





### CIS: Major trends (1980-1997)

- Substantial variations between different statistical energy and economic data sources
- Total decline of GDP by about 40% between 1990 and 1996 will continue until 2001 at least
- Considering statistical series disruptions, final energy consumption fell by about 25% between 1990 and 1996
- Since 1990 tertiary-domestic energy consumption increased by 6% while transport and industry decreased by about 50%
- Share of electricity was quite stable with a large potential from domestic appliances
- Gross inland energy consumption, met about 50% by natural gas, declined more slowly since 1995
- Russia remained the biggest energy producer in the world after the United States and China
- Efforts to rationalise the coal industry were hampered by the payment arrears of large consumers
- Crude oil production experienced an upturn in 1997
- Large potential of Caspian Basin still limited by the development of pipeline infrastructure
- CIS became the world's second largest gas producer in 1997, overtaken by the United States
- CIS represented about 23% of the world's fossil fuel reserves
- Electricity generation dominated by thermal power and more specifically by gas
- Power sector faces financial crisis while low tariffs and subsidies continue
- Refining industry in need of rationalisation and upgrading
- Energy intensity increased by 17% since 1990 and the near future appears unfavourable
- CO<sub>2</sub> emissions have fallen by 37% since 1990
- Energy exports peaked in 1996

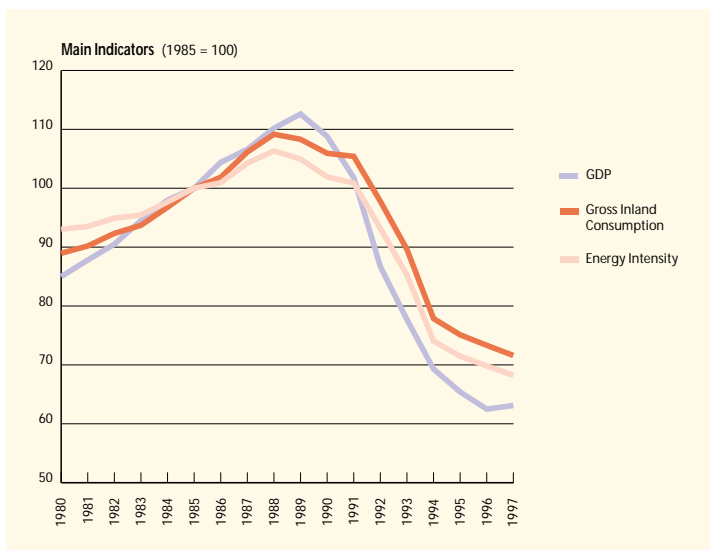
The Community of Independent States (CIS) includes the following twelve republics: Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine and Uzbekistan. In addition, as consolidated energy balances do not exist for Baltic countries before 1992, they are included in the total energy balances; if available, the contribution of these countries has been identified explicitly. As the contribution of these countries was limited to only 2% of the total gross inland consumption of the former USSR, the effect of this aggregation is limited.

*Substantial variations between different statistical energy and economic data sources...*

Energy and macroeconomic data for all these republics are sometimes of dubious quality, and consequently comments are made on significant trends rather than relying on absolute values to draw analytical conclusions. In particular, the statistical systems of the republics are currently ill-equipped to identify activity in the private sector. This has two effects: firstly, to underestimate GDP as a whole and, secondly, to understate the share of activity of the service sector. Since the service sector is generally less energy intensive than industry, a failure correctly to register activities from this sector has resulted in aggregate energy intensity being seriously overestimated. In addition, some statistical series suffer from major time disruptions; and discrepancies still remain between the sum of all Republics and statistical data for the CIS as a whole, even for recent years.

*Total decline of GDP by about 40% between 1990 and 1996 will continue until 2001 at least...*

The Russian Federation and other independent states, apart from the Baltics, have been in trouble since the beginning of their transition period. As a whole, GDP declined by about 37% between 1990 and 1997 even though the first signs of stabilisation appeared in 1997. Russia, whose economy dominates the CIS, accounts for slightly more than 65% of total GDP. It demonstrated a first stabilisation in 1997, after a total decline of about 40% between 1990 and 1996. Ukraine, the second largest economy with just 15% of



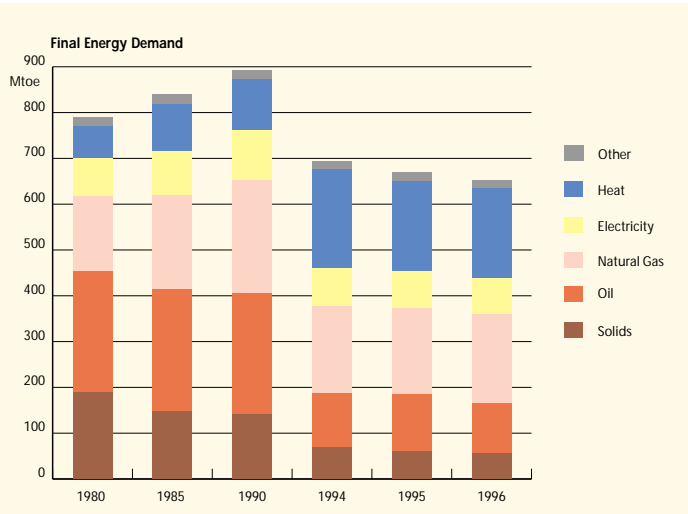


total GDP, lags behind Russia, with a 3.2% decline in 1997 and a 51% decline since 1990. On the other hand, other republics demonstrated more sustained economic growth since 1980, with the exception of Turkmenistan. In 1997, the general perception of economic forecasts was in favour of a progressive recovery in the near future. But the deterioration of the Russian economy in mid 1998 has led to some substantial downward revisions of economic projections. The lower expectations are caused by the August 1998 devaluation of the Russian rouble, the defaults of public and private debts, the collapse of the Russian banking system, the worsening political situation for Boris Yeltsin and any potential successor and expected changes in monetary policy which raise the possibility of hyperinflation. In 1997, most forecasting sources were projecting positive growth in Russia's GDP in 1998, like other republics, and accelerating recovery in the years to follow. However, in October 1998, PlanEcon radically revised its GDP forecast for Russia for 1999 from +4.2% to -5%, with no positive GDP growth expected before 2001.

## ENERGY OUTLOOK

*Considering statistical series disruptions, final energy consumption fell by about 25% between 1990 and 1996...*

**Final energy demand** peaked in 1989 at 908 Mtoe but, since then, has experienced an accelerated decline down to 652 Mtoe in 1996, a fall of more than 31% over 7 years. But this observation needs to be placed in context. In fact, statistical series were somewhat disrupted as the accounting of heat generation produced by local heating plants has improved since 1992. As a result of this, since 1992 heat consumption was accounted at the final stage instead of by the fuels used to produce it; and, as a consequence, production losses were reported in the transformation sector. The volume of additional heat averaged 130 Mtoe. That



## Main items

The progressive dismemberment of the former Soviet Union since 1990 has led to grave, and sustained, economic collapse and continuing political uncertainty in the CIS. Real GDP, industrial production and living standards have seriously deteriorated – though poor economic data and a thriving informal and barter economy make precise performance measurement difficult. Economic transition in most of the CIS has been beset with huge problems. The merits of further western-style reforms, such as liberalisation and privatisation, remain in political dispute; efforts to stabilise currencies and control inflation have been undermined by recent economic events; creation of private banking, service and industrial enterprises has been set back; salaries and bills remain unpaid; debts have accumulated; and inward investment flows heavily curtailed. Yet the CIS is a crucial player on EU and world energy markets, with huge reserves of coal, oil and especially gas. Despite recent output declines, oil and gas exports account for some 40% of Russian export revenues and hard currency earnings. Lower real petroleum prices have had a serious impact. In future, gas exports are planned to rise considerably, especially to the EU and eastern and southern Europe. Despite the economic turmoil, greater foreign investment in gas production expansion has been secured; and several major pipeline projects are under construction. However, the coal industry is being painfully restructured; older nuclear reactors in the CIS give cause for safety concerns; and plant decommissioning and nuclear waste disposal have yet to be adequately addressed. The CIS suffers from severe environmental degradation and pollution. Steeply declining output, especially in energy-intensive industries, has led to lower emissions. Continued structural reform, and adjustment of energy prices to reflect costs, will further lower energy and carbon intensity in future. As a result, the CIS could benefit from substantial credits in any carbon trading schemes which might be developed following the 1997 Kyoto Protocol.

corresponds to about 30 Mtoe of losses reported in the transformation sector. Even allowing for this statistical adjustment, final energy demand still experienced a decline of about 24% between 1990 and 1996.

With this modification of heat accounting since 1992 it is difficult to evaluate precisely the evolution of consumption by fuel since 1990. On the period 1992-1996 for which consistent data were available, total final energy demand fell continuously. Those fuels delivered by a fixed infrastructure (gas, electricity and heat) decli-



ned less rapidly than fuels that require physical deliveries (solid fuels and oil). In total the demand fell by 228 Mtoe over these five years; mainly oil products (92 Mtoe or 44% reduction), followed by distributed heat (49 Mtoe or 20%), solids (41 Mtoe or 42%), electricity (23 Mtoe or 22%) and gas (16 Mtoe or 7%). These trends were in line with the internal energy policies, which favoured reserving oil for export and concentrating internal consumption on gas.

in this region suggest that the average distance travelled per vehicle has fallen dramatically in recent years.

*Share of electricity was quite stable with a large potential from domestic appliances....*

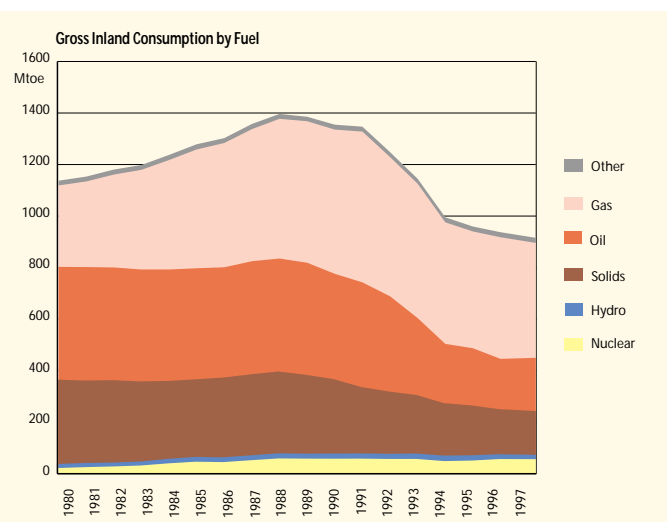
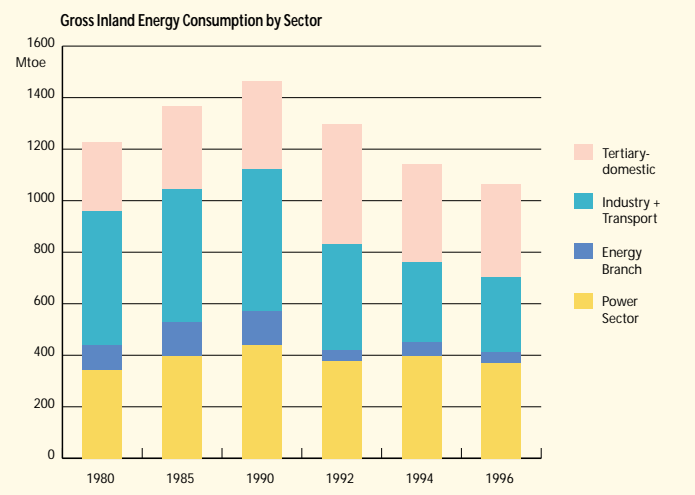
**The electricity share** in final consumption has been quite stable since 1985; but the growth of residential demand remained limited. Household appliances such as televisions and refrigerators are already in widespread use. Other devices such as video recorders and freezers are rarer, while appliances such as fully automated washing machines, clothes dryers and dish washers are virtually unknown. There is great scope for the introduction of these products with any improvement of living standards, but their use is also subject to space constraints in household accommodation. The low level of maximum power demand currently available in some apartments also strictly limits the development of larger electricity using appliances. About 85% of electricity connections require modernisation to accommodate larger electricity consuming items such as washing machines. Much of the housing stock is limited to a maximum demand of 1.3 kW per apartment. Overcoming this constraint will take considerable investment and time.

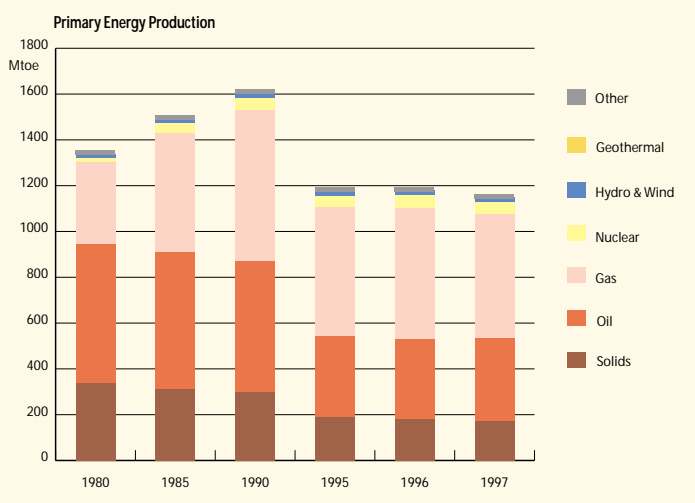
*Since 1990 tertiary-domestic energy consumption increased by 6% while transport and industry decreased by about 50%...*

In 1990, the last year of the Soviet energy data system, industry represented about 48% of total final demand, buildings 24%, transport 15% and agriculture and other uses 13%. Since then, considering the lack of coherent data, it can be estimated that the industry and transport shares have been reduced by about 45% and 56% respectively whereas the residential share increased by about 6%. Demand in the residential sector tends to be unresponsive to price changes partly due to the absence of metering and control equipment, non-payment of bills and the lack of debt enforcement. Furthermore, residential energy demand appears to be quite unresponsive to falls in income. In addition, in several parts of the region, household consumption of gas and electricity is either unmetered or sold at very low prices, thus limiting price-related incentives to reduce consumption. As a consequence, since 1992, the tertiary-domestic sector largely dominated the final demand of energy with about 55% of total demand in 1996, compared to 35% for industry and only 10% for transport. In 1993, it was estimated that there were less than 18 million private cars in the CIS, or about 60 cars per 1000 inhabitants. There has been a rapid expansion of the car fleet over the past few years but passenger car ownership remained considerably lower than in the OECD countries. In addition, data on kilometres driven per vehicle

*Gross inland energy consumption, met about 50% by natural gas, declined more slowly since 1995...*

**Gross inland energy consumption**, after a peak of 1394 Mtoe in 1988, fell to only 911.1 Mtoe in 1997 or a 35% total drop over 9 years. The decline was very rapid between 1991 and 1994, with a reduction by about 10% each year on average, but has slowed down over the last three years. The reduction, however, was not the same for all primary fuels as already illustrated by the evolution of final consumption. Solids and oil demand decreased systematically since 1980, and very rapidly after the reforms of 1990





(-7.4% on average per year for solid fuels and -9.3% for oil). For the first time since 1987, oil consumption increased again by 5.8% in 1997. On the other hand, natural gas consumption has steadily increased during the 1980's to become the largest source of energy since 1985. Since 1990 gas consumption dropped on average

by 3.2% per year, slower than gross inland energy consumption. Consequently, gas consumption accounted for about half of gross inland consumption in 1997. Other forms of energy consumption were met mainly by nuclear energy, with limited contributions from both hydro and renewable energy. Nuclear energy saw a significant increase in consumption between 1980 and 1988, stagnated until 1993, fell by 15.5% in 1994 but recovered gradually to its 1993 level in 1997. The contribution of hydro has been stable since 1985 at about 20 Mtoe although there is a large potential for expansion.

*Russia remained the third biggest energy producer in the world after the United States and China...*

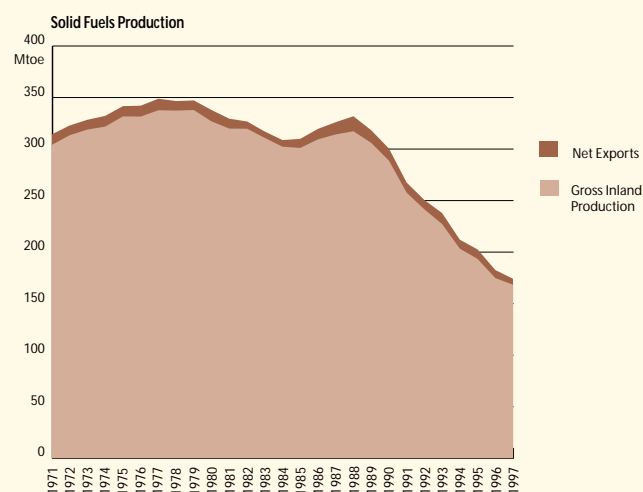
The CIS as a whole remains the second biggest energy producer in the world after the United States and just ahead of China, and the world's leading producer and exporter of natural gas. CIS republics produce all types of primary fossil fuels, although they are not equally distributed. In 1997, Russia accounted for 79% of total energy production, but 58% of solid fuels production, 85% of oil production, 84% of gas production, 55 % of nuclear electricity

**CIS(1) : TOTAL ENERGY**

Mtoe	1980	1985	1990	1994	1995	1996	1997	85/80	90/85	95/90	96/95	97/96
Annual % Change												
<b>Total Production</b>	1357.9	1513.0	1624.3	1228.6	1195.0	1198.0	1169.5	2.2%	1.4%	-6.0%	0.2%	-2.4%
Armenia	1.3	1.5	0.1	0.3	0.2	0.7	0.5	3.5%	-38.5%	13.0%	202.2%	-28.4%
Azerbaijan	26.1	24.7	20.4	14.9	14.7	14.4	13.6	-1.1%	-3.8%	-6.3%	-2.3%	-5.1%
Belarus	3.7	5.4	4.3	3.5	3.3	3.1	3.1	7.9%	-4.6%	-5.0%	-4.9%	-0.6%
Georgia	4.9	1.9	1.6	0.5	0.6	0.7	0.7	-17.4%	-3.4%	-18.7%	24.1%	-1.5%
Kazakhstan	79.7	82.9	86.1	69.7	61.9	62.0	65.7	0.8%	0.7%	-6.4%	0.1%	6.0%
Kyrgyzstan	2.3	2.2	2.3	1.6	1.4	1.4	1.5	-0.3%	0.4%	-9.6%	4.3%	7.4%
Moldova	0.1	0.1	0.1	0.1	0.1	0.1	0.1	-7.1%	-5.7%	-1.0%	6.6%	-2.7%
Russia	976.5	1132.6	1252.4	965.5	942.9	945.6	920.0	3.0%	2.0%	-5.5%	0.3%	-2.7%
Tajikistan	2.2	2.0	1.8	1.5	1.3	1.3	1.3	-1.4%	-2.0%	-6.3%	1.2%	-6.5%
Turkmenistan	65.1	73.3	74.5	32.6	32.5	32.6	25.1	2.4%	0.3%	-15.3%	0.0%	-22.7%
Ukraine	154.6	143.5	130.3	85.1	80.0	78.3	79.8	-1.5%	-1.9%	-9.3%	-2.1%	1.8%
Uzbekistan	32.8	32.2	38.5	44.9	47.1	47.3	47.8	-0.4%	3.7%	4.1%	0.3%	1.1%
Baltics (2)	8.7	10.8	12.3	8.3	8.7	10.4	10.2	4.3%	2.7%	-6.6%	19.6%	-1.9%
<b>Total Net Import</b>	-212.21	-219.18	-259.97	-227.25	-244.49	-276.56	-256.63	0.6%	3.5%	-1.2%	13.1%	-7.2%
<b>Total Gross Inland Consumption</b>	1131.9	1272.4	1351.2	990.9	955.7	933.0	912.0	2.4%	1.2%	-6.7%	-2.4%	-2.3%
Armenia	5.7	4.5	7.7	1.4	1.7	1.8	1.3	-4.5%	11.2%	-26.3%	7.2%	-25.0%
Azerbaijan	20.0	20.8	23.0	16.8	13.5	12.4	13.4	0.8%	2.0%	-10.1%	-8.4%	8.3%
Belarus	18.3	33.2	41.4	26.1	23.5	24.2	23.7	12.7%	4.5%	-10.7%	2.9%	-1.8%
Georgia	10.4	7.6	10.7	3.2	2.1	1.6	1.7	-6.0%	7.1%	-28.0%	-22.0%	2.7%
Kazakhstan	76.9	77.1	73.8	59.2	52.6	42.7	42.0	0.1%	-0.9%	-6.5%	-18.9%	-1.6%
Kyrgyzstan	4.8	4.7	6.3	2.9	2.6	2.9	3.2	-0.4%	5.9%	-16.2%	13.0%	8.1%
Moldova	23.1	26.0	26.4	22.0	21.6	21.9	22.3	2.4%	0.3%	-3.9%	1.1%	2.0%
Russia	709.3	755.3	814.3	616.0	600.9	595.7	576.6	1.3%	1.5%	-5.9%	-0.9%	-3.2%
Tajikistan	4.0	4.2	6.5	3.3	3.3	3.5	3.4	0.6%	9.2%	-12.7%	7.2%	-4.2%
Turkmenistan	8.7	69.6	18.7	13.5	14.0	12.4	11.9	51.6%	-23.1%	-5.6%	-11.6%	-3.8%
Ukraine	198.7	196.7	243.1	163.8	159.8	152.4	151.2	-0.2%	4.3%	-8.0%	-4.6%	-0.8%
Uzbekistan	27.2	41.2	45.5	45.5	42.1	43.8	44.4	8.6%	2.0%	-1.6%	4.2%	1.4%
Baltics (1)	24.8	31.5	33.8	17.1	17.3	17.6	17.8	4.9%	1.4%	-12.5%	2.0%	0.9%

(1) Including Baltics only for statistical reasons  
 (2) Including oil shale





and 71% of hydro. Other major producers are Ukraine (solids, oil, natural gas and nuclear), Kazakhstan (solids, oil and gas); Uzbekistan (oil and gas) and Turkmenistan (gas).

*Efforts to rationalise the coal industry were hampered by the payment arrears of large consumers...*

For solid fuels the CIS (174 Mtoe in 1997) is now the third largest producer in the world after China (686 Mtoe) and the United States (546 Mtoe) even if Russia, the main contributor, was individually overtaken by Australia and South Africa. Solid fuel production has declined continuously since 1980 when the annual production reached 339 Mtoe, falling about 7.5% per year on average since 1990. The three main coal-producing countries - Russia (58% in 1997), Ukraine (23%) and Kazakhstan (18%) - were facing similar problems. The coal industries in Russia and Ukraine continue to be state-run operations, although efforts are underway to privatise the industries in both countries. These efforts are aimed primarily at shutting down inefficient mines and transferring support activities, such as housing, kindergartens, and health and recreation facilities, to local municipalities. Even efficient mines, however, are hampered by the payment arrears of their large customers, which have been making it nearly impossible to pay workers and purchase essential mining supplies and equipment.

#### CIS(1) : SOLID FUELS

Mtoe	1980	1985	1990	1994	1995	1996	1997	85/80	90/85	95/90	96/95	97/96
Annual % Change												
<b>Total Production</b>	338,7	312,5	300,5	208,2	190,5	180,4	174,7	-1,6%	-0,8%	-8,7%	-5,3%	-3,1%
Armenia	0,0	0,0	0,0	0,0	0,0	0,0	0,0	-	-	-	-	-
Azerbaijan	0,0	0,0	0,0	0,0	0,0	0,0	0,0	-	-	-	-	-
Belarus	0,0	2,4	1,3	0,7	0,6	0,5	0,5	-	-11,2%	-14,1%	-10,8%	0,0%
Georgia	0,9	0,7	0,4	0,0	0,0	0,0	0,0	-5,3%	-10,3%	-47,0%	-49,8%	0,0%
Kazakhstan	56,8	55,0	54,3	44,8	35,8	33,1	31,2	-0,6%	-0,2%	-8,0%	-7,6%	-5,7%
Kyrgyzstan	1,5	1,4	1,3	0,5	0,3	0,3	0,3	-1,3%	-2,3%	-25,3%	-13,3%	14,3%
Moldova	0,0	0,0	0,0	0,0	0,0	0,0	0,0	-	-	-	-	-
Russia	172,2	155,5	154,3	109,8	107,1	104,4	98,7	-2,0%	-0,1%	-7,0%	-2,5%	-5,4%
Tajikistan	0,5	0,2	0,1	0,0	0,0	0,0	0,0	-19,6%	-2,3%	-39,2%	-44,0%	0,0%
Turkmenistan	0,0	0,0	0,0	0,0	0,0	0,0	0,0	-	-	-	-	-
Ukraine	96,0	88,8	81,2	47,5	42,5	37,6	39,4	-1,5%	-1,8%	-12,2%	-11,5%	4,9%
Uzbekistan	2,8	1,8	2,1	1,3	1,1	1,0	1,0	-8,8%	3,6%	-13,0%	-6,7%	0,0%
Baltics (2)	8,0	6,8	5,4	3,5	3,2	3,6	3,6	-3,2%	-4,4%	-10,1%	11,1%	0,0%
<b>Total Net Import</b>	-11,05	-8,80	-11,72	-8,67	-9,21	-13,50	-5,63	-4,5%	5,9%	-4,7%	46,5%	-58,3%
<b>Total Gross Inland Consumption</b>	326,8	301,1	288,8	203,3	193,4	174,8	169,1	-1,6%	-0,8%	-7,7%	-9,6%	-3,3%
Armenia	0,0	0,2	0,2	0,0	0,0	0,0	0,0	-	2,4%	-64,5%	67,9%	0,0%
Azerbaijan	0,0	0,1	0,1	0,0	0,0	0,0	0,0	-	2,2%	-50,1%	0,6%	0,0%
Belarus	0,0	3,5	2,9	1,4	1,3	1,3	1,1	-	-3,5%	-15,3%	3,2%	-17,2%
Georgia	0,9	0,7	0,5	0,1	0,1	0,1	0,1	-5,2%	-6,2%	-26,4%	-7,5%	-15,0%
Kazakhstan	53,9	52,5	37,7	33,9	30,8	24,3	24,0	-0,5%	-6,4%	-4,0%	-21,2%	-0,9%
Kyrgyzstan	1,5	1,4	2,0	1,0	0,4	0,6	0,5	-1,2%	8,0%	-26,4%	32,5%	-15,6%
Moldova	0,0	2,2	1,9	0,9	0,6	0,5	0,5	-	-2,8%	-21,0%	-12,9%	-7,7%
Russia	176,9	148,3	155,5	110,6	105,0	100,0	94,2	-3,5%	1,0%	-7,6%	-4,8%	-5,8%
Tajikistan	0,5	0,2	1,4	0,0	0,0	0,0	0,0	-19,6%	54,6%	-61,3%	311,4%	-14,3%
Turkmenistan	0,0	0,0	0,0	0,0	0,0	0,0	0,0	-	-	-	-	0,0%
Ukraine	81,5	82,8	76,0	49,4	50,2	42,7	43,6	0,3%	-1,7%	-8,0%	-14,9%	2,1%
Uzbekistan	2,7	1,7	3,0	1,6	1,0	1,2	1,0	-8,7%	12,0%	-19,1%	12,8%	-17,2%
Baltics (1)	9,0	7,7	7,7	4,3	4,0	4,1	4,1	-3,0%	-0,2%	-12,1%	2,8%	-0,5%

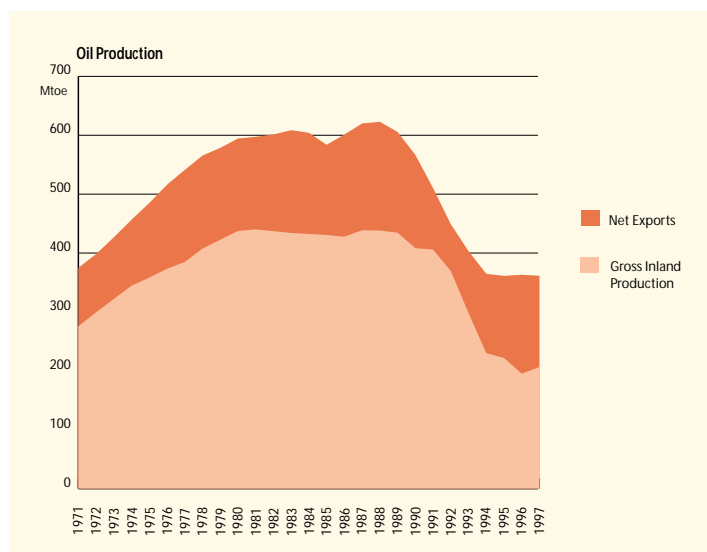
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(2) Including oil shale



Crude oil production experienced an upturn in 1997...

Crude oil production has decreased since 1980 (606 Mtoe) to reach only 362 Mtoe in 1997, with an accelerating trend (more than -10% per year) between 1990 and 1994. Production as a whole increased by 2.5% in 1997 after the stabilisation registered in 1996. Russia represented more than 86% of the total production, remaining the third world producer after Saudi Arabia (457 Mtoe) and the United States (395 Mtoe). The dramatic production decline experienced since 1988 is a result of several factors, including natural reservoir depletion, insufficient investment, stalled implementation of tax reforms and poor technical management. Activity by foreign companies is currently restricted to a number of joint ventures which, however, will have some impact on total oil production. Negotiations are also under way for larger projects that will support the expected rebound of oil production in the near future. As a consequence of Russian energy policy promoting gas use, oil exports for the CIS as a whole have registered a 95% increase since 1992 but are still about 17% below the 1988 peak.



Large potential of the Caspian Basin still limited by the development of the pipeline infrastructure...

The Caspian Basin is an area of potentially vast resources. Only the United States and Saudi Arabia are thought to have more ultima-

CIS : OIL												
Mtoe	1980	1985	1990	1994	1995	1996	1997	85/80	90/85	95/90	96/95	97/96
Annual % Change												
<b>Total Production</b>	606.2	598.2	573.5	362.8	353.7	353.0	361.5	-0.3%	-0.8%	-9.2%	-0.2%	2.4%
Armenia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-
Azerbaijan	14.7	13.2	12.3	9.6	9.2	9.1	9.0	-2.1%	-1.5%	-5.6%	-0.7%	-1.1%
Belarus	2.6	2.0	2.1	2.0	1.9	1.9	1.9	-4.5%	0.2%	-1.2%	-3.7%	0.0%
Georgia	3.2	0.6	0.2	0.1	0.0	0.1	0.1	-29.5%	-18.4%	-25.2%	172.3%	0.0%
Kazakhstan	18.7	23.0	25.3	20.4	20.5	23.1	26.3	4.2%	1.9%	-4.1%	12.4%	14.0%
Kyrgyzstan	0.2	0.2	0.2	0.1	0.1	0.1	0.1	-2.7%	-3.4%	-11.1%	12.4%	0.0%
Moldova	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-
Russia	549.4	546.6	519.6	317.3	306.6	302.7	306.7	-0.1%	-1.0%	-10.0%	-1.3%	1.3%
Tajikistan	0.4	0.4	0.2	0.0	0.0	0.0	0.0	-0.1%	-12.4%	-34.0%	-16.0%	0.0%
Turkmenistan	8.0	6.1	5.6	3.4	3.5	4.1	5.6	-5.4%	-1.5%	-9.0%	17.1%	36.4%
Ukraine	7.5	4.1	5.3	4.2	4.1	4.1	4.3	-11.5%	5.2%	-5.1%	1.1%	3.7%
Uzbekistan	1.3	2.0	2.8	5.5	7.5	7.5	7.2	8.3%	7.2%	21.6%	0.5%	-4.8%
Baltics	0.0	0.0	0.0	0.1	0.1	0.2	0.2	-	-	-	21.1%	33.3%
<b>Total Net Import</b>	-156.93	-153.10	-158.37	-134.66	-139.56	-167.92	-164.08	-0.5%	0.7%	-2.5%	20.3%	-2.3%
<b>Total Gross Inland Consumption</b>	437.5	430.7	411.7	230.0	221.7	195.2	206.2	-0.3%	-0.9%	-11.6%	-11.9%	5.7%
Armenia	2.2	3.1	3.7	0.4	0.3	0.2	0.2	7.1%	3.4%	-40.2%	-44.6%	9.1%
Azerbaijan	7.6	8.5	8.2	8.7	7.0	6.6	7.7	2.3%	-0.8%	-3.0%	-6.5%	17.9%
Belarus	14.7	29.0	26.5	12.1	10.4	10.2	9.9	14.6%	-1.8%	-17.0%	-2.3%	-2.9%
Georgia	5.4	5.9	4.5	0.4	0.2	0.1	0.2	1.8%	-5.5%	-49.1%	-12.6%	38.9%
Kazakhstan	16.1	18.9	22.1	14.2	10.4	9.4	9.9	3.3%	3.2%	-14.0%	-9.5%	5.5%
Kyrgyzstan	2.2	2.9	2.3	0.4	0.5	0.6	0.6	5.7%	-4.9%	-24.7%	9.1%	8.3%
Moldova	6.2	6.2	4.6	1.1	1.0	1.0	1.0	0.0%	-5.7%	-25.8%	-7.2%	5.9%
Russia	310.4	259.5	249.0	149.6	149.5	131.3	139.9	-3.5%	-0.8%	-9.7%	-12.2%	6.5%
Tajikistan	1.9	2.6	1.9	1.2	1.2	1.2	1.3	6.5%	-6.3%	-8.2%	0.0%	3.7%
Turkmenistan	1.3	2.1	6.6	2.9	2.7	3.3	3.0	10.1%	25.8%	-16.4%	22.0%	-9.7%
Ukraine	52.1	66.4	57.3	23.8	25.3	18.7	19.8	5.0%	-2.9%	-15.1%	-25.8%	5.7%
Uzbekistan	7.0	10.3	10.6	8.1	6.9	6.6	6.9	8.0%	0.6%	-8.3%	-3.7%	4.3%
Baltics (1)	10.4	15.3	14.5	7.2	6.3	6.0	5.9	8.0%	-1.1%	-15.3%	-4.5%	-3.0%

(1) Including Baltics only for statistical reasons



tely recoverable conventional oil resources. Three of the independent states, Azerbaijan, Kazakhstan and Turkmenistan, have the greatest oil production potential in the Caspian Sea region. The development of adequate infrastructures is the key to enabling the Caspian region to join the ranks of major suppliers in world oil trade. Azerbaijan, Kazakhstan and Turkmenistan are surrounded by other countries and cannot get oil to market without crossing the borders of neighbouring countries. Currently, Caspian oil, in relatively small quantities, is able to flow through pipelines into Russia. By the end of the decade, several pipeline routes to the Black Sea are expected to become available. Significantly larger volumes are expected to flow via pipeline through Turkey to the Mediterranean Sea and across Iran to the Persian Gulf. Even China has indicated an interest in obtaining its oil supplies by such pipelines.

Access to Caspian oil is a function of several difficult geopolitical issues such as: ownership of the resources, financing the exploration, production and distribution of the oil, taxation and environmental concerns. The manner in which these issues will be resolved, whether adversarial or co-operative, will determine how quickly oil from the Caspian Basin will enter the international market.

*In 1997, CIS became the world's second largest gas producer, overtaken by the United States...*

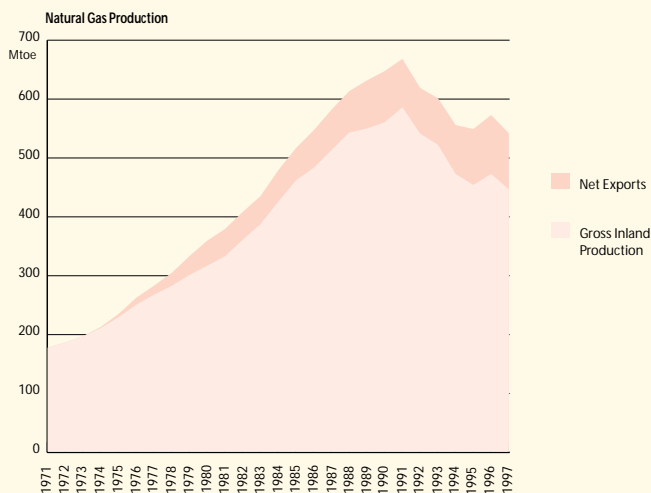
1996 saw a reversal of the downward trend in the natural gas market in much of the CIS region. However, in 1997, both production and consumption again declined. Overall gas consumption in the CIS, which accounted for 22.4% of the world's total consumption in 1997, fell by 5.5% from 1996 levels. Production of natural gas increased steadily to reach a maximum in 1991 (from 360 Mtoe in 1980 to 659 Mtoe in 1991) but subsequently fell by about 18%, though production rebounded in 1996. Russia, where production is concentrated in West Siberia, was the largest gas producer (84% of the total CIS production). Production from all of Russia's major gas fields, with the exception of Yamburg, is declining. Attention is now focused on new fields in the Yamal Peninsula and the Far East Sakha region. Since 1994, Uzbekistan has become the second producer, far ahead of production in Turkmenistan and Ukraine.

Gazprom, the Russian State gas company, controls more than 95% of Russia's natural gas production, owns and operates 140,000 Km of gas pipeline grids, and runs 26 trading houses and marketing joint ventures in 13 European countries. Gazprom is by far the lar-

CIS : NATURAL GAS												
Mtoe	1980	1985	1990	1994	1995	1996	1997	85/80	90/85	95/90	96/95	97/96
	Annual % Change											
<b>Total Production</b>	359.6	520.1	656.3	570.9	562.9	572.7	542.0	7.7%	4.8%	-3.0%	1.7%	-5.3%
Armenia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-
Azerbaijan	11.3	11.3	8.0	5.2	5.4	5.1	4.5	0.1%	-6.7%	-7.7%	-5.2%	-12.5%
Belarus	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.4%	-2.2%	-6.5%	0.0%	0.0%
Georgia	0.2	0.1	0.0	0.0	0.0	0.0	0.0	-22.3%	-6.5%	-27.5%	-70.0%	0.0%
Kazakhstan	3.5	4.4	5.7	3.7	4.8	5.2	7.6	4.7%	5.5%	-3.4%	7.2%	46.6%
Kyrgyzstan	0.1	0.1	0.1	0.0	0.0	0.0	0.0	-1.5%	-3.5%	-17.3%	-27.8%	0.0%
Moldova	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-	-
Russia	212.8	372.8	516.6	479.9	470.4	479.2	455.1	11.9%	6.7%	-1.9%	1.9%	-5.0%
Tajikistan	0.2	0.2	0.1	0.0	0.0	0.0	0.0	4.1%	-18.0%	-18.9%	24.5%	0.0%
Turkmenistan	57.1	67.1	68.8	29.2	29.0	28.4	19.5	3.3%	0.5%	-15.9%	-2.0%	-31.3%
Ukraine	45.9	35.5	22.6	14.2	13.9	14.9	14.4	-5.0%	-8.6%	-9.2%	6.6%	-3.1%
Uzbekistan	28.2	27.9	33.0	37.4	38.1	38.2	39.1	-0.2%	3.4%	2.9%	0.4%	2.3%
Baltics (1)	0.0	0.4	1.0	1.1	1.0	1.4	1.5	-	20.2%	-0.4%	44.1%	8.9%
<b>Total Net Import</b>	-42.6	-54.8	-86.9	-83.1	-94.9	-100.1	-87.9	5.2%	9.7%	1.8%	5.5%	-12.1%
<b>Total Gross Inland Consumption</b>	315.9	460.9	559.5	471.5	453.0	471.7	446.2	7.8%	4.0%	-4.1%	4.1%	-5.4%
Armenia	2.4	0.0	3.6	0.7	1.1	0.9	0.6	-100.0%	-	-20.5%	-22.0%	-28.1%
Azerbaijan	11.3	11.4	14.2	7.3	5.8	5.1	5.0	0.2%	4.6%	-16.4%	-11.8%	-1.5%
Belarus	3.7	0.2	11.0	12.2	11.2	11.8	12.8	-44.2%	122.9%	0.4%	5.4%	7.9%
Georgia	3.6	0.1	4.4	2.1	1.2	0.8	0.8	-51.2%	113.2%	-22.6%	-37.0%	4.7%
Kazakhstan	6.4	4.4	11.7	8.9	10.2	7.7	7.5	-7.2%	21.5%	-2.7%	-24.0%	-3.1%
Kyrgyzstan	0.9	0.1	1.6	0.7	0.7	0.9	0.9	-35.6%	74.5%	-14.5%	19.3%	0.0%
Moldova	0.8	0.0	3.3	2.6	2.6	2.9	3.5	-100.0%	-	-4.8%	14.4%	19.7%
Russia	196.0	307.8	365.3	316.9	306.4	324.2	300.3	9.4%	3.5%	-3.5%	5.8%	-7.4%
Tajikistan	0.9	0.2	1.6	0.6	0.7	0.9	0.9	-26.0%	52.5%	-15.0%	27.4%	-7.0%
Turkmenistan	7.2	67.4	12.2	10.6	11.2	9.1	8.6	56.4%	-28.9%	-1.8%	-19.1%	-4.7%
Ukraine	61.7	34.7	91.8	71.7	65.4	69.7	66.4	-10.9%	21.5%	-6.6%	6.5%	-4.7%
Uzbekistan	16.5	28.0	30.6	34.1	32.7	33.9	34.4	11.2%	1.8%	1.4%	3.7%	1.5%
Baltics (1)	4.5	6.6	8.1	3.1	3.6	3.7	4.4	8.0%	4.1%	-14.8%	1.7%	18.6%

(1) Including Baltics only for statistical reasons





gest Russian taxpayer and hard currency earner. Because it has had difficulty making tax payments due to non-payment for supplies received by many of its customers, both domestic and foreign, Gazprom has resorted to curtailment of supplies in some instances and to barter in other instances as a means of reducing debts owed to the company. Consequently, trade among CIS republics has been in decline in the 1990's.

The company controls one-fifth of the world's natural gas reserves. In April 1994, the government took the first steps towards privatising Gazprom, allocating 15% of shares to current and retired employees. Since Gazprom relaxed rules barring foreign investors in 1997, international banks have been pouring money into the gas industry, with export projects, in particular the construction of the Yamal-Europe pipeline, attracting most of the big loans. Gazprom shares, long barred to foreign investors, have been successfully traded on the London stock market since October 1996. The Government subsequently agreed to sell shares in blocks of 2.5%. Potential bidders, at the end of 1997, included the German utility Ruhrgas, Royal Dutch/Shell and Italy's Eni. In late 1998, Ruhrgas, currently Gazprom's biggest export customer, effectively obtained a shareholding in Gazprom.

*CIS represented about 23% of the world's fossil fuel reserves...*

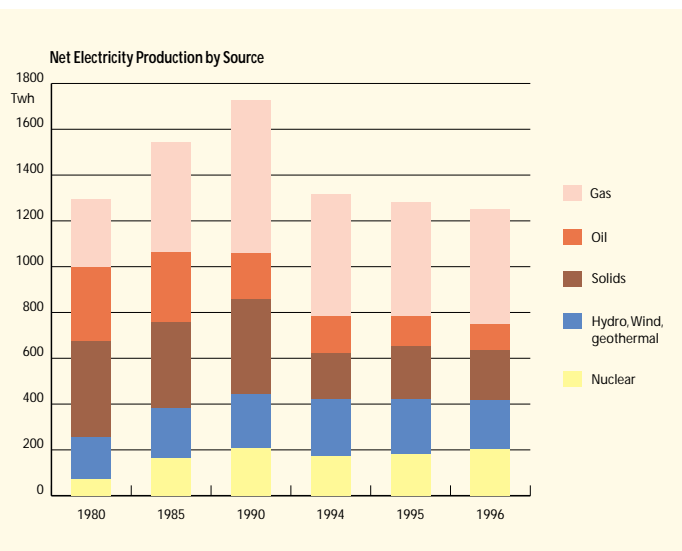
The CIS's oil reserves at end 1997 amounted to about 6.4% of the world's oil reserve, the bulk of which were concentrated in Russia (4.7%). The situation is somewhat more favourable for natural gas with the CIS accounting for 39.2% of world reserves, mainly concentrated in Russia (33.2%). CIS coal reserves totalled 23.4% of world reserves.

*Electricity generation dominated by thermal power and more specifically by natural gas...*

Electricity generation peaked in 1990, and has declined continuously since then to reach the 1980 level in 1996. Although it has experienced a continuous decrease since 1990 (-35%), thermal generation dominated electricity production, with about two-thirds of total generation in 1996 (three-quarters in 1990). Hydropower output has remained stable since 1990 representing only 17% of electricity production in 1996, but with very large potential in future. Nuclear production, which tripled its contribution from 1980 to 1990, has remained stable since then with the progressive decommissioning of obsolete and unsafe nuclear power plants compensated by the commissioning of new units (Ukraine) or reopening of mothballed units (Armenia). The fuel mix varied by region depending on primary energy production levels and import facilities. The use of solid fuels in thermal power stations remained rather stable over the 1980s but has declined significantly since then (-33%); its share dropping progressively from 40% in 1980 to only 26% in 1996. Gas became the most important fuel for power generation in 1983 (35% of total) and has continued to increase its share (60% of the total in 1997). Gas is projected to remain the dominant fuel for electricity generation mainly due to the more favourable economics of gas-fired generation. The consumption of oil for electricity production decreased by about 54% between 1980 and 1996 as a result of this substitution by gas.

*Power sector faces financial crisis while low tariffs and subsidies continue...*

The power sector is facing financial crisis as a result of the continued subsidisation of industrial and residential users and a chro-





nic non-payment problem. To illustrate the scale of this problem, recent figures showed that consumers paid for only 84% of electricity supplied in 1997. However, the majority of payments appeared to be in barter goods. Only about 20% were in cash. The Russian government has set a target of 35% cash payments by the end of 1998 but, with the current government prioritising help for manufacturing industry, this objective appears somewhat ambitious. Furthermore, the balance sheets of electricity utilities are burdened by significant, and rising, arrears in both payments and receipts.

The structure of the Russian electricity sector has several flaws, which lead to the inefficient allocation of resources. The industry is split into two parts. Firstly, the regional entities, regulated by Regional Electricity Commissions, have a monopoly on delivering electricity to industrial and commercial end users. The second is UES, which runs the wholesale electricity market. Only nine of the 73 regional entities have the necessary output capacity to meet demand, with the deficit regions buying electricity from UES-owned generators, surplus regions or state-owned nuclear facilities. One of the sector's main problems is that tariffs are set on a cost-plus basis. Thus there is no incentive to improve efficiency or reduce costs. Many regions take output from the local entities first, despite cheaper electricity being available on the wholesale market, resulting in artificially high prices. Therefore, price hikes and the phasing-out of industrial and residential subsidies, which would force both producers and customers to rationalise and cut costs, are unlikely to happen.

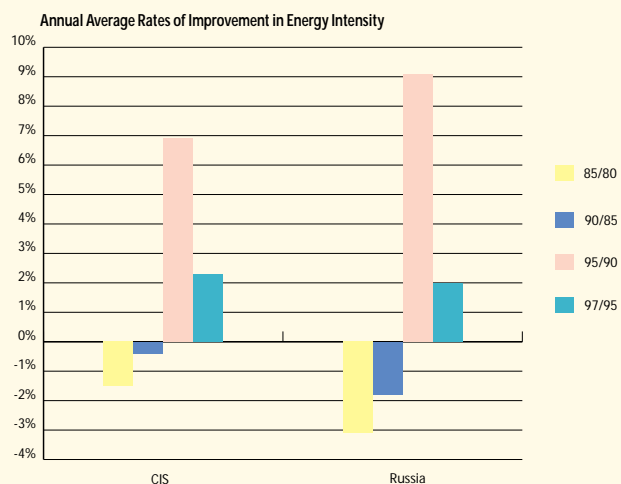
#### *Refining industry in need of rationalisation and upgrading...*

In 1996, refinery capacity (10.4 millions barrels day) represented 13% of the world capacity (16% in 1985). Since 1985, the capacity has declined by 1.5% per year. Most of the refineries were constructed in the 1940s and 1950s and are relatively unsophisticated. In addition, the product mix from refineries is not geared towards producing light products such as gasoline. Catalytic cracking accounted for only 4% of primary distillation capacity. Heavy fuel oil now accounts for about half of refinery output. In addition, low investment levels have resulted in poor maintenance and working conditions, leading to inefficient and unsafe plant operation. The utilisation rate of refineries decreased sharply from 79% in 1985 to only 52% in 1997. The most important recent trend for the petroleum industry in Russia has been vertical integration into companies which combine crude production, refining, distribution and retailing in one integrated structure.

## COMPETITIVENESS

*Energy intensity increased by 17% since 1990 and the near future appears unfavourable...*

From 1980 to 1990, considering all the uncertainties about GDP calculation, the energy intensity decreased by about 0.7% per year on average. Before the start of its economic collapse, the former Soviet Union had the highest energy intensity in the world (bearing in mind the suspected undervaluation of GDP). The artificially low energy prices encouraged development of industry that used energy very inefficiently. In general the economy has been weighted heavily towards industry, with a relatively small-service sector. There is some evidence that rather than rationalising production by closing factories, and concentrating it in the most efficient plants, production has been maintained at low levels across many plants resulting in large energy overheads per unit of output. This partly explains why energy consumption has fallen more slowly than GDP since the beginning of the transition period and also why energy intensity increased significantly during this period. A large potential for improvement exists. The region's economies will rebuild through the reduction of the inefficiency in energy use, the commissioning of more efficient technology, the rationalisation of the energy and industrial systems, and the introduction of a price system that properly reflects the market costs of the fuel, in contrast to the artificially low, subsidised prices that characterised the region before 1990. The energy intensity increased sharply by 3.2% per year between 1990 and 1996, but experienced an improvement of 3.3% in 1997. Unfortunately, the financial crisis of 1998, with its expected negative impact on GDP until 2001, may well cause a further deterioration in this indicator.





Capital shortage makes it difficult to raise energy efficiency within the industrial sector. Although progress toward price reforms were under way, more efforts are needed to curb the subsidisation of energy use throughout the economy. Furthermore, industry accounts for a substantial share of total economic activity as the region has a relatively small service sector at least in the present calculation of GDP. The future evolution of energy intensity in industry will depend on the level of capital investment in more efficient equipment, as well as the relative rate of growth of less energy-intensive industrial activities.

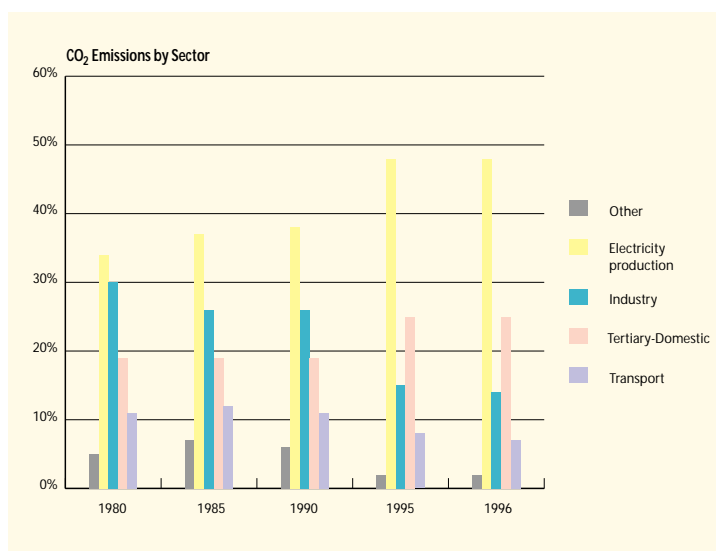
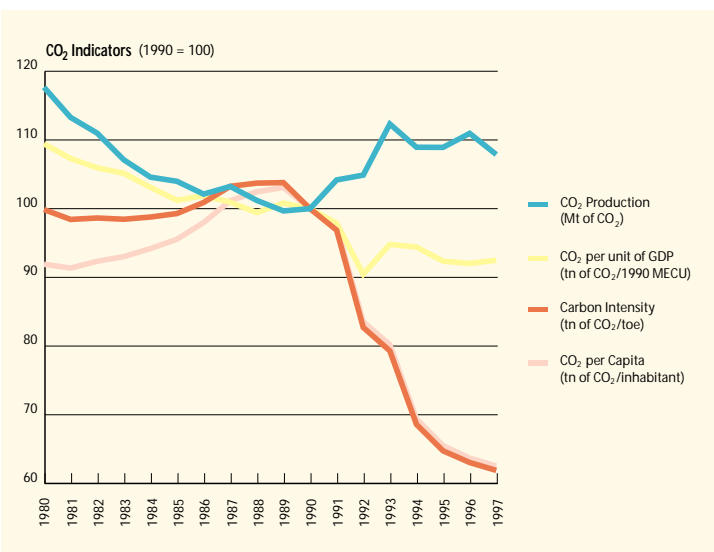
As regards the residential-tertiary sector it must be stressed that energy demand tends to be unresponsive to price changes, partly due to the lack of debt enforcement. In addition, in several parts of the CIS region, household gas and electricity is either unmetred or sold at very low prices, thus reducing price-related incentives to reduce consumption. As a result, residential energy demand appears to be quite unresponsive to falls in income.

The gross inland consumption per capita, which reached 4.8 toe/capita in 1988, fell to only 3.12 toe/capita in 1997, below the European level. Large discrepancies exist between republics with higher consumption per capita in Russia (4.0 toe/capita in 1997) and much lower levels, largely below 1 toe/capita in some cases, in the Central Asian Republics.

## ENVIRONMENT

*CO<sub>2</sub> emissions reduced by 37% since 1990...*

The CO<sub>2</sub> emissions in the CIS increased from 3253 Mt in 1980 to 3539 Mt in 1990 but then declined to 2213 Mt in 1997 (-37% since 1990) in line with the evolution of gross inland consumption. In addition, the CIS as a whole benefited substantially from the increasing contribution of natural gas in reducing CO<sub>2</sub> emissions. The expected decline of GDP in the near future will certainly amplify this reduction. But, after 2000, it is expected that any economic rebound will cause coal and particularly oil to increase their contribution to gross inland consumption, especially with the expected growth of transport fuel use. This means that the carbon intensity of fossil fuels might increase by about 5-10% over the first decade of the new millennium and consequently led to a resurgence in the growth of CO<sub>2</sub> emissions. Although CO<sub>2</sub> emissions per capita have closely followed the trend in total emissions since 1980, CO<sub>2</sub> intensity per unit of GDP has increased substantially since 1990 - almost regaining the 1982 level in 1997 due to the increasing energy intensity of the economy.



The power sector was by far the largest source of CO<sub>2</sub> emissions. With a maximum level of 1410 Mt reached in 1991, emissions declined until 1996 to the 1980 level and represented about 48% of total emissions (34% in 1980). As this sector was already particularly inefficient (average electrical efficiency of about 20%), any improvement of the power sector will have a significant impact on its CO<sub>2</sub> emissions. All sectors have contributed to the CO<sub>2</sub> emissions reduction recorded since 1990 but to a varying extent: energy branch emissions declined by 80%, industry by 65%, transport by 61%, the power sector by 19% and the tertiary-domestic sector by only 15%.



## GLOBAL MARKETS

### *Energy exports peaked in 1996...*

Exports of energy have always been very important for the economy of the former USSR until 1990 (and for Russia as a major CIS component since then), being a source of hard currency, mainly from Western Europe. Exports of energy represented about 22% of energy production in 1997 against 16% in 1990 due to the reduction of both production and gross inland consumption. Total export volumes increased to 260 Mtoe until 1990 from 212 Mtoe in 1980. They dropped by 22% between 1990 and 1992, but recovered the 1990 level in 1997. The largest exported energy remained crude oil, exports of which dropped by 50% between 1990 and 1992; but they recovered their 1980's historical values of about 155 Mtoe in 1997. The main markets for oil exports are Western Europe (91 Mtoe in 1997) and Central Europe (32 Mtoe in 1997) respectively.

Exports of natural gas also reached a peak in 1990 (87 Mtoe) and then decreased by about 5% per year between 1990 and 1992. The decline stopped in 1993, and then exports increased to reach a new absolute peak of about 100 Mtoe in 1996. 1997 experienced a slight decrease of about 5 Mtoe. These variations are connected to the export policy of Russia, which currently exports about 35% of its natural gas production. Of this amount, about 58% is destined for European Union markets and the remainder for Eastern Countries. Western Europe relies on Russian gas to meet about a quarter of its total needs. Trade among the CIS Republics has been in decline because of non-payment for supplies and the subsequent amassing of enormous debts for natural gas, causing reluctance on the part of shippers to provide more gas until these outstanding payments are made.

Gas infrastructure expansion within eastern countries and CIS Republics is underway to meet projected demand growth. Russia in particular is planning significant infrastructure expansion in order to serve expanding European markets. The most significant developments are of the Yamal gas fields in northern Siberia and the construction of the Yamal-Europe pipeline through Belarus and Poland to move gas to market. But the higher production costs in the Yamal fields and the additional cost of building the pipeline will significantly increase the cost of gas supplies from the region.



CIS(1) : SUMMARY ENERGY BALANCE

Mtoe	1980	1985	1990	1995	1996	1997(4)	85/80	90/85	95/90	96/95	97/96
Annual % Change											
<b>Primary Production</b>	1357.8	1512.9	1624.6	1194.8	1198.0	1167.9	2.2%	1.4%	-6.0%	0.3%	-2.5%
Solids	338.7	312.5	300.5	190.5	180.4	174.1	-1.6%	-0.8%	-8.7%	-5.3%	-3.5%
Oil	606.2	598.2	573.5	353.7	353.0	361.6	-0.3%	-0.8%	-9.2%	-0.2%	2.5%
Natural gas	359.6	520.1	656.3	562.9	572.7	540.7	7.7%	4.8%	-3.0%	1.7%	-5.6%
Nuclear	19.0	43.5	55.1	47.9	53.8	53.3	18.0%	4.8%	-2.8%	12.3%	-0.9%
Hydro & Wind	15.9	18.4	20.0	20.6	18.5	18.4	3.0%	1.7%	0.5%	-9.8%	-0.9%
Geothermal	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	-0.1%	0.0%
Other	18.4	20.2	19.1	19.2	19.6	19.7	1.9%	-1.1%	0.1%	2.2%	0.5%
<b>Net Imports</b>	-212.2	-219.2	-260.0	-244.5	-276.6	-256.6	0.6%	3.5%	-1.2%	13.1%	-7.2%
Solids	-11.1	-8.8	-11.7	-9.2	-7.8	-5.7	-4.5%	5.9%	-4.7%	-15.5%	-26.6%
Oil	-156.9	-153.1	-158.4	-139.6	-167.9	-155.0	-0.5%	0.7%	-2.5%	20.3%	-7.7%
Crude oil	-116.1	-105.1	-108.5	-97.8	-112.0	na	-2.0%	0.6%	-2.1%	14.6%	na
Oil products	-40.9	-48.0	-49.8	-41.8	-55.9	na	3.3%	0.8%	-3.5%	33.8%	na
Natural gas	-42.6	-54.8	-86.9	-94.9	-100.1	-95.1	5.2%	9.7%	1.8%	5.5%	-5.0%
Electricity	-1.6	-2.5	-3.0	-0.8	-0.8	-0.8	8.6%	3.9%	-22.6%	-5.2%	5.4%
<b>Gross Inland Consumption</b>	1131.9	1272.4	1347.8	955.7	932.9	911.1	2.4%	1.2%	-6.6%	-2.4%	-2.3%
Solids	326.8	301.1	288.8	193.4	174.8	168.3	-1.6%	-0.8%	-7.7%	-9.6%	-3.7%
Oil	437.5	430.7	408.3	221.7	195.2	206.5	-0.3%	-1.1%	-11.5%	-11.9%	5.8%
Natural gas	315.9	460.9	559.4	453.0	471.7	445.6	7.8%	4.0%	-4.1%	4.1%	-5.5%
Other (2)	51.7	79.7	91.3	87.6	91.2	90.6	9.1%	2.7%	-0.8%	4.2%	-0.6%
<b>Electricity Generation in TWh</b>	1294.0	1544.0	1727.0	1288.2	1254.8	na	3.6%	2.3%	-5.7%	-2.6%	na
Nuclear	73.0	167.0	211.5	182.2	204.8	na	18.0%	4.8%	-2.9%	12.4%	na
Hydro & wind	184.7	214.4	233.0	239.1	215.7	na	3.0%	1.7%	0.5%	-9.8%	na
Thermal	1036.3	1162.6	1282.5	866.9	834.3	na	2.3%	2.0%	-7.5%	-3.8%	na
<b>Generation Capacity in GWe</b>	266.8	319.3	343.7	342.6	341.8	na	3.7%	1.5%	-0.1%	-0.3%	na
Nuclear	14.0	28.1	37.9	37.9	37.4	na	15.0%	6.2%	0.0%	-1.3%	na
Hydro & wind	52.5	61.3	65.0	66.1	66.1	na	3.1%	1.2%	0.4%	0.0%	na
Thermal	200.2	229.9	240.8	238.6	238.2	na	2.8%	0.9%	-0.2%	-0.1%	na
<b>Average Load Factor in %</b>	55.4	55.2	57.4	42.9	41.9	na	-0.1%	0.8%	-5.6%	-2.3%	na
<b>Fuel Inputs for Thermal Power Generation</b>	342.6	397.9	439.3	374.6	369.5	na	3.0%	2.0%	-3.1%	-1.3%	na
Solids	138.4	129.6	142.7	101.4	96.1	na	-1.3%	1.9%	-6.6%	-5.2%	na
Oil	107.2	104.6	67.8	56.1	49.5	na	-0.5%	-8.3%	-3.7%	-11.8%	na
Gas	97.0	163.7	228.8	214.6	221.5	na	11.0%	6.9%	-1.3%	3.2%	na
Geothermal	0.0	0.0	0.0	0.0	0.0	na	-	-	-	0.0%	na
Other	0.0	0.0	0.0	2.4	2.4	na	-	-	-	0.0%	na
<b>Average Thermal Efficiency in %</b>	26.0	25.1	25.1	19.9	19.4	na	-0.7%	0.0%	-4.5%	-2.5%	na
<b>Non-Energy Uses</b>	62.2	65.5	75.3	34.9	34.4	na	1.1%	2.8%	-14.2%	-1.5%	na
<b>Total Final Energy Demand</b>	789.7	839.0	892.0	670.3	652.3	na	1.2%	1.2%	-5.6%	-2.7%	na
Solids	189.2	148.6	141.3	60.6	57.2	na	-4.7%	-1.0%	-15.6%	-5.5%	na
Oil	265.7	266.9	265.5	126.1	109.5	na	0.1%	-0.1%	-13.8%	-13.2%	na
Gas	162.6	203.9	248.0	187.4	193.9	na	4.6%	4.0%	-5.5%	3.5%	na
Electricity	82.9	97.5	107.3	81.3	79.9	na	3.3%	1.9%	-5.4%	-1.7%	na
Heat(3)	71.0	101.9	110.8	197.4	194.6	na	7.5%	1.7%	12.3%	-1.5%	na
Other	18.4	20.2	19.1	17.5	17.2	na	1.9%	-1.1%	-1.8%	-1.5%	na
<b>CO<sub>2</sub> Emissions in Mt of CO<sub>2</sub></b>	3253.2	3381.8	3539.4	2318.0	2254.5	2213.0	0.8%	0.9%	-8.1%	-2.7%	-1.8%
<b>Indicators</b>											
Population (Million)	265.97	278.11	288.99	292.31	291.95	291.91	0.9%	0.8%	0.2%	-0.1%	0.0%
GDP (index 1985=100)	85.0	100.0	108.8	65.4	62.5	63.1	3.3%	1.7%	-9.7%	-4.5%	1.0%
Gross Inl Cons./GDP (toe/1990 MEUR)	2009.9	1920.7	1869.4	2204.6	2254.2	2180.2	-0.9%	-0.5%	3.4%	2.3%	-3.3%
Gross Inl Cons./Capita (toe/inhabitant)	4.26	4.58	4.66	3.27	3.20	3.12	1.5%	0.4%	-6.9%	-2.3%	-2.3%
Electricity Generated/Capita (kWh/inhabitant)	4865	5552	5976	4407	4298	na	2.7%	1.5%	-5.9%	-2.5%	na
CO <sub>2</sub> Emissions/Capita (t of CO <sub>2</sub> /inhabitant)	12.2	12.2	12.2	7.9	7.7	7.6	-0.1%	0.1%	-8.3%	-2.6%	-1.8%
Import Dependency (%)	-18.7	-17.2	-19.2	-25.6	-29.6	-28.2	-1.7%	2.3%	5.9%	15.8%	-5.0%

(1) Includes Baltic countries for statistical reasons

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

(3) Disruption in statistical series in 1992

(4) Estimates





## CIS (1) : MAIN INDICATORS

	1980	1985	1990	1994	1995	1996	85/80	90/85	95/90	96/95
	Annual % Change									
<b>Gross Inland Consumption (Mtoe)</b>	1131.9	1272.4	1347.8	990.9	955.7	932.9	2.4%	1.2%	-6.6%	-2.4%
Public Thermal Power Generation	325.4	380.5	422.5	390.3	354.4	352.7	3.2%	2.1%	-3.5%	-0.5%
Autoprod. Thermal Power Generation	17.2	17.4	16.8	10.0	20.2	16.8	0.2%	-0.7%	3.7%	-16.4%
Energy Branch	96.3	130.4	131.5	51.1	46.8	45.2	6.2%	0.2%	-18.7%	-3.5%
Final Energy Consumption	789.7	839.0	892.0	688.6	664.7	647.0	1.2%	1.2%	-5.7%	-2.7%
Industry	399.7	386.1	413.5	244.6	233.7	226.5	-0.7%	1.4%	-10.8%	-3.1%
Transport	123.8	134.1	139.9	65.6	67.6	62.0	1.6%	0.9%	-13.5%	-8.2%
Tertiary-Domestic	266.2	318.9	338.6	378.4	363.4	358.6	3.7%	1.2%	1.4%	-1.3%
<b>Energy Intensity (toe/1990 MEUR)</b>	2009.9	1920.7	1869.4	2157.2	2204.6	2254.2	-0.9%	-0.5%	3.4%	2.3%
Public Thermal Power Generation	577.8	574.4	586.1	849.8	817.5	852.1	-0.1%	0.4%	6.9%	4.2%
Autoprod. Thermal Power Generation	30.6	26.3	23.3	21.8	46.5	40.7	-3.0%	-2.4%	14.8%	-12.4%
Industry	709.7	582.7	573.5	532.4	539.1	547.2	-3.9%	-0.3%	-1.2%	1.5%
Transport	219.9	202.4	194.0	142.8	155.9	149.8	-1.6%	-0.8%	-4.3%	-3.9%
Tertiary-Domestic	472.8	481.4	469.7	823.8	838.2	866.3	0.4%	-0.5%	12.3%	3.4%
<b>Energy per Capita (Kgoe/inhabitant)</b>	4256	4575	4664	3389	3269	3196	1.5%	0.4%	-6.9%	-2.3%
Industry	1503	1388	1431	836	800	776	-1.6%	0.6%	-11.0%	-3.0%
Transport	466	482	484	224	231	212	0.7%	0.1%	-13.7%	-8.1%
Tertiary-Domestic	1001	1147	1172	1294	1243	1228	2.8%	0.4%	1.2%	-1.2%
<b>Electricity Share (%)</b>										
Final Energy Consumption	10.5%	11.6%	12.0%	12.3%	12.2%	12.4%	2.1%	0.7%	0.3%	0.9%
Industry	13.9%	16.5%	16.5%	17.0%	16.2%	16.1%	3.5%	-0.1%	-0.4%	-0.4%
Transport	5.3%	5.3%	5.3%	11.7%	10.8%	11.6%	-0.1%	0.3%	15.1%	7.2%
Tertiary-Domestic	7.8%	8.4%	9.3%	9.3%	10.0%	10.1%	1.5%	2.3%	1.3%	1.5%
<b>Total Renewable Consumption (Mtoe)</b>	34.3	38.7	39.1	40.8	40.5	38.2	2.4%	0.2%	0.7%	-5.6%
Hydro	15.9	18.4	20.0	21.3	20.6	18.5	3.0%	1.7%	0.5%	-9.8%
Biomass	18.4	20.2	19.1	19.6	19.9	19.6	1.9%	-1.1%	0.8%	-1.3%
Other	0.0	0.0	0.0	0.0	0.0	0.0	-	-	-	0.2%
Renewable intensity (toe/1990MEUR)	60.9	58.4	54.3	88.9	93.4	92.3	-0.8%	-1.4%	11.5%	-1.2%
Renewable per capita (Kgoe/inhabitant)	128.9	139.1	135.4	139.6	138.4	130.8	1.5%	-0.5%	0.4%	-5.5%
<b>CO<sub>2</sub> Emissions (Mt of CO<sub>2</sub>)</b>	3253.2	3381.8	3539.4	2456.7	2318.0	2254.5	0.8%	0.9%	-8.1%	-2.7%
Public Thermal Power Generation	1061.9	1187.8	1291.4	1139.0	1044.3	1030.2	2.3%	1.7%	-4.2%	-1.4%
Autoprod. Thermal Power Generation	55.4	54.6	53.1	29.6	66.2	56.4	-0.3%	-0.5%	4.5%	-14.8%
Energy Branch	166.7	222.6	199.9	50.7	43.7	40.0	5.9%	-2.1%	-26.2%	-8.5%
Industry	987.1	866.1	919.3	337.4	338.3	319.8	-2.6%	1.2%	-18.1%	-5.5%
Transport	364.6	392.6	406.6	170.8	177.6	160.4	1.5%	0.7%	-15.3%	-9.7%
Tertiary-Domestic	617.4	658.1	669.1	607.0	580.2	568.1	1.3%	0.3%	-2.8%	-2.1%
<b>Carbon Intensity (tn of CO<sub>2</sub>/toe)</b>	2.9	2.7	2.6	2.5	2.4	2.4	-1.6%	-0.2%	-1.6%	-0.4%
Public Power Generation	2.9	2.7	2.6	2.5	2.5	2.4	-1.9%	-0.7%	-1.0%	-1.9%
Public Thermal Power Generation	3.3	3.1	3.1	2.9	2.9	2.9	-0.9%	-0.4%	-0.7%	-0.9%
Autoprod. Power Generation	3.2	3.1	3.2	2.9	3.3	3.3	-0.5%	0.2%	0.7%	1.9%
Autoprod. Thermal Power Generation	3.2	3.1	3.2	3.0	3.3	3.3	-0.5%	0.2%	0.8%	1.9%
Energy Branch	1.7	1.7	1.5	1.0	0.9	0.9	-0.3%	-2.3%	-9.3%	-5.2%
Industry	2.5	2.2	2.2	1.4	1.4	1.4	-1.9%	-0.2%	-8.2%	-2.5%
Transport	2.9	2.9	2.9	2.6	2.6	2.6	-0.1%	-0.1%	-2.0%	-1.6%
Tertiary-Domestic	2.3	2.1	2.0	1.6	1.6	1.6	-2.3%	-0.9%	-4.2%	-0.8%
<b>CO<sub>2</sub> per Capita (kg of CO<sub>2</sub>/inhabitant)</b>	12231	12160	12247	8402	7930	7722	-0.1%	0.1%	-8.3%	-2.6%
Industry	3711	3114	3181	1154	1157	1095	-3.4%	0.4%	-18.3%	-5.4%
Transport	1371	1412	1407	584	607	549	0.6%	-0.1%	-15.5%	-9.6%
Tertiary-Domestic	2321	2367	2315	2076	1985	1946	0.4%	-0.4%	-3.0%	-2.0%
<b>CO<sub>2</sub> per unit of GDP (tn of CO<sub>2</sub>/1990 MEUR)</b>	5777	5105	4909	5348	5347	5447	-2.4%	-0.8%	1.7%	1.9%
Public Thermal Power Generation	1886	1793	1791	2480	2409	2489	-1.0%	0.0%	6.1%	3.3%
Autoprod. Thermal Power Generation	98	82	74	64	153	136	-3.5%	-2.2%	15.7%	-10.7%
Energy Branch	296	336	277	110	101	97	2.6%	-3.8%	-18.3%	-4.2%
Industry	1753	1307	1275	735	781	773	-5.7%	-0.5%	-9.3%	-1.0%
Transport	647	593	564	372	410	387	-1.8%	-1.0%	-6.2%	-5.4%
Tertiary-Domestic	1096	993	928	1321	1338	1373	-2.0%	-1.4%	7.6%	2.6%

(1) Includes Baltic countries for statistical reasons



RUSSIA : SUMMARY ENERGY BALANCE									
Mtoe	1990	1994	1995	1996	1997(2)	94/90	95/94	96/95	97/96
						Annual % Change			
<b>Primary Production</b>	1262.0	969.0	946.2	948.7	923.1	-6.4%	-2.4%	0.3%	-2.7%
Solids	164.9	112.4	109.5	106.3	100.5	-9.1%	-2.6%	-2.9%	-5.4%
Oil	518.8	317.3	306.6	302.7	306.7	-11.6%	-3.4%	-1.3%	1.3%
Natural gas	516.1	480.9	471.3	480.4	456.4	-1.8%	-2.0%	1.9%	-5.0%
Nuclear	30.6	25.9	26.3	28.8	29.1	-4.0%	1.5%	9.4%	1.2%
Hydro & Wind	14.3	15.1	15.2	13.3	13.0	1.3%	0.2%	-12.6%	-1.7%
Geothermal	0.0	0.0	0.0	0.0	0.0	-0.9%	20.0%	-0.1%	0.0%
Other	17.3	17.3	17.3	17.3	17.3	0.0%	0.0%	0.0%	0.0%
<b>Net Imports</b>	-394.7	-315.1	-314.2	-332.4	-328.1	-5.5%	-0.3%	5.8%	-1.3%
Solids	-0.6	1.0	-2.9	-3.2	-3.6	-	-	10.6%	12.7%
Oil	-262.0	-165.6	-157.6	-171.4	-166.8	-10.8%	-4.8%	8.7%	-2.7%
Crude oil	-204.3	-122.5	-114.4	-118.5	na	-12.0%	-6.6%	3.6%	na
Oil products	-57.7	-43.1	-43.2	-52.9	na	-7.0%	0.3%	22.4%	na
Natural gas	-131.7	-148.8	-152.0	-156.1	-156.1	3.1%	2.2%	2.7%	0.0%
Electricity	-0.4	-1.8	-1.7	-1.7	-1.7	46.0%	-4.3%	-0.5%	0.5%
<b>Gross Inland Consumption</b>	873.8	636.9	621.8	616.2	594.9	-7.6%	-2.4%	-0.9%	-3.4%
Solids	167.0	113.8	108.7	102.9	96.9	-9.1%	-4.5%	-5.3%	-5.8%
Oil	264.6	149.6	149.5	131.3	139.9	-13.3%	0.0%	-12.2%	6.5%
Natural gas	380.3	316.9	306.4	324.2	300.3	-4.5%	-3.3%	5.8%	-7.4%
Other (1)	61.9	56.6	57.1	57.7	57.8	-2.2%	0.9%	1.0%	0.1%
<b>Electricity Generation in TWh</b>	1114.2	848.6	859.0	846.3	na	-6.6%	1.2%	-1.5%	na
Nuclear	117.4	97.8	99.5	109.0	na	-4.5%	1.8%	9.5%	na
Hydro & wind	166.8	175.9	176.3	154.1	na	1.3%	0.2%	-12.6%	na
Thermal	829.9	574.9	583.2	583.2	na	-8.8%	1.5%	0.0%	na
<b>Generation Capacity in GWe</b>	213.1	214.7	210.8	210.8	na	0.2%	-1.8%	0.0%	na
Nuclear	20.2	21.2	21.2	21.2	na	1.2%	0.0%	0.0%	na
Hydro & wind	43.3	43.8	43.8	43.8	na	0.3%	-0.1%	0.0%	na
Thermal	149.5	149.7	145.8	145.8	na	0.0%	-2.6%	0.0%	na
<b>Average Load Factor in %</b>	59.7	45.1	46.5	45.8	na	-6.8%	3.1%	-1.5%	na
<b>Fuel Inputs for Thermal Power Generation</b>	317.3	295.5	276.8	286.0	na	-1.8%	-6.3%	3.3%	na
Solids	65.2	46.7	55.1	58.0	na	-8.0%	17.9%	5.3%	na
Oil	47.1	57.5	45.0	40.9	na	5.1%	-21.8%	-9.0%	na
Gas	205.0	191.3	176.7	187.0	na	-1.7%	-7.6%	5.8%	na
Geothermal	0.0	0.0	0.0	0.0	na	-0.9%	7.1%	0.0%	na
Other	0.0	0.0	0.0	0.0	na	-	-	-	na
<b>Average Thermal Efficiency in %</b>	22.5	16.7	18.1	17.5	na	-7.1%	8.3%	-3.2%	na
<b>Non-Energy Uses</b>	37.0	27.0	29.0	28.8	na	-7.6%	7.8%	-0.8%	na
<b>Total Final Energy Demand</b>	658.8	459.9	452.0	446.2	na	-8.6%	-1.7%	-1.3%	na
Solids	49.4	32.1	28.6	29.4	na	-10.2%	-10.8%	2.7%	na
Oil	168.3	65.1	74.7	64.9	na	-21.1%	14.8%	-13.2%	na
Gas	145.2	105.6	106.2	112.4	na	-7.6%	0.6%	5.8%	na
Electricity	74.2	54.6	53.2	52.9	na	-7.4%	-2.7%	-0.5%	na
Heat	204.3	185.1	171.9	169.3	na	-2.4%	-7.1%	-1.5%	na
Other	17.3	17.3	17.3	17.3	na	0.0%	0.0%	0.0%	na
<b>CO<sub>2</sub> Emissions in Mt of CO<sub>2</sub></b>	2138.3	1520.1	1438.3	1450.7	na	-8.2%	-5.4%	0.9%	na
<b>Indicators</b>									
Population (Million)	148.29	148.35	148.20	147.74	147.42	0.0%	-0.1%	-0.3%	-0.2%
GDP (index 1985=100)	109.1	70.7	67.8	64.4	65.0	-10.3%	-4.1%	-4.9%	0.9%
Gross Inl Cons./GDP (toe/1990 MEUR)	1920.8	2160.5	2200.4	2293.1	2194.2	3.0%	1.8%	4.2%	-4.3%
Gross Inl Cons./Capita (toe/inhabitant)	5.89	4.29	4.20	4.17	4.04	-7.6%	-2.3%	-0.6%	-3.2%
Electricity Generated/Capita (kWh/inhabitant)	7513	5720	5797	5729	na	-6.6%	1.3%	-1.2%	na
CO <sub>2</sub> Emissions/Capita (t of CO <sub>2</sub> /inhabitant)	14.4	10.2	9.7	9.8	na	-8.2%	-5.3%	1.2%	na
Import Dependency (%)	-45.1	-49.5	-50.5	-53.9	-55.1	2.4%	2.1%	6.7%	2.2%

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

(2) Estimates

## UKRAINE : SUMMARY ENERGY BALANCE

Mtoe	1990	1994	1995	1996	1997(2)	94/90	95/94	96/95	97/96
Annual % Change									
<b>Primary Production</b>	135.7	86.3	81.0	79.0	80.5	-10.7%	-6.1%	-2.4%	1.9%
Solids	86.8	48.6	43.4	38.3	40.2	-13.5%	-10.7%	-11.8%	4.9%
Oil	5.3	4.2	4.1	4.1	4.3	-5.4%	-3.4%	1.1%	3.7%
Natural gas	22.6	14.2	14.0	14.9	14.4	-11.0%	-1.6%	6.7%	-3.1%
Nuclear	19.9	17.9	18.4	20.7	20.6	-2.5%	2.4%	12.8%	-0.8%
Hydro & Wind	0.9	1.1	0.9	0.8	0.8	3.6%	-17.7%	-13.2%	8.8%
Geothermal	0.0	0.0	0.0	0.0	0.0	-	-	-	-
Other	0.3	0.3	0.3	0.3	0.2	-2.8%	-2.5%	-2.6%	-3.2%
<b>Net Imports</b>	119.8	75.3	80.9	74.9	71.5	-11.0%	7.4%	-7.4%	-4.5%
Solids	-5.8	2.2	8.5	5.7	4.7	-	286.8%	-33.4%	-17.2%
Oil	54.6	19.6	21.2	14.6	15.1	-22.6%	8.2%	-31.0%	3.3%
Crude oil	53.4	15.9	13.4	9.3	na	-26.1%	-15.8%	-30.6%	na
Oil products	1.2	3.7	7.8	5.3	na	31.5%	111.4%	-31.6%	na
Natural gas	73.5	53.6	51.4	54.8	52.0	-7.6%	-4.1%	6.5%	-5.1%
Electricity	-2.4	-0.1	-0.3	-0.2	-0.3	-56.2%	183.3%	-32.2%	47.6%
<b>Gross Inland Consumption</b>	252.9	165.4	161.8	153.9	152.4	-10.1%	-2.2%	-4.9%	-1.0%
Solids	81.6	50.8	51.9	43.9	44.9	-11.2%	2.3%	-15.4%	2.1%
Oil	60.9	23.8	25.3	18.7	19.8	-20.9%	6.2%	-25.8%	5.7%
Natural gas	91.8	71.7	65.4	69.7	66.4	-6.0%	-8.8%	6.5%	-4.7%
Other (1)	18.6	19.2	19.3	21.6	21.4	0.7%	0.4%	12.0%	-0.9%
<b>Electricity Generation in TWh</b>	298.8	202.9	194.0	181.7	na	-9.2%	-4.4%	-6.3%	na
Nuclear	76.2	68.8	70.5	79.6	na	-2.5%	2.4%	12.8%	na
Hydro & wind	10.7	12.3	10.2	8.8	na	3.6%	-17.7%	-13.2%	na
Thermal	212.0	121.7	113.3	93.3	na	-12.9%	-6.9%	-17.7%	na
<b>Generation Capacity in GWe</b>	54.3	54.2	54.3	54.2	na	0.0%	0.0%	0.0%	na
Nuclear	12.8	12.8	12.8	12.8	na	0.0%	0.0%	0.0%	na
Hydro & wind	4.7	4.7	4.7	4.7	na	0.1%	0.2%	-0.2%	na
Thermal	36.8	36.7	36.7	36.7	na	-0.1%	0.0%	0.0%	na
<b>Average Load Factor in %</b>	62.8	42.7	40.8	38.2	na	-9.2%	-4.4%	-6.3%	na
<b>Fuel Inputs for Thermal Power Generation</b>	94.2	29.9	31.8	28.0	na	-24.9%	6.2%	-11.7%	na
Solids	26.6	15.7	20.4	16.9	na	-12.3%	29.9%	-17.5%	na
Oil	22.0	2.8	2.8	2.1	na	-40.3%	0.0%	-25.4%	na
Gas	45.6	11.4	8.5	9.1	na	-29.3%	-25.0%	6.5%	na
Geothermal	0.0	0.0	0.0	0.0	na	-	-	-	na
Other	0.0	0.0	0.0	0.0	na	-	-	-	na
<b>Average Thermal Efficiency in %</b>	19.3	35.0	30.7	28.6	na	16.0%	-12.3%	-6.8%	na
<b>Non-Energy Uses</b>	3.4	1.1	0.8	0.6	na	-24.5%	-25.3%	-32.6%	na
<b>Total Final Energy Demand</b>	180.3	109.3	104.3	97.7	na	-11.8%	-4.5%	-6.3%	na
Solids	45.6	25.2	22.0	18.9	na	-13.8%	-12.8%	-13.9%	na
Oil	42.6	17.3	18.9	14.1	na	-20.2%	9.4%	-25.4%	na
Gas	34.5	40.4	39.9	42.5	na	4.1%	-1.3%	6.5%	na
Electricity	19.2	12.9	12.3	11.6	na	-9.5%	-4.5%	-5.9%	na
Heat	38.2	13.2	11.0	10.4	na	-23.4%	-16.7%	-5.7%	na
Other	0.3	0.3	0.3	0.3	na	-2.8%	-2.5%	-2.6%	na
<b>CO<sub>2</sub> Emissions in Mt of CO<sub>2</sub></b>	720.7	412.7	409.3	373.0	na	-13.0%	-0.8%	-8.9%	na
<b>Indicators</b>									
Population (Million)	51.89	51.92	51.53	50.72	50.19	0.0%	-0.8%	-1.6%	-1.0%
GDP (index 1985=100)	109.6	70.5	62.2	55.9	54.1	-10.4%	-11.8%	-10.1%	-3.2%
Gross Inl Cons./GDP (toe/1990 MEUR)	2041.8	2074.2	2300.6	2434.0	2490.2	0.4%	10.9%	5.8%	2.3%
Gross Inl Cons./Capita (toe/inhabitant)	4.87	3.19	3.14	3.04	3.04	-10.1%	-1.4%	-3.4%	0.1%
Electricity Generated/Capita (kWh/inhabitant)	5759	3908	3765	3583	na	-9.2%	-3.7%	-4.8%	na
CO <sub>2</sub> Emissions/Capita (t of CO <sub>2</sub> /inhabitant)	13.9	7.9	7.9	7.4	na	-13.0%	-0.1%	-7.4%	na
Import Dependency (%)	47.4	45.5	50.0	48.7	46.9	-1.0%	9.8%	-2.6%	-3.6%

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

(2) Estimates