The changing dynamics of global energy markets:
The geopolitics of new energy realities

Tom Howes
DG Energy
European Commission
Target: a low carbon-economy by 2050
EC 2050 scenarios show decarbonisation options:
Natural Gas - Gross Inland Consumption
Oil demand falls in all OECD regions by 8.8 mb/d in total, while the non-OECD countries in aggregate see their demand rise by 18.8 mb/d between 2011 and 2035.

Source: IEA WEO 2012
Imports rising, but demand declining……..possibly…

Source: EC, IEA, Eurogas, Booz & Company
Energy

Story of renewable energy and gas synergy...

Gas-fired power stations support the integration of significant RES on the electricity grid

- Flexible CCGTs and gas peaking units
- Fast start-up and ramp-up times,
- Large load range
- Privileged technology for load variability

The gas transport infrastructure could potentially be used as an energy buffer for RES producers

- Unused wind/solar energy stored in the gas grid
- Power-to-gas conversion units
- Direct use of gas or reconversion in gas-fired units
- Several pilot plants currently developed in the EU

Gas and RES players are both advocating for a stronger CO2 price signal, as it is at the interest of their technologies
EU-wide infrastructure planning

Import capacity (in% of total capacity) before and after implementation of common infrastructure priorities

2011 2022
Gas infrastructure capacity – pipeline corridors and LNG

Source: Eurogas, GIE, European Commission, IEA, ENTSOe
Rethinking EU Energy Markets

Interdependence and increasing shares of renewables

More electricity

Need for flexible resources.

RES impact on wholesale market prices: spot prices could decrease due to zero marginal cost generation. Concern of investors’ ability to recover capital and fixed operating costs.

⇒ Ensure that market arrangements offer cost-effective solutions, allowing all resources to be used (including demand side)
⇒ Ensure that policy developments do not create new barriers to electricity - or gas - market integration

More RES

More trade
The 2030 energy and climate policy framework
Future wholesale market design

Past
Energy only utilities
vertical integration &
centralisation
Baseload-plus-peak

Future
Flexibility, Efficiency
Responsiveness
Networks
x-border cooperation
<table>
<thead>
<tr>
<th><strong>Element</strong></th>
<th><strong>Impact</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Shale gas in the US</strong></td>
<td>• LNG volumes originally destined to the US are redirected towards other markets</td>
</tr>
<tr>
<td></td>
<td>• Possibility of export of US LNG.</td>
</tr>
<tr>
<td></td>
<td>• Decreasing coal use in the US pushes coal prices down in the EU (switch gas-to coal in power generation due to the low coal and CO2 prices).</td>
</tr>
<tr>
<td><strong>Unconventional gas in the EU</strong></td>
<td>• Would reduce the import dependency and improve security of gas supply in the EU.</td>
</tr>
<tr>
<td></td>
<td>• Limited prospect compared with the US (7 times higher than in Europe) and not equally distributed within the EU (mainly Poland, UK, Spain and France).</td>
</tr>
<tr>
<td></td>
<td>• Geology of unconventional gas in Europe is not well understood so far.</td>
</tr>
<tr>
<td></td>
<td>• Spatial distribution of resources in the EU will require a technology that will respect environment integrity.</td>
</tr>
<tr>
<td><strong>Unconventional gas in China</strong></td>
<td>• Major future source of unconventional development, with shale gas reserves estimated to be even greater than those in North America.</td>
</tr>
<tr>
<td></td>
<td>• Development of own unconventional resources might delay the need for an agreement with Russia on gas purchase. This will slow down the ambition of Russia to diversify from the EU market.</td>
</tr>
<tr>
<td><strong>Methane Hydrate in the Arctic</strong></td>
<td>• According to experts, methane hydrate resources are the largest resources of hydrocarbons in the planetary crust</td>
</tr>
<tr>
<td></td>
<td>• US DOE is spending more than 5 USD million on programs for the recovery of methane hydrate from the Arctic ice layers</td>
</tr>
</tbody>
</table>
Despite policy effort, EU import dependency grows, along with the rest of the world...except US...

Source: IEA WEO 2012
Where are we headed?

- Still decarbonising: flexible, diverse/indigenous supplies, integrated EU market, technology innovation, esp. in transport...

- Worried about energy "competitiveness".

- Insulated but still competing for resources.
Backup
Combined with labour costs, low energy costs have a serious impact on US industrial competitiveness.

Impact on industrial competitiveness:

Due to lower labour and energy costs:

- U.S.-based manufacturers can capture 2 to 4% of Western European exports by 2015.
- By around 2015, the U.S. will have an export cost advantage of 5 to 25% over Germany, Italy, France, the U.K., and Japan in a range of industries.
- Together with the capture of Japanese exports, this would translate into as much as $90 billion in additional U.S. exports per year.
- The biggest U.S. export gains will be in machinery, transportation equipment, electrical equipment and appliances, and chemicals.

Source: Eurostat, DECC, BCG
The supply structure in the EU as a whole is diversified, although there are significant regional differences.

**Breakdown of gas supplies in the EU-27, % (2010)**

Total = 1799.3TWh (GCV)

- Indigenous: 35%
- Russia: 22%
- Qatar: 19%
- Libya: 9%
- Norway: 7%
- Algeria: 2%
- Nigeria: 3%
- Trinidad: 2%
- Libya: 1%
- Egypt: 1%
- Other: 6%

Source: ENTSO-G
Deep dive 2 – current and future role of LNG in the EU

Geographical distribution of operating LNG Capacity

Installed LNG Capacity 100% = 183 bcm/a

- SP: 183 bcm/a
- UK: 31 bcm/a
- FR: 200 bcm/a
- NL: 414 bcm/a

Source: European Commission
DECARBONIZATION

Compared to coal and nuclear, gas fired power plants are well suited to back RES production.
Increasing liquidity, increasing competition

Traded gas volumes on EU hubs

EU Wholesale gas price formation

- Oil indexed
- Gas to gas
- Regulated
Additional imported volumes to come from neighboring reserves and through global LNG

New piped gas volumes from neighboring reserves

- EU is located close to 80% of the world natural gas reserves
- Southern Gas Corridor to open an access to new resources in Central Asia
- Russia to remain a long-term important partner

Proven gas reserves, 2011, 000' bcm

Increasing role of LNG in the EU

Source: ENTSOG, GIE, Eurogas, BP statistical review
But competitiveness and financial viability of investments in gas-to-power are at stake.
RISKS & UNCERTAINTIES
It influences the investment decision in new power plants but also the operation of existing ones

Plants cancelled and postponed

Recent (January 2013) announcements:

- **E.ON** to decide on the mothballing of Irsching-5 (850MWe CCGT commissioned in 2010)
- **RWE** plans to mothball a further 3,000 MW [gas capacity] in Britain in 2013
- **GDF Suez** to close 2.1 GW of gas-fired capacity in Europe
RISKS & UNCERTAINTIES
Capacity mechanisms in the EU and other regulatory uncertainties

Diversity of capacity mechanisms

Risk of regulatory expropriation

National Energy Plan that includes the ability for the Government to prevent the closure of traditional power plant to satisfy supply/demand adequacy

The German government is preparing a draft law to prevent the retirement of certain power plants so-called "system-relevant" but unprofitable