ISSN 1831-5666

Europe's energy position

2010 Annual Report

Directorate-General for Energy

EUROPEAN COMMISSION

MARKET OBSERVATORY FOR ENERGY

Market Observatory for Energy

This publication is based on the Commission Staff Working Document '2010 Annual Report of the Market Observatory for Energy', SEC(2011) 272 of 1 March 2011.

It is the third annual report of the European Commission's Market Observatory for Energy.
Contact: ENER-EMOS@ec.europa.eu

More information on the European Union is available on the Internet (http://europa.eu).

Cataloguing data can be found at the end of this publication.

Luxembourg: Publications Office of the European Union, 2011

ISBN 978-92-79-17863-4
doi:10.2833/65670

Printed in Belgium

PRINTED ON WHITE CHLORINE-FREE PAPER

Europe's energy position – 2010 Annual Report

FOREWORD

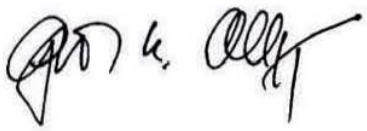
Dear Reader,

It is my pleasure to present the 2010 Annual Report of the Market Observatory for Energy of the European Commission. This is the third annual report on Europe's energy position, following our previous editions in 2008 and 2009.

The report focuses on the period from early 2009 to mid-2010. Energy markets witnessed a slow but gradual recovery from their lows reached in the early months of 2009. However, Europe faces major challenges in the forthcoming decade.

Energy is a key component in our welfare and our competitiveness. It is also fundamental to climate change policies. Major investment decisions of strategic importance need to be taken urgently to deliver our political goals and ensure that markets can continue to provide reliable and affordable energy. The Commission's new Energy 2020 Strategy will help create the confidence and stability to underpin these investment decisions.

Based on the strategy, the Commission will take forward European initiatives for energy efficiency, open and integrated energy markets, diversified and smart energy networks and a strong international profile. We are also developing longer term strategies to largely decarbonise our energy by 2050. European energy policy will help ensure that our economy functions with the cleanest and most efficient technologies, fully exploits indigenous energy resources at our disposal and assures reliable supplies and competitive energy prices to all European consumers.



Günther H. Oettinger
European Commissioner for Energy

TABLE OF CONTENTS

1. EXECUTIVE SUMMARY

The third annual report of the Market Observatory for Energy focuses on the main developments of the energy markets in Europe. Including 2008 and 2009 statistical data, it represents Europe's energy position and it contains a detailed description of the evolution of energy production, final consumption, the energy mix and the uses of energy for different purposes[1]. These elements are presented in a time frame stretching from January 2009 to September 2010, thus including a period with large amplitudes in price movements, followed by market consolidation. Some countries outside the European Union which have relevance in energy relations with the countries of the EU are also presented in this report, mainly from the angle of their influence on the energy position of the Union.

The deepest point of the economic recession for the Member States of the European Union and the major world economies occurred at the beginning of 2009. After a period of consolidation, the EU economy started to recover and by the end of the second quarter of 2010 most of the Member States were out of recession. However, in the late spring of 2010 when financial problems in some countries of the euro-zone became apparent, the volatility of currency and commodity markets rose again and fears of a double-dip of the world economy became stronger.

These macro-economic developments provide the framework for the current report, which looks at the impact of the economic crisis and recovery on the EU's energy positions and markets. In summary, the following important developments took place during the period observed:

1. Gradual decrease of the EU gross inland consumption of energy continued in 2009 and the first half of 2010. While the decoupling of GDP growth and energy consumption[2] which had already been observed prior to the reported period was confirmed, there were indications that the recent recession accelerated the pace of reduction in consumption of energy.

2. During the period observed, the share of the major energy sources / carriers in the energy mix remained stable, with solid fuels registering a small decrease and that of renewable energy sources progressing further; the decline in energy supply from domestic sources was greater than the reduction in gross inland consumption as energy companies had to face the combined challenge of economic slowdown and gradual depletion of production fields; the climate performance of the EU energy sector improved in 2009; greenhouse gas emissions and energy intensity fell for a seventh year in a row.

3. In 2009, the euro appreciated by 5 % with respect to the US dollar. While the exchange rate mitigated somewhat the variation effect of crude oil prices on European consumers, the price of Brent still registered a record year-on-year increase in December 2009 from the low point reached a year before. In 2009, the demand and supply of crude oil fell on average by roughly 1.4 million barrels per day. Despite an unstable economic environment and uncertainties on the supply and demand side, the price of crude remained stable for most of 2009. Final prices of refined products, such as gasoline, diesel and heating oil, followed similar developments but were relatively less volatile than crude oil, while variations in costs and distribution margins remained in line with the two previous years.

4. According to the most recent data available, the supply/demand imbalance for diesel and gasoline has widened, further increasing the EU's dependence on trade of petroleum products. In recent years, the EU refining sector has had to cope with the challenges of developing more costly and complex refining capacity primarily in order to meet a growing demand for middle distillates as the EU crude diet has become progressively heavier and more sulphurous.

5. The difficult economic conditions were also affecting the traditional relations between suppliers, shippers and consumers of natural gas in Europe. Two gas disputes involving producing and transiting countries occurred in the 18 months covering 2009 and the first half of 2010. Both happened outside of the EU but impacted consumers from the Member States. These events prompted the Commission into action with new regulation for security of supply coming into force in December 2010.

6. In 2009 and 2010, the decline in domestic production of natural gas exceeded the reduction of the gross inland consumption. The relative part of LNG continued to increase in the EU import mix. Spot volumes of traded gas increased despite the economic slowdown. In general, market participants were taking on arbitrage opportunities by adjusting the utilisation rates on interconnection points whenever short term premium emerged. As long term contract gas priced against lagged values of crude and refined products, margins between long term contract and spot gas widened significantly, prompting holders of long term contracts to seek to renegotiate / introduce stronger flexibility clauses in the existing contracts by reducing the take or pay obligations.

(1) Wherever it is possible, the Annual Report uses the latest available EU official statistical data complemented with market data sources or those of other administrative data providers.

(2) Decoupling occurred in both 2007 and 2008 as GDP growth was not accompanied by increasing energy consumption, rather a slight decrease could be observed in gross inland energy consumption. See Chapter 2.1.1.

7. The process of integration of the EU electricity wholesale markets continued in 2009 and 2010 with several important developments taking place in the observed period. Traded volumes and liquidity on the organised exchanges and on the over-the-counter market improved. As wholesale prices of adjacent areas started to align, the combined volumes of exports and imports of electricity registered a small decrease.

Several important legislative acts were adopted in the observed period. In July 2009 the European Parliament and the Council adopted the so-called Third Legislative Package of the energy domain that contains several regulations and directives aiming at improving the functioning of the European internal energy market, including:

> Two directives which lay down the common rules of the functioning of the internal electricity and gas market in the EU.

> Two regulations which lay down rules on conditions for access to networks for cross border trading of electricity and gas and establishing two important institutions: the European Network of Transmission System Operators (ENTSO) for electricity and gas. The role of these entities is to ensure the optimal management of transmission networks and to allow cross border trade of electricity and gas.

> A regulation which establishes the Agency for the Cooperation of Energy Regulators (ACER). To become fully operational as of March 2011, ACER will perform, among other important tasks, the coordination of the work of the national regulatory authorities.

Furthermore, in April 2009 a Directive (2009/28/EU) on the promotion of the use of energy from renewable sources was adopted. In May 2010 a recast of two other directives was adopted: the Directive (2010/30/EU) on indication by labelling and standard product information of the consumption of energy and other energy related resources and the Directive (2010/31/EU) on the energy performance of houses.

In addition, in June 2010 a new legislation was adopted on the notification to the Commission of investment projects in energy infrastructure within the European Union. This should increase transparency on the structural evolution of the EU energy system and enhance the ability of EU institutions to anticipate problems.

In October 2010 the Council and the European Parliament adopted a new regulation[3] concerning measures to safeguard security of gas supply and repealing Council Directive 2004/67/EC. This regulation establishes provisions aimed at safeguarding the security of gas supply by ensuring the proper and continuous functioning of the internal market in natural gas, by allowing for exceptional measures to be implemented when the market can no longer deliver the required gas supplies. The regulation entered into force on 2nd December 2010.

In November 2010 the European Commission published a Communication entitled 'Energy 2020: A strategy for competitive, sustainable and secure energy' which defines the energy priorities for the next ten years and sets the actions to be taken in order to tackle the challenges of saving energy, achieving a market with competitive prizes and secure supplies, boosting technological leadership, and effectively negotiate with our international partners.

At the same time the European Commission also adopted a Communication entitled 'Energy infrastructure priorities for 2020 and beyond', in which it defines EU priority corridors for the transport of electricity, gas and oil. A toolbox is also proposed in order to enable a timely implementation of these priority infrastructures.

The final Chapter of the Annual Report looks into the energy sectors of the United States of America, Canada, Qatar and Libya, which are among the most important energy trading partners of the EU.

(3) EU No 994/2010.

2. ENERGY POSITION OF THE EU[4]

2.1. EU ENERGY CONSUMPTION

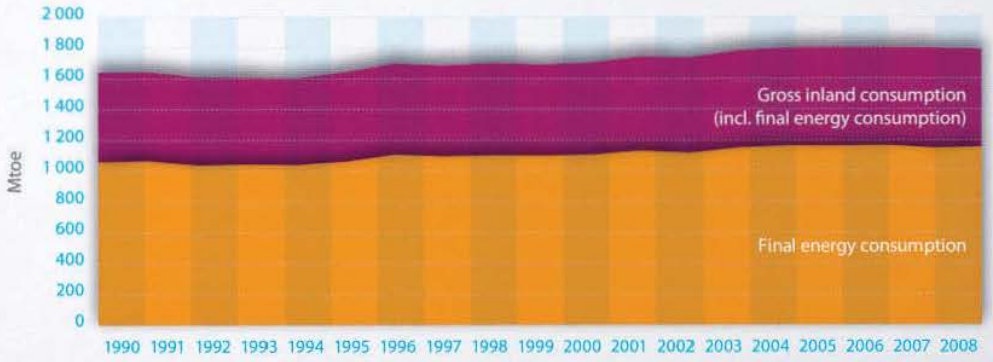
2.1.1. Total energy consumption

Energy consumption decreased slightly in 2008 compared to the previous year, similarly to the consumption evolution in 2007. In 2008, gross inland energy consumption in the EU-27 was 1799 Mtoe while it was 1806 Mtoe in 2007 and 1826 Mtoe in 2006. 2008 annual data provide further confirmation that the growing trend of energy consumption has been reversed. 2008 consumption, down by 0.5 % from 2007, was lower than in 2003 (1803 Mtoe).

Final energy consumption[5] showed a slight upturn in 2008, increasing by 0.3 %. In 2008, total final energy consumption was 1168 Mtoe while it was 1164 Mtoe in 2007. 2008 final consumption remained close to the 2003 level. The diverging evolution of gross inland consumption and final consumption of energy may be explained by decreasing energy transformation losses (between 2007 and 2008 transformation losses diminished from 404 Mtoe to 397 Mtoe).

FIGURE 1

EU-27, GROSS INLAND CONSUMPTION AND FINAL ENERGY CONSUMPTION (in Mtoe) (1990-2008)



Source: Eurostat

According to preliminary data, a significant decrease occurred in gross inland energy consumption in 2009 (5.5 %), which coincides with the consequences of the looming economic crisis (e.g.: drop in the GDP of the EU-27 by 4.2 % between 2008 and 2009). It is worth noting that the decrease of the gross inland consumption was larger than that of GDP, pointing to a further improvement in energy efficiency of the EU-27 economy.

2.1.2. The flow of energy

The chart on the following page shows the flow of energy in the economy using 2008 annual data. From the input (supply) side, the two most important sources are the *Indigenous (primary) production* and the *Import* of energy. The supply serves the purposes of Gross inland consumption and the Export of energy products. Gross inland consumption includes Bunkers and Changes in energy stocks. If all Losses (*Transmission* and *Distribution*) and Consumption of the *energy sector* are eliminated, the amount of *Energy for final consumption* can be obtained.

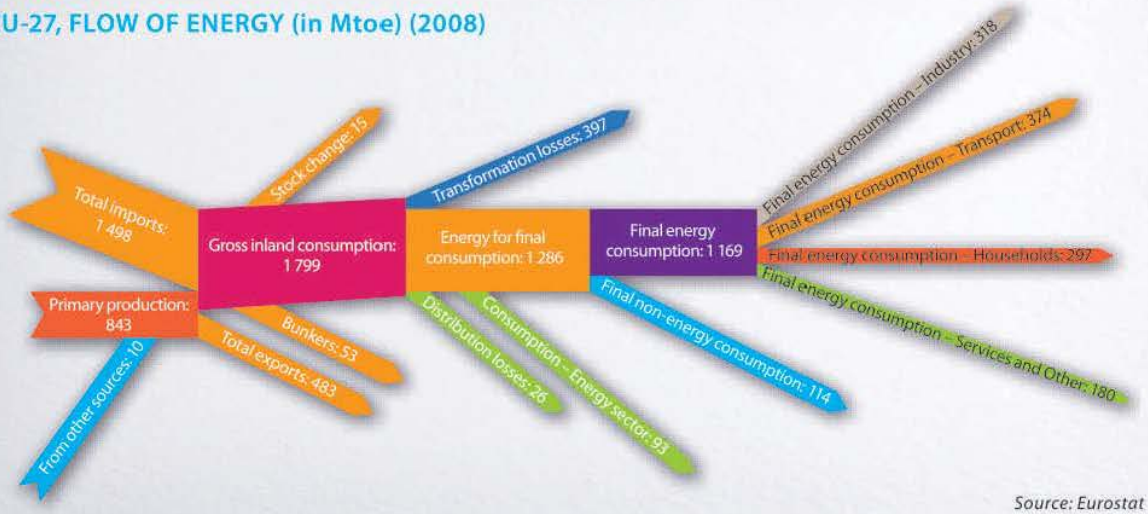
After eliminating *Final non-energy consumption* the amount of *Final energy consumption* remains. This is distributed among the different sectors of the economy (*Industry, Transport, Households, Services* and other *sectors*).

(4) Based on 2008 Eurostat data and on provisional 2009 Eurostat data.

(5) Final energy consumption includes all energy delivered to final consumers in the industry, transport, household and other sectors for all energy uses. It excludes deliveries for transformation and/or own use of the energy producing industries, as well as network losses.

FIGURE 2

EU-27, FLOW OF ENERGY (in Mtoe) (2008)



Source: Eurostat

2.1.3. Gross inland consumption and energy mix

With a 36.5 % share in gross inland consumption (and amounting to 656 Mtoe), oil remained the most used energy source in the EU in 2008. This value does not show significant change compared to that of 2007 and according to 2009 monthly aggregated data, the share of oil in 2009 also remained close to this value. In comparison, in 1990 oil represented 38.1 % of total annual consumption.

Natural gas consumption grew by 1.9 % in 2008, to 440 Mtoe, which is slightly above its 2006 level when annual consumption last recorded positive growth. Gas remained the second most used energy source in the EU in 2008 with a slightly increasing share in the energy mix (24.5 % in 2008; up from its 2007 value of 23.9 %).

Nuclear energy consumption remained stable in 2008 (at 241 Mtoe), and its share in the energy mix in 2008 was 13.4 %, representing the fourth energy source in the EU-27 gross inland consumption. According to preliminary data[6] of Eurostat, in 2009 the consumption of natural gas fell by 5.8 %, while that of nuclear energy decreased by 2.8 %.

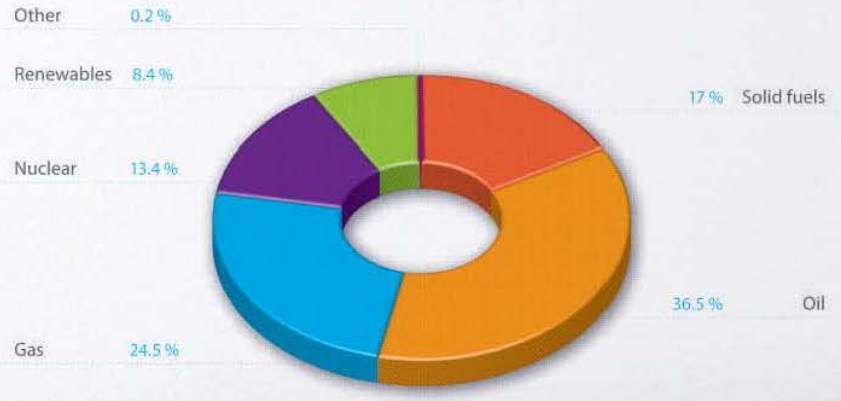
In 2008, the trend of increasing solid fuel consumption that could be observed in the preceding three years was reversed, recording a significant drop compared to 2007. In 2008, it amounted to 306 Mtoe, i.e. -7 % in comparison with the 2007 value of 329 Mtoe. This was the lowest annual consumption level since the end of the 1990s. Solid fuels lost 1.3 pp in the energy mix but remained the third energy source with a 17 % share in 2008. According to monthly aggregated data from Eurostat, in 2009 the consumption of solid fuels experienced a strong decline (12.7 %). This is closely related to the reduction in demand of certain industrial branches and energy production as a consequence of the economic crisis in 2009.

The consumption in renewables (RES) increased by 5.6 % in 2008, amounting to 151 Mtoe, compared to 143 Mtoe in 2007. RES consumption has doubled since 1990. Its share in the energy mix represented 8.4 % in 2008, compared to 7.8 % in 2007 and 7.1 % in 2006. RES remained the fifth largest energy source of EU gross inland consumption. In 2009, RES consumption further increased slightly, its share in gross inland consumption of energy rising by 0.6 pp to 9 %.

(6) 2009 preliminary data of Eurostat are computed from monthly data; the final 2009 annual data might show deviations from these preliminary ones in some cases, therefore the comparability of final annual 2008 data and that of preliminary data of 2009 is limited.

FIGURE 3

EU-27, GROSS INLAND CONSUMPTION (in %) (2008)



Total = 1 799.29 Mtoe

Source: Eurostat

In 2008, fossil fuels continued to dominate the energy mix. They represented 78 % of EU-27 gross inland consumption, decreasing slightly from the 2007 level (78.6 %). Low-carbon energy sources (nuclear and renewables) amounted to 22 % of EU gross inland consumption in 2008.

2.1.4. Final energy consumption by energy sources/products, sector and end use

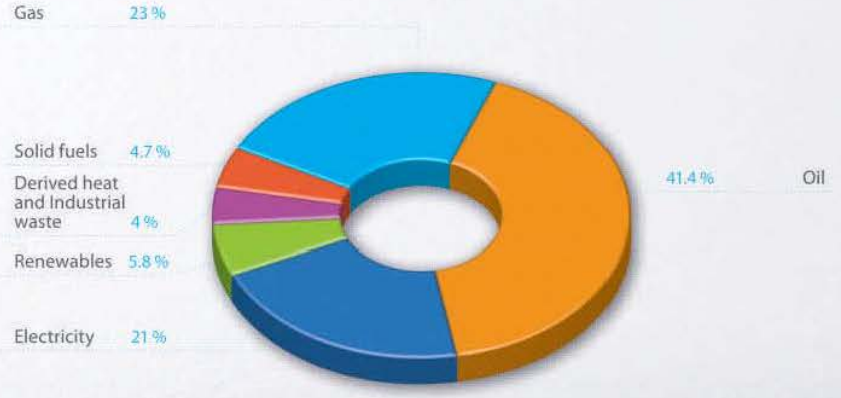
2.1.4.1. Final energy consumption by energy sources/products

Between 2007 and 2008, EU-27 final consumption of solid fuels fell by 2.2 % while that of oil and gas remained relatively stable (+0.1 % and +0.2 %, respectively or in absolute values +4.3 Mtoe for oil and +0.6 Mtoe for gas). Solids fuels have been on a constantly declining consumption path since 1990 while oil (484.4 Mtoe) and gas (269.1 Mtoe) consumption were close to their record high levels set in 2004. Colder weather and high energy prices also contributed to higher consumption. However, final consumption of electricity (245 Mtoe or 2849 TWh) and that of RES (68 Mtoe or 791 TWh) continued increasing respectively by 12.8 TWh[7]/ 0.4 % and 40.7 TWh/ 5.4 %. Legislation and policy initiatives to mitigate climate change effects contributed to the growth of RES consumption.

Oil products remained the largest energy source used in the EU-27 in 2008 (41.4 %), followed by gas (23 %). However, their respective shares fell slightly by 0.5 pp for oil and by 0.2 pp for gas compared to 2007. The share of electricity slightly declined by 0.1 pp while that of RES rose by 0.3 pp. Solid fuels remained stable at 4.7 % in 2008.

FIGURE 4

EU-27, FINAL ENERGY CONSUMPTION BY FUEL AND PRODUCT (in %) (2008)



Total = 1 168.64 Mtoe

Source: Eurostat

(7) Increase in electricity and renewable consumption values are 1.1 Mtoe and 3.5 Mtoe, respectively.

In 2008, final energy consumption rose by 0.3 % in the EU-15[8] 1000 Mtoe versus 997 Mtoe) compared to the previous year and by 0.6 % in the EU-12 (169.1 Mtoe versus 168.1 Mtoe) during the same period. The main differences between the consumption patterns of the EU-15 and the EU-12 concerned the share of oil and solid fuels, although trends are converging. In 2008, the share of oil in the final energy consumption in the EU-15 was 43.1 %, down by 0.5 pp compared to 2007 while for the EU-12, it was 31.7 %, 0.2 pp above 2007 levels.

The share of solid fuels was 8.4 pps higher in the EU-12 than in the EU-15 (with a share of 11.9 % for the EU-12 and 3.5 % for the EU-15) due to higher use of solid fuels for electricity generation and heat production in the EU-12.

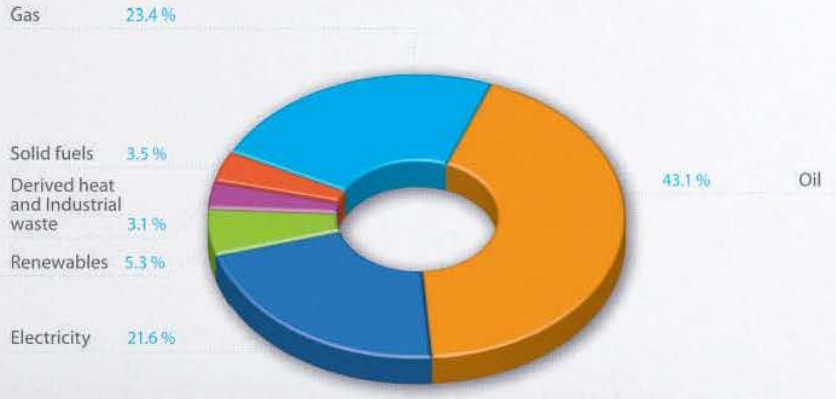
In 2008, 56 % of electricity in the EU-12 was produced from coal, while it was only 22 % in the EU-15. In the case of both the EU-15 and the EU-12, the importance of solid fuels in power generation continued to decline. The EU-12 reduced its coal consumption share by 1.8 pp between 2007 and 2008 while during the same period the share of solid fuels for the EU-15 fell by 2 pp.

Gas was the second largest fuel both for the EU-15 and the EU-12 and amounted respectively to 23.4 % and 20.7 % of final energy consumption. In both cases, this share slightly decreased between 2007 and 2008, by close to 0.2 pp.

Electricity represented a bigger share of the final energy consumption in 2008 in the EU-15 (21.6 %) than in the EU-12 (17.6 %), remaining stable for the EU-15 and increasing by 0.3 pp for the EU-12 compared to 2007.

FIGURE 5/1

EU-15, FINAL ENERGY CONSUMPTION BY FUEL AND PRODUCT (in %) (2008)

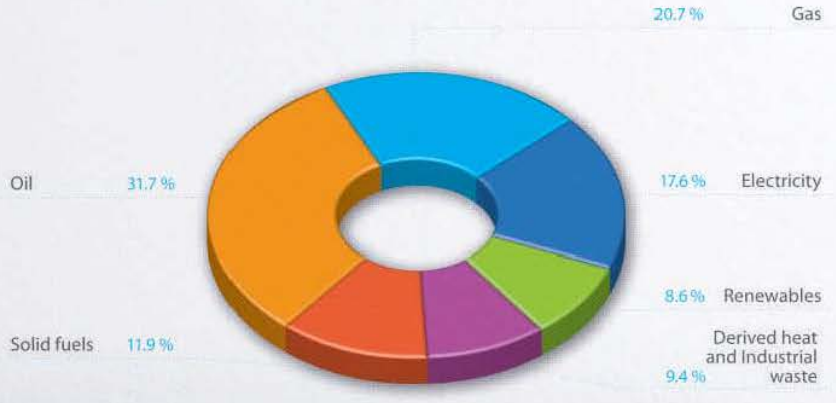


Total = 999.53 Mtoe

Source: Eurostat

FIGURE 5/2

EU-12, FINAL ENERGY CONSUMPTION BY FUEL AND PRODUCT (in %) (2008)



Total = 169.11 Mtoe

Source: Eurostat

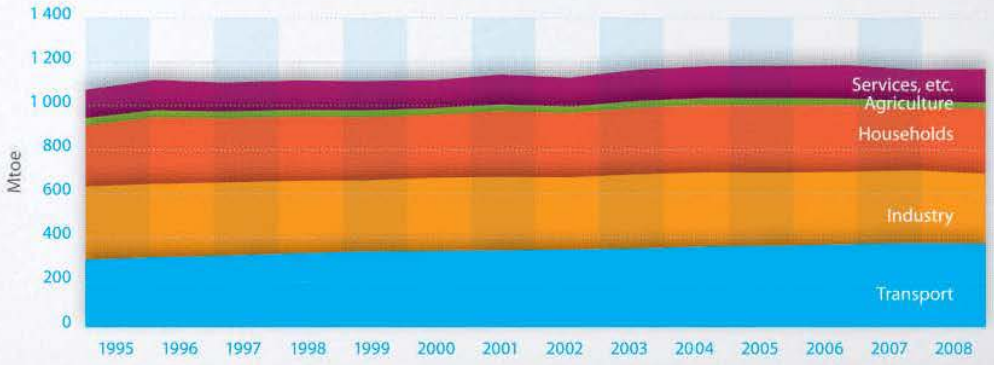
(8) EU-15 denotes those EU Member States that joined the Union before 2004; EU-12 refers to those countries that joined the EU in the last two waves of accessions (2004 and 2007).

2.1.4.2. Final energy consumption by sector

Transport remained the biggest final energy consumer in 2008 followed by industry and households. Compared to 2007, the shares of transport and industry decreased respectively by 0.6 and 0.7 pp. Since 1990, annual energy consumption in the transport sector fell for the first time in 2008, and averaged 1.6 % per annum during the last eighteen years. In contrast, the shares of households and services rose in 2008 (by 1 pp and 0.6 pp, respectively). Households amounted to one quarter of final energy consumption (25.4 %) while services represented 13.1 %.

FIGURE 6/1

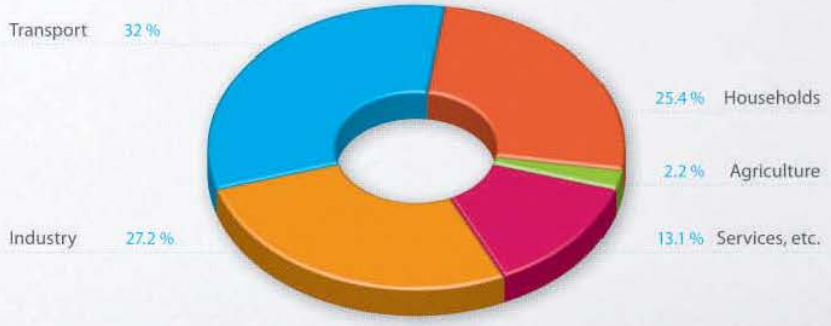
EU-27, TOTAL FINAL ENERGY CONSUMPTION (in Mtoe) (1995-2008)



Source: Eurostat

FIGURE 6/2

EU-27, FINAL ENERGY CONSUMPTION BY SECTOR (in %) (2008)



Total = 1 168.63 Mtoe

Source: Eurostat

In 2008, the breakdown of final energy consumption by sector showed differences between the EU-15 and the EU-12. For the EU-15, transport was the biggest consumer (33 %), followed by industry (26.8 %) and households (24.9 %). For the EU-12, industry was still the biggest consumer (29.8 %) followed by households (28.1 %) and transport (26.3 %). The proportion of the service sector in final energy consumption was comparable between the EU-15 (13.3 %) and the EU-12 (12.4 %).

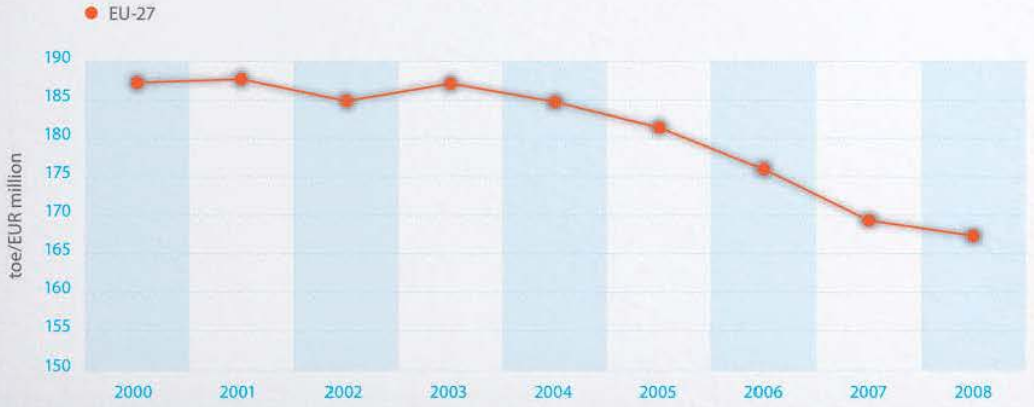
The share of transport rose by 3 pp in the EU-12 final energy consumption between 2006 and 2008 (from 23.3 % to 26.3 %) while for the EU-15 it remained practically stable. The share of households diminished in the case of the EU-12 by 1.3 pp while for the EU-15 only minor changes could be observed during this three year period. These data suggest a convergence between the structure of economic actors' final energy consumption in EU-15 and EU-12 countries.

2.1.5. Energy intensity

Energy intensity is a measure of how much energy is used to produce a unit of economic output. It can be measured as the ratio of gross inland energy consumption and gross domestic product. The following charts show the evolution of this indicator between 2000 and 2008. Since 2003 the energy intensity improved significantly and in 2008 the EU economy needed 11 % less energy for producing a unit of gross domestic product (GDP) than in 2003. This development might have been in relation with increasing energy prices that incentivised all economic actors to consume less energy.

FIGURE 7

EU-27, ENERGY INTENSITY (in toe/EUR million) (2000-2008)



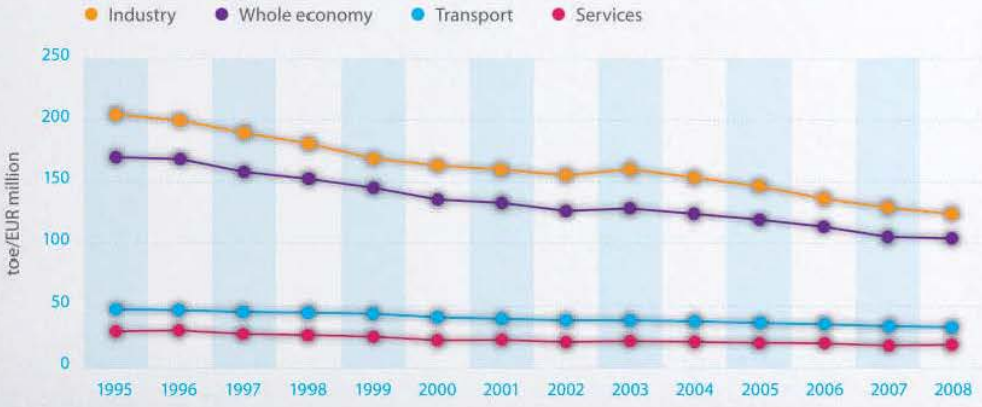
Source: Eurostat

Another measure is final energy intensity. In 2008, EU-27 final energy intensity kept improving, registering a decrease in energy needs for producing a unit of GDP for the fifth consecutive year. Overall, final energy intensity in 2008 was 104.4 toe/M€[9] in 2008 while it was 105.7 toe/M€ in 2007 and 113.9 toe/M€ in 2006. However, the annual decrease registered in 2008 was the smallest in the 2003-2008 period.

With the exception of the least energy-intensive sector, the services sector, for which the final energy intensity indicator deteriorated from 18.6 to 19.2 toe/M€ between 2007 and 2008, progress was made in all remaining sectors. Industry, the main driver of progress in energy intensity in the past, further improved its final energy intensity by approximately 4 % (- 5 toe/M€). Transport also contributed to falling energy intensity by 2.2 % (- 0.8 toe/M€).

FIGURE 8

EU-27, FINAL ENERGY INTENSITY (in toe/EUR million) (1995-2008)



Source: Eurostat

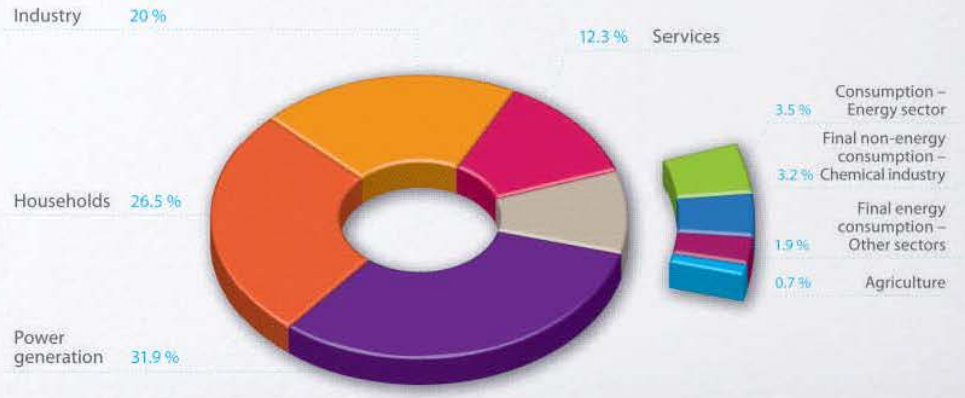
(9) In order to eliminate the impact of inflation from data of different years, euro values in the denominator of energy intensity numbers always refer to euros deflated to year 2000.

2.1.6. Uses of energy sources

In 2008, natural gas consumption in the EU-27 was mainly split between power generation (31.9 %), households (26.5 %), industry (20 %) and services (12.3 %). Compared to 2007, the share of industry decreased by 1 pp while the share of power generation rose by 0.9 pp. The share of households increased by 0.5 pp compared to 2007.

FIGURE 9

EU-27, USE OF NATURAL GAS BY SECTOR (in %) (2008)



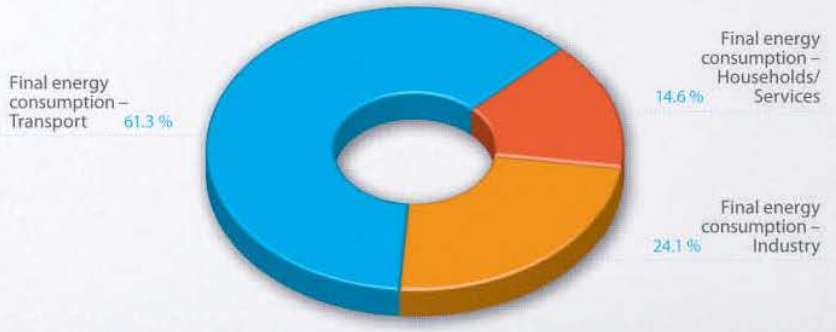
Total = 441.51 Mtoe

Source: Eurostat

The situation is quite different for oil and solid fuels, the transport sector being the main user of oil (61.3 % in 2008). Both industry and household sector (together with services) represented smaller share in the use of petroleum products (24.1 % and 14.6 %, respectively).

FIGURE 10

EU-27, USE OF PETROLEUM PRODUCTS BY SECTOR (in %) (2008)



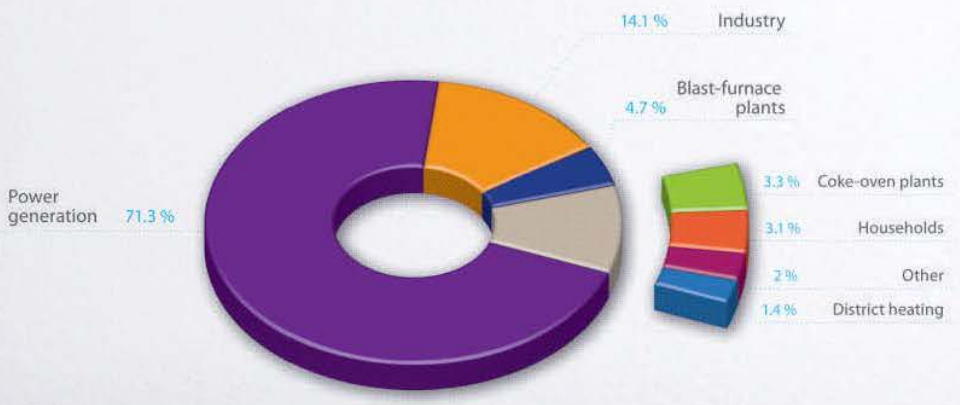
Energy available for final consumption = 582 Mtoe

Source: Eurostat

By far the main use of solid fuels is power generation (71.3 % in 2008). Industry, blast furnace plants and coke oven plants represented smaller shares in use of solid fuels in 2008 (14.1 %, 4.7 % and 3.3 %, respectively). Households and district heating together represented less than a 5 % share, pointing to a diminishing importance of solid fuels in heating.

FIGURE 11

EU-27, USE OF SOLID FUELS BY SECTOR (in %) (2008)



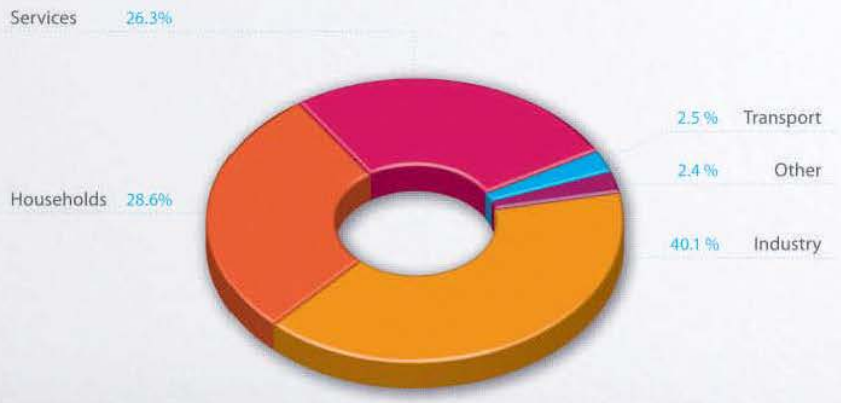
Gross inland consumption = 304.65 Mtoe

Source: Eurostat

Electricity consumption is split between three main sectors. In 2008, industry was the biggest consumer of electricity with a 40 % share of overall consumption, followed by households (28.6 %) and services (26.3 %). While the share of industry declined by 0.4 pp between 2007 and 2008 that of households rose by the same amount. A slight decrease in the share of services (0.5 pp) could also be observed.

FIGURE 12

EU-27, FINAL USE OF ELECTRICITY BY SECTOR (in %) (2008)



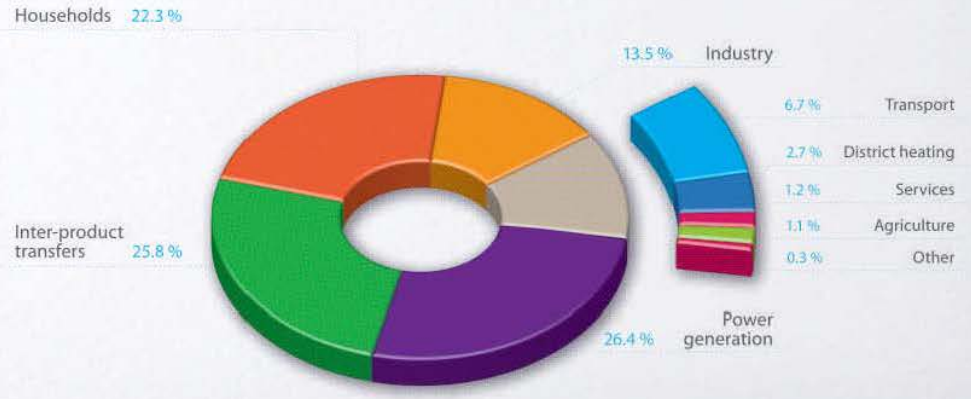
Final electricity consumption = 245.5 Mtoe

Source: Eurostat

RES are mainly used by households, in power generation and by industry. In 2008, households amounted to 22.3 % of EU-27 use of renewables, decreasing by 0.9 pp from 2007. The share of power generation (26.4 %) was also down by 0.8 pp while that of industry (13.5 %) rose slightly by 0.3 pp between 2007 and 2008. The use of RES in transport showed a dynamic increase between 2006 and 2008 (its share increasing from 4.1 % in 2006 to 5.6 % in 2007 and 6.7 % in 2008). The share of district heating represented 2.7 % of the gross inland consumption of RES in 2008, up by 0.3 pp compared to 2007, which equals the value measured in 2006. Inter-product transfers accounted for 25.8 % of gross inland consumption of RES in 2008, which was close to the respective value of the preceding year.

FIGURE 13

EU-27, USE OF RENEWABLE ENERGY SOURCES BY SECTOR (in %) (2008)



Gross inland consumption = 150.88 Mtoe

Source: Eurostat

BOX 1
EU-27 - RES CONSUMPTION

Gross inland consumption of renewable energy sources (RES) continued to grow in 2008 (by 5.6 % since 2007), reaching 151 Mtoe. RES are the fifth energy source in the EU energy mix with a share of 8.4 % in 2008, up by 0.6 pp from 2007.

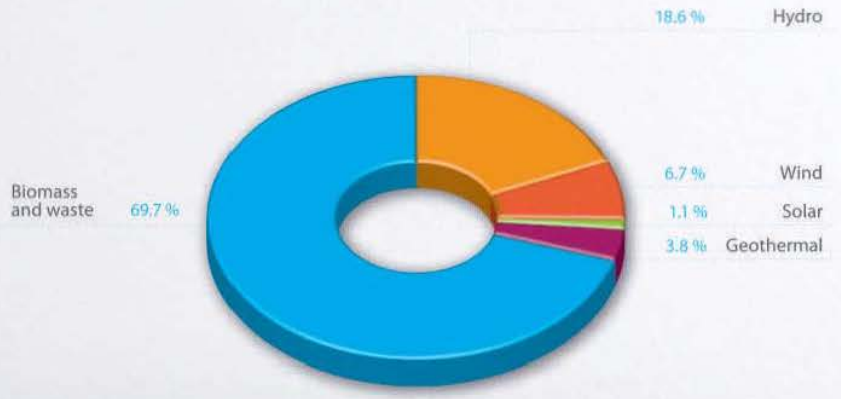
Biomass[10] is by far the largest RES consumed in EU-27 and is consumed in power generation, heat and transport. In 2008, consumption of biomass grew by 4.7 Mtoe/ 4.8 % to reach 105.2 Mtoe. Biomass represented 69.7 % of the consumption of RES in the EU, remaining stable compared to the previous year.

Hydro power remained the second largest RES consumed in the EU with a consumption of 28.1 Mtoe in 2008, which represents 1.5 Mtoe more than in 2007 (+ 5.6 %). Its share in the RES consumption reached 18.6 % in 2008, which is comparable to the 2007 level. The share of geothermal energy in RES consumption fell to 3.8 %, down by 0.2 pp in 2008, as a result of a slight increase (0.5 %) in consumption which was relatively low compared to the overall RES consumption growth.

Consumption of wind energy increased to 10.2 Mtoe in 2008, up by 1.2 Mtoe, growing by 13.3 % compared to 2007. The share of wind in RES consumption increased by 0.4 pp, reaching 6.7 %. It remained the third biggest RES consumed in the EU. Solar energy experienced the highest annual growth rate (36.7 %) among renewable energy sources, although its share rose only to 1.1 % in 2008.

FIGURE 14

EU-27, RENEWABLE ENERGY SOURCES: GROSS INLAND CONSUMPTION BY SOURCE (in %) (2008)



Total = 151 Mtoe

Source: Eurostat

In 2008, biomass represented 5.8 % of gross inland energy consumption, up by 0.4 % year-on-year, while the share of hydro power amounted to 1.6 %, which was comparable to 2006 and 2007. Despite the continuous increase of consumption, wind energy only accounted for 0.6 % of the gross inland energy consumption in 2008.

(10) For further interesting information on the main developments of biomass markets see the 'Focus on' part of the quarterly report of the Market Observatory for Energy: http://ec.europa.eu/energy/observatory/electricity/doc/qreem_2009_quarter4.pdf

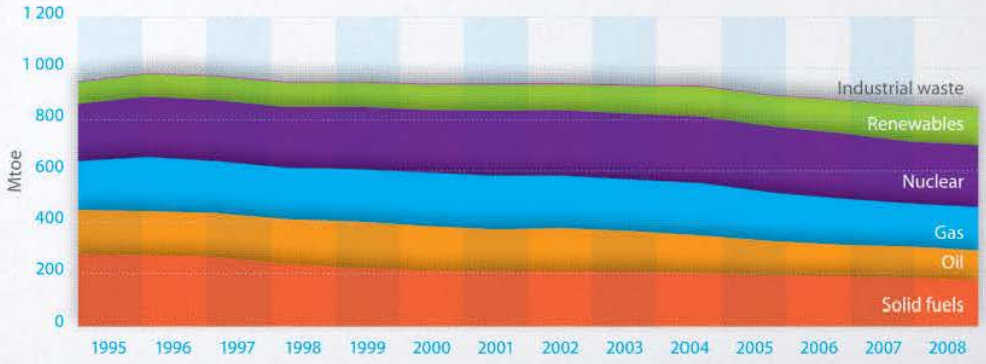
2.2. EU ENERGY SUPPLY

2.2.1. EU indigenous energy production

EU energy production declined in 2008, continuing the downward trend which began in 2003. In 2008, indigenous production fell by 0.7 %, to 853 Mtoe, compared to 859 Mtoe in 2007. Monthly aggregated data suggest that in 2009 the decrease of energy production accelerated (-4.7 %) as the economic crisis impacted on energy demand.

FIGURE 15

EU-27, INDIGENOUS ENERGY PRODUCTION (in Mtoe) (1995-2008)



Source: Eurostat

Except for the production of RES which increased by 5.5 %, the production of all other energy sources either remained stable or declined between 2007 and 2008. The biggest drop occurred in oil production (-7.7 Mtoe/ -6.3 %) and production of solid fuels (-7.4 Mtoe/ -4 %). After declining continuously between 2005 and 2007, gas and nuclear energy production remained relatively stable in 2008, reaching annual production levels of 168.1 Mtoe and 241.8 Mtoe, respectively.

The slight upturn in gas production (of 0.5 %) in 2008 was mainly due to a 10 % increase in production in the Netherlands. Besides the Netherlands[11], Denmark was the only EU country that experienced an increase in indigenous gas production (of 9 %) in 2008 compared to the previous year. Other EU countries continued to produce less gas.

Since 2001 when the last EU-27 production peak was registered, indigenous production of gas has shrunk by more than 19 %. In 2008, the German gas indigenous production fell by 14 %, while Italy, the UK and Romania experienced less decrease in their production (4.6 %, 3.4 % and 2.6 %, respectively).

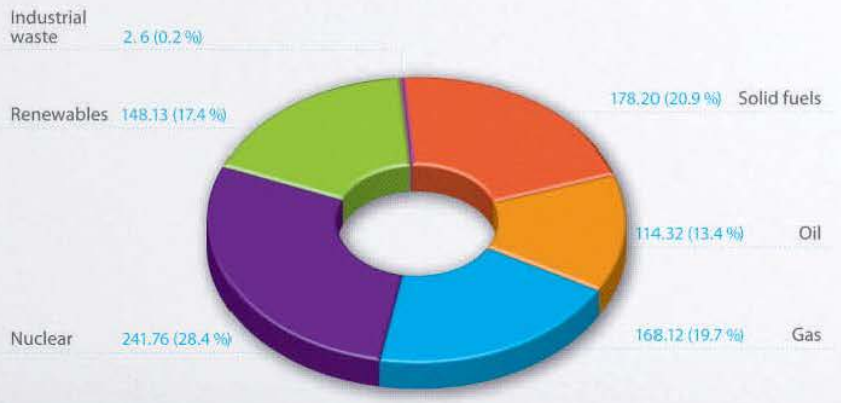
Nuclear and gas remained the two largest energy sources produced in the EU-27 with an individual share of 28.4 % and 19.7 %, respectively. These shares are 0.3 pp higher than in 2007. As a consequence of declining production, shares of solid fuels and oil experienced a 0.9 pp and 0.8 pp decrease between 2007 and 2008, respectively.

Conversely, renewable energy sources amounted to 17.4 % of EU indigenous energy production in 2008, compared to 16.2 % in 2007. In 2008, the gap between the share of EU-27 RES production and that of oil continued to widen (by 4 %) and the share of renewables production became more comparable to that of gas, implying a decreasing importance of fossil fuels.

(11) In the Netherlands and Denmark, production data in the last decade did not show the decreasing trend that characterises the production of most of the EU countries originating from the depletion of gas fields.

FIGURE 16

EU-27, PRIMARY ENERGY PRODUCTION AND RECOVERED PRODUCTS (in Mtoe) (2008)



Total = 852.59 Mtoe

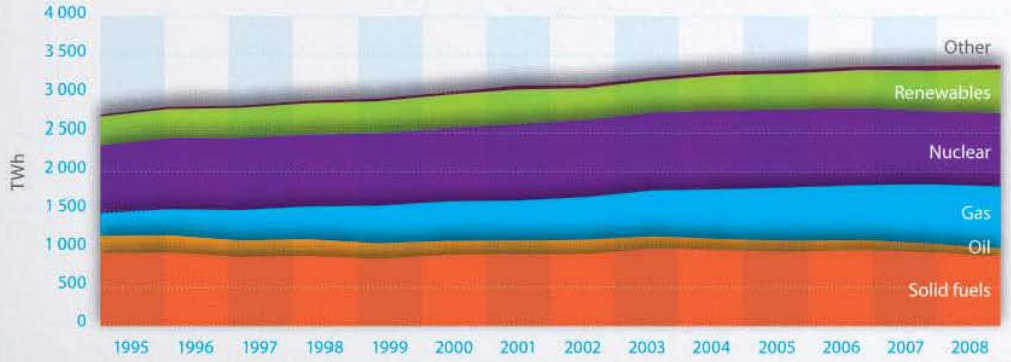
Source: Eurostat

2.2.2. EU electricity generation

Total electricity generation in 2008 was 3374 TWh, which was 0.2 % higher than 2007 total generation, and represented a new record high. It confirmed the continued upward trend of electricity generation. However, the annual increase of 0.2 % in both 2007 and 2008 was lower than in preceding years. According to monthly aggregated data, electricity generation dropped by 5 % in 2009 compared to the previous year, reflecting the impact of the deep economic crisis.

FIGURE 17

EU-27, ELECTRICITY GENERATION (in TWh) (1995-2008)



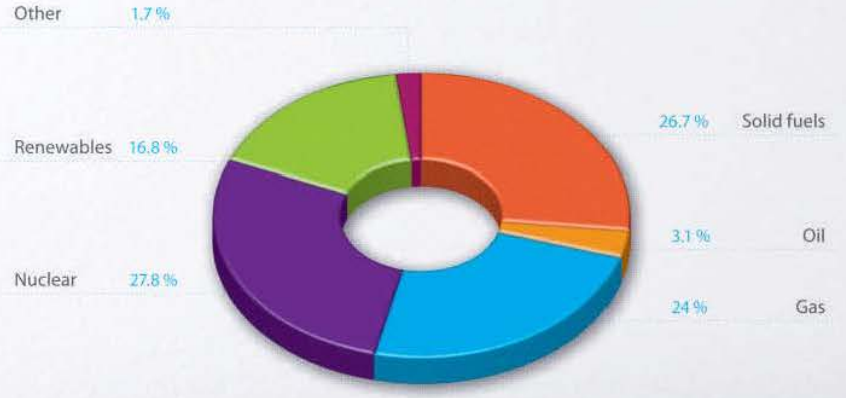
Source: Eurostat

While in 2007 coal was the main energy source of power generation in the EU-27, in 2008 it was nuclear energy, recording an unchanged 27.8 % share against a declining share of coal (26.7 % in 2008 vs. 28.6 % in 2007). Power generation from coal fell by 6.3 % compared to 2007 while that of nuclear energy remained stable (+0.2 %). This slight upturn in power generation from nuclear marked the end in a four year decline in production[12]. On the other hand, power production from coal continued to decline since it reached its peak in 2003.

Electricity generation from gas and from RES increased significantly in 2008, by 5.2 % or about 40 TWh for gas and by 8.1 % or 42 TWh for RES respectively. The trend towards more gas and RES for power generation was confirmed. In 2008, gas amounted to 24 % of the electricity produced, up by 1.4 pp with respect to 2007, while RES increased its share by 1.2 pp and amounted to 16.8 % of electricity produced. In the last five years, the share of gas in electricity generation has risen by 5.4 % while that of renewable energy sources increased by 3.9 %, which confirms the increasing importance of gas in power production.

FIGURE 18

EU-27, ELECTRICITY GENERATION BY FUEL (in %) (2008)



Total electricity generation = 3 374.18 TWh

Source: Eurostat

In 2008, only 3.1 % of electricity was generated from oil, compared to 3.3 % in 2007. Oil still remains a marginal and declining source used for power generation. Oil continued to play a role in power production mainly in geographically isolated areas (e.g.: islands) which were not connected to other power grids.

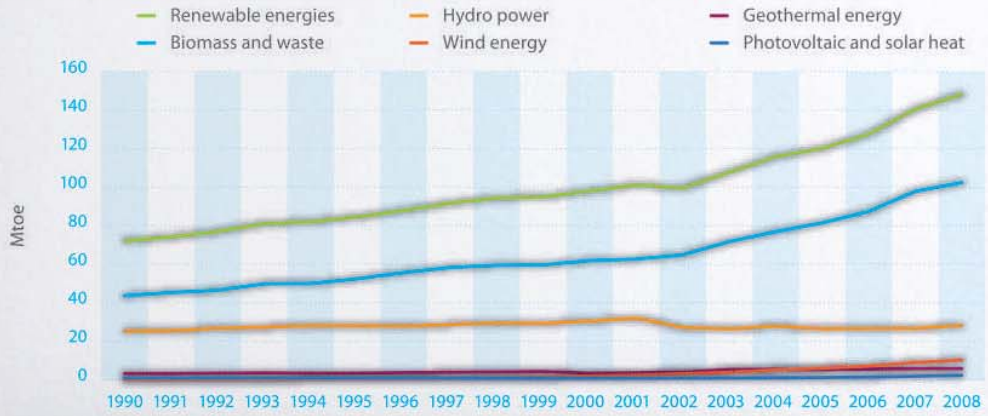
53.8 % of EU electricity was generated from fossil fuels and 46.2 % from low-carbon energy sources in 2008. In comparison, fossil fuels contributed 55.6 % to the power generated in 2007 while low-carbon energy contributed 44.4 % to the total power generation.

(12) The decline in EU nuclear power production was also influenced by shutting down reactors in Bulgaria and Lithuania, and after these reactors were out of production and others continued to operate, there were no reasons for further decline.

BOX 2
EU-27 – RES PRODUCTION

Production of renewables in the EU-27 experienced dynamic growth since 2002, recording an average annual growth rate of 6.8 % between 2002 and 2008. This was mainly due to an increase in the production of biomass and waste that represented 69 % of the total 148 Mtoe (1721 TWh) in renewable energy production in 2008. The production of hydro and geothermal energy was relatively stable during the last couple of years, with a share of 19 % and 3 % respectively in the overall renewable energy production in 2008. In contrast, both wind energy and solar energy (photovoltaics, CSP and heat) experienced rapid growth in recent times. Annual production of wind power energy in the EU-27 exceeded 10 Mtoe (116.3 TWh) for the first time in 2008, and it represented 6.9 % of total RES production. Although solar energy represented less than 2 % of renewables in 2008, solar energy production increased by 27.8 % in 2008 (compared to 2007), exceeding growth in all other renewable energy resources, likely driven by the existence of governmental incentive programmes in solar energy promotion in several EU countries.

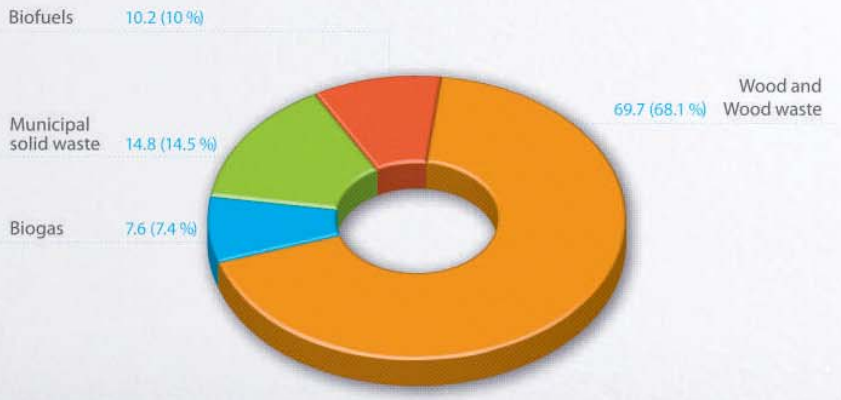
FIGURE 19
EU-27, RENEWABLE ENERGY PRODUCTION (in Mtoe) (1990-2008)



Source: Eurostat

Although production in biofuels increased by 15.6 % in 2008, reaching 10.2 Mtoe (118.6 TWh), this actually represented a more modest annual growth rate, compared to 40-50 % annual growth rates in the preceding three years. In 2008, biofuels production amounted to 10.2 % of biomass production while it was 9 % in 2007. Biodiesel was the most important product and amounted to almost 70 % of the production of biofuels in 2008.

FIGURE 20
EU-27, RENEWABLES: PRODUCTION OF BIOMASS AND WASTE (in Mtoe and %) (2008)

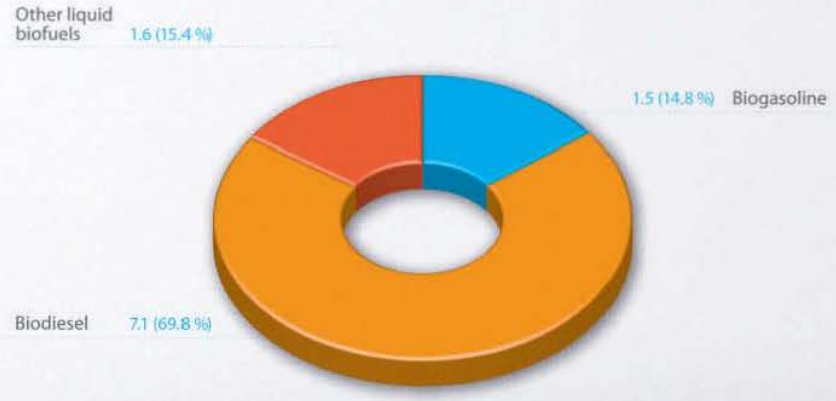


Total = 102.3 Mtoe

Source: Eurostat

FIGURE 21

EU-27, RENEWABLES: PRODUCTION OF BIOFUELS (in Mtoe and %) (2008)



Total = 10.2 Mtoe

Source: Eurostat

BOX 3

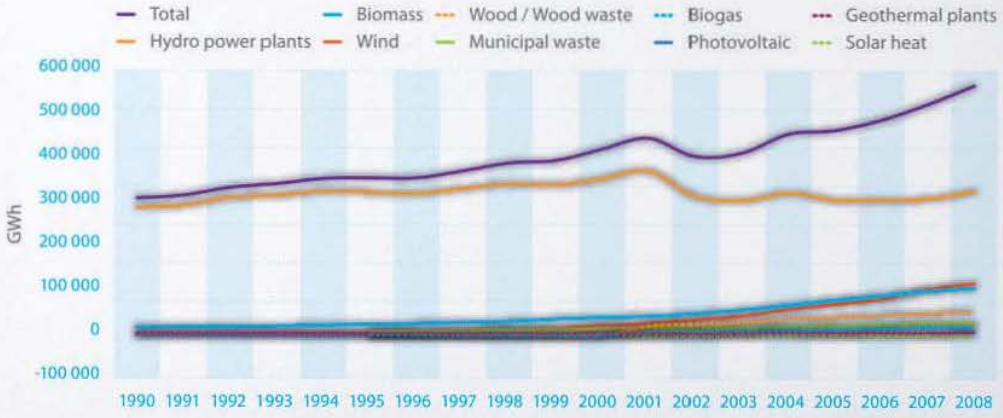
EU-27 - Electricity from RES

In 2008, electricity generated from RES in the EU-27 amounted to 567.1 TWh, up by 8.1 % compared to 2007. It amounted to 16.8 % of the electricity generated in EU-27 in 2008, which represents an increase of 1.2 pp compared to 2007.

The growth in renewable electricity was widely spread among the 27 Member States of the EU, although three countries (Portugal, Slovakia, Denmark) registered decreases in production compared to 2007, while in Bulgaria the increase was below 1 %. However, twelve member states recorded double-digit growth in renewable electricity in 2008.

FIGURE 22

EU-27, ELECTRICITY FROM RENEWABLE ENERGY SOURCES (in GWh) (1990-2008)

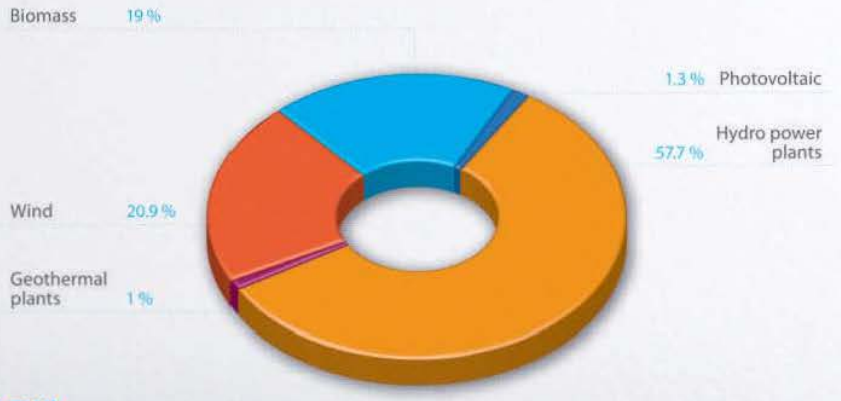


Source: Eurostat

Power production from solar energy experienced the most dynamic growth between 2007 and 2008; reaching 7.4TWh in 2008, which was almost twice the previous year's value. Nevertheless, solar energy's portion was still less than 1 % in overall RES-based power production. In 2008, electricity generated from wind rose by 13 % (14 TWh) compared to 2007 and amounted to 118.7 TWh. As for biomass, electricity generation grew by 7 % (7 TWh) over the same period and amounted to 107.9 TWh. Electricity production from hydro power rose by more than 5 % and reached nearly 327 TWh.

FIGURE 23

EU-27, ELECTRICITY FROM RENEWABLE ENERGY SOURCES IN GROSS ELECTRICITY CONSUMPTION (in %) (2008)



Total = 567.10 TWh

Source: Eurostat

Hydro power remained the largest RES used for electricity generation although its share has been constantly decreasing since 1990 and it hit a low[13] again in 2008 (57.7 %) which represents 1.4 pps less than in 2007. The substantial growth of electricity from wind translated into increasing shares in electricity generation from RES, reaching 20.9 %, up by 1 pp. The share of biomass was practically unchanged (19 %) compared to 2007. Wind based power production remained the second largest type of renewable energy sources for electricity in the EU-27, followed by biomass.

In 2008, hydro power represented 9.7 % of the total EU-27 electricity generation, which was 0.5 pp higher than in 2007. Similarly, wind and biomass increased their shares compared to 2007. In 2008, 3.5 % of the total electricity generation came from wind, up by 0.4 pp, and 3.2 % from biomass, up by 0.2 pp compared to 2007.

(13) It must be noted here that the decrease in hydro power's share is mainly due to the increase of power production from other (mainly renewable energy) sources, the amount of hydro power capacities did not decrease.

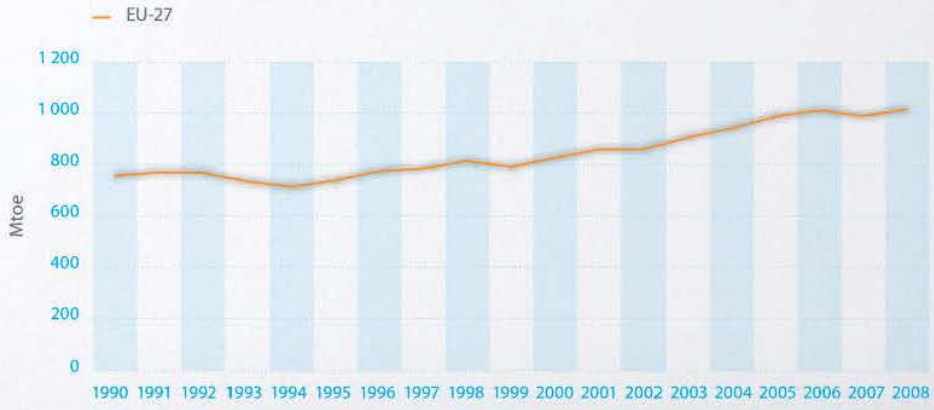
2.2.3. EU energy imports

After a temporary decrease in 2007, EU-27 net energy imports increased again and reached a historical high of 1014 Mtoe in 2008. Compared to 2007, the increase was 26 Mtoe or 2.6% in 2008. This increase in net imports was accompanied by decreasing energy consumption and indigenous production.

According to monthly aggregated data in 2009, net energy imports fell again by approximately 5.7%, in line with the contraction of economic performance in the economies of the EU-27.

FIGURE 24

EU-27, NET IMPORTS OF ENERGY (in Mtoe) (1990-2008)



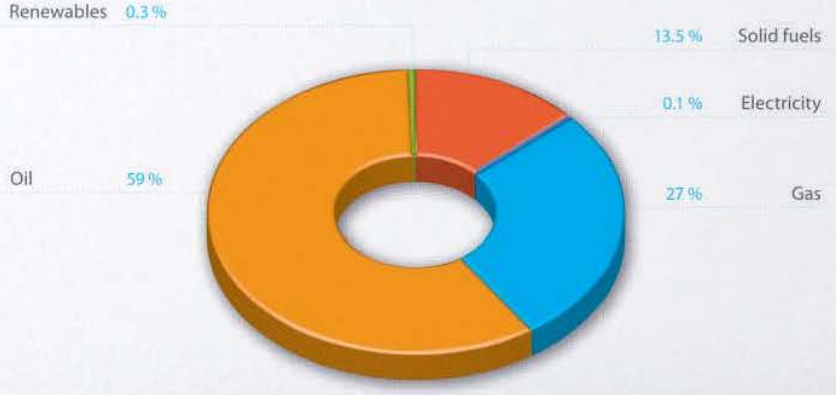
Source: Eurostat

Imports increased for both oil and gas between 2007 and 2008 (1.7% and 5.4%, respectively). Both oil and gas net imports set a record high value in 2008 (Oil: 598.3 Mtoe; gas: 274.5 Mtoe). At the same time, imports of solid fuels increased only by 0.8% since 2007, reaching 137.5 Mtoe. In 2009, the changes in imports calculated from the aggregation of monthly data show significant drops in the imports of hard coal (-16%), crude oil (-7%) and a minor decrease in the imports of natural gas (-1.5%), resulting in an overall 5.7% drop in energy product imports, mainly due to large falls in industrial demand due to the economic crisis.

Crude oil still represented the biggest imported energy source in 2008, corresponding to 59% of EU-27 imports. The share of gas represented 27% of total net imports in 2008, which is only slightly less (-0.4 pp) than in 2007.

FIGURE 25

EU-27, NET IMPORTS OF ENERGY BY ENERGY SOURCE (in %) (2008)



Total = 1 014.95 Mtoe

Source: Eurostat

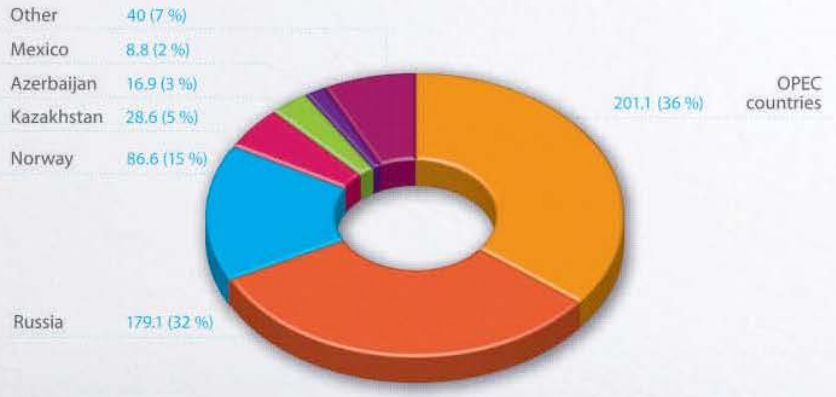
In 2008, the main external suppliers of oil to the EU were OPEC countries (36 %), Russia (32 %), Norway (15 %) and Kazakhstan (5 %). In consequence of the decreasing oil supply coming from Russia (-7 Mtoe/ -3.6 %) compared to 2007, the country's share of EU imports fell by 1.7 pp in 2008. Conversely, the other main suppliers increased market shares, such as the OPEC which rose by 0.5 pp and that of both Norway[14] and Kazakhstan which edged up slightly by 0.2 pp. As a result, external sources of oil supply to the EU became more diversified in 2008. The gap between the two main suppliers, OPEC and Russia, widened from 1.7 to 4 pp between 2007 and 2008. In 2009, according to monthly aggregated data, the import share of Russia increased again while that of OPEC countries decreased.

The three main suppliers of gas to the EU in 2008 were Russia (39.3 %), Norway (30.1 %) and Algeria (15.4 %). Norway strengthened its position as a major gas supplier to the EU (with a share in total EU-27 imports up by 0.9 pp from 2007). Although both Russia and Algeria exported more natural gas to the EU in 2008 (up by 5.2 % and 2.8 %, respectively), this volume increase was below the average growth of overall EU-27 imports (7 % compared to 2007) and thus the share of both countries diminished (by 0.7 pp and 0.6 pp, respectively).

Sources of gas became slightly less concentrated in 2008. In 2009, this trend seemed to continue; the import share of Russia fell by more than 3 pp. This might have been related to the economic crisis, the diminishing competitiveness of long term gas contract prices (LTC) compared to LNG and the gas crisis in January 2009. Import share of Algeria fell by nearly 1 pp while that of Norway was up by nearly 2 pps. Nigeria's share in total EU imports was down by more than 1 pp, while Qatar doubled its share by providing LNG to the EU.

FIGURE 26/1

EU-27, IMPORTS OF CRUDE OIL (in Mt, %) (2008)

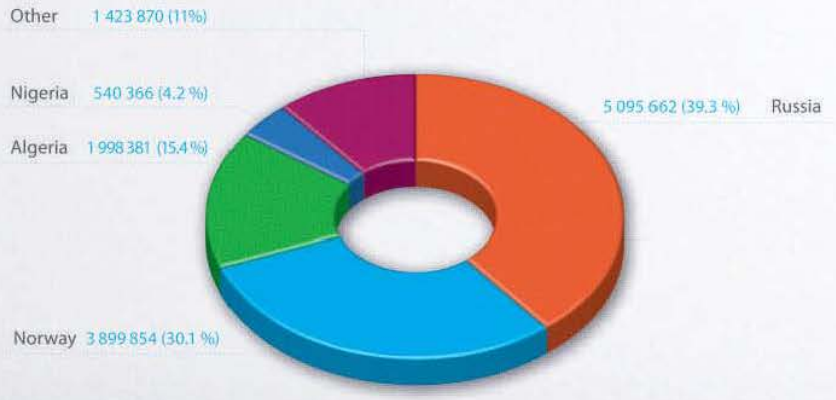


Total = 561.46 Mt

Source: Eurostat

FIGURE 26/2

EU-27, IMPORTS OF NATURAL GAS (in TJ, %) (2008)



Total = 12 958 133 TJ

Source: Eurostat

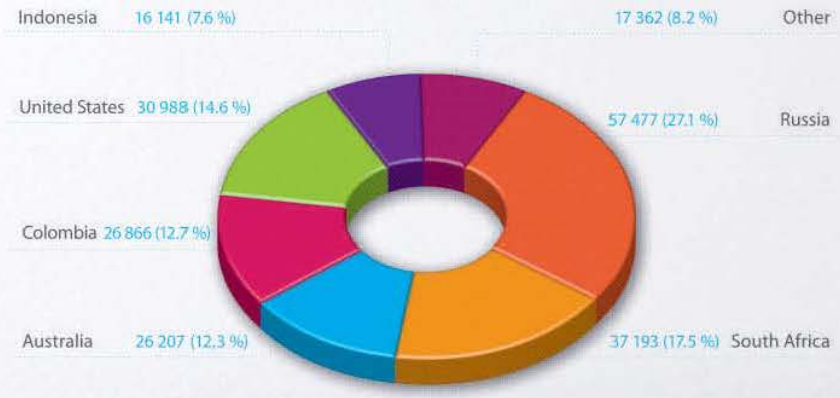
(14) Although Norway's crude oil production continued to decline in 2008, see chapter 3.1.5.

The coal market is more diversified than the oil and gas markets. Coal imports in 2008 came mainly from six countries: Russia (27.1 %), South Africa (17.5 %), the United States (14.6 %), Colombia (12.7 %), Australia (12.3 %), and Indonesia (7.6 %). Compared to 2007, all suppliers except for South Africa and Indonesia increased their exports to the EU. Russia increased its share by more than 1 pp, while South Africa's share fell by 3.8 pp compared to 2007, primarily due to a decrease in exports to the EU by almost one fifth since 2007. On the other hand, the United States significantly increased coal exports to the EU-27 in 2008 (+48 %), thereby gaining almost 5 pp in market share. Both Australia and Colombia shares in EU-27 overall imports fell (by 1.4 pp and 0.7 pp respectively).

Preliminary 2009 data show that the import structure became more concentrated with Russia and Colombia having further increased market shares and South Africa continuing to represent a smaller proportion of EU-27 overall coal imports.

FIGURE 27

EU-27, IMPORTS OF HARD COAL (in 1 000 t, %) (2008)



Total = 218 230 000 t

Source: Eurostat

In 2008, Russia remained a significant source of imports for oil, gas and coal into the EU while Norway played a greater role in EU imports of gas and oil than in the previous year. The Middle East was a major supplier of oil and North Africa was an important source of imports for gas and oil. For hard coal, Australia, Colombia and South Africa still played an important role among major suppliers to the EU.

In power generation steam coal is of particular importance. In 2009 86 % of the EU gross inland consumption of steam coal was used for electricity generation. This equals 208 million tonnes (compared to 235 Mt in 2008). In 2009 the EU imported 148 Mt of steam coal (160 Mt in 2008). 35 % of steam coal import originates from Russia which is the largest supplier. Colombia (21 %), South Africa (18 %), Indonesia (9 %) and the USA (7 %) also have significant shares in steam coal supply to the EU.

2.2.4. EU import dependency

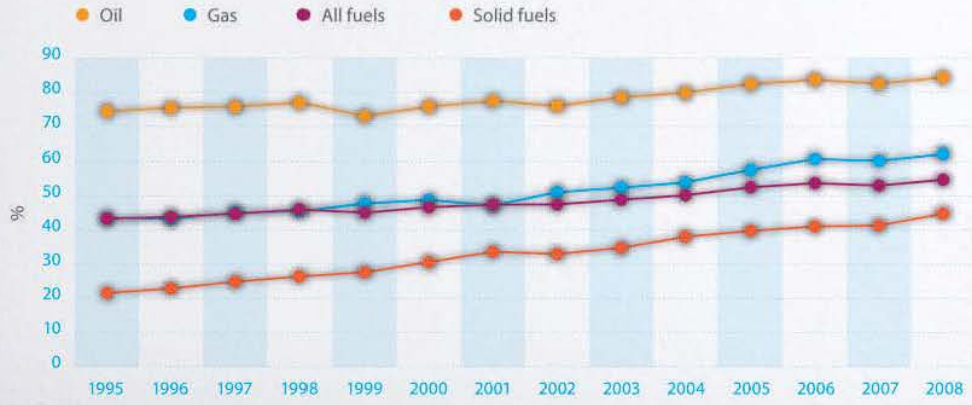
In 2008, EU-27 overall energy import dependency[15] climbed to a record high value (54.8 %) after a transitory decrease recorded in 2007. This was 1.7 pp higher than in the previous year. The increasing import dependency resulted from rising dependence on all kinds of fossil fuels, without exceptions. Import dependence on oil rose to 84.3 %, up by 1.8 pp from its value of 2007. A new record high dependency rate was also set in the import of natural gas (62.3 %).

In 2008, 56 % of EU-27 needs in energy were satisfied domestically. According to 2009 preliminary data, with the exception of natural gas, import dependency remained stable during a year that can be characterised by large decreases in energy demand linked to the economic crisis. However, gas import dependency again reached a new record high value of 64 %.

(15) The import dependency is measured as the ratio of net imports to gross inland consumption plus bunkers.

FIGURE 28

EU-27, IMPORT DEPENDENCY (in %) (1995-2008)



Source: Eurostat

2.3. EU ENERGY SECTOR'S CLIMATE PERFORMANCE

2.3.1. GHG emissions

In 2008, EU-27 total greenhouse gas (GHG) emissions without LULUCF[16] amounted to 4940 Mt CO_2-equivalent. In 2008, these decreased for the seventh consecutive year, falling by 2 % or 99 Mt CO_2-equivalents compared to 2007. CO_2 remains the main greenhouse gas, with a 83.7 % share of GHG emissions, followed by methane (CH4), with a 7.8 % share and nitrous oxide (N2O), with a share of 6.9 %.

In the last quarter of 2008 the beginning of the economic crisis exerted a lowering impact on global GHG emissions. It is also worth mentioning that a shift in power generation mix helped to reduce the amount of greenhouse gases. In 2008 electricity generation from gas and renewable energy sources increased compared to 2007, while at the same time coal-based power generation decreased, improving the carbon intensity of overall energy production. These developments all helped in attaining more favourable emission objectives.

EU environmental and climate policies also exerted a downward pressure on GHG emissions. In December 2008 the so-called energy and climate package were adopted by the Council of the European Union and the European Parliament. Through several common and coordinated policy measures this package aims at attaining significant savings in GHG emissions. The most important areas cover the Emissions Trading Scheme (ETS), the Renewables Directive, the transport sector (fuel quality legislation) and legislations promoting reduction in energy demand, such as the energy performance of the buildings, eco-design requirements or promotion of co-generation (combined heat and power).

In 2008, EU-27 energy-related GHG emissions (i.e. combustion and fugitive emissions) represented 79.1 % of total GHG emissions and amounted to 3907 Mt CO_2 equivalents which was slightly less than in 2007 (79.2 % and 3978 Mt CO_2 equivalents).

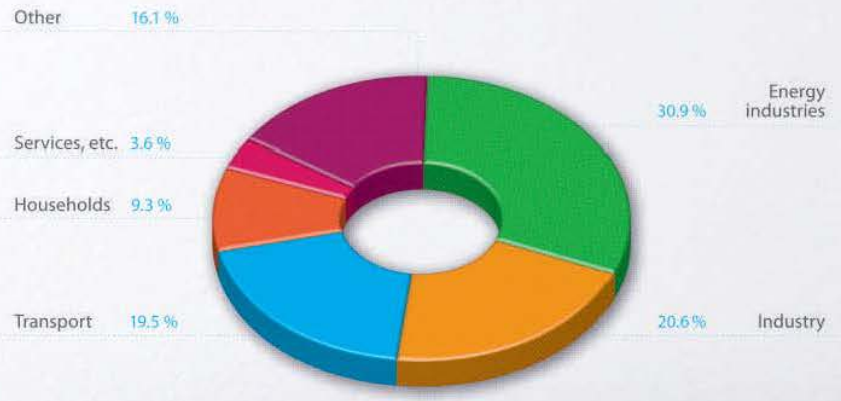
Due to an almost 5 % drop in energy-related GHG emissions, the share of energy industries in GHG emissions decreased by 1 pp in 2008 compared to the previous year. The GHG emissions of manufacturing and construction industries were down by 3.3 %, which led to a 0.5 pp drop in the industry's share in GHG emissions. As transport-related GHG emissions were also down by 1.8 % compared to 2007, the sector preserved its 19.5 % share of total GHG emissions, having decreased by 2 % year-on year.

By contrast, due to an annual increase of 7.5 % in residential sector related GHG emissions, the share of households in total GHG grew by 0.8 pp, having reached 9.3 % in 2008. Due to an increase of more than 7 % in services-related emissions, the share of this sector also rose by 0.3 pp to 3.6 % in 2008. The increase in importance of households and services in GHG emissions was mainly due to colder weather conditions.

(16) The impact of land use, land use changes and forestry (LULUCF) on the GHG inventories is excluded.

FIGURE 29

EU-27, GREENHOUSE GAS EMISSIONS (in %) (2008)



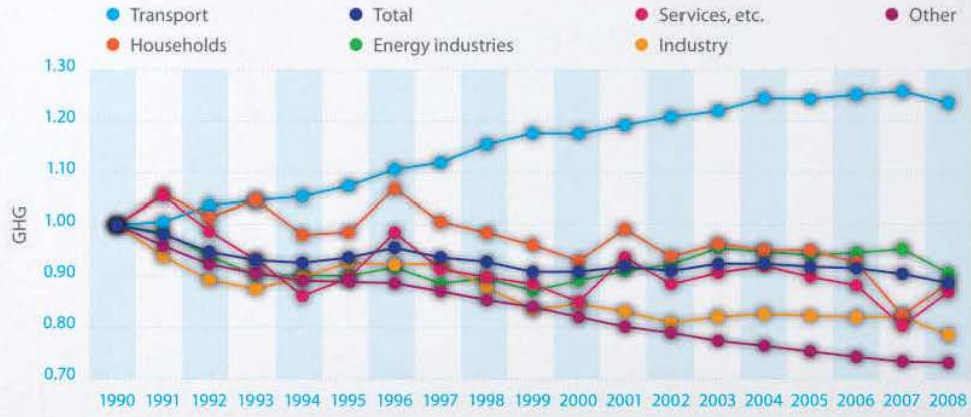
Total = 4 937.7 Mt CO_2

Source: European Environmental Agency

The transport sector experienced the most significant decline in emissions in 2008 (from 1990 to 2007 emissions increased almost permanently; only minor decreases could be observed). With the exception of households and services, all other sectors continued their generally decreasing emission trend. The total GHG emissions of energy industries reached their lowest levels since 2001.

FIGURE 30

EU-27, GREENHOUSE GAS EMISSIONS (GHG) BY SECTOR (1990-2008) 1990=100



Source: European Environmental Agency

According to estimations of the European Environmental Agency (EEA), GHG emissions fell sharply in the EU-27 in 2009 compared to 2008, with expectations of reductions in all GHG emission of 6.9 %[17]. The total amount of verified emissions in 2009 from EU ETS installations in the EU-27 was 1.85 billion tonnes of CO_2, almost 11.6 % lower than in 2008. The drop in emissions can be attributed to various interdependent factors such as reduced economic activity as a result of the recession, lower levels of gas prices throughout 2009, and a sharp reduction in the consumption of coal products.

EEA data also show the countries having the highest annual GHG emissions, and the relation of the latest emission data to that of the Kyoto Protocol target. In 2008 Germany's GHG emission was 958.1 Mt CO_2 equivalents, which was slightly more than in 2007 (+0.1 %), but it was less than the 2012 target value (973.6 Mt CO_2 equivalents). The UK's GHG emission amounted to 628.2 Mt CO_2 equivalents, having decreased by 1.8 % compared to 2007 and it was also lower than the target of 679.3 Mt CO_2 equivalents. The third largest GHG emitter Member State of the EU was Italy, with an annual emission of

(17) With a +-0.6 % estimation error.

541.5 Mt CO_2 equivalents, which was 2 % less than the respective value of 2007, but it still exceeded the target for 2012 (483.3 Mt CO_2 equivalents). France managed to show a slight decrease (0.6 %) in its GHG emission in 2008, amounting to 527 Mt CO_2 equivalents, which was also below its Kyoto target (563.9 Mt CO_2 equivalents).

Poland's 2008 GHG emission was well below its 2012 target (529.6 Mt CO_2 equivalents), similarly to the majority of the transition economies (the majority of the new Member States). The reason for this good emission performance lies behind the rapid change in the economic structure in the 1990s that can be characterised by the fall in production of heavy industry activities. This helped in radically reducing GHG emissions since the base year.

In contrast, Spain's 2008 annual GHG emission, in spite of decreasing by 7.5 % compared to 2007, was still higher than its 2012 target (333.2 Mt CO_2 equivalents).

Taking a closer look at the change in GHG emissions between the Kyoto base year[18] and 2008, the biggest decrease occurred in Poland (29.8 %) among those six countries that contributed the most to the GHG emissions in the EU. Remarkable decreases in GHG emissions could also be observed in Germany (22.3 %), the UK (19.1 %) and France (6.5 %). In contrast, in Italy and Spain the 2008 emission data were higher than those of the base year (by 4.8 % and 40 %, respectively).

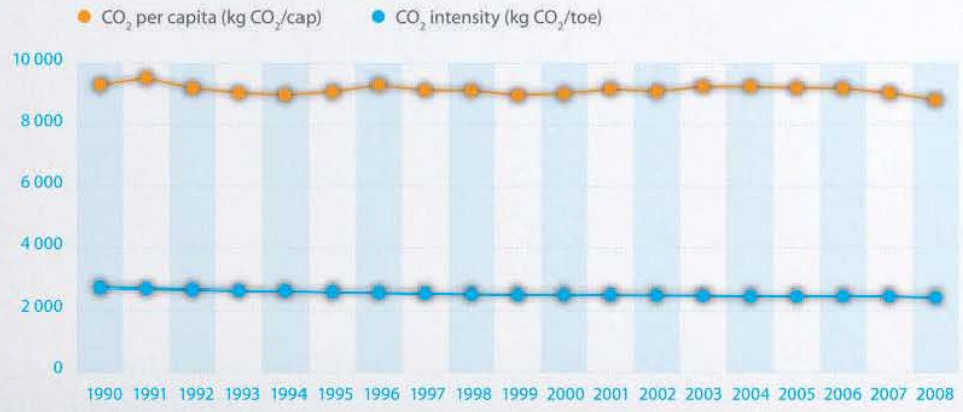
2.3.2. CO_2 emissions and intensity

In 2008, energy-related CO_2 emissions amounted to 3787 Mt and accounted for 92.5 % of total CO_2 emissions. Between 2007 and 2008, they decreased by 1.8 % or 70 Mt. In the EU-27, both households and services increased their levels of CO_2 emissions related to energy by 7.5 % and 8.2 % respectively.

CO_2 intensity, measured as a ton of CO_2 per ton of oil equivalent, fell slightly in 2008, reaching 2.44 t CO_2 / toe (compared to 2.48 t CO_2 / toe measured in 2007). This was the first year since 2004 that any perceivable change occurred in this intensity measure. CO_2 emissions per capita fell by 2.5 % to a value of 8815 kg per capita in 2008. This was the lowest level since 1990.

FIGURE 31

EU-27, CO_2 INTENSITY (in kg CO_2/toe) AND CO_2 PER CAPITA (in kg CO_2/cap) (1990-2008)



Source: European Environment Agency

The split in the EU-27 CO_2 emissions in 2008 between the six largest CO_2 emitters did not change since 2007: Germany (833 Mt), the United Kingdom (533 Mt), Italy (468 Mt), France (391 Mt), Spain (338 Mt) and Poland (324 Mt). However, all of these Member States reduced their total emissions compared to 2007. The Member States that reduced their CO_2 emissions the most compared to 2007 were: Portugal (-9.9 %), Spain (-8.2 %), Slovenia (-6.9 %), Romania (-6.5 %) and Denmark (-6 %). There were five Member States where CO_2 emissions either grew or remained stable.

In terms of CO_2 intensity, which gives an indication of the CO_2 content of the fuel mix, the six Member States with the highest t CO_2/toe levels in 2008 were: Malta (5.91), Greece (3.83), Cyprus (3.44), Poland (3.30), Ireland (3.19) and Estonia (3.12); the same countries as in 2007. The Member States that showed the largest drop in CO_2 intensity (measured as the difference between the 2007 and 2008 t CO_2/toe values) were: Greece and Estonia (-0.20) and Romania (-0.17). In contrast, CO_2 intensity increased significantly in Malta (0.17), the Netherlands (0.08) and Portugal (0.04).

Overall, 18 Member States were above the EU-27 average in 2008, similarly to the previous year.

(18) In most cases Kyoto base year's GHG emission is close to that of the annual data of 1990, but in the 27 Member States of the EU different base years could be agreed for different GHG components.

3. ENERGY MARKET DEVELOPMENTS

3.1. MARKET DEVELOPMENTS IN THE OIL SECTOR OF THE EU

3.1.1. The international environment and the crude oil price evolution

After the financial crisis and the ensuing deep economic contraction in 2008, the oil industry was confronted in 2009 and the beginning of 2010 with a very unstable world environment. Instability was both reflected in the slight recovery that followed the global recession and in the increasing growth disparities between OECD and non-OECD zones.

Indeed, the 1.1 % drop in the world's GDP in 2009 concealed the development of significant disparities in regional growth trends. China and India respectively achieved 8.5 % and 5.4 % growth, whereas the US (-2.4 %) and the euro area (-4.0 %) fell into recession. On the whole, world oil demand fell by 1.3 million barrels per day (b/d) or nearly 2 % in 2009, a second year of consecutive decline. OECD demand fell by 2.2 million b/d (or nearly 5.0 %), a fourth consecutive annual decline whereas demand increased in some parts outside the OECD, notably in China, Saudi Arabia and India.

After its recovery against the euro during the second half of 2008, the dollar faced a new period of depreciation in the course of 2009, falling from €0.74 in December 2008 to €0.68 in December 2009. It subsequently recovered to reach €0.82 in June 2010. Over the entire year of 2009, the dollar reached $0.72, compared to $0.68 in 2008. Crude oil prices surged in the first half of 2008 peaking above $140 per barrel (bbl) in early July and thereafter fell sharply reaching a low of around $35/bbl in December. Since then, oil prices have recovered considerably.

Oil price behaviour in 2009 can be divided into two distinct phases. The first was the recovery phase which saw the Dated Brent price, the European benchmark crude, rising from a very low base of $40.35 on average in December 2008 to $74.28 in December 2009, an increase of 84 % in US dollars or 69 % when expressed in euros. The second was the stabilisation phase which saw the oil price oscillating within a relatively narrow price band mostly between $60 and $70 between the months of July and September and then between $70 and $80 between the months of October and December. For the whole year 2009, the Dated Brent price averaged $61.7 against $97.3 in 2008, a decline of 37 %, the largest one, in percentage terms, since 1986.

In fact, 2009 represents a remarkable year in at least two respects. First, it experienced the sharpest increase in spot oil prices in decades. Second, from July to December, it exhibited a high degree of relative stability despite a very uncertain and volatile global economic environment. The relative price stability continued during the first-half of 2010 with the Brent price mostly fluctuating between $70 and $80/bbl.

The improved economic outlook, including expectations of stronger future oil demand, was the main factor behind rising prices in 2009 and 2010. The oil supply, on the other hand, still indicated large flexibility and additional availability in the form of both large inventories and spare capacity. Future price developments will depend on future production decisions as well as market expectations concerning future supply constraints. Furthermore, crude oil futures prices still point to somewhat increasing prices in the short to medium term.

FIGURE 32

DATED BRENT (in EUR/bbl and USD/bbl) AND EUR/USD EXCHANGE RATE (1/2008-9/2010)

Sources: © Platts (2010); ECB (2010)

3.1.2. Drivers behind the crude oil price developments

The magnitude of variations in oil prices in 2008 and 2009, in tandem with other commodity prices, has renewed the discussion about the impact of financial flows on oil market prices. However, studies undertaken so far have failed to establish links of causality between positions of financial investors, notably in futures markets, and the crude prices observed in the spot market. According to the International Energy Agency (IEA), market fundamentals appear to provide the best information on future price developments, but a range of other factors, including short-term money flows in and out of commodity markets and equity market shifts, can play a short-term role in influencing prices.

A better understanding of the price formation in the oil markets requires better and more transparent markets. With a view to achieving this goal, considering notably the price volatility on the oil market and concerns about financial speculation, several actions have been taken at international level to enhance the functioning of global oil markets.

Under the global reform of financial markets, the G20 leaders agreed in September 2009 in Pittsburgh on the objective to improve over-the-counter (OTC) derivates markets. They notably agreed to improve the regulatory oversight of energy markets by implementing the International Organisation of Securities Commissions' recommendations on commodity futures markets.

The aim is to increase overall market functioning and transparency in the futures markets, giving regulators more power to detect and enforce manipulation cases; improving market supervision; publishing more extended and frequent physical commodity market data, as well as enhancing international co-operation among regulators. These measures should further improve the link between fundamentals and futures prices. International coordination is important in this context to avoid any regulatory arbitrage.

In 2009, the European Commission adopted two Communications[19] to ensure the efficiency and soundness of derivatives markets. This will translate into legislative proposals in 2010 in line with the above-mentioned objectives agreed at the G20 meeting.

Regarding the EU physical oil markets, the European Commission has also taken various steps in recent years to improve transparency, e.g. by establishing the Market Observatory for Energy and adopting a new energy statistics Regulation[20] as well as by participating in the global Joint Oil Data Initiative extended by this year's IEF to cover global data on natural gas. A more specific initiative concerns the recent revision of the strategic oil stock Directive (2009/119/EC). It introduces, in addition to strategic oil stock reporting, the monthly reporting of commercial oil stocks.

3.1.3. The EU crude oil import bill

In line with the evolution of the Dated Brent price and the OPEC basket price, the crude oil supply cost (CIF) of the EU amounted to 60.5 $/bbl (weighted average for 2009) against 94.4 $/bbl for 2008, i.e. a decline of 36 % or 32 % when expressed in euros. For the first half of 2010, an increase of 52 % (in $ and in €) can be noted in comparison with the corresponding period of 2009 (76.9 $/bbl instead of 50.7 $/bbl).

(19) COM(2009) 332 and COM(2009) 563.
(20) Regulation (EC) n° 1099/2008.

FIGURE 33

DATED BRENT AND OPEC BASKET PRICES COMPARED TO CIF PRICES FOR EU-27 (in USD/bbl) (1/2008-9/2010)

Sources: © Platts (2010); European Commission (2010)

Total cost of crude oil imported by the EU from third-party countries reached $225.2 billion for the whole year 2009 (versus $403.1 billion in 2008). On the basis of External trade Statistics (Eurostat's COMEXT database), EU crude oil imports represented, in value, some 13.5 % of total goods imported from third-party countries in 2009 (versus 17.5 % in 2008). The following graph shows the monthly evolution (January 2007 – June 2010) of the total EU crude oil import bill with a breakdown by main origins of supply.

FIGURE 34

TOTAL EU CRUDE OIL IMPORT BILL ACCORDING TO COUNTRY OF ORIGIN (in USD billion) (1/2005-6/2010)

Source: European Commission

3.1.4. Petroleum products price evolution

3.1.4.1. Spot prices and ex-tax prices

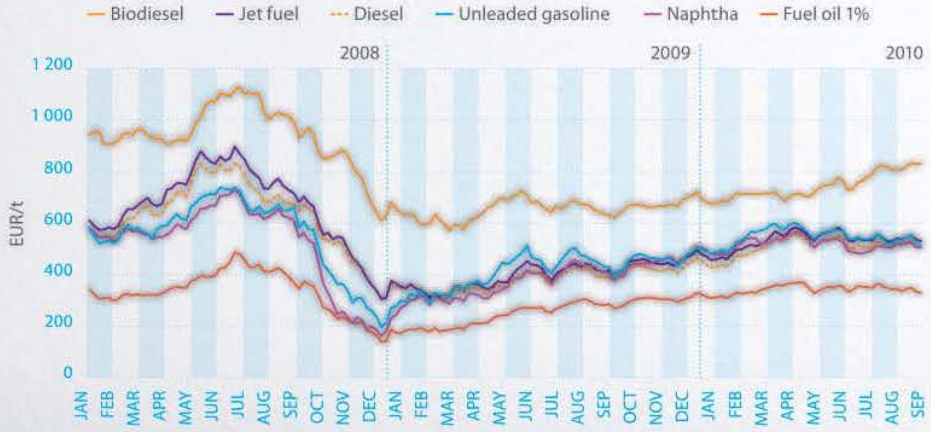
As with the crude price evolution, the spot and ex-tax prices of oil products recovered throughout 2009, after falling significantly at the end of 2008. Price increases mainly occurred during the first semester and were followed in the second part of the year by less sustained growth. In 2010, prices experienced a pretty steep upward trend until mid-May and then registered a stabilisation phase to date (end of September 2010).

Naphtha and jet fuel spot prices, which were significantly affected by the extremely low demand levels during the last quarter of 2008, registered the biggest increases in the first half of 2009. Spot prices and ex-tax prices evolved in parallel over the January 2009 – September 2010 period, the differential being the logistics and storage costs as well as distribution margins.

Depending upon the product, EU level costs and distribution margins have mostly been fluctuating between €8 and €14 per 1000 litres since January 2009 which is in line with the annual averages of the two previous years (See Figure 36 about the differential between spot prices and ex-tax prices).

FIGURE 35

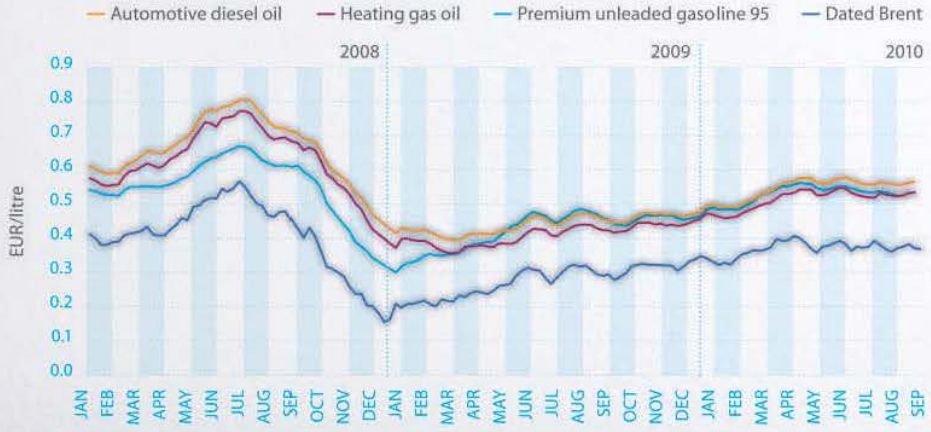
PETROLEUM PRODUCTS SPOT PRICES (in EUR/t) (1/2008-9/2010)



Source: © Platts (2010)

FIGURE 36

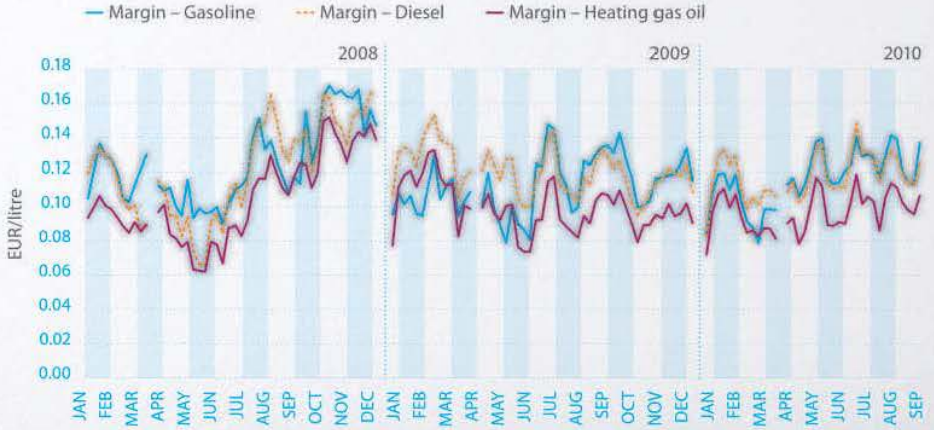
EU-27 EX-TAX PRICES AND DATED BRENT (in EUR/litre) (1/2008-9/2010)



Sources: © Platts (2010); European Commission (2010)

FIGURE 37

DIFFERENTIAL BETWEEN SPOT PRICES AND EX-TAX PRICES (in EUR/litre) (1/2008-9/2010)



Sources: © Platts (2010); European Commission (2010)

In 2008, ex-tax prices for key petroleum products (Euro-super 95, diesel oil and heating gas oil) registered a less significant surge and subsequent drop than for crude oil. This differentiated evolution between crude and products, both expressed in euros, mitigated the extent of the impact on consumers of the crude price increase and decrease.

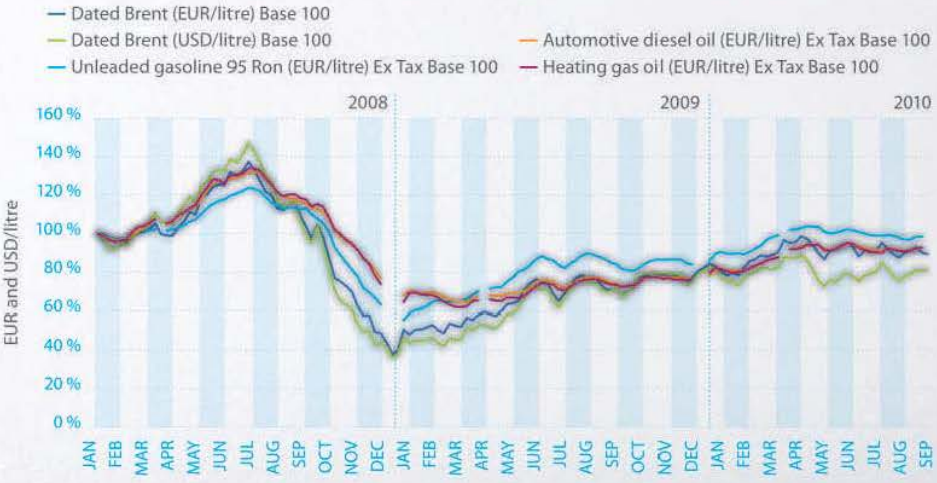
The evolution of the euro/US dollar exchange rate also played an important role in the development of petroleum products ex-tax prices in the euro area. Between January 2009 and September 2010, there were several appreciation and depreciation phases of the euro versus the US dollar. For instance, a 13 % increase took place between April and November 2009 and was followed by a deprecation of 18 % in the following period to June 2010.

It is very clear from the graph below, in which the monthly evolution of prices (crude & products) is expressed, that this last depreciation of the euro against the US dollar negatively impacted the prices of crude oil and petroleum products in 2010 in the EU.

In addition, minor divergences are noticeable in the same graph in the movement of the Dated Brent price and the price for key petroleum products, both expressed in euro. These divergences could be attributed to the fluctuations of seasonal demand for a particular product or to a temporary surplus or deficit on the international market.

FIGURE 38

DATED BRENT PRICE AND EX-TAX PRICES (in EUR and USD/litre), JANUARY 2008 = 100



Sources: © Platts (2010); European Commission (2010)

3.1.4.2. Consumer prices

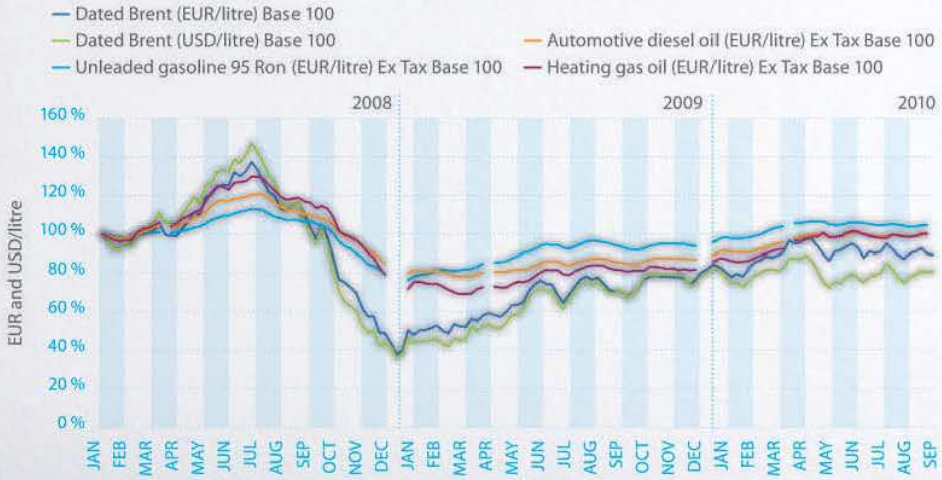
When comparing the following graph with the previous one, (Figure 37 with Figure 38) it is evident that consumer petroleum product prices (i.e. prices including taxes) have followed the same trend as ex-tax prices but with a smaller percentage increase or decrease due to the share of taxation.

Taxation (mainly VAT and excise duties) can have a cushion effect at consumer level[21], since in most member states, taxation, and in particular excise duties, remain fixed for at least one year.

A comparison of the two graphs also shows that the share of taxation has increased on average at EU level between January 2008 and September 2010, as September 2010 petroleum products ex-tax prices were below January 2008 levels whereas consumer prices were slightly above.

FIGURE 39

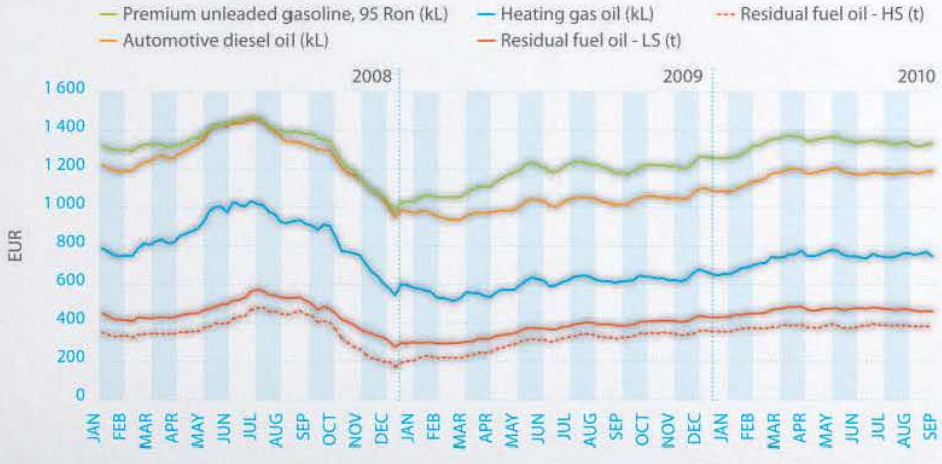
SPOT PRICES AND CONSUMER PRICES (EUR and USD/litre), JANUARY 2008 = 100



Sources: © Platts (2010); European Commission (2010)

FIGURE 40

EU27, WEIGHTED AVERAGE (in EUR) (1/2008-9/2010)



Sources: © Platts (2010); European Commission (2010)

(21) At constant taxation (indirect taxes + VAT) levels, the share of taxation in the consumer price is decreasing when the ex-tax product price is increasing and conversely. The taxation share therefore has a cushion effect at consumer level, in the case of sharp upward or downward trends in ex-tax prices. This can be explained by the fact that the excise duty (and possibly other indirect taxes) is a fixed amount which is independent from the evolution of the ex-tax prices. In turn, VAT, as an ad valorem tax, applies on the total of ex-tax prices plus excise duties (and possibly other indirect taxes).

3.1.4.3. Taxation

At end-September 2010, excise duties on Euro-super 95 were higher than on diesel oil in all EU countries with the exception of the UK where the excise duty rates according to volume were identical.

Consequently, at the pump, the price of Euro-super 95 was higher than the price of diesel oil in all Member States – with the exception of the UK – despite the fact that the ex-tax price was lower for Euro-super 95 than for diesel oil in all EU countries, with the exception of Malta.

FIGURE 41

EU-27, CONSUMER PRICE OF EURO-SUPER 95 AND DIESEL OIL BY MEMBER STATE (in EUR/litre) (at end of September 2010)

Source: European Commission (2010)

FIGURE 42

EU-27, EX-TAX PRICE OF EURO-SUPER 95 AND DIESEL OIL BY MEMBER STATE (in EUR/litre) (at end of September 2010)

Source: European Commission (2010)

Excise duties and VAT rates differ widely from one EU country to another. The variations in excise duties on the main petroleum products at end-September 2010 were as follows:

- **Euro-super 95:** from €350/1000 litres in Romania and Bulgaria to €670/1000 litres in Greece and in the UK (EU minimum threshold[22]: €359/1000 litres);
- **Diesel oil:** from €274/1000 litres in Lithuania to €670/1000 litres in the UK (EU minimum threshold: €330/1000 litres);
- **Heating gas oil:** less taxed than motor fuels in nearly all EU countries, from €10 /1000 litres in Luxembourg to €415/1000 litres in Sweden (EU minimum threshold: €21/1000 litres).

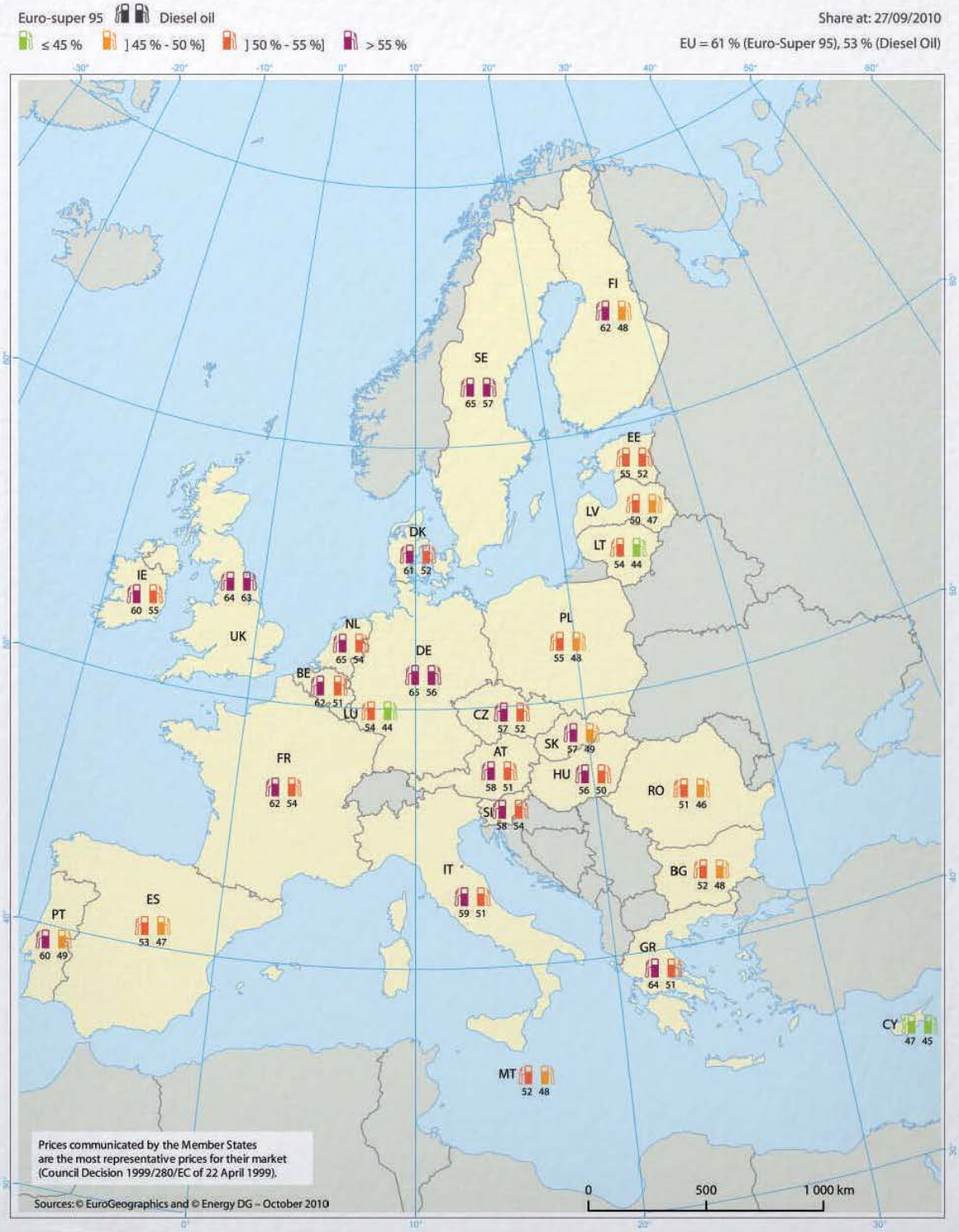
(22) The EU minimum thresholds for euro-super 95, diesel oil and heating oil are defined by Council Directive 2003/96/EC (Energy taxation directive).

Member States with excise duties below the EU minimum threshold are taking advantage of a transitional period or an exemption.

As for VAT rates, at the end of September 2010 they were typically ranging from 15 % (Cyprus, Luxembourg) to 25 % (Denmark, Hungary, Sweden) although a limited number of reduced VAT rates still exists in a few Member States, mainly on heating gas oil.

Total taxation share in the end-consumer price is illustrated by the next EU map which highlights, for motor fuels (Euro-super 95 and diesel oil), the situation in the different Member States at the end of September 2010.

MAP 1
TOTAL TAXATION SHARE IN THE END CONSUMER PRICE OF EURO-SUPER 95 AND DIESEL OIL



3.1.5. Evolution of EU oil production and demand

3.1.5.1. Oil production developments at world level, in the EU and in Norway

Global oil production fell in 2009 by 1.5 million bbl/d which is more than the decline in consumption of approximately 1.3 million bbl/d that same year. This decline in production was primarily the consequence of OPEC's supply management during the year. OPEC made three successive production cuts in late 2008, in response to the sharp drop in oil prices; those cuts remained in effect throughout 2009.

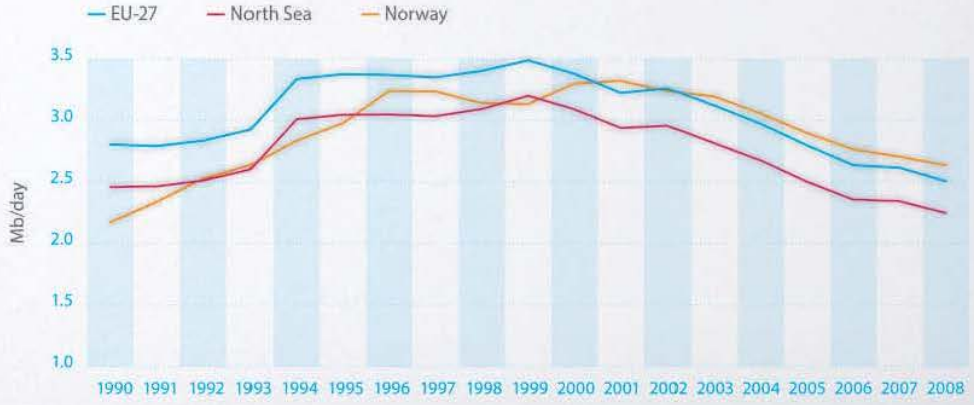
OPEC production fell by 2.3 million bbl/d in 2009 of which Saudi Arabia made up nearly 1 million bbl/d. Production outside OPEC increased, notably in the US by around half a million bbl/d (the strongest increase since 1970), led by offshore production in the Gulf of Mexico. Russia managed to increase further its oil production in 2009 compared to the previous year (+0.1 million bbl/d) and overtook Saudi Arabia with its 9.9 million bbl daily production (which latter produced 9.8 million bbl per day).

In the EU, on the basis of Eurostat cumulated monthly data, crude oil production declined by about 6 % in 2009 and is estimated at around 2 million b/d which represents about 2.4 % of world oil production. This decrease can mainly be attributed to the decline in North Sea production (the United Kingdom, Denmark, and the Netherlands) which represents some 80 % of total EU production.

Norwegian oil production, one of the main EU crude oil supply sources, fell by 3 % in 2009, representing half of the EU North Sea production fall (in percentage terms).

FIGURE 43

EU-27 AND NORWAY AND NORTH SEA, CRUDE OIL PRODUCTION (in Mb/day) (1990-2008)



Source: Eurostat (2010)

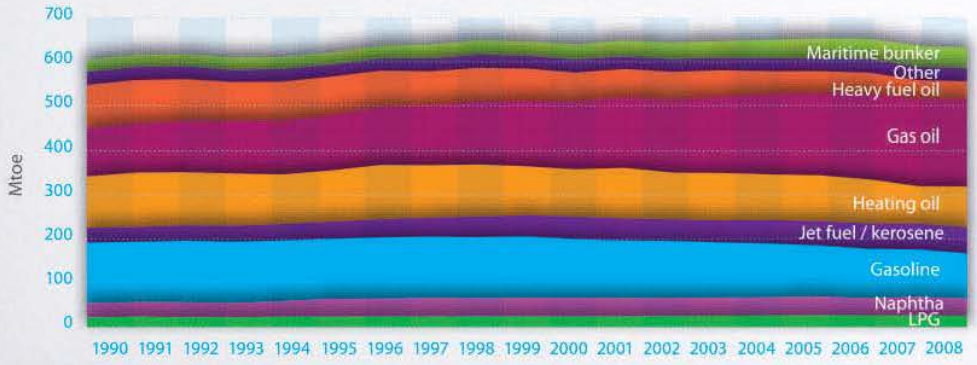
3.1.5.2. Evolution of oil consumption in the EU

It is widely considered that the EU petroleum product market is a mature market which has more than likely already hit its peak. On top of long-lasting effects of the global financial and economic crisis, EU regulations to tighten fuel specifications, reduce emissions from refineries and cars as well as to provide support for the development of non-fossil fuel vehicles point towards a future of diminishing demand for petroleum-based products. The demand for certain products, in particular middle distillates such as jet fuel and diesel fuel, including marine gas oil, is however expected to continue to grow in the years to come. On the other hand, gasoline demand in the EU is widely expected to fall further.

Between 1990 and 2008, the evolution of EU demand in individual petroleum products reveals very different trends: jet fuel & kerosene consumption almost doubled; consumption in diesel fuel registered a steady and sustained growth; demand for naphtha registered an initial increase and then a fall; demand for gasoline and heating oil fell quite sharply, while demand for residual fuel oil fell significantly. This decline in heating oil and residual fuel oil is partly due to the penetration of natural gas in the households and industrial sectors.

FIGURE 44

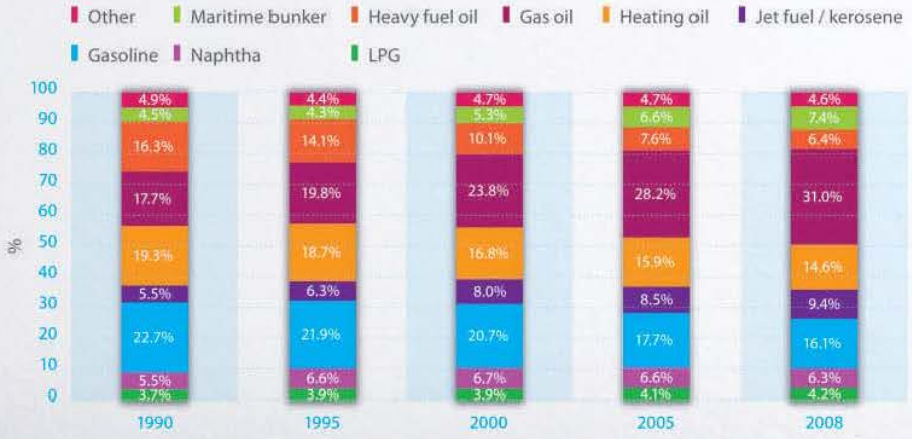
EU-27, PETROLEUM PRODUCTS DEMAND EVOLUTION (in Mtoe) (1990-2008)



Source: Eurostat (2010)

FIGURE 45

EU-27, PETROLEUM PRODUCT DEMAND MIX (in %) (1990-2008)



Source: Eurostat (2010)

According to Eurostat cumulated monthly data, EU gross inland oil consumption fell by 4.5 % in 2009 versus 2008 due to the recession, reaching a level of 610 Mtoe or about 12.2 Mb/d, equivalent to 15 % of world oil consumption. The main petroleum products registered a decrease: 2 % for gasoline, 6.3 % for jet fuel & kerosene, 4.7 % for gas/diesel oil and 6.7 % for residual fuel oil. The share of these main petroleum products in 2009 EU total inland deliveries was as follows: gasoline: 16.8 %, jet fuel & kerosene: 9.6 %, gas/diesel oil: 48 % and residual fuel oil: 5.6 %.

Regarding road fuel demand in the EU, it can be seen from the graph below that diesel oil has registered continuous growth between 1990 and 2009, whereas gasoline demand was flat between 1990 and 1999 and then it fell subsequently by about 25 % between 1999 and 2009. This is probably related to favourable taxation conditions of diesel oil compared to that of gasoline.

FIGURE 46

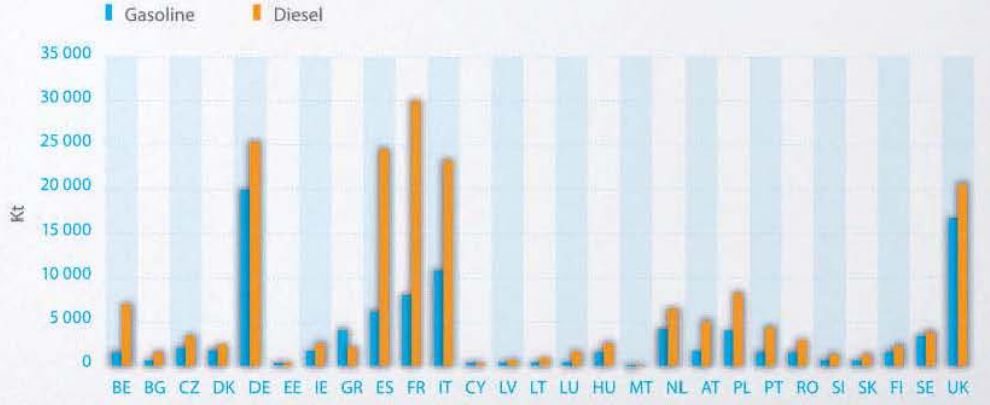
EU-27, EVOLUTION OF ROAD FUEL DEMAND (in Mt) (1990-2008)

Source: Eurostat (2010)

As can be seen from the graph below, more road diesel fuel was consumed in 2009 than gasoline in all EU countries with the exceptions of Greece and Cyprus.

FIGURE 47

EU-27, ROAD FUEL DEMAND BY MEMBER STATES (in Kt) (2009)



Source: Eurostat (2010)

With regard to biofuels, biodiesel remained by far the main biofuel produced and marketed in the EU in 2009 with an output of 9 million tonnes versus approximately 1.5 million tonnes of biogasoline. The EU remained the leading biodiesel-producing region worldwide, representing about 65 % of global output.

The share of biofuels in total final consumption of petrol and diesel oil for transportation purposes has been progressing in the EU over recent years to reach a level of around 3.7 % in 2009. The Renewable Energy Directive[23] is creating a strong framework for the development of the biofuels industry in the EU, with the landmark decision to introduce a 10 % binding target in 2020 for renewable energy use in transport. In addition, biofuels could provide a genuine solution not only to reduce greenhouse gas (GHG) emissions but also to alleviate the increasing EU diesel deficit.

(23) COM 2009/28/EC.

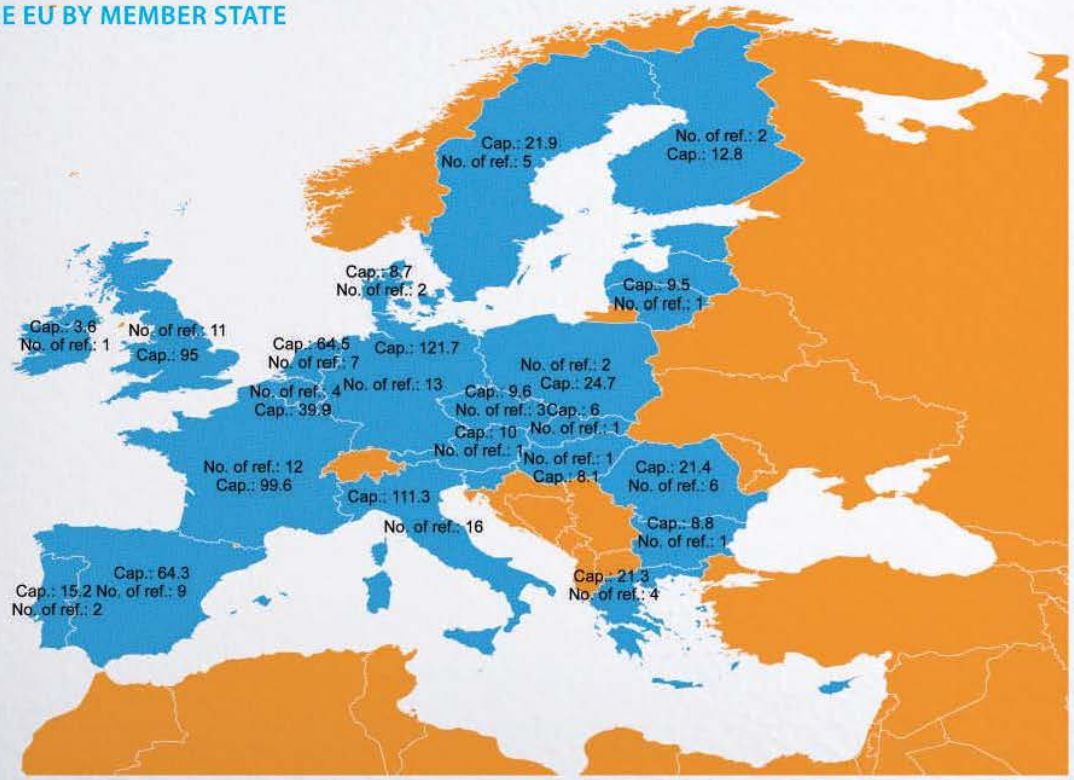
3.1.6. Refining sector developments in the EU[24]

The EU nominal refining capacity (atmospheric distillation) currently represents 778 million tonnes (15.5 million barrels per day), equivalent to 18% of total global capacity. This EU capacity level has been fairly stable over the past decade. However, the refining capacity in service in the EU is currently noticeably below the nominal capacity.

In May 2010, there were around 104 refineries operating in the EU with at least one plant in all EU countries with the exceptions of Cyprus, Estonia, Latvia, Luxembourg, Malta and Slovenia.

MAP 2

NUMBER OF OPERATING REFINERIES AND REFINERY CAPACITY IN MILLION TONNES IN THE EU BY MEMBER STATE



Source: European Commission

While EU nominal refining capacity is more than sufficient to cover total EU gross consumption (inland consumption + bunkers) which amounted to around 660 Mtoe in 2009, (i.e. 85% of the nominal refining capacity), the quantities of crude oil and other feed-stocks processed in the EU refineries amounted to 660 Mt in 2009 as against 709 Mt in 2008[25]. Lower crude runs, due to falling demand for petroleum products in 2009, in conjunction with stable nominal refining capacities, have pushed down EU level refinery utilisation rates to below 80%, representing a continued increase in unused capacity.

Refining margins also fell to very low (in some instances even negative) levels in 2009, both for simple and complex plants.

And while total refinery production capacity is well in excess of total gross consumption in the EU, the situation is quite different at the level of individual products. There have been growing production/consumption imbalances notably for gasoline and middle distillates (kerosene/jet fuels and gas/diesel oil) in the EU in recent years. In particular, the rapid shift of motor fuel demand from gasoline to diesel oil *(see Figure 45 - evolution of road fuel demand)* – the latter favoured by the taxation policy in place in most EU countries as already highlighted – has resulted in a growing production deficit for gas/diesel oil and surplus for gasoline at the EU level.

These growing imbalances have led the EU to become more and more dependent on trade in order to balance out supply

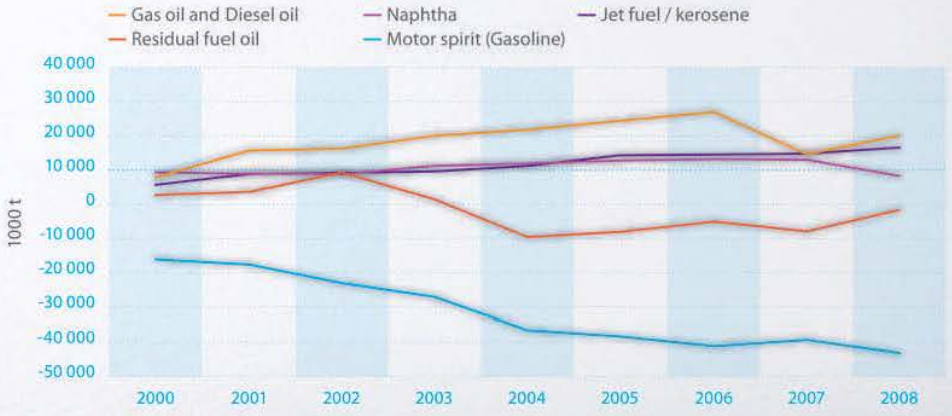
(24) It is worth noting here that more information can be found on the EU refinery sector in the COMMISSION STAFF WORKING PAPER ON REFINING AND THE SUPPLY OF PETROLEUM PRODUCTS IN THE EU published on 17 November 2010.

(25) Eurostat cumulated monthly data.

and demand. The gas/diesel oil deficit is covered to a large extent by imports from Russia (35 % of gasoil/diesel imports in 2008) while a large proportion of the excess gasoline is exported to the USA (37 % in 2008). When compared to EU gross consumption (inland consumption + bunkers), the deficit of the EU refinery production amounted to 7 % in 2008 for gas/diesel oil and to 20 % for kerosenes and jet fuels. If the middle distillates are considered as a whole (gas/diesel oil + kerosenes & jet fuels), then the deficit reached 10 % of the EU gross consumption in 2008, causing an amount of net imports of some 36 Mt. For the same year, gasoline production surpassed consumption by 43 Mt or 40 %.

FIGURE 48

EU-27, EVOLUTION OF NET IMPORTS/EXPORTS IN KEY PETROLEUM PRODUCTS (in 1000 t) (2000-2008)



Source: Eurostat

Should EU demand for middle distillates continue to grow (which is generally expected) and should the current structure of EU refining remain unchanged, the EU's import deficit in middle distillates will tend to extend further. This is not only a problem for the EU, in terms of growing import dependency for such products, but also for the EU refining industry for disposing of growing gasoline excess to other markets, which is not obvious given expected future developments in world demand for gasoline and diesel oil. In the US, for instance, it is widely predicted that gasoline consumption would tend to significantly decrease in the years to come.

Overall crude quality evolution and, in particular, falling North Sea crude production, might also impact the EU refining industry in the future. North Sea crude production (from Norway, UK and Denmark) fell from 6.4 to 4.3 million barrels per day between 2000 and 2008. Over the same period, the supplies to Europe of heavier, sourer/more sulphurous crude oils, from Russia and Africa have been growing. The result has been an increase in the proportion of heavy and sulphurous crude oils coming into EU refineries as well as a higher dependency on oil imports from third-party countries which represented 80 % of EU crude refinery intake in 2008 against 75 % in 2000.

The impact on the EU refining industry of lighter crude being replaced by heavier crude has varied according to region, with North-Western European (NWE) refineries being especially concerned. Conversely, in Central Europe, refineries are often located on the Druzhba pipeline, and the great majority of their intake is Urals crude. In the Mediterranean area, the larger proportion is Arabian Gulf, which is again heavier than Urals crude, with similar API but higher sulphur content, followed by Urals crude.

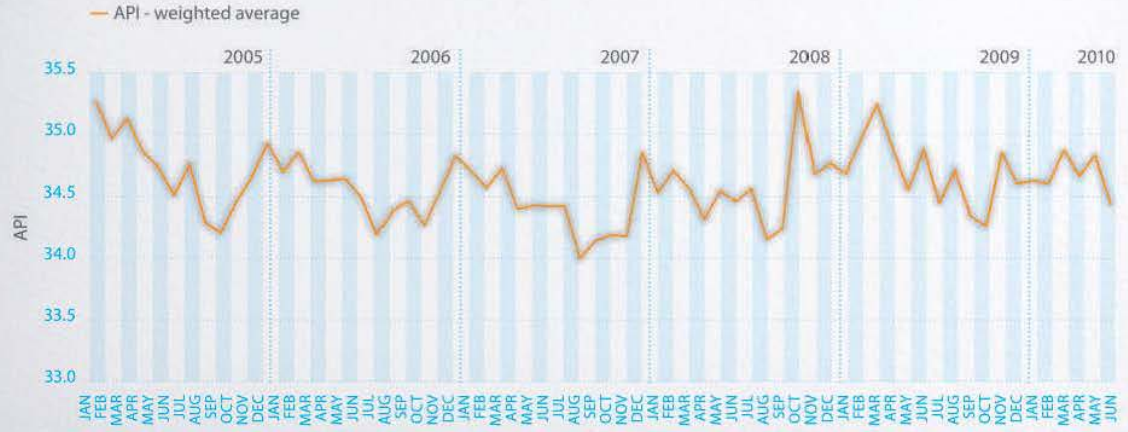
Falling productions of North Sea crude in an environment of growing demand for lighter distillates represents a major concern for the NWE refining industry. Lighter crude oils such as North Sea crude produce a higher share of more valuable, light products (such as naphtha and gasoline) that can be recovered with simple distillation, while heavier crude oils produce a greater share of lower-valued products (such as fuel oil) with simple distillation and therefore require additional processing to produce higher value products.

The quality of crude oil thus dictates the level of processing and re-processing to achieve the optimal mix of product output, with a trend towards heavier and more sulphurous crude oils leading to a more complex and costlier refining process, such as via the use of deep conversion and/or desulphurisation units, also leading to higher CO_2 emissions.

Progressively, it is expected that NWE crude intake from the Urals, Africa, the Caspian region and the Middle East will gradually come to represent growing proportions. This trend may become a key challenge for refiners mainly in the NWE region, pushing them towards investments for the adaptation of their plants in order to refine the changing flow of crude.

FIGURE 49

EU-27, EVOLUTION OF REFINERY CRUDE INTAKE QUALITY (in API – weighted average) (1/2005-5/2010)



Source: European Commission (2010)

3.1.7. EU crude oil and petroleum products imports and exports in 2009

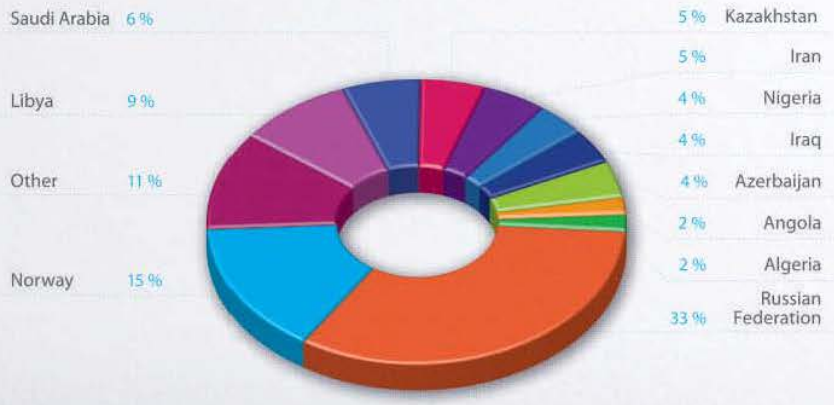
EU Member States import crude oil (and feed-stocks) from a large number of third-party countries. Thirty-two countries of origin were identified in 2009. Among them, Russia was the main supplier with a share of 33 % of the crude imported by the EU, followed by Norway (15 %) and Libya (9 %). Three other countries: Iran, Kazakhstan and Saudi Arabia, have a share between 5 and 7 % and the remaining twenty-seven countries have a share below 5 %.

By geographical zone, the Former Soviet Union has a share of 42 % of the crude imported by EU Member States followed by Africa (22 %), non-EU Europe (18 %), Middle East (15 %) and Americas (3 %).

In 2009, OPEC countries represented 38 % of the EU crude oil imports from third-party countries.

FIGURE 50

EU-27, IMPORTS OF CRUDE OIL FROM THIRD-PARTY COUNTRIES (in %) (2009)



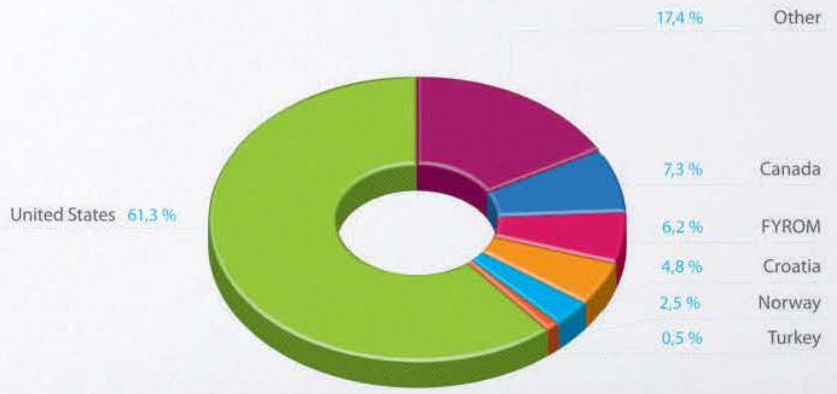
Total = 532.8 Mt

Source: Eurostat (2010, monthly aggregated data)

EU crude oil exports to third-party countries represented about 16 % of the EU crude oil production in 2009, with the United States being the recipient of 62 % of the total, nearly exclusively from the UK.

FIGURE 51

EU-27, EXPORTS OF CRUDE OIL TO THIRD-PARTY COUNTRIES (in %) (2009)



Total = 16 Mt

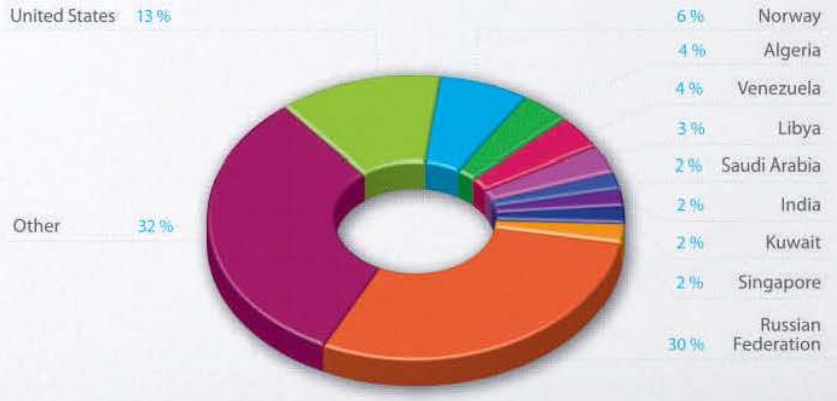
Source: Eurostat (2010, monthly aggregated data)

As was the case for crude oil, Russia was the largest supplier of petroleum products (mainly gas/diesel oil and residual fuel oil) to the EU with a 30 % share in 2009. The United States was the second largest supplier (mainly because of petroleum coke), with a 13 % share.

In 2009, OPEC countries represented 19 % of the total petroleum products imports from third-party countries to the EU.

FIGURE 52

EU-27, IMPORTS OF PETROLEUM PRODUCTS FROM THIRD-PARTY COUNTRIES (in %) (2009)



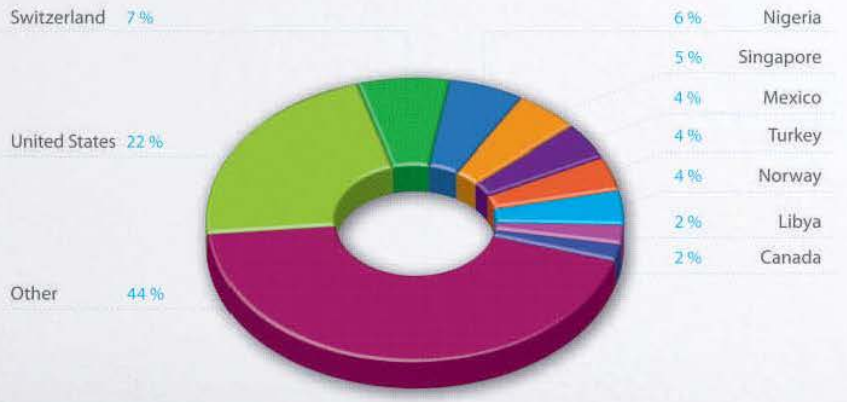
Total = 127.4 Mt

Source: Eurostat (2010, monthly aggregated data)

Again, as for crude oil, in 2009 the United States was the largest recipient of EU petroleum products exports (22 %), mainly constituted of gasoline accounting for 70 % of the EU petroleum products exports to the US.

FIGURE 53

EU-27, EXPORTS OF PETROLEUM PRODUCTS TO THIRD-PARTY COUNTRIES (in %) (2009)



Total = 113.3 Mt

Source: Eurostat (2010, monthly aggregated data)

3.2. Market developments in the gas sector of the EU

The 18 months covering 2009 and the first half of 2010 were an eventful period for the European gas sector. As other industries, the gas industry was operating in a context of difficult economic conditions. According to *Eurostat*, in Q1 2009 the EU economy registered a 2.5 % decrease with respect to Q4 2008, recording a fourth consecutive quarter of negative growth. That tendency persisted until mid 2009 when the GDP of the EU started to recover slowly for the remainder of the observed period. Gas suppliers, shippers and consumers found that their traditional relations were affected by the consequences of the economic slowdown.

The start and the end of the observed period were marked by gas disputes which took place outside of the EU but nevertheless affected EU consumers. Whereas the June 2010 gas dispute between the Russian Federation and Belarus had an insignificant impact on consumers, the gas crisis between the Russian Federation and Ukraine resulted in a complete halt of supply through the Ukrainian transit routes with an estimated economic impact of almost € 1.6 billion for the EU[26]. For a couple of weeks in January 2009 a number of Member States from Eastern and Central Europe had no choice but to cut consumers from the grid in a period of colder-than-normal meteorological conditions. The situation was somewhat alleviated by the decreased amount of industrial demand resulting from the economic slowdown.

As a result, the Commission was prompted into action. One part of this action was the involvement, with the help of the European gas industry, in the resolution of the dispute of 2009 and the resumption of gas flows, including reverse flows where that was technically possible. Another aspect of the action was the launching of the European Energy Programme for Recovery (EEPR), designed especially to finance projects helping to enhance the interconnectivity of gas systems of the EU Member States. The European Commission sidelined € 1.39 billion towards a number of gas infrastructure projects as part of its € 3.98 billion stimulus package of investment in energy-related projects in 2009 and 2010[27].

The Commission also strengthened the legal framework on security of gas supply in the EU in December 2010[28]. The focus lies on prevention and crisis management in the internal energy market and it ensures that in case of a crisis gas supplies are guaranteed to protected customers, in particular to households. The Regulation requires all Member States to take effective action well in advance to prevent and mitigate the consequences of potential disruptions to gas supplies by establishing national preventive and emergency plans. It establishes infrastructure and supply standards aiming to provide incentives for investment in infrastructure necessary for security of supply in the internal energy market. At the EU level, the Regulation supports regional cooperation and strengthens the role of the Gas Coordination Group as a mechanism for Member States and industry to work together to deal effectively with any major gas disruptions which might arise.

The construction of a reliable, transparent and interconnected energy market in the EU is the cornerstone put in place to deal with a variety of complex issues, including security of supply. The third legislative package in the domain of energy policy was adopted in 2009. It includes Regulations and

(26) According to preliminary results from DG ENER and the Gas Coordination Group.

(27) More on information on the EEPR can be found here: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2010:0191:FIN:EN:PDF

(28) Regulation No 994/2010 of the European Parliament and of the Council of 20 October 2010 concerning measures to safeguard security of gas supply and repealing Council Directive 2004/67/EC entered into force on 2 December 2010: http://eur-lex.europa.eu/JOHtml.do?uri=OJ:L:2010:295:SOM:EN:HTML

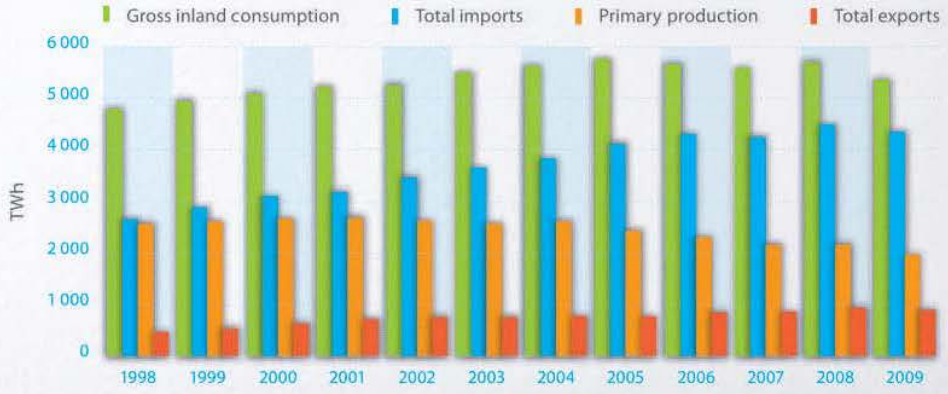
Directives of the European Parliament and of the Council aiming to ensure that all European citizens can take advantage of the numerous benefits provided by a truly competitive energy market.

With regard to gas market developments, the decline in EU domestic production of natural gas outpaced the reduction of gross inland consumption as more and more production fields were entering into post-peak phase. For example, between 2005 and 2009, consumption fell by 7 % whereas domestic production decreased by 19 %. The EU's annual gas balance continued to deteriorate slowly as total imports rose steadily. In that five year period the part of total imports covered on average 76.5 % of the gross inland consumption of natural gas in the EU.

The consequences of the recent recession were apparent on the recorded volumes for gross inland consumption and imports in 2009. Whereas both registered a fall of 6 % and 3 % with respect to the corresponding 2008 levels, the general trend of increasing reliance on external supply sources was confirmed.

FIGURE 54

AMOUNTS OF NATURAL GAS IN THE EU (in TWh) (1998-2009)



Source: Eurostat Energy Statistics

Note: Data for 2009 are based on provisional monthly balances for production, consumption, imports, exports and changes of stocks.

According to *Eurostat* data, EU gas imports amounted to 347.5 bcm in 2008, the most important trading partners being the Russian Federation (38.8 %), Norway (28.5 %) and Algeria (14.3 %). The combined part of Nigeria, Libya, Qatar, Egypt and Trinidad & Tobago was less than 12 %.

The EU's import dependency[29] increased from 48 % in 2000, to 58 % in 2005, to 64 % in 2009. Import dependency is increasing in most of the Member States. For the period covering 2007-2009 some of the more notable evolutions took place in the UK[30] and Bulgaria[31].

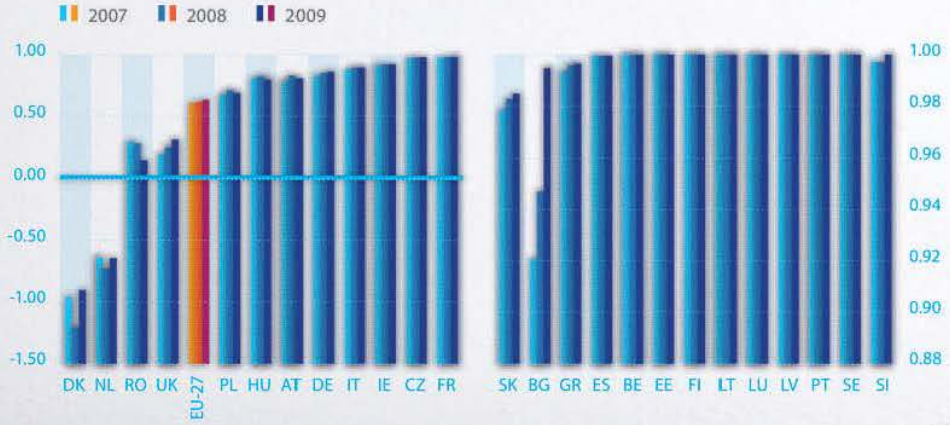
(29) Import dependency is defined by Eurostat as the ratio of net imports to the sum of gross inland consumption and the change in storage levels. Data for 2009 is based on provisional monthly balances for production, consumption, imports, exports and changes of stocks. Source: Eurostat Energy Statistics.

(30) The import dependency rose from 0.20 to 0.31 resulting from an increase of imports (+32 %) and fall in production (18 %).

(31) The import dependency went from 0.92 to 0.99 as a consequence of a significant reduction of domestic production which outpaced the fall of imports and consumption (respectively 25 %and 30 %) resulting from the gas crisis in January 2009. According to Eurostat data the year-on-year production fell by 95.3 % as the offshore Galata gas field was depleted and is now being converted into a gas storage facility.

FIGURE 55

EU-27, NATURAL GAS IMPORT DEPENDENCY BY MEMBER STATE (2007-2009)

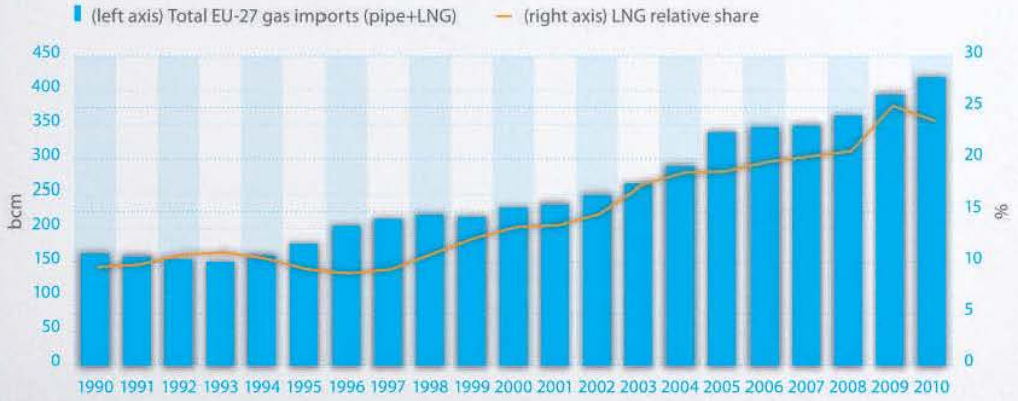


Source: Eurostat

As the volume of imported gas into the EU is gradually increasing, Member States are trying to diversify the supply sources and routes as much as possible. The next graph illustrates that tendency. In the last 20 years, the relative part of liquefied natural gas (LNG) deliveries in the total volume of imported natural gas in the EU rose from 10 % to 25 % before registering a small decrease in the first half of 2010.

FIGURE 56

EU-27, IMPORTS OF NATURAL GAS (in bcm, %) (1990-2010)



Source: Gas Strategies

Note: The 2010 values are indicative, based on data for the first six months of the year.

The number of EU trading partners in the domain of LNG is growing with supplies coming from Norway, Qatar, Algeria, Libya, Egypt, Nigeria, Equatorial Guinea, Trinidad and Tobago, Oman, Malaysia, Australia, the United Arab Emirates and recently Yemen. Some of these partners have committed significant upstream investment in order to increase their production capacity and the number of liquefaction facilities.

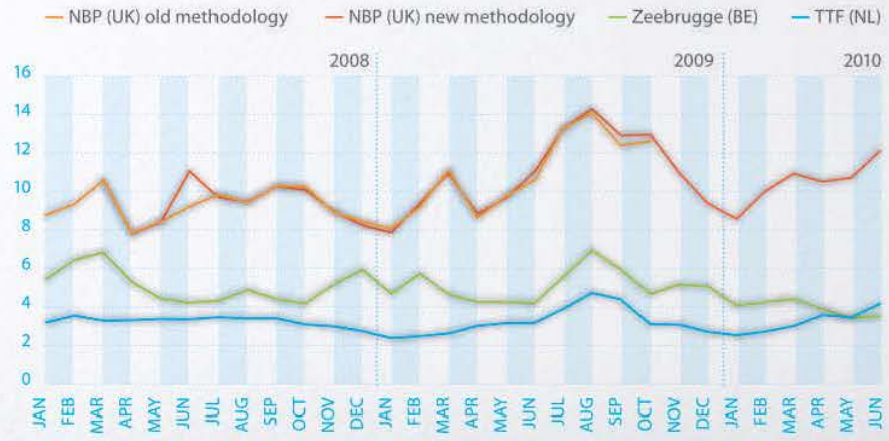
The number of LNG entry points in the EU is growing as well with new regasification plants coming on stream in France (Fos Cavaou), Italy (Adriatic LNG), UK (Dragon LNG, South Hook Phase I and II).

3.2.1. Wholesale markets

Between January 2009 and June 2010, market participants continued to exchange volumes of natural gas on the European hubs. While new trading places emerged in Central Europe[32] and the German venues were in the process of consolidation[33], the traditional hubs in North Western Europe – NBP (UK), TTF (the Netherlands) and Zeebrugge (Belgium) remained the most active trading places.

FIGURE 57

BE, NL, UK, MONTHLY CHURN RATES (1/2008-6/2010)



Sources: Huberator (BE); Gas Transport Services (NL); National Grid (UK); © Platts

Note: The definition of the UK churn rate was modified as from November 2009. Following a change in the volume categories reported by National Grid, the new churn formula uses daily nominations instead of throughput.

For those three hubs, the relative part of the combined day-ahead turnover with respect to gross inland consumption in Belgium, the Netherlands and the UK rose from 66.3 % in the first half of 2008 to 92.1 % in the first half of 2010, the most traded market being the *National Balancing Point* in the UK. Throughout 2009 and the first half of 2010, the ratio of traded volume (cleared through the exchange clearing houses) to the volume of gas physically delivered on the hub (known as the churn rate), remained in the historical ranges for Zeebrugge and TTF while it increased for the NBP. For this market, a new pattern is emerging with the churn increasing during the storage filling season in the summer.

Market participants continued to trade actively despite the difficult conditions and the decreased volumes of industrial demand during the economic slowdown. The stable levels of the churn and the rising part of the day-ahead turnover in the gross inland consumption demonstrates the confidence which participants have in the pricing signals from the market on which they are basing their economic decision-making.

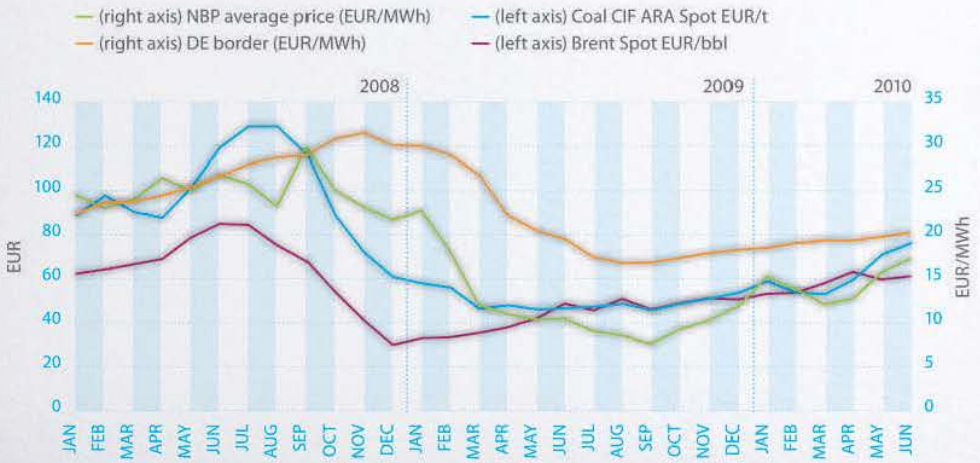
Spot markets

European spot prices for natural gas experienced three different phases in the period covering 2008 to 2010. Until the autumn of 2008, energy prices were increasing, fuelled by a steady growth of demand, especially in South Eastern Asia. In that period, the month-ahead Brent price rose to $ 147 / bbl and the coal CIF ARA contract reached € 130 / mt. At the same time, the average monthly price for natural gas on the NBP reached € 29.42 / MWh.

(32) The Central European Gas Hub (CEGH) in Baumgarten, Austria.
(33) NetConnect Germany and Gaspool.

FIGURE 58

PRICES OF COMPETITIVE FUELS AND THE PRICE OF GAS (in EUR and EUR/MWh) (1/2008-6/2010)



Sources: © Platts (Brent, coal, NBP); BAFA (DE border)

As the financial fallout triggered by the financial crisis in the second part of 2008 was spreading to the real economy, prices of energy commodities went through a significant correction. In a couple of months they lost roughly half of their value.

After a low point was reached at the beginning of 2009, prices of coal, oil and gas started to grow again as the world economy was embarking on a slow recovery.

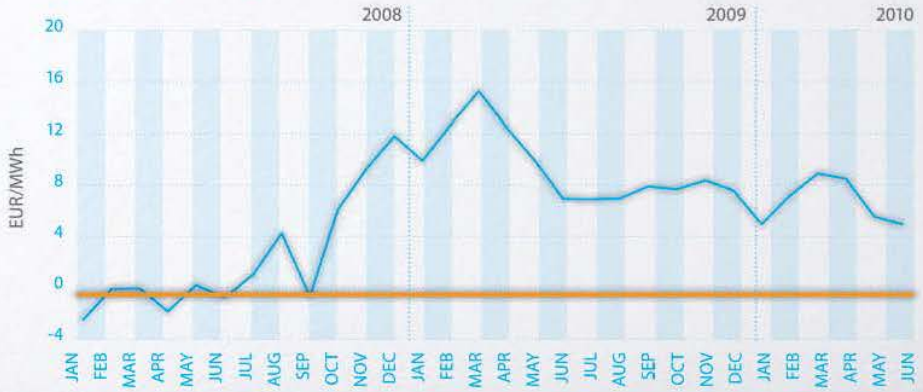
During the observed period, spot gas prices in Europe were reacting to specific supply and demand conditions on the different markets. In general, market participants in Austria, France, Germany, Belgium, the Netherlands and the UK were taking on arbitrage opportunities, adjusting utilisation rates of interconnection points whenever a short term premium emerged with commercial flows increasing from a low to high price area. More detailed information on developments in the EU markets for natural gas can be found in the *Quarterly Reports on European Gas Markets (QREGaM)*[34].

Prices of gas delivered under long term contractual obligations[35] had a similar evolution to spot prices traded on European hubs. Gas prices under long term contracts (LTC) are indexed with respect to the price of crude oil or refined products, lagged by several months. This could explain the reason why LTC prices were also lagging those of the spot gas. The next graph shows the evolution of the price differential of gas delivered under LTC or on the spot. Because of the lagged parameters used in the pricing formula, the LTC gas price was at its highest value in Q4 2008 and Q1 2009. At the same time, spot prices were falling in reaction to strong demand contraction and stable supply conditions. This development prompted the emergence of a significant margin between the two pricing approaches. While spot and LTC gas were priced at similar levels in the first half of 2008, spot gas became much more competitive in the following months.

(34) Publicly available at: http://ec.europa.eu/energy/observatory/gas/gas_en.htm
(35) The long term gas prices are illustrated by the German border price in the graph above.

FIGURE 59

DIFFERENCE BETWEEN DELTA LTC PRICE AND ZEEBRUGGE SPOT PRICE (in EUR/MWh) (1/2008-6/2010)



Source: © Platts

Note: The Gas Contract Indicator (GCI) is used to represent the price of gas delivered under long-term contractual obligation in the North Western European region. The Zeebrugge hub in Belgium is used to represent the price of gas exchanged on the spot market.

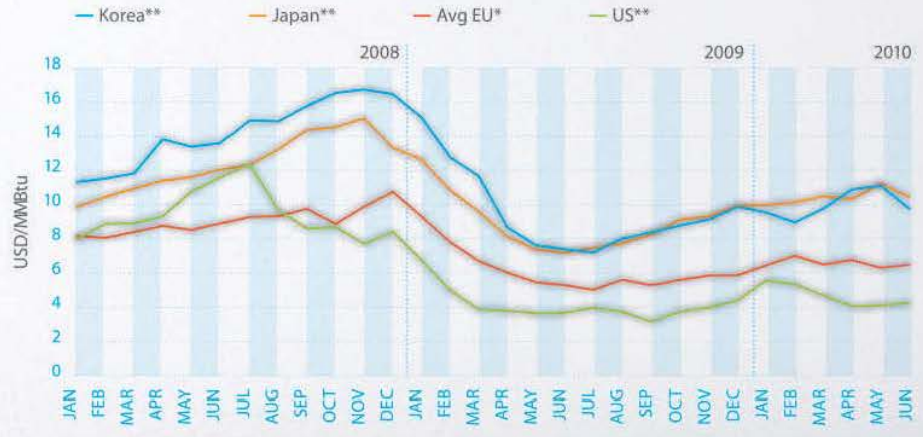
The price difference reached almost €16 / MWh in March 2009. By the end of June 2010, LTCs still exceeded spot prices by more than €4 / MWh. The persisting price differential led more and more European companies to look for a renegotiation of their LTCs, especially in the area of reducing the amount of take-or-pay (TOP) obligations.

LNG spot deliveries played an important role as a competitive source of gas pushing down spot prices. In 2009, the US outpaced the Russian Federation as the biggest producer of national gas, due to strong growth in production from unconventional gas sources. As the United States remained well supplied in gas[36], the EU emerged as the highest price area in the Atlantic basin. This also led to a gradual decoupling of the US Henry Hub price and European spot prices.

The large number of LNG cargoes that were attracted to the relatively high EU prices brought additional supply flexibility whenever there was more need for gas. This was for example the case in the winter months of 2009 and 2010 when colder than average temperatures in North Western Europe triggered a rise in the residential demand for heating.

FIGURE 60

LNG PRICES (in USD/MMBtu) (1/2008-6/2010)



*Sources: * Eurostat COMEXT; ** Gas Strategies*

*Note: * "Avg EU" is a weighted average price for monthly LNG deliveries in: Belgium, Portugal, Spain, UK, Italy (from January 2009) and France (from January 2010) as reported by Eurostat. ** The formula for calculating monthly prices in Japan, Korea and the US was modified in Q4 2009. Previously these prices were an average of prices charged by different suppliers. Starting from October 2009, the averages are weighted by the monthly LNG deliveries of each supplier.*

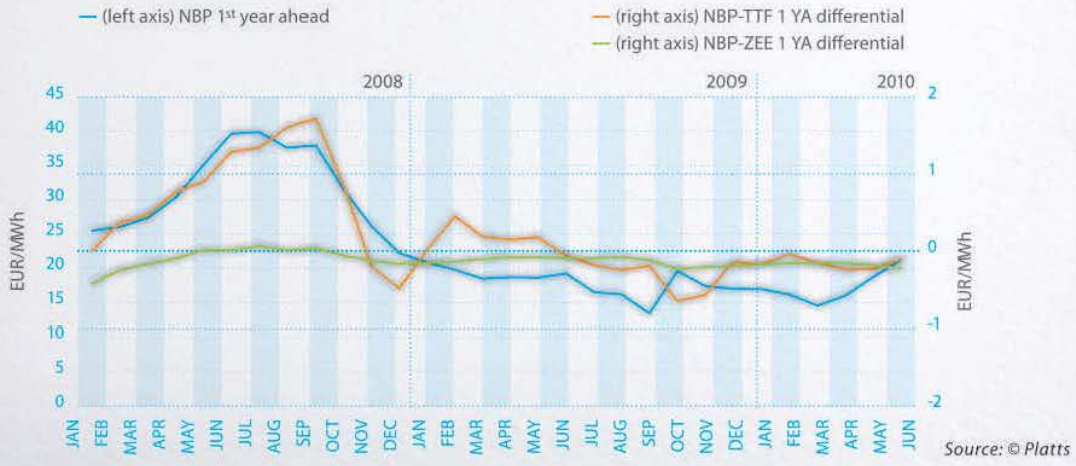
(36) The term "gas glut" has become common usage to describe actual global gas market conditions.

Forward markets

In mid-2008 the UK and Belgian year-ahead contracts were priced at a € 1.5 / MWh premium with respect to the Dutch hub. Later on, the three contracts were traded close to each other. Among the reasons for this evolution was the relatively quicker reaction of the TTF price to the fall in demand while market operators in Belgium and the UK were, at that time, more concerned about 2009 supply. As construction of the new LNG terminals was kept on schedule and deliveries of North Sea gas were stable, supply concerns dissipated quickly and the year-ahead contracts fell from € 40 / MWh in June 2008 to around € 15 / MWh in March 2010 and then increased again to € 20 / MWh in June 2010.

FIGURE 61

EUROPEAN 1ST YEAR FORWARD HUB PRICES (in EUR/MWh) (1/2008-6/2010)



3.2.2. Retail markets

The prices of gas, net of taxes, for the three household bands of *Eurostat*[37] were relatively close to the average EU levels in the period from the first half of 2008 to the first half of 2010. The price ratio of the Member States with the highest and lowest price level was 5.05 for the most modest group of consumers (band D1), while the corresponding values for groups D2 and D3 were 3.14 and 2.85 respectively. Excepting Romania, a Member State whose domestic production allows low prices to be set for retail household and industrial users, end user prices appeared even closer to the EU average[38].

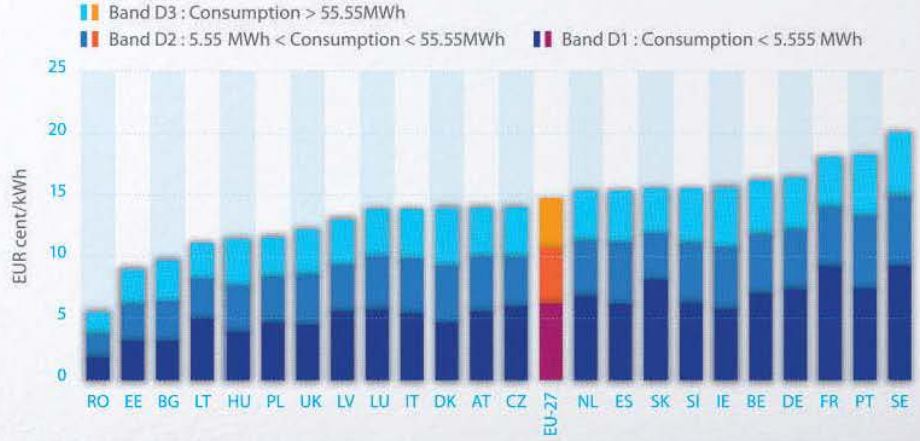
When measured in eurocents per kWh, 7 out of the 8 Member States with the lowest average prices for household customers were still New Member States. Only the UK posted similar price levels. However, if the price is measured in purchasing power parity standards, these countries tend to move up the price ranking order.

Concerning the smallest consumption band D1, Danish and Irish prices appeared relatively cheaper than what would be suggested by the position of these Member States in the overall ranking. Likewise, French and Slovak consumers from bands D2 and D3 seemed to enjoy relatively low prices.

((37) See Figure 61 above.
(38) The corresponding values for bands D1, D2 and D3 become 2.92, 1.98 and 1.91 respectively.

FIGURE 62

AVERAGE HOUSEHOLD NATURAL GAS PRICES (WITHOUT TAXES) FOR THREE EUROSTAT ANNUAL CONSUMPTION BANDS (in EUR cent/kWh) (1ST half of 2008 – 1ST half of 2010)



Source: Eurostat Energy Statistics

Note: Data for Cyprus, Greece, Malta and Finland are missing. EU average data for the first semester of 2010 are preliminary. As of the time of drafting of the report, data were still missing for Denmark, Hungary and Spain.

Similar to the results shown in the previous Annual Report[39], the dispersion of industrial gas prices, net of taxes, around the EU average was even less pronounced. The highest-to-cheapest price ratios were 1.52, 1.62, 1.61 and 1.48 for the four reported bands of industrial consumers starting from the smaller (in terms of consumption volumes) consumers.

For Member States with functioning retail markets this result may suggest that industrial consumers were priced against competitors with similar profiles from other Member States. Likewise, it seems that where retail prices were still regulated, industrial users were paying according to an oil-indexed formula. The use of a similar pricing mechanism produced a harmonisation effect across consumption bands and across Member States.

FIGURE 63

AVERAGE INDUSTRIAL PRICES FOR NATURAL GAS (WITHOUT TAXES) FOR FOUR EUROSTAT ANNUAL CONSUMPTION BANDS (in EUR cent/kWh) (1ST half of 2008 – 1ST half of 2010)

Source: Eurostat Energy Statistics

Note: Data for Cyprus, Greece, Malta and Austria is missing. Finland reports price data on industrial bands 3 and 4, but not on industrial bands 1 and 2. EU average data for the first semester of 2010 is preliminary. As of the time of drafting of the report, data was still missing for Denmark, France, Italy and Hungary.

(39) http://ec.europa.eu/energy/observatory/annual_reports/annual_reports_en.htm

During the observed period some Member States continued to regulate retail prices of natural gas for groups of industrial and household consumers. Cross subsidisation across consumer groups distorts prices and is usually detrimental for competition. The Commission considers these practices as very negative as they are not in line with internal market principles. It has already started a number of infringement procedures.

3.3. Market developments in the electricity sector of the EU

The gradual integration of EU wholesale electricity markets continued throughout 2009 and the first half of 2010. Several important developments for the functioning of a single electricity market took place during the observed period.

The third legislative package in the domain of the EU energy policy was approved by the European Parliament and the Council in July 2009. It establishes two institutions which will have a central role in the design of the single European market for electricity.

One institution is the *European Network of Transmission System Operators for Electricity* (ENSO-E)[40]. ENSO-E became fully operational in July 2009, regrouping 42 TSOs from 34 states and replacing all existing European associations of Transmission System Operators (TSO). Its main role is to ensure optimal management of the electricity transmission network and to facilitate the trade and supply of electricity across borders in the EU. The first ENTSO-E 10-year network development plan was delivered in 2010.

The other institution is the Agency for the Cooperation of Energy Regulators (ACER)[41]. From March 2011 ACER will become fully operational and will play a key role in the EU electricity and natural gas markets. Its competences include, among others, a participation in the preparation of European network rules and taking decisions on conditions for access and security of cross border infrastructure. The Agency will coordinate the work of National Regulatory Authorities (NRAs) and will give advice on various energy related issues to the European institutions.

The Commission also started work on a new initiative for the integrity and transparency of traded energy markets. A formal public consultation was launched in May 2010 concerning the information on demand and supply data, the monitoring on traded markets and transactional data requirements, the applicability of existing market abuse regulations to address market integrity issues on the energy markets and the enforcement of market conduct rules.

Alongside these developments, stakeholders in the EU electricity markets worked in close cooperation in the framework of the different Regional Initiatives. *Box 4* illustrates the activities related to linking the Central Western and the Nordic regions.

(40) Regulation (EC) No 714 / 2009 on conditions for access to the network for cross-border exchanges established the structure and functions of ENSO-E.
(41) Established via Regulation (EC) No 713 / 2009.

BOX 4

THE COUPLING OF THE CENTRAL WESTERN AND NORDIC REGIONS

Day-ahead market coupling and continuous cross-border intra-day platforms were identified by market participants as priority areas of work to promote market integration. The experience of two of the most advanced regions, CWE and the Nordic regions, demonstrates that good co-operation involving all stakeholders (regulators, TSOs and power exchanges) is essential to achieve these goals.

After initial difficulties, the market coupling project[42] on the Danish – German border started normal operation in November 2009. Since the introduction of the Baltic cable connecting Sweden and Germany in May 2010, the market coupling has covered all the interconnections between the Nordic market and Germany.

Likewise, the Trilateral Market Coupling of the French, the Belgian and the Dutch markets was extended in November 2010 to include Luxembourg, Germany and Austria forming the Central Western European Market (CWE).

At a later step, the CWE and Nordic regions will be linked through volume coupling, based on the Nordic-German coupling, providing implicit allocation of available capacities between the CWE and the Nordic region.

BOX 5 describes the evolution of the main aggregates for electricity, together with real GDP growth in the EU. According to *Eurostat* data, electricity gross inland consumption was stable at around 3250 TWh / year for the period covering 2005-2008. In the aftermath of the economic slowdown, consumption decreased by more than 4 % in 2009, much in line with EU real GDP growth.

Another important development was the steady decrease in the combined volumes of exports and imports in the EU. From 2005 to 2009 the sum of exports and imports fell from 628.7 TWh / year to 553.68 TWh / year[43].

BOX 5

YEAR-ON-YEAR CHANGE (%) IN THE EU MAIN ELECTRICITY INDICATORS AND THE REAL GDP GROWTH

	2006	2007	2008	2009
Gross inland consumption of electricity	0.78	-0.11	0.20	-4.61
Total gross electricity generation	1.04	-0.28	0.03	-4.68
Total imports of electricity	-3.34	1.03	-4.60	-4.52
Total exports of electricity	-0.69	-0.76	-6.57	-5.34
Real GDP	3.2	3	0.5	-4.2

Source: Eurostat

(42) Run by the European Market Coupling Company, a joint venture of Nord Pool Spot, European Energy Exchange (EEX), 50Hertz Transmission GmbH (formerly Vattenfall Europe Transmission), Transpower Stromübertragungs Gmbh (formerly E.ON Netz) and Energinet.dk.
(43) The corresponding values for 2006, 2007 and 2008 were 615.9, 616.8 and 582.4 TWh / year.

A number of factors could explain such a decrease.

Such an occurrence may appear counterintuitive parallel to opening the EU wholesale markets and enhancing commercial exchanges across the border. However, two elements could at least partly explain such an evolution:

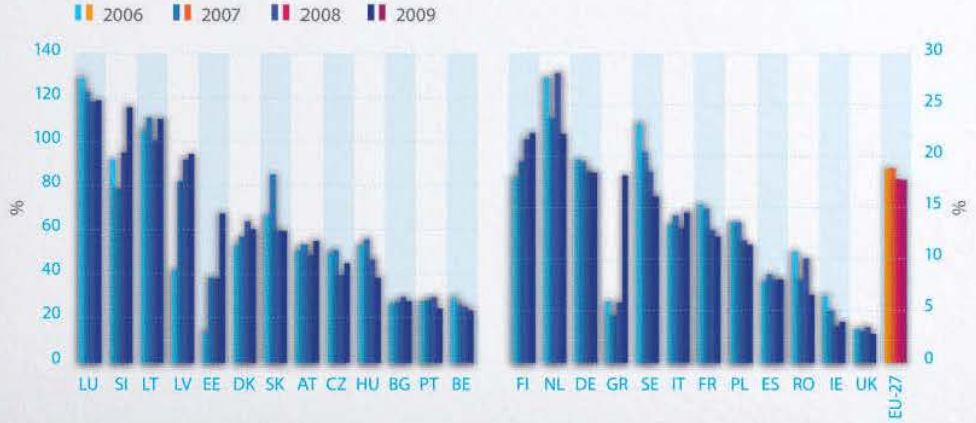
First, comparing 2008 to 2009 values, (i.e. pre- and in- recession data), it seems that the relative fall in exports and imports matched that of gross inland consumption[44]. It can therefore be argued that cross-border exchanges fell roughly as much as consumption. Weaker demand might also create conditions of well supplied markets where it is easier for domestic capacity to meet consumer requirements.

However, in the longer period of 2005-2009, consumption fell by less than 4 % whereas exports and imports decreased by 14.7 % and 12.4 % respectively, implying that there may be another factor explaining this evolution. According to preliminary results from the Market Observatory for Energy, this factor may be related to the gradual tendency of EU wholesale prices to align with each other. If such is the case, incentives to trade / exchange electricity across the border may be reduced.

Whatever may be the reason behind the recent decrease in EU exports and imports of electricity, the next graph shows that for the majority of Member States the amount of energy exchanged with neighbouring countries compared to consumption remains well above 10 %. Moreover, for a number of Member States like Slovenia, Finland and Greece, the relative part of external trade in the gross inland consumption of electricity is actually increasing. As a rule, the Member States which are most open to cross-border trade seem to be countries of modest size strategically positioned between big producing and consuming centres at the heart of the continent. The Baltic countries represent another interesting case. It seems that the closing down of Unit 2 of the Ignalina nuclear power plant in Lithuania increased exports and imports of electricity, especially in 2009.

FIGURE 64

TOTAL ELECTRICITY EXPORTS AND IMPORTS (as % of gross consumption) (2006-2009)



Source: Eurostat Energy Statistics; Data for Malta are missing

3.3.1. Wholesale markets

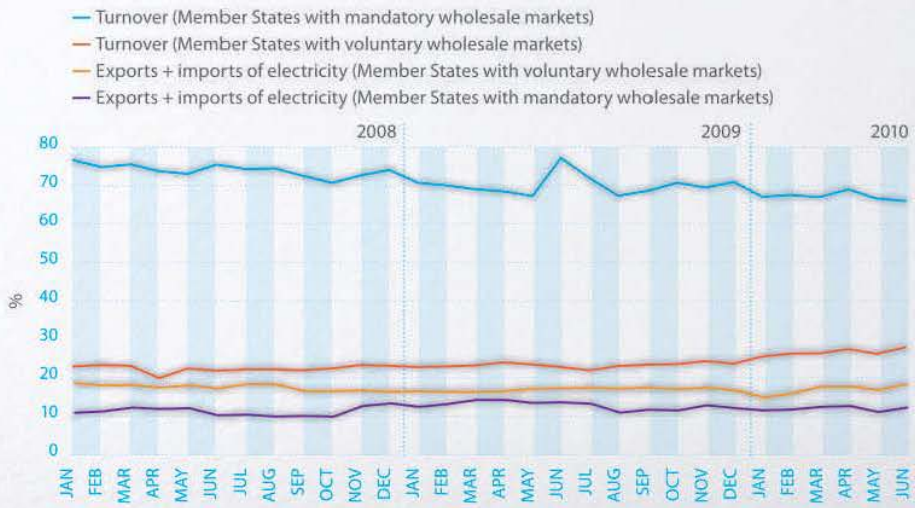
For the group of Member States with functioning wholesale markets[45], it seems that the countries with voluntary trading schemes[46] are relatively more open to cross border exchange of electricity than the countries with mandatory pools[47]. For the former, the cross border ratio for 2008 – 2010 was between 16 % and 19 %; for the latter it was in the 10 % – 13 % range. However, the amount of electricity exchanged across the border may be independent of the type of trading venue for the wholesale markets. It may have more to do with the fact that islands and peninsulas tend to be less connected to the mainland of the European continent and so the opportunities to exchange electricity are fewer.

While the relative part of external trade remained stable between 2008 and the first half of 2010, the day-ahead turnover of the organized electricity exchanges continued to increase.

(44) The corresponding vales for consumption, exports and imports are respectively -4.8 %, -5.6 % and -4.7 %.
(45) And for which data is available.
(46) Austria, Belgium, the Czech Republic, Denmark, Finland, France, Germany, the Netherlands, Poland, Romania, Slovakia, Sweden, United Kingdom and Norway.
(47) Greece, Italy, Portugal and Spain.

FIGURE 65

DAY-AHEAD TURNOVER AND THE SUM OF EXPORTS AND IMPORTS OF ELECTRICITY (as % of gross inland consumption) (1/2008-6/2010)



Sources: Eurostat; Platts; Operator trhu s elektrnou; Towarowa Gielda Energii S.A.; Operatul Pietei de Energie Electrica din Romania; Hellenic TSO. Reported Member States with voluntary wholesale markets include: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Netherlands, Poland, Romania, Slovakia, Sweden, United Kingdom and Norway. Reported Member States with mandatory wholesale markets include Greece, Italy, Portugal and Spain.

Regarding the subgroup of Member States with voluntary wholesale markets, the total traded volume on the day-ahead segment went from 270.72 TWh in the first half of 2008 to 314.30 TWh in the first half of 2010. The churn rate went from an average value of 0.22 in January 2008 to 0.28 in June 2010, representing a rise of almost a quarter within 30 months. While consumption of electricity was low in 2009, the strong performance of the churn suggests that the turnover of the exchanges remained robust despite the reduction in industrial demand for electricity.

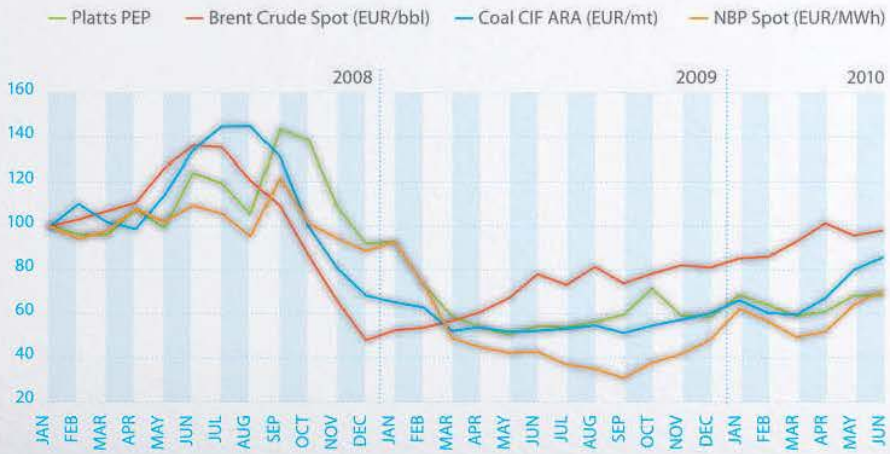
The subgroup of Member States with mandatory wholesale markets experienced a gradual decrease of the day-ahead turnover. For example, in the first half of 2010 the day-ahead total volume of the pool markets stood at 238.16 TWh, about 6 and 40 TWh less than in the corresponding periods of 2009 and 2008. Compared to gross inland consumption, the turnover represented 66 % in June 2010, about 10 % less than it did in January 2008.

Spot markets

Similar to the price evolution of other energy commodities in the period between January 2008 and June 2009, the electricity *Pan European Price* (PEP) index of *Platts* registered a three phase movement, including a steep rise and decline followed by a slow recovery. The scale of up and down movements was comparable across energy commodities.

FIGURE 66

SPOT PRICES OF ENERGY COMMODITIES (January 2008 = 100) (1/2008-6/2010)



Source: © Platts

Coal and crude oil were among the first commodities to peak in mid 2008, appreciating by about 35 % in 6 months. Crude oil was also among the first to level after the steep fall triggered by the financial crisis. In the second half of 2008 the Brent average monthly price fell from € 85.17 / bbl to € 30.13 / bbl, falling by a factor of 2.8. By the beginning of 2009 oil prices started to recover and in March 2010 they reached the levels recorded at the beginning of 2008.

The electricity spot price followed a path which was similar to that observed for natural gas, with a rise, fall and recovery lagging by several months with respect to oil and coal. Contrary to gas however, the electricity index peaked higher and was quicker to level off after the decline, both scale and time wise. Detailed information on price developments can be found in the *Quarterly Reports on European Electricity Markets* of the Market Observatory for Energy[48].

From January to September 2008, the average monthly PEP index rose by € 30, reaching € 95.83 / MWh while the NBP contract for natural gas appreciated from € 24.52 to € 29.84 / MWh. Later on, the PEP reached a low value of € 36.13 / MWh in June 2009 (-46 % with respect to the start of 2008) whereas the NBP spot was traded at € 7.61 / MWh in September, losing about 70 % of its January 2008 value. This development suggests that supply conditions were tighter and the demand recovered faster in the wholesale market for electricity than that for gas.

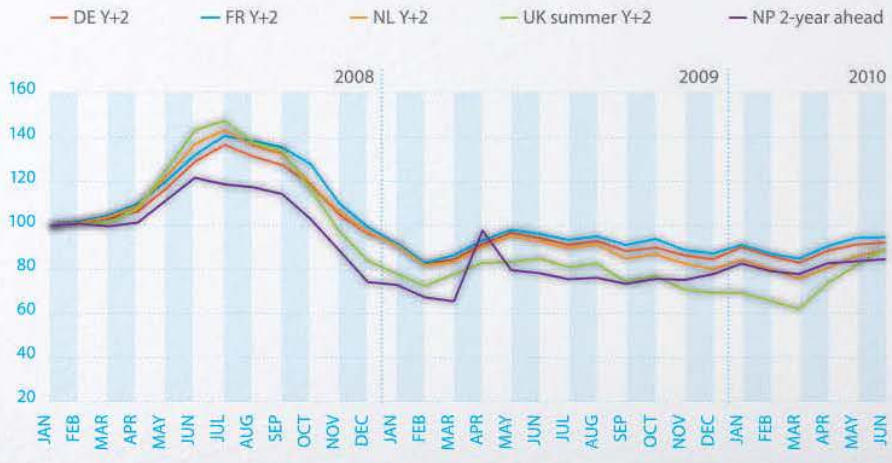
Financial markets

The volatility on the far end of the forward curves for EU electricity contracts was comparable but smaller than that observed for spot prices.

(48) Publicly available here: http://ec.europa.eu/energy/observatory/electricity/electricity_en.htm

FIGURE 67

MONTHLY AVERAGE PRICES FOR TWO-YEAR BASELOAD ELECTRICITY FORWARDS (January 2008 = 100) (1/2008-6/2010)



Source: © Platts

**Note: The yearly baseload contracts for Germany, France and Netherlands as well as the summer season contract for UK are roll-over calendar forwards. The baseload contract for the Nordpool region is a standard year ahead.*

Excepting the benchmarks for the UK and the Nordpool regions, the two year-ahead contracts appreciated much like the corresponding day-ahead contracts in the first part of 2008. Contrary to the spot prices, in the decline phase, the two year ahead forwards lost less than 20 % of their values from the start of 2008. By the end of June 2010 they were also closer to the January 2008 levels than spot prices.

In 2009 and 2010, forward prices remained mostly in contango[49], implying that market participants were more optimistic about future prospects of the EU electricity markets than the current post recession situation.

3.3.2. Retail markets

Average end consumer prices for industrial and household users increased during the observed period, reflecting with some lag the evolution of wholesale prices. Some of the exceptions to that rule were France and Ireland with lower domestic and industrial prices in the first half of 2010 than in the first half of 2008.

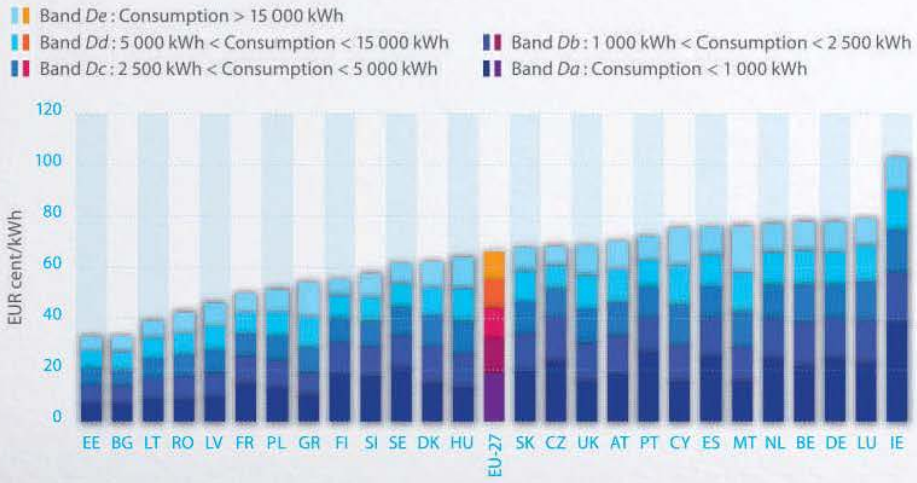
Household electricity prices, net of taxes, for the five reported consumption bands of *Eurostat* were quite dispersed across Member States. For example, an average consumer from the lowest consumption band *Da* paid an average price in the range of € 0,07 / kWh - € 0,39 / kWh for the period covering January 2008 to June 2010 depending on his or her country of residence.

The ratio of the lowest (Bulgaria) to highest (Ireland) price paid by a consumer from band *Da* stood at 5.7. For higher consumption bands the ratio of most expensive to cheapest price decreased, going from 2.9 and 2.5 for bands *Db* and *Dc* to 2.4 and 3.2 for bands *Dd* and *De*. The price dispersion was reinforced by the policies of some Member States to keep prices regulated for some industrial and household consumers.

(49) A situation of contango arises when the closer to maturity contract has a lower price than the contract which is longer to maturity on the forward curve.

FIGURE 68

AVERAGE HOUSEHOLD ELECTRICITY PRICES (WITHOUT TAXES) FOR FIVE EUROSTAT CONSUMPTION BANDS (in EUR cent/kWh) (1ST half of 2008 – 1ST half of 2010)



Source: Eurostat Energy Statistics

Note: Retail electricity price data (without taxes) for households is not available for Italy. EU average data for the first semester of 2010 is preliminary. As of the time of drafting of the report, data was still missing for Greece. Denmark. Hungary. Spain and Malta.

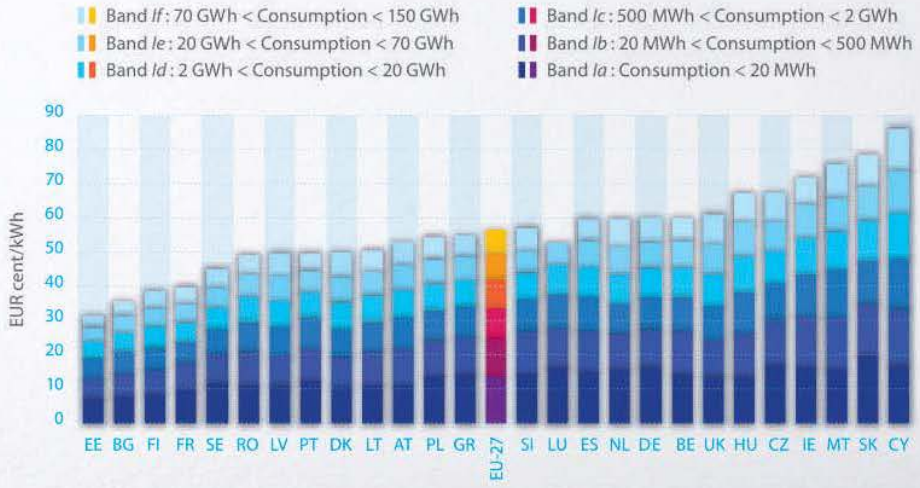
In the UK, retail consumers from the lowest band (band *Da*) paid relatively cheaper prices than what would be suggested by the overall position of that Member State. The same was also true for the biggest household consumers (band *De*) in the Czech Republic, Luxembourg, Finland and Belgium as well as for consumers from the middle bands (*Db*, *Dc* and Dd) in Portugal, Germany and Spain.

Seven of the ten countries with lowest prices for household consumers were New Member States. However, the ranking changes significantly if purchasing power parity standards are used instead of euros as a metric for the monetary unit. In that case, Member States from Eastern and Central Europe tend to move up in the ranking.

The price dispersion between cheap and expensive prices, net of taxes, for industrial electricity consumers covering the period from the start of 2008 until mid-2010, was in general smaller than the one observed for household prices.

FIGURE 69

AVERAGE INDUSTRIAL ELECTRICITY PRICES (WITHOUT TAXES) FOR SIX EUROSTAT CONSUMPTION BANDS (in EUR cent/kWh) (1ST half of 2008 – 1ST half of 2010)



Source: Eurostat Energy Statistics

Note: Retail electricity price data (without taxes) for industrial users are not available for Italy. Data for industrial users. Band "If" for Luxembourg is not available.

Industrial consumers from the lower consumption bands[50] were more closely distributed around the EU average than the big industrial users of electricity. For example, the most expensive to cheapest price ratio for consumers in band Ia and *Ib* were respectively 2.72 and 2.73. When it comes to bands *Ie* and *If*, the corresponding price ratios varied from 3.01 and 3.34. The reason for this development may be the fact that larger consumers in open and non-regulated retail markets may find it easier to switch suppliers, choosing from different competing offers.

Denmark and the UK were among the countries where industrial prices for low consumption bands were relatively cheaper when compared to the overall position of the respective Member State. Big industrial users in Slovenia were enjoying a similar situation.

(50) As defined in the Eurostat Energy Statistics database.

4. IMPORTANT ENERGY TRADE PARTNERS OF THE EU

This chapter of the 2009 annual report focused on those countries that play important role either as key suppliers to the EU (such as Russia, Norway, Algeria) or as important emerging supplier and transit counties (such as the Caspian Region and Central Asia, Turkey, Brazil) The current report continues to present the most important energy and economic features of some countries playing a major role in supply and trade of energy products with the EU. Four countries have been chosen to be presented briefly, namely the United States, Canada, Qatar and Libya.

The EU has different kinds of cooperation with these countries.

The cooperation between the USA and the EU in the energy domain is coordinated within the framework of the EU-US Energy Council, a bilateral energy dialogue, focusing on the questions of energy security, technologies and policies.

Energy cooperation between Canada and the EU takes place in the framework of EU-Canada High Level Cooperation and under the Euratom Agreement in areas of peaceful uses of atomic energy, enrichment, nuclear and fusion related scientific research.

A chapter on cooperation in energy matters has been included in the Free Trade Agreement (FTA) negotiations with Libya.

4.1. The United States of America

In 2008, the United States of America (USA) was the world's largest energy consuming country[51]. In that year the gross inland energy consumption of the USA was 2313 Mtoe (millions of tons of oil equivalent), compared to 1799 Mtoe for the EU.

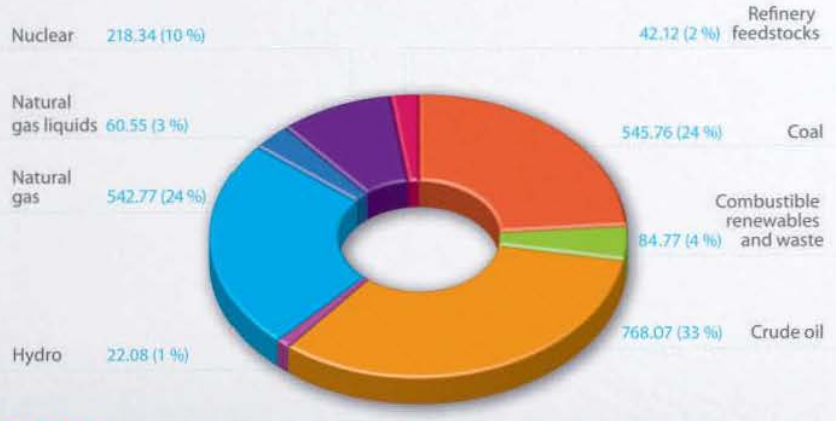
In 2008, 26 % of gross inland consumption was imported, amounting to 601 Mtoe[52].

84 % of the US's energy imports were crude oil and petroleum products while natural gas imports amounted to 13 % in 2009. The volume of energy exports of the USA was about one fourth of that of imports in 2009. It exports mainly petroleum products (53 %), coal (22 %) and natural gas (15 %).

As the next chart shows, the energy mix of the USA is predominantly based on the consumption of fossil fuels, making up 85 % of all energy consumption in 2008.

FIGURE 70

USA, GROSS INLAND CONSUMPTION OF ENERGY (in Mtoe, %) (2008)



Total = 2 312.84 Mtoe

Source: © OECD/IEA 2010

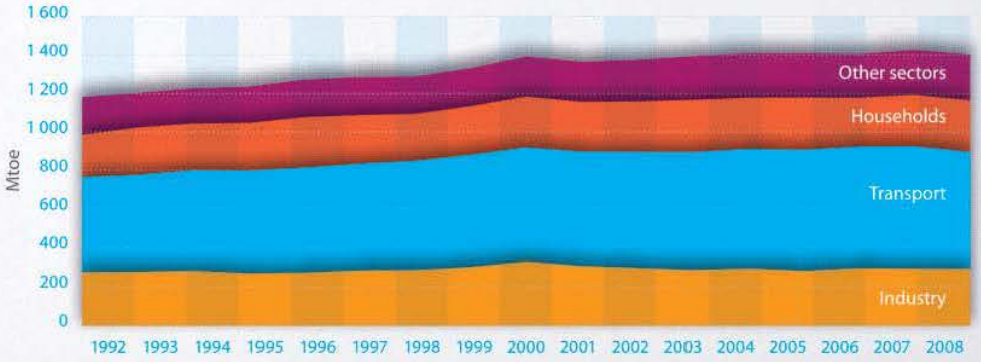
(51) It is worth mentioning that the IEA's World Energy Outlook 2010 suggests that according to preliminary data China overtook the US in energy consumption
(52) Source: US Energy Information Administration - EIA

Compared to the energy mix of the EU-27, solid fuels (namely coal) represented a higher share in the energy mix of the USA while the proportion of crude oil was less than in Europe. The importance of nuclear energy (10 %) or renewable energy sources (5 %) is less than in the EU-27 (13 % and 8 %, respectively). The share of coal was especially high in electricity generation (46 %) in 2008 in the US as opposed to that of the EU-27 (26.7 % in the same year).

During the last two decades, the final energy consumption of the USA experienced an almost permanently increasing trend, although in 2008 annual consumption was less than the preceding year. The largest fall in consumption occurred in the transport sector (-4.3 % compared to 2007) which might have been in conjunction with high fuel prices in 2008.

FIGURE 71

USA, FINAL ENERGY CONSUMPTION (in Mtoe) (1992-2008)

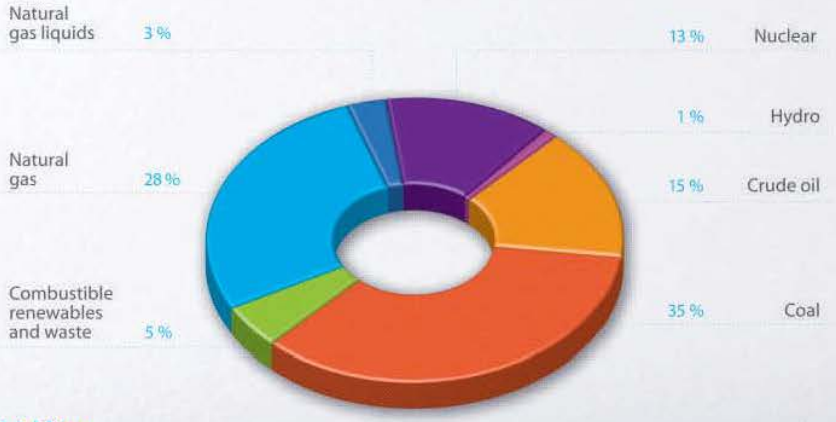


Source: © OECD/IEA 2010

As the chart showing total primary energy production reveals, the importance of coal in production is even higher than in gross inland consumption (while crude oil based energy consumption is heavily import-dependent, giving less importance to crude oil in production than in consumption).

FIGURE 72

USA, TOTAL PRIMARY ENERGY PRODUCTION (in Mtoe, %) (2008)



Total = 1 716.14 Mtoe

Source: © OECD/IEA 2010

Note: values under 1% are not presented.

The USA's more fossil fuel-dominated energy mix leads to higher greenhouse gas emissions: in 2007 the US emitted 19.1 Mt CO_2/capita compared to 9.0 Mt CO_2/capita in the EU.

Besides significant energy consumption and production the USA has huge reserves of energy. The country possesses 1.4 % of the world's proven crude oil reserves, ranking it twelfth in the world. Regarding natural gas reserves the US possesses the sixth largest reserve (proven or probable reserves, see figure 88) in the world, with 3.7 % of the global stocks and amounting to 6900 bcm at the end of 2008. If the 'technically recoverable' reserves are also taken into account, the total reserves amount to 48 Tcm of which more than 60 % is unconventional gas[53].

According to data of the Energy Information Administration (EIA) of the USA, in 2008 the country possessed the largest recoverable reserve of coal in the world (262.000 Mt or 28.7 % of the total world reserves).

Taking a look at production figures on the next chart, the USA was the second largest natural gas producer behind Russia in the world in 2008. As a consequence of decreasing Russian production and further increase in that of the USA the country became the number one natural gas producer in 2009. The country was the third largest oil producer in both 2008 and 2009.

FIGURE 73

USA, EVOLUTION OF OIL AND GAS PRODUCTION AND RESERVES (in Mbbl, bcm) (2006-2008)

OIL	2006	2007	2008
Annual production (Mbbl)	2 500	2 500	2 500
Production to date (Mbbl)	224 100	226 700	229 100
Reserves (proven and probable) (Mbbl)	29 400	30 500	28 400
GAS	**2006**	**2007**	**2008**
Annual production (bcm)	520	540	580
Production to date (bcm)	28 800	29 400	30 000
Reserves (proven and probable) (bcm)	6 000	6 700	6 900

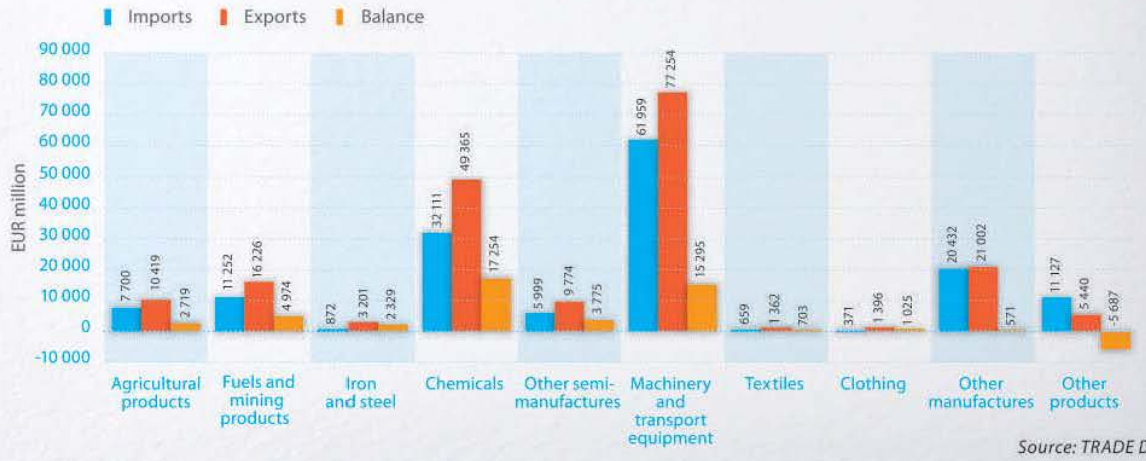
Source: © Petroconsultants SA (2010) (rounded values)

The United States is also an important energy trading partner for the EU-27. The import share of fuels and mining products from the US (€ 11.3 billion) was 7.1 % in 2009, the EU's exports of energy products (€ 16.2billion) that year accounted for 7.9 % of overall exports to the US.

(53) Source: US Energy Information Administration - EIA

FIGURE 74

EU, TRADE WITH UNITED STATES (in EUR million) (2009)



Source: TRADE DG

Taking a closer look at individual energy products, coal is the most traded energy product between the USA and the EU. According to IEA data, about 51 % of all hard coal exported from the US was shipped to the EU while more than 14 % of the EU-27's hard coal import originated from the US.

As mentioned previously, the country heavily depends on foreign crude oil sources and refined petroleum products also play a major role in its energy product exports. Looking at the country of origin import structure of oil products, the OPEC countries are the major suppliers of the USA (with a 42 % share in the overall import volume), followed by Canada, Mexico and Russia. The countries of the EU-27 had a minor share in 2009 (5.8 %).

FIGURE 75

USA, OIL AND OIL PRODUCT IMPORTS BY COUNTRY OF ORIGIN (in %) (2009)

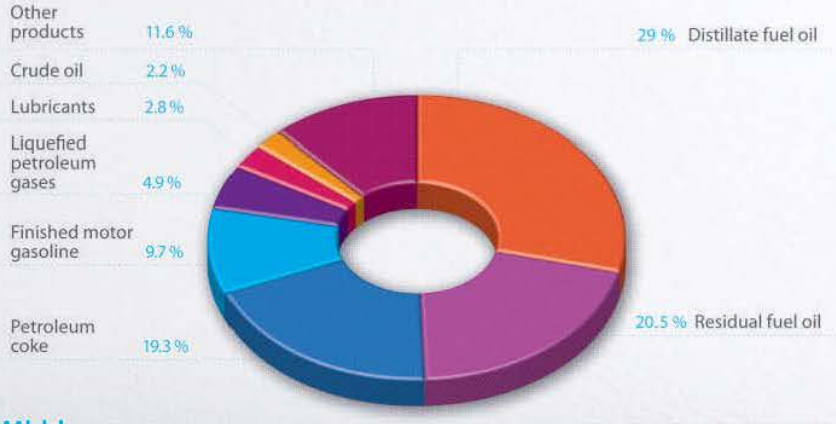
Total = 42 647.1 Mbbl

Source: US Energy Information Administration (EIA)

While the share of crude oil import was nearly 80 % within petroleum products in both 2008 and 2009, the structure of oil products exports show a completely different picture, with an almost negligible share of crude oil.

FIGURE 76

USA, OIL AND PETROLEUM PRODUCT EXPORTS (in %) (2009)



Total = 738.8 Mbbl

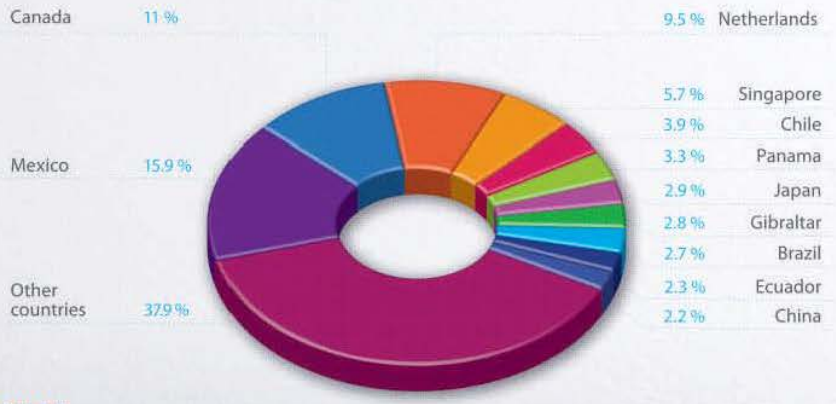
Source: US Energy Information Administration (EIA)

Refined products, such as distillate and residual fuel oil, petroleum coke and finished motor oil, dominated the exports of US petroleum products in 2009, while the share of crude oil was small (2.2 %).

In the case of crude oil imports, the USA primarily depends on OPEC member states. In contrast, the country's petroleum product export structure was more diversified, although Mexico and Canada are the two major trade partners, similarly to the case of crude oil imports.

FIGURE 77

USA, OIL AND PETROLEUM PRODUCT EXPORTS BY COUNTRY OF DESTINATION (in %) (2009)



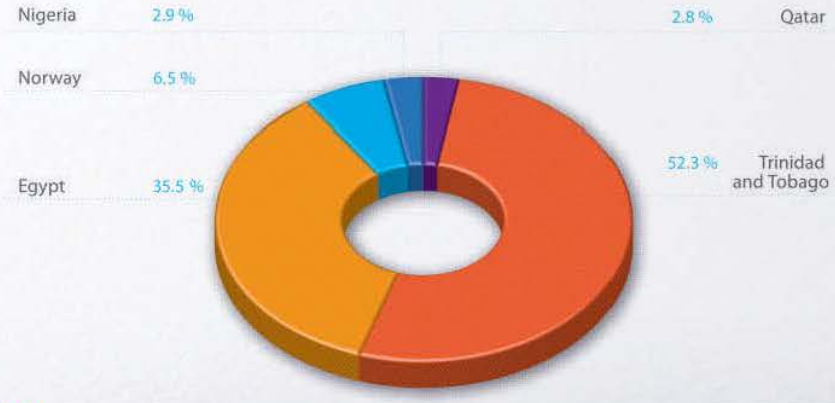
Total = 738.8 Mbbl

Source: US Energy Information Administration (EIA)

Almost all natural gas export (97 %) from the USA in 2009 was through pipelines to the two neighbouring countries (Canada and Mexico). The import of natural gas was also dominated by pipeline trade (with an 88 % share in 2009).

FIGURE 78

USA, LNG IMPORTS BY COUNTRY OF ORIGIN (in %) (2009)



Total = 12.8 bcm

Source: US Energy Information Administration (EIA)

The import sources of LNG shipped to the US show a duopolistic structure, with the two major players, Trinidad and Tobago and Egypt. Qatar, which is the world largest LNG producer country, played only a marginal role in US import supply.

Within US gas production the share of unconventional gas has been steadily growing during the last two decades. In the beginning of the 1990s its share was around 10-15 % and in the last two years (2008 and 2009) the proportion of unconventional gas reached almost 50 % of all US natural gas production.

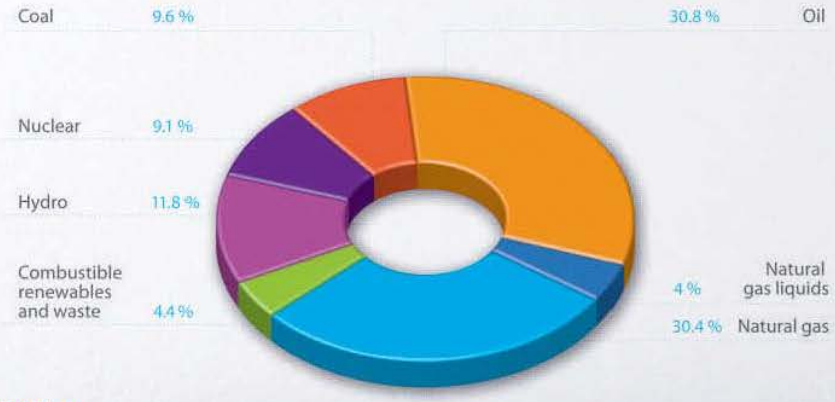
4.2. Canada

Energy-intensive activities make up an important part of the Canadian economy (e.g.: aluminium manufacturing, paper and pulp industries), with the result that Canada uses almost twice as much energy to produce one unit of GDP than the economies of the EU-27. This energy intensity can also be seen in gross inland energy consumption or electricity consumption per capita figures which are significantly higher than those of the EU-27 average (with values some 2.5 times the respective EU value). The carbon-dioxide emission per capita (Mt CO_2/per capita) value of the country was above 17.0 in the last couple of years, compared to 9.0 for the EU.

The country's energy mix in 2008 was dominated by oil and natural gas, each representing more than 30 % of gross inland energy consumption. Coal and nuclear fuels were of minor importance, although both fuels exceeded 9 % in the energy mix. Hydro power represented 12 % of consumption which is higher than the respective value of both the EU-27 and the US. Indeed, hydro power represented 59 % of electricity generation in 2008.

FIGURE 79

CANADA, GROSS INLAND CONSUMPTION (energy mix) (in Mtoe, %) (2008)



Total = 267.33 Mtoe

Source: © OECD / IEA 2010

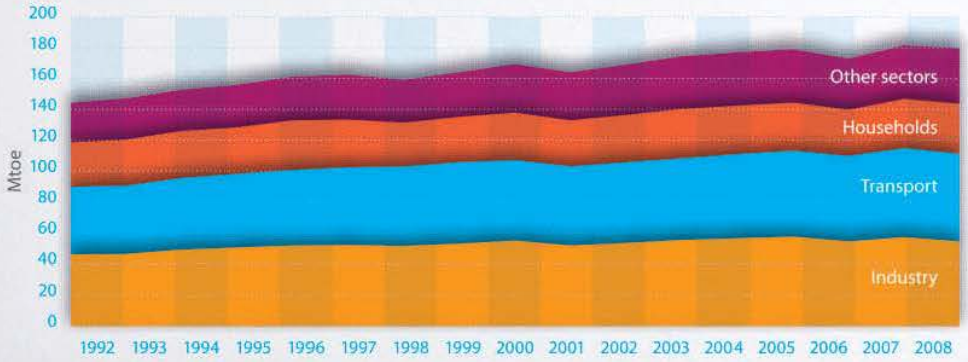
Note: values under 1% are not presented.

The importance of fossil fuels is much higher in the country's primary energy production than in that of the energy mix (89.4 % of total produced energy comes from fossil fuel resources whereas the share of fossils is only 74.7 %) which explains the country's strong net energy exporter position. In 2008, Canada exported more than 133 Mtoe of energy products.

The evolution of Canada's final energy consumption between 1992 and 2008 can be seen on the next chart. The change in the annual final consumption in 2008 (a 1 % decrease) was mainly driven by the fall in the industrial and transport sectors that made up more than 60 % of the country's final energy consumption in 2008. The relative importance of households in the final energy consumption slightly declined during this period while that of the other sectors slightly increased.

FIGURE 80

CANADA, FINAL ENERGY CONSUMPTION (in Mtoe) (1992-2008)

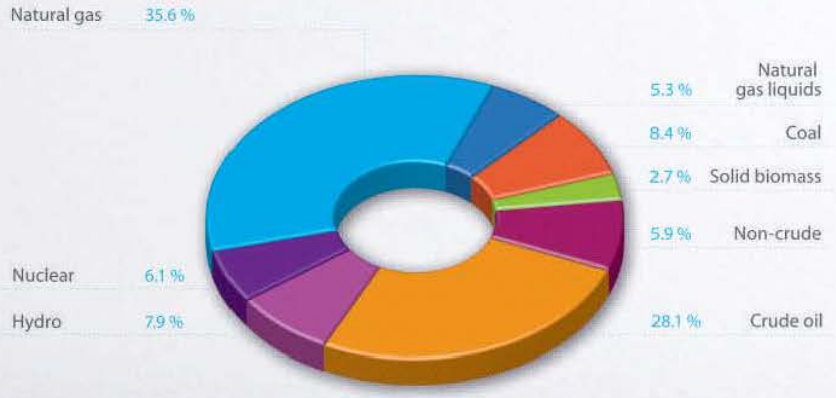


Source: © OECD/ IEA 2010

The vast majority (97-98 %) of Canada's fossil fuel exports are destined to the US, with which the country has very strong inter-linkages in energy markets. An example of this integrated nature is in terms of the electricity supply sources of the North-Eastern part of the US as the largest cities on the shore of the Atlantic are supplied by Canadian power sources.

FIGURE 81

CANADA, TOTAL PRIMARY ENERGY PRODUCTION (in Mtoe, %) (2008)



Total = 404.55 Mtoe

Source: US Energy Information Administration (EIA)

Note: values under 1% are not presented.

Canada's importance from an energy point of view mainly lies in its huge unconventional crude oil reserves. As of January 2009 the country's crude reserves amounted to 178 billion barrels, of which only 5 % is traditional crude oil, while the vast majority can be found in tar sand deposits. This ranks Canada second behind Saudi Arabia in the world in terms of crude oil reserves.

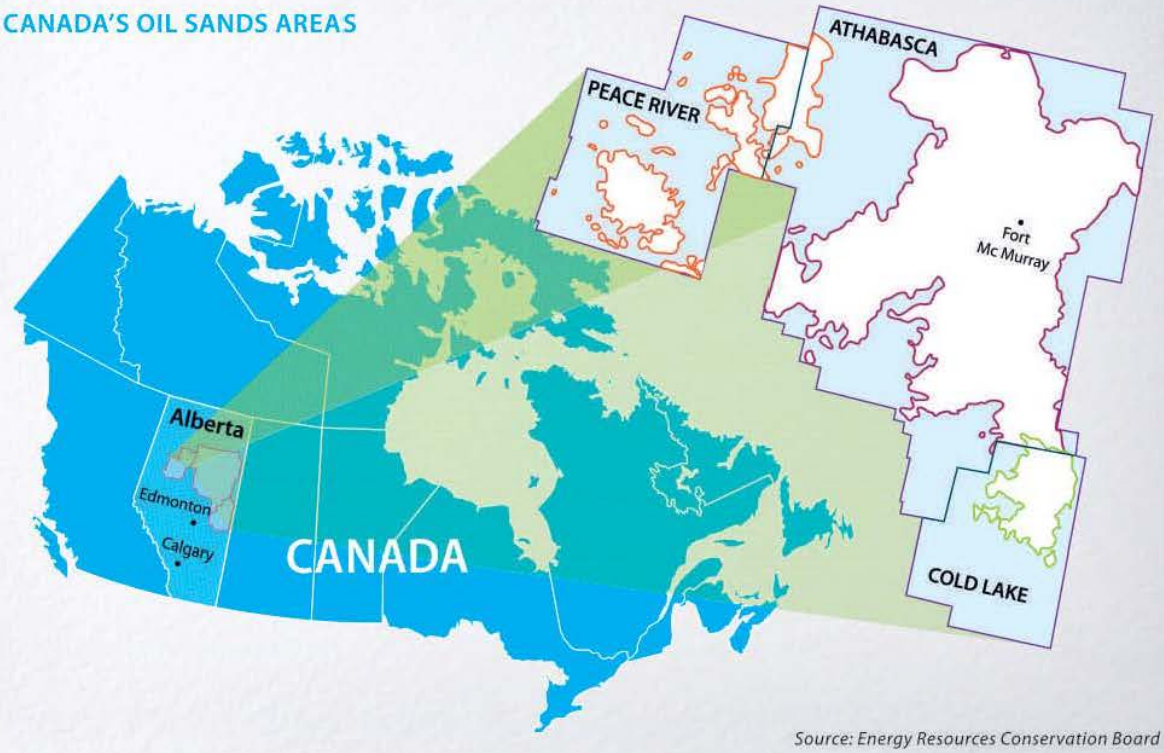
Most of the oil sands of Canada are located in three major deposits in northern Alberta. The Alberta deposits also contain at least 85 % of the world's total bitumen reserves. The largest bitumen deposit, containing about 80 % of Canada's bitumen deposits, and the only one suitable for surface mining, is the Athabasca Oil Sands.

Canada's oil production (including all liquids) was 3.22 million bbl/day in 2009. This is the sixth biggest daily production in the world (about one third of the value of top oil producer Russia). Canada's oil production has steadily risen over the past two decades (in 1990 it slightly exceeded 2 million barrels per day), as new oil sands and offshore projects have come on-stream to replace aging, mature fields.

In 2008, oil sands production represented approximately half of Canada's total crude oil production. The Athabasca oil sands deposit in northern Alberta is one of largest oil sands deposits in the world. There are also sizable oil sands deposits on Melville Island in the Canadian Arctic, and two smaller deposits in northern Alberta near Cold Lake and Peace River. Most of the oil sands development to date has focused on the Athabasca deposit.

MAP 3

CANADA'S OIL SANDS AREAS



Source: Energy Resources Conservation Board

Canada possessed around 1.750 billion cubic metres (bcm) of natural gas as of January 2010, which is less than 1 % of the world's proven reserves. However, its annual production was more than 170 bcm in 2008, amounting to 5.5 % of the world's production in 2008. The country uses about half of its indigenous production; the other half is exported, almost exclusively to the US. Similarly to oil production, the majority of gas extraction is concentrated in Alberta and in the Arctic regions, namely in the Valley of Mackenzie. The production of Liquefied Natural Gas (LNG) and unconventional gases such as shale gas was begun in the past decade, although the construction of most of the planned facilities is still in embryonic phase.

Coal and solid fuels play a less important role among fossil fuels in the energy mix of Canada; the relative importance of this fuel type in power production (16 % in 2008) is less than that of the EU-27 (21 %) and that of the US (46 %). Canada only possesses 0.8 % of the world's hard coal reserves and its consumption amounted to 1 % of the world total in 2008.

Although the share of nuclear fuel in Canadian power production (9 %) is relatively modest, Canada was the second largest uranium-producing country in the world in 2009, after Kazakhstan. Kazakhstan's world share of production amounted to 27.4 % in 2009, compared to 20.1 % for Canada. Canada's uranium production grew by 13 % in 2009, compared to 62 % in Kazakhstan, compared to 2008. Kazakhstan's rapid production growth was a key factor in taking Canada's number-one position, which was unrivalled until 2008.

FIGURE 82

NATURAL URANIUM PRODUCTION (in tonnes) (2008-2009)

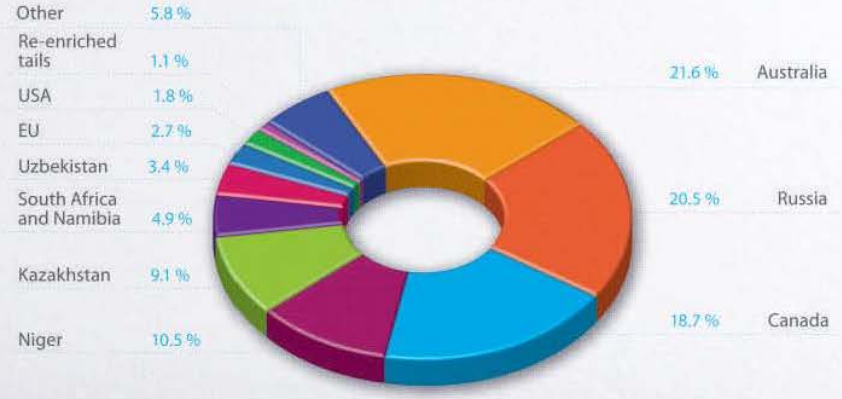
Natural uranium production in 2009 (compared with 2008, in tonnes of uranium)					
Region/Country	Production 2009 (tonnes)	Production 2008 (tonnes)	Share in 2009 (%)	Share in 2008 (%)	Change 2009/2008 (%)
Kazakhstan	14 020	8 521	27.61 %	19.43%	64.53 %
Canada	10 173	9 000	20.04 %	20.52%	13.03 %
Africa	8 536	8 053	16.81 %	18.36%	6.00 %
Australia	7 928	8 430	15.61 %	19.22%	-5.95 %
Russia	3 564	3 521	7.02 %	8.03%	1.22 %
Uzbekistan	2 429	2 338	4.78 %	5.33%	3.89 %
USA	1 453	1 430	2.86 %	3.26%	1.61 %
Other	2 669	2 560	5.26 %	5.84%	4.26 %
Total	50 772	43 853	100 %	100%	15.78 %

Source: WNA

Until 2008, Canada was the most important external uranium supplier of the EU's nuclear reactors until 2009 when Australia supplied 21.6 % of the EU's external uranium supplies, amounting to 3800 Natural Uranium (NatU), while Russia supplied 20.5 % (3599 NatU) and Canada supplied 18.7 %, or 3.286 tonnes of natural uranium. Beside these three countries Niger (10.5 %) Kazakhstan (9.1 %) and South Africa & Namibia (together: 4.9 %) could be deemed to be significant uranium suppliers to the EU in 2009.

FIGURE 83

ORIGINS OF URANIUM DELIVERED TO EU UTILITIES (in %) (2009)



Total = 17 591 tonnes of NatU

Source: Euratom Supply Agency Annual Report 2009

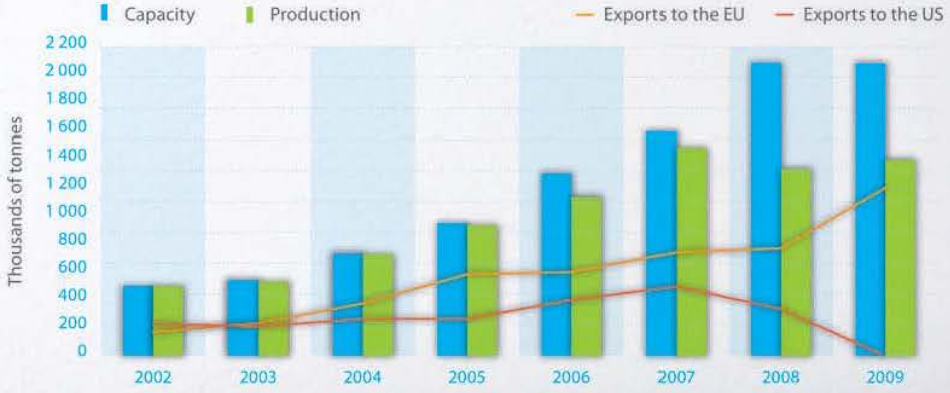
Canada is a significant supplier of wood pellets to the EU. In 2002, 46 % of Canadian pellet production was exported to the US and 34 % to Europe. By 2008, exports to the US doubled but only comprised 25 % of Canadian pellet production, while 58 % of the production went to Europe that same year, including the Netherlands, Sweden, Denmark, Belgium, Italy, Ireland and Germany.

By 2009 most of the pellet shipments were destined to Belgium, the UK and the Netherlands. In 2009, 1200 tonnes were shipped to the EU, satisfying about 15 % of the EU's pellet annual consumption (8 millions of tonnes).

Though plant capacity in Canada reached 2 million tonnes in 2009, production did not rise appreciably due to the lack of mill residues. In 2009, the impact of the Biomass Crop Assistance Program in the US provided US pellet producers with a $50/tonne cost advantage over Canadian plants. This advantage led to virtually zero Canadian exports to the US. The fall-out in exports to the US was compensated by boosting shipments to Europe that raised the export share of the EU market to 85 % in 2009. In 2009 as a new market approximately 100,000 tonnes of pellets were shipped to Japan.

FIGURE 84

TOTAL MANUFACTURING CAPACITY, ANNUAL PRODUCTION AND EXPORTS OF WOOD PELLETS FROM CANADA (in thousands of tonnes) (2002-2009)

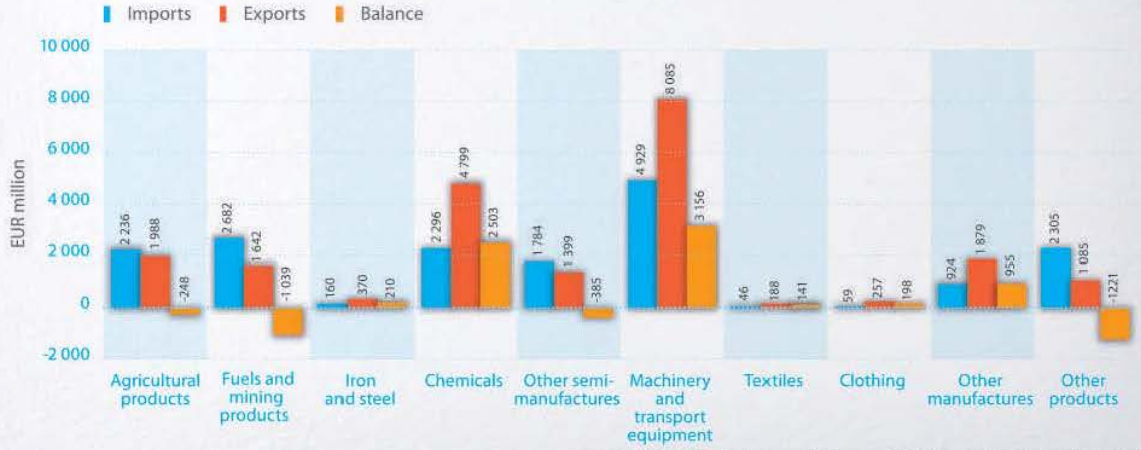


Sources: Canadian Report on Bioenergy 2010; European Wood Pellet Atlas

As the next chart shows, fuels and mining products are important trade goods between the EU and Canada. In 2009 fuels and mining products accounted for 15 % (€ 2.7 billion) of all EU imports from Canada, and these products covered 7 % (€ 1.6 billion) of all exports from the EU to this country.

FIGURE 85

EU TRADE WITH CANADA (in EUR million) (2009)



Sources: Canadian Report on Bioenergy 2010; European Wood Pellet Atlas

4.3. Qatar

Situated in the Persian Gulf, Qatar plays a major role in supplying many countries in the world with fossil fuels and possesses significant proven hydrocarbon reserves. According to the data in the table below, the country's natural gas reserves amount to 28 trillion cubic metres (tcm), equating to more than 140 years taking into account both currently operating gas production and planned facilities capacities, the latter representing annual capacity of 185.7 billion cubic metres (bcm). Qatar's oil reserves amounted to 33.3 billion barrels which translates into almost 90 years of stock value assuming a daily production of 801 kbbl[54].

FIGURE 86

QATAR, EVOLUTION OF OIL AND GAS PRODUCTION AND RESERVES (in Mbbl, bcm) (2006 and 2008)

OIL	2006	2007	2008
Annual production (Mbbl)	400	390	400
Production to date (Mbbl)	7 000	7 400	7 800
Reserves (proven and probable) (Mbbl)	34 100	33 700	33 300
GAS	**2006**	**2007**	**2008**
Annual production (bcm)	46	53	64
Production to date (bcm)	550	600	660
Reserves (proven and probable) (bcm)	28 500	28 500	28 400

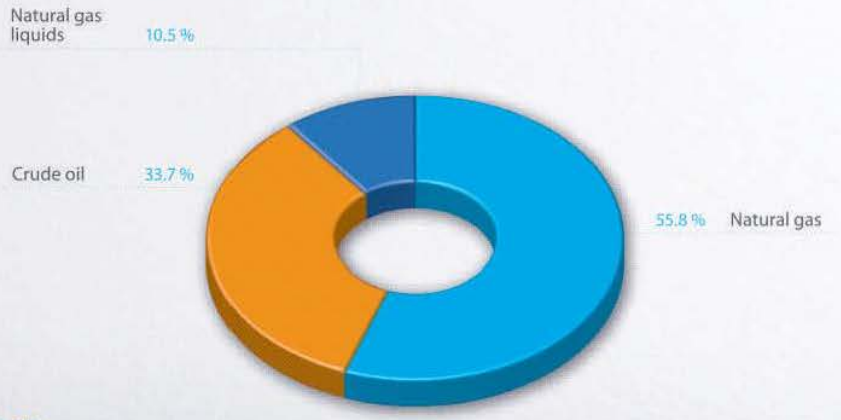
Source: © Petroconsultants SA (2010) (rounded values)

Although the Non-Oil and Gas Sector accounted for more than half of Gross Domestic Product (GDP) of Qatar in 2009 (56.8 %), both gas (24.5 %) and oil sectors (21.7 %) also play a major role in the development of the country. QNB's data confirm the trend which could be first observed in 2008 that the gas sector overtook that of the oil sector regarding its contribution to the overall GDP.

On the following chart the structure of the energy production shows the relative importance of natural gas production to that of crude oil:

FIGURE 87

QATAR, TOTAL PRIMARY ENERGY PRODUCTION (in Mtoe, %) (2008)



Total = 124.83 Mtoe

Source: © OECD/IEA 2010

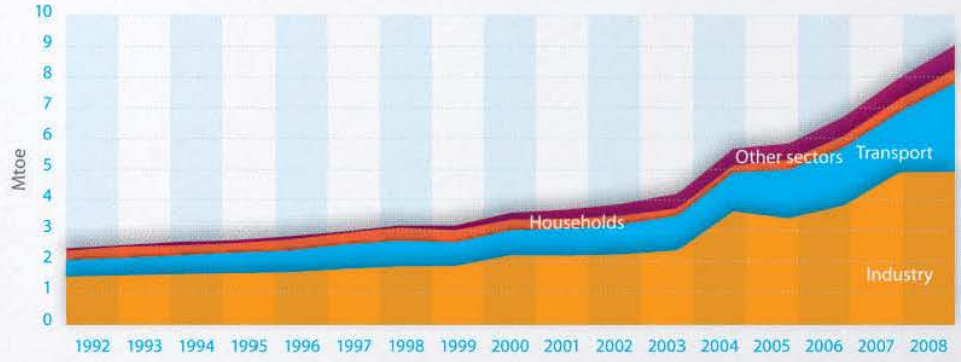
(54) Estimation made by the Qatar National Bank.

Between 2005 and 2009, Qatar possessed one of the fastest growing economies in the world with an annual average GDP increase of 17.4 % and despite the looming economic crisis in 2009 it was still able to deliver 8.7 % in growth. Fast economic growth is coupled with a rapidly growing population, of 20 % per year, which was mainly due to the increase in number of immigrant workers the economy permanently needs.

Rapid growth in energy demand has resulted from such economic developments, which led to a doubling of final energy consumption between 2003 and 2008.

FIGURE 88

QATAR, FINAL ENERGY CONSUMPTION (in Mtoe) (1992-2008)



Source: © OECD/IEA 2010

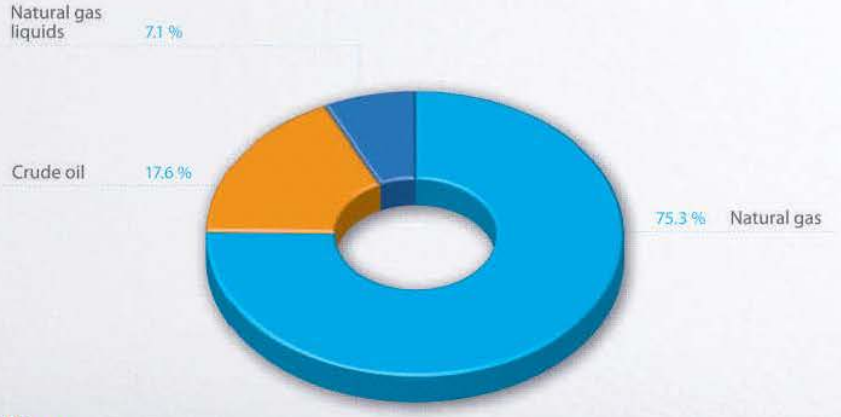
The main driver of growth in final energy consumption was the industrial sector, followed by transport activities. Although Qatar's population grew rapidly in the last five years, contributing to a doubling of households' final energy consumption between 2003 and 2008, households contributed only a modest amount to the overall final consumption (5.2 %) during this period.

The rapid growth in energy consumption might also have been influenced by fossil fuel consumption subsidies. According to the World Energy Outlook 2010 of the IEA the global value of such subsidies in 2009 amounted to $312 billion. Although Qatar's fossil-fuel consumption related subsidy expenditure is not extremely high in absolute figures in an international comparison, it spent 3 % of its GDP for this purpose in 2009, which cannot be deemed insignificant.

Qatar's gross inland energy consumption is broadly based on natural gas and gas liquids; almost 83 % of the country's energy consumption is based on gas, reinforcing the role of this fuel.

FIGURE 89

QATAR, GROSS INLAND CONSUMPTION (in Mtoe, %) (2008)



Total = 25.03 Mtoe

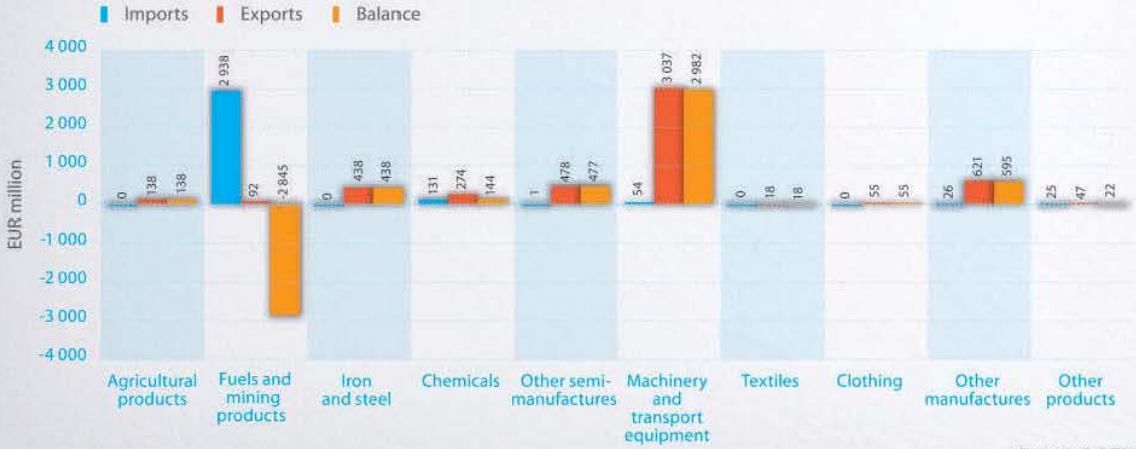
Source: © OECD/IEA 2010

Note: values under 1% are not presented.

The EU-27's trade with Qatar can be characterised as highly concentrated among certain economic branches. The EU imports mainly fuels and mining products from Qatar while the EU mainly exports machinery and transport equipment to the country.

FIGURE 90

EU TRADE WITH QATAR (in EUR million) (2009)

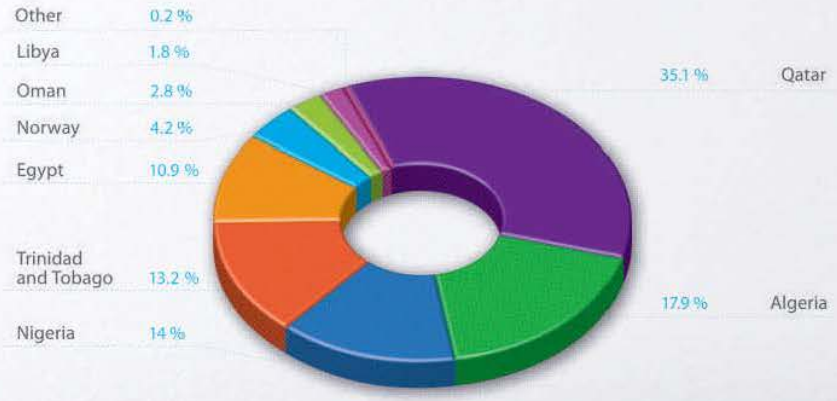


Source: DG TRADE

EU exports to Qatar represented 0.5 % of overall EU-27 exports while 0.3 % of the EU-27's imports of products originated from Qatar in 2009. These relatively low numbers mask the importance of energy trade relations between Qatar and the EU-27. In 2008 2.3 % of the EU-27's natural gas imports originated from Qatar, increasing to 5 % in 2009 according to preliminary data of Eurostat. Qatar is the EU's leading supplier of liquefied natural gas (LNG), supplying 35 % of all LNG imports in the EU in 2009, compared to between 23 and 24 % in 2007 and 2008. In certain EU countries (e.g.: Belgium and the UK), Qatar's contribution to LNG imports exceeded 50 %.

FIGURE 91

EU-27, LNG IMPORTS ACCORDING TO COUNTRY OF ORIGIN (in %) (2009)



Total = 49.7 bcm

Source: Eurostat COMEXT database

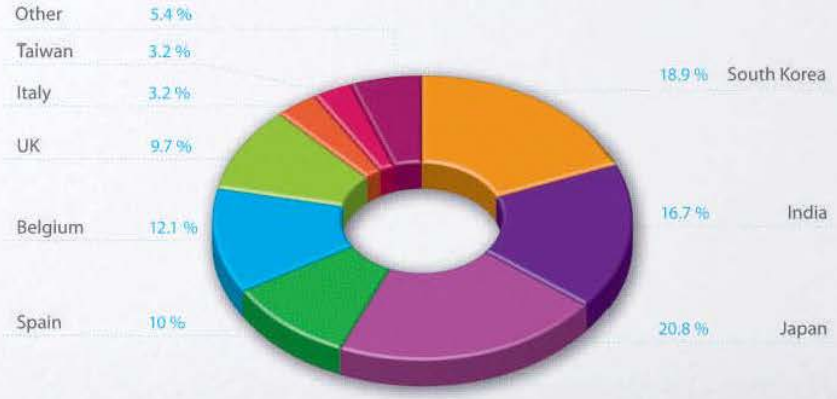
Besides Qatar, Algeria, Nigeria, Trinidad and Tobago and Egypt were all important LNG suppliers to the EU-27 in 2009.

Looking at the destination breakdown of Qatar's LNG exports, it reveals that the most important export trade partners are Japan, the Republic of Korea and India, altogether representing more than 57 % of market destinations. The most important European partners are Belgium (12.1 %), Spain (10.0 %), the UK (9.7 %) and Italy (3.2 %).

Qatar's LNG exports grew by 22 % in 2009, to reach 51.1 bcm, up from 41.9 bcm in the previous year. The volume of annual contracted values to 2012 (103 bcm) presages further rapid growth in Qatar's LNG exports and makes it probable that it will remain the world's most important LNG supplier in the near term.

FIGURE 92

QATAR, MAJOR DESTINATIONS OF LNG EXPORTS (in %) (2009)



Total = 51.2 bcm

Source: Qatar National Bank

4.4. Libya (Libyan Arab Jamahiriya)

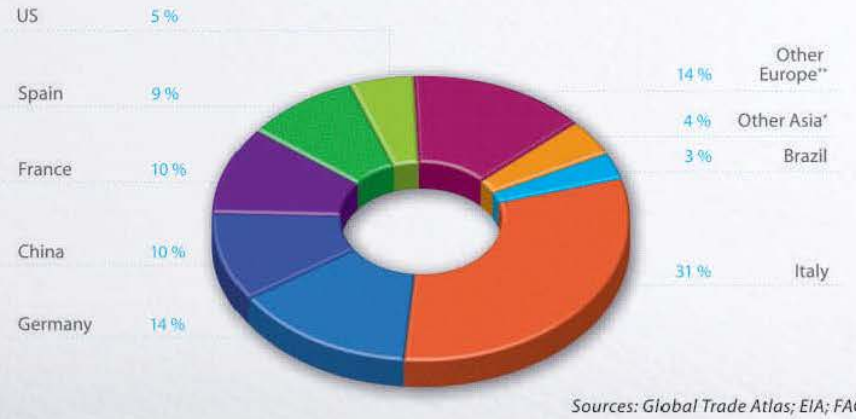
Libya is an important supplier of oil and natural gas to the EU due to its geographical proximity to Europe and its fossil fuel reserves. Situated in Northern Africa in the neighbourhood of Tunisia, Algeria and Egypt, the country is part of the Mediterranean electricity grid, which has the potential to bind together a future integrated Mashreq-Maghreb power grid in the Southern Mediterranean.

Libya also possesses the largest proven oil reserves of the African continent and it exports nearly 80 % of its annual production to the EU, with Italy, Germany, France and Spain being the main Libyan oil importers.

The trade dependence of Libya on the EU is very significant. Over 70 % of Libya's total exports are directed to the EU market while the EU relies on Libya for less than 1 % of its exports. In 2009, more than 40 % of Libya's total GDP depended on crude oil exports to the EU.

FIGURE 93

LIBYA, OIL EXPORTS BY DESTINATION (in %) (2009)



Sources: Global Trade Atlas; EIA; FACTS Global Energy

** Other Asia: Indonesia, India, Singapore and Malaysia. ** Other Europe: Serbia, UK, Netherlands, Austria, Portugal, Ireland, Greece, Sweden and Czech Republic.*

In 2008, 10.2 % of the total crude oil import of the EU-27 originated from Libya, which has become the third most important crude oil supplier to the EU (compared to Russia: 32 % and Norway: 15.5 %). Among the OPEC countries, Libya was the most important oil supplier to the EU-27. Provisional Eurostat data show that in 2009 the share of Libya in EU-27 crude oil import slipped slightly below 10 % but its third place in the import supply ranking order still holds.

FIGURE 94

LIBYA, EVOLUTION OF OIL AND GAS PRODUCTION AND RESERVES (in Mbbl, bcm) (2006-2008)

OIL	2006	2007	2008
Annual production (Mbbl)	670	675	675
Production to date (Mbbl)	25 800	26 500	27 200
Reserves (proven and probable) (Mbbl)	27 300	27 000	26 400
GAS	**2006**	**2007**	**2008**
Annual production (bcm)	23	26	N/A
Production to date (bcm)	420	450	450
Reserves (proven and probable) (bcm)	2 100	2 000	2 100

Source: © Petroconsultants SA (2010) (rounded values)

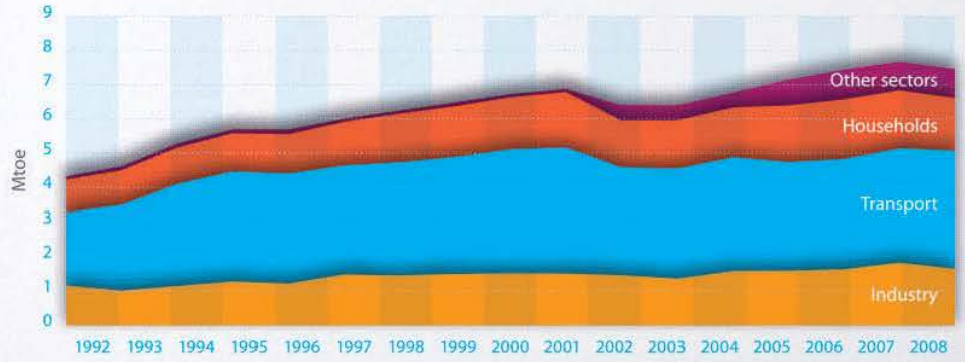
Libya is also a significant gas supplier to the EU, although its share in overall EU-27 imports is less than that for crude oil. In 2008, the country exported 10 bcm natural gas to the EU, representing 3% of overall EU-27 gas imports. The majority of this amount (95%) was exported through the Green Stream pipeline to Italy, and the remaining 5% was shipped as LNG.

In parallel with increasing energy prices, Libya's economy experienced rapid growth between 2004 and 2008, registering an average 6.2% annual GDP growth during this period according to IMF data. In 2009, a minor contraction occurred (2.3%) in the performance of the economy as fossil fuel prices became significantly lower as a consequence of the worldwide economic slowdown.

The evolution of Libya's final energy consumption mirrors relatively rapid GDP growth in the last couple of years, and being driven in particular by the newly arising energy demand in other sectors (mainly services).

FIGURE 95

LIBYA, FINAL ENERGY CONSUMPTION (in Mtoe) (1992-2008)



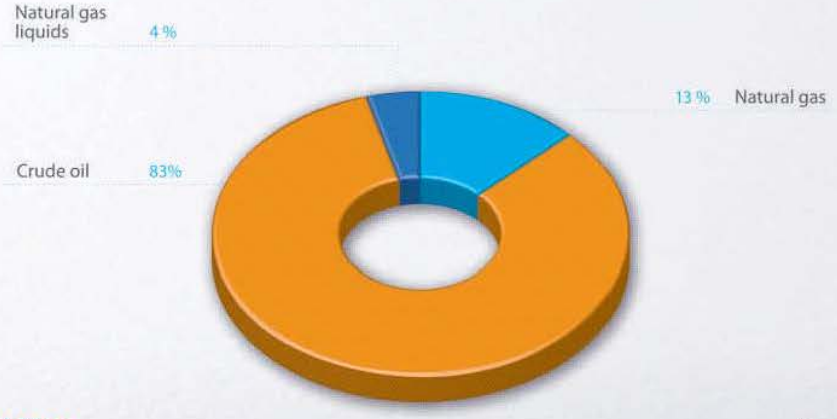
Source: © OECD/IEA 2010

Similarly to Qatar, Libya spent 3% of its GDP on fossil fuel consumption subsidies in 2009 that might have also contributed to the rapid growth of its final energy consumption.

The next chart shows the structure of primary energy production in Libya in 2008 according to Eurostat annual energy data.

FIGURE 96

LIBYA, TOTAL PRIMARY ENERGY PRODUCTION (in Mtoe, %) (2008)



Total = 103.74 Mtoe

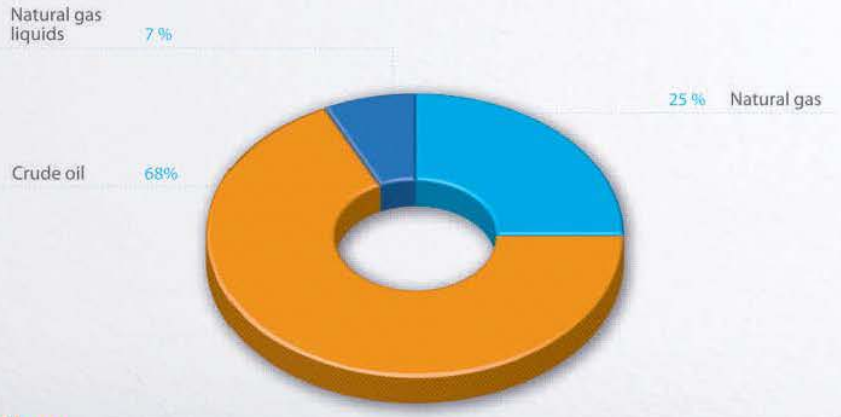
Source: © OECD/IEA 2010

Note: values under 1% are not presented.

The predominance of oil is evident, given its 83 % share in primary energy production. However, natural gas and liquid gas respectively have a significantly higher share in the gross inland consumption of the country as a higher proportion of oil production is exported than natural gas.

FIGURE 97

LIBYA, GROSS INLAND CONSUMPTION (in Mtoe, %) (2008)



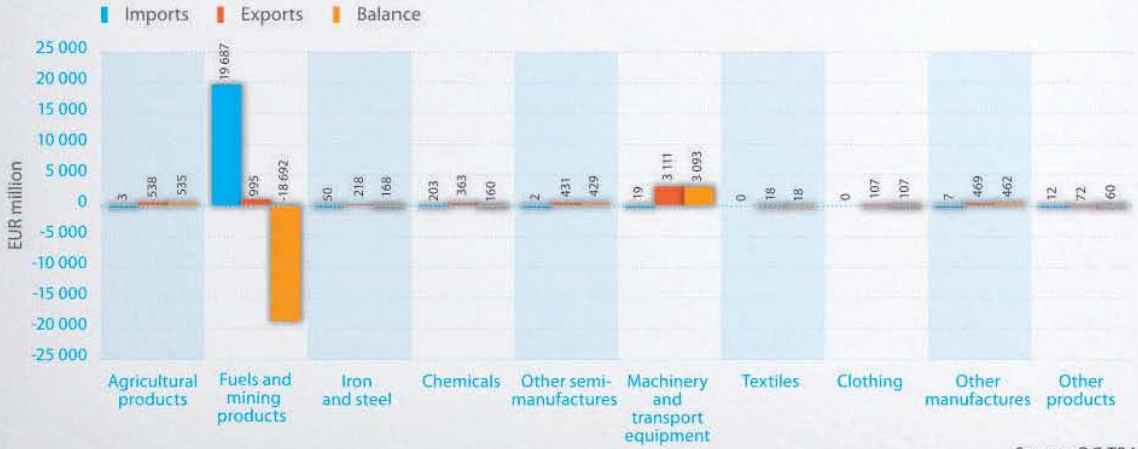
Total = 18.42 Mtoe

Source: © OECD/IEA 2010

EU imports from Libya amounted to € 20 billion in 2009 and exports were equivalent to € 6.4 billion. The majority of imports consisted of oil (85 %) and gas (13 %). EU-27 exports to Libya were dominated by machinery and transport equipments and other machinery products (73 %).

FIGURE 98

EU TRADE WITH LIBYA (in EUR million) (2009)



Source: DG TRADE

Annotations

Total primary energy supply – shows the share of energy sources in the energy mix. It is the quantity of energy consumed within the borders of a country. It is calculated using the formula: primary production + recovered products + imports + stock changes - exports - bunkers (i.e. quantities supplied to sea-going ships).

Total final consumption – (Mtoe) – is the energy finally consumed in the transport, industrial, commercial, agricultural, public and household sectors. It excludes deliveries to the energy conversion sector and to the energy industries themselves.

Electricity mix – shows the share of the various energy sources used for electricity generation.

Electricity generation – (TWh) – is the quantity of electricity produced within the borders of a country.

Indigenous production – shows the share of energy sources extracted and used from domestic natural sources. The precise definition depends on the fuel involved.

Coal – quantities of fuels extracted or produced, calculated after any operation to remove inert matter. In general, production includes the quantities consumed by the producer during the production process (e.g. for heating or operation of equipment and auxiliaries) plus any quantities supplied to other on-site producers of energy for conversion or other uses.

Crude oil – quantities of fuels extracted or produced within national boundaries, including offshore production. Production includes only marketable production and excludes any quantities returned to formation. Production includes all crude oil, natural gas liquids (NGL), condensates and oil from shale and tar sands, etc.

Natural gas – quantities of dry gas, measured after purification and extraction of natural gas liquids and sulphur. Production includes only marketable production, and excludes any quantities re-injected, vented and flared, and any extraction losses. Production includes all quantities used within the natural gas industry, in gas extraction, pipeline systems and processing plants.

Nuclear – quantities of heat produced in a reactor. Production is the actual heat produced or the heat calculated on the basis of the gross electricity generated and the thermal efficiency of the nuclear plant. All nuclear production is set as fully indigenous.

Geothermal – quantities of heat extracted from geothermal fluids. Production is calculated on the basis of the difference between the enthalpy of the fluid produced in the production borehole and that of the fluid disposed of via the re-injection borehole.

Biomass/Waste – in the case of municipal solid waste (MSW), wood, wood waste and other solid waste, production is the heat produced after combustion and corresponds to the heat content (NCV) of the fuel. In the case of anaerobic digestion of wet waste, production is the heat content (NCV) of the biogases produced. Production includes all quantities of gas consumed in the installation for the fermentation processes, and excludes all quantities of flared gases. In the case of biofuels, production is the heat content (NCV) of the fuel.

Hydro – electricity generated by hydro power plant includes small hydro. Tide, Wave, Ocean power plants are included as well, because Eurostat is using it in this way.

Wind – electricity generated by onshore and offshore wind power plants. Figures are set for the end of 2004, while there was a significant increase of new installed Wind Power Plants in 2005.

Net imports by fuels (Mtoe) – share of all energy sources imported, excluding all nuclear, which is set as indigenous by Eurostat. Net electricity imports are included.

Imports of crude oil – imported crude oil divided by countries of origin, EU-27 is counted without imports inside the EU.

Imports of natural gas – imported natural gas divided by countries of origin, EU-27 is counted without imports inside the EU.

Imports of hard coal – imported hard coal divided by countries of origin, EU-27 is counted without imports inside the EU.

Final energy intensity – is calculated as final energy demand divided by value added at basic prices. For some industrial sectors, like the iron and steel industry, the non-ferrous metals industry and the engineering industry, it was not possible to calculate energy intensity values, as the value added at basic prices is not given for these definitions of sectors in the national accounts data from Eurostat. In contrast to primary energy intensity, final energy intensity does not consider the efficiency of the energy transformation sector.

CO_2 emissions per capita – are calculated as total CO_2 emissions divided by total population.

CO_2 intensity – is calculated by dividing the total CO_2 emissions by the gross inland energy consumption. It is an indicator for the carbon intensity of the energy system.

Import dependency – net imports of a country or region divided by the sum of the gross inland consumption and bunkers of that energy carrier. 'All Fuels' shows the import dependency for oil, gas, solid fuels, electricity and renewable energy sources in total. The aggregate 'renewables' considers all forms of renewable energy carriers, like electricity from wind or hydro power as well as biofuels and biomass in general. A negative import dependency has to be interpreted as net exports.

Industry – the sector is defined according to the following NACE Rev. 2 codes: B (Mining and quarrying), C (Manufacturing) and D (Electricity, gas, steam and air conditioning supply).

Non-Metallic Mineral Products Industry – the sector is defined according to the NACE code CG 'Manufacture of rubber and plastics products, and other non-metallic mineral products'.

Chemical Industry – the sector is defined according to NACE Rev.2 code CE 'Manufacture of chemicals, chemical products'.

Food, Drink and Tobacco Industry – the sector is defined according to NACE Rev.2 code CA 'Manufacture of food products; beverages and tobacco products'.

Paper and Printing Industry – the sector is defined according to NACE Rev.2 code CC 'Manufacture of wood and paper products and printing'.

Services - the sector is defined according to the following NACE Rev. 2 codes: from G to S.

Transport – the sector covers all types of transport (NACE Rev. 2 H 49-52). To calculate energy intensity the final energy consumption in transport was divided by the value added at basic prices of the whole economy.

ABBREVIATIONS

API degree – American Petroleum Institute degree

bcm – billion cubic meter

Cap – capita

CIF Price – cost, insurance and freight price

Dutch TTF – Dutch Title Transfer Facility

EUR – euro

EUR/bbl – euro per barrel

GDP – Gross Domestic Product

GWh – gigawatt hour

IEA – International Energy Agency

LNG – Liquefied Natural Gas

Mb/d – million barrels per day

Mbbl – million barrels

MMBtu – thousand thousand British Thermal Units

Mt – million tonnes

Mtoe – million tonnes of oil equivalent

MWh – megawatt hour

NBP – National Balancing Point (UK)

OECD – Organisation for Economic Cooperation and Development

OPEC – Organisation of the Petroleum Exporting Countries

Platts PEP – Platts Pan European Power index

pp – percentage point

TJ – terajoules

Toe – ton of oil equivalent

TSO – Transmission System Operator

TWh – terawatt hour

USD – US dollar

KO-AE-10-001-EN-C

Publications Office