Market Structure in the New Gas Economy: Is Cartelization Possible?

Amy M. Jaffe and Ronald Soligo
The Issues

• How are gas reserves and exports distributed?
• What are the implications of those distributions for:
  – Security of gas supply
  – Cartelization of gas supply
• Collaboration with OPEC
Distribution of Reserves

**OIL**
- Russia: 6%
- Iran: 10%
- Iraq: 11%
- Saudi Arabia: 25%
- Kuwait: 10%
- Other Middle East: 3%
- Central & South America: 7%
- North America: 4%
- Africa: 9%
- Asia & Oceania: 5%
- UAE: 6%
- Other: 4%

**Gas**
- Russia: 30%
- Iran: 15%
- Qatar: 9%
- Saudi Arabia: 4%
- Other Middle East: 8%
- Asia & Oceania: 8%
- Africa: 8%
- Central & South America: 4%
- North America: 5%
- Kuwait: 10%
- Other: 9%

**North America**

**Other Middle East**
Distribution of Exports

**Gas**
- Russia: 30%
- Iran: 15%
- Qatar: 9%
- Saudi Arabia: 4%
- Other Middle East: 8%
- Asia & Oceania: 8%
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**Oil**
- Saudi Arabia: 25%
- Kuwait: 10%
- UAE: 6%
- Iraq: 11%
- Other Middle East: 3%
- Other: 4%
- Africa: 9%
- Asia & Oceania: 5%
- Central & S. America: 7%
- North America: 4%
Distribution of Gas Reserves

- **Russia**: 31%
- **Iran**: 15%
- **Algeria**: 3%
- **Iraq**: 2%
- **Other**: 16%
- **Uzbekistan**: 1%
- **Turkmenistan**: 1%
- **Norway**: 1%
- **Australia**: 2%
- **Indonesia**: 2%
- **Nigeria**: 2%
- **Venezuela**: 3%
- **United States**: 3%
- **UAE**: 4%
- **Saudi Arabia**: 4%
- **Qatar**: 9%
- **Saudi Arabia**: 3%
Distribution of Oil Reserves

- Saudi Arabia: 25%
- Iraq: 11%
- Iran: 10%
- UAE: 6%
- Russia: 6%
- Venezuela: 5%
- Nigeria: 3%
- Libya: 3%
- China: 2%
- United States: 2%
- Other FSU: 2%
- Kuwait: 10%
- Other: 15%
- Iran: 10%
- Other: 15%
Distribution of Oil Exports

- Saudi Arabia: 16%
- Russia: 10%
- Norway: 7%
- Venezuela: 6%
- Malaysia: 6%
- Iran: 5%
- United Arab Emirates: 5%
- Nigeria: 4%
- Iraq: 4%
- Kuwait: 4%
- Colombia: 1%
- Angola: 2%
- Kazakhstan: 1%
- Canada: 2%
- Qatar: 2%
- Oman: 2%
- United Kingdom: 2%
- Libya: 3%
- Algeria: 3%
- Mexico: 4%
- Argentina: 1%
- Venezuela: 6%
- Rest of World: 12%
Distribution of Gas Exports

- Russia: 28%
- Canada: 17%
- Algeria: 10%
- Norway: 8%
- Turkmenistan: 6%
- Indonesia: 5%
- Netherlands: 5%
- Malaysia: 3%
- Uzbekistan: 3%
- Qarar: 3%
- Rest of World: 12%
Security of Gas Supplies

• Reserves are highly concentrated at top of distribution:
  – Russia has 30.5%
  – Russia + Iran have 45%
  – Add Qatar, Saudi Arabia + UAE
  – These 5 countries have 62%

• But regional distribution is better. Middle East has 36% of gas reserves compared with 65% of oil reserves.
Conditions for an Effective Cartel

- Cartel members control large share of market
- Must agree to production quotas or capacity controls
- Must prevent cheating
- Must prevent new entry
- Inelastic demand for product
- Low elasticity of supply of non-members
- Small number of members
  - Easier to coordinate
  - Easier to catch cheaters
Prospects for a Gas Cartel

• Distribution of gas reserves is concentrated
• Gas exports are even more concentrated.
  – Russia has 28%
  – Top 7 have 79% of exports
  – But Canada, Norway and Netherlands with 30% of exports are not likely to join
  – Only significant Middle East exporter is Qatar with 2.6%
• But export concentration reflects underdevelopment of gas deposits in many countries.
• More widespread development will create many sources of supply. (the supply elasticity of non-members of a cartel is large in short - intermediate term)
Prospects for Gas Exporting Countries Forum (GECF)

• Little power at present
  – Attempts to prevent European liberalization
  – Algerian gas for Boston

• Too many members with competing interests to constrain capacity expansion in intermediate term.
In the Long Run…

- As LNG market becomes more liquid, Qatar could emerge as a “swing producer”
- Rice World Gas Model Forecasts:
  - Russia’s dominance increases: pipeline gas is cheaper than LNG
  - Iran also show strong growth in pipeline gas
  - Saudi share (LNG) becomes important after 2030
- But Russian market power is constrained by potential entry of Middle East LNG
- Russia plays arbitrage role between Europe and East Asia
Supply projections

2030

- Russia: 24%
- Canada: 2%
- US (L48 and Alaska): 9%
- Mexico: 1%
- Mexico: 8%
- Australasia: 8%
- South America (majors): 8%
- Turkmendnistan: 2%
- Kazakhastan: 1%
- Saudi Arabia: 5%
- Iraq: 2%
- Iran: 8%
- ROW: 16%
- North Sea Region (majors): 6%
- Afric (majors): 6%
- ROW: 16%
# Export Share Of Rest Of World Demand

Export Share of Rest of World Demand

<table>
<thead>
<tr>
<th>Year</th>
<th>Russia</th>
<th>Saudi Arabia</th>
<th>Qatar</th>
<th>Iran</th>
<th>North Africa</th>
<th>Australia</th>
<th>Indonesia</th>
<th>Malaysia</th>
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<tbody>
<tr>
<td>2002</td>
<td>8.71%</td>
<td>0.12%</td>
<td>0.94%</td>
<td>0.02%</td>
<td>3.20%</td>
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<td>3.24%</td>
<td>0.56%</td>
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<td>3.08%</td>
<td>0.50%</td>
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<td>2008</td>
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<td>1.24%</td>
<td>0.15%</td>
<td>3.10%</td>
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<td>3.42%</td>
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<td>2012</td>
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<td>0.12%</td>
<td>1.22%</td>
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<td>3.49%</td>
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<td>2015</td>
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<td>1.15%</td>
<td>0.25%</td>
<td>3.16%</td>
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<td>1.17%</td>
<td>2.23%</td>
<td>1.44%</td>
<td>0.51%</td>
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Source: Rice World Gas Trade Model
Concluding Remarks

• As in oil, world will become increasingly dependent on few sources of gas after 2030
• Russia and OPEC will have incentives to coordinate pricing of oil and gas
• Consuming nations can reduce market power of exporters by
  – Promoting competition among energy sources by
    • Liberalizing domestic energy sectors
    • Develop technologies that facilitate fuel switching
  – Improve energy efficiency