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UNCONVENTIONAL SOURCES OF NATURAL GAS: Development and Possible Consequences for the Central Eastern European Region

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The authors of this study declare that they are wholly responsible for the following text, including any possible inaccuracies or mistakes.

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1. INTRODUCTION

Although unconventional natural gas is an expensive gamble, its potential rewards could be vast. Shale gas could free Poland from its dependence on dirtier coal, which accounts for 95% of Polish power generation. Poland may no longer have to rely on Russia, the closest large provider, for most of its natural gas. [1]

Unconventional natural gas resources (UNG), specifically shale gas, raise both hopes and fears in Europe. Shale gas was once a fairly experimental technology. Following a quiet revolution in the United States (US), it became a reality of today's energy market, thanks to which the US, a former substantial importer, became self-sufficient, with the prospect for potential export.

Could similar developments occur in Europe as well? Ongoing exploration indicates that there are UNG reserves in the EU. An increase in European gas production would represent both an economic and security blessing. Several pros include creating greater liquidity and market flexibility as well as eliminating some geopolitical and security risks inherent with a limited number of suppliers.

It is clear that the US' situation cannot simply be copied to Europe. Careful evaluation of different geographic, economic, social, and regulatory conditions is required. Some (mainly Polish) representatives' currently exaggerated optimism is wishful thinking. The North American model won't necessarily work in the Europe, and even if it did, the economy and consequences of production in the EU could notably differ.

The key issue of the increasingly intense European debate is therefore information availability. It begins with geology and ends with production and infrastructure economics. The analysts of the Faculty of Social Studies (FSS MU) and the International Institute of Political Science (IIPS MU),[2] for the Ministry of For-

[1] The Economist (2011, July 23). *Fracking Heaven*. Retrieved from: http://www.economist.com/node/18867861

[2] The activities related to energy security within the Department of International Relations and

eign Affairs of the Czech Republic, created this study to contribute to the debate.

We will focus on potential impacts which shale gas production could have on Central Europe and the Czech Republic.

The goal is to provide a basic map of the current UNG situation in Poland, which is considered a test case for European UNG's expansion. We do not intend to analyze production's geological or technical aspects. For that, information from specialized departments should be consulted. Instead, we focus on Europe's social, political, economic, and environmental aspects that can affect production. While these "soft" factors are currently somewhat discounted in the debate, setting an appropriate regulatory framework or local community resistance will have as serious an impact on production as geological exploration.

First, we will contrast crucial differences between successful UNG development in the US and Poland. Our main focus will be the evaluation of areas that complicate or prevent development in Poland.

Next, we explore the European Union's role in UNG development. The EU has great potential to interfere with production. Over the last several months, an intense debate in the EU about whether (and how) to support production has been taking place.

The largest part of this study, so far missing from the debate, is an analysis of actors' perceptions. This is an analysis of the stances interested groups and institutions have towards UNG issues and how they will affect their future actions. We used the DANA analytical software to map this, allowing us to categorize data associated with individual actors' perceptions. The MEOS model allowed us to evaluate possible implications of UNG production in Central Europe. This approach's efficiency has been verified before in several studies, which suggest that the data has considerable value.

European Studies of the Faculty of Social Studies take place on several levels, starting from teaching courses dedicated to this problem to research (in cooperation with the IIPS MU). The team which made this study has its background in these institutions. For more details, go to http://www.opvk.fss.muni.cz/ensec/ and www.iips.cz.

Because of the highly competitive nature of the energy industry, researchers studying it face a series of problems. Many state bureaus and private companies are unwilling to share precise data, making it difficult to identify the long-term strategies of individual energy players. Furthermore, available data often is not completely conclusive or credible, whether due to its providers' limited reliability or because accurate data is missing.

For that reason, we paid special attention to verifying all information by checking it against several sources. However, in some cases even very reliable and respected sources diverged considerably. In cases where data could not be fully verified, we considered the information to be unverified. We used dozens of open resources, including frequent reference of IEA materials, as well as interviews, discussions, and fieldwork.

Data collection took place in the Czech Republic, Poland, and Brussels, from April 2011 to December 2011.

2. THE LIMITS OF POLISH UNCONVENTIONAL PRODUCTION

Poland's success in UNG development will largely be determined by economic factors. Environmental, regulatory, and other aspects can influence production costs. Our primary goal is not to estimate production scale or costs, but to predict Polish production's competitiveness. Such predictions, with a certain degree of error, are possible and appear in existing studies.[3] The following analysis of factors affecting Polish potential should be viewed as a contrast between Polish (or, generally, European) conditions and the US' production conditions.

2.1 GEOLOGY

At this time, it is unclear if Poland has significant amounts of shale gas at its disposal. Although projections have differed over the last two years (consistently increasing to 5.3 Tcm in estimates by the American EIA from 2011), there is currently only systematic exploration data from Polish and Soviet geologists in the 1970s. The first official estimates based on 2011 pilot surveys should be published by the Polish Geological Institute during January or February 2012. Under Polish law, the Institute may access all geological exploration documentation which oil companies collect. However, because fewer than 20 of the 300 required exploration wells have been completed, the report will be only a more qualified estimate.

Oil companies generally evaluate deposits in three steps. First, they try to identify shale basins which contain gas. Second, they determine if a sufficient amount of gas exists and how the shale reacts when fractured. Finally, they estimate whether production would be profitable or competitive. The Polish UNG sector is currently at the end of the second step. Early tests demonstrate that Polish basins do contain gas and that it is extractable. However, more complex surveys are required to project production costs; these surveys are expected within the

[3] See, for example: Gény, F. (2010). *Can Unconventional Gas be a Game Changer in European Gas Markets?* Oxford: Oxford Institute for Energy Studies. http://www.oxfordenergy.org/wpcms/wp-content/uploads/2011/01/NG46-CanUnconventionalGasbeaGameChangerinEuropeanGasMarkets-FlorenceGeny-2010.pdf

next two years.

Thermal maturity is a key variable determining the conditions in which sediments with organic deposits were formed. Thermal maturity (Ro) is usually measured by the Rock Eval pyrolysis method.[4] Next, type and organic richness is assessed, along with the shale layer's strength and depth, which directly influence productive potential and extraction cost. Thermal maturity and the production level also depend on depth (greater depths increase both temperature and pressure). Higher pressure at greater depths means that gas flow from the deposit will be higher. This also suggests that fracturing will be more difficult than usual, because more force is needed to inject water into the wellbore. One of the most important parameters is the shale's fragility, which is determined by how much silicon and clay is present.

Siliceous shale is harder and more brittle, which is why it can be successfully fractured. With soft clay shale, cracks are not sustained for long enough to release sufficient gas. Shale basins with thermal maturity Ro > 1% and organic richness beyond 2% are potentially appealing.[5]

Tab. 1: Geological parameters of the Baltic shale basin[6]

Parameter	Value	American equivalent
Thickness	More than 100 m	Barnett (30-200 m)
Depth	2,700 m	Barnett (2,200-3,000 m)
Thermal Maturity (Ro)	1.5%	Marcellus (1-2.5%)
Organic richness	7%	Fayetteville (4-9.5%)

[4] See, for example *Rock Eval Pyrolysis*. Retrieved from: http://www-odp.tamu.edu/publications/tnotes/tn30/tn30_11.htm

[5] Gény, F. (2010). *Can Unconventional Gas be a Game Changer in European Gas Markets?* Oxford: Oxford Institute for Energy Studies. P 105. http://www.oxfordenergy.org/wpcms/wp-content/uploads/2011/01/NG46-CanUnconventionalGasbeaGameChangerinEuropeanGasMarkets-FlorenceGeny-2010.pdf

[6] Gény, F. (2010). *Can Unconventional Gas be a Game Changer in European Gas Markets?* Oxford: Oxford Institute for Energy Studies. P 53. http://www.oxfordenergy.org/wpcms/wp-content/uploads/2011/01/NG46-CanUnconventionalGasbeaGameChangerinEuropeanGasMarkets-FlorenceGeny-2010.pdf

Tab. 2: Geological parameters of the Lublin shale basin[7]

Parameter	Value	American equivalent
Thickness	110-220 m	Barnett (30-220 m)
Depth	2,500 m	Barnett (2,200-3,000 m)
Thermal maturity (Ro)	1.4%	Marcellus (1-2.5%)
Organic richness	0.5-1.2%	-

Generally, Polish basins are at greater depths and subjected to higher temperatures and pressure. This will mean higher production costs when compared to the US.

2.2 THE ENVIRONMENT

Current environmental debates suggest that natural gas is a transitional energy resource between fossil fuels and renewable resources. Because it leaves the least amount of silicon gas and almost no solid substances behind,[8] it is the purest fossil fuel. Replacing Europe's coal with gas for power production is, environmentally, an indisputably positive trend; however, switching to natural gas brings a false feeling of satisfaction and effectively hinders advancement towards renewable resources.

UNG and conventional gas are the same end products. However, unlike conventional gas, UNG's extraction is controversial. Hydraulic fracturing (fracking) represents one of the largest environmental issues associated with UNG production. The first fracking efforts took place in Kansas in 1947, although concerns were not raised until the last decade. Since 1940s, more than a million wells have been fracked, making fracking a relatively common procedure to increase deposit yield.

Extensive water use and its contamination with chemicals are two issues with

[7] Gény, F. (2010). *Can Unconventional Gas be a Game Changer in European Gas Markets?* Oxford: Oxford Institute for Energy Studies. P 53. http://www.oxfordenergy.org/wpcms/wp-content/uploads/2011/01/NG46-CanUnconventionalGasbeaGameChangerinEuropeanGasMarkets-FlorenceGeny-2010.pdf

[8] In the case of CO_2, approximately half of the emissions per unit of energy are released compared to coal, and two thirds when compared to oil. Sulphur oxide and nitrogen emissions are usually less. *Natural Gas and the Environment*. Retrieved from: http://www.naturalgas.org/environment/naturalgas.asp

fracking. Data varies depending on territory, geology, and number of fracturing steps, but roughly 22 thousand hectoliters of water are used per step of fracture.[9] It is possible to achieve 45 steps per well, which, when measured by "number of wells" increases water consumption, but when measured by "gas extracted" decreases water consumption. Gény claims that in Europe, 8-step-wells will be the most common, which require 280 thousand hectoliters of water.[10]

Tab. 3: Selected water consumption estimates[11]

Basin/water consumption (hL)	Drilling	Fracturing	Total/well
Barnett	15,000	86,000	101,000
Fayetteville[12]	2,000	109,000	112,000
Haynesville	38,000	101,000	139,000
Marcellus	3,000	142,000	145,000

The water used in UNG extraction is indisputably high. However, the US production shows that total UNG water consumption is between 0.1% and 0.8% of all water used in a given region. In the Marcellus Formation, daily water consumption for extraction is 12.6 million hectoliters; the region uses roughly 240 million hectoliters for electricity production alone.[13] One company, Chesapeake, estimates that the water share used for extraction is 1.5%, while a majority of regional consumption is by households, for electricity production, and for agriculture. Unlike UNG wells, these consumers require constant water. According to Chesapeake, 100,000 hL of water is typically needed for an average well; in a 1,000 MW coal power plant, this is spent in only 12 working hours.[14]

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[9] U. S. Department of Energy (n.d.) *Modern Shale Gas Development in the United States: A Primer*. P 58. Retrieved from: http://www.fossil.energy.gov/programs/oilgas/publications/naturalgas_general/Shale_Gas_Primer_2009.pdf

[10] Gény, F. (2010). *Can Unconventional Gas be a Game Changer in European Gas Markets?* Oxford: Oxford Institute for Energy Studies. P 67. http://www.oxfordenergy.org/wpcms/wp-content/uploads/2011/01/NG46-CanUnconventionalGasbeaGameChangerinEuropeanGasMarkets-FlorenceGeny-2010.pdf

[11] U. S. Department of Energy (n.d.) *Modern Shale Gas Development in the United States: A Primer*. P 64 Retrieved from: http://www.fossil.energy.gov/programs/oilgas/publications/naturalgas_general/Shale_Gas_Primer_2009.pdf

[12] Drilling jobs in Fayetteville and Marcellus basins did not incorporate water-based drilling fluids.

[13] U. S. Department of Energy (n.d.) *Modern Shale Gas Development in the United States: A Primer*. P 65. Retrieved from: http://www.fossil.energy.gov/programs/oilgas/publications/naturalgas_general/Shale_Gas_Primer_2009.pdf

[14] *Hydraulic Fracturing Facts*. Retrieved from: http://www.hydraulicfracturing.com/Water-

An equally important aspect is the water composition used for fracking. The fluid, a mixture of water and sand, also contains roughly 0.5% to 2% of chemical substances necessary to achieve desired fracking characteristics (pH regulation, lower corrosive effects, etc.). Although the concentration of these chemicals is fairly low, environmental contamination around the well may occur. No single case of fracking fluid entering groundwater has been recorded. Groundwater is located at a depth of up to several hundred meters or less, while UNG production normally takes place at depths measured in kilometers. However, there are cases when fluid is improperly stored on the surface, or when the fluid returning from the well has not been sufficiently secured (depending on geology, the extent is between 0% and 80%; the most frequent figures are roughly 25% of injected capacity). This may lead to surface spillage. Such accidents can be prevented with proper regulation of storage and environmental conditions, and with the promotion of fracking fluid recycling. In Europe, such recycling is expected to be more common than in the US due to Europe's stricter environmental regulations and because of water's higher cost.

Oil companies are continually devising new fracking fluid compositions. In time, substituting the most toxic substances for less environmentally-harmful ones will occur. The basis of this process is regulation, which in some American states obliges companies to publish the fluid compositions they use. This obligation will probably be even stronger in Europe.

While there is no record of groundwater contamination by chemicals in the well, methane leakage and its presence in groundwater remains a big issue. In contrast to the extent of fracking operations, their environmental impact has only recently been monitored. There are not any sufficiently authoritative, quantitative reports adequately analyzing all environmental side-effects caused by UNG production. According to preliminary research, it has become clear that the groundwater near some Pennsylvanian and New York fracking wells contains methane.[15] Industry representatives raised doubts by claiming that methane was also in wells where no gas was found. In Europe, it is important that the environmental impacts report for UNG production, commissioned by the

Usage/Pages/Information.aspx

[15] Discovery News (11. 3. 2011) *Shale-Gas Drilling Contaminating Drinking Water*. Retrieved from: http://news.discovery.com/earth/hydrofracking-shale-methane-leak-in-wells-110511.html

Directorate General (DG) for Internal Policies, emphasizes research evidencing increased groundwater methane concentrations when and where fracking actually occurred.[16]

Robert Howarth's study (Cornell University) garnered great attention at publication by comparing greenhouse gas emissions by UNG and coal during their entire life cycles (from surveying to extraction, processing, conversion, and consumer utilization) over a twenty-year period.[17] Howarth concluded that fluid returning from a UNG well several days after drilling (flow-back fluids) emits methane. Because a denser gas network, which always leaks some methane, is required, the impact of UNG over the short-term (20 years) is roughly 20% worse than coal, and only over the long-term (100 years) does it become comparable to conventional gas. Since its publication in 2011, Howarth's study has been questioned on reasonableness many times,[18] including about who the members of Howarth's team were and how Howarth collected data. While it would be wrong to judge using only Howarth's standards, his goal was achieved – it became evident that greater attention should be given to the environmental impacts of the entire cycle, not only of combustion (or other final forms of conversion) of energy resources.

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[16] DG for Internal Policies (2011). *Impacts of Shale Gas and Shale Oil Extraction on the Eenvironment and on Human Health*. P 28. Retrieved from: http://europeecologie.eu/IMG/pdf/shale-gas-pe-464-425-final.pdf

[17] Howarth, R. W. (ed. 2011). *Methane and the greenhouse-gas footprint of natural gas from shale formation*. Retrieved from: http://www.eeb.cornell.edu/howarth/Howarth%20et%20al%20%20 2011.pdf

[18] The calculation of leaked methane as of the extracted natural gas minus natural gas added into the network finds its place among the most important methodological disputes. Currently, Howard ignores the natural gas used for machines in the well or for some compression points of the gas pipeline. There is practically no data on gas leakage from infrastructure and Howard himself admits that more information should have been gathered concerning, among other things, Russian long-distance pipelines from the 1960s and 1970s. The other issue is the 20-year term. Although methane is a more potent greenhouse gas than carbon dioxide, it lingers in the atmosphere only for several decades, while carbon dioxide remains for centuries. For that reason, higher methane leakage over a short term unfairly alters the balance towards natural gas' disadvantage. Howard also proved to be a bit inconsistent in his analysis of the complete cycle when he grounded the comparison of both fuels on GJ energetic content. Considering the fact that the efficiency of conversion of thermal energy into electricity is 60% in combined cycle power plants, while the best coal power plants move around 40%, it can be argued that the sole resignation of drawing comparisons based on results (the production of kWh) is a sufficient reason why Howarth's analysis can be regarded only as a guiding suggestion for further research. You can browse the internet for further objections to Howard's work. See for example: *Five Things to Know About the Cornell Shale Study*. (n.d.) Retrieved from: http://energyindepth.org/wp-content/uploads/2011/10/Five-Things-to-Know-Factsheet-FINAL.pdf

Howarth has managed to provoke a series of further studies[19] which all demonstrate that methane emissions during extraction from shale regularly go beyond that of conventional extraction by 1% (which, among other factors, is attributed to measurement deviation). They also show that gas which does not reach the consumer is not lost in the atmosphere, nor is it used for machines and compression points, and, generally, that the impact of UNG cannot be compared with coal.

A similar issue is speculation that hydraulic fracturing causes earthquakes. In April 2011, Cuadrilla Resources had to stop their drilling operations in Blackpool, Great Britain due to earthquakes reaching 2.3 on the Richter scale. An earthquake of 1.5 followed in May.[20] Spent-fluid storage in separate wells was forbidden in El Dorado, Arkansas, after the Deep-Six Water Disposal Services well apparently caused an earthquake with a magnitude of 4.7. Both sites are in seismically active areas. According to the National Geological Service, 18 days before the ban, the drilling area was hit by 85 earthquakes, while 18 days after the ban only by 20. In contrast, according to the Arkansas Earthquake Center, about 10,000 lesser-magnitude earthquakes shook the area, many of which humans could not sense. Nevertheless, only 280 of them occurred in the vicinity of the wells. This suggests that drilling itself probably does not cause these events.[21]

Hydraulic fracturing must, by definition, cause seismic activity. Shale in the bedrock is literally torn to pieces. According to the Polish Ministry of Environment, the effect this process has on Earth's surface is, however, a thousand times weaker than what humans can detect. The Ministry even compared measurements in Poland from fracking (at 1km from instrumentation) to values recorded during an earthquake measuring 9 on the Richter scale that shook Japan in Spring 2011 (8500 km from instrumentation). They also compared fracking to an earthquake

[19] *Cornell Response to Cornell: 'None of These Conclusions are Warranted'* (11. 3. 2011). Retrieved from: http://www.energyindepth.org/tag/cornell/

[20] The Telegraph (2. 11. 2011). *Cuadrilla admits drilling caused Blackpool earthquakes.* Retrieved from: http://www.telegraph.co.uk/finance/newsbysector/energy/8864669/Cuadrilla-admits-drilling-caused-Blackpool-earthquakes.html

[21] The Huffington Post (27. 7. 2011). *Natural Gas: Arkansas Commission Votes To Shut Down Wells.* Retrieved from: http://www.huffingtonpost.com/2011/07/27/natural-gas-arkansas-commission-shut-down-wells_n_911541.html

in Kaliningrad in 2004, which registered in the entire Polish north-east and caused minor damage to buildings in some areas (magnitude 5.2, 200 km). Seismic records show values significantly higher in Kaliningrad and Japan than from fracking.[22]

UNG extraction does have an environmental impact, and, if allowed, Poland should expect environmental contamination, accidents, and leaks of toxic materials. It is, however, disputable how significant these events are when compared to alternatives such as conventional natural gas extraction or coal extraction.

Although we have considerable data on UNG production's environmental impact, we lack data which is sufficiently authoritative or quantitative. The problem with most current scientific studies on UNG's environmental impact is that they often subscribe to different reports or theories. Existing data has such a wide range that one can cherry-pick figures that support researchers' favored result. There is a wide spectrum of arguments which can support or contradict conclusions with a comparable level of methodological correctness.

The final report of the US Environmental Protection Agency (EPA) will be published in 2014, which is good news for regulators in countries not anticipating immediate UNG production, but rather future production (China, as well as Poland). The report should lay the foundation for future UNG environmental regulation in the US and its preliminary conclusions will be available in 2012. Expectations are that both US regulations and the extraction industry's own standards will rapidly adjust to the report's results.

2.3 INFRASTRUCTURE

Infrastructure is a critical extraction and transportation element. Infrastructure also strongly indicates what Polish UNG extraction will look like. Transportation infrastructure (roads and railways) determines how costly the transport of required material will be. The importance of access points and the issue's complexity are indicated by three different strategies for drilling-rig placement:

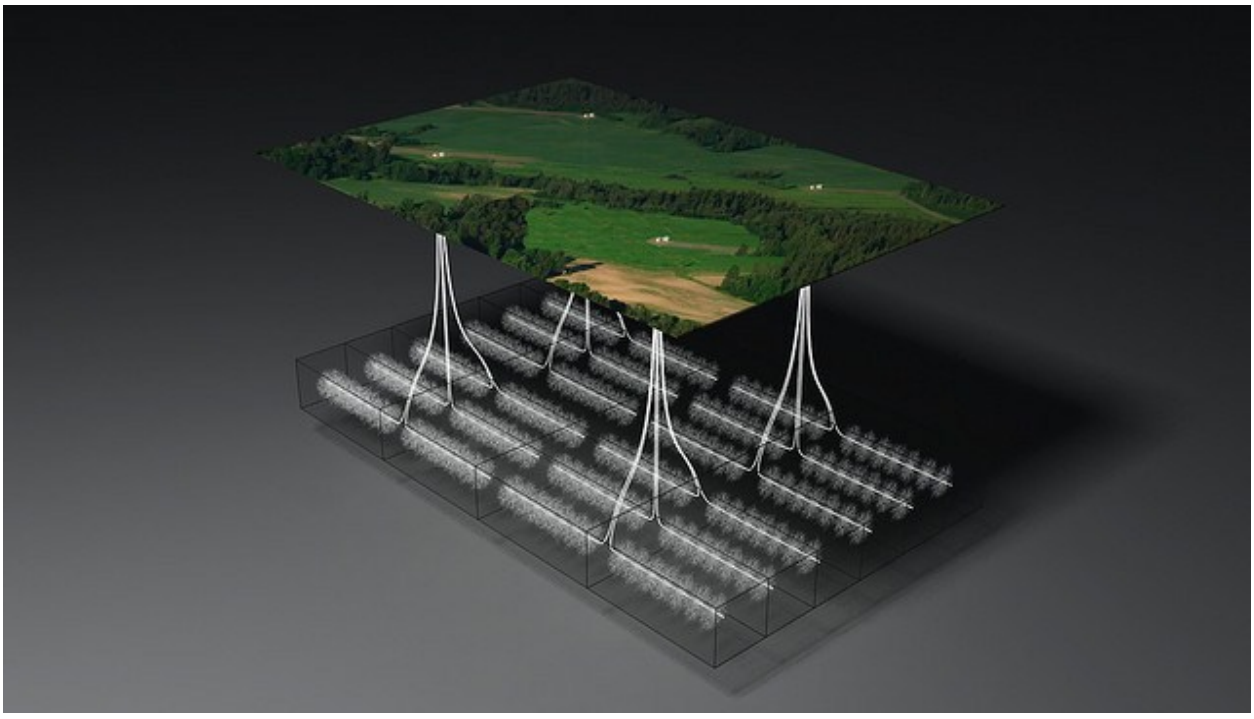
[22] Ministry of Environment (n.d.) *Shale Gas Will Not Shake Poland!* Retrieved from: http://www.mos.gov.pl/artykul/123_16285.html?j=en

- Locating where land owner negotiations will be easiest;
- Finding the best access to the most profitable deposits; and
- Finding the best locations for transporting materials, technique, and personnel.

The road networks in Poland do not satisfy the requirements of contemporary society and the economy. Polish parameters proved problematic in light of heavy cargo transportation's growth, an essential element for UNG development. To illustrate, one well with a total depth of 1,500 – 4,000 meters, with an 8-inch diameter casing and a 6-inch production pipe, requires 700 – 2,000 cargo deliveries (350 – 1,000 for water supplies and 350 – 1,000 for flow-back fluid).[23]

Currently, the most frequent method is to use multiple wells at one site, called "drilling pads." Pads are arranged in a rectangular network and are usually separated by spaces measuring up to 6 km by 3 km. 6 to 8 wells are in each pad.

Fig. 1: Shale gas drilling pad distribution[24]



[23] DG for Internal Policies (2011). *Impacts of Shale Gas and Shale Oil Extraction on the Environment and on Human Health*. P 37. Retrieved from: http://europeecologie.eu/IMG/pdf/shale-gas-pe-464-425-final.pdf

[24] Statoil (n.d.) *Multiple Gas Wells*. Retrieved from: http://www.statoil.com/en/NewsAndMedia/News/2008/Downloads/Muliple_shale_gas_wells.pdf

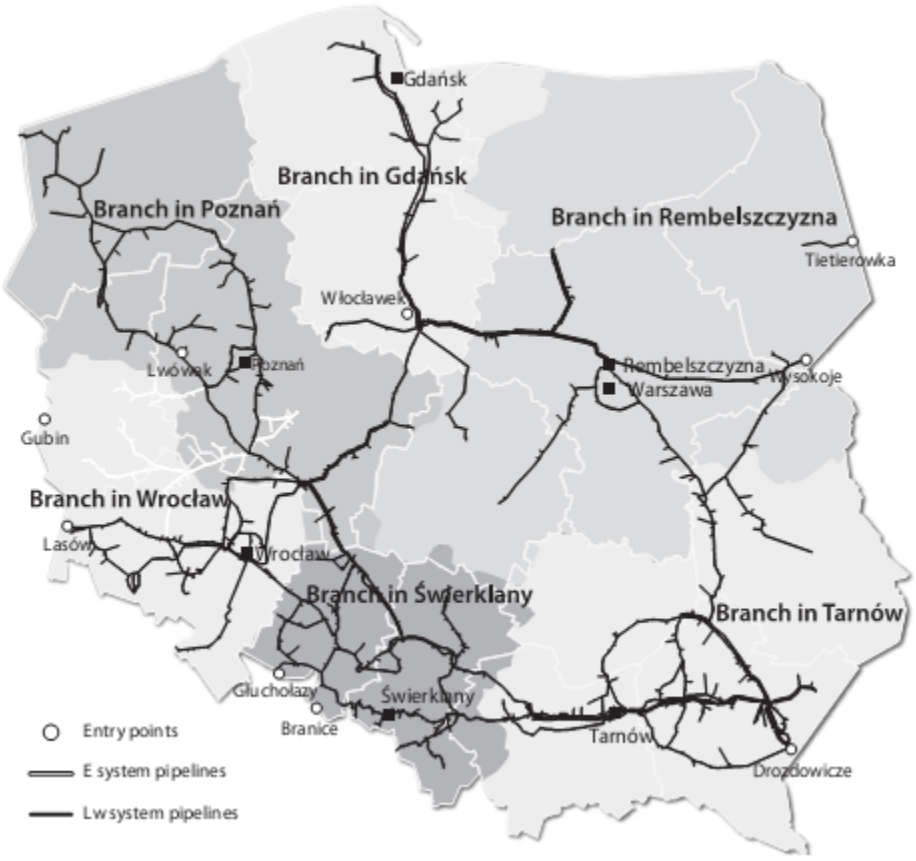
By adding wells to pads, fracking fluid-recycling and construction of water-supply pipes can save more than 50% of the transportation cost. What hinders this setup in Poland is the division of land amongst several owners. Typically, the largest agricultural fields are only 10 to 20 hectares, while drilling pads occupy between 2 to 4 hectares during drilling and 1 hectare during extraction.[25]

The absence of pipelines for transporting gas to the market is another issue. Polish infrastructure has import entry points with a capacity of 18.3 bcmy, entry points for gas from domestic sources of 8.5 bcmy, and entry points for gas from underground containers with a capacity of 1.7 bcmy. The only functional Polish export point is at the Malinow point, where gas from the Yamal pipeline is transferred to Germany.[26] However, these entry and exit points do not present a problem, because, if necessary, they can easily be extended or built up. The real insufficiency is in the distribution network's capacity.

[25] Clean Tech Poland (2011). *Shale Gas Investment Guide/Poland*. P 59. Retrieved from: http://www.cleantechpoland.com/wp-content/uploads/2011/08/Shale-Gas-Investment-Guide-Poland-Summer-2011.pdf

[26] The Kosciuszko Institute (2011). *Unconventional Gas – a Chance for Poland and Europe? Analysis and Recommendation*. P 148. Retrieved from: http://ik.org.pl/test/cms/wp-content/uploads/2011/09/Kosciuszko_Institute_UCG_report_29.08.2011.pdf

Fig. 2: Polish distribution system[27]



The domestic distribution system's individual branch capacity goes slightly beyond 20 bcmy.[28] A long-term contract with Russia obliges Poland to set aside 10 to 11 bcmy, which means that 4 bcmy of current distribution capacity is available for domestic conventional production and barely 10 bcmy for potential UNG production.

Moreover, it is not clear which regions will receive extracted UNG. Even with adequate growth in distribution capacity and with the optimistic prospects that gas will largely replace coal in power plants, Poland alone will not be able to

[27] The Kosciuszko Institute (2011). *Unconventional Gas – a Chance for Poland and Europe? Analysis and Recommendation.* P 145. Retrieved from: http://ik.org.pl/test/cms/wp-content/uploads/2011/09/Kosciuszko_Institute_UCG_report_29.08.2011.pdf

[28] For example, the Tarnow branch, with 5.1 bcmy, the Rembelszczyzna branch with 5.1 bcmy, the Gdansk branch with 2.4 bcmy, and the Swierklany branch with 3.1 bcmy.
The Kosciuszko Institute (2011). *Unconventional Gas – a Chance for Poland and Europe? Analysis and Recommendation.* P 145. Retrieved from: http://ik.org.pl/test/cms/wp-content/uploads/2011/09/Kosciuszko_Institute_UCG_report_29.08.2011.pdf

absorb another 15 bcmy beyond current consumption levels until 2020. Poland's southern and eastern neighbors are also bound by long-term contracts, which is why, for Poland, the only export option is Germany via the Yamal pipeline, which has roughly 8 to 10 bcmy available out of a total capacity of 33 bcmy. Such volumes will not re-draw the regional map of natural gas flow and it is questionable whether international oil companies will find them desirable enough to overcome complex licensing and certification procedures.

2.4 THE REGULATORY FRAMEWORK

UNG regulations reflect the state's important role in Poland's energy sector. In Europe, the state typically owns natural resources. Exploration and production companies buy the right to use, but not own, minerals, in contrast to the US, where minerals belong to the landowner.

The Polish government has strong influence over whom and how surveying and production will be performed. Survey results must be reported to state institutions. Exploration does not guarantee that a license will be granted (although there are mechanisms acknowledging an applicant's right to a license). Most importantly, the conditions under which the state may reject an application are not fully specified. No rules exist to ascertain the duration of right of use – which allows for bureaucratic arbitrariness where, in extreme cases, the state may set an insufficient right of use duration. Ministries also possess authority to rescind a license at any work stage, and it owes no compensation in cases where activities present a threat to the public interest.[29]

2.4.1 The Licensing Process

The Polish upstream sector has thus far been dominated by PGNiG, a state company. Like the presence of international oil companies, UNG is a novelty in Poland. The legal framework regulating this area in detail is absent, and licensing procedures adhere to conventional extraction rules.[30]

[29] Baginski, W. (2011). Shale Gas in Poland – The Legal Framework for Granting Concessions for Prospecting and Exploration of Hydrocarbon. *Energy Law Journal*. Vol. 32:145 2011. PP 153-154. Retrieved from: http://www.felj.org/docs/elj321/18_145_shale_gas_in_poland.pdf

[30] Exploration and extraction, or the activities with them associated, are regulated by the following legislation:

- The Geological and Mining Act, issued on February 4, 1994 (valid until 31. 12. 2011)

In terms of legally extracting UNG, Polish legislation makes a distinction between licenses for exploration and production. 108 exploration licenses were issued up to December 1, 2011, but no production licenses were issued. Production licenses are issued for a 50-year maximum (in reality, 25 to 30 years), whereas Polish UNG exploration licenses are usually valid for 5 years. The geographical scope is another restriction of the license. At most, the license can cover 1,200 km^2, while the average license covers 853 km^2. There is no limit to how many licenses a company can hold. Any legal entity registered in an EU member state, in members of the European Free Trade Association, or in states under a particular bilateral agreement (for example Ukraine, Russia, or the United States) can apply for a license directly. Legal entities registered in the rest of the world may apply for the license through a Polish subsidiary.

Polish authorities have not provided detailed instructions or a model application for license approval. Applicants have therefore made their own application forms, complicating the process from the start. The final license decision is made by the Ministry of Infrastructure, the Ministry of the Economy, or by local self-administrative units of lower or higher order (municipalities, provinces).[31]

Compulsory sections

Regardless of whether an applicant applies for an exploration or production li-

- The New Geological and Mining Act, issued on June 9, 2011 (valid from 1. 1. 2012)
- Free Trade Law, issued on June 2, 2004
- Water Law, issued on July 19, 2011
- Environmental Data Register, Environmental Protection, Communal Participation in Environmental Protection and the Evaluation of the Environmental Impacts Legislation, issued on October 3, 2008
- Law on Tendering, January 29, 2004
- Law on Nature protection
- Law on Waste
- Mine Waste Law
- Environmental Planning and Development Law
- Law on Construction
- Council of Ministers' regulation on projects of important environmental impacts.

[31] The districts (*powiat*) responsible for local communication coordination are placed within municipalities (*gmina*) where municipal roads, land, water, and the like fall under its jurisdiction, and provinces, whose Regional Bureau for Environmental Protection arranges, for instance, the Decision on Environment Conditions. Municipalities and provinces play a decisive role in the licensing procedure.

cense, they must provide compulsory information, including:

- name;
- address;
- identification number;
- list of trade activities;
- type and range of activities covered by the license;
- ownership of a place of business or the intention to obtain it; and
- the applicant's financial background.

The applicant must then pay a stamp fee for registration. Depending on the type and extent of planned activities, the applicant must submit additional documentation, such as permission issued by environmental authorities. If the trade activity interferes with state security or national interest, the Ministry may demand payment of a specific deposit to cover possible claims related to the activity.

Regulation of Right to Use

Considering that UNG is, like all natural resources, state-owned, the applicant must, in addition to the concession, apply for right to use (usufruct), which allows him to access the state's natural resources. Usually, the Ministry and the applicant first sign a usufruct agreement. However, the agreement is valid only after license approval. According to the European Parliament (EP) and European Committee directive 94/22/EC, issued on May 30, 1994, there should be no regulations guaranteeing an exclusive right to one entity to explore and extract hydrocarbons. In other words, licenses should be available for all parties interested in this activity. In Poland's case, smaller tracts of land (and usufruct approval) are regulated with a call for tenders,[32] while the "first-come, first-serve" rule applies to larger tracts. The European Commission found this implementation defective, because the dominant licensing approach did not prevent artificial market domination by one entity.[33]

[32] In practice, the only procedure arranged for call for tenders was announced in 2007, when 14 licenses were approved.

[33] The Kosciuszko Institute (2011). *Unconventional Gas – a Chance for Poland and Europe? Analysis and Recommendation*. P 188. Retrieved from: http://ik.org.pl/test/cms/wp-content/uploads/2011/09/Kosciuszko_Institute_UCG_report_29.08.2011.pdf

The usufruct agreement documents a valid period, the resource of interest, its spatial allocation, the purpose of the usufruct (the nature of the anticipated activity), the fee and method of payment for license approval, the rules of transferring the usufruct, and rules and procedures for terminating the legal relationship.

The exploration license

For UNG production licenses, the application must contain a plan for geological exploration. The required sections of the plan include: a goal, method, and documentation for geological exploration, a time-schedule for the activities, the geographical range of the work, a method for environmental damage prevention (mainly the protection of groundwater), the drilling approach, and plans for local soil rehabilitation.

Warrants compulsory for the exploration license approval include:

- Decision on the Environmental Conditions, DEC[34]
- Decision on the Construction and Territorial Development
- Construction Approval
- Water Usage Authorization
- Decision on the Waste Treatment

A Decision on Environmental Conditions (DEC) is a condition for successful licensing. For it to be issued, the following has to be provided:

- A report on environmental impact. The report must consist of:
    - A description of the project (overview, main activities, and pollution estimates);
    - A list of environmental objects threatened by the project;
    - A list of historical monuments which could be affected by the project;
    - Environmental effects if the project fails;
    - A list of alternatives for project realization (including applicant-preferred options and his reasons for selecting them, best-option alternatives and

[34] In Polish, Decyzja o środowiskowych uwarunkowaniach, DŚU.

the most environmentally-friendly options);
- A proposal for mitigating the project's environmental impacts;
- A summary in non-technical language;
- A certified copy of the land registry map, with precisely-marked project locations and affected land;
- Topographical and contour maps of the affected area;
- An abstract of the territory plan, or confirmation that the area's plan was not approved;
- An abstract of the estate registry book covering the affected area;
- Consent from the land owner; and
- An Environmental Impact Assessment (EIA),[35] except in the following cases: when exploration includes the use of underground explosives, when it is carried out on the seabed, or in wells deeper than 1,000 meters.

In justified cases, the Ministry can also order the issuance of an EIA. Most importantly, an EIA rests on:

- An environmental impacts report authentication;
- Obligatory approvals (like those issued by the relevant Bureau for Environmental Protection),[36] and recommendations (for example, by the National Hygiene Inspection);[37] and
- Consultations with the public.

Specific conditions are assessed when exploration or extraction is performed in areas falling under Natura 2000, the European ecological framework.[38] In such cases, the entity has to provide evidence that the intended activity will not have a negative impact on protected plant and animal species.

Authorizations for environmental requirements in Poland are quite complex and

[35] In Polish, Ocena oddziaływania na środowisko, OOŚ.
[36] Regional bureaus are established at the level of provinces. In the case of exploration and extraction of UNG, they are responsible for the entire DEC.
[37] The opinion of the National Hygiene Inspection is required when territory planning is included in the project. Its stance is not binding, only advisory.
[38] Natura 2000 is the system of protected areas located in all EU member states which are managed by the same unified principles. Natura 2000's aim is to ensure the protection of animal and plant species and of certain types of habitats, which are, from a European standpoint, the most valuable, endangered, rare, or whose presence is endemic to a particular area. Today, Natura 2000 areas in Poland amount to 19.7% of its territory, but their borders are constantly changing.

the process can take more than a year. The duration of the process differs for projects which do and those which do not require a DEC. For that reason, applicants usually split their appeals: first, they apply for 2D and 3D seismic approvals only, since an EIA is not immediately necessary for them. In the meantime, they apply for a license extension for drilling work, which requires both an EIA and updated geological data.

Another way to speed-up the licensing procedure is to exclude problem areas from the original concession, for example, areas with historical value or with monuments located there. The following type of situation is also not unusual: oil companies do not wait for a license, and instead pay the penalty for using water for unapproved industrial purposes.

For exploration licenses, municipalities are advisors (their opinion is not binding on the Ministry of the Environment, but it may influence why they do not grant a license). For institutions whose opinions (both binding and nonbinding) are required for granting a license, geological law gives a 14-day time-period to announce it. If they do not express their position before the deadline, the Ministry can declare that there are no remarks on the appeal.

The Extraction License

Claim on extraction license approval

Production comes after successful exploration, and it depends on the approval of a corresponding production license. An exploration license approval does not guarantee that the applicant will get a production license as well. However, if the production license for a given area is being granted and if the applicant meets all requirements, he has a two-year priority claim on this license as well. The two-year period starts when the Ministry confirms in writing that it accepts the geological survey results.[39] The applicant's second benefit is stated in Article 47, Section 3, of the geological law, which states that the one who provided the findings of a geological exploration (the applicant) has exclusive access to that data over the course of five years, starting from the day when the provider was authorized to perform the explorations. The provider is entitled to use these re-

[39] Transparency of the results is the obligation set by the geological law.

sults for scientific, exploratory, production, and other purposes administered by the mineral law.

For a production license, it is necessary to specify the deposit and, if possible, the part of the deposit to be produced. The method of extraction and the amount of production expected, in total and per year, must be specified. Other natural resources which the applicant plans to use, and how, must also be detailed. This requirement motivates the applicants to sparingly use available resources and to extract the maximum amount of available resources. The application also must include the geographical location and the precise production site. The applicant must prove that he has proper geological documentation, which is necessary for successful production and, almost importantly, that he has the right to its ownership and use. For UNG production licenses, the Ministry may demand geological documentation in order to check them against the application data.

For production licenses, in addition to the documentation for the exploration license, the requirements are as follows:

- Geological deposits documentation;
- An EIA (for an extraction license, it is an obligatory part of a DEC);
- The consent from the affected municipalities (binding for an extraction license);
- consent from the Ministry of the Economy;
- Consent from the National Mining Authority[40]
- Consent from the Ministry of Transportation, Construction, and Maritime Affairs (for submarine deposits).

Reasons for rejecting a license application

Geological law suggests that an application can be rejected for the following: the application's formal requirements are not met (missing information or documents); planned activities clash with environmental principles (including economical resource use); and when work would prevent utilization of a piece of land for its original purpose. The law does create an obligation to reject an ap-

[40] In Polish, Wyższy Urząd Górniczy

plication; this is at the Ministry's discretion. If the Ministry's final decision is rejection, it must offer a proper explanation to the applicant.

Other institutions can also oppose or reject a license application. For seabed exploration and extraction, the Ministry of Transport, Construction, and Maritime Affairs can hinder the process; for extraction performed on land, it could be the Ministry of the Economy or municipalities.[41] When the holder repeatedly and blatantly breaks rules in geological law, the Ministry can also withdraw the license without compensation or limit its scope.

The exploration license fee, 219.94 zloty per km^2, as with the extraction fee of 5.89 zloty per 1,000 standard cubic meter of natural gas, is split 60:40 between the relevant municipality and the National Fund for Environmental Protection and Water Management.[42] Usufruct fees are negotiated between the applicant and the state. Payments are considered state treasury income.

Another problem lies in the large volume of required certificates. In 2011, 13 exploratory drillings were carried out in Poland. Another 15-18 are to be expected in 2012. However, companies must carry out at least 300 drills to be reasonably certain that there is enough economically extractable gas available. Such a scope cannot be managed without American technology, which requires a European Certificate (CE, for Conformité Européenne). CE, among other things, does not allow heavy American freight trucks, therefore, at admission points, drilling platform components must be moved in European trucks. In another example, firefighting equipment could only be imported without the engines, which had to be supplied by Europe due to EU engine safety regulations.[43]

Equipment must also meet Polish certification requirements. Thus, some technology cannot be imported at all, which clashes with the EIA suggestion on using the best technology available. The certification process for employing Amer-

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[41] The Kosciuszko Institute (2011). *Unconventional Gas – a Chance for Poland and Europe? Analysis and Recommendation*. P 183. Retrieved from: http://ik.org.pl/test/cms/wp-content/uploads/2011/09/Kosciuszko_Institute_UCG_report_29.08.2011.pdf

[42] Orlen (2010). *Shale Gas Basic Information*. Retrieved from: http://www.orlen.pl/en/PressCenter/Publications/Documents/orlen-shale-gas_ENG.pdf

[43] Clean Tech Poland (2011). *Shale Gas Investment Guide/Poland*. P 24. Retrieved from: http://www.cleantechpoland.com/wp-content/uploads/2011/08/Shale-Gas-Investment-Guide-Poland-Summer-2011.pdf

ican workers and their equipment is estimated to be between 18 to 20 months of effort.[44]

Importing expertise is even more complicated. Key occupational positions (for example, the drilling site foreman) require Polish certification. The ability to communicate in Polish is mandatory, which usually eliminates everyone except Polish workers. However, Polish workers do not always have experience with the newest methods which have, in the last four years, considerably reduced the average time and costs of drilling.

Mandatory worker and equipment certification forces investors from abroad to cooperate with Polish drilling companies such as Nafta Pila.[45] If deposit potential is sped up and if UNG extraction is to happen, the certification procedure needs to become fast and simple. If the goal is highly efficient, highly secure, low-cost drilling operations, technological and staffing regulations must be reduced.

Land relations are another important topic. The nature of UNG extraction requires numerous wells, supply pipelines and other infrastructure, and, therefore, cooperation with numerous land-owners. To compare, a piece of farmland in Poland is usually 10-20 hectares; in Texas, home to the Barnett basin, the average farm is 260 hectares.[46] Current legislation only allows for expropriation for roads, railways, LNG terminals, nuclear power plants, stadiums, airports, and telecommunications.[47] Extending expropriation options to include pipelines would greatly facilitate UNG extraction.

How extraction royalties are determined is unclear. Currently, royalties in Po-

[44] CEE Consulting Group (n.d.). *Shale-gas and Poland - A potential game-changer with complications Briefing*. Retrieved from: http://ceeconsultinggroup.com/en/news/18/shale-gas-and-poland-a-potential-game-changer-with-complications-briefing

[45] Czech MND is an exception.

[46] Clean Tech Poland (2011). *Shale Gas Investment Guide/Poland*. P 59. Retrieved from: http://www.cleantechpoland.com/wp-content/uploads/2011/08/Shale-Gas-Investment-Guide-Poland-Summer-2011.pdf

U. S. Department of Agriculture (2012). *State Fact Sheets: Texas*. Retrieved from: http://www.ers.usda.gov/StateFacts/TX.htm

[47] In practice, if the owner moves out of his property without delay, he/she is offered 110% of the land value. If he/she refuses, the property will be confiscated, and he/she will be compensated with 100% of the value. If the owner is dissatisfied with the estimate, he/she can forward the case to the court. If the court brings the verdict in his favour, he gets the amount he demanded, if not, he will again receive 100% of the value estimated.

land range from 1% to 2.5% of sale value, and are among the lowest in the world,[48] while a flat sum is set for 1,000 m^3 of the extracted gas. In 2009, royalties were 5.63 zloty per 1,000 m^3 of gas, while the same amount reached 2,410 zloty on the retail market. These values neither reflect Polish regulation's liberal orientation, nor do they represent efforts to attract foreign investors, but are rather the result of clear dominance by upstream state companies. The state does not have to pay fees to itself. It is likely that royalties will change considerably before foreign oil companies begin extraction.

There are a few taxation options. One is to keep profits up to 130-150% of the initial investment tax-free and then impose fairly strict levies (50-70 %) for everything going beyond that limit. A more likely option, according to the two dominant parties in the Polish Sejm, would be to set the total tax-burden from gas sales at approximately 50%.[49]

2.4.1.1 Changes Brought by the New Geological and Mining Law[50]

Effective January 1st 2012, this Act fully implements Directive 94/22/EC on the conditions for granting and using authorizations for the prospect, exploration, and production of hydrocarbons.

Regulations for cooperation between administrative bodies operating within the Act and other administration bodies were changed to include an obligation on the latter to respond no later than 14 days from the delivery of a draft settlement. If no response is given, it is considered approval of the submitted draft. Principles concerning the calculation method of the 14-day period were also described in detail.

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[48] To draw a comparison, producers in Norway pay a 28% tax on income (like all other legal entities) and, in addition, 50% of extraction and gas income (78% total). If the company also has a gas station, it pays 28% tax on its income as well. In the liberal United States, these charges range between the traditional 12.5% and 17%.

[49] *Poland Gas Tax Sees Full Share for Government* (4. 1. 2012). Retrieved from: http://www.naturalgaseurope.com/poland-gas-tax

New Compromise on Poland Shale Gas Tax? (2. 11. 2011). Retrieved from: http://www.naturalgaseurope.com/new-compromise-on-poland-shale-gas-tax-3316

[50] Mladej,K. (2011). *New Geological and Mining Law in Poland – an overview of key changes.* Retrieved from: http://www.worldoil.com/December-2011-New-Geological-and-Mining-Law-in-Poland%E2%80%93an-overview-of-key-changes.html

The Act retains the "mining usufruct" institution, but some principles concerning usufruct were specified in greater detail or amended. It clarified that the establishment of a "mining usufruct" is the only legally-permitted form for disposition of "mining property" by the State Treasury. At the same time, the Act abandoned the valid solution where "mining usufruct" expires or is withdrawn by concession. This had solved, for example, problems of legal title to operations in an area which were previously granted "mining usufruct" during obligatory action by the entrepreneur which require access to an area after concession expiration. The solution also allows for the avoidance of previously held doubts as to the moment of expiration of a "mining usufruct" in a situation when the decision about the concession expiration loses its power, which is possible; for example, by means of the administrative court's sentence overruling such a decision. What is new is that in cases not provided for in the Act the laws applicable to "mining usufruct" are accordingly regulations on lease and not, as it is today, on usufruct, which shall consequently increase the State Treasury's control over the area subject to "mining usufruct".

The Act states that entrepreneurs who have obtained permission to extract so-called minerals of greatest importance, such as hydrocarbons, hard coal or brown coal, or for non-tank underground storage of hydrocarbons will be entitled to buy properties for these tasks based on market criteria.

Another important new provision states that the commencement of operations specified in the concession is considered an "irreversible legal effect" connected to Article 156 §2 of the Polish Code of Administrative Procedure. It states that "irreversible legal effects" do not create an invalid administrative decision (including concession). This greatly strengthens an entrepreneur's legal situation once they have begun operations, because in spite of a loss of power of a concession, the concession would still remain in force. Additionally, concession changes from a resumption of proceedings are impossible if one year elapses from the day of operational commencement. However, in these situations it is still possible to ascertain if a concession was illegally issued, allowing potential remedy claims in general court by those who sustained damage from a faulty concession decision.

The Act no longer requires preparation of spatial management plans for drilling

sites. Communities can legally request such a plan (for all or part of the drilling site), if the operations may substantially impact the environment.

The Act also introduces several new extraction fee principles. The fee rates are stated in the Act, and fee settlement periods have been extended to six months. Additional fees for activities that violate concession conditions or approved geological projects are also planned. Furthermore, new increased fees for conducting activities without a concession or approval will be implemented. These are both independent of the geological- and mining-law fees.

The deadline to file claims for damage caused by extraction-related traffic has been extended to 5 years. Currently, the law does not specify a statute of limitations for such claims. Consequently, the Polish Civil Code's statute of limitations is used; it is 3 years for disputes between entrepreneurs. Another very important change is that the claimant can choose the form of damage remedy; either restoration to previous conditions or pecuniary compensation. Up to now the law has imposed restorations to previous conditions.

2.4.2 Evaluation

The existing legislation reflects a fairly defensive attitude and an effort to guarantee strategic resource control, especially when foreign companies seek them. Such a framework can offer a certain measure of assurance, but currently it is rather counterproductive because the regulation clearly protects international companies' interests.

Applicants are calling for a change in the current legislation. Problems can be divided into two types: (1) problems associated with licensing, and (2) problems associated with determining extraction taxes. Oil companies exert more pressure on licensing, while the state is more interested in taxes.

Licensing in Poland is overly complicated. Enthusiasm about UNG dominates virtually all levels of the state government and encourages certain offices to simplify the process. The licensing process is impractical, and because a single method of appeal does not exist, every bureau must be visited separately for approval. Unlike North American legislation, which seeks a balance between supporting trade and defending public interest, Polish regulations are focused on

control.

The licensing process illustrates this: licensing takes 21 days in Canada, but more than a year in Poland. Jakub Zlamaniec, a consultant for the Energy Jobs CEE Company adds: "Poland does not have any experience in helping corporations, making their lives easier. Definitely there is no 'one window approach' as there is in Canada; there's a 50-window approach."[51] The effect the new Geological and Mining Law will bring remains to be seen.

The current regulatory framework neither favors investors, because it bars entry into the industry, nor the state, since it does not guarantee adequate gains from commercial UNG extraction. Considerable changes in the Polish regulatory process can be expected, likely leading to more thorough implementation of liberal market EU norms. The most important aspects are price deregulation and third-party access to underground storage and pipeline infrastructure (transport and storage capacities are currently only available to PGNiG). Similarly, at the state level, one can expect an increase in extraction royalties with a more open upstream sector.

[51] *Tapping into Shale Talent* (29. 3. 2011). Retrieved from: http://www.naturalgaseurope.com/tapping-shale-talent

3. THE EUROPEAN UNION

The European Union (EU) has no direct interest in UNG (in contrast to its member states, for which UNG provides work for local companies). However, the EU creates and maintains the basic functional and legislative framework which member states operate in. This extends to the energy sector. Thus it is appropriate to ask what role the EU will play in UNG's development. Will interested member states succeed in demonstrating UNG's economic and energy security benefits to encourage the EU to open the door to further development? Or will environmental criticism pressure Brussels to limit further development?

We attempt to map and analyze the EU's position on this issue. Then we describe the "playground" or "arena," reviewing key players' attitudes towards UNG, their motivations, their willingness to interfere when problems arise, and the position they will take. Finally, problems associated with UNG from an EU perspective will be discussed in the final part, particularly with regard to environmental legislation.

3.1 RELEVANT ACTORS AND INSTITUTIONS

Standard and formal distributions of power in the EU draw particular attention to the European Council, the representative body comprised of institutional elites from member states. Ministers in the Transportation, Telecommunications and Energy Council (TTE), including committees such as COREPER I and COREPER II, are engaged in practical performance.[52] The European Commission is the next important body, providing oversight of agreements and serving as part of the informal "government" of the EU, along with the European Parliament, the growing citizen-elected representative body. These institutions mutually-cooperate and interact with other organizations (non-governmental organization (NGO) representatives, professional associations, institutions of the EU, and others). They constitute the center of power which drafts and controls EU legisla-

[52] The Transportation, Telecommunications and Energy Council (TTE) was established in 2002 by combining the three administrative areas. The committee meets roughly once every two months.

tion, determines how the EU functions, and determines how political and economic power is distributed across Europe.

For this study, we will only examine some of them. Our selection is based on two main criteria:

- First, the desire to get involved in the subject (UNG), whether based on the entity's function (the DG Energy, for example), or because of the entity's general interest in substantial activities within the EU (for example, the European Parliament).
- Second, the entity must have the potential to influence the argument. Again, this potential could be based on the entity's decision-making position (as with the European Commission and the European Parliament), or on informal influence from the entity's lobbying experience, public support, or industry association support (such as from NGOs or collective business organizations).

The goal of this subchapter is to identify key players, define their relevance to the issue and their position within the EU decision-making structure, and to examine their actual power to influence UNG issues in the EU. Interests, preferences, and potential activities will follow.

3.1.1 The Council of the EU/The Council of Ministers – Transportation, Telecommunication and Energy Council

In the formal hierarchy, the highest body for joint decision-making is the Council of Ministers, which is organized into several groups.[53] This entity also carries clear biases from its member states' interests. Each state is represented, but their numbers of decision-making votes differ.[54] The Czech Republic, for example, has 12 votes, whereas the most influential EU states – France, Germany, the UK, and Italy – each have 29 votes.[55]

[53] One of the most important ones is the General Affairs Council (GAC). Ministers also gather in the Foreign Affairs Council (FAC), Economic and Financial Affairs Council (ECOFIN), and so on.
[54] The Committee votes in several ways – unanimously, simple majority, or the most frequently used mechanism, qualified majority. Qualified majority is adapted by the Lisbon Treaty as well. Specifically, the voting should be based on a, so called, double majority - 55% of the votes in the Council, which should at the same time represent 65% of the Union's citizenry. The safety lock of this system is the existence of the blocking minority represented by the negative stance of 4 Council members.
[55] Currently, Malta has the least number of votes – 3.

In this study, the Transportation, Telecommunications and Energy Council (TTE) is the most important of these entities. As previously mentioned, the TTE is composed of national governments' transportation, telecom, or energy ministers, and meets for an agreed-upon agenda. Since the 1990s, one of its main goals has been to develop trans-European networks.

Like the other institutions, the Council of Ministers and the TTE are subdivided. The Committee of Permanent Representatives (COREPER) plays an important role. The permanent member state representatives[56] hold sessions, and this group connects member states to each other and to EU institutions (especially to the Commission). The power of COREPER is in its role as a mediator.

Every proposal goes through COREPER first, then to the Council. Proposals are evaluated against technical/expert criteria (by 200 working groups) and then their political impact is considered. COREPER can be thought of as a "litmus test" indicating particular member states' interests, therefore the most intense negotiations and the formation of coalitions and oppositions take place here. Voting within the Council is often only a formality. The Council's technical and administrative functions are, as with other organizations, arranged by the General Secretariat. During the integration process, the common title for the Council leader (including the leader of COREPER) became "Presidency." This position is always held by one member state for a half-year period. Even though the Lisbon Treaty limits the power of the presiding country, thanks to the presidency, every member state has a chance to influence the EU's priorities and projects.[57]

Despite the Council of the European Union's integral position, we will not focus on it or its subdivisions. While the Council represents member states' opinions, it does not have the distinctive autonomy of the European Commission. The stances of its members depend directly on the stances of its member states. Attention should instead be on individual states' opinions on UNG rather than on the Council.

[56] The Czech Republic has been represented by Milena Vicenová since January 7, 2008.
[57] In its semi-annual priority selection (known as the "presidency program"), the member state submits to several conditions. Specifically, in order to maintain the highest continuity possible, there are always three consecutive presidential countries which take part in priority selection, and issues are also discussed with representatives from other institutions.

3.1.2 The European Commission

The European Commission is meant to be an independent group, removed from the interests of individual member states. Instead, it represents the interests of the entire EU. Because of the scope of its authority, the European Commission reports to the European Parliament, illustrating the special relationship between these two institutions.[58] Regarding UNG, the European Commission is acting as an information resource both for subject committees and for individual members of the European Parliament.

The European Commission's authority can be divided into several parts. First and foremost, it is the main (formerly exclusive) initiator of legislation for collective EU activities. At the same time, the European Commission monitors adherence to legislative acts (as we will discuss later, this is precisely the case with UNG). The European Commission is also a mediator between other players interested in UNG resources (i.e. countries, the EP, the European Council of Justice, etc.). Even though the position of the High Representative of the EU for Foreign Affairs and Security[59] was created by the Lisbon Treaty, the European Commission also represents the Union on energy issues (for example, at summits between the EU and the US, the EU and Russia, and so on).

Unlike the European Parliament, the European Commission is not directly selected. Each member state nominates one representative, who becomes a European Commissioner after European Parliament approval. Before the formation of each commission, a period of intense backstage negotiations occurs between member states. The goal is to occupy positions with the most exposure on a

[58] During the development of European integration, the European Parliament and European Commission were in many cases cooperating as "supranational allies" against a strong Council of member states.

[59] The High Representative of the EU for Foreign Affairs and Energy is named by the European Council, and he or she chairs the sectors of the Council of Ministers of Foreign Affairs. The High Representative is also a deputy chairman of the European Commission. His or her assignment is to carry out EU foreign policy and to represent the EU at the international level. The argument for establishing this position was relatively prosaic – expectations were that it would harmonize the EU's "voices" and bolster an EU identity when viewed from the outside of it. Due to complications during negotiations, the authority and assignments of the High Representative were not specified in detail, leaving room for different interpretations of the position. Presently, the position is occupied by Baroness Catherine Ashton.

commission (the Finance Commissioner is a typical example). The Energy Commissioner is, by nature, an important post, and the nominees for that position are intensely debated. The German representative, Günther Oettinger, has been appointed for the period between 2010 and 2014.

The European Commission's organizational structure can be compared to a national government (although this is a simplification). It contains an executive branch consisting of discrete areas of expertise, with a Directorate General's (DG) office and various specialized service offices. Individual commissioners have authority over Directorate Generals. These "Ministries" in the Union are further split into thematic directorates and units headed by career officials, unlike the often politically-accomplished commissioners.[60] The overall operation of the European Commission in terms of organization is provided by the Secretary General.[61]

As previously mentioned, the EU's legislative process rests in the European Commission.[62] Initially, gaps in legislation must be "identified," and then an impact assessment of legislation is considered, primarily from the principles of subsidiarity and proportionality. Before the creation of final legislation, the European Commission usually submits the legislation as a green or white paper. These documents seek to initiate a broad discussion and pave the way to binding legislation.

Legislative proposals start with a pre-legislative phase for text preparation and creation of dossiers in the corresponding DG's office. The legal basis for the law is also determined at this time (directives, regulations, or decisions). Each proposal then has two *rapporteurs* appointed to it (usually a junior and senior official). After the text is created, the proposal undergoes a legal and linguistic check, after which the board of commissioners approves it. Typically, a proposal

[60] For example, the chair of the DG Energy Commission is currently Philip Lowe.
[61] In relation to the Council, so-called comitology must be mentioned in regard to the European Commission. It is a system of special committees which emerged during the crisis of the Community in the 1960s. The goal was to control the power of the EC.
[62] Simultaneously, so-called people's initiatives created by the Lisbon Treaty can push for legislative initiatives as well. They are created by European citizens representing a substantial number of member states (1/3) (one million EU citizens is the current amount required for a given action) who can petition the EC to address a particular issue legislatively. It could be said that this is more of an "insurance policy," because this right has never been used.

is accepted after intense backstage negotiation. At this point, the preparatory phase ends and the practical legislative process begins.

For the purposes of this study, the greatest attention was devoted to two DGs - DG Energy and DG Environment:

3.1.2.1 DG Energy

This Directorate, which only recently came into existence from a split between the transportation and energy sectors, is responsible for energy matters and joint energy politics for the EU. It is very active in the liberalization of the common market, renewables, power industry decarbonization, and energy issues related to the environment (along with the DG Environment, DG Climate Action, and others). Finally, it is responsible for energy security (supply and crisis management, and contact with suppliers). As with other DGs, key activities include analysis and creating policies, declaring EU reporting lines, encouraging innovation, developing legislation, etc.

From a power and influence perspective, this DG is considered the main guarantor of energy policy in the EU. It is the critical office which all energy activity goes through, and it serves as an aggregate of disparate energy interests amongst other DG and EU offices – whether for the environment, power industry, internal affairs, or other related interests. The most considerable power is the ability to prepare legislation. Accordingly, it plays a strong role and offers an expert opinion of that DG, which is manifested both in member states and in the European Parliament, the European Council, and the Council of Ministers. This DG will be one of the main players in UNG because its professional foundation, expertise, studies, and opinions influence the stance of other EU bureaus. This professional stance will probably have a greater influence on future events than any specific legislation treating a particular issue.

3.1.2.2 DG Environment

This Directorate General focuses on environmental protection issues. Unlike the DG Climate Action, the center of its attention is on sustainability and preservation of land, water, animals, and plants. It cooperates actively with the civil sector (NGOs, the general public), and one of its main activities is monitoring com-

pliance with existing environmental regulations. The method with which they accomplish this is (analysis, legislation) is similar to the DG Energy's methods.

In terms of power and influence, this DG is gaining importance over time. With higher EU living standards and greater attention to environmental protection, regulations become stricter, which has a direct impact on member states' power industries and associated energy firms. This DG will probably be under the strongest pressure by interest groups with regards to UNG. Taking into consideration that the key issue with extraction of these unconventional resources is concern for surrounding landscapes and groundwater disruption, interest groups will demand that the DG strictly adheres to existing Union and domestic legislation, and, depending on the exploration and extraction progress, to make it even stricter.

In addition to these two key bureaus, the DG Climate Action or Directorate-General for Health and Consumers (DG-SANCO) can subsequently intervene in a limited capacity for issues regarding impacts on climate change or the citizen health, respectively. The Joint Research Center of the European Commission, which carries out scientific research, occupies a fairly neutral role - such as preparing studies on UNG and its role in the EU power industry.

3.1.3 The European Parliament

The European Parliament is being frequently cited as the only institution whose legitimacy comes directly from European citizens. It is this characteristic that numerous struggles against the EU's democratic deficit are based on. The European Parliament has continuously increased its influence beginning with the first direct elections in 1979. The European Parliament (elected once in five years) represents a distinguished legislative and decision-making component of the EU. However, the European Parliament does not possess legislative initiative; it can only respond to legislation proposed by others. The Lisbon Treaty widened the European Parliament's authority considerably, mainly through joint decision-making procedures, where the European Parliament is equal to the Council. Thus, the European Parliament has a strong influence on the character of emerging legislation (including issues which energy and environmental policy have in common).

The European Parliament is headed by a president and 14 deputies. Permanent committees exist which take an active part in the decision-making process.[63] Additionally, there are temporary or investigative committees. For our purposes, it is significant to observe affairs within the Committee on Industry, Research and Energy (ITRE). It is led by Herbert Reul, and the Czech Republic is represented by Jan Březina, Miroslav Ransdorf and Evžen Tošenovský.

The Committee on the Environment, Public Health, and Food Safety (ENVI) is also important, as it is led by a long-standing and, with regard to UNG matters, outspoken member of the European Parliament, Jo Leinen. The Czech Republic is represented there by Milan Cabrnoch, Miroslav Ouzký, and Pavel Poc. Committee membership, especially for "important committees," is a popular topic in the European Parliament, especially between different factions. According to recognized rules, each Member of Parliament must be a member of at least one committee. In practice, however, the Members of Parliament participate in no fewer than two committees each.

Committees review and comment on reports for legislative proposals, prepare their own reports, and assess modifications to existing European Commission directives or regulations. A legislative proposal is initially debated within the relevant committee, where the committee president plays a key role along with the appointed *rapporteur* (in most cases, a member from the opposite political spectrum). Each faction then forms its own opinion regarding the proposal and intense backstage negotiations take place. Only then are proposals formally approved in a European Parliament plenary session.

As mentioned earlier, the decisive European Parliament factions are those which can comment on proposed legislation, so political divisions in the EP influence the selection of "shadow *rapporteurs*," who complement the aforementioned "standard *rapporteur*."

Factions in the European Parliament are formed on the basis of political, not national, principles. As to structure, the factions tend to mimic standard political parties, even including a president and vice-president.

[63] The number of these permanent committees of the European Parliament is not exact. For the election period between 2009 and 2014, the 23 permanent committees have been established. The EP usually gathers once or twice per month.

3.1.4 Lobbyist and Information Groups

Considering that the influence of EU institutions on member state policies is rather high, it is natural that these institutions are targets of intense lobbying by the energy industry. EU interest groups are supported by EU institutions (mainly the European Commission), and provisions for broad dialogue are embedded in EU legislative rules.[64]

Lobbying is primarily directed at the pre-legislative phase in the European Commission, i.e. during the period when proposals are in early draft stages. In the European Parliament, lobby groups focus on influencing appropriate committees. These targets are chosen because, for example, when a legislative proposal is created in the European Commission, the Commission "closes" the process and actively impedes further lobbying. It does so mainly because reaching a consensus for wording legislative acts is fairly complex and delicate.

For our purposes, the lobbying and information organizations can be divided into the following categories:

3.1.4.1 Energy Company Offices

Most major energy companies have offices in Brussels. It is a wise investment regardless of cost; these companies get both very fresh information and a preview and certain sensitivity regarding the events in the EU. At the same time, these offices serve as a base for lobbying; companies' representatives supply the European Commission and other bodies with necessary information, present requested data, or actively influence opinions of discussed subjects. ČEZ a.s. (or its parent company, RWE AG) has an office in Brussels on behalf of the Czech Republic, as does PGNiG SA for Poland.

[64] The European Commission is an important example. When considering its power of legislative initiative and a lack of its own expertise, the presence of interest groups during drafting of legislative acts is a necessity. The European Commission has to, depending on the subjects, consult the NGOs, lead a social dialog, etc.

3.1.4.2 Industrial Unions

This category of lobbyist isn't very important for our purposes, and will not be further analyzed.

3.1.4.3 Nongovernmental Organizations (NGOs)

NGOs representing civil society are very active in Brussels. Despite their limited formal power, these organizations have great expertise, extensive lobbying experience, and ways to motivate the public into action. Their influence cannot be underestimated; several, including Greenpeace, Friends of the Earth, or the Health and Environment Alliance have started preliminary activities associated with UNG.

3.2 THE EU PLAYING FIELD

Having looked at the key players in the UNG debate, we now examine their positions in detail, and how aggressively they push those positions. Our inquiry is based on interviews with appropriate bureaus, primary EU materials, and related secondary sources.

One must first consider the DG Energy, DG Environment, and European Parliament's positions. Some aforementioned groups have not been considerably involved yet, and in the short-term this will continue to be true, so closer analysis of their positions will not be necessary until UNG is commercially developed.

3.2.1 DG Energy

The DG Energy directly controls UNG, but it appears unexpectedly restrained. This reservation is based on the following arguments:

First, DG Energy representatives perceive UNG as an internal market issue, and not a security issue based on independence from non-Union gas suppliers. Possible benefits of UNG in regard to the liquidity of the shared energy market are in that manner considered, when a greater volume of the trading material can contribute to a notable boost of the market with a wider portfolio of interested subjects. Along with positive pressure on the price, although to a limited degree.

Therefore, the DG Energy perceives UNG as an ordinary commodity principally driven by common energy market mechanisms. Its development must also be based on extraction profitability and advantages for firms and clients.

In this context, proclamations by the DG Energy that the EU has no interest in and will not support UNG (financially or otherwise) stem from this perception.[65] In contrast, it seems that the DG Energy will fight for maximum adherence to Union market rules, including those that limit state support for these types of technologies. Thus, the DG Energy is reserved about UNG's role in EU energy security and its ability to reduce dependence on external gas supplies as argued by Poland.

This opinion, also held by the DG Environment, is interesting. The DG Energy supports its colleagues because of both UNG's possible methane emission issues and with regard to shale's role in the Union power industry's slow transition to coal-free operations (see below).

The DG Energy's attitude towards the situation in the US is also noteworthy. There, the practice is very inconsistently perceived as a sort of victory over state control by private companies. For the DG Energy, it is essential to avoid repeating the mistake of allowing firms to take the initiative, with state and federal organizations only reacting to the population's negative reactions to possible damage from extraction. That is why the EU should make an effort to modify and enforce existing control mechanisms consistently and from the start. As some DG Energy representatives anonymously shared with us *". . .affecting those states which, with the prospect of improving their situation and under the influence of big expectations, may forget the rules"*.

Nonetheless, it seems that the DG Energy approaches the entire matter rather defensively, and is waiting for more data on the economy, extraction techniques, and potential environmental impacts. Until this data is acquired,[66] one cannot expect significant activity from the DG Energy. Even when the data is available, it will most likely act as a consultant rather than by enacting strict legislation. In

[65] At the same time, from the point of the EU rules, the possibility to support unconventional resources at the member state level is strongly limited.
[66] The DG collects data from publicly available and open servers, and private firms share information with it rather selectively and sometimes unwillingly.

any case, the DG will not want or be able to vigorously support or limit UNG.

We must also mention this DG's role as referee, as it is capable of influencing potential extraction or limiting it without using legislative tools, but by using its authority and its professional expertise to get involved in negotiations and bargaining between member states, municipalities, or NGOs. This was the case in Bulgaria, where the local government tried to shift partial responsibility to the European Commission to decide on potential prohibition of exploration.

Further development of the DG Energy's position, including complete changes of opinion, should be expected, but the Council of Ministers' influence, and that of the European public and NGOs, should not be underestimated.

3.2.2 DG Environment

This Directorate General is and most likely will be one of the most active Union UNG players. Because of the balance between rigid environmental legislation and UNG profitability, this DG will also be subjected to the most intense lobbying. The greatest battle for UNG's future will be about how strict EU environmental legislation will be and how high extraction expenses will be.

Currently, the DG Environment is pushing the necessity to obey existing rules, while noting that modification should wait until more accurate data is available. Even with occasional pressure by the European Parliament or interest groups, the DG Environment has not been willing to take big regulatory steps. The bureau is trying hard to avoid politicizing the matter by announcing decisive opinions without solid data and professional support.

However, when the DG Environment gains information confirming potential problems during exploration or extraction, it is willing to intervene vigorously and independently. There is a strong desire to avoid the American experience, environmental protection policies conspicuously lagged behind the extraction activities.

Thus far, the DG Environment has only informed member states when there were doubts about shortcomings during exploration within their territory. Although not yet significant, the DG Environment has warned that environmental

difficulties may occur with exploration and not only during commercial extraction.

From a wider perspective, the DG's position on UNG is interesting. Besides its direct environmental impacts (including possible groundwater pollution), the DG has expressed concern about climate effects. As mentioned earlier, UNG extraction can release measurable amounts of methane, which is a considerably more harmful greenhouse gas than carbon dioxide. For this reason, the DG will study this problem in greater depth with the DG Climate.

The DG Environment is also particularly reserved towards UNG because its greater development could limit the EU's transition to coal-free power suggested by *A Roadmap for Moving to a Competitive Low-Carbon Economy by 2050.*[67] If cheap and plentiful gas from unconventional resources is developed, it may foster unwillingness to develop renewables and low–coal. The European emission-free energy sector's development may stop halfway, at a level that is environmentally bearable, but with resources that are not ideal.

Overall, the DG Environment again emphasizes adherence to existing legislation during exploration, but is more open to the possibility of stricter rules when acquired data illustrates the necessity. The DG Environment's position on UNG is more reserved than the DG Energy's, and, environmentally, these resources may prove more negative than positive. In that event, the DG Environment will cooperate actively with member states, whether by gaining data or by exerting their control.

Like the DG Energy, no complete position changes can be expected from the DG Environment's position, but the Council of Ministers' influence should not be underestimated. The European public and relevant NGOs will also have an important role. The greatest pressure will come from environmentally-oriented groups.

[67] For a more detailed look, see the corresponding pages of the European Commission: Energy: Roadmap 2050 (n.d.). Retrieved from: http://ec.europa.eu/energy/energy2020/roadmap/index_en.htm

3.2.3 The European Parliament

Along with the previously mentioned European Commission DGs, the European Parliament occupies a key position regarding UNG in the EU. In many cases with equally divided positions, Members of the European Parliament (MEP) often turn to inflammatory rhetoric and create proposals either vigorously supporting or staunchly opposing UNG. MEP Sadrin Bélier's (Verts/ALE) question to the European Commission serves as an example:

> "A recent study on the impact of shale drilling on the environment and on health, conducted at the request of the European Parliament's Committee on the Environment, has brought to light not only significant environmental and health impacts, but also gaps in EU legislation . . . Will the Commission strengthen EU water legislation and adopt laws prohibiting the use of the hydraulic fracturing technique on European territory? If so, when?" [68]

MEP Dominique Vlasto's (PPE) asked this question of the European Commission:

> "How does the Commission intend to address any threat to European environmental policy posed by the prospects of the development of shale gas production?"[69]

A written declaration by MEPs P. Juvin, J. Bové, E. Estrela, C. Lepage and A. Rosbach in mid-2011 called for a:

> " . . . Europe-wide moratorium to be declared forthwith on shale gas and oil exploration and extraction . . . ", and
>
> "Calls on the Member States to suspend exploration licenses and con-

[68] Bélier, S. (2012, December 1.) Ban on hydraulic fracturing (fracking) in the EU. Question for written answer to the Commission. *European Parliament – Register of documents*. From http://www.europarl.europa.eu/RegistreWeb/search/simple.htm?language=EN

[69] Vlasto, D. (2011, April 14.). Consequences of the production of shale gas for the supply of energy in Europe. Question for written answer to the Commission. *European Parliament – Register of documents*. Retrieved from: http://www.europarl.europa.eu/RegistreWeb/search/simple.htm?language=EN

duct health and environmental impact studies."[70]

The MEP members are well connected with their home countries, so they tend to assume their nation's stance on UNG. While we tack the Polish MEPs more optimistic stance on UNG (see, for example, Michail Tomasz Kamiňski, ECR), greater skepticism exists in countries with strong opinions on UNG, and in countries lacking extraction potential.

The European Parliament's most striking feature is the fragmentation of opinions between individual MEPs, as well as their stronger expressions and demands. This is understandable given the absence of a strong hierarchy to submit to (unlike in the European Commission). Individual responsibility alone plays a role when individual MEPs know that they act on their own behalf rather than representing the entire European Parliament. MEPs are aware that their opinions (no matter how distinctive) will not change the situation fundamentally. Finally, MEP's, as politicians, are opposites of the bureaucratic and more professional-oriented European Commission, and they tend to act in a more strikingly populist manner.

Something else worth mentioning is the report requested by the Committee on Environment, Public Health and Food Safety titled "Impact of Shale Gas and Shale Oil Extraction on the Environment and on Human Health." This rather negative text defined areas where European law insufficiently addresses UNG extraction (and coal somewhat as well). This text drew great attention in the European Parliament and elsewhere and it was used to support arguments during a series of UNG debates.

Statistics summarizing questions that MEPs addressed to the European Commission can be a strong, though incomplete, illustration of the atmosphere within the European Parliament – 65% of questions were skeptical regarding UNG, 23% were neutral, and only 13% were positive.[71]

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[70] Juvin, P. - Bové, J.- Estrela, E.- Lepage, C.- Rosbach, A. (2011, June 6.) Written Declaration pursuant to Rule 123 of the RUles of Procedure on shale gas and oil exploration 0032/2011. *European Parliament*. Retrieved from: http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//NONSGML+WDECL+P7-DCL-2011-0032+0+DOC+PDF+V0//EN&language=EN

[71] The graph is based on written questions and also on questions written with priority which MEPs directed to the European Commission in 2011. In total, 26 questions directly devoted to UNG were split into three categories: Neutral, with an effort mainly to gain more detailed in-

To what extent the EP can really intervene in UNG development is debatable. Other institutions' views on Parliament range from skeptical to indulgently reserved, but, it should be noted that the European Parliament has gained considerable power through gradual development of EU primary law, which it utilizes to its maximal benefit. The same is true regarding activism and willingness to engage in UNG. Thus, underestimating the EP's role is denying the EU's true distribution of power.

3.3 EU UNG LEGISLATIVE TREATMENT

As we have mentioned, in Europe, UNG can be analyzed from two perspectives. First, one must observe how the EU positions itself with regard to the environment and the effects of exploration and extraction. From this perspective, the EU showed that fracking and related projects produced a whole series of concerns among the public, and thus, pressure on the EU to regulate this technology is getting stronger.

Accordingly, UNG is also often perceived as a security and economic issue. Potential extraction promises a reduced dependence on external supplies and reduced natural gas prices. For that reason, more and more frequently the debate turns to whether the EU will support exploration and extraction development (and if so, how), how UNG serves the EU's long-term common energy policy, and how the common energy market will be affected.

We dedicate the following pages to the first point, and omit the safety and economic issues. The questions of safety and the impact of extraction on gas prices are, from the EU's current perspective, matters falling under states' internal policies. European institutions are not, and likely never will be, willing to include these aspects into their decision-making.

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formation on the subject; Sceptical, which assumes negative outcomes for UNG in different spheres; and positive, which emphasizes potential benefits of shale gas. Source: the author, based on the European Parliament: Register of Documents. From http://www.europarl.europa.eu/RegistreWeb/search/simple.htm?language=EN

3.3.1 Environmental legislation

The debate over environmental legislation and UNG extraction's environmental impacts is growing; however, because no detailed analysis of these impacts exists, there is no overarching, dedicated UNG legislation. This is primarily due to UNG's relative novelty – until now, detailed regulation was not necessary. That said, the EU has a robust system of laws governing energy production in general, and thus covers many extraction risks with existing regulation. One should keep in mind that UNG is not a new resource – it is the same as conventional natural gas. Only its extraction process is unique.

When cataloguing current regulation applying to UNG, one should start with mining regulations. These directives cover extraction waste treatment (particularly 2006/21/EC – Directive on the Management of Waste Resulting from Extractive Industries), employee safety and work conditions, and the distribution of hydrocarbon extraction licenses.

UNG production is also covered by a broad spectrum of laws protecting the environment. Regulations exist to protect soil, water, plants, and animals, and also to limit environmental exposure to radioactive materials (particularly from extraction waste). Existing safety regulations, chemical-handling rules, and noise- and pollution-limits will all have an impact on UNG development.

This study's limited scope does not allow for examination of all laws in detail;[72] therefore, we will devote attention to the most interesting and sensible laws and discuss possible modifications for UNG. For practical reasons, we provide both Czech and English titles for these laws to facilitate tracking and researching them.

[72] More details about the issue can be found from Lechtenbohmer, S.-Altmann, M.-Capito, S. – Matra, Z. – Weindrorf, W. – Zittel, W. (2011, June). Impacts of Shale Gas and Shale Oil Extraction on the Environment and on Human Health. Directorate General for Internal Policies. From http://europeecologie.eu/IMG/pdf/shale-gas-pe-464-425-final.pdf

3.3.1.1 Environmental Impact Assessment (EIA)[73]

> "Environmental assessment is a procedure that ensures that the environmental implications of decisions are taken into account before the decisions are made. Environmental assessment can be undertaken for individual projects, such as a dam, motorway, airport or factory . . . (principle) is to ensure that plans, programmes and projects likely to have significant effects on the environment are made subject to an environmental assessment, prior to their approval or authorization. Consultation with the public is a key feature of environmental assessment procedures."[74]

The Environmental Impact Assessment carries a potentially broad range of measures which could notably limit potential exploration and extraction. An EIA alone cannot shut down a production project (it is used for advisory purposes), but a negative result could support other reasons to halt production. Whether an EIA is needed for UNG production depends on how the activities are interpreted.

Activities potentially requiring an EIA fall into two categories. The first group (from Annex I. of the EU directive 85/337/EC) automatically requires an EIA. The second group requires a preliminary screening to determine if a full EIA is necessary. Natural gas' determining factor is if production capacity is beyond 500,000 cubic meters, which is far beyond what most wells can produce.

However, this factor is increasingly disputed for UNG, and there is a debate about modifying it. Those responsible for changing it are currently cautious, but do allow for potential modifications.[75] In Poland, UNG exploration projects " . . . are usually seen as annex II project, which require the performance of an

[73] The English title is understood in Czech as well, so we use it here.
[74] For more details, see the corresponding pages of the European Commission: Environmental Assessment (n.d.). Retrieved from: http://ec.europa.eu/environment/eia/home.htm
[75] See the lecture of the socio-economical analytic DG Environment ‚Michaie Tomescu, on the seminar Shale Gas in the EU: "Health & Environment implications of Shale Fracturing for Natural Gas" in October 2011. It was mentioned there that the release of the modified directive is planned for 2012. See Tomescu, M. (2011, October 7.) EU policies context for shale gas and issues considered. *Health and Environment Alliance*. Retrieved from http://www.env-health.org/spip.php?article1251

EIA, if they have a significant impact on the environment."[76] Thus, likely impacts are judged by a preliminary screening.

3.3.1.2 REACH

REACH (Registration, Evaluation, Authorization and Restriction of Chemicals, Directive 2006/121/EC) is a robust regulation covering chemical production, importation, and use within the EU. It requires firms producing more than 1 metric ton of regulated materials to register with the European Chemical Agency (ECHA) based in Helsinki. REACH was formally initiated in 2007 and features a graduated implementation schedule. It will be in full force in 2018.

Fracking utilizes up to hundreds of distinct chemicals with varying levels of toxicity. Thus it is critical to determine how thoroughly REACH is applied to their use, while noting that the end user (private industry) carries responsibility for making sure REACH requirements are met.

REACH compliance has raised some doubt recently. Last September, Karl Falkenberg, a senior officer with the DG Environment, declared in a conference on REACH that " . . . none of the substances used (for cracking) have been registered for this process in Helsinki so far. You can only use substances for registered purposes. We need to know what substances are used to get to this resource (shale gas)."[77]

Every imported or utilized chemical must have its own dossier, which provides information about the chemical and procedures for safe handling. Substances must also be registered according to their usage. ECHA reviewed which materials were frequently used for fracking, and concluded that none of the importers had registered them in Europe. DG Environment spokesman Joe Hennon added that " . . . registration dossiers submitted by the industry to ECHA are incomplete and do not allow shale gas operators to take appropriate risk-management measures . . . (while) shale gas operators are not allowed to use a substance

[76] Philippe and Partners. (2011, November 8.) Final report on unconventional gas in Europe. *European Commission*. Str. 104. Retrieved from http://ec.europa.eu/energy/studies/doc/2012_unconventional_gas_in_europe.pdf

[77] *Use of Chemicals for Fracking May Be Illegal Under REACH, European Commission Says*. (2011, September 28.) Bloomberg BNA. Retrieved from http://www.bna.com/chemicals-fracking-may-n12884903614/

which does not fulfill REACH requirements." [78]

Suspicions of incomplete adherence were confirmed when Cuadrilla Resources carried out exploration in Britain using hydrogen chloride and polyacrylamide acid, both of which ECHA checked into and found were not registered for fracking. Cuadrilla's response was that "We´d heard nothing at all about this" regarding the absence of registration and that "We´re looking into it."[79] Incidentally, chemical users are required by REACH to report improperly registered chemicals to ECHA.

3.3.1.3 NATURA 2000

A less discussed, but potentially serious problem is the fact that UNG extraction requires large surface utilization which could interfere with areas protected by NATURA 2000. NATURA 2000 is an EU-wide program protecting habitats for the most valuable or most threatened animal and plant species. It creates two types of territories: Special Protection Areas (for birds) and Sites of Community Importance (for general purposes).

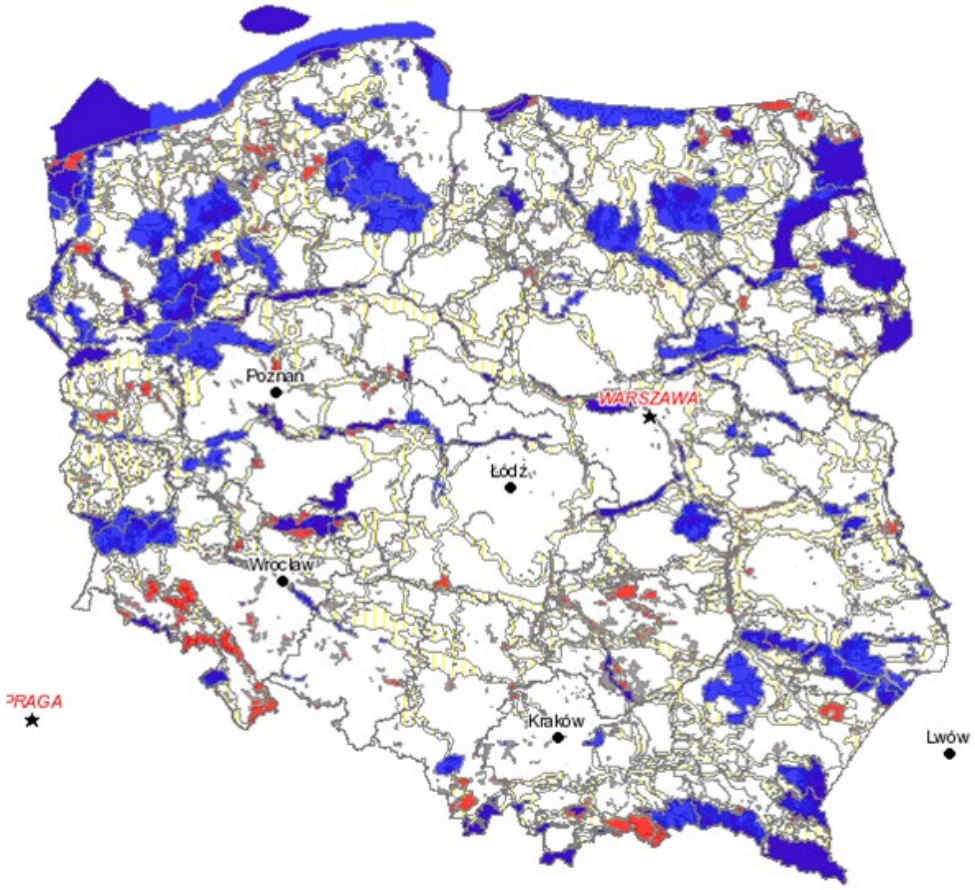
NATURA 2000 does not create absolute boundaries preventing exploration or extraction, but does considerably complicate these activities. Drilling is an issue up to a distance of 6.5 miles from a NATURA 2000 area.[80] Additionally, although NATURA 2000 does not generally ban activity in a given space, activity must not disturb the existence of the protected organisms within the area. There are rules allowing limited cases of disturbance, particularly when the state can prove that the disturbance is indispensable and fundamentally important to its society. In those cases, all possible measures must be taken to minimize damage.

It will be important to observe how Poland, which has approximately one-fifth of its territory within NATURA 2000 areas, will deal with these requirements. The following maps illustrate. In the first map (NATURA 2000 on the territory of Poland) one can see SPA areas highlighted in blue and SCI areas in red. On the second, areas in red are intended to be used or have been approved for UNG

[78] Ibid.
[79] Ibid.
[80] Maciazek, E-M. (2011, May 5.) NATURA 2000 versus Shale Gas Euphoria. *BSJP*. Retrieved from http://www.bsjp.pl/en/topical-issues/n368_natura-2000-versus-shale-gas-euphoria

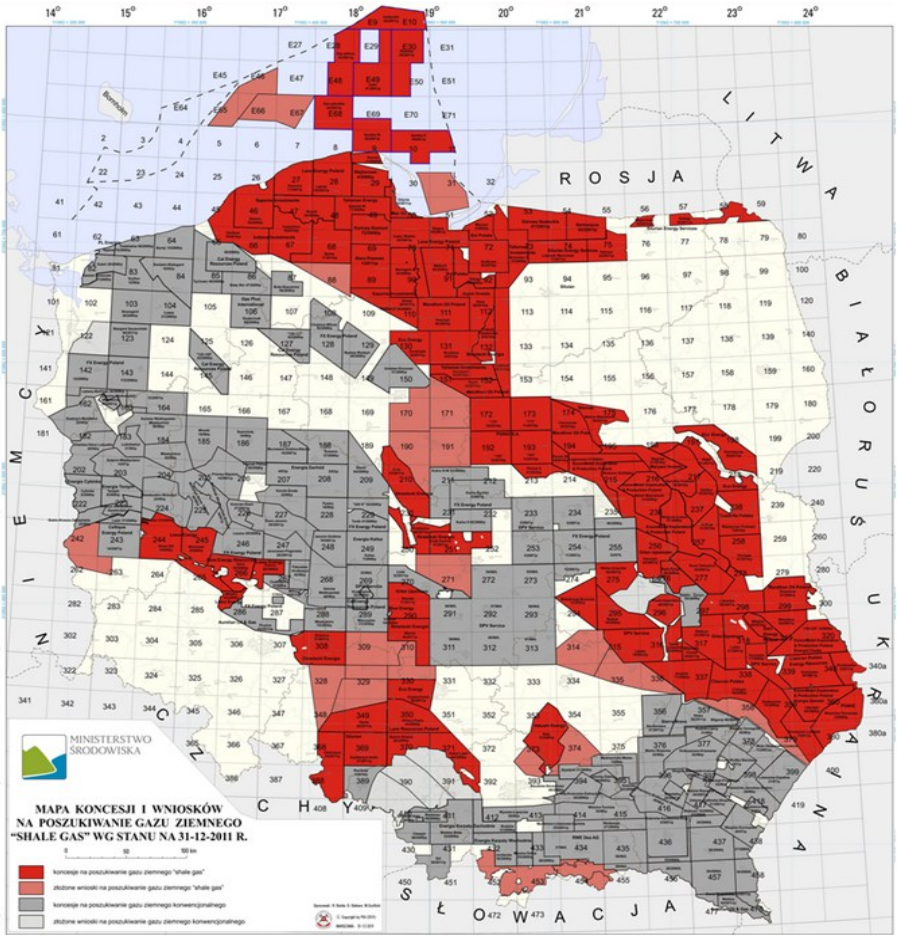
exploration, and blue areas represent conventional gas fields. The overlap in some areas is obvious.

Fig. 3: NATURA 2000 on the territory of Poland[81]



[81] Mapa koncesji na poszukiwanie i rozpoznawanie gazu lupkovego. (2012, January 1.) *Ministerstwo Srodowiska Rzeczpospolita Polska*. Retrieved from http://www.mos.gov.pl/kategoria/3320_mapy/

Fig. 4: The UNG extraction concessions (red) and conventional resources (gray) in Poland[82]



3.3.1.4 The EU Water Framework Directive

UNG extraction's water usage and the interaction of fracking fluid with groundwater must be seen against the demands of Directive 2000/60/EC, otherwise known as the Water Framework Directive. This directive from the European Parliament and the Council established a framework for Community action in water policy.

[82] Natura 2000 map. (n.d.). European Ecological Natura 2000 Network. Retrieved from http://natura2000.gdos.gov.pl/natura2000/en/jednostki.php?minx=-125406.281155&miny=101014.000000&maxx=1126502.281155&maxy=851247.000000&imagewidth=550&imageheight=330&CMD=&INPUT_TYPE=&INPUT_COORD=&KEYMAPXSIZE=120&KEYMAPYSIZE=112&MapSize=Map+size&OSO=Y&OSO_A=Y&SOO=Y&SOO_A=Y&miasta=Y&wojewodztwa=Y&zbiorniki=Y&PREVIOUS_MODE=0&FULL.x=6&FULL.y=6

This complex legislation covers all aspects of water protection, both above and below ground. It is also instructive rather than restrictive; its goal is to reach a "good" water status by 2015, and to remedy all traces of harmful human activity. For UNG, a substantial requirement is the:

> " . . . prohibition of direct discharges into groundwater (with exemptions i.e. for exploration and exploitation of hydrocarbons provided that environmental objectives for respective groundwater body is not compromised."[83]

The Water Framework Directive has not been considerably discussed with regard to UNG, primarily because commercial extraction has not started. This situation is likely to change. We can already see trends among interested parties to modify the directive for UNG. [84]

The directives covering drinking water (98/83/EC) or groundwater (2006/118/EC) must also be included among regulations and directives regulating water quality.

3.3.1.5 Mining Waste Directives

Laws dedicated to waste products, specifically Directive 2006/21/EC (On the Management of Waste from the Extractive Industries), can also have considerable, though not readily apparent, influence on UNG's future. Directive 2006/21/EC defines waste management (including management of wastewater) for mining activities. It requires preparation of a Waste Management Plan before extraction starts, setting aside financial reserves for related expenses, and calls for public participation during extraction preparation.

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[83] Tomescu, M. (2011, March 14.) EU Environmental Legislation and Unconventional Gas. DG Environment. Retrieved from http://oliver-krischer.eu/fileadmin/user_upload/gruene_btf_krischer/2011/ENVTomescuShale_GasOverview.pdf

[84] Lechtenbohmer, S.-Altmann, M.-Capito, S. – Matra, Z. – Weindrorf, W. – Zittel, W. (2011, June). Impacts of Shale Gas and Shale Oil Extraction on the Environment and on Human Health. Directorate General for Internal Policies. Str. 62-63. Retrieved from http://europeecologie.eu/IMG/pdf/shale-gas-pe-464-425-final.pdf

4. POLICY ANALYSIS: THE POLISH STAKEHOLDERS' PERCEPTION OF THE UNG DEVELOPMENT

4.1 THE DEFINITION OF STAKEHOLDERS

Aggregating various stakeholders is not always appropriate for analyzing policy-making institutions because if often ignores important mechanisms occurring below the "differentiation level." For cognitive mapping, this is not necessarily a disadvantage. Such aggregation is legitimate if stakeholders are grouped according to similar perceptions about a subject. [85]

This approach can contribute to analytical transparency and easier interpretation of outputs (as well as reducing time and technical requirements). During our evaluation, we concluded that certain stakeholders in lower levels of aggregation (for example, particular ministries or environmental NGOs) mainly differed at the development of the issue's causal map. Conversely, when we took individual elements into account (like action, factors, perspectives, and objectives), we noted a strong similarity between stakeholders.

However, the perception of some stakeholders (for a more detailed look, see below) differed quite significantly from the "self-perception" (reflection) of those stakeholders.[86] As expected, we found significant differences among causal maps across stakeholder groups.

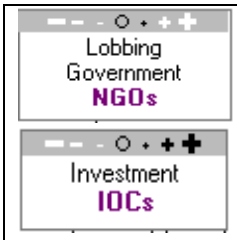
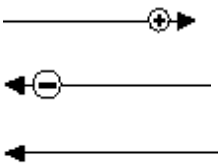
[85] Bots, P. W. G. (2008, June 13-14). *Analyzing actor networks while assuming "frame rationality"*. Presented at the conference on Networks in Political Science (NIPS), Kennedy School of Governance, Harvard University, Cambridge, MA. Retrieved from: http://www.hks.harvard.edu/netgov/files/NIPS/PWG_BOTS_Analyzing_actor_networks_14_June_2008.pdf

[86] Simply put, stakeholders' notion of their own role and interest differs from the one which other stakeholders have about them.

4.2 PERCEPTION GRAPHS

The following section displays perception graphs for particular stakeholders, consisting of the following components. For more on methodology and perception graphs, see the Methodology Appendix.

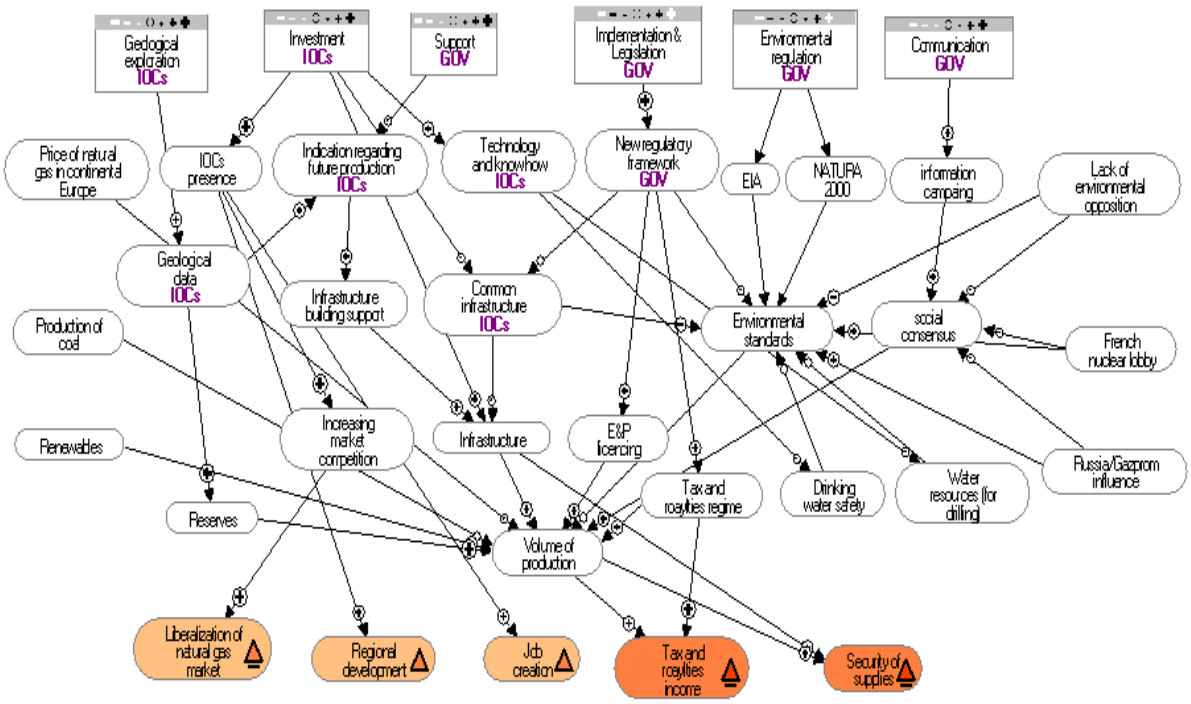
Tab. 4: How to read perception graphs[87]

	Actions represent intentional actions by stakeholders motivated by the accomplishment of a certain objective. A stakeholder's action range in the upper segment defines action alternatives; marks bolded in white imply either a stakeholder's insufficient capacity to perform action in a given range (as with NGO lobbying) or a logical impossibility for action (when, for example, a company has not invested in the market, it cannot draw from the investments or invest less; for this reason the options ---, --, and - are left out of the range of action).
	The priority of goals defined in the terms of utility resulting from rate of accomplishment is presented in color (the darker the blue, the greater the priority) and also with a triangle sign; the size of the triangle implies which of the three grades of goal accomplishment has the most utility, while an underline means that the structure of output does not fit the predefined program options. An upside down triangle designates a negatively defined objective, i.e. that a stakeholder seeks to prevent the accomplishment of this "objective." A circle marks situations aimed at status quo continuation. Cases in which the stakeholder does not prefer a particular change are struck-through (in our case, OPEC does not prefer the decrease of its own reserves).
	Factors representing internal and external intervening variables which affect the prospect of objectives' accomplishment. We consider factors to be external when they do not affect the stakeholder's actions; in contrast, internal factors are affected by the stakeholders' actions. The influence that factors exert over other components of the graph (objectives, other factors, or even actions) is determined by the links which connect them (see below).
	The character of a link is defined by two parameters: intensity (multiple effect) and the direction of activity. The direction determines whether the given link amplifies, reduces, or is neutral; the direction of activity is marked with +, -, or no signs. Link intensity determines to what extent the link amplifies or reduces the succeeding component of the graph; Intensity is indicated by the size of the sign. It is also possible to define a mutually constitutional (bidirectional) link.

[87] Bots, P. W. G. (2009, February 3). *Overview of DANA*. Retrieved March 6, 2012, from: http://dana.actoranalysis.com/overviewframe.htm

4.2.1.1 Government (GOV)

Fig. 5: Perception graph: GOV



As illustrated, Poland attaches great importance to UNG development's possible outcomes. Its main goals are (1) security of supply; (2) a tax and royalty regime; (3) employment rate growth; (4) regional extraction sector (mainly infrastructure) development; and (5) support for natural gas market liberalization.

The first two objectives are high-priority; market liberalization and infrastructure development are considered desirable side effects.

Arguments about the importance of resource development, either in security terms or supply growth (particularly with regard to Central and Eastern European and Baltic countries), and in terms of economic competitiveness (UNG is a cheap resource for a "more competitive Europe"[88]) also appear in government announcements.[89] We did not include these arguments in the perception graph

[88] Daly, J. (2012, January 26). Poland Gives Green Light to Massive Fracking Efforts. *Oilprice.com*. Retrieved, March 7, 2012, from: http://oilprice.com/Energy/Natural-Gas/Poland-Gives-Green-Light-to-Massive-Fracking-Efforts.html

[89] For example: Poland Committed to Developing Its Shale Gas Reserves. (2011, May 19). *Warsaw Voice*. Retrieved, March 7, 2012, from: http://www.warsawvoice.pl/WVpage/pages/article.php/16734/news

because government representatives hold a cautious stance towards them (these are expected long-term outcomes), and because they can legitimize "outward" extraction development (towards other European states, particularly those engaging in the UNG debate).

On the "input" side (actions which governments perform to accomplish their objectives) we find (1) implementation of existing policies and creation of new legal frameworks; (2) support for convenient investment; and (3) communication with local communities and the general public.

The most important factors affecting achievement of objectives are (1) environmental standards (connectivity:[90] c = 10); (2) infrastructure (c = 5); (3) new regulatory frameworks (c = 5); (4) social consensus (c = 5) about the development of these resources; and (5) IOCs presence (c = 4).

The presence of these factors is a condition for reaching stated goals. The external factors (prospects) are: (1) the price of natural gas in continental Europe; (2) coal production; (3) renewables; (4) lack of environmental opposition; (5) the French nuclear lobby; and (6) Russian/Gazprom influence.

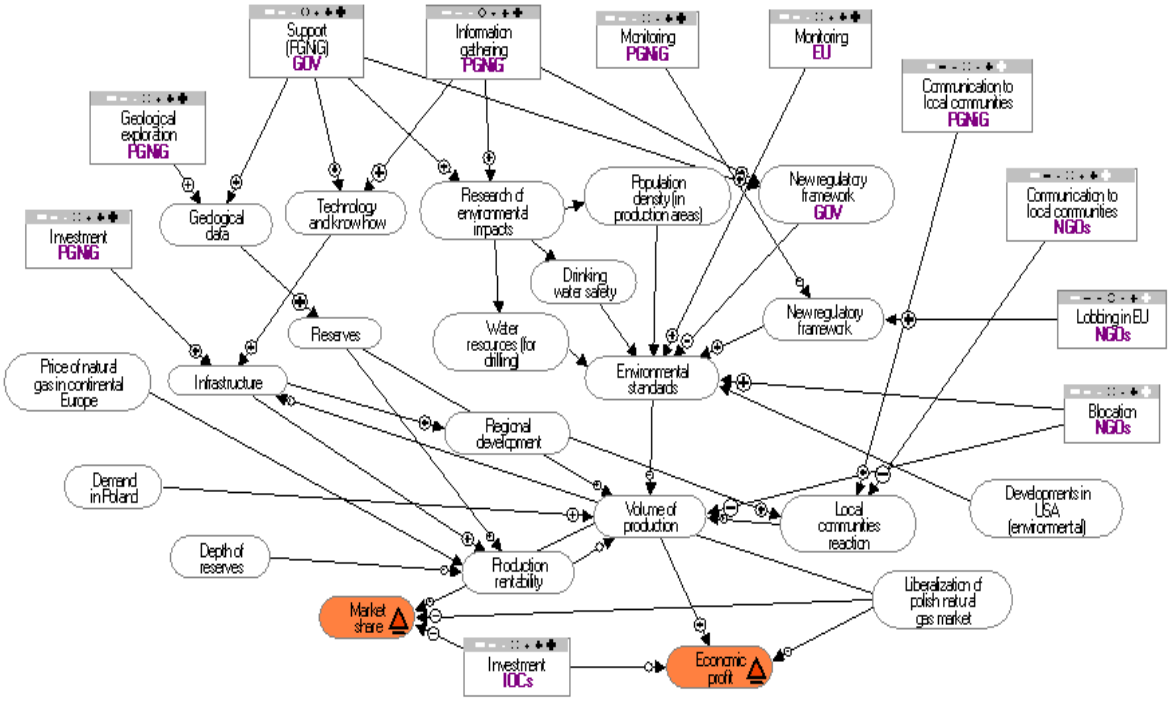
Significant influence is given to coal consumption's decline, which should be supplanted by UNG production. However, such a scale is not assigned to renewables growth; this trend is associated with limits on export potential to Germany. Further significant influence comes from France's critical opinion of UNG, which is perceived as threatening undesirable EU environmental regulations and disruption of social consensus for utilization of these resources (through environmental NGOs or local NIMBY movements). Gazprom's impact is observed in much the same manner.

Natural gas prices are another factor in which favorable development, meaning towards higher prices with breakeven price rising accordingly, is expected, although a certain level of uncertainty is acknowledged.

[90] Connectivity relates to the number of connections which factor has with other components of the perception graph.

4.2.1.2 PGNiG

Fig. 6: Perception graph: PGNiG



Due to the state's majority ownership (approx. 74%) of PGNiG, the linkage between outcomes of Polish UNG development and their goals is less clear. Like all commercial entities, the main objectives of PGNiG are (1) economic profit; (2) increasing (or, for monopolies, maintaining) market share.

Breaking the company up could be another goal motivated by changing market conditions in Poland (or because of expectations of such changes). This chiefly relates to market liberalization. This may also be reflected by UNG development performed by international companies (IOCs), currently led by ExxonMobil and Chevron. However, we did not identify this objective in primary data sources.

With 15 exploration licenses, PGNiG is the biggest actor in the (1) the geological exploration and test well drilling. Its intent to gain the greatest possible share of potential production is evident, and would counter the effects of any competitor's entry into the market. PGNiG's dominant position and import commitments with Gazprom explain, when compared to government and IOCs, its re-

strained position and sensitivity to environmental factors.[91] Another inputs such as (2) investment, both in exploration and infrastructure for UNG processing[92] or the necessity of (3) additional information gathering and monitoring the development of the debate around UNG's environmental impacts are also emphasized. (4) Communication with local communities where production will occur, particularly with regard to French development) is also very important. In addition to providing information, emphasis is placed on potential benefits to regional employment and infrastructure.

The EU is expected to continue (5) monitoring UNG, and not creating new UNG-related regulation. PGNiG, like other companies, is thus (6) waiting for and monitoring the EU debate and whether or not the national regulatory framework will be found to be sufficient. Coordination with government and (7) state support [GOV] for PGNiG is not surprising given PGNiG's ownership structure; strategic state interests are implemented through PGNiG.[93]

The presence of foreign companies will reduce PGNiG's market share, breaking its monopoly and decreasing its profits. Thus, such investments [IOCs] are opposed to PGNiG's objectives.

All NGOs' activities (8, 9, and 10) leading to tighter environmental regulation or complete bans on extraction (blockading, communication to local communities, lobbying [GOV]) are negatively perceived, all on the basis of *a priori*, ideological positions towards UNG.

The most important factors affecting the achievement of objectives are as follows: (1) environmental standards (c = 9); (2) rentability of production (c = 5); (3) infrastructure (c = 5); (4) research on environmental impact (c = 5); and (5) local community reactions (c = 4).

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[91] This situation has changed notably since Marek Karabula became Chief Executive Officer of the company (CEO). Karbula is considered to be a shale gas supporter and, according to media records, he will remain the CEO. PGNiG boss resigns (2012, December 20). Retrieved, March 7, 2012, from: http://www.warsawvoice.pl/WVpage/pages/article.php/19186/news

[92] PGNiG to invest in refinery to process shale gas (2011, October 17*). Warsaw Business Journal*. Retrieved, March 7, 2012, from: http://www.wbj.pl/article-56501-pgnig-to-invest-in-refinery-to-process-shale-gas.html?typ=wbj

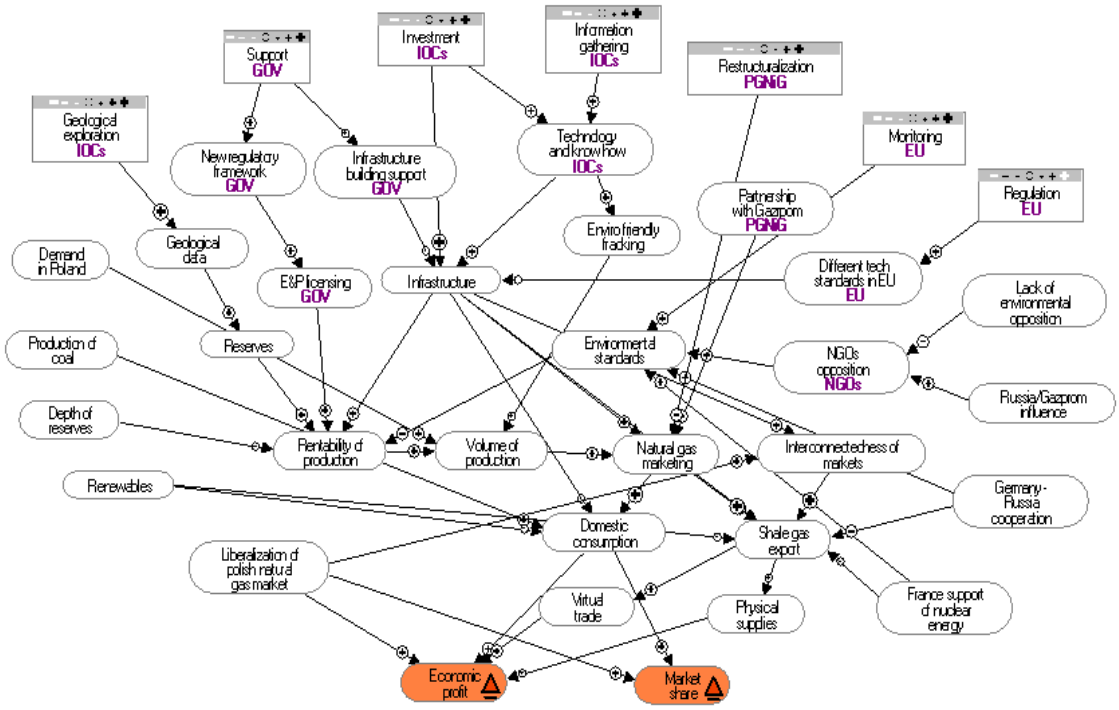
[93] Poland's PGNiG eyes 900 bcm of shale gas. (2011, November 21). Reuters. Retrieved, March 7, 2012, from: http://www.reuters.com/article/2011/11/21/pgnig-shale-idUSL5E7ML1SQ20111121

The external factors (prospects) are (1) the liberalization of the Polish natural gas market; (2) developments in the US (environmental); (3) the price of natural gas in continental Europe; (4) demand in Poland; and (5) the depth of reserves.

While the trend's direction cannot be observed at factors (2) and (3), it is evident that a decrease of profit is expected with liberalization of Poland's market. The greater depth of reserves is a negative as well (because of higher extraction costs). However, Polish natural gas demand is expected to rise.

4.2.1.3 Private companies (IOCs)

Fig. 7: Perception graph: private companies (IOCs)



Like PGNiG, private companies (IOCs) also have clear objectives: (1) Maximization of economic profit; (2) maximization of market share.

There are three input activities (1, 2, and 3) related to geological exploration; investment; and information gathering.

The following concern other stakeholders' inputs: (1) Support, whose approach is

positively-valued regardless of an inefficient certification process and a heavy bureaucratic burden, for example. PGNiG's retreating monopolist position is, in contrast, rather negative; PGNiG is considered an inefficient state juggernaut pressured by government to undertake (2) destructuralization and to invest in UNG.

The EU's role is evaluated similarly to PGNiG; the EU therefore presently (3) monitors UNG and, in the short-term, (by up to 5 years), it does not expect (4) regulation which would slow the development of UNG. If Europe tends towards stricter regulations, it will most likely be due to (1, 2, 3) French and German influence (i.e. countries which are critical of UNG development) and Gazprom's influence, through its various branches in member states. Along with these negative factors goes (4) renewable energy, either supported by the Union's environmental regulation or represented by renewables production growth in Germany, which is a potential (or rather, hypothetical) export market. This assumption is further weakened by (5) "extraordinary" relations between Russia and Germany (and by insufficient transport infrastructure on the level of factors). The main risk beyond IOCs' control is also (6) the depth of Polish reserves, since this generally increases the breakeven price.

On the other hand, positively evaluated trends are (7) the decline of coal's share in the energy mix; (8) the rise of natural gas demand associated with it; (9) market liberalization, which grants equal access to the market; and (10) a weak domestic environmental opposition; which explains the absence of this stakeholder in the IOC causal model.

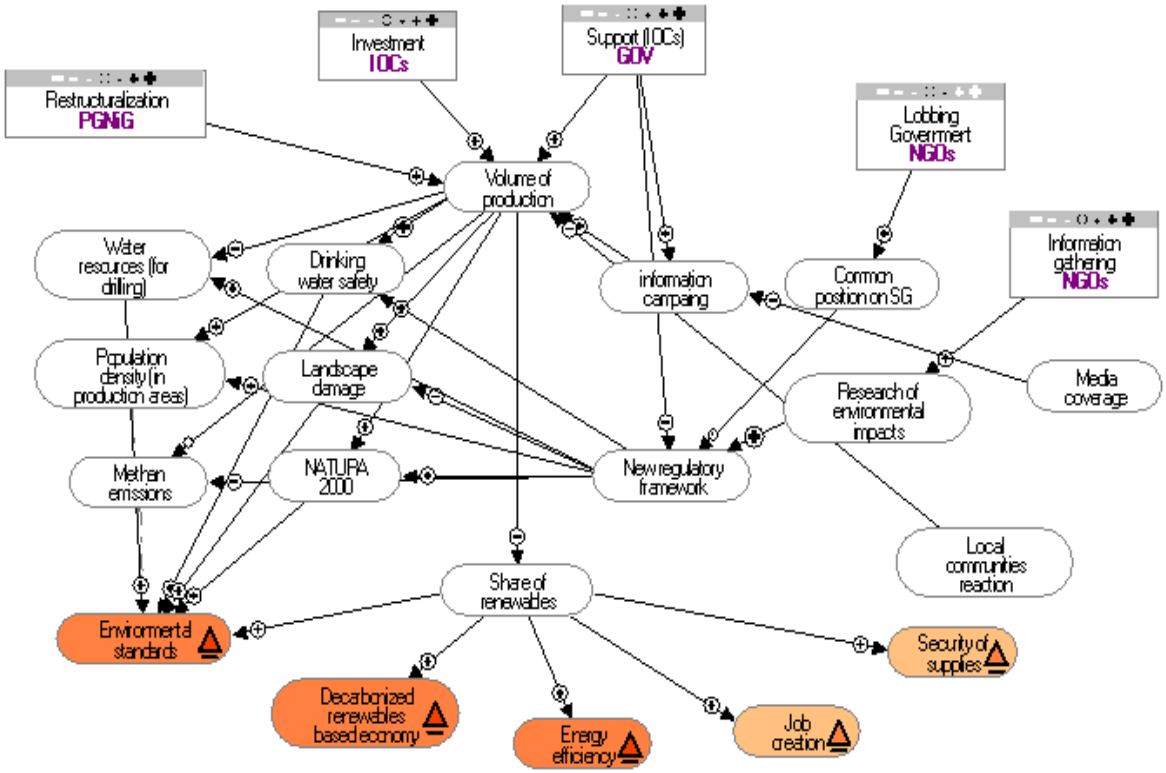
The most important factors affecting achievement of objectives are (1) infrastructure (c = 9); (2) natural gas marketing (c = 6); (3) rentability of production (c = 6); and (4) environmental standards (c = 5).

Regarding insufficient domestic infrastructure and undeveloped cross-border interconnections, in the event that extraction launch occurs quickly, high-volume sales will prove problematic. That is why supplies will initially be for local consumption or swap operations. Physical supplies can be optimistically expected later; export would probably be to neighboring countries (except Germany) and/or to the hub in Baumgarten.

As shown, environmental standards do not have as privileged a position as in the previous two cases (or in the following two: the EU and NGOs). Hydraulic fracking is perceived as a safe technology; non-toxic fracking mixtures are being developed, likely eliminating the most serious threat –pollution of drinking-water reserves.

4.2.1.4 Environmental NGOs

Fig. 8: Perception graph: NGOs



As illustrated, NGOs' perceptions of UNG's implications greatly differ from the previous stakeholders, both in terms of set goals, causal links between themes, and in terms of connectivity between individual factors. The factors which we observed are (1) environmental standards; (2) a de-carbonized, renewables-based economy; (3) energy efficiency; (4) job creation; and (5) supply security.

The first three objectives are priorities. Job creation and supply security are fairly secondary, but very desirable outcomes of energy sector decentralization and

the transition to renewables.

For actions which NGOs carry out in order to reach their goals, we find (1) lobbying government; and (2) gathering information. Naturally, in lobbying terms, NGOs perceive their position in relation to the government as very weak (reduced action range in the model). Additionally, there has been no agreement on the manner in which NGOs can interact with EU institutions. Because shale gas is a new topic for Polish NGOs, a great majority of them do not have official positions on it yet. In spite of the joint Climate Coalition platform being established, no collective action has occurred which would strengthen the NGOs' position against the Polish government or the EU. Information gathering and the detailed study of environmental impacts in Poland, which should precede extraction, are also considerably important. The manner of potential regulation is also an open question; i.e. whether modification of existing regulation is sufficient or if regulation specific to shale gas is required, or if EU regulations are required. NGOs refuse governments' and IOCs' stances that existing regulation is sufficient. The government, IOCs and PGNiG are interested in the fastest supply development possible (3) restructuralization and (4) investment without determining the environmental impacts.

With that goal in mind, the government (1) supports companies with intensive media campaigns focusing on supply security, the argument drawing the greatest attention.

Since international companies own the majority of concessions, it is unclear how important extraction's economic contribution will be. Considering all of the risks and the requirement to advance towards a de-carbonized, renewables-based economy, shale gas would be considered a usable, strategic resource in the long run. Although it solves some environmental issues, it should be evaluated only as a transition resource which helps minimize the impact of reduced coal mining.

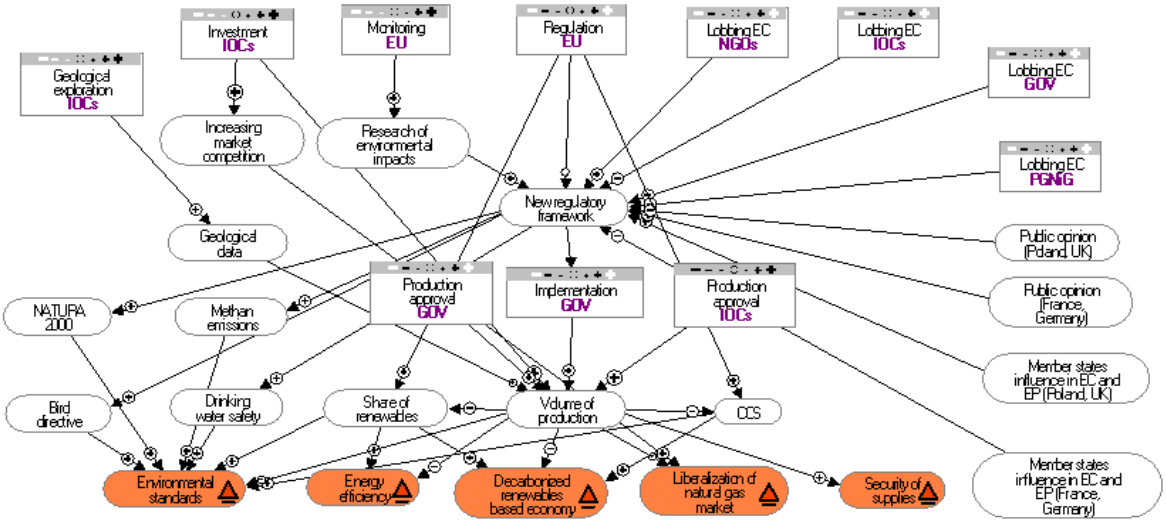
The most important factors which affect the achievement of introduced objectives are (1) new regulatory frameworks (c = 9); and (2) the share of renewables (c = 6).

The existence of a competitive relationship between UNG production capacity

and renewables' share in the energy sector is thus apparent. Since the renewables' share is the main factor positively affecting all objectives, it is clear that the growth of UNG production will always be associated with the decline of profit. A new regulatory framework should then eliminate extraction's negative outcomes; the government's support for IOCs is perceived as a risk here. The external factors (prospects) are (1) media coverage; and (2) local community reactions. The expected course in both cases goes towards a more critical stance.

4.2.1.5 EU

Fig. 9: Perception graph (EU)



The EU's perception graph intersects with NGO objectives and the government's agenda. In the first case, it is through (1) environmental standards; (2) energy security; and (3) a de-carbonized, renewables based economy. In the second, it is through (4) liberalization of the natural gas market; and (5) security of supplies. On the input side, we find (1) UNG monitoring; and (2) UNG regulation.

The EU is mainly observing progress in the US and gathering information; two research reports[94] are being prepared which will serve as a basis to decide if legislation should be adapted specifically for UNG. If a new regulatory framework is prepared, (3, 4, 5, and 6) all of the stakeholders (oil companies, the Polish gov-

[94] Philippe & Partners. (2012). *Final Report on Unconventional Gas in Europe. In the framework of the multiple framework contract for legal assistance* (TREN/R1/350-2008 lot 1). http://ec.europa.eu/energy/studies/doc/2012_unconventional_gas_in_europe.pdf

ernment, and NGOs) would try to enter that process through lobbying. The activities of the oil companies (7, 8) then stand in an obvious contradiction with the first three EU groups (1, 2, and 3). Like NGOs, the reason lies in renewables' key position (i.e. Carbon Capture Storage technology - CCS), which is in competition with shale gas. UNG development supports the remaining two objectives: market and supply security. It is necessary to remark about the EU market approach[95] to supply security, which differs considerably from the Polish government's position.

The most important factors affecting the achievement of these objectives are (1) a new regulatory framework (c = 15); (2) the share of renewables (c = 5); and (3) CCS (c = 4).

This distribution of factors suggests that if the EU's monitoring concludes that shale gas does not pose an environmental risk, it would have no reason to significantly interfere in UNG's development.

The external factors (prospects) are (1, 2) influence by member states through other EU institutions, particularly the Council of Ministers and the EP.

It is at also expected that the coalition of EU regulation supporters will center around France and Germany. Poland and probably Great Britain could push a solution at the member state level. Similarly can be evaluated also (3) the division of public opinion; and (4) opposition movement strength.

[95] European Union. (2000). *Green Paper. Towars a European strategy for the security of energy supply*. Retrieved from: http://ec.europa.eu/energy/green-paper-energy-supply/doc/green_paper_energy_supply_en.pdf

5. THEMES IN THE FOREIGN POLICY DISCOURSE OF THE RUSSIAN FEDERATION RELATED TO UNCONVENTIONAL NATURAL GAS[96]

We now examine the themes in which UNG is framed within (1) official state documents; (2) documents and announcements by Gazprom; and in (3) Russian Internet and printed media. For our database, see the list of literature resources; for more on our methodology, see the Methodology Appendix.

As with the perception analyses we pursued in the previous section, we approach international relations from a constructivist standpoint. We therefore assume that international policies result from the influence produced by political culture in a given state (structural level), which shapes identity, and thus the behavior political actors who reproduce transform political culture. This mutual influence happens primarily throughout the discursive process.[97] We use discourse as a particular form of *representation,* in our case, of the international milieu shaped by talks and texts.[98]

We are also interested in trends that those talks and texts have in common.[99] Our goal is to discover how UNG is *framed* in Russian foreign policy; specifically, what characteristics, naming, examples, etc. are associated with UNG, what sort of relationship exists between these semantic elements, and what arguments are related to UNG. We understand framing as a process within which certain aspects of reality are being emphasized in a given discourse, so that it is possible

[96] The authors thank Tatiana Kardošová for taking part in preparation of this chapter.

[97] See Baumann, R. (2002). The Transformation of German Multilateralism. Changes in the Foreign-Policy Discourse since Unification. German *Politics and Society* 20, pp. 6-8. Retrieved from: http://www.questia.com/googleScholar.qst?docId=5001932946

[98] See Fairclough, N. (2000). Discourse, social theory, and social research: the discourse of welfare reform. *Journal of Sociolinguistics 4*(2), pp. 163-195.

[99] We are, therefore, not interested in power relations, which are produced within the discourse, motivations of actors, and *primarily* not even in the social context of the communication. For interpretation of results alone, however, we (by necessity, based on our goal) do work with a social context.

to assert the specific definition of a given problem, its causal interpretation, its moral evaluation and recommended solution.[100 and 101]

Again, the analysis' contribution does not lie in the capability to predict actors' behavior. This is because mutual formative influences between the sources of international politics and their realization makes that sort of explanation impossible. The intention here is to understand how some foreign policy positions and actions are legitimized; enabling one to identify what parts of the discourse should be protected and what represents the a threat.[102] We will demonstrate:

(1) What meaning Russian foreign policy discourse attributes to UNG and how it identifies UNG resources;
(2) Additional elements of the discourse and how they are related to UNG; and
(3) How UNG's theme is framed in foreign policy discourse and by what argument scheme is associated with it.

We will summarize the definitions most often given to UNG, which definitions should be considered crucial, and what categories can be formed from those definitions. Individual segments granting specific meaning to UNG are selected and coded within corresponding texts (that is, within the parts relating to UNG). By comparing and merging particular codes, summary categories can be formed which concentrate the meaning of related codes into one general concept. Individual categories are further defined through dimensions, i.e. characteristic attributes which can acquire different values.[103]

Based on our analysis, two themes were formed (1) the image of Russia as a reli-

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[100] König, T. (2007). Frame Analysis. Theoretical Preliminaries. *Research Methods: an ESRC research programme*. Retrieved from http://www.ccsr.ac.uk/methods/publications/frameanalysis/

[101] In framing theory, there is no agreement on whether thematization occurs through an unintentional discursive process (Goffman, 1974), or whether speakers alone can manipulate components of the discourse and purposefully select from the available interpretations to suit their interest. (Entman, 1993). In this study, we resort to the second theoretical approach. Cited according to König, T. (2007). Frame Analysis. Theoretical Preliminaries. *Research Methods: an ESRC research programme*. Retrieved from http://www.ccsr.ac.uk/methods/publications/frameanalysis/

[102] Weldes, Y. (1996). Constructing National Interests. *European Journal of International Relations 2*(3), 275-318. doi: 10.1177/1354066196002003001

[103] Corbin, J., & Strauss, A. (1999). *Základy kvalitativního výzkumu. Postupy a techniky metody zakotvené teorie*. Brno: Sdružení podané ruce. Boskovice: Nakladatelství Albert.

able supplier; and (2) the character of the relationship between conventional and unconventional natural gas.

The first field is defined by the categories *reliable supplier* and *the century of gas*, and the second field is defined by the categories *successful natural gas* and *mistaken unconventional gas resources*.

5.1 THE IMAGE OF RUSSIA AS A RELIABLE SUPPLIER

First category included (*reliable supplier)* sums up the ways in which the position of Russia as a natural gas supplier is presented. As shown (table), the key lies in the triplet of following codes: *perspective NG, perspective supplier* and *stable Russia*.

The stability image (*stable Russia)* is being shaped mainly by comparing stable inner political and security situation in Russia to instability typical of traditional producers in the MENA region[104]. The stability of Russia constructed this way is evident in, for example, this segment of Alexej Miller's statement:

> "Political crises in North Africa and the Middle East, the war in Libya and suspended oil and gas deliveries from this country caused changes in the approach to the energy supply risks assessment.
>
> The question is clear: Does Europe need another Libya to reduce its dependence on Russia?"[105]

In contrast, Russia, and Gazprom respectively, represent a proven and predictable long-term partner:

> "I want to say that for more than 40 years of gas supplies to Europe we have never violated our contractual obligations, fully and timely sup-

[104] MENA (Middle East and North Africa): the abbreviation denotes the geographical area of North Africa and Middle East countries.

[105] Miller, A. (2011, June 2). *Ecological Challenges and the Energy Sector*. Speech presented at the European Business Congress Annual General Meeting and Conference "Ecological Challenges and the Energy Sector", Prague, Czech Republic. Retrieved from: http://www.gazprom.com/press/miller-journal/067734/

plied the required gas volumes to our consumers."[106]

We can observe similar argumentation in official Gazprom documents, which represent experts' opinions on the development of unconventional resources:

> "The USA has understood that it may get rid of the dependence on the unfavorable regimes. These are, mainly, the Middle Eastern regimes that traditionally supplied LNG to the North American market.[107]
> . . .
> For Europe it is a real blessing that it has such a powerful neighbor with such conventional gas reserves. Exploration of non-conventionals may end with no results, as experience of certain countries shows. So let's live in peace and friendship and contribute to strengthening Russia's contacts and ties with the European Union and Ukraine."[108]

Russia has been, therefore, sketched as a proven, stable and reliable supplier which represents *an alternative* to the supplies of energetic commodities from politically unstable regions. Russian supplies are considered as *the way out* of current turbulent situation. Accordingly, as was the case with the category of *triumphing NG,* the choice between good (Russia) and bad (*unfavorable regimes*) comes into sight. That is the case despite the fact that, according to the assessment of the Freedom House index, Russia holds approximately the very same level as these regimes do[109]; notwithstanding historically burdened relations between Russia and a number of European consumers.

By the same token, not only do Russian supplies represent the way for overcoming current state of extreme uncertainty on the energy markets, but they also offer *long-term solution* by providing sufficient intake of energy resources. Con-

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[106] Gazprom. (2011, February 21). *Press Conference following the Topical European Energy Issues roundtable discussion* . [Press Release]. Retrieved from: http://www.gazprom.com/f/posts/80/905737/krugly-stol-stenogramma-eng-2011-02-21.pdf

[107] Gazprom. (2010, May 13). *How can the development of shale gas production influence the global energy market?* Retrieved from: http://gazprom.com/press/comments/522327/

[108] Gazprom. (2011, February 21). *Press Conference following the Topical European Energy Issues roundtable discussion.* [Press Release]. Retrieved from: http://www.gazprom.com/f/posts/80/905737/krugly-stol-stenogramma-eng-2011-02-21.pdf

[109] See Freedom in the World (http://www.freedomhouse.org/report-types/freedom-world).

trary to a series of skeptical estimations[110] regarding Gazprom's productive capabilities, the image of *perspective supplier* has been set, which has so far not completely developed its *potential;* which was clearly indicated by A. Miller in his other statement:

> "Great efforts have been taken lately on streamlining the geological exploration system in Gazprom. Structural changes are underway - the Company is consolidating its onshore exploration activities performed in Russia and abroad. The cost management system in exploration has been improved, exploration efficiency indicators are introduced with due consideration for the value of growing physical reserves, their commercial value, role and place in ensuring the mid-term and long-term gas balance."[111]

The concept *potential* was emphasized even stronger in relation to the natural gas as a commodity and the conventional resources (code *perspective NG;* read further for more details). Two codes remaining, *diversification* and *foreign investment*, further strengthen the image of Russia as a reliable (in this context: reliable because worldly competitive) supplier:

> "Being a global energy company, Gazprom develops hydrocarbon fields abroad.
>
> Hydrocarbon reserves have been discovered within our licensed blocks in Algeria. Commercial gas inflow was reported during exploration drilling in Uzbekistan.
>
> Gazprom signed production sharing agreements with Equatorial Guinea and a contract to develop an oil field in Iraq as well as reached agreements with foreign partners enabling to expand Gazprom's par-

[110] For example Mäkkinen, H. (2010). *The future of natural gas as the European Union´s energy source – risks and possibilities*. Electronic Publications of Pan-European Institute 9/2010. Retrieved from: http://www.tse.fi/FI/yksikot/erillislaitokset/pei/Documents/Julkaisut/M%C3%A4kinen.pdf

[111] Miller, A. (2011, June 30). Gazprom: New Horizons. Speech presented at the Annual General Shareholders Meeting, Moscow, Russian Federation. Retrieved from: http://www.gazprom.com/press/miller-journal/370038/

ticipation in developing hydrocarbons in Latin America."[112]

We can, therefore, summarize that the image of Russia as a reliable supplier is based on the emphasis of transparency and inner political stability, superpower position of Russia, the importance and potential of its conventional reserves and also know-how and capital power of the Russian gas sector. Rival suppliers are then characterized as either instable or problematic regimes (MENA states), or like producers whose exporting potential is limited; in case of the UNG, typically due to economical and technological reasons. The *adventure* metaphor is a quite commonly used one for giving the UNG development an *irrational* quality and a high degree of *uncertainty* associated with it. At the same time, the attention is drawn to the fact that Europe is losing the privileged position of the *only* key consumer market, as supported by references to the exporting diversification via LNG terminal and supplies to East Asian markets:

> "Gazprom has many advantages - long-term rules of play; no risks, neither technological nor economical. The question is whether this stability and confidence in future will be heavier on the scale than the adventurous attempts to find an alternative to conventional gas.[113]
>
> . . .
>
> There is no doubt the beginning of gas deliveries to China along the "western route" will become a new reference point in the history of the Russian Unified Gas Supply System development.[114]
>
> . . .
>
> At the same time, the proportion of European energy markets in the total volume of Russian energy export will steadily decline due to export diversification to Eastern energy markets (China, Japan, Republic of Korea, other countries of the Asia-Pacific region)."[115]

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[112] Miller, A. (2011, June 30). Gazprom: New Horizons. Speech presented at the Annual General Shareholders Meeting, Moscow, Russian Federation. Retrieved from: http://www.gazprom.com/press/miller-journal/370038/

[113] Gazprom. (2010, May 13). How can the development of shale gas production influence the global energy market? Retrieved from: http://gazprom.com/press/comments/522327/

[114] Miller, A. (2011, June 30). Gazprom: New Horizons. Speech presented at the Annual General Shareholders Meeting, Moscow, Russian Federation. Retrieved from: http://www.gazprom.com/press/miller-journal/370038/

[115] Russian Department of Energy. (2009). *Energy strategy of Russia for the period up to 2030*. Moscow: Author, p. 23. Retrieved from: http://www.energystrategy.ru/projects/docs/ES-

The second category *(the century of gas)* defines the position of the natural gas in the context of the changing structure of the energy market. Besides the image of the natural gas itself, the presentation of alternative resources (primarily renewables) is decisive as well.

Accordingly, an analogy is drawn with the period of oil dominance in the second half of the 20th century. This "turnover", therefore, implies the decreasing importance of oil, which is by all accounts taken (and should be taken) by natural gas, or more precisely, natural gas extracted from conventional resources. Competing resources, whether core resources or renewables, are then considered as either dangerous (events in Fukushima) or uncompetitive (renewables and also UNG); incentives to their development are, therefore, political, not economic in their nature:

> "For instance, the March earthquake in Japan and the subsequent tragedy with Fukushima 1 Nuclear Power Plant strongly affected the market not only due to the breakdown of some energy capacities, but rather due to the large-scale environmental collapse provoked by these events. As a result, many energy consumers changed their opinion of the nuclear power industry. And this involves other global systems as well. The public opinion is nowadays focused on environmental and energy safety issues that can be met using, first of all, conventional energy sources with natural gas as the top-priority.[116]
>
> . . .
>
> We think that today, in the current post-crisis period, the Third Energy Package has become outdated from the standpoint of supporting energy alternatives. The reason for this is quite simple - state budget deficits in the European countries. And if some time ago the European Union could afford itself to provide large subsidies for alternative energy, today we see that the situation has changed and the amount of subsidies is reducing rapidly. That's why power energy prospects didn't seem to look good with the existing subsidies, but, anyway, at present,

2030_%28Eng%29.pdf

[116] Kirilov, D. (2011, June 23). Stanislav Tsygankov: Maintaining the drive. Gazprom Magazine Issue 6. Retrieved from: http://www.gazprom.com/press/reports/tsygankov-draiv/

> in the post-crisis period, they seem to be even more problematic than before. That's why we consider the 20th century to be the age of oil and the 21st century - the age of gas. Gas is surely the key fossil fuel, which will dominate the European Union energy balance in the medium and long term. I'm sure about it."[117]

The unfavorable economic situation therefore only underscores the non-viability of Union's plans to switch to the decarbonized energetic sector and the inevitability to strengthen the role of the natural gas in the energetic mix of the EU on the expense of not only traditional fossil fuels, but of renewables as well.

5.2 THE CHOICE BETWEEN CONVENTIONAL AND UNCONVENTIONAL RESOURCES

The *successful NG* category includes a series of attributes determining conventional natural gas characteristics and its position within the energy sector. The *mistaken UNG* category then combines definitions which run counter to "traditional" or "conventional" natural gas. As we will later see, polarized arguments are typical of UNG themes.

Arguments supporting greater usage of "conventional" natural gas are fairly consistent, and when natural gas is mentioned, we usually find mention of all of the codes. An interview with Stanislav Tsygankov, General Director of Severneftegazprom, illustrates this heavy emphasis on natural gas:

> "This situation proves our words that we have been proclaiming for many years now: natural gas remains the most efficient, environmentally-friendly, clear both for producers and for consumers and, most importantly, the safest energy carrier. Its safety may be evaluated not only in terms of an individual business entity or a household, but rather on the global scale – by counties and state alliances such as the European Union. In this context, natural gas has been and will in the foreseeable future remain number one energy resource associated with stability, demand and development prospects for the global gas indus-

[117] Gazprom. (2011, February 21). *Press Conference following the Topical European Energy Issues roundtable discussion* . [Press Release]. Retrieved from: http://www.gazprom.com/f/posts/80/905737/krugly-stol-stenogramma-eng-2011-02-21.pdf

try as a whole and our company in particular."[118]

Natural gas is associated with attributes such as efficiency, ecology, transparency and safety. Verification or establishment of natural gas in Europe is emphasized, as is its role in gas sector stabilization and in EU economic development. This is also an interesting reference to the fact that *natural gas* was and probably will remain the most important resource of the global *gas* (sic) sector.

This statement implies that natural gas produced in unconventional deposits is considered distinctive distinct, *different source of energy* in relation to "conventional" or "traditional" natural gas (even though its characteristics are identical). Stressing the distinctiveness and competitiveness of UNG creates problems for its position within the *century of gas* image, which should be the same "traditional" natural gas. This differentiation is also important from a normative connotations standpoint regarding UNG utilization.

While characteristics such as efficiency, eco-friendliness, and availability are represented as simple and evident facts, the aforementioned code *good gas* highlights the segments of the text which carry an *explicitly* normative message:

> "Shale gas production development in America enthusiastically regarded by many experts has an adverse effect on Europe so far. "What brings the competitiveness - a newly discovered cheap energy resource or still subsidized renewable power generation?" The answer is evident and it will not cheer European taxpayers.
>
> Of course, by no means we are calling for a turn back in the course of history. But we want to highlight that the critical mass of factors has already been reached allowing to reconsider the European sense of good and bad, the structure of the optimal fuel and energy balance and the prioritization of the energy policy in a changing environment."[119]

[118] Kirilov, D. (2011, June 23). Stanislav Tsygankov: Maintaining the drive. *Gazprom Magazine Issue* 6. Retrieved from: http://www.gazprom.com/press/reports/tsygankov-draiv/

[119] Miller, A. (2011, June 2). Ecological Challenges and the Energy Sector. Speech presented at the European Business Congress Annual General Meeting and Conference "Ecological Challenges and the Energy Sector", Prague, Czech Republic. Retrieved from: http://www.gazprom.com/press/mi-

The choice between conventional and unconventional natural gas resources is portrayed as the choice between "right and wrong" or "good and bad". This message can thus be understood as determinative or instructive. Investment in UNG is associated with economic loss which the consumer will bear. Consumer countries are put before key (even moral) decisions, deciding whether they will move towards stability and prosperity, or towards uncertainty and decline.

The codes *costly UNG* and *mythical UNG* are the most frequent ones; they both reference irrationality of UNG. UNG development is represented as a purely political decision directed against *common sense* or against market efficiency which cannot be *outwitted*:

> "There is common sense as it relies on the economics that are impossible to outwit. And there is the policy that is often detached from real market demands, but willing to meet the interests of this or that country."[120]

UNG's mythical quality is acknowledged by analogizing with unsuccessful biofuels or blaming a speculative *bubble* for the UNG's temporary success. Just as the real estate bubble was expanded by the rise of new financial instruments which hid the real value of assets, the UNG bubble is expanded through investment hedging which obscures the high costs of extraction. It is, therefore, only a matter of time until the situation is corrected; i.e. *waking up* to reality. Accordingly, the label *myth* is frequently used in an explicit manner.

> "As for shale gas - it is an international PR campaign, well planned by mass media. There are plenty of those campaigns - global warming, biofuel, I can give other examples.[121]
>
> . . .
>
> It's very hard for shale gas producers to stop dreaming. We can say

---

ller-journal/067734/

[120] Kirilov, D. (2011, June 23). Stanislav Tsygankov: Maintaining the drive. *Gazprom Magazine Issue* 6. Retrieved from: http://www.gazprom.com/press/reports/tsygankov-draiv/

[121] Gazprom. (2011, February 21). *Press Conference following the Topical European Energy Issues roundtable discussion*. [Press Release]. Retrieved from: http://www.gazprom.com/f/posts/80/905737/krugly-stol-stenogramma-eng-2011-02-21.pdf

> that shale gas production reminds one of riding a bicycle: if you stop pedaling, you fall. Hedging is the second explanation - your revenues allow you to meet your costs and you are allowed to survive for a certain amount of time until your situation improves.[122]
> ...
> Look, we do not believe in this myth of shale gas, that it is cheap gas. It is not true."[123]

UNG's temporary success was explained primarily through the unique nature of the North American market. Reproduction of the "quiet revolution" in Europe was excluded; moreover, growth of UNG prices could only occur in the US. UNG will thus not exceed additional resources. We should add that the UNG is labeled as perspective prospective resource only in the North American market, Russian UNG supplies, and in local UNG usage. Therefore, UNG has no potential to influence the European market's structure.

> "We do not think that the American experience with the extraction of gas from shale will be easily transferable to Europe – for legal, geological, technological, environmental and other reasons. In any case, the shale gas produced in Europe will be more expensive than in the U.S. And that is why we do not find shale gas to be a serious competitor."[124]

UNG utilization is also used with following concepts: *geological uncertainties*, *technological shortcomings, environmentally risky* and *lacking regulative framework*. All of these characteristics further strengthen the element of uncertainty and lack of potential of UNG. Environmental risks are given factual status, even though authoritative studies confirming this are not available.

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122 Natural Gas Europe. (2011, April 18). Gazprom: Think Twice About Shale Gas. Natural Gas Europe. Gazprom. Retrieved from: http://www.naturalgaseurope.com/gazprom-costs-of-shale-gas

123 Sergej Komlev's statement, Head of Contract Structuring and Price Formation Directorate. Baczynska, G., Kahn, M., & Reddall, B. (2012, February 9). Insight: Poland's shale gas play takes on Russian power. Reuters. Retrieved from: http://www.reuters.com/article/2012/02/09/us-poland-shalegas-idUSTRE8180PM20120209

124 Tramba, D. (2011, June 13). Břidlicový plyn? Nemá šanci, říká šéf Gazpromu. *Lidové noviny*. Retrieved from: http://byznys.lidovky.cz/bridlicovy-plyn-nema-sanci-rika-sef-gazpromu-f35-/firmy-trhy.asp?c=A110712_150431_firmy-trhy_apa

> "It is obvious that serious conclusions on the prospects for shale gas production development are premature. The phenomenon is young and has no "deferred result" when you can estimate long-term consequences. Will this factor become so influential to make a considerable impact on the global markets and the global energy policy, or will it remain just a regional phenomenon? This will be clear at least in five years.[125]
>
> ...
>
> The production of shale gas is associated with significant environmental risks, in particular, the hazard of land surface and underground water contamination with chemicals applied in the production process. This fact already caused the prohibition of shale gas development and production in France."

Shale gas projects feature a number of technological and commercial peculiarities. These include a large scope of drilling, a sharp drop in production volume in the first few years, a constant need to move to new development areas, significant consumption of water, and substantial environmental risks.[126]

5.3 RUSSIAN CONVENTIONAL RESOURCES AND THE BEGINNING OF THE NATURAL GAS ERA

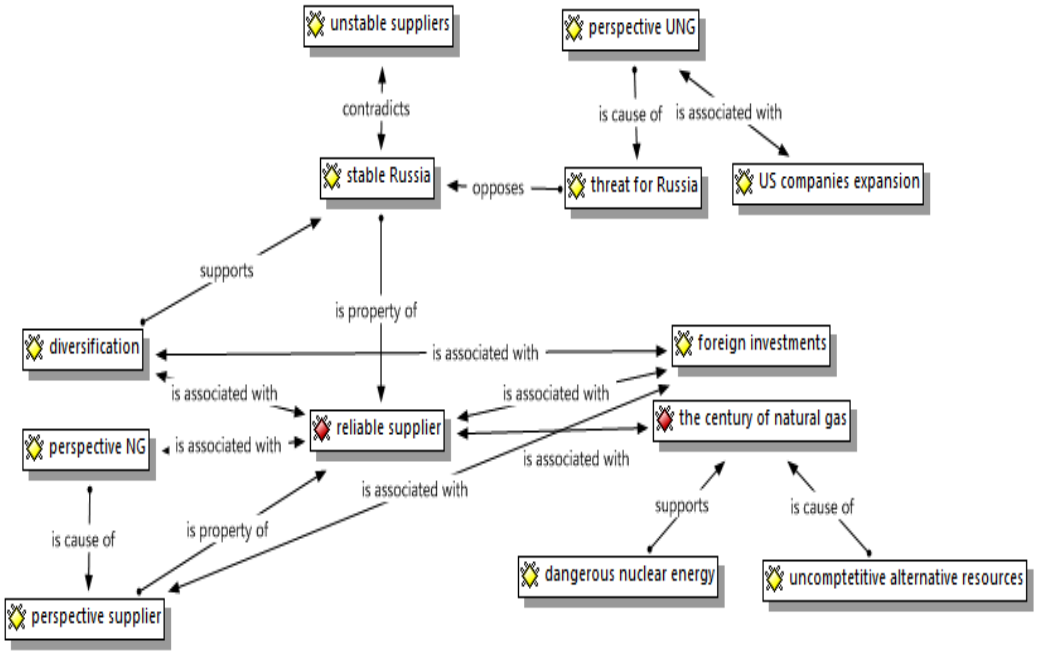
As is already evident from the graph, the category *reliable supplier* is primarily determined by characteristics of stability and resource potential (codes *stable Russia* and *perspective supplier*). The codes *diversification* and *foreign investments* further develop this meaning. The image of reliability is formed by both defining oneself against unstable suppliers and setting natural gas as a commodity growing stronger and possessing competitive advantage against other energy commodities. It is this natural gas model with an assumed macroeconomic prospect that enables the formation of the contextual category *the century of gas*. Russia, as the largest natural gas exporter and the owner of the greatest open supplies, *logically* has to occupy an even more important position in this newly

[125] Gazprom. (2010, May 13). How can the development of shale gas production influence the global energy market? Retrieved from: http://gazprom.com/press/comments/522327/

[126] Gazprom. (2011, November 29). Gazprom to keep focus on worldwide shale gas development. Gazprom. [Press Release]. Retrieved from: http://www.gazprom.com/press/news/2011/november/article124440/

emerging environment.

Fig. 10: Semantic network[127] graph 1



UNG stands outside of the image above. As previously argued, successful development of UNG is regarded as unique to the North American market, having no rational basis anywhere else. Despite general trivialization, there are also several cases in which UNG development is associated with a threat to the Russian market position. A direct threat (in the first paragraph below) is associated with concerns that Russia's consumer market share would shrink, while indirect threats (in the second two paragraphs) relate to the ongoing pressure regarding long-term contracts and their relation to oil and growing competition.

> "Komlev said he had read in a Polish newspaper that Poland could become a second Norway. "I started to imagine what would happen with our long term contract with Poland, expiring in 2022, which is for delivery of 11 billion cubic meters per year. I can imagine Poland would break relations with Russia, and start production of shale gas."[128]

[127] Semantic network represents semantic associations between concepts that it consists of. It consists of nods (of concepts; in our case, of codes and categories) and connections/associations which characterize the relationships between particular nods (concepts).

[128] Natural Gas Europe. (2011, April 18). Gazprom: Think Twice About Shale Gas. Natural Gas

> . . .
> Shale plays in Europe have not been investigated so far. There are two most common, though opposite, opinions. According to the pessimistic opinion, shale gas reserves account for a half of the onshore gas reserves being developed in Europe. While the optimistic opinion states that these reserves are commensurate with the conventional gas reserves in the operating fields and reach a half of all the discovered but not developed conventional gas reserves. The deposits could be large enough for Europe to repeat the US experience.
>
> In this situation Russia should in any case think of how to maximize the profit from gas exports to Europe. One of the options is to change the gas pricing mechanisms by detaching the formula from oil derivatives. Meanwhile, it is most likely that the amount of gas supplies to the European market well be maintained. Another option is to keep the price formula intact with a high probability of reduction in supply amounts. In order to select the best option, it is necessary to carry out serious analysis based on the market development scenarios and the actions of other market players."[129]

The likelihood of a threat to Russia is certainly associated with the list of (mainly economic) arguments, raising doubts about the UNG potential, and, by the same token, the treat itself.

5.4 THE COMPETITIVE RELATIONSHIP BETWEEN CONVENTIONAL AND UNCONVENTIONAL RESOURCES

While the "traditional" or "conventional" natural gas (*triumphant NG)* is unequivocally and consistently emphasized, the formation of UNG's meaning is more complex. The antagonistic nature of both categories is evident; codes which determine them are formed in dichotomy: pure NG vs. environmentally risky NG, established NG vs. mythical NG, NG with prospects vs. NG without prospects, and so on. This polarity is constant: "conventional" natural gas and UNG do not

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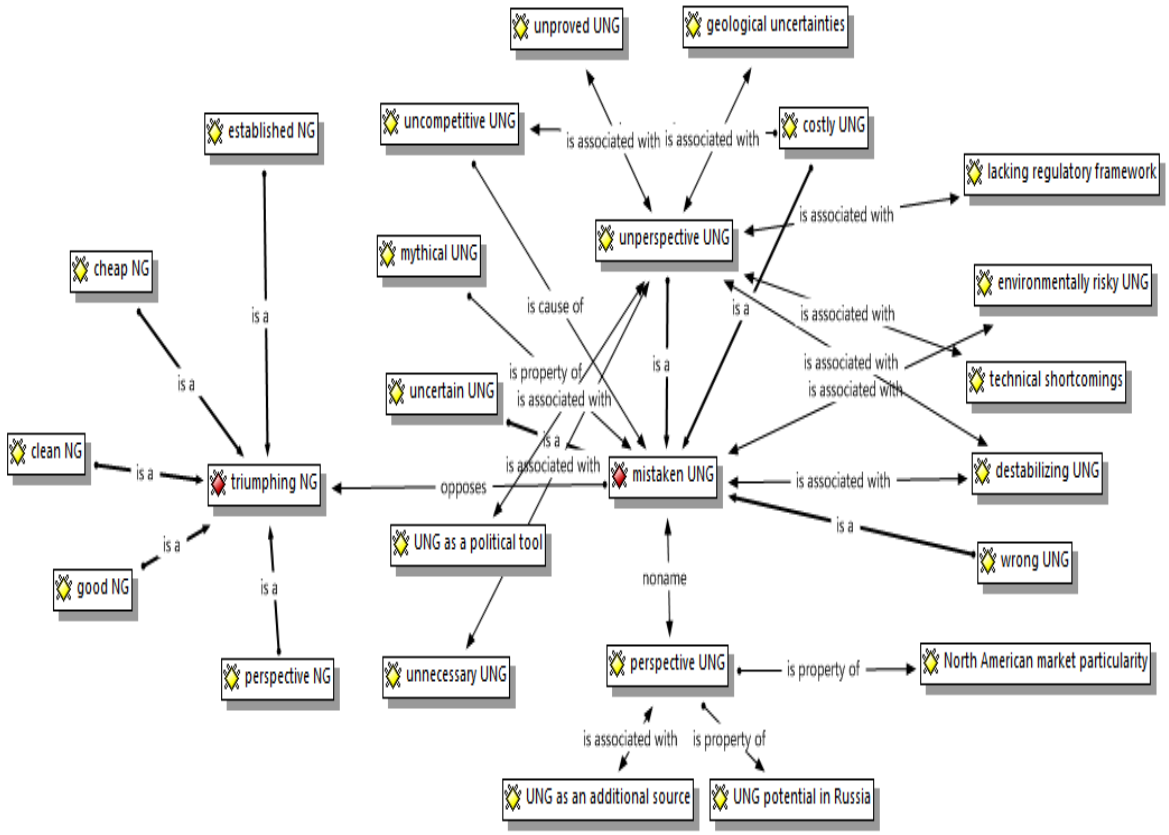
Europe. Gazprom. Retrieved from: http://www.naturalgaseurope.com/gazprom-costs-of-shale-gas

[129] Gazprom. (2010, May 13). How can the development of shale gas production influence the global energy market? Retrieved from: http://gazprom.com/press/comments/522327/

have a single code in common. The relationship between *triumphing UNG* and *mistaken UNG* is in that way perfectly competitive. Emphasizing that UNG is a different, unproven and destabilizing source of energy is repeated here.

Fig. 11: Semantic network graph 2



6. POLISH UNG EXTRACTION AND ITS IMPLICATION ON CENTRAL-EUROPE

It has been impossible to predict how UNG extraction will occur in Poland; however, we can estimate the effects of regional natural gas trade development. That development is expressed by scenarios generated from the combination of extraction level and the nature of regional cross-border interconnections. The scenarios are analyzed using the MEOS model, which was successfully applied in a study titled *The Future of Natural Gas Security in V4 Countries*. For more on the MEOS methodology, see the Methodology Appendix.

6.1 SCENARIO SETTINGS

Scenarios are usually set in the year 2020. The study combines three supply variants characterized by various levels of Polish UNG extraction, one demand variant and five infrastructure variants. The Reference scenario represents the regional situation before Nord Stream pipeline was built, the Nord Stream scenario reflects the changes generated by this pipeline, and, finally, scenarios 1 through 5 introduce different levels of interconnection among distinct Central European distribution systems. A plan has been drafted for a connection network called the North-South Gas Corridor, which connects or will connect the markets of Poland, the Czech Republic, Austria, Slovakia, Hungary, and Croatia.

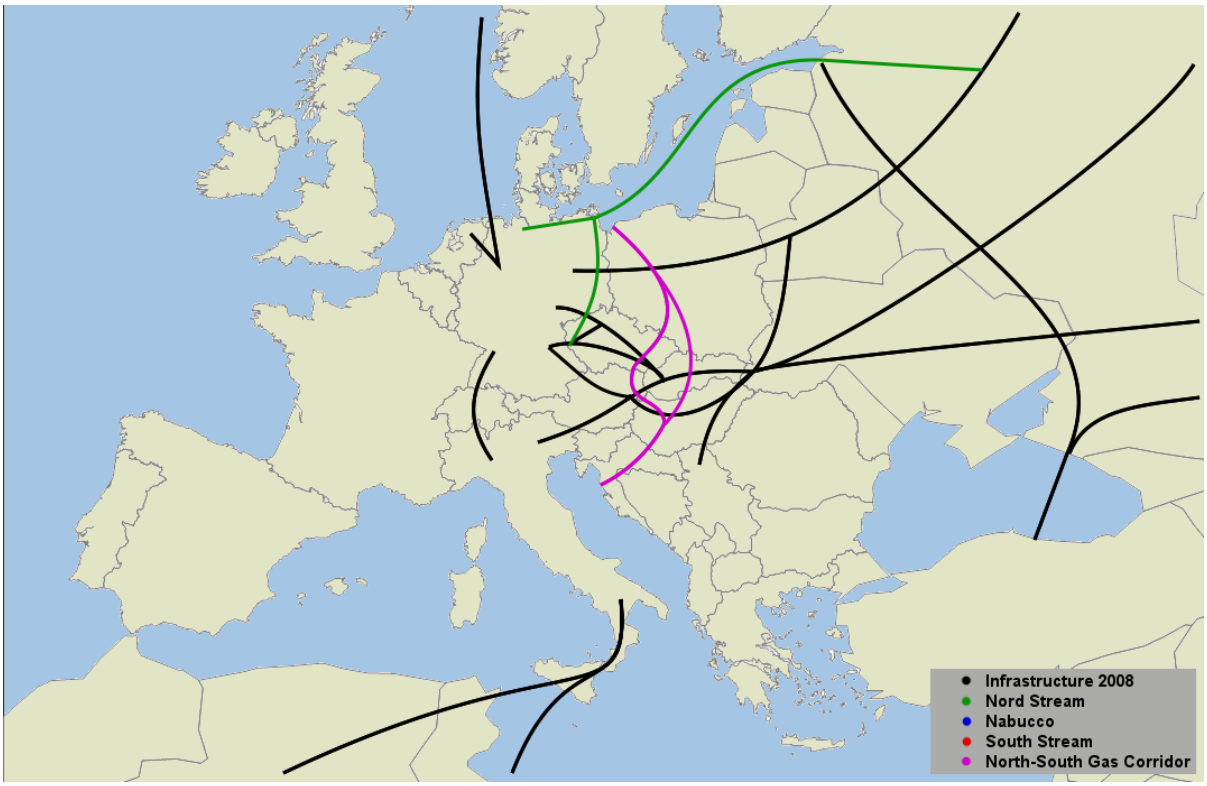
Tab. 5: The variants of supply

Unconventional production 5 bcmy	Scenario 1
Unconventional production 10 bcmy	Scenario 2
Unconventional production 50 bcmy	Scenarios 3-5

Tab. 6: The variants of infrastructure

Status of 2008	Reference scenario
Status after launching Nord Stream	Nord Stream
Nord Stream + North-South Gas Corridor (1 branch, 5 bcmy)	Scenario 1-3
Nord Stream + North-South Gas Corridor (2 branches, 5 bcmy)	Scenario 4
Nord Stream + North-South Gas Corridor (2 branches, 10 bcmy)	Scenario 5

Fig. 12: Visualization of infrastructure



Tab. 7: Variants of demand (development in selected consumption nodes, bcmy)[130]

	2008	2020
Czech Republic	8,7	9,1
Slovakia	5,7	7,2
Poland	13,9	16,1
Hungary	12	16,5
Austria	8,6	9,6
Serbia + Bosnia and Herzegovina	2,7	3,7
Germany	93	96,3
Italy	84,8	102,2

6.1.1 The Reference Scenario

The reference scenario is based on the status of flows and infrastructure captured in 2008, before the economic crisis and construction of the Nord Stream pipeline. This scenario reflects all source areas affecting gas flow in the V4 region and the associated transport infrastructure.[131] The scenario, therefore, covers the following:[132]

Russia

Russia is at the point when supplies meant for European demand (the west-Siberian Nadym-Pur-Taz, NPT, including the Yamal peninsula, and the areas of Orenburg and Astrachani southern European Russia and the Barents Sea) are becoming more important. Three super-giant fields are in the NPT region: Urengoy, Yamburg, and Medvezhye. Together, they total more than two-thirds of all Russian production and have been at peak production for more than a decade (in Yamburg's case) or two (in Urengoy's case).[133] The decline of their production

[130] These values do not include domestic production consumption. In 2020, these numbers will be significant only in Poland (approximately 3.5 bcmy) and Italy (5 bcmy). In Germany, domestic production is covered by exports, but a small portion of French consumption (6 bcmy) is also added to their own, which is supplied via the Czech Republic and Bavarian Russia. Likewise, Switzerland's consumption is included in Italian consumption.

[131] The MEOS model, like any other model, operates with certain level of generalization. For an example, see the previous footnote.

[132] For a more detailed outline, see Černoch (ed. 2011). *The Future of Natural Gas Security in the V4 Countries*. Brno: IIPS.

[133] *Fernandez*, R.*: Russian gas exports have potential to grow through 2020*, Energy Policy, Vol 37, No 10, October 2009, pp. 4029-4030. To download, go to: (http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6V2W-4WD6Y0K-3&_user=10&_coverDate=10%2F31

(by approximately 20 bcmy per year) was to be offset by the Yamal field (Bovanenko) and by deposits in the Barents Sea (Shtokman).

Thus, Gazprom mainly relies on Central Asian imports and on the increased extraction of independent producers reaching the level of more than 100 bcmy in 2008.[134] Considering declining demand and a surplus of freely traded gas, the opening of both super-giant fields has been postponed until the second half of the decade. Additionally, technical extraction difficulties in these areas must not be underestimated. It is difficult to tell when and by how much Russian extraction will shift from the NPT region to the Yamal pipeline and the Barents Sea, where northern transport routes (Yamal and Nord Stream pipelines) are more appealing than currently dominant Ukrainian ones. In this scenario, gas transport mainly passes through Ukraine via the Brotherhood (30 bcmy), Northern Lights (25 bcmy), Progress (30 bcmy), Transgas (40 bcmy) and Soyuz (26 bcmy) pipelines, which mostly carry Central-Asian gas to Ukraine, but also further towards Europe. The Yamal-Europe (33 bcmy) pipeline passes through Belarus.

The EU and Norway

The Netherlands, Great Britain, and Germany are the most important gas-producers in the EU. The Netherlands is, nevertheless, the only net exporter supplying natural gas to Belgium, France, Germany, Switzerland, and Great Britain.[135] The estimated decrease of the Netherlands' supplies and the decline of domestic extraction in Germany might be offset by LNG and also by Norway's increased production and export. Norwegian gas travels to German entry-exit transport and distribution systems through two submarine pipelines: Europipe I (18 bcmy) and Europipe II (24 bcmy).

%2F2009&_rdoc=1&_fmt=high&_orig=search&_origin=search&_sort=d&_docanchor=&view=c&_searchStrId=1640097095&_rerunOrigin=google&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=61a8bc1f41aa36bff874ac98ed0de8e3&searchtype=a).

[134] International Energy Agency: *Natural Gas Information 2009*, Paris, IEA Publications 2009, pp. 4, on-line version (http://www.iea.org/textbase/nppdf/free/2009/gasmarket2009.pdf).

[135] BP (2011). *Statistical review*. Retrieved from: http://www.bp.com/sectionbodycopy.do?categoryId=7500&contentId=7068481

North Africa

Algeria, Libya, and Egypt are the main North African gas exporters. Algeria distributes its exporting activities equally between pipeline (mainly to Spain and Italy) and LNG. Italy, which is significant for gas flows through V4, is supplied with Algerian gas via the Trans-Med (34 bcmy) pipeline, which passes through Tunisia. Another Algeria-Italy pipeline (GALSI, 8-10 bcmy) is planned. Libyan exports are transported to Italy by the Greenstream pipeline (8 bcmy). Egyptian exports are sent to Jordan, Lebanon, Syria, and Israel. Egypt also exports LNG (projects Segas T1, Egypt LNG 1, and Egypt LNG 2, with a total capacity of 16.3 bcmy).

6.1.2 Nord Stream Scenario

In this scenario, the infrastructure introduced in the Reference scenario incorporates both branches of the Nord Stream pipeline (2x27.5 bcmy, with the first branch launched in Autumn 2011). The year of reference for this and other scenarios (excluding Reference) is 2020. A partial shift of Russian extraction from the NPT region to the Yamal pipeline are also included in this calculation.

Tab. 8: Nord Stream[136]

Length	1220 km (offshore)
Capacity	Offshore 55 bcmy NEL 20 bcmy OPAL 35 bcmy Gazelle 35 bcmy
Completion	2011, 2012
Costs	7.4 mld euro (offshore)
Main goals	Direct connection with key European markets, reduction of the transit countries' influence
Consortium	OAO Gazprom (51%) Wintershall Holding GmbH (15.5%) E.ON Ruhrgas AG (15.5%) N.V.Nederlandse Gasunie (9%) GDF Suez S.A. (9%)

[136] Černoch (ed. 2011). The Future of Natural Gas Security in the V4 Countries. Brno: IIPS.

6.1.3 Scenarios 1-3

These scenarios assume construction of the western branch of the North-South Gas Corridor with a (minimum) capacity of 5 bcmy. Consequently, the LNG terminal in Poland, the Czech Republic, the Austrian CEGH hub[137] in Baumgarten, the Hungarian distribution and storage infrastructure, and the Croatian infrastructure (including a planned LNG terminal on Krk Island) are interconnected. Unlike one transport pipeline, the North-South Gas Corridor is instead a system of interconnections meant to link various national distribution infrastructures.

Tab. 9: Interconnectors within the North-South Gas Corridor [138]

Interconnector	Pl-Cz (Moravia)	Cz-At (LBL)	Cro-Hu
Length	35 km	60 km	206 km
Capacity (bcmy)	0.5 (2011) both-ways 3 (2015) both-ways	6.6 (2012) both-ways	7.5 (Hu → Cro) 5.5 (Cro → Hu)
Completion	2011	2013+	2011
Costs	7 mil. euro	80 mil. euro	100 – 150 mil. euro
Main goals	Phase one: solving the supply deficit on behalf of Poland Phase two: supplies for the combined cycle power plant; possible re-exports from the Swinouscie LNG terminal	Connecting the Czech network with liquid CEGH, enabling spot trading gaining the access to supplies from the Nabucco and/or South Stream pipelines and/or from the Adria LNG terminal	diversification of supplies in Croatia and B&H; an indispensable requirement for re-exportation from the Adria LNG terminal
Status	Completed	Planned	Completed
Conscorcium	NET4GAS (Cz) Gaz-System (Pl)	NET4GAS (Cz) ÖMV Gas (At)	Plinacro (Cro) FHSZ (Hu)

The missing pieces are the linkage of the Czech and Austrian infrastructures and a larger connection between the Czech Republic and Poland.

Scenarios 1-3 differ in the volume of Polish UNG production. In Scenario 1, the volume reaches minimum values of 5 bcmy. Further on, in Scenario 2, it is 10 bcmy, at which the export potential starts and which corresponds to available

[137] Central European Gas Hub
[138] Černoch (ed. 2011). The Future of Natural Gas Security in the V4 Countries. Brno: IIPS. P. 179

capacity in the Yamal pipeline. Optimistic estimates are represented by Scenario 3, which assumes production as high as 50 bcmy.

6.1.4 Scenarios 3-5

The goal of Scenarios 3-5 is to closely analyze importance of infrastructure for Polish extraction. For that reason, all of these scenarios operate with an optimistic estimate for future production (50 bcmy) and differ in volume and capacity which they provide to the regional infrastructure network. Scenario 3, as noted above, works with a complete South-North Gas Corridor with a capacity of 5 bcmy. Scenarios 4 and 5 add an eastern branch, thus including the Poland-Slovakia-Hungary connection to the Poland-Czech Republic-Austria-Hungary-Croatia one. Construction of the Hungary-Slovakia interconnectors should start in 2013; while the Poland-Slovakia interconnector is currently only in the initial stages of preparation (selection of a company to perform a feasibility study is pending).

Tab. 10: Eastern branch of the North-South Gas Corridor[139]

	Hu-Svk	Pol-Svk
Length	115 km	?
Capacity (bcmy)	5 / both-ways	?
Completion	2014	?
Costs	120 mil. euro	?
Main goals	Diversification of supplies in Slovakia (and to a lesser extent in Hungary); strengthening the North-South Corridor	Diversification of supplies in Slovakia and Poland; access to trade spots (CEGH, LNG arbitrage)
Status	Approved (MoU)	Preparing calls for the feasibility study
Consortium	OVIT (Hu) Eustream (Svk)	Gaz System (Pl) Eustream (Svk)

Scenario 5 results from the combination of an optimistic outlook of infrastructure and of an optimistic outlook of Polish UNG production, representing both branches of the North-South Gas Corridor with a capacity of 10 bcmy and the Polish production of 50 bcmy. The scenarios appear as follows:

[139] Jourdain, A. (15. 6. 2011). *Challenges in Gas Transmission: The V4+ Perspective*. Retrieved from: http://www.gazkonferencia.eu/dl/share/mp_gk_Jourdain_Antoine_ENG.pdf

Tab. 11: Characteristics of scenarios: summary

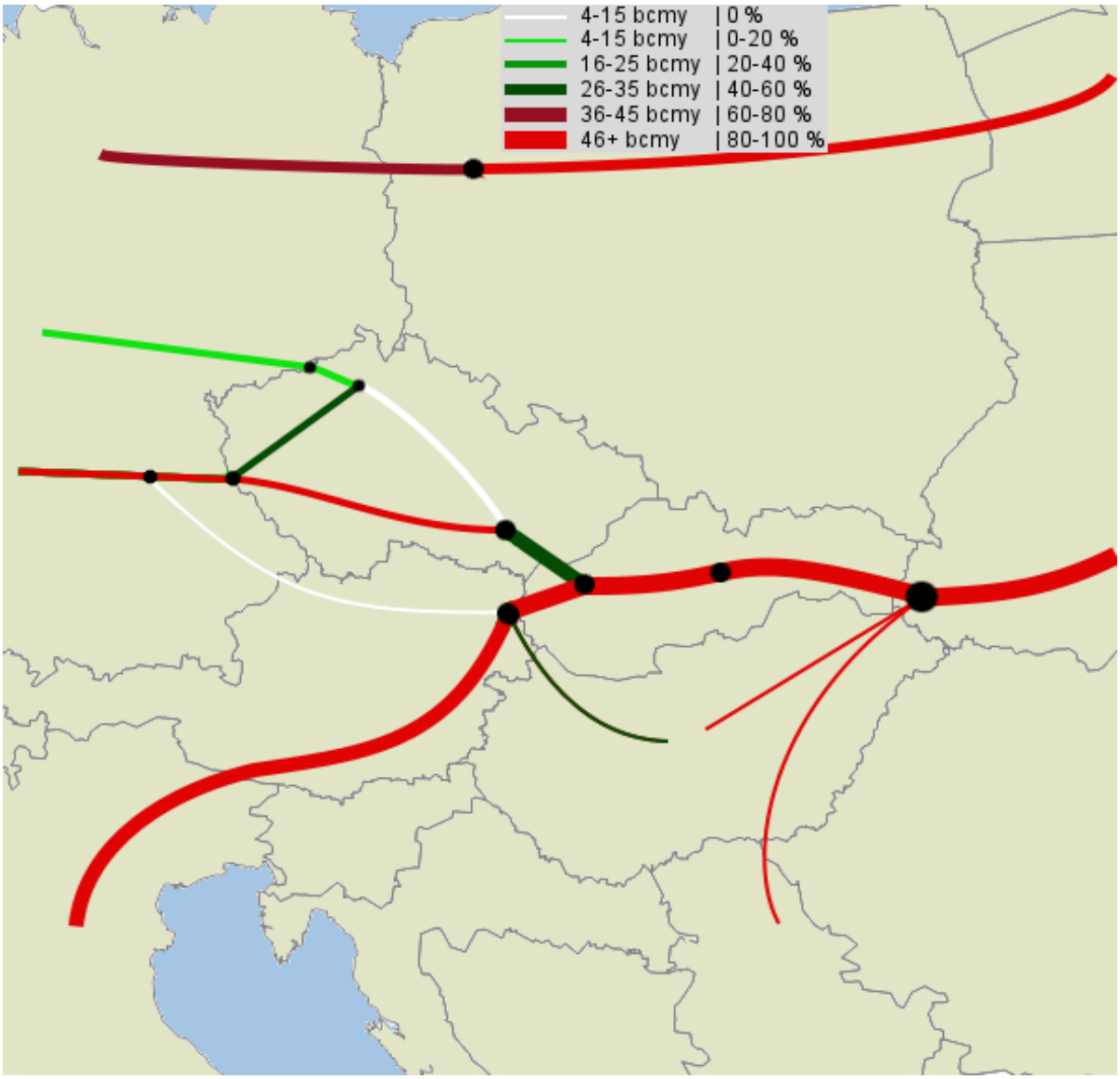
Assumptions|Scenario	Ref.	NS	1	2	3	4	5
Production UNG in Poland 5 bcmy			x				
Production UNG in Poland 10 bcmy				x			
Production UNG in Poland 50 bcmy					x	x	x
Nord Stream		x	x	x	x	x	x
N-S Corridor with a capacity of 5 bcmy			x	x	x		
N-S Corridor with a capacity of 5 bcmy (two branches)						x	
N-S Corridor with a capacity of 10 bcmy (two branches)							x

6.2 SIMULATION RESULTS

6.2.1 The Reference Scenario

The Reference Scenario provides us with the *de facto* current status of Central European transport. On the borders, Ukrainian transport of 85 bcmy splits supplies for Hungary, Serbia, and Montenegro in one direction and for Central and Southern Europe in the other. Hence, 67 bcmy goes through Slovakia, which covers the Slovakian consumption of 5.7 bcmy, while 36 bcmy is passed to Austria and further to Italy via the southern route; finally, a bit less than 23 bcmy continues through the western route, 14 bcmy of which is transported to Bavaria via the Czech Republic. Polish transportation through the Yamal pipeline is 24 bcmy.

Fig. 13: Visualization of economically rational flows for the Reference Scenario



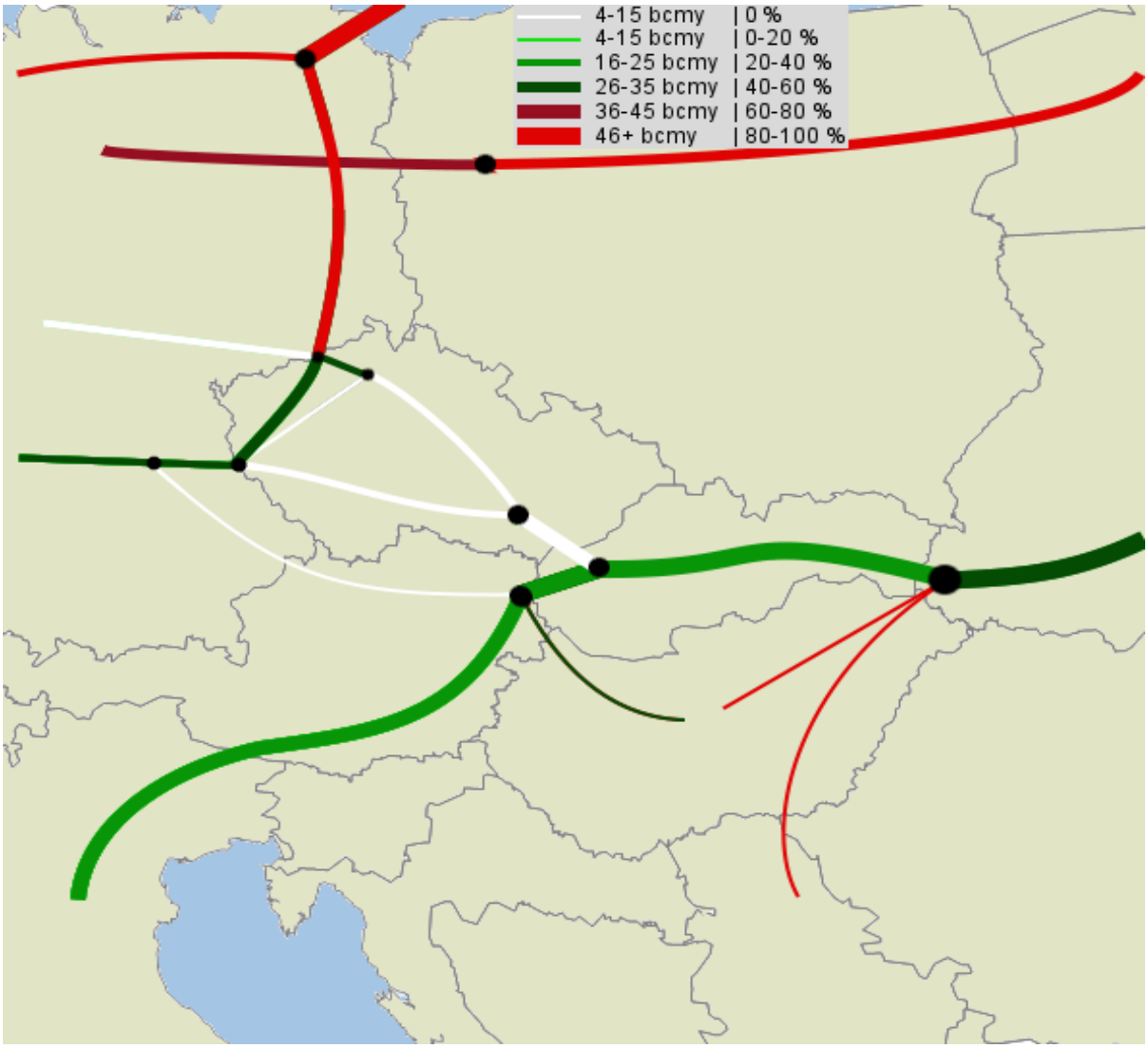
6.2.2 Nord Stream

Significant regional flow changes are expected after Nord Stream launches. Simulations partially confirm this. When 43 bcmy goes through its offshore section, Nord Stream is utilized at less than 80% of its capacity. The fully-utilized western onshore branch NEL (20 bcmy) continues, together with 23 bcmy which passes through the southern onshore branch of OPAL. This branch also supplies the Czech Republic (which is not quite realistic) and 14 bcmy is transported by the Gazelle connector (Hora Svaté Kateřiny -Waidhaus) to Bavaria. That means that Czech transport capacity would not be affected, but only shifted from the

Lanžhot-Waidhaus to the Gazelle pipeline. These changes are best displayed in Ukrainian and Slovakian transits. Compared to the Reference scenario, roughly half of the volume passes through both states (47 and 33 bcmy respectively). The changes will be also evident in the utilization of the Austrian TAG pipeline, where the transport figures will decrease from 36 to 14 bcmy.

Polish concerns about the decline of transportation through the Yamal pipeline have proved unfounded. Thanks to relatively low fees in Belarus and Poland, the transport is competitive in all circumstances, and in this scenario, it remains fully utilized on the Belarus-Poland route to Germany, which receives only 18 bcmy due to Polish consumption.

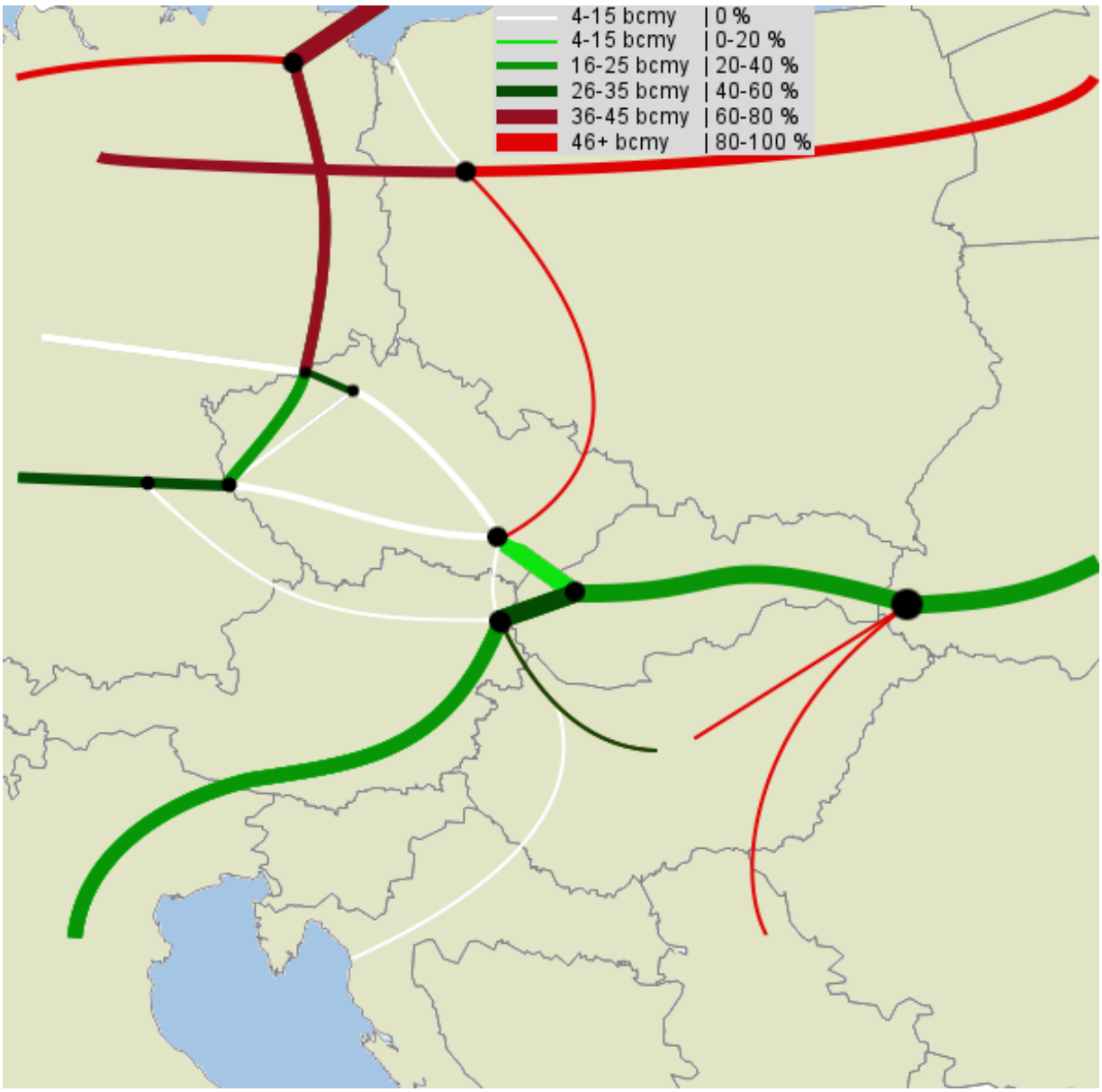
Fig. 14: Visualization of economically rational flows for the Nord Stream Scenario



6.2.3 Scenario 1

The launch of minimal Polish UNG production of 5 bcmy and the completion of the western branch of the North-South Gas Corridor with the same capacity causes only marginal differences in the established trend. The most interesting point is the 4 bcmy transfer from Poland to Slovakia, which is due more to the Yamal pipeline's competitiveness against Transgas than to Polish extraction. Poland also exports 1 bcmy via Yamal to Germany (in total, Yamal has a share of 19 bcmy), and does that at the expense of Nord Stream.

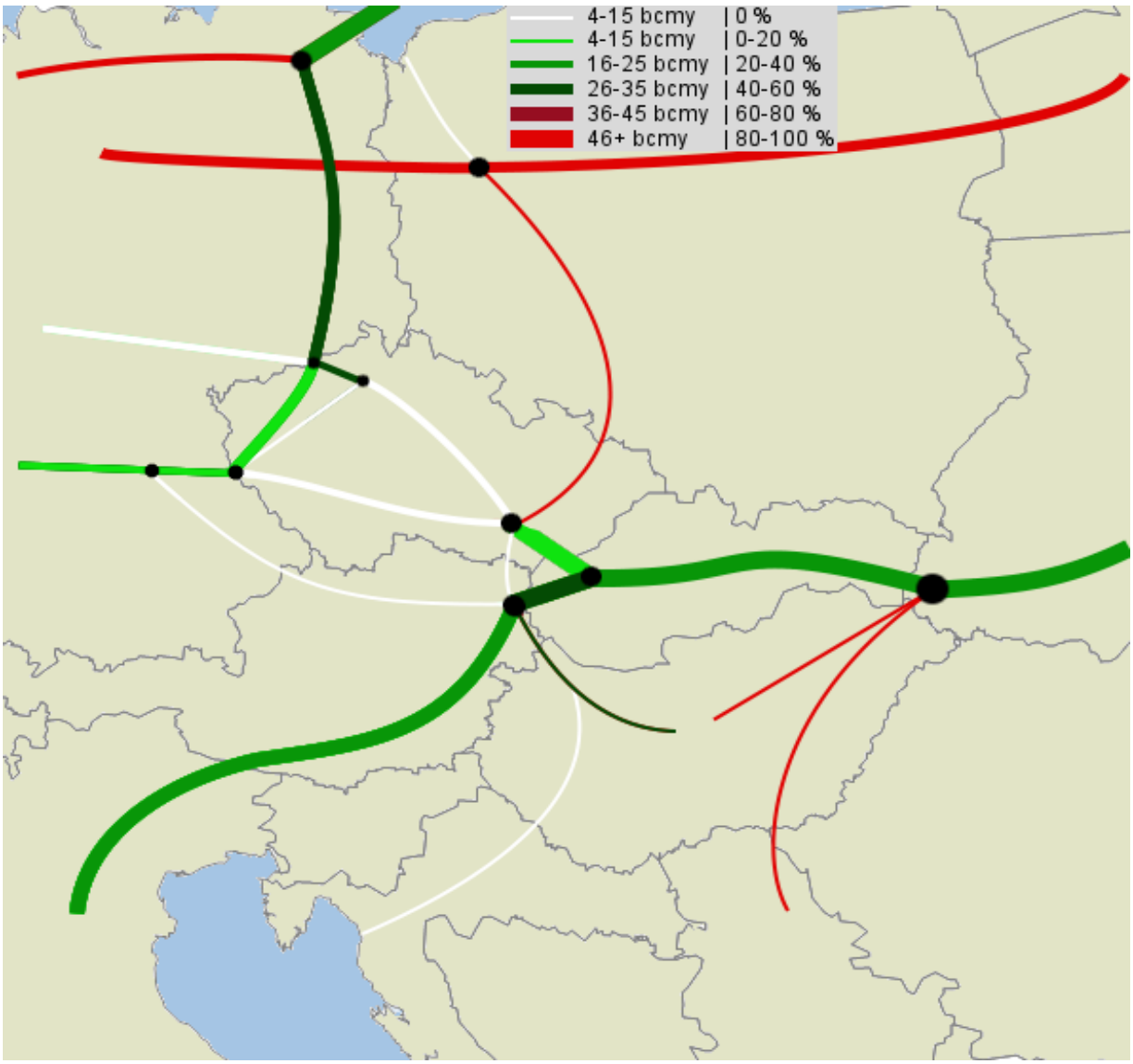
Fig. 15: Visualization of economically rational flows for Scenario 1



6.2.4 Scenario 2

This trend is even more visible in the second scenario, calculated with the same infrastructure setting, but doubling Polish extraction (10 bcmy). The additional 5 bcmy is transferred through the Yamal pipeline (24 bcmy goes from Poland to Germany), and thus cannibalizes the Nord Stream pipeline (37 bcmy), specifically its southern OPAL branch (17 bcmy) and Gazelle (8 bcmy).

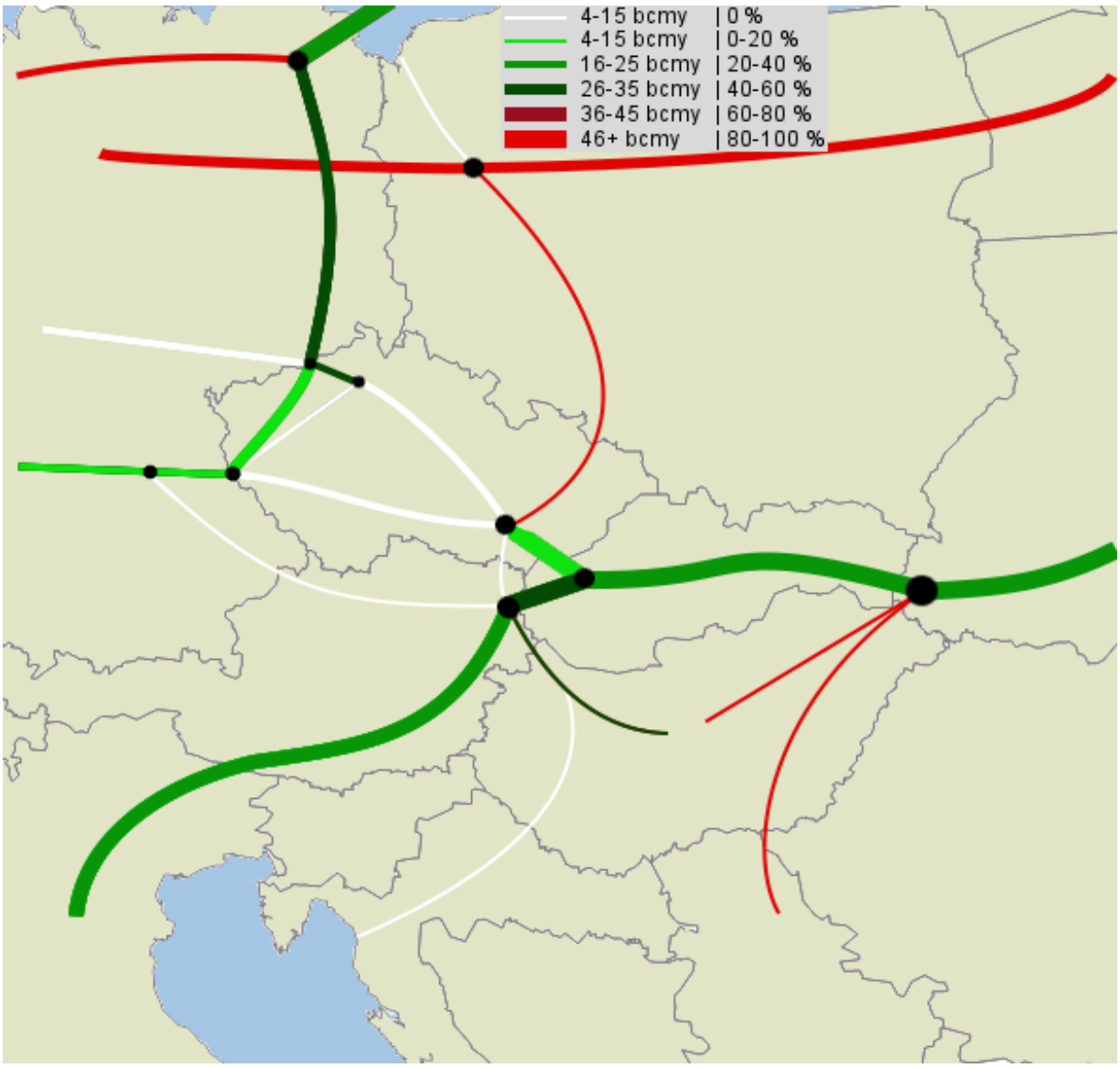
Fig. 16: Visualization of economically rational flows for Scenario 2



6.2.5 Scenario 3

Scenario 3 displays infrastructure development's critical importance to Polish UNG extraction. Even though 50 bcmy is available, as opposed to Scenario 2's suggestion (production of 10 bcmy), markets receive only an additional 8 bcmy, which Poland exports through the Yamal pipeline to Germany. Yamal thus carves another slice of capacity from Nord Stream, which is utilized at 55% in this scenario. The OPAL (11 bcmy) and Gazelle (2 bcmy) pipelines record similar declines. The rest of the flows remain unaffected.

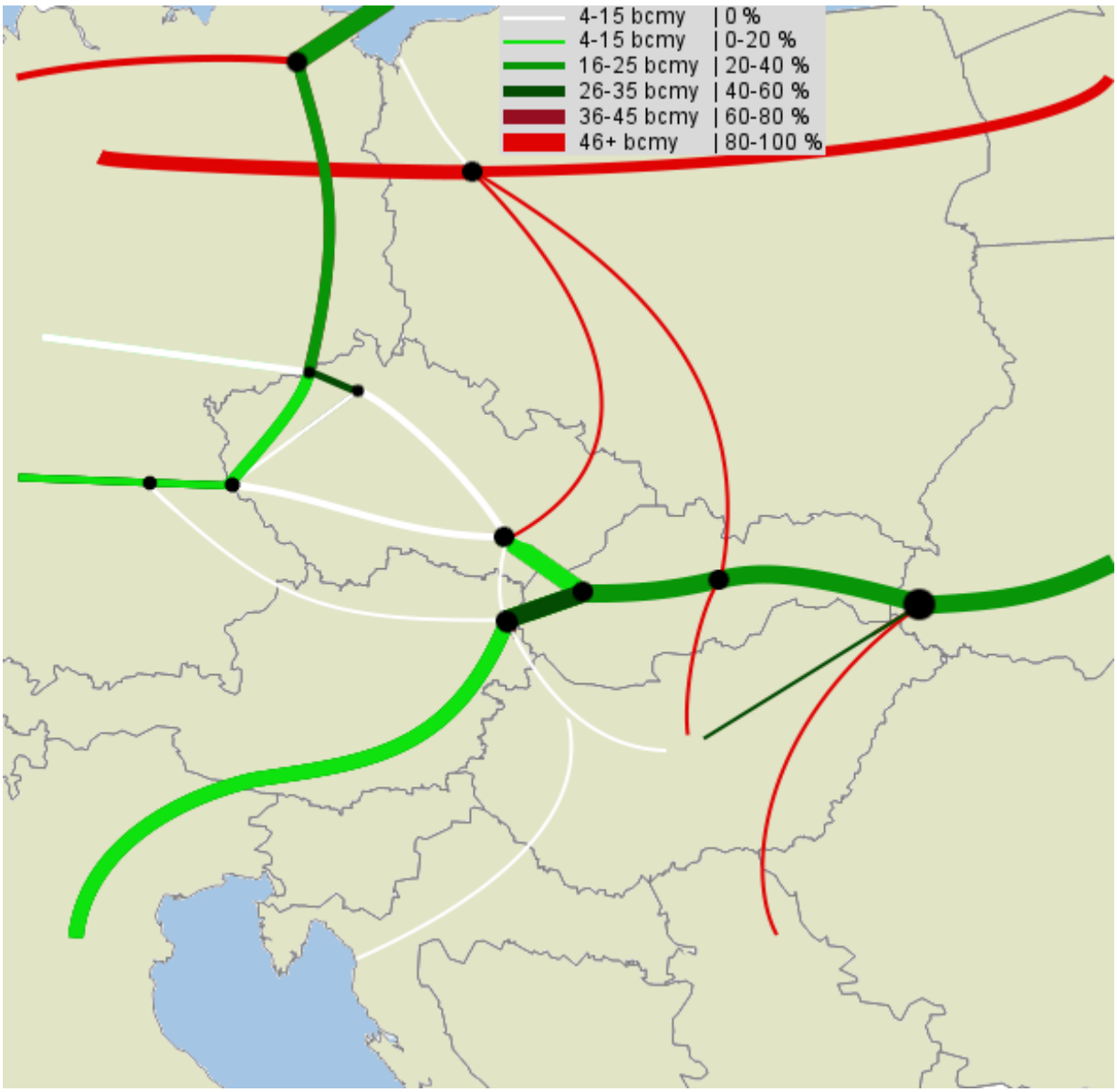
Fig. 17: Visualization of economically rational flows for Scenario 3



6.2.6 Scenario 4

Scenario 4 confirms the assumption from the previous scenario. The opening of an eastern branch of the North-South Gas Corridor leads to significant changes to supplying Hungary when Polish natural gas is transported through Slovakia, suppressing gas coming from Western Europe and part of the Russian gas transmitted via the Ukrainian route to Hungary. Ukrainian transport reaches 38 bcmy. As in the previous scenario, the Yamal pipeline, which exports Polish surpluses, achieves its full utility.

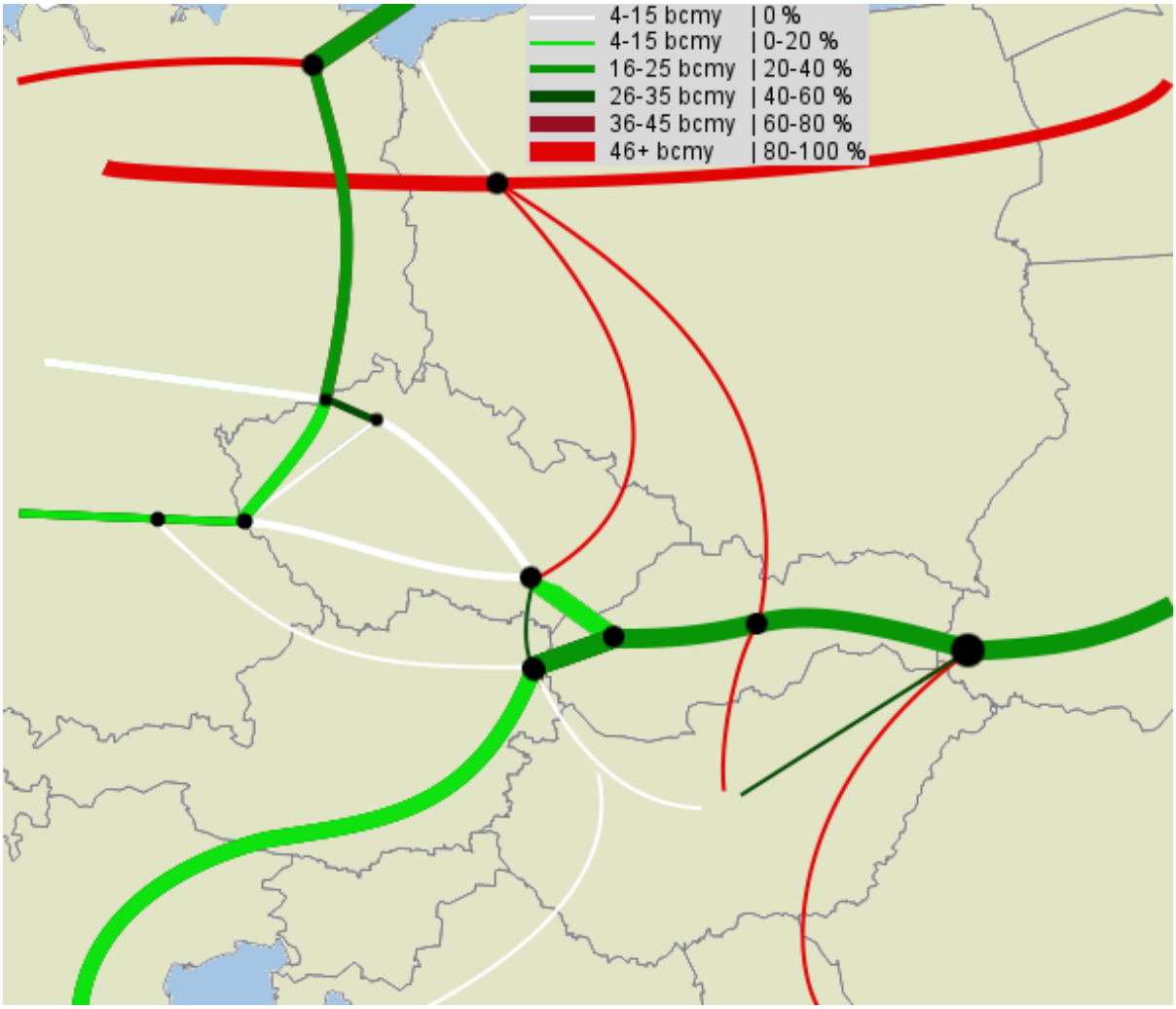
Fig. 18: Visualization of economically rational flows for Scenario 4



6.2.7 Scenario 5

Scenario 5 represents the potential of Polish UNG reaching the Visegrad dimension and counts on 50 bcmy of production and on two branches of the North-South Gas Corridor with capacity of 2x10 bcmy. This scenario implies creation of a regional market in which Poland's export rates reach 20 bcmy. 10 bcmy would go to the Czech Republic, which is equally distributed for supplying Slovakia and Austria; the other 10 bcmy go to Slovakia, which passes it on to Hungary. Hungarian, Serbian, and Bosnian consumption is covered mostly from Polish resources, while Russian gas coming via Ukraine plays a minor role. In this context, Ukrainian transport drops to 28 bcmy, a third of what the Reference scenario suggests.

Fig. 19: Visualization of economically-rational flows for Scenario 5



Tab. 12: Results of MEOS simulations: data (bcmy)

Route|Scenario	Ref.	NS	1	2	3	4	5
Transgas Ukraine	85	47	43	43	43	38	28
Transgas Slovakia	67	33	29	29	29	26	21
Transgas Czech Rep. Lanžhot-Waidhaus	14	0	-4	-5	-5	-5	-5
TAG (Austria – Italy)	36	14	14	14	14	14	14
Nord Stream (offshore)	-	43	42	37	30	30	30
OPAL (to HSK)	-	23	22	17	11	11	11
Gazelle (HSK-Waidhaus)	-	14	13	8	2	2	2
Belarus-Poland (including Yamal)	38	38	38	38	38	38	38
Yamal (Poland-Germany)	24	18	19	24	33	33	33
NS: Poland-Czech Republic	-	-	4	5	5	5	10
NS: Czech Republic-Austria	-	-	0	0	0	0	5
NS: Poland-Slovakia	-	-	-	-	-	5	10
NS: Slovakia-Hungary	-	-	-	-	-	5	10

7. CONCLUSIONS

We analyzed the specific Polish problems for UNG development, and then the role of the European Union in UNG's European development, as well as how various Polish actors perceive the problems. This analysis was supplemented by a chapter devoted to Russian perceptions to the development of this potentially significant competitor to their energy exports. Finally, we examined possible regional implications of Polish UNG development.

Our response to the question we posed in our introduction is that emulating North American UNG development will be problematic. Polish extracting costs will be strikingly higher than in the United States. This results from the following:

- Deposits are located at greater depths;
- Water is even 10 times more expensive than in the US;
- A large group of small, independent land-owners may complicate the ideal distribution of drilling-pads and construction of new infrastructure;
- Existing infrastructure (pipelines and roads) is insufficient;
- Polish regulation tries to guarantee state control over the sector (even with changes to critical laws, a residual trend should be expected);
- Environmental and certification requirements in Europe are stricter and prevent use of the most efficient American technology (leading, however, to lessened environmental impact); Long-lasting and uncertain licensing procedures make effective planning and optimal technique application impossible;
- Europe has considerably fewer experts and assistance firms at its disposal (from drilling, to flow-back fluid cleansing, to catering and accommodation); and
- Companies are far less competitive – for example, the expected rent for a drilling platform is between 25 to 30 thousand USD per day. In 2010, the rent for the very same platform in the US would have been 20 thousand USD per day.[140]

[140] Some positive trends can be identified as well, such as, for example, population density, which

Lastly, in Poland, and generally in Europe, a significant learning curve should not be expected, as was the case in the US. Complex industry entry requirements, more formal requirements, and stricter UNG regulation promises a considerable slowdown of initial production growth, as well as a slowdown of price decline. Without a sufficiently high level of production, it will not be possible to effectively utilize economy of scale, and investments specific to Europe (and/or Poland) will pay off very slowly.

Polish UNG extraction will only be successful when the price of gas settles between production costs (including all additional costs, taxes and profit) and the upper limit set by prices which existing suppliers are able to offer.

The EU's role in the process is clear. The crucial theme for Brussels will be in how exploration and extraction will reflect on the environment. The most debated and lobbied issue will be environmental regulation because of the potentially strict legislation's implications on economy of production. UNG's importance for EU energy security will not be greatly emphasized. UNG will have to function in accordance with market principles in the common energy market and it cannot expect any financial or other support from the EU.

The EU will, in the medium-term, limit itself to data collection and supervision of the environmental the common market. One can expect that with an increasing intensity of production, the control function of the European Commission and the behavior of member states will clash in greater frequency. From the EU perspective, the most important positions will be those of the DG Environment and perhaps of the DG Energy, with a somewhat unforeseeable role for the European Parliament. Private companies and their representation in Brussels will tend to calm and weaken the ongoing debate as much as possible, while NGOs will tend towards the opposite. Thus, data will be crucial. Any sort of study, report, or research results will be thoroughly followed and by this or that party

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is presented as one of the obstacles for UNG development in Europe. Excluding the urban areas of Warsaw and Gdansk, Polish basins are located outside of metropolitan territories. Population density in regions for which exploration licenses are provided is on average 20-60 people per km^2. For the sake of comparison, the Barnett shale lies directly under the Fort Worth area, which has a population density of around 700 inhabitants per km^2. Gény, F. (2010). *Can Unconventioal Gas be a Game Changer in European Gas Markets?* Oxford: Oxford Institute for Energy Studies. P 74. http://www.oxfordenergy.org/wpcms/wp-content/uploads/2011/01/NG46-CanUnconventionalGasbeaGameChangerinEuropeanGasMarkets-FlorenceGeny-2010.pdf

and used to support or attack UNG.

If we look closely at the energy (gas) sector of Poland, we see four dominant stakeholders who have been the most involved in Polish UNG production issues: the Polish government, PGNiG (a state-owned company), private (Polish and foreign) energy companies (IOCs), and environmental NGOs. The EU has not engaged itself directly, but regarding the aforementioned reasons (new EU regulation and NGO pressure), one can expect its importance to grow.

Local communities in exploration and extraction areas are stakeholders with a currently limited scope of authority; one can assume that their importance for UNG development will increase with the growing scale of exploration and production. So far, only a small number of protests against exploration have been recorded.

The government's and IOCs' positions are decisive for UNG development; other stakeholders are in a much weaker position, whether because the former have formal relationships (government – PGNiG), available resources (NGOs), or institutional opportunities (EU). Cooperation between government and IOCs is also evident. The government is focused on creating convenient investments and representing UNG development as a subject with society-wide scope, and IOCs are going through a "*risk management*" phase: detailed geological exploration and profitability evaluation. The reception of UNG's security theme by IOCs is interesting, as it further illustrates the harmony of interests between these two stakeholders.

It is more difficult to divine PGNiG's position, for which the entrance of international companies is a threat to its market position. There are several possible outlooks for its stance. Thus far PGNiG has followed the government's optimistic scenario; PGNiG owns the greatest number of exploration licenses and changes in leadership indicate the aforementioned development. In that case, PGNiG could create a joint venture with some of the foreign companies and maintain a considerable share in the emerging market, which would partially compensate it for losses resulting from a reduced amount of Russian imports.

It is also possible that PGNiG will undergo a fundamental restructuring and shift the center of its activities to the oil sector. Another possibility is to close the

market to international companies by applying the "Russian Sakhalin model" measures via the government (through environmental regulation). The behavior and development of PGNiG's position can be considered an indicator of the future direction of the entire UNG sector.

NGOs role is only formative at this point, even though the foundation of their stance is already apparent. This includes an emphasis on transitioning to a carbonless economy based on renewables and a different approach to environmental risks. The voices indicating that UNG could be the most important transition resource for Poland are in the minority. NGOs also refuse the energy security argument, which they perceive as an "old way of thinking." The NGOs position regarding UNG development has not been profiled and, in most cases, Polish NGOs turn to the foreign sources of information. Additionally, UNG is not a priority for Polish NGOs (compared to the coal sector and nuclear power plant construction). This can certainly change when commercial extraction begins.

Similar to NGOs, the European Union's position on UNG is still being formed. The EU's future significance is in two areas. A clash within EU institutions can be expected between member states' and private UNG interests and state monopolists and dominant players. This may result in a regulatory framework whose character will be determined by studies assigned by the EU and conclusions of a US EPA survey. One can expect that the EU will become "the natural partner" of the NGOs. One can also expect that contact between representatives of the EU and local authorities that disagree with oil company activities will become more frequent and intense.

Comparing individual stakeholders' perceptions shows that consistency regarding UNG development is low. A greater consistency is observed with NGOs and the EU. According to an evaluation of the indices of conflict, resource dependence, support, and position, the formation of two coalitions can be assumed. While state governments and the IOCs will assess the development of UNG in terms of meeting optimistic scenario conditions, NGOs, with possible EU support, will occupy a critical position. PGNiG will follow the strategic intent of the Polish government.

The situation to now has been clearly different since the EU remains ambivalent. The division between proponents and critics of UNG in NGOs is further com-

plicated by the latent conflict between government and PGNiG. Other pessimistic scenarios going beyond analysis should be considered as well.

UNG has not been a significant theme in Russian foreign affairs discourse so far. References to the UNG are usually contrasted with Russia's image as a reliable supplier characterized by transparency, political stability, the importance and potential of its conventional reserves, and the know-how and capital of its gas sector. Rival suppliers are characterized as either unstable or problematic (MENA states), or as producers whose export potential is limited, typically due to economic and technological reasons.

UNG is contrasted with "traditional, conventional" natural gas, which is associated with attributes such as efficiency, ecology, transparency and safety. These "hard" arguments offer a choice between conventional or unconventional natural gas resources, portrayed as a choice between *right* and *wrong*. The investments into the utilization of the UNG are associated with economical losses (uncompetitive UNG), which will be carried by the consumer. The consumer states are presently put before the key decision that will decide whether they will head towards stability and prosperity or towards uncertainty and decline.

Regarding the Polish UNG development, simulation of economic rational flows demonstrates that infrastructure is critical. Since licensing in Poland is quite demanding, it is likely that international oil companies will have only two options:

- No extraction and zero transaction costs to arrange compulsory approvals; or
- Extracting billions of cubic meters per year to justify relatively high investment and transaction expenses (including transportation, licensing of equipment and personnel, the development of chemicals allowed in Europe, the construction of road and pipeline infrastructure, and complex estate relations).

In the latter case, export necessity rises because Poland's increased consumption is likely to stop at around 200% of current levels by 2020. Limited amounts of gas (approximately 8 to 10 bcmy) will be exportable via the Yamal pipeline. This solution, however, assumes an agreement with the pipeline's owners, PGNiG and Gazprom, neither of which has great interest in UNG development. PGNiG is

particularly opposed because one of the conditions for UNG development is market liberalization, which threatens its monopoly. Similarly, Gazprom's support would cut off its own market share in Poland and Western Europe.

Thus, the only successful option is massive infrastructure development towards the south. The simulation of flows demonstrates that this solution has certain potential. With its exports, Poland would, via the Czech Republic, reach the Russian hub in Baumgarten (CEGH). The hub lacks liquidity so far, as it trades only Russian gas in a region where Russia's long-term contracts dominate the market. New gas resources, either Polish or central-Asian (via Nabucco), could magnify Baumgarten's regional importance to such an extent that companies may start considering it as a negotiating factor for long-term contracts with Russia. However, the fact that half of the Baumgarten hub belongs to Gazprom provides another argument against Polish UNG production.

The eastern branch of the North-South Gas Corridor, which connects Poland, Slovakia, and Hungary, has good potential for changing the nature of gas supply in these countries. Slovakia would become a transit country in both the east-west direction and the north-south direction, diversifying its and Hungary's suppliers.

Because of costly Austrian transportation, Hungary is the only country in the region where Poland's UNG is more likely to push out Western European supplies than Russian ones. In the other countries, it is primarily Russian market share that is in peril.

In that context, it is important to bear in mind that these markets are tied together by long-term contracts. Polish UNG can remain competitive only when it becomes cheaper than the contracted supplies, including penalties from take-or-pay clauses (which require a certain amount of purchase volume). Considering the arguments introduced about the limits of Polish extraction, this situation is practically illusory.[141] The contract with Russia will first expire for Hungary in 2015. That will, in all likelihood, be too soon to include potential Polish UNG in

[141] A similar situation can be found in practice in 2010, when a global surplus of LNG, spurred by development of unconventional resources in the US and by demand decline associated with the economic crisis, knocked down gas spot-prices to such an extent that, for many companies, it paid to purchase, in spite of long-term contract penalties.

negotiations for a new contract. Poland is in an ideal situation because its contract with Russia expires in 2022, when extraction will have been decided upon. The relief of the Slovakian (2029) and Czech markets (2035) will come too late, even though in case of the Czech Republic there seems to be potential in the expiration of Norway's contract (2.5 bcmy) in 2017.

Infrastructure will most likely become the decisive component, or at least an indicator, of the direction future Polish extraction will take. Generally, there are four options:

- The exploration will show a lack of production profitability and Poland will not produce UNG;
- An optimistic scenario for UNG development;
- A pessimistic scenario for UNG development I;
- A pessimistic scenario for UNG development II.[142]

The optimistic scenario anticipates conditions that the European Union is making an effort to create. It assumes that a liberalized market will bring greater supply stability and lower prices at the cost-scale. In this scenario, Poland has a series of independent producers who compete with each other and with external suppliers. The main condition is having sufficient interconnection with the surrounding countries, which would enable cross-border trade and integration of the wider regional market. Access to the infrastructure is simple, and the same conditions apply to everyone. Newcomers to the market (independent producers) and customers benefit. After market integration, the state will benefit as well through greater supply stability. The main losers are existing upstream monopolies (PGNiG and Gazprom), which lose market share in Poland, and any place where Polish gas will be exported.

Both pessimistic scenarios reflect the strong position of PGNiG in the domestic market and its decision-making influence. Polish domestic production is profoundly cheaper than import, and yet merely 30% of productive potential is utilized. In addition to controlling domestic extraction, PGNiG is also Gazprom's opposite in gas contracts, and, with the combination of 30% of domestic production and 70% of imports, it maximizes profit. One does not abandon such a position easily.

[142] The authors thank Greg Pytel for sharing his thoughts. They inspired the presented scenarios.

PGNiG and Gazprom also control 96% of the Yamal pipeline, and no other export infrastructure exists in Poland. Critics warn that the construction of additional export routes will last longer than UNG development, and if production is successfully launched, the gains will be split between producers (international oil companies, PGNiG) and Yamal's owners (Gazprom, PGNiG). In this scenario, international oil companies profit (although less than in the optimistic scenario), and so does Gazprom, at least in transportation. PGNiG will mostly win, as well, holding a series of concessions on UNG production, while higher charges for Yamal will at least partially cover losses from declining upstream market share. The consumers will lose, as will Gazprom, which will have to fight for market share in Poland and in extracted gas' final destinations.

The second pessimistic scenario is based on experiences which Shell had in Russian Sakhalin or which Chinese road-builders had in Poland last year. This scenario again finds PGNiG's domestic market position as the key factor in future development. A number of international oil companies equipped with the most modern exploration technologies currently operates in Poland. These companies perform entire geological surveys and they are obliged by law to share its results with the government. Moreover, they are charged for exploration licenses. Carrying out exploration does not guarantee an extraction license, but guarantees only five-year exclusive access to the geological documentation (which is indispensable, but alone is insufficient for obtaining an extraction license). This scenario presumes that Poland uses international companies for exploration, then disallows extraction due to, for example, environmental concerns, and when the access to documentation expires after five years, it lets PGNiG extract the gas or does not extract at all.

In this scenario, PGNiG wins, because it manages to protect its monopoly (as much as EU legislation allows) from strong players such as international oil companies. This result also suits another player interested in maintaining the status quo - Gazprom. International oil companies will, along with clients, become the chief losers.

Tab. 13: Scenarios for the forthcoming development of the extraction of UNG in Poland

Parameter|Scenario	Optimistic	Pessimistic I	Pessimistic II
Main Upstream Players	Polish and international oil companies	Polish and international oil companies	Polish oil companies
Liberalization of the domestic market	Advanced	Minimal	Minimal
Interconnection with the markets in the surroundings	The level adequate to extraction/export	Minimal	Minimal
Midstream ruled by	TPA principle	PGNiG, Gazprom	Gaz System
Winners	Consumers, the regional market, international oil companies	PGNiG, international oil companies	PGNiG, Gazprom
Losers	Gazprom, PGNiG	Consumers, the regional market, Gazprom	Consumers, the regional market, international oil companies

8. METHODOLOGY APPENDIX

8.1 STAKEHOLDER ANALYSIS (Chapter 4)

The stakeholder analysis developed by Pieter Bots (2008) combines ideas from (1) stakeholder analyses focusing on individual stakeholder perceptions (cognitive mapping) and (2) strategic decision analysis (SDA) relying on game theory and expected utility theory (EUT) to determine and evaluate possible variations of actor's actions.[143] The first part is based on qualitative data reflecting the perception of the problem from the stakeholders' perspective, which is then translated into a causal map or perception graph.

The second part quantifies the contents of these prospects, structures them into familiar relationships, and compares the mutual positions of individual stakeholders.[144] Stakeholder analysis studies:

(a) identification of stakeholders, their interests and power which enables them to pursue those interests;
(b) perception of stakeholder positions and mutual relationships; and
(c) possible interactions (such as conflict/cooperation) between stakeholders and circumstances that determine interaction likelihood.[145]

In this text, we devote ourselves to the first two goals.

(1) The cognitive mapping technique's assumption is to explain *beliefs* which par-

[143] Observed subjects are set in a different manner; for example, the maximization of expected utility (the assumption we operate with), or preferences for an action which brings minimum losses, or for maximum satisfaction or minimum frustration, etc.
[144] Stakeholder is an actor who can affect the development of a public problem and/or is solely affected by it.
[145] Bots, P. W. G. (2008, June 13-14). Analyzing actor networks while assuming "frame rationality". Presented at the conference on Networks in Political Science (NIPS), Kennedy School of Governance, Harvard University, Cambridge, MA. Retrieved from: http://www.hks.harvard.edu/netgov/files/NIPS/PWG_BOTS_Analyzing_actor_networks_14_June_2008.pdf

ticular stakeholders hold about the subject. The "objective" perspective of the researcher is not incorporated, but the perception of the stakeholder based on data evaluation obtained in a semi-structured interview.[146] Individual perception components on the subject or the stakeholders' beliefs are then expressed by concepts representing the character of those beliefs. Bots (2008) identifies three types of beliefs:

(a) causal beliefs (how one state change leads to another);
(b) evaluative beliefs (what changes are desirable); and
(c) factual beliefs (what changes will happen in the near future resulting from the actor's action or from external influences).[147]

These types of beliefs can be further divided into analytic categories (see the table).

Tab. 14: The elements of the perception graph[148]

factors	DANA distinguishes between three types of factors: *system* attributes, *actor* attributes, and *actions*. The concept *system* designates "everything relevant to the case" (examples are the policy arena, several policy arenas respectively, as well as the actors and factors which it consists of). A system attribute is, therefore, a property of the system as a whole. That kind of factor can be the natural gas price, the level of economic growth, etc. On the other hand, natural gas revenues are specific for each individual actor and the relevance of actors' revenue differs from case to case (for example, between a dominant corporation vs. a regional NGO). The same holds for actions. Action attributes and actions are factors which corresponding actors control; on the other hand, system factors are not under their control, so they (and actor attributes for other actors) belong to *prospects* (see below). *Objective* is a specific type of factor/actor attribute (see below).
actions	*Action* is an actor's capability to change the system. Actors are assumed to have full control of their actions, which does not yet mean that they can achieve a full range of action (as determined by the standard semi-qualitative scale ---, --, -, 0, +, ++, +++). For example, if producers are already at capacity limits, their *feasible action range* moves

[146] For clarification, this approach demands the accession of the researcher; in addition to stakeholder selection, the researcher, in accordance to his own perception graph, determines how individual stakeholders approach the subject. Once the stakeholders interfere, the researcher's perception can be modified; thus, the researcher and respondents representing the survey subject arrive at the very same epistemic level.

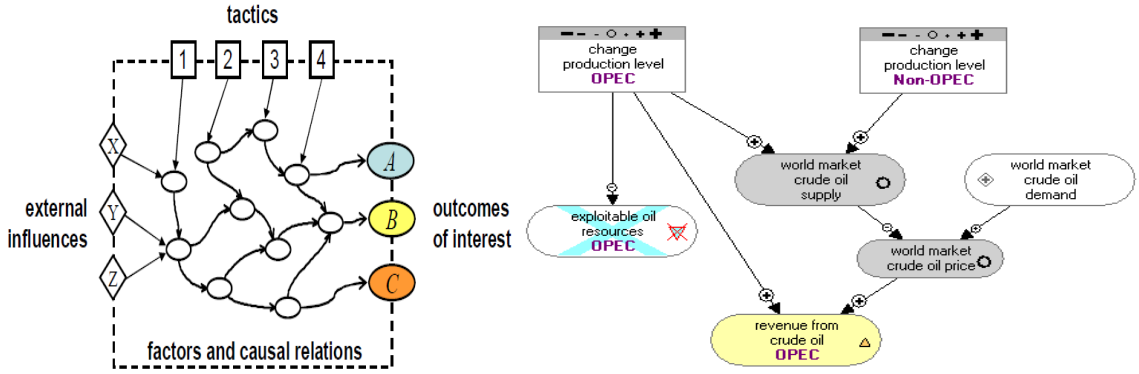
[147] Bots, P. W. G. (2008, June 13-14). Analyzing actor networks while assuming "frame rationality". Presented at the conference on Networks in Political Science (NIPS), Kennedy School of Governance, Harvard University, Cambridge, MA. Retrieved from: http://www.hks.harvard.edu/netgov/files/NIPS/PWG_BOTS_Analyzing_actor_networks_14_June_2008.pdf

[148] Bots, P. W. G. (2009, February 3). *Overview of DANA*. Retrieved from: http://dana.actoranalysis.com/overviewframe.htm

	along the scale between maximum decline of production (---) and maintenance of the status quo (no effect; 0). According to the semi-qualitative scale, there are 4 out of 7 possible *tactics* available for this *action*.
objectives	*Objectives* are defined based on utility value ascribed by the actor to changes of the factor (utility is not associated with other factors or prospects; they are considered intervening variables between an actor's action and the realization of his objective). The 7-point semi-qualitative scale was used here as well (strong disapproval of the realization of the objective – neutral position – strong appreciation).
prospects	*Prospect* is an autonomous change in a factor whose cause lies outside of an actor's control and results from external influences; it does not result from an action by an actor. The 7-point semi-qualitative scale was used here as well, determining the measure of (dis)approval with the change, and the likelihood of change occurrence.
links	If a change in factor A is believed to cause a change in factor B, its amplification of leads to either amplification of factor B or reduction of factor B. When influence is not evident, a neutral position is used, which neither amplifies nor reduces factor B.

These concepts and relationships between them are formally expressed in causal maps or perceptive graphs:

Fig. 20: The scheme of the perception graph[149] and the perception graph in DANA[150]



(2) Strategic decision analysis (SDA) rests on game theory assumptions while expected utility theory sets limits for combinations of possible decisions and defines how actors exchange information in one or more rounds. Cognitive mapping is an approach in which stakeholders' are rationally framed (*frame rationali-*

[149] Bots, P. W. G. (2007). Analysis of multi-actor policy context using perception graphs. In Lin, T. Y. (ed.): *Proceedings of the International Conference on Intelligent Agent Technologies (IAT'07)*. Los Alamitos: IEEE Computer Society Press. Retrieved from: http://actoranalysis.net/documents/IAT2007.pdf

[150] Bots, P. W. G. (2010, February 1). DANA 1.3.3 [Software]. Retrieved March 6, 2012, from: http://dana.actoranalysis.com/

ty), and the sole "grammar" of decision-making follows the rules of previously mentioned theories assuming a perfectly rational actor.[151] The goal is not to predict, but rather to set clearly-defined scenarios of development. SDA was also carried out by the DANA software (2010),[152] which is equipped with algorithms enabling further evaluation of information in perception graphs.[153]

Data collection and data coding

The main source of data lies in semi-structured interviews with selected target respondents (so-called *elite interviews*); in our case, these were representatives of interested institutions and stakeholders. Semi-structured expert interviews, official documents from stakeholders, and to a limited degree, secondary literature were used as supplementary sources. These sources mainly serve to contextualize and confirm credibility of data gathered in *elite interviews*. Regarding subject sensitivity and by request, respondents were not named in the text. The following table displays only those institutions whose representatives participated in interviews.

[151] That means that he is endowed with a fixed identity; with existence of fixed preferences which he assigns to different outcomes of corresponding decisions. He rationally bases his convictions about the world and other actors on new information; he disregards normative considerations (even though they can also be expressed through preferences, if necessary); and he counters fixed and familiar (closed) sets of options (i.e. outcomes) for his decision-making. Kydd, A. H. (2008). Methodological Individualism and Rational Choice. In Snidal, D., & Reus-Smit, Ch. (eds.): *The Oxford Handbook of International Relations*. Oxford University Press, USA. doi:10.1093/oxfordhb/9780199219322.003.0025

[152] Bots, P. W. G. (2010, February 1). DANA 1.3.3 [Software]. Retrieved March 6, 2012, from: http://dana.actoranalysis.com/

[153] For analytical DANA functions, see Bots, P. W. G. (2008, June 13-14). *Analyzing actor networks while assuming "frame rationality"*. Presented at the conference on Networks in Political Science (NIPS), Kennedy School of Governance, Harvard University, Cambridge, MA. Retrieved from: http://www.hks.harvard.edu/netgov/files/NIPS/PWG_BOTS_Analyzing_actor_networks_14_June_2008.pdf

Fig. 21: Data base: interviews

Stakeholder (shortcut in the model)	Interviews with the stakeholders' representatives (*elite interview*)
government (GOV)	Ministry of Economy: Department of Oil and Gas Ministry of State Treasury: Department of Investor Relations Ministry of Foreign Affairs: Department of Economic Policy Ministry of Environment: Department of Geology and Geological Concessions (Ministerstwo Gospodarki: Departament Ropy i Gazu Ministerstwo Skarbu Państwa: Department Relacji Inwestorskich Ministerstwo Spraw Zagranicznych: Departament Polityki Ekonomicznej Ministerstwo Środowiska: Departament Geologii i Koncesji Geologicznych)
NGOs (NGO)	Greenpeace Poland Eko-Unia Instytut na rzecz Ekorozwoju Społeczny Instytut Ekologiczny
PGNiG	PGNiG
Private companies (IOC)	3 Legs Resources Talisman Energy
EU	DG Energy DG Environment

The coding logic for primary data is descriptive; i.e. the codes concentrate information *prima facie* contained in a particular segment of the text.[154]

Notable researcher interference in, for example, tacit meaning interpretation, is undesirable in the cognitive mapping method. The goal is to obtain a sum of concepts throughout the process of coding and subsequent merging of codes in order to create a perception graph. This means that it is necessary to differentiate among four different types of codes representing *action, objects, factors* and *prospects*. At the same time, it is necessary to search for perceived causal relationships between individual codes and their character (i.e. their direction and intensity); the same holds for determining the importance (in terms of utility value) of individual objectives and the probability distribution for the grade of causal links impact, prospects effects, or the likelihood of objectives' accomplishment.

Ideally, it would be possible to determine these parameters (effect intensity and probability distribution) based on the respondent's answers only, but in practice it is often an analytical decision by the researcher relying on supplementary sources and triangulation. These two tools are crucial in that they minimize the

[154] See Saldana, J. (2009). *The Coding Manual for Qualitative Researches*. Sage Publications, pp. 3-4.

limitations associated with this approach (mainly the dependence on an actor's willingness to provide an answer and not intentionally distort answers). Further limitations are that perception graphs represent an actor's position only in a *snapshot* of time; under different circumstances, an actor's position can change notably. The output validity is therefore (considerably) time-restricted.[155] In addition to these technical limitations, the risk of double subjectivity resulting from research design should be mentioned. Perception graphs are based on what a researcher *thinks* that actors *think*.

8.2 QUALITATIVE CONTENT ANALYSIS (Chapter 5)

The research method used to analyze Russian perception of UNG was a qualitative content analysis. The coding logic is semantic. We are interested in how the meaning of UNG is being created; that is, what lexemes[156] UNG is being associated with and how these lexemes contribute to the meaning.[157] Coding units are segments of text giving some meaning to the variable (UNG). During open coding, it is possible (and desirable) to return to coded segments and revise them with expanded (and more profound) context.

Data coded this way was then processed using structuring technique.[158] Similar codes were merged into more general categories in which the direction and character of associations was determined. This was the basis for explaining the argument scheme or

[155] The proposed solution is to repeat interviews after certain time intervals.

[156] Lexeme is the basic element of the lexicon (vocabulary) referring to all forms of a certain letter or phrase. Slouková, D. (2003). *Slovníček důležitých pojmů ke kurzu filosofie jazyka*. Retrieved from http://www.gsgpraha.cz/~sloukova/slovnicek/fjvocab.pdf

[157] There are several ways in which lexemes contribute to the meaning of a sentence or statement. The *cognitive* meaning (designating) is the main component, and is considered a factual element of a lexeme. The *affective* meaning reflects the attitude and emotion of the speaker (worry, for example). *Collocative* meaning reflects the other lexemes (gas – energy, for example) which the given lexeme usually combines with. *Connotative* meaning stems from the usual association with another lexeme (the Middle East - instability). *Transported* meaning reflects another lexeme without both lexemes being used together (coal – black gold). *Stylistic* meaning is given by circumstances of use. T*hematic-organizational* meaning is given by the meaning's organization according to the word order, emphasis, etc.
Slouková, D. (2003). *Slovníček důležitých pojmů ke kurzu filosofie jazyka*. Retrieved from http://www.gsgpraha.cz/~sloukova/slovnicek/fjvocab.pdf

[158] See Baumann, R. (2002). The Transformation of German Multilateralism. Changes in the Foreign-Policy Discourse since Unification. German *Politics and Society 20*, p. 10. Retrieved from: http://www.questia.com/googleScholar.qst?docId=5001932946.

UNG subject framing. This approach's outcome identifies two main UNG argument schemes, demonstrating which concepts and associations are fundamental when UNG is thematized. For data processing, we used the Atlas.ti 6.2 analytical software.

Data corpus consisted of 23 texts (official government documents, Gazprom documents, newspaper articles, transcripts of announcements, and newspaper interviews) in Czech, English, and Russian. The earliest texts were *Energy Strategy for the Period up to 2030* (2009)[159] and the article *Российский газ скоро никто не будет покупать? (Almost No One Will Be Buying Russian Gas?),*[160] from October of the same year. The majority of texts are from 2011. This indicates that UNG is a new topic in foreign policy discourse from the Russian Federation (RF), whose relevance has so far been notably limited. The minimal space which UNG gets in *Energy Strategy for the Period up to 2030* evidences this. Likewise, UNG is only mentioned in passing in energy ministry concept documents.

Of course, both sources differ in their approach to UNG. While Gazprom is the most skeptical, not allowing for more significant (and longer-lasting) UNG influence, the media also warn of geopolitical consequences from UNG development (especially the strengthening of consumer countries' negotiating positions). State documents express an opinion of UNG which is somewhere in between these two poles; the potential for domestic UNG is also brought up.

8.3 THE MEOS MODEL (Chapter 6)

The MEOS model's goal is to optimize the network flows based on their technical and economic parameters. The model employs a physical network of roughly forty trunk pipelines and the interconnection between eastern, central, western, and southern regions of Europe (areas unimportant to natural gas flows in the V4 region are intentionally left out) and their techno-economical parameters (capacity, course, length and the cost of transport). Thus MEOS is similar to the TIGER model. The model's goal is to determine when the demanded amount can be transported from the source to consumer at minimum cost, thus maximizing resource usage and minimizing costs of production and transport. Unlike TIGER, MEOS does not aim to predict physical flows. It only estimates economic pressures from allocating commodities in the network. For that reason, MEOS assumes perfect competition, warranty for third party access (TPA), and ex-

[159] Russian Department of Energy. (2009). *Energy strategy of Russia for the period up to 2030*. Moscow: Author. Retrieved from: http://www.energystrategy.ru/projects/docs/ES-2030_%28Eng%29.pdf

[160] Российский газ скоро никто не будет покупать? (2009, October 20) Аргументы и факты. Retrieved from: http://www.aif.ru/money/dontknow/2851

clusion of politically-motivated interference of transport. Long-term contracts are left out of the algorithm for the same reason, because economic motives for their re-negotiation can be determined by comparing real and modeled flows.

The comparisons in the Reference scenario show that economic rationality was the key element and, to an extent, a basis for the resultant character of real flows. The correspondence of simulated volumes with those actually transported ranged from 66% to 93%, which means that the economic rationality in fixing flow character is at least two-thirds. The remaining 7% to 33% is not allocated with costs of production and transport (higher share on the market at the expense of lower margins of less competitive producers). When we consider the limited availability of data concerning transport fees and differences in tariffs in each country, we can assume that some of that share is ascribed to deviation.

Tab. 15: Cross-borders flows between selected countries (bcm, 2008)

Country	From	Actual	MEOS	To	Actual	MEOS
Austria	Slovakia	38.4	44.6	Germany	2.4	0
				Hungary	2.3	0
				Italy	25.0	36
Czech R.	Slovakia	30	22,4	Germany	21.4	13.7
Germany	Austria	2.4	0	Switzerland	11.9	12.8
	Czech Republic	21.4	13.7			
	The Netherlands / Norway	45.0	68			
	Poland	28.0	24.1			

The data used is primarily from the Scenario of Demand from Černoch eds. 2009. The Infrastructure scenarios draw information from the Energy Section IIPS database, which has been collecting information on European infrastructure projects since 2008. Its work is based on primary and secondary resources, primarily from national TSO data (E.ON Ruhrgas, Eustream, FGSZ, Gaz de France, Gaz-system, Net4gas, OMV, Plinacro, Snam Rete Gas, Srbijagas, Wingas), national energy regulatory agencies (E-Control, MEH), or from analysis by Arthur D. Little, BMI, BP, Energy Charter Secretariat, GIE, OME, IEA, EWI, Susanne Nies, Simon Pirani, for example. Finally, additional data comes from information servers dedicated to particular projects (nord-stream.com, south-stream.info, nabucco-pipeline.com, gashub.at) and articles published on the energy-oriented pages or news servers (by Vladimir Socor, BBC, Gazprom).

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