A GLOBAL PERSPECTIVE ON COAL

Didier Houssin
Director of Energy Markets and Security
International Energy Agency, Paris

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Coal plays an important and growing role in global energy supply and power generation.

Global Primary Energy Supply, 2007

<table>
<thead>
<tr>
<th></th>
<th>TPES</th>
<th>coal’s share</th>
</tr>
</thead>
<tbody>
<tr>
<td>World</td>
<td>12 029 Mtoe</td>
<td>26.5%</td>
</tr>
<tr>
<td>OECD</td>
<td>5 433 Mtoe</td>
<td>20.9%</td>
</tr>
<tr>
<td>USA</td>
<td>2 340 Mtoe</td>
<td>23.7%</td>
</tr>
<tr>
<td>China</td>
<td>1 956 Mtoe</td>
<td>65.7%</td>
</tr>
<tr>
<td>India</td>
<td>595 Mtoe</td>
<td>40.8%</td>
</tr>
</tbody>
</table>

Global Electricity Generation, 2007

<table>
<thead>
<tr>
<th></th>
<th>elec. gen.</th>
<th>coal’s share</th>
</tr>
</thead>
<tbody>
<tr>
<td>World</td>
<td>19 771 TWh</td>
<td>41.5%</td>
</tr>
<tr>
<td>OECD</td>
<td>10 645 TWh</td>
<td>37.1%</td>
</tr>
<tr>
<td>USA</td>
<td>4 323 TWh</td>
<td>49.0%</td>
</tr>
<tr>
<td>China</td>
<td>3 279 TWh</td>
<td>81.0%</td>
</tr>
<tr>
<td>India</td>
<td>803 TWh</td>
<td>68.4%</td>
</tr>
</tbody>
</table>

sources: IEA Key World Energy Statistics 2009 and IEA databases
China’s coal production and use could rise enormously

IEA World Energy Outlook 2009 Reference Scenario for 2030

note: * shows only German hard coal production
The importance of coal in meeting recent growth in energy demand

Increase in primary demand, 2000-07

Demand for coal has been growing faster than any other energy source and is projected to account for more than a third of incremental global energy demand to 2030.
World coal production (to 2008) and CO₂ emissions from fossil fuel use (to 2007)

Coal production accounts for ~20% of energy production and ~10% of TPES in EU-27

**Hard Coal, 2008**
- Poland: 135 Mt
- Germany: 113 Mtce
- Czech Republic
- United Kingdom
- Spain
- other

**Brown Coal, 2008**
- Germany: 452 Mt
- Greece: 139 Mtce
- Poland
- Czech Republic
- Romania
- Bulgaria
- Slovenia
- Estonia
- Hungary
- other

note: TPES: total primary energy supply
source: IEA databases
Hard coal imports into EU-27, 1978-2008

EU-27 imported 43% of its coal needs in 2008, compared with 19% in 1990 (on an energy basis).

source: IEA databases
China became a net importer for the first time in 2009

Net imports of c.100 Mt by 2015, forecast in IEA World Energy Outlook 2007, have been reached 6 years earlier.

sources: IEA Coal Information 2009; IEA World Energy Outlook 2007; and IEA databases
International steam coal prices have fallen from the peaks of mid-2008

Asian spot prices underpinned by demand from China. Lower spot prices elsewhere reflect drop in demand with strong competition from natural gas for power generation.

sources: IEA Energy Prices & Taxes; US Energy Information Administration; and MCIS Ltd.
Global financial crisis has not changed basic outlook for energy

Shares of incremental energy demand
Reference Scenario, 2008-2030

source: IEA World Energy Outlook
Long term, there is no such thing as “business-as-usual”

Efficiency measures account for two-thirds of the 3.8 Gt of abatement in 2020, with renewables contributing close to one-fifth and CCS about 3%.

source: IEA World Energy Outlook 2009 - climate change excerpt
In the 450 Scenario global coal demand plateaus by 2015 and declines progressively, returning to 2003 levels by 2030 - a level almost 50% lower than in the Reference Scenario.
The rationale for CCS

- Without new policies, global emissions increase by 130% by 2050, leading to a 4-7°C temperature rise.

- CCS provides one-fifth of the needed CO₂ reductions in 2050: 9 GtCO₂ captured from over 3000 plants each year.

- Without CCS, cost of stabilization rises by 70%.

- CCS is the only low-carbon solution for gas/coal, cement, and iron & steel sectors.

- 7 plants operating today; over 70 integrated projects planned.
Near-term actions for governments

- Clarify CO₂ transport, storage property rights/access rights.
- Establish regional storage exploration programmes, and policies to encourage commercial exploration.
- Develop national CO₂ storage capacity estimates.
- Expand human capacity in CO₂ storage site assessment.
- Fund RD&D programmes on CCS technologies.
- Ensure provision of regular, transparent data from early projects.
- Establish CCS education/outreach programmes for the general public.
Near-term actions for industry stakeholders

- Take more risk in funding near-term demonstration projects.
- Develop international sector-specific CCS working groups to address CO$_2$ capture and CCS generally.
- Share demonstration data more widely; transparent data will improve public confidence.
- Ensure adequate public engagement in all CCS projects.
Conclusions

- Global coal trade patterns are shifting east – after enormous demand growth since 2000, driven by non-OECD countries, it is the growing import demands from China and India that are now shaping the market.

- The reduction of industrial production in Europe, Japan and the US weakened demand for electricity and steam coal in 2009.

- Low natural gas prices and renewables growth will keep demand weak for imported coal in Europe and the US.

- With economic recovery, coal supply chains will become more stressed, as in 2004-08. Coal prices are likely to become higher and more volatile.

- CCS is a budding technology, but crucial for coal market prospects. The next vital step is full-sized demonstrations.