UNIVERSITY OF CAMBRIDGE | Electricity Policy Research Group

Bypassing Ukraine

The economics of 'Nord Stream'

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E·S·R·C ECONOMIC & SOCIAL RESEARCH COUNCIL

Why this research?

- *Russia-Ukrainian relations have deteriorated much since 2004*
- *…2006, 2009 gas transit disruptions through Ukraine…*
- *…raise concerns over security of gas supply in Europe…*
- *…Investment proposals/decisions not to depend on…*
  - *Russia*
  - *Ukrainian transit route*
- *Nord Stream: little research on the economics of the project*

Main messages

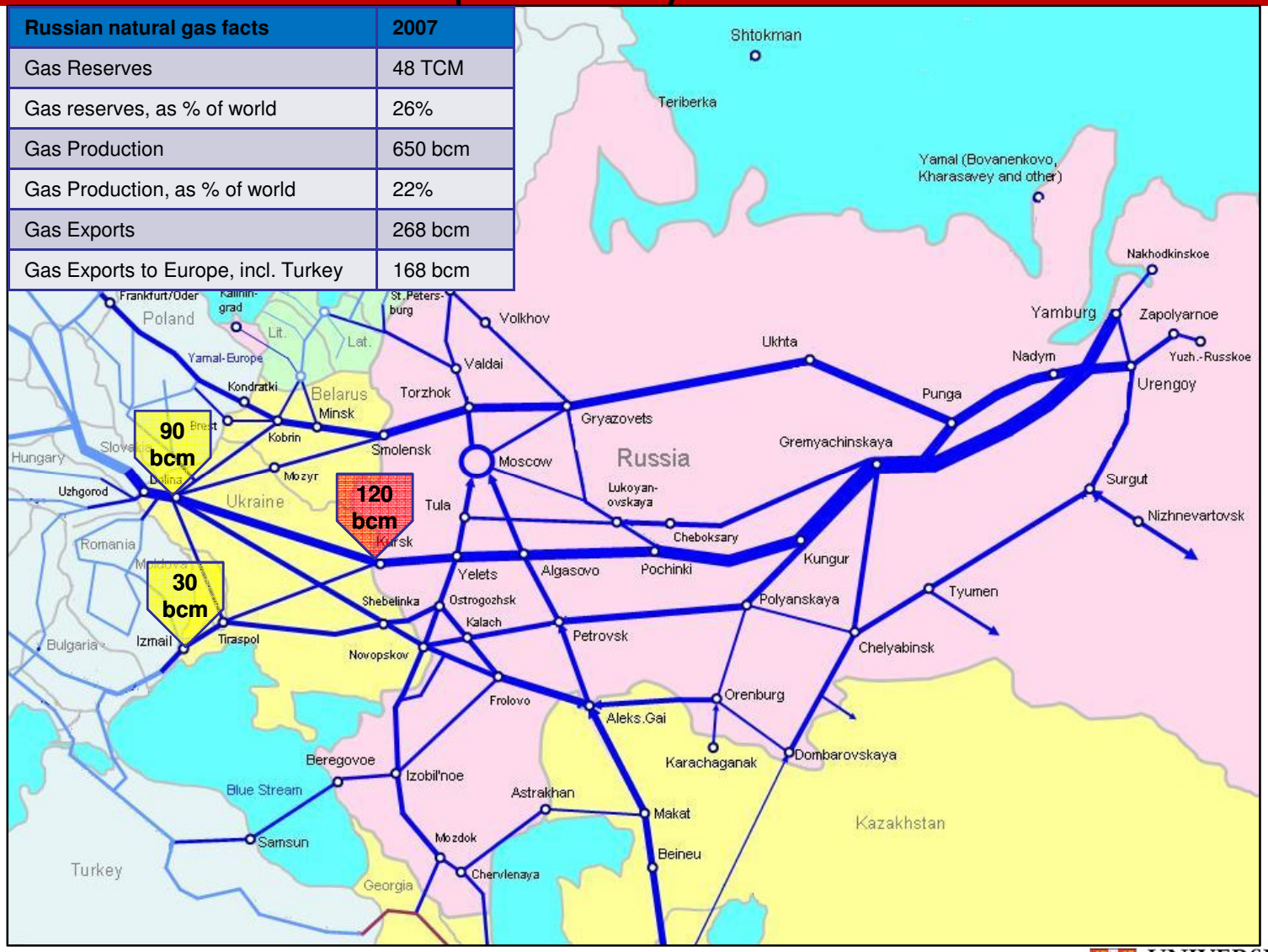
1. *Nord Stream appears to be a cheaper option for Gazprom to transport gas to Europe than through Ukraine…*

2. *Risks of gas transit disruption through Ukraine have no large impact on Nord Stream's value…*

3. *The future of Ukraine's gas transit business depends on rebuilding its transit reputation and bringing transit fee down…*

EU-Russia gas trade
Dependency on Ukrainian transit

Russian natural gas facts	2007
Gas Reserves	48 TCM
Gas reserves, as % of world	26%
Gas Production	650 bcm
Gas Production, as % of world	22%
Gas Exports	268 bcm
Gas Exports to Europe, incl. Turkey	168 bcm



2007

- Russian gas accounts for **25%** of European gas consumption;
- Gas exports to Europe accounts for **4%** of Russian GDP;
- **71%** of Russian Gas exports is transported through Ukraine

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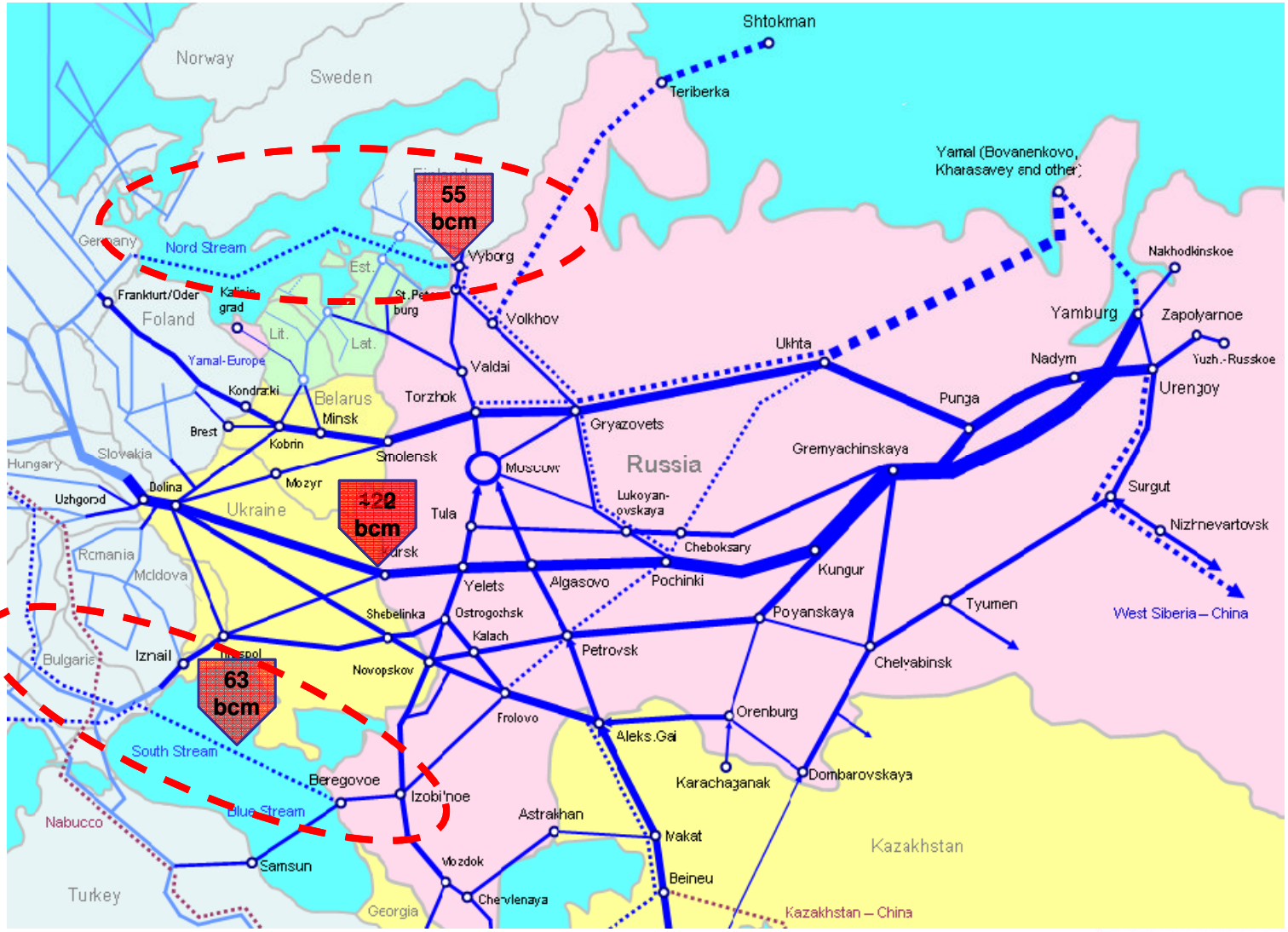
Gazprom's proposed solution
Bypassing Ukraine

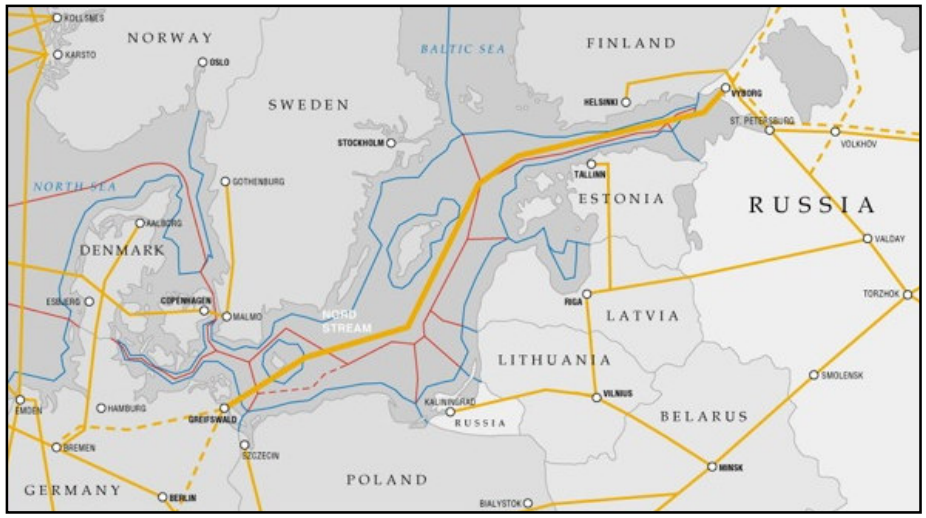


Research question

- ***What is the range of benefit/cost of Nord Stream to Gazprom, under various Ukraine transit disruption scenarios?***

Nord Stream:

Gazprom's strategic partnership with key EU gas importers



Source: Gazprom.com

Off-shore part:

- *Phase I: 2011 (27.5 bcm/a);*
- *Phase II: 2012 (27.5 bcm/a);*
- *Expected to reach design capacity by 2016 (55 bcm/a);*

Russian onshore part:

- *917 km long, 7 compressor stations (CS) (1266 MW), including a 366 MW CS at Portovaya Bay;*
- *Design Capacity 55 bcm/a;*
- *Expected by the end of 2010;*

Source: Gazprom.com

Research Steps

Project-Specific Analysis: Calculation of Transportation cost (TC)

- Monte-Carlo Simulation (e.g. capital cost, interest rate, discount factor)

TC

Model-Based Analysis: Calculation of Gazprom's Profit (P) under various disruption scenarios

- Static Equilibrium Model of European Natural gas trade

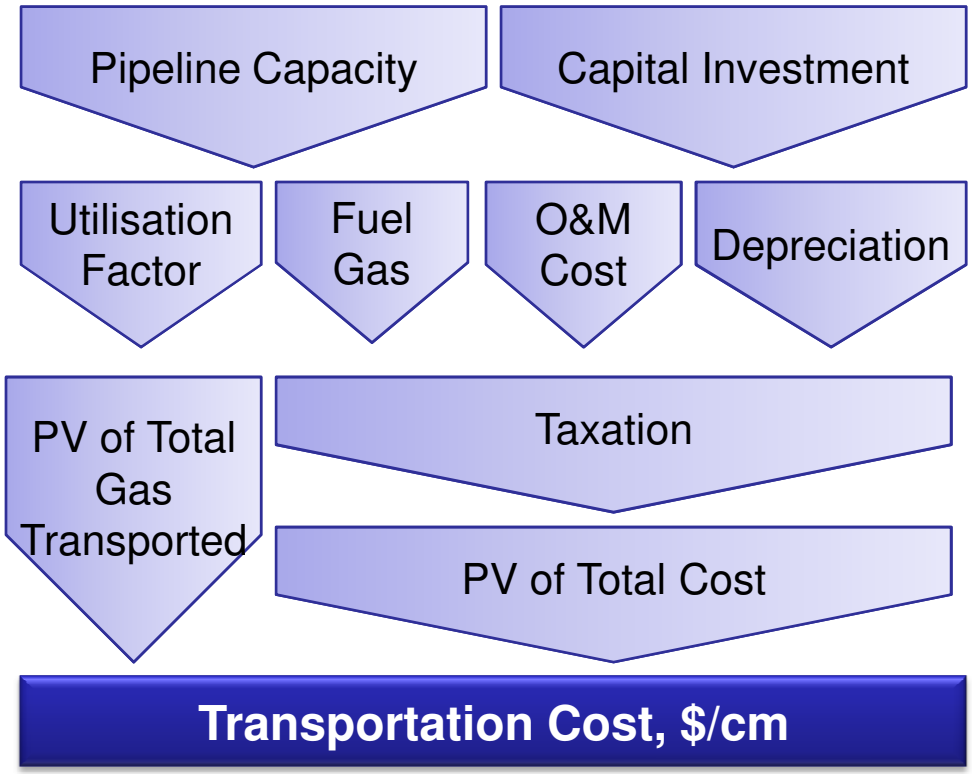
P

Calculation of Expected Value of Nord Stream

- Monte-Carlo Simulation (e.g. Probability of transit disruption through Ukraine)

Project-specific analysis

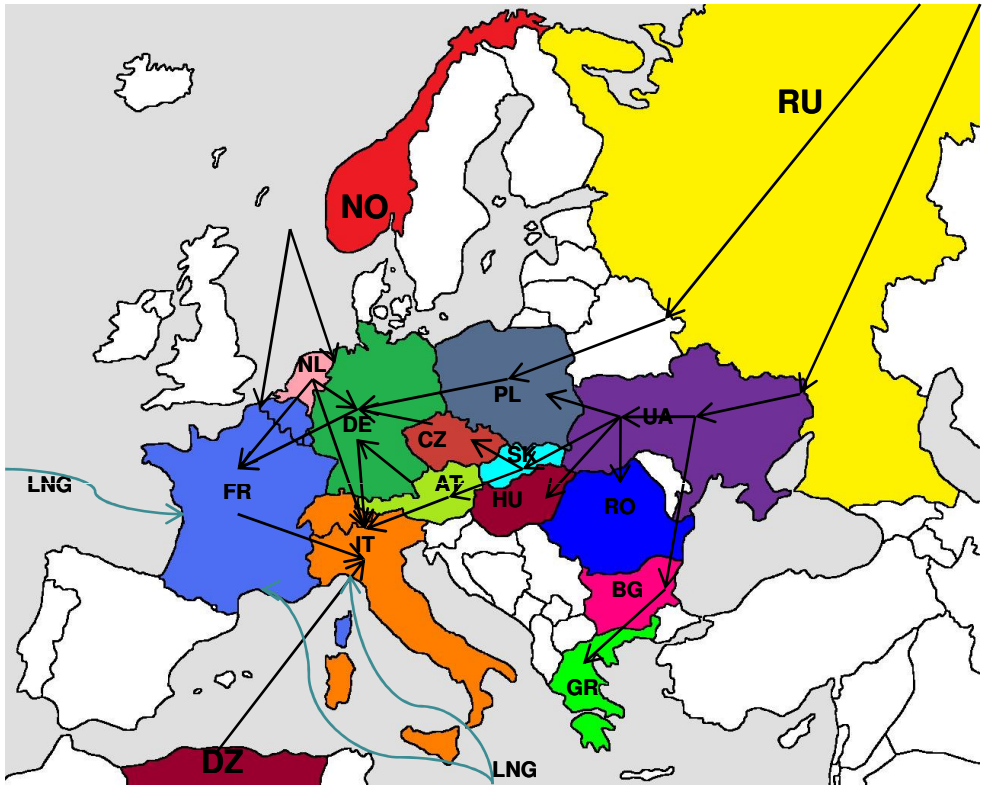
- Calculation of transportation cost for Nord Stream:



- **Monte-Carlo (MC) Simulation applied to all uncertain parameters:**
  - Capital cost overrun ϵ [0%;+30%];
  - Interest rate: follows historical distribution of EURIBOR 1999-2009;
  - Discount factor ϵ [7%;12%];

- **Assumption:**
  - Fuel gas is priced at Gazprom's production cost level;
  - Data on compressor efficiency obtained from industry;
  - Taxation according to Russia → In line with principles of International law;

Model-based analysis

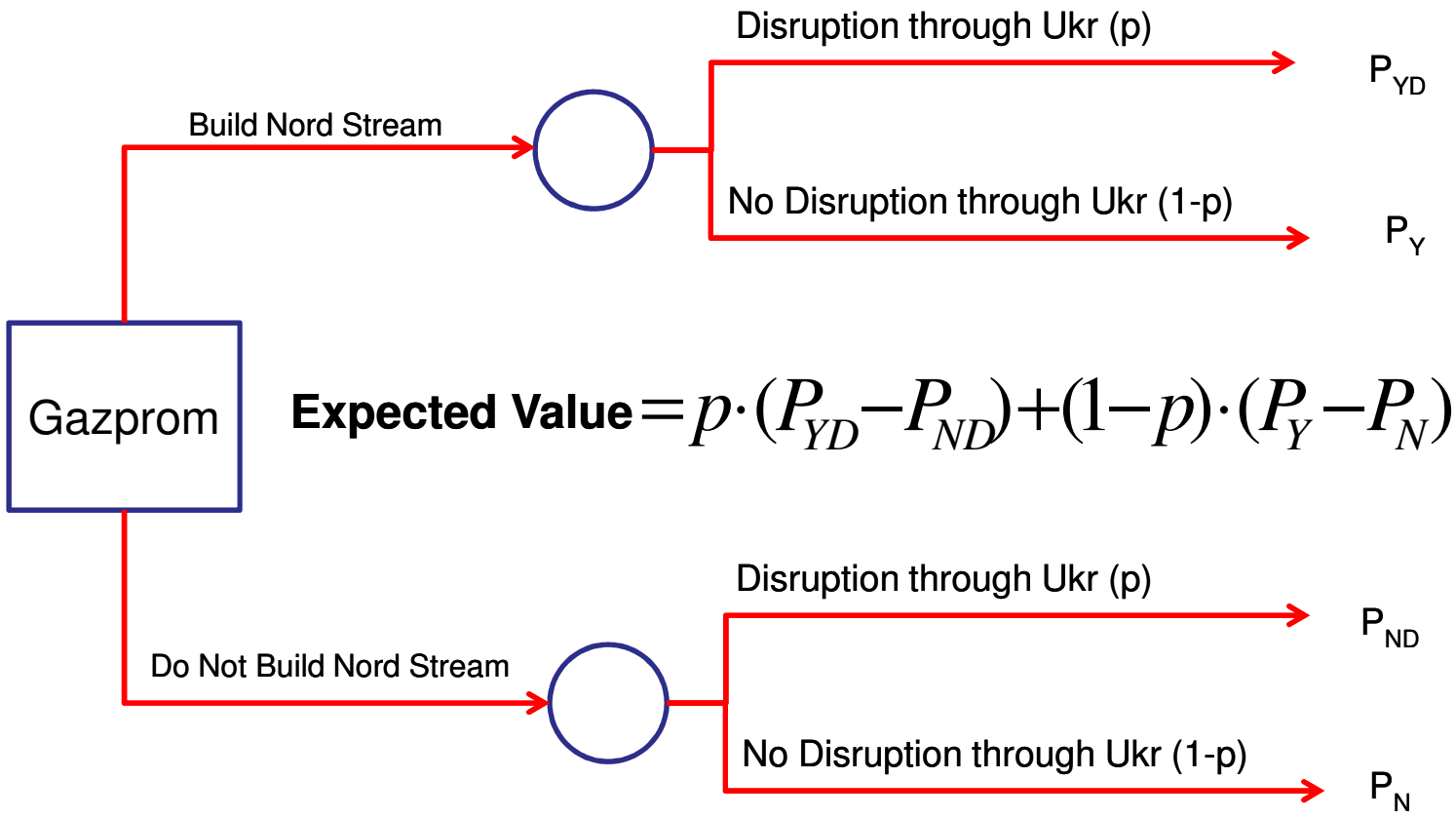


- *Strategic European Natural Gas Model*
  - Two-Stage, static equilibrium model of successive oligopolies;
  - Producers are 'clever' and know how traders will behave;
- *Assumptions for reference case up to 2040:*
  - Price and demand forecast based on EC DGTREN 2007 corrected for economic recession;
  - Forecast of production capacity based on IEA's WEO2009;
  - Future LNG regasificiation in Europe was accounted for;
  - Competitive gas trading in Europe;

Model-based analysis (2)

Nord Stream is Not Built	Nord Stream is Built
Run reference case up to 2040	Run reference case up to 2040
Record Gazprom's Profit (P_N) and gas quantity shipped through Ukraine	Record Gazprom's Profit (P_Y) and gas quantity shipped through Ukraine
Disrupt transit flow through Ukraine and record Gazprom's profit (P_{ND}) under different scenarios: Two and six weeks of disruption every 3 and 6 years over next 30 years;	Disrupt transit flow through Ukraine and record Gazprom's profit (P_{YD}) under different scenarios: Two and six weeks of disruption every 3 and 6 years over next 30 years;

Expected Value of Nord Stream



Data and Assumptions
Nord Stream Capital Cost

- ***Phase I of financing (to be signed by the end of 2009):***
  - €1.67 bn equity;
  - Syndicate of 27 banks will provide the loans of €3.9 bn;

- ***Phase II of financing (to be finalized during 2010):***
  - ~ €1.85 bn.

- ***Financials of €3.9 bn loan during Phase I:***
  - 16-year €3.1 bn covered loan: Hermes: €1.6bn; UFK: € 1bn; Sace: €500 mn;
  - 10-year €800 mn uncovered commercial loan.

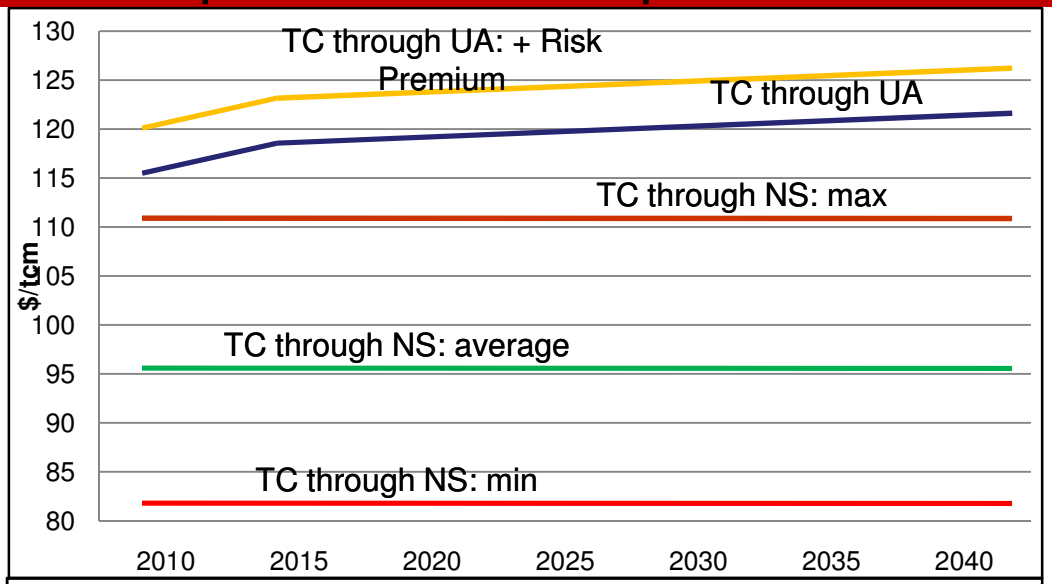
- ***Loan Pricing:***
  - Margin above EURIBOR;

Data and Assumptions (2)

- *Ukrainian transit fee based on January 2009 Gazprom-Naftogaz Long-term transit contract;*
- *Fuel gas for Ukrainian transit assumed equal European 'netback' value;*
- *Transit fees through Slovakia, Czech Republic and Austria remain at 2008;*
- *Capital Cost of Nord Stream based on industry data;*

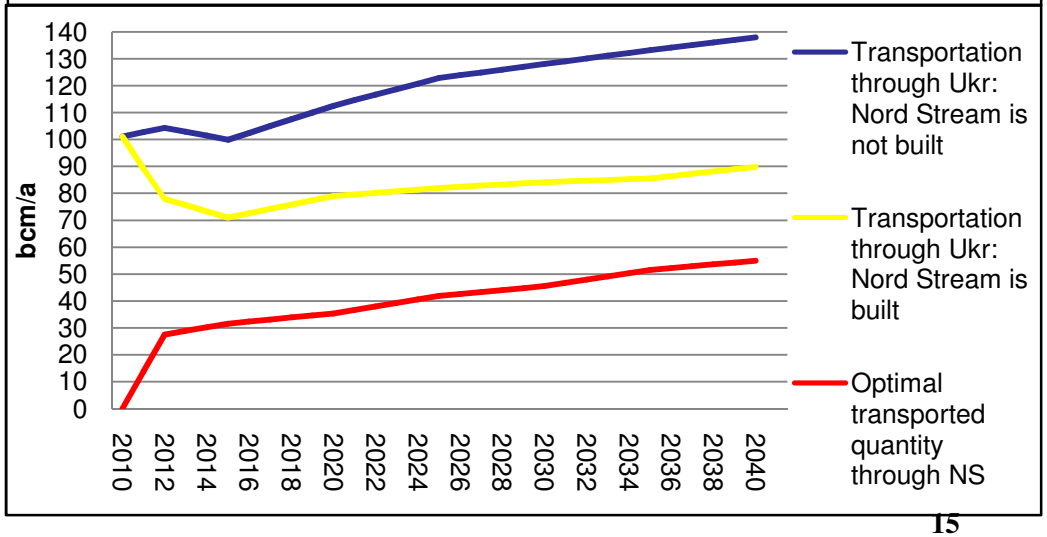
Results
Transportation cost and quantities transported

- *...transportation cost through Nord Stream is 25% lower on average than the cost through Ukraine taken into account risk of disruption and 20% lower without risk of disruption;*



- *With obtained transportation cost, Nord Stream is fully utilized only by 2040...*

- *Nord Stream's design capacity appears to be not optimal...*



Results (2)
Nord Stream's Expected Value

Disruption Scenarios ($ bn)			No Disruption Scenario ($ bn)
Length \ Frequency	Every 3 Years	Every 6 Years	
2 weeks	7.14	7.11	7.10
6 weeks	9.15	8.17	

- *Under all scenarios modeled, Nord Stream brings economic value to Gazprom and its strategic partners...*

- *The most severe risk of disruption brings only 29% more value to Nord Stream than under no disruption scenario;*

Conclusions

- The Nord Stream project appears to be economically justified:
  - From the wellhead to the final market, transportation cost through Nord Stream appears to be lower than through Ukrainian route;
  - The higher the risk of disruption through Ukraine, the more value Nord Stream has;
  - The transit fee through Ukraine is too high, even without any risks premium on transit.
- Next steps
  - European gas market structure;
  - Cost of fuel gas;
  - Ukraine's strategic behaviour;

Thank You!