APPEA 2014
Plenary session: Sustaining our Natural Advantage

7 April 2014

Natural gas: as an integral part of a sustainable global energy future

Jérôme Ferrier
Président IGU
IGU is the voice of 95% of the Global Gas Market

- 83 charters members
- New members since June 2012
- Targets
Primary Energy Global Demand
1980 – 2035

Source: IEA WEO 2013 NPS
Remaining technically recoverable gas resources by type and region, end-2012 (Tcm)

### World gas consumption in 2012

<table>
<thead>
<tr>
<th></th>
<th>Conventional</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tight gas</td>
<td>Shale gas</td>
</tr>
<tr>
<td>E. Europe/Eurasia</td>
<td>143</td>
<td>11</td>
</tr>
<tr>
<td>Middle East</td>
<td>124</td>
<td>9</td>
</tr>
<tr>
<td>Asia-Pacific</td>
<td>44</td>
<td>21</td>
</tr>
<tr>
<td>OECD Americas</td>
<td>46</td>
<td>11</td>
</tr>
<tr>
<td>Africa</td>
<td>52</td>
<td>10</td>
</tr>
<tr>
<td>Latin America</td>
<td>32</td>
<td>15</td>
</tr>
<tr>
<td>OECD Europe</td>
<td>26</td>
<td>4</td>
</tr>
<tr>
<td>World</td>
<td>468</td>
<td>81</td>
</tr>
</tbody>
</table>

Sources: BGR (2012); US EIA (2013); USGS (2000); USGS (2012a and 2012b); IEA databases and analysis

### Reserves in years of production

- Conventional: 140 years
- Unconventional: 100 years

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Number of People without Access to modern Energy Services 2011-2030

<table>
<thead>
<tr>
<th></th>
<th>Without access to electricity</th>
<th>Without access to clean cooking facilities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2011</td>
<td>2030</td>
</tr>
<tr>
<td>Developing countries</td>
<td>1,257</td>
<td>969</td>
</tr>
<tr>
<td>Africa</td>
<td>600</td>
<td>645</td>
</tr>
<tr>
<td>Sub-Saharan Africa</td>
<td>599</td>
<td>645</td>
</tr>
<tr>
<td>Developing Asia</td>
<td>615</td>
<td>324</td>
</tr>
<tr>
<td>China</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>India</td>
<td>306</td>
<td>147</td>
</tr>
<tr>
<td>Latin America</td>
<td>24</td>
<td>0</td>
</tr>
<tr>
<td>Middle East</td>
<td>19</td>
<td>0</td>
</tr>
<tr>
<td>World</td>
<td>1,258</td>
<td>969</td>
</tr>
</tbody>
</table>

Source: IEA WEO 2013 NPS
The Power Sector takes an increasing Share of Energy

Source: BP Energy Outlook 2035

Inputs to power as a share of total primary energy

Primary inputs to power

Source: BP Energy Outlook 2035
CO2 Emissions from Energy Use continue to rise

![Graph showing emissions by region and per capita.](Image)

- **Emissions by region**
  - Billion tonnes CO₂
  - Non-OECD
  - OECD
  - IEA 450 Scenario

- **Emissions per capita**
  - Tonnes CO₂
  - US
  - EU
  - China
  - India

*Source: BP Energy Outlook 2035*
Coal still fuels the largest share of electricity generation in 2040

Source: EIA, WEO 2013 NPS
World Natural Gas Demands by Sectors
2011 to 2035

Source: IEA WEO 2013 NPS
Coal continues to account for the largest share of CO2 emissions throughout the projection.

Source: EIA WEO 2013
Growth of Unconventional Gas Production in selected countries

Source: IEA WEO 2013 NPS
Health damage from coal power plant emissions

18,200 premature deaths
2,100,000 days of medication
4,100,000 lost working days
28,600,000 cases of lower respiratory symptoms

15.5 – 42.8 billion per year
Total health costs

Annual health impacts caused by coal power plants in the EU (27 countries)

Source: HEAL, expert assessment
EPS requires that any new coal fired power plant demonstrate CCS on at least 300 MW of the proposed generating capacity:

- Sets a CO2 emission limit at 450 g/kWh until 2045
- Guarantees stability of emission regulation until 2045 (grandfathering)
- EPS complements the economic signals provided by the Carbon Floor Price and, when applicable, the feed-in electricity purchase tariff with Contract for Difference (CFD)
- EPS gives incentives to « Good Quality » CHPs, by discounting the volumes of CO2 saved in the heat production by displacing other fossil fuels
Natural gas competitiveness with coal in Northern Europe

Source: DGEC et IFP EN
Average annual increases in Renewable based Power capacities

Source: IEA WEO 2013 NPS

* Excludes capacity that directly replaces retired capacity of the same technology type.
Natural gas matches the challenges posed by renewables

**Variability:**
- CCGT and cogeneration ensure back-up of production during wind and solar intermittence
- Natural gas grid and underground storage can accommodate hydrogen flows from electrolysis of excess power production

**Resource location:**
- CCGT can increase the electricity supply to the grid in remote areas (offshore wind) so as to mitigate the cost of extending the transmission network
- Natural gas grid and underground storage provide biogas access to market and flexibility

**Uncertainty:**
- Balancing power supply at a short notice (on a hourly basis) with flexible forms of generation such as gas turbines
- Hybrid electricity and natural gas (or biogas) vehicles would offset much of the limitations restricting the use of electrical vehicles.
natural gas

+++ crucial role for a sustainable energy system/ to fight global warming
+++ ideal partner on the way to a renewable energy system
+++ still a limited and fossil resource and a possible obstacle to renewable energy / climate protection
+++ “fracking”: more risks than benefits
+++ storage capacities for renewable gas, a new market

+++ industry should develop a “road-map 2050”: with strategies to tackle climate change and pathways to a sustainable energy future
2015 World Gas Conference