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PROGRESS IN STRUCTURAL CHANGE - THE MAIN FINDINGS  
OF THE COMMISSION'S REVIEW OF MEMBER STATES' ENERGY  
POLICIES

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(Communication from the Commission to the Council)

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**PROGRESS IN STRUCTURAL CHANGE:  
THE MAIN FINDINGS OF THE COMMISSION'S REVIEW  
OF MEMBER STATES' ENERGY POLICIES**

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**PROGRESS IN STRUCTURAL CHANGE:  
THE MAIN FINDINGS OF THE COMMISSION'S REVIEW OF  
MEMBER STATES' ENERGY POLICIES**

INTRODUCTION

1. In a separate and more detailed Communication to the Council (COM(84)88) the Commission is presenting a full analysis of Member States' energy policies, the third major review since the Council agreed, in a Resolution of June 1980, on Community energy objectives to 1990. The aim of this separate paper is to summarise the main findings of that analysis and to outline some important policy conclusions which should guide future debates on energy policy at Community and at national level.

2. In its analysis the Commission has taken into account the main guidelines included in the 1980 Council Resolution. These are:

- (i) to reduce to 0.7 or less the average ratio between the rate of growth in gross primary energy demand and the rate of growth of gross domestic product;
- (ii) to reduce oil consumption to a level of about 40% of gross primary energy consumption;
- (iii) to cover 70-75% of primary energy requirements for electricity production by means of solid fuels and nuclear energy;
- (iv) to encourage the use of renewable energy sources so as to increase their contribution to the Community's energy supplies;
- (v) the pursuit of energy pricing policies geared to attaining Community energy objectives.

The review does, however, look more closely than in the past at the relationship between energy and economic activity, using supplementary indicators of energy efficiency. It also examines the extent to which the guidelines for 1990 are still relevant, given that the fall in energy and oil demand during the last four years has been much steeper and more sustained than was imagined in the immediate aftermath of the second "oil crisis".

PROGRESS IN STRUCTURAL CHANGE: THE COMMUNITY AS A WHOLE

3. There have been major changes on the energy and oil markets in the Community since 1973, and especially since 1979, as Tables 1 and 2 show:

- inland energy demand for the Community as a whole in 1983 was over 6% lower than in 1973;
- inland oil demand was down by 27%;
- dependence on imported oil for total primary energy supply has virtually halved (from nearly 62% to 32%);
- oil use in electricity generation has fallen by nearly 40%, oil now accounting for 13% of total electricity inputs compared with nearly 32% in 1973.

4. There are five main reasons for these changes:

- (i) a very major improvement in the **relationship between energy demand and gross domestic product**.

The ratio between **primary** energy demand and GDP fell by over 19% between 1973 and 1982 and by nearly 12% between 1979 and 1982 alone. There were even greater improvements in the intensity<sup>1</sup> of **final** energy demand in industry (which fell by 27% between 1973 and 1982) and in the household and tertiary sectors where final demand fell by 23% in the same period. Only in the transport sector has there been a worsening of the ratio, with the share of transport in final energy demand rising significantly over the period (Table 3).

Changes in these ratios over time are not in themselves conclusive proof of greater energy efficiency. The improvement in the relationship between GDP and primary energy demand is partly the result of a fall in the share of GDP taken by manufacturing industry. In industry itself the fall in energy intensity is partly due to changes in industrial structure, notably the reduced importance of the energy-intensive heavy industries. But even allowing for these structural changes there have still been clear improvements in the efficiency of energy use, most obviously in the household sector. These have been analysed more fully in a separate study by the Commission services<sup>2</sup>.

- (ii) the coming on stream of **North Sea oil**. In 1973 practically all Community oil was imported. In 1983 the Community was producing 2.6 mbd or over 30% of its own oil requirements, mainly from the North Sea.
- (iii) increased use of **nuclear power**. In 1973 nuclear provided 7.5% of the inputs to electricity production and met less than 2% of inland energy demand. By 1979 the figures had risen to 13.3% and 3.8% respectively. In the past four years there has been a "quantum leap". In 1983 nuclear provided over 27% of the inputs to electricity and met nearly 9% of inland energy demand.
- (iv) greater recourse to **natural gas**. Natural gas production in the Community in 1983 was around the same level as in 1973, having declined from its peak during the mid-late 1970s. But natural gas

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1. Energy intensity = ratio between final energy demand and output, expressed in real terms at 1975 prices.

2. European Economy N° 16, July 1983.

consumption, despite reductions since 1979, was up by nearly 40% compared with 1973. Practically all this increase has been met by imports, which now account for 29% of gas demand.

- (v) increased use of **solid fuels for electricity generation**. Solid fuel consumption as a whole in 1983 was down by nearly 7% compared with 1973. But the use of solid fuels in power stations has increased by some 22% during the past 10 years and solid fuels accounted for nearly 47% of the inputs to electricity generation in 1983.

#### THE OUTLOOK FOR THE COMMUNITY

5. The latest available projections submitted by Member States for the review exercise indicate the following outlook for 1990 in terms of the Community guidelines:

- total **oil demand** will be down to some 43% of gross primary energy demand in 1990, compared with 48% in 1983. This is on the high side, but not out of line with the Community guideline of "about 40%".
- the combined rôle of **solid fuels and nuclear in electricity generation** will continue to increase, although with nuclear continuing to grow much more rapidly in importance. In 1990 nuclear should be providing close to 40% of electricity inputs, and solid fuels and nuclear combined over 80%. When hydropower and other renewables are taken into account, oil use in power stations could fall to 10% or less of the total.
- **energy intensity** is unlikely to worsen and could improve, although the changes that are projected by Member States are much smaller than those of the past ten years.

6. These detailed projections for 1990 should be treated with caution, particularly since - surprising as it may seem - many Member States have not yet fully revised their forecasts since the second "oil shock". But the overall trends now seen plausible. Even supposing faster economic growth than assumed in Member States' submissions<sup>3</sup>, the movement away from oil in the Community as a whole seems more likely to be consolidated than weakened during the next few years as new structural investments take effect.

On the **supply** side the growth in nuclear capacity by 1990 is now more or less predetermined by construction and commissioning programmes already under way. Any plausible growth in electricity demand should be met, in most Member States, by nuclear and solid fuel-fired plant without recourse to oil; in others the use of natural gas will help to avoid significant increases in oil demand.

On the **demand** side the picture is less certain, but even on pessimistic scenarios energy and oil demand seem unlikely to increase significantly, in particular:

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3. An average of 2.4% a year 1985-1990.

- in the household/tertiary sector oil demand has fallen by over 30% since 1979 as a result of energy saving measures (insulation, more efficient heating systems etc.) and substitution - notably a shift to gas. Much of this gain will be irreversible. To return to its 1979 level oil consumption in this sector would have to increase by 6% p.a. between 1983 and 1990, two and a half times the projected increase in inland energy demand.
- industrial demand for oil would have to experience an even higher growth rate, which is improbable.
- transport is the largest oil consumer and the area where the most limited change has occurred so far. But major R, D & D programmes to improve fuel economy are now beginning to bear fruit and this should at the least offset any tendency towards increased mileage.
- in any case, the trends towards improved energy efficiency and oil substitution would almost certainly be enhanced by higher rates of economic growth since this would in turn accelerate the turnover of capital stock.

7. Provided, therefore, that there is no substantial and sustained fall in relative oil prices in ECU terms during the rest of this decade the Community's dependence on oil is unlikely to grow and could well decrease further by 1990.

**The major questions now relate to developments in the 1990s and to the variations among Member States both in achievements and prospects.**

#### MEMBER STATES' ENERGY PROGRAMMES

8. Member States vary considerably as to their level of economic development, economic and industrial structures, geographical situations, energy resource endowments and the political and administrative frameworks within which energy policy is developed and directed. These differences help to explain some of the differences in progress in reducing dependence on imported oil. But the different rates of progress also reflect both variations in policy and the success with which policy has been implemented, notably in electricity generation and in the encouragement of more rational energy use.

In general the degree of **consistency** among Member States' policies has grown over the past few years. Throughout the Community there have been improvements in pricing policy; in the mix of fuels in electricity generation; and greater attention to energy saving and energy R, D & D. But much remains to be done and there remain major differences of approach and achievement. These are examined fully in Part Two of the separate report by the Commission (COM(84)88). The position in each Member State and the key issues of interest in a Community context that arise from that report can be summarised as follows. Some of the key figures are given in Table 4.

9. Belgium has made steady progress in improving her energy situation since 1973, reducing dependence on oil from 62% in 1973 to close to 50% in 1982. The main element has been the nuclear power programme which has driven down oil demand in the electricity sector. In 1982 nuclear supplied some 33% of primary energy inputs to Belgian electricity production, the second highest percentage in the Community (after France). Belgium expects to reduce her dependence on oil still further as nuclear output more than doubles during the rest of this decade, with oil dependence projected to fall to 41% by 1990.

Until recently less attention has been given to energy savings policies than to management of the supply side. The industrial restructuring of the past few years, and especially the decline in importance of the heavy energy-intensive industries, together with a policy of relatively high energy prices, has led to a considerable improvement in the intensity of energy use. But the unrealised potential for energy saving is large and the outlook projected by the Belgian government seems less than satisfactory in this respect. Recently, however, new emphasis has been given to energy savings policy, backed up by Government finance, which should encourage greater progress.

Other areas where important issues arise are:

(i) the Belgian coal industry which is the highest-cost producer in the Community;

(ii) natural gas demand. At a time when demand expectations were high Belgium contracted for increased supplies of natural gas over the coming years, including Algerian LNG, which are more than the market in the medium term now seems likely to require. Excess quantities are being burned in power stations to replace fuel oil.

In addition, final decisions have yet to be taken on the electricity ordering programme for the early-mid 1990s, but these are understood to be imminent.

The conclusion last year of a long-awaited Parliamentary debate on energy should provide a helpful impetus to future policy decisions in these and other areas.

10. Denmark has effected an impressive switch away from oil over the past ten years by conversion from oil to imported coal in the power-station field, vigorous energy saving policies, realistic energy pricing and high energy taxation, and development of the tradition of collective heat arrangements. Dependence on oil fell from nearly 89% in 1973 to less than 66% in 1982; coal in 1982 provided nearly 92% of the inputs to electricity-generation compared with less than 40% ten years ago; the reduction in energy intensity has been marked, notably in the residential and industrial sectors. Further consolidation of progress away from oil is planned, bringing projected oil dependence down to 52% by 1990.

The high dependence of the electricity system on imported coal demands a correspondingly high level of "risk-spreading" through geographical diversification of sources of imports. The Danes have made considerable efforts in this direction.

Important decisions have also been taken to develop Denmark's offshore hydrocarbon resources. Danish offshore oil now meets 15% of Danish oil requirements and by 1990 this could be as high as 40%. Natural gas from the Danish sector of the North Sea is planned to play an increasingly important rôle in the domestic and industrial heat supply system later in the decade and also to be a limited source of exports.

Energy planning in Denmark has produced highly successful results. The Danish experience, notably in energy conservation and district heating, should be of considerable interest to other Community members. The expertise developed in the planning field now needs to be brought fully to bear to help minimise the high costs involved in the major task of introducing natural gas into the energy system.

Early decisions are also desirable on the place (if any) of nuclear energy in the electricity system in the 1990s. Reports are expected to be submitted to the government this year on nuclear safety and waste disposal. Rapid follow-up action is needed to facilitate long-term planning of the electricity supply system.

11. During the past ten years Germany has consolidated an already relatively diversified structure of energy supply and demand by significantly greater recourse to nuclear energy, continuing commitments by the electricity industry to the German hard coal industry, more widespread use of natural gas and important improvements in energy intensity. The process of change has been encouraged by a generally market-based approach to pricing and vigorous policies to improve energy efficiency. During the remainder of this decade there should be a further major shift towards nuclear power as new stations come on stream, helping to reduce projected oil dependence to around 41% compared with 44.5% in 1982.

There are four important issues for the future:

- the problems of the German hard coal industry which now has to adjust to a new and less buoyant market outlook. The speed of phasing out excess capacity, a process already under way, will need to be a continuing focus of policy attention;
- the electricity ordering programme for the 1990s, and notably the respective rôles for nuclear and coal;
- the costs of the electricity system. The commitments by the electricity industry to burn large quantities of German coal, entered into a time when demand expectations were higher than today, inevitably raise the average costs of German electricity production in more depressed market conditions. The new more stringent environmental legislation will also impact on electricity costs (as well as coal-based district heating);
- the continuing need to reduce oil demand outside the electricity generating sector. On some scenarios oil consumption could increase in volume terms. These scenarios may well be pessimistic, but the outlook clearly needs to be kept under careful review and further opportunities for reducing oil dependence vigorously sought. It is noteworthy in this context that the German government has ceased to



give financial support to energy conservation in the domestic sector where, despite a good deal of progress, there appears to remain considerable potential for reducing oil demand.

12. During the 1970s Greece made useful progress in reducing dependence on oil in electricity generation by some conversion to solid fuels. But in other sectors oil use increased. Energy intensity in industry has fallen since 1973 but is still high compared with the Community average.

In 1982 Greece depended on oil for 73% of energy supplies. Current plans aim to ensure a very major improvement in this situation during the remainder of this decade and beyond, bringing oil's share in primary energy demand down to 57% by 1990. This will require in particular, a very heavy capital expenditure programme to develop domestic lignite resources and lignite-based power generating capacity; attention to renewable energies; and hydrocarbon exploration.

Key questions for the future are:

- whether adequate financial resources and technical and managerial expertise will be mobilised to implement this ambitious programme. In this respect it is desirable that Greece should encourage more widespread recourse to external experience and resources;
- how far the burden of the investment programme and the long-term cost of the electricity system could be reduced by greater recourse to imports of hard coal than currently planned. The aim of the Greek authorities is to develop their indigenous resources in an optimal fashion. It is essential in this context that costs are fully assessed.
- whether or not nuclear should play a rôle in the power station mix in the 1990s. Early decisions will be required if there is to be any reasonable expectation of a nuclear contribution by the late 1990s.
- the adequacy of policies outside the electricity generating sector. Plans to improve oil substitution in industry and the domestic sector are limited and energy saving policy is relatively weak. The weaknesses are accentuated by pricing policy.
- the importance of adapting the Greek oil monopoly to Community rules as early as possible and in any case by the end of 1985.

13. The clear commitment to nuclear power in France, combined with vigorous efforts in the field of energy saving, has brought radical changes in the French energy economy since 1973. Oil dependence has fallen from 72% to less than 53%. Nuclear now accounts for over half of the inputs to power generation, and coal for over one-quarter; energy intensity has fallen significantly. The process of substitution for oil is likely to continue and indeed to accelerate during the rest of this decade as available nuclear capacity doubles, giving France probably the highest share of dependence on nuclear energy for electricity generation (around 85%) of any country in the world.

Together with Denmark, France can claim some of the most impressive achievements in the engineering of structural change in the energy sector. But the changes in the energy situation of the past few years and a more conservative view of likely rates of economic growth are posing difficult problems, notably in the electricity sector and in the coal industry. There is also uncertainty about the future rôle of natural gas. One option for the electricity industry for the longer-term is a sustained policy of net exports of nuclear electricity to other Member States: this is obviously of considerable interest in a Community context. In the coal industry there has been a good deal of uncertainty about the direction of future policy, but recent decisions imply a gradual reduction in output during the remainder of the decade. On some scenarios there could be a significant potential excess supply of natural gas later in the 1980s. Important decisions will be required in each of these areas in the next few years.

France has ambitious objectives for the contribution of new and renewables and for further improvements in energy efficiency, to be promoted in both cases by a special coordinating agency, the Agence Française pour la Maîtrise de l'Energie (AFME). These programmes are supported in part by investment aids from a special fund financed by a tax on motor fuel. The operations of the AFME and the financing arrangements should be of particular interest to other Community members where less vigorous programmes are in force. It is notable that in contrast to some other Member States with a good record on energy saving, France shows no signs of reducing financial incentives in this field and apparently sees further potential still to be exploited.

14. Ireland has made considerable progress in reducing dependence on oil. Key elements have been, first and foremost, the development of the Kinsale Head gas field which has allowed natural gas to substitute for oil on a large scale in the electricity generating sector; the development of indigenous peat; and the switch to solid fuels (mainly imported coal) for domestic heating. Dependence on oil has fallen from 79% in 1973 to less than 56% in 1982. Current forecasts assume further improvements in this situation but at a slower pace than in the last ten years. The major change will be the shift from natural gas to imported coal in power stations, although oil use in power stations is expected to increase in volume terms. Oil and gas were discovered in the Celtic Sea Basin in autumn 1983, which could change substantially the longer-term energy outlook.

Other main issues for the future are:

- energy saving policy, where the rôle of regulatory measures and financial incentives has been particularly weak;
- the development of premium markets for natural gas. Agreement has been reached on the construction of a gas pipeline for supplying Northern Ireland with natural gas from Kinsale. This will provide an export outlet to help reduce gas use in power generation. Natural gas from Kinsale is now also available in Dublin. But continuing efforts are needed to ensure more widespread access to gas by domestic consumers.

15. Progress in Italy so far has been disappointing in a number of respects. Oil dependence has fallen since 1973 but proportionately less than in all Member States apart from Greece (which is at a rather lower level of development) and Luxembourg (where oil use was already relatively low). Italy still depended on oil for over two-thirds of her energy supplies in 1982 and solid fuels, nuclear, hydro and other renewables played together a smaller rôle in electricity generation than in almost all other Community countries.

There has been some improvement in the relationship between energy and GDP and the intensity of final energy demand in industry fell by 27% between 1973 and 1982. But these improvements have been heavily influenced by structural change in the economy. Conservation policy as such has been limited. Progress has been made in recent years in developing a more realistic approach to electricity and oil product pricing than in the 1970s but much still remains to be done.

While specific geographical and economic factors help to explain the limited progress that has been made, the lack until 1981 of a clear political and parliamentary consensus on energy policy prevented rapid and sustained action.

In its last report on Member States' programmes, the Commission welcomed the 1981 Italian Energy Plan as a major step forward, offering the prospect of a radical improvement in the situation over the coming years. Discussion of the Plan appeared to demonstrate a general recognition of the need for a more coherent energy policy and, specifically, progress in the fields of electricity generation and energy saving. But progress in implementing many aspects of the 1981 Plan has been slow and many of the objectives have now been scaled-down or re-timed. This applies particularly to the power station programme for the longer-term where some projected investments have been put back by several years. The major Energy Conservation Law of 1982 has only been partially implemented and as yet there has been no commitment of expenditure. Problems have also arisen in the introduction of natural gas into the Italian energy system because of the fall in gas demand and difficulties in distribution to premium markets; there has been consequent pressure to burn natural gas in power stations.

These elements taken together suggest considerable uncertainty about the rate of future progress in oil substitution and more efficient energy use. Even if current energy projections are realised, nearly half of Italian electricity will still be produced from oil in 1990 and Italy will remain dependent on oil for 57% of her energy supplies. The outturn could be even less satisfactory. It is essential that the planned switch to nuclear and coal in the power-generating sector should not be further delayed by continued problems over siting or the interim use of natural gas in power stations; and that the provisions of the Energy Conservation Law are fully enacted. There is a major risk that, unless the outstanding logjams are broken, Italy's energy position vis-à-vis the other larger Member States will further deteriorate between now and 1990.

16. Luxembourg's small size and the domination of the economy by the steel industry have set a special framework for the development of energy policy. Oil dependence was relatively low in 1973 and it has since been reduced still further through the diversification of inputs (electricity, natural gas) to heat-raising in the steel industry and in the domestic

sector. Practically all Luxembourg's energy is imported and the planning of future imports of gas and electricity from neighbouring countries will continue to be a key element in energy policy. Other important areas of policy for the future are:

- the need to introduce a more comprehensive energy saving policy (policies in the domestic sector and transport have been particularly limited so far);
- further progress in bringing the post-tax prices of motor fuels more into line with those in other Community countries;
- improving and extending the natural gas distribution network so as to give wider access by domestic consumers to gas as an alternative to oil for heating.

17. The energy economy of the Netherlands is dominated by natural gas, and gas revenues (like those from oil in the United Kingdom) are a major element in the financing of the government budget. The availability of large supplies of indigenous natural gas helped in itself to reduce Dutch dependence on oil during the 1970s. But it has also affected the pace at which substitution by other non-oil fuels has occurred, notably in the electricity sector.

In 1982 the Netherlands was still dependent on oil for nearly a quarter of the inputs to electricity-generation. A programme of conversion from oil to coal in electricity generation is underway and the projections indicate that by 1990 solid fuels could provide over 40% of the inputs to electricity. In the meantime, however, natural gas is expected to substitute increasingly for oil in this sector under new arrangements between Gasunie and the electricity industry. Even if the programme of conversion is completed total inland oil demand will increase by 15% between 1982 and 1990 and oil dependence will increase. The completion of the conversion programme is therefore of major importance.

The pace of restructuring on the demand side has been faster. The Netherlands has had one of the most wide-ranging energy conservation programmes in the Community, with a high level of government budgetary expenditure. The government is now reexamining aspects of this programme against a background of budgetary stringency and a general policy of "deregulation". Account must be taken in this review of the constraints on investment in efficient energy use in a generally depressed investment climate.

Other policy issues of particular interest in a Community context are:

- gas export policy. The Dutch government has indicated a change in gas export policy which could release larger quantities of Dutch gas for sale in other Member States in the 1990s.
- nuclear policy. A long Public Debate on (Nuclear) Energy has reached a turning point with the recent publication of the final report by its Steering Committee. It is important for the planning of the electricity supply system in the 1990s that early decisions should now be taken by the government about the future rôle of nuclear power.

18. The United Kingdom has enjoyed a uniquely favourable set of circumstances in the energy field since 1973 in comparison with other Member States - an already diversified energy supply structure, the advent of North Sea oil, and powerful tools of government intervention. The harnessing of North Sea oil resources is one of the major success stories of the 1970s. In 1973 the United Kingdom depended on imported oil for nearly 50% of her energy demand. In 1982 she was a sizeable net exporter of oil.

A large share of oil exports from the UK has gone to other Community members. But access to North Sea oil and gas has reduced pressures to develop a more integrated gas market, in particular, with continental Europe. A limited cross-Channel electricity link exists with France; but there is no direct gas link with continental Europe. It could be of interest both to the UK and to other Community members to encourage better links with the continent, exploiting the scope for cost savings all round and improving energy security.

A second effect of access to large-scale indigenous resources has perhaps been to circumscribe the rôle of energy saving policy. The United Kingdom has made progress in reducing energy intensity but a slower pace than in many other Community countries, and in the industrial sector the scope for improvement appears to be particularly great. Successive policies of restraint on energy prices in the 1970s undoubtedly discouraged improvements in energy efficiency. During the past four years pricing policy has been put on a sounder footing, and the financial situation of the gas and electricity industries is now much healthier. But there are uncertainties about the future direction of energy pricing policy and specific weaknesses in gas pricing. The recent creation of an Energy Efficiency Office is intended to reflect a new priority for energy savings policy. It has a major job to do in ensuring that the potential for energy saving can be exploited.

The available data suggest that oil dependence in the United Kingdom should have fallen to 38/39% in 1990 compared with 40% in 1982. The main element will be the coming on stream of new nuclear stations. Demand for coal is expected, at best, to stabilise. A difficult process of structural adjustment is now under way in the UK coal industry and will be a continuing focus of policy attention. There are also important decisions to be made in the coming years about the "new generation" nuclear programme in the light of the results of the ongoing enquiry into the construction of a PWR at Sizewell. The results of this enquiry should be acted on in a timely fashion so as to reduce uncertainty for the nuclear and electricity industries.

#### POLICY IMPLICATIONS

19. One overriding lesson from the review of Member States' policies is that vigorous energy policies bring clear rewards. Those Member States with the most active policies in encouraging substitution for oil in electricity generation and the more rational use of energy have achieved the biggest gains.

A second lesson is that the existence of political commitments, agreements and programmes at Community level has helped to influence and reinforce energy policy at national level: in particular, the Community's

long-term objectives have provided a valuable framework for the development of national energy policies. The Council (Energy) has already recognised this point in its report on Community energy policy of 4 November 1983.

#### Areas of Concern

20. But although progress to date and the outlook for the rest of the decade are relatively comforting the review has identified some major areas for concern:

- (i) even if progress is sustained, the Community as a whole will still be **dependent on imported oil for one third of its energy supplies** at the end of this decade as Community oil production begins to fall. The OPEC producers will probably supply a larger share of those imports than today. Given the continuing political tensions in the Middle East the risk of a further major oil crisis cannot be ruled out particularly if there were to be major increases in oil demand in developing countries or other major industrialised countries.
- (ii) **some Member States will be much more vulnerable than others.** The coming years could well see a widening of the gap between the Member States which are the most and least dependent on oil. The differences are particularly likely to show up in the electricity generating sector. According to the latest projections, five Member States will still depend on oil for around 50% or more of their energy consumption in 1990 (Italy, Greece, Netherlands, Ireland, and even Denmark despite the considerable progress that has been made). **These differences could have very serious implications for the cohesion of the Community if a major oil crisis were to occur;**
- (iii) much remains to be done to create a real **common market in energy supplies.** There is considerable scope for improving transport infrastructure. The importance of adequate transnational gas interconnections (including a link between the UK and the continent) will be discussed further in the Commission's separate report on Natural Gas Supplies to 2000 which will be transmitted to the Council shortly. The Commission is also studying the scope for reinforcing transnational electricity systems;
- (iv) there are short-term and possibly medium-term **surpluses of capacity** in the coal, electricity and natural gas sectors as a result of reduced growth in energy demand. The existence of these surpluses could delay the decisions needed to ensure further restructuring and diversification in the 1990s. In particular, the burning of additional quantities of natural gas in power stations in some Member States could, if existing contracts are prolonged, slow down the introduction of solid fuels and nuclear energy;
- (v) the **guidelines for 1990** are likely to be broadly met, but at a much lower level of demand than envisaged four years ago. The absolute level of availability and use of alternatives will in fact be much lower in 1990 than expected. This has implications

for the **longer-term**, since lower availability of supplies means that there will be less flexibility in the Community's energy economy.

21. Against that background a new horizon for energy policy coordination is now needed at Community level. The Commission intends therefore later this year to put forward for discussion with Member States scenarios for the development of energy supply and demand in the Community in the 1990s. It will then propose new guidelines for monitoring progress into the middle of the next decade, taking account of the concerns expressed above.

### Priorities

22. The review has also provided a clear picture of the policy areas to which priority attention should now be directed at national and at Community level. These are specified under the following general headings (the particular order is not intended to indicate any hierarchy):

#### (i) **Energy Pricing**

Changes in the price of energy relative to other prices and in the price of oil relative to other sources of energy have played a major rôle in producing the structural changes summarised above. Energy prices will continue to be a very major determinant of action by consumers and investors. Pricing policy is generally on a sounder footing than in the 1970s but there are weaknesses. It is essential that progress should be sustained in the development of more rational energy pricing within the framework of an agreed Community approach, despite the relaxed conditions on the energy markets. The Commission will be submitting shortly to the Council a separate report on Energy Pricing Policy.

#### (ii) **Energy Efficiency**

A considerable potential for improved efficiency of energy use remains to be exploited, especially through the development and application of new technologies. Micro-electronics and advances in computer and materials science offer the possibility of significant improvements in the management of scarce energy resources. In the transport sector, for example, where - despite technical progress - final energy consumption has significantly increased, the scope for improvement should be particularly great. But in other sectors too, much remains to be done, as the wide variety in achievements by Member States clearly indicates. The Community's programmes of R, D & D are particularly relevant. In a separate Communication the Commission is indicating possible avenues for additional action.

### (iii) Oil Supplies

The continuing vulnerability of the Community can be reduced by four key forms of action:

- promoting exploration and development of oil world-wide and especially within the Community itself;
- intensifying relations with oil exporting countries;
- encouraging the more widespread introduction of dual-fired capacity in industry so as to give consumers greater flexibility among fuels;
- enhancing contingency arrangements for dealing with emergencies.

### (iv) Solid Fuels

Solid fuel consumption is stagnant. Outside the power station sector solid fuels have made only limited inroads during the past few years despite their clear price advantage. Even in electricity generating itself the use of nuclear power is rising much more rapidly than that of solid fuels and further progress by solid fuels here and in industry is likely to be affected by growing concern over the environment. The priority here must be the development and introduction of the more efficient and environmentally acceptable technologies required to make solid fuels attractive to industry. Support for these technologies is already an important element in the Commission's proposal for a third energy R & D programme and in the programme of Community demonstration projects.

On the supply side the main requirements remain to put the Community coal industry on a sounder footing so that it can contribute in a more cost-effective manner to the security of Community energy supplies, and to encourage the economic exploitation of lignite and peat. The Commission has already made specific proposals to this end<sup>4</sup>.

### (v) Electricity

There are three essentials:

- to encourage greater **electricity penetration**. The share of electricity in final energy demand increased from less than 12% to over 15% between 1973 and 1982 and is projected (from the submissions of Member States) to increase to only 17% by 1990. Increased use of electricity which also raised demand for oil would clearly be undesirable; but there is scope for greater electricity penetration where this raises the headroom for nuclear and solid fuels. The Commission is currently

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4. COM(83)447 final, Draft Council Regulation concerning Community financial support for industries producing solid fuels.



studying where greater penetration can be achieved in an economic and efficient manner **in substitution for oil** and the most appropriate means of encouraging it;

- **greater integration of the electricity transmission systems between Member States.** The review has indicated the potential for increased intra-Community trade in electricity. The Commission is already engaged on a study of the scope for encouraging further extension of the transnational electricity network so as to facilitate these exchanges and to improve the economy and security of electricity supplies;
- to lay the foundations for an **adequate and cost effective mix of electricity capacity for the mid-1990s.** The pattern of fuel use in power stations in the 1990s will depend heavily on decisions taken over the next few years about new capacity and conversions. Nuclear has made great headway during the past few years and this is continuing. The Council has already recognised the importance of nuclear to the Community's future energy supply. In several countries, however, the rôle of nuclear in the 1990s must be clarified as a matter of urgency so as to facilitate planning of the electricity supply system.

#### (vi) Natural Gas

Three questions deserve particular attention:

- **the implications of increased use of natural gas in power stations.** Additional recourse to gas must be only at the expense of oil and must not be allowed to slow down progress in the introduction of additional solid fuels, nuclear or hydro power station capacity;
- **natural gas supply and security in the 1990s.** The requirements will be analysed more fully in the Commission's separate paper on natural gas supply to 2000. The most pressing elements are the need for early negotiations between Norwegian and Community companies on the exploitation of the Troll gas field and greater attention than in the past to the cost and security benefits of improved transnational pipeline systems;
- **the long-term rôle of natural gas in helping to reduce dependence on oil.** More analysis is needed now on the long-term costs of producing and transporting gas around the world and the implications for the expansion in the longer-term of its economic use.

#### (vii) New and Renewable Energies

Their contribution is still limited (less than 2% of inland energy demand) and the situation is unlikely to improve significantly during the rest of the 1980s. Longer-term prospects depend heavily on advances in technology as well as the evolution of energy prices. Public authorities have a key rôle to play in ensuring continuity in and commitment to R, D & D, particularly at a time of weakening market signals. The Commission's proposals in the non-nuclear R & D field and the Community's demonstration programmes are particularly important in this context.

**C O N C L U S I O N**

23. The Council is invited:

- to endorse the Commission's analysis of the progress and outlook for structural change in the energy sector, including the areas of concern identified in paragraph 20 above.
  
- to agree on the desirability of a new horizon for the coordination of energy policies, focussed on the mid-1990s (paragraph 21); and
  
- to agree on the priority areas for policy attention identified in paragraph 22 above.

TABLE 1: MAIN TRENDS IN THE COMMUNITY ENERGY BALANCE 1973-1990

	MTOE				
	1973	1979	1982	1983 (estimated)	1990 <sup>5</sup> (projected)
<b>DEMAND</b>					
Gross Primary Energy Demand	968	1012	908	896,5	1061
<u>Inland Energy Demand</u>					
(total):	931	985	883	872,5	1032
Oil	564	537	430	410	430
Solid Fuels	222	223	216	207	245
Natural Gas	116	172	158	162	194
<b>SUPPLY</b>					
<u>Indigenous Production</u>					
(total):	351	458	494	516	565
Oil	13	89	118	130	106
Hard Coal	171	149	151 )	174	144
Lignite and peat	26	31	31 )		35
Natural Gas	112	137	116	119	114
Nuclear	18	37	64	78	144
Hydro and Geothermal	9	12	12 )		13
Other Renewables	1	1,5	1,5 )	14	11
<u>Net Imports</u>					
(total):	620	559	418	373	496
Oil	596	487	326	287	353
Solid Fuels	19	34	46	37	65
Natural Gas	4	36	44	47	80

Sources: Statistical Office of the European Communities and submissions by Member States (July 1983 - January 1984)

5. Mid points of ranges submitted.

TABLE 2: MAIN ENERGY INDICATORS - EUROPEAN COMMUNITY  
(related to 1990 objectives)

	1973	1979	1982	1983 (est)	1990 (proj)
I. Share of oil in gross energy consumption	62.1%	55.7%	50.1%	48.2%	43%
II. Fuel inputs to electricity production <sup>6</sup> . Shares taken by:					
Solid fuels	46.1%	47.4%	48.7%	46.6%	41%
Nuclear	7.5%	13.3%	22.8%	27.5%	40%
Hydro and others	4.5%	4.9%	4.9%	4.8%	4%
Natural gas	10.0%	10.4%	7.1%	8.0%	5%
Oil	31.9%	24.0%	16.5%	13.1%	10%
III. Supply dependence on: <sup>7</sup>					
Imported oil	61.6%	48.2%	35.9%	32.0%	33%
Imported solid fuels	2.0%	3.3%	5.1%	4.1%	6%
Imported natural gas <sup>8</sup>	0.4%	3.6%	4.9%	5.2%	7.5%
IV. Share of imports in gross consumption of:					
Energy	64.0%	55.2%	46.1%	41.6%	47%
Oil	97.8%	86.5%	71.7%	66.1%	77%
Solid fuels	8.6%	15.1%	21.4%	17.9%	27%
Natural gas	3.5%	21.0%	28.0%	29.0%	41%
V. Average annual growth rates:	1973/63	1975/73	1979/75	1982/79	1990/85
G D P	+4.7%	+0.3%	+3.6%	+0.4%	+2.4%
Inland energy consumption <sup>9</sup>	+4.6%	-3.8%	+3.4%	-3.6%	+1.6%
Final energy consumption <sup>9</sup>	+4.8%	-4.0%	+3.3%	-4.4%	+1.0%
VI. Energy coefficient <sup>10</sup>	0.98	-	0.94	-	0.67
VII. Energy ratio <sup>11</sup>	1973 833.0	1979 760.6	1982 673.3	1983 659.4	1990 669
VIII. Intensity of final energy <sup>12</sup> demand	573.8	521.9	455.6	n.a.	439.5

6. Basic data expressed in oil equivalent terms

7. Respective shares of imported oil, imported natural gas or imported solid fuels in gross energy consumption.

8. Share of each imported energy source, in gross consumption of that source.

9. Non energy use included

10. Energy coefficient = ratio between growth rates of inland energy consumption and GDP

11. Energy ratio = volume of inland energy consumption per unit of GDP, expressed in real terms, at 1975 prices (in kg of oil equivalent per 10<sup>3</sup> ECU)

12. Intensity of final energy demand = volume of final energy demand per unit of GDP, expressed in real terms at 1975 prices (kg per ECU)

Table 3 TRENDS IN FINAL ENERGY CONSUMPTION - EUROPEAN COMMUNITY

	1973	1979	1982	1990
<b>INDUSTRY:</b>				
Energy consumption (1) (in million toe)	247.94	237.54	193.06	228.4
Share in final consumption	38.7%	35.1%	32.3%	33.7%
Energy consumption per unit of value-added(2) (in kg oe per 10 <sup>3</sup> ECU)	753.8	646.5	549.5	551.2
<b>TRANSPORT:</b>				
Energy consumption (1) (in million toe)	128.22	152.44	156.37	168.9
Share in final consumption	20.0%	22.6%	26.2%	24.9%
Energy consumption per unit of GDP (3) (in kg oe per 10 <sup>3</sup> ECU)	114.8	117.7	119.2	109.5
<b>HOUSEHOLDS, etc...</b>				
Energy consumption (1) (in million toe)	264.94	285.76	248.37	280.8
Share in final consumption	41.3%	42.3%	41.5%	41.4%
Energy consumption per unit of private consumption (4) (in kg oe per 10 <sup>3</sup> ECU)	395.6	356.8	304.2	297.6
<b>FINAL ENERGY CONSUMPTION</b>				
(in million toe) (1)	641.10	675.74	597.80	678.1
of which: Oil	59.1%	55.3%	51.4%	45.7%
Final non-energy use (in million toe)	70.25	69.37	52.77	67.9

Sources and General Notes: Statistical Office of the European Communities (1973-1979); Member States' submissions 1985, 1990, supplemented where necessary by Commission estimates.

Notes: (1) non-energy use, not included.

(2) volume of energy consumed in the industrial sector, per unit of value-added produced by industry, expressed in real terms, at 1975 prices (in kg of oil equivalent per unit of national currency).

(3) volume of energy consumed in the transport sector, per unit of GDP, expressed in real terms, at 1975 prices (in kg of oil equivalent per unit of national currency).

(4) volume of energy consumed in the residential + tertiary sector, per unit of Private Consumption, expressed in real terms, at 1975 prices (in kg of oil equivalent per unit of national currency).

TABLE 4: VARIATIONS AMONG MEMBER STATES

(i) Oil Dependence  
(The share of oil in primary energy demand)

	1973	1982	1990 (projected)
Belgium	62	51	41
Denmark	89	66	52
Germany	56	44,5	41
Greece	81	73	57
France	72	53	36
Ireland	79	56	49
Italy	79	68	57
Luxembourg	37	35	32
Netherlands	56	48	52
United Kingdom	50	40	38.5
EUR-10	62	50	43

(ii) Oil and Natural Gas Use in Electricity Generation  
(% of total primary energy inputs)

	1973		1982		1990 (projected)	
	Oil	Natural Gas	Oil	Natural Gas	Oil	Natural Gas
Belgium	52,5	24	25	4	8	2
Denmark	61	-	8	-	9	-
Germany	14	11	5	10	3	10
Greece	51	-	30	-	7	-
France	44	6	10	2	2	1
Ireland	62,5	-	27	48	36	3
Italy	73	4	59	8	46	8
Luxembourg	24	9	19	-	13	7
Netherlands	13	78	23	45	14	35
United Kingdom	25	1	11	1	5	-
EUR-10	32	10	16	7	10	5

(iii) Energy ratios<sup>13</sup> and intensity of final energy demand<sup>14</sup>

Index 1973 = 100

	1982		1990 (projected)	
	Energy ratio	Energy intensity	Energy ratio	Energy intensity
Belgium	77	72	76	72
Denmark	75	70	69	67
Germany	81	78	82	75
Greece	104	103	115	107
France	81	75	82	72
Ireland	87	84	83	79
Italy	84	88	82	83
Luxembourg	62	63	65	68
Netherlands	77	79	77	79
United Kingdom	82	84	79	80
EUR-10	81	79	80	77

13. Ratio of inland primary energy demand to GDP.

14. Ratio of final energy demand to GDP.