	-	3.9%	24.2%	-4.4%	1.4%
Other	54.4	64.7	23.1	27.5	30.6	35.1	3.6%	-18.6%	2.5%	11.5%	14.6%
CO₂ Emissions in Mt of CO₂	4765.3	4677.5	4954.0	5523.0	5593.0	5655.1	-0.4%	1.2%	1.6%	1.3%	1.1%
Indicators											
Population (Million)	227.73	238.51	249.98	268.09	270.56	273.00	0.9%	0.9%	1.0%	0.9%	0.9%
GDP (index 1985=100)	88.6	100.0	114.6	139.9	145.4	150.5	2.4%	2.8%	2.9%	3.9%	3.6%
Gross Inl Cons./GDP (toe/1990 MEUR)	537.0	468.0	441.3	408.6	398.6	396.2	-2.7%	-1.2%	-1.1%	-2.4%	-0.6%
Gross Inl Cons./Capita (toe/inhabitant)	7.96	7.47	7.70	8.12	8.15	8.32	-1.3%	0.6%	0.8%	0.4%	2.0%
Electricity Generated/Capita (kWh/inhabitant)	10659	10993	12727	13687	14051	14323	0.6%	3.0%	1.0%	2.7%	1.9%
CO ₂ Emissions/Capita (t of CO ₂ /inhabitant)	20.9	19.6	19.8	20.6	20.7	20.7	-1.3%	0.2%	0.6%	0.3%	0.2%
Import Dependency %	16.7	11.2	17.6	23.1	24.4	24.9	-7.7%	9.4%	4.0%	5.8%	2.2%

(1) Includes nuclear, hydro and wind, net imports of electricity, and other energy sources.





OECD PACIFIC : SUMMARY ENERGY BALANCE											
Mtoe	1980	1985	1990	1997	1998	1999	85/80	90/85	97/90	98/97	99/98
	Annual % Change										
Primary Production	139.1	202.0	245.6	323.6	337.0	331.6	7.7%	4.0%	4.0%	4.1%	-1.6%
Solids	64.6	92.1	112.3	145.1	153.2	157.7	7.3%	4.0%	3.7%	5.6%	2.9%
Oil	22.2	29.7	31.6	32.3	34.5	28.1	6.0%	1.2%	0.3%	7.0%	-18.6%
Natural gas	10.2	16.2	22.8	32.3	32.8	33.9	9.7%	7.1%	5.1%	1.5%	3.5%
Nuclear	21.5	41.6	52.7	83.2	86.6	82.5	14.1%	4.9%	6.7%	4.1%	-4.7%
Hydro & Wind	10.4	10.0	11.0	11.3	12.4	11.8	-0.6%	1.8%	0.4%	9.4%	-4.8%
Geothermal	1.8	2.3	3.8	5.9	5.9	5.8	4.8%	11.0%	6.4%	-0.5%	-0.6%
Other	8.4	10.0	11.4	13.5	11.6	11.8	3.6%	2.5%	2.5%	-14.1%	1.7%
Net Imports	305.7	255.9	306.4	327.9	298.2	309.6	-3.5%	3.7%	1.0%	-9.0%	3.8%
Solids	19.0	7.3	1.1	-11.3	-22.8	-25.5	-17.4%	-32.0%	-	102.0%	12.0%
Oil	267.1	215.6	266.0	292.4	272.2	283.7	-4.2%	4.3%	1.4%	-6.9%	4.2%
Crude oil	236.3	174.5	205.1	247.8	234.0	234.4	-5.9%	3.3%	2.7%	-5.6%	0.2%
Oil products	30.8	41.2	60.9	44.6	38.3	49.3	6.0%	8.2%	-4.4%	-14.2%	28.8%
Natural gas	19.5	33.0	39.3	46.7	48.8	51.4	11.0%	3.6%	2.5%	4.5%	5.4%
Electricity	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-
Gross Inland Consumption	430.3	451.2	540.3	639.9	632.7	641.6	1.0%	3.7%	2.4%	-1.1%	1.4%
Solids	87.9	103.0	110.1	133.1	130.4	136.0	3.2%	1.3%	2.7%	-2.0%	4.3%
Oil	270.7	235.1	289.5	314.1	304.4	308.5	-2.8%	4.2%	1.2%	-3.1%	1.3%
Natural gas	29.7	49.2	61.9	78.9	81.4	85.1	10.7%	4.7%	3.5%	3.2%	4.5%
Other (1)	42.1	63.9	78.9	113.9	116.5	111.9	8.7%	4.3%	5.4%	2.3%	-3.9%
Electricity Generation in TWh	698.9	814.5	1037.4	1247.1	1269.6	1298.1	3.1%	5.0%	2.7%	1.8%	2.2%
Nuclear	82.6	159.6	202.3	319.2	332.3	316.6	14.1%	4.9%	6.7%	4.1%	-4.7%
Hydro & wind	120.2	116.2	126.8	130.6	132.8	126.7	-0.7%	1.8%	0.4%	1.7%	-4.6%
Thermal	496.1	538.7	708.3	797.4	804.5	854.7	1.7%	5.6%	1.7%	0.9%	6.2%
Generation Capacity in GWe	175.3	211.0	237.9	289.3	295.6	302.6	3.8%	2.4%	2.8%	2.2%	2.4%
Nuclear	15.7	24.7	31.6	42.7	45.2	45.2	9.5%	5.1%	4.4%	5.9%	0.0%
Hydro & wind	39.9	45.9	49.7	56.5	56.5	56.7	2.9%	1.6%	1.8%	0.1%	0.4%
Thermal	119.7	140.5	156.6	190.1	193.8	200.6	3.2%	2.2%	2.8%	1.9%	3.5%
Average Load Factor in %	45.5	44.1	49.8	49.2	49.0	49.0	-0.6%	2.5%	-0.2%	-0.4%	-0.1%
Fuel Inputs for Thermal Power Generation	113.2	115.7	147.2	166.7	168.8	175.8	0.4%	4.9%	1.8%	1.2%	4.2%
Solids	30.8	44.3	54.2	74.0	79.5	83.2	7.5%	4.1%	4.5%	7.4%	4.7%
Oil	61.5	37.3	49.2	38.1	33.8	33.9	-9.5%	5.7%	-3.6%	-11.2%	0.1%
Gas	17.4	29.4	36.5	44.6	46.0	49.3	11.0%	4.4%	2.9%	3.3%	7.1%
Geothermal	1.8	2.3	3.4	5.2	5.2	5.1	4.8%	8.5%	6.2%	-0.2%	-0.8%
Other	1.7	2.3	3.8	4.9	4.3	4.3	6.8%	10.4%	3.5%	-12.6%	1.1%
Average Thermal Efficiency in %	37.7	40.0	41.4	41.1	41.0	41.8	1.2%	0.7%	-0.1%	-0.4%	2.0%
Non-Energy Uses	32.1	31.8	41.5	51.1	48.8	51.1	-0.2%	5.5%	3.0%	-4.5%	4.7%
Total Final Energy Demand	274.0	288.0	338.5	387.8	386.5	392.3	1.0%	3.3%	2.0%	-0.4%	1.5%
Solids	42.0	42.9	45.3	44.9	42.8	43.2	0.4%	1.1%	-0.1%	-4.8%	1.0%
Oil	157.3	156.6	182.7	207.1	205.8	208.2	-0.1%	3.1%	1.8%	-0.6%	1.2%
Gas	15.1	19.3	23.9	31.6	32.5	33.1	4.9%	4.4%	4.1%	3.0%	1.8%
Electricity	52.6	61.3	78.6	94.5	96.0	98.3	3.1%	5.1%	2.7%	1.6%	2.4%
Heat	0.1	0.1	0.5	1.0	1.0	1.1	6.2%	28.0%	11.4%	1.9%	3.6%
Other	6.7	7.7	7.6	8.7	8.3	8.4	2.7%	-0.3%	2.0%	-4.7%	0.9%
CO₂ Emissions in Mt of CO₂	1095.8	1120.3	1318.6	1483.4	1480.9	1513.5	0.4%	3.3%	1.7%	-0.2%	2.2%
Indicators											
Population (Million)	134.64	139.81	143.99	148.45	149.01	149.46	0.8%	0.6%	0.4%	0.4%	0.3%
GDP (index 1985=100)	84.8	100.0	124.2	143.2	140.3	141.3	3.3%	4.4%	2.1%	-2.0%	0.7%
Gross Inl Cons./GDP (toe/1990 MEUR)	242.5	215.6	207.9	213.5	215.5	217.0	-2.3%	-0.7%	0.4%	0.9%	0.7%
Gross Inl Cons./Capita (toe/inhabitant)	3.20	3.23	3.75	4.31	4.25	4.29	0.2%	3.1%	2.0%	-1.5%	1.1%
Electricity Generated/Capita (kWh/inhabitant)	5191	5826	7205	8401	8520	8685	2.3%	4.3%	2.2%	1.4%	1.9%
CO ₂ Emissions/Capita (t of CO ₂ /inhabitant)	8.1	8.0	9.2	10.0	9.9	10.1	-0.3%	2.7%	1.3%	-0.5%	1.9%
Import Dependency %	68.9	55.7	56.1	50.7	46.7	47.8	-4.2%	0.1%	-1.4%	-8.1%	2.5%

(1) Includes nuclear, hydro and wind, net imports of electricity, and other energy sources.





OECD PACIFIC : MAIN INDICATORS											
	1980	1985	1990	1995	1998	1999	85/80	90/85	95/90	98/95	99/98
	Annual % Change										
Gross Inland Consumption (Mtoe)	430.3	451.2	540.3	608.3	632.7	641.6	1.0%	3.7%	2.4%	1.3%	1.4%
Public Thermal Power Generation	95.5	101.9	125.6	132.6	135.6	142.5	1.3%	4.3%	1.1%	0.7%	5.1%
Autoprod. Thermal Power Generation	15.9	11.5	18.2	22.2	28.0	28.2	-6.3%	9.5%	4.1%	8.1%	0.4%
Energy Branch	21.2	23.4	26.2	29.3	29.8	29.6	2.0%	2.3%	2.3%	0.5%	-0.8%
Final Energy Consumption	274.0	288.0	338.5	374.8	386.2	392.1	1.0%	3.3%	2.1%	1.0%	1.5%
Industry	127.4	125.4	137.7	141.0	141.1	144.9	-0.3%	1.9%	0.5%	0.0%	2.7%
Transport	75.7	80.1	100.5	116.3	124.2	125.8	1.1%	4.7%	3.0%	2.2%	1.3%
Tertiary-Domestic	70.9	82.6	100.3	117.4	121.0	121.4	3.1%	3.9%	3.2%	1.0%	0.3%
Energy Intensity (toe/1990 MEUR)	242.5	215.6	207.9	216.2	215.5	217.0	-2.3%	-0.7%	0.8%	-0.1%	0.7%
Public Thermal Power Generation	53.8	48.7	48.3	47.1	46.2	48.2	-2.0%	-0.1%	-0.5%	-0.7%	4.4%
Autoprod. Thermal Power Generation	9.0	5.5	7.0	7.9	9.5	9.5	-9.3%	4.9%	2.4%	6.6%	-0.3%
Industry	71.8	59.9	53.0	50.1	48.0	49.0	-3.5%	-2.4%	-1.1%	-1.4%	2.0%
Transport	42.6	38.3	38.7	41.3	42.3	42.6	-2.1%	0.2%	1.3%	0.8%	0.6%
Tertiary-Domestic	39.9	39.5	38.6	41.7	41.2	41.0	-0.2%	-0.5%	1.6%	-0.4%	-0.3%
Energy per Capita (Kgoe/inhabitant)	3196	3227	3753	4129	4246	4292	0.2%	3.1%	1.9%	0.9%	1.1%
Industry	946	897	956	958	947	969	-1.1%	1.3%	0.0%	-0.4%	2.4%
Transport	562	573	698	790	834	842	0.4%	4.0%	2.5%	1.8%	1.0%
Tertiary-Domestic	527	591	696	797	812	812	2.3%	3.3%	2.7%	0.6%	0.0%
Electricity Share (%)											
Final Energy Consumption	19.2%	21.3%	23.2%	24.0%	24.9%	25.1%	2.1%	1.7%	0.7%	1.2%	0.9%
Industry	24.8%	24.8%	27.9%	28.9%	29.8%	29.6%	0.0%	2.4%	0.7%	1.0%	-0.6%
Transport	1.8%	1.9%	1.9%	1.7%	1.7%	1.7%	0.5%	-0.2%	-1.3%	-1.0%	-0.8%
Tertiary-Domestic	27.6%	34.8%	38.1%	40.1%	42.9%	43.9%	4.7%	1.8%	1.0%	2.2%	2.4%
Total Renewable Consumption (Mtoe)	20.6	22.3	26.2	28.1	29.9	29.4	1.7%	3.2%	1.5%	2.0%	-1.5%
Hydro	10.3	10.0	10.9	10.8	11.4	10.9	-0.7%	1.8%	-0.2%	1.9%	-4.6%
Biomass	8.4	10.0	11.4	12.1	11.6	11.8	3.6%	2.5%	1.3%	-1.4%	1.7%
Other	1.8	2.3	3.9	5.2	6.8	6.7	5.0%	11.0%	6.1%	9.3%	-1.6%
Renewable intensity (toe/1990MEUR)	11.6	10.7	10.1	10.0	10.2	10.0	-1.6%	-1.2%	-0.1%	0.6%	-2.1%
Renewable per capita (Kgoe/inhabitant)	152.7	159.7	181.7	191.0	200.4	196.9	0.9%	2.6%	1.0%	1.6%	-1.8%
CO₂ Emissions (Mt of CO₂)	1095.8	1120.3	1318.6	1433.5	1480.9	1513.5	0.4%	3.3%	1.7%	1.1%	2.2%
Public Thermal Power Generation	265.0	258.8	317.7	333.9	340.5	354.7	-0.5%	4.2%	1.0%	0.7%	4.2%
Autoprod. Thermal Power Generation	46.4	31.4	49.2	61.1	81.4	81.8	-7.5%	9.4%	4.4%	10.0%	0.5%
Energy Branch	54.8	58.6	62.1	67.3	66.4	65.5	1.4%	1.2%	1.6%	-0.5%	-1.4%
Industry	312.7	305.5	322.7	322.7	314.5	323.5	-0.5%	1.1%	0.0%	-0.8%	2.9%
Transport	228.0	241.1	302.7	350.7	374.7	379.6	1.1%	4.7%	3.0%	2.2%	1.3%
Tertiary-Domestic	145.5	151.5	173.5	196.0	192.4	189.1	0.8%	2.8%	2.5%	-0.6%	-1.7%
Carbon Intensity (tn of CO₂/toe)	2.5	2.5	2.4	2.4	2.3	2.4	-0.5%	-0.3%	-0.7%	-0.2%	0.8%
Public Power Generation	2.1	1.7	1.7	1.5	1.4	1.5	-4.1%	-0.2%	-2.0%	-1.5%	3.2%
Public Thermal Power Generation	2.8	2.5	2.5	2.5	2.5	2.5	-1.7%	-0.1%	-0.1%	-0.1%	-0.9%
Autoprod. Power Generation	2.8	2.5	2.6	2.6	2.8	2.8	-2.0%	0.3%	0.4%	2.2%	0.3%
Autoprod. Thermal Power Generation	2.9	2.7	2.7	2.8	2.9	2.9	-1.3%	-0.1%	0.4%	1.8%	0.1%
Energy Branch	0.0	2.9	2.8	2.7	2.6	2.6	-	-0.6%	-1.0%	-1.3%	0.3%
Industry	2.6	2.5	2.4	2.3	2.2	2.2	-0.6%	-1.1%	-0.6%	-1.0%	-0.6%
Transport	2.5	2.4	2.3	2.3	2.2	2.2	-0.1%	-0.8%	-0.5%	-0.9%	0.1%
Tertiary-Domestic	3.0	3.0	3.0	3.0	3.0	3.0	0.0%	0.0%	0.0%	0.0%	0.0%
CO₂ per Capita (kg of CO₂/inhabitant)	8139	8013	9157	9732	9939	10126	-0.3%	2.7%	1.2%	0.7%	1.9%
Industry	2322	2185	2241	2191	2111	2165	-1.2%	0.5%	-0.5%	-1.2%	2.5%
Transport	1693	1724	2102	2381	2515	2540	0.4%	4.0%	2.5%	1.8%	1.0%
Tertiary-Domestic	1081	1083	1205	1331	1291	1265	0.0%	2.2%	2.0%	-1.0%	-2.0%
CO₂ per unit of GDP (tn of CO₂/1990 MEUR)	617	535	507	509	504	512	-2.8%	-1.1%	0.1%	-0.3%	1.5%
Public Thermal Power Generation	149	124	122	119	116	120	-3.7%	-0.2%	-0.6%	-0.8%	3.5%
Autoprod. Thermal Power Generation	26	15	19	22	28	28	-10.5%	4.8%	2.8%	8.5%	-0.2%
Energy Branch	0	0	0	0	0	0	-	1.0%	5.8%	3.0%	7.4%
Industry	31	28	24	24	23	22	-1.9%	-3.1%	0.0%	-1.9%	-2.1%
Transport	176	146	124	115	107	109	-3.7%	-3.2%	-1.6%	-2.2%	2.2%
Tertiary-Domestic	128	115	116	125	128	128	-2.2%	0.2%	1.4%	0.8%	0.6%





JAPAN : SUMMARY ENERGY BALANCE											
Mtoe	1980	1985	1990	1997	1998	1999	85/80	90/85	97/90	98/97	99/98
	Annual % Change										
Primary Production	47.5	67.7	75.6	107.1	108.9	104.2	7.3%	2.2%	5.1%	1.7%	-4.3%
Solids	10.9	9.6	4.6	2.4	2.0	2.2	-2.5%	-13.8%	-9.0%	-14.3%	6.6%
Oil	0.5	0.6	0.7	0.8	0.8	0.7	3.8%	1.1%	3.7%	-5.3%	-7.1%
Natural gas	1.9	2.0	1.8	2.0	2.0	2.0	0.3%	-1.7%	1.6%	1.0%	-0.9%
Nuclear	21.5	41.6	52.7	83.2	86.6	82.5	14.1%	4.9%	6.7%	4.1%	-4.7%
Hydro & Wind	7.6	7.1	7.7	7.7	8.8	8.2	-1.3%	1.5%	0.1%	14.4%	-6.9%
Geothermal	0.8	1.3	1.5	3.5	3.3	3.2	10.7%	3.1%	12.8%	-6.0%	-2.3%
Other	4.3	5.5	6.7	7.5	5.3	5.4	5.2%	4.1%	1.5%	-28.9%	1.3%
Net Imports	318.8	307.2	369.3	419.3	403.0	413.3	-0.7%	3.8%	1.8%	-3.9%	2.6%
Solids	47.5	62.2	68.9	83.2	82.7	85.0	5.5%	2.1%	2.7%	-0.6%	2.8%
Oil	251.7	212.1	258.7	280.8	262.7	268.1	-3.4%	4.1%	1.2%	-6.4%	2.1%
Crude oil	223.0	172.2	198.5	236.7	223.9	220.1	-5.0%	2.9%	2.5%	-5.4%	-1.7%
Oil products	28.7	39.9	60.2	44.1	38.8	48.0	6.8%	8.6%	-4.3%	-12.1%	23.7%
Natural gas	19.5	33.0	41.7	55.3	57.6	60.3	11.0%	4.8%	4.1%	4.2%	4.6%
Electricity	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-
Gross Inland Consumption	350.8	365.9	438.8	517.8	511.0	515.4	0.8%	3.7%	2.4%	-1.3%	0.9%
Solids	59.6	71.8	74.0	86.5	84.6	87.6	3.8%	0.6%	2.3%	-2.2%	3.5%
Oil	235.6	203.6	253.0	272.2	262.8	266.4	-2.9%	4.4%	1.0%	-3.4%	1.4%
Natural gas	21.4	35.0	43.3	57.2	59.6	62.1	10.3%	4.3%	4.1%	4.1%	4.3%
Other (1)	34.2	55.5	68.6	101.9	104.0	99.3	10.2%	4.3%	5.8%	2.1%	-4.5%
Electricity Generation in TWh	581.0	666.9	850.8	1027.3	1036.2	1057.0	2.8%	5.0%	2.7%	0.9%	2.0%
Nuclear	82.6	159.6	202.3	319.2	332.3	316.6	14.1%	4.9%	6.7%	4.1%	-4.7%
Hydro & wind	88.3	82.9	89.3	89.8	92.5	86.4	-1.3%	1.5%	0.1%	3.1%	-6.6%
Thermal	410.2	424.5	559.2	618.3	611.4	653.9	0.7%	5.7%	1.4%	-1.1%	7.0%
Generation Capacity in GWe	143.7	169.4	194.7	236.5	245.2	252.2	3.3%	2.8%	2.8%	3.7%	2.9%
Nuclear	15.7	24.7	31.6	42.7	45.2	45.2	9.5%	5.1%	4.4%	5.9%	0.0%
Hydro & wind	29.8	34.3	37.8	43.8	43.9	44.1	2.9%	2.0%	2.1%	0.1%	0.5%
Thermal	98.3	110.3	125.3	149.9	156.0	162.9	2.3%	2.6%	2.6%	4.1%	4.4%
Average Load Factor in %	46.1	45.0	49.9	49.6	48.2	47.8	-0.5%	2.1%	-0.1%	-2.7%	-0.8%
Fuel Inputs for Thermal Power Generation	88.7	85.9	110.0	122.2	120.8	125.1	-0.6%	5.1%	1.5%	-1.2%	3.6%
Solids	10.5	20.5	25.3	38.2	40.5	42.4	14.3%	4.3%	6.1%	6.1%	4.7%
Oil	60.3	36.4	48.4	37.5	33.3	33.4	-9.6%	5.9%	-3.6%	-11.4%	0.4%
Gas	15.6	25.7	31.8	39.4	41.0	43.3	10.5%	4.4%	3.1%	4.0%	5.7%
Geothermal	0.8	1.3	1.5	3.2	3.0	3.0	10.7%	3.1%	11.6%	-6.0%	-2.3%
Other	1.5	2.1	3.0	3.9	3.0	3.1	6.8%	7.9%	3.8%	-23.2%	2.7%
Average Thermal Efficiency in %	39.8	42.5	43.7	43.5	43.5	44.9	1.3%	0.6%	-0.1%	0.1%	3.2%
Non-Energy Uses	29.1	28.0	36.8	45.0	42.7	44.7	-0.7%	5.6%	2.9%	-5.1%	4.7%
Total Final Energy Demand	220.8	232.2	274.0	312.3	309.6	314.2	1.0%	3.4%	1.9%	-0.9%	1.5%
Solids	35.4	36.7	38.8	38.2	36.3	36.8	0.7%	1.1%	-0.2%	-5.0%	1.4%
Oil	128.6	129.3	151.5	170.5	168.9	170.7	0.1%	3.2%	1.7%	-0.9%	1.1%
Gas	9.7	11.8	14.7	20.7	21.3	21.8	3.9%	4.6%	5.0%	2.7%	2.3%
Electricity	44.1	50.8	65.1	78.6	79.2	81.1	2.9%	5.1%	2.7%	0.8%	2.3%
Heat	0.1	0.1	0.2	0.7	0.7	0.7	6.2%	7.9%	19.3%	3.0%	3.5%
Other	2.8	3.4	3.7	3.6	3.2	3.1	4.3%	1.5%	-0.5%	-10.7%	-2.8%
CO₂ Emissions in Mt of CO₂	867.6	875.7	1031.1	1144.7	1127.9	1149.7	0.2%	3.3%	1.5%	-1.5%	1.9%
Indicators											
Population (Million)	116.80	120.75	123.54	126.17	126.49	126.69	0.7%	0.5%	0.3%	0.3%	0.2%
GDP (index 1985=100)	84.7	100.0	125.4	143.5	139.5	139.7	3.4%	4.6%	1.9%	-2.8%	0.2%
Gross Inl Cons./GDP (toe/1990 MEUR)	222.5	196.6	188.1	193.9	196.9	198.2	-2.4%	-0.9%	0.4%	1.6%	0.7%
Gross Inl Cons./Capita (toe/inhabitant)	3.00	3.03	3.55	4.10	4.04	4.07	0.2%	3.2%	2.1%	-1.6%	0.7%
Electricity Generated/Capita (kWh/inhabitant)	4975	5523	6886	8142	8192	8343	2.1%	4.5%	2.4%	0.6%	1.8%
CO ₂ Emissions/Capita (t of CO ₂ /inhabitant)	7.4	7.3	8.3	9.1	8.9	9.1	-0.5%	2.9%	1.2%	-1.7%	1.8%
Import Dependency %	88.0	82.4	83.2	80.2	78.0	79.4	-1.3%	0.2%	-0.5%	-2.7%	1.7%

(1) Includes nuclear, hydro and wind, net imports of electricity, and other energy sources.





EFTA : SUMMARY ENERGY BALANCE

Mtoe	1980	1985	1990	1997	1998	1999	85/80	90/85	97/90	98/97	99/98
							Annual % Change				
Primary Production	63.6	83.4	131.3	225.3	219.7	223.8	5.6%	9.5%	8.0%	-2.5%	1.9%
Solids	0.2	0.4	0.2	0.3	0.2	0.3	11.9%	-10.6%	3.5%	-15.1%	49.1%
Oil	25.0	39.5	84.4	160.8	153.9	153.4	9.6%	16.4%	9.7%	-4.3%	-0.3%
Natural gas	22.8	23.4	24.1	41.0	41.3	44.1	0.6%	0.6%	7.9%	0.8%	6.7%
Nuclear	3.7	5.9	6.2	6.6	6.8	6.8	9.5%	1.0%	1.0%	1.7%	0.0%
Hydro & Wind	10.3	11.9	13.3	12.9	13.3	14.4	2.9%	2.3%	-0.5%	3.5%	8.1%
Geothermal	0.6	0.8	1.0	1.1	1.3	1.8	8.0%	4.1%	1.2%	20.6%	37.2%
Other	1.1	1.5	2.0	2.6	2.8	3.0	7.7%	5.7%	3.9%	6.1%	7.6%
Net Imports	-21.4	-38.5	-80.4	-171.6	-164.2	-167.1	12.4%	15.9%	11.4%	-4.3%	1.7%
Solids	1.3	1.3	1.1	0.9	1.0	0.8	0.2%	-4.2%	-2.1%	4.9%	-14.1%
Oil	-1.0	-18.0	-59.4	-137.5	-130.3	-129.9	79.6%	26.9%	12.7%	-5.2%	-0.3%
Crude oil	-11.4	-26.9	-65.2	-140.5	-133.4	-132.6	18.8%	19.4%	11.6%	-5.0%	-0.6%
Oil products	10.4	8.9	5.8	3.0	3.1	2.7	-3.2%	-8.0%	-9.1%	4.2%	-14.0%
Natural gas	-21.0	-21.0	-20.5	-34.8	-34.7	-36.9	-0.1%	-0.4%	7.8%	-0.3%	6.5%
Electricity	-0.7	-0.8	-1.5	-0.3	-0.2	-1.0	1.4%	14.3%	-22.9%	-21.0%	420.6%
Gross Inland Consumption	41.1	45.1	48.6	53.0	54.7	56.5	1.9%	1.5%	1.2%	3.2%	3.2%
Solids	1.4	1.7	1.3	1.2	1.2	1.2	5.2%	-5.9%	-1.0%	2.8%	-1.3%
Oil	23.1	21.5	22.7	22.6	22.8	23.1	-1.4%	1.1%	-0.1%	1.0%	1.1%
Natural gas	1.7	2.4	3.6	6.2	6.7	7.2	7.1%	8.1%	8.1%	7.3%	8.0%
Other (1)	14.9	19.3	21.0	23.0	24.0	24.9	5.4%	1.7%	1.3%	4.4%	4.0%
Electricity Generation in TWh	135.1	162.2	180.7	178.0	184.1	197.4	3.7%	2.2%	-0.2%	3.5%	7.2%
Nuclear	14.3	22.6	23.6	25.4	25.8	25.8	9.5%	0.9%	1.0%	1.7%	0.0%
Hydro & wind	119.5	138.1	155.1	149.3	154.5	167.0	2.9%	2.3%	-0.5%	3.5%	8.1%
Thermal	1.3	1.5	2.0	3.2	3.8	4.6	3.2%	5.9%	7.5%	16.5%	22.6%
Generation Capacity in GWe	34.7	39.7	43.6	44.8	45.5	46.0	2.7%	1.9%	0.4%	1.7%	1.2%
Nuclear	1.9	2.9	3.0	3.1	3.1	3.1	8.5%	0.2%	0.6%	0.0%	1.6%
Hydro & wind	31.8	35.7	39.3	40.2	40.9	41.3	2.3%	2.0%	0.3%	1.6%	1.0%
Thermal	1.0	1.1	1.4	1.4	1.5	1.6	1.4%	4.7%	0.8%	5.6%	5.6%
Average Load Factor in %	44.4	46.7	47.3	45.4	46.2	49.0	1.0%	0.3%	-0.6%	1.8%	6.0%
Fuel Inputs for Thermal Power Generation	0.5	0.9	1.1	1.5	1.9	2.3	11.6%	3.9%	5.2%	21.8%	23.9%
Solids	0.0	0.1	0.1	0.0	0.0	0.0	15.8%	0.0%	-5.0%	-2.9%	11.8%
Oil	0.2	0.2	0.1	0.0	0.1	0.0	2.8%	-10.7%	-12.6%	192.5%	-67.5%
Gas	0.1	0.1	0.1	0.2	0.2	0.2	-1.4%	1.0%	10.8%	-2.9%	3.4%
Geothermal	0.1	0.2	0.4	0.5	0.7	1.2	23.3%	10.6%	4.7%	42.5%	64.5%
Other	0.2	0.3	0.5	0.8	0.8	0.9	17.7%	6.0%	7.3%	7.4%	7.5%
Average Thermal Efficiency in %	21.0	14.2	15.6	18.1	17.3	17.1	-7.5%	1.9%	2.1%	-4.4%	-1.0%
Non-Energy Uses	2.2	2.5	2.5	2.4	2.4	2.3	2.1%	0.0%	-0.2%	-1.2%	-3.1%
Total Final Energy Demand	33.0	35.7	37.0	39.3	40.8	41.6	1.6%	0.7%	0.8%	3.9%	1.9%
Solids	1.3	1.6	1.2	1.1	1.2	1.2	4.8%	-5.1%	-1.1%	7.2%	-5.2%
Oil	19.7	19.3	19.0	19.5	20.1	20.5	-0.5%	-0.2%	0.3%	3.4%	1.8%
Gas	0.7	1.1	1.5	2.1	2.2	2.2	9.4%	5.9%	4.7%	3.3%	3.8%
Electricity	9.7	11.7	12.7	13.5	14.2	14.3	3.8%	1.6%	0.9%	4.5%	1.2%
Heat	0.7	0.9	1.0	1.2	1.2	1.3	5.6%	3.5%	1.7%	1.1%	8.0%
Other	0.9	1.2	1.6	1.9	2.0	2.1	5.5%	5.6%	2.8%	5.6%	7.7%
CO₂ Emissions in Mt of CO₂	72.5	74.3	75.9	83.9	87.8	89.7	0.5%	0.4%	1.4%	4.6%	2.1%
Indicators											
Population (Million)	10.70	10.93	11.21	11.77	11.82	11.88	0.4%	0.5%	0.7%	0.4%	0.6%
GDP (index 1985=100)	90.6	100.0	112.4	125.3	127.9	129.6	2.0%	2.4%	1.6%	2.1%	1.3%
Gross Inl Cons./GDP (toe/1990 MEUR)	185.4	184.2	176.8	173.0	174.8	178.0	-0.1%	-0.8%	-0.3%	1.1%	1.8%
Gross Inl Cons./Capita (toe/inhabitant)	3.84	4.12	4.34	4.51	4.63	4.75	1.4%	1.0%	0.5%	2.8%	2.6%
Electricity Generated/Capita (kWh/inhabitant)	12628	14839	16126	15125	15582	16615	3.3%	1.7%	-0.9%	3.0%	6.6%
CO ₂ Emissions/Capita (t of CO ₂ /inhabitant)	6.8	6.8	6.8	7.1	7.4	7.5	0.1%	-0.1%	0.7%	4.2%	1.6%
Import Dependency %	-51.7	-84.7	-163.6	-317.6	-294.9	-291.1	10.4%	14.1%	9.9%	-7.2%	-1.3%

(1) Includes nuclear, hydro and wind, net imports of electricity, and other energy sources.





EFTA : MAIN INDICATORS											
	1980	1985	1990	1995	1998	1999	85/80	90/85	95/90	98/95	99/98
	Annual % Change										
Gross Inland Consumption (Mtoe)	41.1	45.1	48.6	50.9	54.7	56.5	1.9%	1.5%	0.9%	2.4%	3.2%
Public Thermal Power Generation	0.3	0.5	0.6	0.8	0.9	0.9	10.1%	1.5%	7.6%	4.2%	-2.2%
Autoprod. Thermal Power Generation	0.1	0.1	0.1	0.2	0.2	0.3	5.3%	0.4%	9.1%	2.0%	5.3%
Energy Branch	1.8	2.2	3.4	4.9	6.0	6.4	4.4%	8.8%	7.9%	7.0%	7.2%
Final Energy Consumption	33.0	35.7	37.0	38.5	40.8	41.6	1.6%	0.7%	0.8%	1.9%	2.0%
Industry	10.8	11.4	9.9	10.2	10.7	11.4	1.0%	-2.7%	0.7%	1.6%	5.8%
Transport	7.8	8.9	10.8	11.1	12.0	12.4	2.5%	4.0%	0.6%	2.5%	3.0%
Tertiary-Domestic	14.4	15.5	16.3	17.1	18.0	17.8	1.5%	1.0%	1.0%	1.7%	-0.9%
Energy Intensity (toe/1990 MEUR)	185.4	184.2	176.8	174.0	174.8	178.0	-0.1%	-0.8%	-0.3%	0.2%	1.8%
Public Thermal Power Generation	1.5	2.2	2.1	2.8	3.0	2.9	8.0%	-0.8%	6.3%	1.8%	-3.4%
Autoprod. Thermal Power Generation	0.5	0.6	0.5	0.8	0.8	0.8	3.2%	-1.9%	7.7%	-0.3%	3.9%
Industry	48.6	46.4	36.0	35.0	34.3	35.8	-0.9%	-5.0%	-0.5%	-0.7%	4.4%
Transport	35.4	36.2	39.3	38.1	38.4	39.0	0.5%	1.6%	-0.6%	0.2%	1.7%
Tertiary-Domestic	64.9	63.4	59.3	58.6	57.5	56.2	-0.5%	-1.3%	-0.2%	-0.6%	-2.2%
Energy per Capita (Kgoe/inhabitant)	3844	4125	4339	4363	4632	4751	1.4%	1.0%	0.1%	2.0%	2.6%
Industry	1008	1039	882	879	909	956	0.6%	-3.2%	-0.1%	1.1%	5.2%
Transport	733	811	964	956	1017	1042	2.0%	3.5%	-0.2%	2.1%	2.4%
Tertiary-Domestic	1345	1420	1454	1469	1524	1501	1.1%	0.5%	0.2%	1.2%	-1.5%
Electricity Share (%)											
Final Energy Consumption	29.4%	32.8%	34.3%	35.0%	34.7%	34.5%	2.2%	0.9%	0.4%	-0.2%	-0.8%
Industry	42.9%	48.5%	57.0%	55.9%	56.0%	53.2%	2.5%	3.3%	-0.4%	0.0%	-5.0%
Transport	3.0%	2.8%	2.7%	3.2%	3.1%	3.1%	-1.5%	-0.8%	3.4%	-0.9%	-1.1%
Tertiary-Domestic	33.7%	38.3%	41.5%	43.1%	43.2%	44.3%	2.6%	1.6%	0.8%	0.0%	2.7%
Total Renewable Consumption (Mtoe)	11.9	14.2	16.4	17.5	17.4	19.2	3.7%	2.8%	1.3%	-0.1%	10.2%
Hydro	10.3	11.9	13.3	13.9	13.3	14.4	2.9%	2.3%	0.8%	-1.4%	8.1%
Biomass	1.1	1.5	2.0	2.6	2.8	3.0	7.6%	5.7%	4.9%	2.8%	7.6%
Other	0.6	0.8	1.0	1.1	1.4	1.9	8.0%	4.1%	0.9%	8.4%	36.7%
Renewable intensity (toe/1990MEUR)	53.7	58.2	59.6	59.8	55.7	60.6	1.6%	0.5%	0.1%	-2.4%	8.8%
Renewable per capita (Kgoe/inhabitant)	1113.0	1303.9	1461.7	1500.0	1475.5	1617.5	3.2%	2.3%	0.5%	-0.5%	9.6%
CO₂ Emissions (Mt of CO₂)	72.5	74.3	75.9	80.8	87.8	89.7	0.5%	0.4%	1.2%	2.8%	2.1%
Public Thermal Power Generation	0.4	0.5	0.4	0.2	0.3	0.1	3.3%	-6.8%	-11.7%	19.9%	-70.0%
Autoprod. Thermal Power Generation	0.3	0.4	0.3	0.4	0.5	0.5	4.8%	-3.3%	5.1%	6.6%	6.3%
Energy Branch	4.2	5.1	8.2	11.9	14.8	15.8	3.8%	9.8%	7.8%	7.5%	7.0%
Industry	18.6	17.3	11.8	11.7	12.0	12.7	-1.5%	-7.4%	-0.1%	1.0%	5.5%
Transport	23.3	26.4	32.2	33.1	35.7	36.8	2.5%	4.1%	0.5%	2.6%	3.0%
Tertiary-Domestic	25.5	24.5	23.0	23.4	24.3	23.6	-0.8%	-1.3%	0.3%	1.3%	-2.9%
Carbon Intensity (tn of CO₂/toe)	1.8	1.6	1.6	1.6	1.6	1.6	-1.3%	-1.1%	0.3%	0.4%	-1.0%
Public Power Generation	0.0	0.0	0.0	0.0	0.0	0.0	-2.1%	-8.8%	-12.7%	19.3%	-72.0%
Public Thermal Power Generation	1.4	1.0	0.7	0.2	0.4	0.1	-6.2%	-8.2%	-17.9%	15.1%	-69.3%
Autoprod. Power Generation	0.2	0.3	0.2	0.2	0.4	0.4	3.5%	-3.3%	2.9%	12.2%	2.6%
Autoprod. Thermal Power Generation	2.8	2.7	2.2	1.9	2.1	2.1	-0.4%	-3.6%	-3.7%	4.5%	0.9%
Energy Branch	0.0	0.1	0.1	0.4	1.0	1.1	-	-0.1%	26.7%	31.3%	13.7%
Industry	2.4	2.3	2.4	2.4	2.5	2.5	-0.5%	1.0%	0.0%	0.4%	-0.1%
Transport	1.7	1.5	1.2	1.1	1.1	1.1	-2.5%	-4.8%	-0.9%	-0.6%	-0.3%
Tertiary-Domestic	3.0	3.0	3.0	3.0	3.0	3.0	0.0%	0.0%	-0.1%	0.0%	0.0%
CO₂ per Capita (kg of CO₂/inhabitant)	6773	6803	6775	6926	7432	7547	0.1%	-0.1%	0.4%	2.4%	1.6%
Industry	1738	1581	1049	1000	1017	1066	-1.9%	-7.9%	-0.9%	0.5%	4.9%
Transport	2181	2419	2877	2838	3024	3099	2.1%	3.5%	-0.3%	2.1%	2.5%
Tertiary-Domestic	2381	2245	2052	2006	2057	1986	-1.2%	-1.8%	-0.5%	0.8%	-3.4%
CO₂ per unit of GDP (tn of CO₂/1990 MEUR)	327	304	276	276	281	283	-1.4%	-1.9%	0.0%	0.5%	0.8%
Public Thermal Power Generation	2	2	1	1	1	0	1.3%	-8.9%	-12.8%	17.3%	-70.4%
Autoprod. Thermal Power Generation	1	2	1	1	2	2	2.8%	-5.5%	3.8%	4.2%	4.9%
Energy Branch	0	0	0	0	0	0	-	23.9%	27.7%	48.9%	19.1%
Industry	19	21	30	41	47	50	1.8%	7.3%	6.5%	5.1%	5.6%
Transport	84	71	43	40	38	40	-3.4%	-9.5%	-1.4%	-1.3%	4.1%
Tertiary-Domestic	105	108	117	113	114	116	0.5%	1.7%	-0.7%	0.3%	1.7%



NORWAY : SUMMARY ENERGY BALANCE

Mtoe	1980	1985	1990	1997	1998	1999	85/80	90/85	97/90	98/97	99/98
	Annual % Change										
Primary Production	55.7	72.8	120.1	212.7	206.7	209.8	5.5%	10.5%	8.5%	-2.8%	1.5%
Solids	0.2	0.4	0.2	0.3	0.2	0.3	11.9%	-10.6%	3.5%	-15.1%	49.1%
Oil	25.0	39.5	84.4	160.8	153.9	153.4	9.6%	16.4%	9.7%	-4.3%	-0.3%
Natural gas	22.8	23.4	24.1	41.0	41.3	44.1	0.5%	0.6%	7.9%	0.8%	6.7%
Nuclear	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-
Hydro & Wind	7.2	8.8	10.4	9.5	9.9	10.4	4.1%	3.4%	-1.4%	4.9%	4.8%
Geothermal	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-
Other	0.6	0.8	1.0	1.2	1.3	1.5	5.7%	5.9%	2.3%	4.5%	17.9%
Net Imports	-36.2	-52.4	-96.3	-187.5	-180.8	-182.3	7.7%	12.9%	10.0%	-3.6%	0.9%
Solids	0.8	0.9	0.7	0.8	0.8	0.7	2.0%	-5.2%	2.5%	5.7%	-15.0%
Oil	-15.1	-31.1	-73.5	-151.6	-144.9	-143.5	15.5%	18.8%	10.9%	-4.4%	-0.9%
Crude oil	-16.1	-31.2	-68.4	-145.7	-138.7	-137.9	14.1%	17.0%	11.4%	-4.8%	-0.6%
Oil products	1.0	0.2	-5.1	-5.9	-6.2	-5.6	-29.4%	-	2.3%	4.7%	-9.2%
Natural gas	-21.9	-22.2	-22.2	-37.1	-37.0	-39.4	0.3%	0.0%	7.6%	-0.1%	6.3%
Electricity	0.0	0.0	-1.4	0.3	0.3	-0.2	3.3%	96.2%	-	-4.9%	-
Gross Inland Consumption	18.8	20.3	21.5	24.4	25.4	26.6	1.5%	1.2%	1.8%	4.2%	4.7%
Solids	1.0	1.2	0.9	1.0	1.1	1.1	3.0%	-5.9%	2.6%	4.1%	-1.1%
Oil	9.2	8.4	8.6	8.4	8.5	9.0	-1.7%	0.4%	-0.2%	1.2%	6.1%
Natural gas	0.9	1.2	2.0	3.9	4.3	4.8	6.3%	10.9%	10.3%	9.8%	10.5%
Other (1)	7.7	9.5	10.1	11.0	11.5	11.7	4.3%	1.1%	1.3%	4.6%	2.0%
Electricity Generation in TWh	83.8	102.7	121.6	110.7	116.1	121.7	4.2%	3.4%	-1.3%	4.9%	4.8%
Nuclear	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-
Hydro & wind	83.6	102.4	121.1	110.0	115.4	120.9	4.1%	3.4%	-1.4%	4.9%	4.8%
Thermal	0.1	0.3	0.5	0.7	0.7	0.8	20.4%	6.1%	6.4%	1.4%	12.5%
Generation Capacity in GWe	20.0	23.7	27.1	27.7	28.4	28.6	3.4%	2.8%	0.3%	2.3%	0.9%
Nuclear	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-
Hydro & wind	19.8	23.4	26.9	27.4	28.1	28.3	3.4%	2.8%	0.3%	2.4%	0.9%
Thermal	0.2	0.3	0.3	0.3	0.3	0.3	1.5%	-0.3%	2.3%	-6.5%	0.4%
Average Load Factor in %	47.8	49.6	51.2	45.6	46.7	48.6	0.7%	0.6%	-1.6%	2.5%	3.9%
Fuel Inputs for Thermal Power Generation	0.0	0.1	0.1	0.1	0.1	0.2	22.9%	1.3%	3.6%	3.6%	9.1%
Solids	0.0	0.0	0.0	0.0	0.0	0.0	20.1%	12.5%	-0.4%	-2.9%	11.8%
Oil	0.0	0.1	0.0	0.0	0.0	0.0	19.8%	-50.7%	-100.0%	-	-
Gas	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-7.7%	29.2%
Geothermal	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-
Other	0.0	0.0	0.1	0.1	0.1	0.1	-	42.3%	1.4%	10.4%	2.4%
Average Thermal Efficiency in %	32.7	29.5	37.1	44.4	43.5	44.9	-2.1%	4.7%	2.6%	-2.1%	3.2%
Non-Energy Uses	1.6	1.9	1.8	1.9	1.8	1.7	4.1%	-1.0%	0.2%	-3.9%	-6.5%
Total Final Energy Demand	14.8	15.9	16.3	17.7	18.4	18.8	1.4%	0.5%	1.2%	4.4%	1.7%
Solids	0.9	1.1	0.8	1.0	1.1	1.0	2.5%	-4.9%	2.5%	9.1%	-5.5%
Oil	6.9	6.2	6.1	6.5	6.7	6.9	-2.1%	-0.2%	0.9%	2.4%	3.6%
Gas	0.0	0.0	0.0	0.0	0.0	0.0	-100.0%	-	-	-	-
Electricity	6.4	7.9	8.3	8.9	9.4	9.3	4.1%	1.2%	1.0%	5.3%	-1.2%
Heat	0.0	0.0	0.1	0.1	0.1	0.1	-	14.3%	6.4%	6.1%	9.9%
Other	0.6	0.8	1.0	1.1	1.2	1.4	5.3%	4.7%	2.5%	4.3%	19.2%
CO₂ Emissions in Mt of CO₂	28.4	28.0	29.9	36.9	38.8	40.4	-0.3%	1.3%	3.0%	5.3%	4.0%
Indicators											
Population (Million)	4.09	4.15	4.24	4.41	4.43	4.46	0.3%	0.4%	0.5%	0.6%	0.7%
GDP (index 1985=100)	85.7	100.0	108.6	142.0	145.0	146.3	3.1%	1.7%	3.9%	2.1%	0.9%
Gross Inl Cons./GDP (toe/1990 MEUR)	262.6	243.0	236.8	205.6	209.8	217.8	-1.5%	-0.5%	-2.0%	2.1%	3.8%
Gross Inl Cons./Capita (toe/inhabitant)	4.60	4.88	5.06	5.53	5.73	5.96	1.2%	0.7%	1.3%	3.6%	4.0%
Electricity Generated/Capita (kWh/inhabitant)	20497	24736	28675	25142	26201	27280	3.8%	3.0%	-1.9%	4.2%	4.1%
CO ₂ Emissions/Capita (t of CO ₂ /inhabitant)	7.0	6.7	7.0	8.4	8.8	9.0	-0.6%	0.9%	2.5%	4.6%	3.3%
Import Dependency %	-190.0	-254.4	-439.4	-740.1	-687.1	-663.9	6.0%	11.5%	7.7%	-7.2%	-3.4%

(1) Includes nuclear, hydro and wind, net imports of electricity, and other energy sources.



TURKEY : SUMMARY ENERGY BALANCE											
Mtoe	1980	1985	1990	1997	1998	1999	85/80	90/85	97/90	98/97	99/98
	Annual % Change										
Primary Production	17.1	21.6	25.5	27.4	28.5	26.9	4.8%	3.4%	1.1%	4.0%	-5.7%
Solids	6.2	10.7	12.4	13.1	13.9	13.3	11.6%	3.1%	0.8%	6.3%	-4.7%
Oil	2.3	2.1	3.6	3.4	3.2	2.9	-1.4%	11.3%	-0.8%	-6.5%	-8.8%
Natural gas	0.0	0.1	0.2	0.2	0.5	0.6	-	26.0%	2.5%	123.6%	29.5%
Nuclear	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-
Hydro & Wind	1.0	1.0	2.0	3.5	3.7	3.1	1.2%	14.2%	8.2%	6.5%	-17.0%
Geothermal	0.0	0.0	0.1	0.2	0.2	0.2	-	76.2%	11.2%	26.3%	-10.6%
Other	7.7	7.7	7.2	7.0	7.0	6.8	0.2%	-1.4%	-0.4%	-0.5%	-2.5%
Net Imports	14.4	17.5	28.1	42.7	43.4	43.3	3.9%	10.0%	6.1%	1.7%	-0.1%
Solids	0.5	1.6	4.2	7.5	7.8	6.7	25.7%	20.6%	8.6%	4.5%	-14.7%
Oil	13.8	15.6	21.3	26.8	26.8	26.4	2.5%	6.4%	3.3%	0.1%	-1.6%
Crude oil	11.0	16.1	20.8	23.2	23.6	22.8	8.0%	5.3%	1.5%	1.7%	-3.2%
Oil products	2.8	-0.5	0.4	3.6	3.2	3.6	-	-	35.7%	-10.3%	10.0%
Natural gas	0.0	0.0	2.7	8.2	8.5	10.1	-	-	17.3%	3.5%	18.9%
Electricity	0.1	0.2	-0.1	0.2	0.3	0.2	9.9%	-	-	35.1%	-32.2%
Gross Inland Consumption	31.5	39.1	52.7	70.5	71.7	70.3	4.5%	6.1%	4.3%	1.7%	-1.9%
Solids	7.0	12.1	16.9	21.2	22.0	20.1	11.5%	7.0%	3.2%	3.9%	-8.7%
Oil	15.7	18.1	23.6	30.1	29.6	29.4	2.8%	5.5%	3.5%	-1.7%	-0.6%
Natural gas	0.0	0.1	2.9	8.3	8.9	10.6	-	120.3%	16.5%	7.3%	18.4%
Other (1)	8.8	9.0	9.2	10.9	11.2	10.3	0.5%	0.6%	2.4%	2.8%	-8.2%
Electricity Generation in TWh	23.3	34.2	57.5	103.3	111.0	116.4	8.0%	11.0%	8.7%	7.5%	4.9%
Nuclear	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-
Hydro & wind	11.3	12.0	23.1	39.8	42.2	34.7	1.2%	14.0%	8.1%	6.1%	-17.9%
Thermal	11.9	22.2	34.4	63.5	68.8	81.8	13.2%	9.2%	9.1%	8.4%	18.9%
Generation Capacity in GWe	5.1	9.1	16.3	21.6	22.2	23.4	12.2%	12.3%	4.1%	3.0%	5.1%
Nuclear	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-
Hydro & wind	2.1	3.9	6.8	9.9	10.1	10.3	12.7%	11.8%	5.6%	1.7%	2.0%
Thermal	3.0	5.2	9.6	11.6	12.1	13.0	11.9%	12.7%	2.9%	4.1%	7.7%
Average Load Factor in %	51.9	42.8	40.3	54.6	57.0	56.9	-3.8%	-1.2%	4.5%	4.4%	-0.2%
Fuel Inputs for Thermal Power Generation	3.4	6.0	9.1	15.9	17.3	19.3	12.4%	8.5%	8.3%	8.9%	11.3%
Solids	1.9	4.2	5.7	9.4	10.2	10.5	17.4%	6.4%	7.5%	8.3%	2.5%
Oil	1.5	1.8	1.2	2.0	2.3	2.3	4.3%	-8.2%	7.8%	14.0%	-1.1%
Gas	0.0	0.0	2.1	4.2	4.6	6.3	-	169.4%	10.1%	10.5%	37.0%
Geothermal	0.0	0.0	0.1	0.1	0.1	0.1	-	69.0%	0.4%	2.8%	-4.1%
Other	0.0	0.0	0.0	0.2	0.1	0.1	-	-	-	-50.6%	16.5%
Average Thermal Efficiency in %	30.6	31.6	32.6	34.4	34.2	36.5	0.7%	0.6%	0.8%	-0.5%	6.8%
Non-Energy Uses	0.9	1.4	2.8	4.3	4.9	3.8	10.9%	14.8%	6.2%	13.0%	-23.1%
Total Final Energy Demand	26.3	30.4	38.5	50.6	50.1	49.4	3.0%	4.8%	4.0%	-1.0%	-1.3%
Solids	4.8	6.9	8.7	10.3	10.3	8.5	7.6%	4.7%	2.4%	-0.4%	-16.8%
Oil	12.1	13.2	18.1	22.9	21.6	22.3	1.8%	6.5%	3.4%	-5.8%	3.0%
Gas	0.0	0.1	0.5	3.4	3.6	3.9	14.3%	48.4%	30.1%	6.0%	7.5%
Electricity	1.7	2.4	3.9	6.9	7.4	7.7	7.8%	9.6%	8.5%	7.6%	4.7%
Heat	0.0	0.0	0.0	0.1	0.2	0.1	-	-	31.4%	41.7%	-13.7%
Other	7.7	7.7	7.2	6.9	7.0	6.8	0.2%	-1.4%	-0.6%	1.0%	-2.5%
CO₂ Emissions in Mt of CO₂	71.3	94.1	127.6	180.0	181.4	182.0	5.7%	6.3%	5.0%	0.8%	0.3%
Indicators											
Population (Million)	44.44	50.31	56.20	63.75	64.79	65.82	2.5%	2.2%	1.8%	1.6%	1.6%
GDP (index 1985=100)	78.9	100.0	131.1	176.6	181.5	172.4	4.9%	5.6%	4.4%	2.8%	-5.0%
Gross Inl Cons./GDP (toe/1990 MEUR)	441.6	433.3	444.8	441.8	437.3	451.6	-0.4%	0.5%	-0.1%	-1.0%	3.3%
Gross Inl Cons./Capita (toe/inhabitant)	0.71	0.78	0.94	1.11	1.11	1.07	1.9%	3.8%	2.4%	0.1%	-3.4%
Electricity Generated/Capita (kWh/inhabitant)	524	680	1024	1620	1714	1769	5.4%	8.5%	6.8%	5.7%	3.2%
CO ₂ Emissions/Capita (t of CO ₂ /inhabitant)	1.6	1.9	2.3	2.8	2.8	2.8	3.1%	4.0%	3.2%	-0.9%	-1.3%
Import Dependency %	45.8	44.5	53.3	60.4	60.4	61.4	-0.6%	3.6%	1.8%	-0.1%	1.6%

(1) Includes nuclear, hydro and wind, net imports of electricity, and other energy sources.





The partition of Central and Eastern European countries into two groups does not accurately reflect the geographical and political situation. It originates purely from statistical conventions and practices. The geographical grouping of the Baltic States is introduced to complete the energy presentation to cover all regions of the world. Given the complexities and differences between national, OECD and SOEC statistical conventions, attempts to integrate Estonian, Latvian and Lithuanian energy statistics prior to 1991 into the CEEC summary sheet gave unsatisfactory results, thus necessitating the current ad hoc solution.

A major characteristic of these countries is the fact that 10 of them are candidates for eventual entry into the European Union: Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia. The negotiations opened on 31 March 1998 with Hungary, Poland, Estonia, the Czech Republic and Slovenia, and on 15 February 2000 with Romania, Slovakia, Latvia, Lithuania and Bulgaria. In accordance with the

guidelines for the negotiations approved by the Luxembourg European Council and confirmed by the Helsinki European Council, each candidate proceeds at its own pace, depending on its degree of preparedness. Each candidate is assessed on its own merits and will join the European Union when it is able to meet the obligations of membership. The negotiations are conducted in bilateral accession conferences between the member states and each applicant. The acquis has been divided into 31 chapters for the negotiations. After three years of negotiation with the first five countries, 29 chapters (all chapters dealing with the acquis except 'institutional questions' and 'other questions') have been opened and 18 to 23 chapters have been provisionally closed. With the countries which started negotiations in 2000, three of them, Slovakia, Latvia and Lithuania, presented a similar situation with 18 to 20 chapters provisionally closed. Bulgaria and Romania have respectively only 23 and 17 chapters opened at the present stage.

Central and Eastern Europe: Major trends (1980-1999)

- Driven by Poland, GDP rebounded after 1994 with contrasting evolution by country
- Since 1988 both gross inland energy consumption (-32%) and energy production (-38%) declined sharply
- Since 1994, despite GDP growth, final energy demand continued to decline taking advantage of energy saving potential
- The share of transport doubled since 1985 while that of industry declined by a quarter
- Increasing share of electricity in final energy demand, but still well below the European Union average
- Contribution of solid fuels in gross inland energy declined sharply but still dominated
- Large reduction of energy production despite ongoing restructuring and upgrading of the energy sector
- Eastern countries represented only 2% of world fossil fuel reserves, all of them concentrated on solids
- Solid fuels dominated electricity production which experienced improving efficiency
- International concerns remained about nuclear safety and commissioning of new power stations
- Reform and privatisation of the power industry are continuing
- Refinery industry in need of further restructuring and upgrading with the support of foreign capital
- Energy intensity improvement accelerated with the efforts to satisfy EU membership criteria
- Improvement in energy intensity driven by industry and the tertiary-domestic sector
- CO₂ emissions reduced by 28% since 1990
- Energy import dependency increased regularly since 1994

This region includes the following countries: Albania, Bulgaria, the Czech Republic, Hungary, Poland, Romania, the Slovak Republic and the Republics of the former Yugoslavia which together represent a stable population of around 122 million inhabitants. The "former Yugoslavia" still includes, for statistical reasons related to the political situation prevailing in this region since 1992, all the republics emerging from the partition of that country. For the most recent years (covering 1992-1999), when available, data for the newly formed independent states, especially for Slovenia, have been presented to complement the existing aggregate data.

Driven by Poland GDP rebounded after 1994 with contrasting evolution by country

Eastern European countries have undergone major reforms of their political and economic structures since the early 1990s: industrial restructuring and privatisation, establishment of viable legal structures, regulatory systems, reform of capital markets and trade policies... As a consequence of this transition period, structural reforms induced a deep recession between 1990 and 1993 in all countries except Poland. On average, GDP diminished by 12.5%

¹ Analysis excludes the former Yugoslavia for obvious statistical reasons.





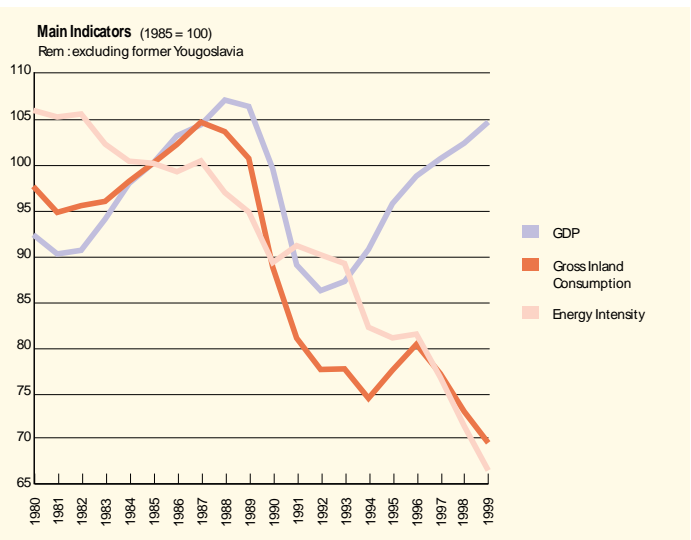
during this period for the whole region with major reductions in Slovakia (-23%), Romania (-19%), Bulgaria (-16%), Hungary (-15%) and the Czech Republic (-14%). Thereafter these eastern countries have begun to rebound from the region's economic setback. Since 1994 they have experienced positive levels of **economic growth**, 3.1% per year on average since 1994 even though different countries experienced contrasting patterns. Poland, the dominant economy in the region, accounting for about 39% of its total GDP, experienced an average growth of 3.6% per year since 1990 and an even more impressive average growth of 5.7% per year since 1993. But Poland remained the exception of the region. Amongst the other countries, Slovakia, the Czech Republic and Hungary recovered in the last six years the losses experienced during the transition period and were close to their 1990 level. But the economic situation continued to deteriorate in Romania (-0.5% per year since 1993) and Bulgaria (-1.3%). Average real GDP growth for the Central and Eastern European countries was 2.2% in 1998 and -0.3% in 1999. After becoming negative in the second half of 1998 for most countries, GDP continued to be depressed throughout 1999 in the wake of the CIS economic situation. Hungary and Poland, at 4.8% and 4.4% on average res-

Main items

Until 1990 the Central and East European economies formed an integral part of the Soviet sphere of influence. Since then these countries have experienced - with very different momentum - major cultural, economic and political changes. By no means are they an homogenous grouping of countries. In particular, the enthusiasm for reform and the recovery of economic growth have varied markedly. The Czech Republic, Hungary, Poland and the Slovak Republic are now members of the OECD. For these, and some other, countries the goal is now membership of the European Union. Adoption of radical reform programmes is the key to more sustained economic growth and to wider economic and political co-operation. Such measures include convergence of financial, legal, regulatory and social policy frameworks; as well as market liberalisation, changes in agricultural practices, and privatisation of many state-owned enterprises. The CEEC countries have experienced significant reductions in indigenous energy production (especially coal) and energy consumption. Structural changes in energy-intensive heavy industries have reduced their historically high energy intensities. These structural changes, coupled with the decline in coal use and a shift in energy prices towards market-related levels, have led to a 28% fall in CO₂ emissions since 1990. Even so, in 1999 CO₂ emissions per unit of GDP in the CEEC were still six times higher than those in the EU. This suggests there is very considerable scope for further improvement, associated with widespread modernisation and the scrapping of less efficient appliances and capital equipment. In this way, economic growth can be largely de-coupled from incremental environmental emissions.

CEEC : GDP (1985=100)

	1985	1990	1994	1995	1996	1997	1998	1999
CEEC	100.00	99.44	90.56	95.64	98.62	100.52	102.22	104.53
Poland	100.00	98.45	102.64	109.87	116.52	124.51	130.46	135.81
Hungary	100.00	104.12	91.02	92.37	93.60	97.89	102.84	107.47
Czech Republic	100.00	108.18	96.13	102.23	106.23	107.27	104.41	104.16
Slovakia	100.00	107.18	86.29	92.26	98.30	104.69	109.30	111.41
Bulgaria	100.00	107.77	91.78	94.40	84.83	78.86	81.62	83.58
Romania	100.00	85.96	72.06	77.19	80.21	74.92	69.29	67.21



pectively, maintained the highest growth rates. The Czech Republic and Romania remained in recession with negative growth of -1.5% and -5.3%, respectively. Bulgaria returned to positive real GDP growth of 3.5% in 1998 and 2.4% in 1999. Slovakia also demonstrated a significant rebound of its economy with GDP growth of 4.4% in 1998 and 1.9% in 1999. Growth surged in the Central and Eastern European countries in 2000, but in many countries high inflation persisted and external current account deficits remained large, reflecting strong domestic demand and higher world oil prices. Current account deficits were largely financed by foreign direct investment, which in turn was supported by the prospect in many countries of eventual accession to the European Union. A rebalancing of the policy mix toward a relative





vely tighter fiscal policy would help restrain domestic demand while limiting upward pressures on interest rates and exchange rates, which would adversely affect net exports and private investment. To promote sustainable growth in the medium term and ensure continued progress toward EU accession, further structural and institutional reforms are needed, notably in privatisation, enterprise restructuring, financial regulation and supervision, labour market reform, and pension and health care systems.

ENERGY OUTLOOK

Since 1988 both gross inland energy consumption (-32%) and energy production (-38%) declined sharply

Eastern countries, as in the CIS, have demonstrated large variations in energy consumption since the beginning of the economic and structural reforms. In addition, these countries were characterised, before 1990, by the world's highest energy intensity after the Former Soviet Union. This situation resulted from an industrial structure based on energy-intensive industries (steel, cement, chemicals...) using energy inefficiently; and very low energy prices as energy consumption was largely supplied from the Former Soviet Union at prices that were usually well below world market levels. Given the economic crisis faced by the Central and Eastern European countries since 1988, a common downward trend has been observed in both energy production (-38% between 1988 and 1999), and gross inland energy consumption (-32%). Both at production and consumption levels, solid fuels suffered the most with a fall in production of 41% and of consumption by 44%. This evolution is of importance in the context of the Kyoto Protocol because the energy circumstances of both Central and Eastern countries and the CIS have slowed down the growth of global energy consumption and hence the growth of greenhouse gas emissions. Given the very large potential for energy saving, which will stabilise energy consumption despite further economic growth - as already experienced since 1995 - Eastern countries are pro-

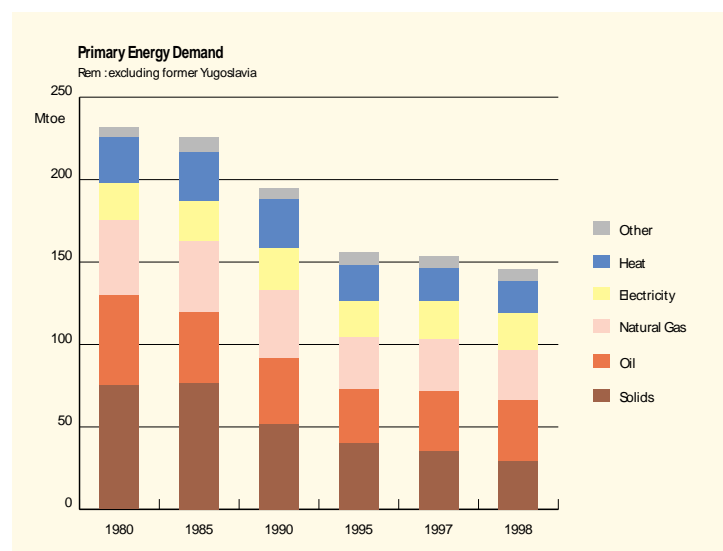
jected to generate net carbon credits in relation to Kyoto Protocol goals and to participate fully in the new market for emission permits to be developed in the near future.

Since 1994, despite GDP growth, final energy demand continued to decline taking advantage of energy saving potential ...

Final energy demand peaked in 1987 (258.7 Mtoe) and has declined since then by 35%, or 3.9% per year on average, to reach a minimum of 167.7 Mtoe in 1998. The bulk of the reduction occurred between 1988 and 1993 during the transition period with a total reduction of about 32% in only five years. The slowdown of economic activity, the massive closure of old energy-inefficient factories and increasing energy prices progressively aligned to world energy market levels explained this rapid decline. Between 1994 and 1997 the improvement of energy intensity generated by the introduction of energy saving measures contributed to a stabilisation of final energy demand while GDP increased by 11%. Since 1997, influenced by the in-depth restructuring and modernisation of all economic sectors permitted by the sustained GDP growth, final energy demand declined again, demonstrating the large energy saving potential. Since 1987 the reduction of energy demand affected energy forms in different ways: solid fuel (-61% between 1987 and 1998), distributed heat (-31%), gas (-27%), oil products (-15%) and electricity (-14%). The reduction of solid fuel consumption resulted from the drastic reduction of direct uses for steam and heat production in all sectors (-51% in industry and -76% in tertiary-domestic) and from the marked slowdown of steel production. Between 1992 and 1997, solid fuel consumption increased slowly in industry (+8%) but declined sharply in 1998 (-12%), and declined continuously in tertiary-domestic. The evolution of gas consumption has been influenced by new supply arrangements imposed by Russia which started to invoice its sup-

TOTAL FINAL ENERGY DEMAND

Mtoe	1988	1993	1998
Solids	77.0	41.4	29.3
Oil	45.0	31.5	37.1
Gas	44.2	26.6	30.4
Electricity	26.7	20.8	22.3
Heat	29.0	29.3	19.4
Other	7.3	6.7	7.2
Total	229.2	156.3	145.7





plies at world market prices instead of the special conditions prevailing before 1989. Consequently, between 1989 and 1992, gas consumption fell by 40%. Since the regularisation of supplies gas use increased on average at 5.0% per year until 1996. Gas consumption decreased again by 3% in 1997 and 4.6% in 1998, the reduction of gas demand by industrial sectors not being compensated by increasing consumption in the tertiary-domestic sector where major substitution occurred away from oil products and solids. Oil, sustained by increasing demand from the transport sector given a growing number of private cars associated with rising private incomes and by the growing demand from industrial sectors, limited its overall decline to 13%; but oil use experienced a 45% reduction in the tertiary-domestic sector and a 36% reduction in industry. Since 1993, demand for transportation fuels increased by 5.4% a year on average. Given the reduction of consumption of all other fuels, demand for oil products increased in each sector in both 1997 and 1998. Distributed heat consumption, equally split between industry and space heating in 1987, remained stable between 1987 and 1993, but declined by 33% since then as a result of industrial restructuring. Tertiary-domestic consumption remained unchanged despite tariff increases largely because of the continued absence of systematic metering of consumption. Electricity demand suffered between 1987 and 1993 from the restructuring of industry that reduced industrial use by 40%. Between 1993 and 1996 the modernisation of industry and improvements in standards of living have raised electricity demand by 2.4% per year on average but, since then, it has declined slowly given lower industrial demand.

The share of transport doubled since 1985 while that of industry declined by a quarter...

The share of the **transport** sector in final energy consumption increased from 9.5% in 1985 to 17.7% in 1998, to the detriment of industry (37.1% in 1998 vs. 49.1% in 1985) while the share of tertiary-domestic increased slowly (45.2% in 1998 vs. 41.3% in 1985). Growth in transport fuel demand resulted from increased motorization, demand for new cars reaching about 1.7 million vehicles in 1998 and increasing demand for goods transportation. On the other hand, energy statistics must be treated with great caution as, until recently, energy consumption for transportation in industry was partly aggregated with industrial energy consumption. Recent statistical improvements, especially better accounting of transport consumption, explain the unexpected growth in transport fuel use in Poland, the Czech Republic and Romania in 1996. As a result of this statistical disruption, transport energy demand increased by 15% in 1996. The high contribution of **industry**, compared to other industrialised countries, reflects the predominance of heavy industries based on old technologies inherited

from the socialist regime. Recent changes result from the modernisation of industrial processes and diversification to industries with higher added values. This evolution was sustained by privatisation of state companies and impressive foreign investment. Nevertheless energy intensity of industry is still five times higher than in the European Union, demonstrating the large potential for energy savings and continuing reduction of industry's share in final energy consumption. The limited increase of the share of the **tertiary-domestic** sector resulted from two main factors. At the domestic level, consumption per capita decreased significantly over the last ten years by 27%, the major part of this reduction being observed before 1994. This was largely caused by increasing tariffs to reflect the real price of energy even though effective metering of energy consumption, mainly for heating uses, is still not yet widespread. On the other hand, services and commercial activities, the energy consumption of which declined sharply before 1992 following the restructuring of public services, are still at an early stage of development and will continue to increase their energy demand in the future even if efficient technologies are utilised. Since 1987, the share of services and commercial activities in the tertiary-domestic energy demand increased from 14.8% to 18.1% and expectations about GDP growth indicated that this trend will be reinforced in the near future.

Increasing share of electricity in final energy demand, but still well below the European Union average...

The share of electricity in final consumption reached 16.5% in 1998 from 12.4% in 1985. It must be stressed that electricity's share of the transport sector is higher than in the OECD region for two reasons: a larger role for railways in long distance transport and the electrification of public transport (trams and trolley buses) in a number of large and medium sized cities. A major evolution was observed in the tertiary-domestic sector where electricity's share increased from 10.6% in 1985 to 20.2% in 1998. This indicator varied widely across the region with lower shares of 10.1% in Romania and 13.5% in Poland but above the European Union average in three countries: the Czech Republic with 27.5%, Bulgaria with 38.5% and Albania with 49.5%. There are no obvious reasons to explain such large discrepancies between similar countries and it illustrates that energy statistics must be treated very cautiously - in particular concerning the accounting of non-commercial energy sources especially those consumed in the tertiary-domestic sector. The volume of electricity sold in this sector increased by 2.2% a year over the last ten years but it remained stable in 1997 and 1998. In industry the share of electricity increased more slowly as consumption declined by some 5% per year during the transition period as a result of restructuring and closure of obsolescent factories. Since 1992, electricity consumption



fluctuated around the 1992 value despite the rebound of industrial production and the diversification to higher added value industries where electricity use is favoured. Consequently the share of electricity in industrial energy demand increased from 14.3% in 1985 to 18.2% in 1998, only two-thirds of the European Union average.

Contribution of solid fuels in gross inland energy declined sharply but still dominated...

Gross inland energy consumption, which declined regularly by about 2.2% per year on average since 1990, was dominated by solid fuels (42% in 1999 from 47% in 1990 and 51% in 1980), followed by oil (26% in 1999 from 24% in 1990 and 27% in 1980) and gas (20% in 1999 as in 1990 vs. 17% in 1980). Fossil fuel consumption by the power sector fell, especially of solid fuels, accentuating the trend observed for these fossil fuels in final consumption. The contribution of nuclear increased sharply during the 1980s to reach about 15 Mtoe but remained stable since then while hydro and biomass remained stable in volume, perceptibly increasing their shares. The decline of energy consumption accelerated in the last three years: -2.9% in 1997, -4.3% in 1998 and -5.3% in 1999 but this regional trend masked very large national variations. On the one hand, Polish energy consumption contracted by 12% in only three years as a result of economic restructuring and energy saving policies even though GDP grew by 17% in the same period. In contrast gross inland energy consumption declined by 18% in Bulgaria and 20% in Romania respectively due to poor economic performance, especially in Romania, associated with the Kosovo War in 1997-1998. Since the peak of 1987, the total reduction of consumption of about 124 Mtoe has been split between solid fuels (86 Mtoe), oil (20 Mtoe) and natural gas (18 Mtoe), while the contribution of non-fossil energy sources increased by 2 Mtoe. Over the last three years, the major fall in consumption was concentrated on solids (-27.7 Mtoe or -20%) with the bulk of the reduction located in Poland and to a lesser extent in the Czech Republic; and on natural gas (-10.6 Mtoe or -17%) - consumption of which declined significantly in Bulgaria and Romania while remaining unchanged in other countries.

Poland, the key **coal** consumer in Eastern countries with a consumption of about 63 Mtoe in 1999, accounted for about 57% of the region's total use. Coal consumption fell by 13 Mtoe in the last three years, associated with coal industry restructuring. In other countries, coal consumption is dominated by use of low-BTU sub-bituminous coal and lignite, produced from local reserves. The second largest consumer was the Czech Republic where solid fuels consumption based on indigenous production reached 16 Mtoe in 1999 and met about 44% of gross inland consumption against 62% in 1990. These two countries accounted for 80% of regional solid fuel consumption

Candidate countries must increase their environmental standards in order to achieve the conditions for their accession to the European Union. Increased consumption of **natural gas**, as an alternative to coal principally for power generation and industrial applications, is considered to be a key component of countries' energy policies to meet these stricter regulations. However, gas consumption has not increased as quickly as expected but - on the contrary - declined by 14% since 1996. Consumption increased slowly in the Czech Republic, actively working to meet European environmental standards, and Slovakia. In two other countries, Hungary and Poland, consumption mainly by final consumers declined slowly but, compared to the 1990 level, the increase remained significant. The spectacular decline in Romania, where natural gas constituted by far the largest energy source, is explained by the large overall reduction in energy consumption stemming from the very poor economic performance. The decline in Romanian gas consumption since 1990 reached an astonishing 50%. For the same economic reasons gas consumption experienced a similar trend in Bulgaria with a fall of 43% since 1990. Because regional gas reserves are limited, the expected increase in consumption in the near future will be met by imports, consequently increasing import dependency. Russia is currently the only major source of imported gas. However, efforts to diversify supply sources are underway. Poland and the Czech Republic have signed agreements with Norway to diversify their supply. Existing regional infrastructure cannot support significant imports from non-Russian sources, so pipeline development is under consideration to permit diversification of suppliers.

Consumption of **oil products** stabilised since 1995, but with marked differences between countries. Poland, which accounted for 35% of total oil consumption in the region, demonstrated a continuous increase since 1990 at about 4% per year on average but the annual growth rate fell sharply since 1996 to reach less than 1%. All final demand sectors in Poland contributed to this increase. Since 1993 oil consumption also increased in the Czech Republic but the 1999 consumption still remained below the 1990 level. Oil consumption fluctuated in a small range in Hungary and Slovakia over the last five years, with increases in the transport sector being offset by reduction of consumption in others sectors. Finally oil consumption declined sharply in Romania and Bulgaria with major reductions in all final sectors since 1990.

The contribution of non-fossil fuels increased steadily. Nuclear grew by 1.3% per year on average since 1990, mainly the result of new commissioning at the Cernadova power plant in Romania and at Kozloduy in Bulgaria, whilst the contribution of other countries remained flat. Hydro production increased by 50% since 1990, Romania accounting for about 50% of the additional production. Use of biomass grew 1.4% per year on average, led by

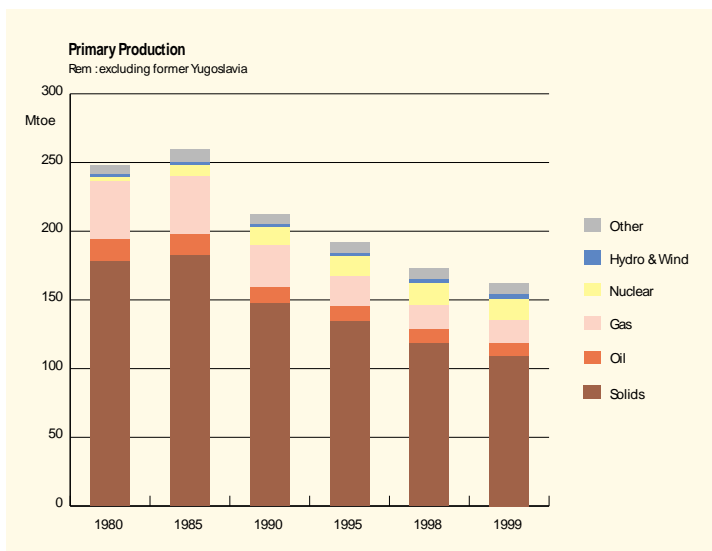




Romania and Bulgaria but Poland remained by far the market leader with about 55% of regional consumption.

Large reduction of energy production despite ongoing restructuring and upgrading of the energy sector...

Indigenous **energy production** has reflected these shifts in gross inland energy consumption driven by the in-depth restructuring of the economies of these countries. The energy sector itself has also been seriously affected by restructuring, investment to improve obsolete equipment and closure of unprofitable facilities. Since 1985 the reduction of fossil fuel production (80 Mtoe for solid fuels, 26 Mtoe for gas and 7 Mtoe for oil) has only been partly compensated by a small increase in nuclear output (8 Mtoe). These reductions were very significant: -58% for natural gas, -40% for solids and -38% for oil. The main reductions in indigenous production occurred in Poland and the Czech Republic (for solid fuels) and in Romania (for oil and gas).



Poland is the key **coal** producer in Eastern Europe. Poland's hard coal industry produced 66 Mtoe in 1998 versus a peak of 81 Mtoe in 1996, and lignite producers contributed an additional 13 Mtoe. At present, Poland's hard coal industry is operating at a loss. Over the past few years, a number of coal industry restructuring plans have been proposed to transform Poland's hard coal industry into a position of positive earnings, thus eliminating the need for government subsidies. In May 1998, Poland announced a comprehensive restructuring programme for the coal industry aimed at maximising efficiency and paying off some of the industry's then \$4.5 billion debt. In 2000, Poland closed 22 coal mines and partially closed seven others, with about 16,000 miners leaving the industry. (The restructuring plan aims to reduce the number of miners by nearly one-half, from 245,000 in 1998 to 128,000 by 2002). This reduced production by about 10.3 million tons, but the coal mining industry was profitable for the first time, and has continued to be profitable into 2001. Privatisation of mines is just

beginning, with the Bogdanka mine, one of Poland's most profitable, approved for a 45% sale to Management Bogdanka, a private company that is a consortium of investors. In addition, the World Bank has indicated its willingness to lend the Polish government up to \$1 billion over a 3-year period to cover the costs of this radical restructuring programme, including economic assistance for miners leaving the industry. The changes brought about by this coal restructuring programme will have positive economic and environmental implications, which are important for Poland's accession to the European Union. The Czech coal industry is also currently being restructured and privatised, in part to meet the requirements for European Union membership in 2003.

The Czech Republic's coal mining industry, which used to be one of the traditional pillars of the domestic economy, has also experienced a thorough restructuring and paring down of activities in the last few years. A programme for restructuring the Czech coal industry was approved by the government in December 1992. On the basis of this document, former state-owned coal mining companies were transformed into five large and two small commercial mining companies. In addition, the Czech government has reduced the number of inefficient mines in operation, cut the coal mining labour force, and increased awareness of environmental issues to bring the country in line with EU standards. As a result, the production of lower-quality brown coal, used mainly by power-producing and heavy industries, has been reduced significantly. The Czech government anticipates the closure of around 20 mines in 2000. However, with many of the most inefficient mines already closed down, total coal production is expected to decrease only moderately in the near future. Despite the reduction in coal output, coal remains the Czech Republic's most important fuel source, accounting for 80% of primary energy production in 1999.

Foreign investment will be critical for the development of the **natural gas** industry in the main producers: Romania (65% of the region's production), Poland (19%) and Hungary (15%). In the difficult transition to a market economy, Romania's natural gas production has fallen precipitously in the last twenty years to represent in 1999 only one third the level in 1980. In addition to developing new production infrastructure, all countries also need to refurbish or replace ageing pipes and to upgrade existing storage. Shell is exploring a possible joint venture with Romgaz, the Romanian state gas company, to rejuvenate gas fields where production has declined, to expand the gas distribution network and to increase gas storage facilities. In June 2000, the Romanian government approved the reorganisation of Romgaz, in order to comply with European Union regulations and to continue the liberalisation of its energy sector. Romgaz is to be restructured into four business units: Transgaz, for transport; Depogaz, for





underground storage of natural gas; Exprogaz, to make and trade in oil products and carry out hydrocarbon exploration; and a distribution company with two subsidiaries.

Regional production of crude oil remains limited. The main producer, Romania, accounted for more than 66% of regional production but its output was only 6.2 Mtoe in 1999. The Romanian government has committed itself to increasing domestic production of oil and gas in order to reduce the country's reliance on imports. The removal of state price ceilings, plus relatively high world oil prices, have induced SNP Petrom, the national oil company, to re-open some of its mothballed oil wells. Romania is also opening up its oil and gas sector to outside investors: in 1996, the government opened 15 oil and gas blocks for exploration. The introduction of Western technology and production methods is expected to boost Romania's reserves and production in the next few years. Privatisation of SNP Petrom, the state oil company, has proceeded slowly. The government has undertaken a gradual programme to revitalise the company and prepare it for partial privatisation, including liberalising prices, closing its most inefficient operations, and selling some of the more profitable ones. Oil from Russia, delivered by pipeline and tanker, satisfies much of the overall demand in these Eastern countries.

Eastern countries represented only 2% of world fossil fuel reserves, all of them concentrated on solids...

Eastern countries' oil reserves at end 1999 amounted to only 0.2% of world reserves, with the major part concentrated in Romania. The situation was comparable for gas reserves which represented only 0.4% of world gas reserves, of which more than 60% were also located in Romania. Finally, coal reserves, mainly located in Poland, accounted for 3.1% of world reserves. As a result, Eastern countries represented only 2% of total world fossil fuel reserves.

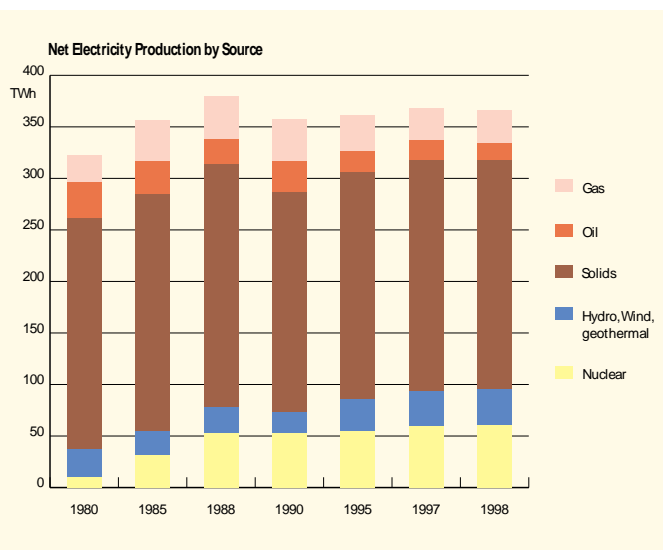
Solid fuels dominated electricity production which experienced improving efficiency...

Electricity is mainly produced by thermal power stations (72% in 1998 declining from 81% in 1985); followed by nuclear (15% in 1998 increasing from 8% in 1985) and hydro (13% in 1998 thanks to a major jump in 1995-1996 following quite stable production since 1985). Thermal power stations are mainly fired by solid fuels (about 82% in 1998 against 76% in 1985); oil and gas, with 6% and 11% respectively, supplied the rest.

Electricity generation peaked at 385 TWh in 1989, yet only reached 369 TWh in 1997. Thus it has not been necessary to expand capacity since 1987. But as the power industry's generating capacity is old, inefficient and highly polluting, huge investment has been required to refurbish existing plants with the aim of improving their performance, cutting production costs and reducing their environmental impacts. The use of low-quality coal, combined with an absence of adequate environmental control equipment, has led to acute environmental pollution problems in Central and Eastern European countries, particularly acid rain. Some efforts have been undertaken by countries in the region to improve the environmental performance of coal-fired plants. Low NOx burners are being installed in Poland and there are also plans to use them in Bulgaria and Romania. Circulating fluidised bed combustion boilers are being installed or planned in Poland and Romania. Electrostatic precipitators are widely used, although they are often inefficient; and several flue gas desulphurisation systems have been installed or are planned in Poland. Refurbishment programmes are under way in some countries, the Czech Republic, Hungary and Poland mainly, to improve plant thermal efficiency. Consequently average thermal efficiency of the region as a whole increased from 26.2% in 1990 to 29.4% in 1997 but still remained well below the performance of EU plants. Nevertheless the efficiency gain already achieved has caused a reduction of fuel consumption of about 10 Mtoe per year and the potential for further improvement is estimated at 15 Mtoe.

International concerns about nuclear safety...

As a result of negotiations to join the European Union, two countries, Bulgaria and Slovakia have agreed to closure schedules for specific units to maintain nuclear safety. The Bulgarian Kozloduy plant, the largest plant in the Balkan Peninsula, consists of six units using Russian-designed VVER reactors. Units 1 to 4 were commissioned in the 1970s and early 1980s. Units 5 and 6 were commissioned as recently as 1987 and 1991. Until the end of 1990, the oldest four units had some of the best load factors in the world. International concerns about the station's safety record, however, have led to calls for its complete closure. Although two of the six units were shut down for safety and maintenance reasons, it was





accepted that the complete closure of Kozloduy now is impractical, given the country's dependence on nuclear power. For its part, Slovakia agreed to shut down the two units of the Bohunice plant when the new units of the Mochovce plant are fully operational. The first unit was completed in 1998 and the second one is scheduled to be online in 2000. However, Bohunice's manager believes units 1 and 2 will have to operate past the 2003 and 2005 shutdown dates originally planned, to recoup the costs of upgrading these units undertaken in the mid 1990s.

The development of renewable energy sources has been limited to improvements of existing hydroelectric facilities and small pilot projects for other renewables, such as geothermal and wind. Hydroelectricity represents a substantial source of power in only a few countries, such as Romania (23% of all electricity generated) and Slovakia (13%). Most of the potential for hydro expansion lies in Albania, Bulgaria and Romania, as well as in the former Yugoslav republics. However, as yet, these countries have found it difficult to secure financing for such expansion projects.

Reform and privatisation of the power industry are continuing...

The traditional **electricity** industries in this region were vertically integrated monopolies controlled by central governments. But reforms of their structure, ownership, and regulation have started. Several countries have attempted to reform their electricity industries, motivated in part by the desire to ensure availability of the foreign funds needed for upgrades and expansion and in part by the necessity to satisfy environmental, efficiency and open market criteria for accession to the European Union. The Czech Republic has been actively pursuing the upgrading and modernisation of its electric power sector to meet rising internal demand and EU environmental standards, mainly by encouraging foreign investment. In an effort to liberalise its electricity sector to conform to EU standards, the Czech Republic is pushing ahead with often-delayed plans to privatise CEZ. The privatisation of the company, which is 68% owned by the state, is scheduled for the end of 2000 while the transmission grid is to be spun off into a separate company. In addition, the government is including in the sale its shares in the regional distribution companies. Western energy groups have already bought large shares in many of the regional electric distributors and have been eagerly awaiting the sale of the government shares to gain majority positions. The privatisation plan also calls for the government to draw up a timetable by year-end 2000 for full deregulation of the Czech energy markets to prepare for European Union entry. Subsidies for household electricity prices are to be eliminated by the year 2002, while another objective is to increase the share of renewable resources in overall electricity production from the current 1.5% to 3%-6% by the year 2010. In November 1998, Poland ambitiously committed itself to adapting its electricity market regulations to EU standards

within four years. Renovation of the sector is expected to cost about ₺15 billion by 2010. For these reasons, Poland's power generation is in need of foreign investment. Multilateral lending institutions, most notably the World Bank and the European Bank for Reconstruction and Development, are involved heavily in financing and participating in projects ranging from building new, non-coal facilities to providing cleaner technologies for existing coal-fired plants. Privatisation is seen as the key to modernisation and efficiency of the electricity sector. In September 1996, a law was passed that laid the foundation for de-monopolisation and privatisation of the industry. Plans called for reducing the number of generating companies from 35 to 7 and for privatising power generation by the end of 2001. A law that took effect in December 1997 sets the groundwork for third-party access to the power grid and vests authority in an independent Energy Regulatory Office.

Romania's old and inefficient power system, combined with difficulties in securing supplies of primary fuels, resulted in periodic energy shortages and shutdowns in power generation, limiting interest for foreign investors. Nevertheless Conel, the state electric utility, announced in June 1999 its intention to become a large regional electricity exporter. The Romanian government is keen to restructure Conel into separate subsidiaries for thermal generation, hydropower generation, transmission and distribution, with a separate company responsible for the country's nuclear generation facilities. The separate Conel companies are scheduled to be transferred to the State Ownership Fund and included in the government's privatisation programme. Conel will retain ownership of the national grid, and will become the parent company for these supply and generation subsidiaries. The country's transmission and distribution systems are scheduled to become regulated monopolies. The Hungarian electricity supply industry was restructured in the past decade in such a way that electricity generation is now largely separate from transmission. There are also separate distribution/retailing companies. Foreign investors largely own generation and distribution activities. At present, the modus operandi of the industry is based on long-term power purchase agreements. Price regulation covers most prices in the industry and, as in the gas industry, the ultimate price-setting authority lies with the Ministry of Economic Affairs. Competitive rules are to be phased in when Hungary accedes to the European Union. The electricity supply industry, more than the gas industry, has been reformed to a point which is only a few steps away from competition. These final steps would require introducing non-discriminatory open access to the power grids, and adaptation of the regulatory mechanisms, as in the gas industry. These moves should be taken soon. Some further unbundling would be necessary, particularly with respect to system operation, but this unbundling would be a minor step compared to the restructuring





that has already occurred. In Bulgaria, the national electric utility, NEK, will privatise 22 large hydro plants and 41 small hydro plants over the period to 2001. Some major thermal power plants will also be sold and joint ventures with foreign investors will be established to refurbish and operate the other units.

Refinery industry in need of further restructuring and upgrading with the support of foreign capital...

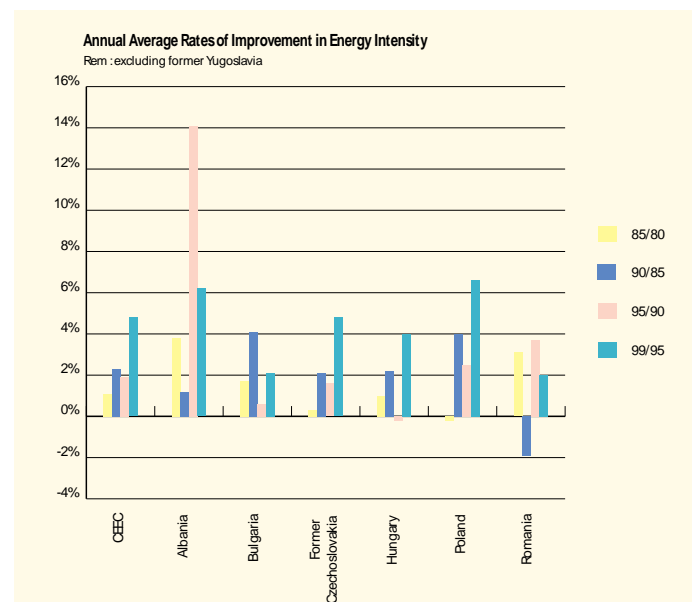
As regards the refining industry, the Communist regimes left Eastern European countries with bloated and inefficient hydrocarbon industries that suffered from decades of neglect, outdated technology, heavy debt and which imposed severe environmental impacts. All eastern European countries have refinery industries. Most are badly in need of restructuring and upgrading. The petroleum marketing sector is the fastest growing sector in Eastern Europe's energy industry, partly due to the introduction of foreign competition in many countries. Thus far, most energy enterprises are still publicly owned and government-run. However, to meet the petroleum needs of those economies where privatisation efforts are strongest, private ownership is beginning to emerge. For example, Hungary has sold an 18.8% stake in its vertically integrated petroleum company, MOL. The Czech Republic merged its two largest refineries and sold 49% to IOC, a western consortium. Foreign capital could play a pivotal role in helping diversify energy supplies, increase energy efficiency through modernisation, and improve the environment. Although foreign direct investment has increased in these areas, inflows remain modest. Foreign direct investment has been slow to materialise due to continuing macroeconomic instability and insufficient institutional reforms. To date, most foreign investment has been through joint ventures. In 1999, refinery capacity, including that of the former Yugoslav Republic, reached 2.75 million barrels a day, or about 2.6% of world installed capacity. In 1998, rationalisation efforts led to the closure of about 10% of the existing capacity of crude oil distillation, the bulk of it being located in Bulgaria. At the same time the conversion capacity remained unchanged so that this sector still needs modernisation in order to meet the shift in demand towards lighter products such as gasoline and diesel.

COMPETITIVENESS

Energy intensity improvement accelerated with the efforts to satisfy EU membership criteria...

Energy intensity declined slowly between 1980 and 1988 resulting from underlying technological improvement. But it must be recalled that, at this time, Eastern countries had one of the highest energy intensities in the world. The industrial structure, the domi-

nant basis of the economy when the contribution of services was limited, comprised mainly the energy-intensive industries (steel, cement, chemicals...) to supply the former Soviet Union. These industries used energy inefficiently as domestic energy prices were kept well below world market levels. From then, the reforms undertaken to restructure the economy, and in particular the industrial sector, stimulated a dramatic improvement. The political changes which occurred in most countries between 1988 and 1993 led to decreases in both GDP (-20% between 1988 and 1992), and gross inland energy consumption (-25%). This led to an average energy intensity improvement of 1.6% per year. After 1993, with the help of foreign investment, industrial restructuring accelerated, leading to a more rapid decrease in energy intensity (-3.5% per year on average between 1992 and 1999), while GDP exhibited clear signs of recovering (+2.1% per year on average). This impressive decline was obtained despite a rebound of 1.2% in intensity in 1996, partly due to the cold weather conditions which boosted energy demand for space heating. Since 1997, some countries reinforced their efforts to satisfy criteria for European Union accession with a marked acceleration of energy intensity improvement: 5.0% in 1997, 6.4% in 1998 and 5.0% in 1999. These efforts concern notably: energy pricing, energy savings, liberalisation of energy markets, and environmental improvements.



Over the period 1988-1999 there were major improvements in energy intensity in Poland (-42%), Slovakia (-33%), the Czech Republic (-28%) and Romania (-25%), with a little less in Hungary (-18%) and Bulgaria (-14%). Poland and Slovakia benefited from a sustained economic rebound after 1994, accompanied by diversification of the economy towards high added value activities. To a



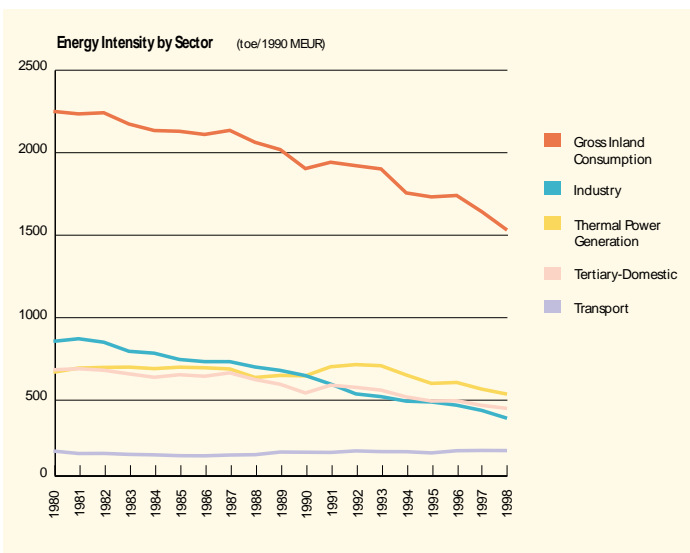


lesser extent the situation is similar in Hungary and the Czech Republic, but with more limited economic growth. This was not the case for Romania, still waiting for its economic rebound, or Bulgaria, where energy intensity has declined over the past ten years by only 8%, mainly resulting from the improvement registered in the last two years. The case of Hungary is distinctive: it has improved its energy intensity by only 12% since 1988 but its energy intensity was already 40% lower than the regional average.

CEEC : ENERGY INTENSITY (TOE/1990 MEUR)							
	1980	1985	1990	1995	1997	1998	1999
CEEC	2208.3	2087.8	1861.5	1689.8	1599.9	1488.7	1387.7
Poland	2682.3	2702.7	2201.6	1938.9	1767.0	1570.9	1475.7
Hungary	1190.3	1129.8	1012.7	1025.2	962.8	909.8	869.1
Czech Republic	2524.4	2510.2	2225.7	2018.3	1991.6	1975.4	1764.4
Slovakia	1981.3	1908.0	1756.6	1656.9	1448.9	1362.7	1216.2
Romania	2170.3	1851.6	2031.9	1681.4	1608.5	1582.6	1551.3
Bulgaria	2237.2	2049.5	1666.2	1615.3	1737.1	1619.3	1480.9

Improvement in energy intensity driven by industry and the tertiary-domestic sector...

The continuing improvement of energy intensity has been sustained mainly by the industrial sector's widespread reconstruction and modernisation (-44% since 1988) and by the tertiary-domestic sector (-22%), despite the improvement of living standards. The energy intensity of transport, which declined in the early 1980s, increased with the outset of the economic reforms to peak in 1992 about 4% above the 1980 value. Between 1992 and 1995 it declined slowly and rebounded in 1996. This was partly caused by some statistical adjustments, leading to the inclusion of some



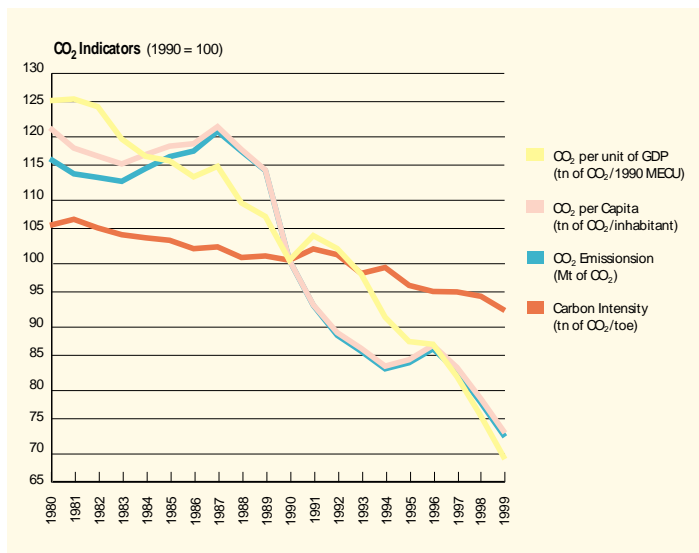
consumption for goods transportation previously recorded in the industrial sector. It has remained stable since then. Finally, the share of power generation was also declining by about 10%, a consequence of the declining consumption of electricity.

In terms of gross inland **energy consumption per capita**, a marked reduction has been observed since the peak of 1987 (from 3.16 toe per capita in 1987 to 2.14 toe in 1998). Despite higher energy intensity, average consumption per capita in 1997 remained some 35% below the European Union average - reflecting the current lower standards of living in this region.

ENVIRONMENT

CO₂ emissions reduced by 28% since 1990...

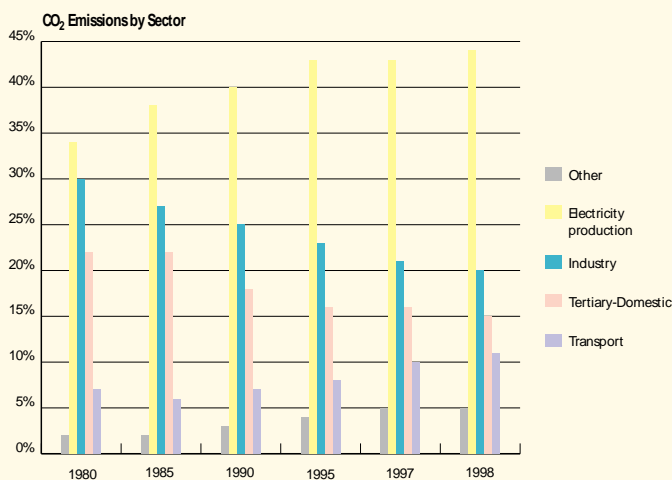
The evolution of CO₂ emissions was profoundly influenced by the profile of energy consumption: increasing continuously between 1980 and 1987 to peak at 1145 million tonnes; but declining rapidly during the transition period to reach 981 million tonnes in 1990. Since 1990, if we exclude a limited rebound in 1995-1996, CO₂ emissions were declining continuously to reach only 703 million tonnes in 1999, 28% below the 1990 level. In particular the last three years have been marked by an accelerated decline: 2.8% in 1997, 4.9% in 1998 and 7.5% in 1999. This trend has resulted from restructuring of the economy, improving efficiency in energy use, reduction of demand caused by higher real energy prices and the switch away from coal, all these factors being favoured by a more optimistic economic climate. The surge in world energy prices which occurred in 1999 reinforced savings of energy, contributing to an impressive reduction of CO₂ emissions. Despite these improvements, and the efforts accomplished by many countries in the





context of European Union accession, a large potential for additional improvement still exists. Per capita CO₂ emissions, which were 9% above the average EU level in 1985, fell to only 71% of the EU level in 1999. But living standards between the two regions are not comparable, as is confirmed by the evolution of CO₂ emissions per unit of GDP. This indicator has declined regularly since 1985 by about 2.5% per year on average but it was 8 times higher than in the European Union in 1985 and still 6 times higher in 1999.

In the period 1990-97, emissions from the tertiary-domestic sector were reduced by 23%, those from industry by 32%, while those from the transport sector increased by 7.5%. The sector with the largest emissions remained power generation (about 43% of total emissions in 1997, from 40% in 1990 and 33% in 1980). This included emissions related to heat produced in cogeneration units and explains the relatively low contribution of the tertiary-domestic sector (16% of total emissions in 1997 from 24% in 1980). Industrial emissions declined in volume until 1993 to represent only 19% of total emissions but were rebounding with the recent progress of industrial production (+23% between 1993 and 1996), even though 1997 marked a new decline (-12%).



GLOBAL MARKETS

Energy import dependency is increasing with some attempts to diversify suppliers..

The overall energy dependence of this region on **external supplies** was 31% in 1998, just above the 1990 level. The present level of dependence represents a new peak since 1980. The marked increase since 1994 resulted from the substantial reduction of regional primary energy production, essentially coal and natural gas. The Eastern countries together have been historically net importers of crude oil and natural gas, mainly from the former

USSR. Oil imports represented 83% of total oil requirements in 1999, a stable contribution since 1990. On the other hand, gas import dependency increased from 54% in 1990 to 65% in 1999 following the significant reduction in indigenous gas production. As regional resources of hydrocarbons are quite limited, any increase of oil or gas consumption in future will need to be met by additional imports and will consequently increase regional energy dependence.

Imports of Russian natural gas dominate Eastern countries' total supply, comprising 56% of consumption and 85% of total gas imports. Some countries have made attempts to diversify their supplies: Hungary receives a small amount of gas from Western suppliers; the Czech Republic already imports 15% of its gas from Norway; and finally Slovenia imports limited volumes of Algerian gas through Italy. On the other hand, Gazprom has been negotiating to increase its participation in Eastern European gas companies. This is already the case in Bulgaria, where a joint venture Topenergy (50% Gazprom) is responsible for importing Russian gas; and the Slovak Gas Company (SPP) has formed a joint venture with Gazprom to increase co-operation between the two countries on gas deliveries and transit. Nevertheless, future demand of natural gas is expected to remain flat thus reducing the need for additional imports. For a long time the CIS has been the biggest supplier of crude oil and oil products to the region.. In 1999 the CIS satisfied 56% of all Eastern countries' imports, other suppliers being the Middle East (19%), Western Europe (18%) and North Africa (6%).





CENTRAL AND EASTERN COUNTRIES : SUMMARY ENERGY BALANCE

Mtoe	1980	1985	1990	1997	1998	1999(2)	85/80	90/85	97/90	98/97	99/98
							Annual % Change				
Primary Production	266.8	285.7	237.3	211.2	194.6	180.4	1.4%	-3.6%	-1.7%	-7.8%	-7.3%
Solids	187.8	198.7	164.4	147.1	131.7	119.2	1.1%	-3.7%	-1.6%	-10.5%	-9.5%
Oil	20.9	19.1	14.9	12.7	12.5	11.9	-1.8%	-4.9%	-2.2%	-2.1%	-4.8%
Natural gas	43.6	44.2	32.0	20.9	19.6	18.6	0.3%	-6.2%	-5.9%	-5.8%	-5.4%
Nuclear	2.8	9.2	15.0	17.1	17.1	17.0	27.1%	10.2%	1.8%	0.5%	-1.0%
Hydro & Wind	4.7	4.1	3.5	4.9	5.1	5.1	-2.6%	-3.1%	4.8%	4.6%	0.7%
Geothermal	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	46.2%	0.0%
Other	7.0	10.4	7.5	8.6	8.6	8.6	8.1%	-6.2%	1.8%	0.3%	0.2%
Net Imports	88.4	83.1	98.3	82.6	81.2	80.4	-1.2%	3.4%	-2.5%	-1.7%	-1.0%
Solids	-8.0	-7.6	-7.1	-11.3	-11.2	-10.3	-0.9%	-1.3%	6.8%	-0.7%	-8.0%
Oil	76.3	64.5	66.0	56.5	56.1	55.4	-3.3%	0.5%	-2.2%	-0.7%	-1.2%
Crude oil	82.9	72.5	68.9	51.9	52.6	na	-2.7%	-1.0%	-4.0%	1.3%	na
Oil products	-6.6	-8.0	-2.9	4.6	3.5	na	4.1%	-18.7%	-	-23.2%	na
Natural gas	18.9	24.6	37.0	37.3	36.8	35.0	5.4%	8.5%	0.1%	-1.2%	-5.0%
Electricity	1.1	1.7	2.4	0.1	-0.5	0.3	9.9%	7.0%	-33.8%	-	-
Gross Inland Consumption	353.7	369.3	335.5	287.3	274.9	260.4	0.9%	-1.9%	-2.2%	-4.3%	-5.3%
Solids	180.0	193.1	158.5	132.1	121.7	108.9	1.4%	-3.9%	-2.6%	-7.8%	-10.6%
Oil	96.1	82.8	80.1	67.1	66.8	66.8	-2.9%	-0.6%	-2.5%	-0.5%	0.0%
Natural gas	62.0	68.0	68.4	57.5	56.0	53.6	1.9%	0.1%	-2.5%	-2.6%	-4.3%
Other (1)	15.5	25.4	28.4	30.6	30.4	31.2	10.3%	2.3%	1.1%	-0.9%	2.6%
Electricity Generation in TWh	383.0	432.9	441.5	441.6	442.1	na	2.5%	0.4%	0.0%	0.1%	na
Nuclear	10.7	35.4	57.6	65.4	65.8	na	27.1%	10.2%	1.8%	0.5%	na
Hydro & wind	54.6	48.0	40.9	56.2	58.8	na	-2.6%	-3.2%	4.7%	4.6%	na
Thermal	317.8	349.5	343.0	320.0	317.5	na	1.9%	-0.4%	-1.0%	-0.8%	na
Generation Capacity in GWe	70.0	88.0	116.2	119.0	119.3	na	4.7%	5.7%	0.3%	0.2%	na
Nuclear	1.8	5.0	8.6	10.2	10.5	na	23.2%	11.5%	2.4%	3.1%	na
Hydro & wind	14.1	17.8	22.6	24.1	24.7	na	4.8%	4.9%	0.9%	2.7%	na
Thermal	54.2	65.2	85.0	84.8	84.0	na	3.8%	5.4%	0.0%	-0.9%	na
Average Load Factor in %	62.5	56.1	43.4	42.4	42.3	na	-2.1%	-5.0%	-0.3%	-0.1%	na
Fuel Inputs for Thermal Power Generation	99.5	118.6	111.7	94.6	92.2	na	3.6%	-1.2%	-2.3%	-2.5%	na
Solids	78.4	90.7	84.4	77.2	75.8	na	3.0%	-1.4%	-1.3%	-1.7%	na
Oil	12.2	13.0	13.4	7.3	5.9	na	1.3%	0.6%	-8.4%	-18.5%	na
Gas	8.5	14.2	13.4	9.8	10.1	na	10.8%	-1.1%	-4.4%	2.7%	na
Geothermal	0.0	0.0	0.0	0.0	0.0	na	-	-	-	-	na
Other	0.3	0.6	0.5	0.3	0.4	na	13.0%	-4.5%	-4.1%	16.5%	na
Average Thermal Efficiency in %	27.5	25.4	26.4	29.1	29.6	na	-1.6%	0.8%	1.4%	1.8%	na
Non-Energy Uses	13.7	13.0	14.1	14.4	14.0	na	-1.1%	1.7%	0.3%	-2.8%	na
Total Final Energy Demand	251.8	248.9	220.2	176.1	167.7	na	-0.2%	-2.4%	-3.1%	-4.8%	na
Solids	79.4	81.3	55.5	37.1	31.3	na	0.5%	-7.4%	-5.6%	-15.8%	na
Oil	63.9	51.1	47.9	45.4	45.8	na	-4.4%	-1.3%	-0.8%	0.9%	na
Gas	47.6	46.4	47.7	35.5	33.9	na	-0.5%	0.6%	-4.1%	-4.6%	na
Electricity	26.1	29.6	30.6	28.0	27.6	na	2.6%	0.7%	-1.3%	-1.2%	na
Heat	28.2	30.7	31.4	21.8	20.9	na	1.8%	0.5%	-5.1%	-4.3%	na
Other	6.7	9.8	7.0	8.3	8.3	na	7.9%	-6.4%	2.4%	0.2%	na
CO₂ Emissions in Mt of CO₂	1076.3	1111.7	980.7	798.9	760.0	702.8	0.6%	-2.5%	-2.9%	-4.9%	-7.5%
Indicators											
Population (Million)	117.58	121.11	123.00	121.44	121.44	121.53	0.6%	0.3%	-0.2%	0.0%	0.1%
GDP (index 1985=100)	94.1	100.0	97.8	94.9	97.0	96.7	1.2%	-0.4%	-0.4%	2.2%	-0.3%
Gross Inl Cons./GDP (toe/1990 MEUR)	1622.1	1593.9	1480.8	1306.9	1223.1	1162.0	-0.4%	-1.5%	-1.8%	-6.4%	-5.0%
Gross Inl Cons./Capita (toe/inhabitant)	3.01	3.05	2.73	2.37	2.26	2.14	0.3%	-2.2%	-2.0%	-4.3%	-5.3%
Electricity Generated/Capita (kWh/inhabitant)	3258	3575	3589	3637	3640	na	1.9%	0.1%	0.2%	0.1%	na
CO ₂ Emissions/Capita (t of CO ₂ /inhabitant)	9.2	9.2	8.0	6.6	6.3	5.8	0.1%	-2.8%	-2.7%	-4.9%	-7.9%
Import Dependency %	24.9	22.5	29.2	28.7	29.5	30.8	-2.1%	5.4%	-0.2%	2.5%	4.7%

(1) Includes nuclear, hydro and wind, net imports of electricity, and other energy sources.

(2) Estimates





CENTRAL AND EASTERN COUNTRIES (FORMER YUGOSLAVIA EXCLUDED) : MAIN INDICATORS

	1980	1985	1990	1995	1997	1998	85/80	90/85	95/90	97/95	98/97
	Annual % Change										
Gross Inland Consumption (Mtoe)	319.5	327.8	290.6	253.7	252.5	238.9	0.5%	-2.4%	-2.7%	-0.2%	-5.4%
Public Thermal Power Generation	77.4	88.4	82.1	76.5	76.2	73.1	2.7%	-1.5%	-1.4%	-0.2%	-4.0%
Autoprod. Thermal Power Generation	13.2	14.7	12.3	7.4	6.5	6.1	2.2%	-3.6%	-9.6%	-6.7%	-5.7%
Energy Branch	13.8	14.3	15.5	18.5	18.9	17.7	0.8%	1.6%	3.5%	1.1%	-6.4%
Final Energy Consumption	232.0	225.4	194.8	155.4	153.5	145.3	-0.6%	-2.9%	-4.4%	-0.6%	-5.3%
Industry	117.8	110.5	94.6	67.0	62.3	55.7	-1.3%	-3.1%	-6.7%	-3.6%	-10.5%
Transport	21.5	18.9	22.0	20.6	24.0	24.3	-2.5%	3.1%	-1.4%	7.9%	1.1%
Tertiary-Domestic	92.8	96.0	78.2	67.8	67.2	65.3	0.7%	-4.0%	-2.8%	-0.5%	-2.8%
Energy Intensity (toe/1990 MEUR)	2208.3	2087.8	1861.5	1689.8	1599.9	1488.7	-1.1%	-2.3%	-1.9%	-2.7%	-6.9%
Public Thermal Power Generation	534.8	563.3	526.0	509.3	482.9	455.7	1.0%	-1.4%	-0.6%	-2.6%	-5.6%
Autoprod. Thermal Power Generation	91.4	93.7	78.6	49.4	40.9	37.9	0.5%	1.3%	1.1%	2.2%	2.2%
Industry	813.8	703.8	606.1	446.0	394.7	347.3	-2.9%	-2.9%	-6.0%	-5.9%	-12.0%
Transport	148.4	120.3	141.2	137.1	152.0	151.2	-4.1%	3.3%	-0.6%	5.3%	-0.5%
Tertiary-Domestic	641.3	611.3	500.6	451.8	425.6	406.9	-1.0%	-3.9%	-2.0%	-2.9%	-4.4%
Energy per Capita (Kgoe/inhabitant)	3352	3347	2926	2569	2559	2424	0.0%	-2.7%	-2.6%	-0.2%	-5.3%
Industry	1235	1128	953	678	631	566	-1.8%	-3.3%	-6.6%	-3.5%	-10.4%
Transport	225	193	222	208	243	246	-3.1%	2.8%	-1.3%	8.0%	1.2%
Tertiary-Domestic	974	980	787	687	681	663	0.1%	-4.3%	-2.7%	-0.4%	-2.7%
Electricity Share (%)											
Final Energy Consumption	9.4%	10.8%	12.9%	14.1%	14.8%	15.3%	2.8%	3.5%	1.8%	2.5%	3.8%
Industry	11.5%	12.9%	14.3%	14.7%	17.1%	17.7%	2.3%	2.0%	0.6%	7.9%	3.4%
Transport	4.9%	6.3%	5.8%	5.2%	4.3%	4.1%	5.2%	-1.5%	-2.2%	-9.5%	-4.6%
Tertiary-Domestic	7.8%	9.3%	13.2%	16.2%	16.4%	17.5%	3.6%	7.2%	4.2%	0.7%	7.0%
Total Renewable Consumption (Mtoe)	8.5	11.4	8.5	10.4	10.3	10.6	6.0%	-5.7%	4.1%	-0.5%	2.4%
Hydro	2.3	2.0	1.8	2.7	2.9	3.0	-2.2%	-2.3%	8.2%	3.3%	5.2%
Biomass	6.3	9.4	6.7	7.7	7.4	7.5	8.4%	-6.4%	2.9%	-2.1%	1.3%
Other	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	10.5%
Renewable intensity (toe/1990 MEUR)	59.0	72.7	54.6	69.4	65.4	65.9	4.3%	-5.6%	4.9%	-2.9%	0.7%
Renewable per capita (Kgoe/inhabitant)	89.6	116.5	85.9	105.5	104.6	107.3	5.4%	-5.9%	4.2%	-0.4%	2.5%
CO₂ Emissions (Mt of CO₂)	991.0	993.9	854.4	716.3	705.2	662.4	0.1%	-3.0%	-3.5%	-0.8%	-6.1%
Public Thermal Power Generation	285.2	321.0	297.6	283.7	283.8	272.3	2.4%	-1.5%	-1.0%	0.0%	-4.0%
Autoprod. Thermal Power Generation	49.2	54.2	44.7	25.0	21.8	20.5	2.0%	-3.8%	-11.0%	-6.5%	-6.4%
Energy Branch	23.1	22.4	24.8	30.3	32.6	30.4	-0.6%	2.0%	4.1%	3.7%	-6.6%
Industry	293.1	273.1	216.6	161.2	148.9	131.5	-1.4%	-4.5%	-5.7%	-3.9%	-11.7%
Transport	64.5	55.3	63.9	59.9	70.4	71.4	-3.0%	2.9%	-1.3%	8.5%	1.3%
Tertiary-Domestic	222.5	214.1	150.6	117.9	111.4	102.5	-0.8%	-6.8%	-4.8%	-2.8%	-7.9%
Carbon Intensity (tn of CO₂/toe)	3.1	3.0	2.9	2.8	2.8	2.8	-0.5%	-0.6%	-0.8%	-0.5%	-0.7%
Public Power Generation	3.5	3.3	3.0	3.0	3.0	3.0	-1.2%	-1.3%	-0.1%	-0.7%	-1.1%
Public Thermal Power Generation	3.7	3.6	3.6	3.7	3.7	3.7	-0.3%	0.0%	0.5%	0.2%	0.0%
Autoprod. Power Generation	3.7	3.7	3.6	3.4	3.4	3.3	-0.2%	-0.2%	-1.5%	0.1%	-0.7%
Autoprod. Thermal Power Generation	3.7	3.7	3.6	3.4	3.4	3.4	-0.2%	-0.3%	-1.5%	0.2%	-0.7%
Energy Branch	3.7	3.6	3.6	3.4	3.3	3.3	-0.2%	-0.3%	-1.1%	-0.5%	-1.8%
Industry	1.7	1.6	1.6	1.6	1.7	1.7	-1.3%	0.4%	0.6%	2.6%	-0.2%
Transport	2.5	2.5	2.3	2.4	2.4	2.4	-0.1%	-1.5%	1.0%	-0.3%	-1.3%
Tertiary-Domestic	3.0	2.9	2.9	2.9	2.9	2.9	-0.5%	-0.2%	0.1%	0.5%	0.2%
CO₂ per Capita (kg of CO₂/inhabitant)	10396	10148	8601	7251	7147	6720	-0.5%	-3.3%	-3.4%	-0.7%	-6.0%
Industry	3074	2788	2180	1632	1509	1334	-1.9%	-4.8%	-5.6%	-3.8%	-11.6%
Transport	676	564	643	606	714	724	-3.6%	2.6%	-1.2%	8.5%	1.4%
Tertiary-Domestic	2334	2186	1516	1194	1129	1040	-1.3%	-7.1%	-4.7%	-2.8%	-7.8%
CO₂ per unit of GDP (tn of CO₂/1990 MEUR)	6849	6330	5472	4770	4468	4127	-1.6%	-2.9%	-2.7%	-3.2%	-7.6%
Public Thermal Power Generation	1971	2044	1906	1889	1798	1697	0.7%	-1.4%	-0.2%	-2.4%	-5.6%
Autoprod. Thermal Power Generation	340	345	286	166	138	127	0.3%	-3.7%	-10.3%	-8.8%	-7.9%
Energy Branch	370	343	361	256	230	210	-1.5%	1.0%	-6.7%	-5.2%	-8.4%
Industry	160	143	159	202	206	189	-2.2%	2.1%	4.9%	1.2%	-8.2%
Transport	2025	1739	1387	1073	943	819	-3.0%	-4.4%	-5.0%	-6.3%	-13.2%
Tertiary-Domestic	446	352	409	399	446	445	-4.6%	3.0%	-0.5%	5.8%	-0.4%





BULGARIA : SUMMARY ENERGY BALANCE											
Mtoe	1980	1985	1990	1997	1998	1999(2)	85/80	90/85	97/90	98/97	99/98
							Annual % Change				
Primary Production	7.7	9.5	9.8	10.1	10.1	9.1	4.3%	0.6%	0.5%	0.1%	-10.0%
Solids	5.2	5.3	5.4	4.9	5.0	4.2	0.4%	0.4%	-1.3%	1.2%	-15.9%
Oil	0.3	0.2	0.1	0.0	0.0	0.0	-6.1%	-21.5%	-10.5%	17.9%	0.0%
Natural gas	0.1	0.0	0.0	0.0	0.0	0.0	-35.0%	-10.1%	15.8%	-17.9%	0.0%
Nuclear	1.6	3.4	3.8	4.6	4.4	4.1	16.3%	2.2%	2.8%	-4.9%	-6.5%
Hydro & Wind	0.3	0.2	0.2	0.2	0.3	0.2	-9.7%	-3.3%	5.6%	12.2%	-9.1%
Geothermal	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-
Other	0.2	0.4	0.4	0.3	0.4	0.5	16.0%	-2.8%	-3.9%	53.5%	21.3%
Net Imports	21.0	21.6	17.1	10.6	10.0	9.6	0.6%	-4.5%	-6.7%	-5.6%	-3.9%
Solids	4.3	5.2	3.4	2.5	2.4	1.9	4.0%	-8.3%	-4.2%	-5.1%	-21.4%
Oil	13.4	11.5	8.6	4.5	4.8	5.0	-3.0%	-5.7%	-8.7%	6.0%	4.1%
Crude oil	13.2	12.6	8.3	6.0	5.6	na	-0.9%	-8.0%	-4.6%	-5.8%	na
Oil products	0.1	-1.1	0.3	-1.4	-0.8	na	-	-	-	-43.7%	na
Natural gas	3.0	4.6	4.9	3.9	3.1	2.7	8.6%	1.3%	-3.3%	-19.0%	-12.3%
Electricity	0.3	0.4	0.3	-0.3	-0.3	0.0	2.3%	-2.5%	-	2.6%	-95.8%
Gross Inland Consumption	28.7	31.0	27.1	20.7	20.0	18.7	1.5%	-2.6%	-3.8%	-3.5%	-6.4%
Solids	9.4	10.5	8.8	7.6	7.3	6.0	2.2%	-3.4%	-2.0%	-4.7%	-16.7%
Oil	13.7	11.5	8.8	4.6	4.8	5.0	-3.4%	-5.1%	-9.0%	5.6%	4.9%
Natural gas	3.2	4.6	4.9	3.7	3.1	2.8	7.7%	1.0%	-3.8%	-15.4%	-11.9%
Other (1)	2.5	4.4	4.7	4.8	4.8	4.9	12.4%	1.2%	0.5%	-1.1%	1.7%
Electricity Generation in TWh	34.8	41.6	42.1	42.6	41.5	na	3.6%	0.2%	0.2%	-2.7%	na
Nuclear	6.2	13.1	14.7	17.8	16.9	na	16.3%	2.2%	2.8%	-4.8%	na
Hydro & wind	3.7	2.2	1.9	2.8	3.1	na	-9.6%	-3.4%	5.6%	12.5%	na
Thermal	25.0	26.3	25.6	22.1	21.5	na	1.0%	-0.5%	-2.1%	-2.9%	na
Generation Capacity in GWe	8.2	10.2	11.1	12.1	12.4	na	4.6%	1.7%	1.2%	2.8%	na
Nuclear	0.9	1.8	2.8	3.5	3.5	na	14.9%	9.4%	3.6%	0.0%	na
Hydro & wind	1.9	2.0	2.0	1.4	1.8	na	1.1%	0.0%	-4.8%	28.7%	na
Thermal	5.4	6.5	6.4	7.1	7.1	na	3.6%	-0.3%	1.6%	-0.9%	na
Average Load Factor in %	48.5	46.4	43.2	40.3	38.1	na	-0.9%	-1.4%	-1.0%	-5.3%	na
Fuel Inputs for Thermal Power Generation	9.5	9.8	7.8	7.3	7.1	na	0.7%	-4.4%	-1.0%	-3.2%	na
Solids	5.4	5.5	5.4	5.9	5.7	na	0.5%	-0.2%	1.2%	-3.0%	na
Oil	4.2	3.4	0.7	0.2	0.3	na	-3.7%	-27.7%	-13.4%	14.2%	na
Gas	0.0	0.9	1.7	1.2	1.1	na	-	13.5%	-5.5%	-8.2%	na
Geothermal	0.0	0.0	0.0	0.0	0.0	na	-	-	-	-	na
Other	0.0	0.0	0.0	0.0	0.0	na	-	-	-	-	na
Average Thermal Efficiency in %	22.6	22.9	28.1	26.0	26.1	na	0.3%	4.1%	-1.1%	0.4%	na
Non-Energy Uses	0.7	0.7	0.5	1.3	1.2	na	0.9%	-6.5%	14.4%	-9.0%	na
Total Final Energy Demand	19.7	18.8	17.5	9.7	9.5	na	-0.9%	-1.4%	-8.1%	-1.7%	na
Solids	3.8	4.8	1.5	1.5	1.4	na	4.6%	-21.1%	0.6%	-10.2%	na
Oil	8.0	5.4	5.8	3.2	3.5	na	-7.6%	1.4%	-8.1%	8.6%	na
Gas	3.2	3.7	2.3	1.2	0.9	na	3.0%	-9.1%	-8.5%	-23.4%	na
Electricity	2.6	3.0	3.0	2.3	2.2	na	3.4%	0.1%	-3.8%	-2.9%	na
Heat	1.9	1.4	4.5	1.1	1.1	na	-5.5%	26.0%	-17.8%	-7.3%	na
Other	0.2	0.4	0.4	0.3	0.4	na	16.0%	-2.9%	-4.4%	59.6%	na
CO₂ Emissions in Mt of CO₂	83.5	81.2	64.8	49.1	47.5	na	-0.6%	-4.4%	-3.9%	-3.3%	na
Indicators											
Population (Million)	8.86	8.94	8.72	8.31	8.26	8.21	0.2%	-0.5%	-0.7%	-0.7%	-0.6%
GDP (index 1985=100)	84.8	100.0	107.8	78.9	81.6	83.6	3.3%	1.5%	-4.4%	3.5%	2.4%
Gross Inl Cons./GDP (toe/1990 MEUR)	2237.2	2049.5	1666.2	1737.1	1619.3	1480.9	-1.7%	-4.1%	0.6%	-6.8%	-8.5%
Gross Inl Cons./Capita (toe/inhabitant)	3.24	3.46	3.11	2.49	2.42	2.28	1.4%	-2.1%	-3.1%	-2.9%	-5.8%
Electricity Generated/Capita (kWh/inhabitant)	3931	4656	4834	5128	5024	na	3.4%	0.8%	0.8%	-2.0%	na
CO ₂ Emissions/Capita (t of CO ₂ /inhabitant)	9.4	9.1	7.4	5.9	5.8	na	-0.7%	-3.9%	-3.2%	-2.7%	na
Import Dependency %	73.3	69.3	62.5	51.0	49.8	51.3	-1.1%	-2.1%	-2.8%	-2.4%	2.9%

(1) Includes nuclear, hydro and wind, net imports of electricity, and other energy sources.

(2) Estimates





CZECH REPUBLIC : SUMMARY ENERGY BALANCE

Mtoe	1980	1985	1990	1997	1998	1999(2)	85/80	90/85	97/90	98/97	99/98
							Annual % Change				
Primary Production	41.8	43.1	39.0	32.8	30.8	25.2	0.6%	-2.0%	-2.4%	-6.2%	-18.3%
Solids	40.5	41.4	34.7	28.2	26.0	20.3	0.5%	-3.5%	-2.9%	-7.7%	-22.0%
Oil	0.2	0.3	0.2	0.4	0.4	0.4	2.6%	-5.1%	11.4%	-2.5%	0.0%
Natural gas	0.3	0.2	0.2	0.2	0.2	0.2	-5.3%	-3.6%	-2.9%	3.7%	0.0%
Nuclear	0.0	0.6	3.3	3.3	3.4	3.5	-	39.3%	-0.1%	5.5%	1.6%
Hydro & Wind	0.2	0.1	0.1	0.2	0.2	0.2	-6.9%	-2.9%	5.8%	-12.0%	21.4%
Geothermal	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-
Other	0.6	0.5	0.5	0.5	0.6	0.6	-3.9%	1.9%	0.9%	2.4%	1.9%
Net Imports	6.4	6.4	7.6	10.5	10.6	11.4	-0.1%	3.6%	4.6%	0.8%	8.0%
Solids	-6.8	-7.2	-5.7	-5.0	-5.2	-4.3	1.1%	-4.5%	-1.8%	2.9%	-16.1%
Oil	10.9	10.1	8.6	8.0	8.3	8.1	-1.6%	-3.1%	-1.1%	4.2%	-2.8%
Crude oil	9.2	8.7	7.4	6.9	6.8	na	-1.0%	-3.3%	-1.0%	-0.8%	na
Oil products	1.7	1.3	1.2	1.1	1.5	na	-4.9%	-1.8%	-1.8%	36.0%	na
Natural gas	2.4	3.5	4.8	7.6	7.6	7.6	7.9%	6.3%	6.9%	0.0%	-0.1%
Electricity	-0.1	-0.1	-0.1	-0.1	-0.2	0.0	-14.9%	0.7%	7.9%	107.8%	-
Gross Inland Consumption	47.8	49.9	47.9	42.5	41.0	36.6	0.9%	-0.8%	-1.7%	-3.5%	-10.9%
Solids	33.4	34.1	29.8	23.0	21.1	16.0	0.4%	-2.7%	-3.6%	-8.4%	-24.2%
Oil	11.1	10.4	9.0	7.9	8.3	8.5	-1.4%	-2.9%	-1.7%	5.1%	2.2%
Natural gas	2.6	4.2	5.3	7.7	7.7	7.8	10.2%	4.4%	5.5%	0.2%	1.2%
Other (1)	0.6	1.2	3.9	3.9	3.9	4.3	12.9%	26.8%	0.1%	1.5%	8.8%
Electricity Generation in TWh	52.7	58.1	62.6	63.7	64.0	na	2.0%	1.5%	0.3%	0.5%	na
Nuclear	0.0	2.4	12.6	12.5	13.2	na	-	39.3%	-0.1%	5.5%	na
Hydro & wind	2.4	1.7	1.4	1.7	1.4	na	-7.0%	-2.9%	2.3%	-17.8%	na
Thermal	50.3	54.1	48.5	49.5	49.5	na	1.5%	-2.1%	0.3%	-0.1%	na
Generation Capacity in GWe	0.0	0.0	15.4	15.2	15.0	na	-	-	-0.1%	-1.2%	na
Nuclear	0.0	0.0	1.8	1.8	1.8	na	-	-	0.0%	0.0%	na
Hydro & wind	0.0	0.0	1.5	2.2	2.2	na	-	-	5.8%	0.2%	na
Thermal	0.0	0.0	12.1	11.3	11.1	na	-	-	-1.0%	-1.7%	na
Average Load Factor in %	0.0	0.0	46.5	47.7	48.6	na	-	-	0.4%	1.8%	na
Fuel Inputs for Thermal Power Generation	12.4	12.7	11.2	15.7	15.0	na	0.4%	-2.5%	5.0%	-4.6%	na
Solids	11.0	11.6	10.1	14.4	13.8	na	1.1%	-2.7%	5.3%	-4.4%	na
Oil	1.2	0.9	0.7	0.4	0.2	na	-5.6%	-4.4%	-9.5%	-34.8%	na
Gas	0.2	0.2	0.3	0.7	0.8	na	0.0%	14.8%	12.2%	2.4%	na
Geothermal	0.0	0.0	0.0	0.0	0.0	na	-	-	-	-	na
Other	0.0	0.0	0.0	0.2	0.2	na	-	-	-	19.7%	na
Average Thermal Efficiency in %	34.9	36.7	37.4	27.0	28.3	na	1.0%	0.4%	-4.5%	4.7%	na
Non-Energy Uses	1.3	1.5	1.7	2.1	2.1	na	3.6%	2.5%	2.4%	1.9%	na
Total Final Energy Demand	37.9	39.9	35.3	24.6	23.9	na	1.1%	-2.4%	-5.0%	-2.9%	na
Solids	21.9	22.9	18.7	5.1	4.4	na	0.9%	-4.1%	-16.9%	-14.4%	na
Oil	8.4	7.7	6.3	5.2	5.6	na	-1.8%	-3.7%	-2.8%	8.8%	na
Gas	2.4	3.4	4.2	6.1	6.2	na	7.7%	4.0%	5.5%	1.7%	na
Electricity	3.3	3.7	4.1	4.3	4.2	na	2.7%	2.2%	0.4%	-1.5%	na
Heat	1.4	1.7	1.5	3.5	3.0	na	3.9%	-2.6%	13.2%	-13.5%	na
Other	0.6	0.5	0.5	0.5	0.5	na	-3.9%	1.9%	-1.3%	-1.9%	na
CO₂ Emissions in Mt of CO₂	174.7	182.0	156.3	117.4	112.7	na	0.8%	-3.0%	-4.0%	-4.0%	na
Indicators											
Population (Million)	10.33	10.34	10.36	10.30	10.30	10.28	0.0%	0.1%	-0.1%	-0.1%	-0.1%
GDP (index 1985=100)	95.2	100.0	108.2	107.3	104.4	104.2	1.0%	1.6%	-0.1%	-2.7%	-0.2%
Gross Inl Cons./GDP (toe/1990 MEUR)	2524.4	2510.2	2225.7	1991.6	1975.4	1764.4	-0.1%	-2.4%	-1.6%	-0.8%	-10.7%
Gross Inl Cons./Capita (toe/inhabitant)	4.63	4.83	4.62	4.12	3.99	3.56	0.9%	-0.9%	-1.6%	-3.4%	-10.8%
Electricity Generated/Capita (kWh/inhabitant)	5099	5623	6037	6181	6219	na	2.0%	1.4%	0.3%	0.6%	na
CO ₂ Emissions/Capita (t of CO ₂ /inhabitant)	16.9	17.6	15.1	11.4	10.9	na	0.8%	-3.0%	-3.9%	-3.9%	na
Import Dependency %	13.4	12.8	15.9	24.6	25.7	31.2	-0.9%	4.5%	6.4%	4.4%	21.2%

(1) Includes nuclear, hydro and wind, net imports of electricity, and other energy sources.

(2) Estimates





HUNGARY : SUMMARY ENERGY BALANCE											
Mtoe	1980	1985	1990	1997	1998	1999(2)	85/80	90/85	97/90	98/97	99/98
							Annual % Change				
Primary Production	15.0	17.0	14.2	12.7	11.8	11.3	2.6%	-3.5%	-1.7%	-6.4%	-4.5%
Solids	6.3	5.7	4.1	3.3	3.0	3.0	-2.0%	-6.3%	-3.2%	-7.7%	-1.1%
Oil	2.5	2.5	2.3	2.0	1.9	1.8	0.0%	-2.1%	-2.0%	-6.3%	-4.7%
Natural gas	5.1	5.8	3.8	3.4	3.0	2.5	2.8%	-8.2%	-1.8%	-11.7%	-14.3%
Nuclear	0.0	1.7	3.6	3.6	3.6	3.7	-	16.2%	0.2%	-0.1%	0.8%
Hydro & Wind	0.0	0.0	0.0	0.0	0.0	0.0	5.4%	2.9%	3.4%	-31.6%	0.0%
Geothermal	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-
Other	1.0	1.2	0.4	0.4	0.3	0.3	3.4%	-19.1%	-1.8%	-7.7%	-5.4%
Net Imports	14.4	13.9	14.2	13.4	14.1	13.9	-0.7%	0.5%	-0.8%	5.5%	-1.8%
Solids	2.2	2.6	1.6	1.4	1.1	1.2	3.6%	-9.0%	-2.4%	-18.7%	6.0%
Oil	8.3	7.1	6.4	5.3	5.9	5.2	-3.3%	-1.8%	-2.7%	11.1%	-12.0%
Crude oil	7.4	6.4	6.3	5.6	6.0	na	-2.9%	-0.3%	-1.8%	8.4%	na
Oil products	0.9	0.7	0.2	-0.3	-0.1	na	-6.5%	-25.7%	-	-47.6%	na
Natural gas	3.2	3.3	5.2	6.5	7.1	7.3	0.4%	9.7%	3.4%	8.1%	3.5%
Electricity	0.6	0.9	1.0	0.2	0.1	0.2	7.9%	0.6%	-20.9%	-65.4%	223.4%
Gross Inland Consumption	29.0	30.5	28.5	25.4	25.3	25.2	1.0%	-1.4%	-1.6%	-0.7%	-0.2%
Solids	8.4	8.0	6.1	4.6	4.2	4.2	-0.9%	-5.3%	-4.1%	-8.6%	0.7%
Oil	11.0	9.8	8.5	7.0	7.3	7.0	-2.1%	-2.8%	-2.8%	4.3%	-4.3%
Natural gas	8.0	8.8	8.9	9.7	9.8	9.9	2.1%	0.2%	1.2%	0.7%	0.9%
Other (1)	1.6	3.8	4.9	4.2	4.0	4.2	18.7%	5.3%	-2.2%	-3.8%	3.7%
Electricity Generation in TWh	23.9	26.8	28.4	35.4	37.2	na	2.3%	1.2%	3.2%	5.1%	na
Nuclear	0.0	6.5	13.7	14.0	13.9	na	-	16.2%	0.2%	-0.1%	na
Hydro & wind	0.1	0.2	0.2	0.2	0.2	na	6.7%	2.8%	2.8%	-28.2%	na
Thermal	23.8	20.2	14.5	21.2	23.1	na	-3.2%	-6.3%	5.6%	8.8%	na
Generation Capacity in GWe	4.8	5.8	6.6	7.9	7.8	na	3.7%	2.6%	2.6%	-0.7%	na
Nuclear	0.0	0.8	1.7	1.8	1.8	na	-	15.1%	1.5%	0.0%	na
Hydro & wind	0.0	0.0	0.0	0.0	0.0	na	0.0%	0.9%	0.0%	0.0%	na
Thermal	4.8	4.9	4.9	6.0	6.0	na	0.6%	-0.2%	3.0%	-0.9%	na
Average Load Factor in %	56.3	52.7	49.2	51.1	54.1	na	-1.3%	-1.4%	0.6%	5.8%	na
Fuel Inputs for Thermal Power Generation	7.8	7.0	5.4	6.3	6.6	na	-2.2%	-4.8%	2.2%	3.8%	na
Solids	4.3	3.7	3.4	2.9	3.0	na	-2.8%	-1.9%	-2.0%	1.7%	na
Oil	1.0	1.4	0.4	1.5	1.5	na	5.6%	-20.2%	18.7%	2.3%	na
Gas	2.5	1.9	1.6	1.9	2.1	na	-5.4%	-3.1%	2.6%	8.0%	na
Geothermal	0.0	0.0	0.0	0.0	0.0	na	-	-	-	-	na
Other	0.0	0.0	0.0	0.0	0.0	na	-	-	-	-	na
Average Thermal Efficiency in %	26.2	24.9	23.0	28.9	30.3	na	-1.0%	-1.6%	3.3%	4.9%	na
Non-Energy Uses	2.6	2.3	1.8	1.5	1.7	na	-2.3%	-5.3%	-2.2%	10.8%	na
Total Final Energy Demand	20.5	21.3	19.3	15.6	15.7	na	0.8%	-1.9%	-3.0%	0.5%	na
Solids	4.0	4.3	2.8	1.0	0.8	na	1.2%	-7.9%	-14.3%	-15.3%	na
Oil	7.7	6.4	6.2	4.0	4.1	na	-3.8%	-0.5%	-6.2%	5.0%	na
Gas	3.9	4.9	5.6	6.4	6.4	na	4.6%	3.0%	1.9%	-0.7%	na
Electricity	2.2	2.6	2.7	2.5	2.5	na	3.4%	0.9%	-1.3%	1.3%	na
Heat	1.7	2.0	1.6	1.4	1.5	na	3.4%	-4.8%	-1.4%	5.1%	na
Other	1.0	1.2	0.4	0.4	0.3	na	3.7%	-21.0%	0.1%	-8.1%	na
CO₂ Emissions in Mt of CO₂	82.3	79.7	69.2	57.1	57.4	na	-0.6%	-2.8%	-2.7%	0.5%	na
Indicators											
Population (Million)	10.71	10.58	10.37	10.16	10.11	10.07	-0.2%	-0.4%	-0.3%	-0.4%	-0.4%
GDP (index 1985=100)	90.1	100.0	104.1	97.9	102.8	107.5	2.1%	0.8%	-0.9%	5.1%	4.5%
Gross Inl Cons./GDP (toe/1990 MEUR)	1190.3	1129.8	1012.7	962.8	909.8	869.1	-1.0%	-2.2%	-0.7%	-5.5%	-4.5%
Gross Inl Cons./Capita (toe/inhabitant)	2.70	2.88	2.75	2.51	2.50	2.50	1.3%	-1.0%	-1.3%	-0.3%	0.2%
Electricity Generated/Capita (kWh/inhabitant)	2230	2533	2743	3486	3677	na	2.6%	1.6%	3.5%	5.5%	na
CO ₂ Emissions/Capita (t of CO ₂ /inhabitant)	7.7	7.5	6.7	5.6	5.7	na	-0.4%	-2.4%	-2.4%	0.9%	na
Import Dependency %	49.6	45.3	49.8	52.7	56.0	55.1	-1.8%	1.9%	0.8%	6.3%	-1.6%

(1) Includes nuclear, hydro and wind, net imports of electricity, and other energy sources.

(2) Estimates





POLAND : SUMMARY ENERGY BALANCE

Mtoe	1980	1985	1990	1997	1998	1999(2)	85/80	90/85	97/90	98/97	99/98
							Annual % Change				
Primary Production	124.1	128.1	101.5	100.1	87.4	84.9	0.6%	-4.6%	-0.2%	-12.7%	-2.9%
Solids	115.9	118.0	94.5	92.1	79.3	76.7	0.4%	-4.4%	-0.4%	-13.9%	-3.3%
Oil	0.3	0.2	0.2	0.4	0.4	0.5	-10.5%	-2.2%	11.1%	14.2%	28.6%
Natural gas	4.5	4.1	2.4	3.2	3.2	3.2	-1.9%	-10.5%	4.4%	1.4%	0.0%
Nuclear	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-
Hydro & Wind	0.2	0.2	0.1	0.2	0.2	0.2	-4.7%	-5.2%	4.8%	17.8%	0.0%
Geothermal	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-
Other	3.1	5.7	4.4	4.3	4.3	4.2	13.0%	-5.0%	-0.1%	-1.5%	-1.9%
Net Imports	1.8	-2.6	2.1	7.4	9.2	9.4	-	-	19.7%	25.1%	2.0%
Solids	-20.5	-23.2	-18.9	-17.4	-15.6	-14.1	2.5%	-4.0%	-1.2%	-10.4%	-9.6%
Oil	18.0	16.0	14.3	18.4	18.7	18.1	-2.4%	-2.1%	3.6%	1.5%	-2.8%
Crude oil	16.6	13.8	12.9	15.1	15.7	na	-3.7%	-1.2%	2.2%	4.1%	na
Oil products	1.4	2.2	1.4	3.3	3.0	na	10.1%	-8.9%	13.2%	-10.4%	na
Natural gas	4.3	4.9	6.8	6.6	6.5	5.6	2.4%	6.9%	-0.4%	-1.9%	-13.2%
Electricity	0.0	-0.2	-0.1	-0.2	-0.3	-0.2	55.5%	-13.3%	11.3%	59.0%	-19.4%
Gross Inland Consumption	125.1	127.2	102.0	103.5	96.4	94.3	0.3%	-4.3%	0.2%	-6.8%	-2.2%
Solids	96.0	96.9	75.4	71.3	64.4	62.6	0.2%	-4.9%	-0.8%	-9.7%	-2.8%
Oil	17.1	15.7	13.2	18.5	18.3	18.7	-1.8%	-3.3%	4.9%	-0.9%	1.9%
Natural gas	8.8	8.9	8.9	9.4	9.5	8.9	0.3%	0.0%	0.7%	1.0%	-6.9%
Other (1)	3.2	5.6	4.4	4.3	4.2	4.2	11.6%	-4.8%	-0.3%	-2.5%	-1.3%
Electricity Generation in TWh	120.8	135.6	134.5	140.9	140.8	na	2.3%	-0.2%	0.7%	-0.1%	na
Nuclear	0.0	0.0	0.0	0.0	0.0	na	-	-	-	-	na
Hydro & wind	2.3	1.9	1.4	2.0	2.3	na	-4.6%	-5.2%	4.8%	17.8%	na
Thermal	118.4	133.7	133.1	139.0	138.5	na	2.5%	-0.1%	0.6%	-0.4%	na
Generation Capacity in GWe	24.7	29.0	30.9	29.9	30.1	na	3.3%	1.3%	-0.5%	0.7%	na
Nuclear	0.0	0.0	0.0	0.0	0.0	na	-	-	-	-	na
Hydro & wind	1.3	2.0	1.9	2.0	2.1	na	8.8%	-1.3%	1.4%	4.7%	na
Thermal	23.4	27.1	29.1	27.9	28.0	na	2.9%	1.4%	-0.6%	0.4%	na
Average Load Factor in %	55.8	53.3	49.7	53.7	53.3	na	-0.9%	-1.4%	1.1%	-0.8%	na
Fuel Inputs for Thermal Power Generation	46.5	50.6	44.5	37.5	36.7	na	1.7%	-2.5%	-2.4%	-2.1%	na
Solids	43.9	48.2	42.7	36.8	36.0	na	1.9%	-2.4%	-2.1%	-2.2%	na
Oil	2.3	1.8	1.2	0.4	0.4	na	-4.7%	-7.0%	-13.8%	-1.4%	na
Gas	0.1	0.1	0.1	0.1	0.1	na	-7.9%	0.0%	-1.3%	49.2%	na
Geothermal	0.0	0.0	0.0	0.0	0.0	na	-	-	-	-	na
Other	0.3	0.6	0.4	0.1	0.2	na	13.0%	-5.0%	-15.1%	17.1%	na
Average Thermal Efficiency in %	21.9	22.7	25.7	31.9	32.4	na	0.8%	2.5%	3.1%	1.7%	na
Non-Energy Uses	4.6	4.6	4.2	4.2	4.2	na	0.3%	-1.8%	-0.1%	0.7%	na
Total Final Energy Demand	78.8	79.5	62.3	65.2	60.5	na	0.2%	-4.8%	0.6%	-7.1%	na
Solids	33.8	31.9	19.3	22.9	18.6	na	-1.1%	-9.6%	2.5%	-18.8%	na
Oil	10.9	10.2	9.3	14.6	15.1	na	-1.3%	-1.8%	6.6%	3.3%	na
Gas	6.1	6.0	6.0	6.6	6.5	na	-0.2%	-0.1%	1.3%	-1.3%	na
Electricity	7.3	7.9	8.3	8.2	8.2	na	1.6%	0.9%	-0.2%	0.3%	na
Heat	18.0	18.4	15.6	8.7	8.1	na	0.4%	-3.3%	-7.9%	-7.7%	na
Other	2.8	5.1	3.9	4.2	4.1	na	13.0%	-5.0%	0.9%	-1.3%	na
CO₂ Emissions in Mt of CO₂	413.4	417.7	339.8	336.1	313.3	na	0.2%	-4.0%	-0.2%	-6.8%	na
Indicators											
Population (Million)	35.58	37.20	38.12	38.65	38.67	38.69	0.9%	0.5%	0.2%	0.0%	0.1%
GDP (index 1985=100)	99.1	100.0	98.5	124.5	130.5	135.8	0.2%	-0.3%	3.4%	4.8%	4.1%
Gross Inl Cons./GDP (toe/1990 MEUR)	2682.3	2702.7	2201.6	1767.0	1570.9	1475.7	0.2%	-4.0%	-3.1%	-11.1%	-6.1%
Gross Inl Cons./Capita (toe/inhabitant)	3.52	3.42	2.68	2.68	2.49	2.44	-0.6%	-4.8%	0.0%	-6.9%	-2.3%
Electricity Generated/Capita (kWh/inhabitant)	3394	3644	3528	3646	3641	na	1.4%	-0.6%	0.5%	-0.2%	na
CO ₂ Emissions/Capita (t of CO ₂ /inhabitant)	11.6	11.2	8.9	8.7	8.1	na	-0.7%	-4.5%	-0.4%	-6.8%	na
Import Dependency %	1.4	-2.0	2.0	7.1	9.5	10.0	-	-	19.5%	33.4%	5.2%

(1) Includes nuclear, hydro and wind, net imports of electricity, and other energy sources.

(2) Estimates





ROMANIA : SUMMARY ENERGY BALANCE											
Mtoe	1980	1985	1990	1997	1998	1999(2)	85/80	90/85	97/90	98/97	99/98
	Annual % Change										
Primary Production	52.6	54.3	39.8	29.2	27.0	26.0	0.6%	-6.1%	-4.3%	-7.4%	-3.7%
Solids	8.1	10.3	7.6	5.9	4.6	4.3	4.9%	-6.0%	-3.4%	-22.6%	-6.1%
Oil	11.2	10.4	7.7	6.6	6.5	6.2	-1.4%	-5.9%	-2.1%	-2.3%	-5.0%
Natural gas	31.3	31.3	22.9	11.9	11.1	10.7	0.0%	-6.1%	-8.9%	-6.4%	-3.8%
Nuclear	0.0	0.0	0.0	1.4	1.4	1.4	-	-	-	-1.7%	-2.0%
Hydro & Wind	1.1	1.1	1.0	1.5	1.6	1.5	0.1%	-2.1%	6.3%	7.8%	-5.3%
Geothermal	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-
Other	1.0	1.2	0.6	1.8	1.8	2.0	4.5%	-12.8%	16.9%	0.0%	9.2%
Net Imports	12.5	11.5	21.6	14.1	11.2	10.5	-1.8%	13.5%	-5.9%	-20.9%	-6.3%
Solids	4.5	5.1	4.3	3.1	2.2	2.2	2.7%	-3.3%	-4.7%	-27.4%	-2.9%
Oil	6.9	4.6	10.6	7.0	5.1	4.7	-8.1%	18.4%	-5.8%	-26.7%	-8.1%
Crude oil	15.5	14.2	15.6	6.1	5.8	na	-1.7%	1.9%	-12.6%	-4.3%	na
Oil products	-8.6	-9.6	-5.0	0.9	-0.7	na	2.4%	-12.3%	-	-	na
Natural gas	1.1	1.5	5.9	4.0	3.8	3.6	6.6%	31.2%	-5.4%	-6.4%	-5.6%
Electricity	0.0	0.3	0.8	0.0	0.0	0.0	49.9%	23.8%	-41.5%	73.7%	-21.2%
Gross Inland Consumption	65.1	64.8	61.1	42.2	38.4	36.5	-0.1%	-1.2%	-5.2%	-9.0%	-4.9%
Solids	12.6	15.4	11.7	8.7	7.1	6.5	4.1%	-5.4%	-4.0%	-19.0%	-8.6%
Oil	18.1	14.9	18.2	12.8	11.6	10.9	-3.8%	4.1%	-4.9%	-9.6%	-6.0%
Natural gas	32.4	31.9	28.8	15.9	14.9	14.3	-0.3%	-2.0%	-8.1%	-6.4%	-4.3%
Other (1)	2.1	2.6	2.4	4.7	4.8	4.9	4.4%	-1.3%	10.2%	2.3%	1.2%
Electricity Generation in TWh	67.5	70.9	64.3	57.1	53.5	na	1.0%	-1.9%	-1.7%	-6.4%	na
Nuclear	0.0	0.0	0.0	5.4	5.3	na	-	-	-	-1.7%	na
Hydro & wind	12.6	12.7	11.4	17.5	18.9	na	0.1%	-2.1%	6.3%	7.8%	na
Thermal	54.8	58.2	52.9	34.2	29.3	na	1.2%	-1.9%	-6.0%	-14.4%	na
Generation Capacity in GWe	16.1	19.6	22.5	22.7	22.2	na	4.0%	2.8%	0.1%	-2.1%	na
Nuclear	0.0	0.0	0.0	0.7	0.7	na	-	-	-	8.5%	na
Hydro & wind	3.5	4.4	5.7	5.9	5.9	na	5.1%	5.1%	0.6%	0.5%	na
Thermal	12.7	15.2	16.8	16.1	15.6	na	3.7%	2.1%	-0.6%	-3.4%	na
Average Load Factor in %	47.8	41.4	32.7	28.8	27.5	na	-2.9%	-4.6%	-1.8%	-4.4%	na
Fuel Inputs for Thermal Power Generation	11.3	19.9	22.3	12.8	10.6	na	12.0%	2.3%	-7.6%	-17.6%	na
Solids	4.7	7.0	7.1	5.2	4.3	na	8.4%	0.2%	-4.4%	-17.7%	na
Oil	1.5	2.8	6.2	3.4	1.9	na	13.1%	17.6%	-8.4%	-43.1%	na
Gas	5.1	10.1	9.0	4.2	4.3	na	14.5%	-2.3%	-10.2%	2.6%	na
Geothermal	0.0	0.0	0.0	0.0	0.0	na	-	-	-	-	na
Other	0.0	0.0	0.0	0.0	0.0	na	-	-	20.0%	0.0%	na
Average Thermal Efficiency in %	41.7	25.2	20.4	23.0	23.8	na	-9.6%	-4.1%	1.7%	3.9%	na
Non-Energy Uses	1.4	1.2	0.9	2.0	1.7	na	-3.5%	-4.7%	11.6%	-16.0%	na
Total Final Energy Demand	58.5	49.6	43.6	26.9	24.8	na	-3.2%	-2.5%	-6.7%	-7.9%	na
Solids	7.5	7.5	4.2	2.2	2.0	na	-0.1%	-10.9%	-8.8%	-10.8%	na
Oil	13.4	8.9	8.2	7.2	6.6	na	-7.9%	-1.7%	-1.9%	-7.9%	na
Gas	27.3	21.8	19.8	7.6	6.4	na	-4.3%	-1.9%	-12.7%	-16.9%	na
Electricity	4.6	5.1	4.7	3.3	3.1	na	1.9%	-1.8%	-4.8%	-4.8%	na
Heat	4.7	5.1	6.2	4.9	5.0	na	1.6%	3.8%	-3.3%	2.6%	na
Other	0.9	1.2	0.6	1.7	1.7	na	4.8%	-13.2%	16.8%	0.0%	na
CO₂ Emissions in Mt of CO₂	180.4	177.8	168.1	107.3	94.1	na	-0.3%	-1.1%	-6.2%	-12.3%	na
Indicators											
Population (Million)	22.20	22.73	23.21	22.55	22.50	22.45	0.5%	0.4%	-0.4%	-0.2%	-0.2%
GDP (index 1985=100)	85.7	100.0	86.0	74.9	69.3	67.2	3.1%	-3.0%	-1.9%	-7.5%	-3.0%
Gross Inl Cons./GDP (toe/1990 MEUR)	2170.3	1851.6	2031.9	1608.5	1582.6	1551.3	-3.1%	1.9%	-3.3%	-1.6%	-2.0%
Gross Inl Cons./Capita (toe/inhabitant)	2.93	2.85	2.63	1.87	1.71	1.63	-0.6%	-1.6%	-4.8%	-8.8%	-4.7%
Electricity Generated/Capita (kWh/inhabitant)	3040	3121	2771	2533	2377	na	0.5%	-2.4%	-1.3%	-6.2%	na
CO ₂ Emissions/Capita (t of CO ₂ /inhabitant)	8.1	7.8	7.2	4.8	4.2	na	-0.8%	-1.5%	-5.8%	-12.1%	na
Import Dependency %	19.2	17.7	35.4	33.4	29.0	28.7	-1.7%	14.9%	-0.8%	-13.3%	-1.1%

(1) Includes nuclear, hydro and wind, net imports of electricity, and other energy sources.

(2) Estimates





SLOVAKIA : SUMMARY ENERGY BALANCE											
Mtoe	1980	1985	1990	1997	1998	1999(2)	85/80	90/85	97/90	98/97	99/98
	Annual % Change										
Primary Production	3.4	4.8	5.3	4.7	4.8	4.4	7.1%	1.9%	-1.7%	3.1%	-9.5%
Solids	1.7	1.7	1.4	1.1	1.2	0.7	-0.2%	-3.7%	-2.8%	1.0%	-41.5%
Oil	0.0	0.1	0.1	0.1	0.1	0.1	9.5%	2.6%	-2.0%	-6.2%	0.0%
Natural gas	0.1	0.3	0.3	0.2	0.2	0.2	17.8%	2.1%	-5.9%	-10.2%	0.0%
Nuclear	1.2	2.4	3.1	2.8	3.0	3.0	15.7%	5.1%	-1.5%	5.5%	2.0%
Hydro & Wind	0.2	0.2	0.2	0.4	0.4	0.3	-1.3%	-2.3%	11.9%	3.9%	-8.9%
Geothermal	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-
Other	0.2	0.1	0.2	0.1	0.1	0.1	-4.7%	5.2%	-9.6%	-9.8%	-8.7%
Net Imports	17.4	16.7	16.5	12.5	11.9	11.0	-0.8%	-0.2%	-3.8%	-5.2%	-7.4%
Solids	6.0	6.5	5.7	3.7	3.1	2.3	1.7%	-2.6%	-5.9%	-16.9%	-26.3%
Oil	7.4	5.9	4.7	3.3	3.3	3.2	-4.6%	-4.3%	-5.1%	0.5%	-3.9%
Crude oil	9.8	7.9	6.2	5.3	5.4	na	-4.1%	-4.9%	-2.2%	2.9%	na
Oil products	-2.3	-2.0	-1.4	-2.0	-2.1	na	-2.5%	-6.9%	4.8%	6.7%	na
Natural gas	3.7	3.9	5.6	5.2	5.4	5.5	1.3%	7.4%	-1.0%	3.7%	0.9%
Electricity	0.3	0.4	0.4	0.4	0.1	0.1	4.8%	4.4%	-3.4%	-68.7%	8.2%
Gross Inland Consumption	20.8	21.7	21.4	17.2	16.9	15.4	0.8%	-0.3%	-3.0%	-1.8%	-9.0%
Solids	7.7	8.3	7.4	4.7	4.4	2.9	1.5%	-2.3%	-6.3%	-5.4%	-33.6%
Oil	7.5	6.0	4.7	3.3	3.2	3.2	-4.3%	-4.7%	-5.0%	-1.9%	0.0%
Natural gas	3.8	4.2	5.3	5.6	5.7	5.7	2.1%	4.8%	0.8%	1.6%	-1.2%
Other (1)	1.8	3.1	3.9	3.6	3.5	3.6	11.3%	4.7%	-1.2%	-2.3%	0.9%
Electricity Generation in TWh	20.0	21.9	23.4	24.3	25.2	na	1.9%	1.3%	0.5%	3.6%	na
Nuclear	4.5	9.4	12.0	10.8	11.4	na	15.7%	5.1%	-1.5%	5.5%	na
Hydro & wind	2.3	2.1	1.9	4.1	4.3	na	-1.3%	-2.3%	11.9%	4.0%	na
Thermal	13.2	10.4	9.5	9.4	9.5	na	-4.6%	-1.8%	-0.2%	1.2%	na
Generation Capacity in GWe	0.9	1.8	6.3	7.4	7.8	na	14.9%	29.2%	2.3%	5.3%	na
Nuclear	0.9	1.8	1.8	1.8	2.0	na	14.9%	0.0%	0.0%	14.8%	na
Hydro & wind	0.0	0.0	1.7	2.4	2.5	na	-	-	5.4%	4.6%	na
Thermal	0.0	0.0	2.9	3.3	3.3	na	-	-	1.7%	0.8%	na
Average Load Factor in %	259.0	142.3	42.2	37.3	36.7	na	-11.3%	-21.6%	-1.7%	-1.6%	na
Fuel Inputs for Thermal Power Generation	2.9	2.9	2.9	3.0	3.3	na	0.3%	-0.3%	0.6%	9.9%	na
Solids	2.0	2.2	2.0	1.9	2.1	na	1.5%	-1.5%	-1.1%	10.8%	na
Oil	0.6	0.4	0.2	0.1	0.2	na	-6.3%	-9.3%	-7.2%	57.5%	na
Gas	0.3	0.3	0.6	1.0	1.0	na	2.1%	12.8%	7.1%	1.2%	na
Geothermal	0.0	0.0	0.0	0.0	0.0	na	-	-	-	-	na
Other	0.0	0.0	0.0	0.0	0.0	na	-	-	-	-	na
Average Thermal Efficiency in %	39.8	31.1	28.7	27.1	25.0	na	-4.8%	-1.6%	-0.8%	-8.0%	na
Non-Energy Uses	0.6	0.8	2.3	2.0	1.8	na	5.4%	24.1%	-1.9%	-7.9%	na
Total Final Energy Demand	14.3	14.0	14.6	11.1	10.5	na	-0.3%	0.8%	-3.8%	-5.4%	na
Solids	4.1	4.4	4.8	2.5	2.1	na	1.6%	1.8%	-8.7%	-18.0%	na
Oil	5.0	3.8	3.2	1.9	1.8	na	-5.1%	-3.5%	-7.6%	-3.2%	na
Gas	2.9	3.2	3.7	4.0	4.0	na	2.0%	2.7%	1.1%	1.1%	na
Electricity	1.6	1.8	2.0	2.0	1.8	na	2.4%	1.8%	-0.4%	-8.0%	na
Heat	0.5	0.5	0.6	0.7	0.7	na	3.8%	3.6%	1.1%	6.6%	na
Other	0.2	0.1	0.2	0.1	0.1	na	-4.7%	5.2%	-9.5%	-13.3%	na
CO₂ Emissions in Mt of CO₂	50.0	48.8	50.0	36.7	35.9	na	-0.5%	0.5%	-4.3%	-2.2%	na
Indicators											
Population (Million)	4.98	5.19	5.28	5.38	5.39	5.42	0.8%	0.3%	0.3%	0.1%	0.4%
GDP (index 1985=100)	92.5	100.0	107.2	104.7	109.3	111.4	1.6%	1.4%	-0.3%	4.4%	1.9%
Gross Inl Cons./GDP (toe/1990 MEUR)	1981.3	1908.0	1756.6	1448.9	1362.7	1216.2	-0.8%	-1.6%	-2.7%	-5.9%	-10.7%
Gross Inl Cons./Capita (toe/inhabitant)	4.18	4.17	4.04	3.20	3.14	2.84	0.0%	-0.6%	-3.3%	-2.0%	-9.4%
Electricity Generated/Capita (kWh/inhabitant)	4006	4226	4435	4519	4674	na	1.1%	1.0%	0.3%	3.4%	na
CO ₂ Emissions/Capita (t of CO ₂ /inhabitant)	10.0	9.4	9.5	6.8	6.7	na	-1.3%	0.1%	-4.6%	-2.3%	na
Import Dependency %	83.5	76.9	77.0	72.9	70.3	71.6	-1.6%	0.0%	-0.8%	-3.5%	1.8%

(1) Includes nuclear, hydro and wind, net imports of electricity, and other energy sources.

(2) Estimates





SLOVENIA : SUMMARY ENERGY BALANCE											
Mtoe	1990	1992	1995	1997	1998	1999(2)	95/90	96/95	97/96	98/97	99/98
	Annual % Change										
Primary Production	2.7	2.8	2.8	2.9	2.9	2.7	1.1%	-1.7%	3.9%	0.7%	-5.2%
Solids	1.2	1.2	1.0	1.1	1.0	1.0	-2.6%	-2.3%	3.8%	-1.2%	-4.3%
Oil	0.0	0.0	0.0	0.0	0.0	0.0	-7.8%	-50.0%	0.0%	0.0%	0.0%
Natural gas	0.0	0.0	0.0	0.0	0.0	0.0	-4.9%	-28.6%	-10.0%	-33.3%	0.0%
Nuclear	1.2	1.0	1.2	1.3	1.3	1.2	0.7%	-4.5%	10.0%	0.5%	-10.0%
Hydro & Wind	0.3	0.3	0.3	0.3	0.3	0.3	1.9%	13.3%	-15.8%	11.7%	8.8%
Geothermal	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-
Other	0.0	0.2	0.2	0.2	0.2	0.2	-	0.0%	0.0%	0.1%	0.0%
Net Imports	2.5	2.1	3.0	3.6	3.7	3.7	3.6%	14.1%	3.4%	4.0%	0.8%
Solids	0.1	0.1	0.2	0.2	0.2	0.2	8.2%	16.5%	-16.4%	25.1%	-11.1%
Oil	1.8	1.6	2.3	2.8	2.9	2.9	4.6%	18.4%	3.6%	3.3%	-0.4%
Crude oil	0.6	0.6	0.6	0.6	0.6	na	0.3%	-11.9%	18.7%	-2.8%	na
Oil products	1.2	1.0	1.7	2.2	2.3	na	6.5%	29.4%	-0.1%	5.1%	na
Natural gas	0.7	0.5	0.7	0.7	0.7	0.8	0.7%	-4.3%	9.3%	3.3%	5.9%
Electricity	-0.1	-0.2	-0.1	-0.1	-0.2	-0.1	10.8%	0.0%	2.8%	13.0%	-13.9%
Gross Inland Consumption	5.3	4.9	5.9	6.4	6.7	6.5	2.3%	4.9%	3.8%	3.9%	-2.8%
Solids	1.4	1.3	1.2	1.3	1.3	1.2	-2.9%	-5.1%	9.1%	0.2%	-5.7%
Oil	1.8	1.6	2.3	2.7	2.9	2.9	5.7%	16.5%	0.1%	7.6%	-1.7%
Natural gas	0.7	0.6	0.7	0.7	0.7	0.8	-0.4%	-2.2%	9.0%	2.8%	5.9%
Other (1)	1.4	1.4	1.6	1.7	1.7	1.6	3.7%	-1.2%	4.0%	1.1%	-6.5%
Electricity Generation in TWh	12.4	12.1	12.7	13.2	13.7	na	0.3%	1.0%	3.1%	4.3%	na
Nuclear	4.6	4.0	4.8	5.0	5.0	na	0.7%	-4.5%	10.0%	0.5%	na
Hydro & wind	3.0	3.4	3.2	3.1	3.4	na	1.9%	13.3%	-15.8%	11.5%	na
Thermal	4.9	4.7	4.6	5.1	5.3	na	-1.0%	-2.0%	11.5%	3.7%	na
Generation Capacity in GWe	2.7	2.7	2.7	2.7	2.7	na	0.7%	0.0%	0.0%	0.0%	na
Nuclear	0.6	0.6	0.6	0.6	0.6	na	0.0%	0.0%	0.0%	0.0%	na
Hydro & wind	0.8	0.8	0.8	0.8	0.8	na	2.1%	0.0%	0.0%	0.0%	na
Thermal	1.3	1.3	1.3	1.3	1.3	na	0.1%	0.0%	0.0%	0.0%	na
Average Load Factor in %	53.5	51.1	52.6	54.8	57.1	na	-0.4%	1.0%	3.1%	4.3%	na
Fuel Inputs for Thermal Power Generation	1.3	1.2	1.2	1.1	1.2	na	-1.6%	-5.0%	-0.6%	4.5%	na
Solids	1.1	1.0	1.0	1.1	1.1	na	-1.3%	-5.2%	12.5%	2.5%	na
Oil	0.2	0.1	0.1	0.1	0.0	na	-5.0%	5.8%	-58.3%	-7.5%	na
Gas	0.1	0.1	0.1	0.0	0.0	na	-0.7%	-18.8%	-76.9%	193.3%	na
Geothermal	0.0	0.0	0.0	0.0	0.0	na	-	-	-	-	na
Other	0.0	0.0	0.0	0.0	0.0	na	-	-	-	-	na
Average Thermal Efficiency in %	32.4	32.4	33.5	38.8	38.5	na	0.7%	3.2%	12.2%	-0.8%	na
Non-Energy Uses	0.0	0.0	0.1	0.1	0.2	na	79.2%	35.1%	-26.0%	97.3%	na
Total Final Energy Demand	3.4	3.3	4.0	4.5	4.6	na	3.4%	10.7%	2.4%	3.2%	na
Solids	0.3	0.2	0.1	0.1	0.1	na	-15.2%	-1.5%	-31.8%	-12.5%	na
Oil	1.5	1.5	2.1	2.5	2.7	na	6.8%	15.7%	2.8%	4.9%	na
Gas	0.5	0.4	0.4	0.5	0.6	na	-3.5%	15.4%	11.9%	1.1%	na
Electricity	0.8	0.8	0.8	0.8	0.9	na	-0.7%	1.2%	3.7%	2.7%	na
Heat	0.2	0.2	0.2	0.2	0.2	na	1.6%	6.8%	-4.9%	1.0%	na
Other	0.0	0.3	0.3	0.3	0.3	na	-	-0.1%	0.0%	0.1%	na
CO₂ Emissions in Mt of CO₂	12.2	11.4	12.8	14.2	14.6	na	1.0%	7.9%	2.4%	2.8%	na
Indicators											
Population (Million)	2.00	2.00	1.99	1.99	1.98	1.98	-0.1%	0.1%	-0.3%	-0.2%	-0.2%
GDP (index 1990=100)	100.0	119.0	134.1	143.3	149.0	156.3	6.0%	3.1%	3.7%	3.9%	4.9%
Gross Inl Cons./GDP (toe/1990 MEUR)	386.0	305.4	322.3	328.3	328.1	303.9	-3.5%	1.8%	0.1%	0.0%	-7.4%
Gross Inl Cons./Capita (toe/inhabitant)	2.63	2.48	2.95	3.22	3.36	3.27	2.4%	4.9%	4.0%	4.1%	-2.6%
Electricity Generated/Capita (kWh/inhabitant)	6227	6052	6359	6634	6934	na	0.4%	0.9%	3.4%	4.5%	na
CO ₂ Emissions/Capita (t of CO ₂ /inhabitant)	6.1	5.7	6.5	7.1	7.4	na	1.1%	7.8%	2.7%	3.0%	na
Import Dependency %	48.0	42.5	51.7	55.9	56.0	57.6	1.5%	8.6%	-0.4%	0.1%	2.9%

(1) Includes nuclear, hydro and wind, net imports of electricity, and other energy sources.

(2) Estimates





The Baltic States: Major trends (1990-1999)

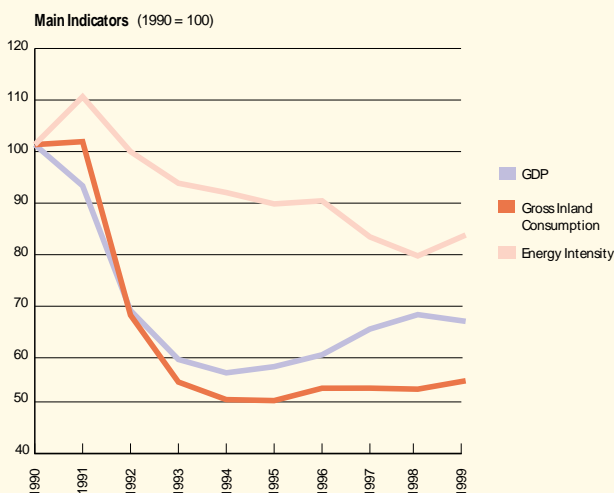
- . Economies began to recover since 1995 but remained heavily dependent upon Russia
- . Both energy production and demand decreased strongly
- . Half of the final demand concentrated in the tertiary-domestic sector
- . Primary energy production, mainly oil shale and nuclear, decreased substantially
- . Reorganisation of the electricity market under way
- . Nuclear and thermal production each accounted for 42% of electricity production in 1998
- . The future of nuclear power plants remains in question
- . Problems with refining capacity
- . Energy intensity improved overall by 18% since 1990 but country variations were very important
- . CO₂ emissions fell by 55% between 1990 and 1995, remaining stable since then
- . Energy import dependency declined slowly to 50% in 1997 and remained stable since then

The Baltic countries comprise Estonia, Latvia and Lithuania, previously part of the former USSR. Reliable economic and energy indicators for these countries were only available for the latest years. Before independence, as generally observed elsewhere in the former USSR, these data were difficult to access due to aggregation of figures for several Republics and to nonstandardised methods of recording economic and energy data. As a consequence, the energy data and indicators described below must be interpreted very carefully, in particular data related to the year 1990 and to biomass.

the reorientation of trade towards the West. But in 1999 the economic climate was still influenced by the financial crisis that affected Russia and consequently a great number of eastern European countries, the main economic partners of the Baltic countries. GDP declined by 2.0% in 1999 but prospects were very favourable for 2000 with growth estimated at 5.3%.

Due to their small sizes, the Baltic countries have joined forces in a number of political and economic arenas to give themselves more influence on the international stage. In addition, the countries have agreed to cooperate in the military sphere in order to bolster their individual security. Each country has applied to join the North Atlantic Treaty Organisation (NATO), and each has made membership of the European Union a stated foreign policy goal. The Baltic countries have agreed to coordinate their energy markets and to harmonise their national energy programmes in a unified bid to meet the EU's membership requirements.

Estonia's economy has grown steadily since 1994, spurred by economic liberalisation and privatisation. Privatisation of small and medium-sized companies has been completed in Estonia, whilst that of large-scale enterprises, such as energy, is in progress. The Estonian Government is giving high priority to the energy sector in its ongoing economic reform programme. The 1999 Estonian GDP corresponded to 80% of its 1990 level. In 2000, Estonia rebounded from the Russian financial crisis by scaling back its budget and reorienting trade away from Russian markets towards EU member states. After GDP shrank by 1.1% in 1999, the economy made a strong recovery in 2000, with growth estimated at 6.9% - the highest in Central and Eastern Europe. Estonia joined the World Trade Organisation in November 1999 - the second Baltic state to do so - and continues its EU accession talks. **Latvia** has completed privatisation of many small and medium sized enterprises, but privatisation of large state-owned utilities and the shipping industry faced more delays in 2000, and political instability will continue to delay completion of the privatisation process over the next year. Many of the largest foreign investments have



Economies began to recover since 1995 but remained heavily dependent upon Russia...

The separation from the former USSR provoked a severe economic crisis in the Baltic countries, as their main economic relations had been restricted to the former Soviet Republics. GDP dropped by about 45% between 1990 and 1994 but stabilised in 1995 and recovered to 4.1% in 1996, 8.6% in 1997 and 4.3% in 1998. This evolution is due to several factors, including the disruption of trading links with other former Soviet Republics, the transformation of these centrally-planned economies to market-based ones and





taken place in the energy sector. The 1999 Latvian GDP represented 58% of its 1990 level. In 2000, Latvia's transitional economy recovered from the 1998 Russian financial crisis, largely due to the government's budget stringency and a gradual reorientation of exports towards EU countries, lessening Latvia's trade dependency on Russia. Latvia officially joined the World Trade Organisation in February 1999, the first Baltic state to join. **Lithuania**, the Baltic state that has conducted the most trade with Russia, has moved to open up its economy by privatising industry. But privatisation of the large, state-owned utilities, particularly in the energy sector, remains a key challenge for the future. An agreement has already been reached to privatise much of its oil sector, and Lithuania has also established a commission to restructure and privatise its electric power company. However, the economy slowed down at the end of 1998 as a result of the financial crisis in neighbouring Russia, and Lithuania entered a recession in 1999. The 1999 Lithuanian GDP was only 66% of its 1990 level. High unemployment and weak consumption have held back recovery. GDP growth for 2000 - estimated at 2.9% - fell behind that of Estonia and Latvia, and unemployment is estimated at 10.8%, the country's highest since regaining independence in 1990. Lithuania must ratify 25 agreements along with other legal documents and obligations by 1 May 2001 before gaining World Trade Organisation membership.

ENERGY OUTLOOK

Both energy production and demand decreased strongly...

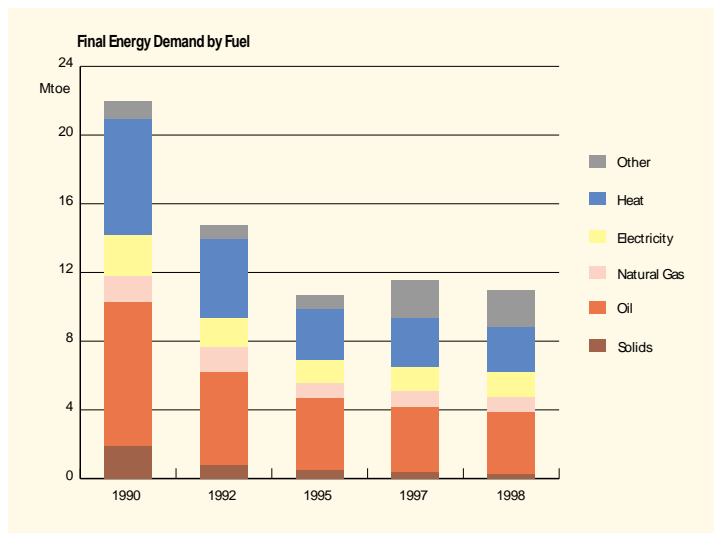
As a direct consequence of economic restructuring, both **energy production and gross inland energy consumption** have decreased significantly since 1990. The production of energy declined from 11.6 Mtoe in 1990 to 6.6 Mtoe in 1994 and rebounded to 9.1 Mtoe in 1999, whereas gross inland energy consumption decreased from 35.1 Mtoe in 1990 to 17.7 Mtoe in 1994 and then increased slowly to reach 19.0 Mtoe in 1999. Demand for all fossil fuels was severely reduced: between 1990 and 1999, consumption of solid fuel dropped by 52% to 3.8 Mtoe, oil products by 54% to 6.8 Mtoe and natural gas by 66% to only 2.8 Mtoe. Only the consumption of non-fossil fuels (nuclear, biomass and hydro) increased substantially over this period, driven by biomass. This last observation should be interpreted with care because non-commercial energy was not explicitly recorded in former Soviet Union statistics. The actual evolution is most probably a stabilisation at the present level, as observed in other eastern countries.

Main items

The Baltic States comprise three small countries – Estonia, Latvia and Lithuania – which achieved legal independence from the former Soviet Union in September 1991. Each country is striving to achieve economic and political realignment, for example by applying for membership of the European Union, the World Trade Organisation and NATO. Given their long prior history of close economic integration with the FSU, the process of adjusting their economies has proved difficult. Significant structural shifts have caused lower industrial production, falling real incomes, and high unemployment. The main elements of their economic reform programmes have included liberalisation and privatisation, cautious budgetary policies and reorientation of foreign trade. Despite these measures, each of the Baltic States experienced a serious contraction in GDP during the 1990s. Further progress is required to liberalise and harmonise their energy sectors – one precondition for EU accession. Energy consumption, energy production and overall CO2 emissions have fallen steeply since 1990. The indigenous energy resource base is small, comprising coal, oil shale, biomass (peat and timber), hydro-electricity and nuclear. The two RMBK units at Lithuania's Ignalina nuclear plant still cause safety concerns; and discussions continue as regards their final decommissioning dates. In the longer term, the Baltic States expect to play a significant role in the transit of Russian oil and gas exports into European markets.

ded to 9.1 Mtoe in 1999, whereas gross inland energy consumption decreased from 35.1 Mtoe in 1990 to 17.7 Mtoe in 1994 and then increased slowly to reach 19.0 Mtoe in 1999. Demand for all fossil fuels was severely reduced: between 1990 and 1999, consumption of solid fuel dropped by 52% to 3.8 Mtoe, oil products by 54% to 6.8 Mtoe and natural gas by 66% to only 2.8 Mtoe. Only the consumption of non-fossil fuels (nuclear, biomass and hydro) increased substantially over this period, driven by biomass. This last observation should be interpreted with care because non-commercial energy was not explicitly recorded in former Soviet Union statistics. The actual evolution is most probably a stabilisation at the present level, as observed in other eastern countries.

These developments resulted directly from the trends in **total final energy demand**, dominated by oil products and distributed heat. Total final demand halved between 1990 and 1995 and has stabilised since then. The demand for oil, gas, electricity and distributed heat fell in absolute terms since 1990 by 57%, 40%, 42%





and 60% respectively in the region as a whole. At the same time, demand for solid fuels declined by 84%. This evolution resulted both from the economic climate and effective increases of energy prices, with energy markets adjusting abruptly to the reality of world or regional market prices. The contraction of final demand since 1990 reached: -54% in Lithuania, -46% in Estonia and -39% in Latvia.

Half of the final demand concentrated in the tertiary-domestic sector...

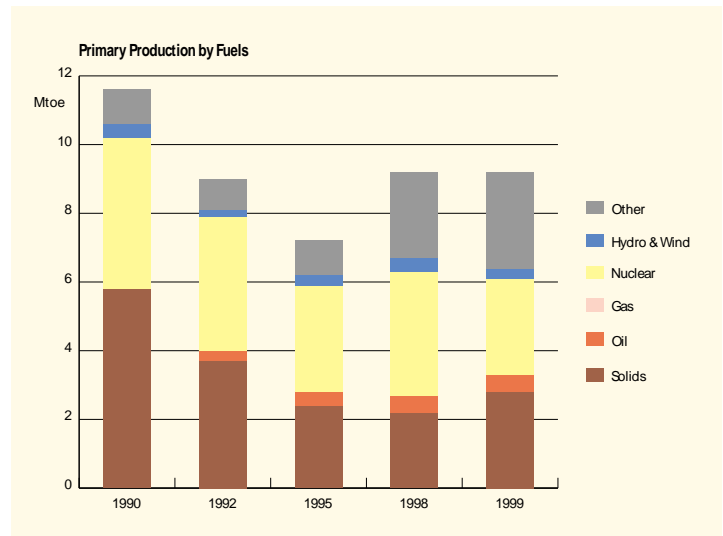
The pattern of final energy demand by sector was significantly different from the other CEEC countries with 50% of energy consumption concentrated in the tertiary-domestic sector, one quarter in transport and only one quarter in industry. Since 1990 energy consumption has fallen by 58% in industry, 55% in the tertiary-domestic sector and only 18% in transport sector which substantially increased its share. The evolution of the sectoral composition of final energy demand demonstrated the effects of the severe economic crisis which resulted in a steep reduction in industrial production and a subsequent lowering of living standards. At the same time, demand for transportation fuel was sustained given the increasing importance of transport in the new market economies, especially growth in car ownership. The first signs of real economic recovery occurred only in 1996 and were confirmed since then but, at the same time, energy consumption in all sectors remained flat. This resulted from the efforts to rationalise energy use in the context of energy prices reflecting world market levels.

Electricity's overall share in final energy demand has increased slowly 1990, reaching 20% in industry but only 16% in the tertiary-domestic sector. These levels remained well below European Union averages and demonstrate the large potential for increases in electricity demand in future as living standards improve.

Primary energy production concentrated on oil shale and nuclear, decreased substantially...

The Baltic countries are **energy producers** of solid fuel, mainly shale oil in Estonia, and nuclear electricity in Lithuania. Production declined significantly between 1990 and 1994, by 53% for oil shale and by 52% for nuclear electricity as export markets to other Republics disappeared. Since 1994, oil shale production has stabilised at about 2.7 Mtoe. Nuclear output, however, showed an increasing trend until 1998 but remained 15% below its 1990 peak. In 1999, nuclear production declined by 23%, following the interruption of deliveries to Belarus. A limited production of oil started in Lithuania but accounted for less than half a million tonnes in 1999. On the other hand, biomass production seems to have increased substantially since 1990. However, the accuracy of

this data awaits confirmation. The statistical series on biomass experienced a discontinuity in 1996-1997, with stability before and after this period.



Reorganisation of the electricity market under way...

The power systems of Estonia, Latvia and Lithuania were originally built to be part of the Soviet Union's north-western unified energy system. After achieving their independence, the Baltic states disconnected from this grid system, forming their own national grids. However, the independent national grids continued to run in parallel mode, allowing Latvia, whose power-generating capacity is mainly seasonal hydropower, to import electricity supplies from Estonia and Lithuania when necessary. In 1999, Russia, Belarus, Estonia, Latvia and Lithuania agreed to re-connect their electricity grids in order to ensure reliable power supplies for consumers in the five countries. But Lithuania, which remained connected to Belarus, Latvia and Estonia, withdrew from the five-party agreement at the last minute due to political reasons.

The Baltic states' power grids are not connected to the Western European energy grid. As a result, both Lithuania and Estonia, which have excess power-generating capacity, have been constrained in their ability to export power. In addition to exporting power to Latvia, Lithuania has exported power to Belarus periodically, but Belarus has failed to make all its payments for electricity supplies. Belarus owes Lithuania around \$50 million for electricity supplied in 1998 and 1999 but, after a one-year break, Lithuania agreed to begin power exports to Belarus again in July 2000 after concluding a unique three-way arrangement with Russian and Belarus. Under the agreement, Russia agreed to purchase 2.2 TWh from Lithuania's Ignalina nuclear power plant for subsequent delivery to Belarus. In exchange, Russia supplied the Ignalina plant with nuclear fuel, while Belarus paid Russia in commodities rather than cash.





Estonia, for its part, has been pushing to link its grid to the Western European system. BALTREL, the Baltic countries' power cooperation organisation, has also proposed supplying Sweden and Finland with power generated in the Baltic countries. A consortium of electric companies agreed in September 1998 to build an underwater electricity transmission cable. This interconnector project, dubbed "Estlink," and rated at 315 MW, should be ready by the end of 2003.

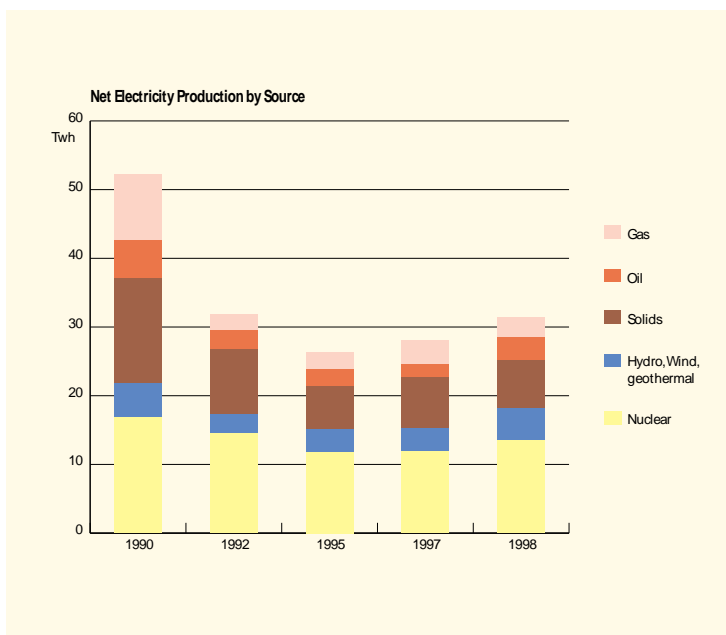
Nuclear and thermal production each accounted for 42% of electricity production in 1998...

Electricity generation capacity has remained almost constant since 1990 at about 11 GWe, the only major modification being the development of hydro capacity, in particular pump storage units. Thermal power stations represented 58% of the capacity in 1998, the balance being covered equally by nuclear energy and hydro. The load factor dropped dramatically from 55% to 31% over the period as, at the same time, electricity production fell by about 46%. This was because of the contraction of the internal demand and the drastic reduction of exports. Solid fuels (52% in 1998), oil (26%) and natural gas (22%) met demand from thermal power stations, production from which was almost equivalent to that from nuclear units in 1998. Between 1990 and 1994, the contribution of natural gas fell drastically (-75%) due to supply reductions imposed by Gazprom as a means of securing payment for deliveries. Since 1994, gas deliveries have increased a little but still remained two-thirds lower than in 1990. Consumption of solids declined steadily since 1990 to represent in 1998 only 46% of that in 1990.

The future of nuclear power plants remains in question...

The Ignalina nuclear power station in Lithuania, 2,370 MWe, is a major concern because it is a RMBK type reactor, the same design used at Ukraine's Chernobyl nuclear plant. Despite a number of safety measures introduced at Ignalina over the past decade, the EU considers the plant's two power units to be dangerous and, as a result, the EU has made closure of the Ignalina plant a pre-condition for Lithuanian membership of the European Union. In exchange for the right to begin EU membership negotiations, in 1999 Lithuania's parliament pledged to take Ignalina-1 out of operation by January 1, 2005, while a decommissioning date for the second reactor is still undecided. Lithuania had planned to decide the fate of Ignalina-2 in 2004, but the EU has insisted that a decision on its closure should be made in 2002.

To facilitate the closure and to develop alternative sources of power, the EU announced at the end of 1999 that it would provide additional aid to Lithuania through its Phare programme. In



June 2000, representatives from countries around the world pledged nearly \$195 million to help Lithuania shut Ignalina-1. However, the preliminary estimate for shutting down only the first reactor unit is some \$530 million, while about \$1 billion will be needed for the closure of the second reactor unit. According to Lithuanian energy officials, the country also needs \$910 million to modernise its non-nuclear power plants and transmission lines to ensure generation after Ignalina-1 is closed.

Problems with refining capacity...

Only one refinery, the Mazeikiai refinery located in Lithuania, accounts for all the regional capacity with 293,000 bbl/d. Oil supply problems caused several shutdowns in recent years at this refinery that processed only 98,000 bbl/d in 2000 and registered large financial losses. In May 2000 Yukos, Russia's second-largest oil company and already the refinery's and oil terminal's biggest supplier, took a 26.9% share in the refinery. Lukoil has also been considering building a small 40,000-bbl/d refinery in Latvia.

COMPETITIVENESS

Energy intensity improved overall by 18% since 1990 but country variations were very important...

In terms of **energy intensity**, as energy consumption declined more rapidly than economic activity between 1990 and 1995, a decrease of 12% was observed during this transition period. But, as this region is relatively small, rapid shifts in energy intensity could result merely from closing or opening a single large industrial plant. Since 1995, despite the rebound of economic activity,





energy intensity has continued to improve on average by 1.8% per year with marked annual fluctuations: +0.7% in 1996, -7.9% in 1997, -4.5% in 1998 but +5.2% in 1999. Major advances were observed in Lithuania (-27% since 1990) and Estonia (-25%); although energy intensity in Latvia increased regularly to be 9% higher in 1999 than in 1990.

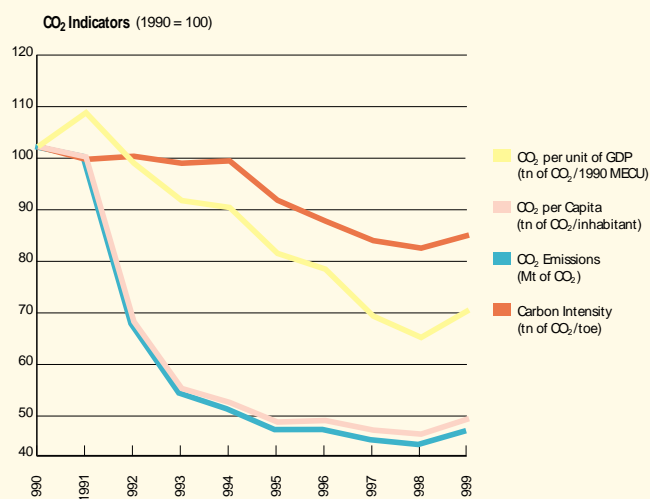
The evolution of sectoral energy intensity was marked by the continued improvement of power stations which reduced their energy intensity by one third since 1990. Industry, confronted with restructuring and modernisation, improved its energy intensity by 40% but, compared to the peak reached in 1992, the gain reached 46%. The tertiary-domestic sector, now faced with energy prices more in line with world levels, demonstrated a significant improvement (one third since 1990) even though lifestyle changes - such as higher penetration of electrical appliances - created additional consumption. Finally the energy intensity of transport increased by 35% between 1990 and 1995 but has decreased by 12% since then.

The **gross inland energy consumption per capita** dropped from 4.41 to 2.28 toe/inhabitant over the period 1990-1995, but rebounded to 2.42 toe/inhabitant in 1996 and has remained stable since then.

ENVIRONMENT

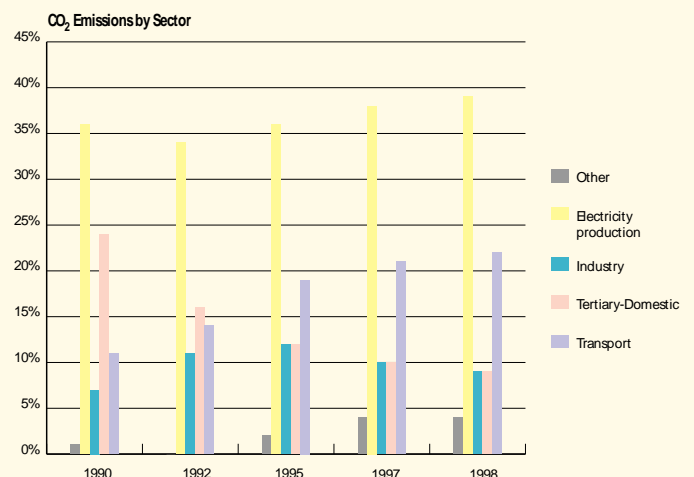
CO₂ emissions fell by 55% between 1990 and 1995, remaining stable since then...

Following the evolution of final energy consumption, **CO₂ emissions** have fallen significantly since 1990: from 87 Mt. CO₂ in 1990 to 40 Mt. CO₂ in 1999 (a 55% drop over nine years). Since 1995,



growing contributions from nuclear and biomass have led to a stabilised consumption of fossil fuels within overall gross inland energy consumption. Consequently CO₂ emissions were stable over the last five years. As the population of the Baltic countries remained constant over the period, the **per capita CO₂ emissions** followed the same trend, and dropped from 11.0 to 5.2 tonnes of CO₂/inhabitant, compared to an average value for the European Union of 8.3 over the same period.

Turning to CO₂ emissions by sector at the regional level, the largest sector in terms of emissions is power generation with about 41% of total emissions in 1997 (36% in 1990). Transport, rapidly emerging as the second contributor, accounted for 20% in 1997 against 11% in 1990. The tertiary-domestic sector declined to 9% in 1997 from 24% in 1990 whereas industry increased from 7% in 1990 to 10% in 1997.



GLOBAL MARKETS

Energy import dependency declined slowly to 50% in 1997 and remained stable since then...

The Baltic countries are **energy importers** of coal, but especially of oil and gas, from the CIS. These imports halved between 1990 and 1993 but have been quite stable since then, the structure by product also remaining unchanged. Historically, with a large capacity based upon nuclear power decided by the government of the former Soviet Union, the Baltic countries have been net exporters of electricity to neighbouring republics of the Former Soviet Union. But electricity exports disappeared rapidly after independence. As gross energy consumption dropped by 46% over the period, the **energy import dependency** fell from 65% in 1990 to 52% in 1999, being stable in the last three years.





Latvia's Ventspils port is Russia's primary crude oil export terminal in the north, and both Estonia and Lithuania have important ports for exporting Russian crude oil and petroleum products. Transit fees for these oil and petroleum products destined for export are an important source of revenue in the Baltic countries. However, Russia is keen to avoid these transit fees by constructing its own oil export terminal at Primorsk, part of Russia's new Baltic Pipeline System (BPS). The Primorsk terminal, with an initial capacity of 240,000 barrels per day (bbl/d), is scheduled to load its first tanker in December 2001. According to various estimates, ports in the Baltic countries could lose between 10% and 50% of their current Russian oil export volumes. Nevertheless, projected increases in Russian oil exports, along with increased oil exports from the Caspian Sea region, especially Kazakhstan, appear likely to ensure that the ports in Estonia, Latvia and Lithuania will remain important oil export terminals in the future.

Russia is the main source of natural gas supplies for each of the Baltic countries, and the proposed North TransGas project by Russia's Gazprom could bring additional Russian natural gas exports to this region. The project, which will be carried out by Gazprom in conjunction with Finland's Fortum and Germany's Wintershall, will pump natural gas to Scandinavian and German customers via a pipeline beneath the Baltic Sea. Latvia's huge natural gas storage facilities could play an important role in the project, and justify an extension from the Baltic Sea to Latvia. The Baltic countries are also looking to diversify their natural gas supplies, and the recent natural gas deal between Norway and Poland may provide the Baltic states with an alternative supply of natural gas. Although the deal appears to threaten Poland with oversupply, since Poland does not consume as much natural gas as the deal calls for, the possible re-export of Norwegian natural gas from Poland to the Baltic states would absorb any of the excess natural gas on the Polish market. Lithuanian and Estonian officials have expressed their interest in receiving natural gas from Poland, which would require the Baltic supply network to be linked to Poland.



BALTIC COUNTRIES : SUMMARY ENERGY BALANCE

Mtoe	1990	1995	1997	1998	1999(3)	95/90	97/95	98/97	99/98
Primary Production	11.6	7.3	9.1	9.2	9.1	-9.0%	12.0%	1.1%	-1.0%
Solids (1)	5.8	2.4	2.6	2.2	2.8	-16.1%	3.9%	-14.5%	27.6%
Oil	0.0	0.4	0.6	0.5	0.5	-	15.5%	-14.5%	0.0%
Natural gas	0.0	0.0	0.0	0.0	0.0	-	-	-	-
Nuclear	4.4	3.1	3.2	3.6	2.8	-6.7%	0.8%	12.4%	-23.3%
Hydro & Wind	0.4	0.3	0.3	0.4	0.3	-7.6%	-1.1%	45.9%	-33.9%
Geothermal	0.0	0.0	0.0	0.0	0.0	-	-	-	-
Other	1.0	1.0	2.4	2.5	2.8	-0.4%	57.4%	1.3%	11.0%
Net Imports	22.9	10.9	9.7	9.7	10.1	-13.9%	-5.6%	-0.1%	4.8%
Solids	1.9	0.6	0.5	0.5	1.0	-20.5%	-5.8%	-9.7%	105.3%
Oil	14.1	6.8	5.7	6.2	6.5	-13.7%	-8.2%	9.7%	3.5%
Crude oil	9.6	3.6	5.7	6.6	na	-17.8%	25.4%	16.1%	na
Oil products	4.6	3.2	0.0	-0.3	na	-7.2%	-89.8%	-	na
Natural gas	8.2	3.6	3.7	3.5	2.8	-15.2%	1.0%	-6.2%	-19.0%
Electricity	-1.3	-0.1	-0.2	-0.5	-0.1	-40.1%	50.2%	121.7%	-80.0%
Gross Inland Consumption	35.1	17.7	18.5	18.5	19.0	-12.8%	2.4%	-0.4%	3.1%
Solids	8.0	3.3	3.2	2.8	3.8	-16.4%	-1.4%	-11.3%	35.4%
Oil	14.6	6.6	6.2	6.7	6.8	-14.5%	-3.1%	6.6%	1.6%
Natural gas	8.1	3.6	3.7	3.4	2.8	-14.8%	1.0%	-8.2%	-17.4%
Other (2)	4.5	4.2	5.4	5.6	5.7	-1.7%	14.2%	3.3%	1.1%
Electricity Generation in TWh	52.2	26.2	28.1	31.4	na	-12.9%	3.4%	11.9%	na
Nuclear	17.0	11.8	12.0	13.6	na	-7.0%	0.9%	12.7%	na
Hydro & wind	4.9	3.3	3.3	4.7	na	-7.6%	-0.9%	45.8%	na
Thermal	30.3	11.1	12.8	13.1	na	-18.2%	7.3%	2.6%	na
Generation Capacity in GWe	10.4	11.1	11.2	11.4	na	1.4%	0.4%	1.8%	na
Nuclear	2.5	2.4	2.4	2.4	na	-1.1%	0.0%	0.0%	na
Hydro & wind	1.3	2.1	2.2	2.4	na	11.1%	2.1%	9.1%	na
Thermal	6.6	6.6	6.6	6.6	na	0.0%	0.1%	0.0%	na
Average Load Factor in %	57.6	27.0	28.6	31.5	na	-14.1%	3.0%	9.9%	na
Fuel Inputs for Thermal Power Generation	9.5	4.1	4.2	4.2	na	-15.4%	0.9%	1.7%	na
Solids	4.8	2.3	2.4	2.2	na	-13.2%	1.3%	-7.9%	na
Oil	1.7	0.9	0.7	1.1	na	-12.6%	-13.4%	67.4%	na
Gas	3.0	0.9	1.1	0.9	na	-21.8%	12.5%	-16.6%	na
Geothermal	0.0	0.0	0.0	0.0	na	-	-	-	na
Other	0.0	0.0	0.0	0.0	na	-	-	-	na
Average Thermal Efficiency in %	27.5	23.3	26.3	26.5	na	-3.3%	6.3%	0.9%	na
Non-Energy Uses	2.0	0.8	0.9	1.0	na	-18.1%	7.1%	12.4%	na
Total Final Energy Demand	22.0	10.7	11.6	11.1	na	-13.4%	3.9%	-4.2%	na
Solids	1.9	0.5	0.4	0.3	na	-22.2%	-14.1%	-14.2%	na
Oil	8.4	4.2	3.8	3.6	na	-13.2%	-4.9%	-3.0%	na
Gas	1.5	0.9	0.9	0.9	na	-10.2%	2.1%	-4.9%	na
Electricity	2.4	1.3	1.4	1.4	na	-11.1%	4.2%	0.9%	na
Heat	6.8	3.0	2.9	2.7	na	-15.1%	-1.7%	-7.7%	na
Other	1.0	0.8	2.2	2.1	na	-3.5%	61.3%	-3.1%	na
CO₂ Emissions in Mt of CO₂	87.4	39.4	37.7	36.9	39.2	-14.7%	-2.2%	-2.1%	6.4%
Indicators									
Population (Million)	7.96	7.72	7.63	7.60	7.57	-0.6%	-0.5%	-0.4%	-0.4%
GDP (index 1990=100)	100.0	56.9	64.2	67.0	65.7	-10.7%	6.3%	4.3%	-2.0%
Gross Inl Cons./GDP (toe/1990 MEUR)	1376.1	1217.7	1129.6	1078.9	1134.7	-2.4%	-3.7%	-4.5%	5.2%
Gross Inl Cons./Capita (toe/inhabitant)	4.41	2.29	2.43	2.43	2.51	-12.3%	2.9%	0.0%	3.5%
Electricity Generated/Capita (kWh/inhabitant)	6559	3400	3675	4130	na	-12.3%	4.0%	12.4%	na
CO ₂ Emissions/Capita (t of CO ₂ /inhabitant)	11.0	5.1	4.9	4.8	5.2	-14.2%	-1.7%	-1.7%	6.8%
Import Dependency %	65.2	60.4	50.3	50.0	51.8	-1.5%	-8.8%	-0.5%	3.5%

(1) Includes oil shale

(2) Includes nuclear, hydro and wind, net imports of electricity, and other energy sources.

(3) Estimates





BALTIC COUNTRIES : MAIN INDICATORS								
	1990	1995	1997	1998	95/90	96/95	97/96	98/97
Gross Inland Consumption (Mtoe)	35.1	17.7	18.5	18.5	-12.8%	4.8%	0.0%	-0.4%
Public Thermal Power Generation	9.3	3.9	4.0	4.1	-16.1%	8.4%	-3.2%	1.9%
Autoprod. Thermal Power Generation	0.2	0.2	0.1	0.1	0.7%	2.4%	-46.0%	-5.1%
Energy Branch	1.0	0.7	1.0	1.1	-8.4%	6.1%	35.2%	13.0%
Final Energy Consumption	21.9	10.6	11.2	10.8	-13.6%	4.6%	1.7%	-4.4%
Industry	6.5	2.8	2.8	2.7	-15.7%	-0.3%	0.2%	-4.0%
Transport	3.3	2.5	2.6	2.7	-5.3%	4.1%	-0.4%	1.3%
Tertiary-Domestic	12.1	5.3	5.9	5.4	-15.4%	7.5%	3.5%	-7.1%
Energy Intensity (toe/1990 MEUR)	1376.1	1217.7	1129.6	1078.9	-2.4%	0.7%	-7.9%	-4.5%
Public Thermal Power Generation	362.3	265.6	246.5	240.8	-6.0%	4.1%	-10.9%	-2.3%
Autoprod. Thermal Power Generation	9.3	16.9	8.3	7.5	12.8%	-1.6%	-50.3%	-9.1%
Industry	254.6	190.8	168.7	155.2	-5.6%	-4.2%	-7.7%	-8.0%
Transport	130.3	174.5	160.1	155.4	6.0%	0.0%	-8.2%	-2.9%
Tertiary-Domestic	474.6	362.8	356.9	317.9	-5.2%	3.3%	-4.7%	-10.9%
Energy per Capita (Kgoe/inhabitant)	4411.7	2291.2	2427.1	2427.9	-12.3%	5.4%	0.5%	0.0%
Industry	816.1	359.0	362.5	349.3	-15.1%	0.3%	0.7%	-3.7%
Transport	417.6	328.3	344.0	349.8	-4.7%	4.7%	0.1%	1.7%
Tertiary-Domestic	1521.4	682.6	766.9	715.3	-14.8%	8.1%	3.9%	-6.7%
Electricity Share (%)								
Final Energy Consumption	11%	12%	13%	13%	2.9%	1.0%	1.0%	5.6%
Industry	15%	19%	20%	20%	3.9%	2.7%	7.0%	-4.3%
Transport	2%	1%	1%	1%	-7.3%	-9.4%	0.4%	-1.2%
Tertiary-Domestic	11%	15%	14%	16%	6.3%	0.8%	-3.3%	15.3%
Total Renewable Consumption (Mtoe)	1.4	1.1	2.5	2.5	-4.7%	44.8%	51.3%	2.4%
Hydro	0.4	0.3	0.3	0.4	-7.6%	-34.0%	48.4%	45.9%
Biomass	1.0	0.8	2.2	2.1	-3.5%	71.5%	51.7%	-3.1%
Other	0.0	0.0	0.0	0.0	-	-	-	-
Renewable intensity (toe/1990 MEUR)	56.0	77.6	150.5	147.8	6.7%	39.2%	39.4%	-1.8%
Renewable per capita (Kgoe/inhabitant)	179.6	146.0	323.5	332.7	-4.0%	45.7%	52.0%	2.8%
CO₂ Emissions (Mt of CO₂)	87.4	39.4	37.7	36.9	-14.7%	0.1%	-4.4%	-2.1%
Public Thermal Power Generation	30.8	13.4	13.9	14.1	-15.3%	7.2%	-3.3%	1.2%
Autoprod. Thermal Power Generation	0.8	0.7	0.4	0.4	-0.8%	3.2%	-47.5%	-3.1%
Energy Branch	1.0	0.6	1.3	1.7	-10.0%	-24.5%	187.5%	23.8%
Industry	6.0	4.7	3.7	3.4	-5.0%	-20.8%	1.7%	-8.6%
Transport	10.0	7.7	8.0	8.1	-5.2%	4.2%	-0.4%	1.3%
Tertiary-Domestic	21.1	4.7	3.7	3.2	-25.8%	-0.3%	-22.6%	-12.4%
Carbon Intensity (tn of CO₂/toe)	2.5	2.2	2.0	2.0	-2.2%	-4.5%	-4.4%	-1.8%
Public Power Generation	2.2	1.8	1.8	1.7	-3.4%	-3.1%	3.7%	-6.3%
Public Thermal Power Generation	3.3	3.5	3.4	3.4	0.8%	-1.0%	-0.1%	-0.7%
Autoprod. Power Generation	3.2	3.0	2.9	2.9	-1.5%	0.8%	-3.5%	2.2%
Autoprod. Thermal Power Generation	3.2	3.0	2.9	3.0	-1.5%	0.8%	-2.8%	2.2%
Energy Branch	1.0	0.9	1.4	1.5	-1.7%	-28.9%	112.6%	9.5%
Industry	0.9	1.7	1.4	1.3	12.7%	-20.6%	1.5%	-4.8%
Transport	3.0	3.0	3.0	3.0	0.1%	0.1%	0.0%	0.0%
Tertiary-Domestic	1.7	0.9	0.6	0.6	-12.4%	-7.2%	-25.2%	-5.7%
CO₂ per Capita (kg of CO₂/inhabitant)	10970	5104	4934	4848	-14.2%	0.7%	-4.0%	-1.7%
Industry	756	603	491	450	-4.4%	-20.4%	2.2%	-8.2%
Transport	1255	994	1042	1060	-4.6%	4.8%	0.1%	1.7%
Tertiary-Domestic	2648	615	480	422	-25.3%	0.3%	-22.2%	-12.1%
CO₂ per unit of GDP (tn of CO₂/1990 MEUR)	3422	2713	2296	2154	-4.5%	-3.9%	-12.0%	-6.2%
Public Thermal Power Generation	1208	924	848	822	-5.2%	3.1%	-10.9%	-3.0%
Autoprod. Thermal Power Generation	30	50	24	22	11.1%	-0.8%	-51.7%	-7.1%
Energy Branch	41	42	81	97	0.8%	-27.5%	164.8%	18.7%
Industry	236	320	228	200	6.3%	-23.9%	-6.3%	-12.4%
Transport	392	528	485	471	6.2%	0.1%	-8.3%	-2.9%
Tertiary-Domestic	826	327	223	187	-16.9%	-4.2%	-28.7%	-16.0%

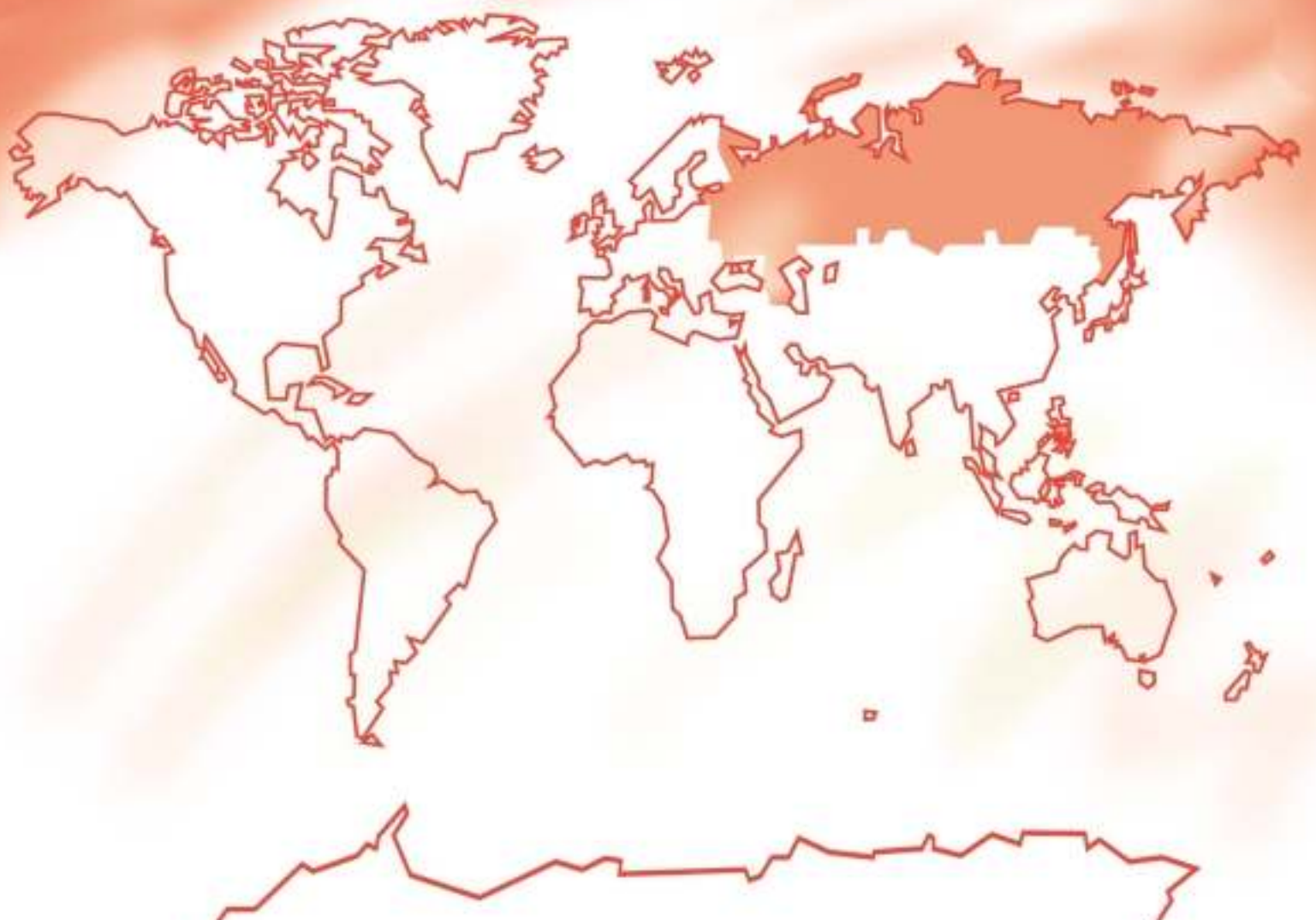


SUMMARY ENERGY BALANCE	ESTONIA				LATVIA				LITHUANIA			
	1991	1995	1998	1999(2)	1991	1995	1998	1999(2)	1991	1995	1998	1999(2)
Mtoe												
Primary Production	5.1	3.0	2.9	3.7	1.2	0.7	1.8	1.7	4.8	3.6	4.5	3.6
Solids	4.8	2.3	2.2	2.8	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Oil	0.1	0.3	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.3
Natural gas	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Nuclear	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.4	3.1	3.6	2.8
Hydro & Wind	0.0	0.0	0.0	0.0	0.3	0.3	0.4	0.2	0.0	0.0	0.0	0.0
Geothermal	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	0.2	0.3	0.5	0.7	0.5	0.4	1.4	1.5	0.3	0.2	0.6	0.6
Net Imports	4.1	1.9	2.0	2.3	6.4	3.4	3.0	3.1	13.4	5.6	4.7	4.7
Solids	0.7	0.3	0.3	0.7	0.4	0.1	0.1	0.1	0.6	0.2	0.1	0.1
Oil	2.5	1.0	1.2	1.1	3.2	2.1	1.7	1.7	9.0	3.6	3.3	3.6
Crude oil	0.0	0.0	0.0	na	0.0	0.0	0.0	na	11.8	3.6	6.6	na
Oil products	2.5	1.0	1.2	na	3.2	2.1	1.7	na	-2.8	0.0	-3.2	na
Natural gas	1.3	0.6	0.6	0.6	2.5	1.0	1.1	1.0	4.8	2.0	1.8	1.2
Electricity	-0.4	-0.1	0.0	-0.1	0.4	0.2	0.0	0.2	-1.1	-0.2	-0.5	-0.2
Gross Inland Consumption	9.6	4.8	4.8	6.0	7.5	4.0	4.3	4.8	18.2	8.9	9.3	8.3
Solids	5.8	2.8	2.5	3.5	0.8	0.2	0.1	0.1	0.7	0.3	0.2	0.1
Oil	2.7	1.2	1.2	1.2	3.2	2.0	1.6	1.7	9.0	3.4	3.8	3.9
Natural gas	1.3	0.6	0.6	0.6	2.5	1.0	1.0	1.0	4.8	2.0	1.8	1.2
Other (1)	-0.2	0.3	0.5	0.6	1.1	0.7	1.5	1.9	3.7	3.2	3.7	3.1
Electricity Generation in Twh	14.6	8.7	8.5	na	5.6	4.0	5.7	na	29.4	13.6	17.2	na
Nuclear	0.0	0.0	0.0	na	0.0	0.0	0.0	na	17.0	11.8	13.6	na
Hydro & wind	0.0	0.0	0.0	na	3.3	2.9	4.3	na	0.3	0.4	0.4	na
Thermal	14.6	8.7	8.5	na	2.4	1.0	1.4	na	12.0	1.4	3.2	na
Generation Capacity in GWe	3.5	3.5	3.5	3.5	1.7	2.0	2.1	na	5.2	5.6	5.8	na
Nuclear	0.0	0.0	0.0	0.0	0.0	0.0	0.0	na	2.5	2.4	2.4	na
Hydro & wind	0.0	0.0	0.0	0.0	1.2	1.4	1.5	na	0.1	0.7	0.9	na
Thermal	3.5	3.5	3.5	3.5	0.6	0.6	0.6	na	2.6	2.6	2.6	na
Average Load Factor in %	48.0	28.5	27.9	na	37.3	22.8	31.4	na	65.1	27.5	33.6	na
Fuel Inputs for Thermal Power Generation	5.1	2.5	2.4	na	1.1	0.6	0.0	na	3.2	1.0	1.3	na
Solids	4.3	2.3	2.2	na	0.0	0.1	0.0	na	0.0	0.0	0.0	na
Oil	0.5	0.1	0.1	na	0.3	0.3	0.2	na	1.2	0.6	0.8	na
Gas	0.3	0.1	0.1	na	0.7	0.3	0.4	na	2.0	0.5	0.4	na
Geothermal	0.0	0.0	0.0	na	0.0	0.0	0.0	na	0.0	0.0	0.0	na
Other	0.0	0.0	0.0	na	0.0	0.0	0.0	na	0.0	0.0	0.0	na
Average Thermal Efficiency in %	24.7	30.3	30.9	na	18.7	15.1	19.9	na	31.9	11.3	21.6	na
Non-Energy Uses	0.3	0.2	0.2	na	0.0	0.0	0.0	na	1.9	0.5	0.7	na
Total Final Energy Demand	5.0	2.5	2.7	na	6.2	3.3	3.8	na	9.9	4.9	4.6	na
Solids	0.4	0.2	0.1	na	0.6	0.1	0.1	na	0.6	0.2	0.1	na
Oil	1.5	0.9	0.9	na	2.1	1.3	1.1	na	4.1	2.0	1.7	na
Gas	0.3	0.2	0.2	na	0.6	0.3	0.3	na	0.7	0.4	0.3	na
Electricity	0.6	0.4	0.4	na	0.7	0.4	0.4	na	1.0	0.5	0.6	na
Heat	2.1	0.6	0.6	na	1.7	0.9	0.8	na	3.2	1.6	1.3	na
Other	0.2	0.3	0.5	na	0.5	0.3	1.0	na	0.3	0.2	0.6	na
CO₂ Emissions in Mt of CO₂	31.5	14.7	14.2	na	19.4	9.7	8.2	na	34.7	14.9	14.5	na
Indicators												
Population (Million)	1.6	1.5	1.5	1.4	2.7	2.5	2.4	2.4	3.7	3.7	3.7	3.7
GDP (index 1990=100)	92.0	67.9	81.2	80.4	89.6	49.6	57.7	57.7	94.3	58.0	68.6	65.7
Gross Inl Cons./GDP (toe/1985 MEUR)	1967.8	1338.3	1120.7	1395.7	858.6	817.4	756.0	842.9	1851.0	1468.1	1309.4	1213.1
Gross Inl Cons./Capita (toe/inhabitant)	6.1	3.3	3.3	4.1	2.8	1.6	1.7	2.0	4.9	2.4	2.5	2.2
Electricity Generated/Capita (Kwh/inhabitant)	9340.4	5853.8	5868.3	na	2113.4	1581.5	2343.0	na	7846.9	3651.1	4632.2	na
CO ₂ Emissions/Capita (t of CO ₂ /inhabitant)	20.1	9.9	9.8	na	7.3	3.9	3.3	na	9.3	4.0	3.9	na
Import Dependency %	41.8	37.6	40.1	38.1	84.2	81.8	61.2	59.4	73.5	63.4	50.2	56.6

(1) Includes nuclear, hydro and wind, net imports of electricity, and other energy sources.

(2) Estimates







CIS: Major trends (1980-1999)

- Total decline of GDP reached 45% between 1990 and 1996, reinforced by the 1998 financial crisis...
- ...but the economy rebounded sharply in 1999-2000.
- Allowing for statistical series disruptions, final energy consumption fell by about 28.5% between 1990 and 1998
- Underpricing and non-payment of bills favoured inefficient use of energy
- Decline of final energy consumption accelerated since 1995, especially in industry and tertiary-domestic sectors
- Share of electricity was increasing but technical constraints are limiting its use in tertiary-domestic sector
- Gross inland energy consumption, met about 50% by natural gas, declined by 36% over ten years
- Russia remained the second biggest energy producer in the world after the United States
- Efforts to rationalise the coal industry were hampered by the payment arrears of consumers and financial crisis
- Crude oil production, concentrated in a small number of large fields, experienced an upturn since 1996
- Large oil potential of Caspian Basin still limited by the ongoing development of pipeline infrastructure
- CIS, driven by Russia, remained the world's largest gas producer, just ahead of the United States
- CIS represented about 22% of the world's fossil fuel reserves, mainly located in Russia
- Gas power stations responsible for about 45% of total electricity generation...
- ...but large uncertainties existed about its future contribution
- Power sector in urgent need of financing to avoid expected regional power shortages
- Safety is a continuing concern for nuclear, with new investment under consideration
- Privatisation and export policy to increase financial capability of the power sector
- Refining industry, characterised by a lack of conversion units, demonstrated a large overcapacity
- Energy intensity increased by 19% since 1990 but the near future appears favourable...
- ...but a large potential exists for improvement
- CO₂ emissions have fallen by 39% since 1990 but will increase in the near future
- Energy exports peaked in 1999 to generate hard currency earnings

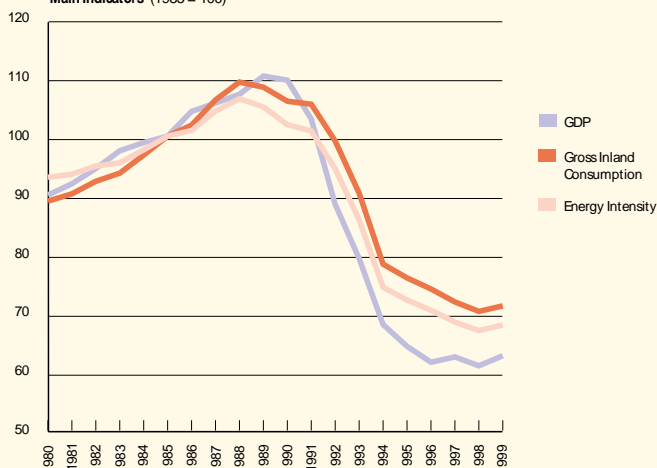
The Community of Independent States (CIS) includes the following twelve republics: Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine and Uzbekistan. In addition, as consolidated energy balances do not exist for Baltic countries before 1992, they are included in the total energy balances; if available, the contribution of these countries has been identified explicitly. As the contribution of these countries was limited to only 2% of the total gross inland consumption of the former USSR, the effect of this aggregation is limited.

Energy and macroeconomic data available for all these republics remained of dubious quality. Comparing data from key sources (OECD, PlanEcon, BP and the US Department of Energy) reveals significant differences. Furthermore, consecutive updates of annual data were marked by substantial statistical adjustments. Finally some data for individual countries were still missing for 1990 before the partition of the former USSR. Consequently comments are made on significant trends rather than relying on absolute values to draw analytical conclusions. In addition, some statistical series suffer from major time disruptions; and discrepancies still remain between the sum of all Republics and statistical data for the CIS as a whole, even for recent years.

Total decline of GDP reached 43% between 1990 and 1996, reinforced by the 1998 financial crisis...

The Russian Federation and other independent states, apart from the Baltics, have faced severe problems since the beginning of their transition period. The implementation of reforms has been difficult politically and the short-term economic consequences painful. GDP contracted by 45% between 1990 and 1996. After rebounding modestly by 1.2% in 1997, GDP resumed its decline in 1998 amidst a profound financial crisis. The immediate cause of the Russian crisis was the growing loss of financial market confidence in the country's fiscal and international payments situation, leading to a loss of international reserves and an inability to roll over treasury bills as they matured. The crisis was accentuated by

Main Indicators (1985 = 100)





the rapid decline in earnings from oil and gas exports due to lower prices on international markets, and from the impact of the Asian economic and financial crisis which undermined confidence among international investors in emerging markets generally. In August 1998, pressure on the rouble led the Government to abandon efforts to maintain its stability. The Government also imposed a 90-day moratorium on foreign-debt repayments without consulting the banking sector. The rouble immediately lost almost half of its value. Inflation, which had fallen to 11% in 1997, surged to more than 50% in September 1998 alone. The crisis undermined the fragile confidence of banks that had been achieved, disrupting transactions between businesses and exacerbating the effects of the devaluation.

...but the economy rebounded sharply in 1999-2000.

But the steep depreciation of Russia's currency increased the competitiveness of Russian exports, and a sharp rise in oil prices in 1999-2000, along with increased political stability following the election of Vladimir Putin as President in March 2000, allowed the country to enjoy its strongest economic growth in a decade. Buoyed by surging oil export revenues, Russia's GDP grew 3.2% in 1999 and up to 8.3% in 2000. The windfall in oil export revenues in turn stimulated increases in other industrial sectors and helped the Russian government pay off some of its \$158 billion foreign debt. Meanwhile, Russia experienced a current account surplus, and the country's rate of inflation slowed from 36.5% in 1999 to 20.2% in 2000. Strong economic performance in Russia helped to boost growth and external positions in most CIS countries. In addition, robust foreign demand contributed to these favorable outcomes, while spillovers from the crises in Turkey were limited.

However, some oil-importing countries were adversely affected by the rise in oil prices. In Ukraine, the economy grew in 2000 for the first time since independence, as net exports were boosted by rapid growth in Russia - the main export market - and the substantial real depreciation of the hryvnia in 1998-99. The fiscal position improved markedly, as strong economic growth boosted tax revenue, and government expenditure was kept in check. In other CIS countries, exports to Russia also grew rapidly in 2000, though economic performance differed depending largely on the role of oil. In energy-exporting countries, including Kazakhstan, Azerbaijan and Turkmenistan, growth was supported by the increase in oil and natural gas prices, with the exceptional growth in Turkmenistan reflecting primarily greater success in securing payment for its energy exports. Conversely, the direct effect of the oil shock on energy-importing countries, including Armenia, Georgia, Kyrgyzstan, Moldova, and Tajikistan, was negative. Growth in 2001 will be influenced mainly by the moderation of energy prices since 2000 and the prospect of somewhat weaker but still robust growth of exports to Russia.

Main items

Since 1990 the twelve independent states forged from the former Soviet Union have experienced continuing political uncertainty and profound economic difficulties. Whilst precise measurement is problematic because of poor economic data, the region's GDP, living standards and industrial production fell dramatically until 1996 and have since evolved rather erratically. In particular, the Russian financial crisis in 1998 led to rapid inflation, currency instability and accumulating indebtedness. This crisis also reduced the confidence necessary to underpin much-needed foreign inward investment across the region. Sustained radical reform is required in areas such as fiscal policy, financial and legal institutions, and corporate governance. Attempts to adjust energy prices to reflect costs have led to widespread non-payment of bills, especially by those facing salary and payment arrears. Final energy demand declined some 28% between 1990 and 1998. Yet both carbon and energy intensities in the CIS remain well above those in the EU and OECD, providing much scope for continued improvement in the longer term. Production of coal, oil and gas have declined sharply since 1990 reflecting lower internal demand. But exports of oil and gas have risen, providing a crucial source of export earnings. For these exports to be sustained in future, large-scale investment is required in new field developments and in pipeline infrastructure - especially in the Caspian Sea and Siberian regions. Numerous environmental and safety issues require urgent attention, including acute degradation and pollution in some areas, together with decommissioning the ageing stock of nuclear reactors and secure routes for radioactive waste disposal. Because of the decline in energy consumption, regional CO₂ emissions have fallen by some 39% since 1990. Modernisation will further reduce carbon intensity. This will provide huge opportunities for carbon trading, if reliable schemes can be devised.

Sustainable growth in the medium term depends on structural and institutional reform, especially deregulating small and medium-sized enterprises, tightening budget constraints, improving corporate governance, introducing greater competition, developing financial systems, and transforming the role of the state. Inflation has moderated somewhat, but it remains high in many countries, reflecting mainly fiscal problems. Although government expenditures have generally been trimmed, quite extensively in some countries, revenue collection remains weak. External debt burdens are especially high in Armenia, Georgia, Kyrgyzstan, Moldova, and Tajikistan.

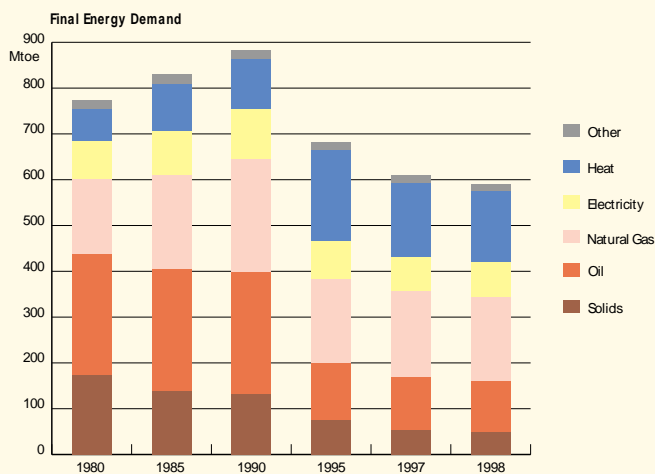




ENERGY OUTLOOK

Allowing for statistical series disruptions, final energy consumption fell by about 28.5% between 1990 and 1998...

Final energy demand peaked in 1989 at 892 Mtoe but, since then, has experienced an accelerated decline down to 589 Mtoe in 1998, a fall of more than 34% over 9 years. But this observation needs to be placed in context. In fact, statistical series were somewhat disrupted in 1992. In particular the accounting of heat generation produced by local heating plants has improved since 1992. As a result of this, heat consumption was accounted for at the final stage instead of by the fuels used to produce it; and, as a consequence, production losses were reported in the transformation sector. The volume of heat generation produced by local heating plants concerned by this switch averaged 130 Mtoe in 1992. That corresponds to about 25 Mtoe of losses reported in the transformation sector by this modification of statistical accounting. Even allowing for this statistical adjustment, final energy demand still experienced a decline of about 28.5% between 1990 and 1998.



With all the modifications progressively introduced between 1991 and 1993 it is difficult to evaluate precisely the evolution of consumption by fuel since 1990. Over the period 1993-1998 for which consistent data seem to be available, total final energy demand fell continuously. Those fuels delivered by a fixed infrastructure (mainly gas and electricity and to a limited extent distributed heat) declined less rapidly than fuels that require physical deliveries (solid fuels and oil). In total the demand fell by 228 Mtoe over these five years; mainly heat (81 Mtoe or a 34% reduction), followed by oil products (50 Mtoe or 31%), solids (50 Mtoe or 48%), electricity (20 Mtoe or 21%) and gas (19 Mtoe or 9%). Even though these reductions are very impressive, the International Energy Agency estimates that a further large potential for reduc-

tions still exists. The very high energy intensities of the three main demand sectors compared to industrialised countries largely confirm this judgement.

Underpricing and non-payment of bills favoured inefficient use of energy...

Despite Russia's considerable progress in establishing cost-based and market-related prices in the energy sector, sizeable subsidies remained. Underpricing of energy results in major distortions in energy consumption and significant economic and environmental costs. One of the largest forms of energy subsidy in Russia is non-payment, which effectively means a zero price to the consumer. In general, non-payment and payment arrears are most prevalent among industrial and commercial customers, where non-payment of bills along the entire production and supply chain is common. The collection rate among households tends to be much higher. Barter, which is prevalent throughout the Russian economy, may also contain some price subsidies and is certainly a possible means of tax avoidance. Although some headway appears to have been made in the last year or so to recover payments, this remains a major problem especially for gas and electricity. The IEA estimates that removal of these subsidies could reduce electricity use by a quarter and gas use by more than a third!

Decline of final energy consumption accelerated since 1995, especially in industry and tertiary-domestic sectors...

In 1990, the last year of the Soviet energy data system, industry represented about 46% of total final demand, the tertiary-domestic sector 38% and transport 16%. Since then, considering the lack of coherent data, it can be estimated that the industry and transport shares have been reduced by about 22% and 17% respectively whereas the residential share increased by about 33%. Between 1990 and 1998, final energy demand was reduced by one third with marked differences between sectors: industry declined by 48%, transport by 44% and tertiary-domestic by 13%. Over the last three years the fall was especially marked for industry (-16%) and tertiary-domestic (-13%), whilst transport consumption stabilised.

Demand in the residential sector, which increased by 3% between 1990 and 1995, appeared to be unresponsive to price changes partly due to both the absence of metering and control equipment and non-payment of bills. The combined effects of initial reforms and the drastic reduction in incomes induced a rapid decline after 1995. It is particularly significant that tertiary-domestic energy consumption per capita was at the same level in the CIS as in the European Union whilst the comfort and equipment ownership levels were absolutely non-comparable between





these two regions. In 1998, it was estimated that there were 26.5 million private cars in the CIS, or about 90 cars per 1000 inhabitants; 18.5 million cars were located in Russia (126 cars per 1000 inhabitants) and 4.9 million in Ukraine (98 cars per 1000 inhabitants). Political instability and economic contraction, along with bureaucratic delays, have reduced sales of personal motor vehicles in the region and made it more difficult for auto manufacturers to penetrate the market. In addition, data on kilometres driven per vehicle in this region suggest that the average distance travelled per vehicle has fallen dramatically in recent years. Freight and passenger rail traffic have declined over the past few years, as road transport has become a more important means of moving people and goods.

Share of electricity was increasing but technical constraints are limiting its use in tertiary-domestic sector...

The electricity share in final consumption increased regularly from 11.8% in 1985 to 12.1% in 1990 and 12.7% in 1998. Even though electricity's share in industrial energy consumption approached that of OECD countries at about 16%, the situation was completely different in the tertiary-domestic sector where it remained very low: 11.3% in 1998 against 9.3% in 1990 and 7.8% in 1980. Household appliances such as televisions and refrigerators are already in widespread use. Other devices such as video recorders and freezers are rarer, while appliances such as fully automated washing machines, clothes dryers and dishwashers are virtually unknown. There is great scope for the introduction of these products with any improvement of living standards, but their use is also subject to space constraints in household accommodation. The low level of maximum power demand currently available in some apartments also strictly limits the use of larger electricity using appliances. About 85% of electricity connections require modernisation to accommodate larger electricity consuming items such as washing machines. Much of the housing stock

is limited to a maximum demand of 1.3 kW per apartment. Overcoming this constraint will take considerable investment and time.

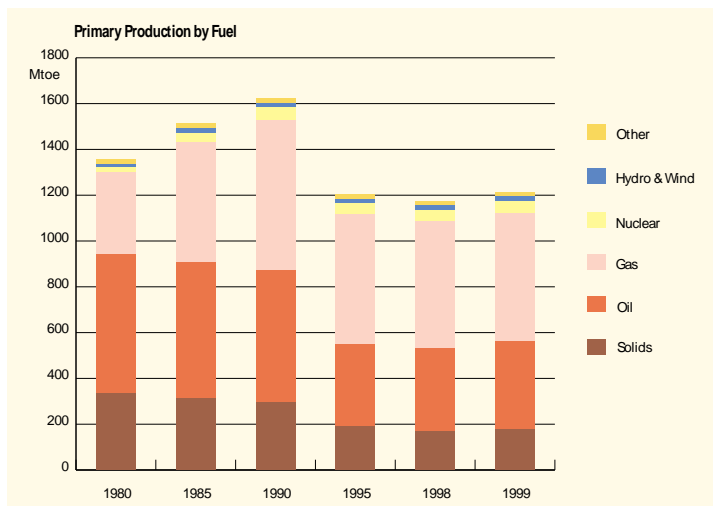
Gross inland energy consumption, met about 50% by natural gas, declined by 36% over ten years...

Gross inland energy consumption, after a peak of 1389 Mtoe in 1988, fell to only 894 Mtoe in 1998 or a 36% fall over ten years. The decline was very rapid between 1991 and 1994, with a reduction by about 10% each year on average; but it has slowed down since then to about 3% per year on average. In 1999, with the first signs of economic recovery, gross inland energy consumption increased for the first time since by 1988 by 1.3%. The major reduction observed since 1988, however, was not the same for all primary fuels as already illustrated by the evolution of final consumption. Solids and oil demand decreased systematically since 1980, and very rapidly after the reforms of 1990 (-5.5% on average per year for solid fuels and -8.24% for oil).

On the other hand, natural gas consumption steadily increased during the 1980s to become the largest source of energy since 1985. Since 1991 gas consumption dropped on average by 3.1% per year, slower than gross inland energy consumption. Consequently, gas consumption accounted for more than half of gross inland consumption since 1997. Oil products were the second contributor with 21% slightly ahead of solid fuels that contributed 19%. The balance was met mainly by nuclear energy, with limited contributions from both hydro and renewable energy. Nuclear energy saw a significant increase between 1980 and 1988, stagnated until 1993, fell by 15.5% in 1994, recovered gradually to its 1993 level in 1996 and remained stable since then. The contribution of hydro has been stable since 1985 at about 20 Mtoe although there is a large potential for expansion. The role of biomass remained marginal, at between 1 and 2% of gross inland energy consumption since 1980.

Russia remained the second biggest energy producer in the world after the United States...

The CIS as a whole remains the second biggest **energy producer** in the world (12.5% of total world production) after the United States (17.5%) and just ahead of China (9.6%), and is the world's leading producer and exporter of natural gas. CIS republics produce all types of primary fossil fuels, although they are not equally distributed. In 1999, Russia accounted for 78% of total CIS energy production, but 57% of solid fuels production, 82% of oil production, 85% of gas production, 58% of nuclear electricity and 70% of hydro. Other major producers are Ukraine (solids, oil, natural gas and nuclear), Kazakhstan (solids, oil and gas), Uzbekistan (oil and gas) and Turkmenistan (gas).





CIS(1) : TOTAL ENERGY

Mtoe	1980	1985	1990	1995	1997	1998	1999	85/80	90/85	97/90	98/97	99/98
	Annual % Change											
Total Production	1357.8	1512.9	1624.6	1205.4	1168.9	1173.8	1211.9	2.2%	1.4%	-4.6%	0.4%	3.2%
Armenia	1.3	1.5	0.1	0.2	0.5	0.5	0.8	3.5%	-38.3%	21.8%	1.7%	39.5%
Azerbaijan	26.2	24.7	20.3	14.7	14.0	16.2	18.6	-1.2%	-3.8%	-5.2%	15.2%	15.4%
Belarus	3.7	5.4	4.3	3.3	3.3	3.4	3.5	7.9%	-4.6%	-3.7%	3.7%	2.1%
Georgia	1.7	1.9	1.3	0.6	0.7	0.7	0.7	1.8%	-6.6%	-8.6%	1.5%	2.1%
Kazakhstan	79.9	82.9	86.0	63.0	65.2	64.1	66.0	0.8%	0.7%	-3.9%	-1.8%	3.0%
Kyrgyzstan	2.3	2.2	2.3	1.4	1.4	1.2	1.4	-0.3%	0.5%	-7.0%	-11.3%	15.4%
Moldova	0.1	0.1	0.1	0.1	0.1	0.1	0.1	-7.1%	-5.6%	8.3%	-38.0%	11.9%
Russia	979.1	1132.6	1253.0	948.8	921.1	926.8	948.0	3.0%	2.0%	-4.3%	0.6%	2.3%
Tajikistan	2.2	2.0	1.9	1.3	1.2	1.3	1.4	-1.4%	-1.8%	-5.6%	2.1%	8.9%
Turkmenistan	65.2	73.3	74.2	33.5	19.4	17.4	26.2	2.4%	0.3%	-17.5%	-10.3%	50.7%
Ukraine	154.8	143.5	130.1	83.0	81.1	80.3	83.6	-1.5%	-1.9%	-6.5%	-1.0%	4.1%
Uzbekistan	32.8	32.2	38.4	47.2	49.2	50.2	49.8	-0.4%	3.6%	3.6%	1.9%	-0.6%
Baltics (2)	8.7	10.8	12.6	8.2	11.6	11.7	11.9	4.3%	3.3%	-1.3%	1.1%	1.6%
Total Net Import	-212.2	-219.2	-260.0	-225.2	-266.5	-278.3	-306.3	0.6%	3.5%	0.4%	4.4%	10.1%
Total Gross Inland Consumption	1131.9	1272.4	1347.8	966.0	914.1	893.7	905.6	2.4%	1.2%	-5.4%	-2.2%	1.3%
Armenia	5.7	4.5	7.6	1.7	1.9	1.9	2.1	-4.3%	10.9%	-18.1%	3.3%	10.0%
Azerbaijan	19.2	20.1	22.1	13.0	11.9	12.4	12.8	1.0%	1.8%	-8.4%	3.6%	3.3%
Belarus	19.0	33.9	41.1	24.7	25.1	26.5	28.0	12.3%	3.9%	-6.8%	5.3%	5.7%
Georgia	10.2	7.4	10.2	1.5	2.3	2.5	2.7	-6.2%	6.6%	-19.1%	9.5%	6.0%
Kazakhstan	77.2	77.2	96.2	51.8	42.0	39.0	38.2	0.0%	4.5%	-11.2%	-7.1%	-2.0%
Kyrgyzstan	4.7	4.7	1.7	2.6	2.7	2.9	3.0	-0.1%	-18.7%	7.5%	6.5%	1.7%
Moldova	6.4	7.9	9.3	4.4	4.6	4.1	3.8	4.1%	3.3%	-9.6%	-11.4%	-5.9%
Russia	726.0	773.5	821.7	623.3	596.9	581.9	584.4	1.3%	1.2%	-4.5%	-2.5%	0.4%
Tajikistan	4.0	4.2	3.3	3.3	3.1	3.3	3.5	0.8%	-4.8%	-0.7%	4.9%	6.5%
Turkmenistan	8.4	69.3	18.2	14.6	11.7	11.1	13.6	52.5%	-23.4%	-6.1%	-5.2%	22.0%
Ukraine	199.0	197.1	237.8	165.5	150.1	142.9	148.2	-0.2%	3.8%	-6.4%	-4.8%	3.7%
Uzbekistan	26.8	40.4	43.5	41.2	42.9	46.3	46.3	8.5%	1.5%	-0.2%	7.8%	0.0%
Baltics (1)	25.2	32.3	35.1	17.8	18.8	18.8	19.0	5.1%	1.7%	-8.6%	0.2%	1.1%

(1) Including Baltics only for statistical reasons

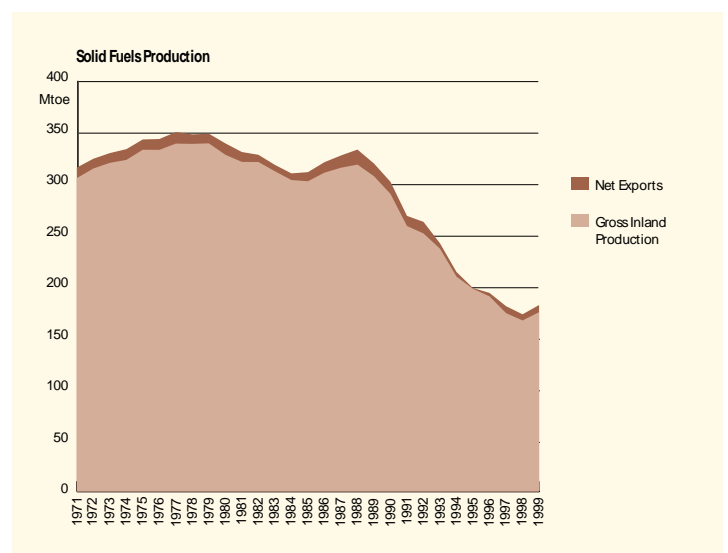
(2) Including oil shale

Efforts to rationalise the coal industry were hampered by the payment arrears of consumers and financial crisis...

For **solid fuels** the CIS (174 Mtoe in 1998) is now the third largest producer in the world after the United States (559 Mtoe) and China (507 Mtoe) even though Russia, the main contributor with 103 Mtoe, was individually overtaken by India, Australia and South Africa. Solid fuel production had followed a downward trend since the break-up of the Soviet Union, with production experiencing a 30% drop between 1992 and 1999. The three main coal-producing countries - Russia (57% of total production in 1999), Ukraine (24%) and Kazakhstan (17%) - were facing similar problems but the decline was more accentuated in Ukraine.

Of the three, Kazakhstan has shown the most rapid progress. Many of Kazakhstan's high-cost underground mines have been closed, and its more competitive surface mines have been purchased and are now operated by international energy companies. In Russia and Ukraine, the coal mining industry has suffered in recent years due to reorientation of the national economies of producing countries, which has severely limited the ability of

governments to provide direct financial support. Restructuring efforts have been aimed primarily at shutting down inefficient mines. Russia's restructuring plan calls for the closure of all unprofitable coal enterprises, with the intention of using the money saved from these closures to upgrade more profitable mines.





CIS(1) : SOLID FUELS

Mtoe	1980	1985	1990	1995	1997	1998	1999	85/80	90/85	97/90	98/97	99/98
Annual % Change												
Total Production	338.8	312.5	300.5	194.8	177.5	170.5	181.0	-1.6%	-0.8%	-7.2%	-4.0%	6.2%
Armenia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-
Azerbaijan	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-
Belarus	0.0	2.4	1.3	0.6	0.6	0.6	0.6	-	-11.3%	-11.7%	8.3%	-0.1%
Georgia	0.9	0.7	0.4	0.0	0.0	0.0	0.0	-5.3%	-10.3%	-53.3%	200.0%	0.0%
Kazakhstan	56.9	55.0	54.2	36.6	32.0	30.8	29.9	-0.7%	-0.3%	-7.3%	-3.8%	-2.9%
Kyrgyzstan	1.5	1.4	1.3	0.3	0.3	0.3	0.3	-1.3%	-2.3%	-17.9%	-13.8%	-4.2%
Moldova	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-
Russia	171.9	155.5	154.1	109.5	101.4	95.9	103.2	-2.0%	-0.2%	-5.8%	-5.5%	7.6%
Tajikistan	0.5	0.2	0.1	0.0	0.0	0.0	0.0	-19.7%	-2.2%	-35.3%	0.0%	-0.1%
Turkmenistan	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-
Ukraine	96.2	88.8	81.1	44.2	39.6	39.7	43.2	-1.6%	-1.8%	-9.7%	0.3%	8.9%
Uzbekistan	2.8	1.8	2.1	1.1	1.0	1.0	1.0	-8.9%	3.6%	-9.7%	-0.8%	-0.4%
Baltics (2)	8.0	6.8	5.8	2.4	2.6	2.2	2.8	-3.2%	-3.2%	-10.8%	-14.5%	27.6%
Total Net Import	-11.1	-8.8	-11.7	-0.7	-6.7	-5.9	-6.9	-4.5%	5.9%	-7.7%	-11.4%	16.8%
Total Gross Inland Consumption	326.8	301.1	288.8	196.7	173.1	166.0	174.1	-1.6%	-0.8%	-7.0%	-4.1%	4.8%
Armenia	0.0	0.2	0.2	0.0	0.0	0.0	0.0	-	1.3%	-48.8%	0.0%	0.0%
Azerbaijan	0.0	0.1	0.1	0.0	0.0	0.0	0.0	-	1.2%	-37.3%	-100.0%	-
Belarus	0.0	3.5	2.7	1.3	1.0	1.0	1.0	-	-4.5%	-13.3%	-0.6%	0.0%
Georgia	0.9	0.7	0.5	0.0	0.0	0.0	0.0	-5.2%	-7.2%	-47.8%	80.0%	0.0%
Kazakhstan	54.0	52.5	52.0	28.4	21.7	21.2	20.0	-0.6%	-0.2%	-11.7%	-2.4%	-5.9%
Kyrgyzstan	1.5	1.4	1.2	0.4	1.0	0.6	0.5	-1.2%	-2.5%	-3.2%	-36.1%	-12.9%
Moldova	0.0	2.2	1.8	0.6	0.3	0.2	0.2	-	-3.9%	-23.3%	-10.1%	-1.6%
Russia	176.6	148.3	147.4	109.1	101.4	95.3	100.1	-3.4%	-0.1%	-5.2%	-6.0%	4.9%
Tajikistan	0.5	0.2	0.1	0.0	0.1	0.1	0.1	-19.6%	-2.5%	-12.7%	0.0%	7.6%
Turkmenistan	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-
Ukraine	81.7	82.8	72.0	52.5	43.5	43.7	47.4	0.3%	-2.8%	-6.9%	0.4%	8.4%
Uzbekistan	2.7	1.7	2.8	1.1	1.0	1.0	1.0	-8.8%	10.8%	-14.0%	4.6%	-0.4%
Baltics (1)	9.0	7.7	8.0	3.3	3.2	2.8	3.8	-3.0%	0.6%	-12.3%	-11.3%	35.4%

(1) Including Baltics only for statistical reasons
 (2) Including oil shale

However, implementation of the restructuring programme has been slow due to labour unrest and strikes in the coal industry. Due to consumers' non-payment of bills, the government has been unable to compensate coal miners, leading to a backlog of wages due to miners. In addition, miners have been angered by their belief that money set aside to revitalize the industry has disappeared and that government subsidies to the coal industry have been misspent. In turn, the slow pace of reform has led to delays in the scheduled disbursement of loans from the World Bank.

Even efficient mines in Russia are not without problems. Payment arrears by large customers have been making it nearly impossible for mines to pay workers and purchase needed mining supplies and equipment. The country's financial crisis of August 1998 exacerbated these problems and, although the economy has recovered to some extent, the coal sector is still feeling the effects. The CIS coal mining industry is likely to undergo further painful changes in future in its attempt to become more efficient and profitable, even if provisional numbers for 1999 demonstrated a 6% increase of solids production.

Crude oil production, concentrated in a small number of large fields, experienced an upturn since 1996...

Crude oil production has declined since 1980 (606 Mtoe) to reach only 353 Mtoe in 1996, with an accelerating trend (more than 10% per year) between 1990 and 1994. Production as a whole increased by 2.2% in 1997, 0.4% in 1998 and 5.4% in 1999, sustained by increasing output by marginal producers such as Turkmenistan (+86% since 1996), Azerbaijan (+50%), Kazakhstan (+25%) and Ukraine (+18%). Russia represented more than 82% of the total production in 1999, remaining the third largest world producer after Saudi Arabia and the United States. Production recovery started only in 1999 for Russia after three years of stabilisation, but accelerated in 2000. Russian production is concentrated in a small number of large fields located mainly in West Siberia which accounted for two thirds of total output. A drop in output from the super-giant Samotlor field in West Siberia was responsible for one third of the total decline in Russian oil production since 1988. The industry faced the depletion of existing oil fields, deterioration in transport infrastructure, and an acute shortage of investment due to the confusing tax and legal environment.





CIS: OIL

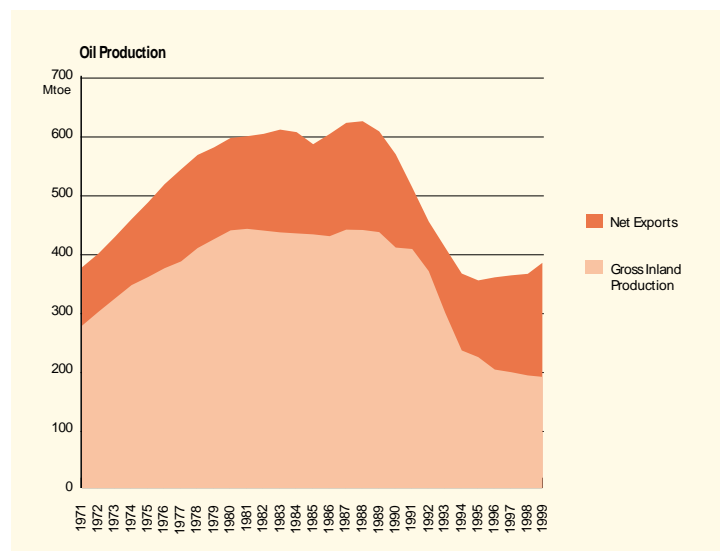
Mtoe	1980	1985	1990	1995	1997	1998	1999	85/80	90/85	97/90	98/97	99/98
Annual % Change												
Total Production	606.2	598.2	573.5	355.3	361.3	362.7	382.4	-0.3%	-0.8%	-6.4%	0.4%	5.4%
Armenia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-
Azerbaijan	14.8	13.2	12.3	9.2	9.1	11.5	13.7	-2.2%	-1.5%	-4.2%	26.6%	19.4%
Belarus	2.6	2.0	2.1	1.9	1.8	1.8	1.9	-4.6%	0.2%	-1.7%	-0.3%	2.8%
Georgia	0.0	0.6	0.2	0.0	0.1	0.1	0.1	-	-18.4%	-5.5%	-11.1%	2.8%
Kazakhstan	18.8	23.0	25.3	20.8	26.0	26.2	30.1	4.1%	1.9%	0.4%	0.8%	14.8%
Kyrgyzstan	0.2	0.2	0.2	0.1	0.1	0.1	0.1	-2.8%	-3.4%	-8.7%	-9.4%	0.0%
Moldova	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-
Russia	552.3	546.6	519.6	306.6	305.4	302.9	314.7	-0.2%	-1.0%	-7.3%	-0.8%	3.9%
Tajikistan	0.4	0.4	0.2	0.0	0.0	0.0	0.0	-0.2%	-12.4%	-25.4%	-23.1%	0.0%
Turkmenistan	8.1	6.1	5.6	4.4	5.4	6.7	8.2	-5.5%	-1.5%	-0.6%	23.7%	22.8%
Ukraine	7.6	4.1	5.3	4.1	4.6	4.4	5.3	-11.6%	5.2%	-2.0%	-3.9%	20.7%
Uzbekistan	1.3	2.0	2.8	7.6	8.2	8.5	7.7	8.2%	7.2%	16.4%	3.9%	-8.7%
Baltics	0.0	0.0	0.0	0.4	0.6	0.5	0.5	-	-	-	-14.5%	0.0%
Total Net Import	-156.93	-153.10	-158.37	-130.26	-164.49	-172.52	-193.64	-0.5%	0.7%	0.5%	4.9%	12.2%
Total Gross Inland Consumption	437.5	430.7	408.3	222.3	196.6	191.2	188.7	-0.3%	-1.1%	-9.9%	-2.8%	-1.3%
Armenia	2.2	3.1	3.6	0.3	0.2	0.2	0.2	7.1%	2.8%	-35.5%	3.0%	33.3%
Azerbaijan	7.6	8.5	7.8	7.0	6.9	7.6	7.7	2.3%	-1.6%	-1.8%	10.6%	0.7%
Belarus	14.7	29.0	25.7	10.7	9.0	10.2	10.2	14.6%	-2.4%	-13.9%	13.6%	0.0%
Georgia	5.4	5.9	4.3	0.1	0.9	1.2	1.2	1.8%	-6.0%	-19.6%	31.2%	-0.1%
Kazakhstan	16.1	18.9	36.0	11.8	12.2	9.8	10.0	3.3%	13.7%	-14.3%	-19.5%	1.4%
Kyrgyzstan	2.2	2.9	0.0	0.6	0.5	0.7	0.7	5.7%	-100.0%	-	36.9%	0.0%
Moldova	6.2	6.2	4.5	1.0	0.9	0.7	0.8	0.0%	-6.2%	-20.6%	-17.0%	6.6%
Russia	310.4	259.5	242.1	147.0	130.0	124.1	121.4	-3.5%	-1.4%	-8.5%	-4.5%	-2.2%
Tajikistan	1.9	2.6	0.2	1.2	1.2	1.3	1.4	6.5%	-41.1%	31.2%	7.1%	3.5%
Turkmenistan	1.3	2.1	6.4	3.5	2.8	3.1	3.2	10.1%	25.1%	-11.3%	11.3%	3.4%
Ukraine	52.1	66.4	55.7	25.3	18.4	18.6	18.3	5.0%	-3.5%	-14.6%	0.8%	-1.4%
Uzbekistan	7.0	10.3	7.4	7.0	7.3	6.9	6.9	8.0%	-6.5%	-0.1%	-5.9%	0.0%
Baltics (1)	10.4	15.3	14.6	6.6	6.2	6.7	6.8	8.0%	-1.0%	-11.4%	6.6%	1.6%

(1) Including Baltics only for statistical reasons

The sharp rise in oil prices during 1999-2000 provided Russian oil companies with a windfall in revenues, giving them strong incentives to upgrade decaying oil infrastructure and to undertake new exploratory drilling. In addition to further development of the West Siberia region, Russian oil producers are conducting more exploration in the Russian sector of the Caspian Sea, and teaming up with foreign oil producers to develop oil projects in the Arctic region, Eastern Siberia, and on Sakhalin Island in Russia's Far East. Russia's future level of oil production will be determined by the ability of oil companies to develop these new deposits, which will require massive infrastructure investment in order to deliver this oil to customers.

Large oil potential of the Caspian Basin still limited by the ongoing development of the pipeline infrastructure...

The Caspian Basin is an area of potentially vast resources. Only the United States and Saudi Arabia are thought to have more ultimately recoverable conventional oil resources. Three of the independent states, Azerbaijan, Kazakhstan and Turkmenistan, have the greatest oil production potential in the Caspian Sea region. Key issues in the Caspian Basin include: legal issues concerning owner-



ship and development rights in the Caspian Sea; regional instability; and development of transnational export routes to take oil and gas from the landlocked Caspian Sea region to world markets. The development of adequate infrastructures is the key to enabling the Caspian region to join the ranks of major suppliers in





world oil trade. Currently, Caspian oil, in relatively small quantities, is able to flow through pipelines into Russia. By the end of the decade, several pipeline routes to the Black Sea are expected to become available. Significantly larger volumes are expected to flow via pipeline through Turkey to the Mediterranean Sea and across Iran to the Persian Gulf. Even China has indicated an interest in obtaining oil supplies via such pipelines.

Russia, by far the largest regional producer, reorganised its state-run oil industry into a number of vertically-integrated oil companies in the early 1990s, and the state has divested itself of large stakes in most of these companies. Nonetheless, foreign investment in the industry has been minimal due to economic and political instability, a poor record of corporate governance, and the unstable legislative framework. In order to create a more stable investment climate, potential investors have called upon the Russian government to undertake further reform including the establishment of framework legislation to permit cohesive production-sharing agreements. Although the political and economic situation has stabilised since the August 1998 financial crisis, and high world oil prices in 1999-2000 enticed some investors

into Russia, others are still awaiting the passage of a new Russian production-sharing agreement regime and tax code.

CIS driven by Russia, remained the world's largest gas producer, just ahead of the United States..

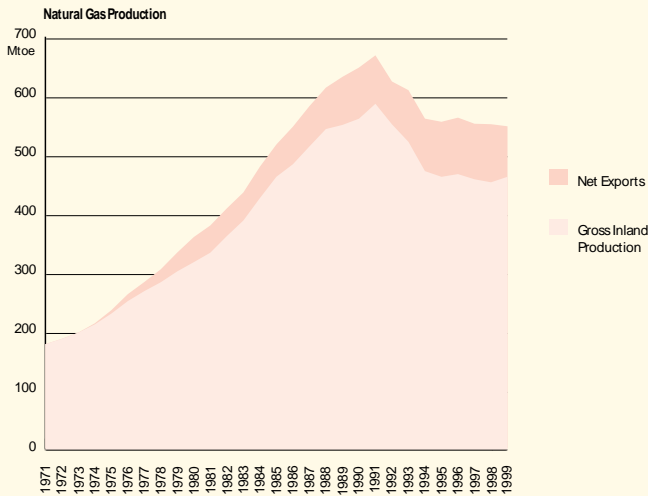
The CIS, and in particular Russia, has one of the most gas-intensive economies in the world and is the world's largest gas producer and exporter. Production has nonetheless been declining gradually in recent years, from a peak of 659 Mtoe in 1991 to 541 Mtoe in 1997, because of falling regional demand and gas field depletion. Overall gas consumption in the CIS increased again by 2.4% in 1998 and 1.1% in 1999 led by Russia, the largest gas producer (85% of total CIS production). Between 1990 and 1999, gas production declined by 15%, significantly less than oil production (-33%) and solid production (-40%). Three fields - Urengoy, Yamburg and Orenburg - account for roughly 68% of total CIS gas production. Attention is now focused on new fields in the Yamal Peninsula and the Far East Sakha region. Since 1994, Uzbekistan has become the second producer, far ahead of production in Turkmenistan and Ukraine.

CIS : NATURAL GAS

Mtoe	1980	1985	1990	1995	1997	1998	1999	85/80	90/85	97/90	98/97	99/98
Annual % Change												
Total Production	359.6	520.1	656.3	569.0	541.3	554.4	560.6	7.7%	4.8%	-2.7%	2.4%	1.1%
Armenia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-
Azerbaijan	11.3	11.3	8.0	5.4	4.8	4.5	4.7	0.1%	-6.8%	-7.0%	-6.3%	5.0%
Belarus	0.3	0.2	0.2	0.2	0.2	0.2	0.2	-4.7%	0.3%	-2.3%	11.3%	0.0%
Georgia	0.2	0.1	0.0	0.0	0.0	0.0	0.0	-22.2%	-6.4%	-100.0%	-	-
Kazakhstan	3.5	4.4	5.7	4.8	6.5	6.4	5.4	4.7%	5.4%	1.9%	-2.0%	-15.8%
Kyrgyzstan	0.1	0.1	0.1	0.0	0.0	0.0	0.0	-1.5%	-3.5%	-11.2%	-55.9%	0.0%
Moldova	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-
Russia	212.8	372.8	517.2	475.2	458.6	474.9	474.1	11.9%	6.8%	-1.7%	3.5%	-0.2%
Tajikistan	0.2	0.2	0.1	0.0	0.0	0.0	0.0	4.1%	-18.0%	-14.3%	-19.3%	0.0%
Turkmenistan	57.1	67.1	68.5	29.0	14.0	10.7	18.0	3.3%	0.4%	-20.3%	-23.4%	68.1%
Ukraine	45.9	35.5	22.5	15.2	15.1	15.0	14.8	-5.0%	-8.7%	-5.5%	-0.9%	-1.5%
Uzbekistan	28.2	27.9	32.9	38.1	39.5	40.2	40.6	-0.2%	3.3%	2.7%	1.6%	1.1%
Baltics (1)	0.0	0.4	1.0	1.0	2.4	2.5	2.8	-	20.2%	13.5%	1.3%	11.0%
Total Net Import	-42.6	-54.8	-86.9	-93.4	-94.3	-98.6	-104.9	5.2%	9.7%	1.2%	4.6%	6.3%
Total Gross Inland Consumption	315.9	460.9	559.4	460.8	456.6	451.5	455.6	7.8%	4.0%	-2.9%	-1.1%	0.9%
Armenia	2.4	0.0	3.6	1.1	1.2	1.2	1.1	-100.0%	-	-14.8%	4.1%	-6.6%
Azerbaijan	11.3	11.4	14.2	5.8	4.8	4.5	4.8	0.2%	4.6%	-14.3%	-6.3%	7.0%
Belarus	3.7	0.2	11.0	11.5	13.8	13.8	15.4	-44.2%	122.9%	3.3%	0.5%	11.0%
Georgia	3.6	0.1	4.4	0.7	0.8	0.7	0.8	-51.2%	113.2%	-22.1%	-10.1%	11.0%
Kazakhstan	6.4	4.4	5.7	10.1	7.0	7.1	7.1	-7.2%	5.5%	3.0%	0.3%	0.9%
Kyrgyzstan	0.9	0.1	0.1	0.7	0.5	0.9	0.8	-35.6%	-4.8%	30.8%	66.6%	-2.0%
Moldova	0.8	0.0	3.3	2.6	3.1	2.8	2.5	-100.0%	-	-0.7%	-9.5%	-10.2%
Russia	196.0	307.8	370.6	311.5	311.5	310.9	308.5	9.4%	3.8%	-2.5%	-0.2%	-0.8%
Tajikistan	0.9	0.2	1.4	0.7	0.6	0.6	0.7	-26.0%	47.3%	-10.7%	2.2%	2.0%
Turkmenistan	7.2	67.4	12.2	11.2	9.2	8.3	10.5	56.4%	-28.9%	-3.9%	-10.3%	27.1%
Ukraine	61.7	34.7	91.8	68.5	66.3	59.5	62.5	-10.9%	21.5%	-4.5%	-10.3%	5.2%
Uzbekistan	16.5	28.0	33.0	32.7	34.0	37.8	38.0	11.2%	3.3%	0.4%	11.0%	0.5%
Baltics (1)	4.5	6.6	8.1	3.6	3.7	3.4	2.8	8.0%	4.1%	-10.6%	-8.2%	-17.4%

(1) Including Baltics only for statistical reasons





To maintain its level of production, Russia has rapidly exploited its reserves, and its major active natural gas fields have been depleted by more than one-third, to the point of declining output. Gazprom, the Russian state gas company, controls more than 95% of Russia's natural gas production; owns and operates 140,000 km of gas pipeline grids; markets all of the gas on domestic and export markets; participates in joint ventures for marketing in several European countries; and controls one-fifth of the world's natural gas reserves. Gazprom's 1997 revenues of US\$23 billion made it Russia's largest earner of hard currency, while its tax payments accounted for 25% of total federal government tax revenues. Gazprom has been unable to make all of its tax payments because only 15% of its domestic customers pay promptly and in cash. Consequently, Gazprom does not have the capital needed either to develop new fields or pursue the upgrades desperately required in the domestic gas industry; and government policy that holds down domestic gas prices and prevents independent producers from exporting gas discourages growth in production. According to Gazprom's own figures, Russia's natural gas shortfall will reach 10 Mtoe in 2000, 34 Mtoe in 2001 and 62 Mtoe in 2002. This situation has caused Gazprom to announce drastic cuts in gas sales to domestic power plants, citing its need to first honour agreements with foreign purchasers.

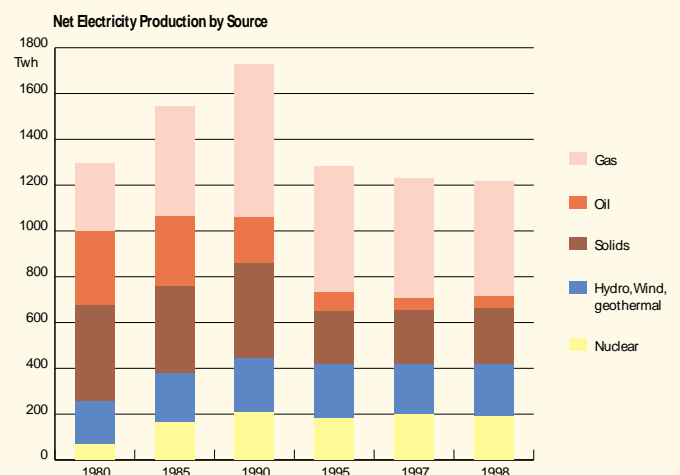
CIS represented about 22% of the world's fossil fuel reserves, mainly located in Russia...

The CIS's oil reserves at end 1997 amounted to about 6.3% of world oil reserves, the bulk of which were concentrated in Russia (4.6%). The situation is much more favourable for natural gas with the CIS accounting for 37.8% of world reserves, mainly concentrated in Russia (32.1%). In addition, as described above, a very large potential for new oil and gas reserves exists in the Caspian Basin.

CIS coal reserves totalled 21.9% of world reserves. Consequently the CIS represented 21.9% of the world's fossil fuel reserves, mainly located in Russia.

Gas power stations responsible for about 45% of total electricity generation...

CIS electricity generation has continued a steady pattern of decline since 1990, reflecting the weak economy. Power generation dropped nearly 10% between 1990 and 1992 and a further 10% between 1992 and 1999. Over two-thirds of electricity produced in 1998 was generated using fossil fuels, with hydropower accounting for 18% and nuclear power 16%. The reduction of production was heavily concentrated (about 95%) in thermal power generation, its share of power output diminishing from 74% in 1990 to 66% in 1999. Hydropower output has remained stable since 1985, but with very large potential in future. Nuclear production, which tripled its contribution from 1980 to 1990, has declined slowly since then with the progressive decommissioning of obsolete and unsafe nuclear power plants, compensated by the commissioning of new units (Ukraine) or reopening of mothballed units (Armenia). The fuel mix varied by region depending on primary resources and import facilities. The use of solid fuels in thermal power stations remained rather stable over the 1980s but has declined significantly (-46%) between 1990 and 1995. Since then solids consumption has been stabilised at about 78 Mtoe per year. Consequently their share in thermal power stations dropped progressively from 40% in 1980 to 32% in 1990 and only 26% in 1995, but it increased again to 30% in 1998. Gas became the most important fuel for power generation in 1983 (35% of the total) and since then has continued to increase its share (57% of the total in 1991 and 62% in 1998). Oil consumption for electricity production has decreased by about 83% between 1980 and 1998 as a result of this increasing contribution of gas.





...but large uncertainties existed about its future contribution

The future use of natural gas in power stations is unclear. In August 1999, Gazprom announced it would supply 11 Mtoe less of gas to Russian power producers in 2000, 19 Mtoe less in 2001 and 27 Mtoe less in 2002 as a result of the inability of power companies to pay for fuel to run their plants. The Unified Energy Systems (UES) that controlled the Russia's electricity sector announced plans to spend \$1.25 billion to convert all its power stations from gas to coal and other types of fuel. In addition, the reduced gas supplies would be reflected in energy tariffs: UES has already approached the Federal Energy Commission with a request to consider increasing electricity tariffs by 80%, but the move has been opposed by regional energy commissions. The decreased reliance on gas and the need to expand coal consumption to produce electricity will also cause more ecological problems with increased pollution.

Power sector in urgent need of financing to avoid expected regional power shortages...

Total generation capacity was 328 GWe in 1998, down from 344 GWe in 1990. In Russia while 6 GWe of new plant capacity were being built annually from 1980 to 1985, only 1 GWe per year was built during the past five years. Within five years, half of the non-nuclear power stations will have exceeded their designed service lives. Installation of new power lines has also dropped markedly. Russian officials estimate that the country will need \$3-5 billion in new capital annually from 1998 to 2000, and \$6-11 billion annually from 2001 to 2005 to carry out capacity expansion plans. Financing of this investment will be difficult to secure internally, especially in the light of continuing payment collection problems by the power companies. Analysts have estimated that, if the rate of investment stays at present levels, about one-third of the current stock of electric power capacity will be out of commission by 2005, prompting a crisis in electricity production that may lead to widespread regional power shortages.

Safety is a continuing concern for nuclear, with new investment under consideration...

As for nuclear units, safety is a continuing concern, particularly with respect to the 16 old reactors of the design used at Chernobyl. Russia has already shut down 4 reactors that were older than 30 years but 15 of the country's 29 operating units are over 20 years old and, by 2005, seven of those reactors will have been in service for 30 years. Reactor maintenance and repairs have been delayed in recent years due to lack of funds. With Russia's plan to export more gas to the West, the country is planning to increase its use of nuclear power to meet its domestic

electricity needs. Minatom, the government agency responsible for overseeing the country's nuclear power plants, is hoping to complete construction at five nuclear reactors that have been under construction since the 1980s and to build 25 new units over the next 20 years. The ministry would finance most of the \$1.5 billion necessary to complete the construction of five reactors by 2005. The 1 GWe Rostov-1 reactor, the 1 GWe Kalinin-3 reactor and the 1 GWe Kursk-5 reactor, all begun during the 1980s, are nearly operational but Western nuclear experts have expressed doubts that Russia can finance the construction of 25 additional reactors on its own. Ukraine's five nuclear power stations operate 14 reactors with a capacity of 12.8 GWe, or nearly one-quarter of the country's total generating capacity, with the construction of two reactors (Khmelnitskii-2, Rivne-4) with a capacity totalling 2 GWe in its final stages.

Ukraine also announced in June 2000 that the last working reactor at Chernobyl would be closed down permanently on 15 December 2000. Ukraine is demanding that the West provide as much as \$1.2 billion in financing to complete the two reactors still under construction to replace the nearly 6% shortfall in power once generated by Chernobyl. However, no decision on replacing the remaining operational reactor at Chernobyl has been reached: some member states have argued that the European Union should only finance the building of non-nuclear power stations in Ukraine.

Privatisation and export policy to increase financial capability of the power sector...

In order to increase financial capability, the Russian government has proposed selling off part of the Unified Energy Systems. The power sector has been targeted for restructuring but reforms have been slow to come as political changes in 1999 have stalled electric power reform. However, the Unified Energy Systems is set to begin the sale of shares in a number of energy companies to private investors in August 2000, with the goal of establishing independent generating companies and increasing participation by the private sector in regional energy companies. The government plans to introduce competition among power-generating enterprises through a new system of payments for electricity from the national grid. Currently, Russian wholesale electricity prices are low, about \$.03 per kWh. In order to boost cash flow, the Unified Energy Systems has begun to focus on export markets. In October 2000, the Unified Energy Systems began to supply electricity to Europe as part of an international project to create an "East-West Energy Bridge". The Unified Energy Systems is participating in the Baltrel programme to create an energy ring with power companies in the Baltic states, and it also signed contracts to export electricity to Turkey via Georgia.





Refining industry, characterised by a lack of conversion units, demonstrated a large overcapacity...

In 1999, CIS refinery capacity (10 million barrels day) represented 12.3% of the world's capacity (16% in 1985). Since 1990, the capacity has declined by 2.5% per year and by 4% in 1998. Most of the refineries were constructed in the 1940s and 1950s and are relatively unsophisticated, oriented towards heavier products, and are operating well below capacity. Catalytic cracking accounted for only 4% of primary distillation capacity. Heavy fuel oil now accounts for about half of refinery output. In addition, low investment levels have resulted in poor maintenance and working conditions, leading to inefficient and unsafe plant operation. Russia's refineries possess refining capacity of 6.6 million bbl/d, or two-thirds of the regional capacity, with Russia's internal demand for refined products limited to 2.8-3.4 million bbl/d. As a result, many refineries in Russia and other independent States are operating well below capacity. The utilisation rate of refineries decreased sharply from 79% in 1985 to only 45% in 1999. This resulted directly from the reduction of internal demand and a refining mix poorly adapted to the products mainly required on the international market. In 1990, the internal demand could guarantee a utilisation factor of 66% before production assigned for export. Almost all of these exports consisted of diesel fuel and fuel oil. In 1999 only 38% of the existing refining capacity was required to satisfy the internal demand.

In addition, because crude oil on the Russian market goes for just over half the world price, many oil companies prefer to export their crude oil rather than refine it in Russia and then export the petroleum products. The Russian government has attempted to ensure deliveries to refineries by making access to export pipelines for oil producers conditional on meeting their delivery tar-

gets to domestic refineries. Nevertheless, several refineries have undergone modernisation programmes, in particular units belonging to the Russian oil giant Lukoil. However, financial constraints still prevent most refineries from undertaking major modernisation work to boost efficiency and the production of high-added value products. The most important recent trend for the petroleum industry in Russia has been vertical integration into companies which combine crude production, refining, distribution and retailing within one integrated structure.

COMPETITIVENESS

Energy intensity increased by 19% since 1990 but the near future appears favourable...

From 1980 to 1990, considering all the uncertainties about GDP calculation, the energy intensity decreased very slowly by about 0.2% per year on average. Before its economic collapse, the former Soviet Union had the highest energy intensity in the world. This must be qualified given that the regional GDP is probably underestimated, as it is obvious that the activities of the service sector are only partially reported in statistical data. Artificially low energy prices have encouraged inefficient use of energy in all sectors: industry, power generation, district heating, the tertiary-domestic sector and to a lesser extent transport. The energy intensity increased sharply by 3.7% per year between 1990 and 1996, experienced an improvement of 1.4% in 1997 as GDP demonstrated some limited gain that year, but increased again in 1998 as a result of the mid-year economic and financial crisis. But supported by surging oil export revenues, Russia's GDP grew 3.2% in 1999 and 8.3% in 2000 while energy consumption increased slowly as a first reaction to the modernisation programmes undertaken in all sectors. Consequently energy intensity is expected to decline by 1.4% in 1999 and more significantly in 2000.

...But a large potential exists for improvement

Russian energy efficiency is very poor compared to other countries. Consumption for space heating and domestic hot water, for example, is about 50% higher in Russia than in OECD countries; while manufacturing energy use per tonne of output is up to twice the level in western European countries. Today, with the economic and legal turmoil in the country, Russia urgently needs clear and efficient rules and procedures to make energy saving an integral element of the daily activities of the Russian government, business and public communities. At the micro-economic level, energy efficiency suffers from the small size of many energy efficiency projects which renders the fixed costs of arranging loans prohibitive; from a lack of skilled experts to identify and develop projects in all

Annual Average Rates of Improvement in Energy Intensity





sectors; from the antiquated structure of buildings and district heating systems; and from the lack of responsibility on the part of homeowners and housing associations. Economic restructuring, combined with the economic downturn, has exacerbated the problem and led to even lower energy efficiency than in the Soviet era.

But despite all these previous negative trends, Russia now seems on the right track to achieving energy-saving targets. Privatising the Russian economy is promoting the development of resource-saving awareness and strategies. Energy-saving awareness has increased along with rapid rises in energy costs, which in recent years have approached those on the world market. The 1994 Energy Strategy outlined the Government's main policy objectives for enhancing energy efficiency in the energy sector, including the introduction of energy-efficient technologies in production processes and power generation; improvements in oil refining; increased use of natural gas and greater use of hydropower; and use of newer technologies.

Energy services contracts are coming increasingly into play within the Russian economic and business environment. Such contracts are created to help in promoting energy-saving projects financed through energy saved. These contracts may concern not only implementing specific energy-saving projects, but also supplying energy-saving equipment, and creating databases of energy-saving technologies. They will cover the development of archetypes for using fuel and energy-saving programmes, providing personnel with customized training, and other preparations. The past few years have witnessed significant changes in the commercial attractiveness of exploiting energy-saving potential.

The institutional environment is also moving towards saving energy. In early 1996 a mechanism for providing investors with Federal guarantees was developed. The adoption of Russia's Energy Code and "On power-saving" Federal law are in the making. The law envisages a number of privileges for those who carry out energy-saving projects and for equipment producers. Specific energy-saving foundations, which were created or are currently in the process of creation at enterprise, regional, and federal levels, focus on support of energy-saving projects. In 1994-95, the Federal budget covered more than a quarter of total expenditures for carrying out energy-saving projects and measures. In addition, international financial organizations and institutions are showing great interest in these projects. The Strategy estimated potential savings at 40% to 50% of primary energy consumption; 33% of these savings would occur in the energy sector, 33% in industry, 16% in the residential sector and 10% in the transport sector. It would conserve 240 to 280 Mtoe per year through market mechanisms, government regulations, reduced energy subsidies and appropriate energy prices and tariffs.

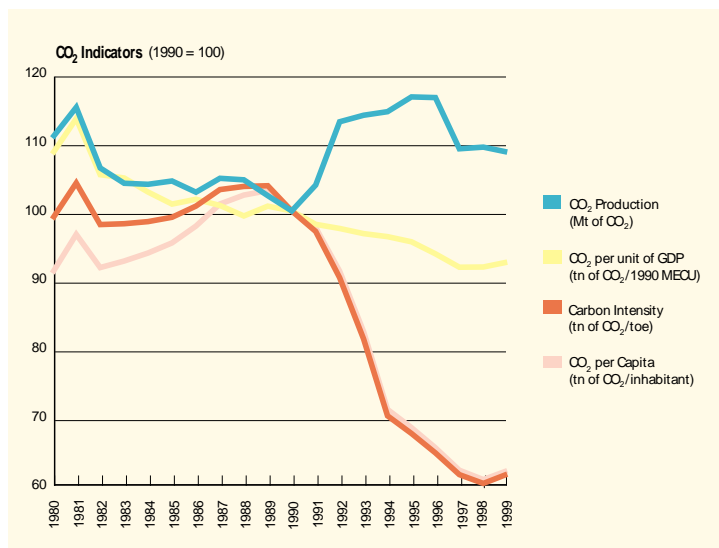
ENVIRONMENT

CO₂ emissions have fallen by 39% since 1990 but will increase in the near future...

CO₂ emissions in the CIS increased from 3190 Mt in 1980 to 3507 Mt in 1990 but then declined to 2136 Mt in 1998 (-39% since 1990) in line with the evolution of gross inland consumption. In addition, the CIS as a whole benefited substantially from the increasing contribution of natural gas in reducing CO₂ emissions. The expected increase of GDP in the near future will certainly modify this evolution: some increase of CO₂ emissions is foreseeable if gross inland energy consumption increases again. The evolution of CO₂ emissions will be influenced by two opposing trends: increasing demand for energy associated with the expected economic rebound and the will of the Government to implement measures to improve energy efficiency. Russia still remains the world's second largest contributor of CO₂ emissions. On the basis of the already registered reduction of CO₂ emissions, the CIS and in particular Russia and Ukraine will have the opportunity to participate in the mechanism of tradable CO₂ emissions permits developed under the terms of the Kyoto Protocol.

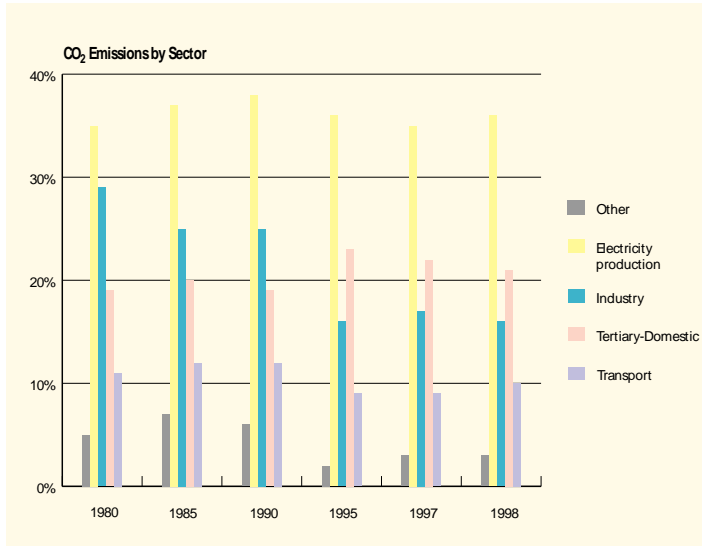
Although CO₂ emissions per capita have closely followed the trend in total emissions since 1980, CO₂ intensity per unit of GDP has increased substantially between 1990 and 1995 due to the increasing energy intensity of the economy. The first signs of improvement appeared in 1996 (-0.5%) and 1997 (-6.7%). Further improvement of this indicator is expected with the rebound of the economy associated with the modernisation of the energy sectors and industry.

The power sector was by far the largest source of CO₂ emissions. After a peak level of 1409 Mt reached in 1991, emissions declined





until 1998 by 46% and represented about 36% of total emissions (35% in 1980). As this sector was still particularly inefficient (with average electrical conversion efficiency of about 25%), any improvement in the power sector will have a significant impact on total CO₂ emissions. All sectors have contributed to the CO₂ emissions reduction recorded since 1990 but to a varying extent: energy branch emissions by 63%, industry by 62%, transport by 48%, the power sector by 46% and the tertiary-domestic sector by only 33%.



GLOBAL MARKETS

Energy exports peaked in 1999 to generate hard currency earnings...

Exports of energy have always been very important for the economy of the former USSR until 1990 (and for Russia as a major CIS component since then), being a source of hard currency, mainly from Western Europe. Exports of energy represented about 25% of energy production in 1998 against 16% in 1990 due to the reduction of internal energy demand. Total export volumes increased from 212 Mtoe in 1980 to 260 Mtoe in 1990. They dropped by 22% between 1990 and 1992, but recovered since then to overtake in 1999 the 1990 level by 18%. The largest exported energy remained crude oil, exports of which dropped by 50% between 1990 and 1992; but they recovered their historical 1980s value of about 115 Mtoe in 1997 and reached 126 Mtoe in 1998. On the other hand, exports of oil products increased continuously until 1996 as the share of refinery capacity required to satisfy internal demand declined but have remained stable since then. During the financial and economic crisis which began in 1998, oil consumption declined while production and exports increased - in part to generate hard currency earnings. This evolution was reinforced since 1999 by higher world energy prices. The main markets for oil exports in 1999 were Western Europe (112 Mtoe) and Central Europe (35 Mtoe) respectively.

The majority of Russian oil is exported via terminals in the Baltic Sea (several ports) and Black Sea (mainly Novorossiisk). Russian crude oil is also exported to Europe via the 1.2million bbl/d capacity Druzhba pipeline. Black Sea exports, however, must pass through the increasingly crowded Bosphorus Straits. As traditional export routes through Black Sea ports have been running at full capacity, and as environmental concerns about the possibility of an oil spill in the Bosphorus increase, oil companies are turning toward the Baltic ports and the Druzhba pipeline as alternatives. In addition, the Baltic Pipeline System currently under construction will allow Russia to export oil directly from its Baltic Sea port of Primorsk rather than shipping it through Estonia, Latvia or Lithuania. Russian oil companies are attempting to challenge Transneft's monopoly position on export pipelines by developing pipeline projects of their own. Yukos, one of the country's largest oil companies, is negotiating with the Chinese government to build an oil pipeline to China, and several international consortia developing oil projects on Sakhalin Island are considering building pipelines to China and Japan to supply oil to customers there. Huge investments in infrastructure will be needed to bring these pipelines online. Russia is manoeuvring to become a major player in the exploration, development and export of oil from the Caspian Sea region. Typically, about 300,000 bbl/d of oil--mainly from Kazakhstan and Azerbaijan--from the Caspian region is exported outside the FSU through Russian oil pipelines controlled by Transneft. With Caspian Sea oil exports set to rise in coming years, Transneft is keen to attract that additional transit oil through its pipeline system in order to reap extra tariff revenues. Caspian regional oil exporters have a number of export options, but Russia is hoping to become the main transit route.

Exports of natural gas also reached a peak in 1990 (87 Mtoe) and then decreased by about 5% per year between 1990 and 1992. The decline stopped in 1993, and exports then increased regularly to reach a new absolute peak of about 105 Mtoe in 1999. The major exporter remains Russia, which currently exports about 40% of its natural gas production. Of this amount, about 67% is destined for European Union markets and the remainder for Eastern countries and Turkey. Major export markets were Germany (28% of total exports) and Italy (15%). Western Europe relies on Russian gas to meet about a quarter of its total gas needs. Trade among the CIS Republics has been in decline because of non-payment for supplies and the subsequent amassing of enormous debts for natural gas, causing reluctance on the part of shippers to provide more gas until these outstanding payments are settled.

Gas infrastructure expansion within Eastern countries and CIS Republics is underway to meet projected demand growth. Russia in particular is planning significant infrastructure expansion in order to serve expanding European markets. The most significant developments are of the Yamal gas fields in northern Siberia and





the construction of the Yamal-Europe pipeline through Belarus and Poland to move gas to market. Although still awaiting final approval, the Blue Stream pipeline, which would traverse the Black Sea and transport Russian gas to Turkey and Southeast Europe, is expected to become operational in 2001. This project is in competition with another proposal, the trans-Caspian project, which would supply Turkey and western markets with gas from Turkmenistan and Azerbaijan.

An October 2000 energy summit between the EU and Russia, whereby the EU agreed to help Russia develop its oil and gas reserves in return for a long-term energy supply commitment, promises to boost Russia's oil exports. EU officials say they hope the energy pact will soon lead to a doubling of imports from Russia. With pipeline projects such as the Baltic Pipeline System under construction, Russia hopes to increase oil exports to Europe to over 5 million bbl/d in the future. In addition, Russian oil exports to Asia are set to increase in the next decade with the development of oil-fields in Eastern Siberia and on Sakhalin Island.



CIS(1) : SUMMARY ENERGY BALANCE

Mtoe	1980	1985	1990	1997	1998	1999(4)	85/80	90/85	97/90	98/97	99/98
Annual % Change											
Primary Production	1357.8	1512.9	1624.6	1168.9	1173.8	1211.9	2.2%	1.4%	-4.6%	0.4%	3.2%
Solids	338.7	312.5	300.5	177.5	170.5	181.0	-1.6%	-0.8%	-7.2%	-4.0%	6.1%
Oil	606.2	598.2	573.5	361.3	362.7	382.4	-0.3%	-0.8%	-6.4%	0.4%	5.4%
Natural gas	359.6	520.1	656.3	541.4	554.4	560.6	7.7%	4.8%	-2.7%	2.4%	1.1%
Nuclear	19.0	43.5	55.1	52.9	51.0	52.9	18.0%	4.8%	-0.6%	-3.7%	3.8%
Hydro & Wind	15.9	18.4	20.0	18.7	19.4	19.5	3.0%	1.7%	-1.0%	3.7%	0.7%
Geothermal	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	4.0%	0.0%
Other	18.4	20.2	19.1	17.1	15.8	15.5	1.9%	-1.1%	-1.6%	-7.5%	-1.8%
Net Imports	-212.2	-219.2	-260.0	-266.5	-278.3	-306.3	0.6%	3.5%	0.4%	4.4%	10.1%
Solids	-11.1	-8.8	-11.7	-6.7	-5.9	-6.9	-4.5%	5.9%	-7.7%	-11.4%	16.8%
Oil	-156.9	-153.1	-158.4	-164.5	-172.5	-193.6	-0.5%	0.7%	0.5%	4.9%	12.2%
Crude oil	-116.1	-105.1	-108.5	-113.6	-126.1	na	-2.0%	0.6%	0.7%	11.0%	na
Oil products	-40.9	-48.0	-49.8	-50.9	-46.4	na	3.3%	0.8%	0.3%	-8.9%	na
Natural gas	-42.6	-54.8	-86.9	-94.3	-98.6	-104.9	5.2%	9.7%	1.2%	4.6%	6.3%
Electricity	-1.6	-2.5	-3.0	-1.0	-1.2	-0.9	8.6%	3.9%	-14.3%	18.6%	-27.0%
Gross Inland Consumption	1131.9	1272.4	1347.8	914.1	893.7	905.6	2.4%	1.2%	-5.4%	-2.2%	1.3%
Solids	326.8	301.1	288.8	173.1	166.0	174.0	-1.6%	-0.8%	-7.0%	-4.1%	4.8%
Oil	437.5	430.7	408.3	196.6	191.2	188.8	-0.3%	-1.1%	-9.9%	-2.8%	-1.3%
Natural gas	315.9	460.9	559.4	456.6	451.5	455.7	7.8%	4.0%	-2.9%	-1.1%	0.9%
Other (2)	51.7	79.7	91.3	87.7	85.0	87.1	9.1%	2.7%	-0.6%	-3.1%	2.5%
Electricity Generation in TWh	1294.0	1544.0	1727.0	1232.9	1221.3	na	3.6%	2.3%	-4.7%	-0.9%	na
Nuclear	73.0	167.0	211.5	201.6	194.1	na	18.0%	4.8%	-0.7%	-3.7%	na
Hydro & wind	184.7	214.4	233.0	217.0	225.1	na	3.0%	1.7%	-1.0%	3.7%	na
Thermal	1036.3	1162.6	1282.5	814.3	802.1	na	2.3%	2.0%	-6.3%	-1.5%	na
Generation Capacity in GWe	266.8	319.3	343.7	328.2	328.3	na	3.7%	1.5%	-0.7%	0.0%	na
Nuclear	14.0	28.1	37.9	37.4	38.5	na	15.0%	6.2%	-0.2%	2.7%	na
Hydro & wind	52.5	61.3	65.0	63.8	64.2	na	3.1%	1.2%	-0.3%	0.5%	na
Thermal	200.2	229.9	240.8	227.0	225.7	na	2.8%	0.9%	-0.8%	-0.6%	na
Average Load Factor in %	55.4	55.2	57.4	42.9	42.5	na	-0.1%	0.8%	-4.1%	-0.9%	na
Fuel Inputs for Thermal Power Generation	342.6	397.9	439.3	261.1	258.0	na	3.0%	2.0%	-7.2%	-1.2%	na
Solids	138.4	129.6	142.7	76.3	78.2	na	-1.3%	1.9%	-8.6%	2.4%	na
Oil	107.2	104.6	67.8	15.8	18.0	na	-0.5%	-8.3%	-18.8%	14.1%	na
Gas	97.0	163.7	228.8	167.4	160.3	na	11.0%	6.9%	-4.4%	-4.2%	na
Geothermal	0.0	0.0	0.0	0.0	0.0	na	-	-	-	4.0%	na
Other	0.0	0.0	0.0	1.6	1.5	na	-	-	-	-7.9%	na
Average Thermal Efficiency in %	26.0	25.1	25.1	26.8	26.7	na	-0.7%	0.0%	0.9%	-0.3%	na
Non-Energy Uses	62.2	65.5	75.3	26.7	27.6	na	1.1%	2.8%	-13.7%	3.1%	na
Total Final Energy Demand	773.6	829.4	883.8	609.3	589.4	na	1.4%	1.3%	-5.2%	-3.3%	na
Solids	173.1	139.0	133.1	53.6	50.4	na	-4.3%	-0.9%	-12.2%	-6.1%	na
Oil	265.7	266.9	265.5	116.9	110.7	na	0.1%	-0.1%	-11.1%	-5.3%	na
Gas	162.6	203.9	248.0	185.9	184.8	na	4.6%	4.0%	-4.0%	-0.6%	na
Electricity	82.9	97.5	107.3	76.0	74.4	na	3.3%	1.9%	-4.8%	-2.2%	na
Heat(3)	71.0	101.9	110.8	161.3	154.8	na	7.5%	1.7%	5.5%	-4.1%	na
Other	18.4	20.2	19.1	15.5	14.3	na	1.9%	-1.1%	-3.0%	-7.4%	na
CO₂ Emissions in Mt of CO₂	3189.8	3344.1	3507.3	2183.8	2135.9	2181.1	0.9%	1.0%	-6.5%	-2.2%	2.1%
Indicators											
Population (Million)	265.97	278.11	288.99	291.99	291.67	291.33	0.9%	0.8%	0.1%	-0.1%	-0.1%
GDP (index 1985=100)	90.0	100.0	109.5	62.5	61.0	62.7	2.1%	1.8%	-7.7%	-2.4%	2.8%
Gross Inl Cons./GDP (toe/1990 MEUR)	1846.2	1867.4	1807.2	2146.7	2150.6	2119.9	0.2%	-0.7%	2.5%	0.2%	-1.4%
Gross Inl Cons./Capita (toe/inhabitant)	4.26	4.58	4.66	3.13	3.06	3.11	1.5%	0.4%	-5.5%	-2.1%	1.4%
Electricity Generated/Capita (kWh/inhabitant)	4865	5552	5976	4222	4187	na	2.7%	1.5%	-4.8%	-0.8%	na
CO ₂ Emissions/Capita (t of CO ₂ /inhabitant)	12.0	12.0	12.1	7.5	7.3	7.5	0.1%	0.2%	-6.7%	-2.1%	2.2%
Import Dependency %	-18.7	-17.2	-19.2	-29.2	-31.1	-33.8	-1.7%	2.3%	6.1%	6.8%	8.6%

(1) Includes Baltic countries for statistical reasons

(2) Includes nuclear, hydro and wind, net imports of electricity, and other energy sources.

(3) Disruption in statistical series in 1992

(4) Estimates





CIS (1) : MAIN INDICATORS

	1980	1985	1990	1995	1997	1998	85/80	90/85	95/90	97/95	98/97
	Annual % Change										
Gross Inland Consumption (Mtoe)	1131.9	1272.4	1347.8	966.0	914.1	893.7	2.4%	1.2%	-6.4%	-2.7%	-2.2%
Public Thermal Power Generation	325.4	380.5	422.5	280.9	235.3	232.9	3.2%	2.1%	-7.8%	-8.5%	-1.1%
Autoprod. Thermal Power Generation	17.2	17.4	16.8	13.8	25.7	25.1	0.2%	-0.7%	-3.8%	36.5%	-2.4%
Energy Branch	96.3	130.4	131.5	49.3	52.5	55.7	6.2%	0.2%	-17.8%	3.2%	6.1%
Final Energy Consumption	773.6	829.4	883.8	676.2	605.8	585.9	1.4%	1.3%	-5.2%	-5.4%	-3.3%
Industry	383.5	376.5	405.3	250.7	225.1	211.4	-0.4%	1.5%	-9.2%	-5.3%	-6.1%
Transport	123.8	134.1	139.9	77.8	75.0	78.0	1.6%	0.9%	-11.1%	-1.8%	4.0%
Tertiary-Domestic	266.3	318.9	338.6	347.7	305.7	296.4	3.7%	1.2%	0.5%	-6.2%	-3.0%
Energy Intensity (toe/1990 MEUR)	1846.2	1867.4	1807.2	2206.3	2146.7	2150.6	0.2%	-0.7%	4.1%	-1.4%	0.2%
Public Thermal Power Generation	530.7	558.4	566.6	641.5	552.7	560.4	1.0%	0.3%	2.5%	-7.2%	1.4%
Autoprod. Thermal Power Generation	28.1	25.6	22.5	31.6	60.4	60.5	-1.9%	-0.9%	-1.0%	6.8%	6.8%
Industry	625.6	552.5	543.5	572.7	528.6	508.8	-2.5%	-0.3%	1.1%	-3.9%	-3.7%
Transport	201.9	196.8	187.5	177.7	176.2	187.7	-0.5%	-1.0%	-1.1%	-0.4%	6.5%
Tertiary-Domestic	434.3	468.0	454.0	794.0	717.8	713.3	1.5%	-0.6%	11.8%	-4.9%	-0.6%
Energy per Capita (Kgoe/inhabitant)	4256	4575	4664	3301	3131	3064	1.5%	0.4%	-6.7%	-2.6%	-2.1%
Industry	1442	1354	1403	857	771	725	-1.3%	0.7%	-9.4%	-5.2%	-6.0%
Transport	466	482	484	266	257	267	0.7%	0.1%	-11.3%	-1.7%	4.1%
Tertiary-Domestic	1001	1147	1172	1188	1047	1016	2.8%	0.4%	0.3%	-6.1%	-2.9%
Electricity Share (%)											
Final Energy Consumption	10.7%	11.8%	12.1%	12.0%	12.6%	12.7%	1.9%	0.6%	-0.2%	2.1%	1.2%
Industry	14.5%	17.0%	16.8%	14.9%	16.1%	16.2%	3.2%	-0.2%	-2.4%	4.1%	0.7%
Transport	5.3%	5.3%	5.3%	9.4%	9.3%	8.6%	-0.1%	0.3%	11.9%	-0.7%	-7.2%
Tertiary-Domestic	7.8%	8.4%	9.3%	10.6%	10.7%	11.3%	1.5%	2.3%	2.5%	0.7%	4.9%
Total Renewable Consumption (Mtoe)	34.3	38.7	39.1	39.2	35.8	35.2	2.4%	0.2%	0.0%	-4.4%	-1.6%
Hydro	15.9	18.4	20.0	20.5	18.7	19.4	3.0%	1.7%	0.5%	-4.7%	3.7%
Biomass	18.4	20.2	19.1	18.6	17.1	15.8	1.9%	-1.1%	-0.5%	-4.1%	-7.5%
Other	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-5.5%	8.0%
Renewable intensity (toe/ 1990 MEUR)	55.9	56.8	52.5	89.4	84.0	84.7	0.3%	-1.6%	11.2%	-3.1%	0.8%
Renewable per capita (Kgoe/inhabitant)	128.9	139.1	135.4	133.8	122.6	120.7	1.5%	-0.5%	-0.2%	-4.3%	-1.5%
CO₂ Emissions (Mt of CO₂)	3189.8	3344.1	3507.3	2401.0	2183.8	2135.9	0.9%	1.0%	-7.3%	-4.6%	-2.2%
Public Thermal Power Generation	1061.9	1187.8	1291.4	825.0	698.3	696.0	2.3%	1.7%	-8.6%	-8.0%	-0.3%
Autoprod. Thermal Power Generation	55.4	54.6	53.1	37.8	71.0	69.7	-0.3%	-0.5%	-6.6%	37.0%	-1.8%
Energy Branch	166.7	222.6	199.9	49.7	67.1	74.3	5.9%	-2.1%	-24.3%	16.3%	10.7%
Industry	923.7	828.4	887.2	382.8	363.5	342.9	-2.2%	1.4%	-15.5%	-2.6%	-5.7%
Transport	364.6	392.6	406.6	208.8	202.0	210.0	1.5%	0.7%	-12.5%	-1.6%	4.0%
Tertiary-Domestic	617.4	658.1	669.1	550.1	471.5	449.3	1.3%	0.3%	-3.8%	-7.4%	-4.7%
Carbon Intensity (tn of CO₂/toe)	2.8	2.6	2.6	2.5	2.4	2.4	-1.4%	-0.2%	-0.9%	-2.0%	0.0%
Public Power Generation	2.9	2.7	2.6	2.4	2.3	2.3	-1.9%	-0.7%	-1.9%	-1.8%	0.9%
Public Thermal Power Generation	3.3	3.1	3.1	2.9	3.0	3.0	-0.9%	-0.4%	-0.8%	0.5%	0.7%
Autoprod. Power Generation	3.2	3.1	3.2	2.7	2.7	2.8	-0.5%	0.2%	-2.9%	0.3%	0.6%
Autoprod. Thermal Power Generation	3.2	3.1	3.2	2.7	2.8	2.8	-0.5%	0.2%	-2.8%	0.4%	0.6%
Energy Branch	1.7	1.7	1.5	1.0	1.3	1.3	-0.3%	-2.3%	-7.9%	12.6%	4.3%
Industry	2.4	2.2	2.2	1.5	1.6	1.6	-1.8%	-0.1%	-7.0%	2.8%	0.4%
Transport	2.9	2.9	2.9	2.7	2.7	2.7	-0.1%	-0.1%	-1.6%	0.2%	0.0%
Tertiary-Domestic	2.3	2.1	2.0	1.6	1.5	1.5	-2.3%	-0.9%	-4.3%	-1.3%	-1.7%
CO₂ per Capita (kg of CO₂/inhabitant)	11993	12024	12136	8205	7479	7323	0.1%	0.2%	-7.5%	-4.5%	-2.1%
Industry	3473	2979	3070	1308	1245	1176	-3.0%	0.6%	-15.7%	-2.4%	-5.6%
Transport	1371	1412	1407	713	692	720	0.6%	-0.1%	-12.7%	-1.5%	4.1%
Tertiary-Domestic	2321	2367	2315	1880	1615	1541	0.4%	-0.4%	-4.1%	-7.3%	-4.6%
CO₂ per unit of GDP (tn of CO₂/1990 MEUR)	5203	4908	4703	5484	5128	5140	-1.2%	-0.8%	3.1%	-3.3%	0.2%
Public Thermal Power Generation	1732	1743	1732	1884	1640	1675	0.1%	-0.1%	1.7%	-6.7%	2.1%
Autoprod. Thermal Power Generation	90	80	71	86	167	168	-2.4%	-2.3%	3.9%	38.9%	0.6%
Energy Branch	272	327	268	113	158	179	3.7%	-3.9%	-15.8%	17.9%	13.4%
Industry	1507	1216	1190	874	854	825	-4.2%	-0.4%	-6.0%	-1.2%	-3.3%
Transport	595	576	545	477	474	505	-0.6%	-1.1%	-2.6%	-0.3%	6.5%
Tertiary-Domestic	1007	966	897	1256	1107	1081	-0.8%	-1.5%	7.0%	-6.1%	-2.3%

(1) Includes Baltic countries for statistical reasons





RUSSIA : SUMMARY ENERGY BALANCE

Mtoe	1990	1995	1997	1998	1999(2)	95/90	97/95	98/97	99/98
Primary Production	1264.9	949.7	923.2	929.0	950.1	-5.6%	-1.4%	0.6%	2.3%
Solids	164.9	109.5	101.4	95.9	103.2	-7.9%	-3.8%	-5.5%	7.6%
Oil	518.8	306.6	305.4	302.9	314.7	-10.0%	-0.2%	-0.8%	3.9%
Natural gas	519.0	476.1	460.8	477.0	476.1	-1.7%	-1.6%	3.5%	-0.2%
Nuclear	30.6	26.3	28.6	27.4	30.9	-3.0%	4.3%	-4.4%	12.8%
Hydro & Wind	14.3	15.2	13.5	13.6	13.6	1.1%	-5.5%	0.7%	0.0%
Geothermal	0.0	0.0	0.0	0.0	0.0	2.3%	-5.5%	4.0%	0.0%
Other	17.3	16.0	13.5	12.1	11.6	-1.6%	-8.1%	-10.0%	-4.8%
Net Imports	-364.6	-314.3	-338.2	-344.8	-364.2	-2.9%	3.7%	2.0%	5.6%
Solids	-0.6	-2.9	-2.3	-1.9	-3.1	35.9%	-9.7%	-21.0%	67.2%
Oil	-262.0	-157.9	-175.5	-179.6	-193.5	-9.6%	5.4%	2.3%	7.7%
Crude oil	-204.3	-114.4	-123.5	-132.3	na	-11.0%	3.9%	7.1%	na
Oil products	-57.7	-43.5	-52.0	-47.3	na	-5.5%	9.4%	-9.1%	na
Natural gas	-101.6	-151.8	-158.6	-161.8	-165.9	8.4%	2.2%	2.1%	2.5%
Electricity	-0.4	-1.7	-1.7	-1.6	-1.7	34.2%	0.2%	-8.4%	8.8%
Gross Inland Consumption	906.7	623.4	597.0	582.0	586.1	-7.2%	-2.1%	-2.5%	0.7%
Solids	167.0	109.1	101.4	95.3	100.1	-8.2%	-3.6%	-6.0%	5.0%
Oil	264.6	147.0	130.0	124.1	121.5	-11.1%	-5.9%	-4.5%	-2.2%
Natural gas	413.3	311.5	311.5	310.9	310.2	-5.5%	0.0%	-0.2%	-0.2%
Other (1)	61.9	55.8	54.1	51.7	54.4	-2.0%	-1.6%	-4.4%	5.2%
Electricity Generation in TWh	1082.2	859.0	833.2	826.2	na	-4.5%	-1.5%	-0.8%	na
Nuclear	117.4	99.5	108.5	103.7	na	-3.2%	4.4%	-4.4%	na
Hydro & wind	166.8	176.3	157.4	158.5	na	1.1%	-5.5%	0.7%	na
Thermal	797.9	583.2	567.2	564.0	na	-6.1%	-1.4%	-0.6%	na
Generation Capacity in GWe	213.1	210.8	205.6	204.0	na	-0.2%	-1.2%	-0.8%	na
Nuclear	20.2	21.2	21.2	21.2	na	1.0%	0.0%	0.0%	na
Hydro & wind	43.3	43.8	43.9	44.1	na	0.2%	0.2%	0.5%	na
Thermal	149.5	145.8	140.5	138.7	na	-0.5%	-1.8%	-1.3%	na
Average Load Factor in %	58.0	46.5	46.3	46.2	na	-4.3%	-0.3%	-0.1%	na
Fuel Inputs for Thermal Power Generation	267.1	194.2	173.1	173.6	na	-6.2%	-5.6%	0.3%	na
Solids	65.2	40.3	45.9	48.1	na	-9.2%	6.7%	4.8%	na
Oil	47.1	12.9	3.9	5.5	na	-22.8%	-45.4%	41.3%	na
Gas	154.8	140.9	123.3	120.0	na	-1.9%	-6.5%	-2.7%	na
Geothermal	0.0	0.0	0.0	0.0	na	0.8%	-1.9%	4.0%	na
Other	0.0	0.0	0.0	0.0	na	-	-	-	na
Average Thermal Efficiency in %	25.7	25.8	28.2	27.9	na	0.1%	4.5%	-0.9%	na
Non-Energy Uses	55.4	28.1	20.6	21.3	na	-12.7%	-14.4%	3.6%	na
Total Final Energy Demand	652.1	456.5	409.9	390.4	na	-6.9%	-5.2%	-4.8%	na
Solids	58.5	39.4	24.9	22.7	na	-7.6%	-20.5%	-8.8%	na
Oil	176.8	75.5	77.3	69.1	na	-15.6%	1.1%	-10.6%	na
Gas	120.8	100.5	107.0	105.8	na	-3.6%	3.1%	-1.1%	na
Electricity	74.2	53.2	50.7	49.7	na	-6.5%	-2.3%	-2.0%	na
Heat	204.3	171.9	136.5	130.8	na	-3.4%	-10.9%	-4.1%	na
Other	17.3	16.0	13.6	12.2	na	-1.6%	-7.8%	-10.1%	na
CO₂ Emissions in Mt of CO₂	2266.3	1532.2	1419.8	1381.9	na	-7.5%	-3.7%	-2.7%	na
Indicators									
Population (Million)	148.29	148.14	147.30	146.91	146.50	0.0%	-0.3%	-0.3%	-0.3%
GDP (index 1990=100)	100.0	62.1	60.5	57.8	59.6	-9.1%	-1.3%	-4.6%	3.2%
Gross Inl Cons./GDP (toe/1990 MEUR)	1993.3	2206.2	2167.6	2215.7	2161.2	2.1%	-0.9%	2.2%	-2.5%
Gross Inl Cons./Capita (toe/inhabitant)	6.11	4.21	4.05	3.96	4.00	-7.2%	-1.9%	-2.2%	1.0%
Electricity Generated/Capita (kWh/inhabitant)	7297	5799	5656	5624	na	-4.5%	-1.2%	-0.6%	na
CO ₂ Emissions/Capita (t of CO ₂ /inhabitant)	15.3	10.3	9.6	9.4	na	-7.5%	-3.5%	-2.4%	na
Import Dependency %	-40.1	-50.4	-56.6	-59.2	-62.1	4.7%	6.0%	4.6%	4.9%

(1) Includes nuclear, hydro and wind, net imports of electricity, and other energy sources.

(2) Estimates





UKRAINE : SUMMARY ENERGY BALANCE

Mtoe	1990	1995	1997	1998	1999(2)	95/90	97/95	98/97	99/98
Primary Production	135.7	83.0	81.2	80.4	83.7	-9.4%	-1.1%	-1.0%	4.1%
Solids	86.8	44.2	39.6	39.7	43.3	-12.6%	-5.3%	0.3%	9.0%
Oil	5.3	4.1	4.6	4.4	5.3	-5.0%	6.1%	-3.9%	20.7%
Natural gas	22.6	15.2	15.2	15.1	14.8	-7.6%	-0.1%	-0.9%	-1.6%
Nuclear	19.9	18.4	20.7	19.6	18.7	-1.5%	6.1%	-5.3%	-4.7%
Hydro & Wind	0.9	0.9	0.8	1.4	1.3	-1.5%	-0.5%	61.4%	-3.8%
Geothermal	0.0	0.0	0.0	0.0	0.0	-	-	-	-
Other	0.3	0.3	0.3	0.3	0.3	-2.3%	-0.4%	-0.4%	-2.4%
Net Imports	119.8	82.5	68.9	62.5	64.9	-7.2%	-8.6%	-9.2%	3.9%
Solids	-5.8	8.3	3.9	4.0	4.1	-	-31.2%	1.5%	3.3%
Oil	54.6	21.2	13.8	14.2	13.0	-17.3%	-19.2%	2.4%	-8.2%
Crude oil	53.4	13.4	9.0	9.9	na	-24.2%	-17.9%	9.4%	na
Oil products	1.2	7.8	4.8	4.3	na	44.6%	-21.3%	-10.8%	na
Natural gas	73.5	53.2	51.1	44.4	48.0	-6.2%	-2.0%	-13.1%	8.2%
Electricity	-2.4	-0.3	0.0	-0.1	-0.3	-36.4%	-77.4%	346.2%	337.9%
Gross Inland Consumption	252.9	165.5	150.1	142.9	148.6	-8.1%	-4.8%	-4.8%	4.0%
Solids	81.6	52.5	43.5	43.7	47.4	-8.4%	-9.0%	0.4%	8.4%
Oil	60.9	25.3	18.4	18.6	18.3	-16.1%	-14.6%	0.8%	-1.3%
Natural gas	91.8	68.5	66.3	59.5	62.9	-5.7%	-1.6%	-10.3%	5.7%
Other (1)	18.6	19.2	21.8	21.2	20.0	0.6%	6.4%	-2.8%	-5.5%
Electricity Generation in TWh	298.8	193.8	177.8	172.8	na	-8.3%	-4.2%	-2.8%	na
Nuclear	76.2	70.5	79.4	75.2	na	-1.5%	6.1%	-5.3%	na
Hydro & wind	10.7	10.0	9.9	15.9	na	-1.4%	-0.5%	61.5%	na
Thermal	212.0	113.3	88.5	81.7	na	-11.8%	-11.6%	-7.8%	na
Generation Capacity in GWe	54.3	54.3	54.2	53.9	na	0.0%	0.0%	-0.6%	na
Nuclear	12.8	12.8	12.8	12.8	na	0.0%	0.0%	0.0%	na
Hydro & wind	4.7	4.7	4.7	4.7	na	0.1%	-0.1%	0.6%	na
Thermal	36.8	36.7	36.7	36.3	na	-0.1%	0.0%	-1.0%	na
Average Load Factor in %	62.8	40.8	37.4	36.6	na	-8.3%	-4.2%	-2.2%	na
Fuel Inputs for Thermal Power Generation	94.2	36.6	32.4	27.6	na	-17.2%	-6.0%	-14.8%	na
Solids	26.6	17.4	13.7	13.7	na	-8.1%	-11.1%	-0.4%	na
Oil	22.0	2.8	1.9	1.9	na	-33.8%	-17.3%	1.6%	na
Gas	45.6	16.5	16.7	11.9	na	-18.5%	0.8%	-28.5%	na
Geothermal	0.0	0.0	0.0	0.0	na	-	-	-	na
Other	0.0	0.0	0.0	0.0	na	-	-	-	na
Average Thermal Efficiency in %	19.3	26.6	23.5	25.5	na	6.6%	-6.0%	8.3%	na
Non-Energy Uses	3.7	1.1	1.1	1.0	na	-21.9%	3.1%	-12.5%	na
Total Final Energy Demand	180.3	107.8	94.2	92.5	na	-9.8%	-6.5%	-1.8%	na
Solids	45.6	22.4	18.0	18.0	na	-13.3%	-10.4%	0.2%	na
Oil	42.6	18.9	13.7	13.9	na	-15.0%	-15.0%	1.5%	na
Gas	34.5	43.0	41.2	40.4	na	4.5%	-2.1%	-1.9%	na
Electricity	19.2	12.3	10.7	10.2	na	-8.5%	-7.0%	-4.8%	na
Heat	38.2	11.0	10.4	9.8	na	-22.1%	-2.5%	-5.8%	na
Other	0.3	0.3	0.3	0.3	na	-2.3%	-0.4%	-0.4%	na
CO₂ Emissions in Mt of CO₂	720.7	401.5	346.0	329.5	na	-11.0%	-7.2%	-4.7%	na
Indicators									
Population (Million)	51.89	51.53	50.70	50.30	49.89	-0.1%	-0.8%	-0.8%	-0.8%
GDP (index 1990=100)	100.0	28.7	25.1	24.7	24.5	-22.1%	-6.6%	-1.7%	-0.4%
Gross Inl Cons./GDP (toe/1990 MEUR)	2120.8	4829.4	5018.5	4862.2	5077.3	17.9%	1.9%	-3.1%	4.4%
Gross Inl Cons./Capita (toe/inhabitant)	4.87	3.21	2.96	2.84	2.98	-8.0%	-4.0%	-4.0%	4.8%
Electricity Generated/Capita (kWh/inhabitant)	5759	3761	3508	3436	na	-8.2%	-3.4%	-2.0%	na
CO ₂ Emissions/Capita (t of CO ₂ /inhabitant)	13.9	7.8	6.8	6.6	na	-10.9%	-6.4%	-4.0%	na
Import Dependency %	47.4	49.9	45.9	43.7	43.7	1.0%	-4.0%	-4.7%	-0.1%

(1) Includes nuclear, hydro and wind, net imports of electricity, and other energy sources.

(2) Estimates







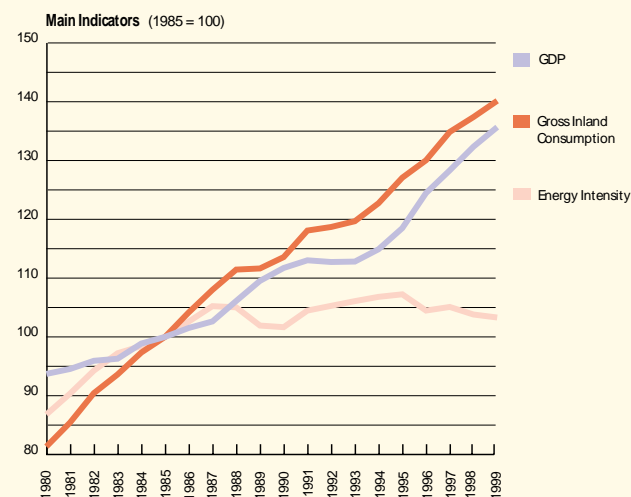
AFRICA: Major trends (1980-1999)

- The economic recovery observed since 1994 continued, supported by sustained growth in North Africa
- Final energy demand driven by the domestic sector, a result of the prevailing rural economy and increasing population
- Low incentives to invest in the industrial sector
- Development of efficient transport infrastructure needed to support economic activity
- Biomass met up to 62% of the final energy demand but caused much environmental damage
- The contribution of locally produced energy forms remained predominant
- Growth of gross inland consumption closely followed the evolution of final demand
- Sub-Saharan oil production has overtaken that of North Africa since 1996, with prospects for an increasing gap
- Africa accounts for about 8% of world fossil fuel reserves
- In 1998, coal provided roughly half of the electricity production but its share declined steadily over time
- The refinery capacity still requires upgrading and enhanced processing capability
- Energy intensity improved since 1995, as well as the GDP per capita ratio
- Gross inland energy consumption per capita was by far the lowest observed in the main world regions
- In 1999 CO₂ emissions, which increased by 65% since 1980, were 26% above the 1990 level
- Africa increased its contribution to world energy markets, led now by sub-Saharan Africa

Africa is a diverse continent from both economic and energy perspectives. A natural geographic separation, the Sahara desert, separates the North along the Mediterranean Sea, and all other countries. There are a number of countries with vast resources of oil, gas and coal. However, the energy sector in the region is largely underdeveloped. Africa includes some of the least developed countries in the world and, as a whole, has the lowest average income per capita among the world regions considered in this outlook. Special economic links exist between North African countries and the European Union, particularly concerning oil and gas supplies. For the analysis, two regions are explicitly considered: North Africa including Algeria, Egypt, Libya, Morocco and Tunisia; and, on the other hand, sub-Saharan Africa which includes all other countries.

The economic recovery observed since 1994 continued, supported by sustained growth in North Africa...

During the 1980s the African population grew at about 2.9% per annum but this increase has been limited to 2.4% per annum since the beginning of the 1990s with about 82% concentrated in sub-Saharan Africa, a constant share over the last two decades. Over the same period, the annual average GDP growth was limited to 2.0%. Though growth was stable during the 1980s at about 1.8% per year, economic growth was marked by stagnation between 1989 and 1993 and by a more sustained evolution since then, reaching 3.4% per year on average despite a limited 2.5% increase in 1999. In these last two years economic growth has been mainly contributed by North Africa with increases respectively of 4.6% and 3.7%. But it must be stressed that GDP is largely underestimated, as a large fraction of the population, mainly located in sub-Saharan Africa, is self-sufficient and thus much economic activity is not recorded. When recent turmoil in financial markets disrupted economies across the globe, the countries of sub-Saharan Africa were adversely affected through trade and the decline in commodity prices induced by the crises. But there was little impact on their financial markets or on the financing conditions facing them, with the exception of South Africa. These countries were in effect largely immune to this financial contagion because of the low degree of international integration and underdevelopment of their financial markets. Nevertheless, the region's average GDP per capita decreased by more than 15% between 1980 and 1995 and experienced a limited 3% increase since then. Though economic welfare increased rapidly in North Africa, about 8.5% since 1995, it remained stable in sub-Saharan Africa. Improvements in health and education are primary sources of





human and economic development. Although sub-Saharan African countries have made significant progress in enhancing education, they are still lagging behind other regions in terms of literacy rates and especially with regard to secondary school enrolment. Recent policy efforts have brought sub-Saharan Africa closer to macroeconomic stability and reduced distortions in incentive structures, resulting in some improvements in economic performance but growth remains fragile and, in most countries, insufficiently strong to significantly reduce the dire levels of poverty that are prevalent.

ENERGY OUTLOOK

Final energy demand driven by the domestic sector, a result of the prevailing rural economy and increasing population...

The growth of final energy remained stable during the 1980s at about 2.5% per year when GDP grew on average by 1.8% per year. During the first part of the 1990s, marked by an annual GDP increase of 1.2% on average, final energy demand grew by only 2.0%. Since 1995, driven by the economic recovery, the growth of final energy demand rebounded to 2.9% per year on average but, for the first time, well below the GDP growth. Resulting from marked differences in industrialisation, the final demand structure and its evolution vary greatly between regions. North Africa presents a structure of final energy demand close to that of industrialised countries if we except the more limited contribution of transport related to a lower level of motorisation. Since 1980, the growth in North Africa (+104%) has been systematically higher than in sub-Saharan Africa (+47%) where the tertiary-domestic - contributing some 70% of total final energy demand in 1998 - absorbed the major part of the increase. As the energy consumption per capita of the tertiary-domestic sector has been quite stable since 1980 at about 650 kgoe per inhabitant, the driving force of final energy growth remains the increase in population. Furthermore, in North Africa, the growth was totally met by commercial energies whilst biomass played a major role in sub-Saharan Africa contributing more than 80% of additional consumption, with the exception of South Africa.

Low incentives to invest in the industrial sector...

Globally, for the whole continent, the domestic and, to a lesser extent, the tertiary-commercial share in final energy demand is by far the most dominant, and this component has accelerated over time, rising from 62% in 1980 to 65% in 1998. In sub-Saharan Africa, excluding South Africa, which presents a pattern of consumption similar to that of industrialised countries, it reached as high as 80% in 1998. The share of industry fell from 25% to 21%

Main items

The African continent is characterised by tremendous diversity in its economic, political and energy evolution. Its three main sub-regions comprise North, South and Sub-Saharan Africa. With some notable exceptions, poor public administration, political instability, onerous regulation and crippling levels of government debt have hampered regional economic prospects. These have limited the volume of much-needed overseas direct investment. Recent debt-relief initiatives by international financial institutions offer the prospect of some assistance. But rapid population growth, poor levels of education and health provision, high military expenditure and unrelenting urbanisation are imposing major strains on economic development. The world's most difficult development challenges are perhaps to be found in Sub-Saharan Africa. Here some two-thirds of the population live in rural areas; 40% subsist on incomes below $\text{€}1$ a day; and climate change threatens access to water. In some countries, the meagre public health facilities are in danger of being overwhelmed by the scourge of Aids and other epidemics. Rapid, but largely unplanned, urbanisation is outpacing the construction of adequate infrastructures for energy, telecommunications, water, sewage and public transport. A high priority remains energy sector reform including market liberalisation, inward investment, better management and rational tariff policies. In North Africa economic development should seek to diversify these economies away from their present heavy dependence on oil and gas exports. Substantial opportunities for the expansion of energy supplies exist in central and west Africa including hydroelectricity; grid interconnections; and production of on- and off-shore oil and gas. Another important priority is much more effective utilisation of biomass and other renewable sources – especially in the many rural areas without access to grid-based electricity.

over the same period, while the transport sector decreased from 14% to 13% as a consequence of the rural economy prevailing in sub-Saharan Africa, which excludes almost all forms of conventional industrial activity, with the exception of South Africa. In this region of more than 574 millions inhabitants or 76% of the whole continent's population, industrial energy consumption remained below 28 Mtoe in 1998, or less than 11% of the European Union's industrial consumption. This situation resulted from the very low level of investment in industrial activities and the relatively poor productivity of most of them. Inadequate infrastructure, poor quality of public services and distortions in investment incentives have been factors limiting the productivity of capital. Moreover,





the high risks attached to the return on investment in Africa, particularly those associated with macroeconomic and political instability, inefficient institutions and a weak legal system, have played a major role in reducing the incentive to invest.

A second reason for this predominance of the domestic sector is the very low efficiency of applications associated with biomass use. During this last decade, progress has been made in biomass energy conservation, in term of technical knowledge, dissemination methodologies, and monitoring and evaluation techniques. However, the lessons learned have not been widely communicated to national governments, donor agencies, and non-governmental organisations that are responsible for implementing programmes. As a result, much effort has been dissipated through trial-and-error approaches that erode the potential impact of project interventions, and have even undermined the credibility of the technologies in some cases.

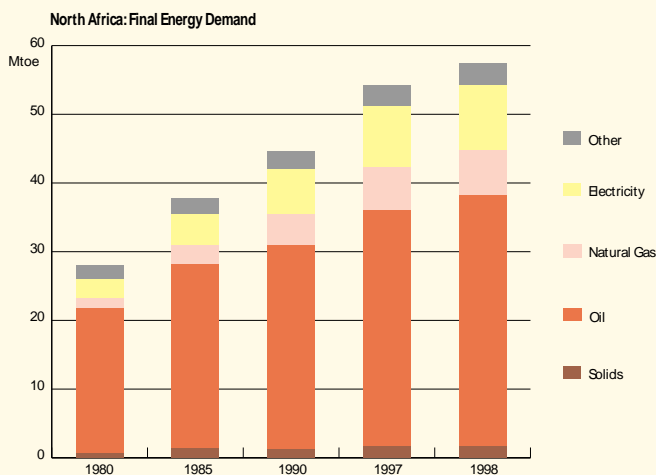
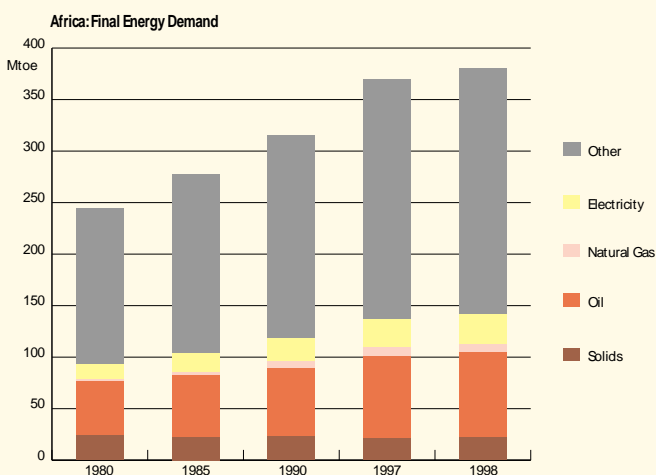
Development of efficient transport infrastructure needed to support economic activity...

Africa's transportation sector has not expanded to the extent that it has in other developing countries, and the limited number of existing roadways have generally not been well maintained. Low per capita incomes have kept the number of vehicles per inhabitant among the lowest in the world. For example, in Nigeria, the most populous African country, there are only 12 vehicles per thousand people; and, even in South Africa, the region's most developed economy, there are only 139 vehicles per thousand persons. In much of the region railways are used primarily to transport goods to market, but the locomotives are outdated, and railway lines are in disrepair. Increased economic activity would make an expansion of trade possible, reinforcing the need for efficient infrastructures and pushing up the demand for transport fuels.

Nevertheless Africa has experienced substantial growth in motorised transport. Transportation is almost exclusively petroleum based and, in many instances, oil import costs account for a significant proportion of export earnings. As transport fuel demand rises, certain problems need to be tackled urgently if this growth is not to place unbearable strains on African economies and urban environments. Chief among these are the fuel-use inefficiencies of the present vehicle fleet, spiralling costs associated with mounting fuel wastage, the absence of systematic transport management and rising levels of urban air pollution.

Biomass met up to 62% of the final energy demand but caused much environmental damage...

Biomass remained the major contributor to final energy demand, with a share of about 62% of energy needs, even though the precise levels of use in individual countries are uncertain. For example, some neighbouring countries with similar economic and geographical characteristics show unexplained differences in their level of per capita biomass use. This illustrates the difficulties of establishing reliable energy statistics for non-commercial fuels, especially in less developed countries. Wood, including charcoal, is the most common and the most environmentally detrimental biomass energy source. Firewood accounts for about 70% of biomass use, the rest being covered mainly by agricultural residues and animal wastes. Deforestation caused by wood utilisation for fuel is now one of the most pressing environmental problems faced by most African nations. Deforestation has negative impacts upon the local environment (increasing erosion) and the global environment (acceleration of climate change and threats to biodiversity).





Furthermore the significant differences in economic development, energy endowment and demography between North African countries, South Africa and the rest of sub-Saharan Africa are reflected in the pattern of biomass energy use. Sub-Saharan Africa, excluding South Africa, accounted for 94% of the continent's total final biomass consumption in 1998, but consumed only 27% of the continent's final conventional energy. There is little prospect that this pattern will change significantly in the foreseeable future. Substitution of commercial fuels such as kerosene, electricity and LPG in place of biomass is being recommended in many urban areas.

on locally produced oil (64%), electricity (16%) and gas (12%), the contribution of solids and biomass remaining limited given the importance of oil and gas in the economies of these countries. On the other hand, solids are the predominant contributor in South Africa (31%), ahead of oil (27%), electricity (22%) and biomass (19%). In the sub-Saharan region excluding South Africa, biomass covers 85% of the needs, oil 11%, electricity 2% and solid fuels less than 1%.

Growth of gross inland consumption closely followed the evolution of final demand...

Gross inland energy consumption closely followed the evolution of final demand, with an average annual increase of almost 3.4% during the 1980s, but of only 2.4% since 1990 even though energy consumption growth recovered to 3.3% in 1997 in line with the economic rebound. Actual data for 1998 and 1999 demonstrate a slow down of the growth to 2.0% per annum despite the continuation of the economic resurgence. There was a general increase for all primary fuels, but with large regional variations depending upon the structure of regional activities and local availabilities. Amongst fossil fuels, oil remains the largest contributor with about 20% of gross inland consumption but the level of consumption, around 100 Mtoe, has remained stable since 1997. The continent's oil consumption growth declined progressively since 1980 - 3.6% per year between 1980 and 1985, but 2.6% over the period 1985-1990 and 1.8% between 1990 and 1997.

The contribution of locally produced energy forms remained predominant...

Oil's share in final energy demand has remained stable since 1980 at about 22% due to the limited increase of transport fuel consumption. Since 1980, oil products consumption has increased 90% in the tertiary-domestic sector, 55% in transport and only 18% in industry. In 1998, transport accounted for 56% of final oil products consumption, tertiary-domestic for 26% and transport for 18%. The share of solid fuels diminished over the same period from 10% to only 6% even though the absolute level of consumption has remained stable at about 23 Moe since 1980, while the gas share rose from 1% to 2% and electricity's share from 6% to 8%. Gas consumption remains concentrated in the major oil and gas producers located in North Africa. Electricity's share remained very low compared to industrialised countries; and consumption of the whole continent represented only 16% of that of the European Union in 1998 or a little less than French consumption. This reflects the fact that a large part of Central Africa is not yet electrified. In 1998, South Africa accounted for just under 50% of Africa's total final electricity consumption, North Africa 32% and sub-Saharan Africa, excluding South Africa, only 20% (less than the Belgian consumption). In per capita terms, the contrast is dramatic: in 1998 South Africa consumed 4897 kWh per capita, North Africa 967 kWh per capita and sub-Saharan Africa only 140 kWh per capita. In North Africa, final energy demand is mainly focused

North Africa, which includes more industrialised countries with better transport infrastructures, absorbed 52.6% of Africa's oil consumption in 1998 against 44.4% in 1980 and 52.8% in 1990, demonstrating a stable share during the 1990s. Oil consumption has grown there by 4.9% during the 1980s and by 1.5% since 1990. Since then, demand growth has been located principally in the tertiary-domestic sector (+41%) and industry (+28%) while it remained very limited in all other sectors: 10% in the power sector and 7% in transport. This means that the share of transport in oil consumption has slowly declined since 1990, contrary to prevailing global trends in industrialised countries.

In sub-Saharan Africa growth of oil consumption by sector has been more typical since 1990: +25% both for transport and the tertiary-domestic sector, +23% in power generation, and -6% for industry. Transport remained by far the largest consumer of oil products with about 68% of total consumption in 1998 against 62% in 1990 and 57% in 1980. Gas, mainly consumed in North Africa where the production is located, grew on average by 10% during the 1980s following the development of local gas networks and by 4.5% per year since 1990 with a 7.4% jump in 1999.

	Total Biomass in Final Energy Demand	Share of the region's biomass use	Share of biomass in Final Energy Demand	Per capita energy use (Kgoe)	
	(Mtoe)			Biomass	Conv. Fuels
North Africa	3.1	1%	5%	23	405
Sub-Saharan Africa	234.2	99%	73%	381	139
of which South Africa	12.0	5%	19%	291	1203
Total Africa	237.3	100%	63%	317	187





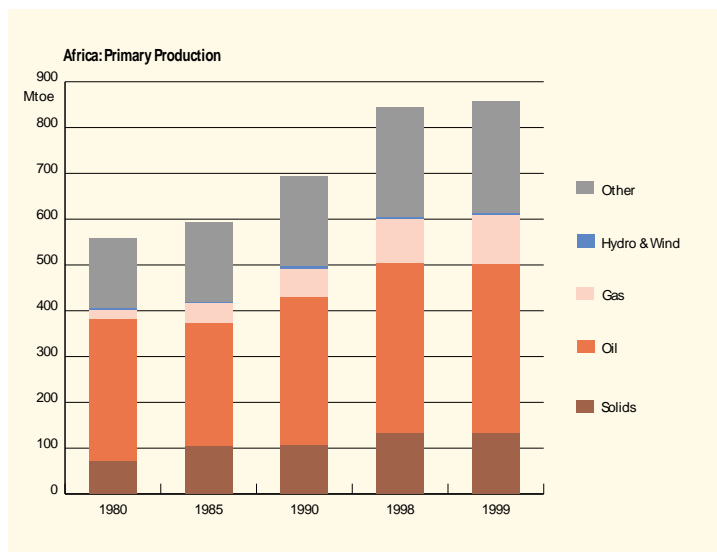
Roughly 70% of Africa's domestic gas consumption and more than 80% of its production occurs in Algeria and Egypt.

Within Africa, natural gas remains by far the least utilised fossil fuel, representing in 1998 less than 20% of all fossil fuel consumed. Low gas consumption reflects a lack of economic development in much of the region as a result of political instability, which has been severe in sub-Saharan Africa. Domestic use of natural gas in Africa for power generation is important, amounting to 40% of regional gas demand. Solid fuels - which increased by about 3.8% during the 1980s with an increase concentrated during the first half of the decade, but only by 2.3% since 1990 and even a decline of 2.2% in 1999 - are mainly produced in South Africa which accounted for about 95% of African production in 1998. Power generation absorbed 58% of solid fuel consumption in Africa and synthetic fuels production in South Africa another 16%. All the incremental consumption since 1985 has been absorbed by the power sector, while final consumption remained stable and inputs for synthetic fuels were declining, a consequence of the relative decline of world oil prices.

Sub-Saharan oil production has overtaken that of North Africa since 1996, with prospects for an increasing gap...

Indigenous energy production in Africa increased by almost 55%, or 305 Mtoe, over the period 1980 to 1999, but with considerable uncertainty relating to the statistical accounting of biomass production. In-depth analysis at country level indicates clearly that evaluation of the role of biomass production clearly differs between them, resulting in significant under evaluation in many countries where reliable statistical tools are still undeveloped or under development. Excluding biomass, energy production still increased by 212 Mtoe.

Over the period, oil remained the major contributor, although its share in primary production decreased from 56% to about 45% in 1997 and 43% in 1999, resulting from the limited decline of oil production in these last two years. Whilst the major oil producers (Algeria, Libya and Egypt) are located in North Africa it must be stressed that sub-Saharan production, driven by Nigeria the largest African producer, Angola and Gabon, has increased more rapidly to overtake that of North Africa since 1996 as a result of the recent new developments in Nigeria (+10.7% of Nigerian production in 1996 and +6.3% in 1997). This trend will continue as vast areas of offshore West Africa are now considered to be promising oil provinces for future development. Several West African producers (Angola, Cameroon, Chad, Congo, Gabon and Ivory Coast) are expected to reap the benefits of substantial exploration activity, especially in the context of more sustained oil prices.



Angola is expected to become a million barrel per day producer early in the new century. Conversely, North African producers, Egypt and Tunisia, produce mainly from mature fields and show little promise of adding to their reserve base. Their production volumes are expected to decline gradually.

Natural gas production activity is concentrated in North and West Africa where proposed more export projects and plans for domestic use are under consideration. In the western part of Africa, especially Nigeria, production of associated gas has risen with development of crude oil reserves and reductions in gas flaring. Gas has seen its production multiply by 5 since 1980 to contribute 12% of primary production in 1999. Almost 91% of gas production was still located in North Africa, Nigeria being the only sub-Saharan country having significant production. Nigerian output is expected to increase in the near future with the first delivery of LNG planned in 1999 and prospects to export the currently-flared Nigerian gas to Ghana, Togo and Benin. In addition to developments in North and West Africa, South Africa has had an important gas find recently and reached agreement to develop offshore gas.

Solid fuels' share has increased slowly since 1980, from 12.8% to 15.5% in 1999 though output increased by 87.5% since 1980, 95% of the total being produced in South Africa with about 127 Mtoe in 1999. Nuclear, hydro and wind, as well as geothermal, remain marginal even though their contribution has increased slowly since 1990. Given that in some sub-Saharan regions biomass remained the only energy source accessible to most people, its use continued to grow. Biomass remained the second largest energy source, covering 28% of primary production in 1999, more than 99% of this being produced in sub-Saharan Africa.





Africa accounts for about 8% of world fossil fuel reserves...

Africa's oil reserves at end 1999 amounted to about 7% of the world's proven oil reserves. Three OPEC Members accounted for most of these reserves: Libya, Nigeria and Algeria with a share of 39%, 31% and 12% of the total respectively. Major additions of new reserves since 1990 occurred in Nigeria (+32%) and Libya (+29%); other countries remaining almost unchanged. Gas reserves, about 7.4% of world reserves as for crude oil, were highly concentrated with over half in North Africa (mainly Algeria with 40%) and more than one third in Nigeria. Gas reserve reassessments since 1990 represent a 38% increase compared to the 1990 level, major gains being observed in Algeria, Egypt and Nigeria. Finally the continent's coal reserves, mainly located in South Africa, accounted for 8% of world coal reserves. As a whole, Africa accounts for 8% of world fossil energy reserves.

In 1998, coal provided roughly half of the electricity production but its share declined steadily over time...

Electricity generation in Africa grew by 6.1% per year during the 1980s. After a relative slow down at 2.5% per annum between 1990 and 1993, growth was re-established to reach 5.0% in 1996 and 4.7% in 1997 with the improvement in economic circumstances. Nevertheless in 1998 generation growth experienced a more limited 2.4% increase. South Africa accounted for more than half of the electricity generated on the African continent, and South Africa, Egypt, Algeria, Libya and Morocco together accounted for roughly 80% of the continent's total electricity production, a constant share since the mid 1980s. The world's lowest electricity consumption per capita, at only about 550 kWh/inhabitant, reflected the current low level of electrification in many sub-Saharan countries. Only around one quarter of African households yet have access to electricity. Even in South Africa only 40% of the population had access to electricity in 1995 and consumed over half the continent's electricity.

With the exception of some nuclear power in South Africa, all the incremental electricity production has been provided by thermal generating units, which multiplied their output by about 2.4 times since 1980. Coal in South Africa, gas in Algeria, Egypt, Nigeria and Tunisia and oil in the rest of Africa mainly feed thermal power units. Coal provided roughly half of the region's electricity production in 1998. The increase of 54% in hydropower capacity since 1980 was reflected in the growth in hydro production but it also resulted from the strong improvement of capacity use observed in these last three years. In general hydro production remains restricted by the unfavourable climatic conditions and the uncertain political situation in some sub-Saharan countries. Africa, particularly sub-Saharan Africa, has a large hydro potential, which

could supply about 1300 TWh per year - or twenty times the present production. However, poor integration of the power networks at the sub-regional level limits the development of these hydro resources. Nevertheless, there are plans to link the electricity supply grids of some countries. Furthermore several African countries have recently opened up their electricity sectors to private investment. Morocco, Egypt, Ivory Coast, Senegal, Nigeria and Ghana have pioneered such privatisation efforts leading to the first private investment for more than 4 GW of new capacity. In particular the 1,356 MWe Jorf Lasfar plant under construction in Morocco will be the largest independent power plant in Africa.

The refinery sector still requires upgrading and enhanced processing capability...

In 1999, the refinery capacity, slowly increasing since 1988 to reach 2.9 million barrels/day, represented only 3.6% of world capacity (2.5% in 1980). At the same time, the refinery utilisation rate increased from 71% to 83%, approaching progressively the world average. Major refineries are located in Algeria, Egypt, Nigeria, Libya (the major oil producers) and in South Africa. These five countries accounted for about 75% of installed refining capacity. In addition, the refining sector is characterised by its relative technical simplicity and age. It requires foreign investment to upgrade and enhance processing capability so as to improve its efficiency and permit production of higher value and cleaner oil products.

COMPETITIVENESS

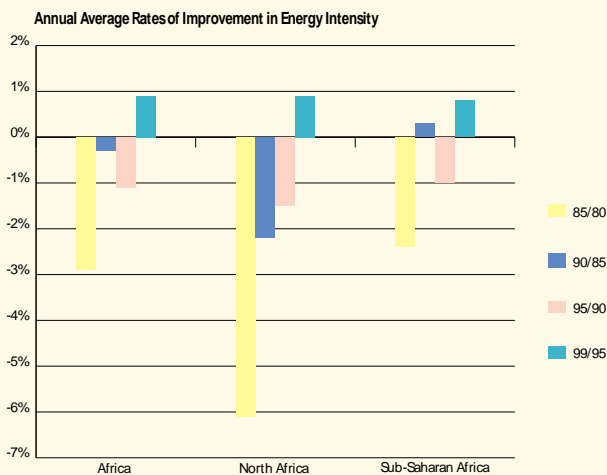
Energy intensity improved since 1995, as well as the GDP per capita ratio...

The growth of energy intensity for the continent as a whole slowed down steadily between 1980 and 1995: from 1.5% per year on average during the 1980s to 1.1% per year during the first part of the 1990s. But, since then, it improved slowly by about 0.7% per year to retrieve the level of 1991. Significant differences occurred between the two main regions. In North Africa energy intensity peaked in 1993 demonstrating a growth of about 1.8% per year on average between 1980 and 1993. Since 1994 energy intensity has oscillated with no firm trend at about 5% below the earlier peak. Energy intensity in sub-Saharan Africa increased regularly between 1980 and 1987 at about 2% per year on average and fluctuated since then between a maximum of 1440 toe/1990 MEUR and a minimum of 1364 toe/1990 MEUR. However a new trend has emerged since 1994 with a regular improvement of 0.7% per year to retrieve in 1999 a level comparable with that of 1985. In North Africa oil and gas revenues heavily influenced economic performance. Consequently, as in the Middle East, the evolution of GDP





has been seriously affected by the low price of crude oil on international markets since 1986, resulting in a limited GDP growth of only 2.2% per year on average since 1985. Economic growth in sub-Saharan Africa has also been limited to a similar trend, being affected by several factors beyond their immediate control, such as rapid population growth, unfavourable climatic conditions, landlocked positions in some cases and long distances from large markets, terms-of-trade changes, and virulence of diseases. As the African population as a whole grew by more than 2.6% per year since 1985, this means that GDP grew less than population and thus Africa had a GDP per capita ratio 5% lower in 1999 than in 1985, even though this ratio has improved since 1994.

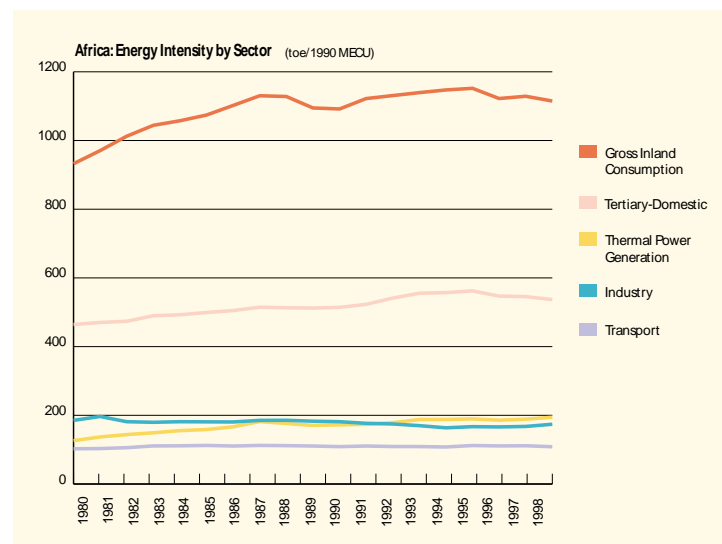


The contribution of the various sectors to the energy intensity varied substantially between regions depending on whether or not the industrialisation rate favoured increased living standards and industrial production. The contribution of all sectors (power generation, industry, transport and tertiary-domestic) was evenly distributed in North Africa in 1980 with contributions of between 20% and 23% to global energy intensity. But by 1998, this picture had been heavily modified in relation with the evolution of the structure of energy demand: power generation contributes 27.5% of total energy intensity, tertiary-domestic 25%, industry 18.5% and transport only 15%. This illustrates the increasing weight of services and improving quality of life. On the other hand, the contribution of mainly domestic applications climbed to 55% in the sub-Saharan countries and even to 85% in some smaller countries where energy needs are limited to essential ones, mainly cooking requirements. In this region the contribution of the different sectors has not really changed since 1980, but the evolution is similar to that in North Africa: the shares of tertiary-domestic and power generation tend to increase slowly while those of industry and transport decline a little.

Gross inland energy consumption per capita was by far the lowest observed in the main world regions...

Per capita gross inland energy consumption data emphasise the very low level of energy use: fluctuating between 0.61 and 0.66 toe/inhabitant between 1980 and 1999, the lowest consumption observed in any of the world's main regions. Large discrepancies again occur between countries with as extremes: 2.68 toe/inhabitant in South Africa and 0.28 toe/inhabitant in the Democratic Republic of Congo. Only four countries belonging to sub-Saharan Africa present to date a ratio above the regional average: South Africa, Gabon, Zimbabwe and Nigeria. Consequently per capita gross inland energy consumption in sub-Saharan Africa as a whole, excluding South Africa, reached only 0.45 toe/inhabitant in 1999. This ratio has been relatively stable since 1990 at the regional level resulting from two opposing trends: the continuous slow decline in sub-Saharan Africa where living standards have generally fallen since 1985 due to the economic situation and political instability, while in North Africa consumption per capita has increased by more than 7% since 1990.

For Africa as a whole, the main contribution comes largely from domestic applications which stabilised their share at about 48% of total consumption per capita in the period 1980-1999. The contributions of industry and transport declined continuously since 1980 to represent in 1997 only 16% and 10% respectively, demonstrating the very low level of industrialisation for the whole continent. But it must be stressed that in absolute terms, consumption per capita of industry increased by about 9% between 1995 and 1998 as a result of the recent economic spurt.





ENVIRONMENT

In 1999 CO₂ emissions, which increased by 65% since 1980, were 26% above the 1990 level...

CO₂ emissions in Africa increased by 65% since 1980 to reach 697 Mt of CO₂ in 1999, 26% above the 1990 level. Over the period, considering the particular structure of energy consumption, the fastest growing source was power generation (+108%) followed by tertiary-domestic (+74%), transport (+48%) and industry (+13%). But this pattern is being modified by two recent trends observed since 1995: the decline of CO₂ emissions in the tertiary-domestic sector and the rapid increase in industry. CO₂ emissions from industry, stable during the 1980s, declined sharply between 1990 and 1994 due to the economic recession but have rebounded since 1995, increasing by 5.2% in 1997 and 12% in 1998. Emissions from the transport sector grew by only 18% since 1990,

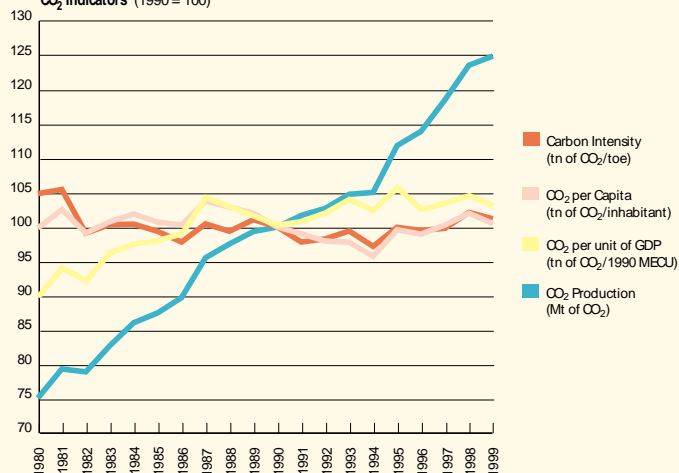
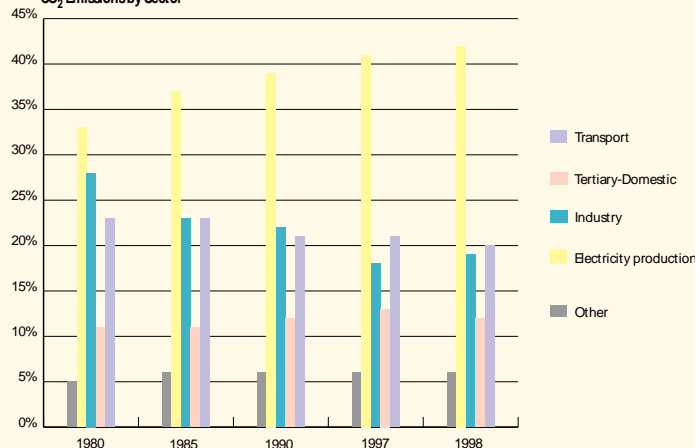
reflecting the poor state of transport infrastructure and a still limited demand arising from industry. North Africa, which accounted for 18% of total population and 40% of economic activities, contributed 36% of the continent's total CO₂ emissions. Power generation contributed 31% of the total, the tertiary-domestic sector 20%, and industry and the transport sector about 18% each. In the sub-Saharan region, South Africa accounted for 72% of CO₂ emissions, a constant share since 1980, due to its economic activities and high dependence on solid fuels. The rest of the sub-Saharan region, where 77% of the African population live, accounted for only 18% of African CO₂ emissions and with a quite different structure of emissions given the major role played by biomass in the domestic sector. Here transport was responsible for 45% of total emissions, power generation and the domestic sector for 18% each, and industry for only 13% reflecting principally the structure of oil consumption - the main commercial energy form in this region.

Overall CO₂ emissions per capita remained stable in the period 1980-1999 but vary widely by region. In 1998, they reached a maximum of 7.8 tonnes of CO₂ per inhabitant in South Africa, an average value of 1.8 tonnes in North Africa as a whole and only 0.2 tonne per head for the rest of sub-Saharan Africa. CO₂ emissions per capita increased since 1990 by 5.8% in South Africa and by 9.1% in North Africa but fell by about 2% in the rest of sub-Saharan Africa. As the shares of each fossil fuel remained relatively stable in the gross inland energy consumption, this implies that the carbon intensity also remained unchanged since 1985. Finally as overall gross inland energy consumption, based on fossil fuels, grew more rapidly than GDP since 1980, mainly in the first part of the 1980s, this implies that the CO₂ content per unit of GDP also increased over the whole period considered, except a down turn observed since 1995 but not yet totally confirmed.

GLOBAL MARKETS

Africa increased its contribution to world energy markets, led now by sub-Saharan Africa...

Africa has continued to increase regularly its contribution to world energy markets. Between 1980 and 1999, energy exports grew from 261 Mtoe to 355 Mtoe with sub-Saharan Africa overtaking North Africa in 1996 and contributing 53% of the whole region's exports in 1999. Oil is by far the major product, accounting for 72% of total energy exports in 1999 (90% in 1980), compared with 16% for natural gas (3% in 1980) and 12% for coal (7% in 1980). Since 1997, oil exports have declined by respectively 3.7% in 1998 and 1.6% in 1999. This resulted mainly from a reduc-

CO₂ Indicators (1990 = 100)CO₂ Emissions by Sector



tion of the Nigerian production in 1998 while North African exports declined only marginally. Although coal exports, wholly supplied by South Africa, increased slowly since 1985 (+45%), gas exports - only from North Africa until now but Nigerian exports were just starting in 1999 - have multiplied by 3 since then. In 1999 Africa was exporting 41% of its total energy production, but 58% of its fossil fuel production. This share has declined since 1980 (65%) given increased consumption within the African continent. In 1999 North Africa exported 65% of its oil production (74% in 1990 and 82% in 1980) and 59% of its gas production (53% in 1990 and 42% in 1980), mainly to the European market. Sub-Saharan Africa's oil exports have now overtaken those of North Africa by about 20%. They represented in 1999 about 73% of its production (70% in 1990 and 66% in 1980). Coal exports from South Africa, increasing regularly since 1990, accounted for the balance of sub-Saharan exports.





AFRICA : SUMMARY ENERGY BALANCE											
Mtoe	1980	1985	1990	1997	1998	1999(2)	85/80	90/85	97/90	98/97	99/98
							Annual % Change				
Primary Production	553.8	589.8	688.4	835.1	845.3	859.8	1.3%	3.1%	2.8%	1.2%	1.7%
Solids	70.0	103.2	104.8	128.4	130.7	131.2	8.1%	0.3%	2.9%	1.8%	0.4%
Oil	311.3	270.0	323.2	380.0	371.8	369.5	-2.8%	3.7%	2.3%	-2.2%	-0.6%
Natural gas	20.3	42.4	61.8	89.7	94.9	105.7	15.9%	7.8%	5.5%	5.8%	11.4%
Nuclear	0.0	1.4	2.2	3.3	3.5	3.3	-	9.7%	5.9%	7.6%	-5.9%
Hydro & Wind	4.1	4.1	4.7	5.5	6.0	6.1	0.2%	2.6%	2.4%	8.3%	1.7%
Geothermal	0.0	0.0	0.3	0.3	0.3	0.3	30.4%	47.1%	0.0%	-6.8%	0.0%
Other	148.1	168.7	191.5	227.8	238.1	243.6	2.6%	2.6%	2.5%	4.5%	2.3%
Net Imports	-260.6	-241.4	-295.1	-353.3	-347.5	-355.0	-1.5%	4.1%	2.6%	-1.6%	2.1%
Solids	-18.4	-30.1	-31.2	-39.2	-39.6	-43.8	10.3%	0.7%	3.3%	1.2%	10.4%
Oil	-235.0	-190.5	-234.0	-267.2	-257.3	-253.2	-4.1%	4.2%	1.9%	-3.7%	-1.6%
Crude oil	-232.8	-177.7	-211.8	-244.1	-240.7	na	-5.3%	3.6%	2.0%	-1.4%	na
Oil products	-2.2	-12.7	-22.1	-23.1	-16.5	na	42.3%	11.8%	0.6%	-28.4%	na
Natural gas	-8.0	-20.9	-29.8	-46.7	-50.4	-58.0	21.1%	7.4%	6.7%	7.9%	15.0%
Electricity	0.8	0.0	-0.2	-0.3	-0.2	-0.1	-43.2%	-	5.8%	-34.7%	-72.1%
Gross Inland Consumption	281.8	345.9	391.8	466.0	480.1	489.4	4.2%	2.5%	2.5%	3.0%	1.9%
Solids	51.7	72.9	73.6	87.6	89.6	87.4	7.1%	0.2%	2.5%	2.3%	-2.4%
Oil	64.9	77.3	87.8	99.0	98.5	100.9	3.5%	2.6%	1.7%	-0.5%	2.4%
Natural gas	12.3	21.5	32.0	43.0	44.5	47.7	11.9%	8.3%	4.3%	3.4%	7.4%
Other (1)	152.9	174.3	198.4	236.4	247.5	253.4	2.6%	2.6%	2.5%	4.7%	2.4%
Electricity Generation in TWh	184.0	261.7	319.6	403.5	413.4	na	7.3%	4.1%	3.4%	2.4%	na
Nuclear	0.0	5.3	8.4	12.6	13.6	na	-	9.7%	5.9%	7.5%	na
Hydro & wind	47.5	48.0	54.5	64.4	69.8	na	0.2%	2.6%	2.4%	8.4%	na
Thermal	136.5	208.3	256.6	326.5	329.9	na	8.8%	4.3%	3.5%	1.1%	na
Generation Capacity in GWe	45.4	62.9	82.4	96.0	98.8	na	6.8%	5.6%	2.2%	2.9%	na
Nuclear	0.0	1.0	1.8	1.8	1.8	na	-	13.8%	0.0%	0.0%	na
Hydro & wind	14.5	17.6	20.4	21.5	22.3	na	4.0%	3.0%	0.8%	3.3%	na
Thermal	30.9	44.3	60.2	72.6	74.7	na	7.5%	6.3%	2.7%	2.9%	na
Average Load Factor in %	46.3	47.5	44.3	48.0	47.7	na	0.5%	-1.4%	1.2%	-0.5%	na
Fuel Inputs for Thermal Power Generation	38.5	51.4	61.7	78.3	83.1	na	6.0%	3.7%	3.5%	6.1%	na
Solids	26.9	32.6	39.1	50.0	52.4	na	3.9%	3.7%	3.6%	4.9%	na
Oil	7.6	10.5	11.1	11.2	12.5	na	6.9%	1.1%	0.1%	11.7%	na
Gas	4.1	8.2	11.1	16.7	17.8	na	15.2%	6.1%	6.0%	6.4%	na
Geothermal	0.0	0.0	0.3	0.3	0.3	na	30.4%	47.1%	0.0%	-6.8%	na
Other	0.0	0.0	0.0	0.0	0.0	na	-	-	-	-	na
Average Thermal Efficiency in %	30.5	34.8	35.8	35.9	34.2	na	2.7%	0.5%	0.0%	-4.8%	na
Non-Energy Uses	4.7	6.8	9.1	16.1	16.1	na	7.8%	6.1%	8.4%	0.3%	na
Total Final Energy Demand	240.6	271.3	307.7	362.9	377.7	na	2.4%	2.5%	2.4%	4.1%	na
Solids	24.2	21.6	21.7	21.1	22.1	na	-2.2%	0.1%	-0.4%	5.2%	na
Oil	52.6	59.9	66.4	78.5	80.8	na	2.6%	2.1%	2.4%	2.8%	na
Gas	2.0	3.7	6.2	8.3	8.6	na	13.3%	10.9%	4.3%	3.1%	na
Electricity	13.8	17.6	22.1	27.4	28.4	na	5.0%	4.7%	3.1%	3.7%	na
Heat	0.0	0.0	0.0	0.0	0.0	na	-	-	-	-	na
Other	148.1	168.7	191.3	227.5	237.8	na	2.6%	2.6%	2.5%	4.5%	na
CO₂ Emissions in Mt of CO₂	422.1	489.7	554.0	661.4	689.7	696.8	3.0%	2.5%	2.6%	4.3%	1.0%
Indicators											
Population (Million)	464.99	537.10	618.17	730.60	748.72	768.01	2.9%	2.9%	2.4%	2.5%	2.6%
GDP (index 1985=100)	93.7	100.0	111.7	128.3	132.4	135.7	1.3%	2.2%	2.0%	3.1%	2.5%
Gross Inl Cons/GDP (toe/1990 MEUR)	917.9	1055.7	1070.3	1108.3	1107.0	1100.9	2.8%	0.3%	0.5%	-0.1%	-0.6%
Gross Inl Cons/Capita (toe/inhabitant)	0.61	0.64	0.63	0.64	0.64	0.64	1.2%	-0.3%	0.1%	0.5%	-0.6%
Electricity Generated/Capita (kWh/inhabitant)	396	487	517	552	552	na	4.3%	1.2%	0.9%	0.0%	na
CO ₂ Emissions/Capita (t of CO ₂ /inhabitant)	0.91	0.91	0.90	0.91	0.92	0.91	0.1%	-0.3%	0.1%	1.7%	-1.1%
Import Dependency %	-90.8	-68.9	-74.3	-74.8	-71.5	-71.4	-5.4%	1.5%	0.1%	-4.4%	-0.1%

(1) Includes nuclear, hydro and wind, net imports of electricity, and other energy sources.

(2) Estimates.





AFRICA : MAIN INDICATORS

	1980	1985	1990	1995	1997	1998	85/80	90/85	95/90	97/95	98/97
	Annual % Change										
Gross Inland Consumption (Mtoe)	281.8	345.9	391.8	438.6	466.0	480.1	4.2%	2.5%	2.3%	3.1%	3.0%
Public Thermal Power Generation	34.0	47.4	58.0	67.7	74.3	78.6	6.9%	4.1%	3.2%	4.8%	5.7%
Autoprod. Thermal Power Generation	4.5	4.0	3.4	4.0	3.6	4.2	-2.4%	-3.5%	3.7%	-5.4%	15.3%
Energy Branch	9.0	12.9	14.4	18.9	19.6	18.1	7.6%	2.1%	5.7%	1.7%	-7.6%
Final Energy Consumption	229.5	258.0	291.7	322.9	342.8	351.4	2.4%	2.5%	2.1%	3.0%	2.5%
Industry	56.6	58.8	65.3	64.8	70.4	75.4	0.8%	2.1%	-0.1%	4.3%	7.1%
Transport	31.1	36.3	39.3	42.9	46.2	46.4	3.2%	1.6%	1.8%	3.8%	0.5%
Tertiary-Domestic	141.8	162.8	187.1	215.2	226.2	229.5	2.8%	2.8%	2.8%	2.5%	1.5%
Energy Intensity (toe/1990 MEUR)	917.9	1055.7	1070.3	1129.5	1108.3	1107.0	2.8%	0.3%	1.1%	-0.9%	-0.1%
Public Thermal Power Generation	110.7	144.6	158.4	174.4	176.8	181.2	5.5%	1.8%	1.9%	0.7%	2.5%
Autoprod. Thermal Power Generation	14.8	12.3	9.2	10.4	8.6	9.6	-3.7%	25.6%	5.6%	1.4%	1.4%
Industry	184.4	179.6	178.2	166.9	167.5	174.0	-0.5%	-0.1%	-1.3%	0.2%	3.8%
Transport	101.3	110.9	107.4	110.5	109.9	107.1	1.8%	-0.6%	0.6%	-0.3%	-2.6%
Tertiary-Domestic	461.7	496.8	511.1	554.1	537.8	529.3	1.5%	0.6%	1.6%	-1.5%	-1.6%
Energy per Capita (Kgoe/inhabitant)	606	644	634	632	638	641	1.2%	-0.3%	-0.1%	0.5%	0.5%
Industry	122	110	106	93	96	101	-2.1%	-0.7%	-2.4%	1.6%	4.5%
Transport	67	68	64	62	63	62	0.2%	-1.2%	-0.6%	1.2%	-2.0%
Tertiary-Domestic	305	303	303	310	310	307	-0.1%	0.0%	0.5%	-0.1%	-1.0%
Electricity Share (%)											
Final Energy Consumption	6.0%	6.8%	7.6%	7.9%	8.0%	8.1%	2.5%	2.2%	0.8%	0.6%	1.1%
Industry	14.9%	17.1%	18.1%	18.9%	19.0%	18.5%	2.7%	1.1%	0.9%	0.4%	-2.8%
Transport	1.2%	1.1%	1.0%	1.0%	1.0%	1.0%	-1.3%	-3.3%	0.4%	-1.4%	0.0%
Tertiary-Domestic	3.5%	4.4%	5.3%	6.0%	6.0%	6.1%	4.6%	4.0%	2.4%	0.3%	1.8%
Total Renewable Consumption (Mtoe)	152.2	172.8	196.4	218.6	233.4	244.1	2.6%	2.6%	2.2%	3.3%	4.6%
Hydro	4.1	4.1	4.7	5.0	5.5	6.0	0.2%	2.6%	1.4%	5.1%	8.3%
Biomass	148.1	168.7	191.3	213.3	227.5	237.8	2.6%	2.6%	2.2%	3.3%	4.5%
Other	0.0	0.0	0.3	0.3	0.3	0.3	30.4%	47.1%	-2.4%	6.5%	-6.8%
Renewable intensity (toe/1990 MEUR)	495.6	527.5	536.3	562.9	555.1	562.9	1.3%	0.3%	1.0%	-0.7%	1.4%
Renewable per capita (Kgoe/inhabitant)	327.3	321.8	317.6	314.9	319.5	326.1	-0.3%	-0.3%	-0.2%	0.7%	2.1%
CO₂ Emissions (Mt of CO₂)	422.1	489.7	554.0	622.1	661.4	689.7	3.0%	2.5%	2.3%	3.1%	4.3%
Public Thermal Power Generation	122.1	166.6	203.8	237.0	259.8	274.3	6.4%	4.1%	3.1%	4.7%	5.6%
Autoprod. Thermal Power Generation	17.1	14.8	12.2	14.8	13.3	15.2	-2.8%	-3.8%	3.9%	-5.0%	13.9%
Energy Branch	21.5	30.0	33.3	42.5	43.6	43.7	6.9%	2.1%	5.0%	1.3%	0.3%
Industry	119.3	113.3	120.9	108.5	120.0	134.4	-1.0%	1.3%	-2.1%	5.2%	12.0%
Transport	95.5	110.9	119.5	130.1	140.1	141.0	3.0%	1.5%	1.7%	3.8%	0.6%
Tertiary-Domestic	46.6	53.7	64.1	89.2	84.6	81.2	2.9%	3.6%	6.8%	-2.6%	-4.1%
Carbon Intensity (tn of CO₂/toe)	1.5	1.4	1.4	1.4	1.4	1.4	-1.1%	0.0%	0.1%	0.0%	1.2%
Public Power Generation	3.2	3.2	3.1	3.1	3.1	3.1	-0.4%	-0.2%	0.0%	-0.2%	-0.4%
Public Thermal Power Generation	3.6	3.5	3.5	3.5	3.5	3.5	-0.4%	0.0%	-0.1%	0.0%	-0.2%
Autoprod. Power Generation	3.4	3.3	3.3	3.3	3.3	3.3	-1.0%	0.2%	-0.1%	0.1%	0.0%
Autoprod. Thermal Power Generation	3.8	3.7	3.6	3.7	3.7	3.6	-0.4%	-0.3%	0.1%	0.4%	-1.3%
Energy Branch	2.4	2.3	2.3	2.2	2.2	2.4	-0.6%	0.0%	-0.7%	-0.4%	8.5%
Industry	2.1	1.9	1.9	1.7	1.7	1.8	-1.8%	-0.8%	-2.0%	0.9%	4.6%
Transport	3.1	3.1	3.0	3.0	3.0	3.0	-0.1%	-0.1%	0.0%	0.0%	0.1%
Tertiary-Domestic	0.3	0.3	0.3	0.4	0.4	0.4	0.1%	0.8%	3.9%	-5.0%	-5.5%
CO₂ per Capita (kg of CO₂/inhabitant)	908	912	896	896	905	921	0.1%	-0.3%	0.0%	0.5%	1.7%
Industry	257	211	196	156	164	179	-3.8%	-1.5%	-4.4%	2.5%	9.3%
Transport	205	206	193	187	192	188	0.1%	-1.3%	-0.6%	1.2%	-1.8%
Tertiary-Domestic	100	100	104	129	116	108	0.0%	0.7%	4.4%	-5.1%	-6.4%
CO₂ per unit of GDP (tn of CO₂/1990 MEUR)	1375	1494	1513	1602	1573	1590	1.7%	0.3%	1.1%	-0.9%	1.1%
Public Thermal Power Generation	398	508	557	610	618	632	5.0%	1.8%	1.9%	0.6%	2.4%
Autoprod. Thermal Power Generation	56	45	33	38	32	35	-4.1%	-5.9%	2.6%	-8.7%	10.4%
Energy Branch	70	92	91	109	104	101	5.5%	-0.1%	3.7%	-2.7%	-2.7%
Industry	388	346	330	279	285	310	-2.3%	-0.9%	-3.3%	1.1%	8.6%
Transport	311	338	326	335	333	325	1.7%	-0.7%	0.5%	-0.3%	-2.5%
Tertiary-Domestic	152	164	175	230	201	187	1.6%	1.3%	5.6%	-6.4%	-7.0%





NORTH AFRICA : SUMMARY ENERGY BALANCE

Mtoe	1980	1985	1990	1997	1998	1999(2)	85/80	90/85	97/90	98/97	99/98
	Annual % Change										
Primary Production	205.3	198.9	237.9	270.2	274.2	280.9	-0.6%	3.6%	1.8%	1.5%	2.4%
Solids	0.4	0.4	0.3	0.2	0.2	0.2	1.3%	-8.0%	-4.7%	-28.4%	6.7%
Oil	182.9	156.0	177.6	183.2	182.2	179.3	-3.1%	2.6%	0.4%	-0.5%	-1.6%
Natural gas	19.0	39.3	56.5	82.5	87.4	96.8	15.7%	7.5%	5.6%	5.9%	10.7%
Nuclear	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-
Hydro & Wind	1.0	0.9	1.0	1.2	1.3	1.5	-3.1%	3.3%	3.0%	3.2%	19.1%
Geothermal	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-
Other	2.0	2.3	2.6	3.0	3.1	3.2	2.8%	2.0%	2.5%	1.7%	2.2%
Net Imports	-156.9	-131.3	-159.1	-162.7	-165.5	-170.1	-3.5%	3.9%	0.3%	1.7%	2.8%
Solids	0.6	1.9	2.2	3.2	3.5	3.9	27.2%	2.6%	5.7%	8.9%	11.7%
Oil	-149.4	-112.4	-131.5	-119.2	-118.6	-116.7	-5.5%	3.2%	-1.4%	-0.5%	-1.5%
Crude oil	-140.8	-93.6	-105.3	-90.2	-90.7	na	-7.8%	2.4%	-2.2%	0.6%	na
Oil products	-8.6	-18.8	-26.2	-29.0	-27.9	na	16.8%	6.8%	1.5%	-3.8%	na
Natural gas	-8.0	-20.9	-29.8	-46.7	-50.4	-57.2	21.1%	7.4%	6.7%	7.9%	13.5%
Electricity	0.0	0.0	0.0	0.0	0.1	0.0	-	-10.6%	17.0%	383.3%	-79.3%
Gross Inland Consumption	43.9	64.9	79.3	97.3	97.7	101.8	8.1%	4.1%	3.0%	0.4%	4.3%
Solids	1.1	2.2	2.5	3.3	3.9	4.0	14.6%	2.2%	4.2%	18.3%	2.4%
Oil	28.9	41.1	46.5	53.9	52.3	53.6	7.3%	2.5%	2.1%	-2.9%	2.4%
Natural gas	10.9	18.4	26.8	35.8	37.0	39.5	10.9%	7.8%	4.3%	3.3%	6.9%
Other (1)	3.0	3.2	3.6	4.3	4.4	4.7	1.1%	2.4%	2.6%	3.2%	6.2%
Electricity Generation in TWh	39.1	67.1	90.6	121.2	129.3	na	11.4%	6.2%	4.2%	6.7%	na
Nuclear	0.0	0.0	0.0	0.0	0.0	na	-	-	-	-	na
Hydro & wind	11.6	9.9	11.7	14.3	14.8	na	-3.1%	3.3%	3.0%	3.3%	na
Thermal	27.5	57.2	78.9	106.8	114.5	na	15.8%	6.6%	4.4%	7.2%	na
Generation Capacity in GWe	10.9	17.7	23.9	32.9	33.5	na	10.2%	6.2%	4.7%	1.7%	na
Nuclear	0.0	0.0	0.0	0.0	0.0	na	-	-	-	-	na
Hydro & wind	3.4	3.4	3.7	4.0	4.4	na	0.2%	1.6%	1.2%	8.7%	na
Thermal	7.6	14.3	20.2	28.9	29.1	na	13.6%	7.2%	5.2%	0.7%	na
Average Load Factor in %	40.8	43.2	43.2	42.0	44.1	na	1.1%	0.0%	-0.4%	4.9%	na
Fuel Inputs for Thermal Power Generation	8.6	14.4	18.8	24.1	26.8	na	10.8%	5.4%	3.6%	11.2%	na
Solids	0.4	0.3	0.7	1.4	1.9	na	-1.1%	15.4%	10.7%	29.6%	na
Oil	5.1	7.7	8.9	8.3	9.7	na	8.3%	2.9%	-1.0%	17.8%	na
Gas	3.1	6.4	9.3	14.4	15.2	na	15.5%	7.5%	6.5%	5.6%	na
Geothermal	0.0	0.0	0.0	0.0	0.0	na	-	-	-	-	na
Other	0.0	0.0	0.0	0.0	0.0	na	-	-	-	-	na
Average Thermal Efficiency in %	27.3	34.1	36.1	38.1	36.7	na	4.5%	1.1%	0.8%	-3.6%	na
Non-Energy Uses	2.9	4.6	6.6	7.7	7.9	na	9.4%	7.4%	2.3%	2.1%	na
Total Final Energy Demand	28.1	37.8	44.7	54.2	57.2	na	6.2%	3.4%	2.8%	5.6%	na
Solids	0.7	1.5	1.4	1.7	1.8	na	17.1%	-1.1%	2.6%	5.0%	na
Oil	21.2	26.8	29.6	34.3	36.5	na	4.8%	2.0%	2.1%	6.3%	na
Gas	1.4	2.7	4.5	6.4	6.6	na	14.4%	10.8%	5.1%	2.5%	na
Electricity	2.8	4.5	6.6	8.8	9.4	na	10.5%	7.9%	4.1%	6.5%	na
Heat	0.0	0.0	0.0	0.0	0.0	na	-	-	-	-	na
Other	2.0	2.3	2.6	3.0	3.1	na	2.8%	2.0%	2.5%	1.7%	na
CO₂ Emissions in Mt of CO₂	112.1	158.6	187.7	225.9	241.1	251.0	7.2%	3.4%	2.7%	6.7%	4.1%
Indicators											
Population (Million)	88.35	101.09	114.07	131.36	133.74	136.19	2.7%	2.4%	2.0%	1.8%	1.8%
GDP (index 1985=100)	91.3	100.0	109.3	124.7	130.5	135.3	1.8%	1.8%	1.9%	4.6%	3.7%
Gross Inl Cons./GDP (toe/1990 MEUR)	392.8	529.4	591.6	636.3	610.7	614.3	6.1%	2.2%	1.0%	-4.0%	0.6%
Gross Inl Cons./Capita (toe/inhabitant)	0.50	0.64	0.70	0.74	0.73	0.75	5.2%	1.6%	0.9%	-1.4%	2.4%
Electricity Generated/Capita (kWh/inhabitant)	442	664	794	923	967	na	8.5%	3.6%	2.2%	4.8%	na
CO ₂ Emissions/Capita (t of CO ₂ /inhabitant)	1.3	1.6	1.65	1.72	1.80	1.84	4.3%	0.9%	0.6%	4.8%	na
Import Dependency %	-345.4	-196.7	-195.2	-161.8	-165.2	-162.3	-10.6%	-0.2%	-2.6%	2.1%	-1.7%

(1) Includes nuclear, hydro and wind, net imports of electricity, and other energy sources.

(2) Estimates





NORTH AFRICA : MAIN INDICATORS

	1980	1985	1990	1995	1997	1998	85/80	90/85	95/90	97/95	98/97
	Annual % Change										
Gross Inland Consumption (Mtoe)	43.9	64.9	79.3	90.5	97.3	97.7	8.1%	4.1%	2.7%	3.7%	0.4%
Public Thermal Power Generation	8.2	13.9	18.0	21.8	23.4	25.7	11.1%	5.3%	4.0%	3.5%	9.9%
Autoprod. Thermal Power Generation	0.4	0.6	0.9	1.0	0.7	1.1	5.9%	8.5%	2.5%	-16.3%	55.9%
Energy Branch	6.3	9.0	10.6	11.4	12.2	12.1	7.5%	3.3%	1.5%	3.3%	-0.8%
Final Energy Consumption	27.9	37.7	44.6	50.7	54.0	57.1	6.2%	3.4%	2.6%	3.3%	5.6%
Industry	10.1	12.0	14.5	14.8	16.0	18.1	3.5%	3.9%	0.4%	4.1%	12.9%
Transport	8.9	12.8	13.5	13.7	14.4	14.5	7.7%	1.0%	0.3%	2.5%	0.7%
Tertiary-Domestic	9.0	12.9	16.6	22.2	23.6	24.5	7.4%	5.1%	6.0%	3.2%	3.7%
Energy Intensity (toe/1990 MEUR)	392.8	529.4	591.6	636.6	636.3	610.7	6.1%	2.2%	1.5%	0.0%	-4.0%
Public Thermal Power Generation	73.4	113.2	134.0	153.7	153.2	161.0	9.0%	3.4%	2.8%	-0.1%	5.1%
Autoprod. Thermal Power Generation	3.8	4.7	6.4	6.8	4.5	6.6	4.0%	-0.4%	0.6%	4.2%	4.2%
Industry	89.9	97.6	108.0	104.0	104.9	113.2	1.6%	2.1%	-0.8%	0.4%	7.9%
Transport	79.3	104.8	100.9	96.4	94.3	90.8	5.7%	-0.7%	-0.9%	-1.1%	-3.7%
Tertiary-Domestic	80.7	105.3	123.8	155.8	154.3	152.9	5.5%	3.3%	4.7%	-0.5%	-0.9%
Energy per Capita (Kgoe/inhabitant)	497	642	695	715	740	730	5.2%	1.6%	0.6%	1.8%	-1.4%
Industry	114	118	127	117	122	135	0.8%	1.4%	-1.6%	2.2%	10.9%
Transport	100	127	119	108	110	109	4.8%	-1.4%	-1.8%	0.6%	-1.0%
Tertiary-Domestic	102	128	145	175	180	183	4.6%	2.6%	3.8%	1.3%	1.8%
Electricity Share (%)											
Final Energy Consumption	9.9%	12.0%	14.9%	16.0%	16.3%	16.4%	4.1%	4.4%	1.4%	1.0%	0.9%
Industry	14.2%	15.8%	17.3%	20.0%	19.5%	18.2%	2.2%	1.9%	2.9%	-1.1%	-7.1%
Transport	0.1%	0.2%	0.3%	0.4%	0.4%	0.4%	9.7%	11.6%	6.0%	-4.2%	2.9%
Tertiary-Domestic	14.7%	20.4%	24.7%	22.9%	23.8%	24.7%	6.8%	3.9%	-1.5%	1.9%	3.7%
Total Renewable Consumption (Mtoe)	3.0	3.2	3.6	4.0	4.3	4.3	1.0%	2.4%	2.4%	3.1%	2.1%
Hydro	1.0	0.9	1.0	1.1	1.2	1.3	-3.1%	3.3%	1.8%	6.1%	3.2%
Biomass	2.0	2.3	2.6	2.9	3.0	3.1	2.8%	2.0%	2.6%	2.0%	1.7%
Other	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-
Renewable intensity (toe/1990 MEUR)	26.9	25.8	26.5	28.2	27.8	27.2	-0.8%	0.6%	1.2%	-0.6%	-2.4%
Renewable per capita (Kgoe/inhabitant)	34.0	31.3	31.2	31.6	32.4	32.5	-1.7%	-0.1%	0.3%	1.2%	0.3%
CO₂ Emissions (Mt of CO₂)	112.1	158.6	187.7	212.9	225.9	241.1	7.2%	3.4%	2.6%	3.0%	6.7%
Public Thermal Power Generation	23.8	39.3	50.6	61.0	65.1	72.2	10.6%	5.2%	3.8%	3.3%	10.8%
Autoprod. Thermal Power Generation	1.3	1.7	2.6	3.0	2.1	3.3	5.9%	8.5%	2.5%	-16.3%	55.9%
Energy Branch	15.7	22.7	26.7	28.8	30.7	30.3	7.6%	3.3%	1.5%	3.3%	-1.4%
Industry	25.3	29.6	34.8	34.1	37.3	43.1	3.2%	3.3%	-0.4%	4.7%	15.3%
Transport	27.2	39.3	41.2	41.6	43.7	44.2	7.7%	0.9%	0.2%	2.5%	1.2%
Tertiary-Domestic	18.9	26.0	31.8	44.5	46.9	48.1	6.6%	4.1%	6.9%	2.7%	2.5%
Carbon Intensity (tn of CO₂/toe)	2.6	2.4	2.4	2.4	2.3	2.5	-0.9%	-0.6%	-0.1%	-0.6%	6.3%
Public Power Generation	2.6	2.7	2.7	2.7	2.6	2.7	0.7%	0.0%	-0.1%	-0.3%	1.1%
Public Thermal Power Generation	2.9	2.8	2.8	2.8	2.8	2.8	-0.4%	-0.1%	-0.2%	-0.2%	0.8%
Autoprod. Power Generation	3.1	3.1	3.1	3.1	3.1	3.1	0.0%	0.0%	0.0%	0.0%	0.0%
Autoprod. Thermal Power Generation	3.1	3.1	3.1	3.1	3.1	3.1	0.0%	0.0%	0.0%	0.0%	0.0%
Energy Branch	2.5	2.5	2.5	2.5	2.5	2.5	0.1%	0.0%	0.0%	0.0%	-0.6%
Industry	2.5	2.5	2.4	2.3	2.3	2.4	-0.3%	-0.6%	-0.8%	0.5%	2.2%
Transport	3.1	3.1	3.0	3.0	3.0	3.0	0.0%	-0.1%	-0.1%	-0.1%	0.4%
Tertiary-Domestic	2.1	2.0	1.9	2.0	2.0	2.0	-0.8%	-1.0%	0.9%	-0.5%	-1.2%
CO₂ per Capita (kg of CO₂/inhabitant)	1269	1569	1645	1683	1720	1802	4.3%	0.9%	0.4%	1.1%	4.8%
Industry	286	293	305	269	284	322	0.4%	0.8%	-2.4%	2.7%	13.3%
Transport	308	389	361	329	333	331	4.8%	-1.5%	-1.9%	0.6%	-0.6%
Tertiary-Domestic	214	257	279	352	357	360	3.8%	1.6%	4.7%	0.8%	0.6%
CO₂ per unit of GDP (tn of CO₂/1990 MEUR)	1002	1294	1401	1498	1478	1507	5.2%	1.6%	1.4%	-0.7%	2.0%
Public Thermal Power Generation	213	321	377	429	426	451	8.6%	3.3%	2.6%	-0.3%	5.9%
Autoprod. Thermal Power Generation	12	14	20	21	14	20	4.0%	6.6%	1.3%	-19.2%	49.1%
Energy Branch	140	185	199	203	201	189	5.7%	1.5%	0.3%	-0.4%	-5.8%
Industry	226	241	259	240	244	269	1.3%	1.5%	-1.6%	0.9%	10.2%
Transport	243	321	307	293	286	276	5.7%	-0.9%	-1.0%	-1.2%	-3.3%
Tertiary-Domestic	169	212	238	313	307	301	4.7%	2.3%	5.7%	-0.9%	-2.1%





SUB-SAHARAN AFRICA : SUMMARY ENERGY BALANCE

Mtoe	1980	1985	1990	1997	1998	1999(2)	85/80	90/85	97/90	98/97	99/98
	Annual % Change										
Primary Production	351.5	394.6	454.5	569.6	570.6	578.9	2.3%	2.9%	3.3%	0.2%	1.5%
Solids	69.5	102.7	104.5	128.2	130.6	131.1	8.1%	0.3%	3.0%	1.9%	0.4%
Oil	128.4	114.0	145.6	196.8	189.5	190.2	-2.4%	5.0%	4.4%	-3.7%	0.4%
Natural gas	1.3	3.1	5.3	7.2	7.5	8.9	18.7%	11.2%	4.5%	3.7%	19.6%
Nuclear	0.0	1.4	2.2	3.3	3.5	3.3	-	9.7%	5.9%	7.6%	-5.9%
Hydro & Wind	3.1	3.3	3.7	4.3	4.7	4.6	1.2%	2.4%	2.3%	9.8%	-2.9%
Geothermal	0.0	0.0	0.3	0.3	0.3	0.3	30.4%	47.1%	0.0%	-6.8%	0.0%
Other	149.1	170.1	193.0	229.5	234.4	240.5	2.7%	2.6%	2.5%	2.2%	2.6%
Net Imports	-103.7	-110.0	-136.0	-190.6	-182.1	-187.1	1.2%	4.3%	4.9%	-4.5%	2.8%
Solids	-19.0	-32.0	-33.3	-42.3	-43.1	-47.6	11.0%	0.8%	3.5%	1.8%	10.5%
Oil	-85.5	-78.1	-102.5	-148.0	-138.7	-138.7	-1.8%	5.6%	5.4%	-6.3%	0.0%
Crude oil	-92.0	-84.2	-106.5	-153.9	-150.1	na	-1.8%	4.8%	5.4%	-2.5%	na
Oil products	6.4	6.1	4.0	5.9	11.3	na	-1.2%	-7.9%	5.6%	92.5%	na
Natural gas	0.0	0.0	0.0	0.0	0.0	-0.7	-	-	-	-	-
Electricity	0.8	0.0	-0.2	-0.3	-0.2	-0.1	-45.0%	-	6.1%	-17.1%	-78.5%
Gross Inland Consumption	241.0	284.7	316.6	373.5	381.9	387.6	3.4%	2.1%	2.4%	2.2%	1.5%
Solids	50.6	70.7	71.2	84.3	85.7	83.4	6.9%	0.1%	2.4%	1.7%	-2.7%
Oil	36.1	36.2	41.3	45.2	46.2	47.3	0.1%	2.7%	1.3%	2.3%	2.4%
Natural gas	1.3	3.1	5.3	7.2	7.5	8.2	18.7%	11.2%	4.5%	3.7%	9.8%
Other (1)	153.0	174.8	198.8	236.9	242.6	248.7	2.7%	2.6%	2.5%	2.4%	2.5%
Electricity Generation in TWh	144.9	194.6	229.0	282.3	284.1	na	6.1%	3.3%	3.0%	0.6%	na
Nuclear	0.0	5.3	8.4	12.6	13.6	na	-	9.7%	5.9%	7.5%	na
Hydro & wind	35.9	38.1	42.9	50.1	55.0	na	1.2%	2.4%	2.3%	9.9%	na
Thermal	109.0	151.1	177.7	219.6	215.4	na	6.8%	3.3%	3.1%	-1.9%	na
Generation Capacity in GWe	34.4	45.2	58.5	63.1	65.3	na	5.6%	5.3%	1.1%	3.5%	na
Nuclear	0.0	1.0	1.8	1.8	1.8	na	-	13.8%	0.0%	0.0%	na
Hydro & wind	11.1	14.2	16.7	17.5	17.9	na	5.0%	3.3%	0.7%	2.1%	na
Thermal	23.3	30.0	40.0	43.7	45.6	na	5.2%	5.9%	1.3%	4.3%	na
Average Load Factor in %	48.0	49.2	44.7	51.1	49.6	na	0.5%	-1.9%	1.9%	-2.8%	na
Fuel Inputs for Thermal Power Generation	29.9	37.0	42.9	54.2	56.3	na	4.4%	3.0%	3.4%	3.9%	na
Solids	26.5	32.3	38.4	48.5	50.5	na	4.0%	3.5%	3.4%	4.2%	na
Oil	2.4	2.9	2.3	3.0	2.8	na	3.6%	-4.5%	3.8%	-5.3%	na
Gas	0.9	1.8	1.9	2.3	2.6	na	14.2%	0.5%	3.4%	11.1%	na
Geothermal	0.0	0.0	0.3	0.3	0.3	na	30.4%	47.1%	0.0%	-6.8%	na
Other	0.0	0.0	0.0	0.0	0.0	na	-	-	-	-	na
Average Thermal Efficiency in %	31.4	35.1	35.6	34.9	32.9	na	2.3%	0.3%	-0.3%	-5.6%	na
Non-Energy Uses	1.7	2.2	2.5	8.3	8.2	na	4.7%	3.1%	18.5%	-1.4%	na
Total Final Energy Demand	215.6	237.1	266.9	313.4	320.0	na	1.9%	2.4%	2.3%	2.1%	na
Solids	23.5	20.1	20.2	19.4	20.4	na	-3.1%	0.2%	-0.6%	5.2%	na
Oil	31.4	33.1	36.8	44.2	44.3	na	1.1%	2.1%	2.7%	0.2%	na
Gas	0.6	1.0	1.7	1.9	2.0	na	10.5%	11.5%	1.9%	4.9%	na
Electricity	11.0	13.0	15.5	18.6	19.1	na	3.4%	3.5%	2.7%	2.3%	na
Heat	0.0	0.0	0.0	0.0	0.0	na	-	-	-	-	na
Other	149.1	170.0	192.8	229.3	234.2	na	2.7%	2.5%	2.5%	2.2%	na
CO₂ Emissions in Mt of CO₂	310.0	331.0	366.3	435.5	448.7	458.4	1.3%	2.0%	2.5%	3.0%	2.2%
Indicators											
Population (Million)	376.64	436.02	504.10	599.24	614.98	631.82	3.0%	2.9%	2.5%	2.6%	2.7%
GDP (index 1985=100)	95.2	100.0	113.2	130.5	133.5	135.9	1.0%	2.5%	2.1%	2.3%	1.8%
Gross Inl Cons./GDP (toe/1990 MEUR)	1234.3	1388.1	1364.0	1395.7	1395.0	1390.2	2.4%	-0.3%	0.3%	-0.1%	-0.3%
Gross Inl Cons./Capita (toe/inhabitant)	0.64	0.65	0.63	0.62	0.62	0.61	0.4%	-0.8%	-0.1%	-0.4%	-1.2%
Electricity Generated/Capita (kWh/inhabitant)	385	446	454	471	462	na	3.0%	0.4%	0.5%	-2.0%	na
CO ₂ Emissions/Capita (t of CO ₂ /inhabitant)	0.8	0.8	0.73	0.73	0.73	0.73	-1.6%	-0.9%	0.0%	0.4%	1.1%
Import Dependency %	-42.4	-38.3	-42.6	-50.6	-47.2	-47.8	-2.0%	2.1%	2.5%	-6.7%	1.1%

(1) Includes nuclear, hydro and wind, net imports of electricity, and other energy sources.

(2) Estimates





SUB-SAHARAN AFRICA : MAIN INDICATORS

	1980	1985	1990	1995	1997	1998	85/80	90/85	95/90	97/95	98/97
	Annual % Change										
Gross Inland Consumption (Mtoe)	241.0	284.7	316.6	352.7	373.5	381.9	3.4%	2.1%	2.2%	2.9%	2.2%
Public Thermal Power Generation	25.8	33.5	40.0	45.9	50.9	52.9	5.4%	3.6%	2.8%	5.3%	3.8%
Autoprod. Thermal Power Generation	4.1	3.5	2.5	3.1	2.9	3.1	-3.4%	-6.2%	4.1%	-2.2%	5.9%
Energy Branch	2.7	3.9	3.8	7.5	7.4	6.0	7.6%	-0.8%	14.8%	-0.9%	-18.7%
Final Energy Consumption	201.6	220.2	247.1	272.2	288.8	294.4	1.8%	2.3%	2.0%	3.0%	1.9%
Industry	46.6	46.9	50.8	50.0	54.4	57.3	0.1%	1.6%	-0.3%	4.3%	5.4%
Transport	22.2	23.5	25.8	29.2	31.8	31.9	1.1%	1.9%	2.5%	4.4%	0.3%
Tertiary-Domestic	132.8	149.9	170.5	193.0	202.6	205.1	2.5%	2.6%	2.5%	2.4%	1.2%
Energy Intensity (toe/1990 MEUR)	1234.3	1388.1	1364.0	1432.7	1395.7	1395.0	2.4%	-0.3%	1.0%	-1.3%	-0.1%
Public Thermal Power Generation	132.0	163.3	172.5	186.4	190.2	193.0	4.4%	1.1%	1.6%	1.0%	1.5%
Autoprod. Thermal Power Generation	21.1	16.8	10.8	12.4	10.9	11.3	-4.4%	39.0%	7.0%	0.7%	0.7%
Industry	238.6	228.5	218.8	203.2	203.3	209.5	-0.9%	-0.9%	-1.5%	0.0%	3.0%
Transport	114.0	114.5	111.1	118.6	118.9	116.6	0.1%	-0.6%	1.3%	0.1%	-1.9%
Tertiary-Domestic	680.0	730.7	734.7	784.2	756.9	749.1	1.4%	0.1%	1.3%	-1.8%	-1.0%
Energy per Capita (Kgoe/inhabitant)	640	653	628	621	623	621	0.4%	-0.8%	-0.2%	0.2%	-0.4%
Industry	124	108	101	88	91	93	-2.8%	-1.3%	-2.6%	1.5%	2.7%
Transport	59	54	51	51	53	52	-1.8%	-1.0%	0.1%	1.6%	-2.2%
Tertiary-Domestic	352	344	338	340	338	333	-0.5%	-0.3%	0.1%	-0.3%	-1.3%
Electricity Share (%)											
Final Energy Consumption	5.5%	5.9%	6.3%	6.4%	6.5%	6.5%	1.6%	1.1%	0.5%	0.4%	0.4%
Industry	15.1%	17.4%	18.3%	18.6%	18.9%	18.6%	2.9%	1.0%	0.3%	0.8%	-1.4%
Transport	1.7%	1.7%	1.3%	1.3%	1.2%	1.2%	0.1%	-4.7%	-0.8%	-1.4%	-0.3%
Tertiary-Domestic	2.7%	3.0%	3.4%	4.0%	3.9%	3.9%	1.8%	2.8%	3.3%	-1.2%	-0.9%
Total Renewable Consumption (Mtoe)	152.2	173.3	196.8	219.2	233.9	239.3	2.6%	2.6%	2.2%	3.3%	2.3%
Hydro	3.1	3.3	3.7	3.9	4.3	4.7	1.2%	2.4%	1.3%	4.8%	9.8%
Biomass	149.1	170.0	192.8	214.9	229.3	234.2	2.7%	2.5%	2.2%	3.3%	2.2%
Other	0.0	0.0	0.3	0.3	0.3	0.3	30.4%	47.1%	-2.4%	6.5%	-6.8%
Renewable intensity (toe/1990 MEUR)	779.7	845.0	848.0	890.4	874.0	873.9	1.6%	0.1%	1.0%	-0.9%	0.0%
Renewable per capita (Kgoe/inhabitant)	404.2	397.5	390.4	386.1	390.4	389.1	-0.3%	-0.4%	-0.2%	0.5%	-0.3%
CO₂ Emissions (Mt of CO₂)	310.0	331.0	366.3	409.2	435.5	448.7	1.3%	2.0%	2.2%	3.2%	3.0%
Public Thermal Power Generation	98.4	127.3	153.2	176.0	194.7	202.2	5.3%	3.8%	2.8%	5.2%	3.8%
Autoprod. Thermal Power Generation	15.8	13.1	9.6	11.8	11.2	11.9	-3.7%	-6.0%	4.2%	-2.4%	6.1%
Energy Branch	5.8	7.4	6.7	13.7	12.8	13.4	4.9%	-2.0%	15.5%	-3.2%	4.5%
Industry	94.0	83.7	86.1	74.4	82.6	91.3	-2.3%	0.6%	-2.9%	5.4%	10.5%
Transport	68.4	71.5	78.3	88.5	96.4	96.8	0.9%	1.8%	2.5%	4.4%	0.4%
Tertiary-Domestic	27.7	27.7	32.3	44.8	37.7	33.1	0.0%	3.1%	6.8%	-8.2%	-12.2%
Carbon Intensity (tn of CO₂/toe)	1.3	1.2	1.2	1.2	1.2	1.2	-2.0%	-0.1%	0.1%	0.2%	0.7%
Public Power Generation	3.5	3.4	3.3	3.3	3.3	3.3	-0.5%	-0.2%	0.1%	-0.2%	-0.6%
Public Thermal Power Generation	3.8	3.8	3.8	3.8	3.8	3.8	-0.1%	0.1%	0.0%	-0.1%	0.0%
Autoprod. Power Generation	3.5	3.3	3.4	3.4	3.4	3.4	-1.0%	0.5%	-0.1%	-0.2%	0.7%
Autoprod. Thermal Power Generation	3.8	3.8	3.8	3.9	3.8	3.8	-0.3%	0.2%	0.1%	-0.2%	0.2%
Energy Branch	2.1	1.9	1.8	1.8	1.7	2.2	-2.5%	-1.1%	0.6%	-2.3%	28.6%
Industry	2.0	1.8	1.7	1.5	1.5	1.6	-2.4%	-1.0%	-2.6%	1.0%	4.8%
Transport	3.1	3.0	3.0	3.0	3.0	3.0	-0.2%	-0.1%	0.0%	0.0%	0.0%
Tertiary-Domestic	0.2	0.2	0.2	0.2	0.2	0.2	-2.4%	0.5%	4.1%	-10.4%	-13.3%
CO₂ per Capita (kg of CO₂/inhabitant)	823	759	727	721	727	730	-1.6%	-0.9%	-0.2%	0.4%	0.4%
Industry	250	192	171	131	138	148	-5.1%	-2.3%	-5.2%	2.6%	7.7%
Transport	182	164	155	156	161	157	-2.0%	-1.1%	0.1%	1.6%	-2.2%
Tertiary-Domestic	74	64	64	79	63	54	-2.9%	0.2%	4.3%	-10.7%	-14.5%
CO₂ per unit of GDP (tn of CO₂/1990 MEUR)	1588	1614	1578	1662	1627	1639	0.3%	-0.4%	1.0%	-1.1%	0.7%
Public Thermal Power Generation	504	620	660	715	728	738	4.2%	1.2%	1.6%	0.9%	1.5%
Autoprod. Thermal Power Generation	81	64	41	48	42	44	-4.6%	-8.3%	3.0%	-6.4%	3.7%
Energy Branch	30	36	29	56	48	49	3.9%	-4.4%	14.1%	-7.2%	2.2%
Industry	482	408	371	302	309	333	-3.3%	-1.9%	-4.0%	1.1%	8.0%
Transport	350	349	337	360	360	354	-0.1%	-0.7%	1.3%	0.1%	-1.9%
Tertiary-Domestic	142	135	139	182	141	121	-1.0%	0.6%	5.5%	-12.0%	-14.2%







MIDDLE EAST: Major trends (1988-1999)

- Regional economic performance remained highly influenced by changes in international oil prices
- Growing population and industrial diversification sustained final energy demand growth of 50% since 1990
- Tertiary-domestic still represented 42% of final demand but, since 1990, industry increased the most rapidly
- The share of electricity in final demand remained very low
- Hydrocarbons dominated the energy market with gas progressively increasing its market share
- First reduction of oil production since 1985, a consequence of world's inventories accumulated in 1997 and 1998
- Recent gas development to increase domestic demand and exports
- The Middle East accounted for 50% of world hydrocarbon reserves but only 18% of world fossil reserves
- Hydrocarbons dominate electricity production
- Investments driven by expression of interest for greater regional cooperation
- Upgrading and expansions, sustained by the world's highest utilisation rate, were continuing in oil refineries
- Growth in energy intensity has slowed down progressively since 1990 to stabilise in 1999
- CO₂ emissions have increased by 59% since 1990
- The Middle East remains the centrepiece of the world energy market...
- ... But serious geopolitical threats could endanger security of supply in the future

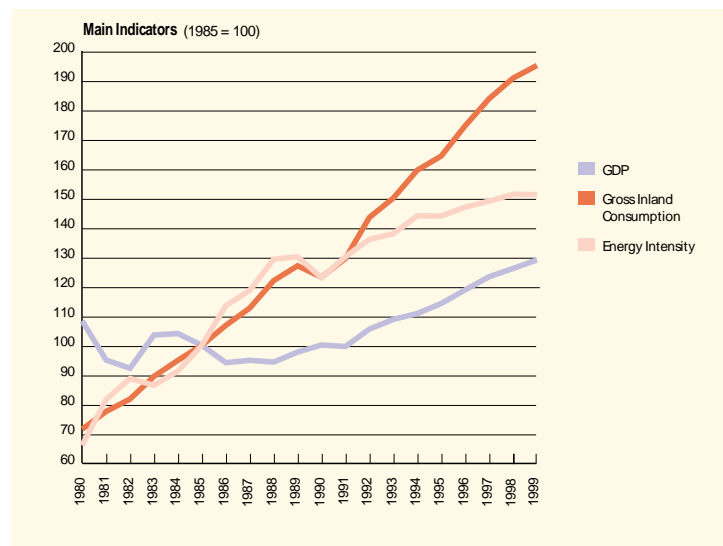
This region includes 13 different countries: Bahrain, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syria, the United Arab Emirates and Yemen. These countries together have a population of 164 million inhabitants, growing by about 2.6% per year since 1990. Over this period, the region has experienced several wars, involving two or more countries (Lebanon, Iran-Iraq, Gulf War...) inflicting severe damage upon basic industrial or energy infrastructure targets. The situation has become progressively more peaceful and clear progress in welfare and industrial activity is noticeable. The region is also one of contrasts, including some developing countries and some others that show many characteristics of highly industrialised countries. Some very small states, with only a few hundred thousand inhabitants, are neighbours of very large and powerful countries. The diversity of the region is demonstrated by the wide variety of countries, ranging from large oil and gas producers and exporters with high per capita incomes, to medium income countries that import most of their energy, and some relatively poor countries.

Regional economic performance remained highly influenced by changes in international oil prices...

Oil revenues constitute the main source of income of the oil exporting countries in the region. These revenues also have positive multiplier effects on the economies of the non-oil exporting countries in the region in the form of official bilateral transfers from the exporting countries to the non-producers/exporters, and remittances from nationals of the non-exporting countries. Therefore, economic performance in the region is highly influenced by changes in international oil prices, vulnerable to prolonged periods of low international oil prices, and the upswing during periods of high prices. Nevertheless, the marked decline of oil prices in 1998 had a limited impact on the

GDP evolution at the regional level even though falling oil prices threw that year's budgets for oil producing countries into chaos, as they scrambled to cut expenditures, raise revenues and reduce budget deficits. Increasing oil exports, by 8% in 1998, helped to minimize these effects.

World oil prices declined sharply in late 1997, and continued to remain extremely low throughout 1998 and into early 1999. Beginning in late 1997, the OPEC "basket" price fell rapidly, from nearly \$19 per barrel in November 1997 to under \$10 per barrel in December 1998. Low oil prices were caused by several main factors, including: OPEC's December 1, 1997 agreement to raise the group's production quota by 10%, which was later reversed by a series of production cuts beginning in March 1998; warmer than normal winters in 1997/1998 and 1998/1999 in the northern hemisphere; increasing





Iraqi oil exports; and depressed oil demand due to the continuing economic crisis in East Asia. In March 1999, oil prices sustained by the surging world economy, started to increase again to reach about 25\$ at the end of the year, an increase of almost 15\$ a barrel. But, at the same time, oil exports from the region declined by 3.7% as a result of a significant reduction of stocks in industrialised countries.

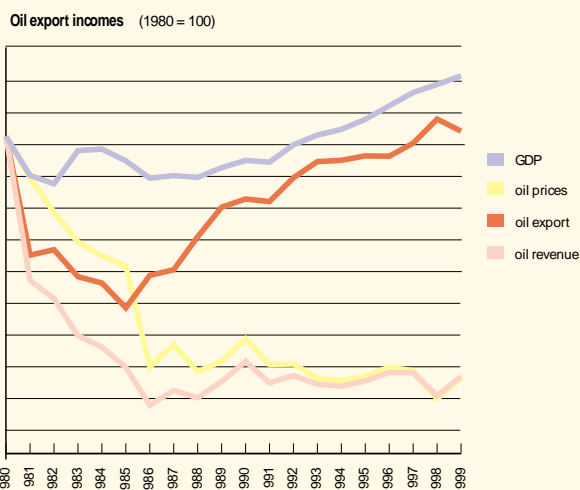
The "oil crash" after 1985 has had a dire impact on economies which have failed to modernize and diversify. So have the impact of sanctions on several critical suppliers, fluctuating demand for oil exports, national policies to increase production and export capacity, and the ability to obtain the investment necessary to implement those policies. These have affected political stability and influenced a wide range of social problems, most importantly the impact of very high rates of population growth, the inability to sustain past welfare and entitlement programmes, and the need to create new economic structures which offer suitable employment and incentives for investment.

Most of these problems began long before the "oil crash," and have continued now that oil again costs \$17 to \$20 a barrel. They are the result of years of over-reliance on oil wealth, economic mismanagement, and the failure of regional governments to realistically plan and budget for the future. Some key Middle Eastern governments are entering their tenth year of budget deficits. Saudi Arabia and Iraq are key cases in point. Other countries are at the beginning of a major structural crisis in which they cannot afford to implement their five-year plans, and cannot fund both their present levels of social benefit entitlements and new investment. Cases in point include Syria, Bahrain, Iran, Oman and Yemen. Most Middle Eastern governments now face a major short-term budget crisis, and this seems to include even states with relatively high ratios of exports to population: Kuwait, Qatar, and the emirates other than Abu Dhabi and possibly Dubai.

These budget problems have already led to under-investment in infrastructure, economic diversification, and state industries other than the petroleum sector. Even the petroleum sector has suffered in some cases, although "starving the hand that feeds you" presents obvious enough reasons for most Middle Eastern states to think twice. Since the oil price fall of 1997, however, government revenues have generally dropped at least 33% below projections, and governments are approaching the short-term crisis point in many cases. State industry cannot attract enough outside or internal investment to meet national needs. Most of the 1998 budgets in the Middle Eastern energy exporting states were in chaos, as countries scrambled to cut expenditures, raise revenues, and minimize budget deficits. One sign of the seriousness of this issue was the fact that Saudi Arabia faced an \$8 billion budget deficit.

Main items

The Middle East has very large geological endowments of low-cost hydrocarbons - with some 65% of proven oil reserves and 35% of world gas reserves. As a result, the Middle East is expected to increase its pivotal role in global energy markets over the next few decades. The development of non-OPEC sources of oil, and lower oil prices in 1997-98, reduced the region's oil-related export earnings and government revenues. But revenues again rose sharply in 1999 given a surge in world oil prices. Over a longer period - since the mid 1980s - regional population growth has grown broadly in line with GDP. Average regional per capita incomes have thus risen slowly. The combination of economic development, population growth, and low energy prices for final users has stimulated energy demand. Diversification of many economies away from heavy dependence on oil is continuing. Priorities include adding value to natural resources through iron and steel, petrochemicals and refining; and developing the light manufacturing, services and tourism sectors. Electricity demand is expanding rapidly, based upon much greater use of gas in power generation. This has allowed the release of more oil for export. Key issues for the power sector include greater interconnection of national grid systems and reform of electricity tariffs to reflect full costs. To meet both regional and global demand, gas production has risen steeply and will continue to do so. The region's major gas export markets are Europe and Asia - yet further reinforcing their economic and strategic dependence upon Middle East hydrocarbons. Not surprisingly policy concern about security of supply is becoming more noticeable. This is particularly true if factors such as cross-border tensions, religious extremism, and high youth unemployment (leading to disaffection with the established order), lead to persistent political instability within the Middle East.





Demographics compound the impact of low oil and gas export revenues on regional economies and increase the risk of political unrest. Regional population growth still averaged 2.3% during 1997-1999, and exceeded 3.1% during the period 1980-1999. The result is the "youth explosion" where roughly 40% of the region's population is now under 17 years of age. The region's educational system is under extreme stress, and real and disguised unemployment for males between 18 and 25 years probably averages over 20%. These problems are further compounded by labour migration and the slow breakdown of the region's traditional family, clan and tribal systems, which are based on villages and the extended family.

The degree of urbanisation in the total population rose from 37% in 1970 to 57% in 1996, and will probably rise to well over 70% by 2020. The Southern Gulf states already have only about 40% of the real per capita income they had at the peak of the oil boom in the early 1980s, and little prospect for anything other than a slow decline. Kuwait, Qatar and the UAE maintain high per capita incomes, but their growth in Saudi Arabia is becoming increasingly marginal as in other countries such as Iran.

ENERGY OUTLOOK

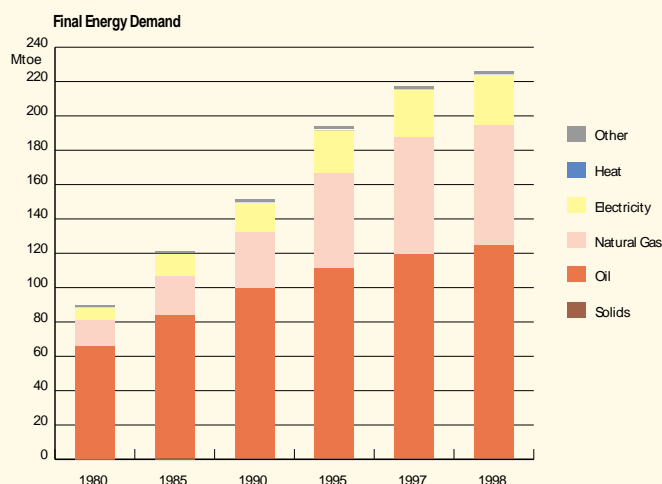
Growing population and industrial diversification sustained final energy demand growth of 50% since 1990...

As a result of the growing population combined with the industrial diversification experienced over the last ten years and the improvement of living standards, final energy demand has increased by about 50%, or about 5.0% per year, since 1990 on a regular basis over the whole region - excepting Kuwait, Lebanon and Qatar which grew twice as fast. The share absorbed by Iran and Saudi Arabia, the two major contributors, has remained stable at around 56% since 1980.

MIDDLE EAST : FINAL ENERGY CONSUMPTION (MTOE)

	1980	1985	1990	1995	1997	1998
Middle East	89.0	120.9	150.7	193.2	217.0	225.6
Industry	36.4	41.3	33.5	55.8	62.4	67.7
Transport	28.5	40.3	39.2	57.2	61.5	63.8
Tertiary-Domestic	24.1	39.3	77.9	80.0	93.0	94.0
Iran	28.5	43.2	48.1	62.9	73.4	75.9
Industry	10.8	16.7	6.0	17.5	19.5	22.0
Transport	4.6	6.2	7.1	19.1	21.3	22.9
Tertiary-Domestic	13.1	20.2	34.9	26.2	32.5	30.9
Saudi Arabia	22.3	26.5	38.3	44.0	49.0	50.8
Industry	12.6	6.7	4.7	4.2	4.5	5.5
Transport	7.6	12.5	9.9	12.1	12.9	13.0
Tertiary-Domestic	2.1	7.2	23.8	27.7	31.6	32.3

Consumption per fuel highlights the major contributions of hydrocarbons and electricity, the shares of both solid fuels and biomass being less than 1% of total final demand. Since 1980, of the incremental energy demand of about 137 Mtoe, the major part was met almost equally by oil products (43%) and natural gas (40%), with electricity covering the remaining 17%. During the same period, the consumption of oil products doubled whilst that of natural gas and electricity quadrupled. This means that the contribution of oil products in final consumption declined significantly: from 74% in 1980 to 55% in 1998. During the same period the share of gas increased from 17% to 31% and that of electricity from 8% to 13%. But very large differences existed between countries: the share of oil ranging from 19% in Qatar to 92% in Yemen. Some national governments have been successful in their efforts to develop indigenous gas consumption to substitute for oil products, thus increasing oil exports and consequently oil export revenue. This was particularly the case in Iran and Saudi Arabia which together represented 54% of the region's gas consumption in 1998 against only 33% in 1980. But major gas development plans were initiated in some other countries including United Arab Emirates, Kuwait, Qatar, Bahrain, Syria and Oman. In these countries average annual growth since 1990 was between 6.1% per year (UAE) and 18.4% (Syria).



Tertiary-domestic still represented 42% of final demand but, since 1990, industry increased the most rapidly...

The evolution of final demand by sector was largely dominated by the tertiary-domestic sector which quadrupled its consumption since 1980, but recent trends demonstrate a marked slowdown of this evolution with an annual growth of around 2.4% since 1990. As a consequence its share in total final demand increased from 27% in 1980 to 42% in 1998. Any analysis that includes the years 1990 to 1992 must be very cautious as clearly some switch occurred between industry





and the tertiary-domestic sector in the Iranian energy statistics. Estimated corrections suggest a 4.5% annual growth rate for the tertiary-domestic sector since 1990, compared to an average yearly increase of 10.5% during the 1980s. Although this results from a general phenomenon of increasing living standards during the 1980s in a region where some countries enjoyed the world's highest per capita incomes, it was certainly reinforced by the low energy prices in force in some countries and growing population that increased by 78% since 1980.

Industrial energy consumption was heavily affected by the Gulf War which reduced the 1990 energy demand to the 1985 level (corrected values), but grew by 6.3% on average since 1990, sustained by industrial development in the region. Iran, the major industrial consumer, represented one third of regional industrial energy consumption. The second country by far remained the Arab United Emirates due to the importance of its chemical and petrochemical industries. Large increases occurred in Qatar, Bahrain, Kuwait, Lebanon and Syria, but for the last three this was largely due to particular conditions related to the 1990 year. Industrial energy consumption remained very low in Saudi Arabia, a level comparable to that of Qatar or Kuwait, underlining the continuing large dependence of the Saudi Arabian economy on the oil industry.

Energy consumption for transport has only doubled since 1980 driven by Iranian demand which has been multiplied by 5 since 1980. Regional transportation infrastructure has not been extensively developed and motorisation levels remain fairly low, at about 55 vehicles per thousand people and are expected to grow slowly. One reason for this low motorization level is that in some countries women are actively discouraged from driving, ultimately limiting the fraction of the population that will own cars. Another reason is the age distribution of the population in some countries. In Saudi Arabia, for example, it is estimated that there are currently about 90 vehicles per thousand people, despite the fact that 60% of the population is under the age of 20.

MIDDLE EAST - FINAL ENERGY DEMAND CORRECTED

Middle East	1989	1990	1991	1992	1993
Final Energy Consumption	147.3	144.9	151.4	167.2	176.9
Industry	40.9	27.0	30.1	37.7	45.3
Transport	44.5	41.1	40.0	42.7	54.9
Tertiary-Domestic	61.9	76.7	81.3	86.9	76.8
.....					
Middle East corrected	1989	1990	1991	1992	1993
Final Energy Consumption	147.3	144.9	151.4	167.2	176.9
Industry	40.9	35.0	37.1	43.7	45.3
Transport	44.5	46.1	48.0	51.7	54.9
Tertiary-Domestic	61.9	63.7	66.3	71.9	76.8

The share of electricity in final demand remained very low...

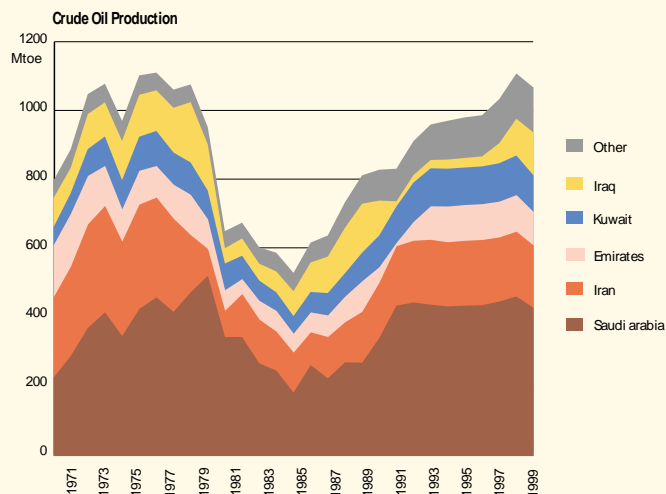
Electricity's share in final demand reached 12.9% in 1998 from 7.6% in 1980 but seems to have stabilised since 1995. Analytical caution is required, as there are some statistical uncertainties about the sectoral allocation of electricity consumption in some countries. The share of electricity in industry increased from 5.0% in 1980 to 8.6% in 1998 due to the development and modernisation of industrial infrastructures. But this contribution remained particularly low compared to industrialised countries. On the other hand, the share in the tertiary-domestic sector stabilised at 24% during the whole period. In addition, the contribution of electricity to final energy demand varied widely, depending on the prosperity, geographical location and economic activity of the countries. The highest levels were observed in Israel (26%), Lebanon (18%), Kuwait (17%) and Saudi Arabia (16%). The lowest levels were in Iran (9%), Syria (8%) and Yemen (5%).

Hydrocarbons dominated the energy market with gas progressively increasing its market share...

Gross inland energy consumption has grown in the period 1980-1999 by about 5.4% per year on average. In that context, the last two years' growth rates, limited respectively to 3.8% and 2.3%, seemed quite low. It was a consequence of the slowdown of GDP caused by the East Asia economic crisis and its further expansion to Latin America, Russia and Eastern Europe. The first indications for 2000 suggest an impressive rebound of the whole Middle East economy. The region's energy demand has grown quickly in recent years and is likely to continue to do so. Oil products dominated the energy market, about 55% of total energy consumption in 1999, even though their contribution diminished in favour of natural gas, the share of which increased from 25% in 1980 to 42% in 1999. Hydrocarbons together covered about 97% of all energy requirements in 1999. In most oil producing countries energy policy trends are promoting further diversification of supply, by substituting gas use for oil, more of which is thus reserved for export. Sectors in which this policy has been applied include households, industry and power generation. Solids contributed a little less than 2%. Israel and Iran accounted for most of the 7.2 Mtoe of coal consumed in 1999, mainly for power generation. Renewables, mainly limited to hydro, represented less than 1%. Two countries, Iran and Syria, produced about 90% of the region's hydroelectricity.

First reduction of oil production since 1985, a consequence of world's inventories accumulated in 1997 and 1998...

Indigenous energy production remains dominated by oil, with 88% of total production in 1999 against 96% in 1980. This production has fluctuated widely over the past 25 years, depending upon the world economic climate, the share of OPEC countries in the world oil market and local circumstances (Iran-Iraq War and Gulf War). Peaking in 1974



at a level of 1106 Mtoe, oil production fell to 548 Mtoe in 1985 or 51% below this peak. Since then, a sustained increase, except for a drop of 1.5% in 1991 (production losses in Iraq and Kuwait not totally compensated by strong increases in Iran and Saudi Arabia), was observed to reach in 1998 a new peak output of 1111 Mtoe. In 1999, for the first time since 1985, production declined by 3.7% but this evolution must be related to the world oil production that fell by 1.7% while world oil consumption increased 1.4%. Taking advantage of low international oil prices in 1997 and 1998, world oil stocks increased to reach an historical peak at end 1998 and were reduced by about 30% during 1999. Historically, Saudi Arabia has assumed the role of swing producer, thus experiencing significantly greater output fluctuations than those observed at the overall regional level. Between 1991 and 1998, the output from the three main producers, Saudi Arabia, Iran and the Emirates has remained stable, all of the increment coming from Kuwait and the more marginal producers. Over the last three years Iraqi production increased from 30 Mtoe to 125 Mtoe, approaching its pre-Gulf War production level. This resulted from the relaxation of the United Nations' embargo. Much of the revenue from these oil sales was allocated for the purchase of humanitarian supplies for distribution in Iraq under the United Nations' supervision. Iraqi production increased further by 18 Mtoe in 1999, being the only rising producer in the Middle East. The four main producers absorbed all the reduction of production: Saudi Arabia for 56% and Iran, Kuwait and United Arab Emirates each for about 15% of the total reduction.

Recent gas development to increase domestic demand and exports...

Regional production of natural gas has more than quadrupled since 1980. The main producers, Iran with 47 Mtoe, Saudi Arabia with 40 Mtoe and the United Arab Emirates with 30 Mtoe, accounted for 72% of total production against only 58% in 1980. But this share has declined since the peak registered in 1996 (76%) as a result of the

development of Qatari gas production. Already a strong producer and growing exporter of natural gas, the Middle East increasingly seeks to develop domestic gas markets. Almost one-half of the Middle East's gas reserves are in Iran, where many natural gas projects moved ahead recently. In late 1999, Iran's National Oil Company signed an agreement with Italy's Eni for the fourth and fifth development phases of the giant South Pars Field. British Gas also signed a joint venture agreement with Iran's Oil Industries Engineering and Construction to pursue both domestic gas projects and LNG exports. Across the border from Iran's South Pars field, the extraordinarily large gas resources extend to Qatar's North Field. In Qatar, RasGas began production from its second LNG train, doubling the capacity at the Ras Laffan facility. Most of the gas will go to Korea under a long-term contract, but excess LNG will also be available for sale. Another plan to increase gas use in the Middle East, the Dolphin project, involves piping gas from Qatar to Abu Dhabi, Dubai and eventually to Oman. Although the United Arab Emirates Offsets Group (UOG) had hoped to start construction on the Dolphin project in 2000, it could not reach agreement with Qatar on a transfer price for the gas. In March 2000, UOG agreed to share equity in the project with Enron and TotalFinaElf which will split a 49% share. Finally, Oman, which produced its first LNG in December 1999, began production at the second train in the second quarter of 2000. LNG exports will go to Korea, Japan and India.

The Middle East accounted for 50% of world hydrocarbon reserves but only 18% of world fossil reserves...

Middle East oil reserves at end 1999 (J-F: check year) amounted to about 65% of world oil reserves, due to the major contributors: Saudi Arabia (25.0%), Iraq (10.8%), UAE (9.3%), Kuwait (9.2%) and Iran (8.6%). The reserves/production ratio reached 83 years as in 1998, more than twice the world average. As a region, the Middle East has the second largest natural gas reserves after the former Soviet Union. Iran, Qatar, Saudi Arabia and the United Arab Emirates have the second, third, fourth and fifth largest gas reserves in the world, respectively, after Russia. Middle East gas reserves, which expanded rapidly in the late 1980s and early 1990s, include the super-giant gas structure involving Qatar's North Field and Iran's South Pars. They represented 35% of world gas reserves, mainly located in Iran (15.3%) and Qatar (7.4%), and a reserves/production ratio well above 100 years despite the increasing domestic production. However, coal reserves are negligible. This means that the Middle East accounts for 50% of global hydrocarbon reserves but only 18% of total fossil fuel reserves.

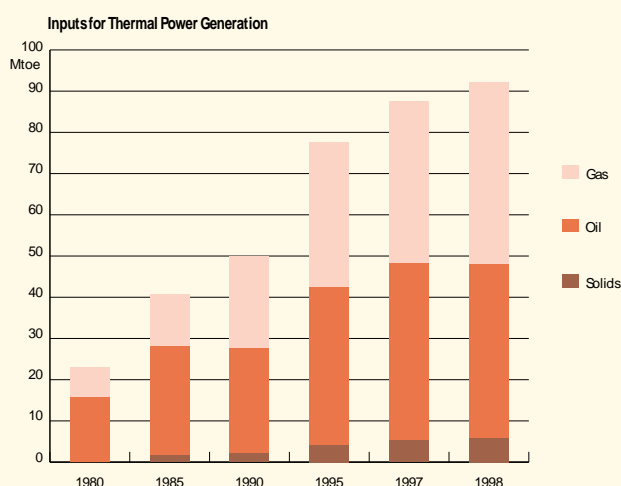
Hydrocarbons dominate electricity production...

Electricity generation in the region grew on average by about 8.4% per year since 1980, but by only 7.1% per year on average since 1990 and 6.3% in 1998. The region's electricity mix was dominated by oil and gas, which in 1997 accounted for 90% of total generation. Since





1980, the most interesting feature has been the switch from oil to gas-fired generation, as countries in the region seek to free oil for export. Most of the existing power plants use steam generators and burn heavy fuel oil, natural gas and crude oil. Gas turbines and diesel engines are used for mid-merit and peaking duty. The share of oil-fired generation fell from 64% in 1980 to 48% in 1997. Since 1990, five countries absorbed 83% of the 35GWe of new capacity installed: Iran (34%), Saudi Arabia (16%), United Arab Emirates, Syria and Israel (11% each). The majority of the Middle East's new capacity is likely to be gas-fired. This increasing contribution of gas opens the door to the future use of high efficiency combined cycle power stations. Israel is the only country in the region to use coal-fired power stations with a coal-based capacity in 1999 of 3750 MWe. Hydroelectric capacity in the region was limited to about 5 GWe in 1998, most of it in Iran and Syria. These two countries accounted for 91% of hydroelectric generation in 1998.



Investments driven by expression of interest for greater regional cooperation...

The Middle East region has seen dramatic growth in electricity demand and utility infrastructures over the past 20 years. In recent years, a lack of power generation capacity has resulted in electricity shortages in some countries - the summer peak load for air conditioning placing a heavy strain on available capacity. The electric utilities of the region continue to confront major challenges as these countries, still confronted with largely subsidised tariff structures, consider plans to commercialise and privatise the electric sector. Given that the power budget for many Middle East countries was often a significant proportion of annual government expenditure, governments are increasingly forced to examine full-cost pricing and private sector involvement. There is considerable planning activity within the region and expressions of interest for greater regional cooperation. Since 1998, Iran has welcomed the participation of pri-

ivate investors in the planned privatisation of the country's power generation industry. Breaking up the state power generation monopoly into competing private companies and reducing large state subsidies are two important proposed measures aimed at increasing electricity generation and transmission efficiency to attract foreign investment. Privatisation of Saudi Arabia's electricity sector is under consideration, as is its division into three parts: generation, transmission and distribution. In December 1997, leaders of the Gulf Co-operation Council (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates) discussed a \$1.7 billion plan to connect their power grids. The first phase of this project will connect Bahrain, Kuwait, Qatar and Saudi Arabia and should be completed by 2002. The idea is to cut the cost of electric power generation and to utilise surplus power more effectively. The second phase will link Oman and the United Arab Emirates, and should be completed in 2007. Since December 1998, Egypt, Iraq, Jordan, Syria and Turkey have been developing a five-country electricity transmission network. The project, which is expected to cost \$450 million, could save the countries an estimated \$2 billion a year by allowing them to share excess capacity at times of peak demand. In March 2001, Jordan and Syria are expected to inaugurate the Syrian/Jordan component of the regional electricity grid. Links are expected to be established between Syria and Turkey by the end of 2001 and between Lebanon and Syria by 2002.

Upgrading and expansions, sustained by the world's highest utilisation rate, were continuing in oil refineries...

In 1999, the refinery capacity (6.4 millions barrels day) represented 7.8% of world capacity (4.4% in 1980). Since 1990, capacity grew on average by 2.8% per year under Iranian (7.2% per year) and Kuwaiti (+5.8% per year) leadership. At the same time, the refinery utilisation rate remained largely above 95%, the world's highest level. Since 1999, dramatically higher oil prices and, consequently, an improved Saudi financial situation, have revived plans for investment in refinery upgrades and expansions. Recent proposals for downstream oil projects concern the upgrade of the Ras Tanura and the Rabigh refineries on the Red Sea coast. Plans call for boosting capacity at Rabigh, Saudi Arabia's largest domestic refinery, to as high as 400,000 bbl/d, as well as upgrading the refinery's product slate away from low-value heavy products towards gasoline and kerosene at an estimated cost of \$1.8 billion. Due to Saudi Arabia's financial difficulties in 1998/1999, the Rabigh project was scaled back by 60% or so, to \$800 million. In order to meet burgeoning domestic demand for middle and light distillates, Iran has imported refined products since 1982, and is attempting to boost its refining capacity to 2 million bbl/d. Two planned green-field refineries include a 225,000-bbl/d plant at Shah Bahar and a 120,000-bbl/d unit on Qeshm Island. The \$3 billion Shah Bahar refinery project was approved by the government in late 1994 and will be built by private investors. Kuwait's refining capacity was damaged

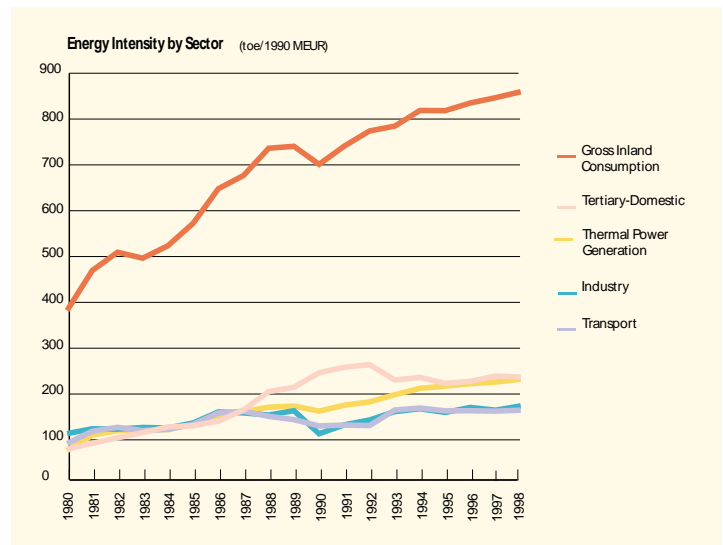


severely during the Iraqi invasion and occupation in 1990-91. After losing most of its pre-war capacity of 820,000 bbl/d, Kuwait had only 200,000 bbl/d of refinery output by early 1992. Kuwait's \$400-million downstream reconstruction programme was completed in mid-1994. At present, Kuwait's three domestic refineries have a combined capacity of around 872,800 bbl/d. Other large refineries include Mina Abdullah (247,000 bbl/d) and al-Shuaiba (190,000 bbl/d). The bulk of Kuwait's refined products are exported.

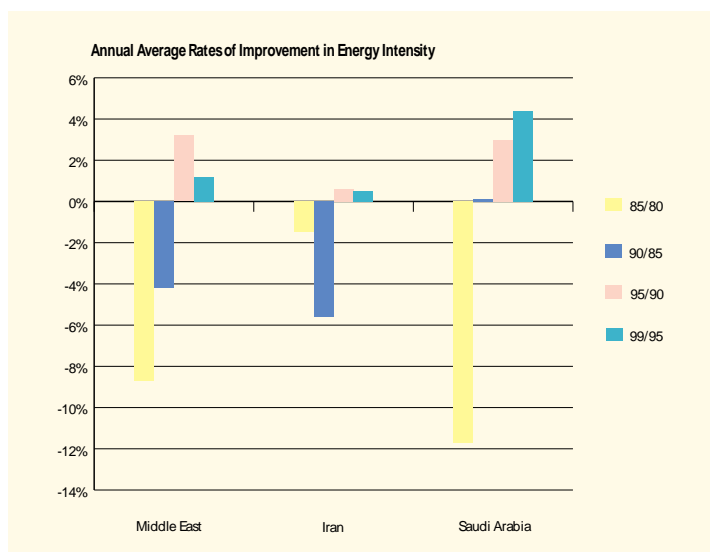
COMPETITIVENESS

Growth in energy intensity has slowed down progressively since 1990 to stabilise in 1999...

The energy intensity indicator was particularly difficult to analyse as oil revenues heavily influenced GDP, especially during the 1980s. Fortunately, since then development of both industry and services, independent of oil activities, have tended to stabilise and reinforce GDP growth. As a result of relatively flat GDP and increasing gross inland consumption, energy intensity increased significantly since 1980; by 8.7% per year during the first part of the 1980s and by 4.2% in the second part. However, because of the regular GDP increase during the 1990s, the energy intensity growth rate slowed down progressively to reach only 2.3% per year on average since 1990 and even demonstrated some stabilisation in 1999. In absolute terms regional energy intensity remains very high, about four times higher than the European Union's intensity. In addition very large discrepancies exist between countries: from more than 1500 toe/1990 MEUR in the very rich oil producer Emirates such as Qatar and Bahrain to only 300 toe/1990 MEUR in Israel, a level close to the European one. If



we except Iraq, whose economy is still deeply affected by the sanctions imposed after the Gulf War, the major increases since 1990 occurred in Qatar (+7.3% per year on average), Kuwait (+4.0%), Saudi Arabia (+3.6%) and United Arab Emirates (+3.2%), all of them well above the regional average. However, energy intensity improved steadily in four countries: Bahrain, Jordan, Syria and Yemen, and remained stable in two others: Iran and Israel. All sectors contributed to the energy intensity growth but the major increase occurred in the tertiary-domestic sector where it has more than tripled since 1980, resulting from the increasing population, the growing share of services in GDP and improved living standards in the whole region. At the same time, the energy intensity of industry, despite the rapid industrialisation of the whole region, increased by only 61% since 1980 but with a marked acceleration since 1990 at about 6.1% per year on average. The energy intensity of transport increased sharply between 1980 and 1995, by more than 90%, but has remained stable since then.



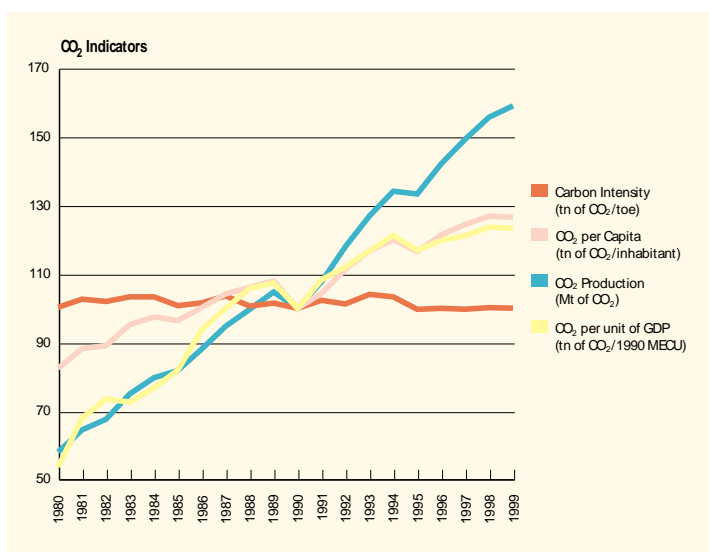
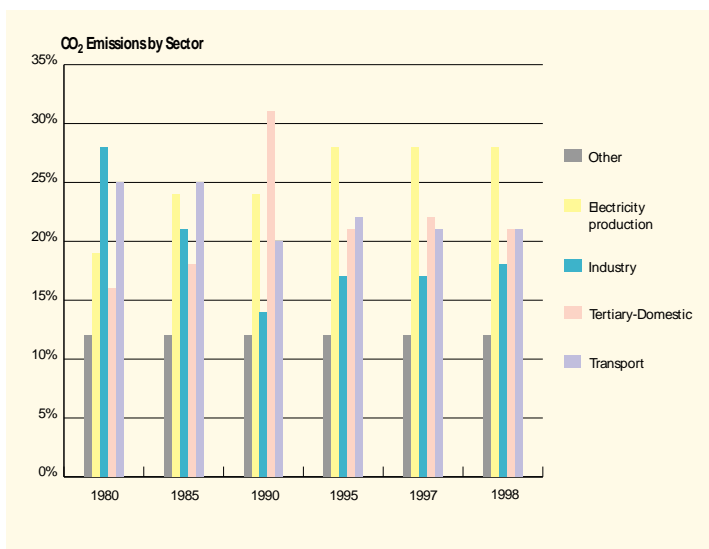
Energy consumption per capita (2.2 Toe/inhabitant) increased at a much slower rate, due to the demographic growth prevailing in the Middle East (3.5% yearly increase during the 1980s, and 2.6% since 1990). Since 1980 this indicator has increased by 2.4% per year on average. The domestic and tertiary contribution (0.6 Toe/inhabitant in 1998) has more than doubled since 1980 due to rising living standards; that of industry increased by 7%, but all the growth occurred only since 1995 demonstrating the appearance of a new trend; while transport consumption per capita increased by only 10% since 1985. Extreme discrepancies are found between countries with a maximum consumption of 20.2 toe per capita in Qatar and a minimum of only 0.2 toe per capita in Yemen, or one hundred times less.



ENVIRONMENT

CO₂ emissions have increased by 59% since 1990...

The CO₂ emissions of Middle East countries have increased regularly by about 5.4% per year since 1980 with an acceleration in the early 1990s. Since 1990 they have increased by some 60%. Iran and Saudi Arabia together contributed 55% of the total CO₂ emissions of the region, a stable share since 1980. The United Arab Emirates and Iraq, each contributing 8%, follow them. The emissions from the tertiary-domestic sector have multiplied four times since 1980, those of the power generation and the energy branch mainly represented by the refinery sector by 3, those of transport by 2 while industry's emissions increased by only 69%. Power generation is now the major contributor with 28% of total emissions in 1998, followed by the tertiary-domestic sector and transport. Industry, the major contributor in 1980, now appears in last position.



The carbon intensity (tn CO₂/toe) remained quite stable, confirming the overall stability of the fuel mix in the Middle East between 1980 and 1998. CO₂ emissions per capita grew on average by 2.4% per year since 1980. Industry's contribution declined by 14% between 1980 and 1995, but experienced a continuous increase since then reflecting the evolution of industrial energy consumption per capita. The contribution of transport increased by 28% since 1980 but, after a rapid growth during the first part of the 1980s, it grew very slowly since 1985, reflecting the slower growth of the motorization rate in the region. CO₂ emissions per unit of GDP have increased on a regular basis by 4.7% per year since 1980 but the growth rate slowed down in the last two years.

GLOBAL MARKETS

The Middle East remains the centrepiece of the world energy market...

The Middle East is the most important net exporter of energy in the world. This results mainly from exports of crude oil and, to a lesser extent, oil products. 81% of the 1070 Mtoe of oil produced during 1999 was exported, 87% as crude. The volume of oil exported has increased regularly from 1985 to 1998 at an average rate of about 6.6% per year although it grew very slowly between 1993 and 1996. This resulted from a limited increase of world oil consumption between 1992 and 1996, only 1.4% per year on average, combined with additional crude production in industrialised countries as a consequence of the OPEC oil export policy to stabilise oil prices. But, as a result of a limited increase of world oil demand in 1999, combined with a significant reduction of oil inventories in industrialised countries, oil exports decreased by 3.7% in 1999. Only Iraq's exports rose, by 20 Mtoe or 27%, as changes in the United Nations' 'oil-for-food' deal allowed Iraq to export more oil to cover the vital needs of the Iraqi population. Between the major producers three of them were reducing their production between 8 and 10%, respectively Saudi Arabia, United Arab Emirates and Kuwait, while Iran, the fourth one, maintained its production unchanged. In 1999 Saudi Arabia still accounted for about 42% of Middle East oil exports, with Iran, the United Arab Emirates, Kuwait and Iraq each accounting for between 10-14%.

Asia, excluding Japan, remained the foremost importer of oil from the Middle East (34% of oil exports from this region), followed by Japan (23%), Western Europe (21%), with the United States absorbing only 13% of Middle East oil exports. This pattern remained stable in recent years, as has the contribution of Middle East exports in the net oil importation of the main industrialised countries: 23% of the net oil import of the United States, 50% of Western Europe and 75% of



Japan. More than one third of Middle East oil exports to Western Europe came from Saudi Arabia (37% compared to 48% in 1998), with significant amounts also coming from Iran (25%) and Iraq (21%).

With its large gas reserves, the Middle East is a major producer and growing exporter of natural gas. Gas is presently exported as LNG through projects in Abu Dhabi, Qatar and Oman. Oman LNG announced that construction of a \$2 billion plant at Qalhat will begin at end 1999, with two trains each with a capacity of 3.3 million tonnes per year. All the production will be sold to Japan, Korea and India. Abu Dhabi exports gas through its Das Island LNG project, mostly to Japanese customers, which account for over 5 million tonnes of LNG per year. There were plans to increase the Das Island capacity by some 200 billion cubic feet, but the Asian economic crisis makes it unlikely that the plans will now go ahead in the short term. However, several pipeline projects to supply gas to Asian countries such as India and Pakistan, as well as to western European countries using Turkey as a transit, have been proposed or are under development.

... But serious geopolitical threats could threaten security of supply in the future...

It is obvious that the Middle East is the centrepiece of world energy supply security as long as industrialised and developing countries depend heavily upon hydrocarbons to satisfy their basic energy needs. But there are, however, serious geopolitical threats to Middle East stability and the security of energy exports. Political risks are increasing, including: internal political and succession issues, growing demographic problems, cultural change and the problem of Islamic extremism, and the long-standing failure to diversify the economies of most countries. Weapons proliferation and long-range strike systems could greatly increase the damage that regional conflicts might cause to energy supply systems. Political revolutions and cross-border conflicts could occur in an environment where the overall volume of exports is expected to continue to increase; and thus the impact of supply interruptions or price increases may have more drastic effects on the global economy.





MIDDLE EAST : SUMMARY ENERGY BALANCE

Mtoe	1980	1985	1990	1997	1998	1999(2)	85/80	90/85	97/90	98/97	99/98
							Annual % Change				
Primary Production	993.1	588.0	916.6	1188.1	1271.4	1236.9	-10.0%	9.3%	3.8%	7.0%	-2.7%
Solids	0.6	0.8	0.8	0.7	0.8	0.8	6.8%	1.5%	-2.1%	6.6%	4.5%
Oil	954.8	531.0	831.0	1036.5	1111.0	1070.1	-11.1%	9.4%	3.2%	7.2%	-3.7%
Natural gas	36.1	54.3	82.2	147.9	156.6	163.0	8.5%	8.7%	8.8%	5.9%	4.1%
Nuclear	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-
Hydro & Wind	0.8	1.1	1.7	1.9	2.0	2.0	4.8%	9.9%	1.9%	2.1%	0.8%
Geothermal	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-
Other	0.8	0.9	0.9	1.0	1.0	1.0	2.7%	0.2%	2.0%	0.3%	0.0%
Net Imports	-851.0	-391.2	-682.9	-833.4	-897.6	-867.2	-14.4%	11.8%	2.9%	7.7%	-3.4%
Solids	0.0	2.0	2.8	6.0	6.6	6.4	113.5%	6.9%	11.6%	9.8%	-3.3%
Oil	-848.7	-390.7	-682.0	-831.1	-896.2	-863.2	-14.4%	11.8%	2.9%	7.8%	-3.7%
Crude oil	-810.8	-335.1	-599.4	-714.3	-776.9	na	-16.2%	12.3%	2.5%	8.8%	na
Oil products	-38.0	-55.6	-82.6	-116.8	-119.2	na	7.9%	8.2%	5.1%	2.1%	na
Natural gas	-2.3	-2.5	-3.7	-8.2	-8.0	-10.4	1.9%	8.2%	12.1%	-2.8%	29.2%
Electricity	0.0	0.0	0.0	0.0	0.0	0.0	21.5%	1.1%	3.3%	-28.6%	-28.6%
Gross Inland Consumption	133.3	186.5	229.6	342.6	355.7	363.7	6.9%	4.3%	5.9%	3.8%	2.3%
Solids	0.6	2.7	3.4	6.6	7.1	7.2	35.0%	5.1%	9.8%	7.8%	0.5%
Oil	97.3	130.1	145.1	193.4	197.0	200.9	6.0%	2.2%	4.2%	1.8%	2.0%
Natural gas	33.8	51.8	78.5	139.7	148.6	152.6	8.9%	8.7%	8.6%	6.4%	2.7%
Other (1)	1.6	1.9	2.6	2.9	3.0	3.0	3.7%	6.0%	2.0%	2.0%	-0.2%
Electricity Generation in TWh	95.1	171.6	235.7	385.2	409.6	na	12.5%	6.6%	7.3%	6.3%	na
Nuclear	0.0	0.0	0.0	0.0	0.0	na	-	-	-	-	na
Hydro & wind	9.7	9.6	14.8	15.8	16.0	na	-0.2%	9.1%	0.9%	0.9%	na
Thermal	85.4	162.0	220.8	369.4	393.7	na	13.7%	6.4%	7.6%	6.6%	na
Generation Capacity in GWe	30.2	57.5	75.0	105.6	110.4	na	13.7%	5.4%	5.0%	4.6%	na
Nuclear	0.0	0.0	0.0	0.0	0.0	na	-	-	-	-	na
Hydro & wind	2.6	3.0	3.3	4.5	4.8	na	3.0%	1.7%	4.6%	7.2%	na
Thermal	27.6	54.5	71.7	101.1	105.6	na	14.6%	5.6%	5.0%	4.4%	na
Average Load Factor in %	35.9	34.0	35.9	41.7	42.4	na	-1.1%	1.1%	2.2%	1.7%	na
Fuel Inputs for Thermal Power Generation	23.0	40.8	50.0	87.6	92.2	na	12.1%	4.1%	8.4%	5.2%	na
Solids	0.0	1.8	2.4	5.5	5.9	na	-	5.2%	12.6%	7.3%	na
Oil	15.8	26.3	25.5	43.0	42.3	na	10.8%	-0.6%	7.7%	-1.6%	na
Gas	7.2	12.6	22.1	39.2	44.0	na	11.8%	11.9%	8.5%	12.5%	na
Geothermal	0.0	0.0	0.0	0.0	0.0	na	-	-	-	-	na
Other	0.0	0.0	0.0	0.0	0.0	na	-	-	-	-	na
Average Thermal Efficiency in %	32.0	34.2	38.0	36.3	36.7	na	1.3%	2.2%	-0.7%	1.3%	na
Non-Energy Uses	4.8	9.7	13.9	18.3	20.9	na	15.0%	7.5%	3.9%	14.6%	na
Total Final Energy Demand	89.0	120.9	150.7	217.0	225.6	na	6.3%	4.5%	5.3%	4.0%	na
Solids	0.6	0.8	1.0	1.0	1.1	na	7.3%	5.0%	0.0%	9.9%	na
Oil	65.4	83.5	98.8	118.6	123.6	na	5.0%	3.4%	2.6%	4.2%	na
Gas	15.5	22.8	32.8	68.3	70.2	na	8.1%	7.5%	11.1%	2.8%	na
Electricity	6.8	12.7	16.8	27.5	29.1	na	13.2%	5.8%	7.3%	5.8%	na
Heat	0.0	0.0	0.0	0.0	0.0	na	-	-	-	-	na
Other	0.8	1.1	1.3	1.6	1.7	na	7.7%	3.4%	3.0%	1.9%	na
CO₂ Emissions in Mt of CO₂	351.6	495.0	604.1	901.6	940.4	960.4	7.1%	4.1%	5.9%	4.3%	2.1%
Indicators											
Population (Million)	91.89	110.69	130.32	156.28	159.90	163.73	3.8%	3.3%	2.6%	2.3%	2.4%
GDP (index 1985=100)	108.3	100.0	100.1	123.3	126.1	129.0	-1.6%	0.0%	3.0%	2.2%	2.3%
Gross Inl Cons./GDP (toe/1990 MEUR)	369.6	559.8	688.5	834.0	847.0	846.4	8.7%	4.2%	2.8%	1.6%	-0.1%
Gross Inl Cons./Capita (toe/inhabitant)	1.45	1.68	1.76	2.19	2.22	2.22	3.0%	0.9%	3.2%	1.5%	-0.1%
Electricity Generated/Capita (kWh/inhabitant)	1035	1550	1808	2465	2562	na	8.4%	3.1%	4.5%	3.9%	na
CO ₂ Emissions/Capita (t of CO ₂ /inhabitant)	3.8	4.5	4.6	5.8	5.9	5.9	3.2%	0.7%	3.2%	1.9%	-0.3%
Import Dependency %	-598.7	-197.2	-290.8	-240.9	-250.0	-235.5	-19.9%	8.1%	-2.7%	3.8%	-5.8%

(1) Includes nuclear, hydro and wind, net imports of electricity, and other energy sources.

(2) Estimates





MIDDLE EAST : MAIN INDICATORS											
	1980	1985	1990	1995	1997	1998	85/80	90/85	95/90	97/95	98/97
	Annual % Change										
Gross Inland Consumption (Mtoe)	133.3	186.5	229.6	306.4	342.6	355.7	6.9%	4.3%	5.9%	5.8%	3.8%
Public Thermal Power Generation	21.7	39.6	48.4	75.4	84.9	89.6	12.7%	4.1%	9.3%	6.1%	5.5%
Autoprod. Thermal Power Generation	1.2	1.2	1.5	2.3	2.7	2.6	-0.5%	5.0%	8.1%	8.7%	-3.5%
Energy Branch	16.4	22.0	27.7	39.2	43.7	46.2	6.0%	4.7%	7.2%	5.6%	5.8%
Final Energy Consumption	88.9	120.8	150.6	193.1	216.9	225.5	6.3%	4.5%	5.1%	6.0%	4.0%
Industry	36.4	41.3	33.5	55.8	62.4	67.7	2.6%	-4.1%	10.8%	5.7%	8.5%
Transport	28.5	40.3	39.2	57.2	61.5	63.8	7.2%	-0.5%	7.9%	3.7%	3.7%
Tertiary-Domestic	24.1	39.3	77.9	80.0	93.0	94.0	10.3%	14.7%	0.5%	7.8%	1.1%
Energy Intensity (toe/1990 MEUR)	369.6	559.8	688.5	805.7	834.0	847.0	8.7%	4.2%	3.2%	1.7%	1.6%
Public Thermal Power Generation	60.3	118.7	145.1	198.3	206.6	213.3	14.5%	4.1%	6.4%	2.1%	3.2%
Autoprod. Thermal Power Generation	3.4	3.6	4.6	6.0	6.6	6.2	1.1%	0.0%	1.5%	7.0%	7.0%
Industry	100.8	123.9	100.4	146.9	151.8	161.2	4.2%	-4.1%	7.9%	1.7%	6.2%
Transport	78.9	120.9	117.5	150.4	149.7	151.8	8.9%	-0.6%	5.1%	-0.2%	1.4%
Tertiary-Domestic	66.8	118.0	233.6	210.4	226.3	223.9	12.1%	14.6%	-2.1%	3.7%	-1.1%
Energy per Capita (Kgoe/inhabitant)	1451	1685	1762	2055	2192	2224	3.0%	0.9%	3.1%	3.3%	1.5%
Industry	396	373	257	375	399	423	-1.2%	-7.2%	7.8%	3.2%	6.1%
Transport	310	364	301	384	394	399	3.3%	-3.7%	5.0%	1.3%	1.3%
Tertiary-Domestic	262	355	598	537	595	588	6.3%	11.0%	-2.1%	5.3%	-1.2%
Electricity Share (%)											
Final Energy Consumption	7.7%	10.5%	11.2%	12.7%	12.7%	12.9%	6.5%	1.2%	2.6%	0.0%	1.7%
Industry	5.0%	7.3%	9.1%	8.6%	8.9%	8.6%	7.7%	4.5%	-1.0%	1.5%	-3.9%
Transport	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-	-	-	-	-
Tertiary-Domestic	20.8%	24.7%	17.7%	24.5%	23.6%	24.8%	3.5%	-6.4%	6.8%	-2.0%	5.0%
Total Renewable Consumption (Mtoe)	1.6	2.0	2.6	2.9	3.0	3.0	3.9%	6.0%	1.9%	2.3%	1.5%
Hydro	0.8	0.8	1.3	1.3	1.4	1.4	-0.2%	9.1%	0.9%	0.8%	1.0%
Biomass	0.8	0.9	0.9	1.0	1.1	1.1	2.9%	0.4%	1.7%	2.9%	0.3%
Other	0.0	0.2	0.4	0.5	0.6	0.6	-	12.5%	4.8%	4.9%	4.8%
Renewable intensity (toe/1990 MEUR)	4.5	5.9	7.8	7.5	7.3	7.2	5.6%	5.9%	-0.8%	-1.6%	-0.7%
Renewable per capita (Kgoe/inhabitant)	17.6	17.7	20.0	19.2	19.2	19.0	0.1%	2.5%	-0.9%	-0.1%	-0.8%
CO₂ Emissions (Mt of CO₂)	351.6	495.0	604.1	805.4	901.6	940.4	7.1%	4.1%	5.9%	5.8%	4.3%
Public Thermal Power Generation	62.9	116.2	138.7	216.9	245.3	257.2	13.1%	3.6%	9.4%	6.3%	4.9%
Autoprod. Thermal Power Generation	3.8	3.7	4.7	6.5	7.6	7.3	-0.3%	5.0%	6.5%	8.0%	-2.8%
Energy Branch	43.2	58.4	71.1	99.1	109.2	115.9	6.2%	4.0%	6.9%	5.0%	6.1%
Industry	99.0	105.9	83.2	138.8	153.4	167.5	1.3%	-4.7%	10.8%	5.2%	9.2%
Transport	87.3	123.5	120.3	175.6	188.8	195.6	7.2%	-0.5%	7.9%	3.7%	3.7%
Tertiary-Domestic	55.3	87.3	186.1	168.6	197.3	196.8	9.5%	16.3%	-2.0%	8.2%	-0.3%
Carbon Intensity (tn of CO₂/toe)	2.6	2.7	2.6	2.6	2.6	2.6	0.1%	-0.2%	0.0%	0.0%	0.5%
Public Power Generation	2.8	2.9	2.8	2.8	2.8	2.8	0.7%	-0.6%	0.3%	0.3%	-0.6%
Public Thermal Power Generation	2.9	2.9	2.9	2.9	2.9	2.9	0.3%	-0.5%	0.1%	0.2%	-0.6%
Autoprod. Power Generation	3.0	3.1	3.1	2.8	2.8	2.8	0.2%	0.1%	-1.6%	-0.6%	0.7%
Autoprod. Thermal Power Generation	3.0	3.1	3.1	2.8	2.8	2.8	0.2%	0.0%	-1.6%	-0.6%	0.7%
Energy Branch	2.6	2.7	2.6	2.5	2.5	2.5	0.2%	-0.7%	-0.3%	-0.6%	0.3%
Industry	2.7	2.6	2.5	2.5	2.5	2.5	-1.2%	-0.6%	0.0%	-0.5%	0.6%
Transport	3.1	3.1	3.1	3.1	3.1	3.1	0.0%	0.0%	0.0%	0.0%	0.0%
Tertiary-Domestic	2.3	2.2	2.4	2.1	2.1	2.1	-0.7%	1.5%	-2.5%	0.3%	-1.4%
CO₂ per Capita (kg of CO₂/inhabitant)	3826	4472	4636	5401	5769	5881	3.2%	0.7%	3.1%	3.3%	1.9%
Industry	1077	956	638	931	982	1048	-2.4%	-7.8%	7.8%	2.7%	6.7%
Transport	951	1116	923	1177	1208	1224	3.3%	-3.7%	5.0%	1.3%	1.3%
Tertiary-Domestic	602	789	1428	1131	1262	1231	5.5%	12.6%	-4.6%	5.7%	-2.5%
CO₂ per unit of GDP (tn of CO₂/1990 MEUR)	975	1486	1811	2118	2194	2239	8.8%	4.0%	3.2%	1.8%	2.0%
Public Thermal Power Generation	174	349	416	570	597	612	14.9%	3.6%	6.5%	2.3%	2.6%
Autoprod. Thermal Power Generation	10	11	14	17	18	17	1.3%	4.9%	3.7%	3.9%	-4.9%
Energy Branch	120	175	213	261	266	276	7.9%	4.0%	4.1%	1.0%	3.8%
Industry	274	318	249	365	373	399	3.0%	-4.7%	7.9%	1.2%	6.8%
Transport	242	371	361	462	459	466	8.9%	-0.6%	5.1%	-0.2%	1.4%
Tertiary-Domestic	153	262	558	443	480	469	11.3%	16.3%	-4.5%	4.1%	-2.4%





SAUDI ARABIA : SUMMARY ENERGY BALANCE

Mtoe	1980	1985	1990	1997	1998	1999(2)	85/80	90/85	97/90	98/97	99/98
Annual % Change											
Primary Production	533.1	200.8	368.8	488.8	505.1	471.9	-17.7%	12.9%	1.2%	3.3%	-6.6%
Solids	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-
Oil	524.6	185.0	343.4	449.5	464.6	431.8	-18.8%	13.2%	0.9%	3.4%	-7.1%
Natural gas	8.5	15.8	25.4	39.3	40.5	40.1	13.1%	10.0%	6.1%	3.3%	-1.2%
Nuclear	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-
Hydro & Wind	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-
Geothermal	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-
Other	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-
Net Imports	-493.7	-139.8	-303.7	-386.8	-400.0	-366.0	-22.3%	16.8%	0.4%	3.4%	-8.5%
Solids	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-
Oil	-493.7	-139.8	-303.7	-386.8	-400.0	-366.0	-22.3%	16.8%	0.4%	3.4%	-8.5%
Crude oil	-484.6	-124.0	-253.7	-344.3	-358.5	na	-23.9%	15.4%	0.5%	4.1%	na
Oil products	-9.1	-15.8	-50.0	-42.5	-41.5	na	11.7%	25.9%	0.1%	-2.4%	na
Natural gas	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-
Electricity	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-
Gross Inland Consumption	35.4	52.2	63.3	100.1	103.2	103.9	8.1%	3.9%	4.9%	3.1%	0.6%
Solids	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-
Oil	26.8	36.5	37.9	60.9	62.7	63.8	6.3%	0.8%	4.2%	3.0%	1.9%
Natural gas	8.5	15.8	25.4	39.3	40.5	40.0	13.1%	10.0%	6.1%	3.3%	-1.3%
Other (1)	0.0	0.0	0.0	0.0	0.0	0.0	14.8%	34.5%	-14.7%	0.0%	-100.0%
Electricity Generation in TWh	20.5	44.3	64.9	113.1	116.5	na	16.7%	7.9%	7.7%	3.0%	na
Nuclear	0.0	0.0	0.0	0.0	0.0	na	-	-	-	-	na
Hydro & wind	0.0	0.0	0.0	0.0	0.0	na	-	-	-	-	na
Thermal	20.5	44.3	64.9	113.1	116.5	na	16.7%	7.9%	7.7%	3.0%	na
Generation Capacity in GWe	7.4	15.9	19.6	24.4	25.2	na	16.4%	4.3%	3.7%	3.5%	na
Nuclear	0.0	0.0	0.0	0.0	0.0	na	-	-	-	-	na
Hydro & wind	0.0	0.0	0.0	0.0	0.0	na	-	-	-	-	na
Thermal	7.4	15.9	19.6	24.4	25.2	na	16.4%	4.3%	3.7%	3.5%	na
Average Load Factor in %	31.4	31.9	37.8	52.9	52.7	na	0.3%	3.5%	3.9%	-0.5%	na
Fuel Inputs for Thermal Power Generation	4.1	10.7	13.0	23.1	22.4	na	21.3%	3.9%	6.7%	-2.9%	na
Solids	0.0	0.0	0.0	0.0	0.0	na	-	-	-	-	na
Oil	3.4	7.3	8.7	15.3	14.4	na	16.4%	3.6%	6.5%	-6.0%	na
Gas	0.6	3.4	4.2	7.8	8.0	na	39.1%	4.5%	7.2%	3.3%	na
Geothermal	0.0	0.0	0.0	0.0	0.0	na	-	-	-	-	na
Other	0.0	0.0	0.0	0.0	0.0	na	-	-	-	-	na
Average Thermal Efficiency in %	43.2	35.6	43.0	42.2	44.7	na	-3.8%	3.9%	0.9%	6.0%	na
Non-Energy Uses	0.9	4.8	4.2	7.0	8.8	na	38.2%	-2.3%	11.0%	25.0%	na
Total Final Energy Demand	22.3	26.5	38.3	49.0	50.8	na	3.5%	7.7%	3.4%	3.8%	na
Solids	0.0	0.0	0.0	0.0	0.0	na	-	-	-	-	na
Oil	21.0	22.3	25.0	28.5	29.8	na	1.2%	2.4%	1.6%	4.5%	na
Gas	0.3	1.1	9.0	12.7	13.1	na	33.5%	52.9%	5.9%	3.3%	na
Electricity	1.1	3.1	4.3	7.8	7.9	na	23.5%	6.6%	7.7%	1.8%	na
Heat	0.0	0.0	0.0	0.0	0.0	na	-	-	-	-	na
Other	0.0	0.0	0.0	0.0	0.0	na	14.8%	34.5%	-14.7%	0.0%	na
CO₂ Emissions in Mt of CO₂	95.3	128.7	179.5	245.9	251.8	na	6.2%	6.9%	4.1%	2.4%	na
Indicators											
Population (Million)	9.37	12.38	15.80	20.07	20.74	21.44	5.7%	5.0%	3.5%	3.4%	3.4%
GDP (index 1985=100)	117.6	100.0	121.9	143.5	146.8	145.3	-3.2%	4.0%	1.2%	2.3%	-1.0%
Gross Inl Cons./GDP (toe/1990 MEUR)	445.6	773.9	769.6	1034.4	1042.4	1060.0	11.7%	-0.1%	3.6%	0.8%	1.7%
Gross Inl Cons./Capita (toe/inhabitant)	3.77	4.22	4.00	4.99	4.98	4.85	2.3%	-1.0%	1.3%	-0.2%	-2.7%
Electricity Generated/Capita (kWh/inhabitant)	2182	3580	4107	5638	5618	na	10.4%	2.8%	4.1%	-0.3%	na
CO ₂ Emissions/Capita (t of CO ₂ /inhabitant)	10.2	10.4	11.4	12.3	12.1	na	0.4%	1.8%	0.6%	-0.9%	na
Import Dependency %	-1246.7	-229.4	-466.8	-379.3	-380.7	-338.9	-28.7%	15.3%	-4.0%	0.4%	-11.0%

(1) Includes nuclear, hydro and wind, net imports of electricity, and other energy sources.

(2) Estimates



IRAN : SUMMARY ENERGY BALANCE											
Mtoe	1980	1985	1990	1997	1998	1999(2)	85/80	90/85	97/90	98/97	99/98
	Annual % Change										
Primary Production	84.0	127.7	180.6	228.0	232.5	227.4	8.7%	7.2%	2.6%	2.0%	-2.2%
Solids	0.6	0.8	0.8	0.7	0.7	0.8	6.8%	0.8%	-2.5%	7.5%	4.9%
Oil	75.9	113.9	158.9	184.6	186.2	178.6	8.5%	6.9%	1.2%	0.9%	-4.1%
Natural gas	6.5	11.9	19.8	41.4	44.2	46.6	12.8%	10.6%	11.2%	6.8%	5.6%
Nuclear	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-
Hydro & Wind	0.5	0.5	0.5	0.6	0.6	0.6	-0.2%	1.9%	-0.1%	1.5%	2.9%
Geothermal	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-
Other	0.6	0.7	0.7	0.8	0.8	0.8	3.6%	0.0%	1.8%	0.0%	1.5%
Net Imports	-44.0	-72.0	-106.4	-116.5	-115.9	-115.6	10.4%	8.1%	-0.1%	-0.5%	-0.2%
Solids	0.0	0.1	0.2	0.4	0.4	0.4	10.9%	31.7%	8.2%	18.3%	0.8%
Oil	-43.9	-72.1	-105.4	-117.2	-117.9	-117.9	10.4%	7.9%	0.4%	0.6%	0.0%
Crude oil	-38.2	-77.0	-112.1	-107.2	-104.4	na	15.1%	7.8%	-2.3%	-2.6%	na
Oil products	-5.7	4.9	6.7	-10.0	-13.5	na	-	6.2%	-	35.2%	na
Natural gas	-0.2	0.0	-1.2	0.3	1.6	1.9	-100.0%	-	-	371.9%	21.1%
Electricity	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-
Gross Inland Consumption	38.9	54.1	71.6	99.6	102.1	106.1	6.8%	5.8%	4.7%	2.5%	3.9%
Solids	0.6	0.8	1.0	1.0	1.1	1.2	7.1%	4.7%	0.5%	11.3%	3.4%
Oil	30.9	40.2	50.8	55.5	53.9	54.9	5.4%	4.8%	0.3%	-3.0%	2.0%
Natural gas	6.4	11.9	18.5	41.7	45.7	48.6	13.4%	9.2%	13.7%	9.7%	6.2%
Other (1)	1.1	1.2	1.2	1.4	1.4	1.4	1.9%	0.8%	1.0%	0.7%	2.1%
Electricity Generation in TWh	22.4	39.2	59.1	97.7	103.4	na	11.9%	8.5%	7.1%	5.8%	na
Nuclear	0.0	0.0	0.0	0.0	0.0	na	-	-	-	-	na
Hydro & wind	5.6	5.6	6.1	6.9	7.0	na	-0.3%	1.9%	-0.1%	1.5%	na
Thermal	16.8	33.7	53.0	90.8	96.4	na	15.0%	9.5%	7.8%	6.1%	na
Generation Capacity in GWe	8.7	16.8	18.8	30.4	30.9	na	14.1%	2.3%	7.2%	1.6%	na
Nuclear	0.0	0.0	0.0	0.0	0.0	na	-	-	-	-	na
Hydro & wind	1.8	1.8	2.0	2.0	2.0	na	0.0%	1.4%	0.5%	0.2%	na
Thermal	6.8	14.9	16.8	28.4	28.9	na	17.0%	2.4%	7.8%	1.6%	na
Average Load Factor in %	29.5	26.7	35.9	36.7	38.2	na	-2.0%	6.1%	-0.1%	4.2%	na
Fuel Inputs for Thermal Power Generation	4.5	8.9	12.6	21.8	22.6	na	14.9%	7.2%	7.7%	3.8%	na
Solids	0.0	0.0	0.0	0.0	0.0	na	-	-	-	-	na
Oil	3.0	7.0	6.3	7.7	5.4	na	18.3%	-2.1%	-2.5%	-30.4%	na
Gas	1.4	1.9	6.4	14.0	17.2	na	5.9%	27.0%	13.7%	22.7%	na
Geothermal	0.0	0.0	0.0	0.0	0.0	na	-	-	-	-	na
Other	0.0	0.0	0.0	0.0	0.0	na	-	-	-	-	na
Average Thermal Efficiency in %	32.4	32.5	36.1	35.9	36.7	na	0.1%	2.1%	0.1%	2.2%	na
Non-Energy Uses	1.3	1.4	5.0	4.4	4.7	na	2.1%	28.9%	1.8%	7.7%	na
Total Final Energy Demand	28.5	43.2	48.1	73.4	75.9	na	8.6%	2.2%	3.8%	3.5%	na
Solids	0.6	0.8	1.0	0.9	1.0	na	7.5%	4.9%	-1.1%	11.4%	na
Oil	20.8	28.8	36.2	39.9	42.4	na	6.8%	4.6%	1.2%	6.3%	na
Gas	4.9	10.0	6.0	25.1	24.6	na	15.3%	-9.8%	9.5%	-1.9%	na
Electricity	1.7	2.9	4.2	6.8	7.2	na	10.6%	8.2%	6.5%	5.6%	na
Heat	0.0	0.0	0.0	0.0	0.0	na	-	-	-	-	na
Other	0.6	0.7	0.7	0.8	0.8	na	3.6%	0.0%	1.8%	0.0%	na
CO₂ Emissions in Mt of CO₂	97.0	148.7	173.1	257.3	266.7	na	8.9%	3.1%	4.1%	3.6%	na
Indicators											
Population (Million)	39.12	47.10	54.40	60.93	61.95	62.98	3.8%	2.9%	1.6%	1.7%	1.7%
GDP (index 1985=100)	77.6	100.0	101.0	136.5	138.9	142.4	5.2%	0.2%	3.2%	1.7%	2.5%
Gross Inl Cons./GDP (toe/1990 MEUR)	535.4	577.7	757.4	779.5	785.6	795.9	1.5%	5.6%	1.5%	0.8%	1.3%
Gross Inl Cons./Capita (toe/inhabitant)	0.99	1.15	1.32	1.64	1.65	1.68	2.9%	2.8%	3.0%	0.8%	2.2%
Electricity Generated/Capita (kWh/inhabitant)	572	833	1086	1604	1669	na	7.8%	5.5%	5.3%	4.1%	na
CO ₂ Emissions/Capita (t of CO ₂ /inhabitant)	2.5	3.2	3.2	4.2	4.3	na	4.9%	0.2%	2.4%	1.9%	na
Import Dependency %	-108.8	-129.3	-143.3	-116.5	-112.8	-106.5	3.5%	2.1%	-4.2%	-3.2%	-5.5%

(1) Includes nuclear, hydro and wind, net imports of electricity, and other energy sources.

(2) Estimates







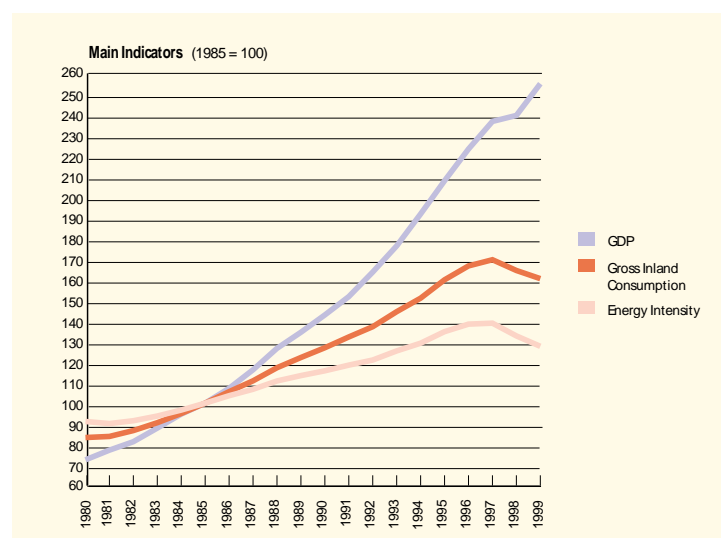
ASIA: Major trends (1980-1999)

- After decades of rapid expansion a severe financial crisis limited GDP growth to only 1.2% in 1998
- GDP growth recovered in 1999 but some uncertainty still remains
- In 1998, final energy demand registered its first decline since 1980
- The transport sector has become the driving force in the growth of final energy consumption
- Industrial energy consumption declined by 7.3% since 1997
- Household income and development of services will be the key drivers of tertiary-domestic demand
- Increasing contribution of electricity, the fastest growing source of end-use energy
- Solid fuels still dominated gross inland energy consumption despite an impressive contraction in China
- Biomass consumption widely distributed inside the region
- Oil and gas consumption has substituted massively for solids since 1996
- Primary energy requirements were based on indigenous energy sources, with the exception of increasing oil importation
- A significant increase in crude oil production is projected for many South China Sea region countries
- Diversification of Asian gas production under way
- Asia represented 16.4% of world fossil fuel reserves, principally solid fuels
- Electricity generation is still dominated by solid fuels, locally available at low cost
- Negative effects of economic crisis on power sector liberalisation...
- Development of electricity interconnection in progress
- Refinery expansion programmes under way to meet increasing domestic oil products demand
- Marked by impressive Chinese achievement, energy intensity has improved by 2.9% per year since 1980...
- ...But Chinese performance remained questionable
- Energy consumption per capita reached only 18% of the European level, with large variations inside the region
- CO₂ emissions declined by 10.4% since 1997 but have still increased by 25% since 1990
- The power sector became the largest contributor in 1996, pushed by the rapid increase of electricity demand
- Regional energy dependency increased steadily but remained low even though oil dependency exceeded 50%

After decades of rapid expansion a severe financial crisis limited GDP growth to only 1.2% in 1998..

Asia is the largest world region, characterised by a population that grew by 1.8% per year on average during the 1980s but by only 1.5% on average since 1990. This is a result of the sharp reduction in the Chinese population growth rate which grew by only 1% per year since the beginning of the 1990s whilst the Indian population continued to grow at more than 1.8% per year. These two countries accounted for 70% of the region's population and 36% of the world's population. The word most commonly used by economists to describe Asian remarkable economic growth during the 1980s and early 1990s was "miracle." China, Malaysia, South Korea, Indonesia and other countries in the region enjoyed rates of growth of nearly 8% a year. The "Asian miracle" was considered extraordinary in part because the region's rapid economic growth was accompanied by very little unemployment and no major wealth gap between the rich and poor. The rapid growth of the Asian economies, especially East Asian ones, was accompanied by impressive advances in social development: poverty, infant mortality and adult illiteracy all declined significantly, while life expectancy at birth rose considerably. Since mid-1997, however, a number of Southeast Asian economies and Korea have been in the grip of severe financial crises that have thrown the region into a deep recession. The downturns have been led by the reduction of

domestic demand, as large exchange rate depreciations, equity price declines and increases in interest rates have cut real income and wealth and boosted debt-servicing costs. Demand and activity have also been reduced by a tightening of bank credit resulting from the deterioration of banks' balance sheets. Consequently, regional GDP growth was reduced to only 1.2% in 1998 with a large number of countries experiencing deep recessions: Indonesia (-13.2%), Hong Kong (-5.1%), Korea (-5.8%), Malaysia (-7.5%) and Thailand (-9.4%). Other major countries were





less affected: China (+7.8%) and India (+6.0%), these two countries accounting for about 50% of the region's GDP. The Asian economic crisis contributed to the sharp decline in world oil prices from late 1997 through the beginning of 1999, as decreased economic activity caused oil demand to fall in several countries which had seen rapidly rising demand in recent years.

GDP growth recovered in 1999 but some uncertainty still remains

The Asian economy recovered rapidly in 1999 with a regional GDP growth of 6.4%, representative of the situation in the main countries: Korea (10.7%), China (+7.1%), India (+6.4%), Taiwan and Malaysia (+5.7%), Singapore (5.4%). As of mid-1999, exchange rates for most East Asian currencies had achieved a measure of stability, and the worst affected governments in the region had made progress in implementing reforms agreed to as a condition for stabilisation loans from the International Monetary Fund (IMF). South Korea had begun reforms aimed at partially breaking up the Chaebols, the five large conglomerates which dominate South Korean industry. Thailand and Indonesia had both implemented massive cuts in state subsidies for consumer goods and services, along with programmes to take over the many banks which failed during the crisis. Exports were generally increasing, supported by competitive exchange rates and improved growth in regional trading partners. The partial recovery of capital inflows has eased financing constraints in most cases and the rise in confidence, along with declining inflation, has permitted further monetary easing. Fiscal policy also continues to play an important supportive role. Stronger growth is projected for 2000 in most countries as the recent improvements in economic confidence and activity are followed by a broader-based pickup in domestic demand. For the recovery to be sustainable, however, an agenda of structural reforms still has to be completed. Plans for financial sector restructuring are generally well advanced, with more stringent and prudential standards in place, bank recapitalisation proceeding, and plans adopted for the privatisation of state-owned institutions. Nevertheless, some signs of pessimism remain regarding prospects for regaining former levels of economic growth. In several countries, recovery is being fuelled by deficit spending, which may not be sustainable, on the part of national governments. Indonesia also offers cause for concern, as its political turmoil in 1998 damaged investor confidence from which it will be difficult to recover, and its economy has continued to shrink in 1999.

Main items

For nearly two decades the Asia region has served as an engine of world economic expansion, experiencing both rapid population and economic growth. In terms of their population the two regional giants are China and India, which now comprise 36% of the world's total. These two countries also now account for 50% of regional GDP. Many regional economies, especially in East Asia, were hard hit by the financial crisis that began in mid-1997 and accelerated in 1998. The crisis began to abate following the economic recovery which resumed in 1999. But Japan - mainly for domestic reasons - has continued to experience its most severe and prolonged recession since 1945. In many countries market liberalisation, and the reform of both financial systems and corporate governance, must be embraced with greater enthusiasm before confidence is high enough to permit large-scale foreign direct investment. Heavy state regulation of the energy sector, and energy prices often set below costs for political reasons, have stimulated demand. But these factors have also reduced corporate self-financing capabilities, leading to funding difficulties especially in the power sector. The energy balances of China and India are still dominated by biomass and coal - though considerable uncertainty surrounds recent coal consumption and thus emissions data for China. Oil requirements for transport are likely to remain buoyant as regional car ownership expands. Strong growth is also envisaged for natural gas following significant investment in pipeline infrastructures. Despite recent and planned additions to hydroelectric and nuclear capacity, the increased dependence upon fossil fuels has caused a doubling in Asia's share of world CO₂ emissions since 1980 - a trend expected to persist as the populous regional economies industrialise over the forthcoming decades.

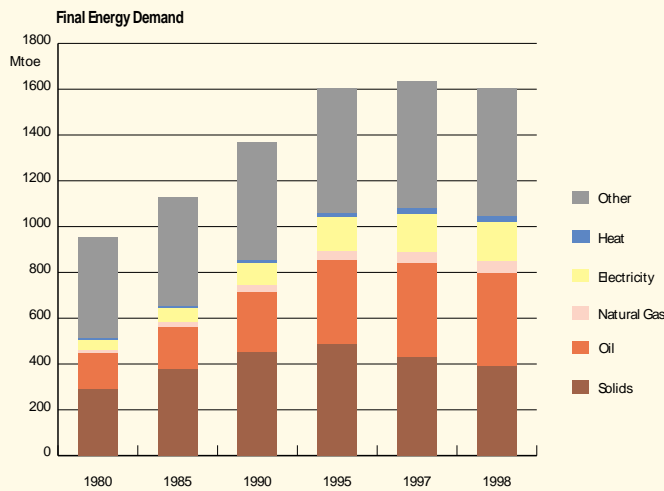
ENERGY OUTLOOK¹

In 1998, final energy demand registered its first decline since 1980

As a consequence of the financial and economic crisis **final energy demand** remained stable in 1997 but declined by 1.9% in 1998. During the 1990-96 period, before the onset of the crisis, final energy demand had increased steadily by 3.4% per year on

¹ Energy data presented for 1998 and 1999 must be treated very carefully. Data are based on the OECD (1999 edition) until 1998 and on the US Department of Energy for 1999. Data presented are in line with BP statistics (2000 edition) and APEC's database. The most recent revision of OECD data, the 2000 edition issued at the end of September 2000, gives a different pattern for the energy balance, especially for solids in China. Gross inland energy consumption of solids is given as equal to 655 Mtoe in 1998 and 628 Mtoe in 1999. Other sources are in the range of 582-617 Mtoe for 1998 and 485-513 Mtoe for 1999. So, the latest OECD data indicate an increase of solids consumption by 10% in 1998 and by 26% in 1999 compared to the average of other sources. If these numbers are confirmed in the future, the analysis in terms of energy consumption, energy intensities and CO₂ emissions will be drastically modified.





average, -representing less than half the GDP growth rate. Biomass still remained the largest single component of final energy demand even though its contribution has been declining continuously from 46% in 1980 to 35% in 1998. Biomass consumption was concentrated in two major countries: China (209 Mtoe), India (195 Mtoe) and to a lesser extent in Indonesia (45 Mtoe), Pakistan and Vietnam (22 Mtoe), these five countries accounting for 90% of the regional biomass consumption. Solid fuel, still the second largest component in 1995, was overtaken by oil products in 1998 as a consequence of the rapid decline observed over the last three years in solids consumption: -4.7% in 1996, -7.7% in 1997 and -8.3% in 1998. Its share declined from 34% in 1985 to 30% in 1995 and only 25% in 1998. About 85% of the reduction in coal consumption occurred in China where the restructuring of the coal industry resulted in the closure of very many small mines dedicated to local markets and in price increases resulting from the reduction in subsidies.

Oil demand increased by 6.7% per year on average between 1990 and 1997 but declined by 2% in 1998. This growth was driven by the transport sector (56% of oil demand in 1998), by the tertiary-domestic sector (24%) and finally by industry (20%). Demand for natural gas has been increasing since 1985 in line with GDP at 6.3% per year on average, the growth continuing in 1998 at a rate of 5.7% but its share remained limited to only 3% of final energy demand in the region resulting from the still limited pipeline infrastructure for transport and distribution. Electricity demand grew by 8.4% between 1985 and 1997 but by only 3.4% in 1998; its share reaching 10.7% of total final energy demand against 5.6% in 1985. Consequently incremental demand since 1990, including the volume of solid fuel substituted, was satisfied mainly by oil products (48% of the overall increment), followed by electricity (26%), biomass (15%), gas (8%) and derived heat (3%).

China accounted for about 46% of the total regional final energy demand in 1998 (51% in 1990) but for only 17% of incremental demand since 1990. It was followed by India with 22% in 1998 against 21% in 1990 (31% of incremental demand) and the NICs with only 9.6% (7.6% in 1990) but 21% of incremental demand. NIC countries have been particularly affected by the financial and economic crisis, experiencing final energy demand declining by 6.6% in 1998, the bulk of the reduction being concentrated on oil products.

The transport sector has become the driving force in the growth of final energy consumption...

Growing industrial activity, combined with increasing household incomes and expanding urban populations, have led to a rising demand for transport across Asia even though the transportation sector is still underdeveloped in China and India. Motorization grew by double-digit percentages in the early and mid-1990s in many countries, as increasing prosperity resulted in more personal transport. The 1997-1999 economic recession in Southeast Asia damped the trend.

Motorization rate remained very low in the two main countries, China and India, at about 10 vehicles per thousand persons, as compared with 250 in South Korea and Taiwan. Personal motor vehicles are still a very small part of China's vehicle fleet, which consists mainly of heavy commercial vehicles. Although privately owned motor vehicles are expected to be the fastest-growing part of China's transportation sector, public transport is expected to remain the primary form of transportation for most people. The Chinese government has not addressed transportation sector issues in its economic plans for several years. To redress this lack of planning, China now intends major investment in its transportation infrastructure, including railway, road and inland waterway projects.

Like China, India has not invested extensively in its transportation infrastructure, and its future economic expansion may be slowed as a result. India does not have a well-established interconnected transportation network. Rail accounts for the greatest share of interstate transportation. Although the country has an estimated 825,000 km of paved roads and highways, 65,000 km of railways and 18,000 km of navigable channels, the roads and rail lines have not been well maintained. The railroad equipment is often outdated, and the poor condition of the roadways makes interstate motor travel difficult. In addition, urban congestion, as in many other cities of developing Asia, is growing worse, causing air pollution problems in the major cities of India, along with a general difficulty in moving through the areas.





The transportation sector underwent rapid growth in Asia in the 1990s. In fact, several countries in this region, including Vietnam, Myanmar, Nepal, Sri Lanka and Hong Kong, had growth rates of more than 10% per year on average since 1990. All other countries, with the exception of Bangladesh, Singapore and North Korea, demonstrated a growth of about 6-7% despite the stabilisation in 1998. Although the economic slowdown that began in 1997 and continued through 1998 has dampened the short-term expectations for transportation use, the transport sector will remain, in the near future, the driving force of final energy demand growth. Since 1990, the transport sector has accounted for a little less than half of total incremental final energy demand against only 16% during the 1980s. About 45% of the increase in total oil demand since 1990 has arisen in the transport sector, the energy consumption of which has grown by about 6.4% per year since 1990. Diesel oil covers 43% of the incremental transport sector consumption, gasoline 34% and kerosene only 9%.

Industrial energy consumption declined by 7.3% since 1997...

Energy demand growth in the industrial sector resulted from the region's strong economic performance. Rapid industrialisation has occurred simultaneously with economic globalisation in Asia. Indeed, a growing share of the world's industrial production now takes place within the region. Asia's share of global output, for example, which was roughly 10% in 1950 and 30% in 1995, is expected to reach 55 to 60% by 2025.

Growth in higher income economies typically involves geographical relocation rather than elimination of resource-intensive activities within the context of extended global production chains. Foreign direct investment was an important part of the industrialisation strategies of many Asian countries. Much manufacturing activity has relocated from OECD economies to the developing economies of East and South Asia. This manufacturing activity is associated with materials and pollution-intensive industries such as metal processing and leather tanning. In some cases, foreign investment involves second-generation technologies that are far less energy- and materials-efficient than those being used in OECD countries.

Consequently the share of industry in final energy demand grew significantly during the 1980s. During this decade, heavy industries were reinforcing their contribution to industrial production with a marked impact on industrial energy consumption that grew by more than 5% per year on average. Since the beginning of the 1990s, and particularly in recent years, the economic programmes of Asian countries appear to be committed to further gradual liberalisation of industrial sectors and to market orienta-

tion of the economy. In this fast-changing economic context, agriculture is losing its once high share, industry is now declining slowly in importance and services are growing rapidly.

In addition, progressive liberalisation of energy markets has favoured the alignment of energy prices with international prices. This increase in prices, coupled with increasing foreign investment, contributed to the modernisation of industrial equipment - implying better use of energy. Expansion of existing facilities, new production lines, and changes in product mix all potentially involve new investment and provide opportunities to shift to less energy- and materials-intensive technologies. New investment is not limited to large firms. Influencing the technology choices of small firms is a major opportunity for reducing energy and materials use and pollution. This explains the relative slowdown of industrial energy consumption between 1990 and 1996 with a growth limited to 3% per year on average. In the second half of 1997 an industrial slowdown occurred in many countries as a result of the financial crises and continued throughout 1998. Consequently industrial energy consumption fell by 2.1% in 1997 and 3.9% in 1998, the first declines since 1982.

In most countries, the industrial sector continued to be dominated by coal even though solids consumption declined by 16% between 1995 and 1998 under the impulse of Chinese industry. In only three years its share declined from 62%, a constant level since 1980, to 55%. Though the level of solids consumption was the same in 1998 as in 1990, oil consumption increased by 10%, gas consumption by 42%, heat consumption by 40% and electricity by 56%. This evolution reflected closely the increasing contribution of high added value industries to industrial production. As a consequence of the rapid expansion of the basic chemical industry, the consumption related to non-energy uses, mainly petrochemical feedstocks, exploded between 1990 and 1998, multiplying by 3 to reach 111 Mtoe. This recent development also accelerated oil product consumption in the region.

Household income and development of services will be the key drivers of tertiary-domestic demand...

The share of the tertiary-domestic sector in final energy consumption declined from 58% in 1980 to 51% in 1990 and 48% in 1998 given growth of both the transport sector (from 8% to 15%) and industry (from 34% to 37%). In the domestic-tertiary sector, the consumption of non-commercial biomass energy is far larger in absolute terms than the consumption of commercial energy: biomass accounted for 74% of this sector's energy consumption in 1980 and still for 66% in 1997. This consumption was mainly located in China and South Asia (India, Pakistan and Bangladesh).



National energy statistics seldom include information about traditional energy consumption with a comparable level of detail as those for commercial or conventional energy sources. Because of the difficulties associated with wood energy data collection and the decentralized nature of wood energy systems, wood energy consumption is not regularly recorded in the same way as for conventional or commercial energy sources. But the large rural population and the significant contribution of agriculture in the economies of the region indicate a still important role for traditional energy sources (fuelwood and charcoal, agricultural residues and animal dung). Fuelwood is used primarily for cooking, which accounts for at least 60% of end use energy consumption of households. The rural areas account for much of total fuelwood consumption. Household income determines fuelwood and total energy consumption to a large extent, but the pattern or degree of influence is distinct for rural and urban areas. For example, the shift to modern fuels with increasing income is more pronounced in urban areas.

As a consequence, consumption of solids, historically the second contributor to cover energy needs in the tertiary-domestic sector, has been reduced by 46% since 1990. Since 1996, oil has become the second contributor with only 13%, followed by electricity (10%), solid fuel (8%), natural gas (2%) and distributed heat (1%). Since 1980 incremental demand has been covered by: biomass (100 Mtoe), electricity (61 Mtoe), oil (60 Mtoe), natural gas (15 Mtoe) and distributed heat (5 Mtoe) while the solids contribution declined by 19 Mtoe. Energy needs of the commercial sector were mainly satisfied by oil and electricity (both 41%) and to a lesser extent by solid fuel (13%). Household income, combined with the development of services, is expected to continue to be the major determinant of both the amount of energy consumed and the choice of fuel used. Demographic trends, such as urbanisation, also affect energy use levels in the tertiary-domestic sector.

Increasing contribution of electricity, the fastest growing source of end-use energy...

The sustained growth in electricity demand reflects the very low level of consumption per capita: 807 kWh in 1998 compared to 6640 kWh in the European Union. Electricity's share in final consumption reached 10% in 1998 from 7% in 1990 and 5% in 1980. In industry, still its primary market, the share of electricity grew from 9% in 1980 to 15% in 1998. This rapid expansion was partly due to a shift toward less labour-intensive activities, modernisation of production equipment and the increased penetration of electro technologies. In the tertiary-domestic sector the contribution of electricity remained more modest, growing from only 3% in 1980 to 9% in 1998. The rapid increase in ownership of elec-

trical appliances and the continuing electrification of rural areas have both contributed to the sustained growth of electricity demand in this sector.

Solid fuels still dominated gross inland energy consumption despite an impressive contraction in China...

Gross inland energy consumption has grown in the period 1980-1997 by about 4.3% per year on average with all primary fuels contributing: natural gas by 9.2% per year on average, oil products by 5.5%, solids by 5.0% and renewable energy, mainly biomass, by 1.9%. This trend was reversed in 1998 with a decline of 3.1%, and still 2.5% in 1999, resulting from the contraction of demand generated by the economic situation. China was the major contributor to this reduction of energy consumption with a decline of gross inland energy consumption by 5.9% in 1998 and 8.4% in 1999. This fall occurred despite GDP growth of about 7% per year. Coal remained the dominant fuel in the region, bolstered by the strong growth registered since 1980 in China and India, although it has the lowest growth rate of the three major fossil fuels. But coal demand has contracted substantially since 1996 and the fall in consumption reached 18% or 181 Mtoe in only three years. This focused on the Chinese energy situation, characterised by a cut in coal consumption of more than 28% since 1996 for two main reasons: restructuring of the coal industry and growing concerns about environmental impacts. Nevertheless the contribution of coal remained important in China where its share in gross inland energy consumption reached 51% in 1999, after a peak of 62% in 1996 and a continuous increase from 52% in 1980. In the other major markets coal consumption continued to grow since 1995: + 10% in India, + 36% in South Korea and +54% in Taiwan but it declined by 20% in North Korea, the third market in importance.

Biomass consumption widely distributed inside the region...

Even though its growth rate was limited to 1.9% per year on average since 1980, renewable energy, biomass constituting the bulk of it, remains the second main contributor at a level now comparable with oil. Biomass consumption was widely distributed in the region, the major contribution being registered in countries with a large potential and limited economic development: Myanmar (86% of total energy consumption), Nepal (83%), Vietnam (66%), Sri Lanka (54%), Bangladesh (50%), India (40%), Pakistan and Indonesia (38% each). But the major consumers by far remained China (38% of regional biomass consumption) and India (36%). Fuelwood is sourced from forest and agricultural lands. Both China and India, the largest countries in the region, have not as





much forest cover as the rest of the countries in the region, but have sizeable agricultural areas (more than 50%). Of the remaining countries, only Philippines and Thailand have more than 40% agricultural areas, but their forest cover is less than 30%. Bhutan, Cambodia, Indonesia, Malaysia, and Myanmar have large forest areas, but have the smallest proportion of agricultural land. Thus, it seems that there is an inverse relationship between the size of forest and agricultural land, indicating, as it were, the competing land uses (e.g. in certain areas forests are "burned" to pave the way for farming). What should be stressed here is that forests are still an important source of fuelwood. Fuelwood production, collection practices and trends in woodfuel use will have important implications for the sustainability of forest resources. The converse is also true. The availability of trees in the forests will have significant implications on the sustainability of fuelwood demand and supply if fuelwood continues to be a key energy source for many Asian countries.

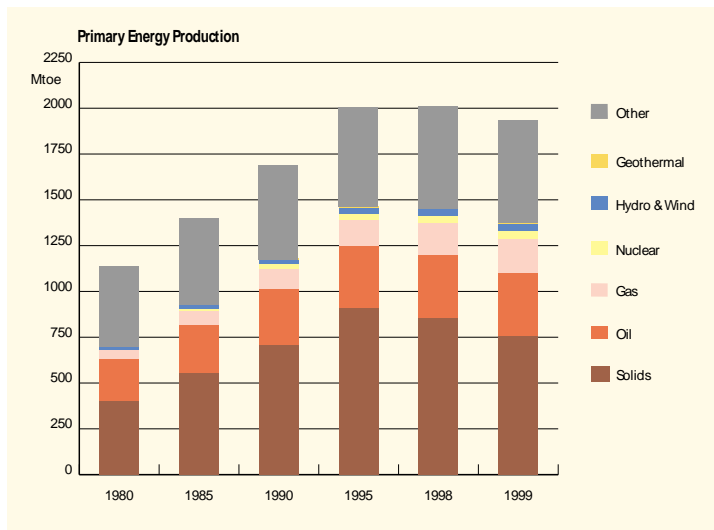
Oil and gas consumption has substituted massively for solids since 1996...

The NICs and South East Asian countries rely most heavily upon oil although natural gas consumption in some of these countries has been growing at an explosive rate. Since 1985, the region's oil consumption has increased by about 6.3% per year on average, despite a reduction of 2.7% in 1998 and a limited recovery of 3.7% in 1999. Major oil consumers were China with 33% of total regional consumption, NICs with 29% and India with 15%. For natural gas the progression was even greater, with an average growth rate of 8.8% per year since 1985. Gas consumption was concentrated in seven countries which represented more than 90% of Asian consumption: Indonesia (18%), China (15%), India (14%), Malaysia (12%), Thailand, South Korea and Pakistan (11% each). Nuclear

energy developed rapidly in the 1980s (growing over 20% per year on average) but stabilised in the early 1990s before new plants were constructed in China and South Korea after 1993. Nuclear energy contributed in only four countries: South Korea (26.9 Mtoe in 1999), Taiwan (9.9 Mtoe), China (3.8 Mtoe) and India (3.3 Mtoe). In 1999 each primary fuel contributed to gross inland consumption as follows: solid fuels with 36% (36% in 1980), oil with 28% (22% in 1980), renewables with 27% (39% in 1980), natural gas with 6% (2% in 1980) and nuclear with 2% (almost nil in 1980).

Primary energy requirements were based on indigenous sources, with the exception of increasing oil importation...

Primary energy production in Asia has evolved on the basis of indigenous energy sources, with the exception of oil which has led to growing oil imports since 1985. Solid fuels largely dominated primary production with 39% of total production in 1999 (46% in 1996, 42% in 1990 and 36% in 1980). In 1998, China and India represented about 67% (75% in 1995) and 20% (15% in 1995) respectively of the region's total production due to their large reserves (11.6% of total world reserves for China and 7.6% for India). China's coal industry, the largest world producer, is currently beset by a serious oversupply problem and the government is implementing major reforms. Large state-owned coal mines have experienced buildups of unused inventories and many of them are operating at a financial loss. A larger number of small unlicensed mines also operate, adding to the oversupply. In 1998 the government launched a large-scale effort to close down the small mines. More than 30,000 small coal mines have been closed, and the effort is continuing. As a result of the closures, depressed local coal prices have started to recover and, combined with cost-cutting measures, some of the large-scale mines have returned to profitability. In contrast to the past, China is becoming more open to foreign investment in the coal sector, particularly in modernisation of existing large-scale mines and the development of new ones. Areas of interest for foreign investment focus upon new technologies only recently introduced in China or with environmental benefits, including coal liquefaction, coal bed methane production and slurry pipeline transportation projects. Over the longer term, China plans to aggregate the large state coal mines into seven corporations by the end of 2005. In contrast, the Indian government controls almost all coal production, which has been plagued by low productivity, distribution problems, and loss of markets to higher quality, less expensive imports. Nearly all of India's 390 mines are under Coal India Ltd, which accounts for about 90% of the country's coal production. Current policy allows private mines only if they are captive operations which feed a power plant or factory.





The share of biomass decreased substantially from 38% in 1980 to 29% in 1999, as biomass production increased on average by 1.3% per year since 1980 while total primary energy production increased by 2.8% per year. The major biomass producers in 1999 were China (210 Mtoe), India (197 Mtoe), Indonesia (46 Mtoe), Pakistan and Vietnam (both 22 Mtoe). Since 1990, however, stable production in China means that biomass production has increased more rapidly in other countries, except in the NICs where its use remained negligible.

A significant increase in crude oil production is projected for many South China Sea region countries..

The share of oil decreased from 20% in 1980 to 17% in 1996 but rebounded a little since then as a consequence of the drastic reduction of solid production. But oil production's growth rate slowed down progressively since the beginning of the 1990s to be flat since 1997. China was the biggest oil producer in 1999 (161 Mtoe) followed by Indonesia (67 Mtoe), Malaysia (39 Mtoe) and India (37 Mtoe). Together these four countries account for 88% of the region's oil production. China's petroleum industry has undergone major changes in recent years. In 1998, the Chinese government reorganised most state owned oil and gas assets into two vertically integrated companies, the China National Petroleum Corporation and the China Petrochemical Corporation. Most Chinese oil production capacity, approximately 90%, is located onshore. One field, Daqing, alone accounts for more than 30% of China's production. It is a mature field and is expected to experience declining output in future years. Government priorities focus on stabilising production in the eastern regions of the country at current levels, increasing production in new fields in the west, and developing the infrastructure required to deliver western oil and gas to consumers in the east. Foreign investment has been encouraged by the Chinese in exploration and infrastructure development, provided that the Chinese partner holds a controlling interest. The main foreign firms involved include ENI, BP, Exxon, Philips Petroleum, Shell, Texaco and Mitsubishi.

Indonesia's recent oil production has remained relatively flat as introduction of crude streams from new, smaller fields has helped compensate for declines at many of the country's mature oil fields. To meet its goal of increasing production, Indonesia has stepped up efforts to sign new oil exploration contracts. The majority of Indonesia's producing oil fields is located in the central and western areas of the country. Companies producing from existing fields are investing in programmes to increase recovery rates and to prolong the life of the fields. The liberalisation of Indonesia's downstream oil and gas sector has been under discussion for several years. Broadly speaking, measures under consi-

deration centre on the termination of the state oil giant Pertamina's monopoly, and the reduction and eventual elimination of subsidies on domestic oil consumption. Pertamina plans to undertake a restructuring and downsizing programme in the hope of becoming competitive enough to survive over the long term in a deregulated industry.

As a result of declining oil reserves, Petronas, the Malaysian state oil and gas company, has embarked on an international exploration and production strategy. Currently, Petronas is investing in oil exploration and production projects in Syria, Turkmenistan, Iran, Pakistan, China, Vietnam, Burma, Algeria, Libya, Tunisia, Sudan and Angola. In 1999, Malaysia exported the majority of its oil to markets in Japan, Thailand, South Korea and Singapore. In India, low oil recovery rates are a major part of the oil supply problem. Recovery rates average only 30% in currently producing Indian fields, well below the world average. It is hoped that allowing foreign investment will bring in technology not available to Indian state firms, thereby increasing overall recovery rates. Oil producers in Far East Asia are beginning to reap the benefits of enhanced exploration and extraction technologies. A significant increase in output potential is projected for many countries (India, deep-water offshore fields in the Philippines, Vietnam, Malaysia, Papua New Guinea...).

Diversification of Asian gas production under way...

Natural gas production has increased continuously by 7.3% per year on average since 1980, to reach 181 Mtoe in 1999 or about 45% that of crude oil production. Indonesia (59 Mtoe), Malaysia (34 Mtoe), China (26 Mtoe) and India (19 Mtoe) were the four main producers responsible for this increase. Gas production has stabilised in Indonesia since 1996 but continued to grow rapidly in the three other main producers. China is becoming increasingly interested in pursuing the development of a natural gas infrastructure as it becomes more heavily dependent on crude oil imports and as the pollution problems resulting from heavy reliance on coal use worsen. Beijing is studying plans for several natural gas pipeline projects with Russia. In October 1998, China and Australia announced intentions to build China's first LNG facility to serve Southern China's Guangdong province. There are also plans to build two regasification terminals in India. First deliveries of the LNG are expected to begin in 2002. The success of these LNG projects will have an impact on the development of natural gas projects throughout India.

At the same time, the economic and financial crisis had a dampening affect on natural gas development in many Southeast Asian countries even though some large projects were still under deve-





development. In the Philippines, the Malampaya gas development project, a 504-km pipeline to transport gas from the offshore Malampaya field to Luzon Island, is in progress. Gas is scheduled to be available for use in power plants that have a total capacity of 2,700 MW in 2002. This project should meet 20 to 30% of the country's electricity needs for at least the next twenty years. Several onshore and offshore gas fields have been exploited in Vietnam to date. The Nam Con Son project, which has more than a third of total gas reserves in the country, is crucial to Vietnam's gas development. In April 1999, Memoranda of Understanding on the Nam Con Son project were signed to determine the gas price, transportation, indexing and government guarantees, and detailed negotiations are now underway between foreign companies and Vietnamese government agencies and state enterprises. In Myanmar, the Yadana project to export offshore gas to Thailand via pipeline was completed in 1998. However, gas supply from Myanmar to Thailand has been delayed as a result of Thailand's failure to install combined-cycle gas turbines as planned. In addition the Yadana and Yetagun projects to be completed in 2000 are expected to provide about 35% of incremental gas supply in Thailand by the beginning of the next century. Gas from the Yadana project was earmarked for power generation in Myanmar, but this plan has been postponed because ASEAN's investment commitment was reduced due to economic problems. In South Korea the state-owned gas importer and supplier revised downwards its projections for LNG imports.

Nuclear energy production was dominated by the NICs which accounted for 93% of total nuclear energy production in 1990 but only 84% in 1998 due to new commissioning in China and India. South Korea contributed more than 60% of Asian nuclear energy, followed by Taiwan with 23%. Increases in nuclear generating capacity are expected for all the Asian nations that currently have

nuclear power plants in operation. In China construction is underway of the next two units at the Qinshan site, 600 MWe PWRs of a Chinese design. Construction had also begun on two PWRs of French design at Lingao. Russia and China finally signed a contract for two 1000 MWe units based on a modernised Russian design. In Taiwan, two 1350 MWe advanced boiling water reactors are under construction at the Lugmen power station. In South Korea four units were still under construction as well as three units in India.

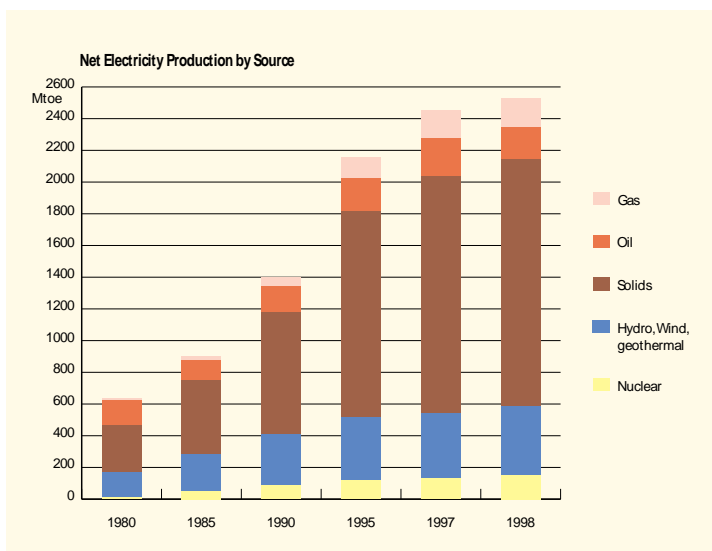
Asia represented 16.4% of world fossil fuel reserves, principally solid fuels...

In late 1999, Asian oil reserves amounted to only about 3.9% of world reserves, mostly located in China (2.3%). The oil reserves/production ratio was only 15.6 years, significantly below the world average. The situation for gas reserves was more comfortable, with about 6.0% of world reserves and a reserves/production ratio close to 39 years. Finally, coal reserves, mainly located in China (11.6%) and India (7.6%), accounted for 22.8% of world reserves. As a result of this, Asia possessed 16.4% of total world fossil fuel reserves.

Electricity generation is still dominated by solid fuels, locally available at low cost...

Electricity generation in Asia grew steadily by 8.0% per year over the period 1980-1998, though this growth rate declined progressively. In 1998 the general slowdown of the Asian economy limited the electricity production growth rate to only 3.1%. Thermal generation dominated electricity production (78% in 1998 against 72% in 1990) with nuclear and hydro accounting for 6% and 16% of total generation respectively. Solid fuels, which are widely produced across the region at low cost, dominated thermal generation of electricity. In 1998, solid fuels accounted for 78% of thermal generation (60% in 1980); oil and gas representing 10% and 9% respectively (37% and 2% in 1980). It must be stressed that the general contraction of solids consumption did not affect power generation where the supply of solid fuels still increased by 2.8% in 1997 and 3.3% in 1998. The contribution of natural gas is growing, sustained by the exploitation of indigenous resources in producing countries and by the development of IPP projects, mainly located in Southeast Asia, often associated with the importation of LNG.

The total generation capacity reached 569 GWe in 1998 and the rate of expansion was very substantial: 7.1% per year on average or about 30 GWe of new capacity per year since 1990. Conventional thermal plants dominate this market, mainly steam coal power units (the bulk of Chinese generation capacity) but





combined cycle units are being built where indigenous gas resources are available. In 1998, thermal units accounted for 74% of total generation capacity (69% in 1980), hydro and wind for 22% (29% in 1980) and nuclear for 4% (2% in 1980). In order to raise the investment capital needed to support Asia's rapid growth in electricity demand, many Asian nations have opened their markets to foreign investors. Most private investment has been limited to electricity projects typically under build-operate-transfer (BOT) or build-operate-own (BOO) arrangements. Malaysia, Indonesia, Pakistan and Thailand have favoured the BOO approach, whereas China and the Philippines have favoured BOT arrangements. Between 1990 and 1997, foreign participation was involved in 57% of the total investment in the region's generation projects.

The economic downturn will no doubt have some negative impact also on near-term development of renewable projects. However long-term projects begun before the crisis, such as China's Three Gorges Dam, have continued for the most part on schedule. Asia remains one region where large-scale hydroelectric projects are still being pursued, despite the controversy that usually surrounds them. In China, about 20 GWe of other hydroelectric projects are currently under construction in addition to the 18 GWe Three Gorges Dam on the Yangtse River. In spite of the large potential for hydroelectric development in India, the environmental issues and high costs involved have until now limited projects to 11.3 GWe of new hydro capacity. Major projects were also under construction in Myanmar, Indonesia and Laos. India is one of the world's largest producers of wind energy but the market stagnated in 1997-98 largely because of difficulties in securing finance for new developments.

Negative effects of economic crisis on power sector liberalisation...

Asian power markets are slowly transforming as restructuring and introduction of competition in the power sector becomes more of an issue. However, the speed and political commitment to liberalisation and market opening varies considerably among countries in the Asian region. Most Asian countries are still at an early stage of market liberalisation, and power reform in the largest countries, China and India, is progressing slowly. Although reform initiatives have been under way in most Asian countries, following the recent economic and financial crisis, governments in the region have become even more cautious. The Asian economic crisis has had a variety of negative effects on a number of projects, mainly located in Indonesia, Thailand and Malaysia. First, the reduced rate of economic growth has slowed electricity consumption, undermining the need for capacity expansion. Second, the crisis also led to a sharp drop in currency values, effectively raising the cost of imported fuels. Third, many of the foreign investments are to be

paid back in foreign currencies against which many of the region's currencies have depreciated. In total an estimated 11 GWe of new capacity has recently been postponed or cancelled. Some countries, such as Malaysia, have delayed plans to break up vertically integrated power utilities and further deregulate the market. Consequently, most Asian power markets will continue to be dominated by vertically integrated utilities which enjoy market power; and the vast majority of commercial and domestic customers in the Asian region will be unable to benefit from competition for some years to come.

Development of electricity interconnection in progress...

The availability of private capital has enabled governments to propose ambitious projects within the framework of two regional trade blocs: the Association of Southeast Asian Nations (ASEAN) and the South Asian Association of Regional Co-operation (SAARC). The creation of an ASEAN electricity grid suffered a setback in the wake of the regional crisis, although three out of nine priority projects had been completed as of July 1999. The construction of an ambitious submarine link between Sarawak and Peninsular Malaysia was cancelled in 1998, while the demand slowdown in Thailand has delayed the construction of export-oriented generation facilities and associated transmission links in Laos and Myanmar. Plans for the creation of a SAARC power grid were officially proposed for the first time in early 1998, with the aim of alleviating power supply problems and optimising infrastructure development across South Asia. The first concrete step is the construction of a link between Pakistan and India, commencing in mid-1999.

Refinery expansion programmes under way to meet increasing domestic oil products demand...

In 1999 **the refinery capacity** (13.8 millions barrels per day) represented 16.9% of world capacity (7.6% in 1980). Since 1990, the capacity has grown by 6.0% per year largely under China's leadership (+6.3% per year). In 1999 China represented about 36% of the total refinery capacity of the region, against 30% in 1980. Infrastructure development in China centres primarily on upgrading existing refineries rather than building new ones, due to current overcapacity. In the late 1990s, the Chinese government shut down many small topping plants, which generally made inferior quality petroleum products. A major issue in the Chinese downstream sector is the lack of adequate refining capacity suitable for heavier Middle Eastern crude, which will become a necessity as Chinese import demand rises in the medium-term future. The construction of adequate refining capacity to keep up with growing oil demand is of great economic importance to South Asia. Each South Asian country is proceeding with refinery construc-





tion plans. India has more than 1 million bbl/d of new refining capacity in various stages of development. The largest project, the Reliance Industries refinery at Jamnagar, came partially on stream in late summer 1999, and will have a final capacity of 540,000 bbl/d. Most of this capacity is scheduled for completion by 2002. The 100,000 bbl/d "Pak-Arab" refinery in Pakistan came online in late 2000, helping alleviate the country's refined products dependence. Petronet India, a company created in early 1998 as part of an agreement among India's three government-owned refineries (IOC, Hindustan Petroleum, and Bharat Petroleum) is building product pipelines that will add about 500,000 bbl/d to current pipeline capacity of about 325,000 bbl/d (all operated by IOC). Completion of these projects will shift the main transportation mode for petroleum products from rail to pipeline. Since 1990, South Korean refinery capacity has increased by 189%, China's by 74%, and all other Asian countries together by 34%. At the same time, the utilisation rate of the refineries increased from 79% in 1990 to 83% in 1999, consistent with the world average but well below the performance registered in 1997 (92%).

COMPETITIVENESS

Marked by impressive Chinese achievement, energy intensity has improved by 3.1% per year since 1980...

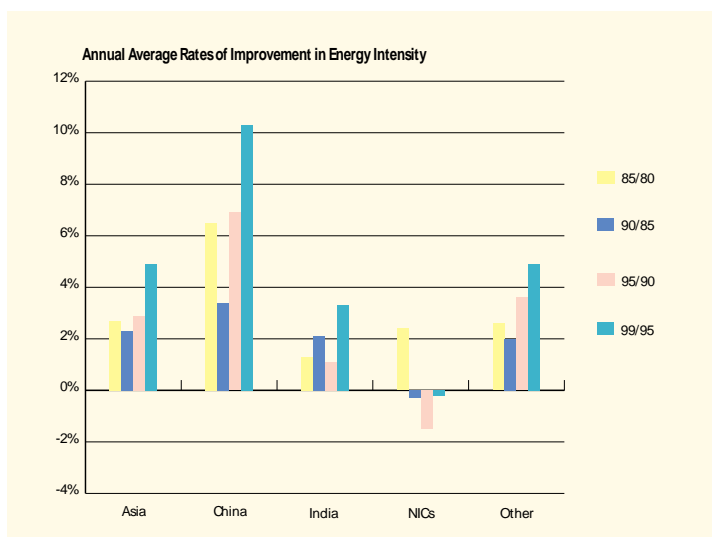
The **energy intensity** indicator for the region has improved significantly (by about -3.1% per year on average) since 1980 and this trend has accelerated since the early 1990s with an impressive gain in the last two years: -4.3% in 1998 and -8.4% in 1999. This trend was mainly sustained by the Chinese improvement observed since 1980 (-6.6% per year on average) reinforced by the performance in 1998 (-12.7%) and in 1999 (-14.5%). Other Asian

countries also registered significant improvements since 1980: Vietnam (-3.1% on average), India and Sri Lanka (-1.9%), Myanmar (-1.8%), Nepal (-1.6%), Indonesia (-1.5%), Taiwan (-1.3%) and Pakistan (-1.6%). However, energy intensities in some other developing countries, such as Malaysia, Philippines, Singapore and Hong Kong, have increased since 1980. Apart from the CIS, China currently has an energy intensity that is amongst the highest in the world but the gap between China and both industrialised and developing countries was diminishing rapidly. Though China was 18 times more energy intensive than the European Union in 1980, this ratio had declined to 12 in 1990 and 6 in 1999. But the Asian region presents widely differing patterns as the energy intensity of the NICs was close to that of the United States in 1996 and some 85% higher than that of the European Union.

...But Chinese performance remained questionable

Several authorities have questioned the exceptionally rapid decrease of China's energy intensity. The World Bank, along with a number of other sources, claims that official statistics tend to underestimate the level of national income mainly for the following reasons: official statistics for some service sectors are still weak; the national accounting system provides incomplete coverage of the national economy; and the added value of agriculture is underestimated. In addition inflation rates have been underestimated and real economic growth rates overestimated in official Chinese statistics. This explains the very high energy intensity observed for China in the early 1980s. Using the GDP estimates of the World Bank for energy intensity calculations provides a "more typical" picture: then China's commercial energy intensity decline between 1980 and 1995 falls to -3.4% per year. Recently, this hesitation was reinforced by the great uncertainty concerning the possible level of coal consumption in China in 1998 and 1999.

The continual improvement of energy intensity has been mainly sustained, at both the regional and Chinese level, by the tertiary-domestic sector (-58% since 1980) in spite of improving standards of living both in cities and rural zones, and by the industrial sector (-45% since 1980) notwithstanding the rapid industrialisation of

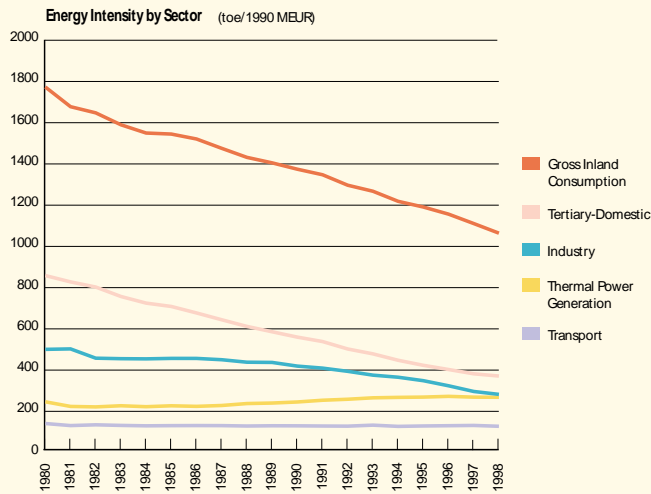


ASIA : ENERGY INTENSITY

toe/1990 MEUR	1980	1985	1990	1997	1998	1999 (1)
ASIA	1768.5	1539.2	1367.9	1102.7	1056.0	968.2
China	5130.2	3662.3	3073.6	1868.0	1630.5	1394.2
India	1690.0	1579.1	1421.8	1258.4	1213.0	1174.1
NICs	438.7	388.9	395.0	439.9	434.2	428.3
Other	2299.9	2013.0	1822.4	1389.5	1312.1	1238.8
European Union	285.5	271.7	248.2	238.3	236.1	231.3

(1) Estimates





the region. On the other hand, the contribution of transport remained stable but, as is often the case for developing economies, increased personal wealth has resulted in the desire for more individual and comfortable means of transport. This will prove a major challenge in the future. Many of the countries in the region, including China and India, still have very low levels of per capita motorisation as the average level of the region was only 18 vehicles per thousand persons in 1997. Because the region accounts for a substantial share of the world's population, however, even the smallest rise in per capita vehicle ownership, and consequently fuel use, will have a very significant impact on the evolution of sectoral and total energy intensity. Finally the weight of power generation was increasing, but to a limited extent, as the share of electricity in final demand rose continuously, and also due to the thermal inefficiency of the power sector.

Energy consumption per capita reached only 18% of the European level, with large variations inside the region...

The gross inland consumption per capita increased by 51% between 1980 and 1996 but remained at the rather low level of 0.75 toe/capita - only 18% of the European Union level. As a result of the financial and economic crisis, gross inland consumption per capita declined by 4.5% in 1998 and 3.9% in 1999 for the region as a whole with reductions above 4.5% in China, Singapore, South Korea and Myanmar. This indicator demonstrated large variations between countries. The NICs' consumption per capita progressively approached the EU level at about 3.8 toe/capita with a regional peak in Singapore where consumption reached 7.4 toe/capita. Southeast Asia, including China, ranged from 2.2 to 0.4 toe/capita and the poorest countries, such as Bangladesh or Myanmar, only reached 0.2-0.3 toe/capita.

ENVIRONMENT

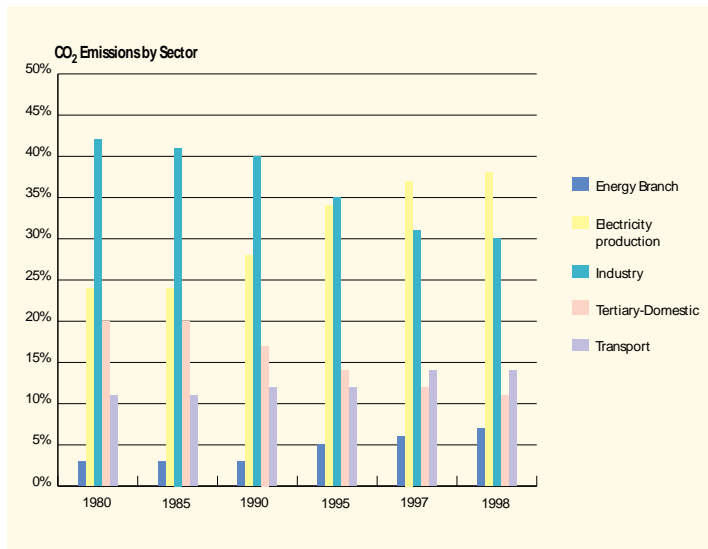
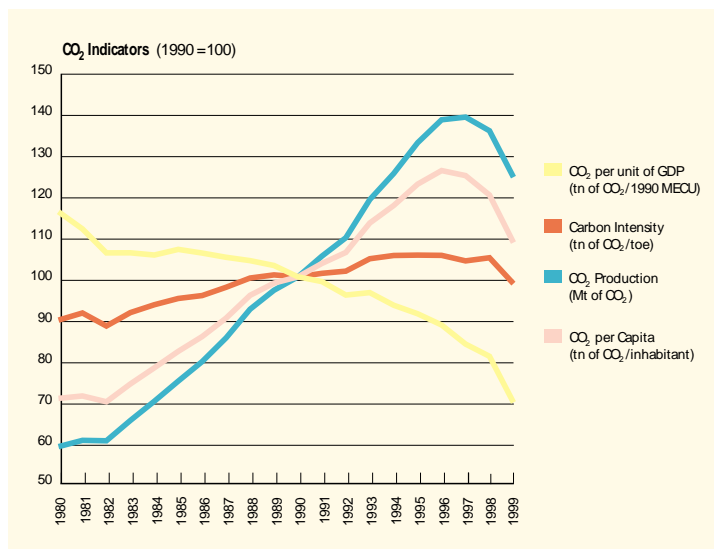
Environmental degradation is a constraint on future growth within the Asia and Pacific region and a barrier to efforts to eradicate severe poverty. Prospects for a sustainable future in the region remain clouded with uncertainty if the driving forces that are causing the deterioration of the environment continue on a destructive trajectory. Environmental quality cannot be achieved by addressing only isolated symptoms. Prescriptions for change must be aimed at the behaviour, governance, economic fundamentals and development of integrated approaches that will have lasting impacts on the root causes of environmental degradation. Many powerful driving forces of change in the Asian region are neither inherently good nor bad for the environment. The environmental impacts of intensified international flows of capital and technology, for example, depend very much on the energy, materials, and pollution intensity of the technologies involved, from power plants to industrial machinery. Environmental outcomes depend on how these driving forces of change are channelled and harnessed to achieve different societal ends. The driving forces underlying patterns of poor environmental quality and extensive environmental degradation in the Asia and Pacific region include the following:

- A growing population that demands more energy, materials and ecosystem services
- Extensive urbanisation and industrialisation
- Income growth, unequal distribution of wealth, and widespread poverty
- Use of technologies based on inefficient energy and material use generating and releasing excessive waste
- Lack of participation of civil society and the private sector, and forms of governance that exclude the majority of stakeholders
- Weak institutions and inappropriate policies that promote inefficiencies and fail to capture the externalities of economic activity

CO₂ emissions declined by 10.4% since 1997 but have still increased by 25% since 1990...

CO₂ emissions were increasing continuously until 1997 (5403 Mt of CO₂ in 1997, compared to 3883 Mt in 1990 and 2281 Mt in 1980), resulting in a 39% rise since 1990. The reduced energy consumption observed in 1998 and 1999, caused by the economic crisis, led to a decline of CO₂ emissions by 2.4% in 1998 and 8.2% in 1999. As the increasingly dominant position of solid fuels induced until recently an increase in the carbon intensity of fossil fuels, emissions increased 16% more rapidly than gross inland energy consumption between 1990 and 1997. Consequently, the share of Asia in total world CO₂ emissions has doubled since 1980,





increasing from 12.5% to 25%. This share was declining in 1998 and 1999 but all indicators suggest that this trend will only be temporary. With the rebound of Asian economies the historical trend will again return. This evolution must nevertheless be compared with other indicators. Per capita CO₂ emissions stemming from higher standards of living increased by 3.7% between 1980 and 1996, with a more sustained growth since 1990. Since then, this ratio has declined 14%. CO₂ intensity per unit of GDP declined by only 2.0% per year on average since 1980, with a marked acceleration during the 1990s.

China and India accounted respectively for 54% and 17% of Asian CO₂ emissions. Given the emergence of South East Asian countries the share of China was diminishing regularly. Between 1990 and 1998 CO₂ emissions growth was greatest in Thailand (+8.6% per year on average) followed by: Malaysia (8.2%), Bangladesh (7.4%), Pakistan (6.8%), Hong Kong (6.4%), India, South Korea and Indonesia (6.1% each). Compared to them, China increased its emissions by only 4% per year on average. In all developing Asia, air quality deterioration and pollution from the growing use of coal as a fuel is expected to worsen, especially as much additional coal-fired power capacity is put on stream, unless adequate regulatory measures are built-in from the design stage.

The power sector became the largest contributor in 1996, pushed by the rapid increase of electricity demand...

Looking at sectoral CO₂ emissions at the regional level, the power sector, mainly based on solids, just overtook industry in 1996, its share reaching 38% in 1998 having increased continuously since 1980 (24%). This is the consequence of both the growing demand for electricity and the low conversion efficiencies of old power plant units. On the other hand, the share of industry, now the second contributor, declined steadily with 30% of total emissions

in 1998 against 42% in 1980. The tertiary-domestic sector, where renewable energy continued to make a significant contribution, reduced its share of emissions from 20% in 1980 to only 11% in 1998 though its emissions volume increased by about 32% over this period. This result is clearly influenced by the rapid decline of coal consumption in the Chinese domestic sector since 1997. More significantly, the CO₂ emissions growth rate of this sector declined continuously from 5.3% per year on average between 1980 and 1985 to only 0.7% per year on average between 1990 and 1996 before marked declines in 1998 (-2.1%) and 1999 (-10.0%). The contribution of the transport sector has increased slowly since 1980, from 11% of total emissions to 14% though transport's total emissions have multiplied by 2.8 since 1980.

GLOBAL MARKETS

Regional energy dependency increased steadily but remained low even though oil dependency exceeded 50%...

With an energy dependency in 1998 of about 14%, Asia is increasingly a net importer of energy. This is true for oil (net imports of 315 Mtoe, supplied mainly by the Middle East) and solid fuels (net imports of 28 Mtoe). But Asia remained a net exporter of natural gas (about 37 Mtoe a year since 1990). Natural gas exports accounted for 31% of indigenous production in 1990, but this share fell to 21% in 1998 in line with increasing indigenous consumption. Exports consisted mainly of LNG to Japan. At a national level, this broad picture differs widely. China, with an overall energy dependence near zero, is a net exporter of solid fuels with increasing volumes over the last few years but has become a net importer of oil since 1993. Oil imports represented about 23% of its oil consumption in 1999 and this share was increasing steadily. Due to the refinery deficit for processing heavy crude oil,





imports of oil products have increased, and represented about two thirds of oil imports in 1998. Crude oil was mainly imported from the Middle East region, but oil products were supplied mainly from regional refineries. India remained a net importer of all commercial energy sources except natural gas, with oil accounting for 80% of total energy imports in 1999. The NICs, without significant fossil fuel reserves, are all major net energy importers. Indeed, they depended on foreign supplies for 94% of their gross inland consumption in 1999, the remainder being supplied mainly by nuclear power. The situation of other developing Asian countries was a little more complex. Their apparent net export balance resulted in fact from a balancing of their oil imports (14 Mtoe in 1999) by their exports of coal (30 Mtoe) and natural gas (59 Mtoe).





ASIA : SUMMARY ENERGY BALANCE											
Mtoe	1980	1985	1990	1997	1998	1999(2)	85/80	90/85	97/90	98/97	99/98
							Annual % Change				
Primary Production	1139.2	1404.7	1693.6	2081.5	2016.3	1941.4	4.3%	3.8%	3.0%	-3.1%	-3.7%
Solids	403.5	555.4	709.4	937.4	858.4	758.9	6.6%	5.0%	4.1%	-8.4%	-11.6%
Oil	228.2	263.3	305.3	341.9	342.3	342.8	2.9%	3.0%	1.6%	0.1%	0.2%
Natural gas	48.3	75.4	109.4	172.2	175.0	187.4	9.3%	7.7%	6.7%	1.6%	7.1%
Nuclear	3.8	13.2	24.0	36.0	39.7	44.0	28.2%	12.7%	6.0%	10.1%	10.9%
Hydro & Wind	13.3	18.8	25.7	31.9	34.0	36.4	7.2%	6.5%	3.1%	6.7%	7.2%
Geothermal	1.8	4.4	5.7	8.5	9.9	9.9	19.9%	5.0%	5.9%	17.1%	-0.6%
Other	440.4	474.1	514.2	553.7	557.0	562.1	1.5%	1.6%	1.1%	0.6%	0.9%
Net Imports	18.2	-1.3	84.6	303.4	280.4	302.8	-	-	20.0%	-7.6%	8.0%
Solids	6.9	23.5	29.4	24.1	22.0	28.1	27.7%	4.6%	-2.8%	-8.4%	27.4%
Oil	29.6	5.7	89.8	315.2	294.5	314.5	-28.0%	73.5%	19.6%	-6.6%	6.8%
Crude oil	21.9	12.3	66.3	257.5	244.3	na	-10.9%	40.1%	21.4%	-5.1%	na
Oil products	7.7	-6.6	23.5	57.8	50.2	na	-	-	13.7%	-13.2%	na
Natural gas	-18.4	-30.6	-34.7	-36.0	-36.2	-40.3	10.7%	2.6%	0.5%	0.7%	11.0%
Electricity	0.0	0.1	0.0	0.1	0.2	0.5	11.1%	-5.9%	11.3%	58.9%	245.0%
Gross Inland Consumption	1148.3	1378.2	1748.7	2337.2	2265.3	2210.7	3.7%	4.9%	4.2%	-3.1%	-2.4%
Solids	412.1	558.6	730.7	952.4	883.9	786.9	6.3%	5.5%	3.9%	-7.2%	-11.0%
Oil	247.1	264.2	373.8	619.0	601.9	624.1	1.3%	7.2%	7.5%	-2.8%	3.7%
Natural gas	29.9	44.8	74.6	135.8	138.8	147.2	8.4%	10.7%	8.9%	2.2%	6.0%
Other (1)	459.2	510.5	569.6	630.0	640.7	652.5	2.1%	2.2%	1.5%	1.7%	1.8%
Electricity Generation in TWh	634.1	905.3	1404.6	2459.5	2537.0	na	7.4%	9.2%	8.3%	3.1%	na
Nuclear	14.7	50.8	92.2	138.2	152.2	na	28.2%	12.7%	6.0%	10.1%	na
Hydro & wind	154.3	218.3	298.3	369.7	394.9	na	7.2%	6.4%	3.1%	6.8%	na
Thermal	465.1	636.3	1014.1	1951.7	1989.9	na	6.5%	9.8%	9.8%	2.0%	na
Generation Capacity in GWe	157.3	231.8	327.4	552.8	568.6	na	8.1%	7.1%	7.8%	2.9%	na
Nuclear	2.9	9.5	14.5	20.0	21.8	na	27.1%	8.8%	4.7%	8.8%	na
Hydro & wind	47.9	64.1	82.2	118.5	124.6	na	6.0%	5.1%	5.4%	5.2%	na
Thermal	106.6	158.3	230.8	414.3	422.3	na	8.2%	7.8%	8.7%	1.9%	na
Average Load Factor in %	46.0	44.6	49.0	50.8	50.9	na	-0.6%	1.9%	0.5%	0.3%	na
Fuel Inputs for Thermal Power Generation	150.8	192.9	299.1	544.3	551.1	na	5.0%	9.2%	8.9%	1.2%	na
Solids	94.2	141.2	226.9	418.6	432.2	na	8.4%	10.0%	9.1%	3.3%	na
Oil	51.9	39.6	48.1	66.5	56.7	na	-5.2%	3.9%	4.7%	-14.7%	na
Gas	3.0	7.7	18.4	50.8	52.3	na	20.6%	19.2%	15.6%	2.9%	na
Geothermal	1.8	4.4	5.7	8.5	9.9	na	19.9%	5.0%	5.9%	17.1%	na
Other	0.0	0.0	0.0	0.0	0.0	na	-	-	-	-	na
Average Thermal Efficiency in %	26.5	28.4	29.2	30.8	31.1	na	1.4%	0.6%	0.8%	0.7%	na
Non-Energy Uses	21.9	26.3	38.7	110.2	110.8	na	3.7%	8.0%	16.1%	0.5%	na
Total Final Energy Demand	954.3	1129.5	1370.9	1634.0	1602.4	na	3.4%	4.0%	2.5%	-1.9%	na
Solids	293.0	380.7	454.4	429.0	393.4	na	5.4%	3.6%	-0.8%	-8.3%	na
Oil	155.8	181.1	262.9	414.8	406.5	na	3.1%	7.7%	6.7%	-2.0%	na
Gas	13.1	20.9	26.9	46.5	49.2	na	9.7%	5.2%	8.1%	5.7%	na
Electricity	44.7	63.6	97.7	166.6	172.3	na	7.3%	9.0%	7.9%	3.4%	na
Heat	7.4	9.1	14.8	23.4	24.0	na	4.3%	10.1%	6.8%	2.6%	na
Other	440.3	474.0	514.2	553.7	557.0	na	1.5%	1.6%	1.1%	0.6%	na
CO2 Emissions in Mt of CO2	2280.5	2898.0	3883.6	5402.9	5274.4	4839.4	4.9%	6.0%	4.8%	-2.4%	-8.2%
Indicators											
Population (Million)	2314.0	2530.1	2774.8	3091.1	3135.7	3181.3	1.8%	1.9%	1.6%	1.4%	1.5%
GDP (index 1985=100)	72.5	100.0	142.8	236.7	239.6	255.0	6.6%	7.4%	7.5%	1.2%	6.4%
Gross Inl Cons./GDP (toe/1990 MEUR)	1768.5	1539.2	1367.9	1102.7	1056.0	968.2	-2.7%	-2.3%	-3.0%	-4.2%	-8.3%
Gross Inl Cons./Capita (toe/inhabitant)	0.50	0.54	0.63	0.76	0.72	0.69	1.9%	3.0%	2.6%	-4.5%	-3.8%
Electricity Generated/Capita (kWh/inhabitant)	274	358	506	796	809	na	5.5%	7.2%	6.7%	1.7%	na
CO2 Emissions/Capita (t of CO2/inhabitant)	1.0	1.1	1.4	1.7	1.7	1.5	3.1%	4.1%	3.2%	-3.8%	-9.6%
Import Dependency %	1.6	-0.1	4.8	12.8	12.2	13.6	-	-	15.1%	-4.7%	11.2%

(1) Includes nuclear, hydro and wind, net imports of electricity, and other energy sources.

(2) Estimates





ASIA : MAIN INDICATORS

	1980	1985	1990	1995	1997	1998	85/80	90/85	95/90	97/95	98/97
	Annual % Change										
Gross Inland Consumption (Mtoe)	1148.3	1378.2	1748.7	2203.0	2337.2	2265.3	3.7%	4.9%	4.7%	3.0%	-3.1%
Public Thermal Power Generation	143.7	181.2	283.0	448.3	508.6	511.8	4.7%	9.3%	9.6%	6.5%	0.6%
Autoprod. Thermal Power Generation	5.4	7.3	10.4	23.1	27.4	29.4	6.3%	7.3%	17.3%	8.9%	7.6%
Energy Branch	30.9	38.8	55.4	106.8	134.1	136.7	4.6%	7.4%	14.0%	12.1%	1.9%
Final Energy Consumption	948.0	1122.8	1362.0	1595.8	1623.3	1591.9	3.4%	3.9%	3.2%	0.9%	-1.9%
Industry	313.9	393.6	513.8	620.0	595.1	577.9	4.6%	5.5%	3.8%	-2.0%	-2.9%
Transport	80.1	101.6	144.1	208.6	243.2	237.3	4.9%	7.2%	7.7%	8.0%	-2.4%
Tertiary-Domestic	554.0	627.6	704.1	767.2	785.0	776.7	2.5%	2.3%	1.7%	1.2%	-1.1%
Energy Intensity (toe/1990 MEUR)	1768.5	1539.2	1367.9	1183.6	1102.7	1056.0	-2.7%	-2.3%	-2.9%	-3.5%	-4.2%
Public Thermal Power Generation	221.3	202.4	221.4	240.9	240.0	238.6	-1.8%	1.8%	1.7%	-0.2%	-0.6%
Autoprod. Thermal Power Generation	8.3	8.1	8.1	12.4	12.9	13.7	-0.3%	7.0%	3.8%	8.3%	8.3%
Industry	483.4	439.6	401.9	333.1	280.8	269.4	-1.9%	-1.8%	-3.7%	-8.2%	-4.0%
Transport	123.4	113.5	112.7	112.1	114.7	110.6	-1.7%	-0.1%	-0.1%	1.2%	-3.6%
Tertiary-Domestic	853.2	700.9	550.8	412.2	370.4	362.1	-3.9%	-4.7%	-5.6%	-5.2%	-2.2%
Energy per Capita (Kgoe/inhabitant)	496	545	630	734	756	722	1.9%	3.0%	3.1%	1.5%	-4.5%
Industry	136	156	185	206	193	184	2.8%	3.5%	2.2%	-3.4%	-4.3%
Transport	35	40	52	69	79	76	3.0%	5.3%	6.0%	6.4%	-3.8%
Tertiary-Domestic	239	248	254	256	254	248	0.7%	0.5%	0.1%	-0.3%	-2.5%
Electricity Share (%)											
Final Energy Consumption	4.7%	5.7%	7.2%	9.1%	10.3%	10.8%	3.7%	4.8%	4.9%	6.2%	5.4%
Industry	9.4%	10.4%	11.7%	13.6%	15.7%	16.3%	2.0%	2.4%	3.1%	7.3%	3.8%
Transport	0.6%	0.9%	1.0%	0.8%	1.1%	1.1%	8.1%	1.5%	-3.8%	14.6%	4.1%
Tertiary-Domestic	2.6%	3.5%	5.1%	7.7%	9.0%	9.7%	5.6%	8.3%	8.4%	8.0%	8.0%
Total Renewable Consumption (Mtoe)	455.4	497.2	545.6	581.8	593.9	600.9	1.8%	1.9%	1.3%	1.0%	1.2%
Hydro	13.3	18.8	25.7	31.8	31.8	34.0	7.2%	6.4%	4.4%	0.1%	6.8%
Biomass	440.3	474.0	514.2	542.8	553.6	556.9	1.5%	1.6%	1.1%	1.0%	0.6%
Other	1.8	4.4	5.7	7.2	8.5	10.0	19.9%	5.1%	4.8%	9.1%	16.5%
Renewable intensity (toe/1990 MEUR)	701.3	555.3	426.7	312.6	280.2	280.1	-4.6%	-5.1%	-6.0%	-5.3%	0.0%
Renewable per capita (Kgoe/inhabitant)	196.8	196.5	196.6	193.8	192.1	191.6	0.0%	0.0%	-0.3%	-0.4%	-0.3%
CO2 Emissions (Mt of CO2)	2280.5	2898.0	3883.6	5158.9	5402.9	5274.4	4.9%	6.0%	5.8%	2.3%	-2.4%
Public Thermal Power Generation	517.7	669.3	1048.0	1660.2	1876.3	1896.0	5.3%	9.4%	9.6%	6.3%	1.1%
Autoprod. Thermal Power Generation	20.0	27.4	38.9	86.7	102.7	110.3	6.5%	7.2%	17.4%	8.9%	7.3%
Energy Branch	78.2	94.4	134.0	259.4	344.8	347.8	3.8%	7.3%	14.1%	15.3%	0.9%
Industry	951.9	1195.6	1540.9	1813.1	1663.9	1590.8	4.7%	5.2%	3.3%	-4.2%	-4.4%
Transport	257.8	322.8	449.1	640.0	744.6	726.1	4.6%	6.8%	7.3%	7.9%	-2.5%
Tertiary-Domestic	454.9	588.6	672.8	698.3	669.6	602.4	5.3%	2.7%	0.7%	-2.1%	-10.0%
Carbon Intensity (tn of CO2/toe)	2.0	2.1	2.2	2.3	2.3	2.3	1.1%	1.1%	1.1%	-0.6%	0.7%
Public Power Generation	3.2	3.1	3.1	3.2	3.2	3.2	-0.7%	0.1%	0.6%	0.2%	-0.7%
Public Thermal Power Generation	3.6	3.7	3.7	3.7	3.7	3.7	0.5%	0.0%	0.0%	-0.2%	0.4%
Autoprod. Power Generation	3.7	3.8	3.7	3.8	3.8	3.7	0.2%	-0.2%	0.2%	-0.1%	-0.2%
Autoprod. Thermal Power Generation	3.7	3.8	3.8	3.8	3.8	3.7	0.1%	-0.1%	0.0%	-0.1%	-0.2%
Energy Branch	2.5	2.4	2.4	2.4	2.6	2.5	-0.8%	-0.1%	0.1%	2.9%	-1.0%
Industry	3.0	3.0	3.0	2.9	2.8	2.8	0.0%	-0.3%	-0.5%	-2.2%	-1.6%
Transport	3.2	3.2	3.1	3.1	3.1	3.1	-0.2%	-0.4%	-0.3%	-0.1%	-0.1%
Tertiary-Domestic	0.8	0.9	1.0	0.9	0.9	0.8	2.7%	0.4%	-1.0%	-3.2%	-9.1%
CO2 per Capita (kg of CO2/inhabitant)	986	1145	1400	1718	1748	1682	3.1%	4.1%	4.2%	0.9%	-3.8%
Industry	411	473	555	604	538	507	2.8%	3.3%	1.7%	-5.6%	-5.8%
Transport	111	128	162	213	241	232	2.7%	4.9%	5.7%	6.3%	-3.9%
Tertiary-Domestic	197	233	242	233	217	192	3.4%	0.8%	-0.8%	-3.5%	-11.3%
CO2 per unit of GDP (tn of CO2/1990 MEUR)	3512	3237	3038	2772	2549	2459	-1.6%	-1.3%	-1.8%	-4.1%	-3.5%
Public Thermal Power Generation	797	747	820	892	885	884	-1.3%	1.9%	1.7%	-0.4%	-0.2%
Autoprod. Thermal Power Generation	31	31	30	47	48	51	-0.2%	-0.1%	8.9%	2.0%	6.1%
Energy Branch	120	105	105	139	163	162	-2.6%	-0.1%	5.9%	8.0%	-0.3%
Industry	1466	1335	1205	974	785	742	-1.9%	-2.0%	-4.2%	-10.2%	-5.5%
Transport	397	361	351	344	351	338	-1.9%	-0.5%	-0.4%	1.1%	-3.7%
Tertiary-Domestic	701	657	526	375	316	281	-1.3%	-4.3%	-6.5%	-8.2%	-11.1%





NICS : SUMMARY ENERGY BALANCE											
Mtoe	1980	1985	1990	1997	1998	1999(2)	85/80	90/85	97/90	98/97	99/98
							Annual % Change				
Primary Production	18.0	27.7	33.9	35.4	39.1	43.1	9.0%	4.1%	0.6%	10.4%	10.2%
Solids	10.2	11.5	8.2	2.1	2.0	1.9	2.5%	-6.5%	-17.8%	-3.8%	-3.4%
Oil	0.2	0.2	0.2	0.5	0.4	0.4	2.5%	-4.8%	16.2%	-14.8%	0.0%
Natural gas	1.6	1.1	1.1	0.7	0.7	0.7	-7.5%	-0.3%	-5.9%	2.3%	0.0%
Nuclear	3.0	11.9	22.3	29.5	32.9	36.8	31.2%	13.5%	4.1%	11.3%	11.8%
Hydro & Wind	0.4	0.9	1.3	1.1	1.3	1.2	16.6%	6.6%	-1.3%	14.9%	-7.7%
Geothermal	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-
Other	2.6	2.1	0.9	1.4	1.7	2.0	-4.1%	-16.4%	7.4%	20.2%	16.5%
Net Imports	70.5	81.6	148.1	283.6	271.5	280.2	3.0%	12.6%	9.7%	-4.3%	3.2%
Solids	8.1	22.7	33.1	57.8	60.3	64.8	22.8%	7.8%	8.3%	4.2%	7.6%
Oil	62.4	59.0	111.7	204.2	190.1	191.4	-1.1%	13.6%	9.0%	-6.9%	0.7%
Crude oil	74.4	73.6	108.6	213.1	203.9	na	-0.2%	8.1%	10.1%	-4.3%	na
Oil products	-12.0	-14.6	3.1	-8.9	-13.8	na	4.1%	-	-	55.2%	na
Natural gas	0.0	0.0	3.4	21.0	20.5	23.4	-	-	29.4%	-2.0%	14.1%
Electricity	0.0	-0.1	-0.2	0.6	0.6	0.5	22.6%	10.5%	-	-2.2%	-15.3%
Gross Inland Consumption	83.2	104.0	164.5	290.4	281.1	298.5	4.6%	9.6%	8.5%	-3.2%	6.2%
Solids	17.3	32.7	41.1	58.2	62.0	66.8	13.6%	4.7%	5.1%	6.7%	7.6%
Oil	58.3	55.4	94.6	178.2	161.2	167.1	-1.0%	11.3%	9.5%	-9.6%	3.7%
Natural gas	1.6	1.1	4.5	21.2	21.4	24.1	-7.5%	33.0%	24.9%	0.7%	13.0%
Other (1)	6.0	14.8	24.3	32.7	36.5	40.5	19.6%	10.5%	4.3%	11.6%	10.9%
Electricity Generation in TWh	99.5	142.8	242.8	453.2	461.5	na	7.5%	11.2%	9.3%	1.8%	na
Nuclear	11.7	45.5	85.8	113.4	126.2	na	31.2%	13.5%	4.1%	11.3%	na
Hydro & wind	4.9	10.6	14.5	12.4	14.8	na	16.6%	6.6%	-2.3%	19.5%	na
Thermal	82.9	86.7	142.5	327.4	320.5	na	0.9%	10.4%	12.6%	-2.1%	na
Generation Capacity in GWe	23.8	43.1	52.6	91.9	96.9	na	12.6%	4.1%	8.3%	5.4%	na
Nuclear	1.9	8.0	12.8	15.5	17.2	na	33.9%	9.8%	2.8%	11.4%	na
Hydro & wind	2.8	4.9	5.1	7.7	7.8	na	11.8%	0.9%	6.0%	1.7%	na
Thermal	19.2	30.2	34.7	68.7	71.8	na	9.5%	2.8%	10.3%	4.5%	na
Average Load Factor in %	47.7	37.8	52.7	56.3	54.4	na	-4.5%	6.9%	0.9%	-3.4%	na
Fuel Inputs for Thermal Power Generation	18.6	19.2	32.6	70.1	67.9	na	0.7%	11.2%	11.5%	-3.0%	na
Solids	2.3	10.8	16.5	38.4	42.7	na	36.5%	8.9%	12.8%	11.1%	na
Oil	16.3	8.4	13.8	19.8	13.9	na	-12.4%	10.5%	5.3%	-30.1%	na
Gas	0.0	0.0	2.3	11.8	11.4	na	-	-	26.3%	-3.7%	na
Geothermal	0.0	0.0	0.0	0.0	0.0	na	-	-	-	-	na
Other	0.0	0.0	0.0	0.0	0.0	na	-	-	-	-	na
Average Thermal Efficiency in %	38.4	38.8	37.5	40.2	40.5	na	0.2%	-0.7%	1.0%	1.0%	na
Non-Energy Uses	6.2	9.1	13.9	33.4	36.2	na	8.0%	8.7%	13.4%	8.4%	na
Total Final Energy Demand	56.0	67.7	104.1	162.7	151.9	na	3.9%	9.0%	6.6%	-6.6%	na
Solids	14.2	20.1	23.1	17.4	17.4	na	7.1%	2.9%	-3.9%	-0.1%	na
Oil	30.9	34.2	60.5	98.5	87.1	na	2.1%	12.1%	7.2%	-11.6%	na
Gas	0.8	0.8	1.8	8.6	9.2	na	-0.1%	17.1%	24.7%	6.5%	na
Electricity	7.4	10.5	17.8	35.1	35.0	na	7.2%	11.2%	10.2%	-0.3%	na
Heat	0.0	0.0	0.0	1.4	1.4	na	-	-	-	-2.2%	na
Other	2.6	2.1	0.9	1.6	1.8	na	-4.1%	-16.2%	8.8%	13.5%	na
CO2 Emissions in Mt of CO2	225.1	268.0	413.6	673.3	636.8	661.8	3.6%	9.1%	7.2%	-5.4%	3.9%
Indicators											
Population (Million)	6325	68.00	71.63	77.28	78.15	79.06	1.5%	1.0%	1.1%	1.1%	1.2%
GDP (index 1985=100)	70.9	100.0	155.7	246.9	242.1	260.7	7.1%	9.3%	6.8%	-1.9%	7.7%
Gross Inl Cons./GDP (toe/1990 MEUR)	438.7	388.9	395.0	439.9	434.2	428.3	-2.4%	0.3%	1.5%	-1.3%	-1.4%
Gross Inl Cons./Capita (toe/inhabitant)	1.32	1.53	2.30	3.76	3.60	3.78	3.1%	8.5%	7.3%	-4.3%	5.0%
Electricity Generated/Capita (kWh/inhabitant)	1573	2099	3390	5864	5905	na	5.9%	10.1%	8.1%	0.7%	na
CO2 Emissions/Capita (t of CO2/inhabitant)	3.6	3.9	5.8	8.7	8.1	8.4	2.1%	7.9%	6.1%	-6.5%	-2.7%
Import Dependency %	79.3	73.7	82.4	89.5	87.7	86.2	-1.4%	2.3%	1.2%	-2.1%	-1.6%

(1) Includes nuclear, hydro and wind, net imports of electricity, and other energy sources.

(2) Estimates





CHINA : SUMMARY ENERGY BALANCE

Mtoe	1980	1985	1990	1997	1998	1999(2)	85/80	90/85	97/90	98/97	99/98
							Annual % Change				
Primary Production	608.6	761.9	894.0	1097.2	1020.3	928.2	4.6%	3.3%	3.0%	-7.0%	-9.0%
Solids	303.9	427.4	529.1	686.4	606.7	507.2	7.1%	4.4%	3.8%	-11.6%	-16.4%
Oil	107.9	127.1	140.8	160.7	161.0	160.8	3.3%	2.1%	1.9%	0.2%	-0.1%
Natural gas	12.0	10.8	12.8	21.1	21.7	26.4	-2.0%	3.4%	7.4%	2.5%	21.8%
Nuclear	0.0	0.0	0.0	3.8	3.7	3.8	-	-	-	-2.2%	4.4%
Hydro & Wind	5.0	7.9	10.9	16.9	17.9	19.6	9.7%	6.5%	6.4%	6.1%	9.8%
Geothermal	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-
Other	179.9	188.5	200.4	208.3	209.4	210.4	0.9%	1.2%	0.6%	0.5%	0.5%
Net Imports	-19.7	-39.1	-32.0	10.5	5.6	18.4	14.7%	-3.9%	-	-46.8%	231.6%
Solids	-2.3	-2.9	-8.3	-24.6	-23.8	-21.8	4.8%	23.5%	16.8%	-3.3%	-8.3%
Oil	-17.4	-36.3	-23.8	38.0	32.2	45.9	15.8%	-8.1%	-	-15.4%	42.7%
Crude oil	-13.2	-30.3	-21.4	15.6	11.7	na	18.1%	-6.7%	-	-25.1%	na
Oil products	-4.3	-6.0	-2.4	22.4	20.4	na	7.0%	-16.9%	-	-8.7%	na
Natural gas	0.0	0.0	0.0	-2.3	-2.2	-5.1	-	-	-	-6.1%	137.6%
Electricity	0.0	0.1	0.2	-0.6	-0.6	-0.5	-	11.4%	-	0.7%	-24.8%
Gross Inland Consumption	593.1	705.6	856.3	1096.5	1031.4	944.5	3.5%	3.9%	3.6%	-5.9%	-8.4%
Solids	306.6	404.9	515.5	655.3	587.1	485.3	5.7%	4.9%	3.5%	-10.4%	-17.3%
Oil	89.7	93.3	116.5	194.1	194.5	204.6	0.8%	4.6%	7.6%	0.2%	5.2%
Natural gas	12.0	10.8	12.8	18.8	19.5	21.2	-2.0%	3.4%	5.7%	3.6%	8.9%
Other (1)	184.9	196.6	211.5	228.3	230.3	233.4	1.2%	1.5%	1.1%	0.9%	1.3%
Electricity Generation in TWh	300.6	410.7	621.2	1134.5	1166.2	na	6.4%	8.6%	9.0%	2.8%	na
Nuclear	0.0	0.0	0.0	14.4	14.1	na	-	-	-	-2.2%	na
Hydro & wind	58.2	92.4	126.7	196.0	208.0	na	9.7%	6.5%	6.4%	6.1%	na
Thermal	242.4	318.3	494.5	924.1	944.1	na	5.6%	9.2%	9.3%	2.2%	na
Generation Capacity in GWe	65.8	87.0	137.9	253.9	277.1	na	5.7%	9.6%	9.1%	9.2%	na
Nuclear	0.0	0.0	0.0	2.2	2.2	na	-	-	-	0.0%	na
Hydro & wind	20.3	26.4	36.0	59.7	65.1	na	5.4%	6.4%	7.5%	8.9%	na
Thermal	45.6	60.6	101.8	192.0	209.9	na	5.9%	10.9%	9.5%	9.3%	na
Average Load Factor in %	52.1	53.9	51.4	51.0	48.0	na	0.7%	-0.9%	-0.1%	-5.8%	na
Fuel Inputs for Thermal Power Generation	78.3	99.1	154.4	280.1	280.7	na	4.8%	9.3%	8.9%	0.2%	na
Solids	57.9	81.8	138.0	258.1	261.4	na	7.2%	11.0%	9.4%	1.3%	na
Oil	20.2	16.9	15.2	20.0	17.3	na	-3.5%	-2.1%	3.9%	-13.3%	na
Gas	0.2	0.3	1.1	2.0	2.0	na	11.7%	29.4%	9.3%	-2.6%	na
Geothermal	0.0	0.0	0.0	0.0	0.0	na	-	-	-	-	na
Other	0.0	0.0	0.0	0.0	0.0	na	-	-	-	-	na
Average Thermal Efficiency in %	26.6	27.6	27.5	28.4	28.9	na	0.7%	-0.1%	0.4%	1.9%	na
Non-Energy Uses	8.3	7.1	7.3	53.3	51.8	na	-3.1%	0.4%	33.0%	-2.9%	na
Total Final Energy Demand	496.4	593.4	692.2	748.0	730.2	na	3.6%	3.1%	1.1%	-2.4%	na
Solids	229.2	297.8	343.0	310.8	284.2	na	5.4%	2.9%	-1.4%	-8.6%	na
Oil	51.8	60.1	79.5	119.5	122.7	na	3.0%	5.8%	6.0%	2.6%	na
Gas	6.8	7.9	10.6	13.7	14.6	na	3.2%	6.0%	3.8%	6.4%	na
Electricity	21.3	29.9	44.0	73.8	76.7	na	7.0%	8.0%	7.7%	4.0%	na
Heat	7.4	9.1	14.8	22.0	22.6	na	4.3%	10.1%	5.8%	2.9%	na
Other	179.9	188.5	200.4	208.3	209.4	na	0.9%	1.2%	0.6%	0.5%	na
CO₂ Emissions in Mt of CO₂	1407.4	1788.5	2268.4	2924.5	2836.5	na	4.9%	4.9%	3.7%	-3.0%	na
Indicators											
Population (Million)	981.24	1051.00	1135.20	1227.20	1238.60	1250.37	1.4%	1.6%	1.1%	0.9%	0.9%
GDP (index 1985=100)	60.0	100.0	144.6	304.7	328.3	351.7	10.8%	7.7%	11.2%	7.8%	7.1%
Gross Inl Cons./GDP (toe/1990 MEUR)	5130.2	3662.3	3073.6	1868.0	1630.5	1394.2	-6.5%	-3.4%	-6.9%	-12.7%	-14.5%
Gross Inl Cons./Capita (toe/inhabitant)	0.60	0.67	0.75	0.89	0.83	0.76	2.1%	2.4%	2.4%	-6.8%	-9.3%
Electricity Generated/Capita (kWh/inhabitant)	306	391	547	924	942	na	5.0%	7.0%	7.8%	1.9%	na
CO ₂ Emissions/Capita (t of CO ₂ /inhabitant)	1.4	1.7	2.0	2.4	2.3	na	3.5%	3.3%	2.5%	-3.9%	na
Import Dependency %	-3.3	-5.5	-3.7	1.0	0.5	2.0	10.7%	-7.6%	-	-43.5%	262.3%

(1) Includes nuclear, hydro and wind, net imports of electricity, and other energy sources.

(2) Estimates



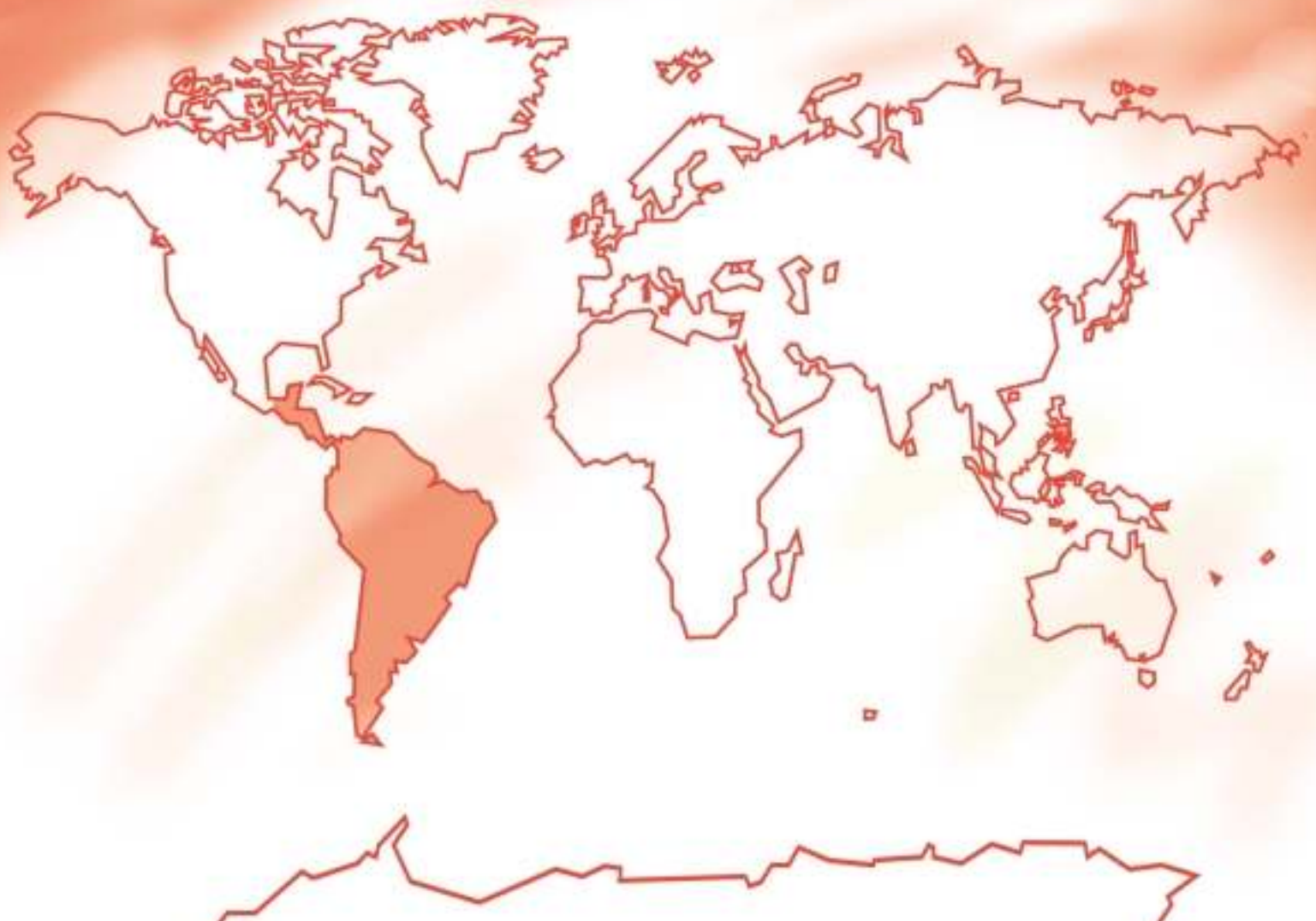


INDIA : SUMMARY ENERGY BALANCE											
Mtoe	1980	1985	1990	1997	1998	1999(2)	85/80	90/85	97/90	98/97	99/98
							Annual % Change				
Primary Production	222.4	279.2	335.3	408.2	413.1	417.2	4.7%	3.7%	2.8%	1.2%	1.0%
Solids	58.7	76.4	106.1	149.5	150.4	152.2	5.4%	6.8%	5.0%	0.6%	1.2%
Oil	9.6	31.0	35.6	38.2	37.7	37.3	26.4%	2.8%	1.0%	-1.3%	-1.1%
Natural gas	1.2	3.8	10.1	18.6	19.5	19.3	25.3%	21.5%	9.1%	4.7%	-1.3%
Nuclear	0.8	1.3	1.6	2.6	3.0	3.3	10.7%	4.3%	7.4%	13.9%	11.2%
Hydro & Wind	4.0	4.4	6.2	6.4	7.1	7.6	1.9%	7.0%	0.6%	11.0%	7.0%
Geothermal	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-
Other	148.1	162.3	175.8	192.8	195.3	197.5	1.8%	1.6%	1.3%	1.3%	1.1%
Net Imports	23.5	16.8	29.4	62.5	67.2	77.7	-6.5%	11.8%	11.4%	7.6%	15.6%
Solids	0.3	1.1	3.1	10.6	9.6	15.3	32.3%	21.9%	19.2%	-9.0%	59.4%
Oil	23.2	15.7	26.1	51.8	57.5	62.3	-7.6%	10.8%	10.3%	11.0%	8.3%
Crude oil	16.3	13.0	20.6	33.3	37.9	na	-4.4%	9.6%	7.1%	13.7%	na
Oil products	6.9	2.6	5.6	18.5	19.6	na	-17.7%	16.3%	18.7%	6.3%	na
Natural gas	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-
Electricity	0.0	0.0	0.1	0.1	0.1	0.1	14.9%	-	1.7%	0.0%	0.0%
Gross Inland Consumption	242.6	294.4	360.5	465.3	475.8	490.0	3.9%	4.1%	3.7%	2.3%	3.0%
Solids	56.9	78.4	106.5	160.5	160.3	167.5	6.6%	6.3%	6.0%	-0.2%	4.5%
Oil	31.5	44.1	60.1	84.2	90.5	94.7	6.9%	6.4%	4.9%	7.5%	4.7%
Natural gas	1.2	3.8	10.1	18.6	19.5	19.3	25.3%	21.5%	9.1%	4.7%	-1.2%
Other (1)	152.9	168.0	183.7	202.0	205.6	208.6	1.9%	1.8%	1.4%	1.8%	1.5%
Electricity Generation in TWh	119.3	183.4	289.4	463.4	494.0	na	9.0%	9.6%	7.0%	6.6%	na
Nuclear	3.0	5.0	6.1	10.1	11.5	na	10.7%	4.3%	7.4%	13.9%	na
Hydro & wind	46.6	51.0	71.7	74.8	83.0	na	1.9%	7.0%	0.6%	11.0%	na
Thermal	69.7	127.4	211.6	378.5	399.4	na	12.8%	10.7%	8.7%	5.5%	na
Generation Capacity in GWe	33.3	52.3	73.7	99.3	102.4	na	9.4%	7.1%	4.4%	3.2%	na
Nuclear	0.9	1.3	1.6	2.2	2.2	na	9.1%	3.3%	5.2%	0.0%	na
Hydro & wind	11.8	15.5	18.8	21.9	22.4	na	5.6%	3.9%	2.2%	2.5%	na
Thermal	20.6	35.5	53.3	75.2	77.8	na	11.4%	8.5%	5.0%	3.4%	na
Average Load Factor in %	40.9	40.0	44.9	53.3	55.1	na	-0.4%	2.3%	2.5%	3.3%	na
Fuel Inputs for Thermal Power Generation	32.2	44.1	63.0	107.3	114.3	na	6.5%	7.4%	7.9%	6.6%	na
Solids	28.9	40.1	56.9	100.3	107.0	na	6.8%	7.2%	8.4%	6.6%	na
Oil	2.8	2.7	2.7	1.3	1.5	na	-0.6%	-0.5%	-9.3%	10.5%	na
Gas	0.5	1.2	3.3	5.6	5.9	na	21.5%	22.8%	7.7%	4.7%	na
Geothermal	0.0	0.0	0.0	0.0	0.0	na	-	-	-	-	na
Other	0.0	0.0	0.0	0.0	0.0	na	-	-	-	-	na
Average Thermal Efficiency in %	18.6	24.9	28.9	30.3	30.0	na	5.9%	3.1%	0.7%	-1.0%	na
Non-Energy Uses	4.7	5.9	7.7	9.5	10.1	na	4.9%	5.5%	3.0%	5.8%	na
Total Final Energy Demand	204.8	240.4	285.6	351.2	354.2	na	3.3%	3.5%	3.0%	0.9%	na
Solids	25.1	31.8	41.1	49.0	42.8	na	4.8%	5.3%	2.5%	-12.6%	na
Oil	23.2	32.5	44.5	69.3	73.5	na	7.0%	6.5%	6.5%	6.2%	na
Gas	0.6	2.4	5.6	9.8	10.3	na	30.8%	18.5%	8.2%	4.7%	na
Electricity	7.7	11.4	18.5	30.3	32.3	na	8.3%	10.2%	7.3%	6.6%	na
Heat	0.0	0.0	0.0	0.0	0.0	na	-	-	-	-	na
Other	148.1	162.3	175.8	192.8	195.3	na	1.8%	1.6%	1.3%	1.3%	na
CO₂ Emissions in Mt of CO₂	304.4	414.7	572.2	868.2	886.1	na	6.4%	6.7%	6.1%	2.1%	na
Indicators											
Population (Million)	687.33	765.15	849.52	962.38	979.67	997.16	2.2%	2.1%	1.8%	1.8%	1.8%
GDP (index 1985=100)	77.0	100.0	136.0	198.3	210.4	223.9	5.4%	6.3%	5.5%	6.1%	6.4%
Gross Inl Cons./GDP (toe/1990 MEUR)	1690.0	1579.1	1421.8	1258.4	1213.0	1174.1	-1.3%	-2.1%	-1.7%	-3.6%	-3.2%
Gross Inl Cons./Capita (toe/inhabitant)	0.35	0.38	0.42	0.48	0.49	0.49	1.7%	2.0%	1.9%	0.5%	1.2%
Electricity Generated/Capita (kWh/inhabitant)	174	240	341	482	504	na	6.7%	7.3%	5.1%	4.7%	na
CO ₂ Emissions/Capita (t of CO ₂ /inhabitant)	0.4	0.5	0.7	0.9	0.9	na	4.1%	4.4%	4.3%	0.3%	na
Import Dependency %	9.7	5.7	8.1	13.4	14.1	15.9	-10.1%	7.4%	7.4%	5.3%	12.5%

(1) Includes nuclear, hydro and wind, net imports of electricity, and other energy sources.

(2) Estimates







LATIN AMERICA: Major trends (1980-1999)

- After a marked slowdown in 1998, GDP declined in 1999 by 0.4%...
- ...but a broadening recovery is expected to emerge in the region in 2000
- Final energy demand continued to increase faster than GDP
- The structure of final energy demand by sector has remained stable since 1980
- Electricity demand has increased by 45% since 1990
- Stable contribution of biomass favoured increasing shares for hydrocarbons
- Gross Inland Consumption dominated by oil and renewable energy sources but the gas contribution increased rapidly
- Oil production contracted in 1999 for the first time since 1987
- Latin America represented only 3.8% of world fossil fuel reserves
- Hydro dominated electricity generation but use of natural gas accelerated
- Development of a continent-wide electricity market is on the way
- Privatisation and deregulation have created a competitive arena and opened the door to foreign investment
- Refining capacity in line with world average
- Energy intensity peaked in 1997, pushed by transport
- CO₂ emissions increased by 42% since 1990
- Net exports, mainly oil, have more than doubled since 1990

.....

After a marked slowdown in 1998, GDP declined in 1999 by 0.4%...

Latin America includes all the countries of Central and South America (excluding Mexico) and the Caribbean islands. It is a mix of large and medium sized countries, such as Brazil and Venezuela, located in South America; and a multitude of smaller ones with different economic structures and energy resources, mainly located in Central America. Latin America experienced rather modest economic growth during the 1980s of about 1% per annum. During this decade the development of the region was driven by Brazil. GDP growth accelerated during the 1990s to peak at 4.3% in 1997. In mid 1998, following the South East Asian and Russian financial crises, a new wave of financial market pressures affected many emerging market economies, especially in Latin America. This was particularly the case for Brazil which accounts for half of the region's total GDP. The Latin American economy began to slow in late 1998, mainly due to Brazil's economic downturn and currency devaluation, low energy and other commodity prices, declining stock markets, higher interest rates, rising unemployment, and continuing emerging market uncertainty. Consequently, the GDP increase was limited to 1.4% in 1998 but with contrasting national experience in the region: Brazilian GDP stagnated but the Argentinean GDP, the second largest economy, increased by 3.9%.

Economic developments were quite diverse across individual countries during 1999 and appeared particularly fragile in several cases. Of most concern, Colombia, Ecuador, and Venezuela experienced particularly severe output contractions in 1999, from 5%

to more than 7%. The downturn in Colombia appears to have bottomed out in the second half of the year, with tentative signs of recovery emerging. In Venezuela, hard-hit by devastating floods and mudslides in December 1999, the rebound in international oil prices has been particularly significant in boosting export earnings and funding a projected increase in public spending (largely because of reconstruction costs). The economic situation in Ecuador deteriorated; a collapse in the exchange rate and rapid monetary growth have fuelled a rapid increase in inflation, while severe difficulties in the financial sector and with foreign debt servicing have also contributed to uncertainties about the future course of economic policies. Brazil has recovered more rapidly than expected from the economic crisis of early 1999. Its economy is estimated to have grown by 1% in 1999, despite projections at the onset of the crisis of a significant output decline, and is projected to grow by 4% in 2000. Leading this recovery have been increases in agricultural output, industrial production (including higher import substitution), and exports - the latter two areas being supported by the lower exchange rate and improving regional prospects. Prospects for economic recovery in Argentina have improved, with several of the influences that led to the 3% contraction in GDP in 1999 weakening or turning around. The stronger outlook projected for Brazil should support a pickup in export growth; reductions in regional financial market tensions should also contribute to lower interest rates and support investment; and the terms of trade are expected to begin to recover as a result of higher international food and oil prices. As a result of these contrasting trends, the GDP of the whole region decreased by 0.4% in 1999.

1 Excluding Mexico



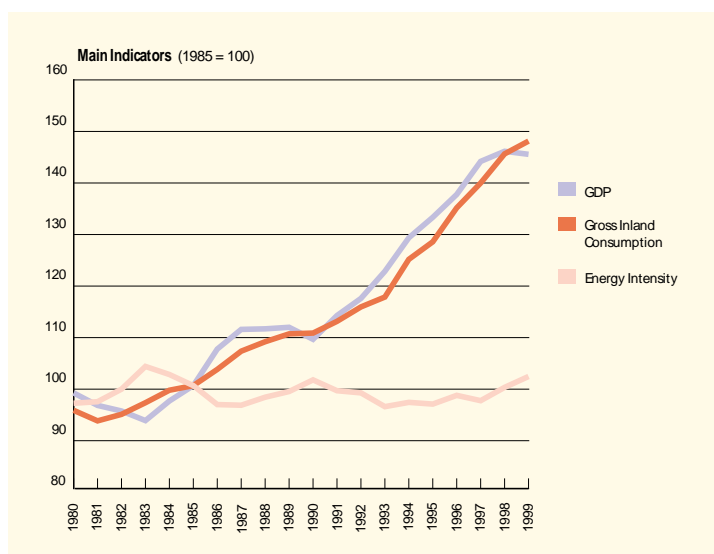


...but a broadening recovery is expected to emerge in the region in 2000

Following a difficult year for many Latin American countries in 1999, a broadening recovery is expected to emerge in the region in 2000. The recovery is generally being led by stronger domestic demand, including a turnaround in investment after a sharp contraction in 1999, and by a pickup in exports supported by earlier exchange rate depreciations in most countries and the general strengthening in the regional and global economy. The contribution of rising export volumes to growth is not expected to be as strong as in the Asian recovery, given the less open character of most Latin American economies and the commodity concentration of exports. Nevertheless, increases in commodity prices - including rebounds over the past year in the prices of oil and metals, and projected improvements in food and beverage prices - are playing an important role in the recovery, both in supporting domestic demand and in easing external financing conditions. Most governments in Latin America have appropriately focused on reducing their fiscal deficits as the key measure needed to build investor confidence and contain the risks associated with the high external financing requirements. Firm monetary policies have been maintained in most countries in the region, another significant departure from the past. Reflecting this, exchange rates have stabilised in several economies following sharp depreciations in early 1999, with some currencies again appreciating, and inflation is generally projected to decline in 2000. The maintenance of cautious macroeconomic policies, together with the improvements projected in external earnings, should contribute to a steady improvement in investor sentiment toward Latin America, helping to lower interest rates and promoting further recovery in domestic economic confidence.

Main items

When the MERCOSUR common market agreement was fully implemented in 1995 there were high hopes that this would underpin a period of greater economic stability and sustained development in Latin America. The agreement created a free trade area comprising Argentina, Brazil, Paraguay and Uruguay as full members and Bolivia and Chile as associates. The region aimed to progress towards more modern, industrialised and urbanised economies based upon considerable natural resources. Key objectives at this time were to reduce chronic inflation and improve economic stability - with the aim of attracting large volumes of inward investment. But, with some exceptions, the high hopes stimulated by the creation of MERCOSUR have largely failed to materialise. Drought, flooding and difficult economic circumstances in 1998 and 1999 have caused disruption and slowed fragile GDP growth. Further, far-reaching economic reform is still required, accompanied by greater financial discipline. In contrast reform of the energy sector was undertaken with some enthusiasm with significant liberalisation and privatisation, especially in electricity and downstream gas activities. Interconnection of electricity and gas networks is also continuing. For many years the regional oil and gas 'major' was Venezuela, an OPEC member. More recently Argentina, Brazil and Colombia have expanded their oil output; and Argentina is now the largest regional gas producer. More modest production occurs in heavy oil and coal. The traditional dependence upon biomass is declining, despite some innovative programmes to use bio-fuels in industry and transport. Hydroelectric power still meets over 70% of regional electricity supplies. Yet regional CO₂ emissions grew rapidly in the 1990s because fossil fuels met 85% of incremental energy consumption in this decade - a cause for concern in the post-Kyoto era.



ENERGY OUTLOOK

Final energy demand continued to increase faster than GDP..

Final energy demand increased steadily by 1.5% during the 1980s, marked by a depressed economy especially during the first part of the decade. Between 1990 and 1997, sustained by a growing economy, final energy demand growth averaged 3.4% per year. The financial and economic crisis, starting in mid-1998, limited the growth of final energy demand to 2.1% in 1998 and first indications suggested that final energy demand would remain stable in 1999. Since 1990, additional consumption was mainly covered by oil (58% of the overall



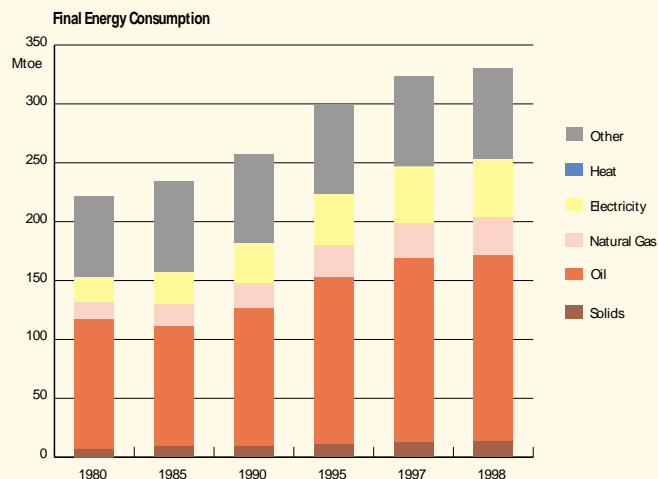


increment), electricity (21%), gas (14%) and solids (5%) although biomass consumption demonstrated relative stability due to the progressive slowdown of the Brazilian alcohol programme resulting from market deregulation. This programme has favourably influenced the development of biomass but has suffered from low oil prices on the international market since the early 1990s. In addition, the Brazilian government is currently considering a proposal to reduce the amount of anhydrous alcohol to be mixed with gasoline to 22% from 24%. This is mainly because sugar cane production has been reduced by a drought and there is concern that there may not be enough sugar cane to meet the internal demand for alcohol fuel. Consumption of conventional energy increased very rapidly: +3.9% per year on average for oil since 1990, +5.2% for gas and +4.8% for electricity. One country, Brazil, absorbed about 44% of total final energy demand in Latin America and its share has been relatively stable since 1980. Argentina with only 12% of total final consumption and Venezuela with 11% followed it. Therefore, developments in regional final energy demand were largely dominated by those of Brazil, except in the case of natural gas for which development was determined mainly by Argentina and Venezuela - the region's main gas producers and consumers.

materials, for example the development of the iron-steel industry in Brazil, now the eighth largest steel industry worldwide. More recently the region has used its resource industries as the basis for moving into higher value-added products, corresponding to a stabilisation of industry's share since the beginning of the 1990s.

Sustained by economic growth and higher incomes, transport sector consumption has increased by 4.7% per annum on average since 1990, accounting for more than 70% of incremental oil demand since 1990. Compared to other developing regions, Latin America has a relatively high degree of vehicle ownership, reflecting higher per capita incomes, high levels of urbanisation, a history of low, subsidised prices for transport fuels across the region and large distances between cities. But there are marked differences within the region: the development of the transportation sector in Latin America varies considerably as a result of differences in political and social factors, geography and levels of investment. But in all countries substantial potential for increased vehicle ownership still exists as incomes rise. Even the financial crisis in 1998 did not dent the trend of transport energy consumption which continued to grow at about 4.4%.

Since 1985, energy consumption of the tertiary-domestic sector rose more slowly than final energy demand. Driving forces for energy demand in this sector were increasing demand for specific uses, especially electrical ones and rapid expansion of the service sector. But these factors were counterbalanced by improving efficiency stimulated by higher prices. In particular the increasing energy consumption per employee in the service sector follows improvements in infrastructure (building, computing facilities, air conditioning...); and the evolution of domestic energy demand depends on per capita income levels, the urbanisation rate and the speed of substitution of non-commercial fuels by commercial energy. In some Latin American countries, there has already been a restructuring of energy prices in recent years to bring them closer to international levels. In other countries, however, end-use prices remain below international levels and still encourage inefficient use of energy.



The structure of final energy demand by sector remained stable since 1980...

The structure of final energy consumption by sector has remained largely unchanged since 1980. The industrial sector's share rose from 36% in 1980 to 38% in 1998; transportation from 30% to 32%; whilst the tertiary-domestic sector declined from 34% in 1980 to 30% in 1988. This is the result of a number of phenomena. Over the past twenty years, the region has embarked on a programme of industrialisation, often led by the most energy intensive sectors based upon exploitation of the large resources of raw

Electricity demand has increased by 45% since 1990...

Electricity demand grew by 4.9% on average since 1980, twice as fast as GDP but, more recently, this elasticity has declined appreciably. The share of electricity in final energy demand reached 15% in 1998 from 12% in 1985 and only 10% in 1980. Brazil, which accounts for about half the region's economic activity and population, also absorbed about half of regional electricity consumption and electricity's share in Brazil rose to 18%. In 1998, about 45% of this electricity was consumed in industry and 55% in the tertiary-domestic sector (of which 52% by the residential sector





and 41% by services – the balance being from agriculture). Since 1990, electricity demand increased by 3.5% per year on average in industry, and by 6.0% in the residential sector and in services. This difference was particularly marked in 1998 when electricity demand in industry increased by only 1.4% while electricity demand in the tertiary-domestic sector jumped by 6.7%. In all sectors, but mainly in residential and services, the share of electricity in total final demand was expanding, reflecting rising income levels, urbanisation, structural and technological shifts in the industrial sector and the increasing use of electrical appliances in the residential/commercial sector. Much of Latin America's electricity consumption growth will stem from expanded access to national electricity grids for a growing segment of the population. Currently, roughly 30% of Latin America's population has no access to the grid, and per capita electricity consumption for the region is roughly 27% of that in the European Union.

Stable contribution of biomass favoured increasing shares for hydrocarbons...

The fuel mix of final energy demand has changed significantly since 1980. Oil and gas now account for 58% of total final energy demand and 75% of commercial energy demand. While oil has continued to be the dominant fuel, its share diminished slightly from 49% in 1980 to 48% in 1997, with a minimum of 45% in 1990. Over the same period, the share of gas increased from 7% to 10%. Since 1990 the share of hydrocarbons has increased from 54% to 58% as a consequence of the stable contribution of biomass at around 75 Mtoe since 1985. But, in most cases, Latin America countries developed policies to conserve oil supplies for export or to reduce dependence on imported oil. To limit the impact of transport demand growth many initiatives have encouraged the use of alternative fuels in the region. These include an alcohol fuels programme in Brazil and promotion of compressed gas in Argentina, Colombia and Chile. These programmes have affected the fuel mix in these countries to varying degrees, mainly through incentives provided by governments. The deregulation process in the region's energy markets is expected to affect such programmes adversely. Finally, the contribution of solids remained very limited, only 4% of final energy consumption. Brazil accounted for 67% of Latin America's total coal demand, with Colombia, Chile and Argentina responsible for much of the remainder. In Brazil, the steel industry absorbed almost two-thirds of the country's total coal consumption, relying on imports of coking coal to produce coke for use in its blast furnaces.

Gross Inland Consumption dominated by oil and renewable energy sources, but the gas contribution increased rapidly...

Gross inland energy consumption was dominated by oil (48% of the total in 1999 from 55% in 1980). After oil, renewable energy

sources, mainly biomass (79 Mtoe in 1999) and hydro (47 Mtoe in 1999), came second in satisfying 29% of total demand in 1999 against 33% in 1990 and 31% in 1980. The natural gas contribution has grown rapidly in the past fifteen years, representing 18% of the total in 1999 (11% in 1980). Solid fuels remained marginal with only 5% of the 1999 total, two thirds of this consumption occurring in Brazil. There is also some use of nuclear energy in Argentina and Brazil but it represents less than 1% of the total in 1999. Since 1990, additional consumption of energy of about 115 Mtoe has been covered respectively by oil (54%), natural gas (27%), hydro (13%), solid fuels (3%) and biomass (1%). In 1997, natural gas became the second fuel in importance, just overtaking biomass; and gas strongly reinforced its position in 1998 and 1999.

In the future gas consumption, which increased by 10% in 1997, another 8.1% in 1998 and still by 4.1% in 1999, will continue to expand rapidly. A great deal of gas market activity is occurring in the Mercosur area, the Southern Common Market involving Brazil, Argentina, Paraguay and Uruguay (with Chile and Bolivia as Associated members), which is becoming a significant pipeline gas market. Several pipelines connecting Argentina and Uruguay, Brazil and Chile were completed or are under development. In Argentina, now the largest regional producer just ahead of Venezuela, natural gas use has increased by more than 70% over the past decade. At the same time, the liberalisation of energy markets in South America as a whole has given Argentina an opportunity to supply growing gas demand in Brazil, Chile and Uruguay. In October 1998, the first Argentina to Uruguay natural gas pipeline was inaugurated. With the first stage of the Bolivia to Brazil natural gas pipeline completed in July 1999 after years of negotiation, potential gas supply increased significantly. A second line to Brazil is now under consideration following significant gas discoveries in Bolivia, but construction is not anticipated before 2001. In addition, a pipeline to Brazil from Argentina is under construction to enable the first imports of Argentinean gas. Elsewhere in South America, the GasAtacama pipeline began operating in mid-1999, transporting gas from Argentina to Chile. It is the second pipeline linking the two countries after TransCanada's GasAndes pipeline in central Chile, which started operation in 1997.

There are also projects to develop the potential for increased use of LNG in smaller markets. In November 1998, Petrobras and Royal Dutch formed a joint venture to develop a regasification plant near Recife, which will be South America's first LNG regasification terminal. In July 2000, Atlantic LNG began natural gas deliveries from Trinidad and Tobago to Puerto Rico, where the gas is used largely for power generation. One other project exists to export LNG to the Dominican Republic. Proposals for two more LNG





export facilities in the American Atlantic Basin, both in Venezuela, were under discussion. Industry experts are sceptical, however, that either project will find a market to take the gas before 2010.

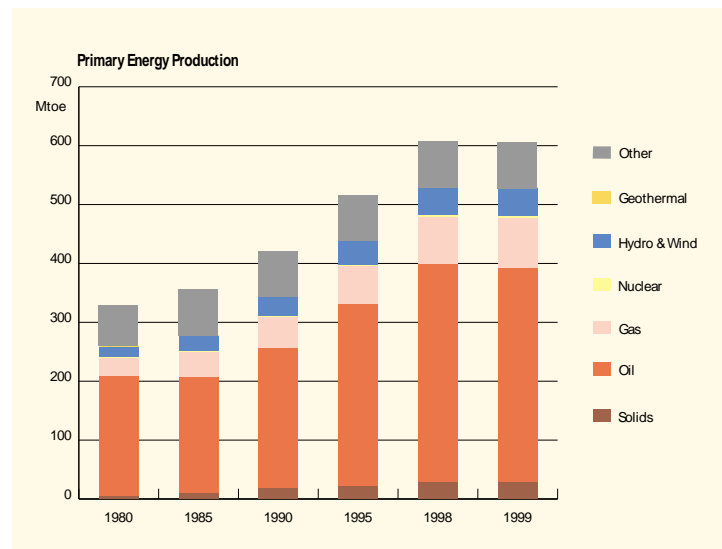
The predominance of oil in gross inland energy consumption continued across the entire region. Oil consumption increased by 3.7% per year on average since 1990. Even though oil use increased by 4.7% per year in Brazil, the major consumer by far, growth was limited to 2.5% in Argentina and 2.3% in Venezuela, respectively the second and third consumers, as a consequence of the rapid expansion of natural gas use in these two countries. In a large number of Central American countries oil consumption growth exceeded 6% per year on average with a maximum of 10% in Guatemala. Since 1990 more than 50% of additional consumption has been driven by transport. In the near future oil consumption growth will be concentrated in transportation and to a lesser extent in other end-use sectors, but a decline in the share of oil in gross inland consumption is expected. The importance of hydro in the generation of electricity is another striking feature of the region. In Central and South America, the electricity sector currently relies heavily on hydro power, which accounted for about 10.5% of gross inland energy consumption for the region as a whole, a stable share since 1990. Because dependence on hydro resources in the region has led to problems in maintaining electricity supply during times of drought, fuel diversification is now being pursued. It will reinforce gas use in the region and, to a very limited extent, coal use. Biomass use has stabilised since 1990, the result of two opposing trends: the reduction of the alcohol programme in Brazil and the development of energy systems in the poorest countries still dominated by biomass.

Oil production contracted in 1999 for the first time since 1987...

Indigenous **energy production** has grown since 1980 on average by more than 3.3% per year, and was accelerating regularly to reach 4.1% in the 1990s even though growth was limited to 2.5% in 1998 and zero in 1999. Production was dominated by oil (60% of the total in 1999) followed by natural gas (14%), biomass (13%), hydro and wind (8%), solid fuels (5%) and nuclear (less than 1%). For the first time since 1987, oil production contracted by 1.8% in 1999 in response to the financial and economic crisis but this resulted mainly from the Venezuelan production cut (-10%). In 1999 Venezuela still heavily dominated oil production (47% of regional production against 54% in 1997). Other major oil producers were Brazil (17%), Argentina and Colombia (both with 12%). Though Venezuelan production grew slowly since 1995 (+5.3%), stronger growth occurred in the other big producers: Brazil (+67%), Colombia (+42%) and Argentina (+11%). Oil producers in Central and South America have significant potential for increasing output over the next decade. Brazil became a million barrel

per day producer in 1999, with considerable production potential waiting to be tapped. Colombia's current economic downturn has somewhat delayed its bid to join the relatively short world-wide list of million barrel per day producers, but its output is expected to reach this level in the coming years, as also for Argentina. The oil sector in this region is benefiting from a more favourable climate for attracting foreign investment.

In 1999, Argentina became the largest regional gas producer just ahead of Venezuela with a production of about 33 Mtoe in Argentina and 29 Mtoe in Venezuela, together accounting for 72% of the whole region's production. However, much of the region remains to be explored and new discoveries have accompanied recent exploration activity. Development of natural gas production and infrastructure has accelerated since the early 1990s, influenced both by privatisation of former state gas companies and increasing private foreign investment in pipelines. Brazil accounted for much of the hydro and biomass production (56% and 52% respectively of the region's totals). Finally, several new low-cost coal producers, including Colombia and Venezuela, have entered the coal supply picture in recent years and are rapidly penetrating world coal markets.



Latin America represented only 3.8% of world fossil fuel reserves...

Latin America's oil reserves at end 1999 amounted to about 9.6% of world reserves, with a major part (7.8%) located in Venezuela, the only OPEC member in this region. If its extra-heavy deposits in the Orinoco belt are included in reserves, then its oil resources are comparable to those of Saudi Arabia. The regional reserves/production ratio for conventional crude oil reached 39.1 years, a little below the world average but it increased regularly in recent years. Regional gas reserves represented only 4.6% of world reserves, more than 60% of





these also being concentrated in Venezuela. Finally, coal reserves, mainly located in Colombia and Brazil, accounted for only 2% of world reserves. As a result of this, Latin America represented only 3.8% of total world fossil fuel reserves.

Hydro dominated electricity generation but use of natural gas accelerated...

Electricity generation in the region grew steadily by 5.0% per year on average in the period 1980-1998. This sustained growth will continue in the near future given that currently roughly 30% of the population has no access to the grid. For several decades, hydroelectric power has dominated electricity supply - meeting 73% of total production in 1997 (68% in 1980 and 75% in 1996). Brazil supplied more than half of all hydro production. But a lack of suitable sites, long construction times, cost overruns, and concerns over displaced populations and environmental damage have all served to diminish the attractiveness of further hydropower investment. The reliability of hydroelectric power also became a growing concern during the drought years of the late 1990s. Thermal generation, 25% of the total in 1998, grew by 1.6% on average during the 1980s but by 4.6% on average since 1990. Input needs are covered mainly by gas (42% in 1998) and oil (37%), followed by solid fuels (14%) and biomass (4%). Oil has historically been the predominant fuel in electricity generation but its importance has been declining in favour of other fuels, especially gas. The growing role of natural gas in electricity production was contingent on the completion of several major pipeline schemes linking producing countries, such as Argentina and Bolivia, with consuming countries, such as Chile and Brazil. Once these projects are completed, a regional natural gas pipeline network will be operational in Latin America, favouring a further development of gas-based power production.

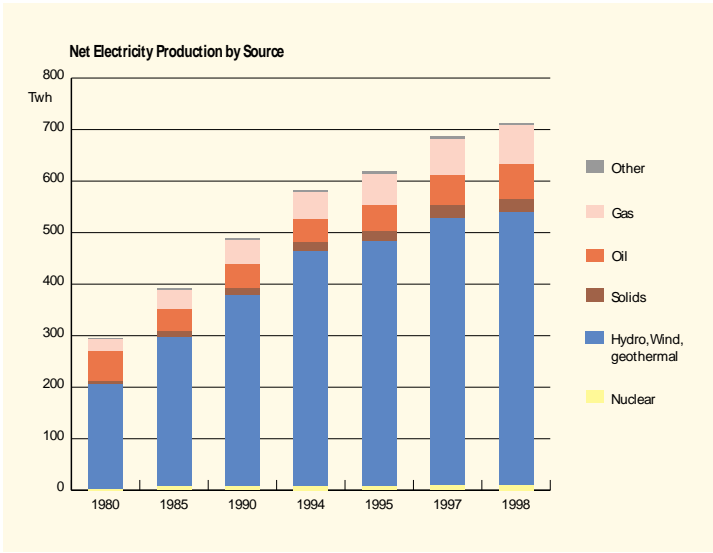
The present situation in Brazil, the largest electricity consumer, is very difficult: an electricity shortage is leading the government to implement a rationing programme under which three-quarters of the 170 million Brazilians have been told to cut consumption by 20% or face blackouts and power interruptions. The government claimed that the measures are needed because Brazil was facing its worst drought in decades. However, at least two other important factors contributed to the current energy crisis: the country's negligence in perceiving that energy demand growth had been consistently outstripping the increments in generation capacity during the last decade; and the lack of corresponding policy initiatives to provide incentives for investment in new power capacity, in particular thermal plants.

Development of a continent-wide electricity market is on the way...

In addition, a continent-wide market for electricity is also evolving in South America. Currently, Argentina, Brazil, Venezuela, Chile and Ecuador are completing a unified electricity transmission system. Uruguay, in an attempt to establish itself as a hub of regional electricity trade, is promoting a number of transmission and generation projects that will connect Argentina with Brazil through Uruguay. Foreign companies, such as Enron and National Grid, are playing a growing role in the development of the transmission network. A regional electricity grid is also evolving in Central America, although at a hesitant pace. In December 1995, the presidents of Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua and Panama endorsed a proposal to interconnect their grids in order to alleviate periodic power shortages, reduce operating costs, optimise regional use of hydroelectric power, create a competitive market in the region and attract foreign investment.

Privatisation and deregulation have created a competitive arena and opened the door to foreign investment...

In most Latin American countries, the electricity industry was previously organised around vertically integrated monopolies responsible for the entire process, from power plants to customers' meters. A single company controlled electricity generation, transportation, distribution and marketing and, in many cases, even set industry policies. In the wake of Chile's restructuring of its electricity sector twenty years ago, Argentina, Bolivia, Peru, Colombia, Brazil and Uruguay have also decentralised their electricity industries to promote competition and minimise regulatory obstacles. In great measure, restructuring in each of the countries has shared certain basic principles: the introduction of competition in electricity generation and supply, open access to transmission networks and (to a lesser degree) distribution networks and, on an institutional level, formal separation of regulatory functions from service provision. To manage the reforms, new governance mechanisms,





with rules specific to the electricity sector, have been created in Latin America. The need to attract foreign investment in order to expand and upgrade electricity infrastructure has inspired a wave of privatisation. For many countries privatisation has become the only effective method of raising capital on favourable terms. In the mid-to late 1990s, the continent saw a virtual swallowing up of newly privatised South American energy companies, many by newly privatised and/or deregulated energy companies from abroad, in particular from the United Kingdom and United States. This first wave opened the door to cross-border investments by other European companies and by indigenous South American companies. Between 1990 and 1997, foreign investors channelled more than \$45 billion into Latin American electricity investment; and, over the next few years, Latin America could surpass Asia as the largest recipient of foreign investment in electricity.

Total generation capacity reached 169 GWe in 1998, of which 64% was hydro (59% in 1980 but 67% in 1996), 35% thermal units (41% in 1980) and 1% nuclear. Since 1980, new commissioning has been shared between hydro for 64 GWe (69% of the total), thermal for 27 GWe and nuclear for 1 GWe. Many countries of Central and South America rely heavily on hydropower for electricity generation. In Brazil, 87% of the installed capacity consists of hydropower. Hydro also accounts for 50% or more of the total installed capacity in Chile, Colombia, Paraguay, Peru and Venezuela. Since 1996, thermal capacity has expanded ever more rapidly, increasing by 9 GWe - representing a 17% growth of installed thermal capacity. By opening up markets to independent power producers (IPPs), and by freeing utilities through privatisation, market economics have favoured the rapid deployment of gas-fired power.

Refining capacity in line with world average...

In 1999, the **refinery capacity** (6.4 million barrels a day, stable since 1997) represented 8.0% of world capacity, a broadly constant share since 1990 (9.3% in 1980). Whereas about 2 million barrels day of refining capacity was closed in the first half of the 1980s, since 1985 the installed capacity has grown by about 1.0% per year on average. But the utilisation rate of the refineries (85% in 1999 from 75% in 1985) increased at the same rate as the world average (83% in 1999 from 74% in 1985).

COMPETITIVENESS

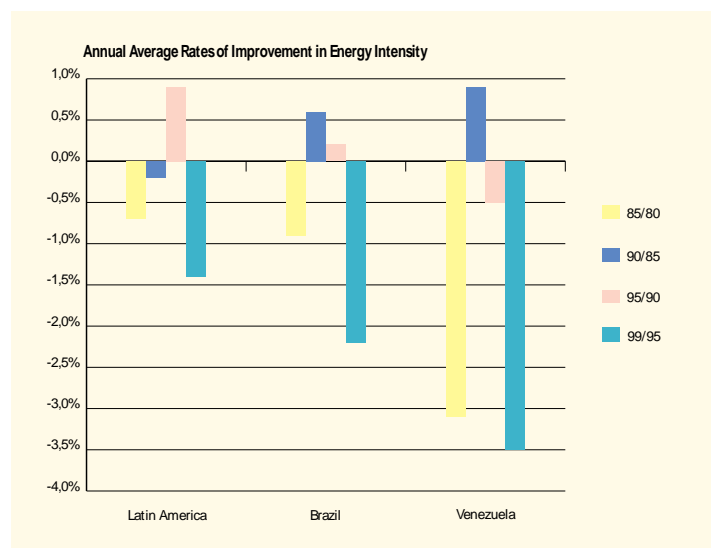
Energy intensity peaked in 1999, pushed by transport...

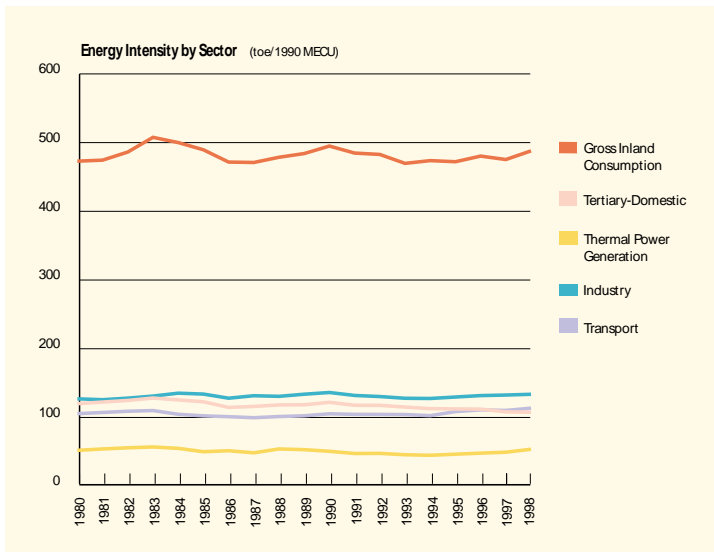
The evolution of the energy intensity indicator for the region varied in the period 1980-1998. It increased regularly by 0.7% per year on average over the period 1980-1990, decreased by 1.0% on

average between 1990 and 1995 but has rebounded since then with an average 1.4% growth rate marked by an acceleration in 1998 (+2.7%) and 1999 (+2.1%), to peak at 495 toe/1990 MEUR, 10% above the world average. This reflects contrasting economic conditions in the region since 1980. The economic recession in the early 1980s, through lower utilisation of industrial capacity, induced increasing energy intensity of industry. At the same time, development of services and improving standards of living accelerated energy consumption in the tertiary-domestic sector, although GDP remained flat. Between 1986 and 1990, the upturn in economic activity resulted in a reduction of industrial energy intensity due to the acceleration of investment despite the development of highly energy-intensive industries relocated from OECD countries. At the same time, the negative impact of the tertiary-domestic sector continued, currently being reinforced by the transportation sector where motorization has accelerated. Finally, since 1990, the increasing energy intensity of the transport sector (+8.0% since 1990) largely offset the gains observed in the tertiary-domestic sector (-12.1%) while energy intensity in industry remained flat overall. It must be stressed that the share of power generation remained quite stable since 1980, at around 10.5% of the total.

Energy intensity analysis by country reveals significant national differences within the region. Argentina and Brazil, amongst the more developed countries, were characterised by an energy intensity of around 370-390 toe/1990 MEUR, comparable with some OECD countries. In contrast Venezuela, together with many Central American countries, has an energy intensity two to four times higher, in line with levels observed in developing countries.

Energy consumption per capita, quite stable during the 1980s has increased since 1990 and rose by 4.4% in 1996, 4.5% in 1997 and 2.5% in 1998. But in 1999, as a result of the financial and econo-





LATIN AMERICA : ENERGY INTENSITY

toe/1990 MEUR	1980	1985	1990	1995	1998	1999(1)
Latin America	469.6	486.2	491.6	468.8	484.6	494.9
Argentina	323.9	363.7	405.6	360.1	344.9	368.1
Brazil	356.6	372.8	361.0	356.8	386.5	390.0
Colombia	732.4	730.9	678.9	648.5	633.0	629.0
Venezuela	993.3	1154.7	1101.0	1126.3	1191.0	1290.3

(1) estimates

mic crisis, energy consumption per capita remained stable. Very large variations exist between countries in this region, from 1050 to 2450 kgoe per inhabitant for the more developed countries to 270-910 kgoe per inhabitant for the less developed countries. By sector, increasing trends were clear since 1990 in transport (+26% over the period 1990-1998) due to greater motorisation and in industry (+14%) as a consequence of increasing industrial production. The energy intensity of the tertiary-domestic sector increased slowly and has even experienced relative stability since 1995. Improving living standards and greater specific demand by commercial services were offset by greater efficiencies induced by deregulated energy prices closer to international prices. Nevertheless, per capita consumption in 1997 remained well below European levels - 40% for industry, 32% for transport and only 24% for the tertiary and domestic sector.

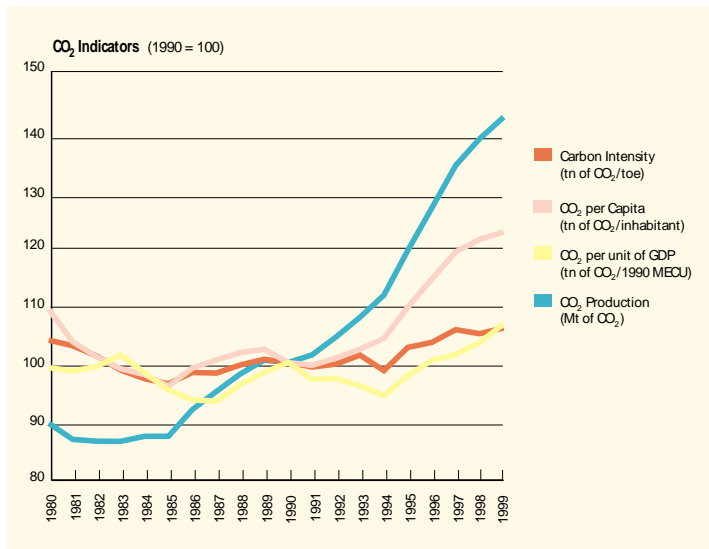
ENVIRONMENT

CO₂ emissions increased by 42% since 1990...

CO₂ emissions have been rising continuously since 1980 (863 million tonnes of CO₂ in 1999, compared to 609 million tonnes in 1990, 533 million tonnes in 1985 and 547 million tonnes in 1980).

Major contributors, in relation to country size and level of development, were Brazil (33% of the total in 1998), Venezuela (17%) and Argentina (16%). Whereas CO₂ emissions increased annually by 1.1% on average during the 1980s, growth accelerated significantly to reach 3.9% per year on average after 1990 due to the fact that fossil fuels covered 85% of incremental energy consumption. CO₂ emissions increased dramatically in 1997 and 1998, by 4.5% and 3.4% respectively. Even in 1999 they increased by 2.6%, 50% faster than the gross inland energy consumption. Other indicators reinforced this evolution, quite a disturbing one in the post-Kyoto context. Carbon intensity began to increase from the early 1990s with the greater contribution of fossil fuels, especially gas but also oil and coal, in satisfying total energy needs of the region. Since 1990, it increased by about 5%. CO₂ emissions per capita decreased by 1.0% per year during the 1980s but increased by 2.4% since 1990 and this growth was accelerating. CO₂ intensity per unit of GDP, quite stable during the 1980s, grew by about 2.3% per year on average since 1994.

In terms of CO₂ emissions by sector at a regional level, the largest sector by far is transport. It easily occupied first place with about 37% of total emissions in 1998, a share that increased slowly since 1990. Industry accounted for about 24%, decreasing slowly since 1980 (27%). The tertiary-domestic sector was quite stable at about 13%, being overtaken by the electricity generation sector in 1998. Since 1990, about 41% of incremental CO₂ emissions have arisen from the transportation sector, 25% from industry, 16% from the power sector, 10% from the energy branch (hydrocarbon production and transformation), and 8% from the tertiary-domestic sector. The most rapid expansion, especially over the last two years came from the power generation sector.





GLOBAL MARKETS

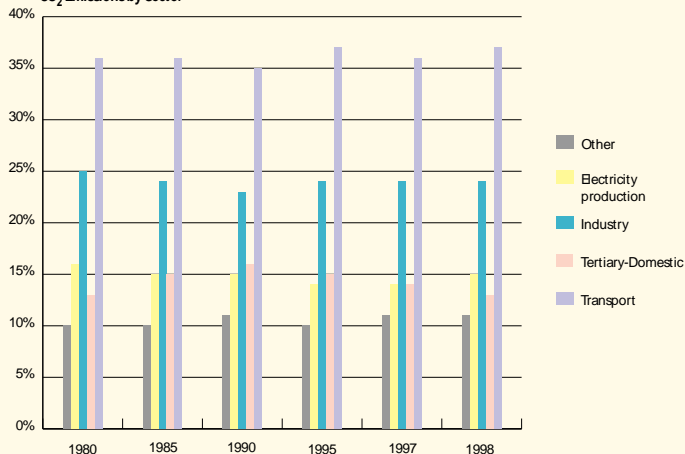
Net exports, mainly oil, have more than doubled since 1990...

Over the whole period, Latin America increased its exportation of energy. Net exports increased from 71 Mtoe in 1990 to 159 Mtoe in 1997, more than doubling. A limited decline, caused by the evolution of Venezuelan oil exports, occurred in 1998 (-2 Mtoe) and 1999 (-8 Mtoe). In fact, as part of a co-ordinated effort by major oil producers to prop up world oil prices since early 1998, Venezuela has agreed to production cuts. Oil accounted for 93% of total Venezuelan exports in 1999 (137 Mtoe from 71 Mtoe in 1990 and only 35 Mtoe in 1980), of which four-fifths consisted of crude oil and one-fifth refined products. Since 1980 crude exports have multiplied by fourteen, although exports of refined products have declined by 25%. In 1999, net oil exports of Venezuela, one of the founders of OPEC, represented more than the net total oil exports of the region, with Argentina and Colombia also increasing their contributions since the early 1990s. Oil exports are oriented towards the United States (83% of the total), Western Europe being the second market with only 9%, and Canada the third with 5%. Bitor, a subsidiary of Petroleos de Venezuela, controlled the processing, shipping and marketing of Orimulsion (a mix of 70% natural bitumen and 30% water emulsifiers) as a boiler fuel, mainly for countries planning to switch from oil. As of late 1998, several power plants in Europe (Denmark, Italy and Lithuania), Japan, China and Canada burned Orimulsion. Bitor now operates one Orimulsion plant with a capacity of 5.2 million tonnes per year, and hopes to produce 20 million tonnes per year by 2006. All this production is intended for export. Despite the limited production of solid fuels, the region became a net exporter in 1991, due to the efforts made by Colombia to develop its coal reserves. But net regional exports remained limited because Brazil absorbed a large part of the coal available on the regional market.

LATIN AMERICA : NET OIL IMPORTS

Mtoe	1980	1985	1990	1995	1998	1999
Latin America	-34.7	-49.6	-71.6	-116.7	-148.4	-137.1
Argentina	1.3	-3.7	-4.1	-14.5	-19.1	-15.8
Brazil	45.1	22.0	27.7	33.4	36.8	29.8
Colombia	1.3	-0.7	-12.4	-17.4	-24.7	-28.6
Venezuela	-103.5	-74.5	-100.8	-140.9	-169.3	-150.8

(1) estimates

CO₂ Emissions by Sector



LATIN AMERICA : SUMMARY ENERGY BALANCE

Mtoe	1980	1985	1990	1997	1998	1999(2)	85/80	90/85	97/90	98/97	99/98
							Annual % Change				
Primary Production	329.2	356.9	421.9	593.7	608.6	608.0	1.6%	3.4%	4.8%	2.5%	-0.1%
Solids	6.3	10.5	19.1	28.1	30.2	29.9	10.8%	12.7%	7.4%	7.7%	-1.0%
Oil	202.1	197.6	238.2	362.9	368.9	362.3	-0.5%	3.8%	5.5%	1.7%	-1.8%
Natural gas	31.6	41.3	51.7	74.8	80.4	85.6	5.5%	4.6%	6.0%	7.5%	6.4%
Nuclear	0.6	2.4	2.5	2.9	2.8	2.8	31.3%	0.8%	2.2%	-3.7%	1.9%
Hydro & Wind	18.6	26.1	33.0	45.9	46.8	47.5	7.0%	4.8%	4.2%	2.1%	1.4%
Geothermal	0.4	0.6	0.7	1.1	1.0	1.1	8.0%	2.2%	4.0%	-6.1%	6.9%
Other	69.5	78.5	76.7	78.0	78.4	78.8	2.5%	-0.5%	0.5%	0.5%	0.5%
Net Imports	-29.5	-44.6	-71.6	-159.3	-156.9	-148.5	8.6%	9.9%	8.8%	-1.6%	-5.3%
Solids	5.3	5.5	0.3	-6.6	-8.4	-9.4	0.6%	-45.3%	27.0%	26.1%	12.3%
Oil	-34.7	-49.6	-71.6	-152.2	-148.4	-137.1	7.4%	7.6%	8.3%	-2.5%	-7.6%
Crude oil	28.1	-8.7	-31.5	-122.0	-118.4	na	-	29.5%	16.5%	-2.9%	na
Oil products	-62.8	-41.0	-40.1	-30.2	-30.0	na	-8.2%	-0.4%	-5.5%	-0.8%	na
Natural gas	0.0	-0.1	-0.3	-0.6	-0.1	-2.0	35.5%	32.4%	-7.8%	-75.6%	1397.7%
Electricity	-0.1	-0.3	0.0	0.0	0.0	0.0	22.2%	-	-36.3%	-	0.0%
Gross Inland Consumption	291.9	306.6	337.8	427.1	444.5	452.1	1.0%	2.0%	3.7%	4.1%	1.7%
Solids	11.3	15.9	17.1	21.7	21.3	20.5	7.1%	1.4%	2.8%	-1.8%	-3.4%
Oil	159.9	142.2	156.5	203.4	213.9	217.8	-2.3%	1.9%	4.2%	5.2%	1.9%
Natural gas	31.6	41.2	51.4	74.2	80.3	83.5	5.4%	4.5%	6.1%	8.1%	4.1%
Other (1)	89.1	107.3	112.9	127.9	129.0	130.2	3.8%	1.0%	1.8%	0.9%	0.9%
Electricity Generation in TWh	298.9	395.2	491.1	689.0	715.5	na	5.7%	4.4%	4.8%	3.8%	na
Nuclear	2.3	9.1	9.5	11.1	10.7	na	31.3%	0.8%	2.2%	-3.7%	na
Hydro & wind	202.2	287.4	366.5	514.6	526.1	na	7.3%	5.0%	4.4%	2.2%	na
Thermal	94.4	98.7	115.1	163.2	178.7	na	0.9%	3.1%	6.5%	9.5%	na
Generation Capacity in GWe	77.5	107.0	132.4	163.0	169.4	na	6.7%	4.3%	3.2%	3.9%	na
Nuclear	0.4	1.7	1.7	1.7	1.7	na	35.3%	0.0%	0.0%	0.0%	na
Hydro & wind	45.7	66.1	88.5	106.3	109.2	na	7.7%	6.0%	2.8%	2.7%	na
Thermal	31.5	39.3	42.2	55.0	58.6	na	4.5%	1.5%	4.3%	6.6%	na
Average Load Factor in %	44.0	42.2	42.3	48.3	48.2	na	-0.9%	0.1%	1.5%	-0.1%	na
Fuel Inputs for Thermal Power Generation	30.7	30.0	33.2	42.6	47.1	na	-0.5%	2.1%	5.5%	10.4%	na
Solids	2.4	3.3	4.5	6.1	6.6	na	6.7%	6.3%	6.5%	8.7%	na
Oil	18.8	13.0	13.2	15.7	17.6	na	-7.0%	0.3%	4.5%	12.1%	na
Gas	7.7	11.2	13.4	18.0	19.9	na	7.8%	3.7%	6.3%	10.5%	na
Geothermal	0.4	0.6	0.7	1.1	1.0	na	8.0%	2.2%	4.0%	-6.1%	na
Other	1.5	1.9	1.4	1.8	1.9	na	4.7%	-5.2%	5.4%	10.0%	na
Average Thermal Efficiency in %	26.4	28.2	29.8	32.9	32.6	na	1.3%	1.1%	0.9%	-0.9%	na
Non-Energy Uses	12.2	18.7	21.5	29.4	30.2	na	9.0%	2.8%	4.9%	2.7%	na
Total Final Energy Demand	221.3	234.5	257.4	323.4	330.2	na	1.2%	1.9%	3.4%	2.1%	na
Solids	6.8	9.8	10.1	13.3	13.5	na	7.4%	0.8%	2.9%	1.4%	na
Oil	110.4	101.7	116.5	156.1	158.6	na	-1.6%	2.8%	4.4%	1.6%	na
Gas	15.0	18.8	21.4	30.1	32.0	na	4.6%	2.6%	5.1%	6.2%	na
Electricity	21.1	27.5	34.1	47.6	49.6	na	5.5%	4.4%	4.9%	4.3%	na
Heat	0.0	0.0	0.0	0.0	0.0	na	-	-	-	-	na
Other	68.0	76.8	75.3	76.4	76.6	na	2.4%	-0.4%	0.4%	0.3%	na
CO₂ Emissions in Mt of CO₂	546.6	533.1	609.4	813.5	841.1	863.4	-0.5%	2.7%	4.5%	3.4%	2.6%
Indicators											
Population (Million)	290.50	321.80	353.14	396.81	403.07	409.53	2.1%	1.9%	1.7%	1.6%	1.6%
GDP (index 1985=100)	98.6	100.0	109.0	143.5	145.5	144.9	0.3%	1.7%	3.6%	1.4%	-0.4%
Gross Inl Cons./GDP (toe/1990 MEUR)	469.6	486.2	491.6	472.0	484.6	494.9	0.7%	0.2%	0.1%	2.7%	2.1%
Gross Inl Cons./Capita (toe/inhabitant)	1.00	0.95	0.96	1.08	1.10	1.10	-1.1%	0.1%	2.0%	2.4%	0.1%
Electricity Generated/Capita (kWh/inhabitant)	1029	1228	1391	1736	1775	na	3.6%	2.5%	3.1%	2.2%	na
CO ₂ Emissions/Capita (t of CO ₂ /inhabitant)	1.9	1.7	1.7	2.0	2.1	2.1	-2.5%	0.8%	2.8%	1.8%	1.0%
Import Dependency %	-9.9	-14.3	-20.8	-36.7	-34.7	-32.3	7.6%	7.9%	4.9%	-5.3%	-7.0%

(1) Includes nuclear, hydro and wind, net imports of electricity, and other energy sources.

(2) Estimates





LATIN AMERICA : MAIN INDICATORS											
	1980	1985	1990	1995	1997	1998	85/80	90/85	95/90	97/95	98/97
	Annual % Change										
Gross Inland Consumption (Mtoe)	291.9	306.6	337.8	392.1	427.1	444.5	1.0%	2.0%	3.0%	4.4%	4.1%
Public Thermal Power Generation	22.5	21.9	24.2	28.4	33.8	37.5	-0.5%	2.0%	3.3%	9.1%	11.2%
Autoprod. Thermal Power Generation	7.8	7.5	8.3	7.7	7.9	8.6	-0.6%	2.0%	-1.6%	1.3%	9.3%
Energy Branch	20.9	20.6	25.0	28.2	33.9	34.8	-0.3%	4.0%	2.5%	9.6%	2.7%
Final Energy Consumption	212.9	220.0	242.8	284.7	308.3	316.0	0.7%	2.0%	3.2%	4.1%	2.5%
Industry	76.9	82.3	91.3	105.6	116.9	119.5	1.4%	2.1%	3.0%	5.2%	2.2%
Transport	63.5	62.4	70.0	87.9	96.7	101.0	-0.3%	2.3%	4.7%	4.9%	4.4%
Tertiary-Domestic	72.5	75.3	81.5	91.2	94.7	95.6	0.8%	1.6%	2.3%	1.9%	0.9%
Energy Intensity (toe/1990 MEUR)	469.6	486.2	491.6	468.8	472.0	484.6	0.7%	0.2%	-0.9%	0.3%	2.7%
Public Thermal Power Generation	36.2	34.8	35.2	33.9	37.3	40.9	-0.8%	0.2%	-0.7%	4.9%	9.7%
Autoprod. Thermal Power Generation	12.5	12.0	12.1	9.2	8.7	9.4	-0.9%	0.3%	-5.4%	-2.6%	7.8%
Industry	123.7	130.6	132.9	126.3	129.2	130.3	1.1%	0.4%	-1.0%	1.2%	0.8%
Transport	102.1	98.9	101.9	105.1	106.8	110.1	-0.6%	0.6%	0.6%	0.8%	3.0%
Tertiary-Domestic	116.6	119.4	118.6	109.0	104.7	104.2	0.5%	-0.1%	-1.7%	-2.0%	-0.4%
Energy per Capita (Kgoe/inhabitant)	1005	953	957	1021	1076	1103	-1.1%	0.1%	1.3%	2.7%	2.4%
Industry	265	256	259	275	295	296	-0.7%	0.2%	1.2%	3.5%	0.6%
Transport	218	194	198	229	244	250	-2.4%	0.5%	2.9%	3.2%	2.8%
Tertiary-Domestic	250	234	231	237	239	237	-1.3%	-0.3%	0.6%	0.3%	-0.6%
Electricity Share (%)											
Final Energy Consumption	9.9%	12.5%	14.1%	15.1%	15.4%	15.7%	4.8%	2.4%	1.4%	1.2%	1.7%
Industry	14.4%	17.7%	18.6%	18.9%	18.9%	18.7%	4.3%	1.0%	0.3%	0.0%	-0.7%
Transport	0.2%	0.3%	0.3%	0.2%	0.2%	0.2%	7.5%	1.0%	-5.7%	-1.7%	0.4%
Tertiary-Domestic	13.7%	17.0%	20.8%	25.0%	26.7%	28.2%	4.4%	4.2%	3.7%	3.4%	5.7%
Total Renewable Consumption (Mtoe)	88.6	105.2	110.4	119.6	125.0	126.2	3.5%	1.0%	1.6%	2.2%	1.0%
Hydro	18.6	26.1	33.0	41.8	45.9	46.8	7.0%	4.8%	4.9%	4.7%	2.1%
Biomass	69.5	78.5	76.7	76.7	78.0	78.4	2.5%	-0.5%	0.0%	0.9%	0.5%
Other	0.4	0.6	0.7	1.1	1.1	1.0	8.0%	2.2%	8.7%	1.1%	-6.0%
Renewable intensity (toe/1990 MEUR)	142.5	166.9	160.6	142.9	138.1	137.6	3.2%	-0.8%	-2.3%	-1.7%	-0.3%
Renewable per capita (Kgoe/inhabitant)	304.9	326.9	312.6	311.2	314.9	313.2	1.4%	-0.9%	-0.1%	0.6%	-0.5%
CO₂ Emissions (Mt of CO₂)	546.6	533.1	609.4	725.6	813.5	841.1	-0.5%	2.7%	3.6%	5.9%	3.4%
Public Thermal Power Generation	67.4	63.9	70.6	82.6	98.7	109.8	-1.1%	2.0%	3.2%	9.3%	11.3%
Autoprod. Thermal Power Generation	18.8	17.1	21.3	19.1	18.8	20.4	-1.9%	4.5%	-2.1%	-0.8%	8.2%
Energy Branch	57.0	54.5	66.2	74.1	88.9	90.7	-0.9%	4.0%	2.3%	9.5%	2.1%
Industry	137.7	126.8	142.5	173.0	197.8	199.8	-1.6%	2.4%	3.9%	6.9%	1.0%
Transport	194.5	191.0	214.2	268.8	295.4	308.4	-0.4%	2.3%	4.6%	4.8%	4.4%
Tertiary-Domestic	71.2	80.0	94.6	107.9	113.9	112.0	2.4%	3.4%	2.7%	2.7%	-1.7%
Carbon Intensity (tn of CO₂/toe)	1.9	1.7	1.8	1.9	1.9	1.9	-1.5%	0.7%	0.5%	1.5%	-0.6%
Public Power Generation	1.7	1.3	1.2	1.2	1.2	1.3	-4.8%	-1.4%	-1.0%	2.6%	5.3%
Public Thermal Power Generation	3.0	2.9	2.9	2.9	2.9	2.9	-0.5%	0.0%	0.0%	0.2%	0.1%
Autoprod. Power Generation	2.3	2.1	2.3	2.3	2.2	2.2	-1.6%	2.5%	-0.8%	-1.3%	-1.0%
Autoprod. Thermal Power Generation	2.4	2.3	2.5	2.5	2.4	2.4	-1.3%	2.4%	-0.5%	-2.0%	-1.0%
Energy Branch	2.7	2.7	2.6	2.6	2.6	2.6	-0.6%	0.0%	-0.2%	-0.1%	-0.6%
Industry	1.8	1.5	1.6	1.6	1.7	1.7	-3.0%	0.3%	1.0%	1.6%	-1.2%
Transport	3.1	3.1	3.1	3.1	3.1	3.1	0.0%	0.0%	0.0%	0.0%	0.0%
Tertiary-Domestic	1.0	1.1	1.2	1.2	1.2	1.2	1.6%	1.8%	0.4%	0.8%	-2.6%
CO₂ per Capita (kg of CO₂/inhabitant)	1881	1657	1726	1888	2050	2087	-2.5%	0.8%	1.8%	4.2%	1.8%
Industry	474	394	404	450	498	496	-3.6%	0.5%	2.2%	5.2%	-0.6%
Transport	670	593	607	700	745	765	-2.4%	0.4%	2.9%	3.2%	2.8%
Tertiary-Domestic	245	248	268	281	287	278	0.3%	1.5%	0.9%	1.1%	-3.2%
CO₂ per unit of GDP (tn of CO₂/1990 MEUR)	879	846	887	867	899	917	-0.8%	1.0%	-0.4%	1.8%	2.0%
Public Thermal Power Generation	108	101	103	99	109	120	-1.4%	0.3%	-0.8%	5.1%	9.8%
Autoprod. Thermal Power Generation	30	27	31	23	21	22	-2.2%	2.7%	-5.9%	-4.6%	6.7%
Energy Branch	92	86	96	89	98	99	-1.2%	2.2%	-1.7%	5.3%	0.7%
Industry	222	201	207	207	219	218	-1.9%	0.6%	-0.1%	2.8%	-0.4%
Transport	313	303	312	321	327	336	-0.6%	0.6%	0.6%	0.8%	3.0%
Tertiary-Domestic	114	127	138	129	126	122	2.1%	1.7%	-1.3%	-1.2%	-3.0%





BRAZIL : SUMMARY ENERGY BALANCE											
Mtoe	1980	1985	1990	1997	1998	1999(2)	85/80	90/85	97/90	98/97	99/98
							Annual % Change				
Primary Production	62.1	95.1	96.6	117.5	126.1	136.6	8.9%	0.3%	3.9%	7.3%	8.4%
Solids	2.5	3.6	1.9	2.2	2.1	2.1	7.2%	-11.9%	-0.2%	-4.2%	2.8%
Oil	9.3	28.0	33.4	46.2	52.0	60.3	24.8%	3.5%	6.8%	12.5%	16.0%
Natural gas	0.8	2.2	2.4	3.5	4.7	5.2	21.5%	1.9%	9.2%	35.0%	10.0%
Nuclear	0.0	0.9	0.6	0.8	0.9	1.0	-	-7.9%	12.4%	3.0%	22.6%
Hydro & Wind	11.1	15.3	17.8	24.0	25.1	26.6	6.7%	3.0%	4.2%	4.4%	6.0%
Geothermal	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-
Other	38.4	45.1	40.5	40.8	41.3	41.3	3.3%	-2.1%	0.5%	1.3%	0.0%
Net Imports	48.8	28.2	38.0	54.6	50.9	43.2	-10.4%	6.1%	4.0%	-6.8%	-15.2%
Solids	3.7	6.1	8.0	10.8	10.7	10.1	10.3%	5.5%	2.9%	-0.6%	-5.4%
Oil	45.1	22.0	27.7	40.4	36.8	29.8	-13.4%	4.7%	4.3%	-8.8%	-19.0%
Crude oil	44.3	28.0	29.2	29.7	28.5	na	-8.8%	0.9%	0.9%	-3.8%	na
Oil products	0.8	-6.0	-1.5	10.7	8.3	na	-	-24.2%	45.7%	-22.5%	na
Natural gas	0.0	0.0	0.0	0.0	0.0	0.2	-	-	-	-	-
Electricity	0.0	0.2	2.3	3.5	3.4	3.0	-	69.1%	5.5%	-2.6%	-10.3%
Gross Inland Consumption	111.7	123.3	131.9	170.4	175.0	178.4	2.0%	1.4%	3.8%	2.7%	1.9%
Solids	6.0	10.1	9.7	12.7	12.5	12.3	11.1%	-0.9%	1.8%	-1.5%	-2.0%
Oil	55.5	49.5	58.6	85.1	87.1	88.7	-2.2%	3.4%	5.6%	2.4%	1.8%
Natural gas	0.8	2.2	2.4	3.5	4.7	5.4	21.5%	1.9%	9.2%	35.0%	14.1%
Other (1)	49.5	61.5	61.2	69.1	70.6	72.0	4.4%	-0.1%	2.0%	2.2%	1.9%
Electricity Generation in TWh	139.4	193.7	223.0	308.0	321.6	na	6.8%	2.9%	4.6%	4.4%	na
Nuclear	0.0	3.4	2.2	3.2	3.3	na	-	-7.9%	12.4%	3.0%	na
Hydro & wind	128.9	178.4	206.7	279.0	291.4	na	6.7%	3.0%	4.2%	4.4%	na
Thermal	10.5	11.9	14.1	25.8	27.0	na	2.6%	3.3%	8.6%	4.3%	na
Generation Capacity in GWe	34.8	45.2	55.0	63.2	65.1	na	5.4%	4.0%	2.3%	2.9%	na
Nuclear	0.0	0.7	0.7	0.7	0.7	na	-	0.0%	0.0%	0.0%	na
Hydro & wind	29.0	38.2	47.5	55.2	56.6	na	5.7%	4.5%	2.4%	2.6%	na
Thermal	5.8	6.4	6.8	7.4	7.8	na	2.0%	1.4%	1.8%	5.9%	na
Average Load Factor in %	45.8	48.9	46.3	55.6	56.4	na	1.3%	-1.1%	2.3%	1.4%	na
Fuel Inputs for Thermal Power Generation	2.3	2.6	2.9	5.1	5.5	na	2.3%	2.4%	7.7%	7.3%	na
Solids	0.9	1.4	1.4	2.0	1.9	na	9.0%	0.2%	2.6%	-1.5%	na
Oil	1.4	1.0	1.3	2.9	3.3	na	-5.2%	4.3%	12.3%	13.1%	na
Gas	0.0	0.0	0.1	0.0	0.0	na	-	-	70.6%	61.5%	na
Geothermal	0.0	0.0	0.0	0.0	0.0	na	-	-	-	-	na
Other	0.1	0.2	0.2	0.2	0.2	na	24.4%	0.0%	3.0%	4.1%	na
Average Thermal Efficiency in %	38.7	39.3	41.1	43.8	42.5	na	0.3%	0.9%	0.8%	-2.8%	na
Non-Energy Uses	6.8	12.9	15.4	18.8	19.2	na	13.6%	3.6%	3.4%	2.1%	na
Total Final Energy Demand	96.8	103.4	110.6	140.7	144.4	na	1.3%	1.4%	3.6%	2.6%	na
Solids	3.5	6.2	5.9	8.5	8.4	na	11.7%	-0.8%	2.4%	-1.2%	na
Oil	44.2	37.1	44.8	64.2	66.4	na	-3.5%	3.8%	5.4%	3.5%	na
Gas	0.5	0.8	1.4	2.9	2.9	na	10.2%	10.2%	11.0%	1.2%	na
Electricity	10.2	14.4	18.1	24.6	25.6	na	7.1%	4.7%	4.6%	4.1%	na
Heat	0.0	0.0	0.0	0.0	0.0	na	-	-	-	-	na
Other	38.4	44.9	40.4	40.6	41.1	na	3.2%	-2.1%	0.5%	1.3%	na
CO₂ Emissions in Mt of CO₂	169.8	162.5	189.5	274.4	280.6	na	-0.9%	3.1%	5.1%	2.3%	na
Indicators											
Population (Million)	121.67	135.22	147.94	163.69	165.87	168.09	2.1%	1.8%	1.4%	1.3%	1.3%
GDP (index 1985=100)	94.7	100.0	110.5	136.7	136.9	138.3	1.1%	2.0%	2.9%	0.1%	1.0%
Gross Inl Cons./GDP (toe/1990 MEUR)	356.6	372.8	361.0	376.9	386.5	390.0	0.9%	-0.6%	0.9%	2.5%	0.9%
Gross Inl Cons./Capita (toe/inhabitant)	0.92	0.91	0.89	1.04	1.06	1.06	-0.1%	-0.5%	2.4%	1.3%	0.6%
Electricity Generated/Capita (kWh/inhabitant)	1146	1432	1507	1881	1939	na	4.6%	1.0%	3.2%	3.0%	na
CO ₂ Emissions/Capita (t of CO ₂ /inhabitant)	1.4	1.2	1.3	1.7	1.7	na	-2.9%	1.3%	3.6%	0.9%	na
Import Dependency %	43.6	22.8	28.7	31.7	28.8	23.9	-12.1%	4.7%	0.1%	-9.2%	-16.9%

(1) Includes nuclear, hydro and wind, net imports of electricity, and other energy sources.

(2) Estimates



VENEZUELA : SUMMARY ENERGY BALANCE

Mtoe	1980	1985	1990	1997	1998	1999(2)	85/80	90/85	97/90	98/97	99/98
	Annual % Change										
Primary Production	139.4	114.4	147.0	233.7	230.6	212.2	-3.9%	5.1%	5.0%	-1.3%	-8.0%
Solids	0.0	0.0	1.6	3.8	5.4	5.5	-1.3%	123.0%	19.2%	44.9%	0.6%
Oil	123.8	95.5	120.9	195.7	190.0	171.9	-5.1%	4.8%	4.8%	-2.9%	-9.5%
Natural gas	14.0	16.5	20.7	28.7	29.6	29.1	3.4%	4.7%	4.8%	3.2%	-1.8%
Nuclear	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-
Hydro & Wind	1.3	1.9	3.2	4.9	5.0	5.2	9.2%	10.3%	3.8%	1.2%	5.0%
Geothermal	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-
Other	0.4	0.5	0.5	0.5	0.5	0.5	5.2%	3.4%	-0.3%	0.0%	0.0%
Net Imports	-103.4	-74.4	-102.0	-181.9	-173.6	-155.3	-6.4%	6.5%	5.8%	-4.5%	-10.5%
Solids	0.1	0.1	-1.1	-3.7	-4.3	-4.5	3.3%	-	15.2%	15.7%	4.5%
Oil	-103.5	-74.5	-100.8	-178.2	-169.3	-150.8	-6.4%	6.2%	5.6%	-5.0%	-10.9%
Crude oil	-72.7	-46.6	-68.7	-135.4	-128.4	na	-8.5%	8.1%	7.4%	-5.2%	na
Oil products	-30.8	-27.9	-32.1	-42.8	-40.9	na	-2.0%	2.9%	1.3%	-4.2%	na
Natural gas	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-
Electricity	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-
Gross Inland Consumption	35.0	38.8	42.0	51.3	56.5	56.9	2.1%	1.6%	3.1%	10.1%	0.6%
Solids	0.2	0.2	0.5	0.0	1.0	1.0	2.5%	21.1%	-	2750.0%	0.0%
Oil	19.2	19.7	17.1	17.2	20.5	21.0	0.5%	-2.8%	0.4%	19.2%	2.8%
Natural gas	14.0	16.5	20.7	28.7	29.6	29.1	3.4%	4.7%	4.8%	3.2%	-1.7%
Other (1)	1.6	2.4	3.7	5.5	5.5	5.8	8.4%	9.1%	3.4%	1.1%	4.5%
Electricity Generation in TWh	35.8	47.3	59.3	78.1	80.9	na	5.7%	4.6%	3.6%	3.6%	na
Nuclear	0.0	0.0	0.0	0.0	0.0	na	-	-	-	-	na
Hydro & wind	14.6	22.6	37.0	57.3	58.0	na	9.2%	10.3%	3.8%	1.2%	na
Thermal	21.2	24.6	22.3	20.8	22.9	na	3.0%	-1.9%	2.9%	10.3%	na
Generation Capacity in GWe	7.3	13.7	18.2	21.6	22.2	na	13.5%	5.8%	2.9%	3.2%	na
Nuclear	0.0	0.0	0.0	0.0	0.0	na	-	-	-	-	na
Hydro & wind	3.4	7.0	11.0	13.2	13.8	na	15.8%	9.5%	3.2%	4.9%	na
Thermal	3.9	6.7	7.1	8.4	8.4	na	11.3%	1.3%	2.3%	0.4%	na
Average Load Factor in %	56.2	39.4	37.2	41.3	41.5	na	-6.8%	-1.1%	0.7%	0.5%	na
Fuel Inputs for Thermal Power Generation	7.6	8.1	7.5	7.0	7.7	na	1.4%	-1.6%	3.8%	10.0%	na
Solids	0.0	0.0	0.0	0.0	0.0	na	-	-	-	-	na
Oil	4.1	2.8	1.9	1.1	1.4	na	-7.2%	-7.5%	2.4%	23.0%	na
Gas	3.5	5.3	5.6	5.9	6.3	na	8.7%	1.1%	4.2%	7.5%	na
Geothermal	0.0	0.0	0.0	0.0	0.0	na	-	-	-	-	na
Other	0.0	0.0	0.0	0.0	0.0	na	-	-	-	-	na
Average Thermal Efficiency in %	24.0	26.1	25.6	25.4	25.5	na	1.7%	-0.4%	-0.9%	0.3%	na
Non-Energy Uses	0.9	0.9	0.9	1.7	1.8	na	-0.8%	0.0%	10.1%	5.4%	na
Total Final Energy Demand	22.4	24.6	27.0	33.6	34.9	na	1.9%	1.9%	2.8%	3.9%	na
Solids	0.2	0.2	0.5	0.0	1.0	na	2.6%	20.7%	-	0.0%	na
Oil	12.0	12.7	13.8	16.6	16.2	na	1.1%	1.7%	1.7%	-2.2%	na
Gas	7.5	8.1	8.3	11.4	12.0	na	1.6%	0.5%	3.3%	5.7%	na
Electricity	2.4	3.1	3.9	5.0	5.1	na	5.5%	4.5%	3.2%	2.0%	na
Heat	0.0	0.0	0.0	0.0	0.0	na	-	-	-	-	na
Other	0.4	0.5	0.5	0.5	0.5	na	5.2%	3.4%	-0.3%	0.0%	na
CO₂ Emissions in Mt of CO₂	96.3	99.9	111.5	137.6	146.0	na	0.7%	2.2%	4.1%	6.1%	na
Indicators											
Population (Million)	15.09	17.14	19.50	22.78	23.24	23.72	2.6%	2.6%	2.2%	2.0%	2.1%
GDP (index 1985=100)	104.8	100.0	113.6	142.3	141.3	131.2	-0.9%	2.6%	1.8%	-0.7%	-7.2%
Gross Inl Cons./GDP (toe/1990 MEUR)	993.3	1154.7	1101.0	1074.3	1191.0	1290.3	3.1%	-0.9%	1.3%	10.9%	8.3%
Gross Inl Cons./Capita (toe/inhabitant)	2.32	2.26	2.15	2.25	2.43	2.40	-0.5%	-1.0%	0.9%	7.9%	-1.5%
Electricity Generated/Capita (kWh/inhabitant)	2372	2759	3042	3427	3481	na	3.1%	2.0%	1.3%	1.6%	na
CO ₂ Emissions/Capita (t of CO ₂ /inhabitant)	6.4	5.8	5.7	6.0	6.3	na	-1.8%	-0.4%	1.8%	4.0%	na
Import Dependency %	-290.5	-189.0	-238.2	-349.9	-304.2	-269.7	-8.2%	4.7%	2.8%	-13.1%	-11.3%

(1) Includes nuclear, hydro and wind, net imports of electricity, and other energy sources.

(2) Estimates



European Commission

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