

Quelle Place Pour Le Charbon ?

Perspectives du charbon en Chine



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29 mars 2006
L'Université Paris-Dauphine

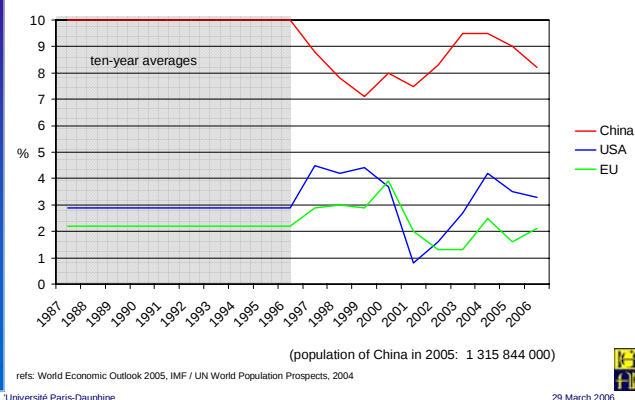
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Thank you Chairman, for this opportunity to speak on the role of coal in China. And coal is certainly what fuels this dragon – far more so than in any other country, for coal meets two thirds of the Chinese demand for energy. Two thirds – compared with just 18% here in (OECD) Europe. Coal is much more important in China than anywhere else in the world. Today, I will give you an overview of why it is so important. My background is in coal, having spent many years working in the industry – mainly on coal-fired power station projects with Alstom and, more recently, with the UK's largest coal mining company, before joining the IEA last year.

I will examine coal production in China, the influence of Chinese demand on the international coal market, projections for future demand, the environmental implications of coal use in China, touch on mining safety and conclude with the draft Coal Plan with its ambition to use China's massive coal resource not only for power generation, but also to produce liquid fuels for transport applications.

Chinese real GDP growth compared with USA and EU

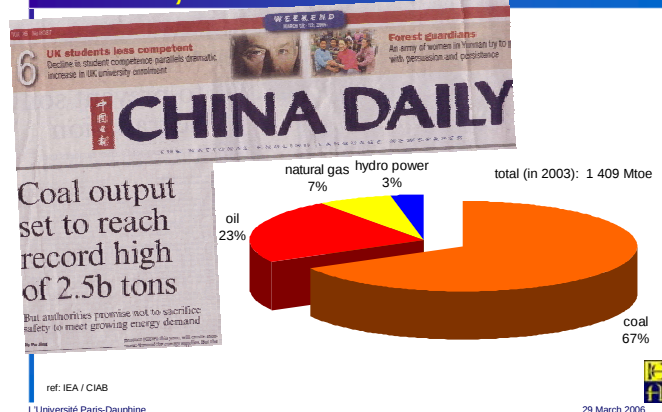


Why should we be interested in China? Well 20% of the world's population lives in China, so one in five of us is Chinese! And those who aren't, are buying more and more goods from China. My computer was made in China and I'll wager that yours was too. Many of my son's toys were made there and I'm sure that we'll soon be driving around in Chinese cars.

During the 19th and 20th centuries, Europe, North America and Japan became heavily industrialised; now China and other developing countries are catching up and their energy demand is rising quickly. This is putting pressure on energy prices and having environmental consequences that should be of great concern to everyone – both in China and elsewhere.

This graph shows the annual growth in Gross Domestic Product of China, the United States of America and the Europe Union. China's growth is phenomenal – it continues to outstrip the western world by a wide margin. Indeed, if the Chinese economy continues to grow at the rate seen over the last decade, then the economy will surpass the US economy in 2015 to become the world's largest, although it would take until the 2040s before per capita GDP matched that of the USA. Today, it is the second largest with 13.2% of the world's GDP – an economy worth US\$8 trillion, at least in terms of purchasing power parity – the Chinese Yuan is supposed to float but remains set at an artificial exchange rate, so China's position appears diminished if expressed in terms of market exchange rates.

Total final energy consumption by fuel in China, 2004

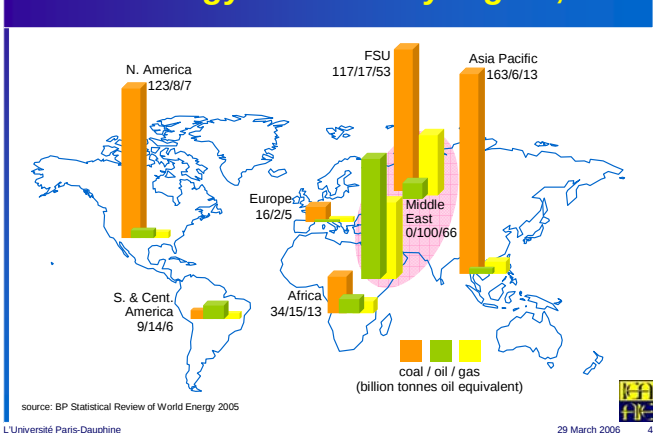


China's total demand for energy in 2004 was 1.40938 Btoe. This is 62% of US energy demand, or 13% of total world demand. With such a large population, the per capita consumption of energy remains low by western standards at just 1.09 toe per head compared with 4.41 toe here in France.

This pie chart shows a breakdown of China's primary energy consumption. Dominated by coal, but it includes a substantial and growing demand for oil, mainly used in the transportation sector. Hydro electricity is an important energy source – with the US\$25 billion, 18,200MW Three Gorges Dam project being a notable example that is already operating, although it will be 2009 before all 26 turbine-generators are commissioned.

Not all of this energy demand is met from indigenous sources – China imports about half of its oil and, in the future, expects to import more oil and gas. It is already the world's second largest oil consumer after the USA, having surpassed Japan in 2003. As such, China's oil demand is a key factor in today's oil market.

Global energy reserves by region, 2004



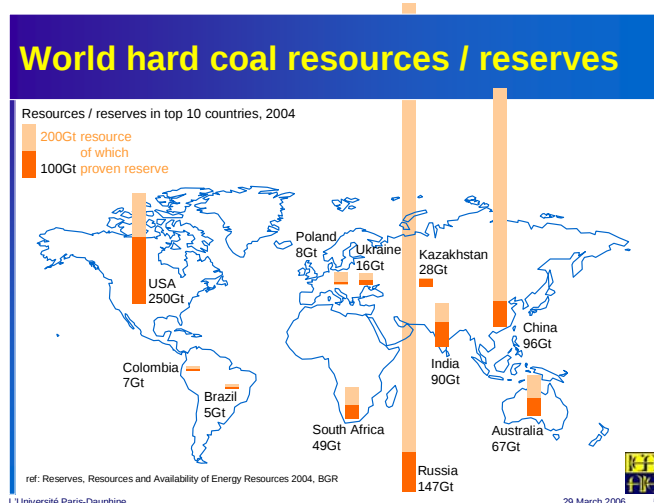
Coal demand is met predominantly by local production, but as we shall see later, China does have an import requirement, especially for coking coals used in iron and steel production, and even for some steam coal used for power generation in the south of the country.

In contrast to Europe, China is planning a future that is heavily dependent on coal, rather than imported oil and gas.

To understand why coal is so important in China, consider the distribution of the world's energy reserves. Oil and natural gas reserves are concentrated in the Middle East and the Former Soviet Union, with only relatively small reserves in the Asia Pacific region. In fact China's oil and gas reserves account for just 1.4% and 1.2% of the world's total respectively – the country is not well endowed with either of these fossil fuels. However, in the case of coal, the distribution around the world is more equitable and China has vast reserves – just over 12% of proven reserves and perhaps 22% of the world's total coal resource.

The data on this chart comes from the BP Statistical Review of World Energy and aims to illustrate the extent of economically-recoverable energy reserves.

On this chart, we see a slightly different presentation of coal reserve data alongside coal resource data from the German Federal Institute of Geosciences and Natural Resources. The data is for the top ten, or rather top eleven countries in terms of coal resource and helps to explain why certain countries of the world will continue to depend very heavily on indigenous coal. With its 96 billion tonnes of proven reserves, China has enough coal to last for 50-60 years at current production levels and has vast resources that may be exploited in the future – resources second only to Russia in size.

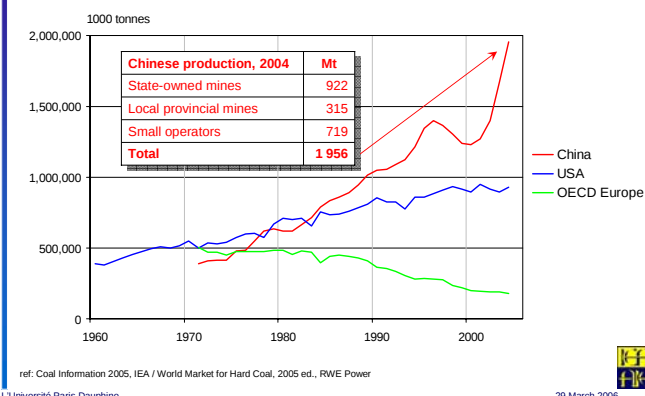


Chinese hard coal production has grown steadily over the last thirty years, mainly from underground mines – just 10% comes from opencast or surface mines. It overtook US coal production during the 1980s when China became the world's largest producer. With the booming economy, production has risen strongly over the last few years, reaching almost two billion tonnes. There are some questions marks over the accuracy of these statistics; some of the year-on-year growth rates look remarkable. Nevertheless, the trend is clear and, as we have seen, the Chinese government reports that it expects production to continue growing and to reach 2.5 billion tonnes by 2010.

The coal sector is a mix of several large, state-owned enterprises and a larger number of provincial mining companies, again state-owned. In addition, there are tens of thousands (24,000) small private mines and rural collectives in towns and villages, each producing very small volumes of coal (10,000-30,000 tpa) but adding significantly to the total production. Whilst the largest mines are highly mechanised and increasingly

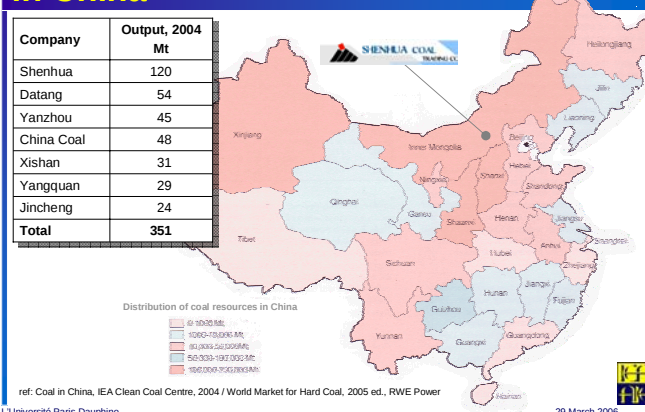
use the best available mining technologies, many provincial mines are inefficient and unprofitable, and the small private mines are labour intensive with a very poor safety record.

Hard coal production



The government's intention over the last decade has been to close the small village mines (to leave 10,000 max.), but with such strong demand for coal, it has proven extremely difficult for the government to execute this policy and indeed, it appears to have relaxed its attitude towards these mines, at least for the time being.

Principal coal regions and companies in China

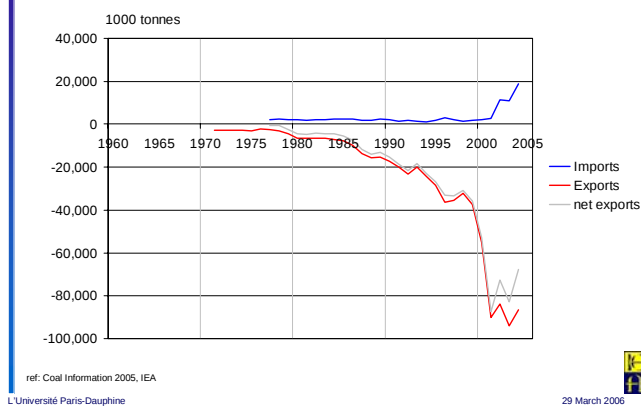


In its vision for the future, the Chinese government wants a small number, perhaps thirteen, large, competing coal companies, each producing over 100 million tonnes of coal per year and located in the coal-rich regions of Shanxi, Shaanxi and Inner Mongolia. Today, the largest coal company is Shenhua which produced 120 million tonnes in 2004 and then Datang with 54 million tonnes. So we should expect to see much consolidation in the industry over the coming years. Following China's entry into the World Trade Organisation in November 2001, the intention is for more liberal policies towards trade and foreign investment with a reduction in import tariffs, for example on mining equipment. Consolidation in the coal industry will probably involve the large multi-national mining companies and there is certainly much interest amongst them to do business in China.

The economic development of China has not been uniform. In general, it is the coastal regions that have prospered, none more so today than the Guangdong province in the south where there is little coal. Coal is therefore shipped by sea from the north to the south and supplemented with coal imports mainly from Vietnam and Australia, but with some coking coal from Canada and steam coal from Indonesia.

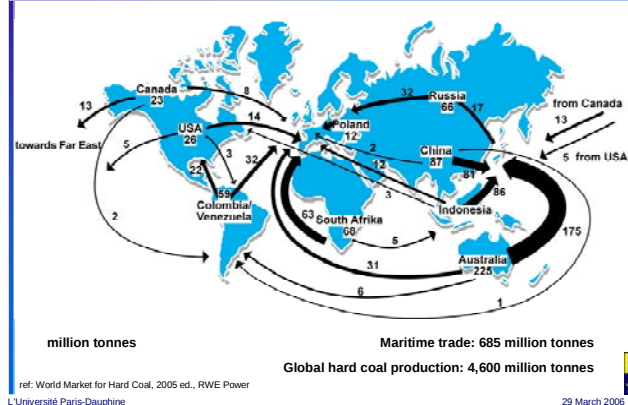
Many inland provinces are rural and poor – 10% of the population lives in poverty.

Chinese hard coal exports



Exports of hard coal from China grew rapidly from 1999, and we all expected exports to rise above 100 million tonnes. Instead, local demand grew so quickly that export growth halted and imports suddenly took off, such that net exports went into decline.

Coal trade shipping routes, 2004



Here we have the world seaborne trade in hard coal, 685 million tonnes in all. Now, you might think that the reduction in net exports of perhaps 20 million tonnes from China would have had a negligible impact on prices, particularly in Europe. But look where most of Europe's coal imports come from – South Africa. Now, South Africa can equally well export coal into the Asian market and, in the past, South African supplies have certainly swung between the Atlantic market and the Pacific market. So, if demand increases in Asia, then South African exports can be redirected and the price signal is transmitted between markets around the world.

In practice, the rise in coal prices was also heavily influenced by shipping capacity constraints. The cost of a tonne of coal imported into Europe is split roughly half for the coal itself and half for shipping the coal to Europe. Whilst the underlying coal price might be less volatile than say oil prices, shipping rates are highly volatile. As dry bulk carriers are used for many commodities, including iron ore, the Chinese economy drew heavily on the world's shipping fleet, again driving prices upwards. Between 2000 and 2004, iron ore imports into China rose threefold from 70 million tonnes to 210 million tonnes.

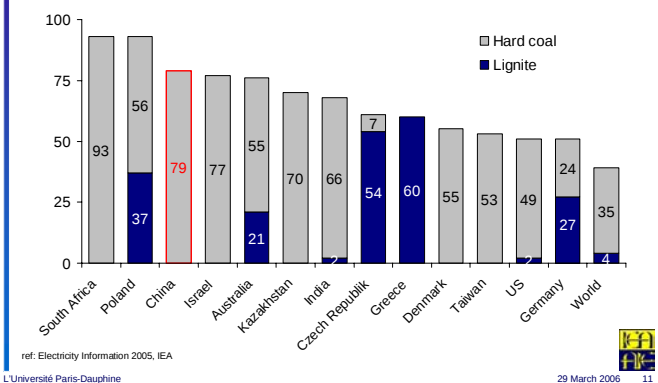
And on this graph we can see the almost step change in coal prices. After many years of a general trend downwards, there was a price hike in 2003/04 that shocked most coal buyers.

Average OECD import price for coal



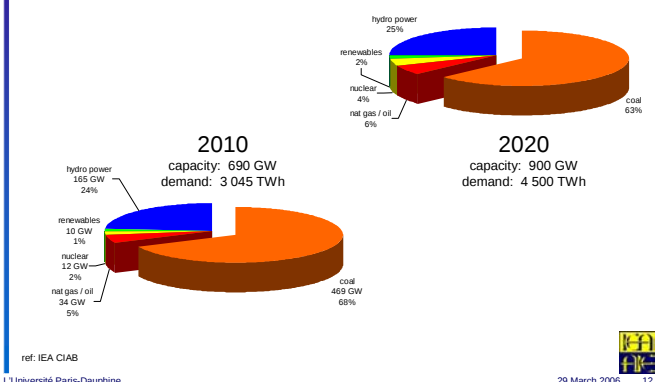
Since then, the Chinese economy has cooled a little and new bulk carriers have been launched. Coal prices did moderate in 2005, but are rising again to new highs today.

Power generation from coal, 2003



Almost 80% of electricity production in China is from coal – twice the world average of 39%. Only South Africa and Poland are more dependent on coal for power generation. In 2004, 1,800 TWh were generated at coal-fired power stations in China with an average efficiency of 33%. This is low compared with other countries – for example the US average is 37%. So, the Chinese government plans to build over one hundred, high efficiency, supercritical units of 600MW or above such that, over time, the fleet efficiency will rise – reducing fuel demand and emissions.

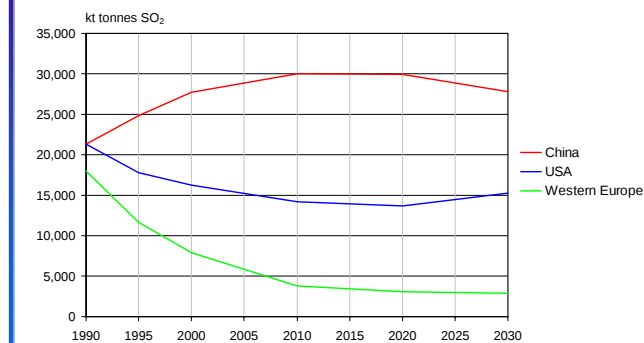
Power generation capacity in China's 11th five-year plan and beyond



In China's 11th five-year plan, as prepared by the National Development and Reform Commission, a massive growth in electricity generation is planned from 2,187 TWh today to over 3,000 TWh in 2010 and 4,500 TWh in 2020 – this being more than the electricity production in the USA today. Coal will continue to fuel most of this new generation. Despite plans to increase nuclear capacity, nuclear will still only account for 4% of capacity in 2020.

But this growing use of coal comes at a cost...

Emissions of sulphur dioxide

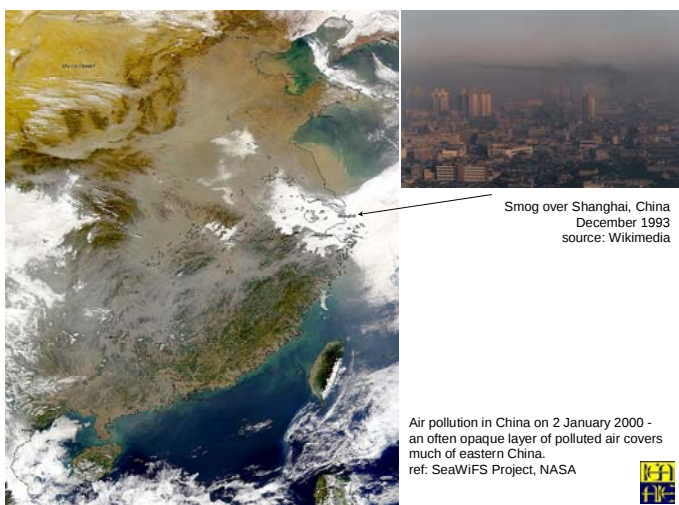


ref: Scenarios of World Anthropogenic Emissions of Air Pollutants and Methane up to 2030, IIASA

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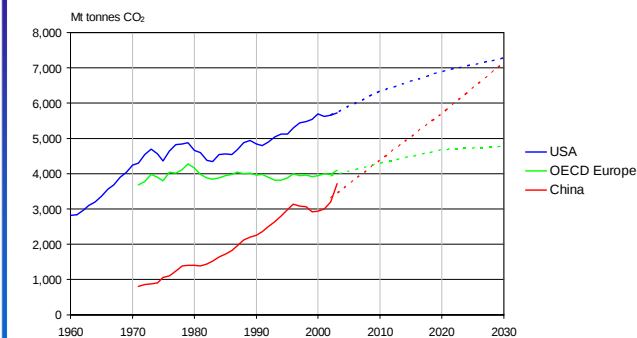
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China suffers from major environmental pollution. According to the World Health Organisation, seven of the world's ten most polluted cities are in China. Acidification of forests and other ecosystems caused by the emission of sulphur dioxide from the combustion of coal is a national problem that also has impacts in neighbouring countries. This graph shows data and projections from the International Institute for Applied Systems Analysis in Austria to illustrate how Europe and, to a lesser extent, the USA have addressed SO₂ emissions to the benefit of human health and the environment. By contrast, China's SO₂ emissions are set to rise to 30 million tonnes, making a grave situation even worse. The country desperately needs to accelerate the deployment of clean-up technologies and the government is moving to achieve this with policies to control local air pollution – including the forced use of natural gas in metropolitan areas in place of coal.



China is a non-Annex I signatory to the UN Kyoto Protocol. As such, it does not have any binding target to reduce its CO₂ emissions, which are, of course, forecast to rise significantly over the coming years as energy demand increases alongside economic development.

CO₂ emissions from fuel combustion



ref: CO₂ Emission from Fuel Combustion 1971-2003, IEA / World Energy Outlook 2004, IEA

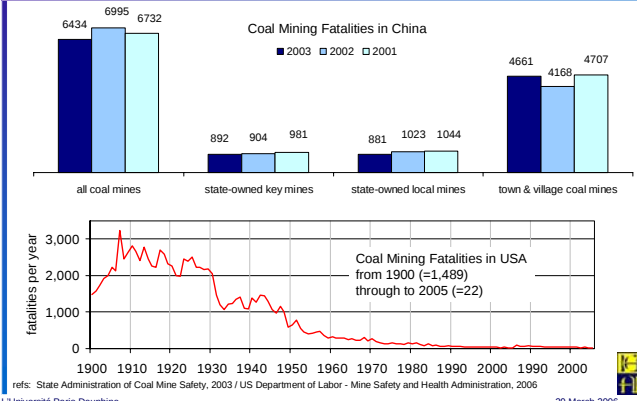
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These projections are taken from the IEA World Energy Outlook and show CO₂ emissions from China equalling those from the USA by 2030. None of these projections reflect the political desire to tackle greenhouse gas emissions and reduce the impact of climate change. There is an urgent need to adopt clean coal technologies in China and elsewhere, including those technologies where CO₂ is captured and permanently stored in geological formations.

Having looked at some environmental issues, let me turn finally to mining safety...

Mining safety in China and USA



refs: State Administration of Coal Mine Safety, 2003 / US Department of Labor - Mine Safety and Health Administration, 2006

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We read too often in our newspapers about mining disasters in China. And yet we hear only about the major accidents where say 100 or more men lose their lives due to flooding, gassing or roof collapses. In fact, many more are killed in the small private and collective mines in the towns and villages. Recent data from China shows that over 6 000 men lose their lives each year in coal mining related accidents. We can compare this to the USA where coal production is roughly half that of China's. In 2005, 22 men lost their lives. The mining safety record in the USA has not always been so good; up until the depression of the 1930s, the annual death toll was between two and three thousand – worse than China today on an output tonnage adjusted basis. What this demonstrates is that progress can and should be made to make coal mining in China very much safer than it currently is.

China's long march since the ending of the last dynasty in 1911 has not been easy. Many have died in war and failed programmes of reform. But today, the political will and entrepreneurial spirit seem to be well-aligned and are bringing new-found wealth to the country. If we are to avoid future conflict over supplies of primary energy and take some bold

steps to protect the environment, then we must do so in co-operation with China. The G8 Action Plan on Climate Change is a step in that direction and the IEA will be working more closely with China and other developing countries including India.

Conclusions

- China has enough coal to fuel its growing energy demand for many generations to come.
- Electricity production will continue to be dominated by coal-fired generation.
- Coal mining safety must be improved.
- Environmental pollution is being addressed, but CO₂ emissions are set to rise negating any reductions that OECD countries might make.
- As China becomes wealthier, environmental concerns will overtake the imperative for economic development and we should see new, cleaner energy technologies being developed and deployed.
- China plans to use its coal resource as a source of liquid fuels for transport.



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Ending on a positive note: as China becomes wealthier, environmental concerns will overtake the imperative for economic development and we should see new, cleaner energy technologies being developed and deployed.

And finally, China has a strong interest in coal liquefaction or coal-to-liquids as it is also called. The aim is to reduce the country's growing dependence on imported oil for use in transport applications. A new facility is being built by the Shenhua Group in Inner Mongolia and is scheduled for start-up at the end of next year. If you would like to know more about coal liquefaction, then please come along to a workshop on this subject hosted by the IEA on 2nd November 2006.

Mr Brian Ricketts joined the IEA in July 2005 as coal analyst working in the Long-term Office's Energy Diversification Division. Following a six-year apprenticeship in aerospace engineering, when he also qualified as a chartered mechanical engineer, Brian joined Alstom in 1987 where he was responsible for dynamic modelling of power systems. In 1997, he joined UK COAL as project engineer to work on a new integrated gasification combined cycle, coal-fired power station to be built in Yorkshire. In seeking planning permission for this ambitious project, Brian was sucked into the political lobbying process and subsequently led UK COAL's lobbying on a number of issues, most notably on the EC Large Combustion Plants Directive. He has worked closely with the UK Department of Trade and Industry, advising on coal markets and all matters relating to clean coal technologies. Brian holds a Masters degree in business administration from the Open University.