

Insights: China's coal power stranded assets challenge

Key Points

- China's carbon emissions have entered a 'new normal' of slow or negative growth as a result of slower growth in electricity demand, and resulting lower coal consumption. However this has not been matched by slower investment in coal power generation.
- Coal power utilities face the threat of asset write-downs, and potentially asset stranding, due to three key factors: displacement by renewable energy sources, falling utilisation rates, and lower than expected demand for electricity.
- If the situation continues during the 13th FYP period, it could represent a significant mis-allocation of resources at a critical moment in China's industrial transformation.
- New environmental 'stress-testing' mechanisms are important, however in order to avoid significant over-investment in coal power all big commercial banks should be encouraged to pursue such measures, and government could tighten controls.

Early emissions peak?

A drop in China's carbon emissions from energy in 2015 has led to speculation that they may have peaked 16 years earlier than the official 2030 target. China's National Bureau of Statistics (NBS) released preliminary data on energy consumption for 2015, which suggest a 1.9% drop in energy-related carbon emissions (with a 1.5% level of uncertainty based on previous statistical revisions). (Peters 2016)

The reduction results mainly from an annual decline in coal consumption of 3.7% in 2015 reported in the NBS annual economic statistics bulletin. Coal burning is China's major source of carbon emissions and such a significant reduction was beyond expectations. A major contributor to this fall in coal consumption is likely to have been the power sector. Power supply and manufacturing together account for over 85% of China's coal consumption. In 2014 coal consumption in the power sector dropped by over 7%; a dramatic fall from the over 14% increase in 2011, although this may also partially be a product of changing coal quality. Relevant data for 2015 should be released in late 2016.

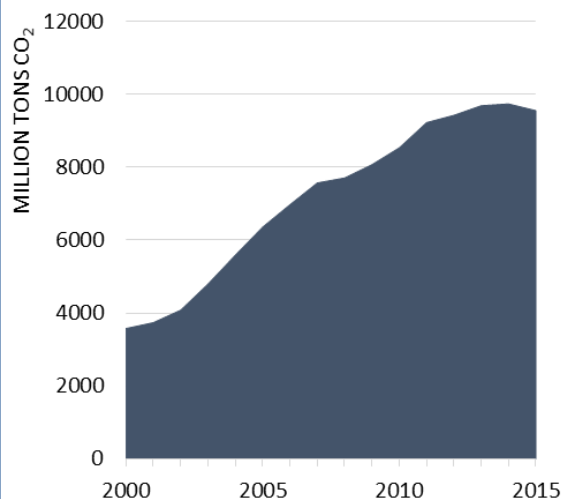


Figure 1: Implied CO₂ emissions from energy. National Bureau of Statistics (NBS); author.

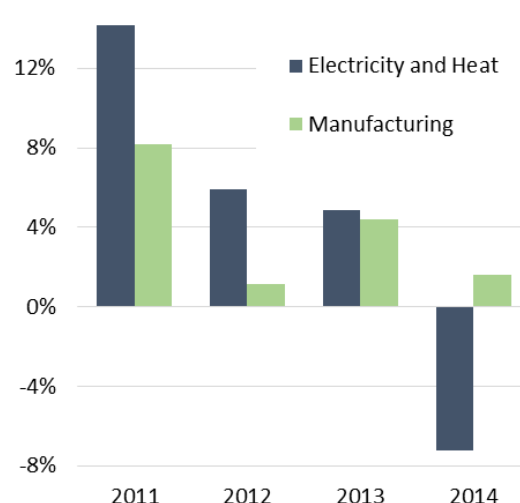


Figure 2: Annual change in coal consumption. NBS.

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Potential stranded assets

While China's economic 'new normal' has provided hope for a less carbon-intensive growth model, there has been debate as to whether recent data implies a marginally lower trajectory for carbon emission, or instead suggests a major shift. Analysis by Green and Stern at the London School of Economics, suggests that we are now seeing major and permanent changes in China's economy, and in particular the power sector. In light of this, we might expect that allocation of investment would be shifting to reflect what now seems to be a significant move away from coal and towards renewable energy and energy efficiency measures. Government data, however, shows that in 2014 RMB 114 billion of investment went in to thermal power (of which coal represents about 90%). This was an increase of almost RMB 13 billion on the previous year and preliminary data suggests that investment was even higher in 2015.

A recent report by the Smith School of Enterprise and the Environment at Oxford University suggests that China's coal power sector is, along with Australia and the USA, the most exposed to the risk of stranded assets. The report developed a list of seven "local risk hypotheses" and ten "national risk hypotheses" against which the coal sector in major economies was assessed. Of the local risks in China, it identified a risk arising from regulation addressing local air pollution, future heat stress, and water stress in western China. Of the national-level risks, the report assessed China's power sector to be at "high risk" from renewable energy policy and falling power plant utilisation rates.

Renewable energy policy is assessed using EY's Renewable Energy Country Attractiveness Index, which currently places China second after the US. This reflects China's proactive approach to encouraging renewable energy electricity generation. Indeed, Coal's proportion of total electricity generation fell from 78.1% in 2011 to 70.5% in 2014, including a fall in absolute generation of 0.7% in 2014. Data for thermal power generation in 2015 (coal and gas combined) fell by 2.8%. (Figure 3) This shift in generation mix has been driven by consistently strong growth in hydropower, supplemented by very high growth of wind power generation in recent years.

Falling power station utilisation rates is considered a significant risk for asset stranding given that lower generation may make it harder for plants to cover their operational and fixed costs, let alone turn a profit. The falling utilisation rates of China's coal-fired power stations, combined with the risk of displacement from renewables and gas, combines to present a real threat of stranded assets (Figure 5).

Finally, perhaps one of the most significant risk factors identified by the report is the **outlook for electricity demand**. Based on projections by the IEA in their "New Policies Scenario" (NPS), the report identified high levels of risk for the power sector in major economies such as Japan, Germany, the UK and Poland. China, however, was assessed as low risk in this regard due to projected growth in electricity demand of 4% on average per year to 2020. Recent data, however, suggests that the IEA's predictions may be on the high side. While electricity consumption grew at very high rates up to 2013, this has dropped off considerably in the last two years, with official statistics suggesting that it grew by only 0.5% in 2015, the lowest level since 1974 (Economic Daily 2016), and power generation actually reduced by 0.2%.

The China Electricity Council has suggested that electricity consumption may only reach 6700 Terawatt hours (TWh) by 2020, lower than both the IEA's New Policies Scenario and its ambitious 450 Scenario which would see China play a proportionate role in limiting global warming to 2 degrees. Such a scenario would see an additional 1100 TWh of demand per year above the 2015 level, although some sector analysts believe even this estimate could be too high.

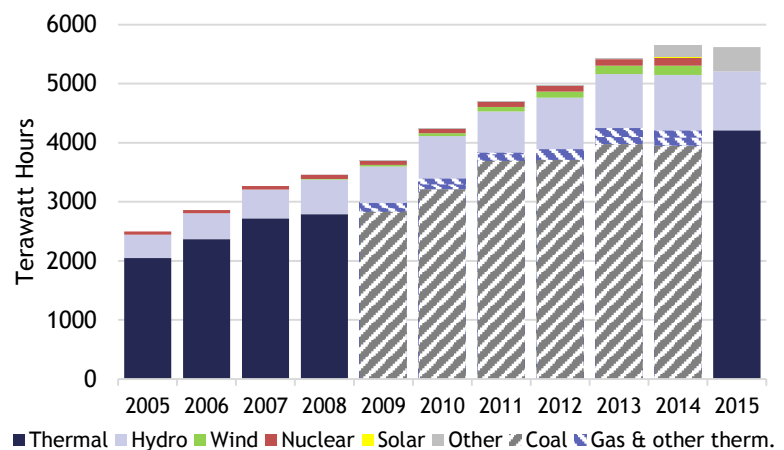


Figure 3: Electricity generation by source. NBS; China Electricity Council (CEC).

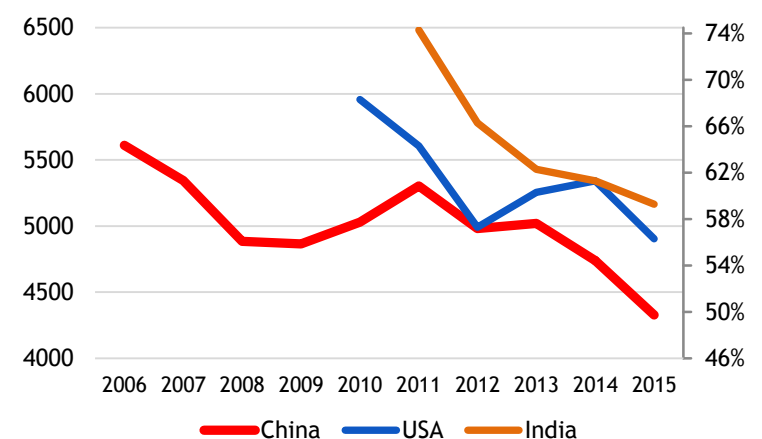


Figure 4: Utilisation hours of thermal power plants in China, the USA and India (% of total hours on right). CEC; National Energy Administration (NEA), Oxford University.

Deciphering a trend from a blip in China’s energy sector is a challenging task. Some observers suggest there is still room for significant growth in electricity demand in coming years, pointing to the fact that current per capita power consumption of China is only about one tenth that of the United States. Whereas electricity demand has previously been driven by heavy manufacturing, increasing tertiary sector and residential consumption may create upward pressure on demand. Indeed, observers such as ICBC see continued strong growth in demand, due to “accelerated electrification, industrialization and automation”. If recent data does represent a new trend, however, then electricity demand could represent another, and perhaps the most significant, long term threat of stranded assets in the coal power sector.

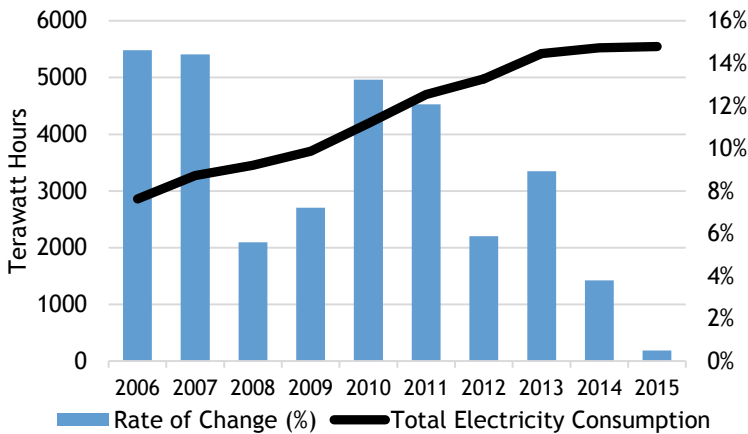


Figure 5: Electricity consumption and annual change. NBS.

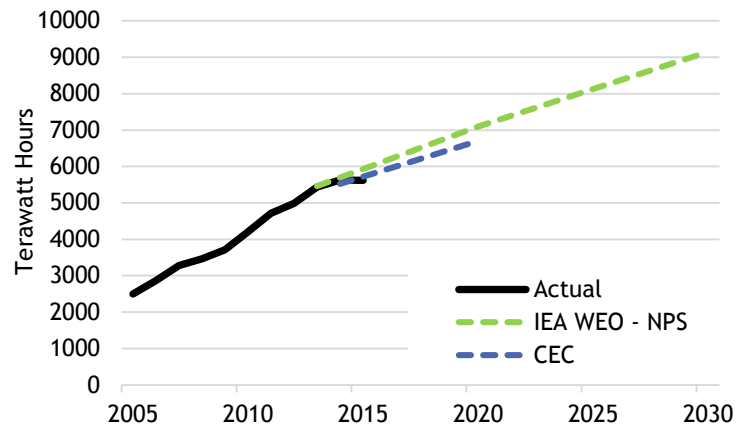


Figure 6: Actual and projected electricity generation/consumption. NBS; IEA; CEC.

Continued investment

Given the challenging outlook for coal-fired power generation as a result of these three key factors: aggressive renewable energy policy, falling utilisation rates, and falling electricity demand, it may seem logical that the investment strategies of power utilities, and in turn their financiers, may be changing to reflect the ‘new normal’.

Data shows, however, that while investment in the thermal power sector has dropped from all-time high in 2008, 2014 saw an increase in investment (Figure 7). This trend continued in 2015, leading to a significant increase in the level of newly installed coal power generation capacity (Figure 8).

The risks identified, and the continued investment in coal power, represent a major policy challenge for the Chinese government. Analysis by Yuan Jiahai and colleagues at the North China Electric Power University, suggests that China would require about 910-960 GW of installed coal power capacity by 2020 under a “high growth” scenario (depending on the extent of electricity substitution), implying an additional 42-92 GW during the 13th Five Year Plan period. The study used conservative assumptions of 6920 TWh of electricity demand and annual plant utilisation of 4800 hours by 2020.

According to the same study, however, as of September 2015, there was about 283GW of new coal power capacity either with EIA approval, or awaiting approval. If all these projects were successfully put into operation by 2020, then coal power capacity would reach 1151GW, about 200GW higher than that required under the high growth scenario. More recent analysis suggests that the pace of growth may be even faster, with 168GW of extra capacity approved in 2015 alone. According to Greenpeace, coal power projects in the construction or permit pipeline

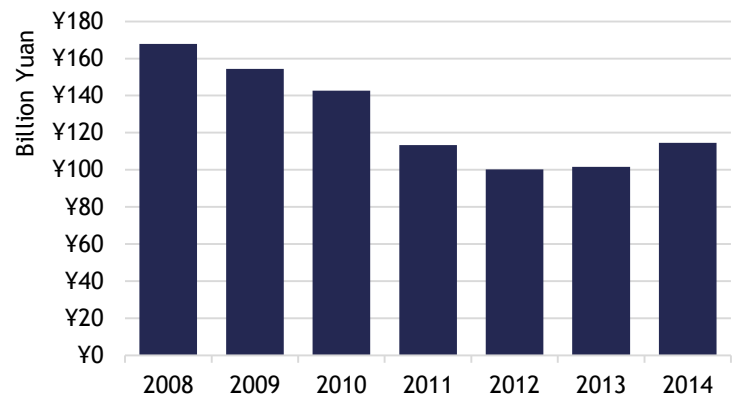


Figure 7: Investment in thermal power. CEC.

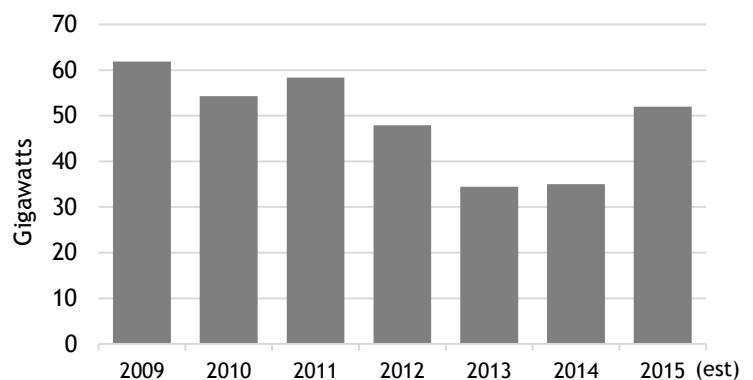


Figure 8: Newly installed coal power capacity. CEC; Yuan.

would take overall capacity to well over 1300GW. Such a high level of over-capacity is bound to keep utilisation of coal power plants below the level of 4500 hours nominated by the National Energy Administration as problematic (Xinhua 2014). In fact, the study by Yuan et al suggested it could reach as low as 3791 hours, with major implications for the financial viability of many power generators.

The large number of projects in the pipeline is partly a result of power utilities taking advantage of State Council guidance in 2013, at the initiative of Premier Li Keqiang, to reduce red tape impeding local economic growth by decentralising approval for industrial projects to the provinces. According to research by the Climate Policy Initiative (CPI), this window of opportunity for gaining approval from development-hungry provinces combined with a distorted power market and financial incentives, as well as battle for market share, to drive investment. According to CPI, “SOEs have evolved to become financially independent through diversified business models, continued access to low-cost debt and finance from the public market, retained earnings, and in particular, tariff revenue to cover depreciation expenses, enough to insulate themselves from changes in government policies. This financial independence allows them to continue to pursue coal power expansion with or without government financial support.”

However, while short-term opportunity and financial incentive may have led to significant recent growth in coal power, there remain substantial risks involved in over-investment in coal power generation. According to Yuan Jiahai, “it is hard to see how the profitability of new coal power projects can be sustained in the 13th FYP period, when electricity market reform will kick off and annual utilization hours will go further down, while a national carbon market and strict environmental regulation will push up coal power generation costs”.

Perhaps recognising that the power sector was reacting to the perverse incentives provided by decentralized decision making and short-term profits to over-invest in new generation capacity, the NDRC made an announcement in November 2015 regarding strengthened controls over the approval of new projects. On March 23, the NEA went a step further and ordered 13 provincial governments to stop issuing approvals for new coal-fired power plants until the end of 2017. It also directed 15 provinces to stop building new coal power plants that have already been approved. Greenpeace analysis shows this could affect up to 250 coal-fired power plant units with a collective capacity of 170GW. Despite the new rules, however, more than 570 coal-fired plants with 300GW of capacity could yet come online. In addition, approval of projects still lies primarily with provincial governments, which do not always share the central government’s level of concern regarding sector over-capacity.

If significant over-investment in coal power generation continues, it will also represent a major opportunity cost for the Chinese electricity sector. According to Lauri Myllyvirta, co-author of a report on China’s coal power bubble, “new coal plant construction started in China 2015 represents one billion dollars per week of committed capital expenditure. Construction of redundant power plants represents a massive wasted opportunity to direct investments in clean energy instead, and threatens to exacerbate the conflict between renewable energy and coal plants in the grid, with the grid operators regularly failing to give priority to clean energy.”

The role of finance

Development of new generation capacity is not possible without access to finance. The CPI report made two key recommendations to government: First, that government should tighten access to low-cost finance or reduce the expectation that the government will inject equity capital to bail them out if they become insolvent; and second, adjustments should be made to the dispatch and tariff schemes which currently incentivize expansion.

In addition to government regulation, however, it is also worth considering the motivations of providers of finance for development of coal power generation, namely banks and equity investors. According to the CPI analysis, of approximately 280 billion Yuan investment in new coal-fired power in 2013, by far the largest provider of finance were the big 5 Chinese commercial banks.

The first step for banks to assess their exposure to risk in the coal power sector is to undertake effective stress-testing, understanding the full scope of challenges currently facing the sector. The first concerted effort in this regard was begun by ICBC in early 2015, at the request of the Green Finance Committee of China which is under the leadership of the People’s Bank of China. On March 23, ICBC released a report outlining the process and outcomes of its initial efforts at a conference on green finance in London. The stress-testing program which looked at 437 companies in the thermal power sector, aims to:

- First, identify risks from stricter environmental standards on enterprises’ unit cost, which include enhanced atmospheric pollution emissions limits, and raised pollutant discharge charges.
- Second, construct scenarios according to relevant standards and regulations issued by the Ministry of Environmental Protection and the State Council in relation to air pollutants.

- Third, develop a transmission mechanism to translate risk in to assessment of credit risk. This involves creating a model which indicates potential impacts on a company’s income statement and balance sheet under stress scenarios. These impacts result in a scorecard and a credit rating matrix which shows changes in quality of loans, probability of default and non-performing loan ratio.

The program has a strong focus on government regulation. This is an important step forward and could lead to some significant rethinking of lending to the coal sector, especially for smaller companies. At the same time, it does not yet take account of some of the most important issues currently facing the sector which relate to the state of the electricity market itself, namely falling demand for electricity, increased competition from renewable energy, and falling utilisation rates. Indeed, the report concluded that, “stricter environmental protection standards impose great cost pressure on the thermal power industry, but the industry will [remain] stable on the whole, owing to the steady growth of the macroeconomy and huge demand for electricity generated in the process of China’s industrialization”.

According to Yin Hong, Deputy Leader of the ICBC stress testing work, “over the past two years, the country’s coal power industry has been plagued with overcapacity, but it is only a temporary phenomenon in the process of economic transformation. This situation will be gradually changed for the better through economic restructuring and industrial upgrading”. ICBC’s scenario assumes that China will require 1650 GW of installed generating capacity by 2020. With 576 GW of this capacity provided by non-fossil sources (renewable plus nuclear energy), this would leave about 1100 GW to be provided by coal (about 65%). This scenario, however, appears to be based on old data, given that non-fossil generating capacity already reached at least 500 GW in 2015 and has been experiencing double digit growth for several years, and coal’s share of installed capacity is now under 60% and trending downwards. While the overall demand for generating capacity is lower than in other analyses, the proportion provided by coal is much higher (Figure 9).

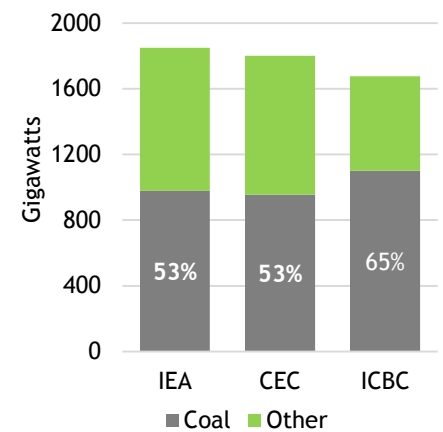


Figure 9: 2020 Projected generation capacity: IEA WEO - New Policies Scenario; CEC Power Supply and Demand Forecast; ICBC stress testing.

Yin Hong, who is Deputy Director at ICBC’s Urban Finance Research Institute, said that the bank plans to expand and deepen its analysis. The next stages involve, “first, expand the coverage, rolling out stress tests in steel and iron, non-ferrous metals, chemical engineering, papermaking and printing and dyeing industries; second, explore the stress test in key regions, such as Hebei Province; third, roll out stress testing for carbon trading.”

The ICBC stress testing also does not so far touch on the important issue of water stress. According to the Oxford University report, ten Chinese companies ranked within the top twenty companies internationally exposed to risk from water stress, including State Grid, CPIC, Datang and Huadian. This issue is the focus of a new multi-national joint project involving the Natural Capital Declaration (co-convened by UNEP Finance Initiative and the Global Canopy Programme) and German Government’s Emerging Markets Dialogue on Green Finance, implemented by GIZ. The project is currently developing an analytical framework for the stress-testing, and has not yet produced quantitative analysis. It involves several major international financial institutions, including ICBC. China’s policy makers are indirectly following the projects’ progress through the involvement of the Research Center for Climate and Energy Finance, a member of the Green Finance Committee.

Summary

China’s carbon emissions, along with the economy as a whole, have entered a ‘new normal’ of slow or negative growth in the short-to-medium term. This has so far not been matched by a slower investment in coal power. If this mismatch continues during the 13th Five Year Plan period, it could represent a significant mis-allocation of resources at a critical moment in China’s industrial transformation. Further research is needed to help policymakers accurately understand how much additional capacity will be required. In the meantime, initiatives aimed at ‘stress-testing’ the financing of coal power are positive. ICBC’s pioneering work, encouraged by the Green Finance Committee, is notable. However the pace of change required to avoid significant over-investment in the sector makes this an urgent issue. There is room to accelerate and build on this initial work and roll out a more comprehensive analysis of risk in the coal power sector. This could include other major commercial banks should develop their own stress-testing mechanisms. Observers also suggest that there is room for government to encourage more rational planning, including further reforming dispatch and tariff schemes in order to reduce incentives for coal power expansion.

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