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EU Eastern Neighborhood:
Economic Potential and Future Development

Work-Package 5

ENERGY TRADE AND COOPERATION BETWEEN EU AND CIS COUNTRIES

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Table of Content

Table of Content

Abbrevaitions $ Acronyms

BTC - Baku-Tbilisi-Ceyhan (pipeline)
BTE - Baku- Tbilisi- Erzurum (pipeline)
BTS - Baltic Transport System
CAC - Central Asia - Centre (pipeline)
CIS - Commonwealth of Independent States
CPC - Caspian Pipeline Consortium (pipeline)
DOE – US Department of Energy
EBRD - European Bank for Reconstruction and Development
EIA - Energy Information Administration (at the US Department of Energy)
IEA - International Energy Agency
EU - European Union
FSU - Former Soviet Union
GUEU -Georgia-Ukraine-European Union pipeline
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

Bpd - Barrel per day
Bcm - billion cubic meters
Bln - billion
Cub.m – cubic meter
Mt – million tonnes
Mtoe – million tonnes of oil equivalent

Measurement

1 barrel = 0.1364 tonne (of oil equivalent).

Introduction

Energy and transport are at the core of many of the issues affecting Europe's current well-being and its long-term international competitiveness. Energy problems originate from higher energy consumption caused by expanding economy, growing population and rising living standard and increase of geographical mismatch between energy supply and demand, that world faces in the XXI century.

In the Presidency Conclusions of the European Council (Brussels, 23/24 March, 2006) it is stressed 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).

European economies are becoming increasingly dependent on imported energy commodities, raising their supply risk and putting under question sustainability of future supplies and the geopolitical balance.

Green Paper of March 2006 is an excellent document describing the actual problems of sustainability, competitiveness and security of energy for EU-25. Growing dependence of EU on imported energy resources is considered as a threat for three reasons: too high dependence on import (up to 70% of energy and 80% of gas) by 2030; too high import from just three neighbor countries; high prices affecting competitiveness. These challenges are common to all of Europe.

Stabilization of prices, development of a long-term prognosis, infrastructure improvement and sufficiency of power-carriers supply, increase of suppliers reliability – all these issues are of immense importance for energy security.

Uneven location of power resources, difference in development levels and characteristics of energy sector determine development of countries and companies interests. These challenges, if allowed to aggravate, will inevitably undermine economy, standards of living and national security.

It is beyond dispute today that prosperity and way of life of every nation are conditioned by energy use. This makes sense to strengthen energy cooperation and security of EU through future development of energy markets and diversity of its energy resources supply. To support economic development the EU needs steady, reasonably priced and sustainable energy supplies.

The energy security challenges differ between consumer and producer countries. This may somewhat complicate the relations between the two groups. Also, it is worth stressing that up till now there has not been any unified EU energy policy. Additionally, in many producer countries the government plays a very important role, often as an owner of major producers of energy commodities. This further complicates the dialogue, due to somewhat different objectives and power of private companies, and national governments.

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

Several oil and gas exporting countries are very much dependant on revenues from this single sector, with insufficient diversification of their economies. On the other hand, potential problems with securing sufficient energy commodity supplies would risk economic stability and development of energy importing countries.

Approaches to solution of the energy problems are different.

The first one can address the problem of sustainability of the current energy markets, lack of confidence between energy importers and exporters in respect to reliability of future deliveries, conflicts around transit of energy resources and other current 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). However, actually highest reserves of hydrocarbons are in the countries where state-owned companies are operating in this field. Russia is one of such examples.

Another direction may focus on studying long-term prognosis and prospects of energy production and energy consumption, determination of their influence on economic growth and the need to diversify energy sources and transit routes. This is the field where we should look for future answers.

All these issues should be resolved taking into consideration requirements of long-term political, economic, social and environmental sustainability. Consequently, it will determine energy sector and economy throughout the XXI century.

The geographical scope of this paper covers the whole European continent and the former Soviet Union countries but the focus is mostly on current EU member states and large CIS energy commodity producing countries.

Major tasks of the paper are:

- to asses the existing trends of energy consumption and imports trends (mostly oil and gas),
- to develop scenarios of future energy needs of EU,
- to study on production and export potential of major CIS oil and gas producers,
- to enlighten proven and probable commodities reserves,
- to review existing and planned transportation infrastructure,
- to analyze barriers of trade and challenges to cooperation between CIS and EU, existing and potential obstacles to intensified trade in energy commodities, barriers to enlarge FSU production and export potential to the EU, and to investment in an energy sector,
- to examine geopolitical characteristics of relations between energy producing countries and “transit countries” of the CIS,
- to assess alternative transportation infrastructure in EU and its political challenges.

According to these tasks, the first section analyses the oil and demand trends and forecasts in EU, second and third sections examine Russian and Caspian energy supply and potential resources. Last section characterizes transportation options, infrastructure capacity trends, cooperation and prospects. [1]

As a consequence, comprehensive analyses can contribute to determining the best policies and best prospects of energy security in EU countries, the sustainable production expansion in CIS producer countries, and security of the transportation routes.
In conclusion, recommendations in the field of cooperation in energy supply are made.

1. Energy Demand Current and Future Trends in Europe: Focus on Oil and Gas

Europe is entering a new energy era. EU energy demand continues a very slow upward trend while its energy resources are limited and internal production is on the decline. Consequently, the EU is increasingly dependent on external sources of energy commodities. In 2005, EU27 import dependency for energy stood at 52%, up from 47% in 2000 and 43% in 1995[2]. The EU is particularly dependent on imported oil and gas. In 2005, its import dependency for oil amounted to 82.2% (up from 75.8% in 2000) and for gas 57.7% (up from 48.9% in 2000),[3] and certain to rise, with falling internal production of hydrocarbons. Energy becomes more expensive, and huge investment is needed over the next years to maintain and increase production, transportation and distribution capacity, replace ageing infrastructure and improve energy efficiency in order to address the environmental challenges and meet expected energy demand increases.

[1] The main data source used in this report is BP (2007). Other information, that is not provided by BP, is taken from IEA, Eurostat, EIA and statistical agencies of respective countries and analytical and forecasting institutes.
[2] Source: Eurostat pocketbook, 2007.
[3] Source: Eurostat pocketbook, 2007. dependency is calculated as a ratio of net imports to consumption of a country or region.

1.1. Current Trends in Oil and Gas Demand in Europe

1.1.1. Oil

Between 1991 and 2005 oil demand in the EU expanded at an annual rate of 0.5%, on average, much slower than in other parts of the world (1.6% average annual growth in North America, 3.5% growth in Asia and Pacific region). In the recent years demand growth seems to have moderated even further, to the average of 0.4% annually between 1999 and 2005[4]. EU27 accounted for around 19% of total global oil consumption in 2005.

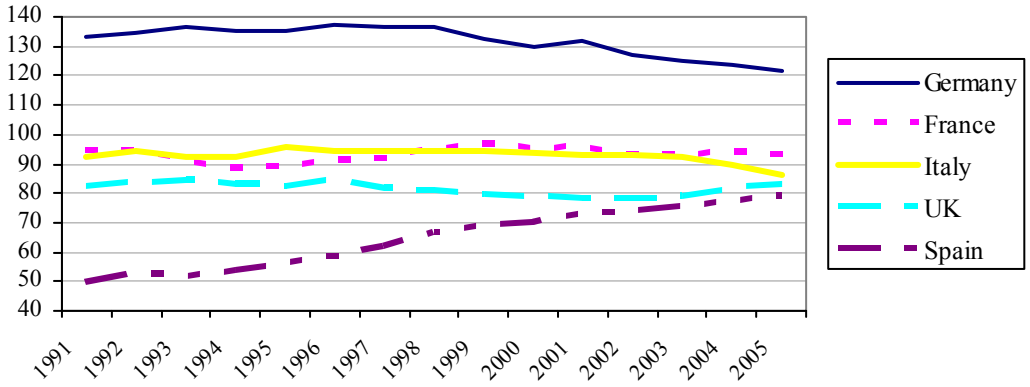
Oil consumption in the whole European continent and the former Soviet Union (FSU) region taken together actually declined quite substantially between 1991 and 2005, by 1% annually on average. This is explained by the major decline in oil consumption in the FSU taking place between 1991 and around 2000 when the consumption reached the trough. In Russia, oil consumption roughly halved between 1990-1991 and 2000-2001, in Kazakhstan the consumption level in 1999 was one third of those from 1990-1991 and in Ukraine 2000 consumption was only 20% of the 1990 level.

The demand trends differed quite substantially among the EU economies and other European countries. Germany, the largest EU consumer has seen its demand rising somewhat between 1990 and 1996 while the last decade brought a gradual but consistent decline. Between 1999 and 2005 demand was declining by 1.4% annually, on average. In France, Italy and the UK demand was broadly flat over the last 15 years. In contrast, Spain witnessed a rapid rise in oil consumption, by 3.4% annually, on average (see Figure 1.1). These five countries account for roughly two thirds of the total EU27 demand.

Figure 1.1

Oil Consumption in Large EU Economies, 1991-2005 (Mt)

[4] Calculations presented in this section are based on BP (2006) data.



Source: BP (2006).

Among other EU economies, Benelux countries have seen fast increase in oil consumption since 1991, accelerating to 3.4% annually over the period 1999-2005. By 2005, Netherlands, Belgium and Luxembourg together accounted for 12% of total EU demand. The trends in other countries were mixed. Poland, Greece, Austria have seen their consumption increasing most of the time throughout the last 15 years, in Romania demand fluctuated substantially mirroring volatile economic growth to rebound over the last 5 years, while Sweden and Hungary have seen generally declining trends.

Beyond EU and FSU, Turkey, Switzerland and Norway belong to the group of large European consumers. Turkey exhibited rising, albeit volatile trend, while demand in Norway, after increases during 1990s started to decline in most recent years and oil consumption in Switzerland was very slowly declining over the last 15 years.

1.1.2. Natural Gas

Between 1991 and 2005 gas demand in the EU expanded at an annual rate of 2.8%, on average, slightly above the global growth rate (2.2%). In the recent years demand growth seems to have moderated somewhat, to the average of 2.4% annually between 1999 and 2005. EU27 accounted for around 18% of global gas consumption in 2005[5].

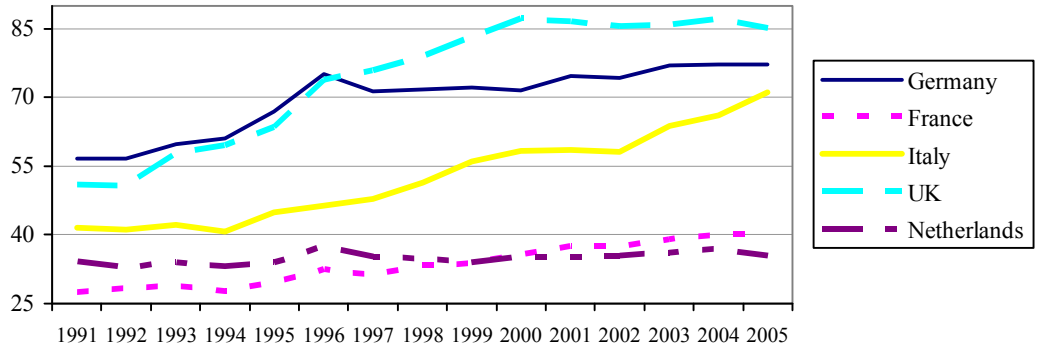
[5] Calculations presented in this section are based on BP (2006) data.

Gas consumption in the FSU was still some 20% above EU27 level in 2005, down from double the EU level back in 1991. Extremely high reliance on gas in FSU countries, compared to other regions in the world is explained by abundant gas reserves in Russia and several Central Asian countries and prevalence (until recently) of very low import and domestic prices. In contrast to oil, a decline in consumption of natural gas in FSU was more muted and since 1997 one observes a continued increase averaging 1.8% annually during 1999-2005.

Gas demand has been growing in almost all EU countries, however, the dynamics differed between member states. The UK, the largest EU gas consumer, has seen stagnation of demand since 1999 (0.4% annual growth during 1999-2005) after a period of rapid increase during 1990s. In Germany, after strong growth till 1996 gas consumption slowed down to see some rebound more recently (1.2% annual growth during 1999-2005). In contrast, demand dynamics in Italy and France has stayed high during the last 15 years averaging at 3.9% and 2.8% annually since 1991, respectively. Netherlands, another large consumer has seen its demand broadly stable since 1991 (see Figure 1.2). These five countries accounted for 70% of EU27 gas demand in 2005 (but well below gas consumption of Russia alone).

Figure 1.2

Gas Consumption in Large EU Economies, 1991-2005 (Mt)



Source: BP (2006).

Among other EU economies, demand growth was very fast in Spain (12.6% annually since 1991) where gas increased its role in the energy mix from insignificant in early 1990s to 18% of the total energy supply in 2004. Belgium, Poland and Hungary have also seen a

continued increase in consumption, to the tune of 2.5-4% annually. Slovakia and Sweden are the only EU27 countries with demand declining since 1999.

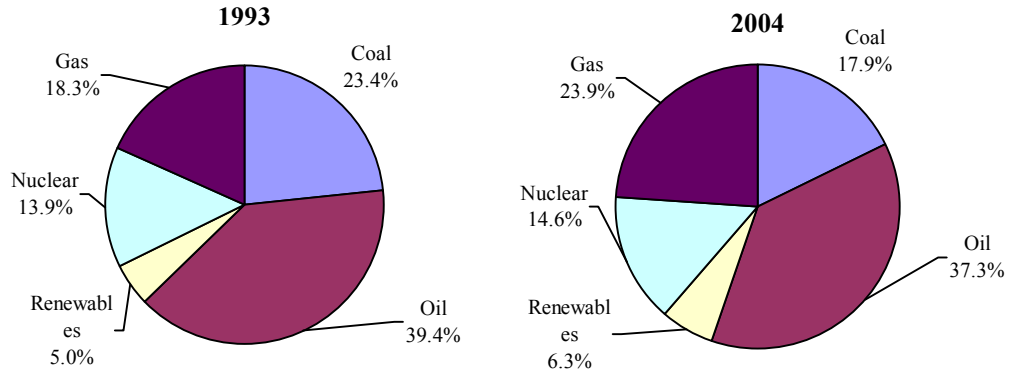
Apart from EU and FSU countries, only Turkey is a significant European consumer of gas, with new import pipeline infrastructure allowing for demand growing at nearly 15% annually since 1999.

1.1.3. Oil and Gas in the Energy Mix

Oil dominates in the EU energy mix with a share of above 37%, just below the world average of around 40%. Between 1993 and 2004, the importance of oil in the total EU energy consumptions stayed broadly stable. One major change in the structure of consumptions was related to the decline in the importance of coal (from 23.4% down to below 18%) and a fast rise in natural gas consumption – from just above 18% to almost 24% share in the energy mix. Nuclear energy accounted for around 14% of the total consumption while renewable sources of energy continued to increase, albeit from a low base – by 2004 they accounted for just above 6% of the total (Figure 1.3.)[6].

Figure 1.3

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. It corresponds to the addition of consumption, distribution, and transformation losses. Data for EU27 are almost identical to EU25.

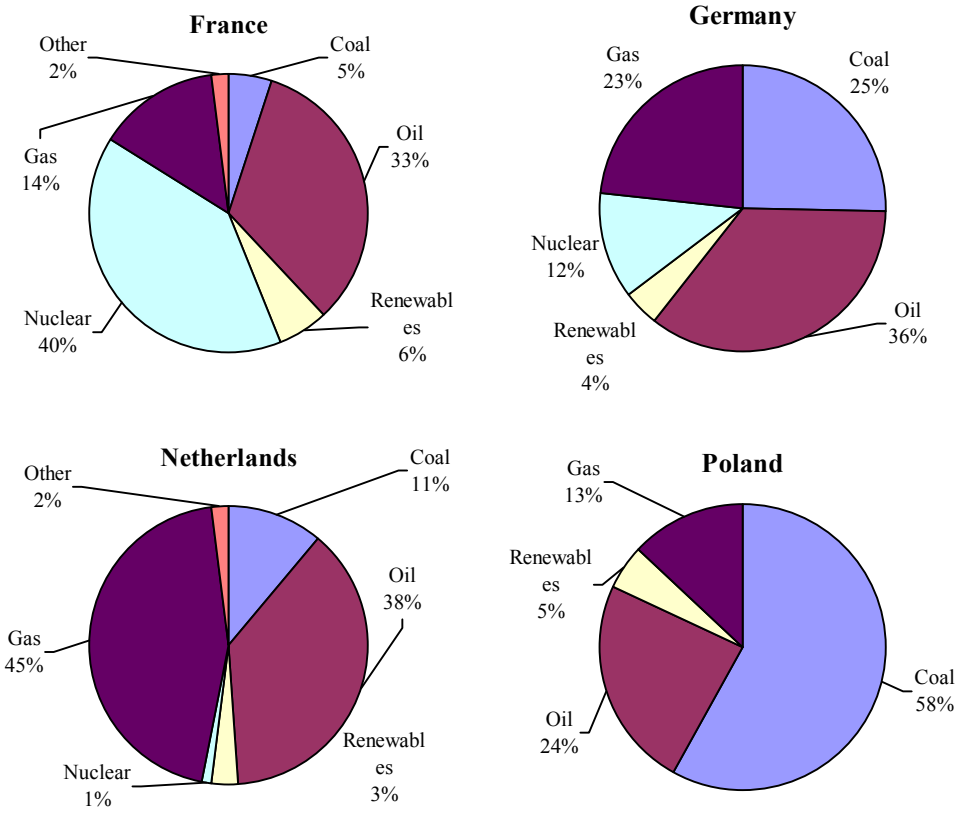
[6] Unless indicated, data presented in this section come from the Eurostat database or European Commission documents based on Eurostat data.

Source: Eurostat.

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 divergence in the relative importance of particular energy resources. To illustrate the scale of differences one can compare Netherlands mostly relying on natural gas – 45% of total energy consumption and oil – 38% with France where nuclear sources dominate with a 40% share (and oil accounts for 33%) and Poland where solid fuels account for as much as 58% of total energy mix, with small role of gas (13%) and no nuclear sources (Figure 1.4). 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 1.4

Energy Consumption by Fuel in Selected EU Member States, 2004 (% shares)

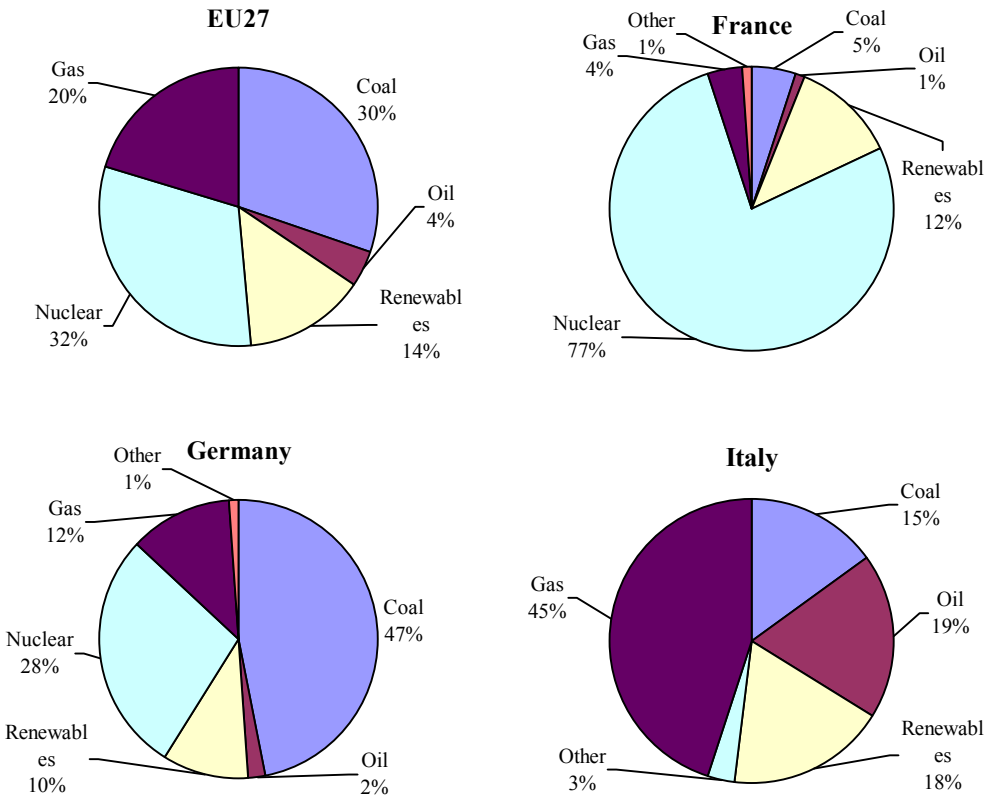


Source: European Commission Staff Working Document, *EU Energy Policy Data,* SEC (2007) 12.

Such major differences in individual fuels shares in total energy consumption are primarily related to very different patterns of electricity generation. It is illustrative to point out that while in France more than three fourth of electricity is produces in nuclear power plants, they do not exist in a number of other EU member states. Solid fuels account for almost half of German and above 90% of Polish electricity generation while playing hardly any role in France for example. 63% of electricity in the Netherlands is produces from natural gas which accounts for less than 5% of electricity mix in the Czech Republic and Bulgaria. Renewables account for almost half of electricity mix in Sweden but just 4% in the UK (see also Figure 1.5).

Figure 1.5

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, most of the increase in electricity generation capacity in the EU25 came from natural gas-fired plants. Their electricity production more than tripled between 1993 and 2004, compared to almost flat generation from solid fuels-fired stations and hydro

power plants, a minor increase in output of nuclear power stations, and a substantial decline in output of oil-fired stations. Output of power plants based on renewable resources (other than hydro energy), particularly wind and biomass increased sharply over the analyzed period (25 times and 3.4 times increase, respectively), although their share in total electricity production is still relatively small.

The data presented so far indicate that while patterns of natural gas consumption differ vastly between countries, the differences in the relative role of oil in total energy mix, while substantial, are of much smaller magnitude. This is explained by patters of use 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 between other uses[7]. It is therefore clear that different industrial, electricity and heat generation patterns in European countries lead to major differences in the role of gas in the total energy mix.

The situation with oil is somewhat different because its main use (roughly half of total consumption in the EU or more when maritime bunker is added) is currently in the transport sector. Oil is also used in the industrial sector, by households, in electricity generation plants and in agriculture; however, these uses play a relatively small role[8]. From the perspective of oil demand trend an important observation is that so far there are hardly any economically significant alternatives for oil products in the transportation sector. In 2005, bio-fuels accounted for below 0.5% of total fuel consumption in most of the EU member states with only a few countries with slightly 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. The European Council of March 2007 re-confirmed a 10% binding minimal target for the share of bio-fuels in overall transport petrol and diesel 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 hot debates in the EU (for an example see e.g. Turmes, 2008). Indeed, it is widely acknowledged that the target is

[7] IEA data pertaining to EU25 2004 consumption patterns.
[8] Oil is a very versatile energy resource and can be also used e.g. for electricity generation. This explains while some very small countries (e.g. islands of Cyprus and Malta) may rely almost entirely on oil. This does not contradict the main message from this paragraph, which applies to countries with a more diversified economic base.

certainly not feasible unless workable and robust sustainability scheme of biofuels production is in place and second generation of biofuels becomes commercially viable (European Commission, 2008). This in particular implies that EU will need to import biofuels from regions where the conditions for their production are more favourable. In turn, boosting international trade in biofuels is not easy in itself, due to lack of internationally-agreed criteria for sustainable production and the diversity 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 talking place. The key trend is the rising relative demand for diesel (in 2005, it accounted for 50% of final energy consumption in the transport sector, up from 40% in 1995) and corresponding falling relative demand for gasoline (31% in 2005, down from 45% in 1995). This results from fast growing popularity of diesel fuelled cars which currently account for around half of new car registration in Western Europe, up from below 20% in early 1990s (IEA, 2006a).

1.2. Forecast of Oil and Gas Demand

1.2.1. Oil

This report presents the results of demand modeling exercise carried with an updated version of the CASE Advisors (2000) oil demand model. Interpretation of the forecast results requires understanding of the methodology and assumptions guiding the modeling. Their brief description is included below followed by presentation and discussion of results.

In the current version of the model we only present one ‘baseline’ scenario. Broadly speaking it assumes continuation and relative stability of 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 major change in taxation and other policies is foreseen that could significantly impact the patterns of demand for transport services (e.g. by increasing the prices of fuels relative to public transport to significantly change patterns of passenger transport in Europe). Brief discussion on the impact of other sets of assumptions is included later in this section.

Forecast horizon is up till 2030, in line with the practice of the International Energy Agency and US Energy Information Administration. Database on historical annual oil demand is taken from the BP (2006).

The model comprises three main blocks: structural, trend and expert. The structural block models the demand for oil at 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 very low price elasticity and significant income elasticity of oil demand. Future GDP growth path are based on assumptions concerning the speed of convergence within the non-FSU European economies and past performance in 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 functions of past data. The expert module uses the information from several large international models used at major institutions, such as International Energy Agency, Energy Information Administration and European Commission (EIA, 2006; European Commission, 2006; IEA, 2005, 2006). 2006 figures are primarily based on preliminary monthly demand data published by International Energy Agency.

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

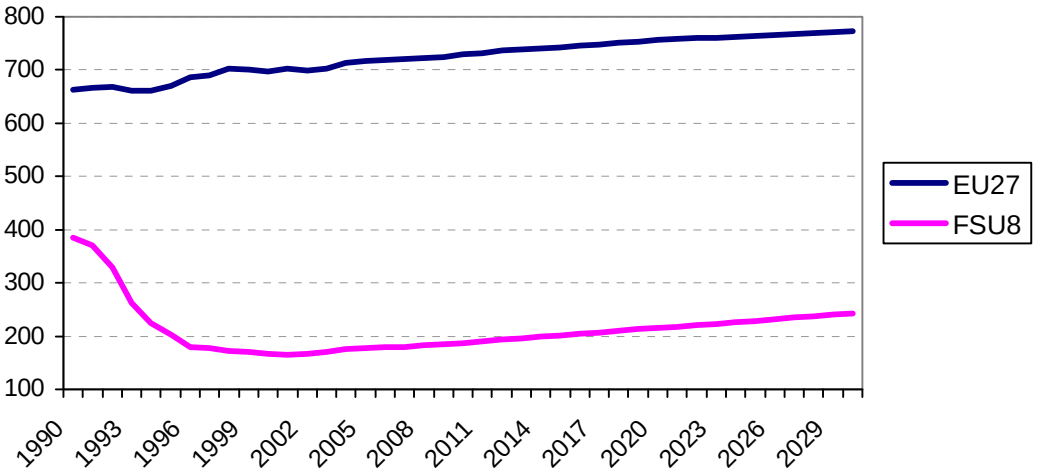
Figure 1.6 and Table 1.1. present the key results of the forecast exercise[9]. Total demand in Europe and FSU region is expected to increase at an average annual rate of 0.5% over the 2005-2030 period, with broadly similar dynamics over the whole forecast horizon. EU27 demand growth is expected to slightly slow down from the levels observed in the decade 1996-2005 (0.7% annually on average) to 0.3% annually over 2005-2030. FSU countries will see much stronger demand growth, at 1.2% annually during 2005-2030, although this

[9] The final version of this report will provide an updated set of forecasts presented in the current version.

still represents a significant decline in oil intensity of their economies compared to the period up till late 1990.

Figure 1.6

Oil Demand in EU27 and FSU8 – 1990-2030 (Mt per annum)



Note: EU27 comprises 27 EU member states as of 2007. FSU8 comprises the 8 largest oil consumers among CIS countries: Russia, Ukraine, Kazakhstan, Belarus, Belarus, Uzbekistan, Turkmenistan, Azerbaijan.
Source: BP (2006) and oil demand model.

Table 1.1. Average Annual Growth of Oil Demand – 1995-2030 (% per annum)

	Total Europe & Eurasia	EU27	FSU8
1995-2005	0.28	0.67	-1.31
2005-2010	0.5	0.3	1.0
2010-2020	0.6	0.4	1.4
2020-2030	0.5	0.2	1.2
2005-2030	0.5	0.3	1.2

Note: EU27 comprises 27 EU member states as of 2007. FSU8 comprises the 8 largest oil consumers among CIS countries: Russia, Ukraine, Kazakhstan, Belarus, Belarus, Uzbekistan, Turkmenistan, Azerbaijan. Total Europe & Eurasia comprises EU27, all CIS countries plus Albania, Bosnia-Herzegovina, Croatia, Former Yugoslav Republic of Macedonia, Gibraltar, Serbia and Montenegro.
Source: BP (2006) and oil demand model.

The results of the baseline demand scenario presented above indicate that oil demand in Europe will grow at much lower pace than in other parts of the world. Europe's share in global consumption is set to decline. It is worth recalling that oil market is global in nature,

i.e. oil price developments will be determined by global demand / supply balance rather than developments in Europe.

In the above scenario (which produces similar results to some other larger forecasting projects carried e.g. by the IEA) Europe is characterized by relatively low oil demand growth compared to other economic centers. Still, the global oil (and more generally energy) demand path emerging from these models is widely described as unsustainable from the environmental perspective (and possibly also due to supply capacity/security constraints). Rising global energy consumption and related CO_2 emissions are, with all likelihood, among the primary factors beyond 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 in particular implies lower consumption of oil. In January 2007, the European Commission proposed "an integrated energy and climate change package" of actions and targets that could achieve these two goals[10]. The coming months and years will likely see the hot debates between various stakeholders and will eventually lead to policy changes effectively reducing consumption of oil relative to the reference scenario. To get the flavor of the possible energy savings one could note that IEA (2005) Alternative Policy Scenario assumes 10% lower global oil demand in 2030 compared to the baseline. Most of the savings come from measures affecting transport sector. Europe is expected to play quite an important role with fostering improvements in efficiency of new vehicles, increasing the role of biofuels, and 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 co-operation is needed to ensure that policies consistent with the Alternative Scenario are implemented. Without such co-operation and 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 quite another approach from that used in modeling oil demand. This is because gas use is diversified across sectors and in all these

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

sectors there are substitutes for gas (unlike in case of oil in the transport sector). Second, gas consumed in Europe mostly comes from pipelines (despite growing role of LNG), indicating the very different character of the European gas market. Unlike oil, gas can only reach a particular destination provided there is sufficient capacity in the pipeline infrastructure. Gas demand is therefore loosely linked to economic developments that can be forecast with some degree of certainty (such as GDP growth) and more with government and private sector policies, and in particular investments in the transport infrastructure. For these reasons the discussion of likely future demand trends below is not based on the modeling exercise but it draws from existing analyses by other sources which are based on careful examination of announced and likely to be announced government policies and other factors determining availability and cost effectiveness of natural gas[11]. The sources include IEA (2005), EIA (2006), Eurogas (2006), Honoré (2006), European Commission (2006) and European Commission Staff (2006).

According to all these sources, between now and 2030, gas demand in the EU is expected to increase significantly faster than oil demand. The expected average annual growth is in the range of 1.5%-2%, with somewhat faster growth between now and 2015 followed by more muted gains between 2015 and 2030[12]. FSU region is also expected to see further increases in domestic demand (from already high current levels), but the dynamics may be slightly lower than in the EU/OECD economies – to the tune of 1.3%-2% annually, depending on the source[13].

Most of the demand increase is expected to come from the power generation sector. Also, among EU countries most of the increase (at least in the period until 2015) is in fact concentrated on just a few markets: Spain, Italy and the UK. Therefore, actual 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

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

[12] Different sources present forecasts for somewhat differently defined groupings of countries. However, given the high concentration of gas demand on a few largest consumers in the EU and OECD, the results for dynamics of demand growth are hardly affected by changes of the region boundaries. Consequently, the results presented for the EU25 or EU27 can also be apply to all non-FSU European countries (among which only the OECD member country Turkey consumes significant amounts of natural gas).

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

other factors such as attitude to nuclear energy, forecast gas prices are playing an important role in this. The current practice is that gas prices are quite strongly related to oil prices, despite the fact that the two natural resources are no longer substitutes to any significant extent (for discussion see Energy Charter, 2007 and Stern, 2007a). In the environment of high global oil prices (and therefore also high gas prices in Europe) the viability of several new investment projects in gas-fired power generation may become less clear to investors, leading to delays in the project implementation.

Honoré (2006) carried an interesting bottom-up accounting exercise looking at particular gas-fired power generation projects in major EU gas consumers. The conclusions from this work are that up till 2015 a scenario with slightly slower increase in gas demand is more likely than suggested by most other sources. This is because of the delays or abandoning of some investment projects in the gas-based power generation. The most likely range of average annual growth in (non-FSU) European demand for gas is between 0.8% and 1.7%[14]. Assuming stabilization or even deceleration over the subsequent 15 years this would likely lead to the average of close to 1.3% or so over the whole 2005-2030 period, i.e. the bottom of the projection range.

We are inclined to believe that conservative growth forecasts for the EU are indeed 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 e.g. to projects based on clean coal technologies[15]. In our view a scenario with some 1.5-2% annual growth up till 2015 slowing down to around 0.8% over 2015-2030 is most likely. This would add up to some 35% increase in gas demand in Europe between 2005 and 2030, or 1.2% average annual growth over the period.

Future gas demand in FSU countries is subject of by even bigger uncertainty due to unknown changes in domestic gas pricing. Policies of individual FSU countries (especially in Russia and Ukraine) will have a major impact on gas demand, and thus on relative competitiveness of various modes of electricity production. One may expect differences

[14] After a long period of growth, 2006 saw a 1.9% decline in gas demand in EU27, with particularly significant decrease in the UK, Italy, France and Germany, while preliminary monthly data for 2007 suggest a rebound with around 2.5% rise in gas consumption over 2006.
[15] Some authors view coal as a promising alternative to oil and gas – provided the technological improvements significantly limiting the CO_2 emissions. See, e.g. Auer (2007).

between major gas producers (Russia, some Central Asian and Caucasus countries) and countries relying on imported gas.

1.3. Potential non-CIS sources of energy supply for the EU

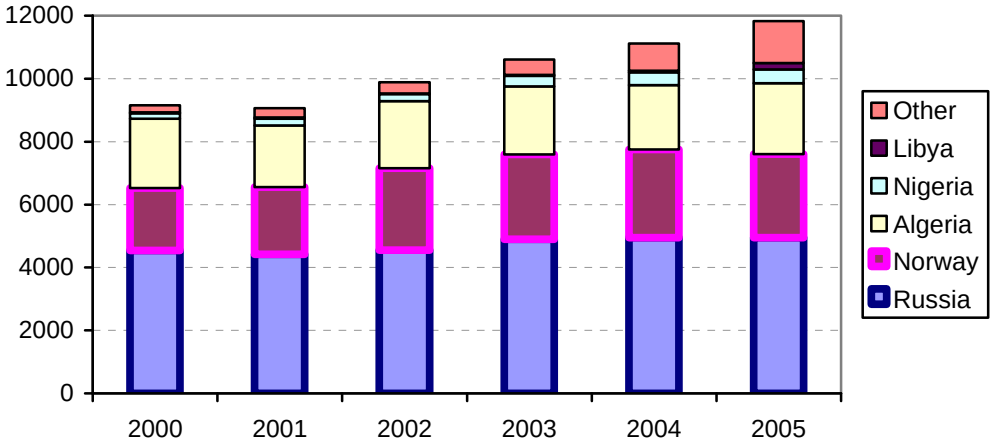
This section briefly presents the outlook for non-CIS sources of natural gas and oil supply for Europe, i.e. of domestic production, and import from other major suppliers.

1.3.1. Gas

Historically, EU was meeting a large part of is gas demand by 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 covered around half of demand of EU-27. Since 1995 EU domestic production of natural gas fluctuated reaching the peak in 2000-2001 and then starting to decline. In 2006, domestic output was below 1995 levels, implying (given a strong surge in demand as discussed in section 1.1.2) a significant rise of import dependency. In mid-1990s almost half of extra-EU gas imports was coming from Russia, with Norway and Algeria accounting for around 15% each. Since then, total EU imports have significantly increased (with 30% rise only between 2000 and 2005) and volumes imported from all major suppliers also increased, but with varying dynamics. The relative importance of Russia has decreased, the relative importance of Algeria has stayed broadly stable, while Norway, Libya, Nigeria and other countries have increased their relative importance. In 2006, EU-27 imported gas from three main destinations: Russia (around 39%), Norway (22%) and Africa, mainly Algeria, Nigeria and Libya (these 3 countries accounted for 24%).

Figure 1.7

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.

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 after that date, possibly accelerating beyond 2015 (see e.g. Stern, 2007b; EIA, 2007, IEA, 2006b). This outlook can be changed by new gas discoveries only. So the key question relates to potential of non-European gas supply.

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

Middle East and Africa are commonly believed to see large gains in gas output until 2030, with projected average annual growth in the range 3-4.5% in 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 be also taken into consideration.

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 IHS (2007) Algerian gas export capacity is expected to rise by above 50% between 2007 and 2020, from below 80 bcm in 2007, to around 110 bcm during 2011-2015 and just below 140 bcm around 2020. The majority of these increase will be absorbed by LNG projects, implying an increasing flexibility of the potential export markets.

According to 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 will be directed towards EU markets. IEA (2006a) presents a scenario where most of increases in gas exports from both Africa and Middle East are directed to Europe which may receive above 200 Bcm from Africa and close to 100 Bcm from Middle East by 2030. However, the 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 the key Europe's competitor for LNG unless projects of exploitation of the Arctic gas (from Alaska and Canada) will be speeded up.

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

Summing up, the following observations can be made:

- the role of Africa (in particular, Algeria) and possibly also of Middle East suppliers of gas for the EU is likely to increase further
- New pipeline projects will increase diversity of gas sources
- Still, LNG will be playing an increasingly important role in EU gas imports implying an increasing international integration of LNG market and competition, in particular between EU and US consumers
- Political instability in producing and transit regions and uncertain demand projections along the gas chain need to be taken into account in formulating supply projections.

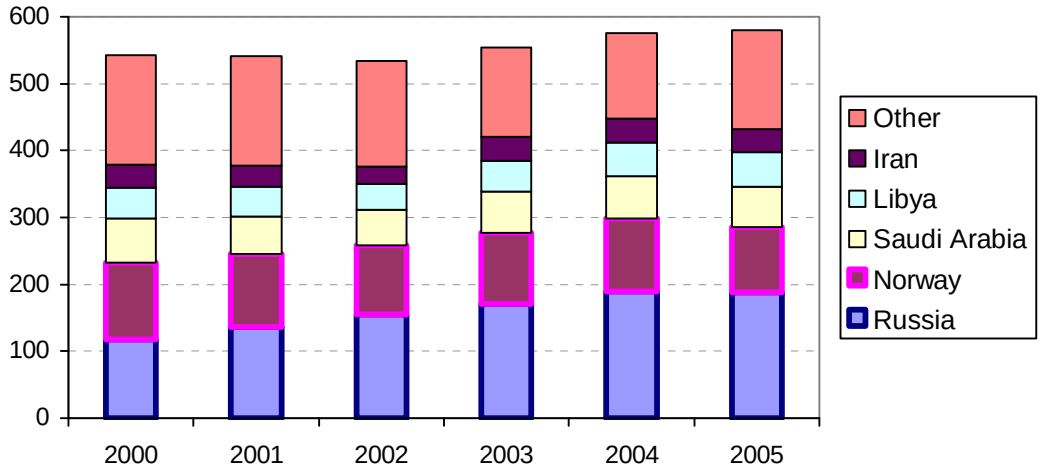
1.3.2. Oil

EU countries import a large share of consumed oil. Imported crude oil accounted for above 84% of inputs to EU27 refineries as of 2006, compared to around 75% in 1994. Among EU countries, only UK is a major but steadily declining (since 1999) oil producer. Denmark also

extracts significant volumes of crude oil, with smaller amount produced by Italy and Romania.

Figure 1.8

EU27 oil imports by origin, 2000-2005 (Mt)



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

EU imports crude oil from OPEC countries, mainly Saudi Arabia, Libya and Iran (37% share in extra-EU imports in 2006), Russia (32%) and Norway (15%). For the last few years total crude oil imports increased in a very slow pace. However, imports from Russia have been growing dynamically, with its share in total imports rising from 22% in 2000 to 32% in 2006. Imports from Norway have declined somewhat while other countries have been supplying broadly stable volume of oil during 2000-2005 (Figure 1.5).

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

The above outlook implies a likely increase of EU oil imports from non-EU countries although the pace of this increase will be moderated by slow demand growth. The relative importance of various suppliers is difficult to predict. However, this is not a particularly important question from the perspective of supply security because of well developed and flexible global oil market with spot transactions playing an important role. Furthermore, well

developed transport and storage capacities allow switching quickly to alternative sources of supply in case of problems with any particular supplier.

For the last few years, the EU has been also increasing imports of petroleum products. There are interesting trends in this trade, which are linked to the on-going demand shift from gasoline to diesel in Europe as discussed in section 1.1.3 above. At the same time, in the US, demand for gasoline has been rising sharply. The European refining industry was unable to adjust to such a 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 CIS countries (mainly Russia). According to Eurostat data, in 2006, EU motor spirit exports reached 42 million tones (17 million to the US), or around 40% of total petroleum product exports[16]. In the same year EU diesel oil imports reached 40 million tones (17 million from Russia, 2 million from Belarus), or above 31% 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 further increasing Europe's reliance on non-EU sources
- OPEC is expected to see substantial gains in output and its share in EU crude oil imports may increase
- From the perspective of supply security, the diversification of oil import sources is much less important than in the case of natural gas.

[16] Eurostat, Oil economy 2006, Data in focus 13/2007.

2. Energy in Russia: Current and Future Trends. Focus on Oil and Gas

Russia is a global supplier of energy commodities and its exports are essential for ensuring global energy balance and stability 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 about 10.3% of world's primary energy (about 1.2 bln TOE in 2005 by IEA estimates) of which 45% is exported and 55% is consumed domestically (including energy intensive goods for export). Russia is the largest single supplier of energy resources to the European Union.

In 2006, primary energy supply almost reached 1990 levels, after a dramatic decline in 1990-s 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 external and domestic demand for energy. Future decades inevitably will bring massive investments in the energy sector that should allow maintaining and increasing production and transportation capacity.

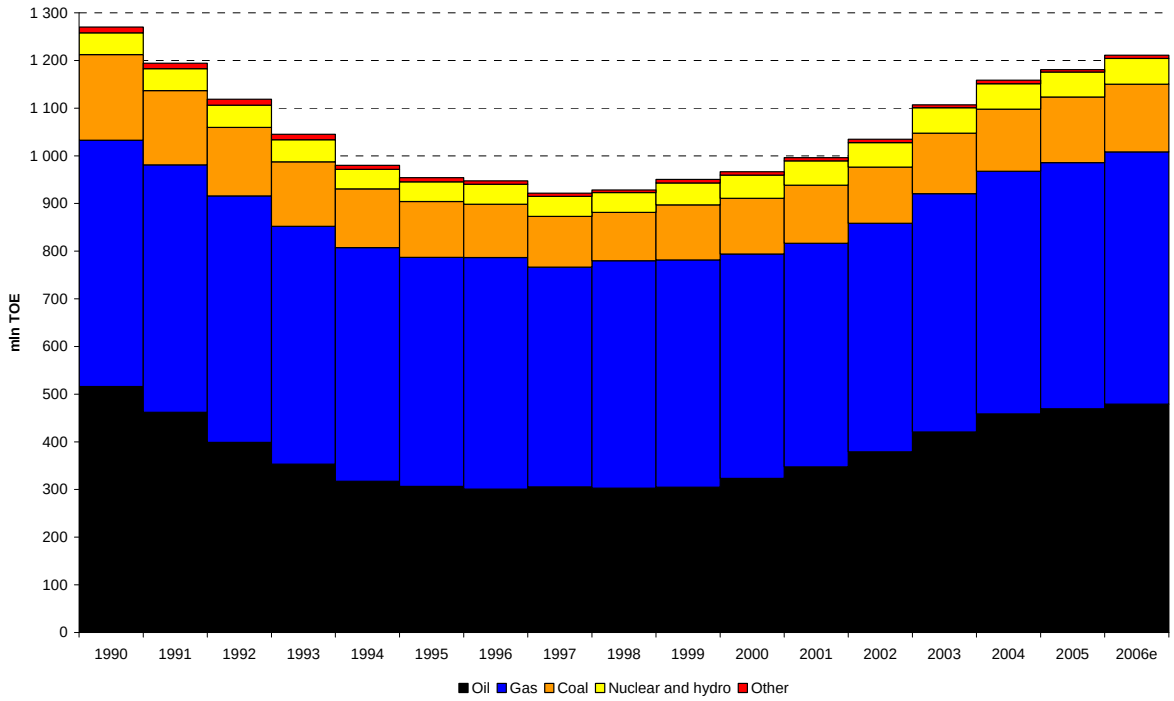
2.1. Current trends of gas and oil production and exports

During the 1990s the domestic demand for energy resources in Russia declined dramatically. 43% GDP contraction between 1990 and 1997 was accompanied by a drop of gas output by 11%, and for oil – by 41%. 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 1990s the transition-related output decline, structural changes in economy and energy sector and low world energy prices were the main causes of declining production of energy commodities. Primary energy supply decreased constantly for the first 8 years of transition – from 1989 to 1997 (See Figure 2.1).

Figure 2.1

Primary Energy Supply, Mtoe by Source Fuel (1990-2006)



Source: Rosstat, IEA, Minpromenergo

2.1.1. Oil

Oil production peaked in 1987 at 569.5 Mt. Economic crisis, low world prices and technical difficulties resulted in a radical decrease of production. Compared to other primary energy products, oil production experienced the largest decline. By 1994 it dropped to only 56% of the historical highs of 1987, to stay only minimally above this level till 1999 (Figure 2.2). Oil sector was privatized early in the reform process. Privatization pattern in the oil industry followed the main idea of disintegration of centralized vertical structure, but a decade later "oil" has been reintegrated into vertical companies again.

Between 1999 and 2004-2005 Russia experienced very fast growth in oil production mostly due to reconditioning of old fields and implementing new improved technologies. No new fields were launched into operation. Some geologists were referring to "squeezing" of old fields by companies with certain long-term losses of oil extraction. The main exceptions were Sakhalin projects (under PSA terms) and parts of Yamalo-Nenetsk region where increase in production was driven by a number of new fields. For example, without output from Sakhalin production growth would be almost nil in 2007.

Oil production reached 490 Mt in 2007, still 14% lower than the 1987 high. Since 2005 one could observe a major slowdown in oil output growth despite all-time-high oil prices. Changes in taxation, property rights conflicts and lagged effect of lack of investments in exploring new fields were the main reasons of decelerating growth.

Changes in production were accompanied by changes in sources of demand. In the early 1990s more than a half of produced oil 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 on oil products have become more dependent on world prices especially with the unified natural resource production tax (UNRPT) and export duties actually linked to world prices. So in the absence of formal regulation on oil product prices there is a strong motive to push domestic prices up as most of the export returns are ripped by the government. Actual pricing of individual oil products is strongly influence by a structure of refining capacity. Most of the refining facilities are rather old and their productivity is below international level. Besides, none new large refinery has been commissioned since 1991.

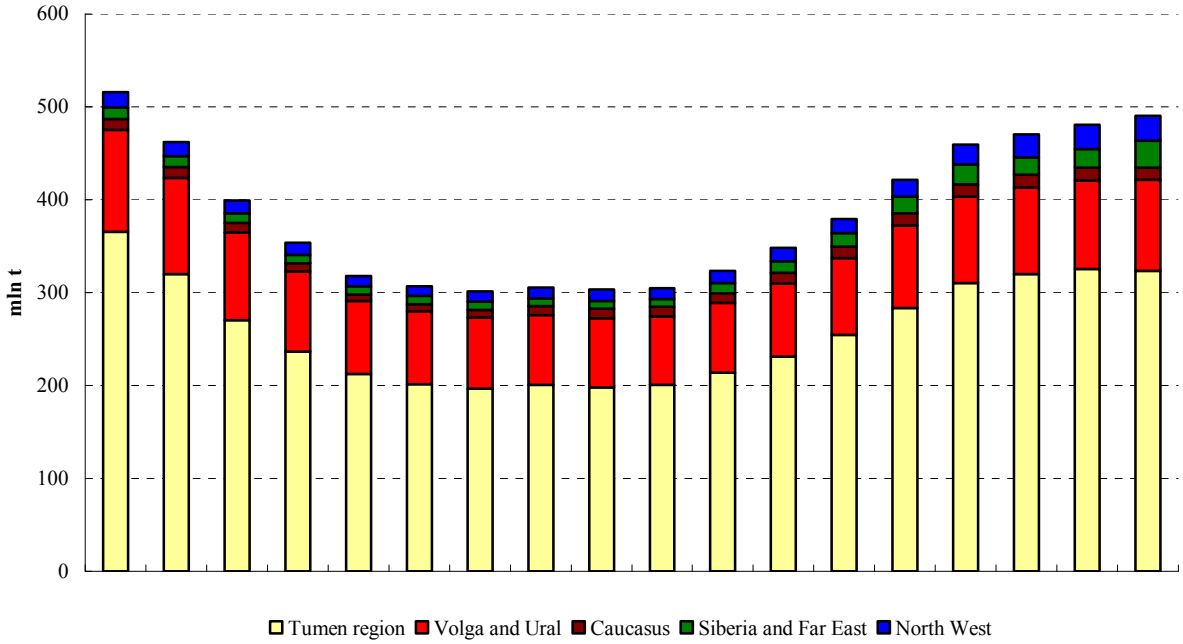
There is also excessive distillation capacity and its uneven geographical location. So there is a fundamental mismatch between domestic demand for oil products and production capacities. These leads to higher prices on light products (like gasoline) and lower prices on heavy products (like fuel oil).

More than 70% of refining capacity is controlled by vertically integrated companies. So there is a strong governmental pressure on oil companies to limit price increase of gasoline and fuels. Major companies have developed strong retail networks and actually control all the stages of the production and distribution chain so they can optimize costs and pricing inside the chain. For example, major companies fixed voluntarily prices of gasoline in 2005-2006.

Exports of crude oil reached the maximum of 260 Mt in 2004 and then gradually declined, mainly on the back of tax and tariff policy stimulating domestic refining. Duties on oil product exports have been lower than for crude since 2004.

Figure 2.2

Russia: Oil production by main regions (Mt), 1990-2007



Source: Rosstat.

EU market is the largest foreign market for Russian crude. In 2006,186 Mt (almost 75% of all crude oil exports) were supplied to the EU. Exports to CIS have been rather stable at around 35-40 Mt annually for the last few years. More than a half of CIS exports goes to Belarus, with Ukraine and Kazakhstan being other major markets.

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. [17] Supplies of oil to eastern direction (including China) will grow in coming years as these markets are specially prioritized by Transneft state corporation in new pipeline projects.

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

Table 2.1 Russian oil exports by destination (Mt), 2003-2006

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

	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

2.1.2. Gas

Compared to oil, natural gas production has seen much less volatility for the last 15 years. At the lowest point (1997) gas production was only 10% lower than in 1990 .mostly because gas industry was more dependent on domestic consumption. About 70% of produced gas is consumed domestically with more than a half going for power plants, 10% for industry, 10% for residential consumption and 9% for transport. This is the fundamental standpoint that makes gas sector situation different from that of oil.

While domestic consumption of oil halved between 1990 and 1998, gas consumption declined only by 13%. This was mainly determined by increasing use of gas by domestic power plants that were switching from expensive and "dirty" fuel oil to gas. Some support came from exports but it played only 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. So changes in gas production were driven mainly by domestic demand.

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 domestic gas prices are still regulated. Low prices made gas a favorable energy source for consumers. However, their low level makes domestic gas sales hardly profitable. This makes Gazprom eager to have higher domestic prices during the current upturn.

Looking for this sector from the supply side, majority of gas fields was put into operation in 1970-1980s and thus by 1990s they were still relatively new (compared to major oil fields, for example) with still relatively modern equipment. Therefore, lack of investments was not so destructive as in the other sectors of energy industry.

Gazprom (in which the state holds majority of shares) is by far the largest gas producer, accounting for 84% of national output in 2007 (this share declined from over 90% at the end of 1990s). Other market players are big oil companies producing mainly associated gas and so-called independent producers (Novatek, Intera and others)[18]. Their share in total output has been rising slowly, being largely determined by access to Gazprom-owned pipeline system.

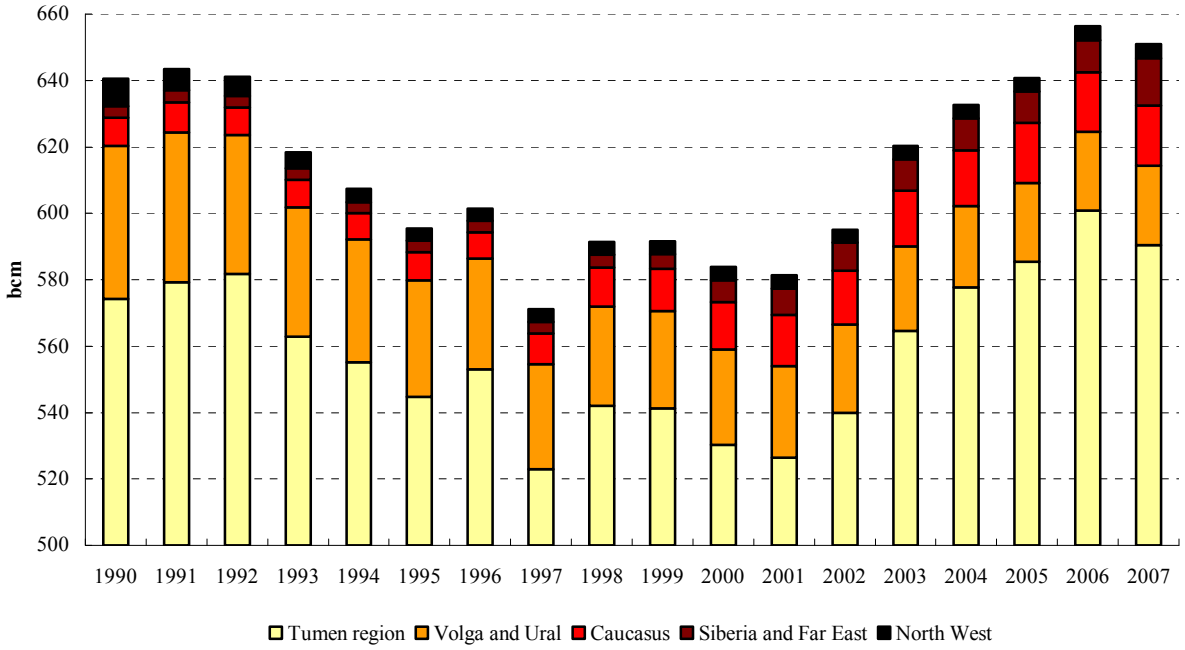
Since 2003 gas production has been increasing at around 2% annually with a bulk of additionally supplied gas going for export (See Figure 2.2). In 2006, gas production in Russia grew by 2.4% with a help of independent gas suppliers and oil companies, while Gazprom did not expand production. In 2007, gas production decreased by 0.8% while Gazprom decreased its production only by 0.1%. It is believed that the main reason for such decline was a warm weather in Russia and Europe that affected demand for gas.

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

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

Figure 2.3

Russian gas production by main regions (Bcm), 1990-2007



Source: Federal State Statistics Service

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

As it was said, Russia exports some 30% of its gas with major part (65% of exports) going to the EU, and CIS (20%) markets. The rest of the exports is mainly directed to Turkey through Blue Stream pipeline. Thus, currently all of the Russian exports are shipped in western and southern directions.

The direction of gas exports changed in last years with the share of EU and Turkey growing and the share of CIS declining. Decrease of exports to CIS can be explained by prices increases and changes in the gas relations between Russia, Ukraine and Turkmenistan. Since

around 2005-2006 a major part of Ukrainian imports comes from Turkmenistan with the transit through Russian territory while Russia supplies only a minor part of Ukraine's imports.

Supplies to main and traditional consumers of Russian gas in Europe – Germany and Italy – has stayed stable for the last few years while the growth has been driven mainly by Turkey and Eastern Europe and beginning of exports to the UK.

Table 2.2 Export of gas by target 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

There is a huge debate both domestic and international as to whether Gazprom has enough investments in gas production and whether Russia can keep its production in the long run on the current level or growing as its main fields progressively mature. For example, the head of the Institute of Energy Policy Vladimir Milov points out that "with the growing domestic consumption and extension of export supplies we will see a serious deficit of gas by 2010" (Milov, 2006). Other domestic observers are also expressing some concerns while they are sure that foreign long-term contracts will be honored under any circumstances.

We also are rather far from pessimistic views. Actual investments in fixed capital of Gazprom increased 6 fold in since 2003 in nominal USD terms. It's obvious that real growth is lower but still impressive enough. Investments in fixed capital will continue to grow, based on the company's investment program.

Importantly, since 2006 there has been a strong shift in investments from transportation to production segment. In 2007 fixed investments (see table 2.3) have reached a record level of $23.6 bln. It is assumed that this level will increase in 2008 as the North Stream project pipeline will begin and active development of Yamal and Yuzhno-Russkoe fields will be continued. So investments in production increased from 4.9 bln $ in 2006 to 9.2 bln in 2007; they were actually nil until 2006.

Table 2.3 Investments in fixed capital of Gazprom by main sectors (bln $), 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

Estimated gas reserves of main fields have stayed unchanged for the last few years fluctuating in the range 16.4-16.6 Trillion cub.m.

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

	2001	2002	2003	2004	2005	2006
Producing fields	16.7	16.6	16.6	16.9	16.6	16.4
Urengoiskoye	5.6	5.5	5.7	5.5	5.4	5.3
Yamburgskoye	4.2	4.3	4.1	4.0	3.9	3.8
Zapolyarnoye	3.5	3.5	3.4	3.4	3.3	3.2
Astrakhanskyoe	2.5	2.5	2.5	2.5	2.5	2.5
Orenburgskoye	0.8	0.8	0.8	0.8	0.8	0.8
Yuzhno-Russkoye	-	-	-	0.7	0.7	0.8

[19] By national classification – A+B+C1

Fields under development	8.2	8.2	8.2	8.2	8.6	8.9
Bovanenkovskoye	4.4	4.4	4.4	4.4	4.4	4.4
Shtokmanovskoye	2.5	2.5	2.5	2.5	2.9	3.2
Kharasaveiskoye	1.3	1.3	1.3	1.3	1.3	1.3

Source: Gazprom

Since Soviet times energy prices have been heavily subsidized in Russia. In 1990s low energy prices and 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 opportunity costs of such subsidies have been rising with growth of export prices. Low prices also stimulated wasteful consumption and lack of progress in energy efficiency. Relatively low cost of energy resources, heavy industry bias in the industrial structure of the economy, harsh economic conditions, soft budget constraints and lack of incentives for improving energy efficiency are the main determinants of relatively high level of energy intensity in Russia (See Table 2.5)

Table 2.5 Total Primary Energy Consumption per Dollar of Gross Domestic Product Using PPP (kg oil equivalent per 2000 US) of some CIS and EU countries

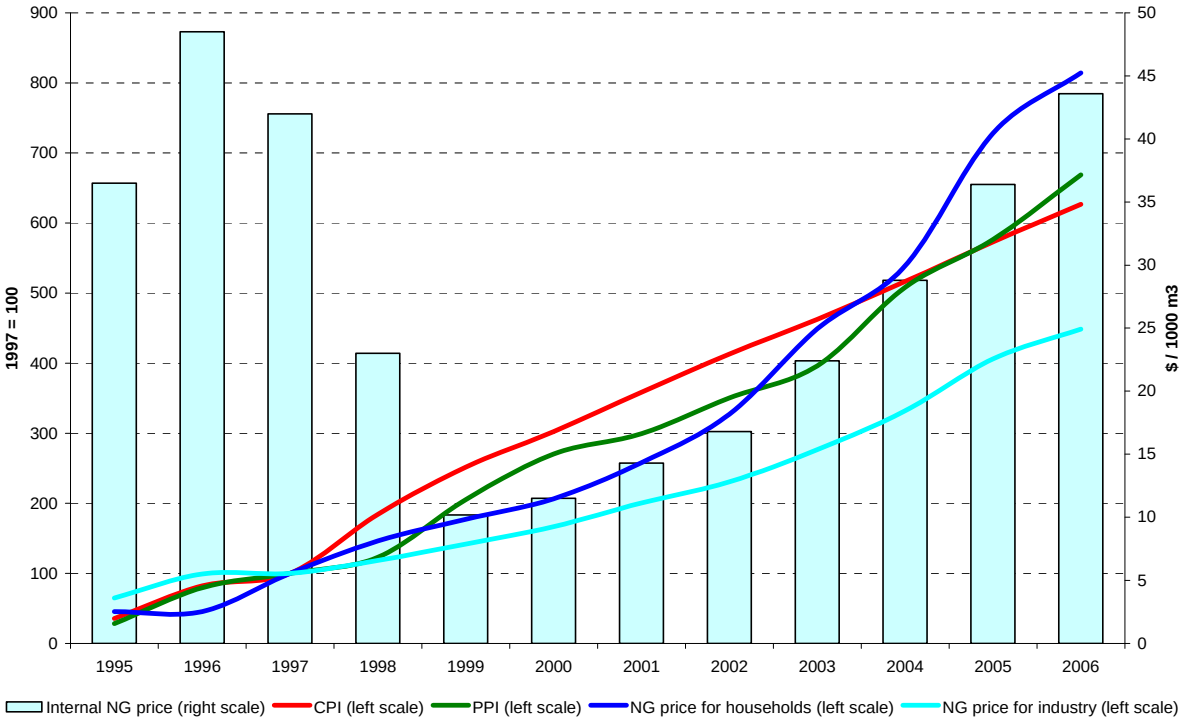
Country	Btu per dollar GDP (2004)
Tajikistan	51.0
Ukraine	43.0
Turkmenistan	35.2
Russia	37.3
Azerbaijan	30.8
Kazakhstan	35.5
Moldova	26.0
Estonia	24.7
Armenia	23.1
Lithuania	22.3
Hungary	20.9
Poland	19.5
France	18.1
Spain	22.7
Germany	17.6
Latvia	14.3

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

The current government policy in this fields aims at fast increase(significantly above the CPI inflation) of energy domestic tariffs and especially 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 export to global market generally resist "too fast" growth of energy tariffs and lobby actively for postponement of tariff adjustment.

Figure 2.4

Russia's Domestic Natural Gas (NG) Price



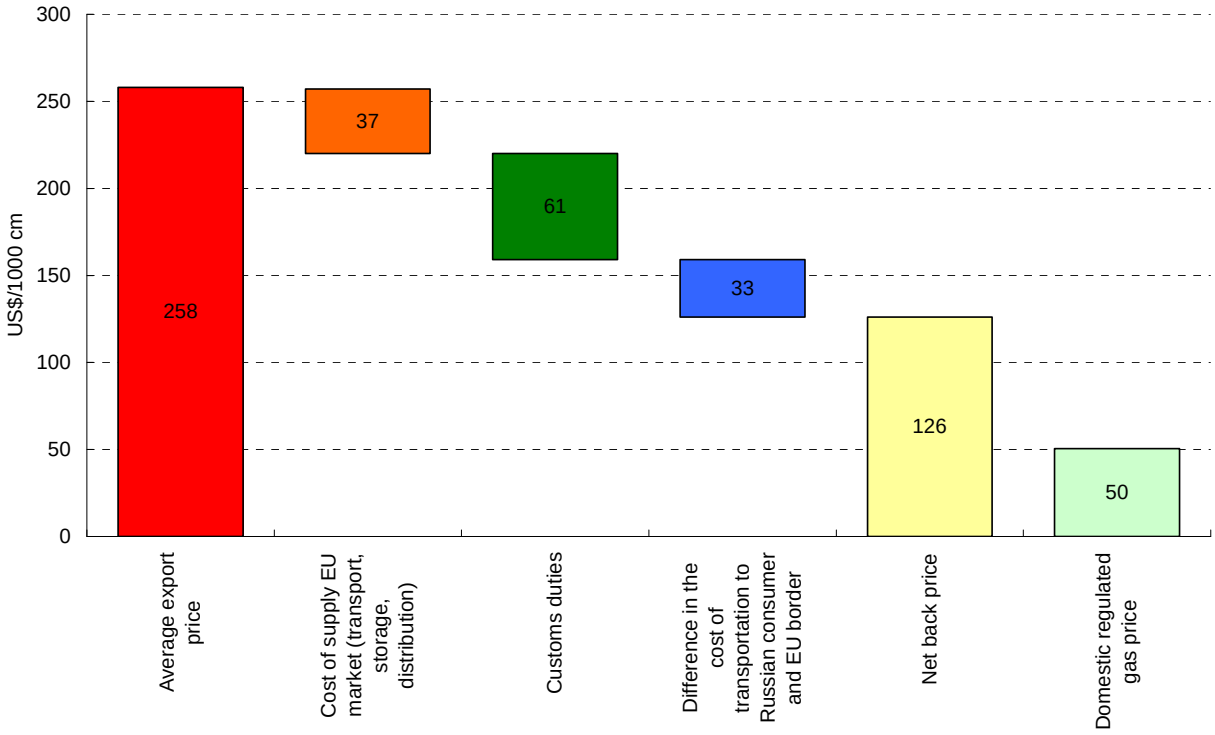
Source: FST, IEF

At the end of 2006 the Russian government declared the increase of domestic prices for natural gas 2.5 times over the 5 year period till 2011. According to Russia's Minister of Industry and Energy Viktor Khristenko, by 2011 domestic gas price will conform to export price less export duties and transport expenses (Valetminsky, 2006). This should bring prices to level comparable to that in EU countries by net back principle. So it surely depends on average export prices. According to our netback estimates for 2007 data this means an increase from $50 to $126 per 1000 cub.m (with an average export price of $258 in 2007)[20].

[20] $50 per 1000 m3 is a regulated wholesale price for industrial users without distribution margin and VAT.

Figure 2.5

Net back estimates for Russian gas, 2007



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

However average prices on oil products increased rapidly since 2006 so did the gas prices. Gazprom sees it average exports prices in 2008 around $350, this will bring net back estimates to more than $200 per 1000 cub.m, all other factors being equal. Government did not expect in 2006 such a rapid increase in international oil and, therefore, also European gas prices. So with growing export prices it is rather difficult to justify equal increase of domestic prices. We expect that domestic gas prices will growth at about 20-25% annually in coming years but will not reach netback levels.

If such a price increase materializes (even to $125 by 2010) it will imply that relative attractiveness of export markets will diminish and become similar to domestic market. Gazprom will be largely indifferent (at least theoretically) between supplying gas domestically or for export. So price increase may boost negotiation power of Gazprom on European market.

Domestic price increase will be a factor of major importance affecting any meaningful long-term forecast of the gas sector development. This is because energy saving and improving energy efficiency will be become more attractive. A reaction of households and industry to

price increases and price elasticity of gas demand is largely uncertain and there are no trustworthy estimates.

2.1.3. Transit issues

Russia plays an important role in 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 EU and other markets mainly via Baltic Sea and Black Sea. The importance of land (pipeline) routes through Belarus and through Ukraine have been declining for the last few years. Russian gas reaches the EU markets via pipelines, mainly through Ukraine, and Belarus (Table 2.3).

Table 2.3 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
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

The cooperation between Russia and transit countries has not been without problems. Main conflicts on energy supplies in the region after 1991 took place between Russian suppliers and Belarusian companies. Politically the most difficult one had occurred in 2007 and resulted in the complex deal on gas and oil. Gazprom had reached the option of buying 50% of Beltransgas for $2.5 bln by 2010 in equal stakes of 12.5%[21]. This is an important step for an operational 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 form of increased customs duties.

Russian relations with Ukraine on gas transit issues have always been complicated due to involvement of political issues and politicians. Gas has been the only good traded between

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

the two countries for which prices did not reflect market conditions (if the netback price principle is applied as a benchmark). In early 2006 Ukraine received payments for Russian gas transit to the West in kind by gas (almost 20 bln cub. annually). Implied price transit was very high by any standards. Essentially an idea of tying up transit and gas prices was in conflict with the Energy Charter which was ratified by Ukraine in 1998. 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. As soon as demand and prices went up Gazprom started squeezing out from politically motivated low prices for gas and extraordinary high transit prices.

Since 2006 Gazprom has been delivering Central Asian gas (in winter of 2008 some Russian gas was also delivered) to the Ukrainian companies for the price of the ultimate supplier plus transit price through Russia[22]. Central Asian gas has been becoming more and more expensive with the price closing to net-back (EU border) price. Political tensions can be expected to cease to exist once Ukrainian import gas prices are on the par with EU import prices (netted back to the Ukrainian border), which might happen by 2009.

There is substantial uncertainty on the technical conditions of Ukrainian pipelines, which could be seen as a factor endangering the security of supply.

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 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 the supplies of Turkey in January 2008. At the same time this will not help in the diversification of EU gas import sources nor will it decrease EU's import dependence.

[22] 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 affecting suppliers.

2.2. Forecasts for Oil and Gas production

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

Forecast of energy production is 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 in a public domain. These factors largely complicate building production forecasts as information on output potential vary substantially between different sources.

Latest official long-term forecasts for energy were developed in 2003 as the Energy Strategy. It was built 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 2.6).

Table 2.6 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, bln cub.	641	656	615	665	730
Coal, Mt	298	309	280	330	430
Electricity, TWh	952	991	935	1 070	1 365

Source: Minpromenergo, Rosstat

In the Energy Strategy of Russia for the period until 2020, forecasted volumes of gas production differ considerably between scenarios assuming different socio-economic developments in Russia. Under an optimistic scenario, gas production may amount to approximately 665 Bcm in 2010, increasing to 730 Bcm in 2020. Under the moderate version, gas production is expected to reach 635 Bcm in 2010 and up-to 680 Bcm by 2020. In case, situation develops under the "pessimistic scenario", Russian gas production will start declining in the near future to stabilize later at the 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 reconstruction of the energy sector. After 17 years of using the fixed assets of the former Soviet Union, it is time for reinvestment of financial resources into infrastructure, exploration and upstream, and especially into downstream and electricity sector. Next decade will play a crucial role in this respect. Naturally, global oil prices and export proceeds will be a background for the development in the energy sector. The Energy Strategy of 2003 is set for the major revision (planned for approval at early 2009) and extension till 2030.

2.2.1. Oil

Although official forecasts for 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. Production of West Siberia and Timano-Pechora provinces will stabilize in 2015-2020 and then will gradually decline.

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

Table 2.7 Forecast production and consumption of energy commodities 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 systems including a large pipeline in Eastern direction (Eastern Siberia – Pacific). Western direction will be influenced by extension of Baltic Transport System (BTS-2). It capacity will be 50 Mt and final points will be Primorsk and/or 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 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. Traditional regions of oil production in Europe and Caucasus will continue decline while production of West Siberia will stabilize. New centers of 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. Further increase in the number of vehicles will boost demand for light products.
- New transport infrastructure. The future projects include BTS-2 and reconstruction of Primorsk port terminal, Haryaga-Indiga pipeline, Burgas-Alexandropolis pipeline with capacity of 35 Mt, modernization of Caspian pipeline consortium (CPC) systems up to 67 Mt and extension of Aturau - Samara pipeline for increase of transit of Kazakhstan and Turkmen oil. So export channels will become more diversified.

2.2.2. Gas

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

Future export trends can be assessed by examining main production projects, domestic consumption and transport infrastructure projects and their directions.

Table 2.8 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 (http://www.eia.doe.gov/oiaf/ieo/excel/figure_45data.xls), Institute of Energy Strategy

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

- Yuzhno-Russkoe fields. Due to expanded difficulties of main fields in 2007, Gazprom accelerated development of Yuzhno-Russkoe field to help to sustain production levels. So it is planned that production of this field will reach 15 Bcm in 2008 and 25 Bcm by 2009. This field is developed together with BASF which has 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 filed 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 transport infrastructure system.

- Shtokman offshore field will be developed with the help of Total (25% of equity stake in operator company) and Norsk Hydro (24%). First phase of the project assumes beginning of production of 23.7 Bcm by 2013 and LNG production by 2014. Gas from Shtokman will supply 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 branch of existing Blue Stream aimed mainly at Israel 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 foreseeable future, but it all depends of the agreed (well in advance) export price and Chinese domestic gas infrastructure investments. As of current moment, there no agreement with China on export price and this factor delays the development of Kovykta project.

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

3. Caspian Oil and Gas Resources: Current Trends and Forecasts

The Caspian Sea countries (Kazakhstan, Azerbaijan, Turkmenistan and Uzbekistan) are substantial energy producers supplying both Europe and Asia with oil, oil products and natural gas. [23]

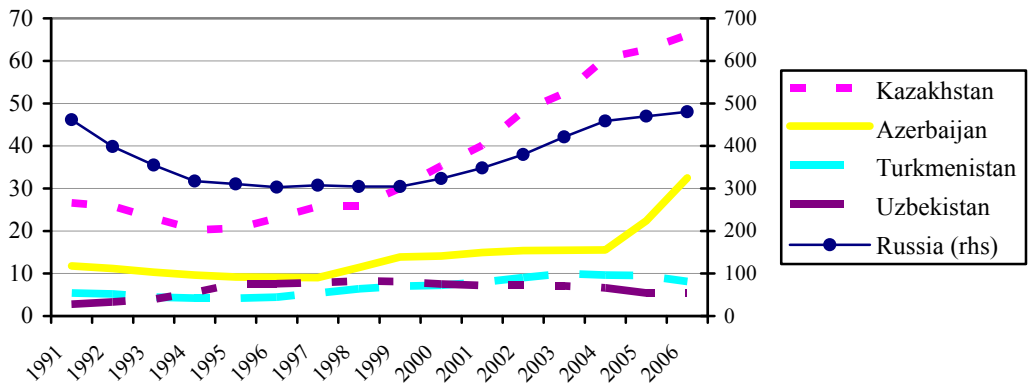
EU and other countries are interested in alternative sources of oil and gas supply. Therefore, from the very beginning, they have been extremely interested in getting access to Caspian sea energy resources and creating alternative pipelines for their transportation. This, in turn, has ensured a large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

3.1. Current Trends of Gas and Oil Production and Demand

Early 1990s witnessed a significant decline in oil output in the Caspian Sea countries, but since the second half of 1990s this region witnessed a strong rebound. As a result, by 2006, oil extraction increased in all the Caspian Sea countries compared to 1990: By more than 150% in Kazakhstan and Azerbaijan, around 40% in Turkmenistan and 90% in Uzbekistan) (BP, 2007).

Figure 3.1

Oil output in major CIS producing countries, 1991-2006 (Mt)



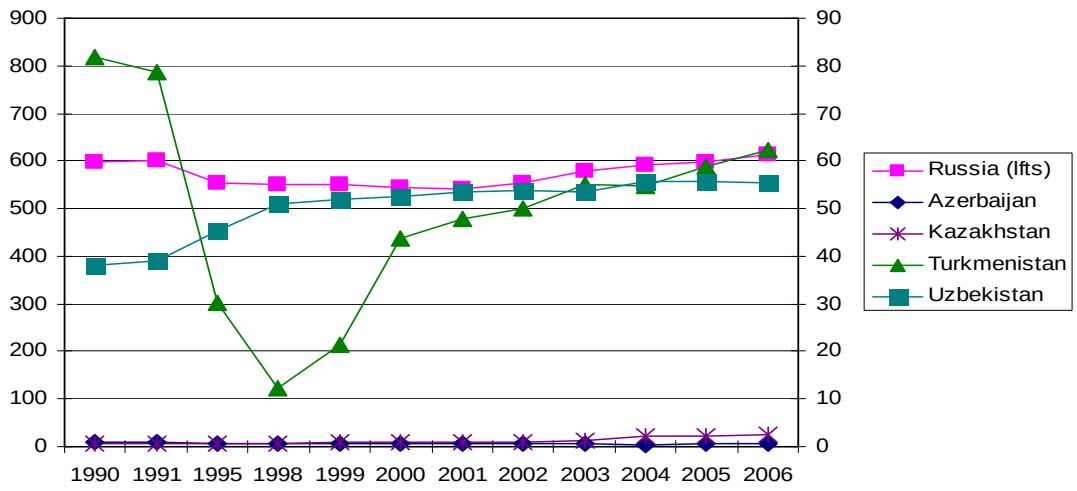
[23] Strictly geographically, the group of Caspian Sea countries covers Azerbaijan, Central Asian countries, Russia and Iran. For purpose of this paper, the term "Caspian Sea countries" will be used in respect to Azerbaijan, Kazakhstan, Uzbekistan and Turkmenistan. Data on Russia (see Chapter 2) consist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

Note: The scale for Russia (left vertical axis) is 10 times larger than for other countries.
Source: BP (2007).

In the same period (1990-2006) gas extraction increased only 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 the previous level (see Chapter 2). Turkmenistan witnessed particularly volatile production patterns with rapid decline of production between 1993 and 1994, then again between 1996 and 1997-1998 and with exports dropping to 1.8 Bcm from levels as high as 70 Bcm in 1991. Then it recorded a sharp increase until 2003 and gradually increase thereafter (in 2005-06). However, in 2006 its production stayed still some 20% below early 1990s level. The production crisis of 1998 was caused by a pricing dispute with Russia. As result, Russia denied Turkmenistan access to the Central Asia Centre pipeline, at that time the only export route out of Turkmenistan. This was one of the first examples of energy disagreement between Russia and Turkmenistan which made huge impact on energy trade relations in the Caspian basin lasting until today.

Figure 3.2

Gas output in Major CIS producing Countries, 1990-2006 (Bcm)



Note: The scale for Russia (right vertical axis) is 10 times larger than for other countries.
Source: BP (2007)

Central Asia decline in oil and gas production in 1990s can be explained by the hardships of the transition period, mostly by lack of new investment. Only at the end of 1990s inflow of foreign investments enabled Caspian Sea countries to increase considerably extraction of

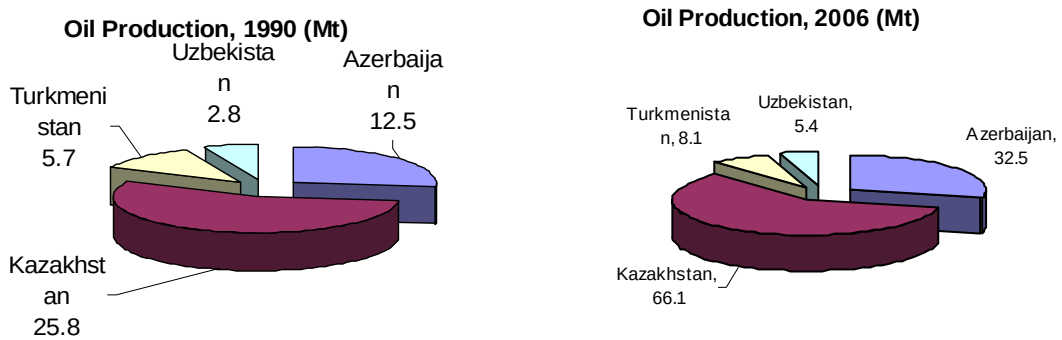
both oil and gas. Overall, oil and gas production increased by 87% in the countries of Central Asia and Azerbaijan between 1990 and 2006.
At the same time, aggregate consumption of oil in these countries declined by 30.5% while gas consumption increased by 33.1%.

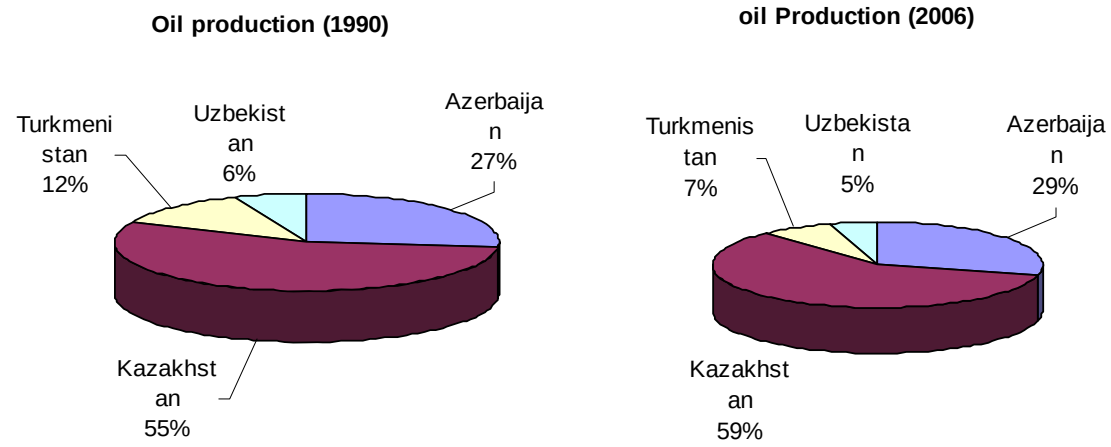
Taken together, these trends indicate a much faster growth of oil and gas production than domestic demand for these resources, increasing the export potential of the region. This has been possible thanks to foreign investments in the sector and establishment of new relations between the countries importing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

Thus, the share of individual countries in total oil and gas production of Caspian Sea 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 Sea Countries without Russia, 1990 and 2006

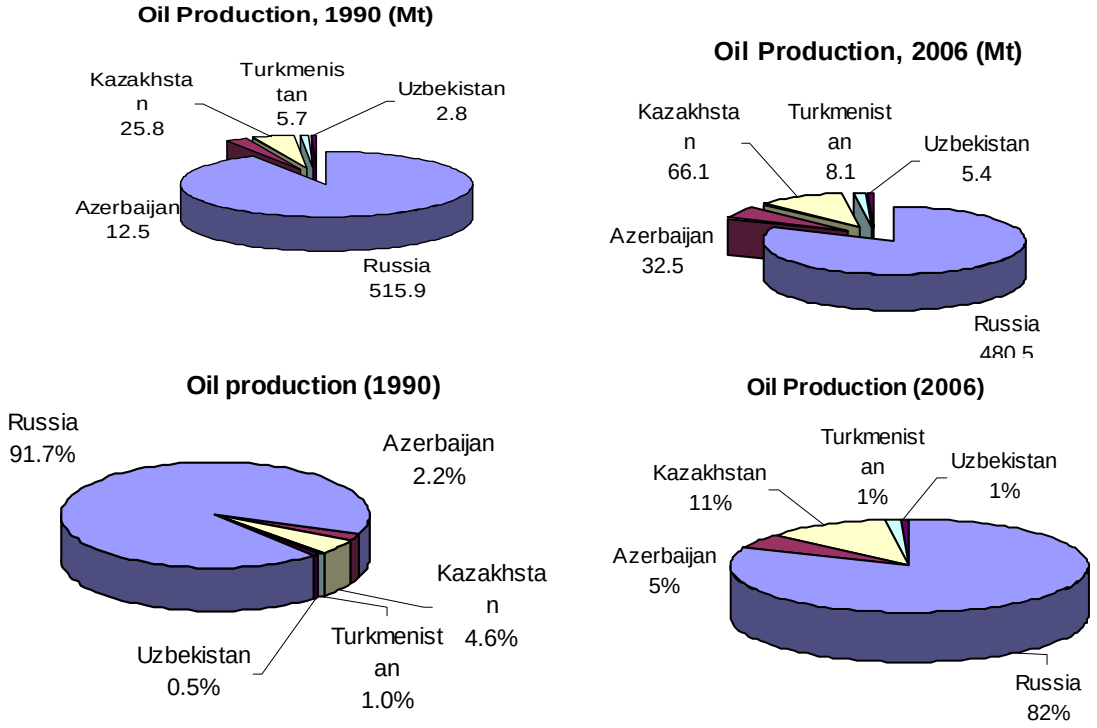




Source: BP (2007)

Figure 3.4

Oil Production in Caspian Sea Countries and Russia (1990 & 2006)



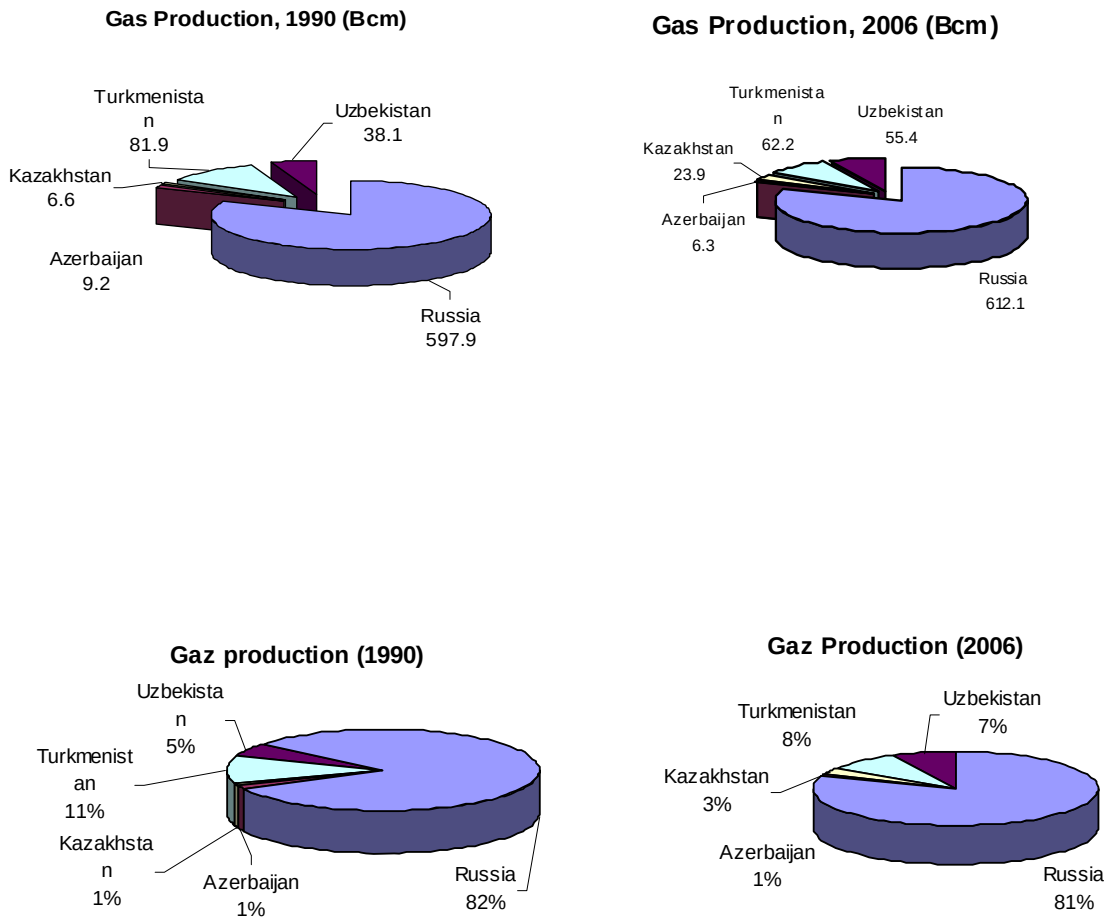
Source: BP (2007)

The share of Uzbekistan in total gas production of the Caspian Sea region (including Russia) increased from 5 to 7% (from 38.1 Bcm to 55.4 Bcm), of Kazakhstan from 1 to 3% (from 6.6 Bcm to 23.9 Bcm), share of Turkmenistan decreased from 11 to 8% (from 81.9 Bcm to 62.2 Bcm). Share of Russia remained at the level of 80-82% (598-612 Bcm). (See Figure 3.5).

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

Figure 3.5

Gas Production in Caspian Sea Countries and Russia, 1990&2006

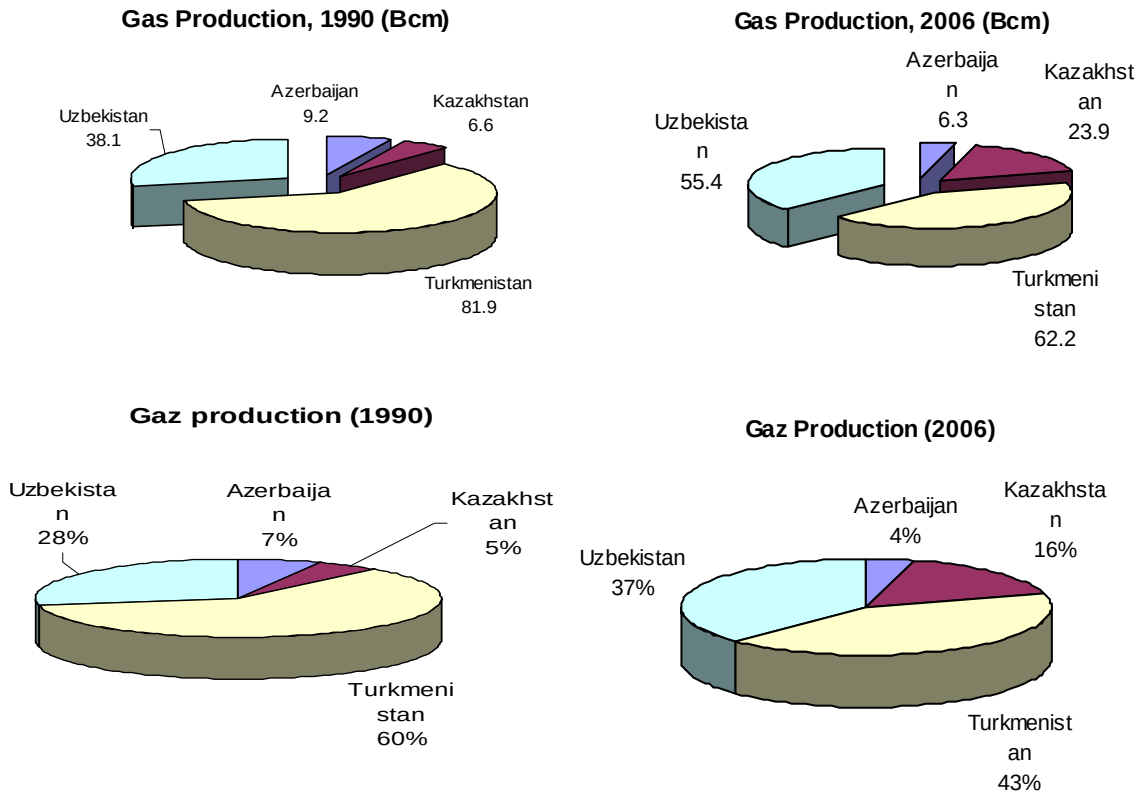


Source: BP (2007)

As for gas production, share of Turkmenistan was reduced from 60 to 43%, still it is the major source of gas production in the region and it is expected to keep the leading role thanks to large reserves. Uzbekistan comes next as major gas producer. However, while in Uzbekistan 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 Sea Countries without Russia (1990, 2006)



Source: BP (2007)

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

Uzbekistan continues to import oil to meet its internal needs, but thanks to growth of its internal resources share of the imported oil reduced almost two-fold and share of gas export increased. While in 1990 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 growth of gas extraction. However, Uzbekistan continues to consume domestically most of its gas output .

The rate of domestic consumption was considerably reduced in Kazakhstan – from 189.4% of gas production in 1990 to 84,5% in 2006. At the same period this rate Russia remained unchanged (about 70-72%).

At the moment, the countries of the Caspian Sea do not account for a large share of world oil and gas production but their confirmed reserves together with perspectives of development of transport infrastructure in the region may increase their importance.

Among Caspian Sea countries, there are two biggest oil producers, Azerbaijan and Kazakhstan. In 2006 Azerbaijan produced 32.6 Mt of oil , Kazakhstan – 66,1 Mt, their shares were respectively 0.8 and 1.7% of the world total. Azerbaijan exported 23.4 Mt of oil, while Kazakhstan – 54.5 Mt. (See Figure 3.7).

Table 3.1

Oil Production, Consumption and Export, 2006 (Mt)

	Oil production	oil consumption	oil export
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**	**77.9**

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
kasakhstan	23.9	20.2	7.8
Turkmenistan	62.2	18.9	48.5
Usbekistan	55.4	43.2	12.6
Total	**147.8**	**91.9**	**69.55**

Source: BP, countries' state statistical departments

Between 1990 and 2006 total oil production in Caspian sea countries (without Russia) increased more than 2-fold reaching 112.1 Mt. In the same period gas production increased only minimally from 135.8 Bcm to 147.8 Bcm (BP, 2007**).**

Taking into consideration the potential resources and production capacity of energy commodities, we may conclude that this tendency will continue in future.

Estimates show that the total volume of exports, with the account on the confirmed reserves and the expected level of domestic consumption, may amount to 4.9 bln tones of oil and 5.5 Trillion cub.m of natural gas in the next 40 years. The export potential of the Caspian Sea

countries may reach the level of 150-170 Mt of oil and 120-140 Bcm of gas in 2015. These volumes may be even higher in 2020. However, everything will depend on the size of investment into oil and gas projects and pipelines, the economic and political situation in the region and individual countries and on a number of other factors.

3.2 Caspian Oil and Gas Resources Forecast

Prospective reserves of the Caspian oil are concentrated mainly at the offshore of Azerbaijan and Kazakhstan, gas reserves at the offshore of Turkmenistan.[24]

3.2.1. **Azerbaijan**

Evaluations show that in Azerbaijan the volume of residual extractable reserves amounts to 1130 Mt of oil and condensate and 820 Bcm of natural gas**.** The main proven oil reserves are concentrated in the Azeri-Chirag-Guneshli deposit while natural gas reserves in the Shah Deniz deposit. According to BP, the proved reserves of gas amount to 1.35 trillon cub.m and of oil to 1 bln tonnes (BP, 2007). However, some very optimistic estimations increase oil reserves at the Azerbaijani sector of the Caspian sea up to 5.3 bln tonnes and of natural gas up to 1.85 trillion cub.m (Cohen, 2006).

3.2.2. **Kazakhstan**

Kazakhstan is a country with substantial reserves of hydrocarbons. On the whole, up to 3.3% of the explored and proved world reserves falls to this country. At the end of 2006 they were assessed at roughly 5.5 bln tonnes of oil (BP, 2007).

Natural gas has been found at less than two dozens of deposits – those known as Amangalgy and Shagirli-Shomyshty, and the Imashevskoye gas-liquids field are the best known (Smirnov, 2006). The proved reserves of natural gas in Kazakhstan total at around 3 trillion cub.m (BP, 2007), while probable reserves, including those beneath the Caspian Sea, are running in the range of 8 to 8.5 trillion cub.m. It must be taken into consideration that over 70 % of the total gas fall to the share of accompanying gas, which is extracted out of the hydrocarbon deposits known as Tengiz, Kashagan and Karachaganak. Instead of processing

[24] At the sea-shore of Russia reserves are not so significant.

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 real reserves of gas are smaller as compared to the officially announced combined stock (Glumskov, 2006).

Consequently, aggregating the above-mentioned figures and the data, which have been included in the corresponding reports EIA, the combined recoverable hydrocarbon reserves, both onshore and offshore, varies between 9 and 40 bln barrels (i.e. 1.2-5.5 bln 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**

According to the EIA of the US (EIA, 2005), Turkmenistan sits on 81.8 Mt of proven oil reserves, while according to BP it is about 74 Mt (BP, 2007). Other sources mostly agree on these estimates.

Turkmenistan is one of the main exporters of natural gas in Central Asia. According to the volume of proved reserves, Turkmenistan takes 13th place in the world and second (after Russia) among CIS countries. In 2006 Turkmenistan took 10th place in the world in the volume of extracted gas and ranked 4th in the volume of gas exports. The proved reserves of gas are running at 3 trillion cub.m (BP, 2007).

More optimistic statements come from representatives of Turkmengeology, the state-owned geological exploration corporation, which put the combined initial hydrocarbon reserves of Turkmenistan at 45 bln tonne, with the recoverable equivalent evaluated at 30 bln tonne (Oil and Gas Reserves of Turkmenistan, 2006).

Mr. Nazar Suyunov, the ex-vice president of Turkmenistan, stated that economically recoverable gas reserves of the country were running in the range of 2.6 and 2.8 trillion cub.m (Suyunov, 2006), i.e. similar to the EIA and BP estimations.

3.2.4. Uzbekistan

The proved reserves of natural gas of Uzbekistan have totaled at around 1.86 trillion cub.m as of the end of 2004 (Ziadullaev, 2006; BP, 2007). Probable reserves of hydrocarbons have amounted to 5.903 trillion cub.m of natural gas, 81.7 Mt of oil, and 36 Mt of gas liquids as of 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).

Oil reserves of Uzbekistan are evaluated at 82 Mt. This amount is related to the predictive estimate of BP (BP, 2007).

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

According to BP analysis, the total volume of confirmed oil reserves of Azerbaijan, Kazakhstan, Turkmenistan and Uzbekistan was 6.7 bln tonne and the total volume of confirmed reserves of natural gas was 9.12 trillion cub.m as of the end of 2006 (BP, 2007), which amount to 3.9% of global oil and 5.1% of global gas deposits.[25]

Table 3.3.

Confirmed Reserves of Oil and Natural Gas

Country	Confirmed oil reserves at end 2006, Mt	Confirmed natural gas reserves at end 2006, trillion cub.m
Azerbaijan	954	1.35
Kazakhstan	5428	3.00
Turkmenistan	74	2.86
Uzbekistan	81	1.87
Total:	**6.5**	**9.08**

[25] A review of different government and non-government sources reveals inconsistency in estimates of the Caspian hydrocarbon wealth. As a rule, government estimates are more optimistic against downbeat forecasts of the others. This can be explained by governments' desire to attract foreign investments as well as draw geopolitical attention from outside. In addition, the ongoing dispute on the legal status of the Caspian Sea (between the Caspian countries) slows down further exploration- works in this region. Depending on various possible outcomes of this dispute, the volume of hydrocarbon resources assigned to each individual country may vary significantly.

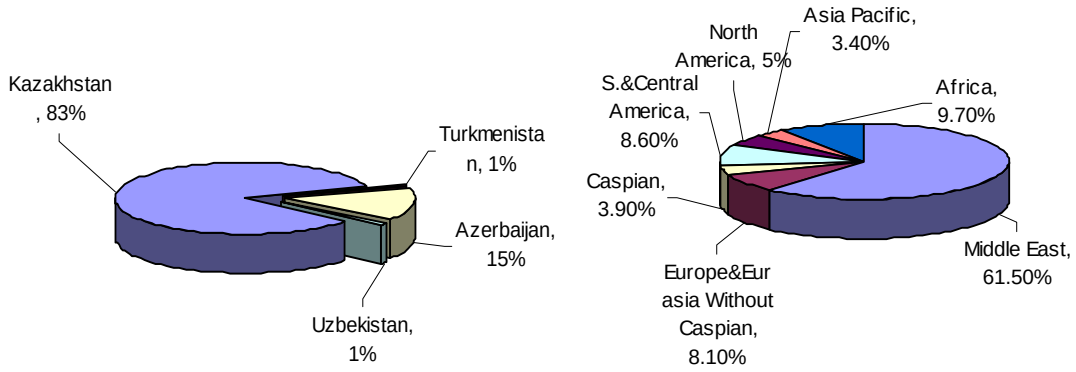
Source: BP (2007).

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

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

Figure 3.7

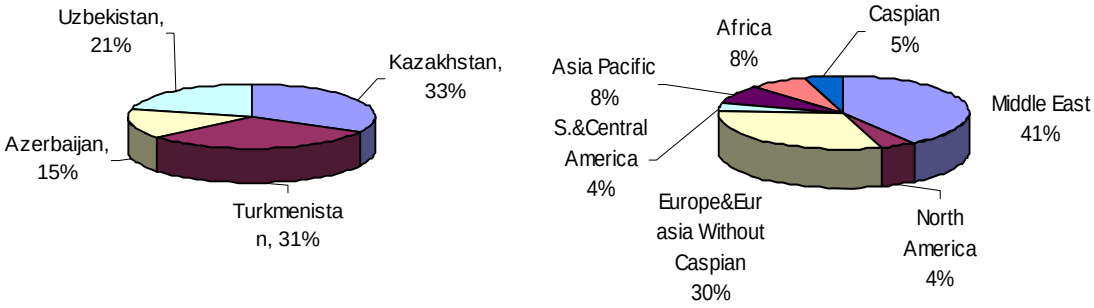
The Global Oil Reserves by Geographical Distribution.



Source: (BP, 2007)

Figure 3.8

The Global Gas Reserves by Geographical Distribution



Source: (BP, 2007)

4. Transportation Choices and Competition of Alternative Pipelines

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

There are different projects for Caspian oil and gas conveyance to Europe. One route - the most important in terms of volumes of gas and oil transported to the EU - goes via Russia, another one – via Azerbaijan, Georgia and Turkey securing mostly Azeri oil export and, starting from 2007, a small portion of its gas export.

4.1. Oil and gas pipelines

At present the following main transportation routes are in operation:

Table 3.4

Oil Pipelines

	Total capacity, thous. barrel per day	Total capacity, thous. tonne per day	Length, km
Baku (Azerbaijan) – Tbilisi (Georgia) – Ceyhan (Turkey);	1000	136	1768
Baku (Azerbaijan) – Novorossiysk (Russia);	115	15.6	1475
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 (1 st line)	1510
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 (budgeting)	960
Neka (Iran) – Tehran (Iran).	175	23.8	350
Turkmenistan – Afghanistan – Pakistan (Gvadar)	n/a		n/a

Source: EIA, BP, Cohen, 2006.

Since the Caspian sea is a land-locked sea, oil delivered to the ports of Azerbaijan and Russia is then transported to the Black Sea ports of Novorossiysk, Batumi, Poti and Kulevi by the existing oil pipelines Makhachkala-Novorossiysk, Baku-Supsa, Baku-Novorossiysk or by Azerbaijan's and Georgia's railway systems or to the Mediterranean 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 development of Kashagan and Tengiz oil fields signed a Memorandum of Understanding on building the Kazakhstan Caspian Transportation System aimed to ensure transportation of the growing amounts of oil exports through the Caspian Sea. Oil will be transported through the route of Eskene – Kurik – Baku – Tbilisi – Ceyhan. 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 at the Caspian coast of Azerbaijan, and integration with the Baku-Ceyhan pipeline infrastructure. According to this project, the Kazakh system will be able to ship 25 Mts of crude oil per year, with possible future expansion up to 38 Mt. The project is expected to be completed by 2010-2011. We should mention that, in case of implementation of this plan, it will fully fill the Baku-Ceyhan pipeline which total annual capacity is 50 Mt. In addition, to secure transit of Azeri and Kazakhstan surplus of oil to the Black Sea ports, a reconstruction of South Caucasus railway infrastructure will be required. The so called **Georgia-Ukraine-European Union (GUEU**) pipeline project, connecting Georgia and Ukraine under the Black Sea was advanced in 2007 by the GUEU Consortium, is planned to bring Caspian oil to EU market.

On March 15, 2007 Russia, Bulgaria, and Greece signed an intergovernmental agreement to build the Trans-Balkan Oil Pipeline, Burgas-Alexandropolis (B-A), which would begin in the Bulgarian Black Sea port of Burgas and end at Alexandroupolis on the Greek Aegean coast. The pipeline is intended to carry 35 Mt of oil annually in the first phase, with expansion to 50 Mt in the second phase.

The pipeline would carry oil mainly from Russian Black Sea ports to the Aegean Sea for shipment from there by tankers. This pipeline is a prolongation of the Caspian Pipeline Consortium's (CPC) line from Kazakhstan to Russia's Black Sea port of Novorossiysk, in direct challenge to the Trans-Caspian oil transport projects from Kazakhstan westward, such as the Baku-Tbilisi-Ceyhan (Turkey) pipeline. The Burgas-Alexandropolis line would also divert Caspian oil volumes necessary to supply the Odessa-Brody pipeline in Ukraine and its possible extension into Plock (Poland), which is the EU-supported project.

In 2007 Cracow summit Azerbaijan stated its interest to join the Odessa Brody-Gdansk pipeline and transit Caspian Sea oil. Ukraine - Poland pipeline can be considered as an option of Caspian Sea oil transportation to EU

Table 3.5

Existing gas pipelines

	Total capacity, Bcm	Length, km
Central Asia - Centre (CAC)	45	The total length on the territory of Turkmenistan is 3,940 km.
Baku-Tbilisi-Erzurum (BTE) or the South Caucasus Pipeline (SCP)	16	1070
Buchara – Ural	5	4500
Korpeje-Kort-Kuy (KKK) (Turkmen-Iranian)	13	200
Tashkent-Bishkek-Almaty (TBA)	22	371

Sources: EIA, BP, kaztransgas, Cohen, Ariel, 2006.

The gas-pipeline network Central Asia – Center (CAC) is the most important route of gas transportation from the Caspian Sea basin to Europe. The construction of this pipeline started in the late 1960s and was completed in the early 1980s. Now the CAC is a web which

threads are located on the territory of Kazakhstan, Uzbekistan and Turkmenistan. The end point of the CAC is the "Aleksandrov Gay" compressor station on Kazakhstan's border with Russia. Through the Central Asia – Centre, Central Asian gas enters the Gazprom system of pipelines. The transport capacity of this pipeline is 45 Bcm per year, and there are plans to increase it in the future (2009) (Expert Report of the Strategic Research Foundation of the Central Asian Region, 2006).

4.2. Competition

As can be seen, countries in the Caspian region: Azerbaijan, Kazakhstan and Turkmenistan, have considerable hydrocarbon reserves and hope to become significant players on the world energy markets. Their production and export potential is, however, limited by transportation infrastructure, in particular to EU markets. Thus, the question of how to get oil and gas out of a Caspian Region to international markets is on the top of the agenda.

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

At the moment the governments of Turkmenistan, Kazakhstan, Uzbekistan and Azerbaijan follow the strategy of multiple export routes for Caspian hydrocarbons, which could provide supply for the world markets (Akhmedov, 2004). Such a tendency can be explained by the fact that for the time being Central Asian gas is transported mainly via Russia due to existing Gazprom pipeline infrastructure being the legacy of the Soviet period and lack of other routes. Russia has occupied so far a very important place on the market of hydrocarbon resources in Europe, and the alternative transportation routes of oil and gas from Turkmenistan, Kazakhstan, Uzbekistan and Azerbaijan to Europe may reduce monopolistic position of Russian companies and stabilize supply of energy resources.

Gazprom's cooperation with gas producers in Central Asia started in 2001 (Foreign Projects, 2006). In line with the intergovernmental Russia-Kazakhstan agreement on cooperation in the gas industry dated 28 November 2001, Gazprom and Kazmunaigas buy crude gas of the Karachaganak gas condensate field, process it at the Orenburg gas processing plant and

supplies the processed dry gas to Gazprom system for sale in individual CIS and other European countries. Gazprom also signed a series of agreements on strategic cooperation in transportation of natural gas with Central Asian governments and state gas companies.

The contract with Uzbekneftegaz of 2002 envisages long-term purchase of Uzbek gas in 2003-12 with bringing its annual volume up to 10 Bcm by 2005. The agreement with the Government of Uzbekistan on the handover of a function of the Uzbek gas export operator to Gazprom was signed in 2003. In 2006 Uzbekistan produced about 55 Bcm of gas. This figure can increase by 2012-2013 when Kandym-Khauzak-Shady-Kungrad gas field increases its annual production from the initial 3 Bcm to over 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 gas industry– signed in 2003 and coveringthe period of 1 January 2004 to 31 December 2028.
In 2005, Gazprom ensured transit of about 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 from Uzbekistan via the traditional Russian route. According to preliminary Kazmunaigaz's estimates, in 2010-2020 Kazakhstan can supply 5.83 Bcm of Tengiz gas and 3.3 Bcm of Kashagan gas (both in annual terms) via Russia if a large portion of gas is re-injected and up to 9 Bcm if the produced gas if it is fully utilised. Therefore, the total Kazakhstan's 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 to Russia over 48 Bcm.

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 development of new pipelines and modernization of existing ones.

In May 2007 Russia, Turkmenistan, Kazakhstan and Uzbekistan reached a preliminary agreement on modernization of Central Asia-Centre gas pipeline and construction of the

Pre-Caspian gas pipeline. Consequently, the four states signed a detail 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.

Extension of CAC and building Pre-Caspian pipelines will increase the export capacity of the Caspian Sea region, but limited export options, and reliance upon the Russian pipeline network will still serve to restrict the ability of countries in the Caspian to profit from their extensive gas reserves. If we take into account that the existing Russian gas transport system is inadequate even for exporting larger volumes of domestically produced Russian gas, it is unclear to what extent the Russian route can really increase gas supply to the EU and whether Russia's gas transport system will have sufficient capacity to receive new volumes of Central Asian gas in 2010-2020.

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

Today the attempts are made to transport part of gas to Europe via South Caucasus. One of the recently completed projects is the **South Caucasus Pipeline** (**Baku-Tbilisi-Erzrum)** pipeline designed to transport natural gas from Azerbaijan's Shah Deniz off-shore field. The diameter of this gas pipeline is 106.6 cm with a transport capacity of 16 Bcm annually. The length of the Azerbaijani section is 442 km, the length of the Georgian section - 248 km, and the length of the Turkish section - 280 km. It is planned that the BTE will be also 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 Gasprom made official suggestion to Azerbaijan Governmnet on the purchasing of Azeri gas at market prices based on a long-term agreement (Grivach, A. 2008). At present Azeri through BTE pipeline sells gas at price USD 120 on thous.cub.m. If Azerbaijan governmnet agree on this offer, gas flows foresee to transit through currently

unloaded pipeline between Russia and Azerbaijan, whose capacity is 5 to 8 bln cub.m. It's true that this proposal is impressive for Azerbaijan promising significantly increase its gas revenues, but from the other hand, this could threaten full operation of SCP, and if not cessation, at least restriction of gas supply to Turkey through BTE pipeline.

The countries on the eastern coast of the Caspian Sea currently have no connection to the BTE pipeline. For them one option to get an independent from Russia access to European market is based on the project of the **Transcaspian gas-pipe-line (TCGP**) - from Turkmenistan, across the Caspian Sea to Azerbaijan, and from there using 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 was aimed to promote gas exports from Eastern Turkmenistan. However, it still remains unclear who will build the pipeline. Overall, the prospects of this project appear uncertain at the moment.

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 volumes for Nabucco could come from Azerbaijan, Turkmenistan and Kazakhstan as well as from Russia, Iran, Iraq and potentially other Persian Gulf producers. In this case, Kazakhstan will be the key onshore harbor for Central Asian gas supplies for the updated Trans-Caspian gas pipeline[26]

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 progress slowly but there is a political will on both sides to come to a resolution of this dispute. Even if this happens Iran and Russia will oppose to this project due to environmental risks associated with submarine pipeline construction. What is even more important, binding supply agreements have been

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

concluded so far only between Azerbaijan and Turkey. However, Azerbaijan gas deposits are insufficient to keep Nabucco in operation at full capacity. [27]

One of important step to avoid environmental risk and to boost exports of Turkmen gas to the EU was made during bilateral talks between Iran and Turkey on August 14, 2007 and between Iran and Turkmenistan on July 12, 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 the 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 proposed to convey Caspian gas to European markets. The **Turkey-Greece-Italy (TGI)** gas pipeline is a win-win project between Turkey and Greece that will deliver Azeri gas (and in the future possibly other Central Asian gas) to the EU markets. The Turkey-Greece section was completed in November 2007. The annual capacity of this pipeline of 212 km length is about 11.5 Bcm and in order to make it fully operational the potential supplies from Central Asia countries seem to play a crucial role (due to limited gas production capacity of Azerbaijan).

China may become another important destination of gas exports from the Caspian region. The Turkmenistan-Uzbekistan-Kazakhstan-China pipeline with annual capacity of 30 Bcm will start from 2009. It is fully financed by China which is connected with future supplies at discount price. This pipeline will impact on the size of gas supplies to Gazprom and it illustrates the gradually increasing competition between Russia, China and the EU for Caspian.

The **Trans-Afghan route (TAF)** is another competitive project that props on Caspian gas and oil supply channels to the East**.** The 1680 km long route will go from Dovletabad (Turkmenistan) through Kandagar (Afghanistan) to Multan (Pakistan)[28]. The pipeline will

[27] Nabucco's main competitor is the South Stream gas pipeline planned to run from the Russian Black Sea coast to Varna in Bulgaria and then into two directions: to Greece and southern Italy (south-western route), and to Romania, Hungary, Slovenia, northern Italy and Austria (north-western route). Pipeline's capacity is scheduled to reach 30 Bcm of gas per annum

[28] The governments of Turkmenistan, Afghanistan and Pakistan signed a memorandum of intentions in February 2006 to start the construction of the pipeline, in which India is interested too.

have a diameter of 1,420 mm and annual capacity of 33 Bcm. (Watan, 2006). However, the unstable situation in Afghanistan and questions related to commercial viability of this project will probably postpone its implementation for a long time (Expert Report, 2006).

5. Caspian Sea Energy Export to EU and Cooperation Prospects

EU hopes to reconcile its need for diversification of energy import with continuation of a strategic and supposedly mutual beneficial relationship with Russia. It should also to strengthen its presence in the Southern Caucasus and Central Asia, while minimizing possible sources of disagreement with Russia. At present, exists only bilateral cooperation in trade with Russia from one side and another with Azerbaijan (South Caucasus). The main task is building a network of multilateral cooperation that can integrate Russia, Central Asia and South Caucasus into a trade partnership cluster where interests of each country will be harmonized.

5.1. Issues of Cooperation with Central Asia

Expecting a significant growth in oil and gas exports from Central Asia, lack of pipeline capacity is the key problem. The governments of Caspian states make effort to develop and diversify export routes.

According to numerous statements made by the 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, EU and China. Kazakhstan's aspiration to diversify its oil export 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 gas and oil from Turkmenistan and Uzbekistan.

Turkmenistan problems are similar to those of Kazakhstan. This country is a major gas exporter and its exports go in two directions: to Russia (close of 90% of the total through the

CAC gas pipeline) and to Iran via a Korpeje-Kurt Kui pipeline (Turkmenistan, 2007). The main buyer is Gazprom but it resells most of Turkmen gas to RosUkrEnergo and Ukraine. Until 2006 Ukraine was the main importer of Turkmen gas. Over the last few years, Turkmenistan has signed promises to export its gas in other directions as well: to China, Europe and to the Southeast – Afghanistan, Pakistan and probably India. Turkmenistan has chance to become a major player in the world energy market once the transportation infrastructure is built.

Among Central Asian countries Kazakhstan and Turkmenistan are prominent with Iran's strategic plans. Iran has developed strong energy and trade ties with Kazakhstan, having signed so far about 60 agreements to consolidate, expand and diversify bilateral relations. Although Iran has a 2-3 % share in Kazakhstan's total trade turnover, it will likely rise even more if the current trend continues. Bilateral trade volume between the two countries rose from $700mn in 2004 to $900mn in 2005 and $2bn in 2006 (Mehmet Öğütçü & Xin Ma., p.20.).

Central Asian countries face two main tasks: (1) strengthening their ties with Russia, (2) opening up to the West and China. At present they are strengthening their ties with Russia. The agreement from May 12, 2007 between Russia, Turkmenistan, Kazakhstan and Uzbekistan on modernization and building of new lines of CAC is substantiation of this alliance but at the same time gas price negotiations with Russia were tense.

5.2. Issues of Cooperation with South Caucasus

The importance of South Caucasus increased substantially for geographic reasons. This region is close to Iran, Iraq and Central Asian countries. Construction of international pipelines like BTC and BTE increased its economic and political role and opened the new channel of energy supply to Europe. Further increase of this role will depend on many factors, including political ones such as resolving intra-regional conflicts (for example, between Armenia and Azerbaijan) or improving Iran's relation with the EU and US. Development of energy transportation network across the Caspian Sea can create an additional channel of exporting Kazakhstan's oil and Turkmenistan gas. Kazakhstan has already committed to exporting its oil through the BTC pipeline, while Turkmenistan has

shown an interest in enlargement of gas export opportunities through a trans-Caspian pipeline.

5.3. Common voice – to harmonize cooperation

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

The purpose of the harmonization is to develop a partnership and cooperation mechanism to take supplier and consumer countries together. In fact, there is no rivalry in energy supply between Russian and South Caucasus routes: South Caucasus route involves currently less than 2% of gas transit and less than 10% of oil transit to EU comparing to those going through Russia.

Harmonization of routes is about resolving alternative plans through respectful dialog. It is about taking into account concerns of each country, and coming up with plans and solutions that deal fairly with all those concerns. It is about reaching a consensus for multi-route pipelines.

EU plans to diversify energy supply is based on work in cooperation with energy partners and integration of all member-states into a common market on the base of establishment of long term coordinated energy policy, were 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 Europe’s increasing interest in stable energy cooperation with CIS countries. They include declining EU production of oil and gas, rising import dependence, tense political relations with Russia, the most important supplier of gas and oil to the EU and fast growth of oil and gas prices over the past

years,. All these factors increased importance of seeking alternative sources of oil and gas supply.

- Consumption of energy resources has increased slowly in the EU countries for the last 15 years. Consumption growth was rather modest in developed countries and it declined in post-communist and especially in former Soviet Union countries. This was conditioned by the transition period in 1990s and related to major changes in their economic structures.
- Gas consumption increased more rapidly both in the EU and in the post-communist countries. In 1990-2005 world gas consumption increased by 25%, in EU-25 by 35% and in FSU – by 7% (BP, 2006). Existing forecasts foresee a continued strong rise in the EU gas consumption.
- EU countries, which are major importers of energy resources, are interested in stability and diversification of energy supply. Energy exporting countries (Russia, the Caspian Sea countries) posses huge reserves of energy resources but their export infrastructure is underdeveloped and they are dependent on foreign investments in transportation systems.
- Caspian Sea countries are also greatly interested in diversifying their export markets but lack of alternative export infrastructure and disagreement over new export routes create serious obstacles to fulfill this goal.
- Russia has been the most important source of EU gas and oil imports and will likely stay the number one supplier for the years to come. Currently, Russia is also the main transit country for Central Asian gas which is mainly directed at other CIS markets (notably Ukraine). Supplies of gas from Central Asia allow Russia to increase its exports to EU markets.
- Recently, the potential importance of Caspian energy resources for Europe has increased. Export potential has increased rapidly in Central Asian countries and Azerbaijan, while Russia's production capacity has recently stabilized although level of Russian oil and gas exports are still of an order of magnitude higher than combined exports from the Caspian Sea countries.
- From the EU perspective diversification of gas import sources and routes of transportation as well as technical upgrades of transit infrastructure can increase the supply security. In case of Central Asian gas the important question is whether a new transit corridor will emerge that could go through the South Caucasus. The prerequisite for this is establishing a connection between Kazakhstan and Turkmenistan and

Azerbaijan (or Iran), that could be achieved by the TCGP pipeline. Ensuring sufficient gas supplies could make the construction of the Nabucco pipeline an attractive option.

- Russia is actively pursuing policies of diversifying its export routes to the EU, decreasing its dependence on third countries (mainly Ukraine and Belarus) and maintaining its control on export routes of Central Asian gas. From this perspective, Russian South Stream pipeline project is a competition for the Nabucco project as they will link similar markets (via different transit countries).
- 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 an important transit points to the energy market of the EU. Central Asian countries have no direct pipeline connections with the EU.
- The two routes of energy supply from Central Asia to EU through Russia and South Caucasus gradually acquire economical sense rather then political one. Individual countries will search economical benefits rather than political influence. The international consortiums are responsible for development of Caspian Sea oil and gas transit facilities and final decisions will depend on the conditions offered to investors (i.e. right incentives and sufficient legal protection).
- EU cannot achieve energy stability without cooperation with Russia and other countries producing or transporting energy resources. It is therefore very important to find ways to harmonize energy trade and take into consideration interests of new partners as well as deepening relations with Central Asia countries .

***Recommendations*:**

As this paper demonstrates, EU energy challenges arise from gas demand growth, declining domestic output, and difficult political relations with several key suppliers. Energy resources from Russia and Caspian Sea countries are expected to play a very important role in meeting EU oil and gas demand. From the EU perspective, security of supplies is important. One specific aspect is related to diversification of transportation routes.

Some of planned transit routes are problematic especially in case of gas transportation from Central Asia. The only actual transit diversification project relates so far to the South Caucasus route.

There is scope for a yet-to-emerge common EU energy policy to help in o-ordinating the actions aimed at increasing the energy security in Europe. We suggest the following recommendations:

1. The EU should play a leading role in developing policies that will guarantee Europe's energy security. 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 cooperation and coordination plans.
2. It is in the EU interest to support Russia in the process of becoming a member of the WTO.
3. Russia will surely remain Europe's largest gas supplier over the next 10-15 years. It will also remain the main transit country for Caspian sea gas and oil. Both EU and Russia stand to benefit from a long-term strategic cooperation. To make guarantees for reliable energy supply, it is of utmost importance how the ongoing energy dialogue between Russia and Europe will develop. It is very important that EU emphasize the mutual profitable plans for every EU states and Russia on energy transit during its talks with Russia . It is critically important for the EU countries to coordinate its energy policies regarding Russia.
4. Increasing dependence on Russian gas may lead to geopolitical vulnerability. Diversification of supply needs new sources of supply and new transportation routes. However, duplicating pipelines that connect same suppliers and consumers has little sense. Diversification effort should involve, among others, increasing focus on Caspian sea energy resources..
5. To ensure variety and development of competitive routes of energy supply, new transit routes should be developed. The Russian - Ukrainian, Russian-Belorussian disputes over gas demonstrate energy interdependence between the energy producer and transit countries. It is important to achieve common interest on energy plans through multinational cooperation.
6. The EU should be a key driver in the design of international agreements, only through common objectives and principles of energy cooperation is possible to offer an opportunity and have an impact on the conditions of trade and investment in the energy sector, and support technological development.
7. Multinational cooperation has to pursue long-term strategic goals at the cost of short-term gains. For achieving common goals according to multinational cooperation any plan for access of energy to individual national markets within the EU can be agreed with within the EU and EU countries which are concerned in it._Any plan aiming at transit of gas and other energy resourses to the EU member-state markets should be

agreed upon with its neighbour countries which are interested in this project and are linked with transit routes.

8. The way to harmonize energy systems and supply is energy cooperation dialogue. Bringing Caspian Sea gas to Western markets may be one subject of such cooperation. Use of Iran, Russia and Iraq resources is the future cooperation goal. Moreover, if investment in the Shah Denis field accelerates Azeri gas supply, this country can also become a more important supplier to Europe. Kazakhstan and Turkmenistan could became important players and partners to EU. The EU should concentrate its effort on encouraging cooperation and helping to build transparent institutions and energy regulations in the Caspian Sea region.
9. The EU should help to create the favorable environment for private capital flows and offer political and financial support to economically reasonable projects.
10. Development of Central Asian and Caspian energy resources may be delayed due to infrastructure and political constraints. So if Europe wants to attract Central Asian gas it must help to build sufficient transportation infrastructure to prevent gradual reorientation of this region to the East. Support for Nabucco, TCGI and GUEU would significantly accelerate Western investments in the Caspian region.
11. 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**.**

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