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# Energy Trade and Cooperation Between the EU and CIS Countries

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## Abstract

The report reviews key issues in energy trade and cooperation between the EU and CIS countries. It describes historical trends of oil and gas demand in the EU, other European and CIS countries and offers demand forecasts until 2030. Recent developments in oil and gas production and exports from Russia and Caspian countries are covered in detail leading to the discussion of the likely export potential of these regions. The key factors determining the production outlook, trade-offs and competition related to energy resources transportation choices are also discussed. The report also covers the interests and role of transit countries in relations between producer and consumer regions. The analytical section leads to policy recommendations that focus mainly on the EU.

## Contents

## Abbreviations

BTC – Baku-Tbilisi-Ceyhan pipeline
BTE – Baku-Tbilisi-Erzurum pipeline
BTS – Baltic Transport System
CAC – Central Asia - Centre pipeline
CIS – Commonwealth of Independent States
CNPC – China National Petroleum corporation
CPC – Caspian Pipeline Consortium pipeline
CPI – Consumer price index
DOE – US Department of Energy
EBRD – European Bank for Reconstruction and Development
EIA – Energy Information Administration (at the US Department of Energy)
EU – European Union
FSU – Former Soviet Union
GUEU – Georgia-Ukraine-European Union pipeline
IEA – International Energy Agency
IEF – Institute of Energy and Finance (Russia)
KMG – KazMunaiGaz
LNG – Liquefied natural gas
OECD – Organization for Economic Co-operation and Development
OPEC – Organization of the Petroleum Exporting Countries
SCP – South Caucasus pipeline
TAF – Trans-Afghan route
TCGP – Transcaspian Gas pipeline
TGI – Turkey-Greece-Italy pipeline

## Units of measurement

bcm – billion cubic meters
cub.m – cubic meter
mt – million tonnes
mtoe – million tonnes of oil equivalent
toe – tonne of oil equivalent

## Measurement

1 barrel = 0.1364 tonne (of oil equivalent)

# Introduction

The world's current energy problems originate from the growing global consumption of energy, which is the result of expanding economies, a growing population, rising living standards as well as a great geographical mismatch between energy supply and demand.

The Presidency Conclusions of the European Council (Brussels, 23/24 March, 2006) stress the fact that Europe is "facing a number of challenges in the energy field: the ongoing difficult situation on the oil and gas markets, the increasing import dependency and limited diversification achieved so far, high and volatile energy prices, growing global energy demand, security risks affecting producing and transit countries as well as transport routes, the growing threats of climate change, slow progress in energy efficiency and use of renewable power-carriers, the need for increased transparency on energy markets and further integration and interconnection of national energy markets with the energy market liberalization nearing completion (July 2007), the limited coordination between energy players while large investments are required in energy infrastructure" (Council of the European Union, 2006).

The EU "Green Paper" of March 2006 points to a growing EU's dependence on import (up to 70% of total energy and 80% of gas by 2030) and high gas import concentration (most supplies come from only three neighbor countries).

The stabilization of prices, the development of a long-term forecast, infrastructure improvements, the sufficiency of power-carriers supply, and an increase in the reliability of suppliers are of great importance for energy security.

The uneven geographical distribution of power resources as well as differences in development levels and characteristics of the energy sector affect the development of countries' as well as companies' interests. These challenges, if allowed to deteriorate, will inevitably undermine economic growth, standards of living and national security.

It is beyond dispute today that the prosperity and way of life of every nation are conditioned by energy use. Therefore it makes sense to strengthen the energy cooperation and security of the EU by developing energy markets and diversifying its energy resources' supply. To support its economic development, the EU needs consistent, reasonably priced and sustainable energy supplies.

Energy security challenges differ between consumer and producer countries. This complicates the relations between the two groups. Until now, no common unified EU energy policy has been formulated. Additionally, in many producer countries, the government plays a very important role, often as an owner of major producers of energy. This further complicates the dialogue, due to the somewhat different objectives and levels of power of private companies and national governments.

Differences between the interests of parties are related not so much to the current problems of prices and supplies (although a few such disagreements were recently observed in the CIS region), but rather to the assurance of future supplies, returns on investment and pricing mechanisms.

Several oil and gas exporting countries are heavily dependent on revenues from this single sector due to the low level of diversification of their economies. On the other hand, potential problems with securing sufficient energy supplies would risk the economic stability and development of energy importing countries.

There are various approaches to resolving energy problems. The first one attempts to address the problem of the sustainability of current energy markets, the lack of confidence between energy importers and exporters in terms of the reliability of future deliveries, conflicts related to the transit of energy resources and other problems.

For the EU member states, it is more efficient to deal with the countries which have achieved political stability and in which oil and gas are produced by private companies (Grigoriev, 2006) despite the fact that the highest reserves of hydrocarbons are in the countries where state-controlled companies are main operators in the energy field.

Another solution is to elaborate a long-term forecast and to study prospects of energy production and consumption and their influence on economic growth. A comprehensive strategy aimed at diversifying energy sources and transit routes is needed. This is where we should look for answers.

When attempting to resolve these issues, we should take into consideration the prerequisites for long-term political, economic, social and environmental sustainability. This, in turn, will influence the energy sector and affect economic growth throughout the XXI century.

The geographical scope of this paper covers the whole European continent and the former Soviet Union countries, with the main focus being on current EU member states and large CIS energy producing countries.

The paper aims to:

- assess energy consumption and import trends (mostly for oil and gas);

- present the future energy needs of the EU;
- study the production and export potential of major CIS oil and gas producers;
- identify proven and likely locations of energy reserves;
- review existing and planned transportation infrastructure;
- analyze barriers to trade and challenges to cooperation and trade between the CIS and the EU, barriers to increasing the FSU's production and exports to the EU, and barriers to investment in the energy sector;
- examine the geopolitical characteristics of relations between energy producing countries and "transit countries" in the CIS;
- assess alternative transportation infrastructure in EU and its political challenges.

The first section analyses the oil demand trends and forecasts in the EU. The second and third sections examine the Russian and Caspian energy supplies and potential resources. The last section characterizes transportation options, infrastructure capacity trends, cooperation and prospects[1].

In conclusion, we offer recommendations in the field of cooperation in energy supply.

[1] The main data source used in this report is BP (2008). All other information not provided by BP is taken from IEA, Eurostat, EIA and the statistical agencies of respective countries and analytical and forecasting institutes.

# 1. Energy Trends in Europe: Oil and Gas Demand

EU energy demand has continued along a slow upward trend. Two important phenomena have changed the energy situation and outlook. First, following a period of an increase in production followed by stabilization in the early 2000s, EU domestic production has started to diminish and is facing further decline in the coming years. Second, oil and gas prices have increased substantially in the last few years (Figure 1.1) and are expected to stay relatively high in the medium term.

**Figure 1.1. Global oil prices, Jan 1992 – Aug 2008 (USD per barrel)**


Note. The figure plots the simple average of three crude oil spot prices: Dated Brent, West Texas Intermediate, and the Dubai Fateh.
Source: IMF commodity prices database

In 2005, EU27 import dependence for energy stood at 52%, up from 47% in 2000 and 43% in 1995 (Eurostat, 2007)[2]. The EU is particularly dependent on imported oil and gas. In 2005, its import dependency for oil amounted to 82% (up from 76% in

[2] Source: Eurostat pocketbook, 2007.

2000) and for gas 58% (up from 49% in 2000)[3]. With the falling internal production of hydrocarbons, Europe's import dependency is certain to rise. DG TREN (2008) foresees that by 2030, the EU's import dependence will reach around 95% for oil, 84% for natural gas, and have an overall import dependence of 67%.

Large investments will be needed over the next few years to support production, transportation and distribution capacity, replace ageing infrastructure, and improve energy efficiency in order to address environmental challenges and meet expected energy demand increases.

## 1.1. Current Trends in Oil and Gas Demand

### 1.1.1. Oil

Between 1991 and 2007, oil demand in the EU expanded at an average annual rate of 0.3%, which is much slower than in other parts of the world[4]. In more recent years, demand growth seems to have moderated even further to an annual rate of less than 0.1% between 1999 and 2007[5]. The EU27 accounted for approximately 18% of total global oil consumption in 2007, down from 21% in 1991.

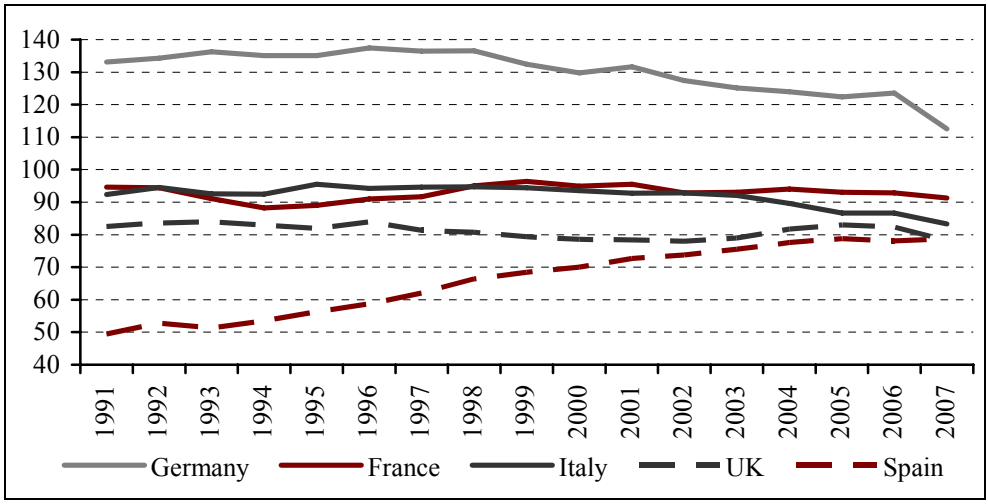
Oil consumption in the whole European continent and the former Soviet Union (FSU) region taken together declined quite substantially between 1991 and 2007, by 1% annually on average. This was due to a major decline in oil consumption between 1991 and 2000 in the FSU. In Russia, oil consumption roughly halved between 1990-91 and 2000-01; in Kazakhstan the consumption level in 1999 was one third of that in 1990-91. In Ukraine, oil consumption in 2000 was only one fifth of the 1990 level.

The demand trends differ quite substantially among the EU economies and other European countries. In Germany, the largest EU consumer, oil demand rose somewhat between 1990 and 1996 while the last decade brought a consistent decline. Between 1999 and 2007, demand was falling by 2% annually on average. In

[3] Source: Eurostat pocketbook, 2007. Dependency is calculated as the ratio of the net imports to the total consumption of a country or region. The overall energy import dependence (for all energy products) is well below the import dependence for oil and gas because of lower dependence on imports of other energy resources such as fossil fuels, etc.
[4] 1.4% average annual growth in North America, 3.4% growth in Asia and Pacific region
[5] Calculations presented in this section are based on BP (2008) data.

France, Italy and the UK, demand has been mostly flat over the last 15 years, with recent signs of a decline. In contrast, Spain witnessed a rapid rise in oil consumption, at an average rate of 3% annually (see Figure 1.2). These five countries account for roughly two thirds of the total EU27 demand.

**Figure 1.2. Oil Consumption in Large EU Economies, 1991-2007 (mt)**




Source: BP (2008).

Among other EU economies, the Benelux countries have seen a rapid increase in oil consumption since 1991. This trend has been especially true recently, with an average annual increase of 2.6% over the 1999-2007 period. By 2007, the Netherlands, Belgium and Luxembourg together accounted for close to 13% of total EU demand. The trends in other countries were mixed. In Poland, Greece, and Austria, consumption was increasing the majority of the time since early 1990s. In Romania, Sweden and Hungary, demand fluctuated.

Beyond the EU and the FSU, Turkey, Switzerland and Norway are among the large European consumers. Turkey exhibited a rising, albeit volatile, trend, while demand in Norway, after increases during the 1990s, has stagnated in recent years. Oil consumption in Switzerland has been declining.

### 1.1.2. Natural gas

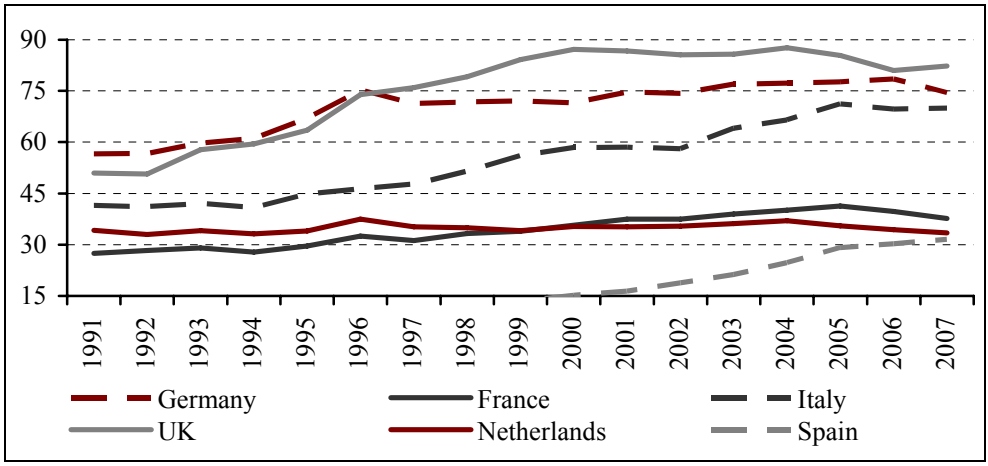
Between 1991 and 2007, gas demand in the EU expanded at an average annual rate of 2.3%, a figure that is in line with the global growth rate. In recent years, demand growth seems to have moderated, to an annual average of only 1.5% be-

tween 1999 and 2007. During this period, global demand accelerated to an average annual rate of 2.8%. The EU27 accounted for around 16.5% of global gas consumption in 2007[6].

In 2007, gas consumption in the FSU was 31% above the EU27 level, down from double the EU level in 1991. Russia alone consumed only 9% less gas than the entire EU in 2007. In the FSU countries, a strong reliance on gas, in comparison with other regions in the world, is explained by abundant gas reserves in Russia and several Central Asian countries and (until recently) very low domestic prices. In the early 1990s, the FSU saw a slight decline in the consumption of natural gas. However since 1997, consumption has risen. From 1999 – 2007, it rose at an average rate of 2.1% annually.

Gas demand has been growing in almost all the EU countries, however, the dynamics differ between member states. The UK, the largest EU gas consumer, has seen a stagnation in demand since 1999 (with an average annual decline of 0.3% during the 1999-2007 period) after a period of rapid increase during 1990s. In Germany, gas consumption also has recently slowed (0.4% annual growth during 1999-2007) after a period of strong growth until 1996. In contrast, demand increases in Italy and France have stayed high since 1991, averaging respective annual rates of 3.3% and 2%. Demand growth has been very rapid in Spain (11.5% annually since 1991) where the role of gas in the energy mix went from insignificant in the early 1990s, to 18% of the total energy supply in 2004 (Figure 1.3). These six countries accounted for 76% of the EU27's gas demand in 2007 (but taken together, consume less gas than Russia alone).

**Figure 1.3. Gas Consumption in Large EU Economies, 1991-2007 (mtoe)**




Source: BP (2008).

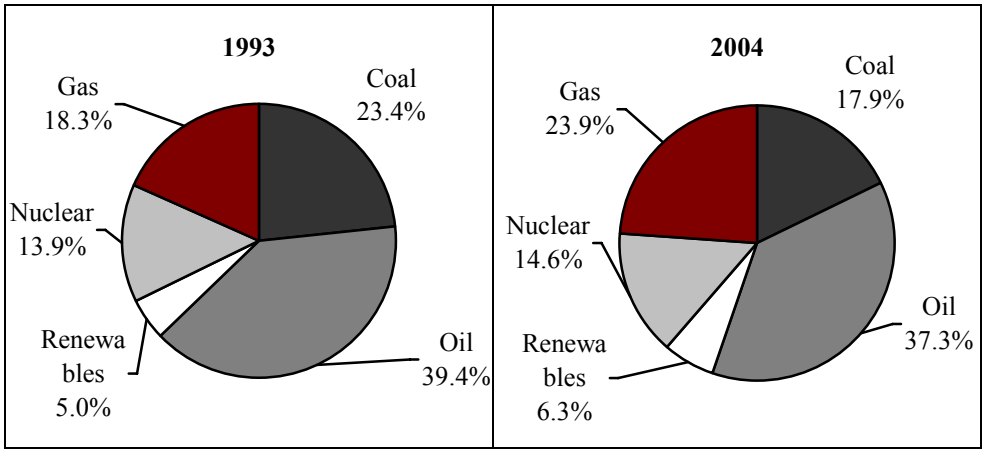
[6] Calculations presented in this section are based on BP (2008) data.

Among other EU economies, Belgium and Poland have seen a continued increase in consumption, at approximately 2.8-3.3% annually. Denmark, the Netherlands, Romania, Slovakia and the UK are the only EU27 countries in which demand has been declining since 1999. Apart from the EU and FSU countries, only Turkey is a significant European consumer of gas, with new import pipeline infrastructure allowing for an annual growth in demand of nearly 14% since 1999.

### 1.1.3. Oil and Gas in the Energy Mix

Oil dominates in the EU energy mix with a share of over 37%, slightly less than the world average of around 40%[7]. Between 1993 and 2004, the importance of oil in total EU energy consumption stayed mostly stable. One major change in the structure of consumption was the decline in the importance of coal (from 23.4% to below 18%) and a rapid rise in natural gas consumption (from just above 18% to nearly 24% of the share in the energy mix). Nuclear energy accounted for around 14% of total consumption while renewable sources of energy continued to increase, albeit from a low base; by 2004, they accounted for slightly more than 6% of the total (Figure 1.4)[8].

**Figure 1.4. EU25 Total Energy Consumption by Fuel, 1993 and 2004 (% shares)**

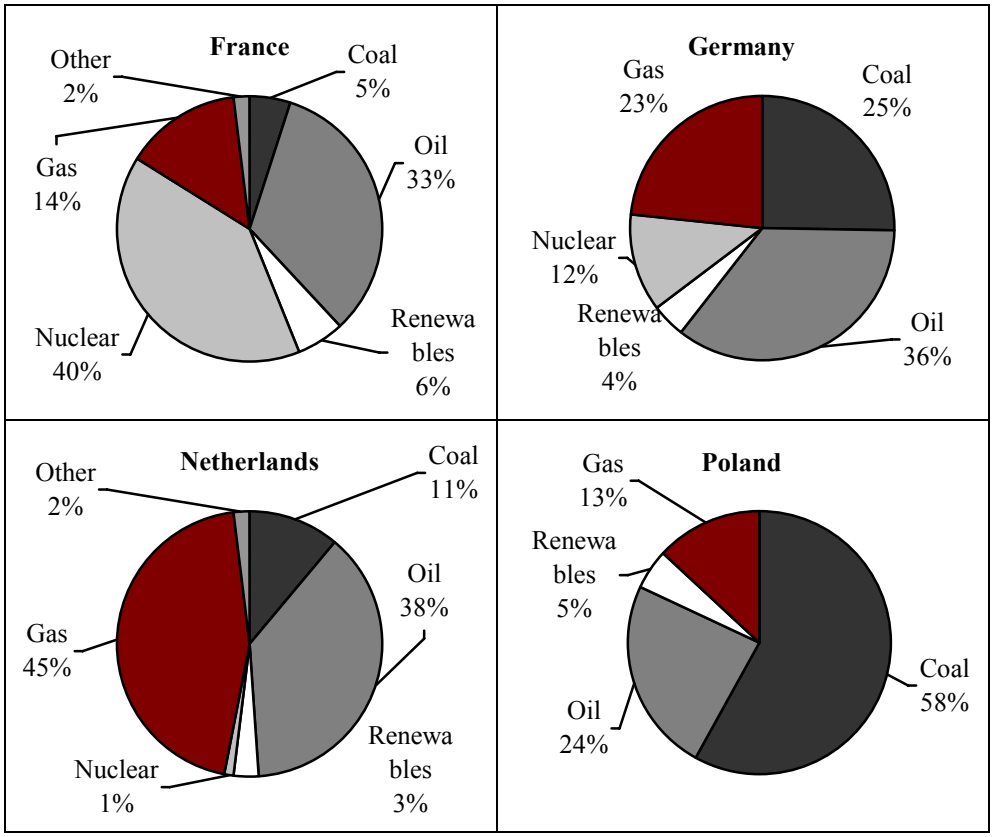



Note. Data based on gross inland consumption figures calculated from primary production, trade, and changes in stocks. Data corresponds to consumption, distribution, and transformation losses combined. Data for EU27 are almost identical to EU25.
Source: Eurostat pocketbook, Energy, transport and environment indicators, 2007 edition, February 2008.

[7] This section discusses 2004 data.
[8] Unless indicated, data presented in this section comes from the Eurostat database or from European Commission documents based on Eurostat data.

The energy mix in some FSU countries, notably Russia and Ukraine, differs from the EU average in that natural gas plays a larger role. For example, in Russia, gas accounted for 54% of the 2004 energy mix. Within the EU, there is also substantial diversity in the relative importance of particular energy resources. To illustrate the scale of differences, one can compare the Netherlands, which relies mostly on natural gas (45% of total energy consumption) and oil (which is 38% of total energy consumption) with France, where nuclear energy dominates (with a 40% share while oil accounts for 33%). One could also contrast these with Poland, which has no nuclear power sources, and where solid fuels account for as much as 58% of the total energy mix and gas plays a very small role (13%) (Figure 1.5). In some smaller member states, the proportions diverge even further from the EU average, e.g. Malta and Cyprus are almost entirely oil economies (100% and 94%, respectively).

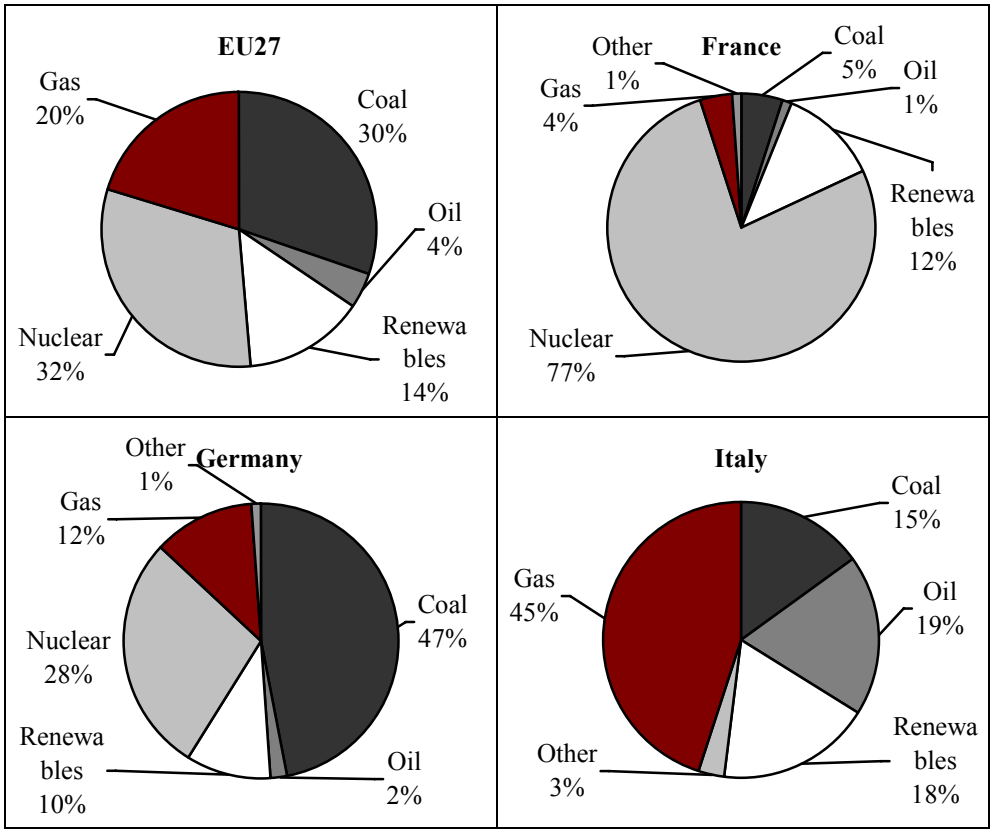
**Figure 1.5. Energy Consumption by Fuel in Selected EU Member States, 2004 (% shares)**




Source: European Commission Staff Working Document, *EU Energy Policy Data,* SEC (2007) 12.

Such major differences in the shares of individual fuels in total energy consumption are primarily related to different patterns of electricity generation. It is illustrative to point out that while more than three-fourths of electricity is produced in nuclear power plants in France, a number of other EU member states do not have any plants. Meanwhile, solid fuels account for almost half of German and more than 90% of Polish electricity generation, while their role is negligent in France. 63% of electricity in the Netherlands is produced from natural gas, which accounts for less than 5% of the electricity mix in the Czech Republic and Bulgaria. Renewables account for almost half of the electricity mix in Sweden but only 4% in the UK (see also Figure 1.6).

**Figure 1.6. EU27 and Selected Member States' Electricity Mix, 2004 (% shares)**




Source: European Commission Staff Working Document, *EU Energy Policy Data*, SEC (2007) 12.

Between 1993 and 2004, the majority of the increase in the electricity generation capacity in the EU25 came from natural gas-fired plants. Their electricity pro-

duction more than tripled between 1993 and 2004, compared to a nearly flat output from solid fuels-fired stations and hydropower plants, a minor increase in output from nuclear power stations, and a substantial decline in output from oil-fired stations. The output of power plants which operate based on renewable resources (other than hydro energy), particularly wind and biomass, increased sharply over the analyzed period (25 and 3.4 times, respectively), although their shares in total electricity production are still relatively small.

The data presented so far indicates that while patterns of natural gas consumption differ vastly between countries, the differences in the relative role of oil in the total energy mix, while substantial, are of a much smaller magnitude. This is explained by the various usage patterns of oil and natural gas. The use of gas is diversified, with electricity and heat generation accounting for close to 30%, residential consumption also close to 30%, industry accounting for close to 25%, and the rest spread among other uses[9]. It is therefore clear that different industrial, electricity and heat generation patterns in various European countries lead to major differences in the role that gas plays in the total energy mix of each country.

The situation with oil is different because its main use is in the transport sector, absorbing roughly half of total consumption in the EU. Oil is also used in the industrial sector, in households, in electricity generation plants and in agriculture; however these uses play a relatively small role[10]. From the perspective of oil demand trends, it is important to note that thus far, no economically significant alternatives for oil in the transportation sector have emerged. In 2005, bio-fuels accounted for less than 0.5% of total fuel consumption in most of the EU member states with only a few countries with higher shares (around 3.5% in Germany) (European Commission Staff, 2007). The share of bio-fuels is expected to increase in the EU, possibly reaching around 5% by 2010. In March 2007, the European Council re-confirmed a 10% binding minimal target for the share of bio-fuels in overall transport fuel consumption by 2020. However, the feasibility of reaching this target without causing major troubles for the agricultural sector, negatively affecting biodiversity, destabilizing global food prices, etc. has been questioned by several stakeholders, sparking heated debates in the EU (e.g., see Turmes, 2008). Indeed, it is widely acknowledged that this target is not feasible unless a functional and robust sustainability scheme of biofuels production is put in place and second generation biofuels become commercially viable (European Commission, 2008). This point in particular implies that the EU will need to import biofuels from re-

[9] IEA data pertaining to EU25 2004 consumption patterns.

[10] Oil is a very versatile energy source and can also be used e.g. for electricity generation. This explains why some small countries (e.g. islands of Cyprus and Malta) may rely almost entirely on oil. This does not contradict the main message of this paragraph, which applies to countries with a more diversified economic base.

gions where conditions for their production are more favorable. In turn, boosting international trade in biofuels is not an easy task due to the lack of internationally agreed-upon criteria for sustainable production and the diverse range of government measures aimed at sheltering domestic markets (see e.g. UNCTAD, 2006).

While the role of oil products in the transport sector is unlikely to change substantially in the coming years or even decades, substantial changes in the mix of fuels are already taking place in the EU. A key trend is the rising relative demand for diesel (which accounted for 50% of final energy consumption in the transport sector in 2005, up from 40% in 1995) and the corresponding falling relative demand for gasoline (which fell from 45% in 1995 to 31% in 2005). This results from the rapidly growing popularity of diesel-fueled cars, which currently account for around half of new cars registered in Western Europe, up from less than 20% in the early 1990s (IEA, 2006a).

## 1.2. Forecast of Oil and Gas Demand

### 1.2.1. Oil

This report presents the results of a demand modeling exercise carried out using an updated version of the CASE Advisors (2000) oil demand model. Interpreting the forecast results requires understanding the methodology and assumptions guiding the modeling. A description of these is included below followed by the presentation and discussion of the results.

The baseline scenario presented in this report assumes the continuation and relative stability of the relationships between aggregate economic activity measures, prices, and oil demand in European countries. In other words, in the forecast horizon, no major technological breakthrough is foreseen that could significantly limit the role of oil as a major fuel for the transport sector. In addition, no change in the patterns of demand for transport services is foreseen. A brief discussion of the impact of other sets of assumptions is included later in this section.

The forecast horizon is until 2030, in line with the practice of the International Energy Agency and the US Energy Information Administration. The database on historical annual oil demand is taken from BP (2008).

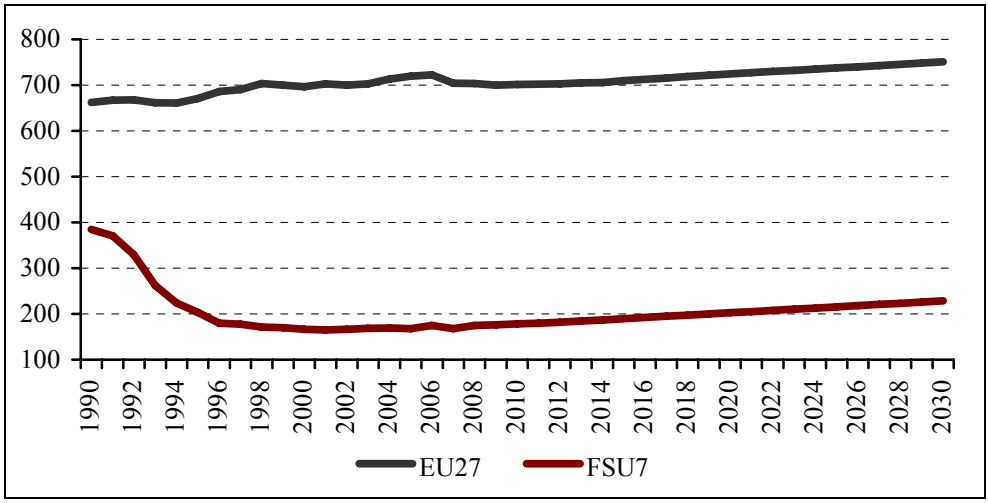
The model comprises three blocks: structural, trend and expert. The structural block models the demand for oil at the country level with measures of aggregate

economic activity (proxied by GDP), oil intensity, and international price levels. Following the typical findings from the literature (see e.g. Krichene, 2005), the structural model assumes low price elasticity in the short term and significant income elasticity of oil demand. Future GDP growth path is based on assumptions concerning the speed of convergence within the non-FSU European economies and past performance in the case of FSU countries.

The trend block relies on a simple autoregressive model (estimated using the automated procedure of Neumaier and Schneider, 2001) to describe oil demand as a function of past trends. The expert module uses the information from several large international models used at major institutions, such as International Energy Agency, US Energy Information Administration, and European Commission (EIA, 2007, 2008; European Commission, 2006; DG TREN, 2008; and IEA, 2006b, 2007, 2008).

The forecasts are obtained as weighted averages from the results suggested by three model blocks with their relative importance differing at various forecast horizons (e.g. weights on the results from the trend block concentrated on the short-term forecast of up to 5 years).

**Figure 1.7. Oil Demand in EU27 and FSU7 – 1990-2030 (mt per annum)**




Note. EU27 is comprised of 27 EU member states as of 2007. FSU7 is comprised of the seven largest oil consumers among CIS countries: Russia, Ukraine, Kazakhstan, Belarus, Uzbekistan, Turkmenistan, and Azerbaijan.
Source: BP (2008) and oil demand model.

Figure 1.7 and Table 1.1 present the key results of the forecasting exercise. Total demand in Europe and in the FSU region is expected to increase at an average annual rate of 0.4% over the 2005-30 period, with broadly similar dynamics over

the whole forecast horizon, apart from the recession-related decline foreseen in the 2008-2009 period. EU27 demand growth is expected to slow from the levels observed in 1996-2005 (0.7% annually on average) to 0.2% annually over 2005-2030. The FSU countries will see much stronger demand growth, at 1.2% annually during 2005-2030, although this still represents a significant decline in the oil intensity of their economies compared to the period through the late 1990s.

**Table 1.1. Average Annual Growth of Oil Demand – 1996-2030 (% per annum)**

| | Europe & FSU | EU27 | FSU7 |
|---|---|---|---|
| 1996-2005 | 0.22 | 0.71 | -1.90 |
| 2006-2010 | -0.20 | -0.50 | 1.20 |
| 2011-2020 | 0.60 | 0.30 | 1.30 |
| 2021-2030 | 0.60 | 0.40 | 1.20 |
| 2006-2030 | 0.40 | 0.20 | 1.20 |

Note. FSU7 is comprised of the 7 largest oil consumers among CIS countries: Russia, Ukraine, Kazakhstan, Belarus, Uzbekistan, Turkmenistan, Azerbaijan. Europe & FSU is comprised of EU27, all CIS countries plus Albania, Bosnia-Herzegovina, Croatia, Iceland, Former Yugoslav Republic of Macedonia, Montenegro, Norway, Serbia, Switzerland, and Turkey.
Source: BP (2008) and oil demand model.

In the above scenario (which produces similar results to some other larger forecasting projects carried out, for example, by DG TREN in 2008, or EIA in 2008), the EU is characterized by relatively low oil demand growth compared to other regions. Europe's share in global consumption is set to decline. It is worth recalling that the oil market is global in nature, i.e. oil price developments will be determined by the global demand/supply balance rather than the developments in Europe. Still, the global oil (and more generally energy) demand path emerging from these models is perceived as unsustainable from the environmental perspective (and possibly also due to supply capacity and security constraints). Rising global energy consumption and related $CO_2$ emissions are, in all likelihood, the primary factors responsible for the climate changes observed in recent decades (IPCC, 2007). This acts as a stimulus for governments, and in particular for the European Commission, to introduce policy initiatives that could (1) limit the energy demand and (2) shift it towards cleaner energy sources. This implies lower consumption of oil.

In 2007-08, the European Commission proposed a set of integrated energy and climate change packages proposing actions and targets related to these two issues[11]. This has sparked heated debates between various stakeholders which may lead to policy changes, effectively reducing the consumption of oil relative to a reference

[11] See European Commission, 2007b, for details.

scenario. To get a sense of the possible energy savings, one could note that the IEA (2005) Alternative Policy Scenario assumes 10% lower global oil demand in 2030 compared to the baseline. The majority of savings come from measures affecting the transport sector. Europe is expected to play an important role in fostering improvements in the efficiency of new vehicles, increasing the role of biofuels, and initiating changes in patterns of passenger and freight transport. However, given the costs involved in upgrading the economy to become less energy-intensive, some form of global cooperation is needed to ensure that policies consistent with the Alternative Scenario are implemented. Without such cooperation and the involvement of other major players such as the US, China, India, or the CIS, any significant progress is unlikely.

### 1.2.2. Gas

Predicting future natural gas demand requires an approach different from that used in modeling oil demand. This is because the use of gas is diversified across sectors and in all these sectors there are substitutes for gas (unlike in the case of oil in the transport sector). In addition, gas consumed in Europe mostly comes from pipelines (despite the growing role of LNG), indicating the unique character of the European gas market. Unlike oil, gas can reach a particular destination only if there is a sufficient capacity in pipeline infrastructure. Gas consumption is therefore loosely linked to macroeconomic developments that can be forecasted with some degree of certainty (such as GDP growth) and depends more on government policies and private sector activities, in particular investments in gas-fired power plants and gas transit infrastructure. For these reasons, the discussion of expected future demand trends below is not based on the modeling exercise. Rather, it draws on existing analyses by other sources, which are based on the examination of present and likely government policies and other factors which determine the availability and cost effectiveness of natural gas[12]. The sources include IEA (2005, 2006, 2007), EIA (2007, 2008), Eurogas (2006), DG TREN (2008), European Commission (2006) and European Commission Staff (2006).

According to all these sources, between 2005 and 2030, gas demand in the EU is expected to increase significantly faster than oil demand. The most recent predictions have scaled down the pace of the annual demand increase: from a forecast of

[12] Another possible approach could rely on forecasting the maximum potential supply assuming that demand will adjust to the available supply. However, as evident from the subsequent sections of this report, forecasting gas supply in any given region is far from an easy task.

1.4-2% in 2006 to 0.6%-1.4% in 2008. A somewhat faster growth until 2015 will be followed by more muted gains between 2015 and 2030[13]. The FSU region is also expected to see further increases in domestic demand (from already high current levels), with dynamics that are broadly similar to the EU/OECD economies (to the tune of around 1% annually)[14].

Most of the demand increase is expected to come from the power generation sector. Therefore, the future path of gas demand will depend, to a large extent, on the perceived economic viability of new gas-fired power plants in these and other European countries. For obvious reasons, apart from factors such as attitude to nuclear energy, forecasted gas prices are playing an important role in this. Currently, gas prices are strongly related to oil prices, despite the fact that the two natural resources are no longer close substitutes (for discussion see Energy Charter, 2007; and Stern, 2007a). In an environment of high global oil prices (and therefore high gas prices), the viability of several new investment projects in gas-fired power generation may become less clear to investors, leading to delays in project implementation.

We are inclined to believe that conservative gas growth forecasts for the EU are more plausible. Apart from expected high oil and gas prices, supply security may be an additional factor increasing the risk of investments in gas-dependent projects and thus limiting their attractiveness relative. to, for example, projects based on clean coal technologies[15]. In our view, a scenario with 0.5-1% average annual growth between 2006 and 2015, slowing to around 0.5% over 2016-2030, appears most likely. This would add up to a 16% increase in gas demand in Europe between 2005 and 2030, or a 0.6% average annual growth over the period.

Future gas demand in FSU countries is even more uncertain due to unknown changes in domestic gas pricing. The policies of individual FSU countries (especially Russia and Ukraine) will have a major impact on gas demand, and thus on the relative competitiveness of various modes of electricity production. One may expect differences between major gas producers (Russia, some Central Asian and Caucasus countries) and countries relying on imported gas.

[13] Different sources present forecasts for somewhat differently defined groupings of countries. However, given the high concentration of gas demand in a few large consumers in the EU and OECD, the results for the dynamics of demand growth are hardly affected by changes in the region boundaries. Consequently, the results presented for the EU27 can also be applied to all non-FSU European countries (among which only Turkey, an OECD member country, consumes significant amounts of natural gas).

[14] These forecasts are subject to particularly wide error margins given the uncertain path of gas price changes in the region from currently still largely artificially low levels.

[15] Some authors view coal as a promising alternative to oil and gas, providing the implementation of technological improvements which significantly limit $CO_2$ emissions. See, e.g. Auer (2007).

## 1.3. Non-CIS Sources of EU Energy Supply

This section briefly presents the outlook for non-CIS sources of natural gas and oil supply for Europe, i.e. of domestic production, and import from other major suppliers.

### 1.3.1. Gas

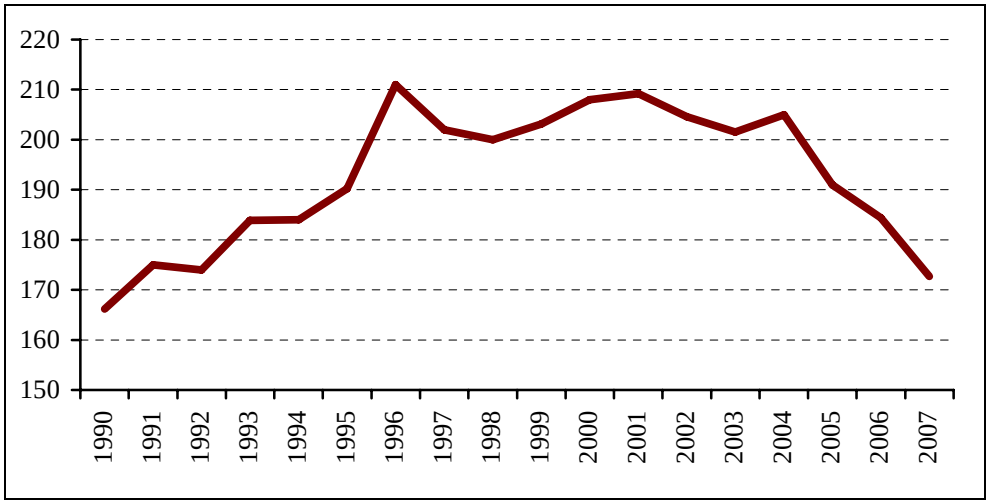
Historically, the EU was meeting a large part of its gas demand with domestic production, mainly in the Netherlands, UK, Italy, Germany, and Romania (with smaller volumes produced in Denmark and Poland). In 1995, the combined production of these countries met about half of EU-27 demand. EU domestic production of natural gas has fluctuated since 1995, reaching a peak in 2000-01, before it began to decline (Figure 1.8). In 2007, domestic output was below 1995 levels, increasing the EU's import dependency (given a strong surge in demand as discussed in section 1.1.2). In the mid-1990s, nearly half of EU gas imports were coming from Russia, with Norway and Algeria accounting for around 15% each. Since then, total EU imports have significantly increased (with a 30% rise between 2000 and 2005). Volumes imported from all major suppliers have also increased, but with varying dynamics. The relative importance of Russia has decreased, and the relative importance of Algeria has stayed broadly stable, while Norway, Libya, and Nigeria have increased their shares in EU gas imports. In 2007, the EU27 imported gas from three main destinations: Russia (around 38%), Norway (25%) and Africa, with Algeria, Nigeria, Libya and Egypt accounting for around 26%.

The currently prevailing view suggests that EU domestic gas output (UK, Netherlands and other countries) as well as Norwegian production may fluctuate until 2010 with a continued decline thereafter, possibly accelerating beyond 2015 (see e.g. Stern, 2007b; EIA, 2007, IEA, 2006b). This outlook will only change due to new gas discoveries. Therefore, the key question relates to the potential of non-European gas supply.

The potential for CIS exports to the EU is analyzed in the subsequent sections of this report. Here we present the outlook of other important gas suppliers.

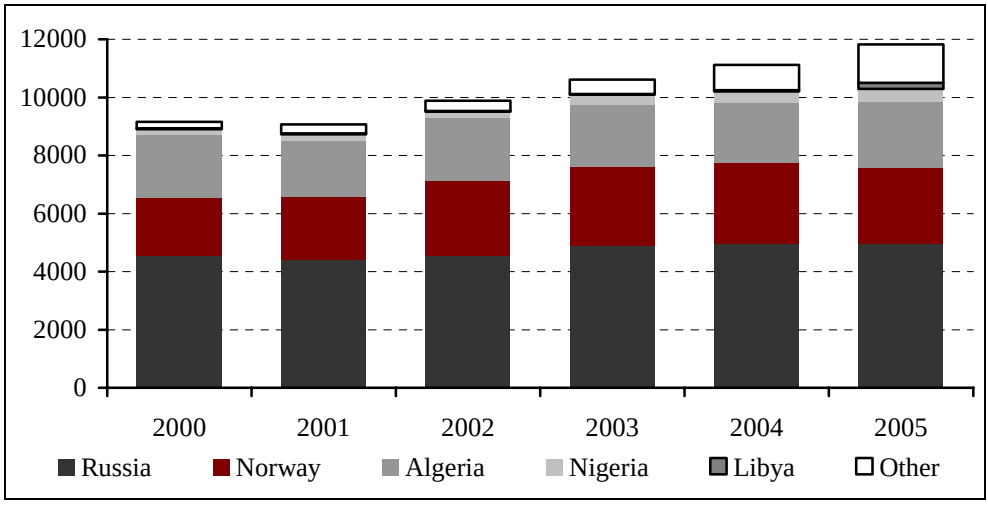
It is commonly believed that the Middle East and Africa will see large gains in gas output until 2030, with a projected average annual growth in the range 3-4.5% in the Middle East and 4-4.5% in Africa (IEA, 2006b, EIA, 2007). Much of the increased output will be exported although rising domestic demand must also be taken into consideration.

**Figure 1.8. EU27 gas production: 1990-2007 (mtoe)**




Source: BP (2008).

**Figure 1.9. EU27 gas imports by origin, 2000-2005 (PJ)**




Note. PJ stands for petajoule (PJ = $10^{15}$ J).
Source: Eurostat pocketbook, Energy, transport and environment indicators, 2007 edition, February 2008.

IEA (2006b) presents an optimistic export outlook for Africa which can increase to around 240 bcm by 2015 and 270 bcm by 2030. According to the IHS (2007), Algeria's gas export capacity is expected to rise by more than 50% between 2007 and 2020, from below 80 bcm in 2007, to around 110 bcm during 2011-2015 and just below 140 bcm in 2020. The majority of these increases will be absorbed by LNG projects, implying the increasing flexibility of potential export markets.

According to the IEA (2006b), the Middle East may see its gas exports expanding to close to 190 bcm by 2015 and around 230 bcm by 2030.

From the EU perspective, the key question is how much of the increased exports should be directed towards EU markets. The IEA (2006a) presents a scenario in which most of increases in gas exports from both Africa and Middle East are directed towards Europe, which is expected to receive more than 200 bcm from Africa and close to 100 bcm from the Middle East by 2030. However, a substantial part of this additional export capacity will be in the form of LNG. Thus, producers will have a substantial degree of freedom in choosing buyers. The US may emerge as Europe's key competitor for LNG unless projects involving Arctic gas (from Alaska and Canada) exploitation are sped up.

Gas pipeline projects from North Africa to Southern Europe are at various stages of planning/construction and one should expect a gradually increasing role of LNG in meeting the EU gas demand. From the perspective of the long-term security of gas supplies to the EU, both the Middle East and Africa involve risks, related inter alia to political instability.

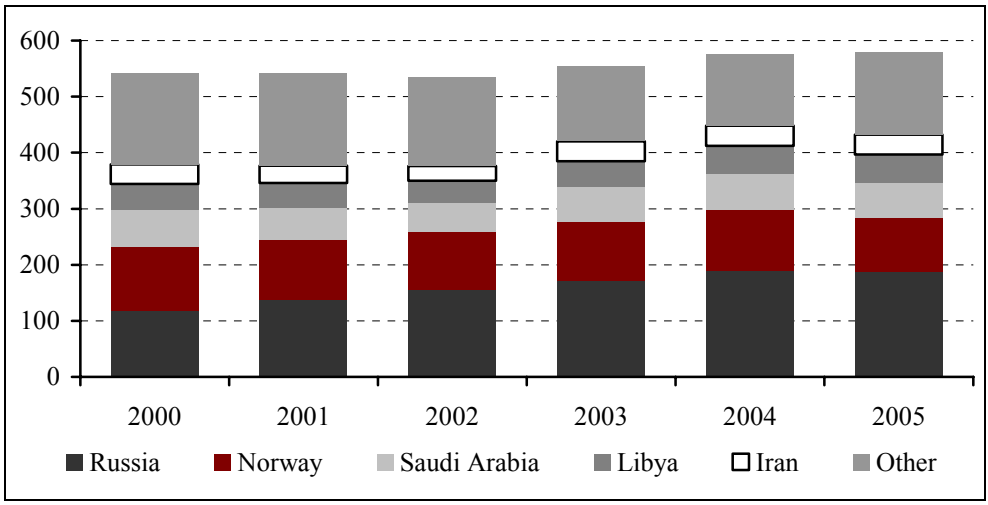
Summing up, the following observations can be made:

- EU domestic output as well as gas imports from Norway are likely to decline, leading to Europe's increasing reliance on non-European sources;
- The role of African (in particular, Algeria) and possibly also of Middle Eastern suppliers of gas for the EU is likely to increase;
- New pipeline projects will increase the diversity of gas sources;
- Nevertheless, LNG will be playing an increasingly important role in EU gas imports, implying the increasing international integration of the LNG market and competition, in particular between the EU and US consumers;
- Political instability in the producing and transit regions and uncertain demand projections need to be taken into account in formulating supply projections.

### 1.3.2. Oil

EU countries import a large share of oil. Imported crude oil accounted for more than 84% of inputs to the EU27 refineries as of 2006, compared to around 75% in 1994. Among EU countries, only the UK is a major oil producer but its production has been steadily declining since 1999. Denmark also extracts significant volumes of crude oil; smaller amounts are produced by Italy and Romania.

**Figure 1.10. EU27 oil imports by origin, 2000-2005 (mt)**




Source: Eurostat pocketbook, Energy, transport and environment indicators, 2007 edition, February 2008.

The EU imports crude oil from the OPEC countries, mainly Saudi Arabia, Iran, Iraq and Libya (which made up 37% of the share of extra-EU imports in 2007), Russia (which supplied 33%) and Norway (which supplied 14%). Kazakhstan and Azerbaijan together accounted for just above 7%. For the last few years, total crude oil imports have increased at a very slow pace. However, imports from Russia have been growing dynamically, with 22% of total imports in 2000 to 33% in 2007. Imports from Norway have declined somewhat while other countries supplied a relatively stable volume of oil in the 2000-2005 period (Figure 1.10).

Norway is likely to continue its downward trend in oil production and supply. The total crude oil output of the European OECD countries (mainly Norway, UK, and Denmark) is forecast to decline at an average annual rate of 4.5% until 2030 (IEA, 2006b). In contrast, OPEC is expected to provide the majority of new global production capacity.

The above outlook implies a likely increase in EU oil imports although the pace of this increase will be moderated by slow demand growth. The relative importance of various suppliers is difficult to predict. However, sources of oil imports are not a particularly essential issue from the perspective of supply security because of a well-developed and flexible global oil market with spot transactions playing an important role. Furthermore, well-developed transport and storage capacities allow switching to alternative sources of supply relatively quickly in case problems arise with any particular supplier.

Over the last few years, the EU has also been increasing imports of petroleum products, the demand for which has been shifting away from gasoline toward diesel (as discussed in Section 1.1.3 above). At the same time, in the US, demand for gasoline has risen sharply. The European refining industry was unable to adjust to such rapid changes in demand structure. This acted as a driving force for substantial EU gasoline exports to the US and other markets and large volumes of diesel imports, especially from the CIS countries (mainly Russia). According to Eurostat data, in 2007, EU gasoline exports reached 43 mt (18 mt to the US), or around 40% of total petroleum product exports. In the same year, EU diesel oil imports reached 30 mt (15 mt from Russia, 2 mt from Belarus), close to 30% of total petroleum product imports. Purvin and Gertz (2008) provide an in-depth discussion of this phenomenon.

Summing up the discussion on potential sources of oil supply for Europe, one can make the following observations:

- EU domestic output as well as oil imports from Norway are likely to decline, thus further increasing EU's reliance on non-European sources;
- OPEC is expected to see substantial gains in output and its share in EU crude oil imports will increase;
- From the perspective of supply security, the diversification of oil import sources is much less important than in the case of natural gas.

# 2. Oil and gas in Russia

Russia is a global supplier of energy sources and its exports are essential for ensuring global energy balance and stability both currently and in the long run. Russia accounts for more than 12% of global oil production, about 22% of global natural gas production and more than 5% of global coal production. It produces 10.3% of world's primary energy (about 1.2 billion TOE in 2005, by IEA estimates), of which 45% is exported and 55% is consumed domestically (including energy-goods for export). Russia is the largest single supplier of energy resources to the European Union.

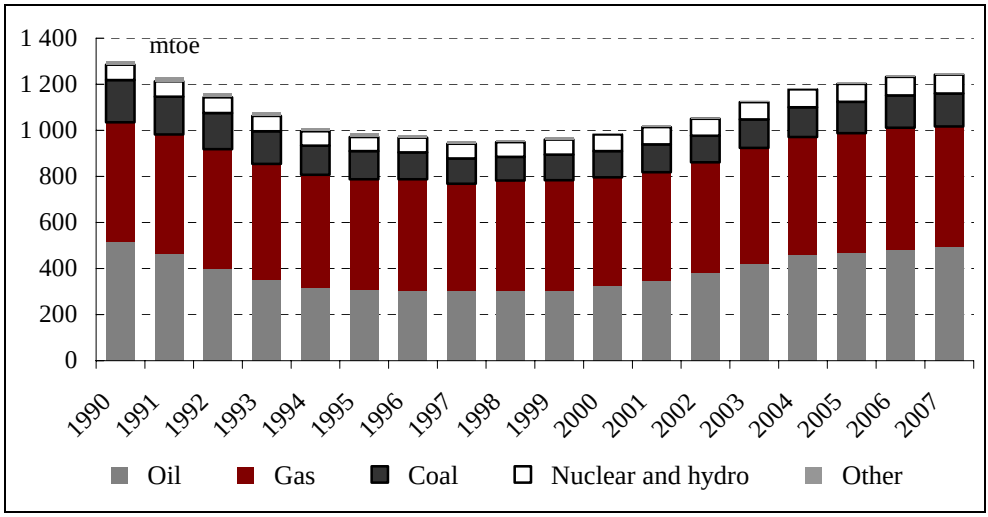
In 2006, the primary energy supply almost reached 1990 levels, after a dramatic decline in 1990s with a slight increase of gas supply comparing to oil and coal. Russia needs to find a harmonized way to develop its energy sector to satisfy both the external and domestic demand for energy. Future decades will inevitably bring massive investments in the energy sector that should allow for maintaining and increasing production and transportation capacity.

## 2.1. Current Trends of Gas and Oil Production and Exports

During the 1990s, the domestic demand for energy in Russia declined dramatically. Between 1990 and 1997, GDP contracted by 43%. This was accompanied by an 11% drop in gas output, and a 41% decline in oil production. Since the start of the economic recovery in 1999, both internal and external demand for Russia's energy products increased again.

On the domestic front, the supply of energy resources was determined by changes in economic rationality on a corporate level, uncertainty related to government regulations and changes in taxation. During the 1990s, the transition-related output decline, structural changes in the economy and the energy sector, and low world energy prices were the main causes of declining production of energy. Primary energy supply was constantly decreasing for the first eight years of transition (from 1990 to 1997) (See Figure 2.1).

**Figure 2.1. Primary Energy Supply, mtoe by Source Fuel (1990-2007)**




Source: Rosstat, IEA, Minpromenergo.

### 2.1.1. Oil

Oil production peaked in 1987 at 569.5 mt. An economic crisis, low world oil prices, and technical difficulties resulted in a radical decrease in production. Compared to other primary energy products, oil production experienced the largest decline. By 1994, it dropped to 56% of the historical highs of 1987, and stayed only minimally above this level until 1999 (Figure 2.2).

The oil sector was privatized early in the reform process. The privatization pattern in the oil industry followed the main idea of disintegration of centralized vertical structure, but a decade later, the industry was reintegrated again.

Between 1999 and 2004/05, Russia experienced rapid growth in oil production, mostly due to the reconditioning of old fields and implementing new improved technologies. No new fields were launched into operation until recently. A number of geologists were referring to “squeezing” out oil from old fields with large long-term losses in oil extraction in the future. The main exceptions were the Sakhalin projects (under Production Sharing Agreement terms) and some of the projects in the Yamalo-Nenetsk region where increases in production were driven by a number of new fields. For example, without output from Sakhalin, production growth would have been almost nil in 2007.

Oil production reached 490 mt in 2007, still 14% lower than the 1987 high. Since 2005, there has been a major slowdown in oil output growth despite all-time-high oil prices. Changes in taxation, property rights conflicts, and the lag effect of

lack of investments in exploring new fields were the main reasons of the deceleration in growth.

Changes in production were accompanied by changes in sources of demand. In the early 1990s, more than a half of oil produced was domestically consumed. In 2006, 70% of production (including oil products) was exported. This means that the oil sector has become more dependent on external demand and export transport infrastructure.

Another implication is that domestic prices of oil products have become more dependent on world market prices especially with the unified natural resource production tax (UNRPT) and export duties linked to world prices. These taxes and duties gave a huge boost to government incomes, while limiting resources for investments of oil companies.

Therefore, in the absence of the formal regulation of oil product prices, there is a strong motivation to push domestic prices up as most of the export returns end up in the state budget. The actual pricing of individual oil products is strongly influenced by the structure of refining capacities. Most refining facilities are old and their productivity is below international levels. No new large refinery has been commissioned since 1991.

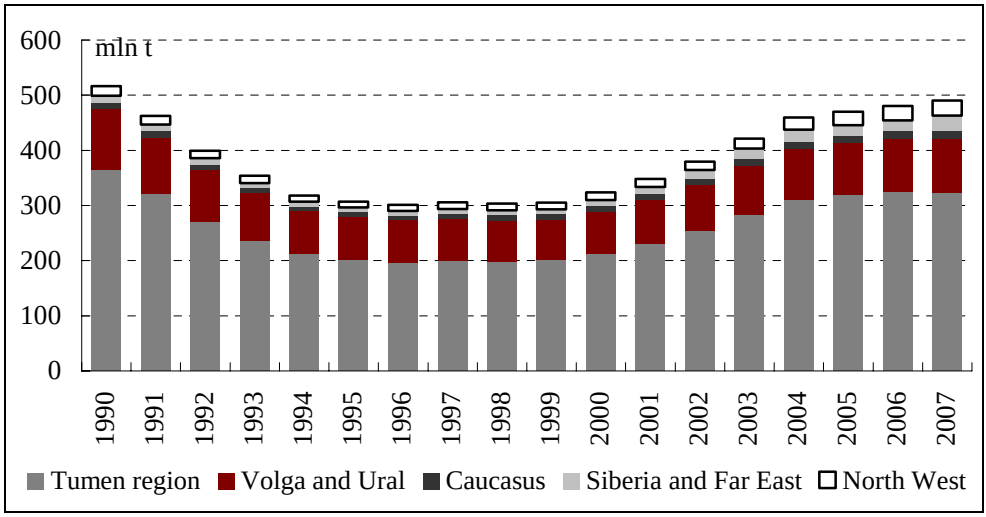
There is also excessive distillation capacity and uneven geographical location. Thus, there is a fundamental mismatch between domestic demand for oil products and production capacities. These lead to higher prices on light products (like gasoline) and lower prices on heavy products (like fuel oil).

More than 70% of the refining capacity is controlled by vertically integrated companies. Therefore, there is strong governmental pressure on oil companies to limit price increases for gasoline and fuels. Major companies have developed strong retail networks and manage all the stages of the production and distribution chain so that they can control costs and pricing inside the chain. Due to public discontent and government pressure, the major companies voluntarily capped prices of gasoline in 2005-07.

Exports of crude oil reached a maximum of 260 mt in 2004 and then gradually declined, mainly thanks to tax and tariff policies which stimulated domestic refining. Duties on oil product exports have been lower than for crude since 2004.

The EU market is the largest foreign market for Russian crude. In 2006, 185 mt (almost 75% of all crude oil exports) were supplied to the EU (Table 2.1). Exports to the CIS have been relatively stable at around 35-40 mt annually for the last few years. More than a half of CIS exports go to Belarus. Ukraine and Kazakhstan are also major recipient markets.

**Figure 2.2. Russia: Oil production by main regions (mt), 1990-2007**




Source: Rosstat.

**Table 2.1. Russian oil exports by destination (mt), 2003-06**

| | 2003 | 2004 | 2005 | 2006 |
|---|---|---|---|---|
| *Total crude and oil products* | *296.1* | *331.0* | *338.3* | *344.4* |
| *Total crude* | *226.1* | *260.8* | *256.5* | *248.3* |
| *EU-27* | *170.8* | *188.9* | *188.0* | *185.2* |
| Germany | 33.5 | 37.1 | 38.2 | 36.9 |
| Poland | 16.6 | 16.7 | 17.5 | 19.2 |
| Netherlands | 11.7 | 16.3 | 16.9 | 18.2 |
| Italy | 17.5 | 19.9 | 18.4 | 17.1 |
| Belgium | 11.5 | 14.0 | 13.4 | 13.3 |
| Spain | 9.9 | 8.8 | 8.5 | 12.2 |
| France | 12.9 | 12.7 | 9.6 | 9.7 |
| Lithuania | 7.1 | 8.2 | 8.9 | 8.3 |
| Finland | 7.8 | 9.5 | 8.5 | 7.8 |
| Hungary | 5.3 | 5.4 | 6.5 | 6.8 |
| Other EU | 37.1 | 40.4 | 41.5 | 35.8 |
| *CIS countries* | *37.0* | *40.1* | *38.0* | *37.3* |
| Belarus | 14.9 | 17.8 | 19.3 | 20.9 |
| Ukraine | 19.4 | 19.1 | 14.8 | 10.7 |
| Other CIS | 2.7 | 3.2 | 3.9 | 5.7 |
| *Other countries* | *18.2* | *31.8* | *30.5* | *25.8* |
| China | 4.4 | 7.4 | 8.1 | 11.0 |
| Turkey | 4.6 | 6.3 | 7.0 | 5.1 |
| Other countries | 9.3 | 18.1 | 15.4 | 9.7 |

Source: Federal Custom Service.

Exports to China have increased rapidly for the last few years (from 1.3 mt in 2000 to 11mt in 2006) backed mainly by Rosneft contracts with CNPC[16]. Oil supplies to countries east of the CIS (including China) will continue to grow in the coming years as these markets are especially targeted by the Transneft state corporation in new pipeline projects.

There are three routes for Russian oil exports: via sea terminals - mainly Primorsk on the Baltic Sea and the Black Sea terminals (around 55% of exports), via the Druzhba pipeline which is connected directly to European consumers (30%), by rail and other modes (15%).

### 2.1.2. Gas

Compared to oil, natural gas production has seen much less volatility over the last 15 years. At its lowest point (1997), gas production was only 10% lower than in 1990. In spite of GDP decline, electricity and especially natural gas consumption were more stable. The growing shift in the use of gas in the S&M private sector, households, and the power sector secured demand in the 1990s. About 70% of produced gas is consumed domestically with more than a half being used by power plants, 10% by industry, 10% by household consumption and 9% by transport.

While domestic consumption of oil halved between 1990 and 1998, gas consumption declined only by 13%. This was mainly determined by the increasing use of gas by domestic power plants, which were switching from expensive and "dirty" fuel oil to gas. Some support came from exports but this played only a limited role. The net gas exports stood at 160-180 bcm for the last 20 years without a significant decline or growth during this period.

During 1997-2002, production was fairly constant at about 580-590 bcm annually. Domestic gas consumption plays a more important role in energy balance than oil.

Another major difference is that unlike oil prices, the domestic gas prices are still regulated. The remaining cheap gas has become a favorable energy source for both consumers and the power sector. However, the low level of domestic gas prices makes its sales hardly profitable. The break-even point in domestic gas trade was only reached in 2007. Gazprom is trying to raise domestic administrative prices as much as possible.

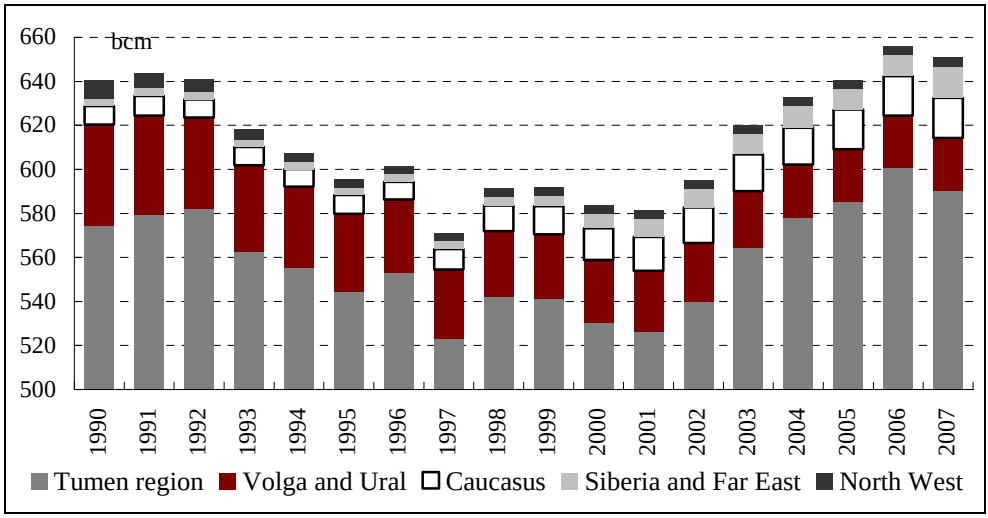
[16] Rosneft' received a loan from CNPC in 2006 and is obliged to supply oil to China until 2010. Oil is transported by rail with a discount tariff set by Federal Tariff Service to make these deliveries more competitive. There are plans to use the Atasu-Alashankou pipeline but there have been no actual supplies yet.

Looking at this sector from the supply side, a majority of gas fields were put into operation in the 1970-80s and thus in the 1990s they were still relatively new (when compared to major oil fields) with relatively modern equipment. Therefore, a lack of investments was not as destructive as in the other sectors of the energy industry.

Gazprom (in which the state holds the majority of shares) is by far the largest gas producer, accounting for 84% of the national output in 2007[17]. Other market players are big oil companies producing mainly associated gas as well as independent producers (Novatek, Itera and others)[18]. Their share in total output has been rising slowly, at a rate that is largely determined by access to the Gazprom-owned pipeline system.

Since 2003, gas production has been increasing at around 2% annually with the bulk of additional supplies being exported. Domestic output has been declining on the Volga and growing in the Caucasus and the East. (See Figure 2.3). In 2006, gas production in Russia grew by 2.4% with the help of independent gas suppliers and oil companies, while Gazprom did not expand production. In 2007, gas production decreased by 0.8% while Gazprom decreased its production by only 0.1%. It is believed that the main reason for the decline was the warm weather in Russia and Europe which affected demand for gas.

**Figure 2.3. Russian gas production by main regions (bcm), 1990-2007**




Source: Federal State Statistics Service.

[17] This share declined from over 90% at the end of the1990s.

[18] As Gazprom has an equity stake in Novatek and Itera (through Sibnefetegas) their "independent" status is questionable. However, this could also give them better terms of access to the pipeline system.

On the European market, the share of Russian gas has been declining steadily. For example, in 1990, Russia contributed to more than 66% of the EU-27's gas import, yet in 2007 it was only 48%.

In the last few years, production began to decline in the three main fields of Gazprom in the north of the Tyumen region (the so-called Nadym-Pur-Taz area): Urengoy, Yamburg, Medvezhye. The growth of gas production is driven mainly by the Zapolyarnoe field (also in the Nadym-Pur-Taz area) which has a capacity of 100 bcm, and the increased activity of independent producers. Gazprom does not disclose information on the production of separate fields so it is hard to estimate the distribution between "old" and "new" fields but there is strong evidence of a considerable Gazprom effort to slow down production decline in Nadymgazprom (Medevezhye and Komsomolskoe fields) and Urengoigazprom. Thus meaningful production growth can only be brought about by new investments.

As previously noted, Russia exports some 30% of its gas with the majority (65% of exports) going to the EU and the CIS (20%). The rest of the exports are mainly directed at Turkey through the Blue Stream pipeline.

The direction of gas exports has changed in the last few years with the share destined for the EU and Turkey growing and the share destined for the CIS declining. A decrease of exports to the CIS region can be explained by price increases and changes in gas relations between Russia, Ukraine and Turkmenistan. Since around 2005-06, a major part of Ukrainian imports have been from Turkmenistan, which have been transported through Russian territory, while Russia supplies only a minor part of Ukraine's imports.

Supplies to traditional consumers of Russian gas in Europe, i.e. Germany and Italy, have remained stable for the last few years. Growth has been driven mainly by exports to Turkey and Eastern Europe and the beginning of exports to the UK (Table 2.2).

There is an ongoing debate, both domestic and international, as to whether Gazprom has enough investments in gas production and whether or not Russia can keep its production levels in the long run at the current level or growing as its main fields progressively mature. For example, the head of the Institute of Energy Policy, Vladimir Milov, repeatedly pointed to grim output prospects which, combined with growing domestic and external consumption, could lead to serious deficits of gas as early as 2010. Other domestic observers are also expressing some concerns while they are explicitly sure that foreign long-term contracts will be honored under any circumstances.

**Table 2.2. Export of gas by final consumer countries (bcm), 2000-2006**

| | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|---|---|---|---|---|---|---|---|
| *Total* | *193.9* | *181.2* | *185.5* | *189.4* | *200.4* | *207.3* | *203.0* |
| *EU-27* | *120.5* | *117.4* | *119.0* | *125.5* | *125.9* | *137.5* | *137.9* |
| Germany | 34.1 | 32.6 | 31.0 | 29.4 | 31.3 | 32.6 | 34.4 |
| Italy | 21.8 | 20.2 | 19.3 | 19.7 | 21.6 | 21.9 | 22.1 |
| France | 12.9 | 11.2 | 11.4 | 11.2 | 13.2 | 13.2 | 10.0 |
| Hungary | 6.6 | 8.1 | 9.1 | 10.4 | 9.3 | 9.0 | 8.8 |
| UK | - | - | - | 1.1 | 2.9 | 3.8 | 8.7 |
| Poland | 7.0 | 7.5 | 7.2 | 7.4 | 6.3 | 7.0 | 7.7 |
| Czech Republic | 7.5 | 7.5 | 7.4 | 7.4 | 6.8 | 7.4 | 7.4 |
| Slovakia | 7.9 | 7.5 | 7.7 | 6.9 | 4.9 | 4.6 | 7.0 |
| Austria | 5.1 | 4.9 | 5.2 | 6.0 | 6.0 | 6.8 | 6.6 |
| Romania | 3.2 | 2.9 | 3.5 | 5.1 | 4.1 | 4.5 | 5.5 |
| Other EU | 14.4 | 15.1 | 17.1 | 20.9 | 19.4 | 26.7 | 19.7 |
| *CIS countries* | *60.0* | *49.2* | *51.3* | *47.3* | *55.1* | *47.5* | *41.1* |
| Belarus | 17.1 | 17.3 | 17.6 | 18.1 | 19.6 | 20.1 | 20.8 |
| Ukraine | 39.7 | 28.7 | 27.5 | 26.5 | 32.3 | 24.4 | 10.1 |
| Other CIS | 3.1 | 3.3 | 6.2 | 2.7 | 3.2 | 3.0 | 10.2 |
| *Other countries* | *13.3* | *14.5* | *15.2* | *16.6* | *19.4* | *22.3* | *24.0* |
| Turkey | 10.3 | 11.1 | 11.8 | 12.3 | 14.5 | 18.0 | 19.9 |
| Other countries | 3.1 | 3.4 | 3.4 | 4.3 | 4.9 | 4.3 | 4.1 |

Source: Gazprom, Federal Custom Service.

We also remain optimistic regarding Russian exports. Actual investments in the fixed capital of Gazprom have increased six fold since 2003 in nominal USD terms. Real growth is obviously lower but still quite impressive. Investments in fixed capital will continue to grow based on the company's investment program.

**Table 2.3. Investments in fixed capital of Gazprom by main sectors (billion USD), 2003-2007**

| | 2003 | 2004 | 2005 | 2006 | 2007e |
|---|---|---|---|---|---|
| Total | 3.5 | 5.2 | 8.4 | 16.1 | 23.6 |
| Gas production | 0.1 | 0.1 | 0.1 | 4.9 | 9.2 |
| Transportation | 2.7 | 3.8 | 6.5 | 9.1 | 8.9 |
| Refining | 0.2 | 0.4 | 0.6 | 0.8 | 1.7 |
| Distribution | 0.3 | 0.3 | 0.7 | 0.8 | 2.3 |
| Other | 0.2 | 0.5 | 0.5 | 0.5 | 1.4 |

Source: Gazprom, IEF estimates.

It is important to note that since 2006, there has been a strong shift in investments from the transportation to the production segment. In 2007, fixed investments (see Table 2.3) reached a record level of USD 23.6 billion. It is assumed that this level will increase in 2008 as the North Stream project pipeline will begin and

active development of Yamal and investments in Yuzhno-Russkoe fields will be continued. So investments in production increased from USD 4.9 billion in 2006 to USD 9.2 billion in 2007; they were actually almost nil until 2006.

The estimated gas reserves of the main fields have remained unchanged for the last few years, in the range of 16.4-16.6 trillion cub.m.

**Table 2.4. Proven reserves[19] by main fields (trillion cub.m), 2001-2006**

| | 2001 | 2006 |
|---|---|---|
| *Producing fields* | *16.7* | *16.4* |
| Urengoiskoye | 5.6 | 5.3 |
| Yamburgskoye | 4.2 | 3.8 |
| Zapolyarnoye | 3.5 | 3.2 |
| Astrakhanskyoe | 2.5 | 2.5 |
| Orenburgskoye | 0.8 | 0.8 |
| Yuzhno-Russkoye | - | 0.8 |
| *Fields under development* | *8.2* | *8.9* |
| Bovanenkovskoye | 4.4 | 4.4 |
| Shtokmanovskoye | 2.5 | 3.2 |
| Kharasaveiskoye | 1.3 | 1.3 |

Source: Gazprom.

Since Soviet times, energy prices have been heavily subsidized in Russia. In the 1990s, low energy prices and a tolerance of massive arrears for energy bills implied *de facto* soft budget constraints for households and enterprises. To put it simply, low energy prices helped households and companies survive during difficult times. But the opportunity costs of such subsidies have been rising with the growth in export prices. Low prices also stimulated wasteful consumption and a lack of progress in energy efficiency. The relatively low cost of energy resources, heavy industry bias in the industrial structure of the economy, harsh economic conditions, soft budget constraints and the lack of incentives for improving energy efficiency are the main determinants of a relatively high level of energy intensity in Russia (Table 2.5).

The current government policy in this field aims at a rapid increase (significantly above the level of CPI inflation) of energy domestic tariffs, particularly for gas where the difference between domestic and export prices is the biggest. Since 2003, natural gas tariffs have been rising faster than CPI and PPI (See Figure 2.5). However, aluminum, chemical, fertilizers and other energy intensive industries that

[19] By national classification – A+B+C1. There is some mismatch between the international classification of the reserves of the UN (WPC/SPE/AAPG) and local classification from Soviet times. There are still no full estimates of Russian mineral resources in the international classification.

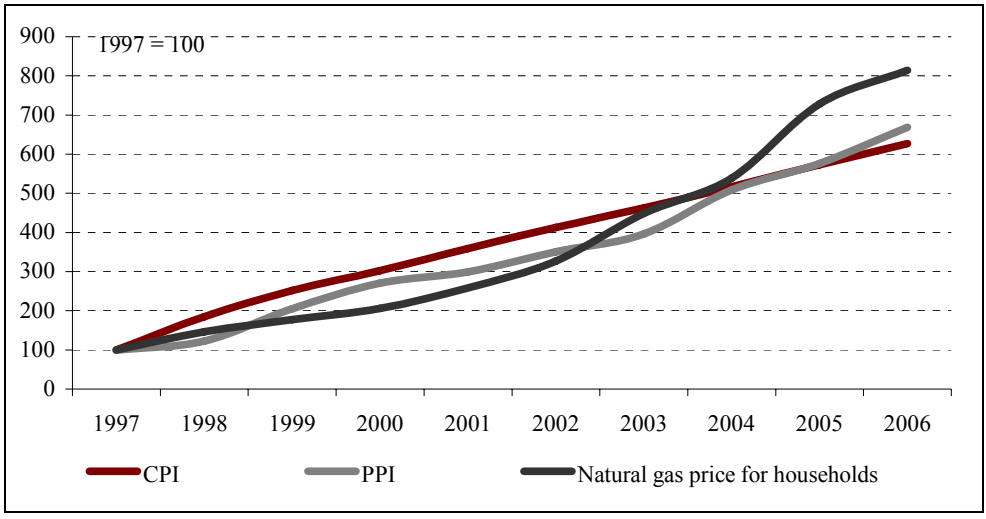
export to global markets generally resist rapid increases in energy tariffs and lobby actively for postponements of tariff adjustments.

**Table 2.5. Total Primary Energy Consumption per Dollar of Gross Domestic Product Using PPP of some CIS and EU countries**

| Country | kg of oil equivalent per 2000 US dollar GDP (2005) |
|---|---|
| Tajikistan | 51.0 |
| Ukraine | 43.0 |
| Russia | 37.3 |
| Turkmenistan | 35.2 |
| Azerbaijan | 30.8 |
| Kazakhstan | 35.5 |
| Moldova | 26.0 |
| Estonia | 24.7 |
| Armenia | 23.1 |
| Spain | 22.7 |
| Lithuania | 22.3 |
| Hungary | 20.9 |
| Poland | 19.5 |
| France | 18.1 |
| Germany | 17.6 |
| Latvia | 14.3 |

Source: EIA (2007) (http://www.eia.doe.gov/pub/international/iealf/tablee1p.xls).

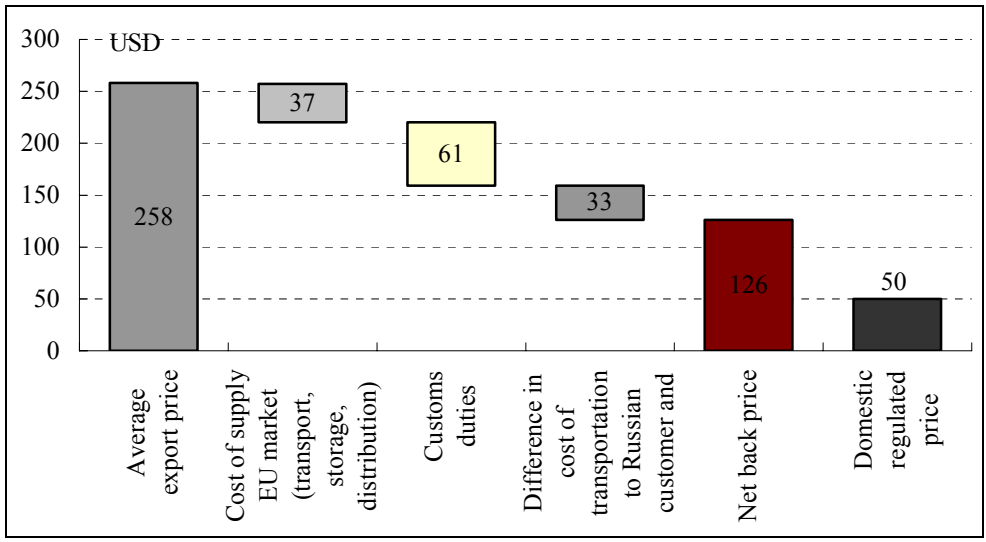
**Figure 2.4. Russia's Domestic Natural Gas (NG) Price**




Source: Federal Tariff Service, IEF.

At the end of 2006, the Russian government declared a 150% increase in domestic prices for natural gas over the five year period until 2011. In 2006, according to Russia's Minister of Industry and Energy, Viktor Khristenko, there was an understanding that by 2011 the domestic gas price would converge with the export price less export duties and transport expenses (Valetminsky, 2006). This should bring prices to a level comparable to levels in the EU countries by net-back principle, depending on export price developments[20]. According to our net-back estimates for 2007, this means an increase from $50 to $126 per 1000 cub.m (with an average export price of USD 258 in 2007)[21] (see Figure 2.5).

**Figure 2.5. Net-back estimates for Russian gas, 2007**




Source: Gazprom, Rosstat, Federal Customs Service, IEF estimates.

However average prices of oil products and gas prices have increased rapidly since 2006. Gazprom predicts that its average export prices in 2008 will be around $350; this will bring net-back estimates to more than $200 per 1000 cub.m, all other factors being equal. The government did not expect such a rapid increase of international oil prices in 2006 and, therefore, also of the European gas prices. With export prices growing so fast, it is rather difficult to justify equal increases of internal prices for households and industry because it would create a huge external

[20] Netback pricing refers the equalization of the gas price in Russia to the gas price in Europe after adjusting for export taxes, transportation costs, and transit tariffs.
[21] $50 per 1000 cub.m is a regulated wholesale price for industrial users without distribution margin and VAT.

shock. We expect domestic gas prices to grow at about 20-25% annually in the coming years, but we do not expect them to reach net-back levels.

If such a price increase did materialize, (even to $125 by 2010) this would imply that the relative attractiveness of export markets would diminish and become similar to the domestic market. Gazprom would be largely indifferent (at least theoretically) if faced with the choice of supplying gas domestically or for export.

Domestic price increases are a factor of major importance which will affect any meaningful long-term forecasts of the development of the gas sector. This is because energy saving and improving energy efficiency will become more attractive. The reaction of households and industry to price increases (price elasticity of gas demand) is uncertain and there are no trustworthy estimates.

### 2.1.3. Transit Issues

Russia plays an important role in the transit of Central Asian oil and gas. In particular, significant volumes of gas from Turkmenistan are reaching Ukraine through the Russian territory. Russian oil reaches the EU and other markets mainly via the Baltic Sea and Black Seas. Russian gas reaches the EU markets via pipelines, mainly via Ukraine, and Belarus (Table 2.7).

**Table 2.6. Russian gas transit volumes and transit fees, 2001-2007**

| | **2001** | **2002** | **2003** | **2004** | **2005** | **2006** | **2007** |
|---|---|---|---|---|---|---|---|
| *Transit volume, bcm* | | | | | | | |
| Ukraine | 104 | 104 | 104 | 106 | 110 | 106 | 101 |
| Belarus | 25 | 28 | 33 | 35 | 41 | 44 | 47 |
| Turkey (Blue Stream) | - | - | 1 | 3 | 5 | 8 | 10 |
| *Transit fees, $/1000 cub. m per 100 km* | | | | | | | |
| Ukraine | n/a | n/a | n/a | n/a | 1.1 | 1.6 | 1.6 |
| Belarus (Beltransgas) | n/a | n/a | n/a | n/a | 0.8 | 0.8 | 1.5 |

Source: Beltransgas, Ukrtransgas, Naftogas, Gazprom.

Cooperation between Russia and transit countries has not been without problems. The main conflicts regarding energy supplies in the region after 1991 took place between the Russian suppliers and Belarusian companies. Politically, the most difficult one occurred in 2007 and resulted in a complex deal on gas and oil. Gazprom reached the option of buying 50% of Beltransgas for $2.5 billion by 2010 in equal annual installments of 12.5%[22]. This is an important step for an operational

[22] Gazprom's stake in Beltransgas reached 25% in February 2008.

beachhead for transit. Belarusian companies retained relatively low prices for gas ($100 per 1000 cub.m in 2007) and some reduced privileges for oil refineries in the form of increased customs duties.

Russian relations with Ukraine related to gas transit issues have always been complicated due to involvement of political issues. Gas has been the only good traded between the two countries for which prices have not reflected market conditions (if the net-back price principle is applied as a benchmark). Before 2006, Ukraine received payments for Russian gas transit to the West in kind using gas (almost 20 billion cub.m annually). Implied price transit was very high by any standards. Essentially the idea of tying up transit and gas prices was in conflict with the Energy Charter Treaty[23] regarding the separation of transit fees and prices of delivered goods (Chapter 7). The ECT was ratified by Ukraine in 1998. Russia, after signing in 1994, is making a point of following its main approach. Such a regime could go on in the early 2000s for reasons of low gas prices and low demand in the EU due to economic stagnation. However as soon as demand and prices went up, Gazprom began to avoid politically motivated low prices for gas and stop paying extraordinarily high transit fees.

Since 2006, Gazprom has been delivering Central Asian gas to the Ukrainian companies for the price of the original supplier plus the transit price through Russia[24] (in the winter of 2008 some Russian gas was also delivered). Central Asian gas has been becoming more and more expensive with the price getting closer to the net-back (EU border) price. Political tensions can be expected to cease to exist once Ukrainian import gas prices are on par with EU import prices (netted back to the Ukrainian border), which might happen by 2009. The Russian side has also been continually voicing discontent about maintenance issues. There is substantial uncertainty regarding the technical conditions of Ukrainian pipelines, which may be a factor endangering the security of supply.

Recently, Russia has been actively trying to diversify its gas export routes to the EU, promoting two large pipeline projects: Nord Stream (under the Baltic Sea) and South Stream (through the Black Sea). If implemented, these projects would decrease Russia's reliance on the current main transit countries, Ukraine and Belarus. The construction of these new pipelines may add to European energy security the same way as the Blue Stream helped to improve Turkey's supplies in January 2008. At the same time, this will not help in the diversification of EU gas import sources.

[23] Energy Charter Treaty (ECT) is an international agreement on energy issues including trade, transit and investment.

[24] A lot of attention was given to the RossUkrEnergo, while it was more a buffer for Gazprom providing some way of rent sharing, and not actually affecting consumers.

## 2.2. Forecasts for Oil and Gas Production

It is a difficult task to forecast energy trends in Russia as the energy sector faces a great deal of price uncertainty, from both the international and domestic point of view. If price differences diminish, the competition between export and domestic markets will increase.

Forecasts of energy production are generally based on resource estimates. Compared to Soviet times, modern Russia witnessed a significant decrease in investment in new fields exploration. Besides, the official information on reserves is still classified and not available to the public. These factors largely complicate building production forecasts as information on output potential varies substantially between different sources.

The latest official long-term forecasts for energy were developed in 2003 within the Energy Strategy. They were based on rather conservative assumptions and became obsolete by 2004. The 2006 actual production figures were closer to forecasts for 2010 in the optimistic scenario of the 2003 Strategy (See Table 2.8).

**Table 2.7. Russia's Energy Output: Actual Data and Energy Strategy 2003 Forecasts (Optimistic Scenario)**

| | 2005 | 2006 | Russia Energy Strategy – Optimistic Scenario | | |
|---|---|---|---|---|---|
| | | | 2005 | 2010 | 2020 |
| Oil, mt | 470 | 480 | 445 | 490 | 520 |
| Gas, billion cub.m | 641 | 656 | 615 | 665 | 730 |
| Coal, mt | 298 | 309 | 280 | 330 | 430 |
| Electricity, TWh | 952 | 991 | 935 | 1070 | 1365 |

Source: Minpromenergo, Rosstat.

In the Energy Strategy of Russia for the period through 2020, forecasted volumes of gas production differ considerably depending on assumptions of different socio-economic developments in Russia. In the optimistic scenario, gas production may amount to approximately 665 bcm in 2010, and would increase to 730 bcm in 2020. In the moderate version, gas production is expected to reach 635 bcm in 2010 and up to 680 bcm by 2020. In the case of the "pessimistic scenario", Russian gas production will start declining in the near future and stabilize later at a level of 555-560 bcm annually by 2010.

Russia is experiencing broad (while not always public) domestic debate over its future course of development and the reconstruction of the energy sector. After 17 years of using the fixed assets of the former Soviet Union, it is time for a reinvestment of its financial resources into infrastructure, exploration, upstream, downstream and the electricity sectors. The next decade will play a crucial role in this

respect. Naturally, global oil prices and export proceeds will play a role in the development of the energy sector. The Energy Strategy of 2003 is set for a major revision (planned for approval at early 2009) and extension until 2030.

### 2.2.1. Oil

Although official forecasts for the Russian energy sector are still to come in the form of the updated Energy Strategy there are some estimates of future trends by the Institute of Energy Strategy under the Ministry of Industry and Energy. Based on their forecasts, oil production in 2010-2030 will grow more slowly (at 2-3% annually) than gas and coal. This trend will be caused mainly by production decline in the Volga-Ural region. By industry estimates, production in this region will decrease by 30% from current levels by 2030. The production of West Siberia and Timano-Pechora provinces will stabilize in 2015-2020 and then will gradually decline.

The main sources for growing output will be concentrated in East Siberia, the Lena-Tungus regions and the fields of the Far East. One of the first projects will be the Vankor oil field in Eastern Siberia which is developed by Rosneft. It is scheduled to begin production in 2008, and will reach an output of 20 mt annually by 2015. Domestic consumption of oil will grow by one third by 2030 and will account for around 169 mt.

**Table 2.8. Forecast production and consumption of energy in Russia, 2005-2030**

| | 2005 | 2010f | 2015f | 2020f | 2025f | 2030f |
|---|---|---|---|---|---|---|
| *Production* | *1,207* | *1,299* | *1,388* | *1,524* | *1,618* | *1,691* |
| Oil | 470 | 510 | 530 | 550 | 565 | 570 |
| Gas | 513 | 538 | 563 | 602 | 627 | 643 |
| Coal | 142 | 156 | 162 | 195 | 222 | 245 |
| Other sources | 82 | 94 | 133 | 176 | 203 | 232 |
| *Net export* | *534* | *530* | *538* | *594* | *632* | *647* |
| Oil | 342 | 360 | 375 | 390 | 401 | 400 |
| Gas | 159 | 136 | 133 | 164 | 183 | 196 |
| Coal | 30 | 31 | 24 | 23 | 34 | 34 |
| Other sources | 3 | 3 | 6 | 17 | 15 | 17 |
| *Primary consumption* | *673* | *768* | *850* | *929* | *986* | *1,044* |
| Oil | 128 | 150 | 155 | 160 | 164 | 170 |
| Gas | 353 | 402 | 429 | 438 | 445 | 448 |
| Coal | 112 | 125 | 138 | 172 | 188 | 212 |
| Other sources | 79 | 92 | 127 | 159 | 189 | 215 |

Source: Institute of Energy Strategy.

There will be substantial changes in oil transport infrastructure including a large pipeline in the Eastern direction (Eastern Siberia – Pacific). The western direction will be influenced by the extension of the Baltic Transport System (BTS-2). Its capacity will be 50 mt and the final points will be Primorsk and/or the Ust'-Luga ports in Baltic sea.

By the end of 2009, construction of the first leg of "Eastern Siberia – Pacific" oil pipeline is planned to be completed. Its capacity will be 30 mt while the capacity of the entire pipeline will be 80 mt. 30 mt are planned to be exported to China while the remaining volume will be delivered to the Primorye terminal for tanker shipping. For export to China, the pipeline branch is to be built from Skovorodino to Daqing (the length of 1030 km).

The main factors driving future trends in oil production and exports are:

- Changes in production geography. Production in the traditional regions of oil production in Europe and the Caucasus will continue decline while the production of West Siberia will stabilize. New centers of the oil industry will develop in the Eastern parts of the country. The new refining capacity will also concentrate more to the east;
- Domestic consumption of oil products. Domestic consumption will grow rather fast especially in the transport sector. A further increase in the number of vehicles will boost demand for light products;
- New transport infrastructure. Future projects include BTS-2 and the reconstruction of the Primorsk port terminal, the Haryaga-Indiga pipeline, the Burgas-Alexandropolis pipeline with a capacity of 35 mt, the modernization of the Caspian pipeline consortium (CPC) systems up to 67 mt and extension of the Aturau - Samara pipeline for an increase in the transit of Kazakh and Turkmen oil. Thus export channels will become more diversified.

### 2.2.2. Gas

There is a high level of uncertainty and significant differences in the forecasts of future trends in the gas industry. For example, there is a major difference in the forecasts by world's most authoritative sources – the International Energy Agency (IEA) and the US Department of Energy (DOE). The latter expects a tremendous growth in both production and exports by 2030 but it is not clear how these growth rates will be achieved on the supply side. The forecasts of the Institute of Energy Strategy and the IEA are close to each other and imply a modest growth in production. Thus there is a general consensus that Russia can sustain its current levels of

production and support moderate growth as new areas of production develop. Future export trends can be assessed by examining main production projects, domestic consumption and transport infrastructure projects and their directions.

**Table 2.9. Forecasts for Russian natural gas sector 2015-2030, bcm**

| | Institute of Energy Strategy (Russia, 2007) | | US Department of Energy (2007) | | International Energy Agency (2007) | |
|---|---|---|---|---|---|---|
| | **2015** | **2030** | **2015** | **2030** | **2015** | **2030** |
| Production | 705 | 800 | 812 | 1 036 | 697 | 804 |
| Net export | 167 | 244 | 280 | 420 | 194 | 222 |
| Gross inland consumption | 538 | 556 | 532 | 616 | 503 | 582 |

Source: IEA, EIA, Institute of Energy Strategy.

In the long run, the Yamalo-Nenets region fields will remain the main base of gas production in Russia. It currently accounts for more than 90% of production but will decline in the future. On the other hand, growth in production will be provided by new fields:

- The Yuzhno-Russkoe fields. Due to the expanded difficulties of the main fields in 2007, Gazprom accelerated the development of the Yuzhno-Russkoe field to help sustain production levels. It is planned that the production of this field will reach 15 bcm in 2008 and 25 bcm by 2009. This field is developed together with BASF, which has a 35% equity stake in the project;
- Yamal. At the end of 2007, Gazprom approved the Yamal peninsula development program. Under the base scenario, production of the Bovanenkovo field will start by 2012 with 15 bcm. The project will reach its capacity of 115 bcm/year by 2016-2017. The development will require massive investments in expanding the transport infrastructure system;
- The Shtokman offshore field will be developed with the help of Total (25% of equity stake in operator company) and Norsk Hydro (24%). The first phase of the project assumes the beginning of production of 23.7 bcm by 2013 and LNG production by 2014. Gas from Shtokman will supply the Nord Stream pipeline;
- Caspian offshore fields;
- Sakhalin offshore fields.

The main planned new transport routes involve:

- Nord Stream;
- South Stream;

- Blue Stream-2, which is a branch of the existing Blue Stream aimed mainly at the Israeli market.

As we can see, most of the planned projects in gas production and transportation are aimed at domestic and EU markets. Gazprom has strategic plans to supply China in the foreseeable future, but this all depends on the agreed upon export price and Chinese domestic gas infrastructure investments. At present, there is no agreement with China on export prices and this is contributing to the delay in the development of the Kovykta project.

Gas from the Sakhalin projects will be processed to LNG and its final consumers will likely be in Japan and South Korea. Therefore the EU will continue to be the main foreign consumer of Russian gas in the long term. All new Gazprom projects are being developed in partnership with European companies – Eni, BASF, Total, Norsk Hydro, EON Ruhrgas and others. Close ties and mutual financial interests will ensure European interests in these projects.

# 3. Caspian Oil and Gas

The Caspian countries (Kazakhstan, Azerbaijan, Turkmenistan and Uzbekistan) are substantial energy producers supplying both Europe and Asia with oil, oil products and natural gas[25].

The EU and other countries are interested in alternative sources of oil and gas. Therefore, from the very beginning, they have been interested in getting access to Caspian energy resources and creating alternative pipelines for their transportation. This, in turn, has ensured a large inflow of foreign direct investments into countries producing oil and gas or transporting these resources through their territories via pipelines.

## 3.1. Current Trends of Gas and Oil Production and Demand

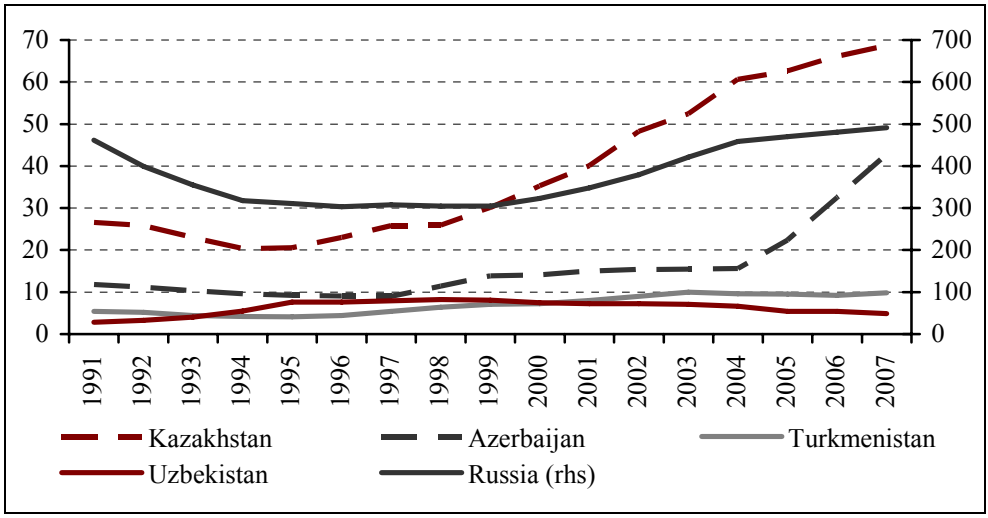
The early 1990s witnessed a significant decline in oil output in the Caspian countries, but since the second half of the 1990s, this region has witnessed a strong rebound, particularly in the cases of Kazakhstan and Azerbaijan (Figure 3.1).

During the 1990-2006 period, gas extraction increased in Kazakhstan (3.6 times) and in Uzbekistan (by 45%). It declined in Azerbaijan (by 32%) and Turkmenistan (by 25%). In Russia, gas production remained approximately at previous levels (see Chapter 2). Turkmenistan witnessed particularly volatile production patterns with a rapid decline in production between 1993 and 1994, and then again between 1996 and 1997-98, with exports dropping to 1.8 bcm from 70 bcm in 1991. It recorded a sharp increase until 2003 and gradually increased thereafter (in 2005-06). However, in 2006, its production remained 20% below the early 1990s level. The production crisis of 1998 was caused by a pricing dispute with Russia. As a result, Russia denied Turkmenistan access to the Central Asia Centre pipeline, which was

[25] Strictly geographically, the group of Caspian countries covers Azerbaijan, Kazakhstan, Iran, Russia Turkmenistan and Uzbekistan. For purpose of this paper, the term "Caspian countries" will be used in respect to Azerbaijan, Kazakhstan, Uzbekistan and Turkmenistan. Data on Russia (see Chapter 2) refer to production of energy on its whole territory.

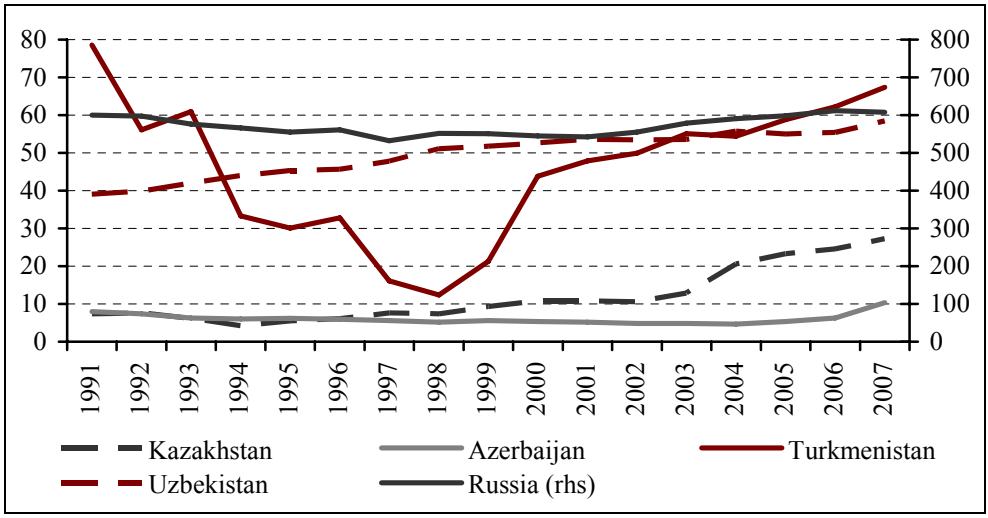
the only export route out of Turkmenistan at that time. This was one of the first examples of energy disagreements between Russia and Turkmenistan which made a huge impact on energy trade relations in the Caspian basin which have lasted through today.

**Figure 3.1. Oil output in major CIS producing countries, 1991-2007 (mt)**




Note. The scale for Russia (right vertical axis) is ten times larger than for the other countries.
Source: BP (2008).

**Figure 3.2. Gas output in Major CIS producing Countries, 1991-2007 (bcm)**



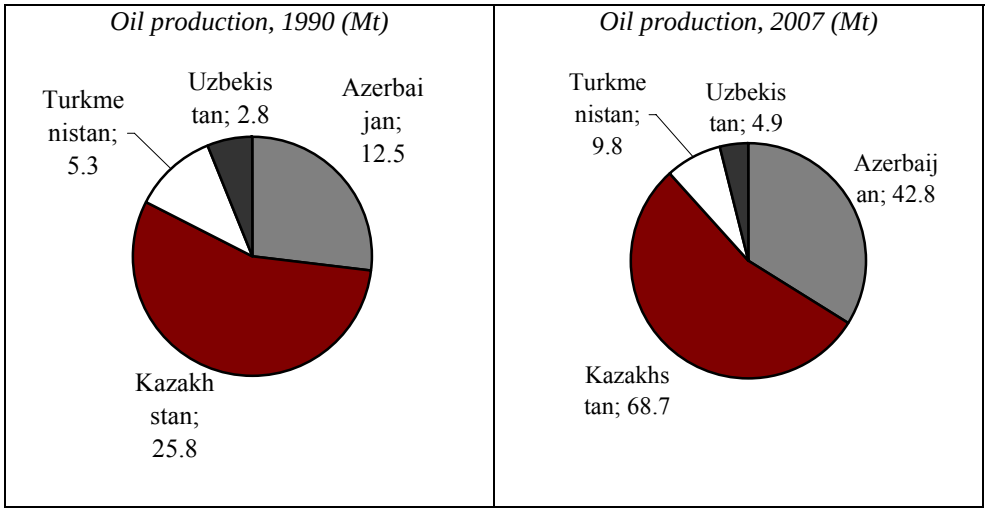

Note. The scale for Russia (right vertical axis) is ten times larger than for other countries.
Source: BP (2008).

Central Asia's decline in oil and gas production in 1990s can be explained by the hardships of the transition period, particularly the lack of new investment. Only at the end of the 1990s did the inflow of foreign investments enable the Caspian countries to considerably increase their extraction of both oil and gas. Overall, oil and gas production increased by 87% in the countries of Central Asia and Azerbaijan between 1990 and 2006. At the same time, aggregate consumption of oil in these countries declined by 30.5% while gas consumption increased by 33.1%.

Taken together, these trends indicate a much faster growth of oil and gas production than domestic demand for these resources, increasing the export potential of the region. This has been possible thanks to foreign investments in the sector and the establishment of new relations between the countries importing and exporting energy.

Thus, the share of individual countries in the total oil and gas production of Caspian countries (Russia included) changed between 1990 and 2006. Oil production in Azerbaijan increased from 12.5 to 32.5 mt and its share increased from 2.2 to 5%. In Kazakhstan, oil production increased from 25.8 to 66.1 mt., i.e. from 4.6 to 11%, while in Russia, production decreased from 515.9 to 470 mt and its share was reduced from 91.7 to 82%. (See Figures 3.3-3.4).

**Figure 3.3. Oil Production in Caspian Countries without Russia, 1990 and 2007**

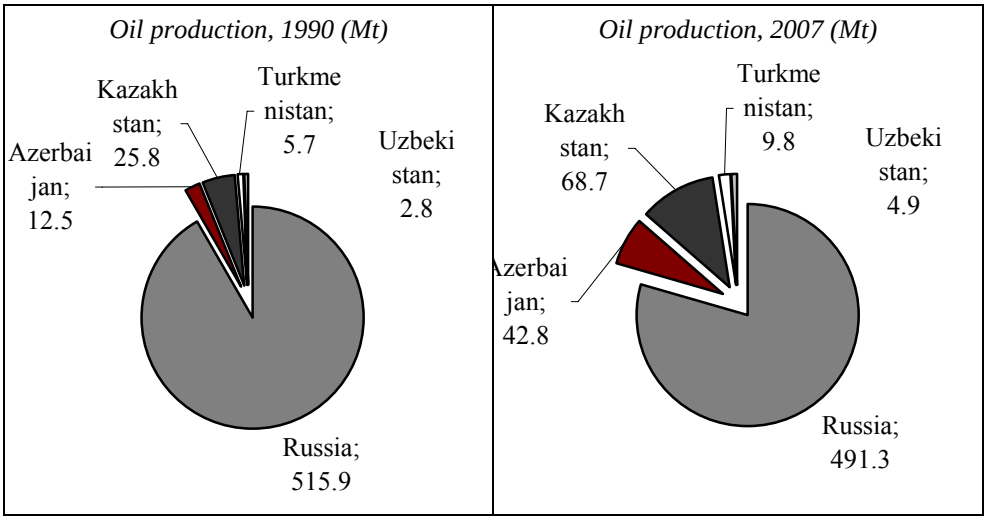



Source: BP (2008).

Uzbekistan's share of total gas production of the Caspian region (including Russia) increased from 5 to 7% (from 38.1 bcm to 55.4 bcm). Kazakhstan's increased from 1 to 3% (from 6.6 bcm to 23.9 bcm), while Turkmenistan's share de-

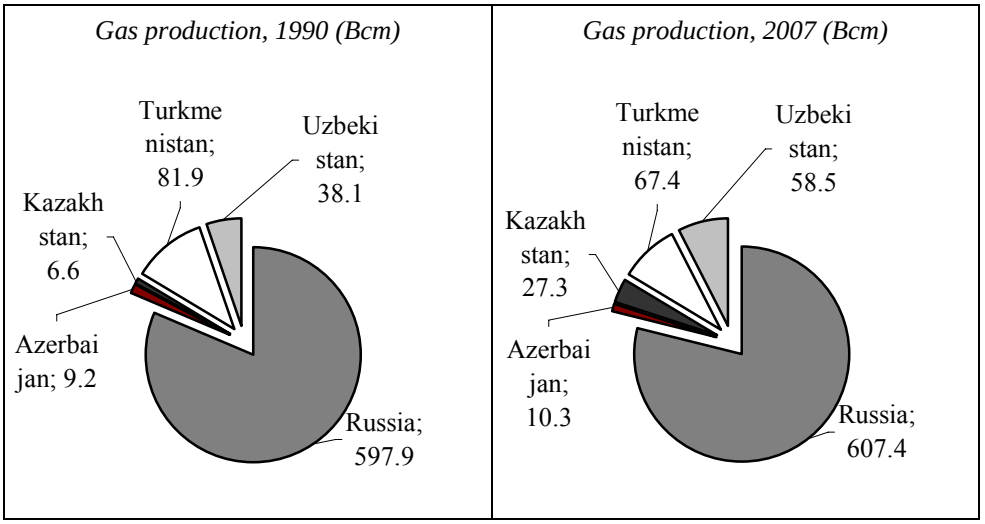
creased from 11 to 8% (from 81.9 bcm to 62.2 bcm). Russia's share remained at the level of 80-82% (598-612 bcm). (See Figure 3.5).

**Figure 3.4. Oil Production in Caspian Countries and Russia (1990 and 2007)**




Source: BP (2008).

**Figure 3.5. Gas Production in Caspian Countries and Russia, 1990 and 2007**

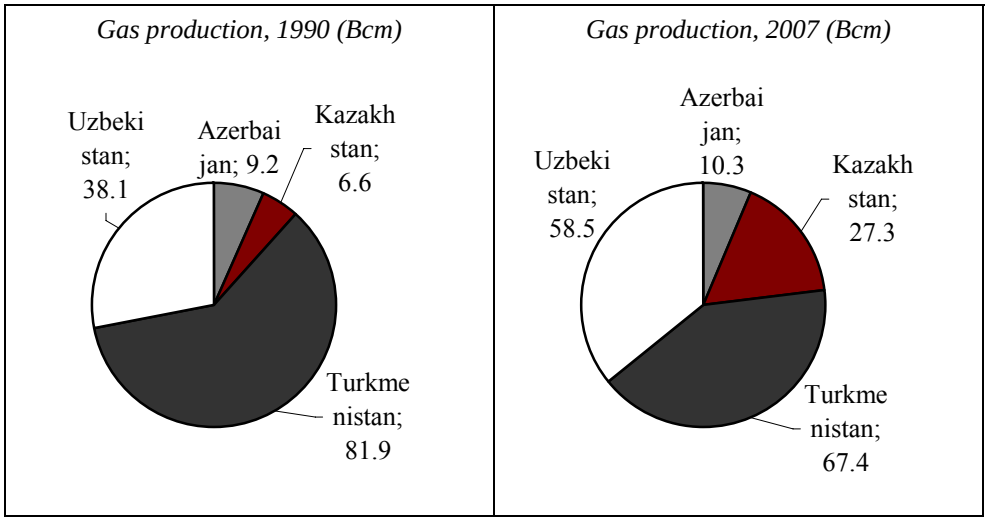



Source: BP (2008).

Kazakhstan is the largest oil producer in the region after Russia. Its share in regional production (Russia excluded) increased from 55 in 1990 to 64% in 2006. Azerbaijan comes in next with a share of 27% in 1990 and 29% in 2006.

As for gas production, Turkmenistan's share was reduced from 60 to 43% and it is expected to keep the leading role thanks to large reserves. Uzbekistan follows as the next largest gas producer. However, while Uzbekistan's internal consumption absorbs 78% of gas production, Turkmenistan exports three quarters of its gas production (See Figure 3.6).

**Figure 3.6. Gas Production in Caspian Countries without Russia (1990, 2007)**




Source: BP (2008).

Oil consumption was reduced almost by a half in 1990-2006 in Kazakhstan, Azerbaijan and Russia together. It only increased in Turkmenistan by 11.8%.

Uzbekistan continues to import oil to meet its internal needs, but thanks to the growth of its internal output, the share of imported oil was reduced almost two-fold and the share of gas export increased. While Uzbekistan was consuming 96.6% of internally produced gas, in 2006 this rate was reduced to 79 %. Consumption increased from 36.6 bcm in 1990 to 43.2 bcm in 2006 due to the growth of gas extraction. However, Uzbekistan continues to consume most of its gas output domestically.

The rate of domestic consumption was considerably reduced in Kazakhstan – from 189.4% of total gas production in 1990 to 84.5% in 2006. In Russia, during the same period this rate remained unchanged (about 70-72%).

At present, the countries of the Caspian do not account for a large share of world oil and gas production. However, their confirmed reserves, together with the perspective of the development of transport infrastructure in the region may enable them to increase this share. In 2006, Azerbaijan's share was 0.8% of world oil production. Kazakhstan's share was 1.7%.

**Table 3.1. Oil production, consumption and export, 2006 (mt)**

| | Oil production | Oil consumption | Oil exports |
|---|---|---|---|
| Azerbaijan | 32.5 | 4.7 | 23.4 |
| Kazakhstan | 66.1 | 10.6 | 54.5 |
| Turkmenistan | 8.1 | 5.2 | n/a |
| Uzbekistan | 5.4 | 6.9 | n/a |
| **Total** | **112.1** | **27.4** | n/a |

Source: BP, countries' state statistical departments.

**Table 3.2. Gas production, consumption and export, 2006 (bcm)**

| | Gas production | Gas consumption | Gas export |
|---|---|---|---|
| Azerbaijan | 6.3 | 9.6 | 0.65 |
| Kazakhstan | 24.6 | 20.2 | 7.80 |
| Turkmenistan | 62.2 | 18.9 | 48.50 |
| Uzbekistan | 55.4 | 43.2 | 12.60 |
| **Total** | **148.5** | **91.9** | **69.55** |

Source: BP, countries' state statistical departments.

Between 1990 and 2006, total oil production in Caspian countries (without Russia) increased more than two-fold, reaching 112.1 mt. During the same period, gas production increased minimally from 135.8 bcm to 148.5 bcm (BP, 2008)**.** Taking into consideration the potential resources and production capacity of energy, we may conclude that this tendency will continue in the future.

Estimates show that the total volume of exports, with the account of confirmed reserves and the expected level of domestic consumption, may amount to 4.9 billion tones of oil and 5.5 trillion cub.m of natural gas in the next 40 years. The annual export potential of the Caspian countries may reach levels of 150-170 mt of oil and 120-140 bcm of gas by 2015. These volumes may be even higher in 2020. However, this will depend on the size of investment into oil and gas projects and pipelines, the economic and political situation in the region as well as a number of other factors.

## 3.2. Oil and Gas Forecast

Prospective reserves of Caspian oil are concentrated mainly offshore of Azerbaijan and Kazakhstan. Potential gas reserves may be located offshore of Turkmenistan.[26]

[26] Russia has limited offshore reserves.

### 3.2.1. Azerbaijan

It is estimated that in Azerbaijan, the volume of residual extractable reserves amounts to 1,130 mt of oil and condensate and to 820 bcm of natural gas**.** The main proven oil reserves are concentrated in the Azeri-Chirag-Guneshli deposit while natural gas reserves are in the Shah Deniz deposit. According to BP, the proven reserves of gas amount to 1.35 trillion cub.m and 1 billion tonnes of oil (BP, 2007). However, some optimistic calculations estimate oil reserves in the Azerbaijani sector of the Caspian at 5.3 billion tonnes and natural gas at 1.85 trillion cub.m (Cohen, 2006).

### 3.2.2. Kazakhstan

Kazakhstan is a country with substantial hydrocarbon reserves. Overall, up to 3.3% of explored and proven world reserves belong to this country. At the end of 2007, there were estimated to be roughly 5.3 billion tonnes of oil (BP, 2008).

Natural gas has been found in less than two dozen deposits. The Amangalgy and Shagirli-Shomyshty fields and the Imashevskoye gas-liquids field are the best known (Smirnov, 2006). The proven reserves of natural gas in Kazakhstan amount to approximately 1.9 trillion cub.m (BP, 2008), while probable reserves, including those beneath the Caspian, are in the range of 8 to 8.5 trillion cub.m. Over 70% of total gas reserves are accompanying gas, which is extracted out of the hydrocarbon deposits known as Tengiz, Kashagan and Karachaganak. Instead of processing the accompanying gas into a commercial commodity, it is more profitable to inject the extracted accompanying gas back into the wells, thereby increasing the rate of reservoir recovery. Therefore, the usable reserves of gas are smaller than those officially reported (Glumskov, 2006).

Estimates of total recoverable hydrocarbon reserves, both onshore and offshore, vary between 9 and 40 billion barrels (i.e. 1.2-5.5 billion tonnes) of oil and 2.8 trillion cub.m of natural gas, putting the country on par with Turkmenistan (EIA, 2008).

### 3.2.3. Turkmenistan

Turkmenistan has a small amount of proven oil reserves estimated at around 82 mt (BP, 2008; EIA, 2005). Other sources largely agree with these estimates. Turkmenistan is the main exporter of natural gas in Central Asia. In terms of the volume

of proven reserves, Turkmenistan is 13th place in the world and is second (after Russia) among the CIS countries. In 2006, Turkmenistan was 10th in the world in terms of volume of extracted gas and ranked 4th in terms of volume of gas exports. Its proven reserves of gas are about 2.67 trillion cub.m (BP, 2008).

More optimistic estimates come from the representatives of Turkmengeology, a state-owned geological exploration corporation, who place the combined initial hydrocarbon reserves of Turkmenistan at 45 billion tonnes, with the recoverable equivalent valued at 30 billion tonnes (Oil and Gas Reserves of Turkmenistan, 2006). Mr. Nazar Suyunov, the former vice-president of Turkmenistan, stated that the economically recoverable gas reserves of the country were in the range of 2.6 and 2.8 trillion cub.m (Suyunov, 2006), which is similar to the EIA and BP estimates.

### 3.2.4. Uzbekistan

The proven natural gas reserves of of Uzbekistan totaled around 1.8 trillion cub.m as of the end of 2004 (Ziadullaev, 2006; BP, 2008). The estimated hydrocarbon reserves amounted to 5.9 trillion cub.m of natural gas, 81.7 mt of oil, and 36 mt of gas liquids at the outset of 2006 (Uzbekistan has Calculated its Natural Gas Reserves, 2006).

The corresponding forecast for 2004-2020 looks as follows: an annual increase in hydrocarbon reserves will make up 75–112 mt of standard fuel, while the commercially viable deposits of natural gas is set to grow by 60–85 bcm per year (Asrorov, 2006). Uzbekistan's oil reserves are estimated at 82 mt. This amount is consistent with the BP forecasts (BP, 2008).

### 3.2.5. The Consolidated Oil Reserves of Azerbaijan, Kazakhstan, Turkmenistan and Uzbekistan

According to BP's analysis, the total volume of confirmed oil reserves of Azerbaijan, Kazakhstan, Turkmenistan and Uzbekistan was 6.7 billion tonnes and the total volume of confirmed reserves of natural gas was 7.6 trillion cub.m as of the end of 2007 (BP, 2008), which amount to 3.8% of global oil and 4.3% of global gas deposits[27].

[27] A review of different government and non-government sources reveals inconsistency in the estimates of the Caspian hydrocarbon wealth. Government estimates are generally more optimistic than non-government forecasts. This can be explained by governments' desire to

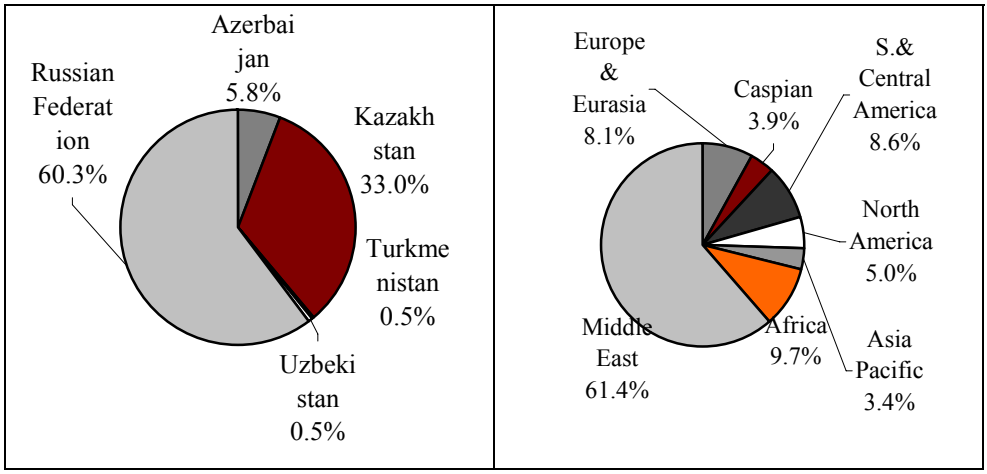
**Table 3.3. Proved Reserves of Oil and Natural Gas**

| Country | Confirmed oil reserves at the end of 2006, thousand mt | Confirmed natural gas reserves at the end of 2007, trillion cub.m |
|---|---|---|
| Azerbaijan | 1.0 | 1.28 |
| Kazakhstan | 5.3 | 1.90 |
| Turkmenistan | 0.1 | 2.67 |
| Uzbekistan | 0.1 | 1.74 |
| **Total:** | **6.4** | **7.59** |

Source: BP (2008).

Thus, one can conclude that the confirmed oil reserves in the analyzed region are sufficient enough to continue extraction at 2006 levels for the next 75 years, and natural gas reserves are sufficient enough to extract for the next 63 years. However, taking into account the large-scale international contracts related to developing the hydrocarbon deposits which have already been signed by the Caspian countries (with a duration of 25-30 years), and the rapid growth of domestic consumption, one can assume that the analyzed region will remain an important supplier of hydrocarbon resources to world markets for at least the next 35-40 years.

**Figure 3.7. The Global Oil Reserves by Geographical Distribution**

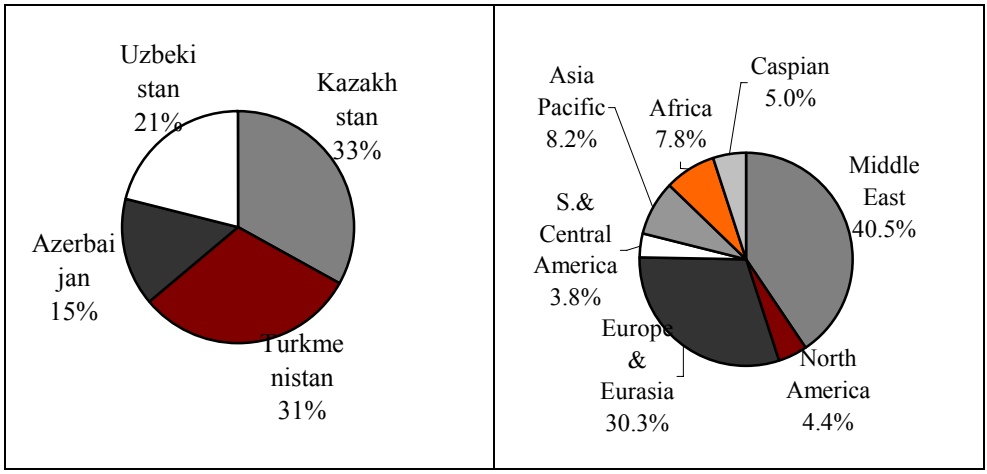



Source: (BP, 2008).

attract foreign investments as well as draw geopolitical attention from the outside world. In addition, the ongoing dispute on the legal status of the Caspian Sea (between the Caspian countries) further slows down exploration works in this region. Depending on the outcome of this dispute, the volume of hydrocarbon resources assigned to each individual country may vary significantly.

In total, the proven recoverable oil reserves of the region constitute around 4 billion tonnes, which is equivalent to just 2.6% of the global crude oil stock. On a global scale, that is comparable with the consolidated reserves in the Northern Sea, but 25-50 times less than the aggregate reserves of the Middle East, which is home to two thirds of the proven hydrocarbon wealth in the world (Vatsganov & Michailov, 2005).

**Figure 3.8. The Global Gas Reserves by Geographical Distribution**




Source: (BP, 2008).

# 4. Transportation Choices and Competition of Alternative Pipelines

While importing countries tend to diversify their supply sources, exporting states try to do the same in respect to their hydrocarbons, i.e. crude oil, natural gas and petroleum products. In both cases, diversification policies are driven by existing geopolitical paradigms.

There are various ongoing projects related to transporting Caspian oil and gas to Europe. One route, the most important in terms of volumes of gas and oil transported to the EU, goes via Russia. The other one goes via Azerbaijan, Georgia and Turkey, and transports most of Azerbaijan's oil and, since 2007, has been transporting a small portion of its gas export as well.

## 4.1. Oil and Gas Pipelines

Main transportation routes in operation are presented in the Table 4.1.

Since the Caspian Sea is land-locked, oil delivered to the ports of Azerbaijan and Russia is then transported to the Black Sea ports of Novorossiysk, Batumi, Poti and Kulevi via either the existing oil pipelines (Makhachkala-Novorossiysk, Baku-Supsa, Baku-Novorossiysk) or via Azerbaijan and Georgia's railway systems. Alternately, it is transported to the Turkish port in Ceyhan via the Baku-Tbilisi-Ceyhan (BTC) route. Oil products from Kazakhstan and Turkmenistan are also transported to the same ports on the Black Sea by railway.

On January 24, 2007, Kazmunaygaz and the contractors in charge of the development of the Kashagan and Tengiz oil fields signed a Memorandum of Understanding regarding building the Kazakhstan Caspian Transportation System. It aims at ensuring the transport of the growing amounts of oil exports via the Caspian Sea. It was decided that oil would be transported via the Eskene – Kurik – Baku – Tbilisi – Ceyhan route. This implies building the Eskene – Kurik oil pipeline. The

Trans-Caspian Transportation System will include oil discharge terminals along the Caspian coast of Kazakhstan, a tanker fleet, oil-loading terminals on the Caspian coast of Azerbaijan, and integration with the Baku-Ceyhan pipeline infrastructure. In this project, the Kazakh system will be able to ship 25 mt of crude oil per year, with a possible future expansion of up to 38 mt. The project is expected to be completed by 2010-2011. We should mention that, once this plan is implemented, it will fully fill the Baku-Ceyhan pipeline which has a total annual capacity of 50 mt. In order to secure the transit of Azeri and Kazak surplus oil to the Black Sea ports, an upgrade of the South Caucasus railway infrastructure will be required. In 2007, the GUEU Consortium moved forward on the so-called **Georgia-Ukraine-European Union (GUEU)** pipeline project, which is to connect Georgia and Ukraine under the Black Sea. The plan is to bring Caspian oil to the EU market.

**Table 4.1. Oil Pipelines**

| | **Total capacity, thous. barrels per day** | **Total capacity, thous. tonnes per day** | **Length, km** |
|---|---|---|---|
| Baku (Azerbaijan) – Tbilisi (Georgia) – Ceyhan (Turkey); | 1,000 | 136 | 1,768 |
| Baku (Azerbaijan) – Novorossiysk (Russia); | 115 | 15.6 | 1,475 |
| Baku (Azerbaijan) – Supsa (Georgia); | 115 | 15.6 | 837 |
| Atyrau (Kazakhstan) – Samara (Russia); | 300 | 40.9 | 697 |
| Tengiz (Kazakhstan) – Novorossiysk (Russia); | 560 (1st line) | 76.3 (1st line) | 1,510 |
| Shimkent (Kazakhstan) – Chardzhou (Turkmenistan through Uzbekistan); | 140 | 19.0 | n/a |
| Atasu (North-West Kazakhstan) – Alashkanou (Xinjiang, China); | 200 (initial), 400 (budgeted) | 27.8 (initial), 54.5 (budgeted) | 960 |
| Neka (Iran) – Tehran (Iran). | 175 | 23.8 | 350 |
| Turkmenistan – Afghanistan – Pakistan (Gvadar) | n/a | | n/a |

Source: EIA, BP, Cohen, 2006.

On March 15, 2007, Russia, Bulgaria, and Greece signed an intergovernmental agreement to build the Trans-Balkan Oil Pipeline, Burgas-Alexandropoulos (B-A), which will originate in the Bulgarian Black Sea port of Burgas and end at Alexandroupolis on the Greek Aegean coast. The pipeline will carry 35 mt of oil annually in the first phase, and will expand to 50 mt in the second phase. The pipeline will carry oil mainly from the Russian Black Sea ports to the Aegean Sea for shipment

by tankers. This pipeline will lengthen the Caspian Pipeline Consortium's (CPC) line from Kazakhstan to Russia's Black Sea port of Novorossiysk. It poses a direct challenge to the Trans-Caspian oil transport projects. The Burgas-Alexandroupolis line will also divert the Caspian oil volumes necessary to supply the Odessa-Brody pipeline in Ukraine and its possible extension into Plock (Poland), which is an EU-supported project.

During the 2007 Cracow summit, Azerbaijan stated its interest to join the Odessa Brody-Gdansk pipeline to ship Caspian oil. The Ukraine-Poland pipeline would be an alternative for Caspian oil transportation to the EU.

**Table 4.2. Existing gas pipelines**

| | Total capacity, bcm | Length, km |
|---|---|---|
| Central Asia – Centre (CAC) | 45 | Total length on the territory of Turkmenistan is 3,940 km. |
| Baku-Tbilisi-Erzurum (BTE) or the South Caucasus Pipeline (SCP) | 16 | 1,070 |
| Buchara – Ural | 5 | 4,500 |
| Korpeje-Kort-Kuy (KKK) (Turkmen-Iranian) | 13 | 200 |
| Tashkent-Bishkek-Almaty (TBA) | 22 | 371 |

Sources: EIA, BP, Kaztransgas, also Cohen, 2006.

The Central Asia – Center (CAC) gas-pipeline network is the most important gas transportation route from the Caspian basin to Europe. The construction of this pipeline started in the late 1960s and was completed in the early 1980s. Now the CAC is an extensive web with threads on the territory of Kazakhstan, Uzbekistan and Turkmenistan. The ending point of the CAC is the "Aleksandrov Gay" compressor station on Kazakhstan's border with Russia. Central Asian gas enters the Gazprom system of pipelines through the Central Asia – Center gas-pipeline network. The transport capacity of this pipeline is 45 bcm per year, and there are plans to increase it in the future (Strategic Research Foundation, 2006).

## 4.2. Competition

The Caspian countries have considerable hydrocarbon reserves. However, their production and export potential is limited by transportation infrastructure, in par-

ticular to EU markets. Thus, the question of how to get oil and gas from the Caspian Region to international markets is a top priority.

At present, countries on the eastern coast of the Caspian Sea almost fully rely on Russian transit infrastructure. The CAC gas pipeline links the region with the Russian gas pipeline system. The situation is different in Azerbaijan, where the newly opened BTC and SCP pipelines have provided the country with direct access to European markets.

At the moment, the governments of Turkmenistan, Kazakhstan, Uzbekistan and Azerbaijan are following a strategy of multiple export routes for Caspian hydrocarbons, which can provide supply to world markets (Akhmedov, 2004). Central Asian gas is transported mainly via Russia due to the lack of alternative routes besides the Gazprom pipeline infrastructure, a legacy from the Soviet period. Russia has always occupied a very important place on the market for hydrocarbon resources in Europe. Alternative transportation routes for oil and gas from Turkmenistan, Kazakhstan, Uzbekistan and Azerbaijan to Europe may reduce the monopolistic position of Russian companies and stabilize the supply of energy resources.

Gazprom's cooperation with gas producers in Central Asia started in 2001. On 28 November, 2001, Gazprom and Kazmunaigas signed an intergovernmental agreement on cooperation in the gas industry. Under the agreement, crude gas is bought from the Karachaganak gas condensate field, processed at the Orenburg gas processing plant, and the processed dry gas is then transported via the Gazprom system for sale to individual CIS and European countries. Gazprom has also signed a series of agreements on strategic cooperation regarding the transportation of natural gas with various Central Asian governments and state gas companies.

The 2002 contract with Uzbekneftegaz was a long-term agreement to purchase Uzbek gas throughout 2003-2012. The parties aimed to increase annual volume to 10 bcm in 2005. Russia signed an agreement with the Government of Uzbekistan regarding the handover of the management of the Uzbek gas export operator to Gazprom in 2003. In 2006, Uzbekistan produced about 55 bcm of gas. This figure may increase by 2012-13 when the Kandym-Khauzak-Shady-Kungrad gas field will increase annual production from the initial 3 bcm to more than 11 bcm (Staff Writer, 2007; Lukoil Overseas holding limited, 2007). The entire volume of gas from these fields is to be exported via the existing pipeline network through Russia.

There is also a long-term Russia-Turkmenistan agreement on cooperation in the gas industry, signed in 2003, covering the period of 1 January, 2004 to 31 December, 2028. In 2005, Gazprom ensured the transit for approximately 54.5 bcm of natural gas from Central Asia. In 2006, Kazakhstan transported 7.8 bcm of its own gas, in addition to 42 bcm of gas from Turkmenistan and around 9 bcm of gas from Uzbekistan via the traditional Russian route. According to preliminary Kazmunaigaz esti-

mates, in 2010-20, Kazakhstan will supply 5.83 bcm of Tengiz gas and 3.3 bcm of Kashagan gas (both in annual terms) via Russia. Therefore, Kazakhstan's total gas export through Russia could reach 9.1-15 bcm per annum. Gas volumes from Turkmenistan and Uzbekistan could vary between 70-80 bcm and 10-21 bcm respectively. Turkmenistan pledged to increase its annual gas supplies through Russia to 60-70 bcm in 2007, 63-73 bcm in 2008 and 70-80 bcm in 2009 and thereafter (Stern, 2005. p.77). In 2006, Turkmenistan exported over 48 bcm to Russia.

Gazprom intends to increase its imports of Central Asian gas up to 100 bcm. per year, with the aim of supplying it to Western markets (Akhmedov, 2004). This requires the development of new pipelines and the modernization of existing ones.

In May 2007, Russia, Turkmenistan, and Kazakhstan reached a preliminary agreement on the modernization of the Central Asia-Centre gas pipeline and the construction of the **Pre-Caspian gas pipeline**. Consequently, the four states signed a detailed agreement on these issues.

The Pre-Caspian pipeline will be built by Turkmenistan, Kazakhstan and Russia and will run from Turkmenistan (360 km) along the eastern shore of the Caspian Sea to Kazakhstan (150 km) and then parallel to the Central Asia-Centre 3 pipeline, which is also scheduled to be upgraded.

The extension of the CAC and the building of the Pre-Caspian pipelines will increase the export capacity of the Caspian countries, but limited export options, and reliance on the Russian pipeline network may still restrict the countries' ability to profit from their extensive gas reserves. If Russia's current gas transport system is inadequate, even for exporting larger volumes of domestically produced gas, it is unclear to what extent the Russian route will be able to increase the amount of gas supplied to the EU and whether Russia's gas transport system will have sufficient capacity to receive the new volumes of Central Asian gas in 2011-2020.

The Central Asian countries are also looking at new routes to China, Iran and South Caucasus for exporting the surplus capacities of their existing resources. However, Russia will probably remain the main route for their gas export.

Today, attempts are being made to transport gas to Europe via the South Caucasus. One of the recently completed projects is the **South Caucasus Pipeline** (**Baku-Tbilisi-Erzurum),** which is designed to transport natural gas from Azerbaijan's Shah Deniz offshore field. The diameter of this gas pipeline is 106.6 cm. It has a transport capacity of 16 bcm annually. The length of the Azerbaijani section is 442 km, the length of the Georgian section is 248 km, and the length of the Turkish section is 280 km. It is planned that the BTE will also be used to supply gas via Turkey to Greece and Italy (TGI), and that it will be subsequently connected to Nabucco (see below).

In June 2008, Gazprom made an official proposal to the Azerbaijani government to purchase gas at market prices based on a long-term agreement (Grivach, 2008). At present, Azerbaijan sells gas through the BTE pipeline at the price of USD 120 per thous.cub.m. If Azerbaijan approves the Gazprom proposal, gas will be shipped through a currently underused pipeline between Russia and Azerbaijan, which has a capacity of 5 to 8 billion cub.m. This arrangement would significantly increase Azerbaijan's revenue. On the other hand, it could threaten the full operation of SCP and the gas supply to Turkey through the BTE pipeline.

The countries on the eastern coast of the Caspian Sea currently have no connection to the BTE pipeline. One option for them to get access to the European market that is independent from Russia is the **Transcaspian gas-pipe-line (TCGP**) project, which will stretch from Turkmenistan, across the Caspian Sea to Azerbaijan, and from there connect with the existing (extended) BTE pipeline across Georgia to Turkey. This proposal has been discussed at the inter-governmental level. Recent geopolitical developments have renewed European and American interests in this project, which initially aimed to promote gas exports from Eastern Turkmenistan. However, it still remains unclear who will build the pipeline. Overall, the prospects of moving forward on this project are still uncertain at this time.

The trans-Caspian pipeline is associated with the **Nabucco** gas project. This planned gas pipeline is to go from Turkey through Bulgaria, Romania and Hungary to Austria. Potential gas supplies for Nabucco could come from Azerbaijan, Turkmenistan and Kazakhstan as well as from Russia, Iran, Iraq and other Persian Gulf producers. In this case, Kazakhstan would be the key onshore harbor for Central Asian gas supplies for the upgraded Trans-Caspian gas pipeline[28].

However, there are several issues that make the construction of the Trans-Caspian and Nabucco pipelines problematic, namely competition from other projects and the legal status of the Caspian Sea. Azerbaijan and Turkmenistan have had tense relations over the delimitation of the Caspian Sea. Dialogue between them is slowly progressing and political will exists on both sides. Even if they resolve this dispute, Iran and Russia will oppose the project, purportedly for reasons of environmental risks associated with the construction of a submarine pipeline. Even more importantly, thus far, binding supply agreements have only been concluded between Azerbaijan and Turkey. Yet Azerbaijan gas deposits are insufficient to keep Nabucco operating at full capacity[29].

[28] An international consortium led by OMV, the Austrian oil and gas company, can construct and operate the Nabucco gas pipeline. The maximum capacity of Nabucco will be 31 bcm. Its length will be 3,300 km, and the expected cost will be 5.8 billion US dollars. Ukraine is also ready to take part in the construction of the Nabucco gas pipeline.

[29] Nabucco's main competitor is the South Stream gas pipeline, which is planned to run from the Russian Black Sea coast to Varna in Bulgaria and from there split into two direc-

An important step toward avoiding environmental risks and boosting exports of Turkmen gas to the EU was made during bilateral talks between Iran and Turkmenistan in July 2007, and between Iran and Turkey in August 2007. Turkey agreed to transport up to 20 bcm of Iranian gas through Nabucco together with Turkmen gas. The Turkey-Iran gas agreement would require an expansion of the existing Korpedje-Kurt-Kui pipeline from Turkmenistan, currently operating at a capacity of 8-10 bcm annually or building a new pipeline linking Turkmenistan and Iran.

Along with Nabucco, there is another project which aims to transport Caspian gas to European markets. The **Turkey-Greece-Italy (TGI)** gas pipeline is a win-win project for both Turkey and Greece. Its will deliver Azeri gas (and in the future possibly also Central Asian gas) to EU markets. The Turkey-Greece section was completed in November 2007. The annual capacity of this pipeline of 212 km is about 11.5 bcm. In order to make it fully operational, the potential supplies from Central Asian countries are to play a crucial role (due to the limited gas production capacity of Azerbaijan).

**China** may become another important destination for gas exports from the Caspian region. The Turkmenistan-Uzbekistan-Kazakhstan-China pipeline, with an annual capacity of 30 bcm will begin operations in 2009. It is fully financed by China, which is assured future supplies at discount prices. This pipeline will affect the volume of gas supplies to Gazprom. It illustrates the gradually increasing competition between Russia, China and the EU for Caspian gas.

The **Trans-Afghan route (TAF)** is another competitive project that will supply Caspian gas and oil to the East**.** The 1680 km route will go from Dovletabad (Turkmenistan) through Kandagar (Afghanistan) to Multan (Pakistan)[30]. The pipeline will have a diameter of 1,420 mm and an annual capacity of 33 bcm (Watan, 2006). However, the unstable situation in Afghanistan and questions related to the commercial viability of this project will probably postpone its implementation for a long time (Strategic Research Foundation, 2006).

tions: to Greece and southern Italy (south-western route), and to Romania, Hungary, Slovenia, northern Italy and Austria (north-western route). The pipeline's capacity will reach 30 bcm of gas per annum.

[30] The governments of Turkmenistan, Afghanistan and Pakistan signed a memorandum of understanding in February 2006 to start the construction of the pipeline. India has also expressed interest.

# 5. Cooperation between the EU and Caspian countries

The EU is trying to meet its need for diversification of its energy imports by maintaining its strategic and supposedly mutual beneficial relationship with Russia. The EU also aims to strengthen its presence in the Southern Caucasus and Central Asia, while minimizing possible sources of disagreement with Russia. At present, bilateral trade and cooperation agreements are in place with Russia on one side and Azerbaijan on the other (South Caucasus). The EU needs to build a network of multilateral cooperation in which Russia, Central Asia and the South Caucasus are integrated in a trade partnership cluster in which the interests of each country will be harmonized.

## 5.1. Cooperation with Central Asia

The governments of Caspian countries are engaged in efforts to develop and diversify export routes, as the lack of pipeline capacity is a key problem for them in light of the expected growth in oil and gas exports from Central Asia.

According to numerous statements made by President Nursultan Nazarbayev, Kazakhstan's energy partnership is based on economic pragmatism. Adhering to this policy, the country's government is building long-term relations with Russia, the US, the EU and China. Kazakhstan's aspiration to diversify its oil export markets is also a manifestation of this policy. Currently each pipeline that is transporting gas or oil from Kazakhstan must pass through Russian territory. At the same time, Kazakhstan is an important transit country for deliveries of gas and oil from Turkmenistan and Uzbekistan.

Turkmenistan's problems are similar to those of Kazakhstan. Turkmenistan is a major gas exporter and its exports go in two directions: to Russia (close to 90% of total gas shipments through the CAC gas pipeline) and to Iran via the Korpeje-Kurt Kui pipeline (Turkmenistan, 2007). The main buyer is Gazprom which resells most of the gas to RosUkrEnergo and Ukraine. Until 2006, Ukraine was the main im-

porter of Turkmen gas. Over the last few years, Turkmenistan signed agreements to export its gas to China, Europe and to the Southeast (Afghanistan, Pakistan and India). Once the transportation infrastructure is in place, Turkmenistan will have the opportunity to become a major player in the world energy market.

Among Central Asian countries, Kazakhstan and Turkmenistan are prominent in Iran's strategic plans. Iran has developed strong energy and trade ties with Kazakhstan, having signed about 60 agreements to consolidate, expand and diversify its bilateral relations. Currently Iran has only a 2-3% share in Kazakhstan's total trade turnover. This share is likely to rise even more if the current trend continues. The bilateral trade volume between the two countries rose from $700 million in 2004 to $900 million in 2005 and $2 billion in 2006 (Öğütçü & Xin Ma., 2008, p.20.).

The central Asian countries face two main tasks: (1) solidifying their ties with Russia, and (2) opening up to the West and China. At present, they are strengthening their ties with Russia. The May 12, 2007 agreement between Russia, Turkmenistan, Kazakhstan and Uzbekistan on modernizing and building new CAC lines gives more substance to this alliance, despite the tense nature of negotiations over gas prices with Russia.

## 5.2. Cooperation with the South Caucasus

The importance of the South Caucasus has increased substantially for geographic reasons. This region is close to Iran, Iraq and the Central Asian countries. The construction of international pipelines like BTC and BTE have increased its economic and political role and opened up a new channel of energy supplies to Europe. Strengthening this role will depend on many factors, including political ones such as resolving intra-regional conflicts such as the one between Armenia and Azerbaijan, or improving Iran's relation with the EU and US. Developing an energy transportation network across the Caspian Sea would create an additional channel for exporting Kazakhstan's oil and Turkmenistan's gas. Kazakhstan has already committed to exporting its oil through the BTC pipeline, while Turkmenistan has shown an interest in increasing gas export opportunities through a trans-Caspian pipeline.

## 5.3. A Common Voice to Harmonize Cooperation

In this respect, the question arises of who will act as the harmonizer of various interests in order to multiply the sources of supplies and transport routes. The planned pipelines will become a reality only when it is commercially viable and the EU states or a consortium of companies work in tandem with the governments of the Caspian countries.

The purpose of harmonization is to develop a partnership and cooperation mechanism to unite supplier and consumer countries. In reality, there is no rivalry between the Russian and the South Caucasus routes in terms of energy supply, with the latter involved in less than 2% of all gas transit and less than 10% of oil transit to the EU.

Harmonizing routes is about resolving alternative plans through a respectful dialogue. It is about taking into account the concerns of each country and coming up with plans and solutions that address all of these concerns. It is about reaching a consensus for multi-route pipelines (Papava, and Tokmazishvili, 2008).

The EU's plans to diversify energy supply are based on work in cooperation with energy partners and the integration of all member-states into a common market on the basis of establishing a long term energy policy, where all members are called "to speak with a common voice" on energy issues.

# 6. Conclusions and Recommendations

## Conclusions

- A number of factors have contributed to the EU's increasing interest in stable energy cooperation with the Caspian countries. These include declining levels of EU production of oil and gas, rising import dependence, unstable political relations with Russia (the most important supplier of gas and oil to the EU), and the rapid growth of oil and gas prices over the past few years. All of these factors have increased the importance of seeking alternative sources of oil and gas supplies;
- The consumption of energy resources has been slowly increasing in EU countries over the last 15 years. Consumption growth has been rather modest in developed countries. In the post-communist countries, especially in the former Soviet Union, consumption growth has declined. This was conditioned by the transition period in the 1990s and was related to major changes in these countries' economic structures;
- Gas consumption has increased rapidly both in the EU and in post-communist countries. In 1990-2007, world gas consumption increased by 47%. Consumption in the EU also increased by 47%. In the FSU, it declined by 5% (BP, 2008). Existing forecasts point to a continued rise in EU gas consumption;
- EU countries, which are major importers of energy resources, are interested in stability and in the diversification of energy supply. Russia and the Caspian countries possess large reserves of energy resources. However, their export infrastructure is underdeveloped and they are dependent on foreign investments in transportation systems;
- Russia will likely remain the number one energy supplier to the EU for the years to come. Currently, Russia is also the main transit country for Central Asian gas, which is mainly directed to other CIS markets (notably Ukraine). Gas supplies from Central Asia allow Russia to increase its exports to EU markets;

- Russia is actively pursuing policies of diversifying its export routes to the EU, decreasing its dependence on transit countries (mainly Ukraine and Belarus) and maintaining its control of export routes of Central Asian gas. From this perspective, the Russian South Stream pipeline project is a competitor for the Nabucco project, as they will link similar markets (via different transit countries);
- Recently, the potential importance of Caspian energy resources for Europe has increased. Export potential has increased rapidly in Central Asian countries and Azerbaijan. Meanwhile, Russia's production capacity has recently stabilized despite the fact that levels of Russian oil and gas exports are still higher than the combined exports from all the Caspian countries;
- Caspian countries are very interested in diversifying their export markets but a lack of alternative export infrastructure and disagreements over new export routes create serious obstacles to fulfill this goal;
- From the EU perspective, the diversification of gas import sources and routes of transportation as well as technical upgrades of transit infrastructure can increase the supply security. In the case of Central Asian gas, the important question is whether a new transit corridor will emerge that could go through the South Caucasus. A prerequisite for this to happen is establishing a connection between Kazakhstan and Turkmenistan and Azerbaijan (or Iran) via the TCGP pipeline. Ensuring sufficient gas supplies could make the construction of the Nabucco pipeline an attractive option;
- The main gas and oil pipelines from the Caspian region supplying the EU go through Russia or through Azerbaijan, Georgia and Turkey. These two directions serve as important transit points to the energy markets of the EU. Central Asian countries have no direct pipeline connections with the EU;
- The two routes of energy supply from Central Asia to the EU through Russia and the South Caucasus are gradually acquiring economic sense rather than political sense. Individual countries will seek out economic benefits rather than political influence. International consortia are responsible for the development of Caspian oil and gas transit facilities and final decisions will depend on the conditions offered to investors (i.e. the right incentives and sufficient legal protection).

## Recommendations

There is potential for a common EU energy policy to help in coordinating the actions aimed at increasing energy security in Europe. We provide the following recommendations:

1. The EU should play a leading role in developing policies that will guarantee Europe's energy security. The EU should strengthen co-operation in the energy sphere, and in particular in energy relations with third countries, notably the key suppliers of energy resources. It must have long-term cooperation and coordination plans;
2. The EU should be a key driver in the design of international agreements. Only through common objectives and the principles of energy cooperation will it be possible to have an impact on the conditions of trade and investment in the energy sector and to support technological development;
3. Multinational cooperation has to pursue long-term strategic goals at the cost of short-term losses. In order to achieve common goals through multinational cooperation, any plan for accessing energy from individual national markets within the EU can be agreed with the EU countries which are interested in this. Any plan aiming at the transit of gas and other energy resources to the EU member-state markets should be agreed upon with the neighbouring countries which are interested in this project and are linked via transit routes;
4. It is important to make an efficient use of all financial instruments which the EU, the European Investment Bank, the European Bank for Reconstruction and Development and other international financial institutions can put at the disposal of the EU's energy interests;
5. The EU should help to create the favorable environment for private capital flows and offer political and financial support to economically reasonable projects;
6. Both the EU and Russia stand to benefit from long-term strategic cooperation. The outcomes of the ongoing energy dialogue between Russia and Europe will determine the reliability of energy supplies. It is very important that the EU emphasize the mutually beneficial plans for every EU state and Russia during its talks with Russia. It is critically important for the EU countries to coordinate their energy policies regarding Russia;
7. It is in the EU's interest to support Russia in the process of becoming a member of the WTO;

8. To ensure the variety and development of competitive routes of energy supply, new transit routes must be developed. The Russian–Ukrainian and Russian-Belarusian disputes over gas demonstrate energy interdependence between the energy producer and transit countries. It is important to satisfy common interests in energy plans through multinational cooperation;
9. Increasing dependence on Russian gas may lead to geopolitical vulnerability. In order to diversify supply, the EU needs to invest in new sources and new transportation routes. However, duplicating pipelines that connect the same suppliers and consumers makes little economic sense. Diversification efforts should involve, among others, increasing focus on Caspian energy resources;
10. The way to harmonize energy systems and supply is to engage in energy cooperation dialogue. Bringing Caspian gas to Western markets may be one effect of such cooperation. Kazakhstan and Turkmenistan could become important players and partners to the EU. If investment in the Shah Denis field increases the Azeri gas supply, this country will become a more important supplier to Europe. The EU should concentrate its efforts on encouraging cooperation and helping to build transparent institutions and energy regulations in the Caspian region;
11. The development of Caspian energy resources may be delayed due to infrastructure and political constraints. If Europe wants to attract Caspian gas, it must help to build sufficient transportation infrastructure to prevent the gradual reorientation of this region towards the East. Support for Nabucco, TCGI and GUEU would significantly accelerate Western investments in the Caspian region.

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