The Rise of Shale Gas and LNG and its Impact on Europe and Russia

Ariel Cohen, Ph.D.
Senior Research Fellow, Russian and Eurasian Studies and International Energy Policy,
The Heritage Foundation
The Shale Gas Revolution: the U.S. and the World

• 2010 - 23% of extracted US gas was shale, 2035 - 49% (projected)

• Results in high price disparity between regions

• LNG = gas as global commodity

• Encourages trade

• Frightens the Kremlin
Shale Gas is Distributed More Evenly than Conventional Gas; China and the US have Largest Reserves

<table>
<thead>
<tr>
<th>Country</th>
<th>Trillion Cubic Feet (tcf)</th>
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<tbody>
<tr>
<td>China</td>
<td>1,275</td>
</tr>
<tr>
<td>United States</td>
<td>862</td>
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<tr>
<td>Argentina</td>
<td>774</td>
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<tr>
<td>Mexico</td>
<td>681</td>
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<tr>
<td>Australia</td>
<td>396</td>
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<tr>
<td>Libya</td>
<td>290</td>
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<tr>
<td>South Africa</td>
<td>285</td>
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<tr>
<td>Algeria</td>
<td>231</td>
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<td>Brazil</td>
<td>226</td>
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<td>Poland</td>
<td>187</td>
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<tr>
<td>France</td>
<td>180</td>
</tr>
<tr>
<td>Norway</td>
<td>83</td>
</tr>
<tr>
<td>Ukraine</td>
<td>42</td>
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</tbody>
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Russian conventional gas reserves still higher 1,575 tcf
Russian Budget Dependence on Oil and Gas as Share of Total State Revenues

- Dependence growing
- Plummeting gas prices could precipitate economic crisis

- Source: International Energy Agency/MinFin
The Rise of LNG Trade

Exerts great pressure on long-term oil-indexed contracts preferred by Gazprom and other exporters

3.2. LNG Trade Volumes

Figure 1: LNG Trade Volumes, 1980-2011

Sources: Cedigaz, Waterborne LNG Reports, US Energy Information Agency (EIA), US Department of Energy (DOE), PFC Energy

Spreading it around
Top ten LNG exporters
2011, bn cubic metres

Source: Eurasia Group, GIINL
Global Gas Market? Not so Fast!

• Markets remain regional. Gas prices influenced by local demand, location, contract terms, and timing

• Pipelines and LNG facilities are very capital intensive, hence long term contracts preferred

• More liquidity over time
Price liberalization & Industry Transformation in EU Gas Market

- EU pipeline system not integrated, lacks open access
- Spot trading only in Britain via the NBP
- Stagnated energy demand gives little incentive to reform
- Coal, nuclear shut down, gas up
- Large suppliers like Gazprom could manipulate prices
Gazprom Troubles?

- EU Commission probe into Gazprom’s monopolistic activities in Eastern Europe, documents forcibly seized
- Shock in Moscow
- Gazprom provided billions of dollars in price discounts to German utilities, Czech RWE Transgaz
- Disputes with Poland’s PGNiG; Naftohaz Ukraine
Gazprom Troubles?

- Failed to negotiate gas contract with China
- Russian subsidized domestic gas prices under pressure
- Shtokman postponed indefinitely
- Gazprom is rushing to build the South Stream, to avoid EU third package anti-monopoly regulations scheduled to take effect March 2013
Yamal Peninsula is Key to Gazprom’s Future – but Production Costs Loom

Yamal Peninsula has 11 gas fields and 15 oil, gas and condensate fields with estimated reserves of 22 trillion cubic meters

Source: Uppsala University
Gazprom’s Projected Gas Production to 2030

Gazprom’s Survival Strategy

• Diversify towards Asia
• Joint ventures and service contracts with Western supermajors and technology providers
• Attract capital from European partners
• Lock in supply
  – Control strategic infrastructure, especially pipelines
• Lock in demand
  – Get stakes in EU’s power generation sector: Gazprom EDF France agreement
• Cultivate ties and “enlist” Western officials for help
• Gas OPEC?
Russia’s Future: Scenarios

1. High energy prices: Petrostate. Authoritarianism. Low levels of the rule of law; human and financial capital flight
Russia’s Future: Scenarios

2. Low energy prices. Authoritarianism increases. Possible state crisis; collapse and chaos. Human and financial capital flight

3. Reforms

4. Muddle through: Scenarios (1 & 3 and 2 & 3)
Europe’s Gas Future

• A bride with many grooms: Russia, Caspian, North Africa (piped gas); LNG (Qatar, Nigeria, Angola, Israel, Cyprus); shale

• Deregulation is good for lower prices

• Positive structural outlook (nuke, coal power generation closing down)

• Poor macroeconomic outlook - low GDP growth

• High environmental awareness - good for the gas industry