Global gas markets, carbon pricing and the future of natural gas

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Plan for this talk

① Gas demand, prices and competition

② Coal-to-gas switching in power generation

③ Political economy & carbon pricing

④ Strategic positioning
Forecasts too bullish given challenges for gas?

Gas grows faster than coal & oil...
... driven by non-OECD Asia/China

... How to secure demand?
- Prices? Investment? Value?

World Gas Demand (bcm)

Source: SNAM 2017 Global Gas Report

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Regional price divergence is the historical norm

“Asian premium”:
- Most of last 20 years
- Imperfect competition + limits to arbitrage

Low & stable HH price
- US LNG exports
- Security of supply (LNG vs pipeline gas)

⇒ Global convergence to Henry Hub-based pricing?

Source: Calculations based on IMF data
Competition in global LNG: A changing market

**Balance of power:** Shift to gas buyers post-2014
- Global price decline (comparable to oil)

**LNG market structure:**

<table>
<thead>
<tr>
<th></th>
<th>2007</th>
<th>2012</th>
<th>2017</th>
<th>2022</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Seller HHI</strong></td>
<td>.102</td>
<td>.140</td>
<td>.136</td>
<td>↑? Further US &amp; AUS</td>
</tr>
<tr>
<td>(# players)</td>
<td>(14)</td>
<td>(18)</td>
<td>(18)</td>
<td></td>
</tr>
<tr>
<td><strong>Buyer HHI</strong></td>
<td>.218</td>
<td>.180</td>
<td>.132</td>
<td>↓? Smaller Asian</td>
</tr>
<tr>
<td>(# players)</td>
<td>(18)</td>
<td>(27)</td>
<td>(39)</td>
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⇒ LNG sell-side now *more* concentrated than buy-side

*Note: Herfindahl index (HHI) is a measure of market concentration, ranging from 1 (monopoly) to 0 (many small players)*

*Source: Calculations based on GIIGNL data*
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Coal-to-gas switching from a climate perspective

How much delay in adoption of near-zero carbon technologies (NZCT) is achieved by switching to gas?

**Parity ratio**: Allowable years of gas per year of coal generation avoided

- **Literature**: ≈ 2.4 years
- Coal plant replaced 15 years before otherwise replaced by NZCT
- Gas can operate for ≤ 36 years, helping climate

⇒ “Bridge fuel” buys 1.4 years per year of coal displaced

Source: Adapted from Hausfather (2015)
Thought experiment: Global coal-to-gas switch

Q: How much existing coal-fired power generation can be replaced with existing *unused* gas generation?

<table>
<thead>
<tr>
<th>Top 5</th>
<th>“Gas potential”</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>6%</td>
</tr>
<tr>
<td>US</td>
<td>47%</td>
</tr>
<tr>
<td>India</td>
<td>12%</td>
</tr>
<tr>
<td>Russia</td>
<td>37%</td>
</tr>
<tr>
<td>South Korea</td>
<td>35%</td>
</tr>
</tbody>
</table>

- **European countries**: mostly >100% potential
- **Zero potential**: Japan, Mexico, Poland, Kazakhstan

A: Global switching potential ~20% with *existing* assets

⇒ Annual global carbon emissions fall by ~1 GtCO$_2$
  - **Social value**: ~$50 billion per year

Source: Grant Wilson & Staffell (2018), 2015 data
Potential for coal-to-gas switching in power

Current gas capacity could completely displace coal

Insufficient gas capacity available to switch coal to gas

Source: Grant Wilson & Staffell (2018)

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Annual generation from coal (TWh)

Degree of fuel switching: 100% 30% 10% 3% 1%

Potential additional gas generation (TWh)

Source: Grant Wilson & Staffell (2018)

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UK: Carbon price floor supports gas switch

Coal phase-out now policy objective (for 2023)

Carbon price floor
- EU ETS + £18/tCO₂
- Emissions performance standard

⇒ Coal share from 41% (2013) to 8% (2017)

Case for CO₂ price floor on power generation
- Regional or EU level

Source: SNAM 2017 Global Gas Report
India: Gas currently squeezed by coal & solar

No clear role for gas/LNG
- Not cost-competitive against domestic coal
- Limited policy support
  - No carbon pricing
  - Infrastructure constraints

Skipping gas? Coal to RE
- Ambitious 175 GW target for 2022 (esp. solar)
- Large cost reductions & low auction prices

Source: International Institute for Strategic Studies (IISS) & Vivid Economics
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3. Political economy & carbon pricing
4. Strategic positioning
Gas industry *itself* is in the midst of a transition

**Strategic repositioning** around natural gas:

① **Energy majors**: oil → gas/LNG & power/RE  
② **Electricity companies**: coal/gas → RE  
③ **Commodity traders**: oil → LNG  
④ **Private equity**: → “legacy” coal/gas assets  
⑤ **New players**: → LNG export, gas E&P

⇒ Trend to *large integrated* or *niche specialist*?
Conclusions

① Significant downside risk in gas demand forecasts

② Global gas price convergence: not any time soon

③ Huge global potential for coal-to-gas switching in power generation

④ Local political economy for gas/LNG in non-OECD (Asia) very different from OECD (Europe)

⑤ Ongoing strategic repositioning reflects companies’ different visions of the future
References


https://www.eprg.group.cam.ac.uk/eprg-working-paper-1816/
