How Much is Enough?
China’s Appetite for Coal

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If China...

- equaled US per capita coal use
  *it would use about twice as much coal as it does now.*

- equaled US per capita total primary energy
  *it would use the equivalent of 87% of the 2006 world total.*

- experienced 6% GDP growth to 2030 with energy growing half as fast
  *it would use twice as much energy as it does today, or about 1/3 of the 2006 world total.*
Regional patterns of energy demand are evolving along with economic growth.
Under Reference Scenario assumptions, global demand grows by over half, with coal use rising most in absolute terms.

IEA, World Energy Outlook 2007, Reference Scenario
Asia: Half the story, and sometimes more

Increase in Primary Energy Demand & Investment Between 2005 & 2030 as Share of World Total

China & India contribute more than 80% of the increase in global coal demand to 2030 on current trends

IEA, World Energy Outlook 2007, Reference Scenario
China’s energy demand more than doubles by 2030, with coal accounting for about half of the increase

IEA, World Energy Outlook 2007, Reference Scenario
China becomes a net importer of coal, while India’s import dependency rises strongly

IEA, World Energy Outlook 2007, Reference Scenario
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IEA, Cleaner Coal in China, forthcoming
Moving towards fewer and larger coal mines

IEA, *Cleaner Coal in China*, forthcoming
How much coal can be used depends, in part, on how it is obtained.

Recommendation:
A properly resourced mines inspectorate is central to ensuring mine worker safety. China needs to strengthen its own inspectorate and complement this by training and empowering coal miners to take greater responsibility for their own safety.

IEA, Cleaner Coal in China, forthcoming
Costlier coal

IEA, Cleaner Coal in China, forthcoming
Alternative Policy Scenario

Incremental primary fossil fuel demand, 2005-2030

New policies lead to a big reduction in coal demand, primarily through slower growth in electricity demand

High Growth Scenario

China's incremental demand by fuel

Coal would see the biggest increase in demand in volume terms were China’s economy to grow faster

Catching up: Cumulative energy-related CO₂ emissions

Around 60% of the global increase in emissions in 2005-2030 comes from China & India

IEA, World Energy Outlook 2007, Reference Scenario
Base Year

Per-capita energy-related CO₂ emissions & population

2005

- US
- Russia
- Japan
- EU
- Other OECD
- Middle East
- Other transition economies
- China
- Other Latin America
- Brazil
- Rest of Asia
- India
- Africa

Per-capita emissions of CO₂ (tonnes)

IEA, World Energy Outlook 2007
In 2030, China’s per-capita emissions would still be less than half of the US.

IEA, World Energy Outlook 2007, Reference Scenario
A new energy revolution: Cutting energy-related CO₂ emissions

Improved efficiency and decarbonising the power sector brings emissions back to current levels by 2050. A 50% cut requires revolutionising transport.

IEA, Energy Technology Perspectives 2008
Energy efficiency is the cheapest way to cut CO₂ emissions

To bring emissions back to current levels by 2050 a CO₂ incentive of $50/t is needed. Reducing emissions by 50% would require a $200-$500/t incentive.

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IEA, Energy Technology Perspectives 2008
How do we get there from here?
Roadmaps help build consensus

CO₂ Capture and Storage - Fossil-Fuel Power Generation

Technology Timeline

Key Actions Needed
- Develop and enable legal and regulatory frameworks for CCS at the national and international levels, including long-term liability regimes and classification of CO₂.
- Incorporate CCS into emission trading schemes and clean development mechanisms.
- REDD to reduce deforestation and improve overall system efficiency.
- RD&D for storage integrity and monitoring. Validation of major storage sites. Monitor and validation methods for site review, injection & closure periods.
- Raise public awareness and education on CCS.
- Assessment of storage capacity using Carbon Sequestration Leadership Forum methodology for the national, basin and field scales.
- New power plants built after 2020 to have CCS.
- New power plants to be “capture-ready” after 2015.

Key Areas for International Collaboration
- Development and sharing of legal and regulatory frameworks.
- Develop international, regional and national instruments for CO₂ pricing, including CDM and ETI.
- Raise public awareness and education.
- Sharing best practices and lessons learnt from demonstration projects (pilot and large-scale).
- Joint funding of large-scale plants in developing countries by multilateral lending institutions, industry and governments.
- Development of standards for national and basin storage estimates and their application.
- Organisations: CIPE, IEA GHG, IEA CC, IPCC.
Recommendation: Even as it pursues innovative new technical and policy solutions, China should provide incentives to quickly adopt well-proven technologies, management practices and policies that deliver immediate, sustainable improvements along the entire coal supply chain.
**Recommendation:** Encourage joint ventures and foreign direct investment in the energy sector to promote technology transfer, both into and out of China.
Co-operate with other nations to establish technical performance standards for coal-fired power plants and their sub-systems to promote the wider deployment of cleaner coal technologies, both in China and elsewhere.

Make market-based mechanisms, such as international carbon trading, central to China’s CO₂ abatement strategy and cleaner coal technology development for domestic and international markets.
Recommendation: International and national partnerships, supported by governments, industry and academia, can stimulate the development of new technologies prior to their commercialization.

Xishan Coal Electricity Tunlan coal mine (6 Mtpa), and Gujiao power plant (600 MWe – planned to reach 3,000 MWe)
A few more of these would be welcome

China Huaneng Group’s Gaobeidian power plant, Beijing
3 ktpa postcombustion CO$_2$-capture pilot plant

photo: Huaneng