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Carbon Constraints Cast A Shadow Over The Future Of The Coal Industry

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Carbon Constraints Cast A Shadow Over The Future Of The Coal Industry

Despite being the most polluting source of power generation, accounting for 41% of global carbon emissions, coal remains a cornerstone of the global economy, delivering 30% of energy and 40% of power generation worldwide. However, recent announcements on carbon regulation in the U.S., attempts to curb pollution in China, and negotiations in the European Union over the 2030 framework for climate and energy policies in October are likely to slow the pace of coal demand. As governments globally seek to reduce their CO2 emissions, it looks increasingly likely that "King Coal" will lose its crown. A significant decline in coal production and consumption globally is becoming a much more realistic concept, in Standard & Poor's Ratings Services' view. However, the pace and scale of change within the coal industry is far from clear, and investors could potentially remain in the dark for some time.

The current structural changes in the thermal coal industry are not uniquely linked to climate change regulation, in our view, but result from the emergence of alternative cheaper energy in the U.S. following the shale gas boom and ramp-up of new coal mining projects. Over the past two years, the price of thermal coal in the seaborne market (that is, coal exported to other countries) has been steadily declining--to \$75 per ton at present from \$105 per ton in early 2012--which is putting pressure on a large part of the industry.

Overview

- The global coal market is in the doldrums, owing to excess supply and fundamental shifts in the U.S. energy mix toward gas and new coal mining projects.
- We nevertheless anticipate a slight recovery in prices over the medium term, although this will remain highly sensitive to Chinese import balances.
- China will stay by far the most dominant player in the coal industry. However, demand growth is likely to decelerate to low single digits before potentially flattening by 2020.
- Coal in the U.S. will remain an important, albeit declining, energy source in the medium term and cheap natural gas and other energy sources will only replace a portion of it.
- The demand for electricity, and coal, is expected to increase further, with other emerging Asian economies (such as India and Indonesia) balancing some of the current global pressures.
- Over the long term, coal miners may experience stranded assets as a result of carbon constraints.

Over the medium term, however, we expect new environmental policies to emerge, which could slow down the demand for coal. On June 2, 2014, the U.S. Environmental Protection Agency announced environmental rules to curb CO2 emissions in the power sector by 30% by 2030 from 2005 levels. Earlier in the year, policymakers in China announced strategic objectives to reduce energy consumption and carbon intensity relative to GDP over the next five years. That said, we believe that countries globally will find it hard to change their energy profiles materially over the next five-to-10 years without compromising their economic competitiveness. This is mainly because of the cost of coal compared with other energy sources and the lack of alternative energy infrastructure. As a result, we still expect the demand for coal to grow in absolute terms over the next five years, notably in countries such as India and China, albeit

at a lower-than-historical rate. On the other hand, demand could fall in some OECD (Organisation for Economic Co-operation and Development) countries over the same period.

Under any scenario, we believe that coal will remain a key commodity worldwide. This should give companies time to adjust to evolving market conditions as changes in countries' energy mix take time to play out. However, since coal is a regional commodity, mainly due to the cost of transportation, the dynamics in each region could be different. We believe the main risk will be the speed of change. As we've observed in the U.S., the dramatic fall in gas prices over the past three years has put many coal producers under pressure.

The changes in the coal industry over the medium- and long term could result in stranded assets (coal reserves with no economic return). In our view, those potential impairments are less likely to affect ratings, compared with the equity value of companies, as we give limited weight to coal reserves that cannot be tapped over the short- and medium term, under current prices.

The Significance Of Coal

Coal provides 30% of the world's primary energy, 40% of global electricity, and 68% of steel. The main advantages of coal are its availability, efficient heat-rate conversion for power generation, and construction costs per megawatt. On the flip side, coal leaves a big carbon footprint compared with other energy sources.

According to BP, global coal reserves are about 890 billion tons, which is enough to last more than 110 years at current production levels. However, if we analyze the quality of the reserves, we find that 50%-60% consists of low quality, sub-bituminous and lignite coal, mainly located in Russia, the U.S., China, Germany, and Indonesia. In a carbon-constrained environment, most of those assets will be turned into stranded assets.

Other key facts:

- Coal consumption rose by 3.9% per year between 2000 and 2013, with an increase of about 3% in 2013, reaching 8 billion tons. According to the International Energy Agency (IEA), coal will become the world's top source of energy, before oil, in the coming years.
- China produces and consumes about 45% of this, with more than half used for electricity generation.
- The top 10 coal producers in 2012 included China (3.5 billion tons), the U.S. (1.0 billion tons), India (0.6 billion tons), Australia (0.4 billion tons), Indonesia and Russia (0.4 billion tons each), South Africa (0.3 billion tons), Germany (0.2 billion tons), and Kazakhstan and Poland (0.1 billion tons each).
- Most thermal coal, used for power generation, is consumed domestically. The seaborne market (that is, exports to other countries) makes up just 14% of global demand (see box 1).
- There are about 1,200 coal-fired power plants around the world, with more than 450 in India and 360 in China. The average life of these plants is 40 years.
- Thermal coal accounts for the lion's share of coal demand (87% or close to 7 billion tons), while consumption of coking coal, a key raw material in the steel industry, was about 1.1 million tons (Mt) in 2013.

The Seaborne Coal Market And Coal Price

Seaborne coal totaled 1 billion tons in 2013 (just 14% of world demand), a quarter of which was taken by China. Australia, South Africa, and Colombia are the main seaborne coal exporting countries.

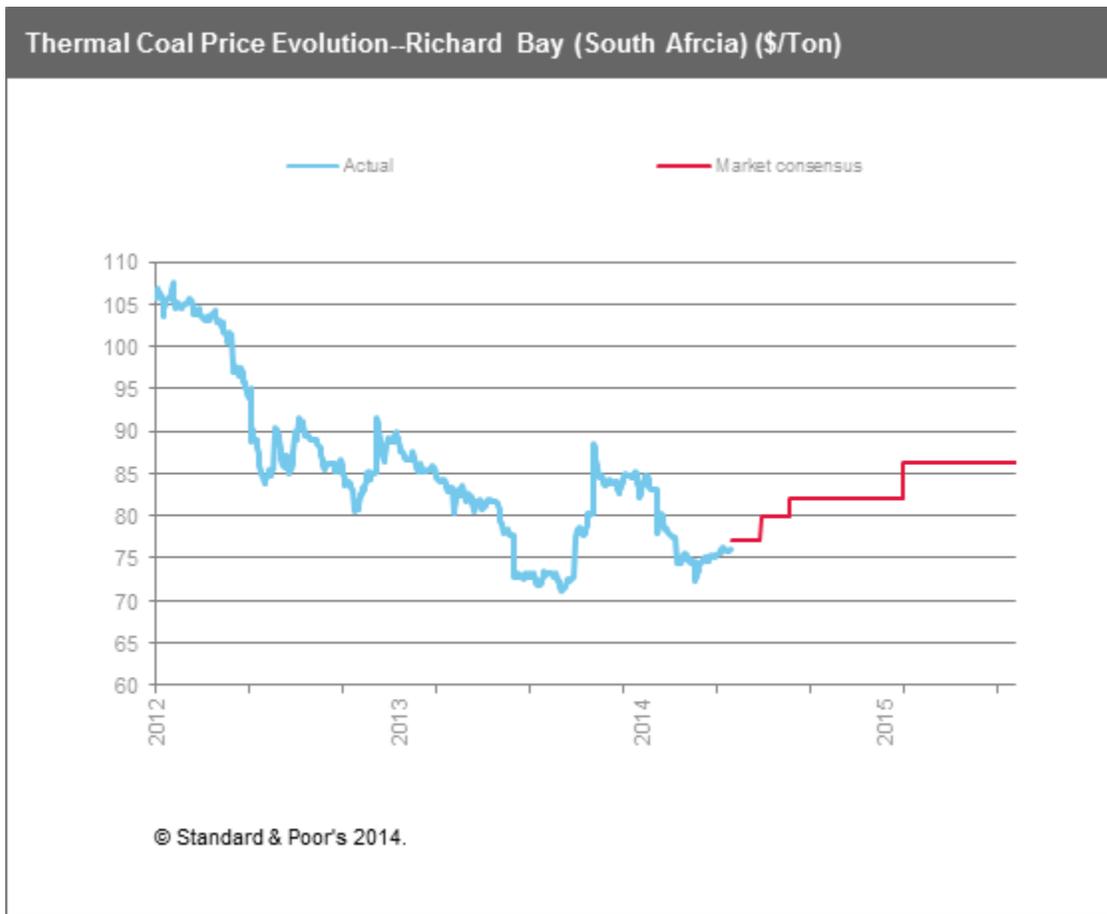
The seaborne market has markedly increased since 2007 when China became a net importer to meet its electricity needs. However, seaborne imports only equal 5%-6% of China's coal demand.

In 2013, the seaborne market remained in oversupply, despite disruptions such as industrial unrest in Colombia. This has kept prices depressed (see chart 1) and discouraged investment. In 2014, prices for thermal coal have dropped to \$75 per ton from \$105 per ton on average in 2012. We estimate that this price is below the breakeven point for about 30% of seaborne volumes (mainly coal coming from the U.S. and Russia), while coal from countries such as Indonesia, Australia, Columbia, and South Africa is still competitive.

We observe three trends affecting seaborne coal prices in the short term. First, limited growth in capital expenditure. Based on the project pipelines of major coal companies, we see little seaborne supply coming to the market between 2014 and 2017. Most of the additional capacity will come from Indonesia (approximately 60-80 Mt) and Australia (about 20 Mt). Second, Chinese imports could increase to keep up with rising coal demand and replace lower quality coal, which is both negative from an energy intensity and environmental (water) perspective. And third, we see the prospect of additional coal export infrastructure, which U.S. coal miners are in the process of expanding. In 2013, U.S. coal miners exported about 100 Mt of thermal coal, compared with 45 Mt in 2006. That said, at the current price level, exports from the U.S. remain largely unprofitable.

We believe that prices should rebound from their current depressed levels over coming years, although not to the level of previous years, for example, \$100 per ton and higher in 2012. Supporting this increase will be some industry curtailment and higher demand for seaborne coal (between 2011 and 2013, the seaborne market grew by about 200 Mt, equivalent to the additional export of coal from the U.S. and new capacity coming from Australia and Indonesia).

Chart 1



How Policies To Halt Climate Change Could Affect Demand For Coal

Energy-related CO₂ emissions have increased in emerging countries as they have experienced rapid growth. Climatologists are concerned about the impact of this increase on global warming and climate change. It is very difficult to predict the turning point and how much emissions can continue to rise before we see irreversible effects on sea levels or changes in rainfall, drought, flood, and other extreme weather conditions (see "Dealing With Disaster: How Companies Are Starting To Assess Their Climate Event Risks," published May 21, 2014, on RatingsDirect). International institutions, including the World Bank and NASA, have assessed that these scenarios could occur if the world's temperature rose by 2-3°C (degrees celsius). Drawing a line between the current policies in place and the impact on climate change, some scientists predict that the world's temperature could increase by more than 6°C by 2035.

Chart 2

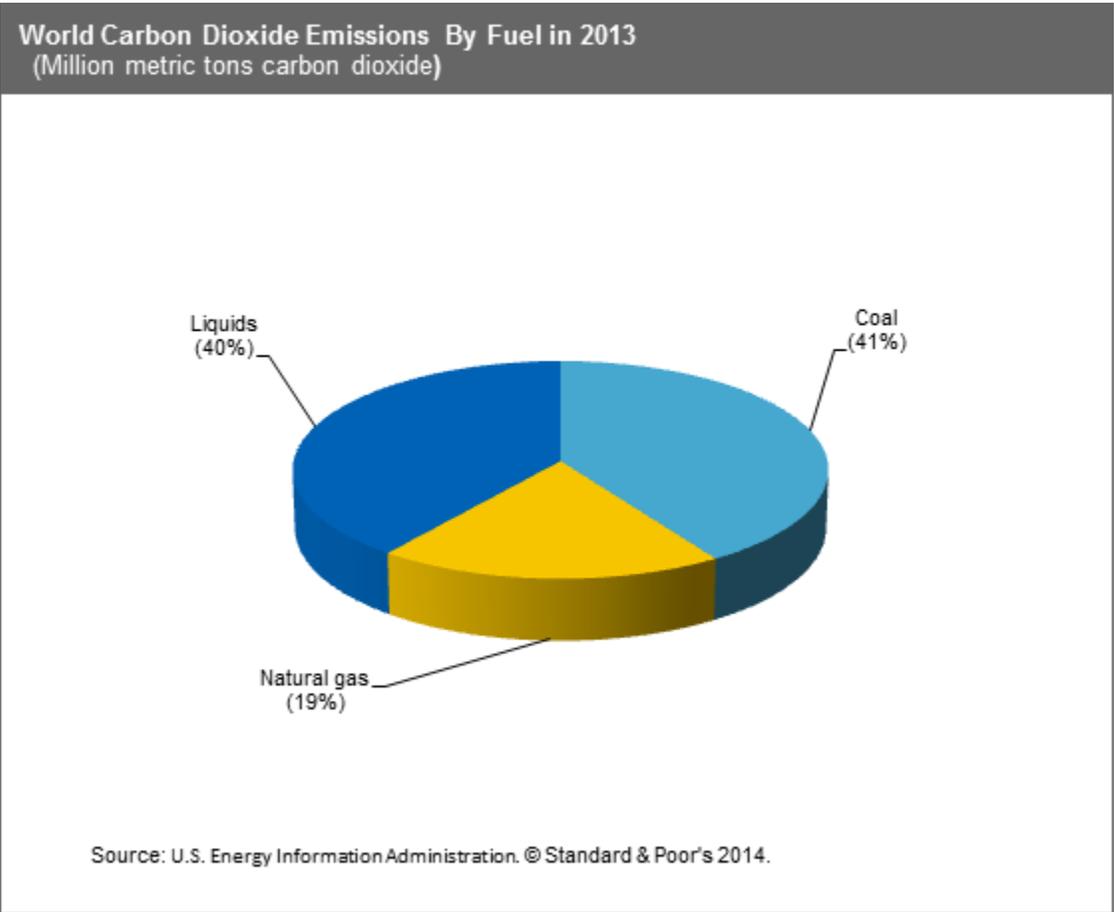
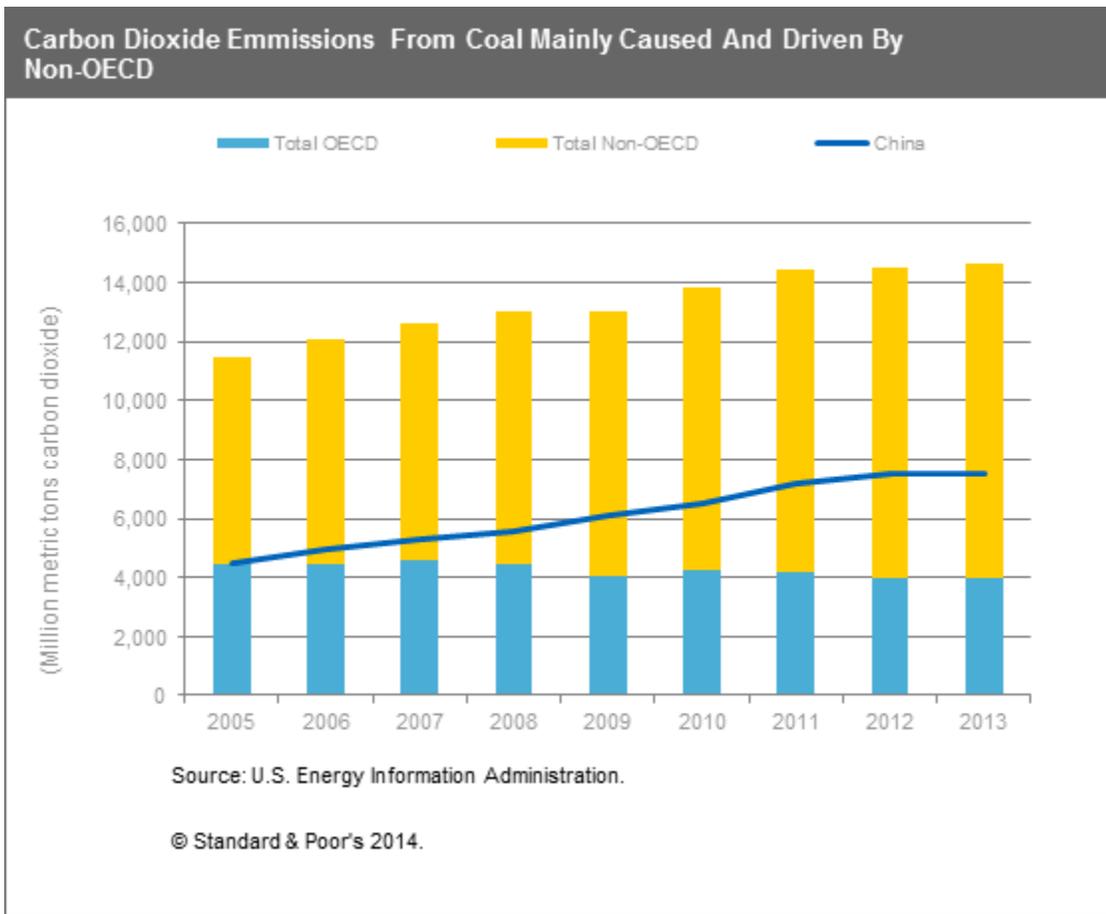


Chart 3



The International Energy Agency (IEA) has assembled several scenarios and assessed their impact on the energy market.

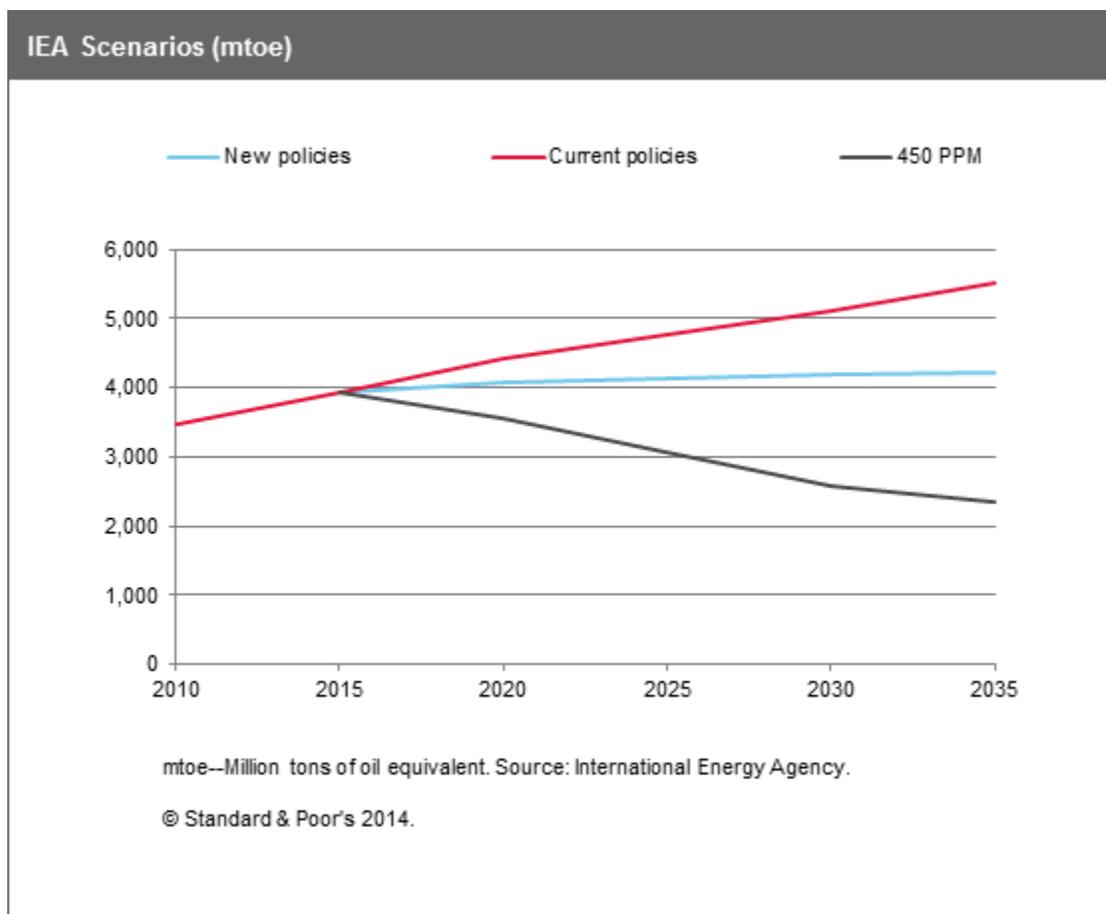
- **New policies scenario.** Under this scenario, governments will introduce energy efficiency programs, support renewables, reduce fossil-fuel subsidies, and in some cases put a price on carbon emissions. Under this scenario, CO₂ emissions will increase by 20% by 2035 and the world's temperature will rise by 3.6°C.
- **450 PPM scenario.** Here, governments will implement selected energy efficiency policies, limit the use of inefficient coal power plants, increase the usage of renewables and nuclear power, and use carbon capture and storage (CCS) technology to prevent the CO₂ emissions from power generation and industry reaching the atmosphere. In this scenario, the IEA estimates that there will be about a 50% chance of meeting the 2°C target by 2035. What's more, the demand for coal should remain around current levels (8 billion tons) until 2020 and decline by 2.5%-3.5% by 2035, to 5 billion tons (including coking coal).

In our opinion, these scenarios appear challenging, as new technologies will need to support a further increase in demand for electricity (an annual increase of 3.4% in demand for coal in the last five years), as well as replace existing coal fired power plants. (See "Assessing The Credit-Supportiveness Of Europe's Renewable Energy Frameworks," May 22, 2014.)

Moreover, given the lack of substitution for coking coal in the steel industry, the decrease in the consumption of

thermal coal by 2035 would be higher than 3.5% under the 450 PPM scenario (assuming that the demand for coking coal remains, at best, at the current level).

Chart 4



As can be seen from the divergence of the IEA's scenarios (see chart 4), the demand for coal in the future and its price will rely on numerous factors and their timing. Some of the most crucial elements include:

- A change in China's energy profile and that of other countries, with a potential move to shale gas.
- Technological breakthroughs, including reduced manufacturing costs, and the introduction of more efficient methods to generate electricity and capture carbon emissions.
- Carbon pricing through either taxation or cap and trade emission reduction schemes.
- New governmental regulations, such as the recent announcement by the U.S. of a reduction in emissions by 30% by 2030 (compared with 2005).
- Global economic growth and urbanization.

We believe new initiatives, such as those made recently by the U.S. and China, may flatten the growth in coal demand over the coming years. However, whether this will lead to a decline of coal use over time (as in the IEA's 450 ppm scenario) is more uncertain. In our view, any decline in coal would depend on the availability of viable alternatives, such as large-scale gas developments in China or renewables.

Clearly, falling demand for coal, both globally and regionally, would be negative for coal prices and coal miners' ability to service their debt. While we believe that shale gas could be part of the solution, we also note that it has some side effects, which are not always taken into consideration. These include: high demand for freshwater, the production of large amounts of waste water, induced seismicity, greenhouse gas emissions, and groundwater contamination.

Increased Environmental Issues Will Support A Gradual Change In China's Energy Mix

China has increased its coal demand by 7.5% per year between 2005 and 2013, and is now the world's largest consumer, accounting for about 45% of global coal consumption. Besides raising the country's output of CO₂ emissions, this rapid expansion has brought heavy air pollution in industrial provinces and issues regarding the availability of clean water. To counter these adverse effects, the Chinese government has recently introduced a new policy to deal with climate change by 2020. One recent initiative is to reduce coal consumption as a percentage of total energy consumption to below 65% by 2017 from about 67% in 2012.

However, we don't believe the current programs will trigger a fundamental change in China's energy profile, and more steps are needed between 2020 and 2030 to meet the IEA's 450 ppm scenario. In addition, we also need to remember that targets may change. For example, in 2009 the government set a target to cut CO₂ per unit of GDP by 40%-45% by 2020, compared with 2005 levels. Based on the increase in the consumption of coal in China since 2005, China is already approaching this limit.

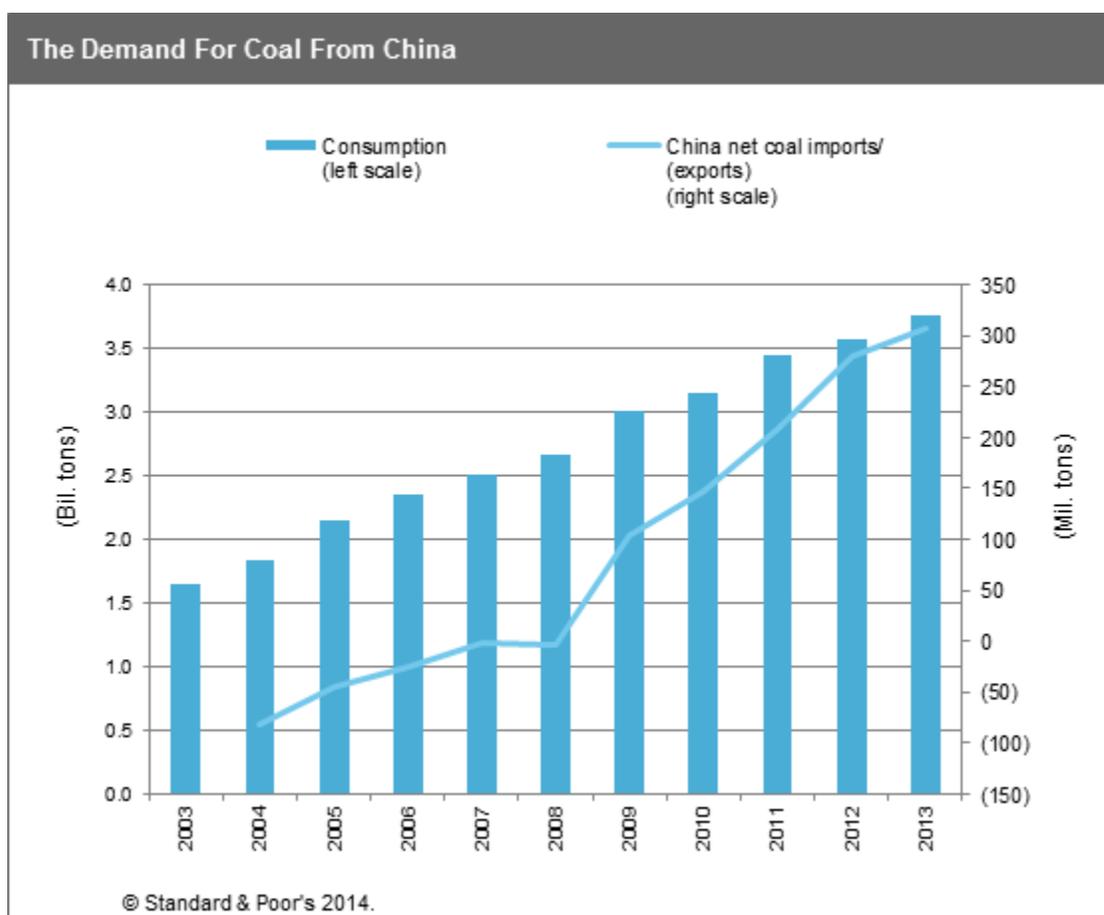
In 2013, China's coal demand totaled about 3.6 billion tons (see chart 3), compared with domestic production of about 3.7 billion tons. At the same time, total imported coal from overseas was about 330 Mt, leading to an oversupply of more than 420 Mt. Domestic coal producers have had to cut prices to face both an economic slowdown and lower seaborne prices.

According to BP, China has 113 billion tons of coal reserves (about half is low quality, sub-bituminous, and lignite coal), meaning that China's reserves are less than 30 years at current consumption levels. We believe that the life and quality of the reserves, in addition to climate change issues, will push the Chinese government toward other energy sources.

When will China reach its peak demand for coal? Some assume that demand will peak between 2015 and 2020. For example, the China Development and Reform Commission points to the possibility of peak coal demand in China by 2015. Others, such as the Chinese coal industry association, see the consumption of coal reaching 4.8 billion tons by 2020, well above the level projected by the IEA.

Under our assumption of GDP increasing by 7.4% and 7.2% in 2014 and 2015, respectively, we assume that the coal demand growth in China will decelerate to low single digits before flattening by 2020. This is due to the slow shift of the economy toward consumption from capital investments; lower GDP growth; and the Chinese government's increasing focus on tightening emission standards and moving to more renewable energy sources. Other tangible factors include the low level of fresh water and lack of long-term quality coal resources. On the other hand, coal is still the cheapest energy source and the application of new policies in China can take time.

Chart 5



That said, capping demand in China is not necessarily bad news for the industry. In previous years, China has offset the gap between domestic coal production and domestic demand with imports. In our view, the import market will also remain an important balancing factor in the future, due to China's need to meet higher demand for coal and replace its domestic low quality ore with higher quality coal. In our view, this scenario could support higher prices for seaborne coal in the medium term.

We believe that gas in China is the main threat for the coal industry over the long term. Without it, we believe it unlikely that there will be a reduction in the use of coal over time or an ability to deal with its climate change challenges.

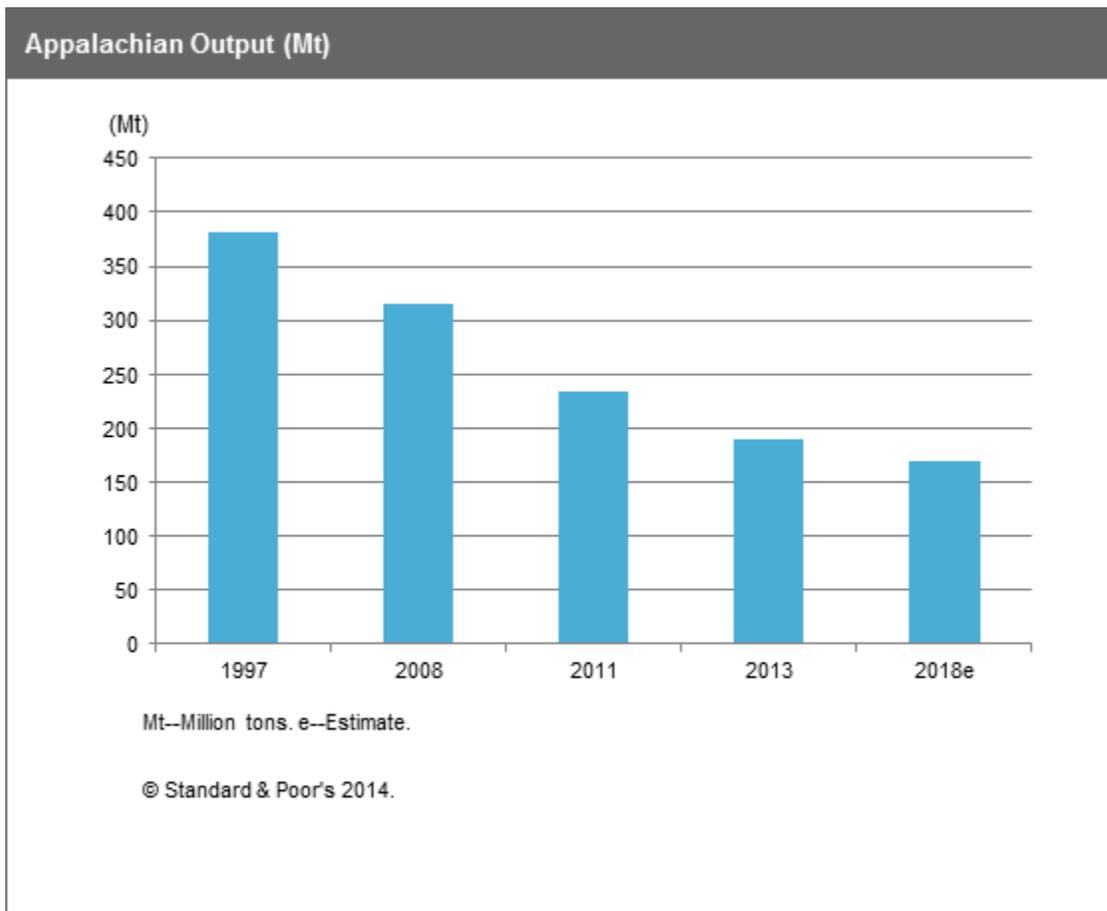
- **Shale gas.** This may become a game changer, but for now it remains an unknown factor. According to EIA, China's technically recoverable shale gas resources are about 1,100 trillion cubic feet (70% more than U.S. shale gas resources). In 2013, the country produced only 0.5 billion cubic meters (bcm) of shale gas. The Chinese government aims to produce between 60 bcm and 100 bcm of shale gas by 2020 (equivalent to 150 Mt-250 Mt of coal). In our view, these targets could be difficult given the current geological challenges, missing infrastructure, and local bureaucracy and, even if achieved, they are small compared with overall demand for energy in China.
- **Natural gas.** China recently signed a large natural gas deal with Russia to secure an annual natural gas supply of 38 bcm for 30 years (see "Standard & Poor's Perspective On Gazprom's Gas Contract With CNPC And Its Implications

For Russia And China," published June 6, 2014). The construction of the pipeline will take between four and six years. This transaction is part of a larger objective to more than double the consumption of natural gas to about 400 bcm by 2020. In order to meet this objective, the country will need to build more liquefied natural gas (LNG) facilities and bring more piped gas to the country.

Gas Rivals Coal In The U.S. Energy Mix

The structural change in the U.S. coal market is probably a more drastic scenario, of the gradual change we anticipate the global coal industry will be going through from 2020. The discovery of large deposits of natural gas in early 2010 triggered a sharp decline in prices from \$7/mmBtu (natural gas price) in 2009 to \$1.9/mmBtu in 2012. Natural gas, as a lower cost and lower carbon energy source, has created incentives for utility companies in the U.S. to abandon the use of coal. Since 2010, the demand for coal in the U.S. has dropped by 125 Mt. In addition, EPA regulations issued over the past few years are likely to result in the retirement of more than 60 gigawatts of coal-fired capacity by 2016, equal to 80-90 Mt. The main mines at risk are in Central Appalachia (CAPP).

Chart 6



However, we believe that coal in the U.S. will continue to remain an important, albeit declining, energy source. In our view, discussions on the subject indicate that a complete replacement of coal with shale gas looks unrealistic over the

short- to medium term. Over time, we assume that cheap natural gas will replace about 200 Mt of coal. We base our assumption on long-term natural gas prices between \$4.25-\$4.5/mmBtu. That said, the impact is not going to be cross-border: while coal from the Powder River basin will continue to be competitive, it would be uneconomical for many utilities to burn CAPP coal at those higher prices.

Switching Point From Coal To Gas

Region	Natural gas price (mmBtu)
Powder River Basin	\$2.50-\$2.75
Illinois Basin	\$3.25-\$3.50
Central Appalachia	< \$4.50

In our view, the future of U.S. coal mining companies will rely on domestic natural gas prices, as well as their ability to export coal, as the momentum toward more gas-fired generation is only likely to accelerate following the EPA's recent announcement to curb emissions. In 2013, U.S. coal miners exported about 100 Mt of thermal coal, compared with 45 Mt in 2006. While U.S. coal miners aim to expand their export capabilities to 220 Mt over the coming years, the EIA anticipates that coal exports from the U.S. will decrease slightly to 90 Mt in 2015.

In our view, should a material increase of exports from the U.S. occur, this may lead to the following outcomes over the short term:

- More pressure on the European coal industry, characterized by relatively high production costs.
- Coal miners (such as GlencoreXstrata) delaying the development of new coal projects. New coal mines will likely be developed in landlocked regions or mines with excellent unit cash cost.
- Demand from China and India supporting a higher demand for energy and replacing lower quality coal.

Consequently, we believe that prices will remain depressed with limited upside.

Global Coal Market Growth Still Depends On Emerging Asian Economies

We don't expect CO2 policies to have a significant effect on coal mining in Indonesia, Vietnam, and Australia in the short term. Absolute demand continues to grow and net production (new growth versus shut production) remains positive. We see fairly sizable production growth in Indonesia (20-30 Mt this year and in 2015 and 2016), even assuming prices of \$75 per ton. This is because the top seven players there--who control 60%-70% of production--remain very profitable and need to grow production to service their large debt burdens.

Even if coal consumption in China is capped, we believe that large energy deficits persist in key countries in Asia (India, Vietnam, and Indonesia for example), where pollution is either not top of the agenda or an issue, and electricity growth through coal will continue to encourage production growth. New regulations in those countries could reduce output to the seaborne market, leading companies to sell their output domestically, which could force small domestic coal miners out of business. This will result in a shift of the regional cost curve to the left, leading to lower prices domestically.

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Related Research

- Standard & Poor's Perspective On Gazprom's Gas Contract With CNPC And Its Implications For Russia And China, June 6, 2014
- S&P's First Take On The EPA's Proposed CO2 Rules For Power Generators, June 3, 2014
- Climate Change: Preparing For The Long-Term, May 22, 2014
- Corporate Carbon Risks Go Well Beyond Regulated Liabilities, May 22, 2014
- Credit FAQ: Assessing The Credit Supportiveness Of Europe's Renewable Energy Frameworks, May 22, 2014
- Dealing With Disaster: How Companies Are Starting To Assess Their Climate Event Risks, May 21, 2014
- What A Carbon-Constrained Future Could Mean For Oil Companies' Creditworthiness, March 1, 2013

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