





## Result sensitivity

Three main factors could influence the short-term energy forecast: the evolution of economic growth, climatic conditions and the evolution of the power sector.

- The economic growth in 1999 largely reflects recent economic development (issues in Asia and Latin America). Projections for 2000 and 2001 are more optimistic, reflecting the already observable improving economic situation in emerging countries, a positive growth in Japan already expected for the second quarter of 1999 and a soft landing of the US economy. Considering these evolutions, economic forecasts can be considered as neutral. If, for some unexpected reasons, economic growth was underestimated at the horizon of 2001 at a level of 0.5% to account for uncertainties, this could induce in 2001 an increase of energy consumption of a maximum of 0.4% or 6 Mtoe, concentrated mainly on gas and electricity. Consequently, CO<sub>2</sub> emissions should be increased at maximum by some 0.2% to 0.4%.
- Evolution of short-term climatic conditions (1989-1998) indicates that the short term (10 years) average degree-days are about 7.3% below the long-term average (25 years). If one believes that the greenhouse effect is already inducing an increase of average temperatures, then the short-term average degree-days are perhaps more representative of the evolution of climatic conditions. This means that average temperature could be underestimated in the forecast leading to an overestimate of energy consumption and CO<sub>2</sub> emissions in 2001 of some 1.7%. The climatic conditions considered in the forecast are clearly one of the most sensitive variables. If the weather conditions replicate in 2000 the warmer year registered since 1990, CO<sub>2</sub> emissions will be 2% lower than in 1990. This is of particular interest as these conditions were very close to the 1990

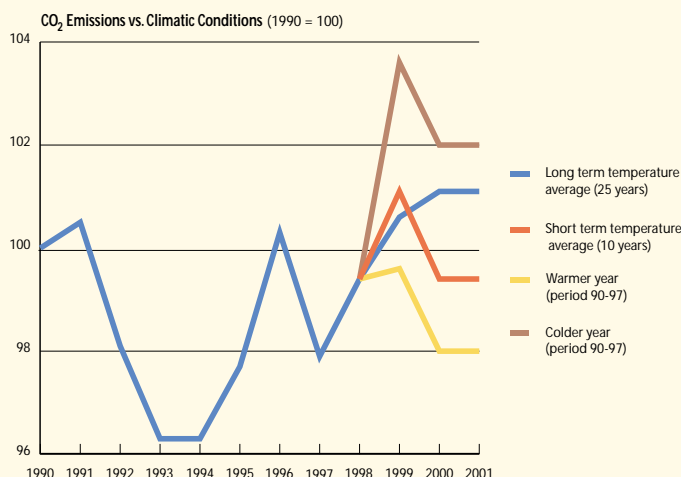
ones meaning that, excluding climatic variations, CO<sub>2</sub> emissions in 2000 will be about 2% lower than in 1990. On the other hand, a repeat of the colder climatic conditions observed since 1990 will result in an increase by 2% of CO<sub>2</sub> emissions in 2000 compared to the 1990 level. Finally, compared with short-term (10 years) average degree-days, CO<sub>2</sub> emissions will be 0.6% lower in 2000 than in 1990.

- The rapid conversion of the power sector to gas consumption is one of the key factors to achieve stability of CO<sub>2</sub> emissions at the 2000 horizon. To quantify the impact of this conversion, it can be considered that each variation of gas consumption of about 15 Mtoe by the power sector results in a variation of total CO<sub>2</sub> emissions of 1%. But the STEO forecast already remains below the latest estimates of gas consumption provided by the power sector itself.

Consequently, the STEO forecast can be considered as: neutral regarding economic growth; prudent in terms of climatic conditions; and conservative concerning gas consumption in the power sector. So the CO<sub>2</sub> emissions forecast - a limited overstepping of the objective of a stabilisation of emissions in 2000 - can also be considered as very prudent.

### Potential impact of higher oil prices

Since establishing the main assumptions used to produce the short-term energy forecast, oil prices for the reference Brent crude have increased significantly from 10.5\$/bbl in February 1999 to 23.2 \$/bbl in September 1999. In early October prices declined to around 22\$/bbl. Many oil experts forecast an annual average price of 17\$/bbl in 1997 and around 18\$/bbl in 2000 and 2001. These recent oil price changes must be placed in the perspective of long-term price evolution. This new short-term forecast now reflects the average prices observed between 1991 and 1997: around 18\$/bbl. In this context 1998 must be seen as an exceptional year characterised by very low oil prices. Even though the latest oil prices are about 20% higher than those assumed in the elaboration of the short-term energy forecast, it must be stressed that the increase in the crude price is heavily dampened for final consumers who face heavy taxation on oil products. This is particularly true for transportation fuels and for tertiary-domestic uses. By returning to their historical level, these oil price increases will not modify significantly the behaviour of economic actors. A recent statement by the new Commissioner, Mr Solbes, confirms that, considering the present macro-economic scenario, economic growth will be in line with the spring 1999 forecast for the year 1999 and perhaps a little more optimistic for the year 2000.





The power sector will experience further rapid changes in the near future. The evolution of coal and gas consumption, and consequently of CO<sub>2</sub> emissions, vary considerably between different forecasts. **New investment** will be oriented mainly to gas fuelled power stations, with a large contribution from combined cycle plants stimulated by the progressive liberalisation of the EU electricity sector. On the other hand, co-generation units are being promoted in nearly all member states, further increasing the contribution of gas based technologies. More than 10 GWe of these kind of units based on natural gas are expected to be commissioned over the next three years. Finally, repowering, conversion of existing units to natural gas, and substitution to gas in polyvalent units mainly in Belgium, Denmark, Germany, Italy and the United Kingdom, will complete the rapid switch to natural gas in power stations. In addition, the market perceptions of the power sector itself are changing rapidly, modifying their investment programmes accordingly. Between 1997 and 1998, their perception of the likely contribution of gas increased from 56 Mtoe in 1996 to about 97 Mtoe in 2000 with a subsequent reduction of hard coal consumption. This significantly affects the structure of gross inland energy consumption and hence CO<sub>2</sub> emissions. Our present forecast does not foresee quite such a bullish development of gas demand, even though consumption of about 89 Mtoe of natural gas is predicted in 2000.

Nuclear electricity production is likely to increase slowly over the next three years due to new commissioning (1.5 GWe) and upgrading of existing units associated with steam generator replacements. Hydropower production is assumed to stay at around its 1997 level. Geothermal production, being almost marginal in the total picture, is expected to increase as some new units will be commissioned in Italy. Considering the non-fossil production, the major increase will surely be in wind power under the pressure of Germany, Denmark, Spain, Netherlands, Italy and the United Kingdom. Together, these four non-fossil sources are expected to account for 48.3% of total generation in 2001 compared to 50% in 1998, bringing them to the same level as in 1990. Consequently, conventional thermal generation of electricity will play a major role in covering additional requirements in the forecast period.

Lignite supported by indigenous production will decline very slowly, decommissioning of existing units being not totally compensated by new ones. Hard coal and oil, penalised by economic and environmental considerations, will see their contributions decline by 12% and 13% respectively between 1998 and 2001. In 1996, gas became the second most important fuel in thermal power generation ahead of lignite and oil and, as discussed above, is predicted to reinforce this position significantly by 2001 to become the largest single contributor amongst the fossil fuels.

### Energy Indicators

The **energy intensity** in the European Union improved by 0.7% p.a. between 1990 and 1998 benefiting from clement climate conditions in 1998. This evolution is particularly significant, as climatic conditions were comparable in 1990 and 1998. During the forecast period, energy intensity is forecast to improve by 1.1% per annum, profiting from sustained economic activity over the whole period accompanied by technological improvements in all sectors. The energy system benefits from strong equipment replacement investment and improved general performance in all sectors, in particular the power sector. On the other hand, energy consumption per capita will increase by about 3% between 1998 and 2001 as it did between 1995 and 1998.

**CO<sub>2</sub> emissions** increased by 1.5% in 1998 compared to 1997, to reach a level just below that of 1990. Over the forecast period, considering average climate conditions, they will increase by about 0.6% per annum on average to give in 2000 a level 1.1% above that of 1990. So the political objective of CO<sub>2</sub> emission stabilisation in 2000 could remain achievable. This is mainly due to two factors: the continuous energy intensity gains observed during the 90's (about 1% per year on average) resulting from technological improvements; and the carbon intensity slowdown (about 1% per year on average) obtained from the larger contribution of natural gas instead of solids and oil as well as the intensification of carbon-free energy sources. Reflecting these major trends, CO<sub>2</sub> emissions per unit of GDP declined by 18% during the 90's and CO<sub>2</sub> emissions per capita decreased by 2.3%.

#### SHORT TERM FORECAST - MAIN INDICATORS (1990 = 100)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
CO <sub>2</sub> emissions (million tn of CO <sub>2</sub> )	100.0	100.5	98.1	96.3	96.3	97.7	100.3	97.9	99.4	100.6	101.1	101.1
Energy Intensity (toe/1990 MECU)	100.0	101.0	99.1	99.4	97.1	96.9	98.4	94.9	93.9	93.7	92.4	90.8
Energy per capita (toe/inhabitant)	100.0	101.7	100.4	99.8	99.9	101.7	104.7	103.4	105.0	106.6	107.7	108.1
Carbon Intensity (tn of CO <sub>2</sub> /toe)	100.0	98.4	96.8	95.1	94.8	94.1	93.5	92.2	92.0	91.4	90.7	90.1
CO <sub>2</sub> per unit of GDP (tn of CO <sub>2</sub> /1990 MECU)	100.0	96.8	93.5	92.2	89.6	88.9	89.7	85.3	84.2	83.4	81.7	79.7
CO <sub>2</sub> per Capita (tn of CO <sub>2</sub> /inhabitant)	100.0	100.1	97.1	94.9	94.6	95.7	98.0	95.4	96.5	97.5	97.7	97.4

N.B.: Differences between the numbers in the table and EU annual energy balances originate from the discrepancies between annual and monthly-based statistics



autoproducers almost wholly based on gas (gas turbine and gas driven engines) will increase the pressure on gas. Finally, given the higher efficiency of gas-based technologies, price competition will also be in favour of gas. Globally, some 18 to 22 GWe of power capacity able to burn natural gas will be completed by 2001 including new investments, repowering and conversion programmes.

**Domestic production** of natural gas is expected to increase by 5.5% until 2001, with imports increasing by 37% over the same period. Consequently, import dependency on natural gas is predicted to increase from 40% in 1998 to 46% in 2001.

## Electricity

**Demand for electricity** has increased steadily for many years driven by the tertiary-domestic sector and, to a lesser extent, industry. In 1997, demand growth reached 2.6% in line with the sustained economic growth although very mild climatic conditions continued. Final electricity demand is expected to continue to grow by 2.0% annually on average until 2001, demonstrating an elasticity of about 0.8 versus GDP but this evolution is deeply influenced by the climate effect in 1999 and 2000 which boosts the demand growth beyond 2.0%.

### ELECTRICITY : SUMMARY BALANCE

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
<b>A.1. Generation (Twh)</b>												
Total Gross Generation	2162.6	2231.0	2229.3	2240.4	2270.6	2335.5	2415.6	2428.4	2475.2	2534.5	2587.7	2621.8
<i>Growth rate from previous period in %</i>		3.2	-0.1	0.5	1.3	2.9	3.4	0.5	1.9	2.4	2.1	1.3
Produced by Pumping	13.8	14.9	16.2	13.9	13.1	16.2	17.9	17.5	19.3	17.7	18.1	20.1
Primary production (Hydro)	273.5	284.7	303.2	309.1	311.8	311.0	307.8	319.8	320.4	326.4	329.2	331.9
<i>Growth rate from previous period in %</i>		4.1	6.5	2.0	0.9	-0.3	-1.0	3.9	0.2	1.9	0.8	0.8
Derived production :	1875.3	1931.4	1909.9	1917.3	1945.6	2008.3	2090.0	2091.1	2135.5	2190.4	2240.5	2269.8
Nuclear	719.9	744.4	757.8	792.7	789.4	808.0	849.1	857.2	847.1	850.4	855.8	862.7
<i>Growth rate from previous period in %</i>		3.4	1.8	4.6	-0.4	2.4	5.1	1.0	-1.2	0.4	0.6	0.8
Conventional Thermal	1152.1	1183.8	1148.6	1121.0	1152.8	1196.9	1237.1	1230.0	1284.2	1334.2	1378.4	1400.8
<i>Growth rate from previous period in %</i>		2.7	-3.0	-2.4	2.8	3.8	3.4	-0.6	4.4	3.9	3.3	1.6
Geothermal	3.2	3.2	3.5	3.7	3.4	3.4	3.8	3.9	4.2	5.7	6.3	6.3
Absorbed by Pumping	19.4	21.1	23.2	19.5	18.5	22.6	25.2	24.7	28.1	25.2	25.8	25.6
Own consumption	114.3	125.2	121.0	116.6	118.4	122.8	118.9	124.0	125.4	129.6	131.5	133.8
Total Net Generation	2050.2	2105.8	2108.3	2123.7	2152.1	2212.8	2296.1	2304.4	2349.7	2404.9	2456.3	2486.0
<i>Growth rate from previous period in %</i>		2.7	0.1	0.7	1.3	2.8	3.8	0.4	2.0	2.4	2.1	1.2
<b>A.2. Disposal (Twh)</b>												
Total Net Generation	2025.3	2084.6	2085.1	2104.3	2133.6	2191.6	2270.8	2279.7	2321.5	2379.7	2430.5	2460.0
Net Imports	25.4	15.5	18.2	23.6	18.0	17.4	0.8	5.4	21.6	14.7	14.3	20.9
Total Available	2050.7	2100.2	2103.3	2127.9	2151.6	2209.0	2271.6	2285.1	2343.2	2394.4	2444.9	2480.9
<i>Growth rate from previous period in %</i>		2.4	0.1	1.2	1.1	2.7	2.8	0.6	2.5	2.2	2.1	1.5
Distribution losses	134.8	140.7	135.0	139.4	144.4	143.9	154.5	153.1	156.6	159.5	163.7	165.6
Consumption Internal Market	1915.8	1959.5	1968.3	1988.5	2007.2	2065.1	2117.1	2132.0	2186.6	2234.9	2281.2	2315.3
Energy Branch Consumption	73.9	78.8	78.8	80.8	80.8	82.6	81.0	79.8	80.7	81.5	82.6	83.8
Available for Final Consumption	1841.9	1880.7	1889.5	1907.7	1926.4	1982.5	2036.1	2052.1	2105.9	2153.4	2198.6	2231.6
<i>Growth rate from previous period in %</i>		2.1	0.5	1.0	1.0	2.9	2.7	0.8	2.6	2.3	2.1	1.5
<b>B. Input to Conventional Thermal Power Stations (Mtoe)</b>												
Solids												
Hard coal	123.7	123.6	118.0	107.9	110.1	109.5	113.4	103.9	110.4	107.0	101.7	97.4
<i>Growth rate from previous period in %</i>		0.0	-4.6	-8.5	2.0	-0.5	3.6	-8.5	6.3	-3.1	-4.9	-4.2
Lignite	54.7	52.9	50.6	48.9	48.5	46.9	46.3	44.7	45.2	44.4	43.7	42.9
<i>Growth rate from previous period in %</i>		-3.3	-4.3	-3.4	-0.7	-3.5	-1.2	-3.4	1.0	-1.7	-1.6	-1.7
Oil	44.0	46.3	47.3	42.5	41.6	43.9	42.7	39.2	40.0	38.5	36.8	34.7
<i>Growth rate from previous period in %</i>		5.0	2.3	-10.1	-2.2	5.4	-2.6	-8.2	2.1	-3.8	-4.5	-5.7
Gas												
Natural gas	31.3	30.4	30.5	35.9	39.5	44.1	51.8	59.6	65.5	76.9	88.9	97.6
<i>Growth rate from previous period in %</i>		-3.0	0.5	17.6	10.0	11.7	17.3	15.2	9.9	17.3	15.7	9.7
Derived gas	2.4	2.2	2.1	2.2	2.4	2.5	2.7	3.0	3.0	2.7	2.5	2.3
<i>Growth rate from previous period in %</i>		-8.2	-4.7	6.7	6.7	6.5	8.6	8.5	1.3	-8.4	-8.3	-8.1
Other	5.1	5.4	5.3	5.4	5.5	5.8	6.5	6.5	6.6	7.1	8.0	8.9
<i>Growth rate from previous period in %</i>		4.9	-2.2	2.8	1.5	5.0	11.9	1.2	1.5	7.4	11.8	12.3
TOTAL	261.2	260.7	253.8	242.9	247.6	252.6	263.4	257.0	270.8	276.6	281.6	283.9
<i>Growth rate from previous period in %</i>		-0.2	-2.6	-4.3	1.9	2.0	4.3	-2.5	5.4	2.2	1.8	0.8

N.B. : Differences between the numbers in the table and EU annual energy balances originate from the discrepancies between annual and monthly-based statistics



## SUMMARY

Based on monthly data, deliveries to final consumers in the European Union increased by about 2.1% in 1998, while gross inland energy consumption increased by about 1.8%. Sustained economic growth was compensated by weather conditions resulting in degree-days about 1% below the 1997 level. Consumption of oil grew by 3.3%. The increasing deliveries of all transportation fuel is driven by kerosene and automotive diesel. It is only partially compensated by lower consumption of heavy fuel oil in the power sector. Consumption of natural gas increased by 2.9% under the pressure of the power sector and final consumers despite the relative stability of heating requirements. Demand for solid fuels was down 0.7% on account of lower demand by final consumers. The production of nuclear energy declined by 1.2% and renewable energy, mainly biomass, increased by 1.9%. Annual CO<sub>2</sub> emissions increased by 1.5%, 0.6% below the 1990 level.

Combining the forecast growth of the European economy (Spring 99 Economic forecast – DG II) and the return to long-term average temperatures results in a growth of gross inland energy consump-

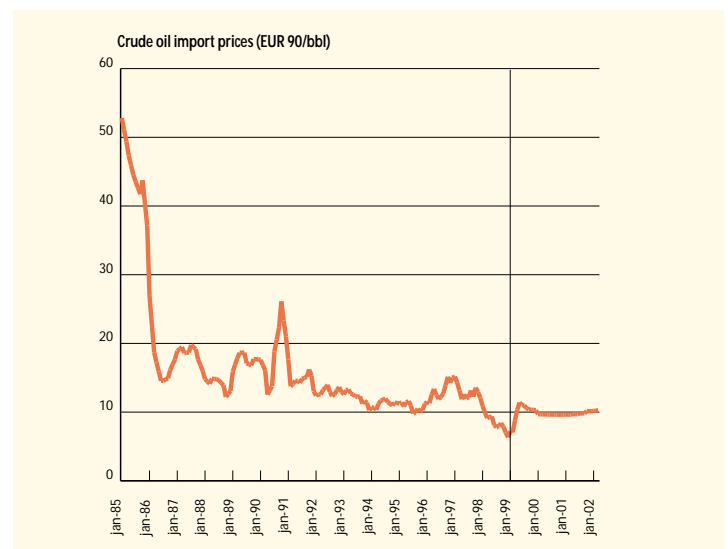
tion of 1.3% per year on average between 1998 and 2001. In fact the gross inland energy consumption will increase by about 55 Mtoe until 2001 but with very contrasted evolution by fuel. Although oil's contribution will slowly increase by 12.5 Mtoe, solid consumption will show a 25 Mtoe reduction while natural gas consumption will increase by 55.5 Mtoe. This increase, associated with the rapid expansion of gas consumption by the power sector, will allow CO<sub>2</sub> emissions to be stabilised in 2001 just above the 1990 level. This is the consequence of both the continuous energy intensity gains observed during the 90's (about 1% per year on average), and the fall in carbon intensity (about 1% per year on average) obtained from the larger contribution of natural gas in substitution of solids and oil as well as the growing contribution of carbon-free energy sources.

So the STEO energy forecast can be considered as: neutral regarding economic growth; very prudent in terms of climatic conditions; and conservative concerning gas consumption in the power sector. The CO<sub>2</sub> emissions forecast, suggesting a limited overstepping of the objective of stabilising emissions in 2000 just above the 1990 level, can be considered as extremely prudent.

## WORKING ASSUMPTIONS FOR THE PERIOD 1999-2001

The short-term energy forecasts are related to the short- and medium-term economic forecasts<sup>1</sup> provided by the European Commission's Directorate General for Economic Affairs (DG II). The main predetermined variables and their values are:

- Sustained GDP growth rates of 2.5% on average over the period 1999-2001, with a high of 2.7% in 2000;
- Private consumption is foreseen to grow by 2.4% on average, demonstrating a marked deceleration from 2.6% in 2000 to 2.2% in 2001;
- Gross fixed capital formation should be sustained with an average growth by 3.8% peaking at 4.8% in 2000;
- Industrial production, which increased by 3.4% in 1998, is expected to grow between 3.1% in 2000 and 2.0% in 2001;
- Normal weather conditions, defined as the average of the last 25 years' observations, are assumed to prevail from 1999 to 2001, after considering weather conditions for the first four months of 1999;
- The average price of European Union crude imports, including freight and insurance charges, is presumed to recover up to 14.09 \$/bbl after the slowdown observed in 1998, and to stabilise at this level until 2001.



In the EU, overall, 1998 turned out well. But since the last quarter of that year the outlook has become clouded due to more negative indicators. Consequently, the slowdown in 1999 is likely to be more pronounced than first expected and real GDP growth will be limited to 2.1%. However, the fundamentals remain healthy and the dip is expected to be only temporary so that an acceleration of real GDP growth to 2.7% in 2000 is possible. The slowdown is provoked by the impact of faltering export demand on investment and stock-building. Private consumption remains largely

<sup>1</sup> Short-term energy outlook - Spring 1999 forecast for 1999-2000 - European Economy - Supplement A n°4 April 1999



### MACROECONOMIC, ENERGY PRICES AND WEATHER ASSUMPTIONS

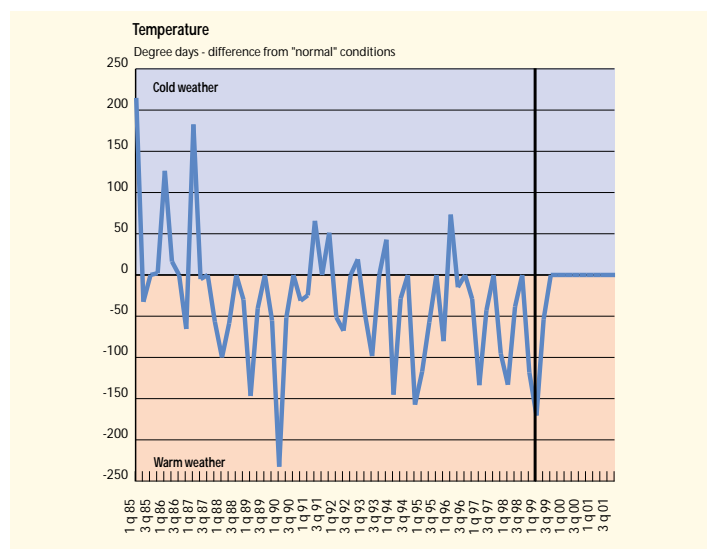
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
<b>A. MACROECONOMIC INDICES (1990=100)</b>												
A.1. Gross Domestic Product	100.0	101.2	102.3	101.8	104.7	107.2	108.9	111.9	115.1	117.5	120.7	123.6
% change from prior year		1.2	1.1	-0.5	2.9	2.4	1.6	2.7	2.9	2.1	2.7	2.4
A.2. Private Consumption	100.0	101.6	103.6	103.3	104.9	106.8	109.0	111.3	114.5	117.4	120.5	123.1
% change from prior year		1.6	2.0	-0.3	1.6	1.8	2.0	2.2	2.8	2.6	2.6	2.2
A.3. Gross Fixed Capital Formation	100.0	101.4	100.9	94.3	96.5	99.6	100.9	103.8	108.9	112.9	118.3	122.0
% change from prior year		1.4	-0.5	-6.5	2.3	3.2	1.4	2.8	4.9	3.7	4.8	3.1
A.4. Industrial Production	100.0	99.8	98.8	95.0	99.1	101.6	101.8	105.1	108.7	111.2	114.7	117.0
% change from prior year		-0.2	-1.0	-3.9	4.4	2.5	0.1	3.3	3.4	2.3	3.1	2.0
A.5. Iron&Steel Production	100.0	98.3	95.1	90.3	98.3	101.0	98.6	105.4	108.7	112.3	115.1	117.8
% change from prior year		-1.7	-3.2	-5.1	8.9	2.7	-2.4	7.0	3.1	3.3	2.5	2.3
A.6. Chemical Production	100.0	100.8	103.7	102.7	108.9	111.9	115.2	122.2	125.4	127.8	132.5	134.8
% change from prior year		0.8	2.9	-0.9	6.0	2.8	2.9	6.1	2.6	1.9	3.7	1.8
<b>B. EXCHANGE RATE</b>												
1 ECU = xx US\$	1.3	1.24	1.30	1.17	1.19	1.31	1.27	1.14	1.12	1.09	1.10	1.10
% change from prior year		-2.6	4.6	-9.6	1.4	10.1	-3.0	-9.9	-2.0	-2.8	1.0	0.0
<b>C. INTERNATIONAL ENERGY PRICES</b>												
Imported Crude Oil (EUR90/toe)	136.0	109.3	95.5	89.2	82.5	79.2	95.8	95.1	62.5	72.7	70.9	72.2
Imported natural Gas (EUR90/toe)	89.8	99.6	79.1	77.6	71.8	70.1	69.5	76.6	68.6	62.0	65.8	64.2
Imported Steam Coal (EUR90/toe)	77.7	71.4	65.5	54.6	51.9	57.8	54.7	52.3	46.9	48.9	48.4	48.2
<b>D. WEATHER</b>												
Degree Days	2141	2549	2357	2354	2126	2202	2486	2185	2167	2233	2457	2457
% change from prior year		19.0	-7.5	-0.1	-9.7	3.6	12.9	-12.1	-0.8	3.0	10.0	0.0

unscathed under the influence of growing real income and buoyant consumer confidence which contrasts sharply with the negative mood in industry.

Some South East Asian countries may be starting to climb out of the trough, but the devaluation of the Brazilian Real underlined the fragility of the emerging markets and tipped Latin America into recession. In Japan, despite the fiscal stimulus injected and measures taken to reform the banking system, the economy will be facing another, albeit smaller, contraction this year. The Russian crisis is sharper than foreseen and is having a greater impact on the Central and Eastern European countries. All this has led to a further deterioration of the international environment which the good news coming from the US could not offset. However, the world economy is expected to recover gradually, so that by 2000 it will no longer exert a negative influence on the European Union.

The general government deficit (-1.5 % of GDP in the European Union) turned out better than expected in 1998, mainly thanks to stronger growth and lower interest rates. The underlying budgetary positions, however, did not show significant improvements. Based on the measures in national budgets presented by the Member States the general government deficit should remain at 1.5% of GDP in 1999 and should see a small reduction in 2000 to 1.3 % for the European Union as a whole.

Among demand components, net exports and equipment investment are likely to suffer most in 1999 while consumption and construction should prove more robust. Indeed, the external shock which affects the European economies has asymmetric effects across economic agents: positive for consumers but negative for industrial producers, while the service sector is relatively sheltered. In 1999 both exports and imports of goods and services are forecast to slow further towards 3.5% and 4.7% respectively. Finally, private consumption should remain relatively strong. Unemployment is likely to continue declining because negative developments in industry are more than offset by positives ones





in the services sector; declining inflation boosts purchasing power; lower interest rates foster consumption. According to the forecast, private consumption should grow by 2.6% in 1999.

As regards 2000, a rebound in EU GDP growth to 2.7% is forecast, assuming robust domestic forces and a gradual improvement in the world environment. In sharp contrast to the years 1994-97, when trade exerted a strongly positive influence on GDP growth and helped sustain activity, the European Union will have to rely mainly on its own forces to realise the rebound. As already seen, private consumption is expected to be practically unscathed by the slowdown, which provides a robust outlook for producers. The slowdown in output growth is assumed to be only temporary and limited to the manufactured goods sector.

The weather effect is measured using so-called degree-days, which are a function of temperature. After one warm year in 1998 the temperature is assumed, after considering preliminary information available for the beginning of 1999, to return to the long-term average causing an increase of 3% in this coldness indicator for the year 1999, and 10% for the year 2000.

## METHODOLOGICAL NOTE

The forecasts are made with a neural network system. The system was constructed to estimate and forecast final demand of energy by fuel (13 aggregates) on a monthly basis. The energy balance is produced based on technical data (e.g. electricity generation capacity) and information from Member States about their primary energy production. This work has been completed with the assistance of Muse srl using the "Insights" computer program developed by Pavilion Technologies NV/SA.

The data used are monthly deliveries to final consumers as provided by Eurostat. There may be some notable differences compared to annual energy balances. To quantify them, total annual energy consumption computed from monthly data is on average 1% below the final yearly data, excluding biomass. But, for some fuels or some years, differences can be more significant. All historical data before 1990 were revised in order to merge all official data now available for ex-GDR by the SOEC.

## RESULTS

### 1. Energy prices

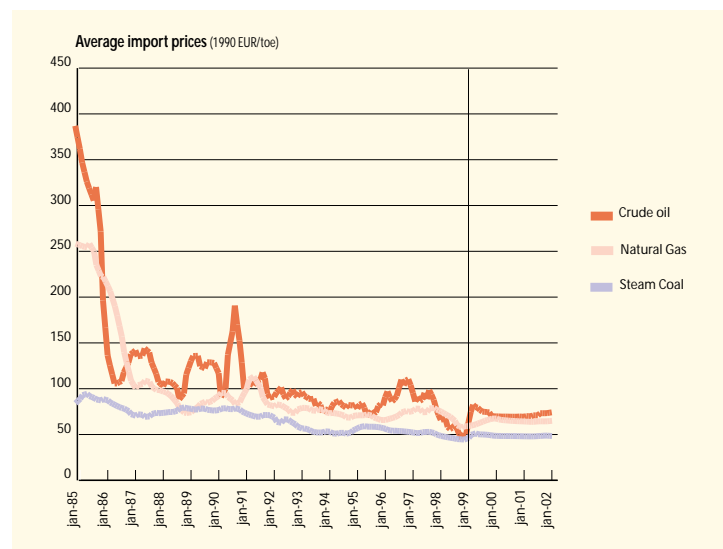
Different forms of energy can often act as substitutes for each other. Consequently, their prices also affect one another. Oil has a

long history of being the price leader in world energy markets causing quick changes in all energy prices but, on the other hand, itself being much more slowly affected by prices and demand for other forms of energy. In the forecast it is expected that the price of natural gas will broadly follow the evolution of the crude oil price but with a six month lag.

**Energy prices in final consumer markets** (including excise duties and VAT) are influenced by the changes in corresponding international markets. Between 1990 and 1995 prices for oil products and natural gas declined in line with crude prices on international markets. Increasing crude oil prices in 1996, reinforced in the first months of 1997 by higher US\$ exchange rates, reversed this trend. The first months of 1998 saw a rapid decline in oil prices reflected in the price evolution. The forecast period assumes a recovery of oil prices to about 14\$/bbl as an average for the whole year followed by a relative stabilisation until 2001. For the forecast period, average excise taxes are assumed to increase slowly in real terms.

The changes in gasoline and diesel prices are different. Despite declining crude oil prices between 1992 and 1995 gasoline and diesel prices have increased slowly since 1992 under the pressure of fiscal measures. Consequently, the 34% reduction of crude oil prices in 1998 resulted in only a 2% reduction in gasoline prices and 9% in diesel prices.

For industrial consumers, the downward trend of energy prices for natural gas and coal was largely amplified in 1998 and in 1999, considering the time lag delay (6 to 9 months) in the response to lower oil prices. Electricity prices, which fell by about 4% in 1998, will continue to decline slowly until 2001 under the pressure of the liberalised market.





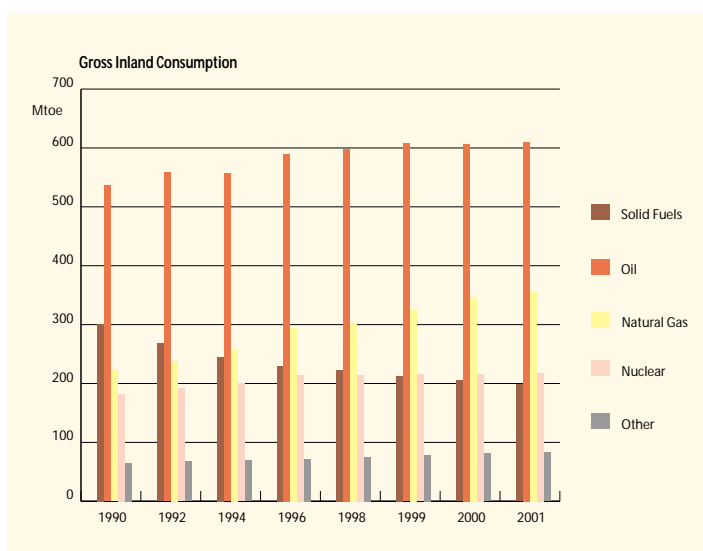


### FINAL CONSUMER ENERGY PRICES IN REAL TERMS

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
<b>A. Oil Products</b>												
Prices (EUR90/toe)												
Gasoline	982	1031	1012	1019	1049	1054	1055	1095	1071	1102	1121	1124
<i>Growth rate from previous period in %</i>		5.0	-1.9	0.7	2.9	0.5	0.1	3.8	-2.2	2.9	1.7	0.2
Diesel	547	567	544	562	562	554	580	584	538	565	586	590
<i>Growth rate from previous period in %</i>		3.6	-3.9	3.2	-0.1	-1.5	4.9	0.7	-8.0	5.0	3.8	0.6
Domestic Heating Oil	382	394	346	346	316	310	330	332	276	289	300	302
<i>Growth rate from previous period in %</i>		3.2	-12.1	-0.2	-8.6	-1.9	6.4	0.7	-17.0	4.8	3.9	0.5
Industrial Heating Oil	282	286	234	239	219	213	238	235	185	193	200	201
<i>Growth rate from previous period in %</i>		1.4	-18.0	2.1	-8.3	-2.8	11.7	-1.5	-20.9	4.3	3.4	0.5
Residual Fuel Oil	124	111	101	98	107	115	118	112	92	98	98	98
<i>Growth rate from previous period in %</i>		-10.6	-8.6	-3.1	9.2	7.4	2.1	-4.4	-18.6	7.3	-0.5	-0.1
<b>B. Natural Gas</b>												
Prices (EUR90/toe)												
Household	322	351	341	322	327	314	286	306	277	252	264	261
<i>Growth rate from previous period in %</i>		9.0	-3.0	-5.4	1.5	-4.1	-8.9	7.0	-9.5	-8.9	4.9	-1.3
Industry	139	135	126	119	116	115	120	128	100	90	93	91
<i>Growth rate from previous period in %</i>		-3.1	-6.6	-5.7	-2.1	-0.9	3.7	6.8	-21.6	-9.8	2.3	-1.3
<b>C. Coal</b>												
Prices (EUR90/toe)												
Household	308	310	307	299	301	302	301	297	284	291	290	289
<i>Growth rate from previous period in %</i>		0.6	-0.8	-2.8	0.8	0.3	-0.2	-1.5	-4.5	2.6	-0.3	-0.4
Industry	96	91	88	85	82	81	78	77	74	76	75	75
<i>Growth rate from previous period in %</i>		-5.0	-3.2	-2.8	-4.4	-1.3	-3.0	-1.3	-3.8	1.9	-0.2	-0.5
<b>D. Electricity</b>												
Prices (EUR90/100 kWh)												
Household	11.72	11.61	11.51	11.47	11.55	11.41	10.91	10.53	10.10	10.02	9.88	9.83
<i>Growth rate from previous period in %</i>		-0.9	-0.9	-0.3	0.7	-1.2	-4.4	-3.5	-4.0	-0.8	-1.5	-0.5
Industry	6.27	6.23	6.12	5.96	5.77	5.56	5.20	5.01	4.77	4.67	4.53	4.50
<i>Growth rate from previous period in %</i>		-0.6	-1.7	-2.6	-3.2	-3.6	-6.5	-3.6	-4.8	-2.0	-3.1	-0.6

## 2. Energy Demand

Based on monthly data, deliveries to final consumers in the European Union increased by about 2.1% in 1998, sustained economic growth being largely reinforced by low energy prices while climatic conditions remained constant compared to 1997. These deliveries will increase by 1.5% per year on average in the period 1999-2001, with a major growth by 2.1% in 1999 due to colder temperatures, continuation of low energy prices, mainly for gas, considering the time lag delay (6 to 9 months) in the price mechanism, and economic growth of 2.1%. Gross inland energy consumption increased by 1.8%, but is expected to increase by only 1.3% per year on average until 2001 due to increasing efficiency in the power sector. During the forecast period (1999-2001), gross inland energy consumption will increase by about 55 Mtoe but with very different evolution by fuel. Although oil's contribution will increase slowly by 12 Mtoe, absorbed by transportation demand, solid consumption will demonstrate a 25 Mtoe reduction, while natural gas consumption will increase by 56 Mtoe. The residual will be covered by non-fossil fuels (nuclear, hydro, wind, geothermal and biomass) with biomass contributing about 50%. Results show solid fuels steadily losing their share in



gross inland consumption from 23% in 1990 to 13.5% in 2001, being overtaken by nuclear in importance. The oil share, which increased slowly between 1990 (41%) and 1998 (42.5%), will decline slowly to reach 41.6% in 2001. Natural gas became the second most important fuel in 1993 and is the only fuel whose share will steadily increase, rising from 17% in 1990 to 21.4% in 1998 and



24.3% in 2000. The non-fossil fuel contribution increased from 19% in 1990 to 20.5% in 1998, and is expected to stay around this figure until 2001.

**Total domestic energy production** is expected to resume an upward trend as a result of moderate increases in both natural gas and crude production. On the other hand, solid fuel production, which declined by 7.5 % in 1998, is expected to continue its decline but a little more slowly. Non-fossil fuel energy sources are expected to continue to grow in the near future, at a slow rate for nuclear and hydro, but at a more sustained one for biomass and especially geothermal. Altogether, the share of net imports in total energy supply increased slightly from 47.5% in 1990 to 49.1% in 1998. As domestic energy production and gross inland consumption are expected to grow at a similar rate, the energy import dependency of the European Union is likely to be stable until 2001 at around 49.4%.

stable between 1993 and 1998 at around 110 Mtoe, will decline by 12.5% between 1999 and 2001. Industry and the domestic and tertiary sectors will also accelerate their switch away from coal, mainly due to its inconvenience of use and environmental pressures. In 1994, for the first time net imports of hard coal exceeded domestic production, and this trend will be maintained in the medium term; but it must be noted that, facing a substantial decline in gross inland consumption, coal imports will also start to decline in 1999.

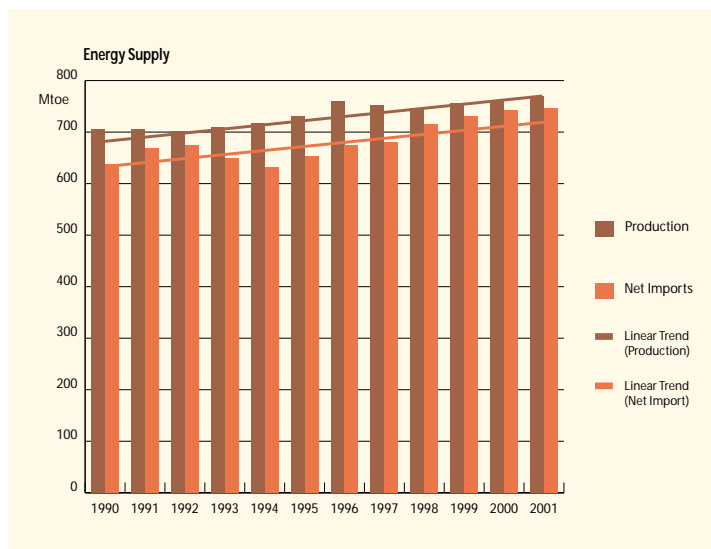
Production and consumption of **coke** is closely connected to the activity level of the iron and steel industry and, to a limited extent, some domestic and tertiary consumers. In all these sectors, demand for coke has been relatively stable since 1992 with limited fluctuation in relation to the iron steel production. In the forecast period, the sustained activity of the iron and steel sector will induce a stabilisation of consumption despite the progressive conversion to electric arc furnaces.

**Lignite** consumption showed a 42% reduction between 1990 and 1998 in two phases: a 40% reduction between 1990 and 1995 due to the restructuring of the new Länder in Germany, followed by a very slow decline. This restructuring mainly affected deliveries to final consumers, while consumption by power generation declined slowly to become by far the major market for lignite consumption. In the near future, lignite will continue its slow decline, as the consumption of the power sector will be reduced by only 5% between 1999 and 2001. On the other hand, deliveries to final consumers will decline by 10% in accordance to the 1990-98 trend - leading to such final consumption becoming marginal.

## Oil

**Gross inland oil consumption** is expected to increase slowly between 1998 and 2001. Domestic production of crude oil is expected to continue to grow, although slowly, to meet 27% of gross inland consumption in 2001 compared to only 22% in 1990. Since 1993 refinery output has exceeded total domestic demand, with an excess of about 5% for export, including bunkers. This figure is expected to increase a little until 2001.

**Deliveries to final consumers** will increase slowly by 0.8% per year on average in the forecast period. Transport demand dominates the oil sector. Its share peaked in 1995 with 45% of total oil consumption and stabilised until 1998. The forecast period expects the share of transport in gross inland oil consumption to recover, reaching 46% in 2001. In fact, 81% of increasing consumption by final users will be for transportation fuel. Gasoline consumption is foreseen to increase slowly (0.3% per year on average) over this period, although diesel consumption



## Solid Fuels

Total demand for **hard coal** has decreased steadily since 1990. The economic recession of 1993 accelerated this downward trend and solid fuel demand dropped sharply (10%) during that year. Between 1993 and 1998 demand dropped by 1.6% per year on average. The downward trend is expected to accelerate in the near future displaying an average annual decline of 4.9% between 1998 and 2001. The power generation sector is the driving force for hard coal demand. Faced with an ageing stock of power plants, reinforced by the competition from natural gas for both economic and environmental reasons, hard coal will lose market share in the electricity market, mainly in the United Kingdom, Germany, Denmark and Italy. This evolution will be reinforced with the growing liberalisation of the electricity market in the European Union. Consumption by the power sector, relatively



SUMMARY ENERGY BALANCE (MTOE)												
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
<b>Production</b>												
Solid Fuels	210.4	189.8	176.5	155.9	136.5	135.3	130.3	125.1	115.7	114.0	111.8	109.7
Hard Coal	121.1	117.7	111.8	95.8	79.4	81.7	77.4	73.6	64.2	63.1	62.0	60.9
Lignite	89.4	72.1	64.8	60.1	57.1	53.6	52.9	51.5	51.5	51.0	49.8	48.8
Oil	116.6	116.1	119.6	124.6	153.4	156.5	158.1	155.0	160.0	162.3	164.8	167.1
Natural Gas	132.5	144.8	146.6	157.4	158.7	164.5	185.3	181.2	180.9	185.4	188.5	190.9
Heat	184.4	190.6	194.2	203.1	202.1	206.8	217.5	219.6	217.3	219.2	221.0	222.7
Nuclear	182.1	188.3	191.7	200.5	199.7	204.4	214.8	216.8	214.3	215.1	216.5	218.2
Geothermy	2.3	2.3	2.5	2.6	2.5	2.5	2.7	2.8	3.0	4.1	4.5	4.5
Primary Electricity	23.5	24.5	26.1	26.6	26.8	26.7	26.5	27.5	27.6	28.1	28.3	28.5
Other	38.9	40.6	39.4	40.7	40.2	41.2	42.7	43.7	44.8	46.2	48.0	50.0
Total	706.4	706.4	702.4	708.4	717.8	731.1	760.3	752.2	746.1	755.3	762.4	768.9
<i>Growth rate from previous period in %</i>		0.0	-0.6	0.9	1.3	1.9	4.0	-1.1	-0.8	1.2	0.9	0.9
<b>Net Imports</b>												
Solid Fuels	88.4	97.8	98.7	84.8	88.2	93.9	94.2	100.0	105.9	97.3	92.3	87.2
Hard Coal	85.5	94.3	95.7	81.2	84.3	89.0	89.9	94.9	99.0	90.1	84.8	79.4
Oil	454.1	475.2	478.0	468.3	443.8	449.0	469.7	465.0	486.2	490.1	489.1	491.8
Natural Gas	92.4	94.4	95.2	94.3	98.4	108.8	110.9	115.0	120.8	141.3	160.4	165.4
Electricity	2.2	1.3	1.6	2.0	1.6	1.5	0.1	0.5	1.9	1.3	1.2	1.8
Total	637.1	668.7	673.5	649.5	632.0	653.2	674.8	680.4	714.8	730.0	743.1	746.2
<i>Growth rate from previous period in %</i>		5.0	0.7	-3.6	-2.7	3.4	3.3	0.8	5.0	2.1	1.8	0.4
<b>Bunkers</b>												
Petroleum Products	35.2	35.1	35.8	36.7	35.5	35.2	38.1	41.0	42.3	43.2	44.1	44.9
<b>Gross Inland Consumption</b>												
Solid Fuels	301.5	286.5	267.8	243.0	244.7	235.8	230.0	224.5	222.8	212.7	205.4	198.1
<i>Growth rate from previous period in %</i>		-5.0	-6.5	-9.2	0.7	-3.7	-2.5	-2.4	-0.7	-4.5	-3.5	-3.5
Hard Coal	209.2	211.2	200.8	179.1	182.2	176.5	172.9	167.8	165.5	155.3	148.9	142.3
Coke	1.9	2.0	0.9	2.6	5.1	5.0	3.2	4.6	5.1	5.6	5.9	6.2
Lignite	90.5	73.3	66.1	61.3	57.4	54.3	53.9	52.1	52.3	51.8	50.6	49.6
Oil	536.2	553.8	558.6	557.2	556.9	575.0	590.0	578.7	598.0	607.3	607.0	610.5
<i>Growth rate from previous period in %</i>		3.3	0.9	-0.2	-0.1	3.2	2.6	-1.9	3.3	1.5	0.0	0.6
Natural Gas	221.9	239.1	238.4	251.3	257.3	270.9	294.1	292.9	301.5	324.9	347.1	357.0
<i>Growth rate from previous period in %</i>		7.7	-0.3	5.4	2.4	5.3	8.6	-0.4	2.9	7.7	6.9	2.8
Heat	184.4	190.6	194.2	203.1	202.1	206.8	217.5	219.6	217.3	219.2	221.0	222.7
<i>Growth rate from previous period in %</i>		3.3	1.9	4.6	-0.5	2.3	5.1	1.0	-1.1	0.9	0.8	0.8
Nuclear	182.1	188.3	191.7	200.5	199.7	204.4	214.8	216.8	214.3	215.1	216.5	218.2
Geothermy	2.3	2.3	2.5	2.6	2.5	2.5	2.7	2.8	3.0	4.1	4.5	4.5
Primary Electricity	23.5	24.5	26.1	26.6	26.8	26.7	26.5	27.5	27.6	28.1	28.3	28.5
<i>Growth rate from previous period in %</i>		4.1	6.5	2.0	0.9	-0.3	-1.0	3.9	0.2	1.9	0.8	0.8
Other	38.9	40.6	39.4	40.7	40.2	41.2	42.7	43.7	44.8	46.2	48.0	50.0
<i>Growth rate from previous period in %</i>		4.2	-3.0	3.4	-1.3	2.4	3.8	2.3	2.4	3.2	3.9	4.1
Total	1306.6	1335.1	1324.4	1322.0	1328.0	1356.4	1400.8	1387.0	1412.0	1438.4	1456.8	1466.8
<i>Growth rate from previous period in %</i>		2.2	-0.8	-0.2	0.5	2.1	3.3	-1.0	1.8	1.9	1.3	0.7
<b>Import Dependency (%)</b>												
Hard Coal	40.9	44.7	47.7	45.3	46.3	50.4	52.0	56.6	59.8	58.0	57.0	55.8
Oil	79.5	80.7	80.4	78.8	74.9	73.6	74.8	75.0	75.9	75.4	75.1	75.0
Natural Gas	41.6	39.5	39.9	37.5	38.2	40.2	37.7	39.3	40.1	43.5	46.2	46.3
Total	47.5	48.8	49.5	47.8	46.3	46.9	46.9	47.7	49.1	49.3	49.5	49.4
<i>Growth rate from previous period in %</i>		2.8	1.4	-3.5	-3.0	1.3	-0.1	1.6	3.1	0.3	0.5	-0.3
<b>Deliveries to Final Consumers (*)</b>												
Solid Fuels	96.2	81.4	70.1	62.4	58.1	51.6	50.6	48.3	47.1	45.8	44.5	43.0
Oil	468.3	476.6	481.3	482.8	483.7	498.7	505.5	507.3	522.5	528.7	531.3	536.0
Natural Gas	191.5	209.8	208.9	216.5	218.8	229.0	245.2	237.8	241.3	253.3	263.7	264.5
Derived Gases	15.9	15.3	13.8	12.6	12.5	12.7	11.9	12.8	11.4	11.1	11.6	11.4
Electricity	158.4	161.7	162.5	164.1	165.7	170.5	175.1	176.5	181.1	185.2	189.1	191.9
Biomass	33.8	35.2	34.1	35.3	34.7	35.4	36.3	37.2	38.1	39.1	40.1	41.1
Total	964.1	980.0	970.8	973.8	973.4	997.9	1024.5	1019.9	1041.4	1063.2	1080.2	1087.8
<i>Growth rate from previous period in %</i>		1.7	-0.9	0.3	0.0	2.5	2.7	-0.4	2.1	2.1	1.6	0.7

(\*) includes some deliveries to electricity autoproducers and non-energy consumption

N.B.: Differences between the numbers in the table and EU annual energy balances originate from the discrepancies between annual and monthly-based statistics



## SOLID FUELS : SUPPLY AND DISPOSAL (MTOE)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
<b>A. HARD COAL</b>												
Production	121.1	117.7	111.8	95.8	79.4	81.7	77.4	73.6	64.2	63.1	62.0	60.9
<i>Growth rate from previous period in %</i>		-2.8	-5.0	-14.3	-17.1	3.0	-5.3	-4.9	-12.8	-1.8	-1.8	-1.7
Net imports	85.5	94.3	95.7	81.2	84.3	89.0	89.9	94.9	99.0	90.1	84.8	79.4
<i>Growth rate from previous period in %</i>		10.4	1.5	-15.1	3.8	5.6	1.0	5.6	4.3	-9.0	-5.8	-6.4
Total supply	206.5	212.0	207.5	177.0	163.7	170.7	172.9	167.8	165.5	155.3	148.9	142.3
stock var	2.6	-0.8	-6.7	2.1	18.5	5.8	5.6	1.8	2.3	2.2	2.1	4.0
Gross Inland Consumption	209.2	211.2	200.8	179.1	182.2	176.5	172.9	167.8	165.5	155.3	148.9	142.3
<i>Growth rate from previous period in %</i>		1.0	-4.9	-10.8	1.7	-3.1	-2.0	-3.0	-1.4	-6.1	-4.2	-4.4
Transformation input	177.1	177.3	169.5	151.2	155.8	154.5	149.9	147.7	147.9	138.0	133.1	127.5
of which :												
Thermal Power generation	123.7	123.6	118.0	107.9	110.1	109.5	114.4	104.3	110.8	107.0	101.3	96.9
<i>Growth rate from previous period in %</i>		0.0	-4.6	-8.5	2.0	-0.5	4.6	-8.9	6.3	-3.4	-5.4	-4.3
Coking plants	38.6	44.6	40.8	37.8	35.9	37.7	35.5	33.9	31.2	28.1	29.2	28.1
<i>Growth rate from previous period in %</i>		15.4	-8.5	-7.4	-4.9	4.9	-5.7	-4.5	-8.2	-9.9	4.1	-3.9
Deliveries to final consumers	32.1	33.9	31.2	28.0	26.4	22.0	23.0	20.1	17.6	17.4	15.7	14.8
<i>Growth rate from previous period in %</i>		5.7	-7.9	-10.4	-5.7	-16.7	4.8	-12.7	-12.4	-1.3	-9.4	-5.7
<b>B. COKE</b>												
Net Imports	1.8	2.2	1.6	2.4	3.6	4.2	3.2	4.5	6.1	6.4	6.7	7.0
Gross Inland Consumption	1.9	2.0	0.9	2.6	5.1	5.0	3.2	4.6	5.1	5.6	5.9	6.2
Coking Plants Production	21.5	20.3	19.3	16.6	14.6	15.0	15.7	16.0	16.1	14.5	15.1	14.5
Deliveries to Final Consumers	23.4	22.3	20.2	19.2	19.7	20.0	18.8	20.1	21.2	20.1	21.0	20.7
<i>Growth rate from previous period in %</i>		-4.7	-9.3	-4.8	2.6	1.1	-5.6	6.7	5.6	-5.2	4.5	-1.4
<b>C. LIGNITE</b>												
Production	89.4	72.1	64.8	60.1	57.1	53.6	52.9	51.5	51.5	51.0	49.8	48.8
Gross Inland Consumption	90.5	73.3	66.1	61.3	57.4	54.3	53.9	52.1	52.3	51.8	50.6	49.6
<i>Growth rate from previous period in %</i>		-19.0	-9.8	-7.3	-6.3	-5.4	-0.8	-3.4	0.4	-1.0	-2.3	-2.0
Transformation Input	49.8	48.1	47.3	46.1	46.1	44.7	44.8	43.4	43.7	43.2	42.6	41.9
Public Power Generation	48.1	47.3	46.5	45.4	45.5	44.2	44.3	43.0	43.4	42.9	42.3	41.6
<i>Growth rate from previous period in %</i>		-1.7	-1.6	-2.5	0.3	-3.0	0.2	-3.0	1.1	-1.2	-1.4	-1.7
Deliveries to Final Consumers	40.8	25.2	18.6	15.2	12.0	9.6	8.7	8.1	8.2	8.3	7.7	7.4
<i>Growth rate from previous period in %</i>		-38.1	-26.1	-18.4	-21.3	-19.5	-9.4	-7.0	1.6	0.3	-6.9	-3.9
Of which electricity autoproduction	4.7	4.8	3.5	3.0	2.6	2.4	1.7	1.5	1.4	1.3	1.2	1.1

N.B. : Differences between the numbers in the table and EU annual energy balances originate from the discrepancies between annual and monthly-based statistics

will increase by about 1.5% per year between 1998 and 2001. This is due to the increasing contribution goods transport by road and the confirmation of the progressive dieselisation of the car fleet. Aviation kerosene use, after the jump registered in the mid-90's as a consequence of the liberalisation of air markets, will continue to increase between 1998-2001 but at a more limited rate of 3.7% per year on average compared to 5.6% per year over the last three years.

Heating gas oil, faced with the competitiveness of natural gas in the household heating and industrial markets, will manage to stabilise its contribution in growing markets. Finally, the fall in fuel oil consumption by industrial users, a 23% reduction over the last three years, will continue at a rate of about 4.4% per year on average mainly as a result of price competition and environmental constraints. This situation will be mirrored in the **power sector** where the reduction will reach 4.7% per year on average due to

major conversion from oil to gas in Italy and decommissioning of older oil-fired plants in some other member states.

Driven by petrochemical consumption, the contribution of other products will continue to increase but there, also, the competition with natural gas will slow down the growth rate to 1.3% per year on average over the forecast period compared to about 3.5% over the last three years.

As a consequence of these developments, refinery output will be more oriented to the gas oil cut (gas oil and kerosene together), although the share of the bottom of the barrel, including bitumen and assimilated products, will still be reduced to represent less than 15% in 2001. Given the increasing environmental quality requirements for all oil products this will favour the profitability of complex refineries.



### OIL AND NATURAL GAS : SUPPLY AND DISPOSAL (MTOE)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
<b>A. OIL</b>												
<b>A.1. Supply</b>												
Primary Production	116.6	116.1	119.6	124.6	153.4	156.5	158.1	155.0	160.0	162.3	164.8	167.1
Crude	113.8	112.6	115.3	119.8	152.7	155.8	157.6	154.7	159.3	161.7	164.2	166.4
Oil Products	2.8	3.5	4.3	4.9	0.7	0.7	0.5	0.4	0.7	0.7	0.7	0.7
Net Imports	454.1	475.2	478.0	468.3	443.8	449.0	469.7	465.0	486.2	490.1	489.1	491.8
Bunkers	35.2	35.1	35.8	36.7	35.5	35.2	38.1	41.0	42.3	43.2	44.1	44.9
Gross Inland Consumption	536.2	553.7	558.6	557.9	556.9	575.0	590.0	578.7	598.0	607.3	607.0	611.5
<i>Growth rate from previous period in %</i>		3.3	0.6	-2.0	-5.2	1.2	4.6	-1.9	3.3	1.5	0.0	0.6
Transformation Energy Consumption	68.0	77.1	77.3	75.0	73.2	76.2	84.6	77.2	78.3	78.5	75.7	74.5
Refineries Input	555.6	572.6	590.5	612.3	630.4	627.0	646.0	655.1	667.6	675.8	679.0	685.1
Refineries Net Output	531.7	541.8	560.6	580.4	598.8	594.7	613.0	621.6	633.6	641.2	644.3	650.1
Power Generation input	44.0	46.3	47.3	43.2	41.6	43.9	42.7	39.2	40.0	38.5	36.8	34.7
<b>A.2. Final Consumers</b>												
Total	468.3	476.6	481.3	482.8	483.7	498.7	505.5	507.3	522.5	528.7	531.3	536.0
<i>Growth rate from previous period in %</i>		1.8	1.0	0.3	0.2	3.1	1.4	0.4	3.0	1.2	0.5	0.9
Motor Gasoline	123.3	125.1	127.7	125.5	123.4	122.0	121.9	121.7	123.9	124.7	125.3	125.2
<i>Growth rate from previous period in %</i>		1.4	2.1	-1.8	-1.7	-1.1	0.0	-0.2	1.9	0.6	0.5	-0.1
Kerosene	30.0	29.8	32.1	33.6	35.7	37.2	39.3	41.0	43.8	45.6	47.4	48.9
<i>Growth rate from previous period in %</i>		-0.6	7.7	4.7	6.2	4.2	5.6	4.3	7.0	3.9	4.1	3.0
Gasoil (total)	186.4	197.7	197.4	207.7	206.2	210.6	220.9	219.6	223.5	227.4	226.2	229.7
<i>Growth rate from previous period in %</i>		6.0	-0.1	5.2	-0.7	2.2	4.9	-0.6	1.8	1.7	-0.5	1.5
Automotive Diesel	92.8	97.2	101.8	101.0	109.5	111.0	110.2	113.9	117.7	120.0	122.3	123.1
<i>Growth rate from previous period in %</i>		4.7	4.7	-0.7	8.4	1.4	-0.7	3.4	3.3	2.0	1.9	0.6
Heating gas oil	93.6	100.4	95.7	106.7	96.7	99.6	110.7	105.7	105.9	107.3	103.9	106.6
<i>Growth rate from previous period in %</i>		7.3	-4.8	11.5	-9.4	3.1	11.2	-4.6	0.2	1.4	-3.2	2.6
Heavy fuel oil	35.3	35.5	34.4	35.9	35.7	34.2	30.2	27.8	26.2	24.8	24.2	22.9
<i>Growth rate from previous period in %</i>		0.8	-3.2	4.2	-0.4	-4.1	-11.7	-8.1	-5.7	-5.3	-2.3	-5.4
Other Products	93.2	88.5	89.7	80.2	82.7	94.7	93.2	97.4	104.9	106.3	108.1	109.2
<i>Growth rate from previous period in %</i>		-5.1	1.3	-10.6	3.2	14.5	-1.6	4.5	7.8	1.3	1.7	1.1
<b>B. NATURAL GAS</b>												
Primary Production	132.5	144.8	146.6	157.4	158.7	164.5	185.3	181.2	180.9	185.4	188.5	190.9
Net Imports	92.4	94.4	95.2	94.3	98.4	108.8	110.9	115.0	120.8	141.3	160.4	165.4
Gross Inland Consumption	221.9	239.1	238.4	251.3	257.3	270.9	294.1	292.9	301.5	324.9	347.1	357.0
<i>Growth rate from previous period in %</i>		7.7	-0.3	5.4	2.4	5.3	8.6	-0.4	2.9	7.7	6.9	2.8
Transf. Input & Own Consump.	30.5	29.4	29.5	34.8	38.5	41.9	49.3	55.4	59.9	71.2	83.1	90.1
<i>Growth rate from previous period in %</i>		-3.6	0.5	18.0	10.6	8.8	17.7	12.2	8.1	18.9	16.7	8.5
Own consumption	6.7	6.9	7.1	7.7	8.6	9.0	9.4	9.0	9.1	9.4	9.5	9.6
Public Power Generation	23.8	22.5	22.4	27.1	30.0	32.9	39.6	46.0	50.3	61.4	73.1	80.0
Available for Final Consumption	191.5	209.8	208.9	216.5	218.8	229.0	245.2	237.8	241.3	253.3	263.7	264.5
<i>Growth rate from previous period in %</i>		9.6	-0.4	3.6	1.0	4.7	7.1	-3.0	1.4	5.0	4.1	0.3
of which electricity autoproduction	7.5	7.9	8.1	8.8	9.5	11.2	12.3	13.6	15.3	16.8	17.9	19.1

N.B. : Differences between the numbers in the table and EU annual energy balances originate from the discrepancies between annual and monthly-based statistics

## Natural Gas

**Natural gas demand** has increased by 3.9% since 1990, with a jump of 8.6% in 1996 due to climatic conditions. In 1998, despite warmer weather, gas consumption still increased by 2.9%. Between 1990 and 1998, with similar climatic conditions, about 75% of the total increase in gross inland consumption was met by gas. The main reasons were higher consumption in power generation (+27 Mtoe), an accelerating trend since 1995, and final consumption sectors (+50 Mtoe). Over the forecast period, natural gas demand is anticipated to increase by 5.7% annually with

major increases in 1999 (+7.7%) and 2000 (+6.9%) due to the climate effect and a more moderate growth in 2001 (+2.8%).

During the forecast period, the bulk of the increase in gas consumption comes from the power sector where gas use increases by 16.7% per year on average. This results both from the liberalisation of the electricity market, favouring combined cycle investment, and environmental concerns leading to repowering and conversion of coal- and oil-fired units to natural gas. Additionally, the new development of smaller sized plants by