Nord Stream

Economical and geopolitical aspects of the project

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Abstract:
Nord Stream is a Russo-European engineering project to lay a gas pipeline on the Baltic seabed. Two parallel pipes are to deliver natural gas from Russian to Germany for further distribution in Central and Western Europe. Among other aspects the economical and geopolitical aspects have raised a lot of discussion. The official statement given by Gazprom is the the projects purpose is to create an extra link to the Russian gas fields is to fill the future gap between the European demand and supply for natural gas. Various parties claimed that this project has no economical value and it is rather designed to bypass the traditional export routes through Ukraine and Belarus thus increasing the political influence on these countries. Others found that this project is not only profitable but also offers other advantages such as more stable supply link. Managing such large infrastructure undertaking is a challenge which has been well handled. The cost overrun in such projects is very common and it is vital to create an efficient strategic system to secure the success. Fourteen years since the beginning of the project the first pipeline is finally being laid and expected to be operational in late 2011. The budget has suffered only minor increases and most of the obstacles have been efficiently resolved. The author collected, presented and reviewed the tools available to evaluate the project's economic value and the existing theory on risk management of large engineering projects. He also presented a discussion on the geopolitical significance of the project concluding that the project has a number of positive outcomes for Gazprom, Russian economy as well as for consumers in Central Europe, but also a number of negative effects primarily for transit countries.

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INTRODUCTION

The Nord-Stream pipeline is the project for a new offshore gas pipeline from Russia to Germany through Baltic Sea. It is designed to bring an additional gas supply capacity for central Europe and bypass traditional transit countries such as Ukraine and Belarus blamed for gas supply disruptions in the past. The Nord Stream is a joint project of five companies: OAO Gazprom (51%), BASF SE/Wintershall Holding GmbH, E.ON Ruhrgas AG, N.V. Nederlandse Gasunie and GDF SUEZ S.A. The Project is currently under construction and consists of 2 pipelines. The first pipeline is due to completion in late 2011, the second is to be completed in 2012. Together these two pipelines should have the capacity of transporting around 55 billion cubic meters (bcm) of natural gas per year, supplying over 26 million households. Estimated costs are 8,8 billion Euros, 30 per cent of which has been financed by shareholders and the rest was financed by external banks and other credit institutions.

The Nord Stream project has attracted a lot of publicity in recent years. The biggest natural gas producer in the world and the biggest company in Russia Gazprom own 51 per cent of Nord Stream AG. The economical aspect of the project has been widely debated and often mixed with the political interests of countries involved.

The author is Russian by origin and is closely following political and economical news related to Russia-Europe relationship. He chose to write about Nord Stream to have a chance to learn more about this project in particular and to have a better understanding of how large infrastructural projects are being designed and implemented.

The aim of this research paper is to give an overview of Nord Stream project and to discuss various aspects of the project in particular. The author has identified several aspects such as environmental, geopolitical, economical, technical and logistical. Despite the importance of ecological, technological and logistical sides of the project for its success they will be only mentioned in relation to economic and political aspects. Instead the concentration will be on economical and geopolitical aspects. In the economical section of the research the author will be discussing methods of calculating profitability

and risk management theory and practice for similar projects and this project in particular. Since the project is of great importance for European energy supply system and it plays a big role in Russian economy its geopolitical implications are hard to ignore. Therefore in addition the author will be discussing the projects political significance. In other words what are positions of different European states and public regarding Nord Stream, what possible changes this project can cause for those states and what are the reasons behind it.

1.1 Methodology and source description

The author chose to use a literature review as a main tool in this research. Conducting own research on profitability of Nord Stream was the original choice but was proven to be a very challenging task due to its complexity. That is why writer chose to review and discuss the researches that have already been done and to try to connect the existing theory to the practice.

In Economics of Nord Stream writer presents the existing theory followed by the discussion on how it is applied in the case of Nord Stream. The sources used are for presenting existing theory in that chapter are mainly theory books on financial theory and some researches more directly connected to the project. The main research chosen for discussion on economic value of Nord Stream is the Economics of Nord Stream completed in September 2010 by students of Cambridge University. This research calculated the net present value (NPV) in 3 market scenarios and concluded that Nord Stream has a positive NPV in all of them. Another publication "Nordstream: An Economic and Market Analysis of the North European Pipeline Project" done by professor Dr. Alan Riley published 2 years earlier assumed a similar aim but used different methods. This research concluded that the project is unlikely to recover invested resources.

The chapter on project risk management is discussing few researches that are concentrated on cost overruns in large infrastructure projects and management of such projects.

To connect these researches to Nord Stream project was a big challenge and the sources used for that chapter vary from articles from online journals, magazines, interviews and press releases published by the companies involved in the project. The information that is published by the companies involved in the project or obtained through interviews given by its representative is often overoptimistic and tends to omit the negative facts. That is why it is needed to present the publications done by independent parties. For example World Wide Fund for nature (WWF) has published several articles criticizing and raising environmental concerns about the project. Professor Dr. Alan Riley presented few arguments against Nord Stream in mentioned earlier publication "Nordstream: An Economic and Market Analysis of the North European Pipeline Project"

In geopolitical chapter the author will present and discuss controversial opinions surrounding Nord Stream and will use several publications and articles discussing its significance for various countries.

2 GENERAL OVERWIEW AND STATISTICS ON NATURAL GAS TRANSPORTATION IN EU

Natural gas is believed to be the most ecological of existing fossil fuels. It is found in abundance in many parts of the world. Europe's energy policy is aimed at developing sustainable and competitive energy market and Natural gas plays a key role in the strategic development of Europe's energy sector. Electricity generation from natural gas is less expensive in comparison to oil.

At the moment natural gas provides 24 per cent of all Europe's and 22 per cent of World's energy consumption and due to its properties and projected overall increase in energy consumption it is believed that the demand for natural gas in Europe will be rising over the next 20 years. According to the last International Energy Outlook 2010 forecast (IEO) the demand on gas will be increasing by 0,5 per cent annually. It is a rather small increase comparing to what other sources had suggested before the crisis hit

Europe. Nevertheless, the demand is growing and the production of natural gas in Europe is falling at the same time. Figures suggest that the production of Natural gas has suffered significant downturn in Europe over past 10 years (Eurostat). That leads to assumption that Europe will need to increase imports of Natural gas.

At the moment there are two popular techniques applied in transporting natural gas from the production fields to its consumers, which are Pipelines and Liquefied Natural Gas. LNG assumes converting gas into liquid form and transportation in special containers. It is suitable solution for transportation of gas over large distances by sea. Pipelines assume pumping natural gas in gas form through the system of pipes using the pressure. It is suitable for local distribution and transporting over relatively close distances.

Russia stays in leading position among suppliers of Natural gas to Europe providing 23 per cent of all gas consumed in EU27 (2010 Eurogas statistical report). It is followed by Norway and Algeria providing 20 and 10 per cent respectively.

Europe is covered with an extensive network of gas pipelines as seen from the map below:

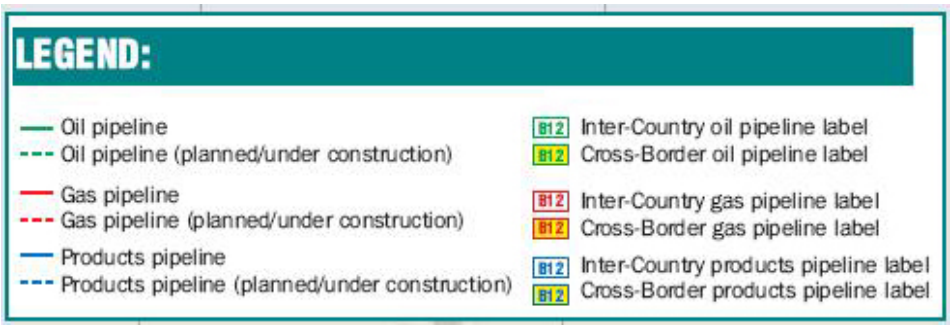

Figure 1Existing pipeline network in Europe

At the moment there are several pipelines transporting gas from Russian production fields to Europe. Their total capacity is 201 billion cubic meters a year. Roughly three quarters of them are laid through Ukraine and the almost a quarter through Belarus. In addition there is a St Petersburg - Finland pipeline with a small capacity and Blue stream laid under black sea directly connecting Russia to Turkey.

In production there are 2 larger underwater pipeline projects led by Gazprom that are Nord Stream and South Stream. Nord Stream is due to completion in 2012 and will add 55 bcm/year to the Russian export capacity. South Stream connecting Russia to Bulgaria and further to Austria is scheduled to open to its full capacity of 63 bcm/year in 2015.

Another major project which is considered to be a rival project to South Stream is Nabucco pipeline. It is a proposed pipeline connecting Turkey to Austria with the proposed

capacity of 31 bcm/year. The projects design has been approved by EU. Many see this project as an important step in reducing European dependency on Russian gas and diversifying European energy suppliers. However the project is yet to secure its gas supply (The voice of Russia).

3 NORD STREAM OVERVIEW

3.1 History of Nord Stream

The Nord Stream project began its existence in 1997. First it was named North European Gas Pipeline (NEGP). Feasibility study, technical capability, alternative routes and economical effectiveness were studied by 1999 and in year 2000 European Commission gave the project its official status of Trans-European Networks. The project was led by Russian Gazprom and Finnish Neste (later known as Fortum) that formed together a joint company North Transgas Oy. German companies Ruhrgas (later E.ON) and BASF - Wintershall joint the project. In November 2002 Gazprom approved the schedule for construction. During following years there were many meetings with banks, leading engineering companies, officials from countries involved during which various cooperation agreements and commitments were signed.

In 2005 the project started to take its final shape. During that year Fortum sold its shares of Transgas to Gazprom and Transgas became 100 per cent owned by Gazprom. Later North Transgas was officially dissolved and a new joint venture North European Gas Pipeline Company (renamed to Nord Stream AG in 2006) was established to lead the project. The shares were distributed as follows: control package of 51 per cent for Gazprom, E.ON Ruhrgas AG and BASF SE/Wintershall Holding GmbH equally dividing remaining 49 per cent. On September 8 in Berlin Gazprom, Ruhgas and Wintershall signed an agreement to construct the pipeline through Baltic Sea. In December 2005 the actual construction of onshore pipeline began on Russian territory.

In 2006 the project has started conducting an environmental impact assessment which was submitted in March 2009. In 2007 an Nord Stream AG partners signed an agreement with the Dutch company N.V. Nederlandse Gasunie to take last as a fourth partner and in 2008 Gausinie was added to the official register of shareholders owning 9 per cent of the project which reduced Ruhrgas's and Wintershall's shares to 20 per cent each. Situation with shares stayed unchanged till June 2010 when French GDF Suez acquired another 9 per cent from 2 German shareholders making the final shareholders list as follows: Gazprom still holding the control package of 51 per cent, E.ON Ruhrgas AG and BASF SE/Wintershall Holding GmbH owning 15,5 per cent each, N.V. Nederlandse Gasunie and GDF Suez equally dividing remaining 18 per cent.

Nord Stream was initially estimated to cost 5 billion €, but in 2008 estimation rose to 7,4 billion €. This estimation did not include the cost of financing, in 2010, when Nord Stream signed crediting agreements with 26 commercial banks, the total cost of the project including the financing cost was estimated to be 8,8 billion €. 30 per cent of the investment was provided by shareholder capital and other 70 per cent is financed by banks and other credit agencies. Financing stage was divided in 2 phases and Nord Stream AG has reported that they did not meet any difficulties raising capital for both phases being 50-60 per cent oversubscribed. Gazprom's deputy chief executive Alexander Medvedev reported that the sales contracts and obligations have been already made and total of 20,5 bcm/year starting from 2011 are already sold based on 20-25 years contracts (Center of Global Energy Studies).

The project had some difficulties acquiring all necessary permits. Sweden originally refused to give a green light to construct the pipeline on its exclusive economic zone claiming that the onshore alternatives were not well considered. Finnish authorities also took long to give their permission on construction in Finnish exclusive economic zone. Nord Stream AG contracted Paavo Lipponen as a consultant to speed up application processes and finally on November 5 2009 Finland and Sweden granted the last necessary permits.

Since all permits were received construction of the first line of Nord Stream started. According to the Nord Stream newsletter from December 2010 60 per cent of the first

pipeline was finished by then and Nord Stream reported that the work is completely on schedule.

3.2 Companies behind Nord Stream

3.2.1 Gazprom

Gazprom is the largest producer of Natural gas in the world and the largest Russian company. It also operates gas pipelines, produces and refines oil, produces energy and heat. In 1989 the Gas Ministry of Soviet Union was transformed into Gazprom. Later in 1993 it was privatized and by the end of 90s state owned only 38 per cent of shares. As soon as Putin came to power in 2000 Gazprom went through major changes. In May 2000 Chernomyrdin who was Gazprom chairman throughout the 90s was replaced by future president Dmitri Medvedev. And Gazprom CEO Vyakhirev was replaced Alexei Miller. Russian state bought missing shares to become the owner of the 50,01 per cent of the company. Now Gazprom emloys over 300 thousand people, in 2008 it produced 549.7 bcm of natural gas and its revenues and taxes add 20-25 per cent to the countries annual budget. In 2009 Gazproms net income was 793.793 million RUB which is over 20 billion EUR with total sales of about 76 billion EUR.

Gazprom is the main investor in Nord Stream and it holds 51 per cent of the projects shares.

3.2.2 BASF SE/Wintershall Holding GmbH

BASF SE is the largest chemical company in the world and Wintershall Holding GmbH is a producer of crude oil and gas in Germany which in its turn is a wholly owned subsidiary of BASF.

BASF employs 105 thousand people on 385 production sites worldwide (BASF at a glance). It is specialized in chemistry, plastics, agricultural and performance products, pharmaceuticals, nutrition, personal care, natural gas and oil. BASF recently celebrated 20 years anniversary of cooperation with Gazprom. In 1990 both companies signed a long term agreement to market Russian natural gas in Germany. (BASF Press release P-10-486). Both companies in 1993 created a joint venture Wingas GmbH which is in charge of marketing and distribution of natural gas in Germany and Europe. Together they constructed a number of pipelines in Europe. BASF owns 15,5 per cent of Nord Stream pipeline project.

3.2.3 E.ON Ruhrgas AG, N.V.

E.ON is German based Holding company. It is the largest private energy provider in the world. Its revenues reached 81 billion Euros in 2009. One of company's units is E.ON Ruhgas which is in charge of gas sector. Ruhgas was the largest foreign investor in Gazprom owning 6,4 per cent of Russina giants shares (E.ON Ruhgas profile). In 2009-2010 E.ON sold its stake in Gazprom to cut its own debt and to raise the capital for new strategic investments (Bloomberg Business Week). E.ON Ruhgas is the owner of 15,5 per cent stake in Nord Stream project. It also participates in Trans Adriatic Pipeline (TAP) project which will connect with 520 km offshore pipeline Greece and Italy. E.ON Ruhgas owns 15 per cent stake there. The company possesses know-how in gas pipeline construction and operation.

3.2.4 Nederlandse Gasunie

Gasunie is a Dutch natural gas infrastructure company operating in Europe. It owns about 15 thousand km of pipelines in Netherlands and Northern Germany. Its revenues were 1,5 billion Euros in 2009. Company's main activities are construction, operation and maintenance of high pressure gas transport system that includes gas pipelines storage facilities, pressure stations and LNG facilities. It owns 9 per cent of shares which

were bought from German shareholders in Nord Stream AG (Gasunie profile). In June 2010 Gazprom and Gasunie signed a bilateral cooperation agreement facilitating future cooperation and know how sharing in gas industry. “Development of the strategic partnership between Gazprom and Gasunie is essential to strengthen the positions of the companies as major players in the European gas market and will strengthen the energy security of Europe. Cooperation with Gasunie has the particularly productive character,” said Alexey Miller on the St. Petersburg International Economic Forum 2010 (Gazprom press release).

3.2.5 GDF SUEZ S.A.

GDF Seuz S.A. is an energy company based in France. The company has expertise in LNG, energy efficiency services, independent power production and environmental services. Name of the company was born from the merger of Gaz De France and Seuz in 2008. GDF Seuz S.A. employs 214 thousand people and in 2009 the company’s revenues amounted to 79,9 billion € (GDF Seuz profile). The largest share of GDF Seuz belongs to French government 35,9 %.

The Company has announced its interest in joining the Nord Stream project in July 2009. In March 2010 the agreement to buy 9 per cent of the Nord Stream shares from 2 German companies was signed. CEO of GDF Seuz Gerard Mestrallet referred to Nord Stream as “a key element in the security and the supplies of natural gas in western Europe” With this deal GDF Seuz secured additional capacity of 1,5 bcm of gas per year starting from 2015. France is the seventh largest foreign investor in Russia, while Russia is France’s largest supplier of crude oil and natural gas, according to figures supplied by MEDEF. (New Europe).

4 ECONOMICS OF NORD STREAM

In this chapter the author will present the existing theoretical literature on profitability and estimating the project value, then concentrate on key factors that affect the economic success of Nord Stream and the methodology used in calculating the profitability of Nord Stream in "The Economics of the Nord Stream Pipeline System" research done by University of Cambridge. Later the author will present existing literature on risk management, researches done on comparable to Nord Stream infrastructure projects and how it has been managed in the Nord Stream case.

Supply areas of natural gas are highly correlated to the oil supply areas and generally located remotely from the consumption regions. It means that the gas has to travel great distances before it reaches the final consumer. Transportation of gas involves a highly sophisticated system of pipelines and LNG infrastructure (figure 1).

Constructing a gas pipeline usually is a large investment project aimed at constructing a pipeline for delivering natural gas from producing fields or part of existing network of gas pipelines to the consumers. The initial investment in such project is enormous, but in a long run it is justified by low transportation cost per unit comparing to the alternative modes of gas transportation. Such projects attract public attention and have to be carefully planned.

In case of Nord Stream the main aim of the project is to meet the growing demand of natural gas in Europe, but various sources have expressed doubts that the demand will grow, that Gazprom is capable to ensure the supply for the new pipeline and that laying it down on the Baltic seabed is the best option. Figure 2 illustrates the present situation with the Russian gas export infrastructure to Europe. Southern Stream built during Soviet Union is passing Ukraine and was a source of many Russia-Ukraine conflicts in the past related to gas prices, debt, transit fees, supply cuts and accusations of gas theft. Yamal pipeline is going through Belarus and Poland and as well as Southern pipeline it stirred similar problems related to gas prices. There was a plan of expending Yamal capacity by building another parallel pipeline to the existing one, but it is unlikely to be finished even though many sections have been already laid. Looking at figure 2 it is easy to see that the big advantage of Nord Stream is that it is not passing any transit

countries, but rather goes directly from the producer to consumer. It eliminates transit fees and risks related to possible disagreements with the transit countries.

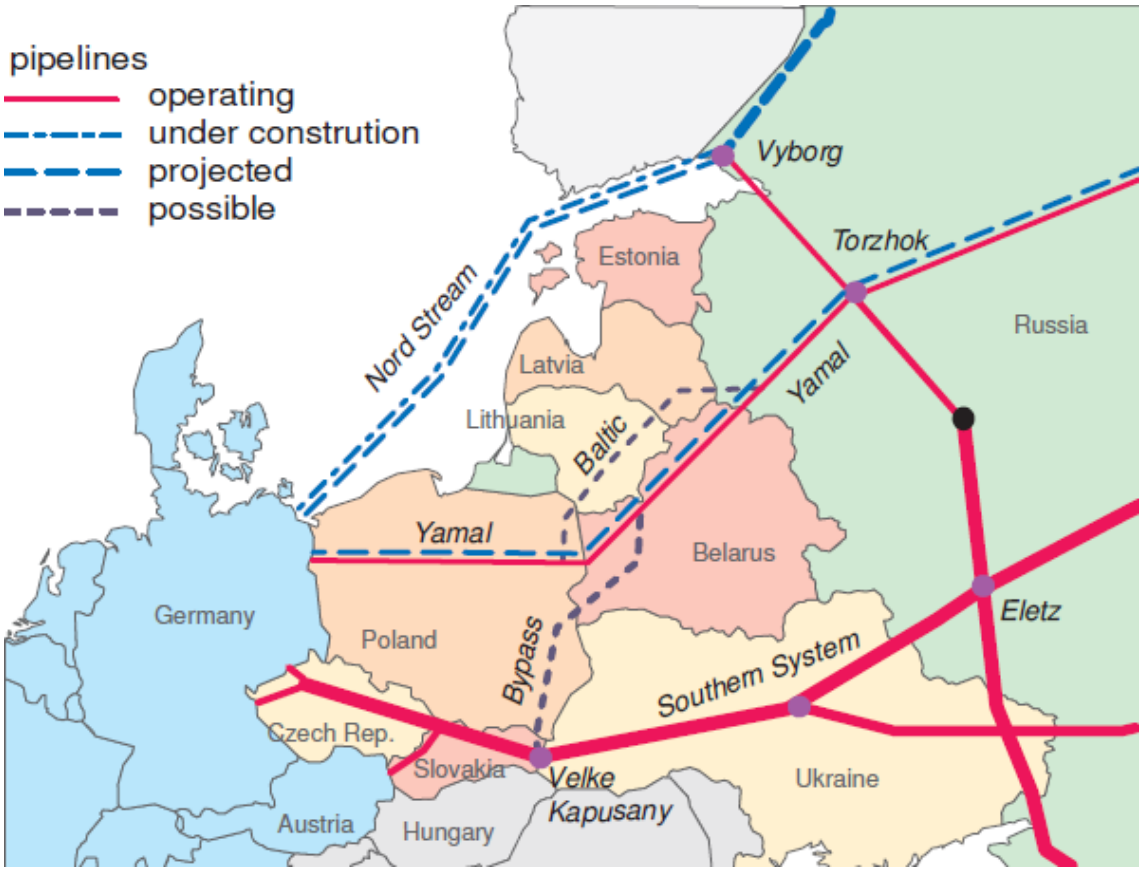

Figure 2Transit Options to North-Western Europe(Hubert and Ikonnikova, 2009)

4.1 Methods used to calculate profitability

There are several ratios available to calculate profitability. “Project financing and the international financial markets” (Buljevich and Park, 2002, p. 137) offers us *the basic earning power ratio, the net profit margin, the operating profit margin, the return on assets, the return on equity, and the earning per share.*

The basic earning power ratio (BEP) is to be calculated as dividing operating income (total earnings before interest and taxes) by total assets. It shows us relation between total operating incomes generated by a company to total value of assets utilized by a

firm for generating that operating income. (Buljevich and Park, 2002, p. 227). The higher value of this ratio shows higher profitability.

The net profit margin ratio is to be computed as dividing net income of a company by its sales revenues. This ratio demonstrates how much profit a company generates per e.g. 1 € of sales. Similar to a previous ratio higher value of this one demonstrates higher profitability.

The operating profit margin ratio demonstrates the degree of profitability of the company which is calculated as dividing the operating profit by total sales. It is very similar to the previous ratio with the difference that net income is substituted by operating income in the formula to calculate the profit margin. The difference between operating income and net income is that operating income is the profit before taxes when net profit is the same, but after taxes being paid.

The return on assets ratio is the ratio computed as dividing net income by total assets. Similar to the basic earning power ratio this one demonstrates company's efficiency at using assets to generate income. The difference is once again in choosing the net profit instead of operating income to calculate the performance.

The return on equity (ROE) is a ratio measuring the degree of profit the company generates using the shareholders equity. It is computed as dividing net income by shareholders equity. Higher value of the ratio translates into better performance.

Earnings per share (EPS) is a proportion of profit generated by a company per each outstanding share of common stock. It is calculated as dividing net income available to shareholders by the total amount shares. It is one of the most important ratios in calculating value of the share.

These ratios are widely used in evaluating the financial performances of the companies. Each ratio has advantages and limitations and they should be used together rather than separately in evaluation process to give more complete image of the company's performance. However these tools are not very useful in evaluating the projects. They are

based on the financial statements of the company and usually deal with the performance of the company over a financial year.

For evaluating and comparing individual investments the more appropriate tool is calculating and comparing net present values of the projects. It is sum of present values of future cash flows. To calculate a present value of the cash inflow or outflow one should discount the cash flow by the discount rate appropriate to the particular risk of the project over a period of time. Written formula looks as:

$$NPV = \sum_{t=1}^{T} \frac{C_t}{(1+r)^t} - C_0$$

Where C_t is a future cash flow, C_0 is an initial cost, r is a discount rate or internal rate of return and t is time.

However knowing NPVs of available projects sometimes is not enough for making the investment decision. NPV do not indicate the amount of investment and since two projects can have a similar NPV the one that requires less investment will apparently be more attractive. For that there is a "profitability index" or in other words benefit cost ratio (Helfert, 2001, p. 242). It is calculated as: Present value of operating inflows (cost) divided by present value of net investment outlays (cost). Higher index shows better project. This is more appropriate tool since it uses present values of inflows and outlays over projects lifecycle.

The main challenge of calculating NPV and profitability ratio is uncertainty about future cash flows. That is why it is common to prepare separate calculations based on varios scenarios e.g. high and low demand case.

4.1.1 Profitability of Nord Stream

Economical justification of Nord Stream project has been debated by various parties for many years. Opinions differ greatly from one another. Polish Foreign Minister Radoslaw Sikorski stated in his speech at Polish National Assembly's foreign affairs commit-

tee in January 2010 that the Nord Stream Project is “waste of European consumers’ money” and that the project “does not make economic sense” (EurActiv, 2010).

Research done by Cambridge University “The Economics of the Nord Stream Pipeline System” concluded that the project has a positive economic value (Chyong *et al.* 2010 p. 18). In this chapter the author will review different opinions on economics of Nord Stream and present the methods used in calculations economic value of the project.

It is an extremely challenging task to accurately calculate economic value of such large investment project. There is a huge amount of factors that have to be considered. That is why the researcher should limit the factors, do a series of assumptions and identify all variables for constructing a simplified model in order to be able to do the calculations. In the Cambridge University research the authors used a strategic gas simulation model that they developed themselves (Chyong and Hobbs, 2000) in order to determine the project’s economic value. The economic value of Nord Stream was expressed as NPV of the project and calculated as follows:

$$PV^{NS} = \sum_{n=2011}^{2040} (Profit_n^{+NS} - AC_n^{NS} - Profit_n^{-NS})(1 + Discount\ Rate)^{-n}$$

where PV^{NS} is the present value of Nord Stream system, $Profitn^{+NS}$ is Gazprom’s annual profit when the Nord Stream system has been built, AC_n^{NS} is annualized total costs of the Nord Stream system as derived from project based-analysis … and $Profit_n^{-NS}$ is Gazprom’s annual profit in case the Nord Stream system has not been built.

(Chyong *et al.* 2010, p. 14)

As a result of the calculations the Cambridge research concluded that Nord Stream has a positive present value in all (low, moderate and high) demand cases. For each demand case the authors of the research also made separate calculations assuming maximum and minimum capital expenditures, and they concluded that even in the worst case of demand and maximum expenditure the present value of the project is still positive. This

disproves the claims that the Nord Stream project is only for political leverage of Russain Federation over Ukraine and Belarus and it has no economical value.

Apart from the direct economical benefits from Nord Stream (i.e. transportation cost benefits) the Cambridge research points out other positive outcomes of the project. They claim that it has a **strategical** importance in increasing Gazprom's bargaining power in lowering transit fees charged by Ukraine. The researh suggests that Ukraine would respond to the new competing option by cutting transit fees on the exports through their own pipelines thus creating a more profitable option for Gazprom. Another valuable point of Nord Stream is **security of supply**. New pipeline would ensure Gazprom from further disruptions in gas exports to Europe.

In authors opinion the key factor of success of Nord Stream is the increasing demand for importing natural gas through pipelines in Europe. The import figure is easy to calculate using the difference between the consumption and production of natural gas. But import figure includes LNG which has to be discounted to calculate how much gas will be needed to pumped through pipelines. Energy Information Administration (EIA) 2010 has released a new forecast data for world natural gas consumption that seems very optimistic (EIA 2010). But most of the demand growth for natural gas comes on non-OECD countries with only 0,5 per cent of annual increase predicted for OECD Europe (in 2009 the same forecast predicted 1 per cent increase). The figure that was used for base scenario in Cambridge research is 0,8 per cent which is slightly higher, but does not impact significantly the results. And for low growth scenario the research used – 0,2 per cent annual drop which still gave a positive NPV. Therefore the minor drop in the demand forecast that has been released after the Cambridge research had been published should not have a notable effect on the results of the calculations.

Financing part of Nord Stream has been completed. The venture has raised 3,9 billion EUR in 2010 and added another 2,5 billion this year after signing agreements with 24 financial institutions in March 2011. The success in financing brought an Oil and Gas Deal of the Year award in 2010 by Infrastructure Journal. The positive respond from the financial institutions indicates that the project is believed to have a positive economic value.

One factor that should have a potential positive outcome for demand of natural gas in Central Europe and Germany in particular is the recent nuclear crisis that occurred after the earthquake and tsunami in Japan. Many countries reviewed their reliance on nuclear power after nuclear disaster unfolded. Germany committed to suspension of seven old nuclear reactors which will cause an increase in imports of energy from outside (The Local, April 4 2011). Natural gas is falling in the category of clean alternative sources of energy and should be the obvious substitute.

Professor Dr Alan Riley published a research paper heavily criticizing economical side of Nord Stream project. In his "Nordstream: An Economic and Market Analysis of the North European Pipeline Project" the author stated that the costs of building Nord Stream are unlikely to be recovered (Riley 2008). He argues that the costs are underestimated and likely be close to 12 billion Euros or even 17.5 billion in the worst case scenario of increasing steel prices. However Dr Riley did not present the base for his costs speculations, referring only to Reuters article from December 2007 that could not be found by the author of this paper. At the moment the first line is about to be completed and latest costs estimates given by Nord Stream are still 7,4 billion Euros or 8,8 including financing costs (Dow Jones Newswires, 4.3.2011). Another prediction made by Riley is delays in construction. He estimated that the earliest practicable date for Nord Stream completion is 2015, when it is clear now that the pipeline is on the schedule and the project is more likely to be completed by the end of 2012.

Growing interest in LNG has been referred as a threat to Nord Stream by Dr. Alan Riley (Riley 2008), but once again the author did not find the grounds for these claims in the research and three years after the paper was published Germany still does not have nor plans to build a single LNG terminal (Global LNG, 2011). The closest to Nord Stream LNG regasification terminal in project is in Poland which is to be constructed in 2014 and the promised maximum capacity is only 7,7 bcm, which is not seen as a threat by Nord Stream with a capacity 55 bcm (New Europe, 27.3.2011).

4.2 Project risk management

It is of high importance to estimate project cost correctly for any large investment project. According to the data obtained by Aalborg University around 90 per cent large infrastructure projects suffer from cost escalation (Flyvbjerg et al. 2003, p. 78). In most of cases the budget overrun amounts to 50-100 per cent and in some cases it can reach up to 2000 per cent.

Trans Alaska Pipeline System (TAPS) is the prime example of cost overrun in the history of pipelines. When the project was proposed in 1969 the estimated cost was 900 million USD and the final cost calculations amounted to 8 billion USD (What it costs, 2011).

A.E. Barinov made a research (Barinov, 2007*)* on the most common reasons for the budget overruns in large scale infrastructure projects and discovered that the most common reason is changes in the original designs during planning process such as changes in original plans due to environmental risk reduction. Other reasons could be delays in the construction stage resulting in fines and penalties or changes in the regulatory framework imposed by authorities during the process resulting in modifications of original plans. It is important to bear these facts in mind while doing the cost-benefit analysis.

Another important aspect of economical analysis of such projects is assessing the risks. Traditional project risk management theory (Chapman, 1997) identifies two approaches.

- quantitative sensitivity analysis, which is basically studies how the changes in certain variables such as anticipated cost would affect the financial performance of the project. More sophisticated methods of using this approach involve calculating probabilistic combinations and constructing a decision trees or influence diagrams. It normally requires computer software to assist in calculations and presenting results. This approach helps to identify the performance variability

and therefore eliminate high risk – low profit projects, effectiveness of this approach is highly dependent on the depth of analysis.

- qualitative approach is concentrated on identifying the risk factors then analysing them in terms of probability of occurrence and potential impact. It can involve brain storming or interviews.

According to the study made by University of Quebec, Montreal (Floricel and Miller, 2001*)* the traditional planning approaches proved to be inefficient in large-scale engineering projects. In this study the authors investigated 60 such projects in order to develop a theoretical framework which would be more applicable for strategic management of large scale engineering undertakings.

The reason that the traditional approach does not fit well for these tasks is that the environment in the traditional theory is more or less predictable and uncertainty level is low. When in the projects such as building a pipeline the project time is large and due to technological changes, competitor moves and changes in the regulations imposed by state that may occur during the project the outcome of strategic actions is increasingly unpredictable. Two alternative strategic avenues were proposed by Bettis and Hitt in the seminal paper (Bettis and Hitt, 1995):

1. Robustness: suggest that managers should design organizations to make performance immune to uncontrollable environmental fluctuations (inspired by Taguchi's approach to quality by design).

2. Flexibility: argue that strategies for turbulent environments must also include flexibility, that is the ability ''to rapidly sense the change in the environment; conceptualize a response to that change and reconfigure resources to execute that change.''

(Bettis and Hitt, p. 18)

However, these avenues are not mentioned much in respect to real projects and therefore they were not developed. Further the author will concentrate more on the theory developed by Montreal University to develop strategy for anticipated risks and turbulence in large-scale engineering projects.

After studying 60 such projects the authors of Canadian research learnt that managers had to deal with both, anticipated risks and more importantly totally unexpected situations that were appearing on a constant basis. Therefore there was a need of developing a system to deal with these unexpected disturbances. In that research paper the authors define "strategizing" as a process of building strategic system to deal with anticipated risk. They describe it as a long continuous process performed by small number of high-positioned managers of different organizations involved in the project. The process is usually done in an interactive manner between the managers of various parties. It is repetitive and it combines search, negotiation and decision making activities. But no matter how thorough the strategizing process is, the managers in all the studied cases were encountering unexpected events that were more threatening than the anticipated risks, these events were defined as "strategic surprises".

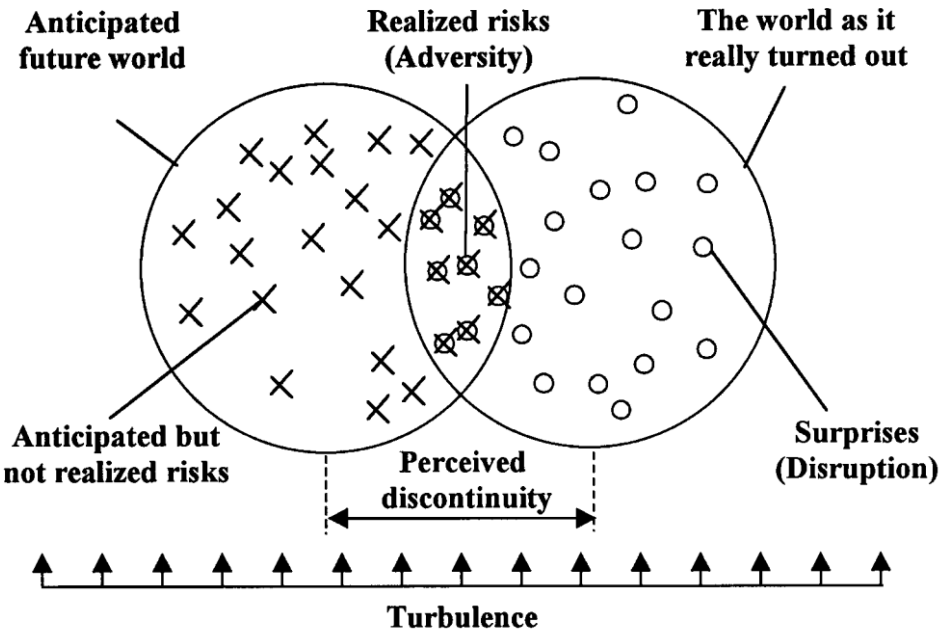

Figure 3Anticipated risk and real events in turbulent environment (Floricel and Miller, 2001 p.3, figure 1)

Managers' responses to the strategic surprises, whether beneficial or negative for the project, were called by the authors of Canadian research "governing attempts". And "governing" was defined as reactive action caused by real events that were not anticipated.

An interesting observation that was made in that research was that more thorough strategizing and more measures taken to deal with anticipated risks may have a negative effect later on governing of the project. It may be caused by the commitments made to deal with anticipated risks by the organizations that limit the projects governability – the ability to effectively respond to unexpected events.

Montreal research has proposed following 5 classes of risk strategies that managers of studied cases had used to deal with the risks they anticipated. The first class is "Information/selection" which refers to gathering information about the projects environment and project itself in order to build a project plan selecting the best strategies for it. It is an information gathering and done by studying the related literature, tests, forecasts, simulations, using the network of social contacts and lengthy face to face interaction with the potential partners such as banks, insurance companies, contractors, regulators, clients, suppliers and consulting agencies. It is a proactive way of finding potential risks and creating the strategies. The second class is "Co-optation" which is securing the core competencies. It may be engineering skills, access to the market or other related competences which would be crucial for the project. Firstly it is deciding on what areas of the project the company developing the project can take on themselves and which parts of it should be outsourced. And deciding on the link between the project and outside parties which could be equity ownership, or contractual and informal agreements. Any large engineering project has a vast number of contractors and usually few equity owners. The outside organizations are traditionally contracted on a fixed price or cost reimbursement basis, but recently the BOT schemes, and turn-key contracts gained popularity. In other words co-optation strategies designate the responsibilities to different parties and decide on type of link between organizations and the project. The third class would be "allocation" strategies which is creating a network of organizations involved in the project with specified responsibilities in form of contracts. The aim is to determine all possible tasks, related risks and to allocate them among the participants in the contractual form. Another class is "design" strategies which mean making the technical and organizational choices in order to avoid the possible negative impacts of the risk. An example to that would be building a power plant on a movable rig to be able to move it to another place if for political or other reasons the original place is not an option anymore. And the last strategy class is "action" strategies. These strategies assume

confronting opponents with the set of informational and legal means. It is convincing participants and parties that could affect the project (such as public) to support the project (Floricel and Miller, 2001, pp 448-449)

The responses to the unexpected events may be divided in 4 groups: adapting, fighting exiting and doing nothing. Adapting refers to actions such as changing the design, technical structure, organisational structure, aimed at avoiding or sustaining minimal damage. Fighting refers to attempt to eliminate the events that threaten the project. Exiting is just accepting the losses and quitting the project. And the last one is doing nothing, which means accepting the losses and moving on.

4.2.1 Risk management in Nord Stream

Constructing a pipeline needs careful preparation, acquiring certain permits and meeting various standards. It often results in several years of planning, and preparation work before the actual building process can be started. Yamal-Europe pipeline was planned since year 1992 and final sections have been constructed only in 2006 (Yamal – Europe).

Nord Stream AG stated that they have developed a comprehensive system to analyze the potential risks of pipeline construction and operation. Nord Stream AG was registered in Switzerland on purpose. Country has a respected and recognized legal system, pipeline itself is not passing near Switzerland and it is not home country for any of the shareholders. Switzerland is a popular option for international project base. It makes it easier to attract specialists to come to Switzerland. Another possible reason for choosing this location is that Switzerland has a strict banking secrecy policy which gives Nord Stream AG more freedom and less potential causes for scandals (Whist, 2008, p 18).

The Nord Stream project consists of 2 identical parallel pipelines. The first pipeline is to be completed in late 2011 and only after it is finished and running the process of laying

the second pipeline will commence. This step by step approach will provide an opportunity to make necessary changes, postpone or give up the second pipeline in case of unexpected disturbances in the environment. In the worst case the project could save up to 0,6 billion € of investment that are budgeted on laying the second pipeline in 2012, this is not a significant sum in relation to the total project cost (Vremya Novostei, 2010)

One of the main reasons of the cost overrun in such projects according to A. E. Barinov's research is change in original plans due to environmental issues. Nord Stream pipeline is to cross territorial waters and exclusive economic zones of 5 countries: Russia, Germany, Finland, Sweden and Denmark. The route was carefully selected to avoid territorial waters Baltic States that are strongly opposing the project. Satisfying the standards of all 5 parties posed a unique threat to the project. Nord Stream has prepared a "Nord Stream Envi-ronmental Impact Assessment" (EIA) also known as "Espoo Report". It was done ac-cording to the Espoo Convention standards. The EIA was necessary in order to receive permits to construct the pipeline. It consisted of 4000 pages and it cost around 100 mil-lion EUR to Nord Stream AG (RIA Novosti, 2010). The report received a lot of criticism. It took over 2 years since the EIA was submitted to receive all the permits. Nord Stream contracted Finnish ex Prime Minister Paavo Lipponen as an independent consultant to help in negotiations with Finnish authorities (Nord Stream press release, 2008).

Finland is 100 per cent dependent on Russian gas supply, and the approval of EIA did not come as a surprise. But approval from Sweden was not anticipated. Sweden raised several issues concerning the project. Beside the environmental concerns Swedish leadership made it clear that they are not comfortable with pipeline maintenance, because it poses a threat to Swedish national security. Robert L. Larson, an analyst from Swedish Defense Research Agency, published a defense analysis (Larsson, 2007). The report heavily criticizes Russian energy policy especially the fact that Gazprom is owned by the state, and it cannot be trusted because it can be used as a political tool. It concludes that Nord Stream poses a direct threat to Swedish national security because the maintenance of the pipeline in Swedish exclusive economic zone can be used as a pretext by Russians to spy on Sweden. The security issue was immediately addressed by Nord Stream and the technical solution was found. According to new designs the pipeline was

to be built without the maintenance platform next to Sweden (Nord Stream, 2008). But the environmental issue stayed and since Sweden did not have a direct economic interest in Russian gas supply it proved to be a major challenge. The factors that played the key role in convincing Swedish authorities to give a green light to the project could be the pressure from all neighboring countries and EU energy commission that already agreed to the Nord Stream, as well as the disruption in gas supply in December 2008 caused by disagreement between Russian and Ukraine on gas prices, indicating a raising need for EU in diversification of gas supply channels (IHC, 2009)

The project was originally considered as a Russo-German bilateral project. 51 per cent were owned by Russian Gazprom and the rest 49 per cent were divided between Wintershall and Ruhrgas of Germany. Later it transformed into European venture with the entry of Dutch and French companies that reduced German stake to 31 per cent. That was partly seen as a demand projection, and partly as a reaction on a growing awareness of risk to the project resulting in changes in risk sharing approach (The Jamestown Foundation, 2010).

5 GEOPOLITICAL ASPECT OF NORD STREAM

In this chapter author will present different implications for various countries of the new Nord Stream pipeline. The project is of high significance for many countries and there is no doubt that its political implications had an effect in projects results. It is necessary to discuss them in order to have a better understanding of significance of Nord Stream for Europe and Russia and the reasons behind the decision to build it.

The author of this research believes that political situation between Russia and its western neighbors played a very important role in the design of the project. The main new feature of this pipeline compared to the existing alternatives (Figure 2) is that it excludes any transit countries delivering gas directly from the producer to the consumer

and it is 51 % owned by Russia. It means that Gazprom does not have to negotiate/pay any transit fees and it has a direct access to operating the pipeline. Also it could push down the transit fees for the gas transported to Europe through the other pipelines (Chyong and Hobbs 2010). For European consumer the main advantage of this project is that the new route is more reliable and prices are more predictable since there is no 3rd party that can affect the supply and prices.

But there are other implications. The gas supply to many European states has been disrupted several times in past decade due to price disputes between Russia, Ukraine and Belarus. This created an outrageous reaction in western media and accusations that Russia is using energy as a political tool to show its influence over Ukraine and Belarus. Meanwhile Gazprom is developing two new marine gas pipeline projects through Baltic and Black seas that bypass those countries. Nord Stream has been seen as a way to increase existing influence over the transit countries (Smith, 2008, p.3). In authors opinion it is more appropriate to see Nord Stream as a way to reduce the influence that transit countries have over the gas supply to EU.

An important question that should be asked is why Gazprom does not build a onshore pipeline instead of Nord Stream. Experts estimate that the cost of building a parallel pipeline to the existing Yamal 1 is only 1,5 – 2 billion USD (Space Daily, 2009). Yamal 2 would have a capacity of 23 bcm, half of what Nord Stream has to offer, but 3-7 times cheaper. Many other parties including Finland and Sweden have criticized Nord Stream for not considering alternative onshore routes and not including them in EIA procedure. Official statement from Nord Stream AG claims that the onshore pipeline assumes higher operating costs, mainly caused by costs of staff and maintenance of compressor stations that are required every 200 km for onshore pipeline, when offshore pipeline can operate without interim compression, and over 25 years period Nord Stream would be cheaper than an onshore alternative (Offshore Advantages, Nord Stream). It is hard to argue with this reasoning without conducting an independent analysis, but in authors opinion the true reasons behind Nord Stream lie deep in the history of troubled relations between Russia and Baltic states. Thus Nord Stream could be seen as a result of trust issues between Russia and transit countries or a failure to agree on a transit protocol (Riley, 2008).

Nord Stream has received a lot of support from Germany. The largest economy in EU is in the energy transition period. Having closed several nuclear reactors, facing the increasing domestic demand for energy and having committed to lower their levels of CO2 emissions, Germany seeks for new energy sources. Natural gas is an obvious choice of cleaner energy source (at least in a short run) and Russia possesses a vast amount of it. Russo-German relations could be described as stable in past decades. Former German Chancellor Gerhard Schröder is now a chairman of the shareholder committee for Nord Stream. For Germany Nord Stream is a strategic investment in the future energy supply. In case of disruptions in the Yamal and Southern system pipelines, which repeatedly occurred in the past, Germany would have their own direct link to the Russian gas reserves (Whist, 2008).

The reasons why Russia supports Nord Stream are evident. Not only it provides a new export possibility with no transit fees, but it also gives Gazprom leverage in gas price negotiations with Belarus, Poland, Ukraine and other transit countries. And if Moscow is seeking a way to use gas supply for its political agenda it can do so with less affect on the strategic partners such as Germany.

Poland has been opposing the project since its very beginning (EurActiv, 2010). It can be explained by several factors. Firstly there are reasonable doubts that Russia will be able to provide enough gas to fill all the existing pipelines and the ones that are under construction to meet the European demand (Smith, 2008). If the shortage of supply occurs in Yamal gas field that supplies both Yamal-Europe and Nord Stream pipelines it is more likely that Gazprom will choose to honor its commitments to Germany and other West-European States that have invested in Nord Stream over Poland and other Baltic states due to strategic importance of Russo-German relationship and the fact that delivering gas through Nord Stream could be cheaper (Chyong *et al.* 2010, p. 10). This scenario could lead to the shortage of gas supply in Poland and Baltic states and it raises another issue between EU members. Nord Stream has received a status of "Pan-European" project despite the protests of Baltic States that are members of EU. Germany has been accused of pushing the project in Brussels pursuing its own interests and disregarding the interests of other EU members (Whist, 2008, p 18).

Beside the direct benefits that the Nord Stream has to offer there are a lot of concerns coming from Europe related to its increasing dependency on Russian gas supply. Currently many east European states almost entirely depend on Gazprom gas supply and once Nord Stream and South Stream are finished the overall EU dependence from Russian gas will go significantly deeper (Smith, 2008). It assumes obvious disadvantages for the European consumer. The attempts to diversify the suppliers are being taken as the EU are setting Nabucco pipeline as a priority gas infrastructure project, but it is not clear yet whether it will be constructed or not. Nabucco is seen as a rival to South Stream project. Both of them have a different gas supplier and route, but they target the same market. Gazproms deputy chairman Alexander Medvedev stated that these 2 projects are not rivals (RIA Novosti, 30.7.2010), but Russia has been accused on numerous occasions in fighting Nabucco primarily by making deals with potential Nabucco suppliers such as Turkmenistan to buy significant amount of gas for further reselling (Petroleum Economist, 2010).

6 CONCLUSION

Nord Stream has been attracting a lot of publicity past decade. Many researches have been discussing its economic value and significance for Germany, Poland, Baltic States, Scandinavian countries and Russia.

The author believes that future demand for natural gas in Europe plays a key role in profitability of Nord Stream and after studying different researches the author found that Nord Stream has a positive economic value in all the demand scenarios. Due to growing interest in natural gas as a green alternative to coal and need to find the substitute for nuclear power in Europe the author assumes that the demand will be growing faster than it was predicted in International Energy Outlook 2010. So there is little doubt that Nord Stream will recover its investments and bring profit to its shareholders.

Nord Stream has faced many obstacles, mainly caused by difficulties in receiving all necessary permits from countries through which territorial waters the pipeline is designed to be laid down. But it suffered only minor cost escalations and delays in comparison with the other similar infrastructure projects. This was achieved through excellent organizational structure and flexibility as well as strong political support from Russia and Germany. The project was created as Russo-German and developed to Russo European after attracting French and Dutch shareholders, thus securing more political support in Europe. When it wasn't enough more politicians were hired as consultants. Nord Stream AG was based in Switzerland which is not a part of EU, it has a highly respected legal system and it offers a banking secrecy.

Laying underwater pipeline is significantly more expensive than using an onshore alternative. Nord Stream has received a lot of criticism for disregarding routes through Baltic States or Belarus. Nord Stream AG claimed that the route was chosen for purely economic reasons claiming that the marine pipeline will recover its overinvestment by lower operational costs due to the fact that it does not need compressor stations that are expensive to build and operate. There is little doubt that Nord Stream will recover its

investments according to the findings that are presented in the Economics of Nord Stream chapter. The author believes that the true reasons are in distrust and hostile relationship between Russia and transit countries rather than doubtful economic benefits. Nord Stream offers the big advantage of bypassing all the transit states and thus reducing the risks related to possible disputes with those countries. Considering the recent history of disruptions in gas supply caused by disagreements on transit fees, gas price and theft allegations the desire to avoid future dependence on transit states is only reasonable. Maybe there are cheaper solutions to these reasonable concerns such as reviewing the transit protocol or improving the relationship with the transit countries.

Another concern coming from Baltic States is that in case of shortage of gas in Russia the first who would suffer would be small transit states while Russia would continue to pump gas to their main European ally Germany through Nord Stream and to other Central European States through another marine pipeline Nabucco. This factor offers an additional explanation as to why Germany supports this project and Eastern European countries do not.

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