Oil and Gas Delivery to Europe:

An Overview of Existing and Planned Infrastructures

European Governance and the Geopolitics of Energy

Susanne Nies

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[Abstract]

The European Union's hydrocarbon energy supply depends heavily on imports. While the European Commission has recommended diversifying and increasing domestic resources, notably with renewable resources which should grow to 20% by 2020, dependence on hydrocarbon imports will remain not only important, but will increase.

Particular attention must thus be paid to the question of transportation, and also to the countries of origin, investments in infrastructure, their protection, relations with transit countries, 'competing consumers'-notably China and emerging countries, but also the United States-, energy wastefulness in producing countries, and finally, price. Security of supply depends on adequate and reliable infrastructure, and must always be thought of in the long-term.

This fourth study conducted by the European Governance and Geopolitics of Energy program at IFRI includes discussions about pipeline routes and potential outputs, their current use and the financial requirements for transportation, on-going projects and those planned for the future, their cost, their financing, and their probable operational start-up date. While all infrastructures are necessarily included (including Norway, the United Kingdom, and North Africa), particular attention is paid to transportation infrastructure that connects Europe with Russia and the former Soviet Union (Central Asia, Caspian Sea). One will quickly understand that the issue of gas is dominant in today's discussions.

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Introduction

The European Union's hydrocarbon energy supply depends heavily on imports. While the European Commission has recommended diversifying and increasing domestic resources, notably with renewable resources which should grow to 20% by 2020, European dependence on hydrocarbon imports will remain not only important, but will increase.

Particular attention must thus be paid to the question of transportation, and also to the countries of origin, investments in infrastructure, their protection, relations with transit countries, 'competing consumers'-notably China and emerging countries, but also the United States-, energy wastefulness in producing countries, and finally, price. Security of supply depends on adequate and reliable infrastructure, and must always be thought of in the long-term. Yet the EU-27 currently considers itself quite vulnerable, and opinions are divided about relations with its largest supplier, Russia. Excessive dependence or beneficial interdependence are the buzz words on both sides of the debate. A veritable escalation in the bidding to secure potential routes for Russian and Commonwealth of Independent States (CIS) gas delivery to Western Europe is putting these two schools of thought into conflict; because of Russia's dominance in the debate presented by the media, the role of Europe's second biggest importer, Norway, is often forgotten.

Creating new oil and gas infrastructure makes it imperative to pay special attention to geopolitical issues, and an "energy diplomacy": pipelines are not only commercial concerns but also fall into the political realm, sometimes being too politicized. These energy links, which include interconnectors in addition to massive oil pipelines spanning thousands of kilometers such as Druzhba and the BTC (Baku, Tbilissi, Ceyhan), are in many cases replacing dependence with interdependence. An oil or gas pipeline can be as much a factor for peace and stabilization as for war. Recall that during the Afghan-Soviet War, the Soviet gas pipeline to Kabul became a target for multiple attacks and its parts today are used in the construction of private home in the Afghan capital. It is also important to remember that the construction of one such link allows others to be added on to it. The construction of Yamal for example, allowed Russia to integrate a fibre optic cable in order to avoid Polish transit fees. Simply put, one can use an oil pipeline's path to construct a gas pipeline or the inverse, as is the case of the BTC. Finally, one can benefit malignantly from the commotion brought on by oil or gas pipeline by

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spying- a problem that Norway is confronting in its projects in the Barents Sea with Russia. Energy links are as much affected by geopolitical conditions as they are influential in shaping them. Thus, the spectrum goes from “peace pipelines,” such as those conceived between Israel and Arab states, or Druzhba, the East-West ‘friendship’ oil pipeline of the Cold War, to pipelines that are targets for attacks, such as the already mentioned Afghan pipeline, the Kirkuk-Ceyhan pipeline, the Tapline in the Middle East, bombarded in 1991 and out of service ever since, or the Adria pipeline closed at the time of the Yugoslav wars and reopened only in 1996.

Energy infrastructure changes economic and cultural relations, and potentially prices. The British interconnector for example has allowed ‘free gas’ from the UK to reach the European gas market; in 1998, gas-gas competition was realized.

Studying energy diplomacy amongst political and economic issues is made more difficult because of the complexity of factors. The abundant literature on particular projects contrasts with the absence of a ‘simple’ vision of the whole picture, which should transform the complex landscape into more understandable terms, translate a multitude of maps without at the same time simplifying them, and, of course be up to date on the state of different projects. What will be the guide that will enable readers to understand the underlying principles behind the remarkable number of projects, which, moreover, are connected to each other, as is the case with the BTC and the Trans-Caspian, and with Nabucco and South Stream?

This study aims to create this overarching view, a picture of existing and planned projects, which includes not only oil and gas pipelines, but also regasification terminals. It looks at imports from the North (Norway, the United Kingdom), the South (Algeria), and above all the East (Russia and the CIS). This objective runs up against the limits of this type of research: a general approach inevitably leads to a lack of details in regional projects and issues.[1]

Europe here includes the EU-27 plus Croatia and Turkey, as well as the Western Balkans, tied to the EU by Association Agreements (AA) and in a larger sense the Stabilisation and Association Process (SAP).

It is necessary here to emphasize the difference in approaches between oil and gas markets, which justifies looking at gas and oil infrastructures in two separate chapters. While the oil market is global, and oil pipelines play a minor role in comparison to marine transport, the gas market is regional. It depends (still?) on gas

1 Here the author refers readers to studies on regional issues carried out by Ifri’s various centres, <www.ifri.org>

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pipelines, and remains a regionalized market for the time being2, while awaiting the advent of liquefied natural gas (LNG). As a result of this it is characterized by much stronger dependency relationships. However, to organise the study into two distinct chapters on gas and oil infrastructure introduces a new problem. The complete view of a given country or region's geopolitical role is unclear. The references will attempt to lessen the negative consequences of this approach, such as the several separate sections that deal with the two issues together, as well as the conclusion.

While gas and oil infrastructures are thought of in the long-term - substantial investments become profitable only after many years -, the projects themselves often prove to be highly unpredictable and are affected by the geopolitical risks of the post-Cold War era. The reader will be astonished to learn of the high number of linkages throughout Europe that have never been completed or have been in discussion for many years, even decades. They disappear, then may suddenly reappear under a different name, led by a different consortium, as is the case with Nord Stream. Others may completely change course, such as with Odessa-Brody, or are finally completed, as is the case with Medgaz between Algeria and Spain. Never quite going away, these projects persist over long periods of time and this knowledge prevents us from hastily classifying them in the history books. Geopolitics in this case creates a climate where some projects flourish, while others simply perish. Factors that affect a project's outcome range from economic stability (long-term contracts, price, available resources, consumers), to legal frameworks (such as EU legislation with its direct or indirect impact –the Third Package– or even national legislation on Production Sharing Agreements (PSA) for example), to diplomatic ties between producers, transit countries, and consumers. Nonetheless, each period has its key issues, and in 2008 there will be three main projects that will continue to come up: Nord Stream and Nabucco/South Stream. This study thus includes two case studies on these key projects.

This study includes discussions about pipeline routes and potential outputs from these infrastructures, their current use and the financial requirements for transportation (when they are available), on-going projects and those planned for the future, their cost, their financing, and their probable operational start-up date. While all infrastructures are necessarily included (including Norway, the United Kingdom, and North Africa), particular attention is paid to transportation infrastructure that connects Europe with Russia and the former Soviet Union (Central Asia, Caspian Sea). One will quickly understand that the issue of gas is dominant in today's discussions.

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[2] Cf Davoust, Romain, "Gas Price Formation, Structure & Dynamics: An Integral Overview," Ifri Note, March 2008

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The role of transit countries in the construction of infrastructure is very important and it is a potential factor of disruption between producer and consumer. Even though factors such as regional or international integration have pacifying impacts and diminish the risk of a crisis, they do not eliminate them. In this context, do not forget that the majority of EU countries are also transit countries, and that conflicts have also arisen between them, notably over the use of networks.[3] The East-East conflicts over certain political, cultural, and economic aspects of their new relationships have also resulted in transit conflicts. Did this East-East conflict arise in 1991 with the end of the USSR, or in 2006? Astonishingly, at the end of the 1970s, Moscow had already decided to circumvent Poland, a "possible source of dissension"4 in order to transport gas to Germany, Austria, France, Belgium, and Italy, passing through Ukraine and Czechoslovakia. And recent analyses of the gas conflicts between Russia and Ukraine, and even Belarus, reveal conflicts dating back to at least the early 1990s between Moscow and Kiev, a pathological relationship between a former hegemonic power and its subject, a lack of confidence between producer and client, as is also the case with the recent dispute between Russia and Turkey over the Blue Stream project. As for the Ukrainian supply cuts, which were given heavy media coverage, we are now seeing reinterpretations of the incident, based on a much more understanding interpretation of Russian behaviour than was the case at the time of the conflict.5 Indeed, if at first many attributed political motivations to Russia and Gazprom's actions, today many analyses focus on the economic rational of their actions.6 The conflicts that have arisen since the fall of the Soviet Union have two strategic impacts: first, they create genuine competition around the role of transit state, as Bulgaria's zeal has proved; secondly, they increase Russia's will to create direct links and reduce dependence on the transit country Ukraine, through which three-fourths of Russian gas passes on its way to the European market. Finally, we are witnessing the emergence of Turkey as an important transit country for energy coming into the EU.

Methods and Sources

Tables and maps constitute a very important tool for interpreting the quite complex EU energy infrastructure mosaic.

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[3] Cristobal Burgos-Alonso, former chair of the Transit Committee, European Commission, stated in an interview with the author in February 2008 that conflicts, notably on the use of networks, was a source of conflict, but that on the other hand no cuts actually took place.

[4] Cited from Chevalier 2004: 276

[5] Victor and Victor 2004, Tönjes/de Jong 2007, for two examples

[6] For example, Victor and Victor 2004: 33-35

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Madeleine Benoit-Guyod, a cartographer, created three maps that serve as the back-bone of this study, based on our information, that of Christian Schülke and of Adrian Dellecker. These three maps (a panorama of gas and oil infrastructures, and a general survey of both) reflect the status quo in 2008 of existing and projected infrastructure. As for other maps, the following sources deserve mention: the yearly updated maps in the annual publication of Petroleum Economist, World Energy Atlas, UK, Edition 2007, (see <www.petroleum-economist.com>, to purchases available maps). Maps are also available on the following sites: Inogate (Interstate Gas and Oil Transport to Europe; the latest update in 2003, <www.inogate.com>), Centre for Global Energy Studies (<www.cges.co.uk>), and the websites of corporations such Gaz de France and Transneft (<www.transneft.ru>). This study thus includes around ten maps, which show existing infrastructures as well as future projects.

Christian Schülke, a student at Sciences Po and an intern with Ifri in 2007, is owed much thanks for his work on developing the existing and projected infrastructure tables, which make up an essential part of the annexes and are partially integrated into the text in order to facilitate reading and analysis. These tables are organized in the following way: they include the name of the pipeline, its route, transit country (ies), the owner or operator, its length, diameter, capacity, and finally the date it began service. They are listed by geographic region, not by importance in the annexes. The text includes excerpts of them in order to facilitate reading and to limit technical information in the text. The basis for these statistics (output, transit costs, investments, imports, production) come from quite diverse sources, including Eurostate, ENI (ENI World Oil and Gas Review, edition 2007), US Energy Information Administration (<www.eia.doe.gov>) which has an excellent section of energy profiles of countries around the world, and the BP Statistical Review (<www.bp.com>). A complete list of sources is again listed in the annex. A difficult problem to resolve was contradicting data from one source to another, and here we decided to indicate the contradiction when necessary. And finally the fact that outputs and investments are calculated in different units, between the barrel and the tonne of oil equivalent (toe), or the Euro and the dollar, makes comparisons difficult-a familiar problem for all experts in this field. While investments are generally expressed in dollars, European projects more often use the Euro. As for units of measurement, “bbl/d” is used for oil (barrel per day), and billions of cubic meters per year (bcm/y) is used for gas.

The author would like to thank the “European Governance and Geopolitics of Energy” Program team – Jacques Lesourne, Maïté Jauréguy, Jan Keppler, Cécile Kérébel - for their constant support, crucial proofreading, and indispensable input on this subject that Jacques Lesourne envisioned.

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As to its general plan and structure, the study begins with a section on European history, discoveries and infrastructure, in order to make the "long-term" design and the legacies of the past understood in the following chapters. Chapter II analyzes oil and chapter III looks at gas, each introduced first by their reserves, and general issues surrounding transport, which is then followed by their links and regional considerations, each of course being different. Chapter III on gas is necessarily much more copious than the preceding one, due to the multitude of projects and because it includes the two case studies already mentioned. Finally, chapter IV deals with the Turkish crossroads, and chapter V summarizes the results and puts these analyses into perspective.

To conclude, the originality of this study consists in writing a "foundation" paper that most believed already exists…and which will have fulfilled its purpose if it conveys an all encompassing, complete overview of energy infrastructure, and if it can also usefully serve as support for more detailed future research, on infrastructure trajectories or on varied regions and countries. It's a question of taking a snap shot, establishing the status quo of the transportation landscape in full evolution. Regular updates are planned, in the form of an annually added report.

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I. The Construction of Gas and Oil Infrastructures in Europe

Since gas and oil infrastructures are long-term projects, past experiences with a producer, transit country, or consumer can prove to be determinant in future projects. Are they a reliable supplier or consumer, are there solid diplomatic links, does one hold negative or positive perceptions? How else can the crucial role of the Italian company ENI and Italy be explained in gas pipeline projects in the Mediterranean as well as in Southeast Europe if not for the fact that this country was the number one European gas producer and its biggest consumer in 1965? This introductive chapter will discuss the legacies of past discoveries and the successive creation of European linkages. The goal is not to simply give a historic overview on this quite interesting aspect of the Cold War because others have already done so very successfully:[7] it hopes to grasp the current and future situation, by means of these *legacies*. For the readers in hurry and experts, one can simply concentrate on the summary and on the status quo in order to proceed directly to chapter II.

Summary

Gas and oil pipelines appeared after WWII and after the evolution away from coal, especially between the fifties and sixties. Their construction followed distinct approaches, emanating from both sides of the Iron Curtain. These differences continue to this day, and make themselves apparent principally through the excessive dependence of new EU member states vis-à-vis Russia. These links thus reflect past relationships. One may be surprised by the existence of 'bridges' that pierced the iron curtain during the Cold War, from Austria but also from West Germany. This precursory role was criticized, notably by their American ally. West Germany would quickly become the first client of the USSR. In today's context of debates over Nord Stream and the map of European gas pipelines, it is interesting to note that gas crossing through the heart of the East to the West circumvents Poland. This partly explains coal's dominance in this country, atypical

[7] Victor and Victor, 2004; Stent 1982; Gustafson 1985; Victor, Jappe, Hayes 2006

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for Europe. That Austria plays a two-faced role in the Nabucco/South Stream debate, as does Hungary, is another curious detail, one that we will return to in the case study.

The chapter concludes with the status quo in Europe after the fall of the USSR. This imperial disappearance goes together with the proliferation of state actors within Europe, and with the redistribution of the energy cards within the former USSR, which creates new opportunities but also huge risks for the EU and the whole of Europe. Evolving transit countries are a source of crisis, as is the pathology of East-East relations. Trends towards decentralization are increasing, and the conflicts within the ex-Soviet block over political, economic, and even historiographic plans reached the European Union in 2004, with the integration of eight countries from Central and Eastern Europe. The status of "transit country" then became, to summarize, problematic, which was not the case in the past. The example of Western Europe will show that interdependence and a high level of integration into European and international structures are the best protection against the risk of energy blackmail. It was however necessary to establish a code of conduct, a common judicial framework.

The fall of the USSR also gave way to a multiplication of oil and gas pipeline projects, alternative routes, and the reconstruction of energy industries in Eastern Europe. This type of project proliferation was unheard of during the Cold War.

1. From the Discovery of Resources to the Construction of Separate East-West Networks

Post-WWII (1945-55)

Europe's energy supply after the War, in the East as well as West, was dependent on coal, supplied by domestic production – a raw material whose share in the total energy mix would later diminish in a manner inversely proportional to the rapid development of hydroelectric, gas and oil capabilities. As for nuclear power, it would become a competitive source of energy only towards the 1970s, within the context of the first oil crisis. The very advantageous price of oil transported by sea made it an ever more important energy resource for Western Europe. Europe thus became dependent on petroleum resources from the Middle East. These sources were successively discovered beginning in 1935 (Bahrain, Kuwait, then Saudi Arabia), but the massive scope of the oil fields, especially in Saudi Arabia, was not confirmed until the period between 1945 and 1960. The reserves are estimated at 25 billion tons, six times more

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than the reserves of the US and the USSR combined.[8] The Middle East is home to the most important reserves in the world, two-thirds of them being controlled by the five member states of the Organization of the Petroleum Exporting Countries (OPEC[9]) of the Persian Gulf. It was only in the mid- 1970s that this excessive dependence on oil imports would again decrease, going from over 60% to around 50% of Europe consumption.[10] While a first oil pipeline, PLUTO (Pipeline Under the Sea), was constructed in Western Europe during the Second World War, connecting the UK to France under the English Channel and supplying the Allied Forces, the construction of the first civil European oil pipeline would have to wait until the 1960s and would be found in the East. Druzhba was born.[11]

Discoveries and the Setting-up of Networks in Western Europe and French Algeria

Petroleum reserves were discovered in Austria in the 1940s and would guarantee its autonomous supply until the 1960s. They would fund war reparations payments to the USSR until 1955. The company founded by Moscow, the Russian Petroleum Administration (*Russische Mineralölverwaltung*) became the Österreichische Mineralölverwaltung (OMV) in 1955. In other words, the actual Austrian petroleum company was created by the Soviet Union and because of this it benefited from a long tradition of cooperation with Moscow. Is this possibly connected to the recent entry (January 25, 2008) of Gazprom into the Baumgarten gas hub?

As for gas, Italy was the first European state to exploit it. They began in the Po Valley during the Second World War, and subsequently built up the biggest gas market in Europe, until 1965. Agip and then ENI were later able to invest, thanks to their experience, in the development of resources in North Africa.[12] It was necessary to wait until the 1960s to confirm the considerable discoveries in other European countries. The gas field of Groningen (the Netherlands, 1959), followed by Norwegian and then British reserves (1960s) – oil,

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[8] Fayennec 2007: 254. Historically oil production began in the USA, and in Europe, Romania, and Russia (Baku), as well as in the Middle East in Persia (1907), and Iraq (Kirkuk 1927). While exploitation in Arab Penninsula had already begun in the 1930s, its rapid development only began after the War.

[9] NLDR: OPEC was created in 1960, initiated by Iran and Venezuela, and joined by Saudi Arabia, Iraq, and Kuwait.

[10] Fayennec 2007: 167

[11] A first oil pipeline in Eastern Europe was already constructed in 1872 in Baku, at the time of the formation of this city in the periphery of this most important oil region of Tsarist Russia.

[12] Hayes, M., "The Transmed and Maghreb Projects: Gas to Europe from North Africa," in Victor 2006.

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then offshore gas – opened up new perspectives. Groningen would have a decisive impact not only on the Dutch economy[13], but also on Western Europe's energy supply. The diversification towards gas was reinforced during the 1973 oil crisis, and gas was established as the rival hydrocarbon to the dominating oil.

Groningen began to be exploited in 1964 by Gasunie, Shell, Exxon and the Dutch state, and gas pipelines were established between this gas field and France, Germany, and Belgium. Later, national gas companies such as Ruhrgas, Gaz de France, Snam, and Distrigaz were established.

Discoveries and Pipelines in the North Sea (United Kingdom, Norway)

The discovery of the Groningen gas field spurred intense research in the surrounding areas, quickly finding success: discoveries in the North Sea, in a zone surrounded by the United Kingdom, Norway, and the Netherlands to its south, the giant Brent, Ninian, Pipers, and Forties (United Kingdom) fields, as well as Ekofisk and Troll, and later Statfjord, Ormen Lange, Oseberg, Gullfaqks, and Snohvit (Norway). These discoveries gave way to a veritable production boom in the UK and Norway in the 1980s. The petroleum reserves discovered in Norway at the beginning of the 1960s, and exploited ever since, reached a height of 3.4 million barrels a day (mb/d) in 2001 and has been in decline since. Norway, which for many years had been the world's third biggest oil producer, fell to fifth in 2006. In 1975, Norpipe Oil, the first oil pipeline, came into service connecting Ekofisk and Teesside in the United Kingdom, stretching over 354 kilometers. Next came Norpipe gas in 1977, covering 440 km and going to Emden in Germany. A gas pipeline connecting Norway to the UK, Vesterled, came into service in 1978, followed by a new series linking Norway and the European continent in 1993: Zeepipe, to Zeebrugge, Belgium, spanning 800 km (1993), the two Europipes (1995 and1999) to Germany, Franpipe going to Dunkerque (1998), and finally, in 2006 and 2007, the two Langeleds, covering 1,200 kilometers.

Algerian Gas

Along with gas coming from the European continent and the North came Algerian gas. The "super-giant" Hassi R'Mel gas field was discovered in French Algeria in 1956, and is the largest gas field in Africa. And, just a few months later, came the discovery of the biggest oilfield in Africa, "Hassi Messaoud." These two fields would constitute

[13] The notion of the 'Dutch Disease' suggests that the profits from raw materials were not used for the development of the State and other economic sectors, but that instead these latter are in decline. The concept was created while observing the Dutch example.

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the foundation for the corporation Sonatrach, an exception on the continent in view of the organization of the energy industry. No other African country has succeeded in creating a national energy company. Sonatrach was the result of nationalizing infrastructures put into place by France, undertaken by the Algerian government at the end of the 1960s, beginning of the 1970s, a development that hardly pleased Paris.[14] In 1961, following other gas discoveries in the south, the first LNG liquefaction factory was constructed at Arzew, Algeria, financed by a Franco-American-English consortium, that put into place the first gas chains between North Africa and Western Europe. One will note that this infrastructure was constructed since the technology to build an underwater gas pipeline to Europe was not available at that time. The gas pipeline Transmed would not open until 1982, transporting Algerian gas to Italy and the European Community (EC), by way of Tunisia and Sicily.

The Discovery of Fields in Eastern Siberia and the First Infrastructures

The first resources discovered in Imperial Russia date to the middle of the 19th century (1853), and were located in the Baku region. 100 years later, the Soviets named the field found to the west of the Urals (1942) the "Second Baku," after the resources found in Eastern Siberia in 1853. The fields in Samotler, the biggest ever found in Russia, were named the "third Baku" in 1967. There are finally the major gas fields of Tjumen-Ourengoy, Yamburg, and Medvezshe.

In 1953 the USSR reached its peak coal, while gas production was insignificant, with around 9 billion m^3 coming from various fields in Russia and Ukraine. Nikita Khrushchev, the Secretary General of the Communist Party, was at the heart of the change. In order to "catch up with the US in 25 years," it was necessary to supply Soviet industry with modern energies. The development of the gas industry figured into the five-year plan from 1956-1960, carried out by the construction of long-distance gas pipelines and the exploitation of resources in the Caucasus, Ukraine, and Turkmenistan. While petroleum was almost immediately successful, dominating the energy mix beginning in 1968, gas followed at a slower pace. Khrushchev made it a priority in 1966 in the eighth economic plan, with a particular emphasis on the exploitation of Siberian resources to the east of the Urals, discovered in 1966 (Ourengoy), and in use since 1978. The fields to the west of the Urals on the other hand are too scattered, and exploitation in the Arctic comes up against

[14] Quotation from Rosoux, V., "Les usages de la mémoire dans les relations internationales : "Houari Boumediène," the Algerian president, spoke of Algerian oil which would be red 'with the blood of our martyrs who made the ultimate sacrifice for Algeria's sovereignty,' in order to justify, in 1971, the nationalization of Algerian oil companies." Sonatrach is today Algeria's largest corporation, employing more than 50,000 people, and alone accounts for 30% of Algeria's GNP

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insurmountable technological obstacles. The priority given to the Eastern Urals was thus because of geographic concerns. The Soviet authorities established links between the new fields to the East and the pre-existing infrastructures, especially in Ukraine. In fact, Ukraine is the only western republic of the USSR that benefited from a modern gas network and stockage infrastructures, which explains its subsequent fundamental role in East-West exports. The most common route thus became the line going from Eastern Siberia to the southwest, which joined up with the Muscovite network, and crossed through industrial regions and Ukrainian gas fields. Gas transport constituted a considerable challenge because of technological delays and climatic conditions (regions of permafrost, for example). An important sector, industry, began using gas again only much later in the Soviet economy. Up until the 1970s it was mostly households that used gas. The fact that the USSR, while progressively becoming an exporter to the West, was at the same time was a net importer of gas from Iran (IGAT gas pipeline [Iranian Gas Trunkline], operational since 1970)[15] as well as from Afghanistan likewise deserves our attention and draws parallels to the current situation in Iran.

2. Developing Infrastructures in the Soviet Block, and their Extension to Western Europe

The building of infrastructures within the Soviet block from 1968-1980 has been the focus of many important studies, such as Stern (1980, 1993), Gustafson (1985), and Stent (1982), to which the author refers the reader, and here will only briefly be touched on. At the start there was Druzhba, the oil pipeline constructed between 1959 and 1964, which links Almetjewsk to Tatarstan through Belarus and Poland at Schwedt/Oder in Eastern Germany. A second arm to the south extends Druzhba from Masyr in Belarus through Ukraine to Czechoslovakia (today Slovakia and the Czech Republic). While the oil industry, driven by the market, is always in search of maritime routes and thus openings to the global market, the construction of Druzhba was alternatively guided by political thinking: to reinforce the Soviet block.

The decision to build the world's longest oil pipeline was made during the 10th Council for Mutual Economic Assistance (Comecon) session in Prague in December 1958. The Soviet satellite countries (Czechoslovakia, Bulgaria, Poland, East Germany, and Hungary)

15 IGAT connected Iran to the Caucasus' gas pipelines through Georgia, and delivered gas north of Moscow. The line was closed in 1979 during the Iranian Revolution.

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participated in its execution, each having to manage around 550 km. These countries had to finance their part (infrastructures, housing for workers, etc.), and were repaid with free gas. The branch to Omisalj, shown on map 4, was later added in 1974; and was created to flow in the opposite direction so as to be able to transport Mid-East oil through Omisalj to Eastern Europe. Since this flow never occurred, the direction was reversed and Russian oil was exported through it. The pipes came from Japan, West Germany, and Italy. On July 17, 1963, the first Russia oil arrived in Schwedt in East Germany.

Map 1. The Druzhba Pipeline

1) Source: « The Belarus Bypass Surgey », website of Robert Amsterdam, 21 May 2007, available on <www.robertamsterdam.com>.

As for gas, a first pipeline called “Bratstvo” (fraternity) in 1968 linked gas fields to the east of Kiev to Czechoslovakia, with one small extension to Austria, and another to Poland. At the start of the 1970s, Soviet authorities began projects for additional links to other countries in the Soviet block, and to countries that were politically and geographically close: Austria, Germany, and Finland.

Sorting Out Transit Countries: The Federal Republic of Germany and Austria

The first energy bridge to cross the Iron Curtain was through Austria, a country that had exchanged electricity with Eastern countries since 1956 (beginning in 1985 with Russia), but above all they exchanged gas, beginning in 1968, by the Bratstvo pipeline. Better known and more strategic for the European Community were the agreements

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made between Bonn and Moscow in the beginning of 1970. The German Economy Minister Karl Schiller and his Soviet counterpart signed an accord linking the Ruhrgas and Gazprom monopolies and Deutsche Bank in the following project: in exchange for the FRG receiving supplies of half a billion m^3 of gas per year in 1973, and 3 billion m^3 per year beginning in 1978, the USSR would get 1.2 million tons of piping manufactured by Mannesmann, plus a very advantageous loan of 1,2 billion Deutsche Marks. This agreement, the first of its kind, was known as the "Gas-for-Pipes" deal (Erdgasröhrengeschäft). This accord served other EC member States, and they in turn would sign supply agreements with the USSR, in order to connect to German infrastructures.

The East-West barter model was simple. The USSR needed Western currency and technology, while Western European countries - West Germany, France, Austria, Italy, and Belgium - looked to diversify their gas supply and to diminish their reliance on Dutch gas. And at the same time, the subsidized prices for "brother countries" and the very complex barter trades reinforced interdependence within the Soviet block.

The previously unseen rapid development of the gas industry and exploitation of networks was possible only after the first oil crisis in 1973, due to the interwoven linkages with Russia. It was thus a veritable catalyst for the first series of long-distance gas pipelines connecting the East to the West. Détente was the political context during the 1970s, and both sides had an interest in East-West commercial exchanges. While in 1970 only three countries received Soviet gas (Czechoslovakia, Austria [Bratstvo 1968], and Poland [gas pipeline in 1949]), the situation had changed considerably by 1975, due to new clients and new pipelines. A new gas pipeline, the Trans Austria Gasleitung (TAG I and II), transported gas to Czechoslovakia, Austria, and Italy (TAG pipelines I and II, in 1974), the MEGAL[16] gas pipeline to Austria, both Germanys, and France (1974, 1976, 1979), and the Soïouz (Union, 1975) gas pipelines exported to Romania, Bulgaria, and Hungary with resources from Orenbourg.[17] The USSR was growing more and more dependent on the export of raw materials, which moreover, by the end of détente in 1980, made up 62,3% of their GNP. Between 1975 and 1980, the volume and the price of gas tripled, and as a consequence, Soviet revenues increased nine fold.[18]

As already mentioned, this economic and energy rapprochement between the East and the West faced resistance and criticism from the United States, notably during the second series of contract

[16] MEGAL = Mittel-Europäische-Gasleitungsgesellschaft GmbH (Central European gas distribution company), with Ruhrgas 50%, GDF and OMV each with 25%

[17] Victor/Victor 2004 2004: 9

[18] Victor/Victor 2004 2004:10, 11

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negotiations between the USSR and Ruhrgas. These agreements were reached within a very tense international context: the end of the Brezhnev era, the arrival of President Ronald Reagan, the start of a new arms race, martial law in Poland, and the Soviet intervention in Afghanistan. The Reagan administration resorted to using sanctions. During the on-going negotiations to increase exports between the German gas monopoly Ruhgas and the USSR, the CoCom[19] list banned the technology transfer of one part of the compressor that is necessary in the gas chain. The gas pipeline, operational since 1985, in fact used a mix of Soviet and Western technologies. The new network doubled Soviet exports to the West (Germany, Italy, France, Austria, Switzerland, Turkey, Finland) from 1985 to 1991. The Reagan administration's sanctions had proved ineffective, a barter system having been set up; a new gas pipeline STEGAL, a joint project between France, Germany, Italy, and the USSR, was put into operation in 1992, while the USSR had only days earlier ceased to exist.

3. Conclusion: Continuity and Ruptures

The construction of oil and gas infrastructures in Europe reveals a thinking that firstly follows Cold War reasoning. In both the East and the West coal was substituted with the hydrocarbons oil and then gas, and hydrocarbon linkages were created. The remarkable turnaround of the 1970s, "détente," went hand in hand with the emergence of the first connections between the two sides, and a growing interdependence between the European Community and the USSR. This rapprochement would come up against US opposition at the end of the 1970s, who in turn resorted to sanctions. Their impact however would be quite limited, and interdependence continued to grow during this period. The foundation of today's cooperation between the EU and Russia/CIS was laid during the 1970s. The construction of energy links and increasing interdependence changed the relationship between the two superpowers and gave birth the EC's own approach to its interests, little by little becoming a regional actor.[20] During the 1970s, transit states emerged in the East. They were at first simply objects in the transport business, but would then become a fundamental issue and concern once the Soviet block fell.

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[19] The Coordinating Committee for Multilateral Export Controls was an international organization that aimed to control the export of strategic products and technologies to banned locations. It was made up primarily of NATO member states as well as other countries such as Japan and Australia.

[20] It is necessary to mention in the context of this relative emancipation the putting in place of the monetary plan and system, in the same period, following the collapse of the Bretton Woods system.

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Hydrocarbon Transport and the Consequences of the fall of the Soviet Union

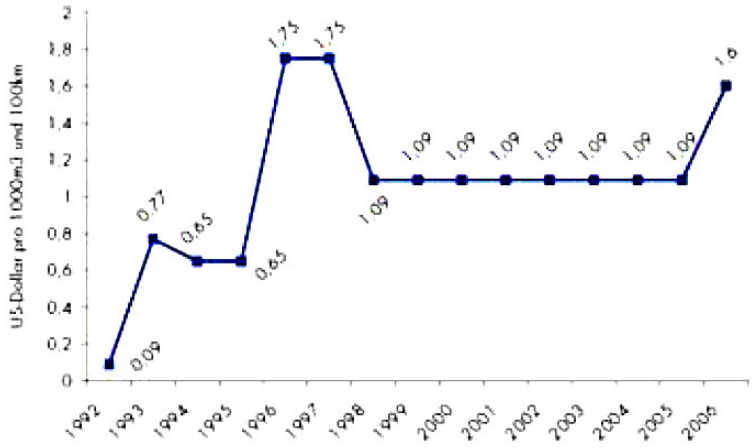
The dissolving of the USSR and the Soviet block had five major consequences directly related to energy:

- New relations, new energy prices within the ex-USSR
- A proliferation of States and transit countries
- A collapse in production and consumption
- A reorganization of the energy sector in the East and in the EU
- A stagnation in the maintenance and restoration of infrastructures

New relations, new prices within the ex-USSR

The Central European countries that are seeking integration into Western structures must now take on world market prices for gas and oil, or at least negotiate a special reduced price, usually in convertible currency. The multiplication of consumers paying world market prices could thus be considered an economic advantage for Russia, a point that is often overlooked in articles. At the same time, the new transit countries began to benefit from their geography and in turn began charging Russia higher transit fees. This evolution is shown in table 1, using transit fees charged by Ukraine between 1992 (fall of the Soviet Union and beginning of the CIS) and 2006 as an example: note the periods 1992-93 – post-Soviet independence and the transition to a market economy, and an increase in the price of Russian gas which led to an increase in transit – and from 1995-1997 – the transit crisis between Ukraine and Russia.

Table 1. Evolution of transit fees in Ukraine, 1992-2006.



2) Source: Ukraine-Analysen 2, available on <www.ukraine-analysen.de>.

If the price of oil rapidly aligned with world market prices and quickly ceased presenting problems, including in the case for Russian

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adhesion to the World Trade Organization (WTO), the situation is much different in the gas sector. In 2007, Belarus, Armenia, and Ukraine were charged $100, $110, and $130 for 1,000 m^3, in contrast to the $235 paid on the European market. Georgia and Azerbaijan, on the other hand, have paid world prices since the beginning of 2007.

A proliferation of States and transit countries

Out of the European part of the USSR, seven independent states emerged: Russia, Ukraine, Belarus, the three Baltic States, and Moldova. From then on, all new Russian projects went through transit States, notably Ukraine, on which 90% of Soviet gas exports depended in 1992, and Belarus. Moreover, this traditional gas export route now went through not only two countries – Ukraine and Czechoslovakia – but three, Ukraine, the Czech Republic, and Slovakia with the break up of Czechoslovakia in 1993. These states act in their own self-interest, which led Russia to consider establishing direct routes. In fact, only one direct link existed, connecting the USSR to Finland since 1974. And it was not until 2003 that a second direct link, this time to Turkey - Blue Stream - was constructed. The proliferation of states in Eastern and Central Europe, following the disintegration of the Soviet empire, created new tensions, conflicts, and pathologies. Competition between transit countries continues, and Ukraine's dominant position in gas is being contested by new projects in countries such as Bulgaria and even Serbia. It is nothing less than the hope of acquiring a "stature," or "role," for their country, becoming a wild card in the game of infrastructure. These relationship pathologies have a strong impact on Western Europe, and are now a problem for the EU since the 5th enlargement took place in 2004. The EU is creating a European energy policy, with a strong focus on external relations and a newfound distrust towards its historic Russian partner, due to Russia's increased dominance in gas and energy markets and infrastructures in Europe.

Collapse in production and consumption

Following the economic shocks provoked by the disintegration of the Soviet block and the often irresponsible experiments of this unprecedented political-economic transition, Russia's gross domestic product (GDP) shrank by 40%, leading to a reduction in energy consumption of around a third (OECD 1997). Commercial exports to former satellites and CIS countries also decreased because of their decline and their decreasing consumption.

Russian petroleum production, number one in world production, decreased by half between 1988 and 1995: from 600 million tons in 1988 to 350 for the CIS (500 to 300 million tons alone for Russia).[21] The only advantage of the decrease in domestic demand within the ex-USSR during this period is that it allowed the CIS and Russia to

[21] Favennec 2007: 190

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maintain its exports in petroleum as well as in gas, despite the drop in production.

Reorganization of the energy sector (gas) in the East and in the West

The gas sector, administered in the USSR by the Soviet Gas Ministry, underwent important organizational changes. First, in 1989 the Ministry was transformed into a committee controlled by the State. This entity was in turn changed, at the end of 1991 by presidential decree, into a corporation owned by Belarus (1,5%), Ukraine (9,5%), and Russia (89%). Over three years this corporation had to be privatized, with the Russian State ending up with 38%. State control over the hydrocarbon sector, having been reduced more and more, was regained only at the end of Yeltsin's term, in 2000.[22]

Changes likewise appeared in the EU. A new European energy policy aimed at increasing competition on the common market by using different forms of unbundling, as well as interconnectors[23]. These policies have strong impacts on the energy market, not only within the Community, but also externally. Because of the reciprocity clause (Gazprom clause) and the planned unbundling, according to multiple EU corporations, they have begun to question the wisdom of continued investments in new infrastructure projects.[24]

Stagnation in the maintenance and restoration of infrastructures

The managerial collapse became clearly evident in terms of infrastructures. 1985 to 2000 was a period marked by existing infrastructure deterioration and stagnation in implementing new projects and in developing domestic fields. These fields were from then on open to exploitation from foreigners (notably the 1996 law on PSAs). From 1998 on, oil production began to increase and today it is close to 1980s levels. A veritable push for new and updated infrastructure is the present result, in view of renovation and repair, but also the introduction of new infrastructures, especially LNG terminals, currently missing till now, and the development of fields for post-2015. Difficult climatic conditions necessitate technology transfers and investments that are essential for creating international consortiums. These latter points however come up against a confusing legal framework that deterred investors, especially during the early 2000s.

Several attempts have been made to find a solution to the lack of an East - West legal framework. At the initiative of the Dutch Prime Minister the Energy Charter was born in the early 1990s, conceived of as a framework for dialogue and cooperation on energy between

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[22] Cf Stern 2005 on Gazprom's evolution, the return of the State under Putin, etc.

[23] Cf the paragraph on interconnectors III.3.2.

[24] Cf Nies, "Unbundling," Editorial, Ifri Energy Program, January 2008

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Western and Eastern Europe. The European Energy Charter (1991) then became the “Energy Charter Treaty” in 1994, and is no longer limited to only Europe, now with 51 members. Purely consultative, and notably not ratified by Russia, this tool quickly showed its limits. Another institution was also conceived: INOGATE, set up in 2001, does not include Russia. This umbrella agreement is supposed to support the development of transport structures for gas and oil, as well as investments in the former USSR. Its efficiency and usefulness remain to be seen.[25]

[25] Information on this organisation can be found at <www.inogate.org>, with its seat in Kiev.

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II. Oil Transport to the EU

This chapter is dedicated to oil transport to Europe. The CIS and Russia dominate oil supply, followed then by the Middle East, Norway, North Africa, and West Africa, and with a small part coming from the Americas (see map 2, “Oil in Europe”).

As the Middle East’s share has seen a progressive decrease since the construction of Druzhba and the increase in intra-European exchanges, Europe’s main attention is naturally fixed towards their large supplier to the East and its former satellite countries.

In the introduction the origins of European resources and supplies are presented in order to then describe the infrastructures by region of origin, present condition, and included projects. The Turkish issue has been voluntarily omitted in this section, in favour of a separate section dedicated to the whole of this country – an important energy crossroads –looking at oil and gas, as well as the significant issue of the Turkish straits.

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Overview :
Oil in Europe
Major oil field
Oil pipelines
Existing oil pipelines
Oil pipelines under study / construction / upgrading
Oil pipeline out of order
Proposed priority axes for crude oil
Current transportation route
Alternative route
Major existing refineries
EU-27
Atlantic Ocean
1 Northern Druzhba
2 Southern Druzhba
3 BTC
North Sea
Baltic Sea
Mediterranean Sea
Black Sea
Caspian Sea
Persian Gulf
Bosphorus
St Petersburg
Moscow
Riga
Vilnius
Minsk
Kiev
Copenhagen
Amsterdam
London
Berlin
Warsaw
Prague
Vienna
Bratislava
Budapest
Paris
Bucharest
Odessa
Ljubljana
Zagreb
Belgrade
Skopje
Sofia
Rome
Athens
Ankara
Baku
Lisbon
Madrid
Algiers
1 000 km
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1. Introduction: Origins of Resources and European Supply

The EU, as the world's second largest oil consumer behind the US with 20% of the world's consumption, imports 80% of its resources. Only the United Kingdom, Denmark, Italy, and Romania have their own resources, and even they however are rapidly diminishing, as is oil in the North Sea.

Around 25% of Europe's oil comes from Russia, 24% from the Middle East, 21% from Africa, and 22% from Norway. The clear trend for the last 15 years has been for the share of Russian oil to grow at the detriment of imports from the Mid-East. Oil imports are acquired partly in the form of refined products. While the EU is self-sufficient in refining petroleum, it is deficient in naphta, the substance used for the fabrication of synthetic fibres and plastics, as well as diesel oil. This gap is made up for with refined Russian and to a lesser extent North African imports.

Table 2. The European Union's Crude Oil Imports in 2006, by country or geographic zone,
in thousands of bbl/d

Country or region of origin	Quantity
Former Soviet Union	58
Middle East	32
North Africa	19
West Africa	79
South & Central America	46
USA	31
Mexico	19
Other Asia Pacific	11
Singapore	27
Japan	15
Canada	11
China	3
East & Southern Africa	1
Unidentified	47
Total imports	13

3) Source: BP 2007

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Introductory Remarks on Oil Transport

Crude oil can be transported by pipeline or tanker, or by a combination of the two: transportation first by oil pipeline and then continued by oil tanker. Transport by means of large tankers over distances greater than a few thousands kilometers is generally more economical. The size of ships used for crude oil transport varies from a few thousand to several hundred thousand tons. Their capacities have grown considerably over time, particularly between 1946 and 1970 in response to the heightened demand during the "Glorious Thirties." While in 1945 the capacity of an oil tanker was limited to tens of thousands of tons, today it is at more than 500,000 tons. It is important however to point out that the two oil crises reduced demand and stimulated production in places closer to consumer countries. Consequently, the demand for immense tankers diminished, since they required modified and costly facilities to accommodate them. Finished petroleum products are subsequently transported by tankers of a limited size, such as those of Rotterdam along the Rhine, which hold some 1,000 to 3,000 tons. Currently, the EU lacks refining capabilities and investments that are necessary for this type of infrastructure.

Europe's Oil Supply and the Impact of Oil Prices

Only Russian and Norwegian oil is transported to Europe by pipeline, through Druzhba and Norpipe. The rest is imported by maritime transport. Because of their proximity, CIS in general and Russia in particular are naturally the top European suppliers for oil as well as for gas.

As for domestic production, the EU has three major producing countries: Norway, the United Kingdom, and Denmark, with the North Sea dominating (United Kingdom, Norway). However, this group's resources have been in decline since 1999 (UK's peak) and 2001 (Norway's peak).

The idea that Russian flows could eventually be reoriented to competing consumers, such as the Americans, Japanese, or Chinese is a concern for the European Community. On the other hand, uncertainties over price and Europe's long-term consumption worry their principal supplier and influence their projects. In the EU, the four biggest economies consume more than half of the hydrocarbons consumed in Europe (56,2%). These are Germany, the United Kingdom, France, and Italy. The UK, a producer and exporter up until 2005 became a net importer that year. Norwegian production has likewise been decreasing since 2001.

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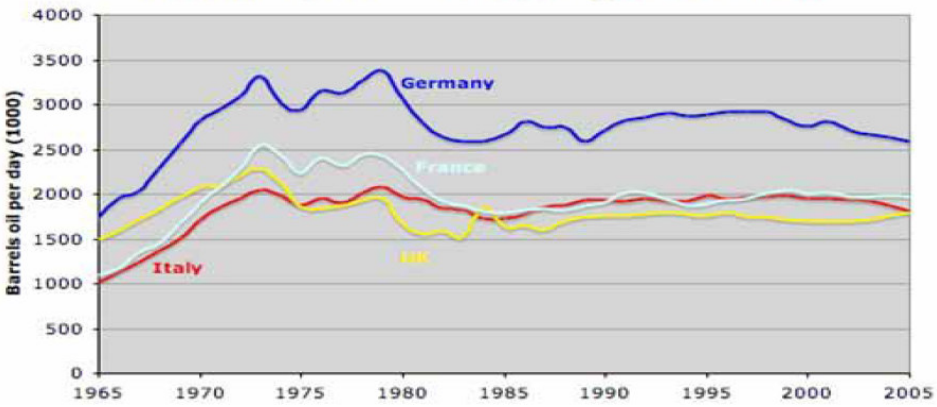
Graph 1. Oil Consumption of the Four Biggest European Consumers



4) Source: adaptation from « EU oil imports set to grow by 29% by 2012 », The Oil Drum: Europe, 3 October 2006, available on <europe.theoildrum.com>, from data of BP Statistical Review 2006, available on <www.bp.com>.

In an unexpected and uncontrollable manner for producers (and notably for OPEC), prices rose to $100 a barrel at the beginning of 2008 - and certain experts are even speculating a rise to $300 in the future, due to growing demand from emerging states, notably in Asia, and also to the decrease in Russian production seen during the first quarter of 2008.[26] Psychologically, the shock was bigger in 1973 during the first oil crisis when the price had quadrupled, going from $2,5 to $12 a barrel, and then during the second crisis when it increased to around $30.[27] The comparison of oil prices in dollars and constant euros should be noted. Due to the advantageous exchange rate for the Euro, a barrel of oil at $90 still translates into 1979-1980 oil prices for the Euro zone. While the share of oil in the energy mix diminished during the 80s and 90s, certain experts have forecast an increase in consumption on the order of 29% between now and 2012.[28] This will occur despite the evolution in price, now elevated and volatile. If it was considered “fair at $25” up until 2003, geopolitical evolutions have added a “risk premium” of around $5-15 a barrel. The outlook is for a tighter period in 2008 with an eventual decline in 2009.[29] The EU is still protected from higher oil prices because of oil being priced in dollars and the quite strong position of the euro compared to the dollar.

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[26] For example, see Dennis, Neil, “Oil hits record on supply concerns,” *Financial Times* 15.4.2008

[27] Cf for the evolution of the price of oil, the chapter in Fayennnec 2007: 42-56, with a historic part. The numbers cited are from Fayennec.

[28] Growth forecast: bases them the data from the 2006 BP Statistical Review, with a growth in demand of 0,5% for the EU-25 plus Norway and Sweden, and at the same time a decline in domestic production of 8%, EU imports are going to grow by 9.8 million bbl/day in 2005, to 12,6 million bbl/day in 2012, which brings about a growth of 29% from 2006-2012.

[29] IEA January 2008, short Energy Outlook

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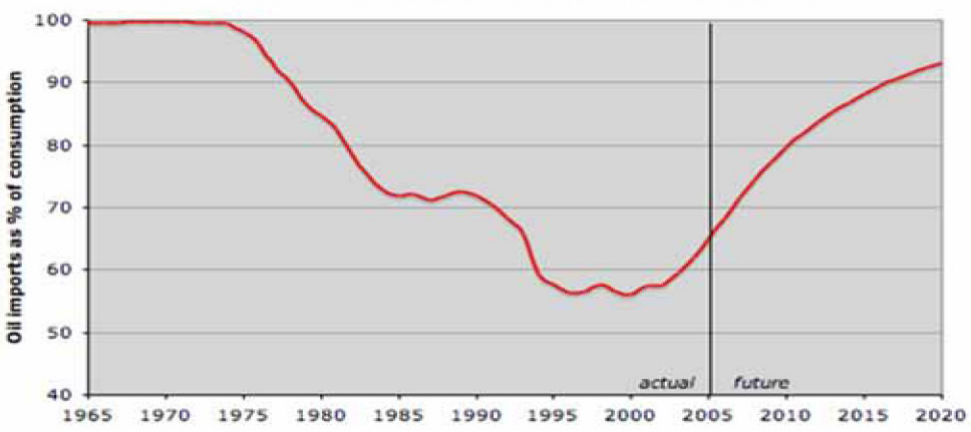
2. The EU's Principal Suppliers

2.1 Norway and Norpipe Oil: A Decline in Domestic Resources

For the moment, Norway remains the most important European exporting country, with an average production in 2005 of around three million bbl/d, which contrasts with a weak domestic consumption of only 213,000 bbl/d. Nonetheless, production has decreased on the order of 7% per year since its peak in 2001.[30]

The Norpipe pipeline, which supplies the EU with oil, began service in 1975 and reached a capacity equivalent to Druzhba North. With the progressive decline in Norwegian oil reserves, this supply however seems to be at risk; consequently, no new oil infrastructure is planned. Graph 2 indirectly shows this drying up of Norwegian oil production.

Graph 2. EU - Norway, Oil Imports as % of Consumption



5) Source: adaptation from « EU oil imports set to grow by 29% by 2012 », The Oil Drum: Europe, 3 October 2006, available on <europe.theoildrum.com>, from data of BP Statistical Review 2006, available on <www.bp.com>.

[30] Data from the 2006 BP Statistical Review

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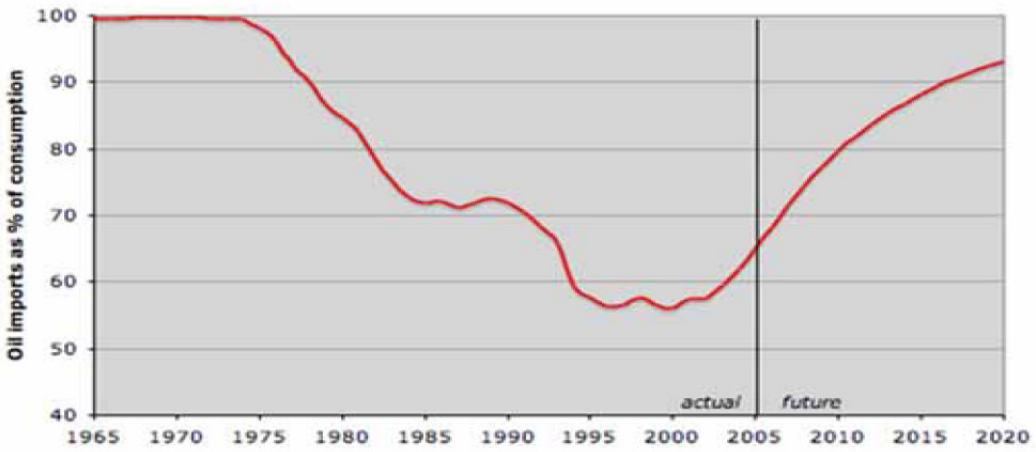
Graph 3. Norway Oil Exports



6) Source: adaptation from « EU oil imports set to grow by 29% by 2012 », The Oil Drum: Europe, 3 October 2006, available on <europe.theoildrum.com>, from data of BP Statistical Review 2006, available on <www.bp.com>.

7)

Table 3. Norpipe Oil

Oil Pipeline	Route	Owner / Operator	Length (km)	Technical capacity (bbl/d)	In service since
Norpipe Oil	Ekofisk Centre (Norway offshore) – Teesside (United Kingdom)	Owner: Norpipe Oil AS - ConocoPhillips Skandinavia: 35,05% Total E&P Norge: 34,93% Statoil: 15% Eni Norge: 6,52% SDFI: 5% Norsk Hydro Produksjon: 3,5% Operator: ConocoPhillips Skandinavia	354	900 000 (1)	1975

8) reception facilities limit capacity to 810 000 bbl/d (NPD)

2.2 The Middle East

Supplies from the Middle East arrive in Europe by oil tanker, with the Alexandria-Rotterdam line being the most important, as map 5 shows. Iranian oil makes up around 6% of the EU's imports from the Mid-East, marking a big difference with the US, whose Iran Libya Sanctions Act (ILSA) prohibits all imports from Iran. While Asia is today the largest consumer of Mid-East oil, as it makes up two-thirds of its energy mix, the EU has experienced a diversification of its sources, notably to Russia, as well as a decrease in its oil

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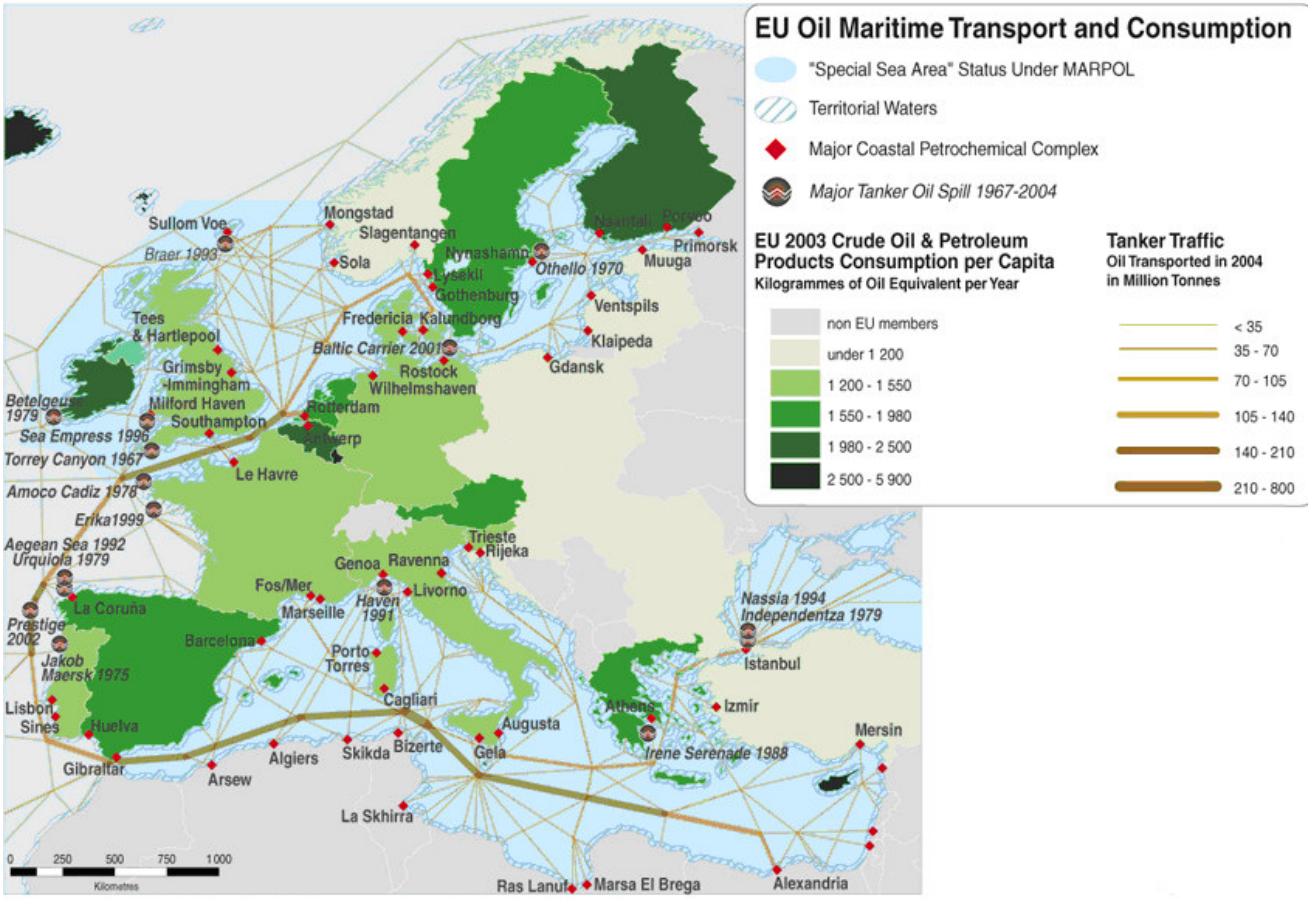
consumption. Because of the existence of alternative supplies (Africa, South America) and the global approach of the oil market, the EU is more concerned with price than with the source of oil.

Map 3. EU Oil Maritime Transport and Consumption



9) Note: The Mediterranean has extensive marine traffic giving access to the Middle East (and the Suez Canal), the Black Sea and Southern Europe; much of this traffic is oil tankers. The result of such traffic is a high risk of pollution and even ecological disaster, worsened by the fact that it is a near-closed sea. It is estimated that minor to major illegal hydrocarbon releases may occur as many as 10,000 times a year in the Baltic Sea. The North Sea and the Baltic Sea are subject to regular aerial surveillance

10) Source: adaptation from « EU Oil Maritime and Consumption », United Nations Development Program, available on <www.grid.unep.ch> and European Commission JRC, Eurostat, ITOPF, UN Population, UN Geographic Information Working Group.

11) Cartography: UNEP/DEWA/GRID-Europe, March 2007. The boundaries and names shown and the designations used on maps and graphics do not imply official endorsement or acceptance by the UN.

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2.3 Russia and the CIS

Russia and CIS Reserves

The largest concentration of Russian oil resources are located in north of Eastern Siberia, in the north of Western Russia, and in the Urals. Reserves in the North Caucasus, including Chechnya, are nearly exhausted and their impact is now only local. While Russia is the world's seventh largest oil producer and number one within the CIS, Kazakhstan is the world's eighth, with resources equivalent to about half of Russia's. The combined Russian and Kazakh reserves, plus several Azerbaijani, Uzbek, and Turkmen oil fields, put the CIS in third place worldwide in oil production, after Saudi Arabia and Iran.

In 2006, Russian oil production was at 9.8 million bbl/d, 2,8 of which was consumed domestically, and around 7 million exported (4 million barrels of crude oil, and the rest as refined products); 1.3 million barrels of crude oil were exported by Druzhba to Belarus, Ukraine, Germany, and Poland, as well as by Druzhba South headed to other Central European countries such as Hungary, Slovakia, and the Czech Republic; 1.3 million barrels of crude oil were exported through the new Primorsk Port near St. Petersburg, and 900,000 barrels were transported through the Black Sea, notably through Novorossiysk. While the largest part of Russian oil is exported via pipelines controlled by Transneft, around 300,000 barrels per day are transported by other means, notably through the two big ports of Novorossiysk and Primorsk. Added to this is a negligible portion that is sent to China via railway.

Challenges for Russia – hydrocarbon exporter

Russia must face three major challenges in its export policy: geography, geopolitics, and materials. As for geography, there are concerns over distances between oil fields, the immense size of its territory, and its limited access to warm waters. Geopolitical worries include its loss of influence over its 'Near Abroad,' and the emergence of a new transit zone. And finally, as for materials, Russia has to worry about the quality of its early infrastructures, of which the majority, including the Druzhba pipeline, date to more than 20 years ago and urgently needs to be modernized, not only to satisfy domestic demand, but also foreign. Recent reports that Russia's oil has peaked concern consumers and again highlight the urgent necessity of Russian investments in exploitation but also in oil transport.

Competing Consumers for Russian/CIS Resources

Table 4 details the flows of Russian oil exports, as well as their means of transport. It is clear that the potential competition, China, is today not connected to Russia by any oil pipelines and that the relatively insignificant quantities of oil it receives are transported the old-fashioned way, by train. Map 3 thus shows an asymmetry in CIS exports to the East and West, very much in Europe's favour, with however over the past few years a new perspective on Central Asia.

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Yukos, who up until its dismantlement was in charge of exports to China, proposed a pipeline from Angarsk (Lake Baikal) to Daqing (China), the largest Chinese oil field and equipped with adequate infrastructure and refineries. This pipeline, with a length of 2,400 km, a capacity between 20 and 30 million tons per year, with estimated construction costs at $2.8 billion, generated great interest in China, but for Russia it has the disadvantage of being a quasi-monopolistic link favouring the Chinese consumer. There is the possibility that they could subsequently abuse this and in doing so modify prices and quantity to its liking. After the arrest of Mikhail Khodorkovsky, the CEO of Yukos, the project was substituted by another: an oil pipeline to the Russian port of Nakhodka, which could eventually export 50 million tons of oil to Asia. Two versions are under discussion, for around a length of 4,200 km, costing $16 billion, and with a construction time of around six years.[31] For the Russians, Nakhodka has the advantage of avoiding dependence on one single client and they would be able to export to the North American market as well as to other Asian countries besides China. Japan has particularly showed great interest in this project.

The United States is another competing consumer. They imported around 18 million tons of oil from the CIS in 2006, China imported 24, and the EU 291.[32]

It should also be highlighted that one of the most important competing consumers is the producer itself. On the one hand this is because of limited energy efficiency, and on the other is growing internal consumption. The latter is nothing more than the outcome of the economic equation, which wants a growth rate of 1% to translate into a rise in energy consumption along the lines of only 0,8%. Social and cultural issues are also important in increasing energy efficiency during this period of higher prices for necessities. Indeed, citizens of the USSR were used to nearly free public goods, and the current socio-economic situation, especially outside of metropolitan areas, makes the issue politically complicated. This problem reflects the current situation in Iran.

Table 4. Russian Crude Oil Exports by Export Outlets, in 2006
(in 1000 bbl/d)

Origin	Quantity
North Sea Ports	
Novorossijsk	768
Other Black Sea	212
Baltic Sea Port	
Primorsk	1,255

[31] Götz (2004, p. 14)
[32] Source: 2007 BP Statistical Review

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Druzhba Oil Pipeline	1,261
Germany	437
Poland	466
Hungary	136
Czech Republic	104
Slovakia	118
Lithuania	158
Total Europe exports	3,660
Other Exports	
Non-transneft by the sea	170
China (train)	178
Murmansk (train)	47
Other non-transneft train	47
CPC	53
Total crude oil exports	4,155

12)

13) Source: Energy Intelligence (Nefte Compass, January 18, 2007, EIA Country Analysis Russia)

Map 4. Russian and CIS Resource Export Infrastructure: What Space is there for Competing Consumers?

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14) Source: adaptation from P. Rekacewicz, « En Asie, des projets de construction de voies d'acheminement du pétrole et du gaz », Le Monde diplomatique, May 2005, available on <www.monde-diplomatique.fr>.

Existing Oil Pipelines: Druzhba

Table 5. Druzhba Pipeline

Oil Pipeline	Route	Owner	Length (km)	Technical Capacity (Mt)	In Service Since
Druzhba North	Tjumen- Almetjewsk / Samara (Russia) - Schwedt (Germany)	Transneft (Russia, Belarus), PERN (Poland)	around 4000, of which is in Russia: 1,603 Belarus: 521	2005: more than 51 (1) Russia: 82 Belarus: 50 (2)	1964
Druzhba South	Tjumen Almetjevsk / Samara (Russia) - Czech Republic / Hungary	Owner: Transneft (Russia, Belarus), Transpetrol (Slovakia 51% (Slovakian Ministry of Economy), Yukos 49%), Mero (Czech Republic) Operator: Transneft	around 4000, of which is in Russia: 1,603 Belarus: 521 Ukraine: 634	Russia: 82 Belarus: 50 Ukraine: 17 (2)	1964

15) Lang

16) (ECS)

Druzhba's Capability Constraints

At this time, the transport capacities of Russia's oil pipelines are fully exploited, and if one goes by the forecasts of Russian demand and production, it will be necessary to nearly double these capabilities between now and 2020.[33] Druzhba has a capacity of 85 million tons per year, which is not currently being utilized in the south, since oil consumption in Hungary, the Czech Republic, and the Balkan States has diminished, and the offshoots to Latvia and Lithuania are no longer supplied.

Projects Around Druzhba: Reducing Oil Tanker Traffic in the Baltic Sea and the Bosphorus: the Druzhba North Extension

The extension of Druzhba to the north and up to Wilhelmshaven was first proposed in the early 1990s. This extension would in fact allow the transport of Russian and Caspian oil to world markets. It would also decongest maritime routes: the Baltic Sea, the Black Sea, and the Mediterranean Sea. As for capacity, the current network is adapted for this project up to Mosyr in Belarus, where Druzhba splits into its two North and South branches. From this junction, it would be

[33] Götz 2004

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necessary to increase the technical capacities to Poland and on to Schwedt, on the order of 20 million tons per year, in order to eventually extend it from Schwedt to Wilhelmshaven, Germany.[34] As logical as this project may seem, its current chances for success are quite low. As Russia is looking to decrease its dependence on transit countries by means of large investments such as with Nord Stream, this being an interest that also coincides with those of numerous European countries, it will certainly not opt for the opposite approach, since these same countries will have an increased role in transporting oil. The extension of Druzhba will thus depend on the relationship between Russia on one side, and Belarus and Poland on the other. As for demand, US demand will be decisive. Currently, a third pipe between Adomowo and Plock is under construction and will increase capacity to sixty million tons per year for this section. On the other hand, it is surprising to learn that a "Nord Stream Oil" project has not yet been developed. Such a project could indeed create the desired link, relieve congestion in the Baltic Sea, and allow for savings in infrastructure as oil and gas could be transported in parallel pipes. But it would run up against the same controversies and oppositions as Nord Stream Gas does, and also economic considerations. Regardless, oil tanker transport remains the most economical, and it does not tie the producer to one particular consumer. This explains the absence of new projects for this raw material, unlike gas.

Odessa-Brody: A Project Without Oil

The Odessa-Brody oil pipeline is the best example to highlight the risks that come along with immense political interference in a project that is not aligned with economic reality. In fact, this pipeline was conceived to limit Polish and Ukrainian dependence on Russia, by transporting oil from the Middle East through Odessa, Ukraine, to Brody, on the Polish-Ukrainian border. Strongly supported by the EU, this project was completed in 2001. Ana Palacio, the Energy and Transport Commissioner declared this project as one of pan-European interest in 2003. A trilateral working group (Poland, Ukraine, EU) was set up and Warsaw and Kiev allocated considerable funds to ensure that the project was successful. Nevertheless, the result was a complete failure. While this pipeline of 674 km was initially meant to receive oil primarily from Central Asia (Kazakhstan) and to thus diversify Ukraine's oil revenues, and later even Poland's through the Brody-Plock link (Gdansk), it remained empty for three years from 2001 to 2004 over a lack of supply. An agreement was finally signed in 2004 between Ukraine and Russia, allowing the reversal of the pipeline flow and consequently Russia's use of it to export oil towards the Black Sea, and from there to different Mediterranean destinations. However, the debate over its use in the original direction continues and reappeared with the "Orange Revolution" and the declarations by President Yushchenko in 2005 on imports of

[34] Soria/Gray 2004; Götz 2004: 12

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Central Asian oil coming through this line. This intention was reiterated at the end of 2006 by Yushchenko, but also by Viktor Yanukovych, his adversary and former Ukrainian Prime Minister. Another agreement on the Sarmatia project, in May and June 2007 planned for a link with Gdansk and the forming of a consortium. This was confirmed by a political agreement between Poland, Ukraine, Lithuania, and Azerbaijan during a conference on the security of supply in Vilnius. The future will tell if this project succeeds, but the fact is that despite the large number of agreements and political goals, most have not yet been translated into viable economic and commercial plans. Quite to the contrary, the Polish and Ukrainian governments lost large sums of money on the construction of a pipeline that was empty from the start.

New Infrastructure and Construction in the North: the BPS, the Port of Primorsk, and the Baltic Issue

Table 6. The BPS, the Port of Primorsk and the Baltic Issue

Oil Pipeline	Route	Owner	Length (km)	Technical capacity	In service since
Baltic Pipeline System (BPS)	Iaroslavl (Russia) - Primorsk (Russia)	Transneft	1514	42 Mt/y (1) 65 Mt/y (2) 1.3 Mbd (3) 1.5 Mbd (4)	2001

17) In March 2004 (Goetz)

18) Since April 2006 (RIA)

19) In 2006

20) In March 2007 (EIA)

21)

The pathological side of the relationship between Russia and the Baltic States after the fall of the USSR took and continues to take multiple forms. The researcher Locatelli revealed that Gazprom's export statistics include the three Baltic States in the CIS category even though none of them are signatories to the Minsk Treaty.[35]

While during Soviet times Druzhba supplied the two Latvian and Lithuanian ports of Butinge and Ventspils, and to a less extent Muuga near Tallinn in Estonia, from where exports left for the Northern markets, the independence of the Baltic States and a series of conflicts led Russia to progressively reduce supplies, eventually leading to their permanent closure once the oil port at Primorsk was inaugurated in 2003. The BPS, opened in December 2001, from then on supplied the new oil terminal at Primorsk. Russia was able to secure new direct access, through the Gulf of Finland, to European and American markets. The risks in the Baltic Sea, a sort of cul-de-

[35] Locatelli 2008: 7, footnote on page 5

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sac sea, to the fragile eco-system, already highly polluted, are important to note here. Latvia and Lithuania had thus been eliminated as transit countries, even if the official explanation noted "repairs to the oil pipeline for an indefinite period of time." Export capacity at Primorsk has steadily increased, with around an average of 1.3 million barrels a day in 2006, and 1.5 in March 2007.[36] As exports from the Baltic region have doubled since 1999, the Primorsk Port, which belongs to Transneft, has profited from this increase the most, even though it is climactically unfavourable compared to other Baltic Ports. It freezes 145 days out of the year, which increases the risk for accidents, and it can only accommodate small oil tankers during this time. While in the past Ventspils was the biggest oil port in the region and the second biggest in the USSR after Novorossisk, Transneft stopped oil shipments to it at the end of 2003 once construction at Primorsk was finished. An attempt to compensate for this loss through railway deliveries was abandoned soon after by the Latvian government. Then, in October 2006 Latvia sold its shares to the company Vitol/Euromin, based in Cyprus, and operator of the Kaliningrad port. Mazeikiai, in Lithuania, is the Baltic region's only refinery. It was modernized in 2003 and was subject to a succession of acquisitions and sales, from Yukos in 2002, and a forced sale in May 2006. In choosing between either Russian or Polish buyers, Vilnius opted for the latter, the refinery corporation PKN Orlen. Lithuania interpreted the subsequent oil cuts by Moscow as a response to this choice. According to them, the decline of relations between Poland and Russia led to the de facto closure of the infrastructures, explained officially by Russian authorities as "technical problems" with the oil pipelines that supply the refinery.[37] Whether the election of Tusk in Poland and the amelioration of Russian-Polish relations will have an impact on this issue remains to be seen.

And Lithuania had used its veto right as a EU member state, thus blocking, after Poland had already done, the renegotiation of the Partnership and Cooperation Agreement with Russia (PCA). Lithuania in fact insisted on the fact that "the success of these negotiations with Russia directly depends upon the resumption of deliveries via Druzhba."[38]

During the transit conflicts between Russia and Belarus in early 2007, the President of Transneft, Semion Vainshtok announced the construction of a supplementary oil pipeline from the Belarusian

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[36] Source: EIA 2007: Russia Country Analysis

[37] Wagstyl, Stefan, "Lithuanian Leader in Cold War Warning," Financial Times, 22.1.2008: 4

[38] "UE/Russie: La Litanie a levé ses réserves à propos de l'ouverture des négociations avec Moscou sur un nouvel accord de partenariat." Agence Europe, n° 9659, 14 May 2008, p. 5.

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border to Primorsk, with an initial capacity of 1 million barrels a day and a possible increase to 1.5 million in the near future. This project has not yet been approved by the Russian government, but construction could be completed in 18 months. A part of Druzhba's flows could thus be redirected to Primorsk.

The Abandoned Siberia-Murmansk Pipeline Project: Pipelines in the Yukos-Transneft Conflict and Projects in the Barents Sea

At the close of 2002, an oil pipeline was proposed to connect Eastern Siberia's oil fields to the 'warm water port' in Murmansk in order to supply the American market and to reinforce energy link between Russia and the US. This project included an onshore oil pipeline through Karelia and an offshore pipeline through the White Sea to the Kola Peninsula.

Table 7. Projects in the Barents Sea

Oil Pipeline	Route	Transit Countries	Owner	Length (km)	Technical capacity (Mt/y)	Estimated cost (billion $)
Barents Sea	Western Siberian oil fields (Russia) - Murmansk (Russia)	via Karelia or the White Sea to the Kola Peninsula	Transneft	2,800-3,900	50-100	9-15 (1)
Barents Sea (alternative)	Western Siberian oil fields (Russia) - Indiga (Russia)	-	Transneft	1,700	50-100	12 (1)

22) Götz

This project that was named the Murmansk pipeline, particularly backed by the oil company Yukos and its president Mikhaïl Khodorkovski, came up against opposition from the state company Transneft. The arguments put forth by Transneft were double: the project's lack of profitability, and a rejection of private financing for energy infrastructure. Alternatively, Transneft proposed the transformation of the Indiga port into an oil export port, which would necessitate a complete overhaul of the infrastructure and the use of an icebreaker in the winter. This port in the Barents Sea could supply the North American market through a much shorter route.

Sakhalin and Reconsidering Yeltsin's Opening Up

Sakhalin, the Russian island to the extreme east, has been the object of much speculation and many projects since the 1970s, when a Soviet-Japanese team began to explore its resources. This zone could in fact become a "second North Sea," being rich in oil and gas

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reserves. Moreover, the Okhotsk Sea finds itself in a strategic geopolitical situation, close to Asian countries with increasing energy demands.[39]

In May 1991, a call was made public for a consortium by the then still Soviet authorities, and the first Production Sharing Agreements were signed in 1994 and 1995. The Sakhalin II project included Shell (United Kingdom, Netherlands), Mitsui and Mitsubishi (Japan), and was therefore the only project without Russian participation. Sakhalin I on the other hand included not only Exxon Mobil (United States), SODECO, and ONGC Videsh (India), but also the two Russian companies Rosneft and Sachalinmorneftgas. Sakhalin I and II are examples of offshore explorations and opportunities for oil tanker transport, since the region does not have any pipelines and transport is impossible during periods of freezing.[40] Sakhalin I is planning for the construction of an underwater oil pipeline to the continent, running 250 km, to arrive at the De Kastri platform. Sakhalin II plans to construct an onshore pipeline of 800 km to the Russian 'warm water port' of Prigorodnoe. While a Russian law on Production Sharing Agreements was adopted in 1996 and allowed foreign groups entrance into projects, in 2003 Vladimir Putin finalized the law by tightening the criteria required for a field to be opened up to PSAs. These subsequently became the exception for the development of Russian fields. At the end of 2005, the Russian Energy Ministry finally announced that only companies with a majority of ownership belonging to Russian entities could obtain licenses to develop gas and oil fields in Siberia. The period from 2003 to 2005 thus represented a veritable turn around in Russian energy policy that one could call the 'return to state control over production and transport, and the limiting of foreign influence and participation…' The Yukos affair and the media-hyped arrest of its president are the best symbols of this change. Yukos controlled 20% of Russian oil production, and a merger with the fifth largest oil company, Sibneft, was about to go through, as were negotiations over the admission of Exxon Mobil and Chevron capital. Compared to other states, nevertheless, Russia remains relatively open to foreign investment, especially in the electricity sector, which is not the issue of this study.

The change in Russian policy (regarding foreign companies' investments) altered participation in Sakhalin II in April 2007. Parts of the Sakhalin Energy Investment Company Ltd (Sakhalin Energy) were in fact divided between Gazprom and the former investors with the signing of a new contract on April 18, 2007. Subsequently,

[39] For a detailed map of the Sakhalin Projects, see <www.robertams-terdam.com>

[40] Bradshaw 2006.

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Gazprom obtained 51%, Shell 27,5%, Mitsui 12,5%, and Mitsubishi 10%.[41]

Since 2003 the Sakhalin projects have thus been under review. In addition, Moscow used ecological arguments, a well known weapon in infrastructure projects all over the world. Foreign companies were charged higher fees. Moscow's behaviour was criticized by the countries and companies involved, emphasizing the unstable investment environment and the lack of a legal framework in Russia. While projects in Russia without Russian participation, such as Sakhaline II, are a thing of the past, and as this strategic change in Russia is understandable, the uncertainty of a legal framework - due more to the recent situation than to an actual plan - also results in a lack of investments in new oil fields and infrastructures in producer countries, a fact so often lamented.

A pan-European Oil Pipeline Project?

Croatia, Romania, and Serbia all signed in April 2008 an agreement in Bucharest on the construction of an Adriatic pipeline. This project, first put forth in 2002, would connect, over 1,300 kilometers, the Romanian port Constanta to Trieste via the Italian coast, Serbia, Croatia, and Slovenia. The EU is supporting this project, and above all the idea of alleviating congestion on the traditional route through the Black Sea.[42]

Access to Oil in the Caspian

The Caspian Sea is home to gas and oil resources of global importance; however they were not exploited during Soviet times because of a lack of financial and technological means, and also a lack of priority. Indeed, after discoveries of hydrocarbons in first Russia and then Siberia, "Baku I" became increasingly neglected. The fall of the Berlin Wall changed this situation in two ways. First, the newly sovereign Central Asian countries as well as Azerbaijan became quite interested in their newly national potential. Secondly, for the first time the door was open to foreign investors. According to expert estimates, Caspian production was able to quickly reach very high levels, with reserves estimated at 220 billion barrels of oil. Nevertheless, one has to cope with a very complicated geopolitical environment, due to these resources being located in a completely enclosed sea. The two bordering countries that are potentially the best able to transport resources (Russia and Iran) are not considered as partners by Western countries but as competitors in these projects. But apart from Russia and Iran, the bordering countries of the Caspian – Azerbaijan, Kazakhstan, and Turkmenistan – do not have any access to an open sea and are thus entirely dependent on

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41 <www.sakhalinenergy.com/en/media.asp?p=media_page&itmID=204>; *Financial Times* 6.6.2007

42 *SETimes*, "Croatia, Romania, Serbia sign Pan-European Oil Pipeline agreement," April 23, 2008, <www.setimes.com>.

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their neighbours, notably Russia. Resources in the Caspian Sea are unequally allocated, a situation that puts Russia and Iran at a disadvantage, and explains these two countries' opposition to recognizing it as a sea.

Sidebar: The Caspian's Status: Sea or Lake?[43]

There is a crucial legal dispute under way between the five countries surrounding the Caspian: is it a sea or a lake?

Historically, the Iranian-Soviet agreement of 1921, renewed in 1940, ensured that the Caspian was a "sea, with shared use," between the two neighbouring states, giving the Iranian fleet navigational rights over the Sea. But the fall of the USSR gave birth to three new bordering states: Azerbaijan, Kazakhstan, and Turkmenistan. And issues over resource ownership and hydrocarbon transportation would have direct impacts on the legal definition of this body of water.

While a sea is governed, according to international law, by the rule of granting bordering states exclusive zones of 12 miles out (22 km), and anything beyond are international waters, the status of lake requires the agreement of all neighbouring states for its use, exploitation of resources, etc.

Russia and Iran both claim that it is a lake, and oppose all attempts of the three new states to give it the status of sea, which would guarantee them ownership in a zone of 12 miles (22 km), and would protect them against the necessity of unanimous agreement for all projects.

This lack of a status turns out to be quite problematic first of all for the development of oil fields, but also for putting transport infrastructure in place. Currently, ownership of fields is being contested, as in the case of Alov, claimed by Iran as well as Azerbaijan and Turkmenistan, or that of Chirac and Kiapgaz, claimed at the same time by Azerbaijan and Turkmenistan.

The BTC Shock

In order to remedy this enclavement, the BTC crude oil pipeline (Baku-Tbilisi-Ceyhan) was constructed, with strong backing from the US and Western countries. Before its creation, oil was transported from Baku to Soupsa through the Western Early pipeline, having a capacity of 155,000 bbl/d, but closed in 2007 for maintenance.[44]

While Kazakhstan at first had continued to export its resources through the Russian networks (gas and oil)[45] dating from the Soviet era, the BTC, operational since 2005, represents a veritable rupture

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[43] For a detailed survey of this issue and the positions of the involved parties see <www.ladocumentationfrançaise.fr/dossiers/mer-caspienne/ partage -mer-caspienne.shtml>.

[44] EIA Azerbaijan 2007

[45] Notably the CPC oil pipeline (Caspian Petroleum Corporation) : allows the transport of 50 million tons of crude per year from Tengiz to Novorossijsk

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in this and a momentous failure for Russia and Gazprom's strategy. Associated with the post-Soviet deterioration of the Yeltsin era, the "BTC Shock" has since determined Russia and Gazprom's strategy, confronted with projects by-passing its territory, such as Nabucco, a subject that the author will later return to. Currently, Turkmenistan and Kazakhstan are again moving closer to Russia, as the trilateral meeting in Türkmenbaşy in March and May 2007 symbolized.

A first pipeline connecting Azerbaijani resources to the Georgian port of Soupsa proved to be barely operational since freighters had to go through the Bosporus and Dardanelles Straits. Thus, the only alternatives were either Iran and the Persian Gulf, eastern Turkey, or the Baltic Sea through an oil pipeline which would cross Europe from the south to the north, going through a number of transit countries that are considered "problematic." The Armenian-Azerbaijani and the Armenian-Turkish conflicts finally resulted in the pipeline going through Georgia. The project was finally approved during the Organization for Security and Co-operation in Europe (OSCE) Conference in Istanbul in November 1999, as was a parallel gas pipeline from Turkmenistan to Turkey through Baku.

The Baku-Tbilisi-Ceyhan Pipeline, the second longest pipeline in the world, spans over 1,768 km and transports oil from the Azeri-Chirag-Gunseshli field in the Caspian Sea to the Mediterranean, by passing through Baku, Tbilisi, and Erzurum and arriving in Ceyhan in Turkey. Oil was first pumped on May 10, 2005, with exports reaching Ceyhan in June 2006.[46]

Table 8. Baku-Tbilisi-Ceyhan (BTC) Pipeline

Oil Pipeline	Owner	Length (km)	Technical capacity	Price	In service since
Baku-Tbilisi-Ceyhan (BTC)	BTC Pipeline Company – BP: 30.1% AzBTC: 25% Chevron: 8.9% Statoil: 8.71% TPAO: 6.53% Eni: 5% Total: 5% Itochu: 3.4% INPEX: 2.5% ConocoPhillips: 2.5% Amerada Hess: 2.36% (in July 2006)	1,768, of which is in Azerbaijan: 443 Georgia: 249 Turkey: 1,076	1 Mbd (1) 1 Mbd (2) 50 Mt/y (3)	The price for members of the consortium, from Sangachal to Ceyhan, is 3.3 $ / bbl (2005-10), 4.6 $ / bbl (2010-16), 5.5 $ / bbl (2016-29). Turkey will make between $140-200 million/year in transit and operation fees. Georgia stands to make $112 million for the period 2004-2008 and $566 million from 2009-2019.	May 2005

[46] IEA 2007

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23) For 2008-2009 (EIA)

24) ECS

25) Götz

Other Caspian Projects[47]

The Caspian region has experienced and continues to experience a veritable proliferation of projects, like the Trans-Caspian oil pipeline. Discussion on this project, which is planning a parallel gas line, have been underway since Kazakhstan proposed this link between the Kazakh port of Aktau and Baku, where it will connect to the BTC. But as the status of the Caspian Sea is still not determined, Russia and Iran are opposed to all offshore oil and gas pipelines in the Caspian Sea. Meanwhile, Astana announced the construction of a Kazakh-Caspian transport system, which should be operation by 2010. This project includes an oil pipeline from Iskene to the Caspian port of Kuryk, terminals in Kazakhstan and Azerbaijan, as well as the construction of oil tankers. It is necessary to construct all oil tankers on-site since the Sea is fully closed-off. This of course makes it quite difficult to build necessary infrastructure of any nature.

3. Summary and Conclusion

Europe's oil supply is tied to two principal pipelines, but it largely depends on the world market and supply by oil tanker. While Russia represents an important supplier, the theory that they have peaked and the current underinvestment in oil fields and infrastructure worries the EU. Moreover, the Caspian's unclear legal status is slowing down the development of these fields. Currently, there are very few new oil pipeline projects, which is not the case for gas. On the contrary, we are witnessing an increase in oil tanker transport, such as the construction of the Primorsk Oil Port in the Baltic Sea. Primorsk and the BPS create direct access between the producer and consumer, while avoiding former Soviet Union transit countries. This is a strategy that Gazprom and Russia are also pursuing with regard to gas. As for investments for the exploitation of resources, Russia has changed its approach, as the PSAs for Sakhalin and the legislation of the early 2000s demonstrate. In this sense, Sakhalin is a symbol of this major shift in trends, and of the Russian authorities' will to control foreign investment in its country, notably in this industry.

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[47] Also see the chapter on gas for Caspian projects; see the works of Adrien de Dellecker on Caspian energy projects, "Caspian Pipeline Project Consortium, Bellwether of Russia's Investment Climate?" Russie.NEI Visions, n° 31, Paris, June 2008, available online.

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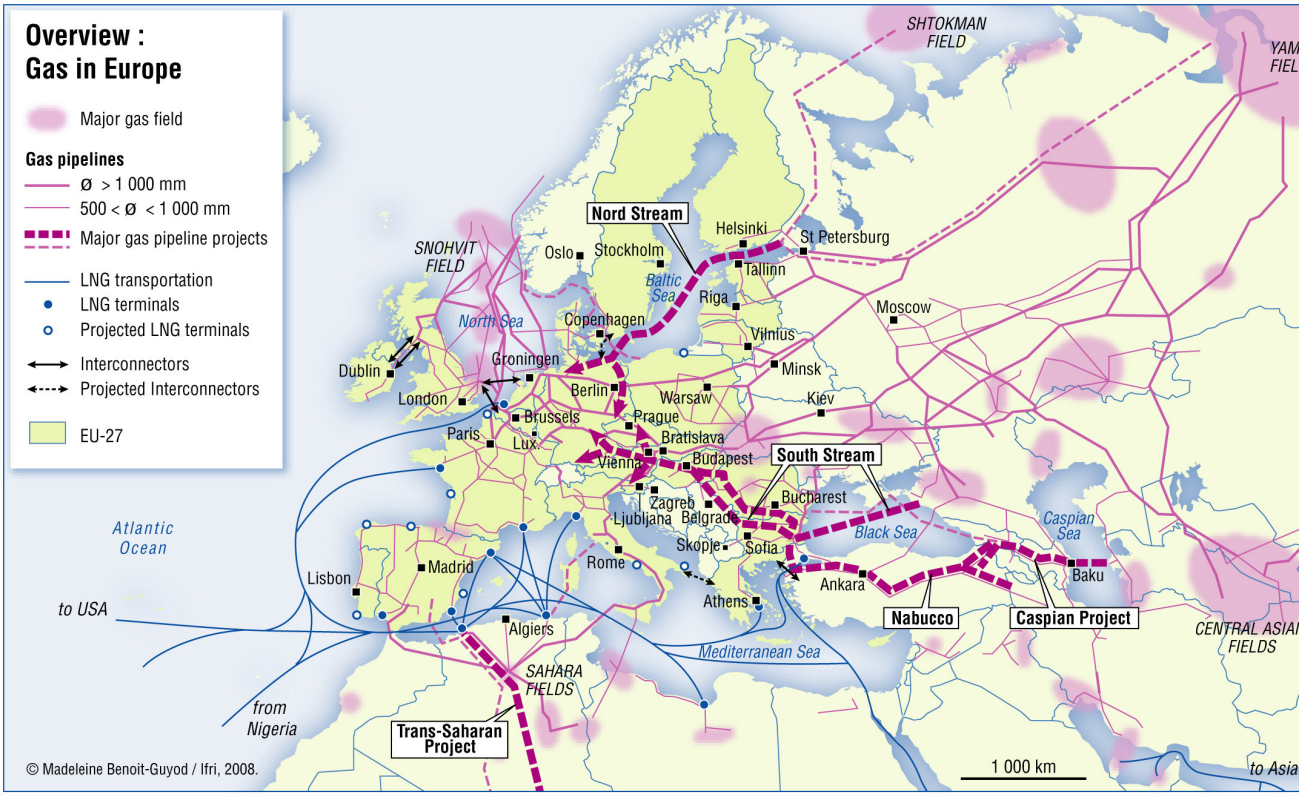
III. Gas from the North, South and East

Map 5. Gas in Europe



26)

27) Source: Benoit-Guyod/Ifri 2008

1. European demand for gas and sources of supply

The world's natural gas reserves are held by Russia (29%), Iran (15,2%), Qatar (14,7%), and to a lesser extent Saudi Arabia (3,8%), the US (3%), Algeria (2,5%), Indonesia, Canada, the UK, the

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Netherlands and a few other countries. Natural gas makes up 24% of the world energy mix, as it does in the EU-27. France is the exception, as gas accounts for no more than 15% of their mix.[48]

Globally, demand for gas is greatly increasing, and according to estimates by the International Energy Agency (IEA) and the Organization for Economic Co-operation and Development (OECD), in the EU, the Balkans, Turkey and Norway it will increase from 200 billion m³ in 2005 to 500-600 billion m³ in 2030. This growth will go hand in hand with an increased dependence on imports, which will reach 84% in 2030. This rise in dependence is explained by the continuous substitution of gas for oil, the growth of electricity generated by gas, and the fact that many producer countries within the EU-27 have already passed their gas peak.

Gas supply in Europe essentially comes from four sources outside of domestic production; production within the EU accounts for around a third, and imports come from the following four countries: Russia (46% of imports), Norway (27%), and Algeria (20%), and to a lesser extent Nigeria (less than 8%). Proportions of supply sources vary from member state to member state for obvious geographic reasons. The dominance of Algerian gas in the mix of Mediterranean states (Italy, France, and also Portugal) contrasts with Russia's dominance in Central Europe, notably in the new member states and Germany.[49] The rest comes from internal production, which rose to 33% in 2005.[50] (see page 5, "Panorama: Gas in Europe").

Table 9. Natural Gas Imports to the EU-27 in 2006, by country of origin

Origin	Quantity (bcm)	Percentage
Russia	128	41
Norway	84	27
Algeria	55	18
Nigeria	13	4
Libya	8	3
Egypt	8	3
Qatar	5	2
Others	13	4
Total	**314**	
Imported by gas pipeline	**264**	
Russia	128	
Norway	84	

[48] Chevalier/Percebois 2007: 22

[49] For a detailed table of energy profiles for each member state, see Energy Information Administration, available on <www.encharter.org/index.php?id=218>

[50] Eurostat Yearly Statistics, 2005

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Algeria	36	
Libya	8	
Others	8	
Imported in LNG	**50**	
Algeria	19	
Nigeria	13	
Egypt	8	
Qatar	5	
Others	5	

28) Source: BP (2007) and author's calculations

Moreover, the new EU member states are much more dependent on Russia than the EU-15 is, which partially explains the fact that they view energy policy as security policy (against Russia).[51]

Table 10. Gas in the EU-25 and in the New Member States: an Uneven Dependence on Russia

(In percentage)

	EU-25	New Member States
Domestic Resources	41	33
Russia	26	62
Algeria	12	1
Norway	16	4
Others/LNG	5	0

29) Source: Tönjes/De Jong 2007, based on the BP Review of World Energy 2006

2. Introductory Remarks on Transport and Gas Prices

Gas can be transported either by pipeline, or in liquid form on specially designed ships, LNG carriers. LNG is obtained by cooling gas to -162°, which is a very costly process. The liquid obtained is transported by special LNG carriers with capacities from 100,000 to 150,000 metres^3, and is then regasified on arrival. Pipelines however remain the favoured mode of transport, which is more economical up to some 3,000 km.

While awaiting the arrival of LNG, gas markets remain regionalized and dependent on pipelines, despite the new process becoming more and more established throughout the world (of course in a very uneven manner from region to region), with its production doubling in 10 years, and global rise in its production of 11,8% in 2006[52]. Like a communicating vessel, the number of liquefaction terminals must correspond to the number of regasification facilities; both are very

[51] Lang, 2007: 11

[52] BP Global Reports and Publications, 2007, <www.bp.com>.

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expensive, as well as the process itself. At the moment there are more regasification terminals than liquefaction terminals, and producers are hesitant to enter into this less economically profitable market.

Laying a gas pipeline is very expensive, but it has the advantages of significant longevity, between 35 and 60 years, and lower maintenance investments.[53] The fact that onshore gas pipelines are more economical than offshore ones is obvious. Construction of the latter can turn out to be vital, such as between Norway, the UK, and the European Continent, but also politically preferable if the producer seeks to avoid third countries and install direct links. This is the case with Blue Stream, opened in 2005 and connecting Russia and Turkey, and also with Nord Stream, which is the focus of a case study later in this chapter.

2.1 LNG in Europe

Currently, the percentage of LNG in Europe's gas supply is quite low, with 93,7% of gas transported by pipeline, and only 6,3% by LNG carriers. In sum, gas is much more expensive to transport than oil, and is difficult to stock. It is thus becoming more like electricity in terms of problems surrounding stockage and transport. It has become competitive only with rising oil prices. However, indexation to oil prices, and the significant price increases since 2003 have moderated interest in gas.

Countries currently exporting LNG to the EU include Algeria for half of the Europe's imports, followed by Nigeria (25%), Egypt and Qatar (9,6% each), with all other countries representing only 7,8% cumulatively. It is estimated that the share of LNG in the EU-27's gas consumption will increase from 8,9% today to 31,8% in 2030. However, regasification capabilities are currently not equally distributed, and neither is the use of LNG itself. While Spain is the number one consumer in Europe, before France and the UK, countries such as Germany and the Netherlands do not have any LNG capabilities. Today there are 12 LNG terminals in the EU-27, and 51 in development or under construction.[54] Debates and doubts over LNG in certain European capitals (such as Berlin) continue in part because they are worried that regasification capabilities will exceed those of liquefaction in producer countries, the latter also being subject to seasonal and climactic uncertainties. Reception

[53] This is very different from the telecommunication industry with their continuous innovations. There are very few innovations in gas pipelines. Cf Hirschhausen, Neumann, 2007: *Competition in Natural Gas Transportation*. Natural gas is transmitted under pressure (10-80 bar) in gas pipelines and compressed every 100-400 kilometres. Diameters vary between 100 and 1400 mm.

[54] European Commission, Energy Sector Inquiry 2007, LNG terminals in the EU

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terminals assume an increase in LNG production in countries such as Iraq, Iran and Qatar, who still largely prefer the advantages of the Groningen system[55] to the risks of LNG carriers.[56] Nonetheless, the development of LNG is clearly in the interest of consumer countries, as it reduces European vulnerability in the face of unexpected gas cuts. To cite one example, Turkey was able to make up for recent Iranian gas cuts through LNG imports.[57]

2.2 LNG Terminals and Projects In Europe

Russia is planning to construct three LNG terminals in the Barents Sea, the Baltic Sea, and on Sakhalin. This is mostly in order to satisfy demand outside of Europe. Sakhalin II is located very far from Europe, and delays in construction make its commissioning unlikely this year. Moreover, Russia has not yet been able to resolve the issue surrounding maritime transport in northern zones that are frozen year round. Sources contradict each other however, as to the construction of terminals in Russia and the estimated duration of their construction.[58]

The first European export terminal was opened in October 2007 in Hammerfest in Norway, with a capacity of 145,000 m^3 going to the EU.[59] This terminal, which was quite costly and constructed under very difficult climactic conditions, is supplied by the Snohvit gas field in the Barents Sea, and was developed by a consortium made up of StatoilHydro, Petoro, Total, GDF, and RWE. A carrier will eventually leave every five days from Melkoya (Hammerfest), each with a capacity of 150,000 m^3. The supplies first go to Europe, but also then to other clients on the global market. All the issues surrounding the relationship between cost and security of supply are there. Norway's experience and Shtokman's proximity led Russia to allow StatoilHydro into the consortium to develop the Arctic reserves.

Table 11 illustrates the current situation and forecasts from now until 2015.

Table 12 shows possible capacities, if certain countries further increase their capabilities, such as France or Italy, and if countries that do not currently have any LNG terminals, like Germany, Croatia, or Greece construct them.

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[55] Cf 2.3 for gas prices and Groningen's legacy

[56] Cf paragraph on LNG

[57] *Interruption in Iran Gas : Problem still exists*. The New Anatolian, 15.1.2008. LNG had been imported by Algeria and Nigeria

[58] For example, Platt 12.3.2007, Poland Business Newswire 1.10.2008, California Energy Commission 2007, etc

[59] Hammerfest LNG Exports First Cargo, 10.25.2007, <www.ogj.com/display_article/310197/7/ARTCL/none/none/hammefest-LNG-exports-first-cargo>

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Table 11. LNG: Probable Evolutions in Regasification Capacities in the EU-27 (bcm/y)

	2007	2010	2015
Belgium	6.5	9.1	9.1
France	15.6	23.9	26.4
UK	9.0	44.0	49.7
Italy	0.0	1.0	17.0
Spain	50.5	57.3	64.3
Portugal	5.5	5.5	5.5
Greece	2.6	2.6	2.6
Total	93.2	159.8	198.0

30) Source: CIEP Analysis, based upon company information, WGI, IEA, taken from Tönjes, de Jong 2007

Table 12. Possible Evolution of Regasification Capacities in the EU-27 (bcm/y)

	2007	2010	2015
Germany	0.0	5.0	10.0
Belgium	6.5	9.1	9.1
France	15.6	23.9	59.4
UK	9.0	44.0	54.7
Italy	0.0	1.0	27.0
Spain	50.5	57.3	64.3
Portugal	5.5	8.5	8.5
Greece	2.6	2.6	2.6
Ireland	0.0	0.0	2.5
Croatia (1)	0.0	0.0	10.0
Total	93.2	167.8	299.5

31) (1) Not currently a member state of the EU, but its entrance is likely by 2015, and its terminals will serve the EU-27

32) Source: CIEP analysis, based upon company information, WGI, IEA, taken from Tönjes, de Jong 2007.

2.3 The Groningen Legacy and Gas Prices

It was the discovery of the Groningen gas field that one owes the establishment of long-term gas contracts and their indexation to the price of oil. The Dutch government and the companies Esso and Shell estimated that fixing prices in this manner would guarantee the necessary large investments.

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Ever since, the market value of exported gas to a given country has been determined by the price of substitutes (*replacement value*), primarily oil. The value in any importing country is then determined by deducting the fees incurred during transit to the particular client state (*netback pricing*). This explains the differences in the exporting price outside of the producer country. This results in prices that are neither dependent on the consumer country, on the cost of production, nor on transport costs. A price review clause is scheduled in contracts spanning 20 to 30 years in the event that the price of substitutes changes (*price review clause*).

In long-term contracts, it is the client who assumes the risks associated with quantity, while the producer takes on those of price (*pay or take*), which it cannot influence. This system, which was established in 1962 and was largely adopted throughout the world, thus creates a situation where gas prices are unrelated to supply and demand. As a world gas market does not exist, long-term contracts thus reflect world oil prices.

The initial objective to establish a viable gas market in the face of oil's dominance, using long-term guarantees and transparent prices, was accomplished in the 1970s. These instruments continue to be used in creating new infrastructure. Infrastructures are only constructed (this goes for LNG as well) when all production is sold through long-term contracts. The debate surrounding a "Gas OPEC," prompted by Russia in 2007, does not appear to be very plausible. It would assume the cancellation of all long-term contracts, which is not in the producer's interests.[60] As a case in point, following are examples of the end dates of long-term contracts between Gazprom and EU operators: GDF in 2030, E.0N in 2036, ENI in 2035, and OMV in 2026.[61]

2.4 Prices and the Race for Hubs

Most of the gas consumed in Europe is subject to long-term contracts, with however the exception of some wholesale natural gas markets.[62] These include Bacton in the UK (National Balancing Point), as well as Zeebrugge in Belgium. The quasi-totality of EU exchanges pass through these two hubs (Chevalier and Percebois 2007, p. 97), and through smaller ones such as the TTF in the Netherlands, Emden-Bunde in Germany, Baumgarten in Austria, and the PSV in Italy. These latter correspond to gas pipeline arrival points

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[60] For a detailed debate over the price of oil and gas, see Energy Charter Secretariat, Putting a Price on Energy, Brussels 2007, <www.encharter.org/index.php?id=218;> and for the debate over a 'gas OPEC' Finon (2007). The proposal of indexation of gas to an energy basket (a bit like the ECU), Chevalier/Percebois 2007.

[61] Percebois 2007

[62] For gas prices since "Groningen," see the section in Chapter I

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in the north and east. As prices on the European continent are governed by the Groningen approach, and the UK and the US follow spots prices, interconnectors consequently led to the arrival of 'free gas' on the European market, and the emergence of a gas market, limited as it may be. As explained by Jean-Marie Chevalier, an interconnector "creates a link between two markets based on different approaches."[63] While prices in the UK depend on supply and demand, the Continent's approach promotes indexation to the price of oil. We are currently witnessing increased competition between the sites mentioned above for first place amongst European gas exchanges and important hubs. There are also debates concerning changes to gas prices with propositions such as a Gas OPEC (Putin) or even indexation to an energy basket (Chevalier/Percebois 2007) or to coal (Chinese proposition). A change in the gas-oil indexation approach would effectively put these two hydrocarbons in competition with each other and put an end to their alignment, leading gas hubs to then play a very important role. A decision on these major changes to the Groningen system will be up to producers and their ability to reach a consensus.

3. EU Actions in Regard to Gas and Oil Infrastructure

This study must include a brief summary of the major Community interventions in infrastructure, simply because it constitutes a determinant factor in the contexts surrounding planned project. At the same time, an extensive and detailed presentation would go beyond this study's parameters. Europe's energy policy holds an increasingly important place on the European agenda, ever since the gas conflict between Russia and Ukraine in 2006, and the European Council a few months later on March 8, 2006. The Commission's Green Paper advocated "secure, competitive, and sustainable energy," with one of the main elements being an external energy policy that should also direct relations with foreign suppliers. On January 10, 2007, the Commission underlined in a communiqué that energy had become a central element of all EU foreign relations. Finally, on May 10, 2007, the EU proceeded in creating a new high-level group, the Network of Energy Security Correspondents (NESCO), which would act as an alert mechanism, notably concerned with the EU's eastern borders. Supply diversification, security of supply, and energy efficiency, just to name a few, have become new concerns. Interconnectors and energy policy are mentioned in the Reform Treaty, unlike the European Constitution Treaty, and policy makers were named in September

[63] Chevalier, 2004: 289

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2007 to ensure their implementation.[64] Currently, there is a large-scale reshuffling of the European energy market, which is being closely followed by supply countries such as Russia and Norway. Indeed, all changes to conditions in the Community framework alter *a fortiori* exchange conditions. In addition to these internal changes, the question of energy will for the first time be a part of the Partnership and Cooperation Agreement (PCA) between Brussels and Moscow. This EU-Russia energy dialogue was established in October 2006, at Romano Prodi's initiative, then president of the Commission, based on the axiom of growing interdependence between Brussels and Moscow. We are thus witnessing the recent politicization of energy at the EU level.

How does the EU today intervene in the multitude of gas and oil pipeline projects, whether it be directly or indirectly? Firstly, its actions are normative and aim to liberalize the European market. Projects on unbundling transport networks and distribution are included in this area (1). Secondly, the EU aims to create intra-European connections and links (2). Thirdly, the EU identified "priority" projects. They thus believe that infrastructure projects do not only follow "commercial" logic, but are also "political," and that it is therefore necessary to support them by calling them "priority projects" (3). Fourthly, the EU initiated and then supported the creation of the Energy Community of South Eastern European (ECSEE), in order to promote regional energy integration between its close neighbours (4). Finally, the EU is integrating energy issues more and more into agreements with third countries, such as with the PCA with Russia in 2008, and also with countries of the European Neighbourhood Policy (NEP).

3.1 Normative actions, the domestic market, and the impact on third countries

The liberalization of the energy market, a part of the Commission's "third package," hopes to enable competition within Europe's energy sector, with the separation of producers and networks as the key element. While this proposition, which manifests as ownership unbundling in its extreme form, comes up against staunch resistance notably from the German and French governments, non-members states such as Norway and Russia are also indirectly impacted. A 'reciprocity clause' (also known as the Gazprom Clause in Brussels jargon), bans the involvement of all countries or individuals from a third country in liberalized infrastructures, without reciprocity in

[64] Text of the Reform Treaty, available on <www.consilium.europa.eu/uedocs/cmsUpload/cg00014.en07.pdf>

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unbundling, liberalization and preliminary consent, not from the country in question, but from Brussels.[65]

3.2 European Interconnectors

In 1990 in Dublin, the EC put in place its Trans-European Transport Networks Policy (TEN-T), which opened up the possibility to cooperate with third countries in the energy sector. The EU hopes to support both the construction of new transnational gas pipelines and to increase the number of LNG terminals in order to diversify their sources of supply, guarantee supplies in the face of growing demand, and to facilitate gas-gas competition, as has happened with the construction of the Bacton-Zeebrugge interconnector.[66] This inter-connector connects two markets, each directed by nationalistic thinking. Bacton-Zeebrugge is a European inteconnector, an under-water gas pipeline spanning 235 km, completed in 1997 and in service since 1998.

This interconnector has played a considerable role since 1998 because it has put Russian, Norwegian and British gas into competition with each other as well as with LNG. Zeebrugge maintains a key role because of both the arrival of LNG and of the underwater Norwegian pipeline Zeepipe. With Bacton-Zeebrugge came the first natural gas hub in Europe; the two British and Belgian networks were thus connected. Exports through this interconnector doubled between 1998 and 2005.[67] Interconnectors play an important role in the diversification of supplies. Reversible, they allow for the introduction of supplies from diverse sources into the pipes. Russian gas could arrive in the UK by Nord Stream and the BBL.

A second interconnector connecting Bacton (Norfolk) to Balgzand (Netherlands) was put into service in December 2006 and strengthened “free gas” imports to continental Europe. The BBL is operated by Gasunie at 60%, E.ON at 20%, and Fluxys (Belgium) at 20%. At the end of 2007, Gazprom entered in with 9% of the capital to the great dismay of the British, in exchange for Gasunie’s entrance into the Nord Stream consortium.

Table 13. The United Kingdom-Continental Europe Interconnectors

Pipeline	Pipeline Route	Owner/Operator	Length	Diameter	Capacity	In service since

[65] For the debate surrounding unbundling, see Editorial of Susanne Nies, January 2008, <www.ifri.org>

[66] Cf for a detailed list and also the Common Position (EC) interconnector projects n o 1/2006 on December 1st, 2005, decided by the European Council

[67] Source Digest of UK Energy Statistics, UK Department for Business 2007, Chapter 4 on Natural Gas

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			(km)	(inches)	(bcm/y)	
Balgzand Bacton Line (BBL)[1]	Balgzand (Netherlands) - Bacton (UK/England)	Gasunie: 60% E.ON Ruhrgas Transport: 20% Fluxys: 20%	235	36	15	12.1.2006
UK Interconnector[2]	Zeebrugge - Bacton	Caisse de dépôt et placement du Québec: 35% Distrigas: 16.41% E.ON Ruhrgas: 23.59% Gazprom: 10% ConocoPhillips: 10% ENI: 5%	230	40	Zeebrugge - Bacton: 25.5 Bacton - Zeebrugge: 20	10.1.1998

Several countries are currently vying for crucial hub roles, one of them being the Netherlands. Indeed, the depletion of resources at Groningen is diminishing the their strategic energy position, and they are looking to create a new role for themselves, drawing from their experience and infrastructure. Groningen could thus become a gas hub in the North-western European markets, especially if Nord Stream is constructed. Baumgarten in Austria is hoping for a similar role in South-eastern Europe, yet this will also depend on the completion of certain projects, notably Nabucco and/or South Stream. The Netherlands have taken several steps in achieving their goal: they are planning three LNG terminals (two at Rotterdam, and one at Eemshaven), participating in the Nord Stream consortium, invited Gazprom to participate in the BBL, and negotiated for a link with Norway.

Interconnector Projects

What is the difference between an interconnector and an “ordinary” gas pipeline? While interconnectors are pipelines, they also have the role of connecting two different systems, perhaps national or price ones. They can be reversible if necessary and change the direction of supply. In the case of a crisis, during temporary shortages, etc., an interconnection thus guarantees supplies to the countries that it connects. Besides the interconnectors mentioned above, the Turkey-Greece interconnector was recently opened, and two more are planned: the Baltic Pipe and one between Greece and Italy, with a length of 800 km, will enter into service in 2011 after construction begins in 2008. These latter projects will do away with thinking based solely on national concerns, an approach that is still evident on European maps. They will allow flows to come or go, enable exchanges in case of an increase in demand on either side, and will eventually lead to the implementation of a European energy policy and increased interdependence. The European Union is vigorously supporting these projects.

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3.3 Priority Projects: The Naming and Politicization of Pipelines

As for the construction of new infrastructure, the Commission decided on a list of ten gas and electricity projects (not oil) of "European Interest," with the goal that seven of them would be up and running between 2010 and 2013. Currently, only Green Stream, connecting Libya and Italy through Sicily, as well as Balgzand-Bacton between the Netherlands and the UK, have begun service. And only the Turkey-Greece section of the Turkey-Greece-Italy pipeline (TGI) is currently working.

The eight other projects are:

Under construction: Transmed II, between Algeria, Tunisia and Italy, through Sicily; Medgas, connecting Algeria and Spain; the Greece-Italy section of the TGI Pipeline;

In the development phase: Nord Stream, between Russia and Germany; Galsi, connecting Algeria to Italy via Sardinia with a branch to France via Corsica; Nabucco 2010.[68]

These infrastructures will increase the EU's import capacity by around 80 to 90 billion m^3, covering between 16 and 17 percent of gas needs in 2010. Why, one should wonder, did Brussels pick the ten projects just mentioned, and according to what criteria, while it neglected others that should obviously be built, such as a project to bypass the Bosporus? And why exclude oil projects? Support for Odessa-Brody (2003), connecting the Black Sea to Central Europe, is another example of poor Community practice, in view of the ensuing events such as the reversal of the flow and the large investments made by the Polish and Ukrainian governments. Should the European Commission intervene in commercial pipeline projects, given that it does not have the financial means to guarantee their completion?

3.4 Initiation of the Energy Community of South Eastern European (ECSEE) in 2005

South Eastern Europe is considered somewhat separate in the European energy picture. Subject to the devastations of war in the 1990s, followed by the creation of new borders, and having limited regional and international trade, the EU must still establish itself here as an 'honest broker' in the energy game. Numerous countries are attempting to gain these countries' involvement in their projects, as is the case for South Stream, promoted by Gazprom and Italy.

The treaty establishing the ECSEE was signed in 2005, with the objective of stabilizing and developing the region. This legally binding treaty covers the gas and electricity industries. The signatory

[68] Cf the Common Position (CE) n° 1/2006 of December 1st, 2005, decided by the European Council for a detailed list and also for the interconnector projects

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countries must conform to European energy legislation and therefore create a market integrated with the EU. The founding members are Albania, Austria, Bosnia-Herzegovina, Bulgaria, Croatia, Greece, Hungary, Italy, Kosovo, the Former Yugoslav Republic of Macedonia, Montenegro, Romania, Serbia, Slovenia, and Turkey. Norway currently hopes to incorporate the organisation.[69] The ECSEE is an independent organization, with its headquarters in Vienna.

4. Future Supplies: Looking to the North, South, and East

How to cope with increased demand?

While Russia seems to be the best positioned to satisfy growing European demand in the future, questions remain however over the possibility of Russia actually competing with it. While its resources are abundant, its increase in domestic consumption was shocking in 2006, accounting for 40% of the global gas consumption increase.[70] Moreover, Russian investments are today directed more towards the acquisition of sections of third-party infrastructure (the latest case being in Nigeria, and even in Bolivia[71]) and the construction of bypassing gas pipelines such as Nord Stream, than in the development of new gas fields. Can this delay be explained by the financially uncertain and volatile environment? There does not yet seem to be a well-established legal-political framework for third-party investments in Russia.

Map 6. Gas Export Potential of the Main Producers to the EU, Switzerland, and Balkan Countries

[69] For a detailed study see Schmidt van Sydow, IFRI 2008 (to appear)

[70] BP Statistical Review of World Energy 2007

[71] Green, Matthew, "Russia's Gazprom is opening doors in Africa by pledging an equal balance between give an take"; Financial Times, 1.5-6.2008:4

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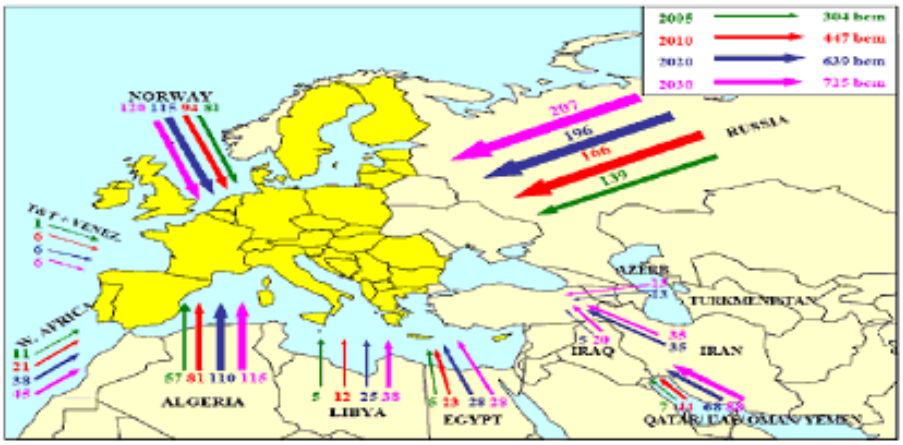
33) 

34) Source: adaptation from OME, 1st Trans-Europan Energy Networks information day, 30 March 2007, available on <ec.europa.eu>.

Faced with disappearing resources – despite some minor discoveries such as the recently found gas field in Hungary with reserves of 600 billion m^3 – the EU and its member states must consider alternative scenarios and supplies. The Caspian as well as Central Asia are the main focus of attention in this respect, although one has to keep in mind Russia's attitude regarding its Near Abroad and the CIS. Debates today are crystallizing around the Nabucco gas pipeline project and its alternative, South Stream. Algeria and the amount of LNG in the energy mix as well as cooperation between the EU and Norway are equally important for the EU. While Iran is regularly brought up in the debate, its increasing domestic demand must be noted, which it will first seek to satisfy before exporting to distant European markets. Iraq should also be mentioned, as it contains important gas reserves in its Kurdish north. But the current political situation makes this option unlikely in the near future, despite the European Commission signing a Memorandum of Understanding (MoU) and the media presenting this as the answer to Nabucco's supply problems.[72]

Beyond the prevailing uncertainties over supplies, there also exists an uncertainty over consumption. The researcher Goetz suggests therefore including European gas consumption forecasts into the EU-Russian dialogue, in order to also reach "security of consumption."

The following paragraphs analyze supplies and projects in the north, east, and south, and will include two case studies on the most discussed projects of the moment: Nord Stream and Nabucco/South Stream.

[72] AFP, April 16th, 2008; Reuters: l'UE et l'Irak se dissent proches d'un accord sur l'énergie, 16.4.2008 ; MoU 4.17.2008

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4.1 Norway and the Baltic Region: Northern Dynamics

Seldom covered by the press, the gas pipelines between Norway and the EU, which were already numerous in the past, continue to develop in a significant way. Four gas pipelines were put into service in the 1990s between Norway and the European continent. These include Zeepipe to Belgium (1993), Europipe I and II to Germany (1995, 1999), and Franpipe to France (1998). In 2006 and 2007 Langeled North and Langeled South were opened, covering 1,200 km up to Easington in the UK. This pipeline, which is the longest in the world, running between Nyhamma and Easington, is considered by London as the most important gas import project for decades to come. A second parallel gas pipeline may follow, according to the Norwegian company.

Table 14. Norwegian gas pipelines

Gas Pipeline	Route	Owner / Operator	Length (km)	Diameter (inches)	Capacity (bcm/y)	In Service since
Europipe I	Draupner E (Norway offshore) - Emden (Germany)	Owner: Gassled Operator: Gassco	660	40	13-16	1995
Europipe II	Kårstø (Norway)- Dornum (Germany)	Owner: Gassled Operator: Gassco	650	42	22	1999
Norpipe Gas	Ekofisk (Norway offshore) -Emden (Germany)	Owner: Gassled Operator: Gassco	440	36	13-16	1977
Franpipe	Draupner E (Norway offshore) - Dunkerque (France)	Owner: Gassled Operator: Gassco	840	42	16	1998
Zeepipe I	Sleipner (Norway offshore) - Zeebrugge (Belgium)	Owner: Gassled Operator: Gassco	814	40	13-15	1993
Langeled (northern leg)	Nyhamna (Norway) - Sleipner (Norway offshore)	Owner: Gassled Operator: Gassco	600	42	20	October 2007
Langeled (southern leg)	Sleipner (Norway offshore) - Easington (UK/England)	Owner: Gassled Operator: Gassco	600	44	20	October 2006
Vesterled	Heimdal (Norway) - St. Fergus (UK/Scotland)	Owner: Gassled Operator: Gassco	350	32	12-13	1978
Frigg	Alwyn North/Frigg (Norway offshore) -	Total	472	24/32	13	1977

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	St. Fergus (UK/Scotland)					
Tampen Link	Statfjord B (Norway offshore) - FLAGS tie-in (UK offshore)	Statoil: 43.9% ExxonMobil: 18.2% Shell: 12.2% StatoilHydro: 10.5% ConocoPhillips: 8.2% Petoro: 7%	23	32	9	October 2007

Other projects, such as a pipeline connecting Norway not only to Denmark and Sweden (Skanled) but also to Poland, have been in discussion since the beginning of the 2000s and promoted by the EU in order to reduce Poland's dependence on Russia, while also developing the gas sector in this country. However, the higher price of Norwegian gas in relation to Russian, and the small size of the Polish market prevented this project from being carried out at the time. The Polish corporation PGNiG did however enter into the Skanled consortium at 15 percent and in November 2007 it signed an agreement with the Dutch company Energinet on a reversible interconnector project (Baltic Pipe).[73]

Table 15. Norway/Baltic Region Projects

Gas Pipeline	Route	Owner / Operator	Length (km)	Capacity (bcm/y)	Estimated operational start-up	Estimated cost (billion €)
Skanled	Kårstø (Norway) - Rafnes - Sweden - Denmark. Exit points are planned at Rafnes (Norwa), Lysekil, Vallby Kile, Bua (Sweden) and Jutland (Denmark)	Skagerak Energi: 20% E.On Ruhrgas: 15% PgNiG: 15% Energinet.dk: 10% Hafslund: 10% Østfold Energi: 10% Göteborg Energi: 8% Agder Energi: 5% Swedegas: 5% Preem Petroleum: 2%	800	maximum 20 (1) 20-24 (2)	October 2012	0.9 (3) 1.1 (4)
Baltic Pipe	Copenhagen (Denmark) - Poland	Energinet.dk PGNiG Gaz-System	250	8-10 (5)	2010	1 (5)
Baltic Gas Interconnector (BGI)	Rostock (Germany) - Avedore (Denmark) and Trelleborg (Sweden)	ENERGI E2 (ex-DONG Energy) Hovedstadsregionens Naturgas (HNG) Verbundsnetz Gas E.ON Sverige Göteborgs Energi Lunds Energi	220	3 in the beginning, eventually 10 (6)	2012	0.232-0.284 (7)

[73] Brower, Derek, "Laying the pipes," Petroleum Economist, October 2007; BBC Monitoring Europe-Political, Supplied by BBC World Wide Monitoring, December 3rd 2007: Visiting Norwegian Minister welcomes Poland as a buyer of gas.

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		Öresundskraft				
Balticconnector	Helsinki (Finland) - Paldiski (Estonia)	Gasum Eesti Gaas Latvijas Gāze Gazprom	80-120	2	2011 at the earliest [8] 2014 [9]	0.1-0.12 [8]
Mid-Nordic Gas Pipeline	Skogn (Norway) - Finland	Pohjolan Voima Oy	880, of which is in: Norway: 70 Sweden: 335 Offshore: 220 Finland: 255	2.8-4.7 [10]	2010 at the earliest [11]	1 [10]

35) Gassco/DNV
36) Energinet.dk
37) Gassco
38) EIA
39) Lang
40) Nord Stream
41) BGI in 2001
42) Gasum
43) BFAI
44) PVO
45) PVO in 2012
46)

A first treaty had been signed in 2001, but was not followed through on. The final decision for the project will be made in 2009 by the consortium, which includes Scandinavian corporations, E.ON Ruhrgas, and the Polish compagne. Operation may possibly start in 2012, as is the case for the other planned extensions to interconnectors and networks in the Baltic region. It is important to note that Denmark would like to use the gas pipeline in both directions to allow for the import of Russian gas.

EU representatives continue to highlight Norway's importance as a supplier but also as a development partner in Europe's energy policy and for technological advancement.[74] Norway's energy industry recently experienced an important shake-up with the merging in October 2007 of two historic companies built on the discoveries of the 1960s. StatoilHydro, the new 'energy champion,' present in 40 countries, producing 1.7 million barrels of tonnes of oil equivalent per day, and having 6.2 billion tonnes of oil equivalent of proved reserves originating for the most part in Norway, seems a bit oversized for little Norway.[75]

StatoilHydro is present in Azerbaijan, Algeria, and Angola. The cooperation initiated with Gazprom is closely followed by the EU and focuses on the exploitation of reserves in the Barents Sea, but more generally on the creation of a strategic alliance. In fact, StatoilHydro and Gazprom share many similarities. They are both national companies benefiting from large, available national resources and both have turned towards the Community market. Germany is the main client of

[74] Joint declaration between Adris Piebalgs, European Energy Commissioner, and Ms. Thorwild Widvey, Norwegian Oil and Energy Minister, 7.6.2005; or 2.2.2007 on cooperation in the area of carbon capture and storage. Norway is in the midst of construction such infrastructure at Mongstad, which will be operational in 2014.
[75] Wyngrove, Martin, "The Vikings are coming," Lloyd's List, 10.9.2007

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both companies. Thus, a strategic partnership between them would have a major impact on dynamics within the gas market. Furthermore, since October 2007, StatoilHydro has held a 24%[76] stake in the development of Shtokman along with Total (July 2007, 25%). For the Russians, the Norwegians' entrance assures the technical competency of Arctic exploitation. They proved this with the opening of Snohvit and Hammerfest.

One could question the evolution of this relationship between two large European suppliers. If at first they developed parallel to each other (with the Western market being Norway's priority, while that of Central and Eastern Europe was principal for the USSR, as well the opposed ideological systems), the post-Cold War period has clearly brought them closer together. The two countries are equally concerned by the Community's policies such as unbundling and taxation, even though one is a part of the European Economic Area (EEA) and the other is not. The renewed EU-Russia partnership however is planning a renewed focus on energy. Russia and Norway, neither being members of OPEC, share an interest in maintaining 'reasonable' prices and avoiding excessive supply on the European market. But rivalry also exists between the two. As the example of Poland and its choice between the East and North showed, the Norwegians negatively receive overly close relations between the EU and Russia.[77] Finally, it is necessary to highlight the very different geopolitical roles of the two countries, between an immense Russia with global ambitions, and a smaller Norway with aspirations for a regional role.

Arctic Resources, Shared between Russia and Norway

In 1984 the giant gas field of Snohvit was discovered (Norwegian side) and those of Shtokmanovskoye, Ledovoye, Ludovskoye (USSR, then Russian side). These Barents Sea resources possessed by Russia (80%) and Norway (20%) are estimated at more than 5,000-6,000 million tonnes of oil equivalent (mtoe), gas and oil combined. To this day, only the Snohvit fields have been developed and exploited, with the opening in 2007 of the Hammerfest LNG plant. There is a territorial dispute between Russia and Norway over an area that holds as many oil and as gas ones.[78] Shtokman, discovered in 1988, is located 555 km from the cost. This field, with an area of 1,400 km^2, holds gas reserves estimated at 3,8 billion $metres^3$.

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[76] Entrance following the merger in October. Cf the news of 10.24.2007

[77] Austvik 2006: 24

[78] Austvik 2006: 19: The dispute concerns the maritime demarcation of the economic zone and continental basement. While Norway proposes the median line, Russia prefers the idea of a sectorial line. The difference concerns 175,000 km2. Negotiations have been ongoing for 30 years. Russia proposed joint sovereignty as a solution, but Norway will accept cooperation only after determining the border. A temporary agreement was made for fishing in the area in 1978, which gives both parties the right to inspect boats in the zone.

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However, 20 years after its discovery a definitive development plan is still not in place.[79] Shtokman should eventually supply the Nord Stream pipeline to make up for the decline in Siberian reserves. Gazprom had initially envisioned supplying the North American market by LNG carriers.

4.2 Russia and the CIS

This section introduces questions relating to Europe's Russian gas supply and then continues in a geographic manner. The Nord Stream case study concludes issues of the 'North,' while the controversy surrounding South Stream and Nabucco wraps up those of the Caspian region.

Russia, having the largest gas reserves in the world with 50,000 billion m^3 proved, currently exports reserves mostly from Western Siberia, and is the most important EU supplier. After declines in economic production and an unprecedented political crisis in the 1990s, Russia seems to be making a comeback. In terms of gas production, in 2006 Russia for the first time passed its 1991 levels (650 billion m^3). While Siberian reserves make up more than 90% of Russian exports, Eastern Siberia and the Far East are only beginning to be exploited. In order to remain at the current level of production, the development of new fields is crucial, in Western Siberia, on the Yamal Peninsula, as well as Shtokman. The potential for Russian exports is largely influenced by its domestic consumption: two-thirds of its gas is consumed domestically, since the country opted for gas instead of coal or nuclear during the 1980s (the "gas pause"). Current Russian growth naturally goes hand in hand with an increase in domestic consumption, heightened even more so by very poor energy efficiency, no economic encouragement to change this fact, and domestic prices remaining low. To summarize, numerous authors thus doubt Russia's ability to satisfy the growing EU demand.[80] Russia must thus rely on gas from Central Asia and pursue a strategy that assures deliveries from Turkmenistan, Uzbekistan, and Kazakhstan. The 'OPEC gas project' also falls into this thinking. This project was presented by Vladimir Putin at the start of 2002 and aims to create a "Eurasian alliance of gas producers," thus grouping the four countries noted above, and intended to counter the Community's attempts to liberalize the gas market beyond its borders.[81] As for competing consumers of Russian energy, there are currently no gas pipelines going to the East. LNG projects and gas pipelines have been planned to transport gas to Japan, and another pipeline from Kovytka, west of Baikal, would supply China. However, these projects

[79] Also see Godzimirski, Russia NEI Visions 25

[80] See for example Tönjes/Jong 2007: 8; or Goetz 2004: 24.

[81] For the debate over a Gas OPEC, see Goetz 2004: 24-25

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are currently not far along and it is appropriate to question Russia's general LNG ambitions. The abandonment of an LNG project on February 8, 2008 in the Baltic region indeed appears rather telling. Does this translate into a preference on the part of the Russians for gas pipelines and the European market?[82] These assessments, at the very least, contradict Russia's LNG commitments in the coming years. While certain observers view Total's entrance into the Shtokman consortium as a sign that Russia wishes to benefit from French know-how in the LNG field, others emphasize Russia's enormous lag in this area.[83] Table 15 summarizes existing and planned routes for Russian gas exports in 2006 and projected for 2012.

[82] Asian projects : Goetz 2004: Bradshaw 2006; "Gazprom gives up a project to produce LNG in the Baltic region", Estweek, Warsaw, 2.13.2008

[83] Kupchinsky, Roman, "Russia : Gazprom Looks to a LNG Future", 7.16.2007, RFE/RL

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Table 16. Russia's Gas Export Routes to Central and Western Europe (in bcm)

Pipeline	Route	Capacity 2006	Capacity 2010	Capacity 2012
Brotherhood/Union (Soviet pipeline grid)	Russia – Ukraine - Central Europe	130	130	130
Polar Lights (Soviet pipeline grid)	Russia – Belarus – Ukraine – Central Europe	25	25	25
Trans-Balkans (Soviet pipeline grid)	Russia – Ukraine – Balkans	20	20	20
Finland Connector (Soviet pipeline grid, extended in 1999)	Russia – Finland	20	20	20
Yamal-Europe (in operation since 1999)	Russia – Belarus – Poland – Western Europe	33	33	33
Blue Stream (in operation since 2002)	Russia – Black Sea – Turkey	16	16	16
Nord Stream pipeline (if operational in 2010 and 2012, respectively)	Russia – Baltic Sea – Germany	-	28	56
South Stream (if operational in 2012)	Russia – Black Sea – Bulgaria – Austria/Italy	-	-	30
Total export capacity to Central & Western Europe		244	272	330

47) Source: Heinrich 2007: 87

Concerns over Direct Links

As was already mentioned regarding oil, using the Primorsk example, Russia's strategy consists of promoting direct links, even if the price is higher than using the existing networks, or the construction of parallel gas pipelines, such as Yamal II. This approach is interpreted as one of the consequences of the Russia-Ukraine and Russia-Belarus conflicts in 2006, 2007, and 2008, to mention only the most publicized transit crises, and which gravely damaged Russia's image as a reliable supplier. As opposed to oil pipelines, extensions and increases in capacity are still possible for Russian gas pipelines. At the same time, no infrastructure currently exists for LNG. While the EU shares the same concerns over direct links and avoiding "problem countries," it nevertheless finds itself in a dilemma over the solidarity expected of it vis-à-vis new member states and neighbour countries.

As a legacy of Soviet times, Russia had only one small, direct gas pipeline, connecting it to Finland. All others were transit pipelines, before the construction of the underwater gas pipeline opening the way to the Turkish market –overestimated at the time– through the

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Black Sea. In the 1990s, only two gas pipelines were constructed: Yamal, through Belarus and Poland, which for the first time bypassed Ukraine, and Blue Stream. All others date to before 1990, as table 16 illustrates. The table also reveals the extreme dependence Russian exports have on the Ukrainian transit state.[84] Yamal is the subject of a detailed study to which the interested reader will be referred.[85] Here only aspects that concern the Polish market will be discussed.

Yamal, Ukraine, Poland and BASF

It is important to highlight that the financial conflicts between Russia and Ukraine over transit date back to the 1990s. The Ukrainian state, unable to collect taxes and to charge for energy, did not pay Russia for its consumption and thus accumulated a large debt. Russia responded by not paying the greatly rising transit fees. Gazprom's distrust vis-à-vis Ukraine led it to design bypassing gas pipelines. Yamal, Nord Stream, and also Blue Stream are the manifestation of this will.

While Druzhba passed through Poland, and a small part of Soviet gas reached Poland through a pipeline that was built in 1949, all Soviet pipelines that were constructed in the 70's and 80's bypassed this country, not only because of pre-existing infrastructure in Ukraine but also for political reasons. Moscow's preferred route was Ukraine and then Czechoslovakia. Unlike other satellite countries, Poland thus did not participate in gas flows, but substituted coal for gas.[86] Several factors favoured the construction of Yamal, also called the Belarusian connector, which took Russian gas through Belarus and Poland to Germany. Yamal reflects commercial and competitive thinking, since BASF, one member of the consortium and the largest industrial consumer of German gas, wished to put an end to the Ruhrgas monopoly, an interest that Gazprom shared for other reasons.[87] The Russian objective to decrease dependence on Ukraine was a second argument, and the desire to supply the Polish market was a third. As for Poland, it was ambivalent, split between the fear of newfound dependence on Russia, and the desire for cleaner energy than coal. And finally, Yamal, as was later case with Blue Stream, turned out to be a temporary commercial failure for Moscow, the Polish market having been largely overestimated and gas failing to rivalling coal

[84] For the Russian-Ukrainian energy relationship and the conflict in January 2006, see analyses of Dubien (2007) and Pleines (2006)

[85] Victor/Victor 2006, Bypassing Ukraine: Exporting Russian Gas to Poland and Germany, in : Victor, Jaffe, Hayes 2006

[86] For Soviets routes and debates see Victor and Victor (2004), The Belarus Connection : Exporting Russian Gas to Germany and Poland, Working Paper 26, Institute for Public Policy; Program on Energy and Sustainable Development Stanford University

[87] There is a detailed presentation of the Yamal project in Victor and Victor (2004), and which calls Yamal the Belarus Connection

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there.[88] In Eastern Germany there was a very different evolution, where unification (and massive subsidies) brought about a quasi-immediate change from coal to gas.

Table 17. Gas pipelines Between Russia and Europe via Ukraine, Belarus, and Finland

Pipeline	Route	Transit Countries	Owner / Operator	Length (km)	Capacity (bcm/y)	In service since
Yamal-Europe	Torzok/Yamal (Russia) – Frankfurt (Oder) (Germany)	Belarus, Poland	Russian and Belarusian parts: Gazprom Polish part: EuRoPol Gaz: Gazprom: 48% PGNiG: 48% Polish Gas-Trading S.A.: 4%	4,187, of which is in: Russia: 2,932 Belarus: 575 Poland: 680	31 (1) 33 (2) 35 (3) 33 in Belarus, 20 in Poland (4)	Belarus-Poland: 1997 Russia-Belarus: September 1999
Northern Lights / Beltransgaz / Siyaniye Severa	Russia – Ukraine	Belarus	Russian part: Gazprom Belarusian part: Beltransgaz		25 (4) 14 in Belarus (5)	
Finland Connector	Russia – Finland	-			20 (4)	1973, enlarged in 1999
Bratstvo (north)	Russia – Germany	Ukraine, Slovakia, Czech Republic, Austria	Gazprom for the Russian part		30 (4)	
Bratstvo (south) / Trans-Balkan	Russia – Turkey	Ukraine, Moldova, Romania, Bulgaria	Gazprom for the Russian part		20 (4)	
Urengoy	Urengoy (Russia) – Germany/Austria	Ukraine, Slovakia, Czech Republic	Gazprom for the Russian part	5000	40 (4)	
Progress / Yamburg	Russia – Ukraine	-	Gazprom for the Russian part		30 (4)	
Soyuz / Orenburg	Russia – Ukraine	-	Gazprom for the Russian part		30 (4)	

48)

49) EIA

50) Gazprom, Yafimava/Stern

51) Lang

52) Victor & Victor

[88] For details on the error in estimations of the Polish market in the 1990s, see Victor/Victor 2004: 27. The estimation that the Polish market could in 1993 absorb around 10, and in 2010 around 20 billion m3 proved to be wrong: in reality Poland consumed only 11,4 billion m^3 in 2001. Traditional production using coal was much less expensive for the Polish economy.

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53) Yafimava/Ster

4.3 Case Study: The Nord Stream Project

Nord Stream is a gas pipeline project of around 1,200 km offshore, connecting Vyborg, Russia to Greifswald in Germany. It has caused debate and controversy in Europe since 2005 because it bypasses Central European countries and conjures up the nightmares of the Russian-German ententes. Agreement on the project was reached in the fall of 2005, between Chancellor Shroeder, today president of the Nord Stream Administrative Council, and the Russian president Vladimir Putin.

In reality, this project is not new. The connection was first made in the early 1990s through a Soviet-British joint venture (Sovgazco) which foresaw the UK as a consumption market. British gas demand was indeed in full swing after the liberalization of the electricity industry, with demand at around 55 billion m^3 per year. The idea however was finally abandoned over a lack of confidence in Gazprom and the high costs of the project.[89]

Nonetheless, Nord Stream is perceived as an important means to guarantee Western European supplies, and extensions from the pipeline are planned to the Netherlands and the United Kingdom, in order to connect to the European network. In order to alleviate transit countries' concerns, especially those of Poland, the Merkel administration proposed an interconnector to Poland. This proposition had been rejected by Warsaw at the time, whose nightmare lies in finding themselves "at the end of the pipe" (of the Yamal pipeline but also the less-used Druzhba, if a link is constructed to Primorsk), with the risk of seeing its supplies cut to the advantage of German and Western European clients. A German-Russian-Polish rapprochement nonetheless seems to be under way, since the liberal Tusk's rise to power, and the resignation of Prime Minister Jaroslaw Kaczynski.[90] The EU put Nord Stream on its priority projects list, along with Nabucco in December 2000, while giving it the status of a trans-European network project.

What about this project? When will it be operational? Is Nord Stream still vital if one considers alternative projects such as a Yamal II gas pipeline parallel to the pipeline that was opened in 2005, or the Amber project? Is Nord Steam a means of coping with potential consumption competition from the US? What should one think of the Norwegian proposal to use its infrastructure?

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[89] Victor/Victor 2004: 32

[90] Poland Business Wire, December 14th 2007, Evaluation of "Amber" overland gas route important; The Polish Prime Minister's visit to Moscow in February 2008

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The Facts: Nord Stream – history and status quo

Table 18. Nord Stream Gas Pipeline

Pipeline	Route	Owner / Operator	Length (km)	Estimated operational start-up	Estimated cost (billion €)
Nord Stream	Vyborg (Russia) – Greifswald (Germany)	Gazprom: 51% Wintershall:24.5% E.ON Ruhrgas: 24.5% Since 2007, 9% for Gasunie, a reduction of E.ON and Ruhrgas to 20% for each	1,200 (offshore)	1st pipe: 2010 2nd pipe: 2012	5 (1) 8 (2) 9 (3)

54) Nord Stream

55) Schröder in December 2007

56) BASF in November 2006

57)

The project was started with a feasibility study in 1998 under the name North Transgas and North European Gas Pipeline (NEGP) and was led by a Russian-Scandinavian consortium including Fortum, Gas Oy, and Gazprom. This project was at first abandoned but then taken up again in 2004 by Gazprom alone. Gazprom allied itself at the end of 2005 with two German companies, BASF and E.ON, to create the corporation under the title Nord Stream AG, headed by Mathias Warnig,[91] with headquarters in Zug, Switzerland. At the same time, the Russian company dropped the notion of exporting resources from Shtokman to the North American market, focusing instead on the European market. Since then, feasibility studies have been carried out, notably focusing on potential routes and ecological and security issues in the Baltic Sea, a cul-de-sac sea with major ecological problems. The presence of chemical residue and weapons dating from WWII adds to them. The signing of the declaration of intent on September 8, 2005 in Berlin was highly publicized because of the planned bypassing of Belarus, Poland, and Ukraine, through which all other Russian gas pipelines to Western Europe pass. The consortium made up of Gazprom (51%), BASF-Wintershall, and E.ON (each with 24,45% up until November 2007, and then down to 20%), was enlarged on November 7, 2007 with the Dutch company Gasunie participating at 9% (and a reduction of the two German companies' share following this entrance). In exchange for Dutch participation,

[91] A controversy in Germany in Fall 2005 concerning notably the Stasi past of the CEO Warnig

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Gazprom entered (in a gas pipeline monopoly kind of way) into the BBL interconnector with 9% of the capital. The Dutch company's entrance, but also the interest shown by the companies Centrica (UK), Distrigas (Belgium), and Repsol (Spain) has improved the image of the project, before thought of as "German." The signing of a contract with Saipem, a subsidiary of ENI (Italy), for the construction of the under water section of the line took place in February 2008. Contracts have been signed[92] for all 27,5 billion m^3 of the first gas pipeline.[93]

Nord Stream will include two pipelines and will eventually transport 55 billion m^3 per year. Gas is compressed at the Vyborg station and arrives in Greifswald, with a service platform at kilometre 543. The two gas pipelines, running 1,200 km, pass through Finnish, Swedish, and Danish Exclusive Economic Zones (EEZ), as well as through territorial waters belonging to Denmark north west of Bornholm. Once the project was declared a Community interest, other countries rallied around it, including the Netherlands who hopes be involved by providing a hub, and would like to see the pipeline extended to Groningen and from there through the BBL interconnector to the UK. The construction of the onshore gas pipeline, the link between the production fields and Nord Stream, already began on the Russian side, leaving from the Yuzhno Russkoe field, from where the first gas supplies will come.

Start-up for the first gas pipeline was initially planned for November 2010, with the second pipe operational beginning in October 2012. The start of construction on the offshore section was pushed back from 2008 to July 2009. Once the gas arrives in Germany, it must be transported through Germany territory, through two other gas pipelines called NEL and OPAL; both should be operational by 2010. NEL (with a capacity of 20 billion m^3) will transport gas to Western Germany and the Netherlands while OPAL (with a capacity of 36 billion m^3) will supply Bavaria and the Czech Republic. Wingas and E.ON will construct these two gas pipelines.

Nord Stream is today experiencing difficulties related to the dramatic increase in the price of raw materials, notably steel. Management changed their estimation in December 2007, putting costs at 8 billion euros, instead of the original figure of 5 billion.[94] The schedule is also facing hold-ups over resistance from affected countries. For example,

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[92] Contracts signed: DONG (Denmark) 1 billion m^3/year, with an option to increase; E.ON Ruhrgas 4 billion m^3; GDF 2.5 billion m^3; Gazprom Marketing and Trading (United Kingdom) 4 billion m^3; Wingas 9 billion m^3; Source: Antasz 2007

[93] Paszyc, Ewa, Loskot-Strachota, Agata, Lukasz Antas, "Nord Stream: The Current Status and possible consequences of the project's implementation," in: East Week, Analytical Newsletter 39/104/ 11.14.2007, Poland

[94] Süddeutsche Zeitung, 12.14.2007 : Ostsee-Pipeline wird teurer ; Betreiber-Konzerne müssen für umstrittenes Projekt mehr zahlen.

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an environmental study, obligatory for this type of project, was turned down by Estonia. Nevertheless, according to Sebastian Sass, representative for Nord Stream AG, the project will still be completed by 2010 as planned, with 1,200 km to be built in 400 days at the rate of three kilometers per day. At the beginning of January, Nord Stream AG announced the start of deliveries in 2011.

Nord Stream's raison d'être

According to Nord Stream AG analysis, the estimated lack of European supplies by 2015 could be satisfied as follows: beginning in 2015, Norway will supply 20% of gas, Nabucco[95] some 20-30%, and Nord Stream the remaining 55%. Nord Stream will first be supplied by fields in Eastern Siberia, and Shtokman will then replace them beginning in 2015.

The Nord Stream Controversy

The following critiques of Nord Stream have been expressed: the bypassing of new member states and notably the German-Russian relationship vis-à-vis Poland; ecological concerns; economic issues and its sustainability compared to alternatives such as Yamal; and the role of the Russian military in the pipeline's security.

For the first argument, bypassing new member states, the debate surrounding construction of Nord Stream first concerns Russian-German intentions, perceived (again) as being motivated by a disregard for small countries, arrogance by the large ones, and a reestablishment of the historic alliance between Moscow and Berlin. The fact that this project was presented after and despite the entrance of eight Central European countries into the EU in 2004, and that the Social-Democratic government of Gerhard Schröder made its preference for Russia clear, only aggravated the situation. The arrival of the Angela Merkel administration, which was clearly for improved cooperation with Central Europe and greater distance from Moscow (but not against the Nord Stream project), was not enough to improve the very tense climate because of the anti-German and anti-Russian campaigns of the ultra-conservative Kaczynski twins in Poland. Nonetheless, the integration of Nord Stream into European projects, such as the interest shown by other EU member states, including the UK and the Netherlands, put an end to the serious initial controversy surrounding the project that then appeared to be more European and less German-Russian. The arrival of the Tusk government in Poland in November 2007 improved relations between Warsaw and Moscow on one hand, and Berlin on the other, with a demonstrated will to reach ententes through a trilateral approach. The German and Polish Economy Ministers will together analyze Nord Stream's economic

[95] Sebastian Sass, representative for Nord Stream AG, referred to Nabucco, not South Stream, in his presentation in Helsinki, which itself is interesting. Logically for a project with a majority controlled by Gazprom the preference should be South Stream and not Nabucco! Helsinki November 2007.

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viability. At the same time, the Polish Prime Minister did make it clear that his country would not participate in the project, but instead hopes to create a situation that would allow for a return to Polish transit.[96] His Minster of Economy, Waldemar Pawlak, rejected Nord Stream, because it is, according to him, economically impossible. Instead, he reintroduced the Amber pipeline project onto the agenda (see table 19). This project, like Yamal II, runs over land. Amber goes through Belarus and Poland, and Yamal II goes through two Baltic States and Poland. Amber however has little chance of success. Proposals such as that of Claude Mandil in his report to the French Prime Minister, which suggest that France should play the role of honest broker in the German-Polish negotiations over Nord Stream could show the way out of the current deadlock.[97] The very poor relations between Russia and the Baltic States[98] as well as the Polish ownership of energy infrastructures in Lithuania (which would potentially strengthen Warsaw's position in energy transit) will surely lead Moscow to reject this option. Sweden's recent support of Amber, for so-called ecological reasons, could however reignite the controversy.[99]

Alternatives to Nord Stream

Table 19. Alternatives to Nord Stream

Gas Pipeline	Owner / Operator	Length (km)	Capacity (bcm/y)	Estimated operational start-up date	Estimated cost (billion $)
Yamal-Europe II (western part)	Gazprom for the Russian part, Poland	1600	33 (1) (2)	2010	2.5 (1) 10 (2)
Yamal-Europe II (northern part)	Gazprom	2500	80 (1)		20-40 (1)
Amber					
Norway	Gazprom/Gassled	Will pass through Norwegian infrastructure			

58) Götz

59) EIA

96 Poland Business Newswire 12 December 2007

97 Mandil (2008)

98 See the section regarding this in Chapter II

99 Süddeutsche Zeitung, 11.30.2007 : Nein zur Gasleitung in der Ostsee : In den Anrainerstaaten wächst der Widerstand gegen die geplante Pipeline von Russland und Deutschland

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During a conference in Helsinki in November 2007 and then in Brussels in February 2008,[100] the manager of Nord Stream, Sebastian Sass, clearly expressed that Nord Stream is not an alternative to other projects and that this was not a concern for the company. He also insisted that none of the controversies concerning former German Chancellor Schröder had affected the project. As proof of this, he cited the participation of so many corporations in the project. As for the argument over the high cost for offshore pipelines, he underlined that the long-term costs were much lower, since they were able to save on compression stations that are needed every 200 km for an onshore pipeline, and therefore their protection. In regard to ecological concerns, the company confirmed that the pipeline represents less risk than transport by LNG carrier, and that the problem of weapons at the bottom of the Baltic Sea had been dealt with. A representative from BASF deemed this a minor risk, given that a layer of sediments measuring several meters thick had formed, covering the weapons and the chemical residue, and separating them, when necessary, from the pipes. But he added, this idea hardly appeals to European citizens.

Currently, opposition to Nord Stream is particularly strong in Sweden and Finland, who are contesting the planned route through their Exclusive Economic Zones, including the planned station on Gotland Island (a tourist destination). In early April 2008, the Swedish authorities announced that Gotland was definitively off the table as a base for the project.[101] Nord Stream will have difficulty finding a route that avoids these Finish and Swedish economic zones, since it would be forced to go through Estonian, Lithuanian, and Latvian zones, countries that are even more hostile to the project. One must also not forget about the loss of transit fees that these countries will experience. However, alternative routes were presented by the Finish and Swedish authorities.[102] At the start of 2008, feasibility studies were underway in the five concerned states. Estonia refused the company in charge of the study access in October 2007. The question of its route remains unresolved.

Doubts also remain over the pipeline's supply, since, according to expert estimates, Shtokman will not be operational until 2015, Yuzhno Russkoe's reserves were overestimated, and resources from Western Siberia go through pipelines that are already not used at full capacity. One thus returns to the question of the Nord Stream alternative versus Yamal (I) and to the risk involved in abandoning the latter. Doubts were also raised when the Russian Navy said it wanted to

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[100] IFRI Energy Breakfast, Gas and Oil to Europe; February 27 2008, Susanne Nies, Sebastian Sass, Brendan Devlin, <www.ifri.org>

[101] Directive of Nord Stream AG, April 7th, 2008

[102] Routes on sur <www.ymparisto.fi/kansainvalinen.yva>

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protect the pipeline, a declaration that only created fear and suspicion within the former Soviet Union and the Scandinavian countries.

Outlook for Nord Stream

In 2008, the strongest doubts are over the completion of this project on schedule, less about its completion in general. The two connecting pipelines, NEL and OPAL, for example, have not yet obtained the exemption to the rule over third party access to the European network. Gazprom's participation in a diversified form in the link between Nord Stream and the European network poses a problem. The relationship between E.ON and Gazprom also demands clarification: E.ON claims access to Russian fields, which was its principal condition for participation in this costly project. The agreement with the other Germany partner, BASK, was finalized in October 2007. The exact conditions of the loan were not established, even if a consortium of Société Générale, ABN Amro, and Dresdner Kleinwort were announced as the financial consultants in November 2007. A loan must be signed to enable completion in the second half of 2008.[103]

To conclude, this project is currently a game of multiple unknowns and impossible assessments. If it is completed, its impact on energy links will be very significant, with a direct link to Russia and increased variation in dependency between EU member states.

4.4 Gas Resources in the Caspian and Central Asia - looking in all directions?

As the characteristics of the Caspian Region having already been addressed in the chapter on oil, here only the gas features of the region will be focused on.

The potential gas exporters in the region are Azerbaijan, Kazakhstan, Turkmenistan, and Uzbekistan, each with different reserves. While resources in Uzbekistan are already exploited at 35% and will be difficult to increase, the three others are 'young' producers, whose output will increase in the future. Azerbaijani production, currently at 8.5 billion m^3 will increase to 20 billion m^3 by 2020; Kazakhstan's production is around 26 billion m^3; and Turkmenistan,[104] by far possessing the most resources, produces 67 billion m^3. The average potential of this country, which sends a majority of its exports to Russia (44 billion m^3 in 2006 and 6 billion m^3 to Iran), is 150 billion m^3,

[103] Financing for the project is planned in the following manner: 30% will be settled by the participants, while 70% will be found in the form of a loan, be payed off up until 2032. While the Western partners must pay in cash, Gazprom has the right to finance through other forms.

[104] Source Götz 2007B: 5-6. According to the same source, Turkmenistan's production, at 90 billion m3 at the fall of the USSR, subsequently collapsed, and reached only 20 billion in the 1990s. Since 2001 production has again increased.

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which leaves, with domestic consumption at 17 billion m^3, an enormous export potential. Uzbekistan, who currently produces around 50 billion m^3, consumes, like Kazakhstan, most of its production itself. As for export possibilities, the Caspian countries are able to export in all directions. However, currently there are only gas pipelines to the north and the west, while links to the south and east are absent.

Construction of the BTE and Supply to the East

The first gas pipeline to Europe was opened at the end of 1997 from Turkmenistan to Iran (Kordkuy), currently with 6 billion m^3 transported from Iran to Turkey, a quite insignificant quantity. The Baku-Tbilisi-Erzurum Pipeline (or the South Caucasus Pipeline, SCP), from Baku to Erzurum in Turkey, mostly running parallel to the BTC oil pipeline, was opened in 2007, and from Turkey it supplies the European markets. Designed for 16 billion m^3, its potential could be increased by constructing parallel lines.

The Trans-Caspian: Issues and Debates

In order to strengthen the security of supply, since 1996 the American government has argued in favour of constructing an underwater gas pipeline from Türkmenbaşy to Baku, a project that up until now has failed, due to the Caspian Sea's unclear status.[105] It was frozen in 2000 over Russian and Iranian opposition, despite feasibility studies that were carried out and the fact that Azerbaijan and Turkmenistan had entered into an agreement (1999) on its completion. In 2006, following the Ukraine-Russia gas conflict, the project was brought back up and debated by the European Energy Commissioner Andris Piebalgs and the Turkmen president Niyazov (March 2006). But an indirect set-back occurred with the trilateral agreements in March, and then in May 2007. The Trans-Caspian, a priority for the EU as well as the US, depends however on the direct relationship that the EU is able to create with the Caspian region, as is also the case for supplying its priority project Nabucco. But the political situation of the surrounding countries, except for Azerbaijan, hardly favours such a relationship.

Table 20. The Trans-Caspian

Gas Pipeline	Route	Owner / Operator	Length (km)	Capacity (bcm/y)	Estimated Cost (billion $)
Trans-Caspian	Turkmenistan - Turkey	Botas	1,700	31	2-3 (1)

60) EIA

[105] Janusz 2007 on the status of the sea, or lake: A lake is exploited by a group of countries, the status of sea gives bordering states exclusive zones of 12 miles. While Russian and Kazakhstan came to an agreement in 1998 over their border, and Azerbaijan in 2001, difference persist between Turkmenistan and Azerbaijan, and Iran insists on joint exploitation.

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Following the political changes in December 2006 with the death of the dictator Sapamurat Niyazov, Turkmenistan under Gourbangouly Berdymukhammedov first appeared to be a more open country, and the international conference on energy held in November 2007 appeared to be the proof. However, the signals given by the new president are at the least contradictory. If on one hand he signed a contract with Moscow to increase deliveries to Russia, he also unveiled a new gas pipeline project to China, with a length of 7,000 km - that should be completed in 2009 according to Peking - and invited the largest oil groups to develop fields in his country. Moreover, Turkmenistan will supply, starting in 2009, 30 billion $m^3$of gas to China.[106] Experts believe that Turkmenistan has sold its resources several times over.

As for Kazakhstan's attitude, it resembles that of Turkmenistan, being very pragmatic. According to multiple experts, and following the strengthening of ties with Russia, one should expect an increase in gas prices, a tripartite agreement between Putin, Berdymukhammedov and Nazarbayev. From the meeting in Türkmenbaşy in May 2007 came terms on the extension of an existing gas pipeline as well as the construction of a new one from Turkmenistan and Kazakhstan to Russia.[107] The contracts between Russia and Kazakhstan are good through 2032, and the current Kazakh deliveries of 50 billion m^3 per year will increase beginning in 2010 to 75 billion m^3 transported via Russia.

[106] Russland torpediert die Pipeline Pläne. Stuttgarter Zeitung 4.12.2007

[107] Currently, the return to gas pipelines from the Soviet period seems to be confirmed, thus reinforcing the new links between Turkmenistan, Kazakhstan, and Russia: the coastal Caspian gas pipeline, from Turkmenistan through Kazakhstan to the Urals, needs renovations; its capacity could be increased to 65 billion m3 of gas per year (around 45 today) (Source: Eurasia Daily Monitor, November 26, 2007, Issue 218, West Racing Russia for Turkmen Gas, Vladimir Socor); the Central-Asian gas pipeline to the Urals, from Turkmenistan through Uzbekistan and Kazakhstan to Russia to the east of the Urals, which is also outdated, needs maintenance. This is a line specifically for Turkmen gas. The two gas pipeline projects, even their updates, will allow Russia to take in more than 80 billion m3 from Central Asia.

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Table 21. Gas Pipelines connecting Russia and the former Soviet Republics to Europe via Turkey or the Black Sea

Gas Pipeline	Route	Transit countries	Owner / Operator	Length (km)	Capacity (bcm/y)	In service since
Blue Stream	Izobilnoye (Russia) – Ankara (Turkey)	-	Gazprom, ENI, Botas	1,218, of which is in: Russia: 357 Offshore: 378 Turkey: 483	"design capacity": 16 quantity transported in: 2004: 3 2005: 5 2006: 7 (1) (2) for 2010, 16 is expected (3)	December 2002, official inauguration in 2005
Turkey-Greece Interconnector / Aegean / South European Gas Ring Project	Karacabey (Turkey) – Komotini (Greece)	-	Botas, DEPA	286	0.75 at the beginning, 11 by the end (4) 0.25 at the beginning (5) 12 by the end (6)	11/18/2007
Baku-Tbilisi-Erzurum (BTE) / South Caucasus Pipeline (SCP) / Shah-Deniz-Pipeline	Shaz Deniz (Azerbaijan) – Ezurum (Turkey)	Georgia	Owners: BP: 25.5% Statoil: 25.5% SOCAR: 10% Lukoil: 10% Total: 10% OIEC: 10% TPAO 9%, Operators: BP and Statoil	883, of which is in: Azerbaijan: 442 Georgia: 248 Turkey: 193	6.6 at the beginning could be increased to 20 (1) maximum capacity 30 (7)	12/15/2006

61) EIA
62) energypublisher
63) RFE
64) Biresselioglu
65) NYT
66) Reuters
67) EDM

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Table 22. Gas Pipelines in Development

Gas Pipeline	Owner/ Operator	Length (km)	Capacity (bcm/y)	Estimated operational start-up	Estimated cost
Greece-Italy-Interconnector / South European Gas Ring Project / Poseidon	DEPA 50%, Edison 50%	800, of which is in: Greece: 600 Offshore: 200	8 (1) (2)	2011-2012	1.3 billion $ (1)
Trans-Adriatic Pipeline (TAP)	Elektrizitäts-Gesellschaft Laufenburg and partners	513, 117 of which is offshore	10, expandable to 20 (3)	2011	100-150 million € (3)
Ionian-Adriatic pipeline	EGL, Plinacro	400, of which is in: Albania: 170 Montenegro: 100 Croatia: 130	5 (4)	2011-2012	230 million € (5)

68) EIA

69) Platts

70) TAP

71) Plinacro

72) energypublisher

4.5. Case Study: South Stream or Nabucco? Politicized Projects

Nabucco and South Stream are clearly today's most politicized gas pipeline projects. Are they in competition with each other, or headed towards a possible merger? Most publicized is the "Russia" factor and the fear of Gazprom's expansion. Are the media lagging behind on the possibility that Nabucco and South Stream are fundamentally reconcilable projects? The main concern is over diversifying European supply routes, with different perceptions. The debate is in full swing. This section will look at the Nabucco project, as well as South Stream by focusing on the multitude of determining factors.

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Map 7. Nabucco/ South Stream

73) Source: Bsdp, available on <www.bsdp.org>.

74)

The Facts

In 2006, following the Russian-Ukrainian gas conflicts, the EU put Nabucco onto its list of priority projects. With a length of 3,300 km, investments estimated at around 6 billion euros, and with an expected start up date of 2012, this pipeline aims to supply Western Europe with gas from Central Asia, the Caspian Sea and the Middle East, while completely bypassing Russian territory. But while the aspect of bypassing Russia was emphasized in 2006, when the Russian-Ukrainian crisis was interpreted in Kiev's favour, today it is less talked about amongst experts. The planned route passes through Turkey, Bulgaria, Romania, Hungary, and up to Baumgarten, Austria where it finally connects with the European gas network. Nabucco could become the EU's fourth largest supply source, with 30 billion m^3, or 7% of gas demand in 2010, if one believes the operators and the EU. Considering the strategic importance of this infrastructure, the Commission appointed a coordinator, the former Dutch Minister of Foreign Affairs Jozias van Aartsen, to oversee its completion. The Nabucco project company, led by the Austrian group OMV, includes in equal share Hungary's MOL, Transgaz, Bulgargaz, and the Turkish group Botas, as well as the German RWE. Gaz de France withdrew from the project at the end of 2007. While the French group explained this by citing other priorities, notably African, analysts insist on the Turkish factor: Ankara would have used its veto due to poor French-Turkish relations.[108]

Allow us to here remark on the poetry of names and the marketing of gas and oil pipelines. Nabucco is of course an excellent example: the name Nabucco, Italian name for the Babylonian king

[108] GDF retire sa candidature du projet Nabucco,< www.euractiv.fr>, 19.2.2008

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Nebuchadnezzar, inspires the imagination much more than the technical and sober South Stream. Druzhba, Northern Lights, Enrico Mattei, are examples of much more clever names than Norpipe or Nord Stream.

In a surprise to everyone, Gazprom made known, in mid-2007, its plans for a project with ENI on the construction of an offshore gas pipeline[109] in the Black Sea in addition to the Blue Stream gas pipeline, followed by an agreement in November on a feasibility study to be completed in 2008. The South Stream project was very skilled in securing support and aid from the majority of Nabucco countries: Bulgaria[110], Hungary[111] - whose company MOL is also being threatened with a takeover by the Austrian company OMV[112] -, and also Serbia - whose national energy company NIS is in the midst of a Russian takeover. Gazprom is the de facto entity controlling the Serbian and Bulgarian energy markets.[113] Greece has also signalled its interest in South Stream.[114] This gas pipeline will leave from the Russian Beregovaya compression station and travel over 900 km to Varna, Bulgaria. Its southern branch will then pass through Greece towards southern Italy, and its northern part will go through Serbia, Hungary and Slovenia towards northern Italy, with a branch also going to Austria. The presumed capacity of the pipeline is 30 billion m^3, following a route similar to that of Nabucco, starting in Bulgaria. It could begin service in 2013, and like Nord Stream would have the advantage of avoiding Belarus and Ukraine as well as Turkey. Both of these projects would reinforce Gazprom's dominant position in the European market.

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[109] Gazprom and ENI signed Memorandums of Understanding at the end of 2007, in order to proceed with the first feasibility study of the project.

[110] Dempsey, J., "Pipeline Cements Russia's Hold on Europe's Gas Supply," New York Times, 19.1.2008; Troev, T., "Bulgaria back Putin's Plans for Gas Pipeline to Rival EU's," Financial Tims, 1.19/20.2008.

[111] Wagstyl, S., "Hungary backs Russian Pipeline," Financial Times 2.26.2008; Ria Novosti, "Gas: La Hongrie devient le maillon clef de South Stream," 1.28.2008

[112] "L'autrichien OMV notifie son intention de rachat du hongrois MOL, » AFP 1.2.2008

[113] MacDonald, Neill, "Gazprom raises offer for Serbia oil and gas group," Financial Times 1.16.2008; Mongrenier, J. "La Serbie, point d'appui de la politique balkanique de la Russie;" <www.fenetreeurope.com>

[114] "La Grèce envisage de participer au gazoduc South Stream," <http://www.armenews.com>; declaration made by Gazprom following the visit by M. Medvedev to Athens on March 31st, 2008.

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Table 23. Nabucco *vs.* South Stream

Gas Pipeline	Route	Transit Countries	Owner / Operator	Length (km)	Estimated operational start-up date	Estimated cost
Nabucco	Georgia/Turkey border and/or Iran/Turkey border – Baumgarten (Austria)	Turkey, Bulgaria, Romania, Hungary	OMV: 20% MOL: 20% Transgaz: 20% Bulgargaz: 20% Botas: 20%	around 3,300	2012	around 5 billion € (1) 5.35-5.8 billion $ (2)
South Stream	Beregovaya (Russia) – North Sea – Varna (Bulgaria) – Italy (and Austria)	Bulgaria, Greece, Albania, Ionian Sea or Romania/Hungary/Slovakia or the ex-Yugoslavia	Gazprom, ENI	900 (offshore)	2013	12 billion $ (3) 10 billion $ (4) 10 billion € (5)

75) <*www.nabucco-pipeline.com*>

76) EIA

77) Brower 2007

78) Global Insight

79) Platts

The Nabucco/South Stream Debate – Is it overly politicized?

Several questions emerge regarding the Nabucco project: the gas supply, its actual contribution to European diversification, the positions of EU member states, such as Italy, Bulgaria, Austria, and Hungary, but also Serbia, as well as relations with Russia. What role will Turkey play, a challenging transit country, as stated by the European coordinator van Aartsen and other observers, and if it is bypassed by South Stream? As for South Stream, which is a quite costly project, it is possible that it owes its entire *raison d'être* to Nabucco. In other words, if Nabucco is abandoned or blocked, South Stream will then itself be discarded.[115]

The Debate over Supply

Presently, only around three billion m^3 from Azerbaijan would be completely available beginning in 2015 to supply Nabucco – but currently no agreement has been signed with Baku…Turkmen gas, like gas from Kazakhstan, would require the construction of infrastructure under the Caspian Sea – the Trans-Caspian, which for the moment does not seem realistic. While the EU congratulated itself

115 Thesis notably defended by Vladimir Soco, Eurasia Daily Monitor, Vol 4, Issue 235, 19.12.2007, *Hungary's MoI stays with Nabucco, but prime Minister weighs South Stream also*

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on its agreement with Turkmenistan for 10 billion m^3 of Turkmen gas beginning in 2009, the prevailing belief is that the country has already sold its resources several times over, and that it will not be able fulfil its promises.[116] However, as noted by Pierre Morel, the EU Special Representative for Central Asia, Turkmenistan is in the midst of integrating into the international energy community, and it's necessary to give this newly independent state time for their progressive rapprochement to the international community. Counting on gas from Turkmenistan would moreover require that it gives priority the EU, to the detriment of Russia. However, since 2007, this hypothesis no longer seems plausible. Ashgabat produced around 72.3 billion m^3 in 2007, and itself consumed around 20 billion m^3. At the same time, they must deliver, beginning in 2009 30 billion m^3 to China, and is tied to Russia by delivery agreements.[117] The European Commission moreover reported on April 17, 2008, that it had reached a gas agreement with Iraq, on the delivery of 5 billion m^3 of Iraqi gas.[118] But given the current instability in Iraq, this assumption does not seem likely. As for supplies from Iran, they run up against production uncertainties, the orientation of this production (Europe or Asia?), the Iranian-Russian relationship, and finally, the international climate and the persistent threat of sanctions. Experts at the International Energy Agency such as William Ramsay furthermore estimate that Iran will focus more on developing LNG capabilities, much less than on gas pipeline transport, which will bind it to consumers and thus make it dependent.[119] Iranian gas, to sum up, will not be arriving in the Nabucco pipes anytime soon. New supplies from Egypt will be dependent on new discoveries. Thus, ironically, the gas transported by Nabucco would have to come from countries that it seeks to bypass: Gazprom and Russia.[120] The idea that Gazprom could join the consortium and that the final project would include a part of South Stream, somehow grafted to Nabucco, is at times put forth.

The Debate over Diversification

As for the argument over the diversification of European gas supplies, Goetz highlights that Nabucco will initially account for only some 6-8% of European gas imports, estimated at 400-500 billion m^3 in 2020,

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116 "UE/Energie; l'UE et le Turkmenistan signent un protocole d'accord," Agence Europe, Bulletin n° 9670, 29 mai 2008, p. 16. ;
<http://fr.rian.ru/business/20080415/105072067.html>

117 "Signature d'un protocole d'accord énergétique UE-Turkmenistan," 29.5.2008, Nouvelles d'Arménie en ligne

118 <www.euractiv.com/fr/energie/energie-accord-ue-irak-prend-forme/article-171716>.

119 Interview with the author, May 2008

120 "Laying the Pipes": Petroleum Economist, October 2007: 13

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a calculation that will change only if Iran participates.[121] Iran could thus potentially become the third biggest European gas supplier, after Russia and Algeria. But the Iranian priorities are anything but clear at the moment, energy wastefulness there is quite significant, the country is itself an importer, and a preference for Asia on their part is possible (China, India, Pakistan) in addition to gas cooperation with Russia.[122] Moreover, Iran's industrial base lacks refineries, and their oil is of a poor quality.

The Stance of Participating Countries Notably Italy, Bulgaria, Austria, and Hungary

To the EU's great surprise, the driving countries behind Nabucco found themselves involved with both the South Stream project, by means of ententes and contract projects linking them to Gazprom, and involved with Nabucco. On January 25, 2008, the Austrian company OMV reached an agreement with Gazprom on joint exploitation and development of Baumgarten,[123] constituting a strategic base of expansion in Europe for Gazprom. It is ironic that this will consequently lead to the gas that bypasses Russia arriving again in an infrastructure that it controls half of.

As for Hungary, whose national company MOL fears a takeover by OMV, is itself connected to Gazprom while supporting Nabucco as much as South Stream. In December of 2007, Budapest formally confirmed is participation in the South Stream project.[124] Serbia, whose national company NIS is not participating in Nabucco, signed an agreement in December 2007 on an energy partnership with Gazprom. From the terms of this accord, Belgrade will receive gas supplied by South Stream that will pass through Serbia in exchange for Russian participation in NIS and stockage facilities in Serbia.[125] The strategic participation of ENI, whose CEO called South Stream "the third pillar of the strategic agreement with Gazprom," speaks even louder.[126] Intense Italian lobbying is underway to convince the

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[121] Götz 2007 B:24

[122] cf Meeting of Iranian and Russian Energy Ministers in December in Moscow, agreements on civil nuclear energy, etc. Work of C Therme, IFRI

[123] cf "Austria's OMV Deal with Gazprom threatens Nabucco project," Eurasia Daily Monitor, Vol 4, 215. Baumgarten is actually the third EU gas hub, owned by the company CEGH (Central European Gas Hub), 100% OMV. The proposal consisted of letting Gazprom in at 50% of the capital; Arnaud, Michel, "La stratégie Gazprom," in *Valeurs actuelles*, 2.22.2008

[124] Grainge, Zoe, "Hungary Officially Joins Gazprom and Eni's South Stream Line." Global Insight 10.12.2007. "Pour la position et politique énergétique hongroises" cf aussi la publication de Fischer 2007.

[125] Boggle, Salle, "Serbian Energy Partnership Agreement with Russia for South Stream Pipeline, Storage," Global Insight 12.14.2007

[126] Cited from Petroleum Economist, "Laying the Pipes," october 2007 :13 ; for the agreement cf "Gazprom, Eni move South Stream step closer," Platts Oilgram News, 11.23.2007.

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countries participating in Nabucco, such as Romania, to join South Stream.[127] The regional political context, including the independence of Kosovo, reinforced Russia's influence, notably in Serbia, but also in Romania and Bulgaria.[128]

These behaviours destabilized not only the Nabucco project, but above all the Community's position. If a project is declared to be Community priority yet the participants join with the opposing camp, the credibility of the aforementioned common project is lost, which hurts Europe's energy policy. But here we come to the dilemma: does making a decision on an energy link fall into the moral sphere, especially if a strong Europe based around energy is only in its the beginning stages? Is it not, on the contrary, necessary to give priority to the emergence of this unified Europe, by accepting for the moment that others must make decisions for their own benefit? The paradox is there, reinforced by the public-private dimension, which proves that a gas pipeline could never result from a purely political approach.

In April 2008 Vladimir Putin offered Romano Prodi the position of CEO of the South Stream management company, as the former chancellor Schröder took with Nord Stream. Prodi refused – conversely, one can only imagine the disastrous effects on a fledgling European energy policy if these political leaders accepted positions in companies such as Gazprom.[129]

White Stream, another Option?

The Ukranian Prime Minister Yulia Tymoshenko, at the start of 2008, returned to another project, the White Stream pipeline, or "Ukrainian."[130] This project was presented to Brussels as an alternative to Nabucco, going through Georgia by the Crimea to Ukraine and then on to the EU. A linkage to the Iran-Armenia gas pipeline is also a possibility, even though this pipeline, which opened in 2007, operates only on a very reduced scale.

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[127] Conference of January 11, 2008 with the Romanian Minister of Foreign Affairs, Adrien Ciorianu, IFRI Paris. The Minister spoke of meetings in the beginning of January with the Italian Minister of Foreign Affairs d'Alema on this subject, as well as the South Stream Conference of January 15, 2008 in Sofia.

[128] Some observers speak of a Russian return to the Balkans; "Russia's Return to the Balkan," Eastt Week 3/112, 1.23.2008, Varsovie; Martens, M., Gasprom kommt, Die Russifizierung des serbischen Gasmarkts, FAZ 1.28.2008

[129] Guy Dinmore, « Prodi Declines Putin's Offer of Pipeline Post », *Financial Times*, 29 avril 2008, p. 5.

[130] Gaz: Timochenko préconise un « Ukrainian Stream », Ria Novosti, 30.1.2008 ; « Wir brauchen neue Transitwege für Ga », FAZ Interview with Ms. Timochenko, 30.1.2008

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Table 24. White Stream

Gas Pipeline	Owner/Operator	Length (km)	Capacity (bcm/y)	Estimated cost (billion $)
White Stream / Georgia-Ukraine-EU (GUEU)	New-York Consortium: Pipeline Systems Engineering (PSE) Radon-Ishizumi consulting	950, of which is in: Georgia (Tbilisi - Supsa): 100 Offshore: 650 Ukraine: 200	8 at the beginning 24-32 if connected to the Trans-Caspian Gas Pipeline - the completion of which is not assured (1)	2 (1)

1) PGJ

Nonetheless, White Stream shares a number of problems with Nabucco, notably the issue of supply.

Conclusion

South Stream, as opposed to Nabucco, has the means to guarantee its supply. Given heterogeneous attitudes of the concerned transit countries who find themselves involved in the two projects at once, not wishing to jeopardize their relationship with Gazprom, the construction of Nabucco under its initial form seems more than ever to be in danger of failing. Moreover, a reinterpretation of the gas crisis between Russia and Ukraine, now in Russia's favour, brings into question the argument that was at the core of this project to begin with. The European countries have proved powerless when confronted with the skilled alliance put together by Gazprom, notably since 2007. The quite obvious political intention to bypass Russia only embittered an already strained Russian-European relationship. Justifying a gas pipeline (Nabucco or another) simply because of relations with Russia only detracts from the EU's own interests. Moreover, labelling Nabucco as a European priority project today creates a boomerang effect on Europe's energy policy that weakens its credibility. The project's promoters shifted their reasoning, and made known that from now on Nabucco and South Stream are not only compatible, but are necessary for each other: European demand for gas was such that all projects are welcome. And even if Nabucco remained empty to begin with, it would have a beneficial impact on prices.[131] The connecting of South Stream into Nabucco, in order to supply it is one possible scenario; it would arrive in all cases at the Russian-Austrian hub of Baumgarten. A Nabucco pipeline enhanced with its South Stream branch would thus become an investment for a future where a democratic and cooperative Iran could play an important role in Europe's gas supply.

[131] Ifri Conference in Brussels 27.2.2008, Brendan Devlin, assistant to Jozias de van Aartsen, project coordinator for Nabucco

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4.6. The South: Algeria and Nigeria

Amongst the EU's African energy suppliers Algeria stands out as Europe's number one energy partner. Algeria is very dependent on its hydrocarbon exports, which constitute 97% of its total exports, 30% of its GDP, and 65% of the state budget. At the same time, 62.7% of Algeria's energy exports is destined for the EU.[132] Three gas pipelines connect North Africa to Europe, with three other projects under way, as well as the hope of increasing Transmed's capacity in two steps: in 2009 and 2012.

The opening of the Enrico Mattei gas pipeline in 1983, which goes through Tunisia and arrives in Sicily, put an end to dependence on the LNG chain –which had dominated in Algeria since the beginning. Its capacity was doubled in 1996 by a parallel gas pipeline. In 1999 the Pedro Duran Farell gas pipeline followed, which passes through Morocco, the Strait of Gibraltar, and finally reaches Spain. Since the 1990s, two pipelines therefore connect the Saharan reserves to Europe, completed with Greenstream in the 2000s. Transit problems with Tunisia, to return again to this issue, have been and continue to be very significant for Enrico Mattei and relations with Tunisia.[133]

Table 25. Gas Pipelines Connection North Africa to the EU

Gas Pipeline	Route	Transit Countries	Owner / Operator	Length (km)	Capacity (bcm/y)	In service since
Greenstream	Mellitah (Libya) – Gela (Sicily, Italy)	-	ENI: 75% NOC: 25%	530	8	October 2004
Enrico Mattei / Transmed	Hassi R'Mel (Algeria) – Sicile – Minerbio (Italy)	Tunisia	Sonatrach: 50% ENI: 50%	2,220, of which is in: Tunisia: 370 Offshore: 380 Italy: 1470	24 (1) 27 (2) (3) 30 in 2008, 33.5 in 2012 (2)	1st line: 1983 2nd line: 1994
Pedro Duran Farell / Maghreb Europe	Hassi R'Mel (Algeria) – Cordoba (Spain)	Morocco	Enagas SNPP Sonatrach Transgas	1,650, of which is in: Algeria: 520 Morocco: 540 Offshore: 45 Andalusia: 275 Extremadura: 270	8.5 (1) 8.6 (2) 12.5 (3)	1996

1) EIA
2) Brower
3) Nicholls

[132] DG Relex, EU-Algerian relations.

[133] Detailed study by Hayes, M., "The Transmed and Maghreb Projects: Gas to Europe from North Africa," in: Victor, Jaffe, Hayes 2006

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Planned Projects: Medgaz

The Medgaz gas pipeline, which will connect Algeria and Spain, has been under construction since 2006 and will be operational in July 2009 if all goes as scheduled.[134] This pipeline between Beni-Saf in western Algeria and Almeria in Spain, runs over a total of 210 km, 200 of which are offshore. Sonatrach is the majority stakeholder in the project with 36%, followed by the Italian companies Cepsa, Iberdrola, and Endesa, along with Gaz de France. The initial capacity of 8 billion m^3 per year will be progressively increased to 16 billion m^3 per year. Algerian gas will thus remain a minority in EU's imports compared to Russian gas, even after the start up of Medgaz, but it will play an important role in supplying Southern Europe.

Galsi- Cooperation with Gazprom?

The fourth Algerian pipeline, Galsi, is currently under further review, following a governmental agreement at the end of 2007. The final decision on the project and especially on its definitive route is expected in 2008. Galsi, directed by a consortium put together in January 2003, aims to establish a gas pipeline between Algeria and Italy via Sardinia, or alternatively to join with France via Corsica. However, the sale of gas is not assured for the moment, notably because the Italian company Edison revised its initial participation, without doubt in favour of Russian imports, given its strategic partnership with Gazprom. Galsi will thus only have a capacity of around 8 billion m3. If construction is settled, the pipeline could begin service by the end of the decade. The recent interest Gazprom has shown for this project (following agreements between Sonatrach and Gazprom at the start of 2007) furthers hypotheses of the Russian giant's participation in this EU supply line.[135]

The Trans-Saharan (Nigeria-Algeria)

Lastly, the Trans-Saharan project also merits mentioning. It is a proposed natural gas pipeline leaving Nigeria, passing through the Sahara to Algeria and then to Southern Europe. This project is at the very least risky, given the attacks that it would be subject to. This pipeline would be able to eventually transport around 30 billion m3 per year, over a distance of 4,300 km. Nevertheless, rapprochement between Gazprom and Nigeria could lead to this gas also being considered Gazprom gas, and Gazprom could develop along with Sonatrach an African hub at Beni Saf.[136]

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[134] Work had been delayed from 2006 to 2007, and the decision to continue was only made on December 21st, 2006.

[135] Brower, Derek, "Laying the Pipes," Petroleum Economist, October 2007

[136] Soarez (2007)

© Ifri

Table 26. Medgaz and Galsi

Gas Pipeline	Route	Owner / Operator	Length (km)	Capacity (bcm/y)	Expected operational start-up date	Estimated cost (billion $)
Medgaz	Beni Saf (Algeria) – Almeria (Spain)	Sonatrach: 36% Cepsa: 20% Iberdrola: 20% Endesa: 12% GdF: 12%	210	8, possible increase to 16 (1) 4 in the beginning, maximum of 16 (2)	mid- 2009	1.2 (2) 0.9 billion € (1)
Galsi	Hassi R'Mel (Algeria) – Sardinia – Pescaia (Italy)	Sonatrach: 38% Edison: 16% Enel: 13.5% Wintershall: 9% Hera: 10% Region Sardinia/Sfirs: 10%	900, 600 of which is offshore	8 (1) (3) (4) 10 was initially expected (1)	2012 (3) (4)	2 (2)
Trans-Sahara Gas Pipeline, TSGP / Trans-African Gas Pipeline / NIGAL	Warri (Nigeria) – Hassi R'Mel (Algeria), then Beni Saf or El Kala	Trans-Saharan Natural Gas Consortium (NIGEL): Sonatrach Nigerian National Petroleum Cooperation	4,128 of which is in: Nigeria: 1,037 Niger: 841 Algeria: 2,310	2015		more than 10

1) Brower
2) EIA
3) Galsi
4) Nicholls

Energy relations with North Africa, which also includes an underwater electric connexion between Morocco and Spain since 1998, are quite stable. This optimism however is somewhat tempered by risks brought on by the Moroccan-Algerian border conflict.

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IV. The Turkish Crossroads

1. Turkey's Role

Why should we look at Turkey separately? The justification is two-fold, and is explained by its role as a crossroads on the European supply landscape after WWII and by the rapid growth of its domestic market.

Turkey holds a very important geopolitical role in the EU's supply, first because of their straits, transit sites for Russian and Caspian oil, but also because of its strategic location; it is a crossroads for gas as much as for oil, these supplies originating from sources as diverse as Northern Iraq, Iran, and the Caspian. Turkey is thus becoming, through these East-West (Caspian and Iranian resources transported to the EU) and North-South corridors (Russian resources) a veritable energy bridge, connecting several producing countries to the EU. It was Turkey that put an end to the confinement of Caspian resources by opening the BTC, and it is again through Ankara that the South Caucasus Pipeline passes, as well as the region between Iran and Azerbaijan. Finally, the Turkey's Ceyhan Port is globally vital as it is first in Iraqi oil exports. Ceyhan is a transit port for a number of raw materials and an arrival point for gas and oil pipelines.

In projects such as Nabucco, Turkey's attitude and position prove to be decisive.[137] On the other hand, South Stream, the Russian project, bypasses Turkey. Finally, enormous growth in its domestic consumption makes it a very coveted market. Its own resources are currently diminishing while its primary energy and electricity consumption will increase considerably according to forecasts for the next twenty years. Ankara and the EU share considerable dependence vis-à-vis Russia, dating back to Soviet times. Turkey in fact depends on Russian gas at close to 70%.[138]

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137 "Turkey pressed to fall into line over gas project." Visit from the EU project coordinator to Turkey, Financial Times 11.2.2008

138 Muizon, G., « Approvisionnement de la Turquie en gaz et pétrole : Les enjeux régionaux. » Septembre 2000, Direction des relations économiques extérieures, Ankara

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2. Oil Transport

As for domestic supplies, Turkey covered its oil needs with supplies coming principally from Iraq (around 30%), then after UN sanctions it turned to Saudi Arabia, Iran, and Libya. As for the existing oil network, it has three principal links, the most important being the Iraq-Turkey oil pipeline, which doubled in 1987 but was blocked by sanctions in the 90s, and has restarted operations in a reduced manner since the end of the 1990s. The Batman and Kirrikale refineries are connected to the Iskenderun Bay by the North-South system.

The opening of the BTC in 2005 opened up Caspian resources for deliveries to Turkey and then on to Western markets. With this project Turkey intends to strengthen its influence and control over the Caspian Region and Central Asia, and to potentially be competitive as much with the US as – and even more so – with Russia and Iran. As for the planned oil pipeline projects, their chances of success are currently quite low. This is especially the case for the Trans-Caspian, which reflects better than any other project the regional hegemonic ambitions of all sides, and which is blocked and will continue to be so for an indefinite period because of the Caspian's controversial legal status. The only exception is the Samsun-Ceyhan oil pipeline that is under construction, which would at least partially relieve congestion in the Bosporus, an issue dealt with below.

Table 27a. Turkey: Existing Oil Pipelines

Oil Pipeline	Technical capacity (Mbd)	Oil transported (Mbd)	Transit fees	In service since
Strategic Pipeline (North-South system)	1.4 (1)	Currently 0 (1)		1975
Kirkuk-Ceyhan	1st line: 1.1 2nd line: 0.5 (1)	0.15 – 0.55 in June 2006 (1)		
Baku-Tibilissi-Ceyhan (BTC)	1 in 2008-2009 (1) 1 (2) 50 Mt/y (3)	0.21on average between June and September 2006 0.5 is expected at the start of 2007 (1)	Fees for consortium members, from Sangachal to Ceyhan: 3.3 $ / bbl (2005-10), 4.6 $ / bbl (2010-16), 5.5 $ / bbl (2016-29). Turkey should earn between $140-200 million/year in transit and operational fees. Georgia stands to earn $112 million from 2004-2008 and $566 million from 2009-2019.	May 2005

1) EIA
2) ECS 3) Götz

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Table 27b: Turkey: Oil Pipelines Still in Development

Oil Pipeline	Route	Owner / Operator	Length (km)	Capacity (Mt/y)	Estimated cost (billion $)
Kiyiköy –Ibrikhaba, Trans-Thrace	Kiyiköy (Turkey) – Ibrikhbaba (Turkey)	OJSC AK Transneft	193	60	0.9 (1)
Trans-Caspian	Turkmenistan – Azerbaijan – Turkey				

1) Götz

3. The Bosporus An oil transport problem for all of European

The EU should pay particular attention to the Bosporus, a site of much European history, connecting Asia to Europe. This strait, with a length of 13 km, had 3.1 billion barrels per day pass through it in 2005 on its way to Western and Southern Europe and on to the global market. Amongst the 50,000 boats that go through it per year, around 550 are oil tankers, of which only half are up to modern standards.[139] Since the fall of the USSR, we have witnessed a spectacular increase in the volumes transported through this route. Unfortunately, the Montreux Convention (1936) guarantees the right of free passage through the straits, and since 2002, the only restrictions the Turks have had at their disposal have been bad weather and ecological problems. While Ankara gains nothing financially from these passages, they do however assume all risks, thanks to a contract that was written 80 years ago in a context that has since changed. Istanbul's economic activities, with their population of 12 million, account for 60% of Turkey's GDP. Any incident on the Bosporus or in the city would thus have an immediate effect on all of Turkey. Indeed, there have been multiple accidents in recent history: the Romanian oil tanker *Esperanza* in 1979, or the Cypriot tanker *Nassia* in 1994, to cite the two most important accidents amongst 155 from 1988 to 1992. While a new navigation scheme (Traffic Separation Schemes, TSS) was introduced in 1999 and the International Maritime Organization (IMO) advocated a Vehicle Tracking System, the dangers remain quite high. It is estimated that each year 20 tons of pollutants per km^2 contaminate the Black Sea, as opposed to per 3.8 per km^2 in the Mediterranean.[140] Multiple plans to bypass the Bosporus – each having merit – have been proposed, but all face the

[139] cf de Waal, Thomas, "Bottleneck at the Bosphorus," Financial Times 5.1.2008:2

[140] Muizon, Gildas, 2000: 63

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same problem: none are competitive compared with the free passage offered by the straits. Turkey is nonetheless engaged in the construction of the Samsu-Ceyhan pipeline. But will it be used? Won't it simply absorb what is already unable to pass through the congested Bosporus without actually decreasing current volumes?

Table 28: The SCP Under Construction

Oil Pipeline	Route	Owner / Operator	Length (km)	Capacity (Mbd)	Estimated operational start up	Estimated cost (billion $)
Samsun-Ceyhan Pipeline (SCP) / Trans-Anatolian Pipeline	Samsun (Turkey) – Ceyhan (Turkey)	Trans-Anadolou Pipeline Company (TAPPCO): ENI: 50% Calik Energy: 50%	555	initial capacity: 1 "design capacity": 1.5 (1)	2010	1.5 (1)

1) Calik/ENI

Planned projects to bypass the Bosporus

Other than the Samsun-Ceyhan, which is currently under construction, the following options have been proposed: a connection between the Romanian port of Constanta and the Adriatic port of Omisalj, or Trieste in Italy; alternately, an oil pipeline project from Constanta or from the Bularian port of Bourgas, either through Macedonia to the Albania port of Vlore, or even to the Greek port at Alexandroupolis, or finally a shorter oil pipeline from the Turkish port of Kiyiköy to Ibrikkaba or Saros. As for the Bourgas- Alexandroupolis project, it seems that work could begin in 2008 following the "agreement between stakeholders on setting up a company for the project to build the Bourgas-Alexandroupolis oil pipeline," signed during Vladimir Putin's visit to Sofia on January 17th and 18th, 2008. All of these plans to bypass the Bosporus however are costly in terms of freight and transit fees, and their use is not guaranteed. All the alternative projects would decongest the Bosporus, as would moreover the Druzhba Nord project, but none of them have made it onto the EU's list of priority projects.

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Table 29: Alternative routes to the straits

Gas Pipeline	Route	Operator	Length (km)	Capacity	Estimated operational start-up	Cost
Bourgas-Alexandroupolis	Bourgas (Bulgaria) – Alexandroupolis (Greece)	Consortium: Russia (Transneft, Rosneft and Gazprom in equal parts): 51% Bulgaria: 24.5% Greece: 24.5% (Bulgarian and Greek parts are likely to be sold)	279	0.7Mbd, potential of 1 Mbd [1] 1st phase: 15-23 Mt/y, 2nd phase: 35 Mt/y [2], 35-50 Mt/y [3]	2010-2011	1 billion $ [3] 0.9 billion $ [1] 0.8-0.9 billion € [4]
Constanta - Trieste (South East European Line, PanEuropean Oil Pipeline)	Constanta (Romania) – Trieste (Italy)		1,300-1,400, of which is in: Romania: 650 Slovenia: 29	60-90 Mt/y [5] 0.48 – 1.8 Mbd [1]	2011-2012	2.3 billion $ [1] 3 billion $ [5] 1.5-2.62 billion € [6]
Albanian-Macedonian-Bulgarian Oil Pipeline (AMBO)	Bourgas (Bulgaria) – Vlore (Albania)	AMBO Pipeline Cooperation	894, 273 of which is in Macedonia	30-40 Mt/y (7) 0.75 Mbd [1] [7]	2011	1.1-1.5 billion $ [1] [7]
Constanta - Vlore	Constanta (Romania) – Vlore (Albania)		900	38 Mt/y		1.1 billion $ [8]
Kiyiköy –Ibrikhaba, Trans-Thrace	Kiyiköy (Turkey) – Ibrikhbaba (Turkey)	OJSC AK Transneft	193	60 Mt/y		0.9 billion $ [8]

1) EIA
2) Transneft
3) RBC
4) bridge-mag
5) 5) Reuters
6) 6) ENS
7) 7) SET
8) 8) Götz

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Turkey is constructing, as was already mentioned, an oil pipeline that is 560 km long, from Samsun to Ceyhan, and entrusted its completion to Calik Energy (Turkey) and ENI (Italy) through a presidential order (April 2006). This route, according to Ankara, will help decongest the straits up to 50% and will transport Russian oil. A parallel gas pipeline is planned.[141]

4. Gas Pipelines to and through Turkey

Russia plays a major role in Turkey's gas supply, who has experienced a substitution of gas for oil since the 1980s, just as in Europe. Turkey has in fact tripled its gas consumption since 1997, and now consumes more gas than oil.[142]

Following an agreement made in February 1984 between Botas and Soyusgazexport, 5-6 billion m^3 per year for 25 years has been delivered by the Bulgarian gas pipeline, traveling from Bratstvo's southern branch up to Ankara. These deliveries began in 1987 and 70% of the gas was paid for with Turkish goods (barter). The capacity of the Bulgarian pipeline doubled in 1997 following a framework agreement between Gazprom and Botas. A Russian-Turkish joint venture called Turusgaz was also created following the visit of Tchernomyrdine, the Russian Prime Minister.[143]

Creating a Direct Link: Blue Stream

Nevertheless, unpleasant experiences with transit countries led Russia and Turkey to plan a direct link to each other through the Black Sea: Blue Stream. In fact, Ukraine had interrupted deliveries in 1994, with the hope of making the Russians pay their transit debts.

The interpretation that Turkey was becoming an important regional consumer, and that it was now necessary to be active on this market and form a strategic partnership with this important actor, led the Yeltsin government to construct the Blue Stream gas pipeline. This line runs under the Black Sea and was completed under extremely difficult geological conditions due to the very uneven nature of the sea floor. This strategy also was aimed at preventing potential competition from Turkmenistan. Blue Stream was the first direct link between the two countries. A large error was made in assessing the Turkish market, as the directors at Gazprom would eventually admit. Indeed, during the intergovernmental agreements between Ankara and

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[141] Swann, Richard, "ENI joins Turkey's Calik in Plan to Build 1 Million/baril/day Line Bypassing Borsporouus," Platts Oilgram News, November 10, 2005

[142] Source: <www.eia.doe.gov>: natural gas (1101.2) (billion m3) ; oil (617,2) (billion barrels per year) ; coal (86,3) (billion short tons) ; electricity 129.0 billion kilowatt hours

[143] Muizon 2000: 25-27

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Moscow in 1997, Moscow gave up on the idea that there would be a large increase in Turkish demand, which in fact did not occur. A phenomenon rarely seen in consumer countries that are concerned with guaranteeing supply security would be observed in Turkey: putting several potential suppliers into competition with each other, in this case Iran and Russia, so as to lower prices. This gas-gas conflict began in Turkey in 2003, a few months after Blue Stream's opening. The Turkish government thus demanded a revision of the contract and price concessions. In April, Gazprom stopped deliveries; this coming only two months after the gas pipeline began operating. This pipeline turned out at first to be a veritable financial disaster for Moscow.[144] The crisis has since passed and is now forgotten. A new inauguration ceremony took place at the end of November 2005 with the Russian, Italian, and Turkish heads of state attending, and its maximum capacity was subsequently reached.

A Caspian transit gas pipeline to European and Western markets was opened at the end of 2006: The BTE, which runs parallel to the BTC, and which bypasses, as does the BTC, Russia. The two projects have considerably strengthened Turkey's transit role; they are respectively presented in the chapters on gas and oil.

The Greek-Turkish Interconnector

Lastly, the construction of the Greek-Turkish Interconnector at the end of 2007, one year late, must be mentioned. Going through the Dardanelles, this bridge connects two networks and should, according to Turkish Prime Minister Erdogan, bring two peoples together. It should be functioning at full capacity by 2009.[145]

Table 30: Gas Pipelines to Turkey and Blue Stream

Gas Pipeline	Route	Owner / Operator	Length (km)	In service since
Bratstvo (south) / Trans-Balkan (Bulgarian gas pipeline)	Russia – Ukraine – Bulgaria-Turkey	Gazprom for the Russian part		1987 (arrival of gas in Turkey)
Blue Stream	Izobilnoye (Russia) – Ankara (Turkey)	Gazprom, ENI, Botas	1,218 of which is in: Russia: 357 Offshore: 378 Turkey: 483	December 2002, official inauguration in November 2005
Baku-Tbilisi-Erzurum (BTE) / South Caucasus	Shah Deniz (Azerbaijan) – Ezurum	Owners: BP: 25.5%	883, of which is in: Azerbaijan: 442	12/15/2006

[144] For details of the negotiations see Victor/Victor 2004: 19

[145] Fink 2006: 2

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Pipeline (SCP) / Shah-Deniz-Pipeline	(Turkey)	Statoil: 25.5% SOCAR: 10% Lukoil: 10% Total: 10% OIEC: 10% TPAO 9% Operators: BP and Statoil	Georgia: 248 Turkey: 193	
Iran - Turkey	Tabriz (Iran) – Ankara (Turkey)		1200	January 2002

Nabucco and Turkey

The most politicized project of the moment is Nabucco, which was the object of an extensive discussion in the chapter on gas, and in which Turkey's behaviour is at best contradictory, perhaps even destructive. While the company Botas is a part of Nabucco's consortium, Turkey has so far refused to accept the financial framework agreement for the pipeline's use, cut supplies to Greece following a reduction of its own supplies coming from Iran, and prevented, for political reasons, Gaz de France's participation in the Nabucco consortium. The European coordinator for gas pipeline projects in South Europe warned Turkey during a visit in February 2008, while openly criticizing its lack of cooperation.[146]

[146] Crocks, Ed., Turkey pressed to fall into line over gas project, Financial Times 11.2.2008 :5

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Table 31. Planned Gas Pipelines to Turkey

Gas Pipeline	Route	Owner / Operator	Length (km)	Estimated operational start-up	Estimated cost
Nabucco	Georgian/Turkish and/or Iran/Turkey border – Baumgarten (Austria)	OMV: 20% MOL: 20% Transgaz: 20% Bulgargaz: 20% Botas: 20%	around 3,300	2012	around 5 billion € (1) 5.35-5.8 billion $ (2)
Trans-Caspian	Turkmenistan – Turkey	Botas	1,700, 230 offshore		2-3 billion $ (2)
Iraq-Turkey	Kirkuk (Iraq) – Ceyhan (Turkey)	Botas, TPAO			

1) <www.nabucco-pipeline.com>

2) EIA

5. Conclusion

Turkey's role, a veritable link for European energy supplies, cannot be underestimated; its impact will continue to grow following the evolution of relationships established throughout the Caspian Region, Central Asia, and Iran. The fact that Turkey can use its position to influence other issues (such as adhesion to the EU) is a recent observation, displayed by its refusal of Gaz de France in Nabucco's consortium, its lack of cooperation in developing the framework conditions, or even the recent cuts to Greece. At the same time, a lack of European interest in the Bosporus issue is not justifiable. The EU must thus develop a veritable energy partnership with Turkey, including issues such as the straits. It should also accept that Turkey is a country that, in this post-Cold War context, has, alas, the ability to disrupt Europe's energy security, along with countries such as Ukraine.

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V. Conclusion and Prospects

While the preceding chapters have presented existing and planned gas and oil infrastructure, this final section aims to give insight into an overarching view of both. It covers, in six sections, the key elements of the context in which infrastructure projects either develop or perish. What does the map of connections and pipelines teach us? At this moment, what needs are the successful links responding to, and what about the abandoned ones?

Hayes and Victor (2006) identified four factors that are determinant, according to them, beyond a pure commercial logic, for the completion of projects. These include the investment context; market risks (quantity and price); the geopolitical relationship between producer, transit country, and consumer, crucial for governments as well as for private investors; and finally, transit countries.

These six factors were touched on in the preceding analyses, and will again be taken up in the following six sections.

1. The Community Context

Energy infrastructures – an agent for integration, and the need for interconnectors

The hydrocarbon transport network, being established since the 1950s, is a strong factor in European integration. These infrastructures are Europe capital that must be looked after, through investments and innovations. Nonetheless, the map still reveals significant nationalized thinking, which results in a lack of interconnectors and thus reinforces a national market approach. On must wonder if the construction of interconnectors would be more beneficial in increasing competition within the Common Market than unbundling.

Infrastructure and Third Countries

Pipelines constitute a powerful factor of integration with extra-Community regions, with producers (Norway, Russia, Algeria), and with transit countries. The EU is currently not fully utilizing its potential for a partnership with Norway, and that not only for supply (especially gas), but also for the implementation of Europe's energy policy. Norway is without doubt the most reliable, competent (in regard to innovations), and closest partner available. Thus, its

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accomplishments in the Arctic, usable for developing the Shtokman field, but also in the development of new technologies for carbon capture and storage, sustainable development, utilizing LNG, and energy efficiency should be a part of the European agenda…However, the annual meetings between the EU and Norway, begun in 2005, did not take place in 2006 and 2007.

Dangers in Hasty Labelling and in Contradictory Marketing

The risks associated with the Nabucco project and the inconsistent attitudes of the member states underlined in 2007 that the EU must not be too hasty in labelling a project as 'priority.' Such a move risks harming the EU's image and the credibility of its selling points and projects. This risk is all the more crucial since Europe's energy policy is still largely a mosaic of the national policies of its member states. Making Odessa-Brody a 'priority project' is an example of this bad practice, carried out in an overly politicized context. As energy infrastructure straddle commercial and political-diplomatic thinking, the EU must progress cautiously in this area, for example to protect its image when calling a project a priority.

The European Infrastructure Agenda

The development of LNG and innovative technologies should be at the top of the EU's agenda. The Lisbon Strategy comes into play here, and we will all remember the slogan that came out of the first oil crisis: "We don't have oil, but we have ideas." Priority should also be given to the following areas: support in increasing energy efficiency in producer countries, notably in Russia and Iran through technology transfers, all in Europe's own interests (since competing consumers are above all the producers who waste their own resources); normative and environmental actions on protecting the Bosporus through a common effort to find alternative routes to the straits; and finally, the increase of interconnectors, above all between the "new and old Europe." These interconnectors, nonetheless, come up against new ecological concerns, such as in the Alps or the Pyrenees.

As for gas prices and the legacy of Groningen, EU countries find themselves facing a real dilemma: while the long-term gas contracts strengthen security of supply, indexation, which is a crucial part of these contracts, makes oil-gas competition impossible. Thus, for the Community's own interest, the EU must adopt proposals set out in the Chevalier/Percebois paper, including the indexation of gas to a basket of raw materials.

The development of LNG and an increase in interconnectors will help create beneficial competition and will make it possible to diversify supplies, also within the EU where dependency patterns from state to state are quite uneven.

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2. The European Context: Energy links in the post-Cold War era still evolving

What can help us to make sense of the large number of projects in this present study?

We are in a time of increased direct links, as with Blue Stream and Nord Stream, or in diversifying on whom we are dependent, by swapping out new transit countries (Serbia, Bulgaria, Hungary) for those that have become a burden (Ukraine, Poland).

Far-off theaters such as Bolivia do not especially concern the EU. On the other hand, closer ones, such as Russia, Central Asia, the Caucasus, Algeria, Nigeria, and Northern Europe - Norway in particular - do. All of today's debates and concerns are directly or indirectly tied to Russia. Polls show that Europeans fear Russia and Gazprom's intentions.[147] The author hoped to highlight the importance of other regions, notably Northern Europe, as well as Turkey's role. This study aimed to underline a number of changes that are not well known in the general public, such as the use of Primorsk to the detriment of the Baltic States, or the construction of direct links such as Blue Stream.

Despite the fact that there are new energy links being created and that new projects are emerging (sometimes quite fanciful ones), the lack of institutions and places to hold these important debates remains a concern. Neither the Energy Charter nor Inogate have been able to make up for their absence. Instead, strategic energy partnerships between the EU and its principal suppliers fill the gap in the meantime. The need to establish additional partnerships with big connecting countries, such as Turkey, is evident and necessary.

3. Transit Issues and the EU's Normative Role

The collapse of the Soviet block accentuated the issue of transit in Europe and made Turkey into an unavoidable transit states for Europe's energy supplies.

The physical ruptures of energy transport networks following the crises with transit countries (Ukraine in 2006 and Belarus in 2007) have forced the EU to confront a dilemma in its relationships with transit countries: to support Nord Stream or not? Promote security of supply and above all diversifying routes? While Nord Stream was

[147] Thornhill, J., "Western fears on Russian Energy," *Financial Times,* 2.18.2008

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made a priority project, the EU, who in 2004 welcomed in the same countries that the project bypasses, must now also take their interests and security of supply into consideration. This includes concerns over the possible drying up of flows through Yamal and Druzhba, as well as the construction of proposed interconnectors. Clearly signaling to Russia, as was done in May 2007 in Samara, that any act taken against Poland is an act against the entire EU, is also a part of the Community's approach. In the long-term, its actions must be normative and it should thus encourage all players to follow the rules of the game. But how can this be accomplished in the near future, against a background of crises?

As for the relationship with Turkey, the EU must expect that Ankara will use its disruptive capabilities as a transit state to exert pressure on the issue of adhesion to the EU. Excluding Gaz de France in the Nabucco project as well as Turkey's behaviour regarding this project justifies this theory. But there again, normative actions and respect for contracts must dictate the behaviour of all parties in order to build the confidence and trust needed for long-term energy infrastructure projects.

4. Competing Consumers and Energy Efficiency

The debate over "competing consumers," notably Asia, which has an excessive dependence on the Middle East in relation to reserves in the former Soviet Union, is under way. A look at the tables and maps puts this fact into perspective. Russia's preference for the European market is clearly evident for gas, but less so for oil. Central Asia on the other hand, is positioning itself otherwise, and is keeping all options on the table. The EU thus has an interest in cultivating and maintaining this relationship. The nomination of Pierre Morel as special representative is a good first step in this direction, especially given his close dealings with the DG TREN.

As mentioned in the first paragraph, the most overlooked competing consumer is often the producer itself, due to economic growth and above all energy inefficiency. Community action is essential in this area, as much for its own interest as for the improvement of links between suppler and producer. We should applaud the fact that this issue is now a part of the strategic EU-Russia relationship.

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5. Dependence or Interdependence with Russia?

The question of Russia and Gazprom is one of the main concerns in today's energy debates in Europe. The fact is that the European Community and the USSR, later Russia, have been successfully developing an interdependent relationship since the 1970s, based on security of supply and the guarantee of consumption. Russia is just as dependent on being the number one gas exporter and on the reliability of its partner, as the EU is as a consumer. Through several gas pipelines examples, such as Blue Stream, it is evident that the loyalty and the predictability of a client is never a given, which on the other hand increases the EU's value in Moscow's eyes. At the same time, issues such as Gazprom's size (despite their figures being infinitely less than those of corporations such as Exxon Mobil), the resources and networks that the company controls, its smart expansion strategies, which include dividing member states, and their competitive nature instead of cooperative, are all alarming for Europe. As we must refrain from snap judgments on issues such as gas cuts to Ukraine, it is at the same time necessary, without demonizing, to correctly measure the interests of all parties involved. On one side, for Europe's own interest, Gazprom's increasing participation in infrastructure on European soil cannot possibly be accepted, and preventing this is one objective of the proposed unbundling measures. On the other side, past experiences testify to the USSR and then Russia's reliability. No supply cut has ever occurred, even during the most difficult times at the end of the 1970s (Solidarnosc, Afghanistan, etc.) or during the collapse of the USSR. It is necessary to distinguish between Russia's own interest and that of Gazprom, and to avoid the suspicious attitudes that only lead to 'demonizing' 'the Russian.' These attitudes are the source of negative stereotypes of which the 20th Century is full of. Considering shared interests, domestic ones, and those of others should serve as the foundation of a relationship that is less alarmist and worrisome; a relationship that is framed by both a renegotiated strategic partnership and enhanced by a new focus on energy in 2008-9. Primary concerns for Russia and the EU must be Europe's increasing demand, the development of infrastructure, fields, and energy efficiency, and relationships with transit countries. Analysts are of the opinion that it is in fact transport infrastructure, and not the available quantities of Russian and CIS reserves that will limit oil supply: while extraction capabilities are sufficiently developed for the time being, the expansion and development of infrastructure is being neglected. The opening of new ports and oil pipelines in the Barents Sea and in Eastern Siberia is progressing much slower than anticipated. The outlook for gas is actually the reverse, in that current infrastructure is sufficient, but gas fields are not sufficiently developed.

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6. Lessons learned from the Soviet experience that can be helpful in the EU-Iran Relationship… building a potential partnership?

The construction of pipelines traversing the Iron Curtain since before the fall of the Berlin Wall that progressively connected Eastern and Western Europe, to the great displeasure of the Reagan administration, leads to two conclusions. European energy supply is above all a regional issue and is intimately tied to Russia, which exports 90% of its hydrocarbons to the EU. The European Community pursued its own interests in the 1970s by reaching an agreement with the USSR. One could wonder if the EC had thus acted selfishly by cooperating with an authoritarian and non-democratic regime, or rather if it simply came out of détente, with "change through rapprochement." In view of this past experience it is today appropriate to ask ourselves about the EU's relationship with Iran, a country that is traditionally close to Europe but currently governed by an authoritarian regime. Is it not necessary here to distinguish between the long- and the short-term and thus build an energy relationship that will on one hand be a link to a future, post-authoritarian Iran while at the same time being a factor to help Tehran quickly move towards this transition? Could Europe's experiences in cooperating with the USSR serve as a model in this respect? Strengthening and constructing infrastructure passing through Turkey, the European crossroads, will be even more important than dealings with Iran, along with certain Central Asian countries who could chose to supply Asia to the detriment of Europe. There remains however, the delicate issue of the fragile European and international consensus over Iran's nuclear program: will it be weakened if the areas of cooperation are increased, if "a new Iran policy," as Christoph Bertram, the former director of SWP and ISS, suggests is adopted?[148] And it is important to ensure others do not go it alone, for example as Switzerland did by signing a gas contract with Tehran for 5.5 billion m^3 beginning in 2009.[149]

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[148] Bertram, Christoph, "For a new Iran Policy," CER, bulletin, London April-May 2008.
[149] "Suisse-Iran: gros contrat gazier signé". RSR.ch, 3.18.2008

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Perhaps future generations will view gas and oil pipelines in the ways we regard ancient aqueducts and the Roman Empire…above all, a past legacy. But just as aqueducts were important in shaping international relations and contributed to the progression of civilizations, so energy links do today.

To conclude, for the Eurosceptic and the convinced European alike, the impressive amount of links, the vast European energy networks – invisible in every day life– and the instruments of mutual aid are all enough to fascinate…Perfecting Europe's energy map, on which Cold War divisions are still etched as if on a phantom wall, remains a challenge.

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Annexes

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I. Glossary and Abbreviations

IEA	International Energy Agency, founded in 1974 within the framework of the OECD.
BAM	Baikal Amur Mainline, railway going from Western (Baikal Lake) to Far-Eastern Russia (Amur River) through Siberia.
Barrel	International unit of measurement for quantities of crude oil: equivalent to 159 liters of crude oil; one metric ton equals 7 to 7.5 barrels. Production is generally measured in Barrel per day (bbl/d). Kbbl/day: 1000 bbl/d; mbbl/d: one million barrels per day. Origin of barrel: 1860-70, when oil was transported in barrels used for other substances (cooking oil, salt, fish, etc) equivalent to this size.
Bbl	Barrel (unit of crude oil)
Bcm	Billion cubic meters, usually calculated per year.
BOE	Cf TOE/BOE
BPS	Baltic Pipeline System
BTC	Baku-Tbilissi-Ceyhan pipeline
Brent	Name of a crude oil field in the North Sea, with its stock quote in London Stock Exchange (pars pro toto: the name Brent is used for the region)
BTU	British Termal Unit, unit of heat used to measure the calorific power of natural gas; a unit to calculate the price of natural gas in dollars per millions of BTU
Choke points	Straits through which oil tankers (and gas tankers) and seaborne transport usually pass. Examples: Hormuz in the Persian Gulf: almost all oil from the Middle East passes through this point. Malacca between Malaysia and Singapore: Principle transport route of oil, LNG, and other products from the West towards China and South-East Asia. Other less important choke points are: Suez, Bosphorus, and the Panama Canal.
CPC	Caspian Pipeline Consortium
DG TREN	European Commission Directorate-General for Energy and Transport
Downstream/upstream: Downstream is access to markets, upstream is access to sources	
EIA	Energy Information Administration (United States), US Energy Department statistics center in charge of establishing data, forecasts and analyses to help in decision-making regarding energy issues. EIA carries out area-based and country-based analyses.
ECS	Energy Charter Secretariat, in charge of missions under the Energy Charter, in order to implement an energy security through multilateral agreements.
FSU	Former Soviet Union
LNG	Liquefied natural gas: obtained by freezing natural gas to -162 degrees Celsius, which reduces the volume of gas to 1/600 of its initial volume.
Inogate	Interstate Oil and Gas Transport to Europe: Accord between countries of the former USSR on principles of cooperation in the transport of gas and oil towards Europe, signed in 2001. Members: Albania, Armenia, Azerbaijan, Belarus, Bulgaria, Croatia, Georgia, Kazakhstan, Kyrgyzstan, Macedonia, Romania, Tajikistan, Turkmenistan,

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	Ukraine, Uzbekistan, Latvia, Serbia, Montenegro, Slovakia, and Turkey (<www.inogate.org>, Secretariat in Kiev)
Mbd	Million barrels per day: Measurement of crude oil, 50 Mbd =1 million tons; more exact: 49 Mbd = 1 million tons of crude oil (calculating error of 2%)
MoU	Memorandum of Understanding
Mt	Million tons, usually calculated per year.
Mtoe	Million tons of oil equivalent
NEGP	North European Gas Pipeline. Today: Nord Stream
PSA	Production Sharing Agreement
Reserves	Distinction, for reserves of hydrocarbons, in the following manner: Three categories of reserves: proven, probable, and possible reserves. Proven= existing and retrievable with today's technology (90% certain). Probable= additional quantities proven with geological information and techniques (50% certain). Possible= oil fields not known today, or unconventional petroleum (sand, schist, etc.) (10% certain).
Spot	Short term energy transaction (one to three days); spot= sale of a given quantity of a given product extracted on a precise date, at a precise place, at an agreed upon price (different from the long term price). The petroleum market is dominated by spot markets, while the gas market is regional, and characterized by the existence of spot markets and above all the indexing of the price of oil, and long term contracts.
TEN	Trans-European Network
TOE/BOE	Tons of oil equivalent. Different energies are calculated according to their energy content in TOE. The equation is: 1 toe=7 barrels of oil=1.5 tons of coal=1000 cubic meters of natural gas. The units of measurement are quite varied in the gas industry, and one normally works with conversion tables (see annex). It is more common to work in Barrel of oil equivalent (BOE): The energy value of a barrel of petroleum is equivalent to 170m^3 of gas: Approximation: Around 1 liter of petroleum equals one cubic meter of natural gas. 1Gm3=5.9Mboe
TOP	Take or pay: the buyer commits to buying a determined amount each year. It is paid even if it is not recovered. Guarantee for the producer, contract at middle or long term.
TNK-BP	Joint venture Tjumenskaja Neftjanaja Kompanija - British Petroleum
US ton, Short Ton	907.1847 Kg (2000 lbs)
Ton, Long	1,016.0469 Kg (20 hundredweights or 2240 lbs)

II. Conversion Table of gas units

As opposed to crude oil, which is measured in barrels or in tons (1 barrel ≈ 0.136 tons), the gas sector uses a great variety of measurement units. According to the country and origin the following are used as criteria:

- the gaseous volume, in cubic meters or feet;
- the energy content- which can be measured in metric tons, equivalent oil (toe) or in equivalent barrels (boe), in joules (Australian and New Zealand industries), in British Termal Units (BTU), in therms, (thermies in French), or even in Kilowatt hours (Gaz de France).
- its mass, expressed either in metric tons, gallons, or American tons (907kg). Measurement by mass is common for the capacity of LNG terminals.
- volume, once liquefied, measured in cubic meters, gallons, or cubic feet. This is the common unit to measure the capacity of gas carriers.

The biggest problem of using different units is the volume - energy conversion: the latter is not constant, ranging from one cubic meter of gas removed from gas fields to one cubic meter of pure methane.
Conversion tables (for pure natural gas, almost methane) allow for the establishment of the equivalent of a billion cubic meters (G.m3) into other units.

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IV. Petroleum Statistics

Presented here are the latest statistics from the European Commission concerning imports to the European Union for 2005, measured first in barrels for the EU-25, and secondly in tons for the EU-27, plus Croatia and Turkey.
Next statistics are presented on the production of oil, within the EU as well as in countries that export to the EU, and on proven reserves and refinement capabilities.
Because of the nature of petroleum transport and of the oil market, it is not possible to give exact and absolute data on imports. Imported oil can be re-exported, etc. Thus, this data varied according to the source.

Registration of crude oil imports and deliveries in the Community (EU-25), 2005

Country of Origin	Volume (1000 BBL)	Total value ($ 1000)	CIF price ($/BBL)	Share of Imports in %
Russia	1 242 688	62 092 124	49.97	30.11
Norway	704 465	38 767 208	55.03	17.07
Saudi Arabia	438 627	22 002 705	50.16	10.63
Libya	371 911	20 013 409	53.81	9.01
Iran	252 240	12 182 196	48.30	6.11
Kazakhstan	191 164	10 207 761	53.40	4.63
Algeria	158 837	8 768 485	55.20	3.85
Nigeria	143 914	8 149 562	56.63	3.49
Iraq	91 367	4 380 166	47.94	2.21
Mexico	76 024	3 294 806	4334	1.84
Syria	67 161	3 324 527	49.50	1.63
Other FSU	61 729	3 096 321	50.16	1.50
Kuwait	54 994	2 614 594	47.54	1.33
Angola	48 196	2 584 033	53.62	1.17
Azerbaijan	48 109	2 692 016	55.96	1.17
Venezuela	38 337	1 479 905	38.60	0.93
Other Africa	36 352	1 869 525	51.43	0.88
Cameroon	23 465	1 203 812	51.30	0.57
Other Europe	22 272	1 176 865	52.84	0.54
Brazil	18 218	809 230	44.42	0.44
Egypt	10 905	554 729	50.87	0.26
Tunisia	9 069	463 520	51.11	0.22
Congo	4 581	248 558	54.26	0.11
Gabon	4 532	205 060	45.25	0.11
Papua New Guinea	3 246	187 063	57.63	0.08
Ukraine	1 126	54 892	48.73	0.03
Zaire	1 007	51 444	51.08	0.02
Abu Dhabi	923	61 738	66.88	0.02
United States	681	41 057	60.26	0.02
Other Latin America	401	13 770	34.32	0.01
TOTAL	4,126.542	212,591.081	51.52	100.00

Source: European Commission, available on <ec.europa.eu/energy/oil/crude/doc/2005_cce_eu.xls>

Imports of Crude Oil by origin to the EU-27, 2005 ((in 1 000 t)

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Origin	Quantity
By region of origin:	
OPEC	216 314
Near and Middle East	118 736
Africa	112 628
By country of origin:	
Russia	188 000
Norway	97 470
Saudi Arabia	60 748
Libya	50 601
Iran	35 385
Kazakhstan	26 386
Algeria	22 776
Nigeria	18 618
Irak	12 290
Mexico	10 647
Syria	9 027
Kuwait	7 621
United Arab Emirates	1 060
*Other**	*109 100*
TOTAL	**649 729**

*Author's calculation

Source: Eurostat (2007), available on <epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-PC-07-001/EN/KS-PC-07-001-EN.PDF >

Imports of Crude Oil by origin to Croatia, in 1 000 t, 2005

Origin	Quantity
By region of origin:	
OPEC	80
Near and Middle East	484
Africa	80
By country of origin:	
Russia	3 435
Syria	484
Libya	80
*Other**	*307*
TOTAL	**4 306**

*Author's calculation

Source: Eurostat (2007)

Imports of Crude Oil by origin to Turkey, in 1 000 t, 2005

Origin	Quantity
By region of origin:	
OPEC	15 897
Near and Middle East	11 681
Africa	4 540
By country of origin:	
Russia	6 997
Iran	6 887
Libya	4 540
Saudi Arabia	3 494
Iraq	976
Syria	324
*Other**	*171*
TOTAL	**23 389**

*Author's calculation

Source: Eurostat (2007)

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Crude Oil: Primary Production in EU-27, thousand tonnes

2000	2001	2002	2003	2004	2005
166 553	155 664	158 145	148 457	138 079	125 838

Source: Eurostat (2007)

Oil Production, million tonnes

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	Share of total (2006)
Saudi Arabia	446.7	454.5	455.7	423.6	456.3	440.6	425.3	485.1	506	526.8	514.6	0.131
Russian Federation	302.9	307.4	304.3	304.8	323.3	348.1	379.6	421.4	458.8	470	480.5	0.123
Iran	186.6	187	190.8	178.1	189.4	186.5	172.7	203.7	207.9	207.3	209.8	0.054
United Arab Emirates	115.1	120.5	123.9	117.6	123.3	118.3	108.5	122.2	124.7	129	138.3	0035
Kuwait	105.1	105.1	110	102.6	109.1	105.8	98.2	114.8	122.6	130.1	133.2	0.034
Norway	154.7	156.2	149.6	149.7	160.2	162	157.3	153	149.9	138.2	128.7	0.033
Nigeria	105	113.2	106	100.8	105.4	110.8	102.3	110.3	121.9	125.4	119.2	0.03
Iraq	28.6	57.1	104.2	128.3	128.8	123.9	104	66.1	100	90	98.1	0.025
Algeria	59.3	60.3	61.8	63.9	66.8	65.8	70.9	79	83.6	86.5	86.2	0.022
Libya	68.6	70.1	69.6	67	69.5	67.1	64.6	69.8	76.6	82.1	85.6	0.022
United Kingdom	129.7	127.9	132.6	137.4	126.2	116.7	115.9	106.1	95.4	84.7	76.6	0.02
Angola	35.4	36.5	36	36.7	36.9	36.6	44.6	42.5	48.2	60.7	69.4	0.018
Kazakhstan	23	25.8	25.9	30.1	35.3	40.1	48.2	52.4	60.6	62.6	66.1	0.017
Qatar	26.2	33.3	34.3	36	38.7	38.4	35.1	41.2	44.9	46.9	50.6	0.013
Oman	44.4	44.9	44.7	45	47.6	47.5	44.5	40.7	37.5	38.5	36.7	0.009
Egypt	45.1	43.8	43	41.4	38.8	37.3	37	36.8	35.4	33.9	33	0.008
Azerbaijan	9.1	9	11.4	13.9	14.1	15	15.4	15.5	15.6	22.4	32.5	0.008
Syria	29.2	28.7	28.6	28.8	27.3	28.9	27.2	26.2	24.7	22.8	20.8	0.005
Denmark	10.2	11.2	11.6	14.6	17.7	17	18.1	17.9	19.1	18.4	16.7	0.004
Turkmenistan	4.4	5.4	6.4	7.1	7.2	8	9	10	9.6	9.5	8.1	0.002
Italy	5.5	5.9	5.6	5	4.6	4.1	5.5	5,6	5.5	6.1	5.8	0.001
Uzbekistan	7.6	7.9	8.2	8.1	7.5	7.2	7.2	7.1	6.6	5.4	5.4	0.001
Romania	6.9	6.8	6.6	6.4	6.3	6.2	6.1	5.9	5.7	5.4	5	0.001
Total world	3376.5	3480.5	3548.3	3482.9	3618.1	3602.7	3575.6	3701.3	3862.6	3896.8	3914.1	1
North America	660.1	670.4	666.7	638.8	650.8	651.8	660.2	669.8	667.4	645.3	646.1	0.165
S. & Cent. America	312.9	329.1	350	338.4	345.3	339.9	334.2	318.3	337.9	347	345.8	0.088
Europe & Eurasia	680	688.6	686.5	699.6	724.7	746.6	786	818.9	850.1	844.8	846.7	0.216
Middle East	1001	1051.1	1112.4	1081.4	1144	1113.6	1039.3	1123.4	1190.4	1212.9	1221.9	0.312

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Africa	355.9	370.4	363.9	359.8	372.2	373.6	378.5	397.6	440.7	467.2	473.7	0.121
Asia Pacific	366.6	370.8	368.9	364.9	381.2	377.1	377.5	373.3	376.2	379.5	379.8	0.097
EU- 25	158.6	157.3	161.9	168.3	159.9	149.4	152.1	142.2	132	120.3	109.4	0.028
OECD	1006.5	1019.4	1011.5	988.9	1011.1	999.5	1005.4	995.6	975.9	930.6	910.5	0.233
OPEC	1380	1448.3	1509.9	1447.4	1526	1486.7	1393.3	1481.3	1594.1	1629.8	1632.7	0.417
Non-OPEC (excludes FSU)	1643.2	1670.3	1675.9	1665.6	1698.7	1691.4	1716.1	1706.4	1710.1	1689.8	1681.6	0.43
FSU (Former Soviet Union)	353.3	361.9	362.5	370	393.4	424.6	466.2	513.6	558.5	577.1	599.8	0.153

(Includes crude oil, shale oil, oil sands and NGLs. Excludes liquid fuels from other sources such as biomass and coal derivates.)

Source: BP (2007)

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Oil: Proved reserves (at end of 2006)

	Thousand million tonnes	Thousand million barrels	Share of total	R/P ratio
Saudi Arabia	36.3	264.3	21.9%	66.7
Iran	18.9	137.5	11.4%	86.7
Iraq	15.5	115.0	9.5%	>100
Kuwait	14.0	101.5	8.4%	>100
United Arab Emirates	13.0	97.8	8.1%	90.2
Russian Federation	10.9	79.5	6.6%	22.3
Kazakhstan	5.5	39.8	3.3%	76.5
Libya	5.4	41.5	3.4%	61.9
Nigeria	4.9	36.2	30%	40.3
Algeria	1.5	12.3	1.0%	16.8
Angola	1.2	9.0	0.7%	17.6
Norway	1.1	8.5	0.7%	8.4
Azerbaijan	1.0	7.0	0.6%	29.3
United Kingdom	0.5	3.9	0.3%	6.5
Denmark	0.2	1.2	0.1%	9.3
Italy	0.1	0.7	0.1%	18.2
Romania	0.1	0.4	<0.05%	11.7
Turkmenistan	0.1	0.5	<0.05%	9.2
Uzbekistan	0.1	0.6	<0.05%	13.0
Total world	164.5	1208.2	100.0%	40.5
North America	7.8	59.9	5.0%	12.0
S. & Cent. America	14.8	103.5	8.6%	41.2
Europe & Eurasia	19.7	144.4	12.0%	22.5
Middle East	101.2	742.7	61.5%	79.5
Africa	15.5	117.2	9.7%	32.1
Asia Pacific	5.4	40.5	3.4%	14.0
EU- 25	0.9	6.7	0.6%	8.0
OECD	10.4	79.8	6.6%	11.3
OPEC	123.6	905.5	74.9%	72.5
Non-OPEC (excludes FSU)	23.2	174.5	14.4%	13.6
FSU (Former Soviet Union)	17.7	128.2	10.6%	28.6

Source: BP 2007

Oil: Refinery capacities in Europe (Thousand barrels daily, 2006)

Country	Capacities
Russian Federation	5 491
Germany	2 390
Italy	2 359
France	1 959
United Kingdom	1 819
Spain	1 377
Netherlands	1 282
Belgium	774
Turkey	613
Greece	425
Sweden	422
Norway	310
European Union 25	15 081
Europe & Eurasia	25 171
TOTAL WORLD	87 238

Source: BP 2007

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V. Table of oil pipelines to the EU

The following table presents a selection of oil pipelines to Europe, sorted into three categories:

1. *Norwegian oil pipeline*
2. *Russian and Central Asian Transporting Oil Pipelines to Europe*
3. *Oil pipelines on the European continent*

Within these categories, the pipelines are arranged geographically.

We have differentiated between existing pipelines, pipelines under construction, and pipeline projects still in development: it is important to remember that this final category is very large - some are very concrete projects that will most certainly be carried out in the near future, while others have been proposed yet lack any real intentions of being constructed at the present time.

Notably for pipelines from the Soviet era in Russia and CIS states, the figures are often difficult to verify and vary according to the source. The system is very complex because of branch lines, ulterior extensions, parallel pipelines, etc.

As a result of this complexity, the following tables are sometimes incomplete and it is possible that some figures are no longer accurate. We would be grateful for all comments and corrections that you would like to share with us for the next edition of this study.

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1. Norwegian Pipeline

1.1 Existing pipelines

Pipeline	Pipeline Route	Transit Countries	Owner / operator	Length (km)	Technical capacity	Diameter (inches)	In Service Since
Norpipe Oil[1]	Ekofisk Centre (Norway offshore) - Teesside (United Kingdom)	-	Owner: -Norpipe Oil AS - ConocoPhillips Skandinavia: 35,05% -Total E&P Norge: 34,93% -Statoil: 15% -Eni Norge: 6,52% -SDFI: 5% -Norsk Hydro Produksjon: 3,5% Operator: ConocoPhillips Skandinavia	354	900 000 bbl/day (the reception installations limit capacity to 810 000 bbl/day) (NPD)	34	1975

Note:
1. www.npd.no; EIA UK, May 2006; EIA North Sea, January 2007

2. Russian/Central Asian oil transport pipelines towards Europe

2.1 Existing pipelines

Pipeline	Pipeline Route	Transit countries	Owner/Operator	Length (km)	Technical Capacity	Petroleum transported	Diameter (inches)	Cost of transit	In Service Since
Caspian Pipeline Consortium (CPC)[1]	Tengiz (Kazakhstan) - Novorossijsk (Russia)	-	Owner: CPC consortium, created in November 2007: Russian government 24% Kazakhstan government: 19% Chevron: 15% LUKARCO: 12,5% Rosneft-Shell: 7,5% Mobil: 7,5% Government of Oman: 7% Agip: 2%	1510, of which is in: Kazakhstan: 187	560 000 bbl/day, projected to expand to 1,34 million bbl/day by 2009 (EIA, ECS) 28 Mt/year, an increase of more than 67 Mt/year for 2008 (Götz) 22 Mt/year for mid-2004, an expected 67 Mt/year for 2008 (cpc.ru)	610 000 bbl/day in 2005 (ECS)	42 between Kropotkin and Novorossijsk 40 for the rest of the pipeline.	30,83 $/Mt for the entire CPC, 2,50 $/Mt for the Kazakh part (ECS) currently 3,87 $/bbl, 4,21 $/bbl after the capacity increase (EIA) Russia received $525 million in taxes, fees (customs and transit) and donations between	2001

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			BG Overseas: 2% Kazakhstan Pipeline Ventures: 1,75% Oryx: 1,75%					1998 and Q3 in 2004. In addition they received other undefined earnings. Profits for Russia and Kazakhstan would be more than $1,5 billion/year from transit fees after the increase in capacity. (cpc.ru)	
Atyrau-Samara[2]	Atyrau (Kazakhstan) – Samara (Russia)	-		695	310 000 bbl/day (EIA)				
Northern Route Export Pipeline / Northern Early)[3]	Baku (Azerbaïdjan) - Novorossijsk (Russia)	-	Owner of the Russian section: Transneft Owner of the Azerbaijan section: Azerbaijan International Operating Company (AIOC) – BP: 34,1% SOCAR: 10,3% Chevron: 10% INPEX: 10% Statoil: 8,6% ExxonMobil: 8% TPAO: 6,8% Devon: 5,6% Itochu: 3,9% Amerada Hess: 2,7%; Operators: BP in Azerbaijan Transneft in Russia	1330, of which is in: Azerbaijan: 231	650 000 bbl/day (EIA) 15 Mt/year (Götz)	50 000 - 90 000 bbl/day (EIA) 160 000 bbl/day (ECS)	28	15,67 $/Mt (ECS), since 1/1/1996	1997
Western Route Export Pipeline / Western Early[4]	Baku (Azerbaijan) – Soupsa (Georgia)	-	Owner: Azerbaijan International Operating Company (AIOC)	837	155 000 bbl/day (EIA) 100 000 bbl/day (ECS)	132 000 bbl/day in 2004 (BP) 100 000 bbl/day in 2005 (ECS)	21	0,17 $/bbl (ECS)	1998
Baltic Pipeline System (BPS)[5]	Yaroslavl (Russia) -	-	Transneft	1514	42 Mt/year in March 2004 (Götz)			-	2001

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	Primorsk (Russia)				65 Mt/year since April 2006 (RIA) 1,3 million bbl/day in 2006 1,5 million bbl/day in March 2007 (EIA)				
Druzhba North[6]	Tjumen - Almetjevsk (Russia) - Schwedt (Germany)	Belarus, Poland	Transneft (Russia, Belarus), PERN (Poland)	Almetjevsk – Schwedt: around 4000, of which is in Russia: 2600 Belarus: 700 Poland: 700 (entire system North and South: around 9000)	900 000 bbl/day (EIA) 1,64 million bbl/day in Russia, 1 million bbl/day in Belarus (ECS)	More than 51 Mt/year in 2005 (Lang) 82 Mt in Russia, 50 Mt in Belarus in 2005 (ECS)	24-40	In Belarus : to Poland: 2,60 $/Mt to Ukraine: 1,14 $/Mt to Lithuania: 1,26-2,00 $/Mt (ECS)	1964
Druzhba South[7]	Tjumen-Almetjevsk / Samara (Russia) – Czech Republic / Hungary	Belarus (Masyr), Ukraine, Slovakia	Owner: Transneft (Russia, Belarus) Transpetrol (Slovakia, 51% Slovak Ministry of Economics (49% Yukos) Mero (Czech Republic) Operator: Transneft	Almetjevsk – Uzhorod: around 3550, of which 2600 is in Russia: 2600 Belarus: 300 Ukraine: 650 Slovakia- Czech Republic: around 400 Hungary: 130	1,64 million bbl/day in Russia 1 million bbl/day in Belarus 380 000 bbl/day in Ukraine (ECS), 400 000 bbl/day (EIA	82 Mt in Russia 50 Mt in Belarus 17 Mt in Ukraine in 2005 (ECS)	21-40	In Ukraine: towards Slovakia and Hungary 5,6 $/Mt (ECS)	1964
Adria-Pipeline[8]	Omisalj (Croatia) - Hungary	-	Adriatic Oil		100 000 bbl/day (EIA)	Currently 0 (EIA)			1974
Greece-Macedonia[9]	Thessaloniki (Greece) - Skopje (Macedonia)	-	Management: consortium Greco-Macedonian Operator: Hellenic Petroleum	225					2002
Odessa-Brody[10]	Odessa (Ukraine) - Brody (Ukraine)	-	Ukrtransnafta	674	300 000 bbl/day (EIA) 180 000 bbl/day (ECS) 9-14,5 Mt/year (Troschke)	120 000 bbl/day (ECS) 3,42 Mt in 2006, 5,3 Mt between January and July 2007	40	12,7 $/Mt (ECS) Ukraine earned 176 million $ in transit fees between de transit 2004 and 7/31/2007 (EIA)	2004

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						(Alexanders)			
Baku-Tibilissi-Ceyhan (BTC)[11]	Baku (Azerbaijan) - Ceyhan (Turkey)	Georgia	Owner: (in July 2006) BTC Pipeline Company – BP: 30,1% AzBTC: 25% Chevron: 8,9% Statoil: 8,71% TPAO: 6,53% Eni: 5% Total: 5% Itochu 3,4% INPEX: 2,5% ConocoPhillips: 2,5% Amerada Hess: 2,36%	1768, of which is in: Azerbaijan: 443 Georgia: 249 Turkey: 1076	1 million bbl/day for 2008-2009 (EIA) 1 million bbl/day (ECS) 50 Mt/year (Götz)	210 000 bbl/day on average between June and September 2006 expecting 500 000 bbl/day at the beginning of 2007 (EIA)	46/42/34	The price for the consortium members, for transport from Sangachal to Ceyhan, is from $3,3 / bbl (2005-10), $4,6 / bbl (2010-16), $5,5 / bbl (2016-29). Turkey should earn between $140-200 million per year in transit and operation fees. Georgia stands to make $112 million from 2004-2008 and $566 million from 2009-2019.	May 2005
Strategic Pipeline (North-South system)[12]	Iraq - Turkey (one-way flow only)	-	State Oil Marketing Organization (Iraq)		1,4 million bbl/day (EIA)	Currently 0 (EIA)			1975
Kirkuk-Ceyhan[13]	Kirkuk (Iraq) – Ceyhan (Turkey)	-	State Oil Marketing Organization (Iraq)	966	1st line: 1,1 million bbl/day 2nd line: 500 000 bbl/day (EIA)	150 000 - 550 000 bbl/day in June 2006 (EIA)	1st line: 40 2nd line: 46		

Notes:
1. Cost of transporting Kazakh petroleum to Butinge: 11,58 $ / mt (ECS); construction costs: $2,5 billion for the first phase, $4,2 billion total, capacity increase would cost $1,5 billion. In Novebmer 2004, CPC began putting Russian petroleum in the system at Kropotkin. Götz 2004; EIA Kazakhstan, October 2006; EIA Caspian Sea Region, July 2002; www.cpc.ru
2. EIA Caspian Sea Region, July 2002
3. Currently oil flows Baku-Novorossijsk, but the Russian government is interested in reversing the flow (Transneft however is skeptical) to join up with the BTC; Azerbaijan reduced its capacity after the opening of the BTC. Götz 2004; EIA Azerbaijan, August 2006; EIA Caspian Sea Region, July 2002; www.bp.com; EIA Turkey, October 2006; www.azerbaijan.az
4. Construction costs: $600 million. www.bp.com; EIA Azerbaijan, August 2006; EIA Caspian Sea Region, July 2002
5. Götz 2004; Lang 2007; EIA Russia, April 2007; www.rian.ru; http://eng.lenobl.ru/economics/investment/principlefederalprojects/balticoilpipeline
6. Branches towards the Baltic countries, but there have been no deliveries since the end of 2002; only the branch towards Germany works at full capacity; construction of a third pipe is under way for Adamowo-Plock (this will increase the capacity to 60 million tons per year); enlargement of Mozyr - Schwedt of 20 million tons and an extension towards Wilhelmshaven is under discussion. Götz 2004; Lang 2007; EIA North-Central Europe, February 2006; EIA Russia, April 2007

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7. Joins up with the Adria-Pipeline in Hungary. Götz 2004; EIA North-Central Europe, February 2006; EIA Russia, April 2007; Reuters 9/1/2007
8. Russia would like to export petroleum via the Adria-pipeline and the Omisalj Port, Croatia opposes this out of ecological concerns. The reversal of the flow, as well as an increase in capacity to 300000 bbl/day would cost around $320 million. EIA Balkans, February 2006; EIA Caspian Sea Region, July 2002; www.transneft.ru
9. EIA Greece, August 2006
10. Pipeline completed in 2001. Ukraine first planned for a flow from Odessa-Brody in order to import Caspian petroleum, but the oil pipeline currently functions, since 2004, in the opposite direction. It could be reversed in the case that Brody-Plock is constructed; another proposal is to lengthen the oil pipeline up to Kralupy (Czech Republic). Ukraine should pay $100 million to TNK-BP if the flow is reversed. EIA Ukraine, August 2007; EIA North-Central Europe, February 2006; www.oei-muenchen.de/info13.pdf; Alexanders 11/9/2007; La Lettre du Courrier des pays de l'Est, n° 39, October 2007; Dubien 2007
11.Construction costs: $3,9 billion. www.bp.com; EIA Azerbaijan, August 2006; EIA Caspian Sea, January 2007; EIA Turkey, October 2006; www.iea.org/Textbase/work/2006/energy_security/Novruzov.pdf
12. Taken out of service in 1990/1991, Northern Oil Company (Iraq) estimated in 2003 that it would take a long time to get the pipeline running again. EIA Iraq, June 2006
13. Private military companies are in charge of the security of the pipeline, which has been the target of numerous attacks. Currently, the pipeline only functions sporadically. EIA Iraq, June 2006

2.2 Pipelines under construction

Pipeline	Pipeline Route	Transit countries	Owner / Operator	Length (Km)	Capacity	Diameter (inches)	Predicted Operational Start-Up Date	Estimated cost
Samsun-Ceyhan Pipeline (SCP) / Trans-Anatolian Pipeline[1]	Samsun (Turkey) - Ceyhan (Turkey)	-	Trans-Anadolou Pipeline Company (TAPPCO): ENI 50%, Calik Energy 50%	555	Initial capacity: 1 million bbl/day "design capacity" 1,5 million bbl/day (Calik/ENI)	42-48	2010	1,5 billion $(Calik/ENI)

Note:

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1.Start of construction: 24 April 2007. Storage capacities: Ceyhan 8 million bbl, Samsun 6 million bbl. EIA Turkey, October 2006; RIA 24/04/2007; www.iea.org/Textbase/work/2006/energy_security/Cavanna.pdf; ww.eni.it

2.3 Oil Pipeline Projects still in Development

Pipeline	Pipeline Route	Transit Countries	Owner/Operator	Length (km)	Capacity	Diameter (inches)	Estimated Operational Start-up Date	Estimated Cost
Kiyiköy –Ibrikhaba, Trans-Thrace[1]	Kiyiköy (Turkey) - Ibrikhbaba (Turkey)	-	OJSC AK Transneft	193	60 Mt/year	48		0,9 billion $(Götz)
Burgas-Alexandroupolis[2]	Burgas (Bulgaria) - Alexandroupolis (Greece)	-	Russian Consortium (Transneft, Rosneft and Gazprom in equal parts): 51% Bulgaria: 24,5% Greece: 24,5% (Bulgarian and Greek stakes are likely to be sold)	279	700 000 bbl/day, potential of 1 million bbl/day (EIA) 1st phase: 15-23 Mt/year, 2nd phase: 35 Mt/year (transneft.ru) 35-50 millions tons/year (RBC)	36	2010-2011	1 billion $ (RBC) 0,9 billion $ (EIA) 800-900 million € (bridge-mag)
Constanta – Trieste (South East European Line, PanEuropean Oil Pipeline)[3]	Constanta (Romania) - Trieste (Italy)	Serbia (Pancevo), Croatia (Omisalj), Slovenia		1.300-1.400, of which is in: Romania; 650 Slovenia: 29	60-90 Mt/year (Reuters) 480 000 - 1 800 000 bbl/day (EIA)		2011-2012	2,3 billion $ (EIA) 3 billion $ (Reuters) 1,5-2,62 billion € (ENS)
Constanta – Vlore[4]	Constanta (Romania) - Vlore (Albania)	Macedonia		900	38 Mt/year			1,1 billion $(Götz)
Albanian-Macedonian-Bulgarian Oil Pipeline (AMBO)[5]	Burgas (Bulgaria) - Vlore (Albania)	Macedonia	AMBO Pipeline Cooperation	894, of which is in: Macedonia: 273	30-40 Mt/year (SET) 750 000 bbl/day (EIA, SET)		2011	1,1-1,5 billion $ (EIA, SET)
Sarmatia[6]	Brody (Ukraine) - Plock (Poland)	-	Sarmatia : joint-venture PERN and UkrTransnafta	490-540	15 Mt/year in the first phase 25 Mt/year in the second phase			500 million € (Lang 2007)
Slovaquie – Autriche[7]	Slovakia - Austria		Transpetrol, OMV	61	72 000 - 100 000 bbl/day		2008	
Novorossijsk – Supsa[8]	Novorossijsk (Russia) - Supsa (Georgia)	-						
BPS-II [9]	Unetscha (Russia) - Primorsk (Russia)	-	Transneft	1.100-1.200	At the beginning, 1 million bbl/day, an increase to 1,5			2 billion $ (Götz)

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					million bbl/day is possible (EIA) =35 Mt/year (BFAI)			
Barents Sea[10]	Field in western Siberia (Russia) – Murmansk (Russia)	via Karelia or the White Sea towards the Kola Peninsula	Transneft	2,800-3,900	50-100 Mt/year			9-15 billion $(Götz)
Barents Sea (alternative)[11]	Field in western Siberia (Russia) – Indiga (Russia)	-	Transneft	1.700	50-100 Mt/year			12 billion $ Götz)
Kara Sea[12]	Field in Vankor (Russia) – Dlkson (Russia)	-	Transneft		15 Mt/year			
Transcaspian[13]	Turkmenistan – Azerbaijan - Turkey							
Isgene Kuryk[14]	Isgene (Kazakhstan) – Kuryk (Kazakhstan)		Kazmunaigaz	950	Up to 150 000 bbl/day		2010	

Notes:

1. Goetz 2004; http://www.simdex.com/future_pipeline_projects/samples/Trans_Thrace_Pipeline.pdf; Alexanders 1/9/2004
2. Intergovernmental agreement signed by Russia, Greece, and Bulgaria March 15, 2007; the construction should begin in 2008; according to the Greek Development Minister, Greece should make between 30 and 50 million dollars per year in transit fees. EIA Southeastern Europe, August 2006; EIA Greece, August 2006; www.rbcnews.com; BBC 15 mars 2007; Radio Free Europe 15 mars 2007; Götz 2004; www.transneft.ru; www.bridge-mag.com
3. Agreement signed by the European Commission and five impacted countries in April 2007. Slovenia stated reservations for ecological reasons. Between Pancevo and Omisalj, the pipeline could use an existing section of the Adria pipeline. It will then join with TAL in Trieste, to export towards Austria, Germany and the Czech Republic. Götz 2004; EIA Southeastern Europe, August 2006; EIA Balkans Factsheet, February 2006; EIA Italy, May 2007; www.gasandoil.com; www.ens-newswire.com; Reuters 26/3/2007
4. Götz 2004
5. It is estimated that Macedonia will make $30 million per year in transit fees. Feasibility study finished in 2002, MOU signed in Dec. 2004, construction should begin in 2008. EIA Southeastern Europe, August 2006; EIA Balkans, February 2006; Southeast European Times 14/2/2007
6. Would link the Odessa-Brody and Plock-Gdansk pipelines, and even connect to Klaipeda. PERN estimates that it would take 3 years after making the decision to complete the project. Agreement signed by Azerbaijan, Georgia, Ukraine, Poland and Lithuania in Vilnius in October 2007. Feasibility study expected in 2008. EIA North-Central Europe, February 2006; La Lettre du Courrier des pays de l'Est, n° 39, October 2007; www.interfax.pl; Lang 2007
7. OMV would be able to import Russian petroleum directly by this pipeline. OMV currently imports all of its petroleum for its Trieste terminal. EIA North-Central Europe, February 2006; www.derstandard.at
8. Would be able to join the BTC in Supsa, otherwise construction of a parallel pipeline to the BTC to Ceyhan (Turkey); Saakshvili's proposition in February 2004. Goetz 2004
9. Project announced in January 2007, after the conflict with Belarus; feasibility study began in May 2007; construction would take only 18 months; there is an proposal for a branch towards Ust-Luga with a capacity of 15 million tons/year. Goetz 2004; EIA Russia, April 2007; www.bfai.de; www.transneft.ru
10. Goetz 2004
11. Goetz 2004
12. Goetz 2004
13. According to Vladimir Socor, Turkmenistan and Kazakhstan would be able to construct underwater pipelines without needing the agreement of the other countries in the area: for example, a pipeline which connects the Turkmen platform deck "Block 1" with the Azerbaijani fields "Azeri-Chirag-Guneshli." Kazakhstan could construct a pipeline that connects to this system that would not be considered "trans-Caspian" in a legal sense. Petroleum Economist July 2007
14. EIA Caspian Sea, January 2007

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3. Oil Pipelines on the European continent

3.1 Existing Oil Pipelines

Pipeline	Pipeline Route	Transit Countries	Owner/Operator	Length (Km)	Technical Capacity	Petroleum Transported	Diameter (inches)	In Service Since
Rotterdam-Rhein Pipeline (RRP)[1]	Rotterdam (Netherlands) - Wessling (Germany)	-		322	690 000 bbl/day (EIA)			1960
Südeuropäische Ölleitung / South European Pipeline / SPSE[2]	Fos-sur-Mer (France) - Karlsruhe (Germany)	Switzerland	Total France: 27,84% ExxonMobil: 22,00% Société de Participations dans l'Industrie et le Transport du Pétrole: 15,40% BP France: 12,10% Shell: 10,32% BASF: 10,00% CococoPhillips Germany: 2,00%	769	670 000 bbl/day (EIA)	3 Mt/year in recent years transported 42 Mt in 1973 (SPSE)	40	1962, capacity doubled, then tripled in 1971-1972
Trans Alpine Pipeline (TAL)[3]	Trieste (Italy) - Ingolstadt (Germany) - Karlsruhe (Germany)	Austria	OMV: 25% Shell: 24% ExxonMobil: 16% Ruhr Oel: 11% ENI: 10% BP: 9% ConocoPhillips: 3% Total 2%	TAL-IG (Trieste-Ingolstadt): 465 TAL-OR (Ingolstadt-Karlsruhe): 266		690 000 bbl/day in 2004 (EIA) 36,15 Mt in 2006 (TAL)	TAL-IG 40, TAL-OR 26	1967
Ingolstadt - Kralupy nad Vltavou – Litvinov (ILK)[4]	Ingolstadt (Germany) - Kralupy nad Vltavou (Czech Republic) - Litvinov (Czech Republic)	-	Mero CR (operator)	350, of which is in: Germany: 178	10 million tons/year, extension to 15 million/year is possible (Mero)		28	1996

Notes:
1. EIA Germany, December 2006
2. EIA Germany, December 2006; www.spse.fr
3. EIA Germany, December 2006; EIA Southeastern Europe, August 2006; www.tal-oil.com
4. Receives oil from TAL. EIA North-Central Europe, February 2006; www.mero.cz

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VI. Cross-Country Comparison of Transit Tariffs

Country	Transit tariff (US$/mt)	Distance (Km)	US$/100 tkm
Belarus (Russia-Ukraine), *Druzhba*, 520/720 mm	1.14	245	0.47
Belarus (Russia-Poland), *Druzhba*, 630/820 mm	2.60	521	0.50
Ukraine (Russia-Odessa), *Pridneprovskie company*, 720 mm	6.30	1,097	0.57
Ukraine (Belarus-Slovakia), *Druzhba*, 530/720 mm	5.60	634	0.88
Ukraine (Odessa-Brody), 1020 mm	12.70	674	1.88
Ukraine (Russia-Yuzhniy), *Collide ltd.*, 720 mm	12.00	1,112	1.07
Russia (Caspian sea-Black sea), *Makhachkala-Novorossiysk*, 720 mm	7.06	774	0.91
Russia (Azerbaijan-Black sea), Baku- Novorossiysk, 720 mm	15.67	1,411	1.11
Russia (Kazakhstan, Turkmenistan oil), *Transneft*, 720-1200 mm			0.73
Caspian Pipeline Consortium (Kazakhstan-Russia), 1016 mm	30.83	1,580	1.94
Georgia (Azerbaijan-Black sea), Baku-Supsa, 530 mm	1.48	370	0.40
Azerbaijan (Azerbaijan-Black sea), Baku-Supsa, 530 mm	2.14	457	0.47
Kazakhstan (Russia-Russia), *Altayfrakht*, 720 mm	2.50	187	1.34
BTC	18.8 – 24.1	1773	1.06 – 1.36

Source: ECS (2007), p. 6

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VII. Statistics on Natural Gas

Presented here are statistics on imports of natural gas to the European Union (European Commission statistics for 2005 [first three tables] and BP statistics for 2006), on gas production in member states, and in the main exporting countries within the EU, as well as a table of proven natural gas reserves.

Imports of Natural Gas by origin to the EU-27, in TJ (GCV), 2005

Origin	Quantity
Russia	4 952 879
Norway	2 642 633
Algeria	2 256 826
Nigeria	436 319
Libya	209 499
Egypt	202 419
Qatar	195 713
Oman	71 379
Other*	3 776 189
TOTAL	14 743 856

* Author's calculation

Imports of Natural Gas by Origin to Croatia, 2005 (in TJ [GCV])

Origin	Quantity
Russia	43 096

Imports of Natural Gas by Origin to Turkey, 2005 (in TJ [GCV])

Origin	Quantity
Russia	660 621
Algeria	158 992
Nigeria	42 832
Other*	167 209
TOTAL	1 029 654

* Author's calculation

Imports of Natural Gas to the EU-27, 2006

Origin	Quantity (billion m^3)	Percentage
Russia	128	41
Norway	84	27
Algeria	55	18
Nigeria	13	4
Libya	8	3
Egypt	8	3
Qatar	5	2
Others	13	4
TOTAL	314	
Transported by gas pipeline	264	
Russia	128	
Norway	84	
Algeria	36	
Libya	8	
Others	8	
Transported in LNG	50	
Algeria	19	
Nigeria	13	
Egypt	8	
Qatar	5	
Others	5	

Source: BP (2007) and author's calculations

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Natural Gas Production

(Billion cubic meters)

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	Share of total (2006)
Russian Federation	561.1	532.6	551.3	551.0	545.0	542.4	555.4	578.6	591.0	598.0	612.1	21.3%
Iran	39.0	47.0	50.0	56.4	60.2	66.0	75.0	81.5	91.8	100.9	105.0	3.7%
Norway	37.4	43.0	44.2	48.5	49.7	53.9	65.5	73.1	78.5	85.0	87.6	3.0%
Algeria	62.3	71.8	76.6	86.0	84.4	78.2	80.4	82.8	82.0	88.2	84.5	2.9%
United Kingdom	84.2	85.9	90.2	99.1	108.4	105.9	103.6	102.9	96.0	87.5	80.0	2.8%
Saudi Arabia	44.4	45.3	46.8	46.2	49.8	53.7	56.7	60.1	65.7	71.2	73.7	2.6%
Turkmenistan	32.8	16.1	12.4	21.3	43.8	47.9	49.9	55.1	54.4	58.8	62.2	2.2%
Netherlands	75.8	67.1	63.6	59.3	57.3	61.9	59.9	58.4	68.8	62.9	61.9	2.2%
Uzbekistan	45.7	47,8	51.1	51.8	52.6	53.6	53.5	53.6	55.8	55.0	55.4	1.9%
Qatar	13.7	17.4	19.6	22.1	23.7	27.0	29.5	31.4	39.2	45.8	49.5	1.7%
United Arab Emirates	33.8	36.3	37.1	38.5	38.4	39.4	43.4	44.8	46.3	47.0	47.4	1.6%
Egypt	11.5	11.6	12.2	14.7	18.3	21.5	22.7	25.0	26.9	34.6	44.8	1.6%
Nigeria	5.4	5.1	5.1	6.0	12.5	14.9	14.2	19.2	22.8	22.4	28.2	1.0%
Kazakhstan	6.1	7.6	7.4	9.3	10.8	10.8	10.6	12.9	20.6	23.3	23.9	0.8%
Ukraine	17.2	17.4	16.8	16.9	16.7	17.1	17.4	18.0	19.1	19.4	19.1	0.7%
Germany	17.4	17.1	16.7	17.8	16.9	17.0	17.0	17.7	16.4	15.8	15.6	0.5%
Libya	5.8	6.0	5.8	4.7	5.3	5.6	5.6	5.8	6.2	11.3	14.8	0.5%
Romania	17.2	15.0	14.0	14.0	13.8	13.6	13.2	13.0	12.8	12.1	12.1	0.4%
Italy	20.0	19.3	19.0	17.5	16.2	15.2	14.6	13.7	13.0	12.1	11.0	0.4%
Denmark	6.4	7.9	7.6	7.8	8.1	8.4	8.4	8.0	9.4	10.4	10.4	0.4%
Azerbaijan	5.9	5.6	5.2	5.6	5.3	5.2	4.8	4.8	4.7	5.3	6.3	0.2%
Poland	3.6	3.6	3.6	3.4	3.7	3.9	4.0	4.0	4.4	4.3	4.3	0.1%
TOTAL WORLD	2227.9	2231.5	2279.5	2343.7	2425.2	2482.1	2524.6	2614.3	2703.1	2779.8	2865.3	100.0%
North America	725.5	732.8	744.3	747.9	762.2	777.6	759.1	759.9	747.4	736.9	754.4	26.5%
S. & Cent. America	81.4	82.5	88.4	90.0	97.9	102.6	104.4	115.7	129.0	137.9	144.5	5.0%
Europe & Eurasia	945.4	899.1	915.4	934.8	959.5	967.7	989.1	1024.7	1055.6	1060.0	1072.9	37.3%
Middle East	158.0	175.4	184.0	193.8	206.8	224.8	244.7	259.9	290.7	317.5	335.9	11.7%
Africa	88.9	99.4	104.8	117.1	126.8	127.2	130.3	140.9	146.0	164.8	180.5	6.3%
Asia Pacific	228.6	242.2	242.7	260.1	272.0	282.2	297.0	313.1	334.2	362.6	377.1	13.1%
EU-25	219.0	211.1	209.8	213.1	218,4	220.1	215.4	212.0	215.3	199.8	190.0	6.6%
OECD	1019.1	1024.4	1036.1	1048.5	1070.2	1092.8	1081.2	1085.9	1083.6	1065.9	1078.5	37.8%
FSU	669.0	627.4	644.5	656.2	674.5	677.3	691.9	723.5	745.8	760.0	779.3	27.1%
Other EMEs	539.8	579.7	599.0	639.0	680.4	712.0	751.6	804.9	873.7	953.9	1007.5	35.1%

Source: BP (2007)

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Natural gas: Proved Reserves at End 2006

	Trillion cubic meters	Share of total	R/P ratio
Russian Federation	47.65	26.30%	77.8
Iran	28.13	15.50%	>100
Qatar	25.36	14.00%	>100
Saudi Arabia	7.07	3.90%	96
Nigeria	5.21	2.90%	>100
Algeria	4.5	2.50%	53.3
Iraq	3.17	1.70%	>100
Kazakhstan	3	1.70%	>100
Norway	2.89	1.60%	33
Turkmenistan	2.86	1.60%	46
Egypt	1.94	1.10%	43.3
Uzbekistan	1.87	1.00%	33.7
Netherlands	1.35	0.70%	21.8
Azerbaijan	1.35	0.70%	>100
Libya	1.32	0.70%	88.9
Ukraine	1.1	0.60%	57.7
Romania	0.63	0.30%	51.7
United Kingdom	0.48	0.30%	6
Germany	0.16	0.10%	9.9
Italy	0.16	0.10%	14.5
Poland	0.1	0.10%	24.4
Denmark	0.08	<0.05%	7.4
TOTAL WORLD	181.46	100.00%	63.3
North America	7.98	4.40%	10.6
S. & Cent. America	6.88	3.80%	47.6
Europe & Eurasia	64.13	35.30%	59.8
Middle East	73.47	40.50%	>100
Africa	14.18	7.80%	78.6
Asia Pacific	14.82	8.20%	39.3
EU-25	2.43	1.30%	12.8
OECD	15.9	8.80%	14.7
Former Soviet Union	58.11	32.00%	74.6

Source: BP (2007)

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VIII. Table of Gas Pipelines to the EU

In the following tables a selection of gas pipelines to Europe are presented, sorted into nine categories:

1. *Pipelines connecting North Africa to Europe*
2. *Pipelines in the North Sea*
3. *Connections between the United Kingdom and the European continent*
4. *Pipelines in the Baltic Sea*
5. *Pipelines on the European continent*
6. *Pipelines between Russia and Europe via Ukraine, Belarus, and Finland*
7. *Pipelines between the Caspian region and Russia*
8. *Pipelines connecting Russia and states of the former Soviet Union with Europe via Turkey or the Black Sea*
9. *Pipelines connecting Iran and Europe*

Within these categories, the pipelines are arranged geographically.

We have differentiated between existing gas pipelines, pipelines under construction, and pipeline projects still in development: it is important to remember that this final category is very large- some are very concrete projects that will most certainly be carried out in the near future, while others have been proposed yet lack any real intentions of being constructed at the present moment. If nothing else is indicated, the 'capacity' column refers to the technical capacity.

Notably for pipelines from the Soviet era in Russia and CIS states, the figures are often difficult to verify and varies according to the source. The system is very complex because of branch lines, ulterior extensions, parallel pipelines, etc.

As a result of this complexity, the following tables are sometimes incomplete and it is possible that some figures are no longer accurate. We would be grateful for all comments and corrections that you would like to share with us for the next edition of this study.

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1. Gas Pipelines connecting North Africa and Europe

1.1 Existing Gas Pipelines

Pipeline	Pipeline Route	Transit Countries	Owner/Operator	Length (km)	Diameter (inches)	Capacity (billion m^3 / year)	In Service Since
Greenstream[1]	Mellitah (Libya) - Gela (Sicily, Italy)	-	ENI 75%, NOC 25%	530	32	8	October 2004
Enrico Mattei/ Transmed[2]	Hassi R'Mel (Algeria) - Sicily - Minerbio (Italy)	Tunisia	Sonatrach 50%, ENI 50%	2220, of which is in: Tunisia: 370 Offshore: 380 Italy: 1470	47 onshore 26 offshore	24 (EIA) 27 (Brower, Nicholls) (increases scheduled: see notes at the end)	1983 (1st line) 1994 (2nd line)
Pedro Duran Farell/ Maghreb Europe[3]	Hassi R'Mel (Algeria) - Cordoba (Spain)	Morocco	Enagas, SNPP, Sonatrach, Transgas	1650, of which is in: Algeria: 520 Morocco: 540 Offshore: 45 Andalusia: 275 Extremadura: 270	28-48 onshore 2x22 offshore	8,5 (EIA) 8,6 (Brower) 12,5 (Nicholls)	1996

Notes:
1. Construction costs of $6,6 billion, Edison takes 4 billion m3 /year, Energia Gas and GdF 2 billion m3 / year. EIA Italy, May 2006; EIA Libya, March 2006; www.eni.it
2. There is an extension towards Slovenia; increase in capacity to 30,2 billion m3 expected for 2008 and to 33,5 billion m3 for 2012 (Brower) / plan to increase to 36 billion m3 (EIA) / increase to 33,5 billion m3 expected for 2009 (Nicholls). EIA Algeria, March 2007; EIA Italy, May 2006; EIA Tunisia, April 2006; Hayes 2003; Brower 2007; Nicholls 2007; www.eni.it; www.mem-algeria.org/
3. Extension towards Portugal (500 km, 28 inch); increase in capacity to 18,4 billion m3 expected for the end of 2006 (EIA). EIA Algeria, March 2007; EIA Iberian Peninsula, June 2006; ECS 2006; Nicholls 2007; www.iea.org; www.iea.org/textbase/work/2002/cross_border/MORALED.PDF; www.mem-algeria.org/fr/statistiques/Bilan-MEM-2000-2006.pdf

1.2 Gas Pipelines under Construction

Pipeline	Pipeline Route	Transit Countries	Owner/Operator	Length (Km)	Diameter (inches)	Capacity (billion m^3 /year)	Expected Operational Start-up Date	Estimated Cost
Medgaz[1]	Beni Saf (Algeria) - Almeira (Spain)	-	Sonatrach: 36% Cepsa: 20% Iberdrola: 20% Endesa: 12% GdF: 12%	210	24	8, possible increase to 16 (Brower) 4 at the start, a maximum of 16 (EIA)	Mid 2009	1,2 billion $ (EIA), 0,9 billion € (Brower, Medgaz)

Note :
Agreement signed in 2001, feasibility study completed in 2002, under construction since 2007, will also supply gas to France, plan for a parallel electric line. EIA Algeria, March 2007; EIA Iberian Peninsula, June 2006; EIA France, April 2007; Nicholls 2007; Brower 2007; www.medgaz.com

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1.3 Gas Pipelines Projects in Development

Pipeline	Pipeline Route	Transit Countries	Owner/Operator	Length (km)	Capacity (billion m^3 / year)	Possible Operational Start-up	Estimated Cost
Galsi[1]	Hassi R'Mel (Algeria) - Sardegne - Pescaia (Italy)	-	Sonatrach: 38% Edison: 16% Enel: 13,5% Wintershall: 9% Hera: 10% Région Sardegna/Sfirs: 10%	900, 600 of which is offshore	8 (Brower, Galsi, Nicholls) 10 was initially expected (Brower)	2012 (Galsi, Nicholls)	2 billion $ (EIA)
Trans-Sahara Gas Pipeline, TSGP / Trans-African Gas Pipeline / NIGAL[2]	Warri (Nigeria) - Hassi R'Mel (Algeria), then Beni Saf or El Kala	Niger	Trans-Saharan Natural Gas Consortium (NIGEL): Sonatrach Nigerian National Petroleum Cooperation	4128, of which is in: Nigeria: 1037 Niger: 841 Algeria: 2310	20 to 30	2015	(more than) 10 billion $

Notes: 1. Operational start date initially expected for 2009-2010, agreement signed in 2002, feasibility study completed in 2005, intergovernmental agreement of 14/11/2007; alternative route via Corse, plan for a parallel electric line. EIA Algeria, March 2007; EIA Italy, May 2006; Nicholls 2007; Brower 2007; www.mem-algeria.org/actu/comn/galsi.htm; www.edison.it
2. Feasibility study conducted by PENSPEN/IPA. EIA Algeria, March 2007; EIA Nigeria, April 2007; O'Neill 2007

2. Gas Pipelines in the North Sea

2.1 Existing Gas Pipelines

Pipeline	Route	Owner/Operator	Length (km)	Diameter (inches)	Capacity (billion m^3 / year)	In Service Since
Europipe I [1]	Draupner E (Norway offshore) - Emden (Germany)	Owner: Gassled Operator: Gassco	660	40	13-16	1995
Europipe II [2]	Kårstø (Norway)- Dornum (Germany)	Owner: Gassled Operator: Gassco	650	42	22	1999
Norpipe Gas[3]	Ekofisk (Norway offshore) -Emden (Germany)	Owner: Gassled Operator: Gassco	440	36	13-16	1977
Zeepipe I [4]	Sleipner (Norway offshore) -Zeebrugge (Belgium)	Owner: Gassled Operator: Gassco	814	40	13-15	1993
Franpipe[5]	Draupner E (Norway offshore) - Dunkerque (France)	Owner: Gassled Operator: Gassco	840	42	16	1998
Langeled (northern leg)[6]	Nyhamna (Norway) - Sleipner (Norway offshore)	Owner: Gassled Operator: Gassco	600	42	20	October 2007
Langeled (southern leg)[7]	Sleipner (Norway offshore) - Easington (United Kingdom-England)	Owner: Gassled Operator: Gassco	600	44	20	October 2006

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Vesterled[8]	Heimdal (Norway) - St. Fergus (United Kingdom- Scotland)	Owner: Gassled Operator: Gassco	350	32	12-13	1978
Frigg[9]	Alwyn North/Frigg (Norway offshore) – St. Fergus (United Kingdom- Scotland)	Total	472	24/32	13	1977
Tampen Link[10]	Statfjord B (Norway offshore) –FLAGS tie-in (United Kingdom offshore)	Statoil: 43,9% ExxonMobil: 18,2% Shell: 12,2% StatoilHydro: 10,5% ConocoPhillips: 8,2% Petoro: 7%	23	32	9	October 2007
Tyra West-F3 [11]	Tyra West (Denmark offshore) - F3-FB (Netherlands offshore)	Owners: -DONG Energy: 50% -Shell Danmark: 23% -Moller-Maersk: 19,5% -ChevronTexaco Denmark: 7,5% Operator: Maersk Oil & Gas	100	26		2004
Ireland Scotland Gas Interconnector /Interconnector 1 [12]	Moffat (United Kingdom- Scotland) - Loughshinny (Ireland)	Bord Gáis Eirann	290, 200 of which is offshore	30 onshore, 24 offshore		1993
Interconnector 2 [13]	Beattock (United Kingdom- Scotland)- Gormanston (Ireland)	Bord Gáis Eirann	195 offshore	36 onshore, 30 offshore		2002

Notes :
1. Gassled: Petoro 38.245%, Statoil 20.180%, Norsk Hydro Produksjon 11.620%, Total E&P Norge 8.086%, ExxonMobil Exploration and Production Norway 5.298%, Mobil Development Norway 4.267%, Norske Shell Pipelines 4.140%, Norsea Gas 2.839%, Norske ConocoPhillips 1.946%, Eni Norge 1.574%, A/S Norske Shell 1.115%, DONG E&P Norge 0.690%; Gassco: 100% Norwegian state. Facts 2007; www.gassco.no; www.npd.no
2. Facts 2007; www.gassco.no; www.npd.no
3. Facts 2007; www.gassco.no; www.npd.no
4. Zeepipe II A and B link Kollsnes to Draupner. Facts 2007; www.gassco.no; www.npd.no
5. Facts 2007; www.gassco.no; www.npd.no
6. Construction costs: $10 billion (for both branches, EIA). EIA UK, May 2006; EIA Norway, August 2006; Facts 2007; www.gassco.no; www.statoil.com; www.npd.no
7. EIA UK, May 2006; EIA Norway, August 2006; Facts 2007; www.gassco.no; www.statoil.com; www.npd.no
8. Facts 2007; www.gassco.no; www.statoil.com; www.npd.no
9. EIA UK, May 2006; EIA Norway, August 2006; www.total-icop.co.uk; www.npd.no
10. Connects with the British FLAGS system for export towards St. Fergus (United Kingdom). Facts 2007; www.gassco.no; www.npd.no
11. www.shell.com
12. www.subsea.org; www.nationalgrid.com; www.atkinsglobal.ie; www.bordgais.ie
13. www.subsea.org; www.bordgais.ie

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2.2 Gas Pipelines Projects in Development

Pipeline	Pipeline Route	Transit Countries	Owner/Operator	Length (km)	Diameter (inches)	Capacity (billion m^3 / year)	Estimated Operation Start –Up	Estimated Cost
Shtokman - Norway - Europe	Shtokman (Russia) -Norway – Western/Northern Europe (to be accomplished with Norwegian infrastructure)	Norway	Gazprom, Gassled					

3. United Kingdom – continental Europe interconnectors

Pipeline	Pipeline Route	Owner/Operator	Length (km)	Diameter (inches)	Capacity (billion m^3 / year)	In Service Since
Balgzand Bacton Line (BBL)[1]	Balgzand (Netherlands) – Bacton (United Kingdom-England)	Gasunie: 60% E.ON Ruhrgas Transport: 20% Fluxys: 20%	235	36	15	1/12/2006
UK Interconnector[2]	Zeebrugge (Belgium) – Bacton (United Kingdom-England)	Caisse de dépôt et placement du Québec: 35% Distrigas: 16,41% E.ON Ruhrgas: 23,59% Gazprom: 10% ConocoPhillips: 10% ENI: 5%	230	40	Zeebrugge-Bacton: 25,5 Bacton-Zeebrugge: 20	1/10/1998

Notes: 1. With agreement on the entrance of Gasuni in Nord Stream, Gazprom obtained an option to buy 9% of BBL. EIA UK, May 2006; www.bblcompany.com
2. www.interconnector.com; EIA UK, May 2006

4. Gas Pipelines in the Baltic Sea

4.1 Existing Gas Pipelines

Pipeline	Pipeline Route	Transit Countries	Owner/ Operator	Length (km)	Diameter	Capacity (billion m^3 / year)	In Service Since
Oresund[1]	Dragor (Denmark) - Limhamn (Sweden)	-	Swedegas	20		2	1985

Note: 1. www.nord-stream.com/uploads/media/nord_stream_facts_issue_2_english_download_02.pdf

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4.2 Gas Pipelines Projects in Development

Pipeline	Pipeline Route	Transit Countries	Owner/Operator	Length (km)	Diameter (inches)	Capacity (billion m^3 / year)	Estimated Operational Start-Up	Estimated Cost
Nord Stream[1]	Vyborg (Russia) - Greifswald (Germany)	-	Gazprom: 51% Wintershall: 24,5% E.ON Ruhrgas: 24,5%	1200 (offshore)	48	27,5 (1 pipe) 55 (2 pipe)	1st line: 2010 2nd line: 2012	More than 5 billion € (Nord Stream) up to 8 billion € (Schröder in December 2007) 9 billion € (BASF in November 2006)
Balticconnector[2]	Helsinki (Finland) - Paldiski (Estonia)	-	Gasum Eesti Gaas Latvijas Gaze Gazprom	80-120		2	2011 at the earliest (Gasum) 2014 (BFAI)	100-120 million € (Gasum)
Baltic Pipe[3]	Copenhagen (Denmark) – Poland	-	Energinet.dk PGNiG Gaz-System	250		8-10 (Lang)	2010	1 billion € (Lang)
Baltic Gas Interconnector (BGI)[4]	Rostock (Germany) – Avedore (Denmark) and Trelleborg (Sweden)	-	ENERGI E2 (ex-DONG Energy) Hovedstadsregionens Naturgas (HNG) Verbundsnetz Gas E.ON Sverige Göteborgs Energi Lunds Energi Öresundskraft	220	28-32	3 at start 10 at the finish (Nord Stream)	2012	232-284 million € (BGI in 2001)
Mid-Nordic Gas Pipeline[5]	Skogn (Norway) - Finland	Sweden	Pohjolan Voima Oy	880, of which is in: Norway: 70 Sweden: 335 Offshore: 220 Finland: 255	16-24	2,8-4,7 (PVO)	2010 at the earliest (PVO in 2002)	1 billion € (PVO)

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Skanled[6]	Karsto (Norway) – Rafnes - Sweden - Denmark. « Exit points » are expected at Rafnes (Norway), Lysekil, Vallby Kile, Bua (Sweden) and Jutland (Denmark)	-	Skagerak Energi: 20% E.On Ruhrgas: 15% PgNiG: 15% Energinet.dk: 10% Hafslund: 10% Ostfold Energi: 10% Göteborg Energi: 8% Agder Energi: 5% Swedegas: 5% Preem Petroleum: 2%	800	20-26	Maximum 20 (Gassco/DNV) 20-24 (Energinet.dk)	October 2012	900 million € (Gassco) 1,1 billion $ (EIA)

Notes: 1. Initial agreement of 8/9/2005 signed by Gazprom, E.ON, BASF; agreement of 6/11/2007 gives Gasunie an option to buy 9% (4,5% of Wintershall and 4,5% of E.ON); exports expected to the United Kingdom (BBL) and Denmark; buying contract signed in December 2007 (in billion m3 / year): Wingas (9), Gazprom Marketing & Trading (UK) (4), E.ON Ruhrgas (4), GdF (2,5), Dong (DK) (1); delays expected in carrying it out; "Project of European Interest" (TEN) since 2000, priority project since 2002; NEL and OPAL will transport the gas from Greifswald on; multiples branches were/are under discussion: towards Poland, Sweden, Latvia, Finland, Kaliningrad; new budget expected in February/March 2008; Nord Stream is waiting for authorizations from Sweden and Denmark. EIA Russia, April 2007; EIA Germany, December 2006; Lang 2007; Eurasia Daily Monitor -- Volume 4, Issue 209, 9/11/2007; www.diploweb.com; Cohen 2006; www.nord-stream.com; www.osw.waw.pl; Süddeutsche Zeitung 14/12/2007
2. Would extend the existing pipeline between Latvia and Estonia, in order to connect Finland to stocked reserves in Latvia. Feasibility study completed in May 2007, study on environmental impacts expected in 2008. www.gasum.fi; www.nord-stream.com/uploads/media/nord_stream_facts_issue_2_english_download_02.pdf; www.upstreamonline.com; www.bfai.de
3. First project in 2001, abandoned, started up again in 2007; would extend Skanled in order to transport Norwegian gas towards Poland, but would also be able to transport Russian gas towards Denmark; "co-operation agreement for implementing" signed in November 2007; final investment decision expected in 2008; the pipeline will be mainly financed by Poland. Lang 2007; www.energy-business-review.com; www.energinet.dk; www.nord-stream.com/uploads/media/nord_stream_facts_issue_2_english_download_02.pdf
4. Construction authorizations given by Sweden and Denmark. The construction of Skanled will put the profitability of the BGI into question. EIA Germany, December 2006; Nord Stream June 2007; www.balticgas.com; www.nord-stream.com/uploads/media/nord_stream_facts_issue_2_english_download_02.pdf
5. www.pvo.fi/File/e9662f81-bc68-4f40-87da-dc89e1a9da2a/Feasibility+Study+Report+on+the+Mid-Nordic+Gas+Pipeline.pdf
6. Investment decision expected in October 2009. EIA Norway, August 2006; www.gassco.no; www.energinet.dk/

5. Gas Pipelines on the European Continent

5.1 Existing Gas Pipelines

Pipeline	Pipeline Route	Transit Countries	Owner/Operator	Length (km)	Diameter (inch)	Capacity (billion m^3 / year)	In Service Since
Trans-European Natural Gas Pipeline (TENP)[1]	Netherlands - Italy	Germany, Switzerland	E.ON SnameRete ENI	968		16	
Germany – Poland[2]	Zgorzelec	-				1	1992

Notes: 1. Currently transports Dutch gas, but could also transport Algerian or Libyan gas to Germany. EIA Germany, December 2006; EIA Italy, May 2006; www.eni.it
2. Heinrich, 2007

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5.2 Gas Pipeline Projects in Development

Pipeline	Pipeline Route	Transit Countries	Owner/Operator	Length (Km)	Diameter (inches)	Capacity (billion m^3 / year)	Estimated Operational Start-Up	Estimated Cost
Bernau – Police[1]	Bernau (Germany) - Police (Poland)	-	Bartimpex E.ON Ruhrgas PGNiG VNG			2,5 at the beginning 5 maximum (EIA)		
Ostsee Pipeline Anbindungs-Leitung (OPAL)[2]	Greifswald (Germany) - Olbernhau (Germany)	-	Wingas 80%, E.ON 20%	480	55	36	2010	
Norddeutsche Erdgas Leitung (NEL)[3]	Greifswald (Germany) – Achim/Rehden (Germany) / Netherlands	-	Wingas 75%, E.ON 25%	370	48	20	2012	

Notes:
1. Discussions on the pipeline were suspended by the Polish side in spring 2006. Lang 2007; EIA Germany, December 2006; EIA North-Central Europe, February 2006
2. In the process of authorization; would connect Nord Stream with JAGAL, STEGAL and Gazela; start of construction expected in Q4 2008. www.osw.waw.pl; www.wingas.de
3. In the process of authorization; would connect Nord Stream with the gas pipeline Rehden-Hamburg and thus West Germany, the Netherlands, and the United Kingdom. www.osw.waw.pl; www.wingas.de

6. Gas Pipelines between Russia and Europe via Ukraine, Belarus, and Finland

6.1 Existing Gas Pipelines

Pipeline	Pipeline Route	Transit Countries	Owner/Operator	Length (km)	Diameter (inches)	Capacity (billion m^3 / year)	In Service Since
Yamal-Europe I [1]	Torzok/Yamal (Russia) – Francfort-sur-l'Oder (Germany)	Belarus, Poland	Gazprom for the Russian and Belarusian sections EuRoPol Gaz (48% Gazprom, 48% PGNiG, 4% Polish Gas-Trading S.A.) for the Polish section	4187, of which is in Russia: 2932 Belarus: 575 Poland: 680	56	31 (EIA) 33 (Gazprom, Yafimava / Stern) 35 (Lang) 33 in Belarus, 20 in Poland (Victor&Victor)	Belarus-Poland: 1997 Russia-Belarus: September 1999
Northern Lights / Beltransgaz / Siyaniye Severa[2]	Urengoi (Russia) - Uzhgorod (Ukraine)	Belarus	Gazprom for the Russian section Beltransgaz for the Belarusian section	4500		25 (Victor&Victor) 14 in Belarus (Yafimava / Stern)	1983

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Finland Connector[3]	Russia -Finland	-				20 (Victor&Victor)	1973, enlarged in 1999
Bratstvo (North) / Transgas (Slovakia – Czech Rep. branch)[4]	Russia - Germany	Ukraine, Slovakia, Czech Republic, Austria	Gazprom for the Russian section	2750		30 (Victor&Victor)	1967
Bratstvo (South) / Trans-Balkan[5]	Russia - Turkey	Ukraine, Moldova, Romania, Bulgaria	Gazprom for the Russian section			20 (Victor&Victor)	1967
Urengoy[6]	Urengoy (Russia) - Germany/Austria	Ukraine, Slovakia, Czech Republic	Gazprom for the Russian section	5000		40 (Victor&Victor)	1984
Progress / Yamburg[7]	Russia - Ukraine	-	Gazprom for the Russian section			30 (Victor&Victor)	1986
Soyuz / Orenburg[8]	Russia - Ukraine	-	Gazprom for the Russian section			30 (Victor&Victor)	1978
Poland – Ukraine[9]	Drozdowicze					6 (GTE)	
Ustilug – Hrubieszow[10]	Ustilug (Ukraine) – Hrubieszow (Poland)		PGNiG, Naftogaz	17		Up to 0,5 (Lang)	2005
Sachsen-Thüringen-Erdgasleitung (STEGAL)[11]	St. Katharinen (Czech Republic) - Reckrod (Germany)	-	Wingas	322	32	17	1992
Mitteleuropäische Gasleitung (MEGAL)[12]	MEGAL-North: Czech Republic - Medelsheim (Germany) MEGAL-South: Oberkappel (Austria) - Schwandorf (Germany)	-	E.ON	467 (MEGAL-North) 161 (MEGAL-South)	32	15	1979
Trans Austria Gasleitung (TAG)[13]	Baumgarten (Austria) – Arnoldstein (Austrian-Italian border), branch towards Slovenia	-	ENI 89%, OMV 11%	380		32	

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Hungaro-Austria-Gasleitung (HAG)[14]	Baumgarten (Austria) – Györ (Hungary)	-	OMV, MOL	120, of which is in: Hungary: 70 Austria: 50		4,4 (MOL)	
West-Austria-Gasleitung (WAG)[15]	Baumgarten (Austria) – Oberkappel (Austrian/German border)	-	OMV	245			
Budapest-Belgrade[16]	Budapest (Hungary) – Belgrade (Serbia)	-	MOL			3,3 (MOL)	

Notes:
1. Extended to Germany by JAGAL; branches towards the Baltic states. EIA North-Central Europe, February 2006; EIA Russia, April 2007; Heinrich 2007; Lang 2007
2. Joins up with Bratstvo in Ukraine. Russia, April 2007; EIA Ukraine, August 2007; Victor&Victor 2004; Yafimava / Stern 2007
3. Victor&Victor 2004
4. EIA North-Central Europe, February 2006; EIA Russia, April 2007; EIA Ukraine, August 2007; EIA Turkey, October 2006; Victor&Victor 2004
5. Branch towards Greece. EIA North-Central Europe, February 2006; EIA Russia, April 2007; EIA Ukraine, August 2007; Victor&Victor 2004
6. EIA Russia, April 2007; EIA Ukraine, August 2007; Victor, Jaffe, Hayes 2006; Victor&Victor 2004
7. EIA Russia, April 2007; EIA Ukraine, August 2007; Victor&Victor 2004
8. Joins up with Bratstvo in Ukraine. EIA Russia, April 2007; EIA Ukraine, August 2007; Victor&Victor 2004
9. Lang 2007; www.gie.eu.com
10. Lang 2007; www.przeglad-techniczny.pl
11. Capacity increased in 2006; imports Russian gas to Germany. EIA Germany, December 2006; www.wingas.de
12. MEGAL-Sud connects with MEGAL-Nord in Schwandorf; transports Russian gas to Germany and France. EIA Germany, December 2006
13. Reuters 17/5/2007; www.taggmbh.at
14. www.mol.hu
15. www.bog-gmbh.at
16. www.mol.hu

6.2 Gas Pipelines Under Construction

Pipeline	Pipeline Route	Transit Countries	Owner/Operator	Length (km)	Diameter (inches)	Capacity (billion m^3 / year)	Estimated Operation Start-Up	Estimated Cost
Gryazovets – Vyborg[1]	Gryazovets (Russia) –Vyborg (Russia)	-	Gazprom	917	56		2010	
Uzgorod – Novopskov[2]	Uzgorod (Ukraine) - Novopskov (Ukraine)	-				Max.19 (EIA)	2009	2,2-2,8 billion $ (EIA)

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Arad-Szeged[3]	Arad (Romania) - Szeged (Hungary)	-	Transgaz	105, of which is in: Romania: 65 Hungary: 40				

Notes:
1. To connect Nord Stream to Unified Gas Supply System of Russia (UGSS); Construction began on 9/12/2005. www.gazprom.com
2. Construction began in February 2006. EIA Ukraine, August 2007
3. EIA Southeastern Europe, August 2006; http://crib.mae.ro

6.3 Gas Pipelines Projects in Development

Pipeline	Pipeline Route	Transit Countries	Owner/Operator	Length (km)	Diameter (inches)	Capacity (billion m^3/year)	Estimated Operational Start-Up	Estimated Cost
Yamal-Europe II (northern section)[1]	Yamal Peninsula (Russia) – Torzok (Russia)	-	Gazprom	2500		80 (Götz)		20-40 billion $ (Götz)
Yamal-Europe II (western section)[2]	Torzok (Russia) – Frankfurt-sur-l'Oder (Germany)	Belarus, Poland	Gazprom for the Russian part, Poland	1600		33 (Götz, EIA)	2010	2,5 billion $ (Götz) 10 billion $(EIA)
Amber[3]	Russia –Germany	Latvia, Lithuania, Poland						

Notes:
1. Goetz 2004
2. Poland and Russia are not in agreement on the route in Poland: Gazprom wants a pipeline towards Slovakia/Central Europe, Poland wants a pipeline towards Germany; its construction is unlikely after the decision on Nord Stream. EIA North-Central Europe, February 2006; EIA Russia, April 2007; Lang 2007
3. Alternative to Nord Stream, proposed by Poland, Ukraine and Baltic states in 2004; construction unlikely. Götz 2005

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7. Gas Pipelines between the Caspian region and Russia

7.1 Existing Gas Pipelines

Pipeline	Pipeline Route	Transit Countries	Owner/Operator	Length (Km)	Diameter (inches)	Capacity (billion m^3 / year)	In Service Since
Caspian Coastal pipeline / PreCaspian[1]	Turkmenistan - Russia	Kazakhstan	Gazprom for the Russian section			5 (EDM) an increase of 20 is expected for 2012	
Central Asia-Center (CAC)[2]	Caspian Sea region (Turkmenistan) / Eastern Turkmenistan / Southern Uzbekistan - Alexandrov Gay (Russia)	Kazakhstan, Uzbekistan	Gazprom for the Russian section	2750		45 (EDM), 45 or 54 (Rousselot)	1974

Notes:
1. In a very poor state, renovation of the pipeline and an increase in capacity to 20 billion m3 / year expected in 2012 according to an agreement in May 2007, or the construction of a new pipeline which would follow parallel to the existing one. Eurasia Daily Monitor 26/11/2007; Pirog 2007
2. Agreement on modernizing and increasing the capacity to 65 billion m3/year signed in May 2007; transports mainly Turkmen gas, but also Kazakh and Uzbek gas. EIA Kazakhstan, October 2006; EIA, Central Asia, September 2005; EIA Caspian Sea, January 2007; Eurasia Daily Monitor 26/11/2007; Petroleum Economist July 2007; Götz 2004; Rousselot 2007

8. Gas Pipelines connecting Russia and states of the former Soviet Union with Europe, via Turkey or the Black Sea

8.1 Existing Gas Pipelines

Pipeline	Pipeline Route	Transit Countries	Owner/Operator	Length (Km)	Diameter (inches)	Capacity (billion m^3 / year)	In Service Since
Blue Stream[1]	Izobilnoye (Russia) – Ankara (Turkey)	-	Gazprom, ENI, Botas	1218, of which is in: Russia: 357 Offshore: 378 Turkey: 483	47/55 onshore 24 offshore	"design capacity": 16 quantities transported in: 2004: 3 2005: 5 2006: 7 (EIA, energypublisher) for 2010,16 is expected (RFE)	December 2002 official inauguration in November 2005

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Baku-Tbilisi-Erzurum (BTE) / South Caucasus Pipeline (SCP) / Shah-Deniz-Pipeline[2]	Shaz Deniz (Azerbaijan) - Ezurum (Turkey)	Georgia	Owners: BP: 25,5% Statoil: 25,5% SOCAR: 10% Lukoil: 10% Total: 10% OIEC: 10% TPAO: 9% Operators: BP et Statoil	883, of which is in: Azerbaijan: 442 Georgia: 248 Turkey: 193	42	6,6 at the start could increase to 20 (EIA) maximum capacity 30 (EDM)	15/12/2006
Turkey-Greece Interconnector / Aegean / South European Gas Ring Project[3]	Karacabey (Turkey) - Komotini (Greece)	-	Botas, DEPA	286	36	0,75 at the start, 11 by the finish (Biresselioglu) 0,25 at the start(NYT), 12 by the finish (Reuters)	18/11/2007

Notes:
1. Construction costs: $3,2 billion, $1,7 billion of which is for the offshore part; debates on the extension towards Italy or Hungary (via Bulgaria and Romania, cost estimated at 5 billion EUR); Turkey quit delivering via Blue Stream in March 2003, began deliveries again in December 2003. EIA Russia, April 2007; EIA Turkey, October 2006; International Herald Tribune 12/3/2007; RFE/RL 27/8/2007; www.energypublisher.com; Pirog 2007
2. Parallel to the BTC, construction costs $1,0-1,3 billion. EIA Azerbaijan, December 2007; EIA Caspian Sea, January 2007; EIA Turkey, October 2006; www.bp.com; EDM 8/5/2006
3. Transports Azerbaijani gas, via Baku-Tbilisi-Erzurum; construction costs: $300 million; will be extended (by Greece-Italy), to form the Turkey-Greece-Italy-Interconnector (TGI). EIA Italy, May 2006; www.edison.it; Biresselioglu 2007a; Biresselioglu 2007b; www.reuters.com

8.2 Gas Pipeline Projects in Development

Pipeline	Pipeline Route	Transit Countries	Owner/ Operator	Length (Km)	Diameter (inches)	Capacity (billion m^3/year)	Estimated Operational Start-Up	Estimated Cost
Trans-caspian[1]	Turkmenistan - Turkey	Azerbaijan, Georgia	Botas	1700, 230 of which is offshore		31(EIA)		2-3 billion $(EIA)
Nabucco[2]	Turkish/Georgian border and/or Iranian/Turkish border - Baumgarten (Austria)	Turkey, Bulgaria, Romania, Hungary	OMV: 20% MOL: 20% Transgaz: 20% Bulgargaz: 20% Botas: 20%	around 3300	56	initial capacity up to 8 maximum capacity 31 (Nabucco)	2012	around. 5 billion € (Nabucco) 5,35-5,8 billion $ (EIA)

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South Stream[3]	Beregovaya (Russia) – Black Sea – Varna (Bulgaria) – Italy (et Austria)	Bulgaria and Greece (+ Albania) + Ionian Sea or Romania/Hungary/Slovakia or ex-Yugoslavia	Gazprom, ENI	900 (offshore)		30 (Petroleum Economist, Platts)	2013	12 billion $ (Brower 2007) 10 billion $ (Global Insight) 10 billion € (Platts)
White Stream / Georgia-Ukraine-EU (GUEU)[4]	Georgia - EU	Caspian region – Black Sea - Ukraine - Poland/Lithuania/Slovakia; alternative: offshore up to Romania	New York Consortium: Pipeline Systems Engineering (PSE) Radon-Ishizumi consulting	950, of which: Georgia (Tbilisi - Supsa): 100 Offshore: 650 Ukraine: 200	42 in Georgia, 24 offshore, 20 in the Crimea	8 to begin 24-32 if connected to the Trans-Caspian Gas Pipeline (of which the realization is uncertain, PGJ)		2 billion $ (PGJ)
Greece-Italy-Interconnector / South European Gas Ring Project / Poseidon[5]	Komotini (Greece) - Ottranto (Italy)	-	DEPA 50%, Edison 50%	800,of which: Greece: 600 Offshore: 200		8 (EIA, Platts)	2011-2012	1,3 billion $ (EIA)
Trans-Adriatic Pipeline (TAP)[6]	Saloniki (Greece) - Brindisi (Italy)	Albania	Elektrizitäts-Gesellschaft Laufenburg and partners	513, 117 of which is offshore	48 onshore, 36 offshore	10, expandable to 20 (TAP)	2011	100-150 million € (TAP)
Ionian-Adriatic pipeline[7]	Vlore (Albania) - Ploce (Croatia)	Montenegro	EGL, Plinacro	400, of which: Albania: 170 Montenegro: 100 Croatia: 130	28	5 (Plinacro)	2011-2012	230 million € (energypublisher)

Notes:
1. Construction agreement signed by Botas in 1999, but terminated because of the discovery of Shah Deniz; EIA Turkey, October 2006; EIA Caspian Sea Region: Reserves and Pipelines, July 2002
2. RWE seems to be on the path to joining the consortium, GdF was also interested; a definitive construction decision carried forward in Q1 2008. EIA Iran, August 2006; EIA Turkey, October 2006; EIA North-Central Europe, February 2006; www.bundestag.de/bic/analysen/2007/Nabucco-Pipeline.pdf; www.nabucco-pipeline.com; Stuttgarter Zeitung 4/12/2007; Brower 2007; Bauchard / Therme 2007
3. Gazprom and ENI signed a MOU on 23/6/2007; time to complete project estimated at less than three years; feasibility study expected in 2008; will transport Kazakh and Russian gas. www.energypublisher.com; Platts 23/11/2007; Global Insight, December 10, 2007
4. The pipeline would split from the South Caucasus Pipeline, close to Tbilisi and would initially transport gas from Shah Deniz. Eurasia Daily Monitor – Volume 3, Issue 226, 7/12/2006; www.pipelineandgasjournal.com/PGJ/pgj_archive/Feb07/Intl207.pdf

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5. Construction should begin in June 2008; agreement in January 2007: 80% of gas transported will be reserved for Edison and 20% for DEPA. EIA Italy, May 2006; www.edison.it; Biresselioglu 2007a; Biresselioglu 2007b; www.reuters.com
6. Feasibility study concluded in March 2006; construction decision expected in Q3 2008, www.trans-adriatic-pipeline.com
7. Intention declaration signed by the Ministers of the three concerned countries on 25/9/2007; EGL and Plinacro signed a MOU; the pipeline would be connected to the Trans-Adriatic pipeline. www.energypublisher.com; www.doingbusiness.ro/energy2007/presentations/getfile.php?filename=Plinacro-Goran_Francic.pdf

9. Gas Pipelines Connecting Iran to Europe

9.1 Existing Gas Pipelines

Pipeline	Pipeline Route	Transit Countries	Owner/ Operator	Length (Km)	Diameter (inches)	Capacity (billion m^3/year)	In Service Since
Iran – Turkey[1]	Tabriz (Iran) – Ankara (Turkey)	-		1200		14 actual deliveries: 2,8-4,2 (EIA)	January 2002

Notes:
1. Turkey complained of the poor quality and recurrent interruptions of deliveries; interruptions due to technical problems and attacks by separatist Kurds on the pipeline; Turkish-Greco agreement to extend the pipeline towards Greece. EIA Iran, August 2006; EIA Turkey, October 2006; Stuttgarter Zeitung 4/12/2007

9.2 Gas Pipeline Projects in Development

Pipeline	Pipeline Route	Transit Countries	Owner/ Operator	Length (Km)	Capacity (billion m^3/year)	Estimated Operational Start-Up	Estimated Cost
Sarmatia[1]	Iran – Poland	Turkey, Black Sea, Ukraine					

Notes:
1. Very vague idea, layout would be partly parallel with Odessa-Brody-Plock. Lang 2007

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IX. Transit Fees

Transit fees for natural gas are the subject of recurring debates in certain countries, such as Ukraine or Belarus. Negotiations often take place at the same time as negotiations over the price of gas that transit countries must pay to the supplier. There are different models of price setting, some of which are not straightforward or clear. These agreements are not always published, or only partially disclosed. The transit fees that are indicated here are thus incomplete.

- **Belarus:** 1,45 $ / 1000 m^3 / 100 km (agreement of 31/12/2006, for Northern Lights)
- **Bulgaria:** 1,66 $ / 1000 m^3 / 100 km (ECS 2006)
- **Georgia:** 5% of gas in transit (ECS 2006)
- **Morocco (Pedro Duran Farell):** 5-7% of gas in transit (ECS 2006)
- **Poland:** 380 million € / year (estimation in Heinrich 2007), 2,47 $ / 1000 m^3 / 100 km (in 2004, ECS 2006)
- **Czech Republic:** 2,9 $ / 1000 m^3 / 100 km (ECS 2006)
- **Russia:** 1,7 $ / 1000 m^3 / 100 km (agreement of 6/12/2007, to be paid by Ukraine for the transport of Turkmen gas)
- **Tunisia (Enrico Mattei):** 5,25% for the first 12,4 billion m^3 / year, 6% for the next two million m^3 / year, 6,75% for the volume higher than 14,4 milliards m^3 / an (APS); 5-7% of transported gas (ECS 2006); 25 million $ / year (Hayes)
- **UK Interconnector:** 2,12 $ / 1000 m^3 / 100 km (ECS 2006)
- **Ukraine:** 1,7 $ / 1000 m^3 / 100 km (agreement of 6/12/2007)

Comparison table for transporting 350 Km (ECS 2006, p. 65, €/hour/year*):*

- **Austria (Penta West):** 96 €/m3/h/y
- **Belgium (Fluxys):** 78 €/m3/h/y
- **Poland (Yamal):** 71 €/m3/h/y (estimation)
- **Germany (Wingas):** 63 €/m3/h/y
- **Slovakia (SPP):** 62 €/m3/h/y
- **UK Interconnector:** 55 €/m3/h/y (estimation)
- **Bulgaria:** 43 €/m3/h/y (estimation)
- **Russia:** 28 €/m3/h/y (estimation)
- **Ukraine:** 28 €/m3/h/y
- **Belarus (Yamal):** 19 €/m3/h/y (estimation)
- **Belarus (Northern Lights):** 12 €/m3/h/y (estimation)

Ukraine

Imported Gas Originating From Russia
182 billion m^3 in 2006 (RAMSES 2008)

Transit through Ukraine
- Technical/theoretical capacity: 140-175 billion m^3/year, (Götz e-mail), 155 billion m^3/year (Victor&Victor 2004), 140 billion m^3/year (Götz 2004), 170 billion m^3/year (Denysyk/Parmentier 2007), around 40 billion m^3/year of non-utilized capacity.
- Actual gas transported through Ukrainian territory: 130 billion m^3/year (Götz 2004, Dubien 2007), 128.4 billion m^3 in 2006, 116.8 billion m^3 expected in 2007 (UkrTranzGas, according to EIA).
- 80 to 90% of Russian gas exports to Europe goes through Ukrainian territory (Denysyuk/Parmentier 2007), 80% (RFE/RL 5/12/2007, Ukraine-Analysen 2)

Evolution of Transit Fees
1,09375 $ / 1000 m^3 / 100 Km (agreement of summer 2004)
1,6 $ / 1000 m^3 / 100 Km (agreement of 4/1/2006)
1,7 $ / 1000 m^3 / 100 Km (agreement of 6/12/2007)

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X. LNG Terminals in Europe and in Nearby Supplier Countries

Regasification Terminals in the EU

Source: European Commission, http://ec.europa.eu/comm/competition/sectors/energy/inquiry/index.html

Status of EU-25 regasification terminals by country, in 2006				
Country	Existing	Under construction	Proposed	Total
Belgium	1	1	0	2
Cyprus	0	0	1	1
France	2	1	3	6
Germany	0	0	1	1
Greece	1	1	2	4
Ireland	0	0	1	1
Italy	1	2	13	16
Latvia	0	0	1	1
Netherlands	0	0	3	3
Poland	0	0	1	1
Portugal	1	0	1	2
Spain	5	4	5	14
Sweden	0	0	1	1
UK	1	3	6	10
Total	12	12	39	63

Maximum capacity of EU-25 regasification terminals in bcm, in 2006				
Country	Existing	Under construction	Total	Proposed
Belgium	4.5	4.5	9.0	-
Cyprus	-	-	-	0.7
France	14.8	8.3	23.1	16.0
Germany	-	-	-	10.0
Greece	2.3	4.3	6.6	n.a.
Ireland	-	-	-	n.a.
Italy	3.5	16.0	19.5	84.2
Latvia	-	-	-	n.a.
Netherlands	-	-	-	>12.0
Poland	-	-	-	3.0
Portugal	5.2	-	5.2	3.3
Spain	39.9	12.8	52.7	>9.6
Sweden	-	-	-	n.a.
UK	4.6	26.5	31.1	>18.9
Total	74.8	72.4	147.2	-

Regasification Terminals in Europe and in Nearby Supplier Countries

Sources:
California Energy Commission (maps), October 2007, www.energy.ca.gov/lng/international.html
King & Spalding, LNG in Europe, 2006, www.kslaw.com/library/pdf/LNG_in_Europe.pdf
Stagnaro Oil and Gas Journal 9/7/2007
Company websites.

1. LNG Terminals (liquefaction) in Europe and in Nearby Supplier Countries

1.1 Existing LNG Terminals (liquefaction)

- **Algeria (4):** Skikda, Arzew, Alger, Bettioua
- **Egypt (2):** Damietta, ELNG (Abu Qir)
- **Libya (1):** Mjarsa Al-Brega
- **Norway (1):** Snovit (Melkoya / Hammerfest)

1.2 LNG Terminal Projects (liquefaction) Under Development / Proposed

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- **Algeria:** Gassi Touil, Tinrhert
- **Egypt:** à l'ouest de Damietta, Méditerranée nord-est (offshore)
- **Kazakhstan:** banks of the Caspian Sea (South-West Kazakhstan)
- **Libya:** Ghadames, Sirte Ras Lanuf, Sirte Murzuq, région Nord-est
- **Morocco:** North-West Morocco
- **Norway:** Nordic LNG (South-West Norway)
- **Russia:** Shtokman (Murmansk), Ust-Luga (Baltic LNG, St. Petersburg region), 2nd project in the St. Petersburg region, South Tambey, Yamal Peninsula

2. LNG Terminals (regasification) in Europe

2.1 Existing LNG Terminals (regasification)

- **Belgium (1):** Zeebruge
- **Spain (6):** Barcelona, Bilbao, Cartegena / Murcia, El Ferrol, Huelva, Sagunto / Valencia
- **France (2):** Fos-sur-Mer, Montoir-de-Bretagne
- **Greece (1):** Revithoussa
- **Italy (1):** Panigaglia
- **Portugal (1):** Sines
- **United Kingdom (2):** Isle of Grain, Teesside
- **Turkey (2):** Marmara Ereglisi, Izmir / Aliagla

2.2 LNG Terminals (regasification) Under Construction

- **France:** Fos Cavaou
- **United Kingdom:** Dragon LNG Milford Haven, South Hook Terminal Milford Haven
- **Italy:** Brindisi, North Adriatic LNG offshore Rovigo, Isola Porto di Levante, Rosignano Maritomo, Livorno

2.3 LNG Terminal (regasification) Projects in Development/ Proposed

- **Albania:** Fieri
- **Germany:** Wilhelmshaven, Rostock
- **Cyprus:** Vassiliko
- **Croatia:** Omisalj
- **Spain:** Gijon, Iles Canaries, Granadilla de Abona (Tenerife)
- **France:** Le Verdon, Dunkerque, Antifer, Bordeaux
- **Ireland:** Shannon
- **Italy:** Augusta, Castiglione della Pescaia, Corilligliano Calabro, Gioia Tauro, Livorno offshore, Muggia, Porto Empedocle, Porto Torres Sassari, San Ferdinando, Taranto, Trieste offshore, Trieste Zaule, Vado Ligure
- **Lithuania:** an undefined location on the Baltic Sea
- **Netherlands:** Gate Terminal Rotterdam, LionGas Terminal Rotterdam, Eemshaven, Maasvlakte ou Groningen
- **Poland:** Swinoujscie, Gdansk
- **Romania:** Constanta
- **Sweden:** Brunnsviksholmen
- **United Kingdom:** Anglesey, Barrow, Canvey Island[1], East Irish Sea, Morecombe Bay, Teesside offshore
- **Turkey:** Ceyhan, Izkenderun
- **Ukraine:** undefined location on the Black Sea

[1] Former regasification terminal of Canvey Island, Thames Estuary, opened in 1959, stopped activity in 1994

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XI. Oil and Gas Pipelines to Turkey

1. Gas Pipelines

1.1 Existing Gas Pipelines

Gas Pipeline	Pipeline Route	Transit Countries	Owner/Operator	Length (Km)	Diameter (inches)	Capacity (billion m3 / year)	In Service Since
Bratstvo (south) / Trans-Balkan[1]	Russia - Turkey	Ukraine, Moldova, Romania, Bulgaria	Gazprom for the Russian section			20 (Victor&Victor)	1987 (arrival of gas in Turkey)
Blue Stream[2]	Izobilnoye (Russia) – Ankara (Turkey)	-	Gazprom, ENI, Botas	1218, of which: Russia: 357 Offshore: 378 Turkey: 483	47/55 onshore 24 offshore	"design capacity": 16 quantity transported in: -2004: 3 -2005: 5 -2006: 7 (EIA, energypublisher) -for 2010, 16 is expected (RFE)	December 2002, official inauguration in 2005
Baku-Tbilisi-Erzurum (BTE) / South Caucasus Pipeline (SCP) / Shah-Deniz-Pipeline[3]	Shaz Deniz (Azerbaijan) - Ezurum (Turkey)	Georgia	Owners: -BP: 25,5% -Statoil: 25,5% -SOCAR: 10% -Lukoil: 10% -Total: 10% -OIEC: 10% -TPAO: 9% Operators: BP and Statoil	883, of which: Azerbaijan: 442 Georgia: 248 Turkey: 193	42	6,6 at the start, could increase to 20 (EIA) maximum capacity 30 (EDM)	15/12/2006
Iran – Turkey[4]	Tabriz (Iran) – Ankara (Turkey)	-		1200		14 actual deliveries 2,8 to 4,2 (EIA)	January 2002

Notes:
1. Branch towards Greece. EIA North-Central Europe, February 2006; EIA Russia, April 2007; EIA Ukraine, August 2007; Victor&Victor 2004

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2. Construction costs: $3,2 billion, $1,7 billion of which is for the offshore section; debates over an extension towards Italy or Hungary (via Bulgaria and Romania, cost estimated at 5 billion €); Turkey quit delivering via Blue Stream in March 2003, started up again in December 2003. EIA Russia, April 2007; EIA Turkey, October 2006; International Herald Tribune 12/3/2007; RFE/RL 27/8/2007; www.energypublisher.com; Pirog 2007
3. Parallel to the BTC, construction costs: $1,0-1,3 billion. EIA Azerbaijan, December 2007; EIA Caspian Sea, January 2007; EIA Turkey, October 2006; www.bp.com; EDM 8/5/2006
4. Turkey complained of the poor quality and recurrent interruptions of deliveries; interruptions due to technical problems and attacks by separatist Kurds on the pipeline; Turkish-Greco agreement to extend the pipeline towards Greece. EIA Iran, August 2006; EIA Turkey, October 2006; Stuttgarter Zeitung 4/12/2007

1.2 Gas Pipeline Projects in Development

Gas Pipeline	Pipeline Route	Transit Countries	Owner/Operator	Length (Km)	Diameter (inches)	Capacity (billion m3/year)	Estimated Operational Start-Up Date	Estimated Cost
Nabucco[1]	Turkey/Georgia Border and/or Iran/Turkey border - Baumgarten (Austria)	Turkey, Bulgaria, Romania,	OMV: 20% MOL: 20% Transgaz: 20% Bulgargaz: 20% Botas: 20%	around 3300	56	initial capacity up to 8 maximum capacity 31 (Nabucco)	2012	around 5 billion € (Nabucco) 5,35 to 5,8 billion $ (EIA)
Transcaspian[2]	Turkmenistan - Turkey	Azerbaijan, Georgia	Botas	1700, 230 of which is offshore		31 (EIA)		2-3 billion $ (EIA)
Iraq-Turkey[3]	Kirkuk (Iraq) – Ceyhan (Turkey)		Botas, TPAO					
Syria – Turkey[4]	Aleppo (Syria) – Kili (Turkey)			100				
Samsun –Ceyhan[5]	Samsun (Turkey) – Ceyhan (Turkey)		Botas, TPAO					

Notes:
1. RWE seems on the path to joining the, GdF was also interested; definitive construction decision carried forward in Q1 2008. EIA Iran, August 2006; EIA Turkey, October 2006; EIA North-Central Europe, February 2006; www.bundestag.de/bic/analysen/2007/Nabucco-Pipeline.pdf; www.nabucco-pipeline.com; Stuttgarter Zeitung 4/12/2007; Brower 2007
2. Construction agreement signed by Botas in 1999, but terminated because of the discovery of Shah Deniz; EIA Turkey, October 2006; EIA Caspian Sea Region: Reserves and Pipelines, July 2002
3. Route would be parallel to the existing Kirkuk-Ceyhan pipeline. Fink 2006
4. Agreement in January 2008, will transport Egyptian gas to Turkey. OGJ Daily Update 15/1/2008
5. Idea to construct a gas pipeline parallel to the oil pipeline currently in development, which would make transport by boat possible, while avoiding the Bosporus detour. Fink 2006

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2. Oil Pipelines

2.1 Existing Oil Pipelines

Oil Pipeline	Pipeline Route	Transit Countries	Owner/Operator	Length (Km)	Technical Capacity	Petroleum Transported	Diameter (inches)	Transit Fees	In Service Since
Baku-Tibilissi-Ceyhan (BTC)[1]	Baku (Azerbaijan) - Ceyhan (Turkey)	Georgia	BTC Pipeline Company –BP: 30,1% AzBTC: 25% Chevron: 8,9% Statoil: 8,71% TPAO: 6,53% Eni: 5% Total: 5% Itochu: 3,4% INPEX: 2,5% ConocoPhillips: 2,5% Amerada Hess: 2,36% (in July 2006)	1768, of which: Azerbaijan: 443 Georgia: 249 Turkey: 1076	1 million bbl/day for 2008-2009 (EIA) 1 million bbl/day (ECS) 50 million tons/year (Götz)	On average 210 000 bbl/day between June and September 2006 500 000 bbl/day is expected at the beginning of 2007 (EIA)	46/42/34	Fees for members of the consortium, for transporting from Sangachal to Ceyhan, is 3,3 $ / bbl (2005-10), 4,6 $ / bbl (2010-16), 5,5 $ / bbl (2016-29). Turkey will earn between $140-200 million per year in transit and operation fees. Georgia looks to make $112 million from 2004-2008, and $566 million from 2009-2019.	May 2005
Strategic Pipeline (North-South system)[2]	Iraq - Turkey	-	State Oil Marketing Organization (Iraq)		1,4 million bbl/day (EIA)	Currently 0 (EIA)			1975
Kirkuk-Ceyhan[3]	Kirkuk (Iraq) – Ceyhan (Turkey)	-	State Oil Marketing Organization (Iraq)	966	1st line: 1,1 million bbl/day 2nd line: 500 000 bbl/day (EIA)	150 000 - 550 000 bbl/day in 2006 (EIA)	1st line: 40 2nd line: 46		

Notes:
1.Construction costs: $3,9 billion. www.bp.com; EIA Azerbaijan, August 2006; EIA Caspian Sea, January 2007; EIA Turkey, October 2006; www.iea.org/Textbase/work/2006/energy_security/Novruzov.pdf
2. Taken out of service in 1990/1991, Northern Oil Company (Iraq) estimated in 2003 that it would take a long time to get the pipeline running again. EIA Iraq, June 2006
3. Private military companies are in charge of the security of the pipeline, which has been the target of numerous attacks. Currently, the pipeline only functions sporadically.. EIA Iraq, June 2006

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2.2 Oil Pipelines Under Construction

Oil Pipeline	Route	Transit Countries	Owner/Operator	Length (Km)	Capacity	Diameter (inches)	Expected Operational Start-Up	Estimated Cost
Samsun-Ceyhan Pipeline (SCP) / Trans-Anatolian Pipeline[1]	Samsun (Turkey) - Ceyhan (Turkey)	-	Trans-Anadolou Pipeline Company (TAPPCO): - ENI: 50% - Calik Energy: 50%	555	- initial capacity: 1 million bbl/day - "design capacity": 1,5 million bbl/day (Calik/ENI)	42-48	2010	1,5 billion $ (Calik/ENI)

Notes:
1. Start of constructions: April 24, 2007. Will transport Russian petroleum that will arrive in Samsun by boat. EIA Turkey, October 2006; RIA 24/04/2007; www.iea.org/Textbase/work/2006/energy_security/Cavanna.pdf; ww.eni.it

2.3 Oil Pipeline Projects in Development

Oil Pipeline	Route	Transit Countries	Owner/Operator	Length (km)	Capacity	Diameter (inch)	Expected Operational Start-Up Date	Estimated Cost
Kiyiköy – Ibrikhaba, Trans-Thrace[1]	Kiyiköy (Turkey) - Ibrikhbaba (Turkey)	-	OJSC AK Transneft	193	60 million tons/year	48		0,9 billion $(Götz)
Transcaspian[2]	Turkmenistan - Azerbaijan - Turkey							

Notes:
1. Goetz 2004; http://www.simdex.com/future_pipeline_projects/samples/Trans_Thrace_Pipeline.pdf; Alexanders 1/9/2004
2. According to Vladimir Socor, Turkmenistan and Kazakhstan would be able to construct underwater pipelines without needing the agreement of the other countries in the area: for example, a pipeline which connects the Turkmen platform deck "Block 1" with the Azerbaijani fields "Azeri-Chirag-Guneshli." Kazakhstan could construct a pipeline that connects to this system that would not be considered "trans-Caspian" in a legal sense. Petroleum Economist J

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