# King Coal's Long, Slow Decline

By Michal Meidan and Rosealea Yao

*Just a few years ago, the notion that China's coal use might soon stop growing was laughable. Now it seems likely that peak coal demand is imminent.*

Can China's coal consumption ever stop growing? For years this has been unthinkable. Cheap, abundant domestic coal has been a key input in China's capital-intensive growth strategy. With coal accounting for two-thirds of primary energy use, and nearly three-quarters of electricity generation, continued economic growth seemed joined at the hip with ever-rising coal use. Beijing's recent pledge to cap coal consumption at 4.2bn tons by 2020 was seen as wildly unrealistic.

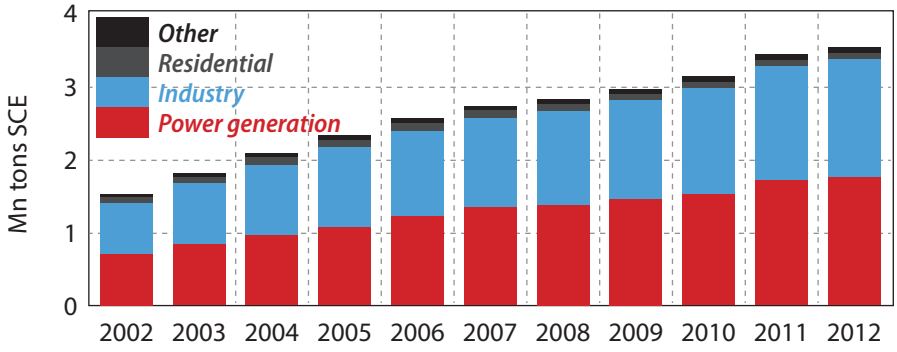
The unthinkable is now an imminent reality. In 2014 coal use fell for the first time since 1998. It may rebound a bit in the next year or two, but it looks likely that consumption will hit a permanent peak no later than 2017, thanks to slowing economic growth, a structural shift away from heavy industry, and aggressive substitution of other fuels. It will take quite a few more years for this to translate into cleaner skies for China's cities, whose unbearable smog is largely created by coal burning. The consequences for other fuels—notably natural gas and renewables—will, however, be substantial.

**Too much of a good thing?**

China has long powered its growth with coal to a greater extent than any other major country. Although the energy mix has been diversifying, China still accounts for 50% of the world's annual coal consumption. The reliance on coal was rooted in two facts: China had a lot of it, and it was relatively cheap. This made it ideal for economic policy makers who wanted to minimize the input costs of capital-intensive investment, and

**Electricity and industry drives coal demand**

Coal demand by sector




Gavekal Data/Macrobond

to avoid a strategically problematic reliance on imported energy. Thanks to coal, China's self-sufficiency in primary energy hovered near the 90% mark until 2009, when surging demand and a focus on higher quality led China to become a significant net coal importer for the first time. (Since 2010 net coal imports have averaged 250mn tons a year, and reliance on imported natural gas has increased, pushing the energy self-sufficiency ratio down to 80%.) The coal industry is large and politically powerful, employing 5mn people and accounting for Rmb250bn in tax and fee revenue for government in 2012.

Unfortunately, coal brought with it some undesirable externalities. Its abundance and low cost enabled China to cling to an inefficient, energy-intensive growth model for longer than it would have had if it faced a harder energy-cost constraint. And coal burning is by far the biggest single contributor to air pollution levels that have rendered many Chinese cities smog-ridden purgatories and to greenhouse gas emissions that threaten to destabilize the global climate. Beijing has long recognized these problems: for several years, and especially since the Xi Jinping government took over in late 2012, it has tried to rein in coal consumption. Despite those efforts, coal demand continued to rise, and until last year it seemed that the government's pledge to cap coal use at 4.2bn tons by 2020 would be unattainable. Many analysts continue to believe the peak of China's coal consumption could occur as late as 2030, and will be as high as 4.8bn tons.

This is far too pessimistic. Rapid shifts in environmental policy, economic structure and energy efficiency meant that coal demand will probably peak by 2017, if it has not done so already.

Linked policy initiatives on environmental protection and energy efficiency have been around for at least a decade. The scale of China's envi-

ronmental problems makes it tempting to dismiss the government's efforts to deal with them, but these policies have had some impact. The first energy-efficiency targets were imposed in 2005; since then, the amount of energy needed to generate a yuan of GDP has fallen by more than 30%. The focus started to shift away from energy efficiency to a broader set of emissions targets in 2007, when China surpassed the US to become the world's largest carbon dioxide emitter. That year saw China's first climate change policy, which included an initiative to lower the carbon intensity of the power sector by raising the average efficiency of China's coal-fired power fleet and decommissioning the worst-performing power generating units.

That policy also emphasized the development of renewable energy. But the renewables policy was not very effective, because it emphasized the production of renewable-energy equipment (such as wind turbines and solar panels), rather than maximizing power generation from renewables. Renewable targets were set for installed capacity rather than for total consumption. As a result, even though installed wind capacity in China reached 61 GW in 2012, it operated at a utilization rate of around 20%.

**A new environmental equation**

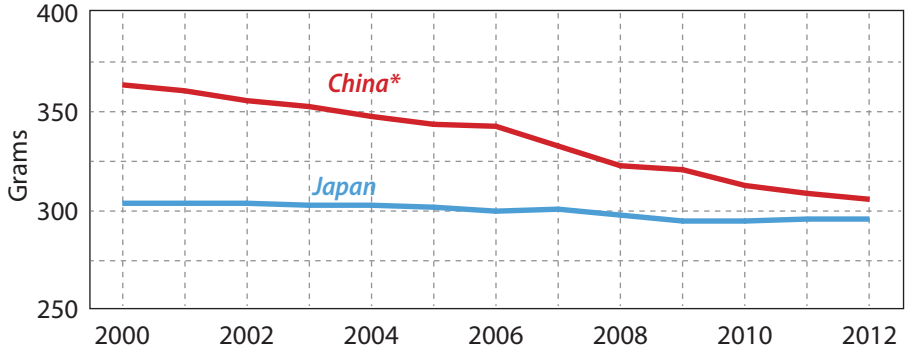
The environmental calculus changed dramatically in 2012. A new generation of leaders came to power amid a thick blanket of toxic smog resulting from pollutants from coal-fired power plants, while "mass incidents" related to environmental degradation were increasing by the day. Pollution was becoming a central political issue. Tough new environmental rules will cut coal demand by over 100mn tons from 2012 levels.

In September 2013, the State Council issued an action plan on air pollution, which aims to reduce the concentration of PM10 (particulate matter of 10 micrometers or less) by 10% from 2012 levels in cities nationwide by 2017. Certain regions have tougher targets: the Beijing-Tianjin-Hebei belt is required to reduce concentrations of smaller (PM2.5) particles by 25% by 2017; the Yangtze River Delta's PM2.5 reduction target is 20% and the Pearl River Delta's is 15%. If the Beijing-area target is met, Beijing, Tianjin, Hebei and Shandong will reduce their combined coal consumption by 83mn tons over 2012 levels.

A year later, the State Council mandated higher efficiency targets for the country's coal-based power generation. Gains in this area have already been substantial. Since the year 2000 the average efficiency of Chinese coal-fired power plants (with capacity of at least 6MW) has improved by 16% and is now close to Japanese levels, at 305g of standard coal per kilowatt hour (kWh) of power. The rules require that new coal-fired plants must be built

**Powerful efficiency gains**

Amount of standard coal needed to generate a kWh of electricity




*Plants with capacity of 6 MW or above

**Paulson Institute, China Electricity Council, Japan Institute of Energy Economics**

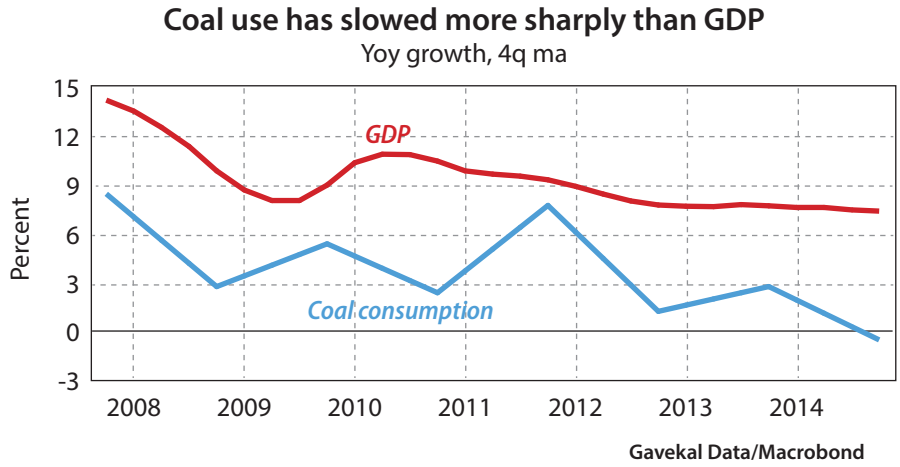
to consume less than 300g/kWh, and existing plants must be upgraded to a standard of 300g/kWh by 2020. This measure alone will reduce coal demand by more than 10mn tons of standard coal each year.

Another measure taking aim at the pollution effects of coal is a rule that took effect in January restricting the import, production and transportation of low quality coal. Much of the media attention to this rule highlighted the negative impact on coal imports. More important, it will lead to a reduction of low-quality domestic production, especially in Inner Mongolia and Yunnan.

**Canary in the coal mine**

Finally, and perhaps most crucially, Beijing has changed the pricing structure for coal via a revamped coal resource tax. For years, the resource tax on coal was assessed at a fixed rate per ton (Rmb2-4 for thermal and Rmb8 for coking coal). Since most of the money from this tax went to provincial governments, provinces had a fiscal incentive to promote as much coal production as possible. In October 2014, finally enacting a long-discussed reform, the State Council ordered that the coal tax be shifted to a value basis at a rate of 2-10% of the average sales price. (The exact rates will be set by the provinces.) In the long run, the value-based tax will shift the incentive of local governments from maximizing coal production to maximizing the coal price—which in some cases will mean restraining production. And a higher cost of coal will make it easier to achieve pricing parity between coal-fired and other forms of electricity production.

It is true, though, that in the short run the impact of the coal tax will be offset by measures to soften the financial impact on coal mining firms.




Fifteen of China's 19 listed coal companies reported profit declines in the first half of 2014, thanks to slower coal demand growth and falling domestic prices. In order to prevent the coal tax from further eroding miners' profits, Beijing paired the tax shift with an abolition of other fees and charges on coal production. In Shanxi, the tax increase from the province's new 8% coal resource tax will at first be completely offset by the elimination of other fees. But over time, the coal price will rise, and this will constrain demand.

The news is not all bad for the coal industry: even as it tightens the screws on coal production and power generation in eastern and central China, the government is promoting 16 large-scale coal-power bases in northern and north-western China. These will be run by the big state-owned coal miners and will be connected to demand centers in east and central China by 12 new ultra-high-voltage (UHV) power lines which will become operational in 2017.

**Renewables rising**

Beyond environmental and energy efficiency policies, the last element in the peak coal equation is the growing availability of fuel substitutes. Beijing has been encouraging the development of renewable energy, issuing a target to have non-fossil fuels (wind, solar, hydro and nuclear) account for 11.4% of the energy mix by 2015 and 15% by 2020. After a slow start, this target now looks attainable. In 2014, according to NDRC, the non-fossil share of primary energy use rose to 11.1% (from 9.6% in 2013), while the coal share fell to 64.2%. Much of the shift has occurred in the power industry, where the renewables share doubled between 2009 and 2014 while coal's share fell from 78% to 70%.

An obstacle to faster adoption of renewable-fueled power generation is State Grid, which has a monopoly on transmission and distribution (T&D) of electricity in all but five southern provinces and has been reluctant to connect renewables. Administratively-set power prices have been a major discouragement since State Grid's profit structure also led it to prioritize coal. Its profits are determined by the difference between the prices it charges to electricity end users, and the "on-grid" tariffs it is required to pay power producers. The NDRC sets both the end-user and on-grid prices, and the on-grid prices vary by fuel source. Since the NDRC-set prices give the grid a higher margin on coal-based electricity, the grid has little incentive to promote the use of renewables.

The stage is now set for a new round of power sector reform to break this gridlock. The government has set up trial programs in Shenzhen and Inner Mongolia in which end-user power tariffs will be set based on reasonable return on the local grid's assets. This is a shift toward the type of pricing structure common for regulated utilities in other countries; regulators hope that it will force the grid to be more efficient, increase its purchases of renewables-fueled electricity, and lower costs for end users. The reforms are likely to encounter resistance, which Beijing hopes to break down in part through anti-corruption investigations. Targets of anti-graft efforts reportedly include the head of the State Grid's North China operations; officials in NDRC's price bureau; officials at the National Energy Administration (NEA) who were involved in approving large power projects; and leaders from Shanxi, China's largest coal-producing province.

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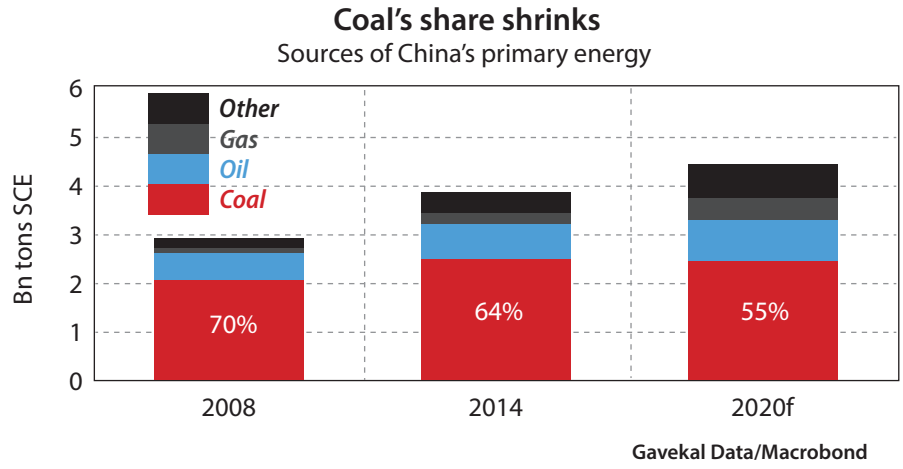
**Signs of change**

All of these forces are having a clear downward impact on China's coal consumption. In the decade to 2011, coal use rose at an average annual rate of 9%. In 2012-13 growth fell to under 2%, and in 2014, coal use actually declined by 2.9%—the first annual decrease since 1998. In the space of two years, the change of course in China's energy mix is already visible. Coal use in power generation, which represents half of total coal consumption, fell by 1.8%; coal use in steel production fell by 1%.

This is a noteworthy shift. But is it just a temporary blip, or a signal that peak coal demand has already been reached? There is a good case to be made that we are past the peak and coal demand will continue to decline:




- Economic growth is slowing; the GDP growth target for 2015 was set at 7%, down from the 7.4% growth achieved in 2014.
- Total energy demand is slowing even more sharply. It rose at an average annual rate of 8.8% in 2001-11, then fell to 3.9% in 2013 and a meager 2.5% in 2014.
- Energy demand faces relentless downward pressure because of the government's energy efficiency drive and the gradual rebalancing of the economy. Industry is six times more electricity-intensive than services; the service sector's share of the economy has grown from 39% in 2000 to 48% in 2014, and now exceeds that of industry.

These trends seem inexorable, and China may have already passed the point of peak coal demand. A short-term rebound in coal use is possible in 2015-16, given an expected ramp-up in electricity generation from the new coal-power bases in Xinjiang. But at most, these factors will delay the inevitable by only a year or two. The most likely scenario is for coal use to plateau at roughly its current level and then begin a long, slow decline after 2017.

Even under this scenario, China's total coal use will remain extraordinarily high for quite a long time. Assuming that coal use peaked in 2013 and that government support lifts gas demand growth back up to 12% a year, coal's share of total primary energy consumption will fall to 55% in 2020, from 64% last year. Meanwhile the shares of gas and non-fossil fuels will rise to 10% and 16% respectively. This would be a huge achievement. But even so, China's coal use in 2020 is likely to be only 2-3% lower than last year, and by far the highest in the world. So while coal traders will suffer through a permanently weak market, Chinese citizens inhaling coal-induced smog will find little relief.