CHINA’S COAL DEMAND BOOM – THE END OF CHEAP STEAM COAL FOR EUROPE?

Coal Round, European Parliament
Brussels, March 16th, 2010

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Chinese hard coal demand grew by more than 150% in the last ten years.
Chinese imports will make up ~20% of global trade market in 2010

- China became a net importer of coal in 2009 (roughly 110 Mt net).
- In 2010, Chinese imports were around 147 Mt.

Source: IEA
Chinese coal demand key for future imports and therefore global coal prices

• Chinese coal production is likely to be planned around 4 Bt for 2015 but **transport** will be a challenge
• GDP growth, development of energy intensity, and deployment of nuclear, gas and renewables will be the key factors in determining coal demand.

Source: IEA
Future scenarios for coal-based energy transport in China

<table>
<thead>
<tr>
<th>Current situation in China</th>
<th>Future</th>
<th>Coal-by-train</th>
<th>Coal-by-wire</th>
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<td>More than 60% of coal is transported via railway, another 15% by trucks</td>
<td>May cover the largest part of future coal supply</td>
<td>Massively expanded railway capacity during last years</td>
<td><strong>Until now</strong>: Several demonstration HVDC projects</td>
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<td>Some HVDC lines for mine mouth coal-fired power plants already exist</td>
<td>Hindrances</td>
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<td>Coal imports are cost competitive compared to domestic production in Chinese coastal demand centres</td>
<td>1. Weak central planning institutions</td>
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<td>2. Remuneration schemes of Chinese TSOs do not give enough investment incentives</td>
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Chinese import volumes are heavily influenced by inland transportation costs and capacities

We analyze two scenarios with different assumptions on Chinese domestic transport infrastructure:

**Coal-by-train 2030**

- Supply regions: Xinjiang, Shanxi, Henan, Shanghai, Hong Kong
- Demand Hub: IMAR, Beijing

**Coal-by-wire 2030**

- Supply regions: Shanxi, Henan
- Demand Hub: IMAR, Beijing
- HVDC lines: Shanxi to IMAR, Henan to IMAR
- Conventional transport: IMAR to Beijing, IMAR to Shanxi

Development of coal demand and oil price levels are based on IEO 2010 (EIA)
Fundamentals support supply costs of 110+ $/t for European imports

Long run marginal costs - Europe

Long run marginal costs - China

<table>
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<tr>
<th>Year</th>
<th>Ref.</th>
<th>by-wire</th>
<th>by-train</th>
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<td>2009</td>
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<td>2020</td>
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<td>2030</td>
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Prices - reference

LRMC - model

LRMC „coal-by-wire“

LRMC „coal-by-train“
Europe: In the “coal-by-wire” scenario, the role of the marginal supplier switches from the US to Russia.
China: In the “coal-by-wire” scenario, China is able to cover its coal consumption through domestic production.
Besides coal-by-wire, several other developments influence if China will be able to cope with its growing coal import dependency.

Measures to cope with coal consumption in new 12th 5-Year Plan:

- More “moderate” economic growth rates planned
- Planned reduction of energy intensity
- Strong increase of gas-fired power generation until 2015
- Massive expansion of renewables and nuclear plants
Broader context and implications for Europe

It now matters “if a sack of rice topples over in China”

Future European coal import prices will be set in the Pacific, by Chinese im- and exports

Future import prices for steam coal may not be as cheap and stable in the future as anticipated by many. This has implications on fuel switching potential and new coal-based power generation in Europe

Chinese energy strategy is not only relevant for global oil and gas markets, but also for global coal markets
Thank you for your attention

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Welfare effects of HVDC investments are positive, especially if we look at China only.