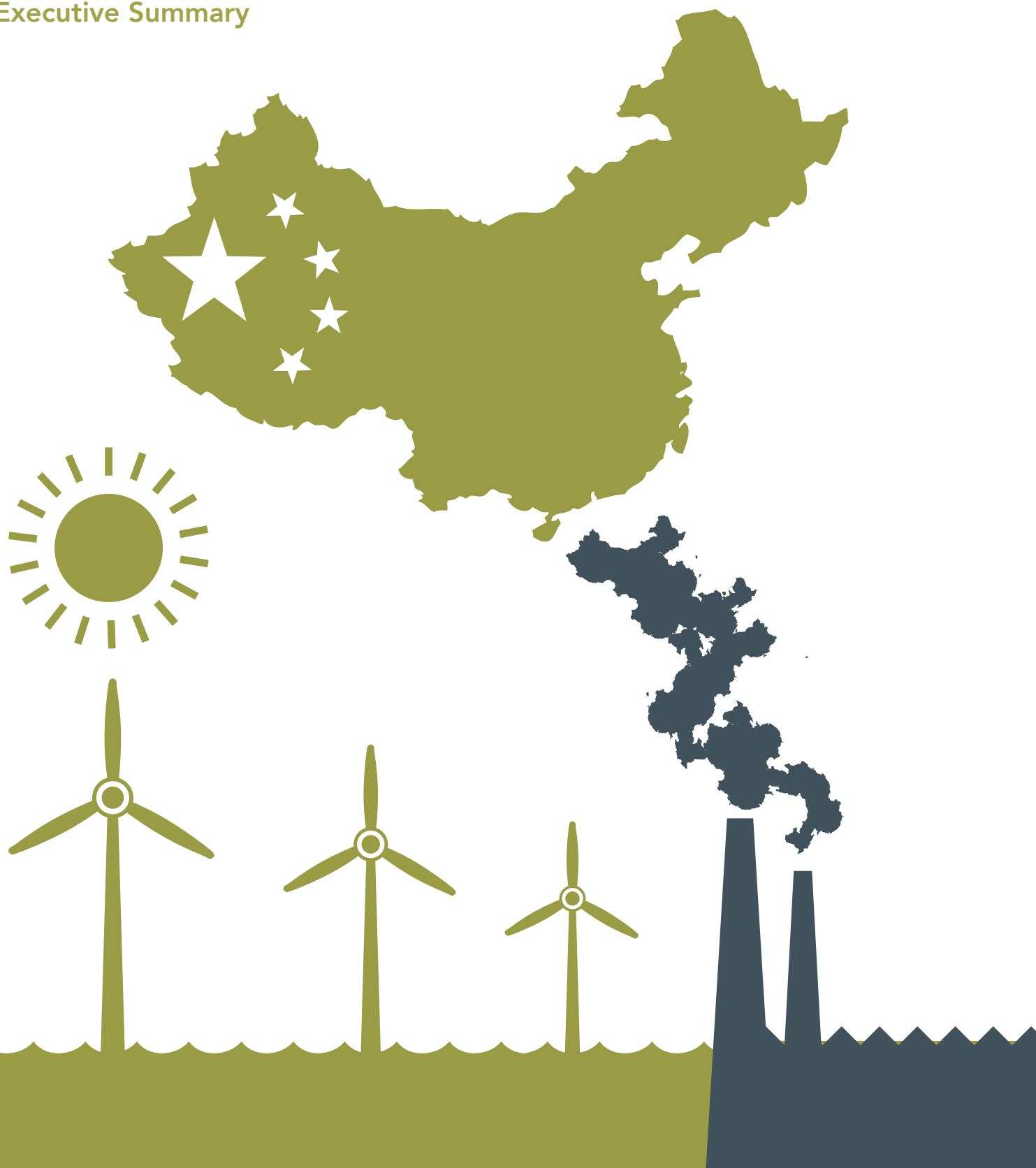


The Great Coal Cap

China's energy policies and the financial implications for thermal coal

Executive Summary



About Carbon Tracker

Carbon Tracker comprises a team of financial specialists aiming to make carbon investment risk visible today in the capital markets. Carbon Tracker is applying our thinking on unburnable carbon, stranded assets and wasted capital across geographies and asset classes to inform investor thinking and the regulation of capital markets. We are funded by a number of US and European charitable foundations.

About ASrIA

The Association for Sustainable and Responsible Investment in Asia (ASrIA) is the leading association in Asia dedicated to promoting sustainable finance across the region. ASrIA plays a critical role - as a thought leader, convener and advocate - in facilitating Asia's transformation to a sustainable future and encouraging thoughtful participation by governments, multilateral bodies, corporates, NGOs and financial institutions in addressing the challenges that Asia will face in the years ahead. For over 13 years, ASrIA has provided leadership, helped to build capacity and leveraged expertise to promote the development of sustainable financial markets and systems in Asia. ASrIA encourage financial innovation, and disseminate global best practice on resource allocation, environmental protection and climate resilience.

Background to the research

Following the publication of Carbon Tracker's 2013 global analysis, Wasted Capital and Stranded Assets, we are undertaking research at a regional level, focusing on financial markets with significant exposure to fossil fuel extraction.

Find the full report at: www.carbontracker.org/chinacoalcap

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Contact

Margherita Gagliardi, Communications Officer
mgagliardi@carbontracker.org

Luke Sussams, Senior Researcher
luke@carbontracker.org

For more information about ASrIA

Jessica Robinson, CEO
jessica.robinson@asria.org

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Report summary

Since the beginning of the 21st century, China has accounted for over four-fifths of global coal consumption growth, half of which is thermal coal used predominantly to fuel China's coal-fired power generation fleet. The purpose of this report is to demonstrate to key stakeholders that the dynamics of China's thermal coal sector are changing and that a greater understanding of these dynamics is required, particularly in the context of transitioning to greener growth and the role that financial market actors play in this process.

A number of downside drivers are combining that will slow China's thermal coal demand growth to a likely peak. These include:

- Slowing total power demand;
- Reduced attractiveness of thermal coal as a fuel to meet power demand; and
- Increasingly competitive non-coal power sources taking a greater proportion of new power generation capacity.

In the broader context, the Chinese Government is taking substantive action in addressing critical domestic challenges, most notably on air pollution and water scarcity. The resultant change in the policy landscape is likely to reduce the demand for and, in turn, the value of fossil fuel intensive assets.

The report highlights the potential directional impacts of these developments most notably with regards to:

- Value-at-risk to China's coal suppliers and consumers through asset stranding;
- Negative impact on shareholder value; and
- Value destruction risk to China's financial markets.

In particular, the report highlights the need for domestic and international investors to rebase their assumptions about China's thermal coal sector amid strong signals that future growth may not follow past performance. The financial implications of these changing dynamics will be critical for the investment industry – investors who accurately identify the winners in China's rapidly changing coal consumption scenario will have a clear advantage over peers.

1. Drivers of peaking thermal coal demand

China's coal demand is changing. Since 2005 a decoupling of China's total coal demand from GDP¹ appears to be occurring. A closer look reveals that year-on-year, China's coal consumption growth is slowing - with 2012 the lowest increase for a decade. This reflects declining absolute coal consumption in 10 of China's 30 provinces².

Lowering power demand growth

Absolute power demand growth in China is showing signs of slowing, resulting in slower demand growth for thermal coal, which currently supplies 79% of China's total power. The key driver is slower GDP growth, which has fallen from a compound average rate of 10% between 2000 - 2010 to 7.7% in 2013. Furthermore, China's economic growth has become less energy-intensive due to a greater reliance on the service sector (which is six times less power intensive than the industrial sector).

Lowering competitiveness of thermal coal

In addition to structural changes in power demand growth, regulatory responses to some of the major environmental challenges faced in China – most notably relating to air pollution and water scarcity issues - are emerging as key drivers of thermal coal demand peaking.

Air pollution: China's air pollution crisis, which has escalated in the last two years, has resulted in certain air quality targets being set in those provinces with the worst air quality³. Importantly, these also tend to be provinces with the highest consumption of coal and, consequently, coal reduction targets have also been established. If extrapolated to 2020, these targets imply a reduction of 655m tons of coal use over the period, thus illustrating the scale of potential downside risks to coal demand forecasts that do not take tougher regulation into account.

Water scarcity: The majority of China's coal-fired power generation capacity is located in water-scarce regions. Given that water is essential for coal-fired power for cooling purposes as well as for steam-driven turbine generators, lack of available water is drawing into question the ability for some regions to continue providing coal-fired power. Furthermore, water quotas have been applied to all provinces, incentivising the use of alternative power sources⁴.

Further environmental regulatory developments are likely, with the policy landscape continuing to shift against contributors to these environmental problems. For example, the continued development of China's emissions trading schemes and the possibility of a carbon tax will serve to increase the perceived risk associated with high carbon power sources.

Increasing competitiveness of non-coal power sources

While the shifting dynamics of China's thermal coal sector are signalling a future downturn, one of the most dynamic elements of the Chinese energy scenario is optimism reflected in the outlook for non-coal power sources. For example, forecasts from a range of different sources including the IEA and a number of investment banks⁵ predict that future installed capacity for nuclear, gas, wind and solar power will exceed the Chinese Government's forecasts (with hydropower being the only exception).

Natural gas, shale gas and coal-bed methane are being strongly supported by the Chinese Government. This is primarily due to substitution potential of such sources for coal and therefore the perceived air pollution mitigation advantages this could bring. For example, it is estimated that China will consume 230bcm of natural gas by 2015 – approximately 8% of the expected power mix⁶. The prospects for shale gas and coal-bed methane are more complicated given the early stages of exploration and geological complexity within China. However, China's shale gas reserves are the largest of any nation in the world and the NDRC has identified this energy source as a priority in the current Five-Year Plan.

Significant progress is being made with renewable energy sources, particularly solar and wind where the rate of installations is increasing at a record level. By way of illustration, it is estimated that if the Chinese Government's targets to 2020 for increasing the installed capacity of renewable energy technologies are met, the contribution of thermal coal to China's total power generation will fall from 79% to 63%⁷.

2. Asset stranding from 'early-peaking' of thermal coal demand

As highlighted, there are a number of drivers on thermal coal demand which will likely result in a peak in use - however, the timing of this is unknown and widely debated, with forecasts ranging from 2015 to 2030. The purpose of the report's analysis on the changing dynamics in China's thermal coal sector is to highlight the risk that this will result in the stranding of assets, with financial consequences for market actors including investors and policy-makers.

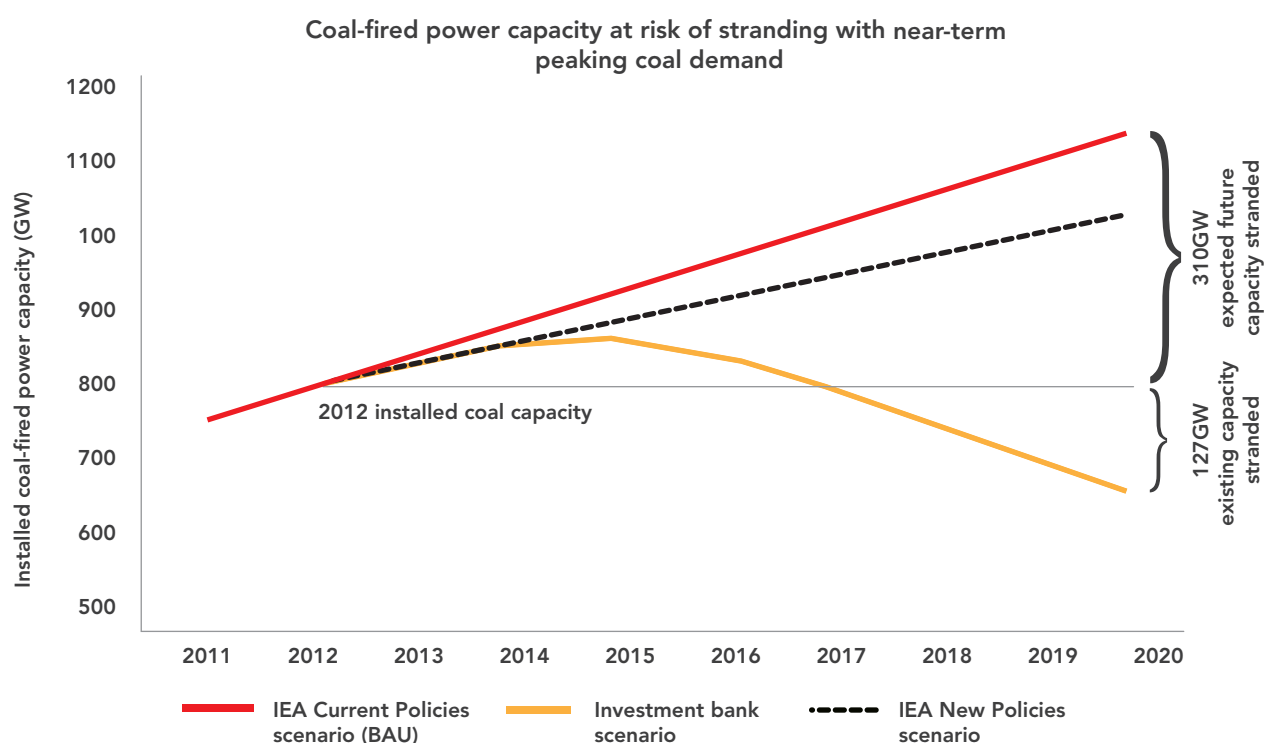
'Stranded assets' are defined by the IEA as *'investments which have already been made but which, at some time prior to the end of their economic life, are no longer able to earn an economic return'*⁸. The intervention that causes stranding can arise either due to regulatory changes or economic changes such as in price or cost.

Peaking at the earlier end of the forecasted range could occur from a combination of factors – including aggressive policy ambitions on behalf of the Chinese Government and significant investment into non-coal power alternatives. Managing the transition in demand from strong growth to a peak and subsequent falls in demand will inherently result in a degree of asset stranding. However, the 'early-peaking' scenario would lead to a far greater level of 'asset stranding' because the difference between the expected trajectory of demand on which investments were based and the realised pathway of lower demand and pricing would be greatest.

Stranded coal-fired power generation assets

In order to illustrate this risk, the IEA's 'Current Policies Scenario'⁹ (i.e. 'business as usual') has been compared with the earliest peaking thermal coal demand scenario (based on analysis published by investment banks included in the research). This illustrates the maximum amount of thermal coal power generation capacity that could potentially be stranded in a lower-than-expected demand future, i.e. those assets which, if built on an assumption that thermal coal demand will grow strongly in the future, would be uneconomic if market and regulatory forces serve to peak demand for thermal coal.

Figure 1: Coal-fired power capacity at risk of stranding with near-term peaking coal demand



Source: IEA World Energy Outlook 2013, Bernstein research: Asian coal and power, June 2013

Figure 1 reveals that up to 437GW of China’s coal-fired power generation capacity could be at risk of stranding by 2020 due to lower-than-expected demand, equivalent to up to 40% of total installed coal-fired capacity by the end of the decade. The IEA’s ‘New Policies Scenario’ shows that the ‘cautious implementation’ of already announced policies does not significantly reduce the scale of potential coal-fired power generation asset stranding. The operators of those generation assets which are ‘stranded’ will incur financial losses as they have to write them down, i.e. reduce the book value, such that they are not carrying more than their recoverable amount.

However, over 70% of the difference in generation capacity between the two scenarios in Figure 1 is comprised of expected future capacity that might yet have a pending, and influenceable investment decision – of the 437GW at risk of stranding, 127GW of this coal-fired capacity is already installed (against 2012 levels) and up to 310GW of potential additional capacity is not yet built meaning some capital is still recoverable if the project does not go ahead due to risks of future thermal-coal fired power. Therefore, Figure 1 illustrates that the changing dynamics of China’s thermal coal sector pose a significant financial risk to power generation companies such that they (and their investors) should assess their exposure to potentially strandelable assets and the scale of capital invested into them.

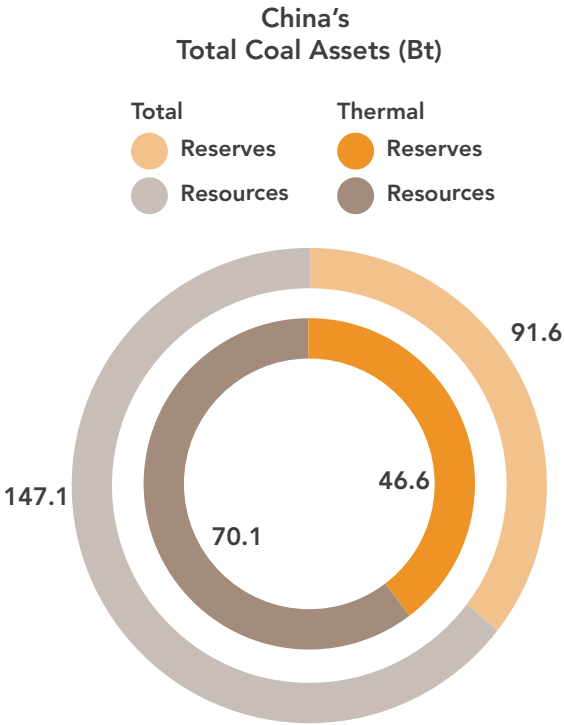
Stranded thermal coal supply assets

The report identifies that the potential gap between business as usual and peaking demand (Figure 1) equates to 1030m tons of annual thermal coal supply (56% of China’s demand in 2012) that may not have an end-market in 2020.

In spite of this, China has total proven thermal coal reserves of 46.6bt and 70.1bt of thermal coal resources¹⁰ equating to 23 years and 36 years of thermal coal supply at the current consumption rate (Figure 2). These thermal coal reserves and resources constitute significant future supply that could be at risk from an early-peaking demand future. This poses a potential risk to the value of thermal coal assets of China’s coal extraction companies and their investors’ holdings.

From the investor perspective, the report provides analysis to support a reassessment of exposure to assets with the greatest value-at-risk as a result of stranding.

Figure 2: Over two decades of proven coal supply



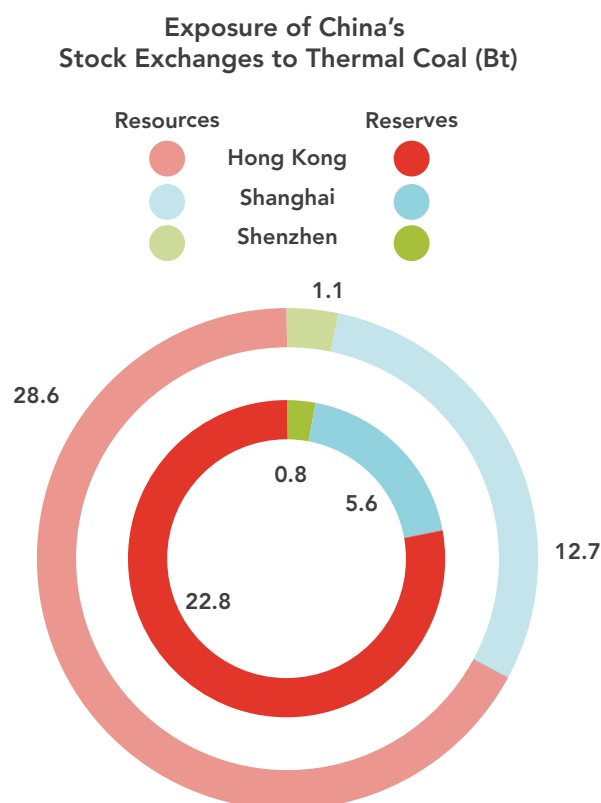
3. Vulnerabilities within China's capital markets

Based on the report's analysis, the Shanghai, Shenzhen and Hong Kong stock exchanges are potentially vulnerable to value destruction resulting from structural shifts in China's thermal coal assets, with over 80% of non-state owned assets attributable to companies listed on these exchanges.

In particular, Hong Kong Stock Exchange runs the greatest exposure to China's changing thermal coal industry with companies listed on the exchange owning 22.8Bt of thermal coal reserves (Figure 3) – more than three times that of the other two exchanges combined. Unlike the mainland exchanges, Hong Kong also lists companies with thermal coal assets located outside of China, including in Kazakhstan and Australia, exposing it to potential value impacts resulting from policy changes and market conditions in countries in which China has no control.

The report's analysis focuses on potential implications for direct investors but also identifies exposures passed onto passive investors through Hong Kong's indices. For example, the Hang Seng Enterprises Index, which derives over 18% of its market capitalisation from companies with thermal coal assets, is particularly vulnerable to downside risks. The largest coal companies in this Index are state-owned enterprises including China Shenhua Energy Co. In a scenario whereby such companies amass excess coal reserves and market valuations decline, potential impact on value will be borne by the Chinese Government.

Figure 3: Thermal coal on China's capital markets



4. Identifying wasted capital expenditure (CAPEX)

In 2013 China's coal companies spent approximately Rmb 129 billion (USD\$21 billion)¹¹ to explore for and develop additional thermal coal reserves. Over 80% of this CAPEX was made by the three largest and most investible coal companies with a market capitalisation of over Rmb 45 billion. Such companies also possess the largest thermal coal reserves and – as a consequence – carry the largest exposure to changes in the sector.

Based on this report's analysis, investors should question whether this CAPEX spending will mean these larger companies either:

- Exploit cost-advantages to establish a stronger financial foundation and gain market share at the expense of smaller competitors; or
- Accelerate the challenges associated with lower cash flow by investing capital in order to expand coal operations in a declining market (a market which has over 20 years of proven thermal coal supply and brings in to question the most effective use of capital).

Factors to consider when determining potential exposures

The following factors should be given consideration when investors are undertaking risk assessments:

- **Debt levels** – Lower prices and falling revenues will make it increasingly difficult for those companies with high leverage to service their debt. For example, amongst major companies, Shanxi Coal International Energy Group and Datang International Power Generation Co. have been particularly damaged by recent low coal prices resulting in high debt to market capitalisation levels;
- **Coal quality** – Coal mines could be targeted by Government regulation in terms of the quality of their coal output, so lowest quality assets are most at risk of being stranded. For example, China Coal Energy Co. could be considered the most vulnerable on this basis, with their reserves comparing unfavourably to the industry averages for calorific content and ash and moisture content;
- **Geographic location** – Distance to end-market and the feasibility and / or cost competitiveness of extraction are primarily determined by geographic location of supply. All major companies' reserves tend to perimeter China's biggest power demand centres meaning transport costs are low and their general access to market is competitive;
- **Political support** – Coal companies with part or whole state-ownership may have greater support in an asset-stranding scenario;
- **Revenue sources** – Those companies that have diversified revenue sources more closely aligned with China's changing power generation sector are likely to be more resilient to changes in the sector.

5. Risks to the international coal market

Over the past 10 years, China has transitioned from being a net-exporter of coal to the largest net-importer globally and the biggest influencer on the future demand and price of traded thermal coal. The peaking of China's thermal coal demand would likely result in a sharp decline in China's import demand; this would exacerbate an already over-supplied international market and leave those currently exporting to China with excess supply.

Increasing Chinese thermal coal supply to substitute for imports

Although demand growth is slowing, China is continuing to increase domestic coal supply. In 2011, China's domestic production of coal increased by 800m tons. This upward trend looks set to continue with plans to triple railway track additions between 2013 and 2015 on the previous three year's additions to remove current supply bottlenecks¹². These efforts to increase domestic supply despite an already over-supplied international market indicate a desire for China to consolidate its domestic sector at the expense of exporters. This will leave exporters with excess supply, brought online in the assumption of China's continuing insatiable demand for coal, and resulting in the need to find another end-market or being left with stranded assets.

Australian and Indonesian exporters at risk

Of notable interest is the reliance of Australia and Indonesia in particular on demand growth, because companies mining in these two countries are the largest exporters of coal to China. In addition, both countries face issues that increase the potential impacts of lower seaborne thermal coal demand:

- Australia is more economically reliant on its coal exports in terms of contribution to total merchandise export value.
- Indonesia produces lower quality coal, negating somewhat cost benefits somewhat due to the need to burn a larger amount of low grade coal than a higher grade equivalent to produce a required amount of energy, and exposing its exports to potential regulation in the future that aims to move away from the consumption of high polluting coal.

Outside of China there is a need for greater understanding of the potential for a terminal decline in the demand for coal imports to China. If it is treated as merely a cyclical phase, then there is a greater risk of stranded assets in the future.

6. Recommendations

The report makes a number of recommendations to key stakeholders including investors, policy-makers and companies, the purpose of which are to enhance understanding of stranded asset risk in a low demand future and the potential feed through effects to financial markets.

Investors

- Require improved disclosures from coal companies with regards to future capital expenditure strategies, with specific reference to expected developments in China's thermal coal sector;
- Require improved disclosures from coal companies with regards to the quality of thermal coal reserves and resources, and resilience against lower market demand dynamics;
- For new investment analysis, ensure risk factors that determine resilience to lower demand are clearly and accurately factored into investment decision-making; and
- Implement effective risk monitoring processes to ensure timely and accurate analysis of changing investment risks associated with market upheavals.

Policy-makers

- Prepare for such feed through effects to minimise asset stranding and protect the current stock of financial assets by:
 - Requiring stress-testing of banks and other financial institutions for potential on balance sheet exposure to stranded asset risk and subsequent risks to market stability; and
 - Introducing environmental considerations into the scope of macro-prudential activities of financial regulators and the central bank, underpinned by a robust approach to financial market impact analyses of major environmental policies and developments to determine likely impact on financial institutions.
- Set up a framework to assess risks to the future stock of financial assets by:
 - Improving on and extending the application of its existing green credit and sustainable investment guidelines; and
 - Stress-testing all new investments against transparent criteria regarding policy responses to a changing power sector.
- International cooperation is critical to enhance broader risk management of stranded assets by ensuring relevant issues are on the agenda at key meetings of the G20, Financial Stability Board, the Bank of International Settlements and the World Bank.

Companies

- In line with recently emerging global developments, provide markets with information and analysis on potential exposures and resilience to the risk of stranded assets (such moves have been initiated by some of largest oil and gas companies such as Exxon Mobil, Shell and Total).
- Adopt more conservative capital spending strategies that reflect demand shifts and broader market upheavals.
- Stress-test the benefits of diversifying revenues sources from pure coal to a broader range of prospering technologies that more closely reflect China's power transition.

7. Concluding comments

China has made considerable strides in addressing critical domestic environmental challenges and technological developments are making clean technology energy solutions increasingly cost attractive. However, the concepts of stranded assets and wasted capital expenditure have increasing relevance to China's thermal coal sector. For a broad range of stakeholders, there is significant potential value-at-risk associated with a failure to recognise the impact of early peaking demand within the sector. The purpose of this report is to begin to draw attention to the exposure of China's capital markets to this value-at-risk and the investment factors that should be considered to enhance resilience during a period of significant transition in China's power sector.

There is an opportunity for both China and other countries to ease the potential disruption and risks associated with stranding assets by requiring investors and financial institutions with significant assets at risk to develop and agree with the suitable regulator a plan of action for managing the stranding process. Furthermore, fiscal and other incentives can be provided to advance such stranding in an orderly fashion to reduce risks of sudden insolvency and systemic risk. Ultimately, China's imperative and opportunity is to develop its own approach to assessing and effectively managing the financial system consequences of the transition to an ecological civilization.

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- ¹⁰ Data from Raw Materials Data group. Typically, reserves are considered as those assets with at least a 90% probability of being proven economically viable; resources have at least a 50% probability of being proven economically viable.
- ¹¹ Bloomberg Data
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