A UK dash for ‘smart’ gas

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Content

- Paper overview
- Energy security
- Affordability: Gas prices
- Environment: local impacts and GHG emissions
- Conclusions
Abridged version of GRI policy paper: A UK ‘dash’ for *smart* gas

**Focus:** What role for conventional/unconventional natural gas in the UK electricity sector?

**Approach:** literature review – impacts on:

1) energy security
2) affordability (prices)
3) the environment
(1) Energy security

- Domestic conventional gas resources depleting
- UK net importer of gas since 2004 (>40% in 2011)
- **Domestic shale gas** can reduce the need for foreign gas

But:

- Even highest (available) estimates suggest shale gas at best replacing depleting conventional reserves → imports likely to remain at current levels

Source: Based on National Grid (2012) Gone Green Scenario, Pöyry (2011) and ECC (2012)
How much shale gas?

- Different units: cubic meters, cubic feet (1 bcm = 35 bcf)
- Different indicators: gas in place, technically recoverable resources (TRR), proven reserves
## Estimated shale gas potential in the UK

<table>
<thead>
<tr>
<th>Location</th>
<th>Gas in place</th>
<th>EIA</th>
<th>Cuadrilla</th>
<th>BGS/DECC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Midland Valley</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>2,270</td>
</tr>
<tr>
<td>TRR</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>Bowland Shale</td>
<td>2,690</td>
<td>5,660</td>
<td>37,600*</td>
<td></td>
</tr>
<tr>
<td>TRR</td>
<td>540</td>
<td>900-1,200**</td>
<td>80-200</td>
<td></td>
</tr>
<tr>
<td>Weald Basin</td>
<td>60</td>
<td>n/a</td>
<td>n/a</td>
<td>0</td>
</tr>
<tr>
<td>TRR</td>
<td>30</td>
<td>n/a</td>
<td>n/a</td>
<td>0</td>
</tr>
<tr>
<td>Total UK</td>
<td>2,750</td>
<td>5,660</td>
<td>39,870</td>
<td></td>
</tr>
<tr>
<td>TRR</td>
<td>570</td>
<td>900-1,200</td>
<td>n/a</td>
<td></td>
</tr>
</tbody>
</table>

* Central estimate (Andrews, 2013)
** Based on Cuadrilla’s assumption that 15 -20% of gas in place could be extracted (ECC, 2012).

**TRR:** ~ 10-15% of gas in place (Cuadrilla)

**Proven reserves:** not assessed yet. ~14-18% of TRR (IPCC); 10% of TRR (US)

- UK yearly gas demand: 80 bcm
- Proven reserves (Cuadrilla) for max ~ 2-3 years? More?

Source: DECC (2011)
(2) Affordability: Gas prices

Future gas prices are uncertain

- Natural gas is a regional market: prices are set at regional not global level
- Large uncertainties about effect of global shale gas production on prices
- UK shale gas reserves too small to affect domestic gas prices (influenced by EU prices)
- IEA does not expect EU gas import prices to decrease (70-80p/therm in 2035; in 2012 they were ~70p/therm)

Source: BP (2012)
(3) Environmental impacts

Local impacts (shale gas):
- Water pollution;
- Earthquakes;
- Traffic and noise etc.

Limited. Can be mitigated, but need adequate technology and regulation

→ Issues of social acceptability:
  - Higher population density compared to US;
  - No royalties to land owners – unlike the US;
  - Landscape/visual impacts;

Careful planning needed, not all areas exploitable
GHG: fugitive emissions from shale gas

- Conventional and unconventional gas lifecycle emissions are of similar magnitude (if managed well)

Note: NGCC = Natural Gas Combined Cycle
Source: Bassi et al (2013)
GHG: The UK climate change targets

- Gas power plants → half the emissions from coal power plants.

...but:

- 2008 Climate Change Act: statutory 80% GHG reduction by 2050 (vs 1990)
- 4th Carbon Budget: 50% GHG reduction by 2025

Source: Based on Bowen and Rydge (2011).
Long run: gas remains significant for heating

- Lower demand (energy efficiency) & slow ramp up of RES
- But gas still significant in **residential sector**

Source: CCC, 2010
Long run: Power sector decarbonisation

2012: ~4.2% energy from RES

2020: 15% energy from RES (EU target)

2050: full decarbonisation?

Electricity:

- Total supply: ~ 375 TWh
- ~ 330 TWh

Sources: DECC (2013); National Grid (2012)
Key findings

- **Scope for gas is in the short term**, as it replaces coal and provides flexibility.
- **Shale gas** can help meet demand, but **reserves may be limited**.
- Shale gas should be developed **within environmental and social constraints** to minimise impacts and public opposition.
- UK shale gas is **unlikely to affect gas prices**.
- In the long term, the **power sector needs to be further decarbonised to meet climate change mandatory targets**.
- No single winner → need a **coherent portfolio of energy policies**, including energy efficiency, RES, nuclear, and flexibility measures (e.g. demand management) + **CCS if gas is to remain a player**.
Thank you

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A UK ‘dash’ for smart gas

By Samuela Bassi, James Rydge, Cheng Seong Khor, Sam Fankhauser, Neil Hirst and Bob Ward
Grantham Research Institute (LSE) & CCCEP, Grantham Institute (Imperial College)

Available at: http://www2.lse.ac.uk/GranthamInstitute/Home.aspx
References

- DECC, 2012e. *The unconventional hydrocarbon resources of Britain’s onshore basins - Shale gas*.