



The Chinese Coal Monster - running out of puff

Posted by [Euan Mearns](#) on November 20, 2010 - 10:32am

Topic: [Supply/Production](#)

Tags: [china](#), [economic growth](#), [fridley](#), [peak coal](#), [richard heinberg](#), [rutledge](#) [[list all tags](#)]

In July of this year I wrote a story called [The Chinese Coal Monster](#) drawing attention to the fact that China would soon account for 50% of global coal production and consumption. 10% per annum growth in Chinese coal is clearly unsustainable and I posed the question "How long can this go on?"

An article published in the Wall Street Journal earlier this week called [China's Coal Crisis](#) suggests the answer to this question is not much longer.

Policy makers [in Beijing] are mulling an annual cap of between 3.6 billion tons and 3.8 billion tons in the next five-year plan, running from 2011 to 2015, the state-run Xinhua news agency reported earlier.

A Nature publication called [The End of Cheap Coal](#) by Heinberg and Fridley was also published this week. This refers to earlier work such as [Blackout](#) (Heinberg), [Hubbert's peak - the coal question](#) (Rutledge) and [A global coal production forecast with multi-Hubbert cycle analysis](#) (Patzek and Croft). The most notable thing about Heinberg and Fridley's (on The Oil Drum known as [Sparaxis](#)) comment is that it is published in Nature. More commentary and full reproduction of The Chinese Coal Monster below the fold.

Let's begin with a few excerpts from the WSJ article:

State-run media reported that Beijing is considering capping domestic coal output in the 2011-2015 period, partly because officials worry miners are running down reserves too quickly to meet the needs of a rapidly expanding economy.

Imposing a cap would be significant as China's mining sector is already finding it hard to keep up with domestic coal demand, which has grown around 10% annually over the past decade.

So the cap has been set because the mining industry is finding it increasingly difficult to maintain and grow production.

In the three years to September 2010, Chinese companies spent \$20.96 billion on overseas coal-sector acquisitions, according to Dealogic.

Even if no official limits are introduced, China can't keep growing coal output much beyond another decade, analysts say. The mining sector is constrained by chronic infrastructure bottlenecks, especially road and rail, and those coal deposits that are easiest to mine have already been tapped.

Experts are starting to predict when China's coal reserves will run out—a nightmare scenario in a country where 70% of its energy is derived from coal.

This is a key issue. China may well have vast reserves remaining, but these may be further away, deeper down, thinner seams and lower energy content, and at some point it just becomes impossible to achieve what you achieved the previous year when so many variables work against you.

Let's put the 3.6 to 3.8 Gt cap in perspective. In 2009, China produced 3050 million tonnes (3.05 Gt) coal ([2010 BP statistical review of world energy](#)). If that increases by 10% this year that will bring production to 3355 million tonnes already suggesting that the lower limit of the proposed cap may be reached in 2011 (next year). At this point it's worth noting that Patzec and Croft (2010) forecast peak coal production in 2011, which I and many other commentators thought was unduly pessimistic.

What I imagine we will see happening is that Chinese production growth in 2010 will be significantly less than 10% and we will see a plateau develop within the 3.6 to 3.8 Gt range in the period to 2015. Growth in Chinese coal production has underpinned their industrial revolution and an end to growth in their primary energy source poses risks to their and global economic growth. But the Chinese are enterprising people and I imagine they will manage their transition away from domestic coal by a combination of increasing dependence upon coal imports, improving energy efficiency of coal fired power stations, and rapid expansion of nuclear capacity.

The Chinese Coal Monster

Published 12 July 2010

- China set to consume 50% of global coal production this year
- Production and consumption roughly in balance
- Coal imports used for stock pile growth?
- Consumption growing >10% year on year in line with economic growth
- Rest of world consumption declined 7% in 2009

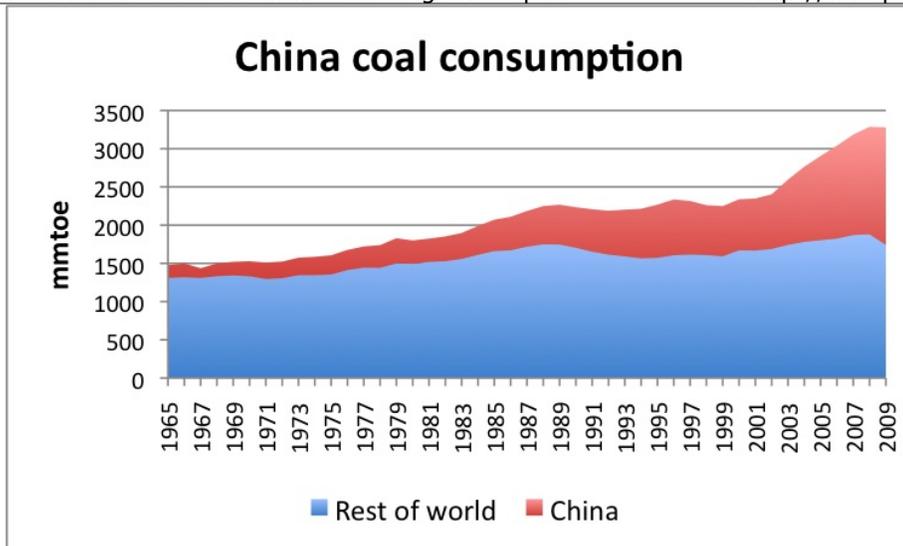


Figure 1 Chinese coal consumption compared with the rest of the world.

How long can this go on?

Data

Data are taken from the [2010 BP statistical review of world energy](#) - both a priceless but flawed resource. BP provide annual coal production figures in tonnes and tonnes oil equivalent (TOE) from 1981 and consumption figures in TOE only from 1965. Hence to make a production / consumption balance comparison it is necessary to use TOE. In China, 1 TOE is close to 2 tonnes coal - so simply double the TOE numbers to get at the approximate tonnages. Note that the energy content of coal varies by rank and from region to region and conversion factors to TOE vary from 1.5 to 3.

The coal monster

Like everything else in China, coal production statistics are simply immense. China now consumes and produces close to 50% of all the coal in the world. Thus, changes in Chinese consumption and / or production may have a dramatic impact upon the global coal market.

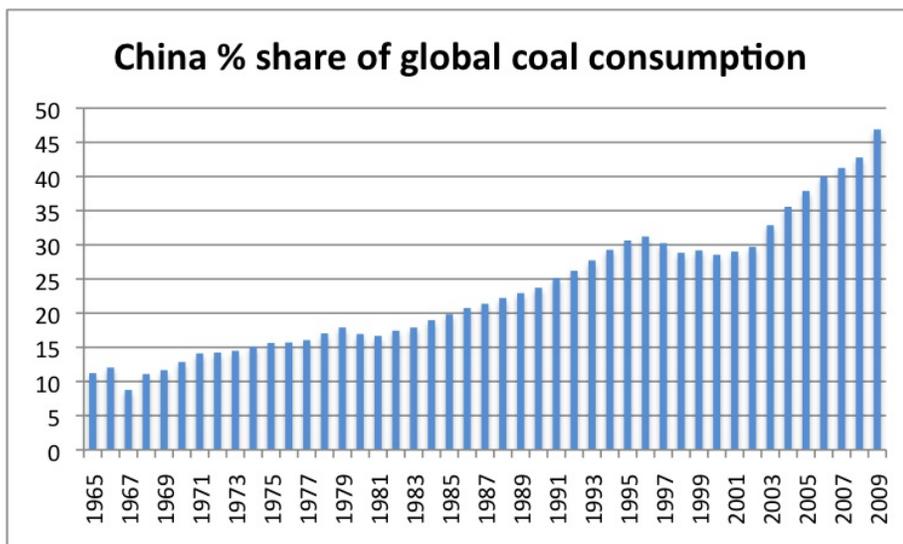


Figure 2 Since 1965, China has steadily increased its percentage share of global coal consumption and looks set to account for 50% of global coal consumption this year. Virtually all consumption is met from Chinese domestic coal production (Figure 3)

Coal production and consumption are in balance

In light of [press stories](#) describing rapid growth in Chinese coal imports, I was both surprised and puzzled when I plotted the Chinese coal production and consumption data and saw that these have always been roughly in balance (Figure 3). I sent the chart around the TOD email list and copied to Professor Dave Rutledge at Cal Tech. It was [DaveR](#) who came up with a possible explanation.

DaveR pointed out that in countries like the UK, coal stock piles equivalent to roughly 4 months consumption are maintained. If China does similar then stock piles will be around one third of 3 Gt equal to 1 Gt. With consumption growing at 12% in 2009, stock pile growth would need to be around 120 Mt to maintain the 4 month buffer. China [People's Daily](#) reported that Chinese net coal imports were 104 Mt in 2009 - barely sufficient to maintain stock pile growth.

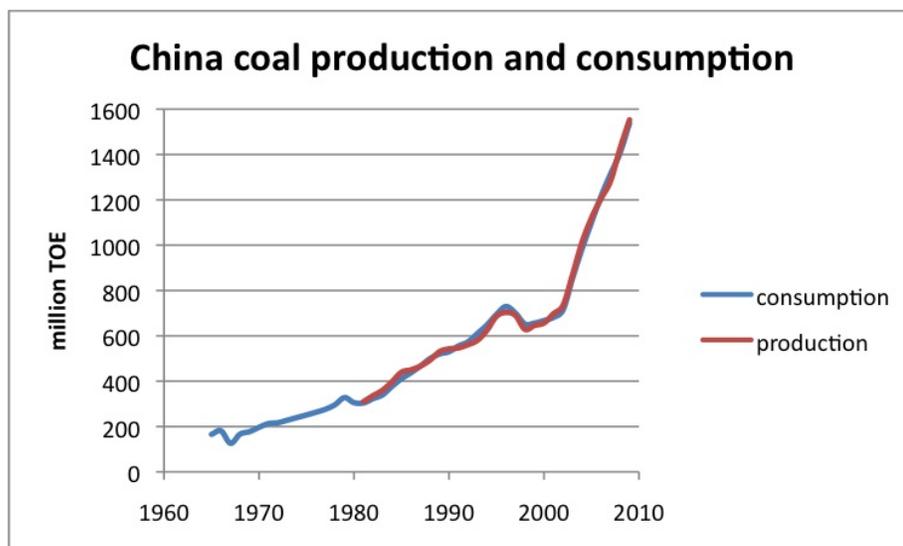


Figure 3 Despite stories of ballooning coal imports, China produces as much coal as it consumes. It seems imports merely contribute to domestic coal stock piles.

Global coal trade

The top 20 coal producers account for 98% and the top 5 producers account for 79% of global coal production. It is therefore possible to get a handle on global coal trade by looking at the top few producers. China as we have already seen is roughly in production / consumption balance, and India is a major importer of coal. The main export nations are the USA, FSU, Australia, Indonesia and South Africa. Looking at the production / consumption balance of these 5 nations shows an export surplus of 450 million TOE (roughly 900 million tonnes coal). Chinese coal imports of 100 Mt therefore account for roughly 11% of global coal trade (contrary to the People's daily report) - and that is just to maintain stockpiles!

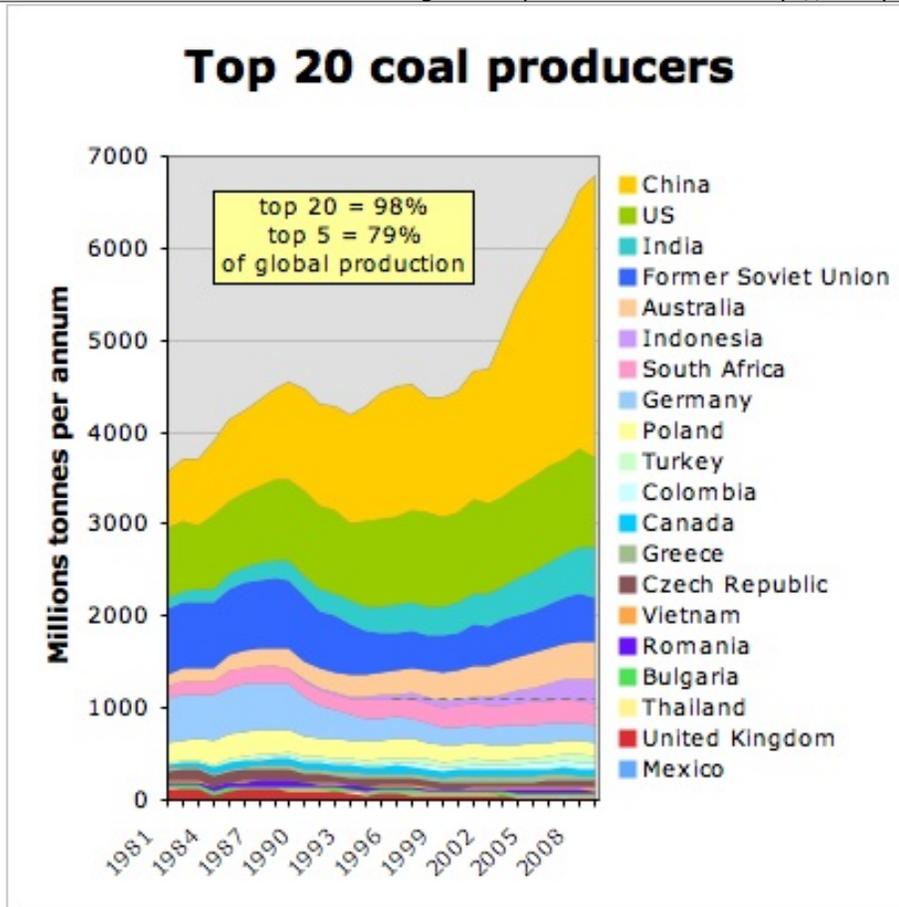


Figure 4 The top 20 coal producers. The dashed grey line marks approximate zero growth for the last decade. All the growth in coal supplies comes from the nations above that line with growth dominated by China with contributions from India and Indonesia.

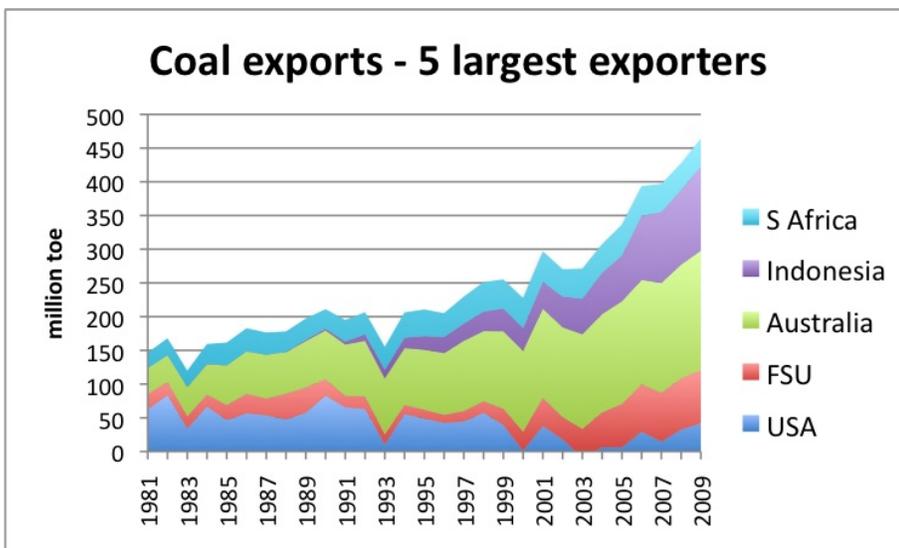


Figure 5 The global export market is dominated by 5 nations. Export growth has come mainly from Australia and Indonesia.

Threat to global economy

Should China ever fail to match coal consumption with indigenous production then 1 of 3 things may happen. The first option is that consumption is pegged back to match stalled production and this would stall Chinese economic growth with knock on effects to the global economy. The second option is that China tries to meet any shortfall buying coal on the international market. As already pointed out China is such a huge consumer of coal this would create great competition in the international market for limited supplies leading to severe upwards pressure on coal prices. The third option is that China somehow manages to install sufficient nuclear capacity to plug any energy gap.

The [People's Daily](#) reports a doubling of Chinese coal imports for the first 5 months of 2010 and upwards pressure on coal prices and it therefore looks like option 2 may be under way. Should Chinese coal imports double this year and next then China will be competing for about 50% of the coal on the world market and that may be like a wrecking ball going through the global economy that is founded on abundant and cheap supplies of energy.

Reserves and peak production

Finally a note on reserves. BP report China to have 114.5 Gt of coal reserves. BP in fact report coal reserves figures from the World Energy Council and the figure of 114.5 Gt has been reported every year since 1992. Thus we have the same unsatisfactory non-varying reserves reporting for Chinese coal that exists for Middle East OPEC crude oil reserves. Since 1992 China has produced 31 Gt of coal and the reserves should be reduced by that amount leaving 83.5 Gt reserves as of end 2009.

In 2006, the German based [Energy Watch Group](#) (47 page pdf) reported Chinese reserves to be 96.3 Gt. They produced a Hubbert curve forecast scenario that has proven to be inaccurate thus far (Fig. 6).

Dave Rutledge is currently estimating 139 Gt for ultimate recovery of Chinese coal. Cumulative production 1896 to 2009 is 51 Gt indicating 88 Gt remaining.

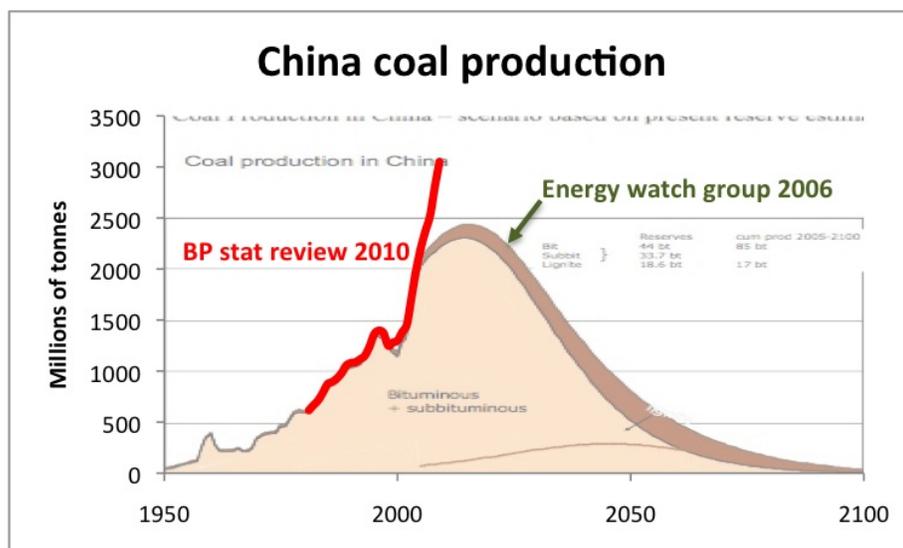


Figure 6 A Chinese coal production scenario produced by The Energy watch Group in 2006 (page 28 of report linked to above) illustrating how difficult it is to forecast production scenarios, especially pre-peak. One possible outcome is that Chinese coal production peaks earlier than shown and then enters rapid decline. Alternatively, substantially larger reserves may produce a taller and broader peak than shown here.

Chinese coal production will peak one day but it is very difficult to predict when that day will come based on these figures. The indications are that China has used about 37% of its coal. It has to be assumed that the best resources have been mined first and that for every year that passes the challenge of first meeting and then exceeding the previous year will become increasingly difficult. But the Chinese are an enterprising people.

Useful links

Dave Rutledge: [Hubbert's Peak, The Coal Question, and Climate Change](#)

Richard Heinberg: [China's coal bubble...and how it will deflate U.S. efforts to develop "clean coal"](#)

China: [Summary of Coal Industry](#)

One final note. In response to The Chinese Coal Monster, Jean Laherrere pointed out that BP and EIA production data differ, saying:

It is very important to know that China is importing much more than in the past. In the above graph, with EIA data, it is a cliff, while BP data show a plateau. JL

The comment from Jean can be read [here](#).



This work is licensed under a [Creative Commons Attribution-Share Alike 3.0 United States License](#).