

# FUNDAMENTALS

## Peak coal: in terminal decline?

Our forecast of a long-term structural shift away from coal could have dramatic implications for investors.

Once the bedrock of the global energy system, coal's position looks ever more threatened by the energy revolution. Earlier this year, the UK was able to meet its total electricity demand for twelve hours without needing to switch on a single coal generator, something not seen since 1882. Just 50 years ago, over 1000 mines were operating. Now only ten remain and face yet further closures. With the British government aiming to completely eliminate coal use in just eight years' time, we look at whether the drastic decline of coal in the UK is a window into coal's future around the world.

Our view is that the outlook for coal may actually be even worse

than the already dire predictions of some forecasters. We think coal will be displaced from the current energy mix at an accelerating pace. More worryingly for coal investors, we estimate that the independently-traded coal market, also known as the 'seaborne' market, is going to be disproportionately affected as key consumers increase their self-sufficiency. Crucially, we believe this outcome is likely even if policy makers are unsuccessful in implementing an effective global carbon price mechanism, although the introduction of one would accelerate this process.

### WHERE IS COAL TODAY?

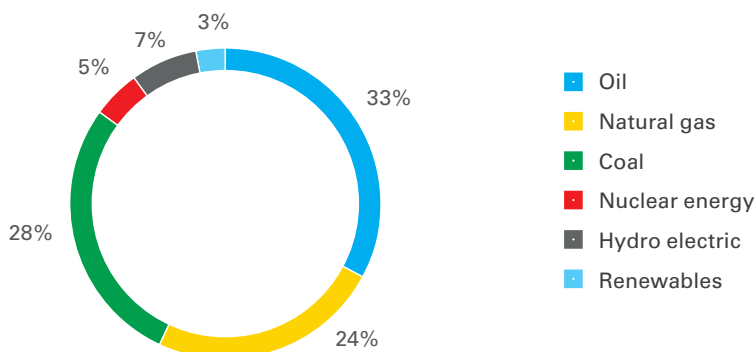
Thermal coal remains a dominant source of energy globally, making



up almost a third of all primary energy consumption and a substantially greater share of electricity generation markets.<sup>1</sup>

In emerging markets, coal has an even greater share of the energy mix, accounting for nearly 40% of consumption. Setting aside the environmental costs, coal is an extremely abundant resource with a quoted reserve life of 150 years, or three times more than that of oil or gas, and an extremely high ratio of energy return on energy invested. Compared to alternative sources of fuel, it has also generally been cheap to procure as many of the major coal consumers have large domestic reserves. With this in mind, it is easy to see why coal has been such a popular source of energy. It is also easy to understand why countries, particularly in the emerging world, have been so reluctant to take the hard (and often expensive) decision to move away from coal.

**Figure 1: Coal is still a major source of global energy use**



Source: LGIM Analysis, BP

1. For the purposes of this outlook, when we are using the term 'coal' we are referring to thermal coal which is used to warm homes and generate electricity. Metallurgical coal, which is used in the steel making process, looks a lot better in fundamental terms but is much smaller by volume.

**ASIA DETERMINES COAL'S FUTURE**

Coal is a global commodity, albeit with many regional and isolated local markets. To understand the future of coal we have to focus on the world's largest consumer, China.

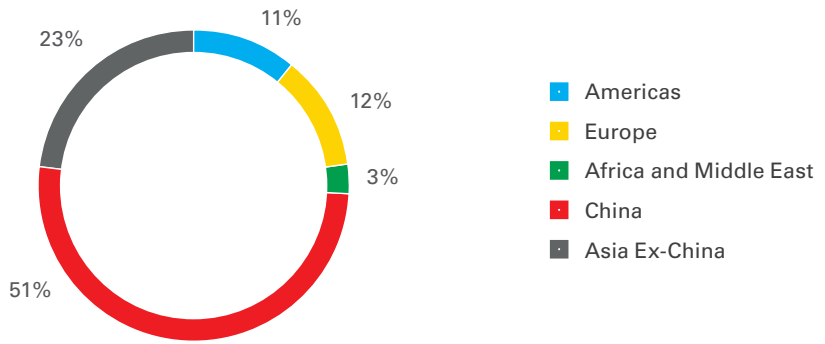
India is also a significant import market, overtaking China in 2014 (Figure 3). However, this is because China's domestic coal production is far larger, with India's total coal consumption equal to just 20% of China's.

**BURNING COAL COMES WITH SUBSTANTIAL NON-FINANCIAL COSTS**

Coal may be cheap to burn but the consequences are costly. Not only does coal contribute more than oil and gas to climate change through CO2 emissions, it also creates substantial air quality and pollution issues. No country has had to deal more with these problems than China.

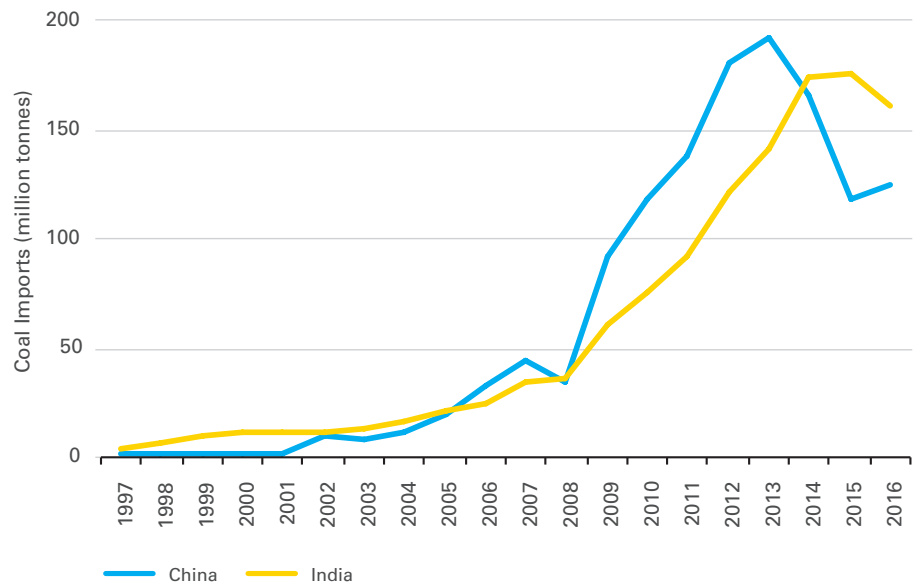
Any frequent visitor to China cannot help but notice how poor the air quality has become. If you travel into the industrial north or the developing west, it can be very unpleasant. In January this year, the Chinese Ministry of Environmental Protection published data conceding that over 60% of Chinese cities were suffering

**Figure 2: China dominates coal consumption**



Source: LGIM Analysis, BP

**Figure 3: Chinese and Indian imports remain high**



Source: LGIM Analysis, Credit Suisse

from significant air pollution issues. This problem might once have been ignored, but no longer:

in late March, Beijing closed its last coal plant situated within city limits following constant public pressure.

**THE GOOD NEWS – REDUCING CHINA’S DEPENDENCE ON COAL IS PROVING RELATIVELY EASY**

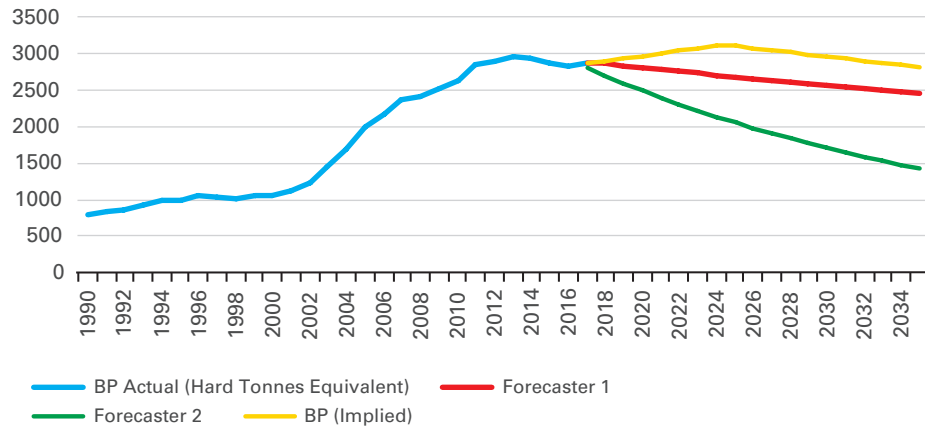
Predicting how fast Chinese coal consumption will decline in absolute terms is difficult to do with any confidence. Three independent forecasters have dramatically different views, as can be seen in Figure 4. That said, all agree that we have either passed, or are close to, the peak of Chinese demand.

China stands apart from the rest of the world in that, according to our estimates, almost 50% of its demand for coal is for power and the remaining half for heat, burned in small-scale industrial and residential boilers. Contrast this to the US, where about 93% of all coal consumed is for power generation. We see both sources of Chinese demand being displaced over time and on multiple fronts.

The first is replacing coal-fired boilers with electric-powered energy sources. Even if coal power plants generated this electricity, we estimate that coal savings would still be about 15% because of how inefficient small-sized boilers are.

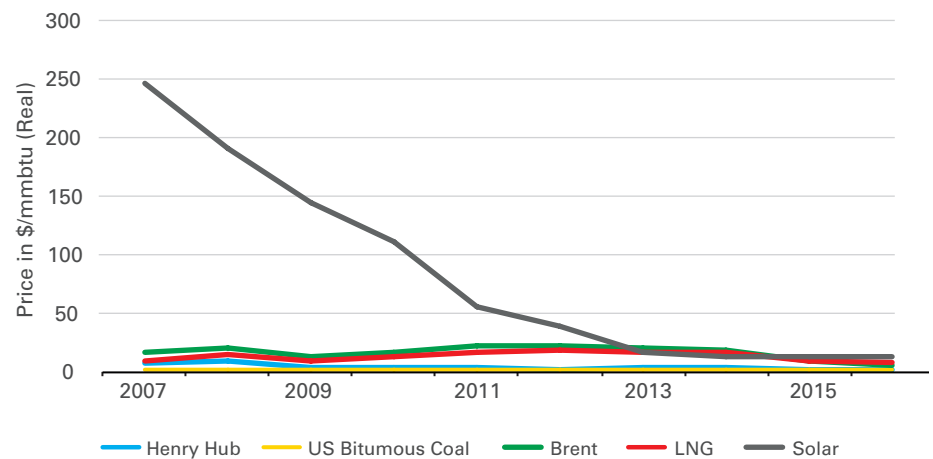
The second is to replace coal-fired boilers with gas boilers. There is an increased cost associated with displacing coal with gas. However, as we learned from recent meetings with a leading Chinese city gas distributor, government subsidies to encourage such switching are increasing. For example, a new and very generous policy to encourage even non-urban consumers to switch fuel is now in place in parts of northern China.

**Figure 4: Forecasters hold very different views of future Chinese coal demand**



Source: LGIM Analysis

**Figure 5: The rapidly decreasing cost in solar**



Source: LGIM Analysis, Bernstein

On the power generation side, huge falls in the cost of renewables (Figure 5), scale advantages of the domestic nuclear industry and the cheapening of imported gas have encouraged the replacement of coal-powered generation. We believe that many investors are underestimating how fast the Chinese power generation sector is going to shift away from coal to alternative energy sources such as solar.

Finally, we believe that coal power plants’ technical improvements are increasing efficiency and therefore

reducing coal demand. Plant efficiency is judged on a scale from ‘sub-critical’, the least efficient, to ‘super-critical’ and the imaginative superlative ‘ultra-supercritical’. Over 50% of Chinese coal plants still remain sub-critical. However, while it is unrealistic to assume this improves dramatically in a very short period of time, the on-going gradual modernisation of the Chinese fleet can potentially reduce coal consumption materially. That said, the domestic availability of sufficiently high grade coal may be a limiting factor.

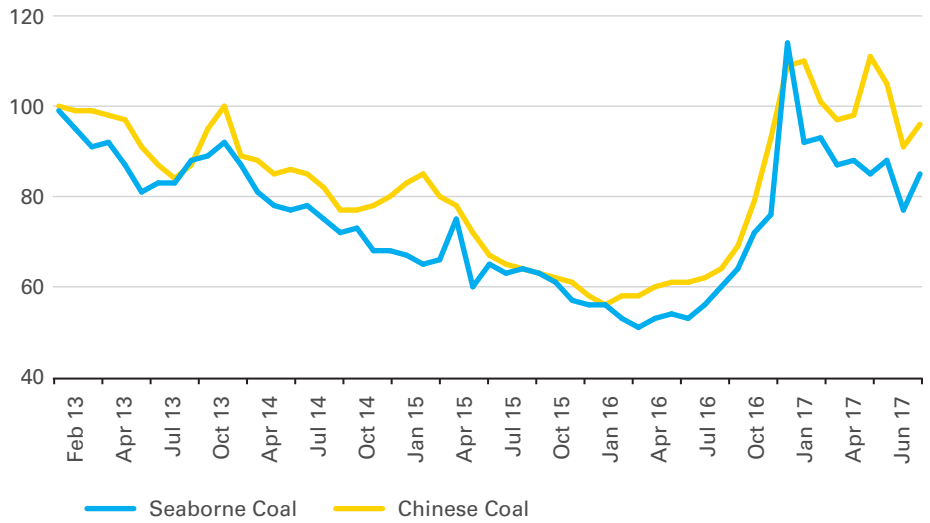
**SEABORNE COAL – A BALANCING ITEM FOR ASIAN CONSUMPTION**

While a decline in total coal consumption in China is good news for the environment, the implications for investors’ portfolios is less rosy.

The bulk of coal exposure in typical portfolios is to the internationally-traded market (seaborne), as opposed to the Chinese domestic market. The seaborne market is essentially a ‘balancing item’ for Chinese and other Asian power generation markets. As a consequence, prices for the seaborne market very closely track the Chinese domestic price (Figure 6).

The difficulty for investors is that as China’s demand for coal has declined in recent years, it has opened up significant domestic spare capacity. China currently imports a large amount of coal to

**Figure 6: Seaborne coal price has largely tracked the Chinese domestic price**

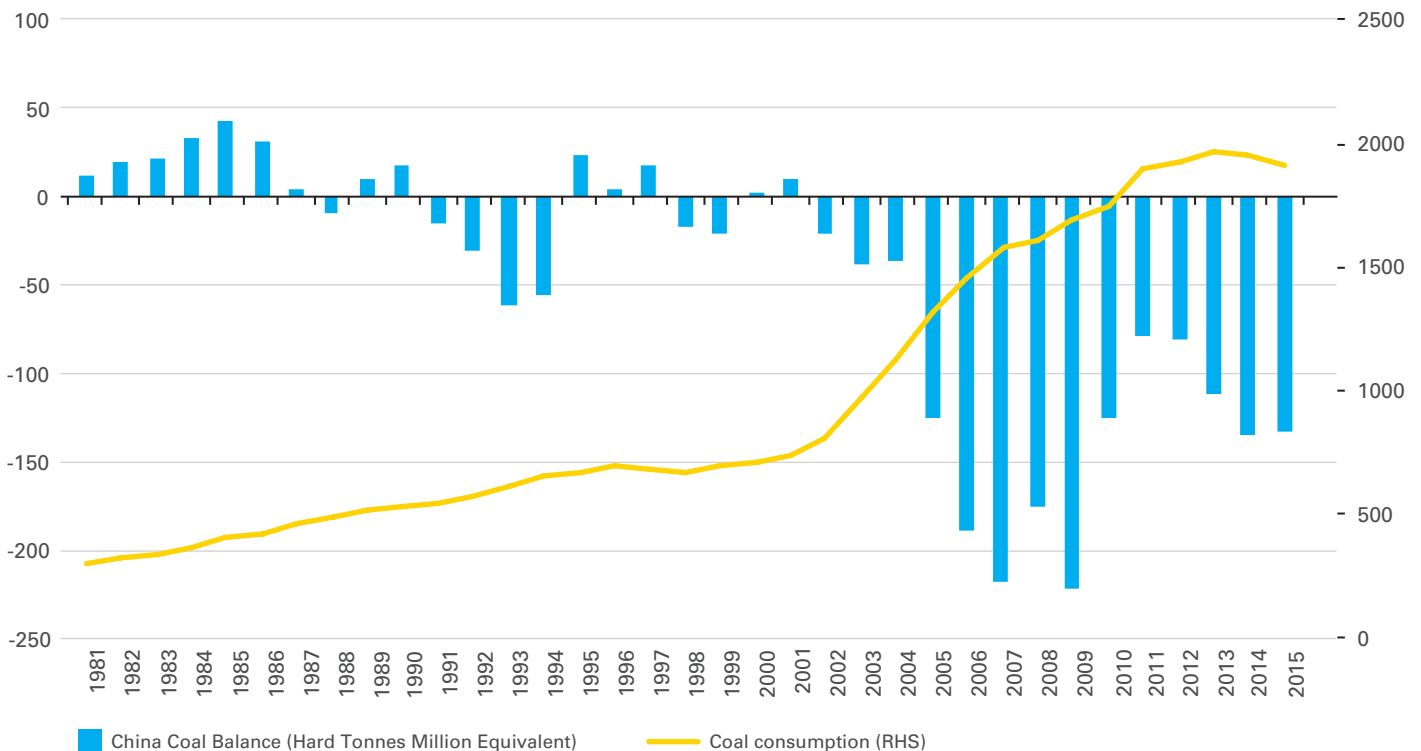


Source: LGIM Analysis, Bloomberg, rebased to 100 as at 1 January 2013

meet domestic demand (especially premium coals) but this dynamic begs an important question: when coal demand starts rapidly declining and the spare capacity in China grows, will China continue to import more than 100 million

tonnes of seaborne coal? Indeed, as Figure 7 shows, China has been a net exporter of coal in the past. If China ceases to be an importer of thermal coal, then this could swing the seaborne supply/demand balances by about 15%.

**Figure 7: Peak coal demand (consumption) leaves significant ‘spare capacity’**



Source: LGIM Analysis, BP, Jefferies Research

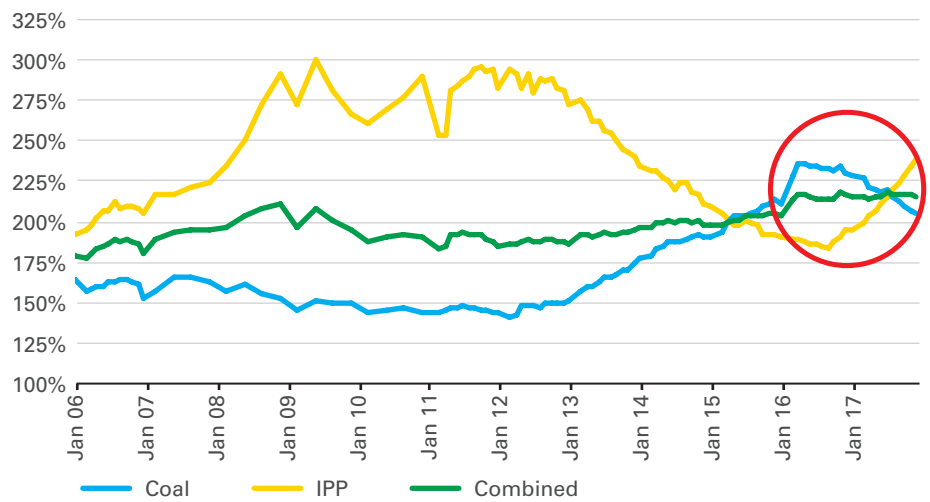
**WHERE COULD WE BE WRONG - THE PROBLEM OF DEBT AND THE CHINESE POLICY RESPONSE**

2016 was a year that made structural coal bears like us look a bit foolish. After five years of price declines, coal prices more than doubled in the middle of the year and the share price of coal companies (some of which were extremely indebted) rose by even more. The reason for this dramatic reversal in fortunes was due to Chinese government policy.

Since opening a coal mine in China had previously been such a fantastically profitable business, many smaller mines opened in the period between 2009 and 2011. As prices started to collapse these mines became large borrowers from what is colloquially called the 'shadow banking sector' in China. But expanding capacity and lower prices meant that such heavy borrowing became unsustainable, and in late 2015 the solvency of China's coal mining sector was a potential threat to the country's financial stability.

In response, in early 2016 the Chinese government limited the number of days a domestic mine could operate to roughly 260. The consequence was a dramatic increase in prices, leading to a natural deleveraging in the domestic coal sector (Figure 8). But this policy has come at a cost, forcing higher leverage within the domestic power producers as coal prices increased. Moreover,

**Figure 8: Coal leverage has moderated, in contrast to independent power producers (IPP)**



Source: LGIM analysis, Jefferies Research

it seems unsustainable to allow importers to gain market share and profits at the expense of highly indebted domestic coal producers.

It is clear that the demise of coal is not going to be a linear journey, and is going to be extremely sensitive to government policy response.

**BOTTOM LINE**

Coal mining and trading is a substantial economic activity, accounting for \$81 billion of revenue in 2016 according to PWC. Our forecast of a long-term structural shift away from coal could have dramatic implications for investors.

Over the next 10–20 years, we believe that the largest coal consumer, China, will increase its self-sufficiency. At best, coal will form an ever decreasing share in a growing energy mix

and has probably seen peak demand. Companies engaged in the business of mining coal to sell into the seaborne market are at risk of having substantial stranded reserves that will never be economically mined. Investors should therefore carefully consider their investments in companies that extract, ship and trade thermal coal.

For coal companies this is a miserable prediction, not just for their shareholders, but also their workforces and local communities who will require much in the way of transition assistance. However, coal is one of the most polluting and carbon-intensive fuel sources. If we are right, then this is tremendously positive for global climate change objectives, alongside encouraging implications for pollution and air quality.

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