



Oslo Centre of Research on Environmentally friendly Energy

Export of Russian natural gas to Europe

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Russian gas exports

- Disputes between Russia and Ukraine triggered Russia to build Nord Stream (to Germany) and launched South Stream (to Bulgaria)
- Direct export to Europe
- More conflicts may come – Ukraine, Belarus, Poland...

- Effects of Russia building pipes that avoid transit of natural gas
- Effects of Russia exporting more natural gas to Asia

- Potential large effects:
 - 1/3 of natural gas imports to Europe delivered from Russia (direct and indirect)
 - 60 % of total Russian natural gas exports delivered to Europe
- Need a numerical model to quantify effects

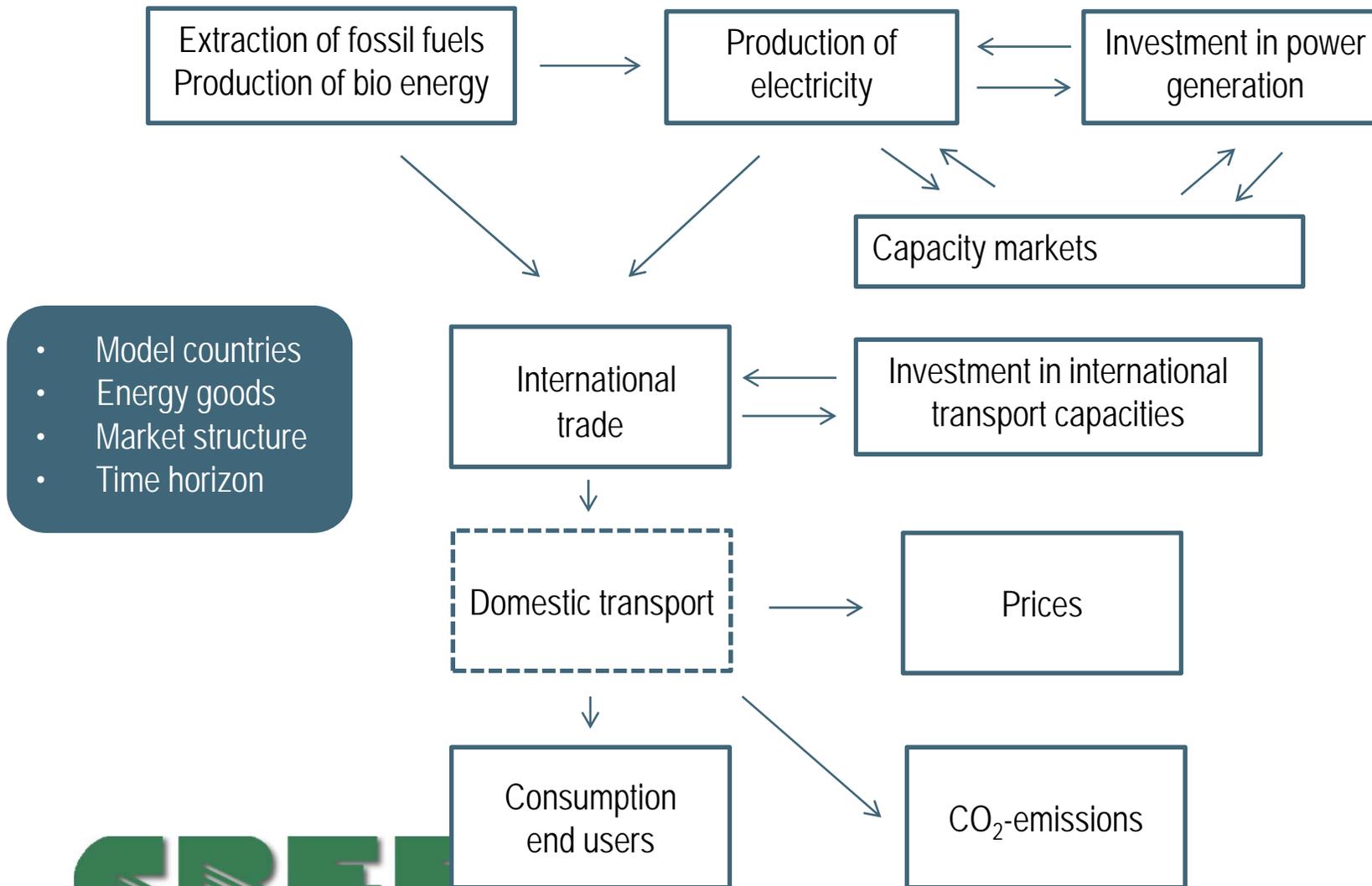


LIBEMOD

- Equilibrium model for energy markets in Europe, Russia and globally
- Determination of energy quantities and prices in European, Russian and global markets
- Investment, extraction, production, trade, consumption
- Supply of natural gas
 - Extraction in several countries in Europe
 - Price sensitive European imports of piped gas, partly from Russia
 - Price sensitive European imports of LNG
- Static model – equilibrium for a future year



LIBEMOD



LIBEMOD

Modeling of Russia

- Russia is divided into three regions
- Regulated end-user prices of natural gas
 - Golombek et al. (2015) calibrated natural gas subsidies
 - Difference between (i) real cost of supply and (ii) price actually paid
 - Subsidies: 120 to 160 €/toe
- Russia has market power in the European gas market
 - Golombek et al. (2015): mark-up calibrated to 18 €/toe
- Russian exports of natural gas to Europe
 - Direct: Germany (North Stream), Finland, Estonia, Lithuania
 - Indirect: through Ukraine and Belarus
- Exogenous investment in gas pipes between Russia and Europe/China
 - Scenarios



2020 Reference Scenarios

- Exogenous GDP growth rates between 2009 (calibration year) and 2020
- 2009 natural gas subsidies to large users reduced by 50 %
 - 2007: Reach European net-back gas price parity (Gazprom lobbying)
 - Current policy: Reach 70 % of European net-back gas price by 2030 for large users of natural gas
- EU 2020 climate and renewable energy targets are reached
 - Three instruments



2020 Reference Scenarios

	2009 calibration	2020 reference equilibrium
Russian natural gas exports to Europe	102 Mtoe	77 Mtoe
Natural gas consumption, Europe	409 Mtoe	346 Mtoe
Natural gas price, EU	504 €/toe	447 €/toe
Natural gas price, Russia	43 €/toe	66 €/toe



Gas pipeline from Russia through Turkey to Greece

- Russia launched South Stream (to Bulgaria) after first dispute with Ukraine
- EU feared Russia would gain market power in South-East Europe – demanded third-party access
- Putin canceled South Stream in 2014, but launched Turkish Stream
 - 57 Mtoe capacity from Russia to Turkey, 43 Mtoe capacity from Turkey to Greece
- Political tensions between Russia and Turkey – will Turkish Stream be built?



Gas pipeline from Russia through Turkey to Greece

- Effects of Turkish Stream
 - Assume 14 Mtoe is exported to Turkey
 - **Russian exports to Europe drops by 8 Mtoe (10 % relative to reference scenario)**
 - NPV is negative
- Rationalization of Turkish Stream
 - Prevent competing projects (from the Caspian region) for gas imports to Turkey
 - Russia may need more capacity if transit through Ukraine is not used



Russian restrictions on gas exports via Ukraine

Background

- Ukraine became a transit country when the Soviet Union dissolved
- Initially, price charged for Russian natural gas was low, but then increased
 - Ukraine did not accept new terms in 2006
 - Russia accused Ukraine for stealing gas; turned off the gas
 - Ukraine accepted the price formula
- Similar crises in 2009
- Russia annexed the Crimea Peninsula in 2014
 - Ukraine imported more gas from Europe, mainly from Slovakia
 - More than 50 % of Russian gas export to Europe is currently transported through Ukraine



Effects of no Russian exports to Ukraine

- No exports to and via Ukraine, but Russia can invest in gas pipes going directly to Europe (if profitable)
- Effects relative to the 2020 reference scenario
 - Total Russian gas exports drop by 1/3
 - No idle capacity to Europe in new equilibrium
 - Natural gas consumption in Europe drops by 5 %
 - Natural gas consumption in Russia increases 18 %
- No exports to and via Ukraine, **and** Turkish Stream is built
 - Natural gas consumption in Europe drops by 3 % relative to reference scenario



Russian restrictions on gas exports to Poland

- The relationship between Russia and Poland has historically been tense
- Poland is afraid to be put under pressure by Russia
- Poland opposed Nord Stream 1: Would allow Russia to cut off deliveries to Poland without affecting Germany («The Polish Nightmare»)
 - For Western Europe: Increased supply
- Restrictions on Russian gas exports to Poland
 - No trade from Belarus to Poland and to rest of Europe
 - No increase in trade between Lithuania and Poland
 - No exports to and via Ukraine
 - Trade between Poland and EU possible



Partial effect of restrictions on exports to Poland

Effects relative to no exports to and via Ukraine

- Total Russian exports are reduced by 10 %
- Natural gas consumption in Europe is reduced by 1 %

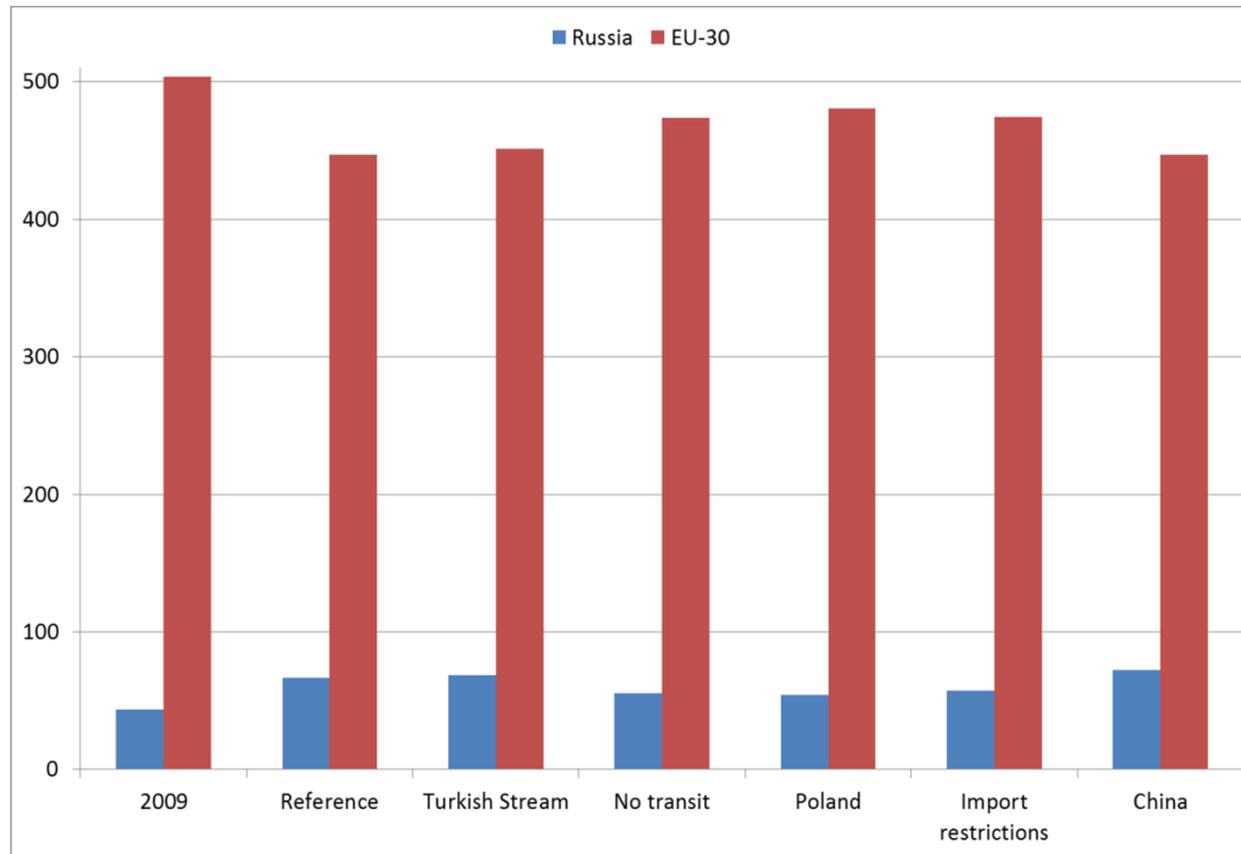


Russian gas exports to China

- Russia and China signed export agreement in 2014
 - Russia will deliver 30 Mtoe by 2030
- Disagreement over which Russian gas fields to extract from
 - Eastern vs. Western Siberia
- Effects of Russian gas exports of 30 Mtoe by 2020
 - Negligible effects in Europe
 - Robust finding wrt. which Russian fields to extract from



Natural gas consumer prices. Euro/toe



Main findings

- Overall modest effects in Europa of
 - Turkish Stream
 - No Russian exports to and via Ukraine
 - No exports from Balarus to Europe
 - Russian export agreement with China

- Have identified long-run effects. Short-run effects may be stronger

