Natural Gas in a Climate Change Perspective

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24 June 2010, Moscow, Russian Federation
IGU represents around 95% of global gas market

IGU established in 1931
### Top 20 Proven Reserves NG

(source BP Outlook 2009)

<table>
<thead>
<tr>
<th>Country</th>
<th>Bar Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>Russian Federation</td>
<td>45</td>
</tr>
<tr>
<td>Iran</td>
<td>30</td>
</tr>
<tr>
<td>Qatar</td>
<td>25</td>
</tr>
<tr>
<td>Turkmenistan</td>
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</tr>
<tr>
<td>Saudi Arabia</td>
<td>15</td>
</tr>
<tr>
<td>US</td>
<td>10</td>
</tr>
<tr>
<td>United Arab Emirates</td>
<td>10</td>
</tr>
<tr>
<td>Nigeria</td>
<td>8</td>
</tr>
<tr>
<td>Venezuela</td>
<td>8</td>
</tr>
<tr>
<td>Algeria</td>
<td>7</td>
</tr>
<tr>
<td>Indonesia</td>
<td>6</td>
</tr>
<tr>
<td>Iraq</td>
<td>5</td>
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<tr>
<td>Norway</td>
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</tr>
<tr>
<td>Australia</td>
<td>5</td>
</tr>
<tr>
<td>China</td>
<td>5</td>
</tr>
<tr>
<td>Malaysia</td>
<td>4</td>
</tr>
<tr>
<td>Egypt</td>
<td>4</td>
</tr>
<tr>
<td>Kazakhstan</td>
<td>4</td>
</tr>
<tr>
<td>Kuwait</td>
<td>3</td>
</tr>
<tr>
<td>Canada</td>
<td>3</td>
</tr>
</tbody>
</table>

*IGU members*

Moscow, Russian Federation
Rising population – from 6 to 9 billion in 2050

Human strive for a better life

Technological progress

Climate change concerns
Messages about gas and climate

- Cleanest fossil fuel
- Developed and easily transferable technology
- Affordable – No large subsidies required
- Mitigate CO2 emissions at low cost
- Enables wind and solar

Gas - part of the climate solution
Renewable energy and Carbon Capture and Storage (CCS)

- CCS, solar and wind power require huge subsidies
- Technology needs further development
- Solar and wind power only works part time

Decades before large impact on GHG emissions
Natural gas in power generation - climate friendly

- Replace coal with gas
- GHG reduction potential

CO2 emission for different types of power generation

- Old coal plant: 100%
- State-of-the-art coal plant: 64%
- New CCGT: 32%

Source: Deutsche Bank/Statoil
Cost of reducing CO2 emissions

Cost of saving carbon emissions
€ per tonne of CO2 by 2030

- Building gas-fired power stations instead of coal-fired: 0.5 €
- Building nuclear plant: 10.5 €
- Building wind farm: 22.4 €
- Building coal-fired plant that captures CO2 emissions: 37.5 €

Source: McKinsey
Fuel switching potential

Percentage of lignite and hard coal in power generation

<table>
<thead>
<tr>
<th>Country</th>
<th>Hard Coal</th>
<th>Lignite</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poland</td>
<td>93</td>
<td>79</td>
</tr>
<tr>
<td>China</td>
<td>68</td>
<td>32</td>
</tr>
<tr>
<td>India</td>
<td>55</td>
<td>45</td>
</tr>
<tr>
<td>Denmark</td>
<td>51</td>
<td>49</td>
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<td>USA</td>
<td>51</td>
<td>49</td>
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<tr>
<td>Germany</td>
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<td>49</td>
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<tr>
<td>World</td>
<td>39</td>
<td>61</td>
</tr>
</tbody>
</table>

2005 Data
Challenge
GHG Emissions and Perceptions

Clean Energy
- Solar
- Nuclear
- Wind
- Natural Gas

Fossil Fuels
- Oil
- Coal

GHG Emissions

News, Views and knowledge on Gas - World Wide
Gas market integration

- **Demand security**
  - Energy policy, climate framework
  - Long term agreements

- **Supply security**
  - Production and transmission infrastructure
  - Gas storage and LNG terminals
Energy intensity trends...

Distribution of proven gas reserves (est 2008)

185 Tcm

Source: IGU.
Shale gas reserves

<table>
<thead>
<tr>
<th>REGION</th>
<th>SHALE RESERVES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asia Pacific</td>
<td>120 Tcm</td>
</tr>
<tr>
<td>Middle East</td>
<td>71 Tcm</td>
</tr>
<tr>
<td>South America</td>
<td>59 Tcm</td>
</tr>
<tr>
<td>North America</td>
<td>110 Tcm</td>
</tr>
<tr>
<td>FSU</td>
<td>20 Tcm</td>
</tr>
<tr>
<td>Europe</td>
<td>20 Tcm</td>
</tr>
<tr>
<td>Africa</td>
<td>8 Tcm</td>
</tr>
<tr>
<td>WORLDWIDE</td>
<td>410 Tcm</td>
</tr>
</tbody>
</table>

Source: IEA

410 trillion m³
Natural Gas for a Sustainable Energy Future

- promote switching to natural gas in power and industry
- encourage use of natural gas in transportation
- improving efficiency and best practices
- implement relevant policies and regulations enabling the development of gas infrastructure
IGU is creating arenas for...

Networking - Knowledge - Dialogue

- **The IGU World Gas Conference**
  - Buenos Aires 2009
  - Kuala Lumpur 2012

- **Co-sponsor of LNG Conferences**
  - LNG 16 in Oran, Algeria, April 2010
  - LNG 17 in Houston, USA, April 2013

- **Ministerial Gas Forums**
  - 2nd IEF – IGU Ministerial Gas Forum, Doha, Qatar, 30 Nov 2010

- **The IGU Research Conference**
  - IGRC 2011 in Seoul, Korea, October 2011
The IEF-IGU Ministerial Gas Forum

Second Ministerial Gas Forum
Doha, Qatar - 30 November, 2010
“The Role of Natural Gas in a Sustainable Energy Future”
COP 15 Copenhagen, IGU Event

International Gas Union (IGU)

The Contribution of Natural Gas Towards a Sustainable Energy Future

COP15 Gas Event organised by the IGU

Sunday 13 December 2009, 1500-1830 hrs
Policy messages

- Policy documents to reflect role of natural gas
- Regulations to support infrastructure investments

Gas: Green, abundant, affordable, secure
Gas: Part of the long term energy solution