Chapter 2

Information about Nord Stream

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2 Information about Nord Stream

2.1 Information about the applicant / ownership

2.1.1 Applicant and operator

In 2000 the European Commission recognised the northern European gas pipeline through the Baltic Sea as part of the Trans-European Energy Networks (TEN-E). The European Commission referred to the Project in September 2006 as one of the highest priority energy projects in the European Union (EU) and of interest to the whole of Europe. The TEN-E status was confirmed in 2006(1).

In September 2005, OAO Gazprom (hereinafter “Gazprom”), BASF AG (today BASF SE, hereinafter “BASF“) and E.ON AG (hereinafter “E.ON”) reached an agreement on the joint assumption of responsibility for the development, construction and operation of a new upstream pipeline system. The North European Gas Pipeline Company was founded in November 2005 on the basis of the cooperative intent of these three companies, and this company was renamed Nord Stream AG (hereinafter "Nord Stream") in October 2006.

Gazprom has a 51% share in the joint Project. Each of the European companies, BASF (indirectly via its 100%-owned subsidiary Wintershall Holding AG, hereinafter “Wintershall”) and E.ON (indirectly via its 100%-owned subsidiary E.ON Ruhrgas AG, hereinafter “E.ON Ruhrgas”), have each a 20% share. The gas infrastructure company Gasunie Infrastruktur AG, a 100 % affiliate to the Dutch N. V. Nederlandse Gasunie, (hereinafter “Gasunie”) has a 9% share. The multinational nature of the shareholders, with direct involvement extending beyond companies in the countries of origin and destination of Nord Stream, underlines the European character of the Project. The headquarters of Nord Stream AG is in Zug, Switzerland.

2.1.2 Shareholders of Nord Stream

The structure of Nord Stream ensures an efficient and successful implementation of the Project. The reliability and experience of project implementation will be guaranteed by the shareholders Gazprom, Wintershall, E.ON Ruhrgas and Gasunie. These companies have many years of experience in the fields of exploration, production, transport and marketing of natural gas, which

(1) European Parliament and Council. Decision No. 1364/2006/EC of 6 September 2006.

they bring to bear in Nord Stream. A description of the individual shareowners and of their specific competencies relevant to the Project follows.

Gazprom

Gazprom is the largest gas-producing company in the world. It is listed on the Moscow Stock Exchange, and 50.002% of the company is owned by the Russian state. The German energy company E.ON Ruhrgas owns a 6.4% share in Gazprom. In 2006, the company employed approximately 432,000 people, of which the largest share, 65%, worked in natural gas production.

With 44,650 bcm, Russia has 25.2% of the world's currently known natural gas reserves.(1) Russia's natural gas reserves are thus the largest quantity of confirmed natural gas reserves in a single territorial area in the world. Gazprom owns 60% of Russia's natural gas reserves, which equates to approximately 15% of the confirmed global natural gas resources. The amount of natural gas delivered by Gazprom in 2006 amounted to 556 bcm. Gazprom also has the world's largest network of pipelines for transporting natural gas, at a total length of 155,000 km. As a consequence Gazprom is very experienced in the operation of natural gas pipeline networks. When subsidiaries are included, Gazprom is responsible for the operation of 463,000 km of the Russian pipeline and distribution network. Gazprom has therefore competencies that concern both pipeline operation and continual optimisation of pipeline networks.

Gazprom is also active in planning and constructing natural gas pipelines. In addition to experience with onshore pipelines on the Russian mainland, Gazprom is experienced in the construction and operation of offshore pipelines, which is particularly of relevance to the Nord Stream Project.

In 2005, the Blue Stream pipeline, a joint project between Gazprom and Eni S.p.A., an Italian multinational oil and gas company with a government share of 30%, was officially inaugurated. This pipeline runs from Izobilnoye in Russia to Ankara in Turkey, and 386 km of its total length runs under the Black Sea. Although shorter, this offshore section is no less technically demanding than the Nord Stream pipeline route. The maximum depth at which the Blue Stream pipeline is laid is 2,150 m, many times deeper than the maximum laying depth of the Nord Stream pipelines, the deepest point of which is approximately 210 m. Moreover, high concentrations of hydrogen sulphide in the Black Sea posed particular challenges to the construction and material properties of the Blue Stream pipeline. During this and other projects, Gazprom has gained a particular offshore expertise that the Nord Stream pipeline Project will benefit from under the particular circumstances and environmental challenges of the Baltic Sea.

(1) BP. June 2008. Statistical Review of World Energy. 22.

E.ON Ruhrgas

E.ON Ruhrgas AG (E.ON Ruhrgas) is a 100%-owned subsidiary of E.ON AG and responsible for E.ON's natural gas business in Germany and Europe. The company, with its headquarters in Essen, has been active in the heating gas market for approximately 80 years and in the natural gas market for approximately 45 years. E.ON Ruhrgas is Germany's largest supplier of natural gas and among Europe's leading gas companies. E.ON Ruhrgas employed approximately 12,700 people in 2006 and delivered 62 bcm of natural gas. With experience as constructor and operator of a long-distance pipeline network, E.ON Ruhrgas has gained comprehensive, relevant expertise for the Nord Stream Project.

E.ON Ruhrgas has gained experiences that are particularly relevant to Nord Stream, with involvement in important European offshore pipelines in the North Sea, including the Interconnector UK pipeline (IUK) between Great Britain and Belgium; the Balgzand-Bacton Line pipeline (BBL) between the northern Netherlands and Great Britain; and the Seal offshore pipeline from Elgin/Franklin in the central North Sea to Bacton.

Wintershall

Wintershall Holding AG (Wintershall) is a 100%-owned subsidiary of BASF SE. For more than 75 years, Wintershall has been active in various regions of the world (today in Europe, North Africa, South America, Russia and the Caspian Sea region) in exploring and extracting oil and natural gas. Over 60% of the natural gas and oil extracted by Wintershall is produced from deposits in which the company itself acts as operator. During natural-gas extraction in the Dutch North Sea, Wintershall acquired wide-ranging competence in the field of offshore pipeline engineering.

The natural gas trade, which Wintershall conducts via WINGAS GmbH & Co. KG (hereinafter WINGAS) with its Russian partner Gazprom, is, alongside exploration and production, the second area of work for Wintershall. WINGAS has been active in gas supply since 1993 and delivers natural gas to public services, regional gas suppliers, industrial operations and power stations in Germany and elsewhere in Europe through a newly built pipeline network of WINGAS TRANSPORT GmbH & Co. KG that is now more than 2,000 km long, and that is being used by WINGAS as well as by third parties. In 2006 WINGAS delivered 23 bcm of natural gas to its customers.

Nederlandse Gasunie

The Dutch company N.V. Nederlandse Gasunie is 100%-owned by the Kingdom of the Netherlands. The company's headquarters are in Groningen. Gasunie has more than 40 years' experience in the construction and operation of natural gas pipelines. The company specialises in infrastructure projects in the field of natural gas supply, and its main areas of business are in the following fields: management, operation and development of the national transport network;

construction and maintenance of the transport network; participation in international projects. The business employed approximately 1,480 people in 2006 and transported 96 bcm of natural gas.

Gasunie was responsible for the construction of the BBL pipeline, which was completed in December 2006. Gasunie indirectly owns 60% of the shares in this Project and operator company BBL Company. As such, Gasunie is primarily responsible for the operation and maintenance of the BBL pipeline, 230 km of which run under the North Sea, connecting Balgzand and Bacton.

2.1.3 Summary of competencies in Nord Stream

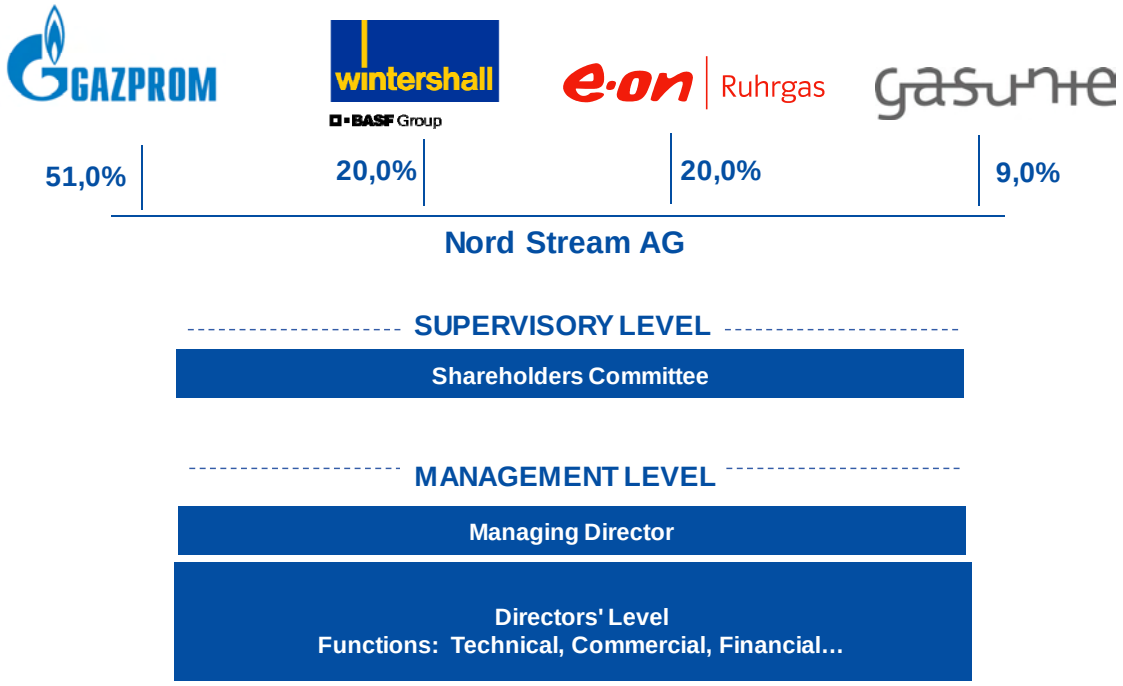

Figure 2.1 The Nord Stream organisation

In addition to former employees of the above-mentioned shareholders, Nord Stream employs experienced international experts from 17 countries. Nord Stream also works with leading European advisors from the fields of environment, technology and finance. In international tenders, contractors with many years of experience were selected for individual assignment areas.

The contractor structure is a further testament to the European character of the Project. In the field of environmental assessment and permitting, for example, the Danish company Rambøll and for engineering services the Italian company Snamprogetti were selected. In the field of

project certification, the independent foundation Det Norske Veritas (DNV), based in Oslo, was commissioned. The Swedish company Marin Mätteknik AB (MMT) is conducting munitions surveys on the planned pipelines route. Further environmental surveys and field studies are conducted by well known international companies like Geological Survey of Sweden (SGU), PeterGaz/Russia, Finnish Institute of Marine Research, DHI/Denmark, Fugro OSAE/Germany and Institute for Applied Ecology/Germany. The German company Europipe will supply 75% of the pipes for the first pipeline, and the Russian company United Metallurgical Company (OMK) will supply the remaining 25%. For the laying work, a letter of intent has been signed with the company Saipem, registered in London.

2.1.4 Brief description of the Project

Nord Stream plans to construct a natural gas pipeline, consisting of two parallel strings, through the Baltic Sea. The pipeline, around 1,200 km long, is to run from Portovaya in the area of Vyborg/St Petersburg in Russia to Lubmin in the Greifswald region in Germany, and will thus connect the world's largest natural gas deposits in Russia with the integrated European pipeline network. Nord Stream will be the Project's commissioner and operator.

The first of the two pipelines of the Nord Stream Project should be completed by the end of 2011. With this first pipeline, a transport capacity of approximately 27.5 bcm of natural gas per annum will be provided. In a second Project phase, this transport capacity is to be doubled by a second pipeline to run almost in parallel to the first, increasing the overall transport capacity to approximately 55 bcm of natural gas per annum. This second pipeline is planned to be completed in 2012.

The Nord Stream offshore pipelines will transport natural gas to Germany, from where it can be transported to Denmark, the Netherlands, Belgium, Great Britain, France, Poland, the Czech Republic and other countries.

2.2 Project History

2.2.1 Objectives and structure

The following chapter describes the history of the Nord Stream Project. Rather than tracking back the numerous single decisions that were taken at different stages of the Project, its purpose is to give an overview of main evolutions that led to the Project as it is set up today. Hence, these pages should enlighten about the reasoning behind the existing offshore route, thus following all obligations stipulated by applicable national and supranational law.

The chapter is structured chronologically and the applied structure within each epoch will, as far as it is applicable, follow basic economic principles of supply and demand, finance and cost approaches, major tendencies of shareholders' corporate strategies, geo-political situations, environmental challenges and technical developments as they have evolved in the course of time.

2.2.2 1980-1990: Russian-Nordic initiatives to launch new supply projects

The idea of a natural gas pipeline supplying Western Europe with gas from Northern Europe is not a recent phenomenon. Indeed, plans for such a natural gas pipeline go back to before the fall of the Berlin Wall in 1989. The purpose of the following lines is to provide background information about how these plans have been developed and how they finally led to the Nord Stream Project.

Norwegian plans for gas supply to and transit via Sweden

In the beginning of the 1980s, when oil and gas prices were still high and the Swedish public debate about an adequate substitute for nuclear power was gaining momentum, several analyses were carried out for gas transportation solutions via Sweden. The most ambitious project was the Trans-Scandinavian project, with Statoil as promoter, to bring gas from the Barents Sea via Sweden and possibly Denmark to Germany. Plans were also developed to bring gas from the Haltenbanken area, in the Norwegian Sea, via Sweden to Central Europe.

In recent years new systems have been developed, such as Skanled, an offshore solution connecting Norway, Sweden and Denmark and extending to Poland. Onshore solutions, such as the Scandinavian Gas Ring have also been considered, but were shelved for a combination of market, environmental, authority related and taxation reasons.

Russian gas to Finland and Sweden via the Baltic Sea

In the late 1980s the Swedish gas company Swedegas, in cooperation with the Finnish company Neste, worked on a business plan for transportation of Russian gas to Sweden and Western Finland. Offshore routes north and south of the Åland Islands were analysed and marine surveys conducted in 1989 and 1990. The break up of the Soviet Union and the following economic crises in Sweden and Finland were the main reasons for abandoning the project.

In 1986, oil and gas prices crashed after the sharp increase of prices of the late 1970s when OPEC curbed oil production and the ensuing scarcity in oil supply led to rising oil and gas prices. At the same time there was a strong lobby in Sweden against the use of natural gas. Only in the late 1990s should these visions be rejuvinated again, when the then Russian president, Boris Yeltsin, visited Sweden and feasibility studies were undertaken.

2.2.3 1990-1995: The construction of the Yamal pipeline

The Yamal pipeline runs from the Western Siberian gas fields through Belarus and Poland to the German border in Brandenburg State. Near Frankfurt (Oder) the pipeline connects with the German transmission network. With a total length of 1,600 km to the Russian city of Torzhok and a diameter of 56” (1,420 mm), it annually provides 33 bcm natural gas to Western Europe. Yamal 1 was initiated due to expected high growth rates in demand for natural gas in both Poland and Western Europe. It was also meant to be a technical diversification from existing transportation routes for Russian gas. Established after the disintegration of the Soviet Union, Yamal was the first major pipeline scheme undertaken by the then newly founded Gazprom company. Construction began in the mid 1990s to bring gas to Poland. During construction, complex negotiations with land-owners and farmers in Poland and Belarus proved to be main obstacles and caused considerable delays. The pipeline is operated by a Russian-Polish joint venture set up by Gazprom, Polish state oil company Polskie Górnctwo Naftowe i Gazownictwo SA (PGNiG) and Gas-Trading S.A., with Gazprom and PGNiG each holding 48% of the shares and Gas-Trading S.A.possessing 4% of the shares.

2.2.4 1995-2000: North Transgas Oy (NTG) studies – Nord Stream's hour of birth

NTG Project: Definition and Shareholders

The scope of the company North Transgas Oy, founded in 1997, was to conduct a thorough analysis of (1) gas supply to the Nordic countries and (2) the use of the Nordic countries as transit region to Western and Central Europe. From a European perspective, Brussels was eager that Finland and Sweden, which joined the EU in 1995, be integrated into the EU gas system.

NTG was regarded as a benchmark analysis at that time, as it included a very ambitious and detailed feasibility study with a larger budget – more than 20 Million. USD – than for similar projects in Europe. The shareholders behind NTG were Gazprom and Fortum Oil and Gas Oy, which was the result of a merger between Neste and IVO in 1998. Neste was a Finnish company heavily engaged in natural gas projects in the Nordic countries in the late 1990s. Neste worked on the Nordic Gas Grid (NGG) study and on projects launched by the Nordic Council of Ministers, an intergovernmental forum for co-operation between Denmark, Sweden, Finland, Norway and Iceland, to integrate those countries' gas systems. IVO, whose full name was Imatran Voima Oy, was then Finland's largest utility. NTG's headquarters were based in Helsinki, from where most of the practical work on the feasibility study was carried out.

Feasibility study: Scope

The NTG study was conducted in 1998. Approximately 3,900 km in the Baltic Sea, Gulf of Finland and Gulf of Bothnia were screened to identify one or several pipeline routes. Over one

hundred geological seabed samples were taken for laboratory testing. Three different route options were investigated together with sixteen landfall sites. Pipeline routes both east and west of Gotland and Bornholm were surveyed. The three main route options were as follows and included variants on the location of the landfall areas:

- Option 1: Overland Finland and Sweden, including marine crossing north of the Åland islands
- Option 2: Overland Finland. Spur line to Sweden at either north of the Åland islands (Alt. 2a) or north of Gotland (Alt. 2b)
- Option 3: Totally offshore with delivery to Finland and Sweden through spur lines to Hanko and Nyköping respectively

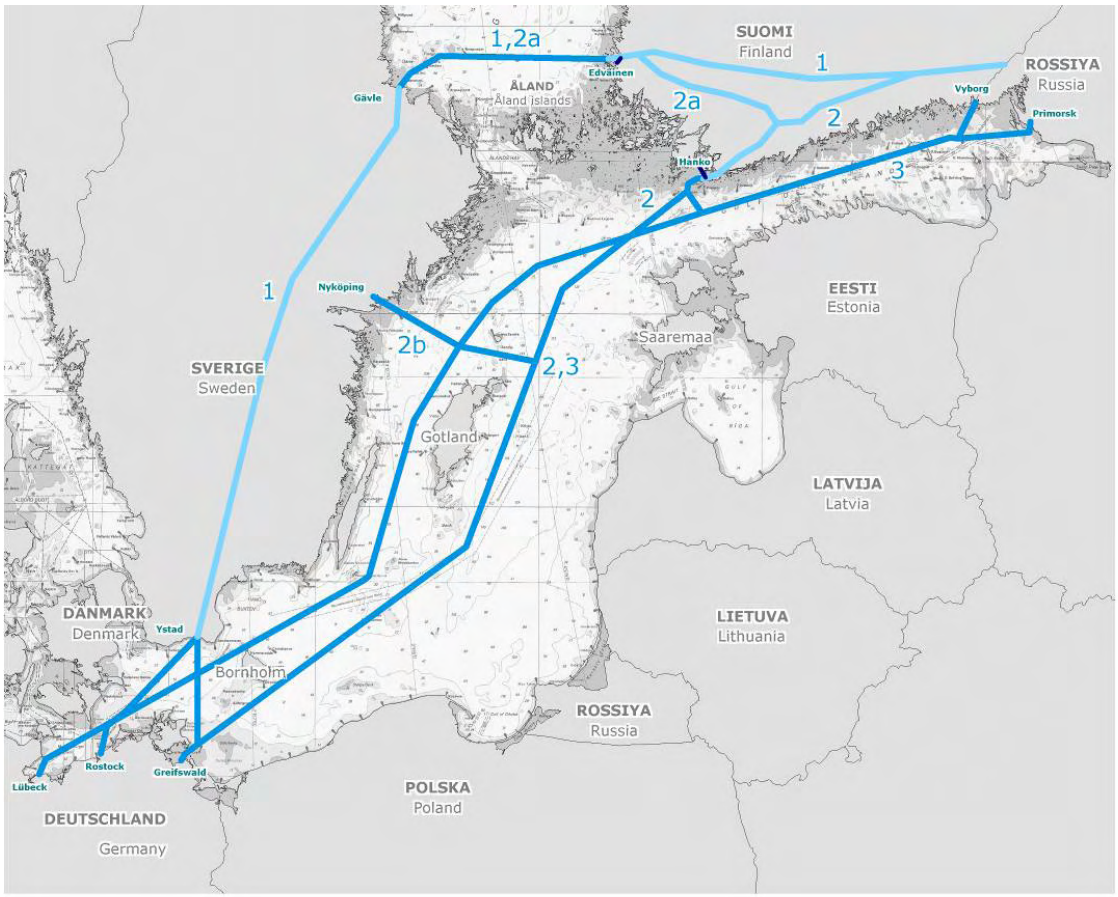

Figure 2.2 Route options examined in the NTG feasibility study 1998

All route options included the landfall of the pipeline at Greifswald as the base case, although route alternatives to Lübeck and Rostock were also surveyed and evaluated. Furthermore, an alternative landfall point at the island of Usedom (east of Greifswalder Bodden) was briefly considered, but abandoned before the survey campaign was launched due to technical requirements and existing intense alternative use of the area such as tourism.

Whereas the Baltic countries and Poland were not part of the scope of NTG, all identified variants would have connected Russia with Finland, Sweden and Germany. Gas transport volumes envisaged would have varied from 35.5 bcm per annum to 21.6 bcm per annum. Thus, the two Nordic countries which joined the EU in 1995, would have been fully integrated in the EU gas system. The study included the possibility of reverse gas flows from Germany to Scandinavia in case of supply bottlenecks from Russia, using diversified German supply structures from the Mediterranean, Middle Eastern and North Sea region.

Feasibility study: Results

After evaluation of the routes and establishing the technical feasibility of all routes, NTG concluded in 1999 that route option 2b completely through the Baltic Sea proved to be most advantageous. This route consists of an onshore section in Finland and an offshore section through the Baltic Sea to Germany. The Finnish onshore part was replaced in the next project phase by a complete offshore solution through the Gulf of Finland.

The results have not been implemented as Fortum Oil and Gas Oy changed its priority, focusing more on the power sector and establishing new nuclear power plants in Finland and buying Swedish utilities. Hence, a natural gas pipeline connecting the Nordic countries to Western and Central Europe was no longer included in Fortum's corporate strategy. Consequently, Gazprom and the Russian government shifted their attention to their southern flank. To enhance a strategic partnership between both countries, Russia and Turkey signed an intergovernmental agreement on the construction of the subsea pipeline Bluestream from the Russian shore of the Black Sea to the Turkish town of Samsun in 1999. Gazprom and Eni S.p.A. became the shareholders of this joint venture which is supposed to transport 16 bcm of natural gas per annum to Turkey and onwards to Southern and South Eastern Europe.

2.2.5 Excursus: The Baltic Sea – The preferred option for a new European energy supply route

Analysing key decision drivers for offshore pipelines underlines the outcome of the NTG feasibility study. This will be done in the following brief excursus.

Economic principles

From a supply point of view, the Russian Baltic coast with its geographical proximity to various Russian gas fields is clearly favoured as starting point of the pipeline. Nord Stream's key supply

basis comprises gas fields on the Yamal peninsular and the Yuzhno-Russkoye gas field in the short and medium term. The Shtokman offshore gas field in the Barents Sea will constitute a future option once it comes into large-scale production.

From an investor's perspective, the market size targeted by the Project is decisive. Thus, with regards to demand, Western Europe is an attractive market as its own gas reserves are decreasing and the greenhouse gas emissions gap has yet to be met. To ensure a smooth connection to a well developed pipeline network, Germany was a suitable entry point for non-EU gas supplies. Furthermore, going onshore via the Baltic States and Poland was not an option from an economic perspective. Market potential of Western European countries was regarded as more promising. This argument was, apart from low population density and long distances between potential urban sales spots, also true for an onshore alternative via Sweden or Finland.

Political components

At the time of the analysis the market-size based argument was reinforced by a political facet.

The different route options investigated in the NTG feasibility study would have represented the only possible direct Russian-EU connection, linking vast Russian gas reserves with more than 300 million inhabitants of the EU in its size from 1998 – a significant pool of potential consumers. Compared to an onshore routing via Poland or the Baltic States, the legal situation in EU countries was more predictable and stable. Though investment projects are based on economic decisions, political backing can be an important factor. While the then EU accession candidates from Central and Eastern Europe were eager to reduce their dependence on Russian gas and diversifying their energy supplies, Western European countries faced increasing demand and were focussing on security of supply of energy resources.

Financing aspects

In the late 1990s Russia was still one of the International Monetary Fund's receiving countries and thus was not able to finance a project of such magnitude. Therefore, initial discussions about routes including onshore sections via Finland or Sweden were partly justified by financing requirements. Alternative routes via the former Soviet sphere of influence were due to lack of funds – among other reasons – not an option. Russia's subsequent economic recovery with soaring growth rates, bankable ratings and high-rising global energy prices, finally allowed for a direct link from Russia to Western and Central Europe.

Cost analysis desk study

To complete the economic argumentation, a cost comparison between on- and offshore solutions seems to be adequate. Nord Stream have undertaken a feasibility study comparing the

Amber[1] and Yamal-Europe onshore design with Nord Stream's offshore approach. An objective cost comparison needs to consider an upstream pipeline system that links targeted supply points with distribution points of existing pipeline networks. Therefore, the study is based on a model that links the Russian supply points Yamburg for the Western Siberian gas fields and Murmansk for the Shtokman gas field with the distribution points in the German gas pipeline system Achim in the state of Lower Saxony and Olbernhau in Saxony. Furthermore, the analysis has to be conducted based upon comparable transport capacities. Consequently, Nord Stream's targeted capacity of 55 bcm with two separate pipe strings is compared with two Amber pipelines, for each of which a capacity of 27.5 bcm has been assumed, thus summing up to a 55 bcm. Nord Stream is also compared with one Amber and the Yamal-Europe pipeline. Again, individual capacities of 27.5 bcm for each pipeline have been assumed. This yields a total capacity of 55 bcm. Finally, the cost-comparing study considers equivalent design pressures, which enable transport of natural gas through an offshore or onshore pipeline respectively. The aforementioned assumptions are reflected in three scenarios, which were chosen for analysis:

- Scenario one is based on the Nord Stream pipeline with its two separate pipe strings plus connection from Russian supply points and to German distribution points
- Scenario two refers to a model of two Amber pipelines including the aforementioned connection lines
- Scenario three reflects a combination of one Amber and one Yamal-Europe pipeline including the aforementioned connection lines

Main results are that the Nord Stream pipeline is shorter in length than the Amber or Yamal-Europe solution and that the need for compressor power is significantly lower for the offshore route. The smaller number of compressor stations require less fuel gas and, as a consequence, operational costs are reduced. This leads to an overall cost-advantage of the Nord Stream pipeline in terms of today's value of total cost.

Cost calculations are based on various assumptions. Due to differences in considered connections to supply and distribution points, assumed budget, pipeline diameters, technical parameters such as design pressure and wall thickness, other models calculated more remarkable cost advantages for the Nord Stream pipeline compared to the Amber pipeline over an assumed life span of 25 years. According to the project life cycle for the Nord Stream pipeline, decommissioning has been estimated after a life span of approximately 50 years. Nord Stream's overall cost advantage is thus even more relevant.

(1) The so-called Amber pipeline is a natural gas pipeline project suggested to link Russia with the Yamal-Europe pipeline passing through Latvia, Lithuania and Poland.

Comparing Nordic onshore alternatives, the route via Finland and Sweden will have a greater capital costs due to its greater length, 1,400 km onshore as opposed to the 1,220 km offshore route.

Environmental focus

From an environmental perspective, the Kyoto Protocol, signed in 1997, has had an important influence on energy related issues. Thus, the displacement of coal usage in Germany, the UK and other European countries by dints of the natural gas pipeline will contribute to the reduction of carbon dioxide emissions on which parties to the treaty, such as the EU, have agreed on. In addition, an offshore pipeline through the Baltic Sea will generate significantly less carbon dioxide than onshore routes via Eastern and Central Europe. This is based on increased efficiencies from higher design pressure.

With regard to sustainability a rough comparison of potential environmental impacts showed that any onshore solution would lead to greater impact on the natural environment. First, this is based on a trenching corridor of 40 m required by onshore routes as well as on the different pace in pipe laying. Thus, it is assumed that 2.5 km to 3 km of offshore pipelines are constructed per day while onshore solutions advance at a considerably slower pace. As a consequence, the environmental impact is more intense. Second, the geographical circumstances of the different route options clearly favour an offshore solution. Onshore routes via the Nordic countries as well as via a Baltic-Polish corridor would lead to complicated lake and river crossings and would pass other environmentally sensitive areas. Thus, the originally foreseen onshore sections in Finland of approximately 328 km (alternative 1, see **figure 2.2**) and 391 km (alternative 2, see **figure 2.2**) would have had to cross the river Kymijoki. Near Edväinen, one of the planned Finnish landfall sections, environmentally sensitive areas would have to be passed. A possible landfall north of Hanko would have led to complicated passings of the Bay of Pohjanpitäjänlathi. In Sweden, the approximately 654 km onshore part would have faced two major lake crossings and the environmentally sensitive Fyledalen valley. Moreover, seabed conditions around the Finnish town of Hanko are rough and would have led to considerable intervention works.

Routing onshore via the Baltic States and Poland would also have crossed various environmentally sensitive areas. In the north eastern part of Poland national parks abound, all of which possess a large variety of birds and other wildlife. In this respect, the Wigierski National Park, the Biebrzanski National Park and the Narwianski National Park are to be mentioned. In addition, numerous large and small lakes and wetlands are located in the area close to the border to Kaliningrad and Lithuania. The two largest lakes are Sniardwy and Mamry which are connected via small rivers, channels and lakes. Tourism and recreation are an important source of income generation around the lakes and the national parks. Finally, the area south of the Kaliningrad border is characterised by an almost unspoiled mix of agricultural activities, forests, wetlands, lakes and rivers.

A comprehensive environmental comparison would require a full impact assessment of possible onshore routes, which is outside the scope of Nord Stream and which has not been conducted by the involved EU member states. As it will be shown later in this section, EU funds intended to be allocated for this reason have never been applied for(1).

2.2.6 2001-2005: Gazprom takes over – NTG shifts into the North European Gas Pipeline

From 2001 to 2005 the activities shifted from Finnish Fortum to Russian Gazprom. Gazprom enhanced its cooperation with German gas company Ruhrgas, later to be taken over by E.ON AG and ultimately renamed E.ON Ruhrgas AG in 2004, and German gas producer and BASF subsidiary Wintershall. As Fortum Oil and Gas Oy had changed its business strategy, Gazprom bought Fortum's 50 percent stake in NTG in 2005.

Targeting new markets and improving technology – Incidents favour the Baltic Sea route

The Project changed its name to North European Gas Pipeline (NEGP). Denmark and the Netherlands became additional target markets. Due to a decline in gas production in the UK, the British gas market got into more focus and supply route solutions from Russia via Denmark to the United Kingdom were assessed. UK gas companies were considering alternative supply sources, next to Russian ones also Norwegian options and LNG supplies. Due to the geographical proximity of the pipeline's starting point to Russian gas fields, NEGP would increase the diversification of the EU's gas supply. From a technological point of view, the improvement of technology for large diameter, high pressure and long distance pipelines was further developed mainly from Norway to the European mainland and UK, but also in the Middle East. The milestone of the construction of the Bluestream pipeline at depths upto 2150 m also paved the way for a new generation of technologically advanced offshore projects.

For the Baltic Sea offshore solution a gas supply of 19.2 bcm per annum was foreseen with a pipeline diameter between 42” and 48” and design pressure of respectively 220 and 160 bar.

Eventually, it was decided to build the Langeled pipeline from the Norwegian offshore Ormen Lange field to the UK and other offshore connections from Norway to British shores. Moreover, plans to develop the Shtokman gas field as an LNG field for non-European markets were discussed. To diversify British supplies, the construction of a new pipeline from the Netherlands to Great Britain, the Balgzand Bacton Line (BBL), along almost the same route as the one evaluated as part of NEGP, was commissioned. Hence, no direct pipeline from Russia to the UK was required as the BBL could be used to serve this market via Germany and the Netherlands. Moreover, the possible use of intermediate storage facilities in Germany turned out as an additional advantage.

(1) See chapter 2.2.7.

To sum up, the promoters of the Norway-UK connection, Statoil and Hydro, as well as the main drivers of the BBL pipeline, Dutch energy company Gasunie and Belgium gas corporation Fluxys, contributed indirectly, but considerably to Nord Stream as it is set up today.

Further advance and development of planning

Several route optimisations were conducted. In 2004 Russian engineering and environmental company PeterGaz was contracted to launch a renewed survey of the offshore section in the Baltic Sea. First, it was aimed to perform a detailed review of the NTG, public domain and commercially available data. Second, a preferred survey corridor was elaborated. This corridor formed the basis for the detailed geophysical survey in the Baltic Sea performed in 2005. This survey led to a route alignment for further evaluation and design activities. The selected alignment was considered appropriate for the purpose of conceptual engineering tasks and was identified as the base case for further development activities.

Simultaneously, more opportunities for optimisation have been identified during the conceptual study route evaluation to further reduce potential impacts and risks to the environment. Subsequently, the route was revised and new reference route alignments were established for visual inspection surveys conducted by remotely operated vehicles in 2006.

The route corridor surveyed extends from Portovaya Bay near the Russian town of Vyborg in the Leningrad region to Lubmin near Greifswald in the German state of Mecklenburg-Western Pomerania covering a route length of approximately 1,200 km with a branch line to Sweden.

2.2.7 Creation of Nord Stream

Signing contracts, moving into offices

A basic agreement to construct the pipeline was finally reached in September 2005. Two months later, the North European Gas Pipeline Company was founded and registered in Zug, Switzerland, its shares originally being distributed between Gazprom (51%), E.ON Ruhrgas AG (24.5%) and BASF/Wintershall Holding AG (24.5%).(1) In October 2006, the company was renamed to Nord Stream AG. The final shareholder agreement on the construction of Nord Stream from Russia to Germany via the Baltic Sea was signed in July 2007 and did not contain a Swedish branch due to a lack of demand in this market. In June 2008 Gasunie Infrastruktur AG took over 4.5% from each of the two German shareholders, which led to a share of 9% for Gasunie. The incorporation of the Dutch company guaranteed the opening of the BBL pipeline as an onward connection of gas transported by Nord Stream to the UK.

(1) Current distribution of shares see chapter 2.1.3.

The routing proves its timeliness

The agreements foresaw two pipelines ensuring a greater yearly capacity of 55 bcm and a higher flexibility for inspection and maintenance. A reason for increasing the capacity were pressures from EU countries to lower carbon dioxide emissions by displacing coal with natural gas. The argumentation on the supply side gained credence as the joint development of the Yuzhno-Russkoye gas field was agreed on.

With regard to demand, the Project still became more attractive as the transportation companies OPAL NEL TRANSPORT GmbH ("ONTG") and E.ON Ruhrgas Anbindungsleitungs GmbH ("ERNA") of the two German shareholders E.ON and BASF would be responsible for two large diameter onshore pipelines to respectively Achim-Rehden as well as the German-Czech border near Olbernhau connecting the upstream pipeline Nord Stream with the European gas grids. Consequently, the pipeline can supply Denmark, the Netherlands, the UK, Belgium, France, Poland, the Czech Republic and other countries. This European perspective is reflected in the decision of the European Parliament and the European Council by listing the pipeline as a "Project of European Interest"[(1)] within the Trans-European Energy Networks (TEN-E). According to European Commissioner for Energy, Andris Piebalgs, the pipeline projects Yamal II and Amber were selected in 2004 for a comparative feasibility study to which the Commission was intending to allocate funds of approximately 1 Million. Euro.[(2)] As no applicants showed interest, these feasibility studies were not conducted. While for many Western European countries security of supply of energy resources has gained importance, Polish Ministry of Economy passed a guideline in 2007, renouncing at additional Russian gas imports to Poland and focussing on the construction of LNG ports. In contrast, the EU's approach towards Moscow seems straightforward: In September 2008, the EU unanimously stressed its inclination to keep tight economic relationships with Russia.

Basing Nord Stream's head office location in a financial hub, proved to be a visionary decision. With the collapse of the real estate bubble in the United States in the winter of 2007/2008, project financing became more challenging.

2.2.8 Outlook

Nord Stream is currently applying to the various national permitting authorities of Germany, Denmark, Sweden, Finland, and Russia. Adjacent to these national processes, Nord Stream, which uses cutting-edge and proven pipeline design, engineering, construction and maintenance technologies, will meet highest standards set by international governmental organisations. The Project has committed itself to abide to the Convention on Environmental

(1) European Parliament. Decision No 1364/2006/EC of September 6, 2006.

(2) Public hearing on 29 January 2008.

Impact Assessment in a Transboundary Context, an United Nations Economic Commission for Europe (UNECE) document. It also will fulfil the Equator Principles, a global set of environmental and social benchmarks for managing related issues in project finance which base on environmental and social standards of the World Bank Group organisations International Bank for Reconstruction and Development (IBRD) and International Finance Corporation (IFC). The Nord Stream Project embodies the successful transformation of a visionary idea back in the 1980s to an indispensable key element of sustainable European gas supply.

2.3 Rationale for the Nord Stream Project: Securing Europe's Energy Supplies

2.3.1 New natural gas import capacities are needed to meet rising demand for natural gas within the EU

Imports will supply a greater share of total EU consumption

A continuing increase in the demand for natural gas within the EU(1) is expected, coupled with a decline in the EU's own productive capacity and reserves. As a consequence, imports will supply a greater share of total EU consumption. Natural gas import requirements are expected to rise from 314 bcm per annum, corresponding to 58% of total demand, in 2005 to 509 bcm, corresponding to 81% of total demand, in 2025(2). New import capacities are needed to prevent the emergence of a natural gas import gap.

(1) "EU" refers to the 27 Member States of the European Union.

(2) Based on data from the European Commission. 2007. European Energy and Transport – Trend to 2030. Update 2007. 96. The figures are based on 10.3 kwh/m^3 at 20 °C. The source is based on the assumption of conservative oil price scenarios. These and subsequent figures were rounded.

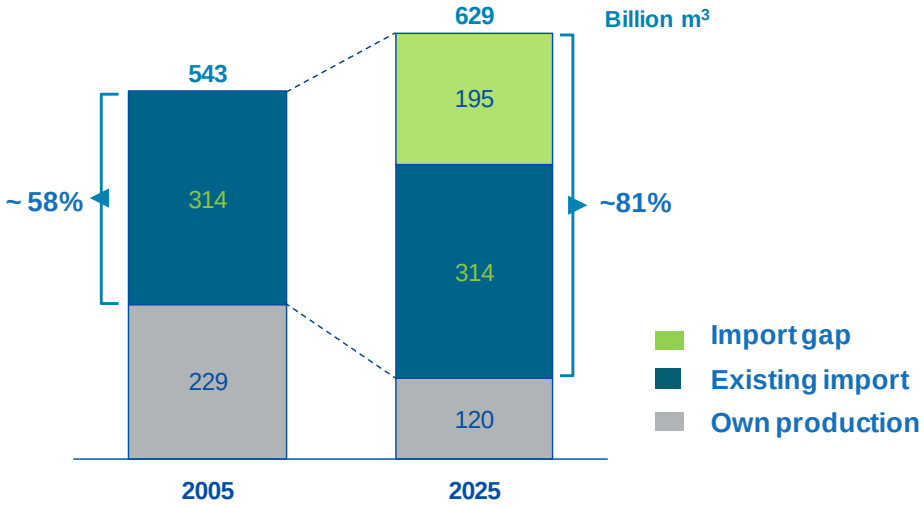

Figure 2.3 **Forecast supply and demand in the EU** (This chart is based on the assumption that current supply contracts will be renewed).

The following section

- Shows why further growth is projected for EU natural gas demand
- Highlights the forecast decline in EU reserves and productive capacity
- Analyses in detail the forecast increase in the EU's gas import requirements

The rising demand for natural gas in the EU

Currently making up one quarter of the primary energy consumption, natural gas accounts for a significant proportion of energy consumption within the EU. Moreover, EU natural gas demand is expected to grow at an average annual rate of 0.74% from 543 bcm in 2005 to 629 bcm in 2025[(1)]. Over this 20 year period, the share of natural gas in the primary energy mix is expected to rise from 25% to 26%[(2)] while the share provided by oil, coal and nuclear power declines. The proportion supplied by renewable energy is forecast to increase from 7% to 11%.[(3)]

(1) Based on data from European Commission. 2007. European Energy and Transport - Trends to 2030. Update 2007. 96.

(2) Based on data from European Commission. 2007. European Energy and Transport - Trends to 2030. Update 2007. 96.

(3) Based on data from European Commission. 2007. European Energy and Transport - Trends to 2030. Update 2007. 96.

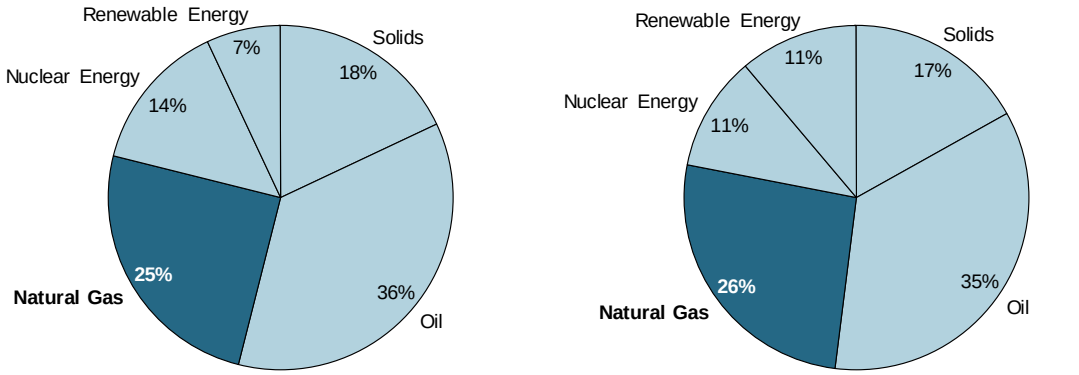

Figure 2.4 Anticipated development of the EU's primary energy mix, 2005 to 2025. Based on: European Commission. 2007. European Energy and Transport, Update 2007. 96

The additional demand for natural gas will, in terms of total volumes, come mostly from Great Britain, Italy, Germany, Poland and Spain(1), reflecting amongst other factors a progressive replacement of oil and coal for electricity generation(2).

The consumption of natural gas by households is also rising steadily. In Germany, France, Belgium, the UK, the Netherlands and Italy, households constitute the largest or second-largest source of gas demand.(3) The EU Council Directive 2004/67/EC of 26 April 2004 concerning measures to safeguard security of natural gas supply states: “In view of the growing gas market in the Community, it is important that the security of gas supply is maintained, in particular as regards household customers".(4)

Environmental compatibility is a further factor contributing to the rising demand for natural gas in the EU. Gas has a distinct advantage over other fossil energy sources as a primary energy source: due to its higher hydrogen to carbon ratio and a cleaner combustion process, natural gas causes 30% to 50% less pollution and greenhouse gases than coal or oil contributing significantly to an environmentally sustainable energy supply.(5) Especially against the backdrop

(1) Based on data from European Commission. 2007. European Energy and Transport - Trends to 2030. Update 2007. Various pages.

(2) European Commission. 2007. Green Paper - Towards a European strategy for the security of energy supply. 42.

(3) Based on data from European Commission. 2007. European Energy and Transport - Trends to 2030. Update 2007.

(4) European Council. Council Directive 2004/67/EC of 26 April 2004.

(5) http://www.umwelt.niedersachsen.de/master/C24188911_N23067576_L20_D0_I598.html (accessed Oct. 26, 2007).

of the decision by the European Council in March 2007 to reduce the greenhouse gas emissions by 20% by the year 2020[1], a further increase in demand for natural gas is expected.

Use of renewable sources to meet EU primary energy demand is forecast to increase, but not sufficiently to cover the forecast shortfall in EU gas supplies. While its importance will grow, the share of renewables in the EU primary energy is forecast to rise only to 10% by 2020 and 12% by 2030.[2] As a consequence, natural gas itself cannot be replaced by the consolidated use of alternative primary energy sources until 2030 and beyond.

Drop in the EU's own natural gas reserves

While the demand for natural gas is rising in the EU, its own available resources are diminishing. Current total proven natural gas reserves in the EU (about 2,800 bcm)[3] are relatively low compared with projected demand of 629 bcm per annum in 2025. At 1,250 bcm, the Netherlands has the largest proven reserves within the EU. Great Britain, which currently contributes approximately 16% of annual natural gas production in the EU, only has reserves of approximately 410 bcm.[4] No noteworthy new natural gas finds are anticipated in the EU.[5]

As a result, the EU's self-sufficiency will further decline. At present, natural gas production in the EU covers roughly 42% of demand,[6] and production from existing natural gas reserves in the EU will decline from around 229 bcm per annum in 2005 to only 120 bcm per annum in 2025.[7]

With production declining and demand rising over the coming decades, the EU Council sees the need to mobilise "significant additional volumes of gas".[8] New natural gas import capacities will be needed to offset the emerging shortfall in EU natural gas supply.

(1) http://ec.europa.eu/environment/etap/agenda_en.htm#4 (accessed October 19, 2007).

(2) European Commission. 2007. European Energy and Transport - Trends to 2030. Update 2007. 96.

(3) BP. June 2008. Statistical Review of World Energy. 22.

(4) BP. June 2008. Statistical Review of World Energy. 22.

(5) European Commission. 2007. European Energy and Transport - Trends to 2030. Update 2007. 74.

(6) Based on data from European Commission. 2007. European Energy and Transport - Trends to 2030. Update 2007. 96.

(7) Based on data from European Commission. 2007. European Energy and Transport - Trends to 2030. Update 2007. 96.

(8) European Council. Council Directive 2004/67/EC of 26 April 2004.

The need for new natural gas import capacities to the EU

As a result of the decline in the EU's own productive capacity and reserves coupled with an increase in the demand for natural gas within the EU, natural gas import requirements are expected to increase from 314 bcm per annum in 2005 to 509 bcm per annum in 2025. Therefore, new import capacities are needed to prevent the emergence of a natural gas import gap.

Europe currently obtains natural gas primarily from three sources: Russia provides the most important share, followed by Norway and Algeria.(1) The size of reserves as well as their geographic proximity to the EU and the long term reliability of supply will be important factors in the choice of future import sources. Russia turns out to combine these advantages.

2.3.2 The strategic importance of Russia as a natural gas supplier

Three factors mean Russia has the potential to make a significant contribution to the EU's future supply security: (a) Russia has the largest confirmed natural gas reserves in the world, (b) is geographically close to the EU, and (c) can show a reliable supply relationship for over 35 years with natural gas customers in the EU.

(a) Russia has the world's largest confirmed natural gas reserves

The current composition of import volumes from natural gas-producing countries will shift in favour of regions with long-term resources. Therefore, the size of reserves will be an important factor in the choice of future import sources. Known world gas reserves are located in three main regions:

- Europe and Eurasia: approximately 33.5% (Russia: 25.2%; Norway: 1.7%)
- Middle East: 41.3% (Iran: 15.7%, Qatar: 14.4%)
- Africa: 8.2% (Nigeria: 3.0%, Algeria: 2.5%)(2)

The remaining 17% of total world reserves are distributed in small volumes across various regions.

(1) Eurostat. 2007. Eurostat Statistical Books - Gas and Electricity Market Statistics. 56.

(2) BP. June 2008. Statistical Review of World Energy. 22. Please also refer to this source for a detailed definition of regions.

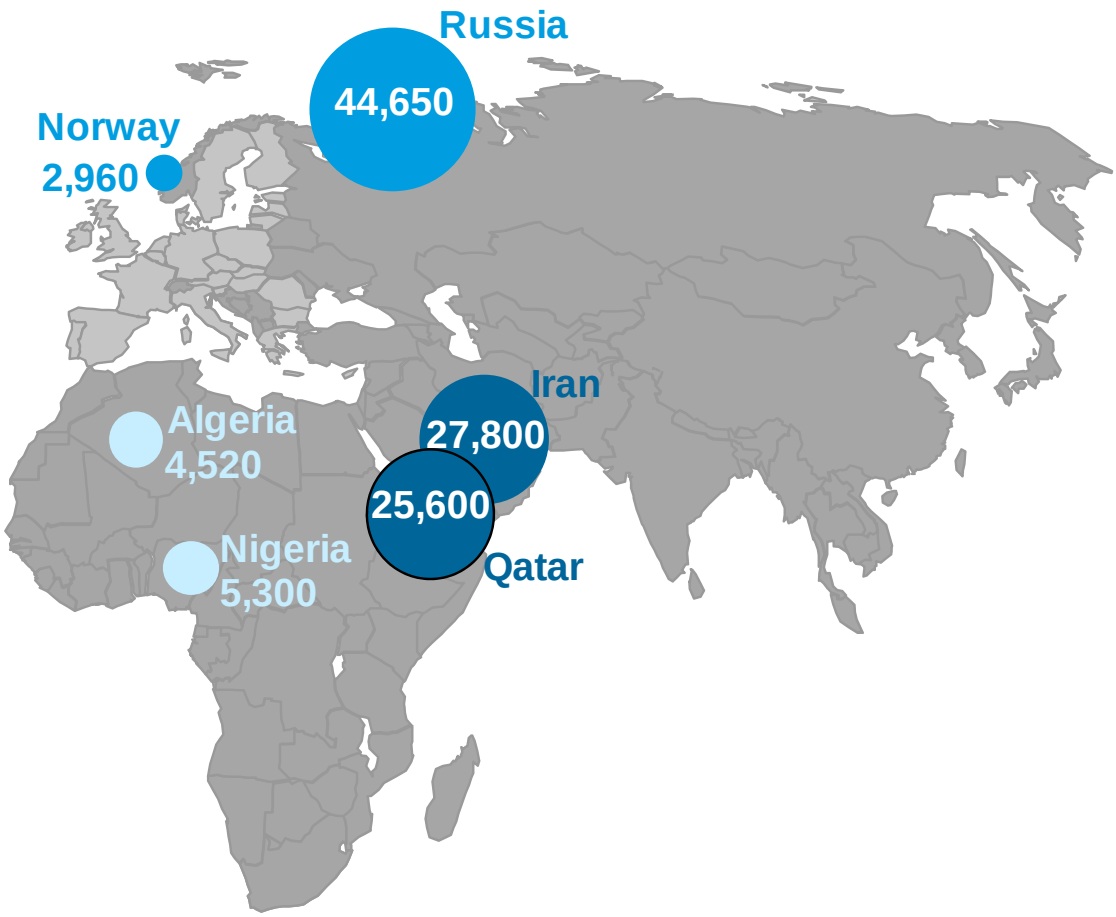

Figure 2.5 **Overview of confirmed natural gas reserves: Russia, Norway, Iran, Qatar, Nigeria, Algeria. Based on: BP. June 2008. Statistical Review of World Energy**

In each of the three mentioned regions, the EU has a **major supply relationship** with those countries which have either the largest or the second largest remaining gas reserves – **Algeria, Qatar, Norway and Russia**. The EU has no supply relationship with Iran.

Algeria currently has 4,520 bcm of natural gas reserves(1) and is located close to the countries of Mediterranean Europe. There are plans to raise current exports of 65 bcm per annum to a level of 115 bcm per annum in 2015(2).

(1) BP. June 2008. Statistical Review of World Energy. 22.

(2) http://algerien.ahk.de/index.php?id=landesinfos (accessed August 4, 2008).

Qatar has 25,600 bcm of natural gas reserves, the third largest in the world after Russia and Iran(1). Exports are mainly effected in the form of LNG because of the great distances to target markets. Efforts to expand Qatari LNG exports were mainly aimed at the Japanese and South Korean markets. Low level exports to the EU began in 2000 and several projects for expanding LNG exports to North American and European markets were under construction. However, in December 2006, some of the supplies initially contracted by a North American buyer were sold to a customer in the Pacific area(2) underlining the destination flexibility of LNG supplies. However, at present an official moratorium has stopped any further natural gas production projects. Therefore a short- or medium-term expansion of Qatari LNG production capacities is uncertain.

At 2,960 bcm, **Norway**(3) will continue to play an important role in the EU natural gas supply in the short and medium terms. However, Norway's gas export is expected to peak at 150 bcm per annum in 2020. By 2025, Norway's natural gas export is expected to attain merely 120 bcm per annum(4). This corresponds to 19% of the EU's required natural gas supply in 2025.

With 44,650 bcm, **Russia** has 25.2% of the world's currently known natural gas reserves.(5) Their geographic concentration also facilitates development with 90% of current Russian production taking place in West Siberia. In the future, extraction will be extended to include the Shtokman offshore field in the Barents Sea and some further offshore fields in the Kara Sea. The Shtokman field has 3,700 bcm of confirmed natural gas reserves concentrated in a single field with the big advantage of being located close to the EU.

The potential rise in gas exports from Norway, Algeria and Qatar are insufficient to cover medium- and long-term growth in EU import requirements. The potential shortfall adds to the importance of constructing additional large volume transport capacities from Russia to the EU.

(b) Russia's proximity to the EU

The source of imported natural gas varies widely across the EU, with geographic proximity the key determinant. Countries like Germany, France, Belgium and the UK obtain natural gas mainly from Russia and Norway, most Italian and Spanish natural gas imports come from Algeria. Geographic proximity will be an important factor in the choice of future import sources. In addition to its unique resource base, Russia has the advantage of its geographic proximity to EU

(1) BP. June 2008. Statistical Review of World Energy. 22.

(2) Energy Information Administration. 2007. International Energy Outlook. 41-42.

(3) BP. June 2008. Statistical Review of World Energy. 22. Note: Norway's natural gas reserves are not part of the EU's reserves.

(4) German Ministry for the Economy. September 2007. Monitoring-Bericht des BMWi nach § 51 EnWG zur Versorgungssicherheit bei Erdgas. 17.

(5) BP. June 2008. Statistical Review of World Energy. 22.

markets. The Shtokman field will be an outstanding contribution for the supply security of the EU in the future.

(c) Russia has had a long-term and reliable supply relationship with natural gas customers within the EU

A supply relationship based on mutual interest has existed between the EU and Russia for more than thirty-five years. EU companies buy some 80% of Russian natural gas exports.(1) Russian reserves are also of great significance for the EU's future supply security. The oil and gas industries constitute a major sector of the Russian economy, accounting for two thirds of its export revenue in 2007. Gas export earnings are crucial to Russia's national budget. The European Commission speaks of an evident mutual dependency on the part of the EU and Russia in respect of energy partnership, and of the mutual benefit of Russia having greater access to the EU's natural gas market.(2)

Moreover, the exporting company is committed to make additional volumes of natural gas available. Russian Energy company Gazprom has already contractually agreed to sell an additional 21 bcm of natural gas per annum to be supplied via the Nord Stream pipeline to various purchasers. These contracts demonstrate that Gazprom's intention to export via the new supply route is matched by the long-term demand for natural gas projected by the European energy companies concerned. The Nord Stream pipeline is thus a priority project for both Gazprom, the supplier, and for European gas purchasers.

Although a tried and tested supply relationship has existed between exporting companies in Russia and purchasers in the EU, early connection of Russian natural gas reserves to the European market is also important given the increasing competition between natural gas consumers. This is described in the following paragraphs.

2.3.3 The importance of connecting Russian natural gas reserves to the European market at an early stage in the context of the rising demand for natural gas in Asia

China's geographic proximity to Russian gas fields in north Tyumen region is comparable to the EU's geographic proximity. Given the increasing competitive pressure to access natural gas supplies, the strategic safeguarding of sources in Russia is becoming increasingly important for the EU. This is primarily associated with the rising demand for natural gas in Asian countries.(3) Demand for natural gas between 2004 and 2030 is estimated to grow at 5.1% per annum in

(1) Calculation based on BP. June 2008. Statistical Review of World Energy. 30.

(2) European Commission. October 2006. Commission to the European Council: Foreign relations in terms of energy supply - principles, measures.

(3) Federal Ministry of Labour and Economic Affairs. 2005. Energy market trends up to 2030. 18.

China and 4.2% per annum in India, compared with 3.4% and 3.0% per annum for oil and 2.8% and 3.3% per annum for coal.(1) The Asia-Pacific region currently consumes 439 bcm per annum, about 81% EU levels.

China is one of the largest and fastest growing markets for natural gas in the region. Given the expected increase in demand, China is likely to show a heightened interest in Russian natural gas exports. China's geographic proximity to Russian gas fields will encourage the transport of gas from Russia to China.

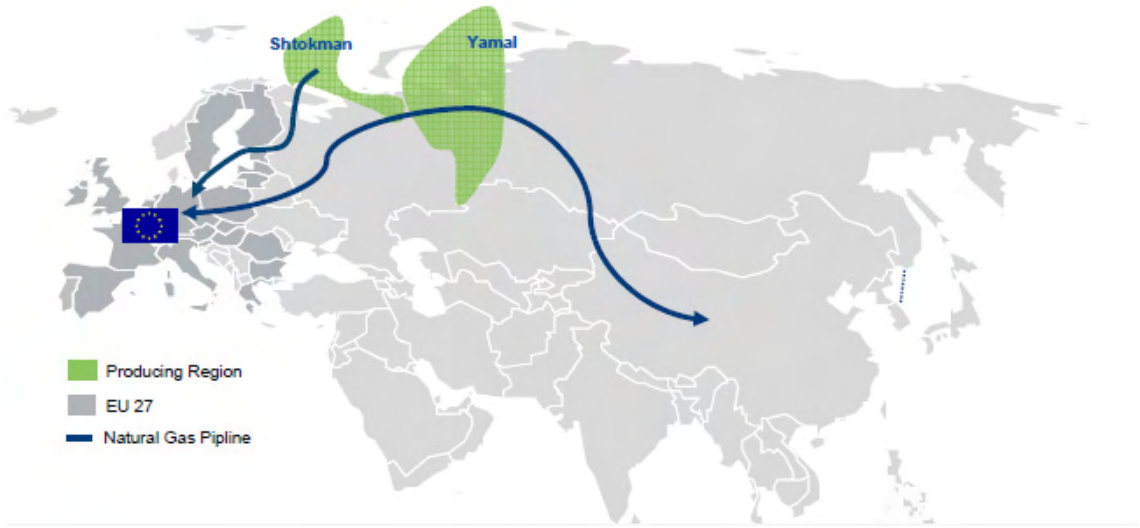

Figure 2.6 Existing gas reserves in Russia and construction of the supply network for China

As energy trading relations grow between Russia and Asia, there is a danger of the EU taking second place as a customer for Russian gas from Tyumen region. An early strategic expansion of the connection from Russia to the European market is therefore important in securing the supply of natural gas to the EU over the long term. Gazprom's major investment commitment in the Nord Stream pipeline underlines the interest of the world's leading natural gas producer in a long-term supply relationship with the EU. This is a considerable benefit to the EU in the context of increasing competition for natural gas as an energy resource.

Establishing a direct link between Russian gas reserves and the EU market is gaining in urgency. Therefore, the European Commission supports projects aiming at the timely expansion of gas infrastructure to the EU from third countries via the guidelines for Trans-European Energy Networks (TEN-E). The Nord Stream pipeline can provide a significant proportion of the required additional transport capacities into the EU and is, therefore, of very high importance for EU's

(1) International Energy Agency. 2006. World Energy Outlook. 86, 112, 127.

security of gas supply. On September 6, 2006 the European Parliament and Council recognised the Nord Stream pipeline as “a Project of European interest”[1] and a priority project.

2.3.4 The Nord Stream pipeline as an essential element of the Trans-European Energy Networks

The Nord Stream pipeline in the context of the Axes for Priority Projects of the Trans-European Energy Networks

Implementing the Trans-European Energy Networks decision involves improving the integration and development of the energy transport infrastructure by furthering the connection, interoperability and development of natural gas transport capacities. This European Commission programme prioritises certain axes for the expansion or re-establishment of natural gas supplies to the EU from third countries, as well as raising the efficiency of energy markets within the EU.[2] The EU supports projects which correspond to these “Axes for Priority Projects”. On September 6, 2006, the EU defined six axes for priority projects (NG1 to NG6)[3].

(1) European Parliament. Decision No 1364/2006/EC of September 6, 2006.

(2) European Commission. 2004. Trans-European Energy Networks: TEN-E Priority Projects.

(3) European Parliament. Decision No 1364/2006/EC of September 6, 2006.

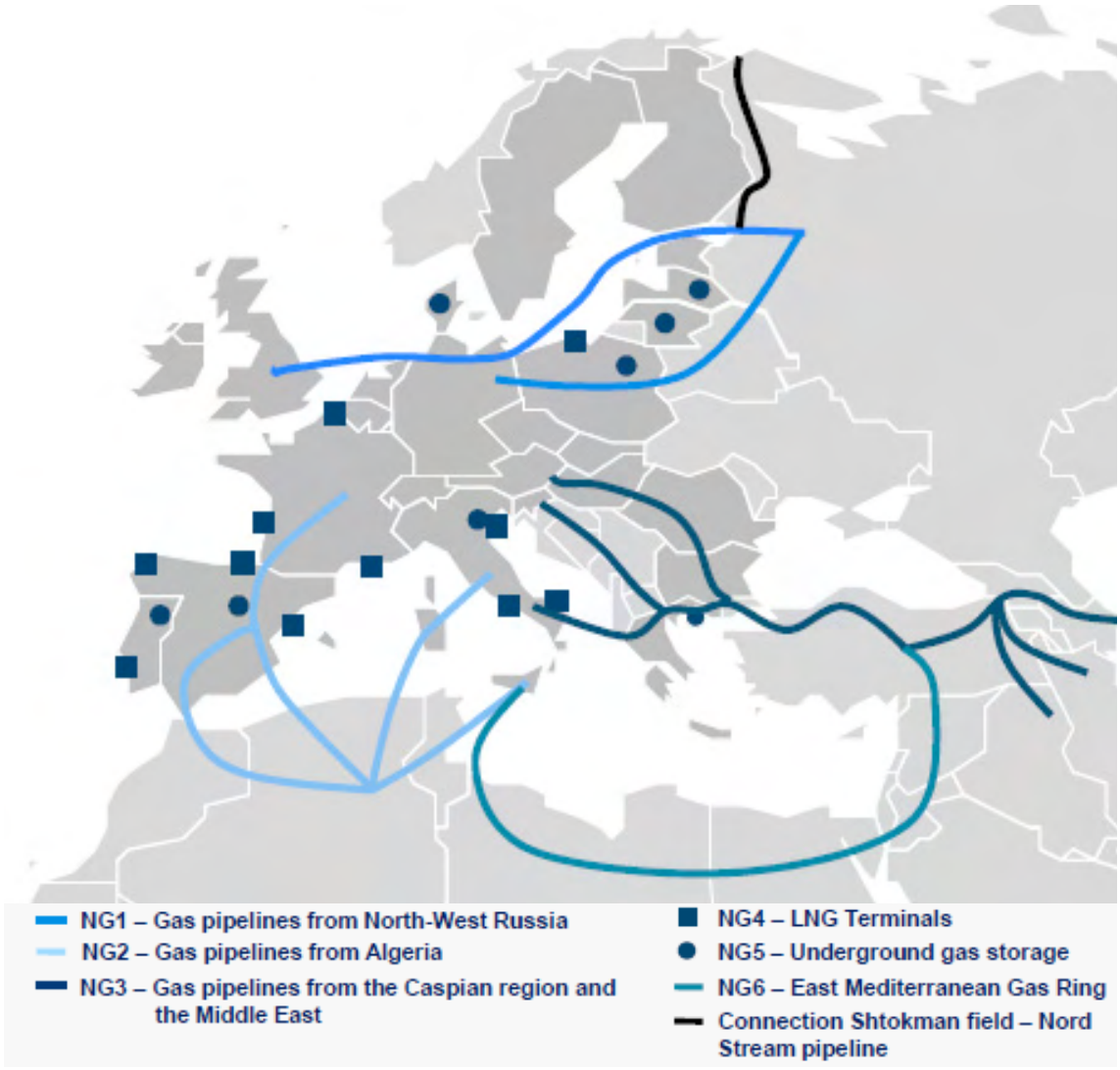

Figure 2.7 Trans-European Networks: natural gas priority projects, based on an illustration by the European Commission

The **NG1 axis** covers a corridor from Russia to Great Britain via northern continental Europe (including Germany, the Netherlands and Denmark) for the creation of a new import route for Russian natural gas. This axis aims at the connection between Russian gas reserves in Western Siberia in general – more particularly the Shtokman field - and the EU. **The Nord Stream pipeline as the backbone of this corridor will serve to realise this goal.** The efficiency of the internal EU gas market is also to be enhanced by increasing transport capacity between continental Europe and Great Britain.

A pipeline network connecting Algeria with Europe is to be created on the **NG2 axis**. This includes several routes to Spain and Italy. From there, other connections to France are envisaged.

On the **NG3 axis**, the connection of gas reserves from the Middle East and the Caspian Region to the EU is planned via the “Nabucco” pipeline which is to run across Turkey, Bulgaria, Romania and Hungary as far as Austria.

The aim of the projects designated as **NG4** is the construction of additional regasification terminals for liquefied natural gas (LNG) in Belgium, France, Spain, Portugal and Italy. First By creating flexible transportation routes by ship, these projects are designed to stimulate competition between natural gas exporting countries, to establish additional import capacities and to diversify the sources from which natural gas is imported. However, already today the LNG world market is characterised by a strong competition between importing countries in Europe, the United States and the Far East.

The aim of the projects designated as **NG5** is to increase gas storage capacity primarily by constructing underground storage facilities (e.g. depleted natural gas deposits, salt caves).

The **NG6 axis** focuses on expanding pipeline capacity from Libya, Egypt, Jordan, Syria and Turkey to EU Member States in the Mediterranean region: establishment of the East Mediterranean gas ring.

The Nord Stream pipeline in the context of the various projects realised for the Trans-European Energy Networks

In accordance with the axes prioritised by the European Commission, various new natural gas import infrastructure projects are to be implemented. The Nord Stream pipeline is defined as one of TEN-E infrastructure projects and the largest single project for new import capacity into the EU.

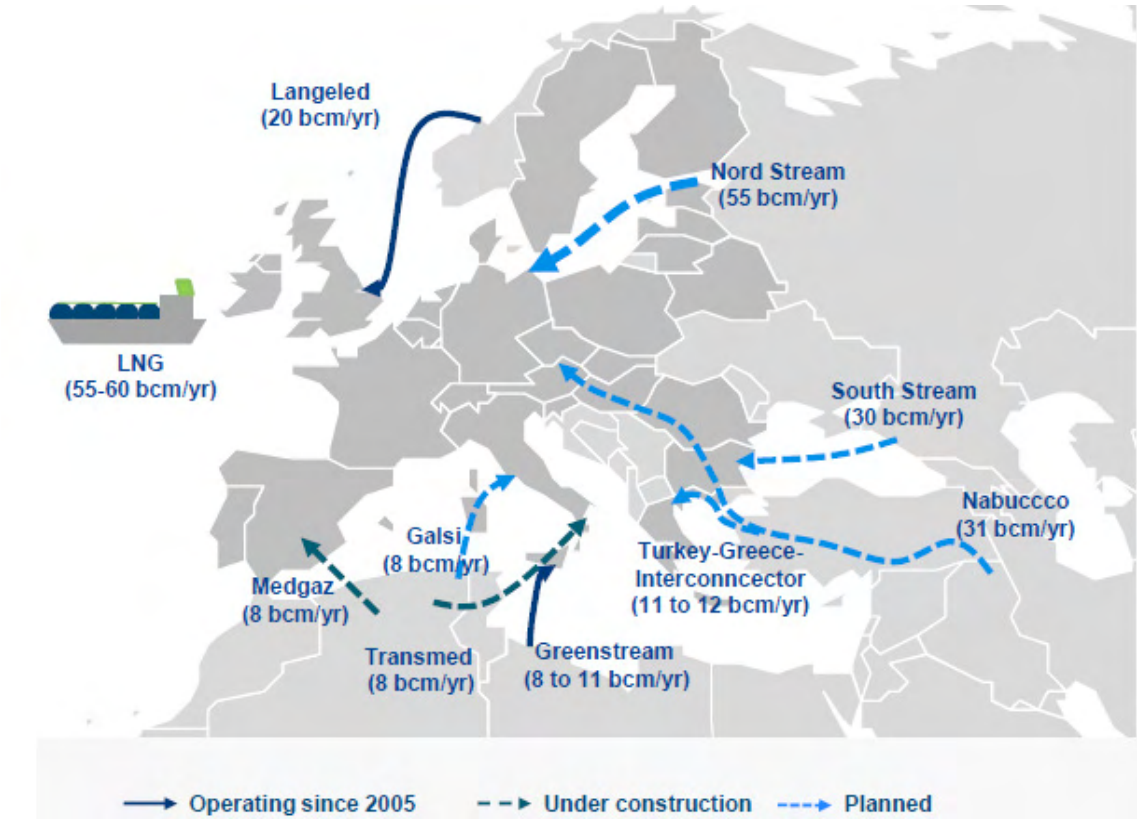

Figure 2.8 Trans-European Networks - natural gas priority projects

The Langeled pipeline, which runs from the Nyhamna Terminal in Norway to Easington in England, is one of the strategic infrastructure projects mentioned. In combination with the development of the Norwegian Ormen Lange field, this pipeline, officially inaugurated in 2006, is contributing approximately 20 bcm per annum to the EU's import capacities.

Expansion of pipeline connections between North Africa and Italy or Spain is designed to increase annual EU import capacity by up to 42 bcm per annum starting in 2015 (GME, MEDGAZ, GALSI, Transmed, expansion of the Green Stream pipeline). The Nabucco pipeline is planned as an import route for natural gas from the Caspian region with import capacities of 20-30 bcm per annum starting in 2011 at the earliest.

Extra LNG capacities are planned, providing in total 66 bcm per annum of additional regasification capacity is currently planned, raising capacity by 2015 to approximately 180 bcm per annum. However, the majority of the projects listed are still at an early planning stage, and their execution is in some cases uncertain.

All the pipeline projects currently planned and under construction in the framework of TEN-E would add – including Nord Stream – a total of 140 bcm to EU import capacity. This corresponds

to over 70% of EU additional gas import needs in 2025. The Nord Stream pipeline with a planned capacity of 55 bcm per annum, is meant to provide more than 25% of EU additional gas import needs, and therefore makes a significant contribution to guaranteeing the security of EU gas supplies. As stressed by EU Energy Commissioner Andris Piebalgs, Nord Stream should be seen as complementary to other projects, which will also need to be completed, not competitive to them.(1) Beyond its importance in terms of volume, the route chosen for Nord Stream would contribute significantly to the "diversification of natural gas sources and supply routes".(2) A June 10, 2004 report from the European Commission on the TEN-E priority projects confirms this.(3) Diversification was defined as a priority in the future development of the trans-European energy supply networks by EU Decision No 1364/2006/EC of September 6, 2006. This recognised the northern European natural gas pipeline running from Russia to Germany through the Baltic Sea as a project "in the general interest" of the EU.(4) Due to the Nord Stream pipeline's capacity to provide a significant share of the required additional import capacity, and due to its strategic importance, the non-realization of the Nord Stream Project is not an option.

2.3.5 Consequences in case of non-implementation of the Project

This chapter deals with the consequences for the future natural gas supply of the EU, if the Nord Stream Project were not implemented. As discussed above, non-implementation of the Nord Stream Project would represent a major risk to the security of EU natural gas supply due to the non-availability of 55 bcm p.a. through the Nord Stream pipelines. The planned pipeline would cover more than one-quarter of additional gas import demand, estimated at up to 195 bcm p.a. by 2025. Non-implementation would seriously threaten EU energy supply security.

Most of the remaining required import capacity is planned to be covered by gas import projects listed under **2.3.4.** These projects should all be regarded as complementary to each other. The supply gap resulting from the non-implementation of the Nord Stream Project would have to be covered by projects that are not even yet under consideration not to mention planning.

Without Nord Stream, the following should be considered:

a) Other areas of origin

b) Other natural gas transport routes into the EU

(1) Public Hearing of the Committee on Petitions, Brussels, 29 January 2008.

(2) European Parliament and Council. Decision No 1364/2006/EC of September 6, 2006. Article 4.3. See also: European Commission. January 2007. The communication from the Commission to the European Council and the European Parliament - An energy policy for Europe. 6.

(3) European Commission. 2004. Trans-European Energy Networks: TEN-E Priority Projects. 25.

(4) European Parliament and Council. Decision No 1364/2006/EC of September 6, 2006.

c) Other energy sources

Besides the analysis of these three aspects, it must be emphasized that, in addition to Nord Stream, other projects currently under consideration are required to meet the rising demand for imported natural gas (see **section 2.3.4**), and therefore, cannot be regarded as alternatives to the Nord Stream Project.

(a) Other areas of origin

Based on the following criteria, there is no comparable alternative to Russia.

- Russia holds the world's largest natural gas reserves and will be able to supply natural gas to the EU in the long run
- Russia lies in geographic proximity to the EU
- Russia offers the possibility of long-term supplies
- A link to incremental Russian gas supplies can be made available in the medium term

Other potential sources of additional gas are:

- Caspian and Middle East region – transmission pipeline systems and LNG
- Algeria and Libya – pipelines across the Mediterranean Sea
- Norway – pipelines through the North Sea
- More distant sources – LNG

None of these alternatives offer the advantages of the Nord Stream Project connecting the EU to Russian gas fields. Moreover, they would be only available in the longer term; several years after Nord Stream. LNG transports, in particular, involve higher CO_2 emissions.

(b) Other natural gas transport routes into the EU

Below, other modes of transport are compared with Nord Stream regarding emission efficiency, which is the main environmental aspect to be considered. Other environmental aspects that are taken into account are safety and public perception of these means of transport.

The Nord Stream Project offers distinct advantages in terms of energy efficiency compared to onshore routes and LNG transport, an important factor in view of the EU's goal of reducing CO_2 emissions.

Onshore pipelines

Given the same pressure levels and throughput volumes, the energy needed to operate a pipeline is primarily a function of the average transportation pressure. With increasing pressure the specific pressure consumption during transportation will drop due to the compressible nature of gases, thus reducing the number of compressor stations necessary for gas transport over a certain distance. With the maximum input pressure of 220 bar for the Nord Stream pipelines no intermediate compression is needed to transport gas over a distance of more than 1,200 km.

As onshore pipelines are predominantly operated at pressure levels considerably below 100 bar far more compressor stations and thus fuel gas would be necessary to guarantee an equivalent performance. Therefore, the Nord Stream Project results in lower CO_2 emissions compared to an onshore project.

LNG transport

LNG transports are markedly less energy-efficient and involve higher carbon emissions than an offshore pipeline. The LNG process is complex and involves high-pressure liquefaction of gas at the point of export, specialised shipping transport and finally re-gasification. Each part of the process involves significant energy losses and carbon emissions. Analysis shows that a pipeline link from the Murmansk province where the Shtokman gas will be landed will involve fewer energy losses and lower carbon emissions than transportation by LNG tanker to the North German coast. The same comparative benefits of pipeline transport over LNG transport also apply to a subsea link to North Germany from Vyborg on Russia's Baltic coast. To replace the capacity planned for Nord Stream would mean some 600-700 LNG tanker round trips across the Baltic Sea per year, with noise and other disturbances impacting seriously on the Baltic environment, over and above additional carbon emissions. Moreover, in a 2007 statement the European Commission observed that completion of various LNG terminals was "encountering significant delays"[(1)], referring to TEN-E Priority Projects that are at least in the planning stage. This statement clarifies the difficulty of realising additional LNG terminals that have not yet even been planned.

(c) Other energy sources

Renewable energy

By 2025 the European Union expects the Europe-wide share of renewable energy to be 11% of the primary energy mix[(2)]. From an environmental point of view, renewable energy is a preferred option. However, the renewable energy projects are not able to meet the basic developmental

(1) European Commission. October 2007. Communication from the Commission to the Council and the European Parliament: Priority Interconnection Plan. 11.

(2) European Commission. 2007. European Energy and Transport - Trends to 2030. Update 2007. 96.

objective, as their share in the energy mix remains too small. To replace energy from 55 bcm of gas to be provided via the Nord Stream pipeline, 240,000 wind mills would have to be built, or approximately 90,000 to 100,000 km^2 of corn fields would have to be added for bio ethanol production. Renewable energy projects will therefore not be considered an alternative to the Project.

Fossil fuels

Natural gas creates 30 – 50% less pollution and greenhouse gas emissions than other fossil fuels such as coal and oil, as natural gas has a higher hydrogen-carbon ratio and a clean combustion process. Therefore, gas has less impact on the environment than other fossil fuels. Tackling the energy need in case of non-realisation of the Nord Stream Project with other fossil fuels than gas would mean to build 55 additional coal-fired plants or to have 150 oil tankers crossing the Baltic Sea per annum.

Especially against the backdrop of the decision by the European Council in March 2007 to reduce the greenhouse gas emissions by 20% by the year 2020(1), a further increase in demand for natural gas is expected. Fossil fuel projects have a more negative impact on the environment than the Nord Stream Project and therefore will not be considered an alternative to the Project.

Nuclear power

An increased use of nuclear energy as an alternative to the use of natural gas might be an option if the long term supply of natural gas through existing infrastructure proves to be less than the demand. Tackling the energy need in case of non-realisation of the Nord Stream Project with nuclear power would require 23 new nuclear power stations. Since the construction process of nuclear stations is of long duration, a tackling of the import gap in 2025 with nuclear power is highly unrealistic.

Moreover, nuclear power has environmental disadvantages. On the one hand nuclear power generation has a positive effect on CO_2 emissions. On the other hand the present uncertainty still existing regarding the long term impacts(2), nuclear power generation has a more negative impact on the environment than the Nord Stream Project. Additionally it can be observed that the future use of nuclear energy is heavily challenged in many countries of the European Union by public pressure, and e.g. Germany has committed itself not to build any new nuclear power plant and step-by-step to replace existing nuclear power plants by using other sources of energy. Therefore, nuclear power will not be considered an alternative to the Project.

The Nord Stream Project has lower carbon dioxide emissions than LNG transport and on-shore pipelines. LNG is the most carbon-intensive way to transport natural gas. Transferring gas in a

(1) http://ec.europa.eu/environment/etap/agenda_en.htm#4 (accessed October 19, 2007).

(2) Such as: uranium mining, safety issues and nuclear waste issues.

submarine pipeline is one of the most efficient and safe ways to transport energy. In this context environmental impacts on flora and fauna should be contrasted with environmental impacts resulting from the use of natural gas instead of other fossil fuels. Considering that the construction of an off-shore pipeline through the Baltic Sea is environmentally the most favourable way of increasing the natural gas transportation capacities into the EU, and considering that renouncing from increasing the import capacities is no option, it can be concluded that, apart from renewable energy, any other projects aiming to supply the EU with required energy sources, would result in more harmful effects on the environment.

2.3.6 Conclusion

Non-implementation of the 55bcm per annum Nord Stream pipeline, providing more than 25% of EU additional gas import needs, is not an option without risking a serious threat to EU energy supply security:

- The Nord Stream pipeline is an indispensable element of the TEN-E priority projects that aim at securing the EU's gas supply
- The Nord Stream pipeline will connect the EU with the world's largest known natural gas reserves
- The Nord Stream offshore pipeline is the most environmentally compatible way of transporting natural gas into the EU
- Compared with other gas transportation projects into the EU, the Nord Stream Project is at a very advanced stage of technical design and planning. It can be completed and operational in time to help meet the EU's growing demand for gas. Therefore, the Nord Stream pipeline is of major importance for meeting EU gas demand as it will increase in the coming years

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