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March 17, 2014

Asian Coal, Power and Renewables

Less, Less, Less: The Beginning of the End of Coal

Prepared for
Institute for Energy Economics and Financial Analysis
and
New York University Institute for Policy Integrity

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Asian Coal, Power and Renewables

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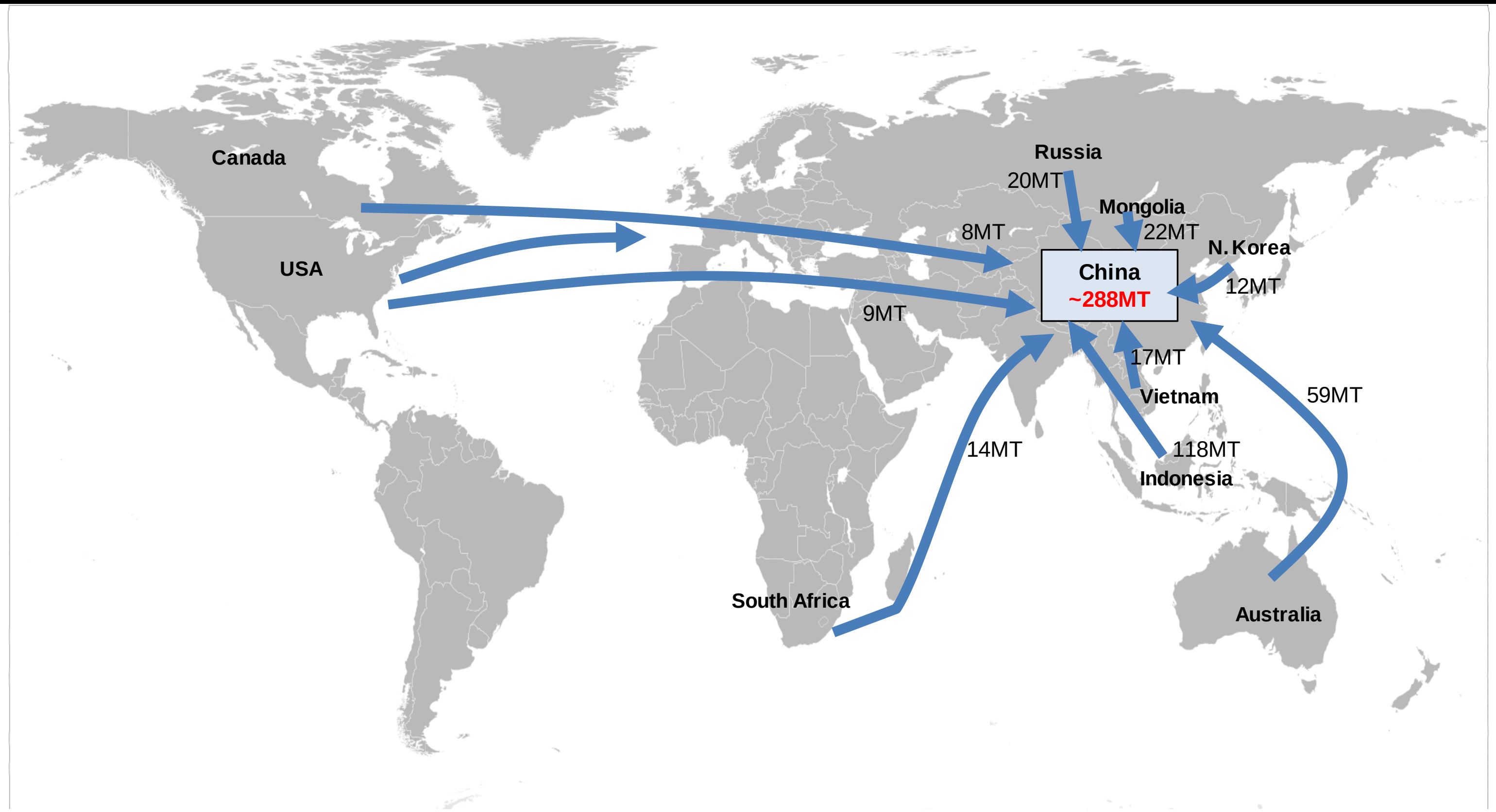
Asian Coal – The Appalachian Butterfly Effect

- Chinese coal prices didn't fall 25% over the course of 2012 because of the US and South Africa combining to export an incremental 11M tons of coal to a 4B ton Chinese coal market. Coal prices fell primarily because Chinese coal production and transportation capacity growth outstripped Chinese demand growth.

Major Seaborne Coal Exporters Supplying Asia – 2012

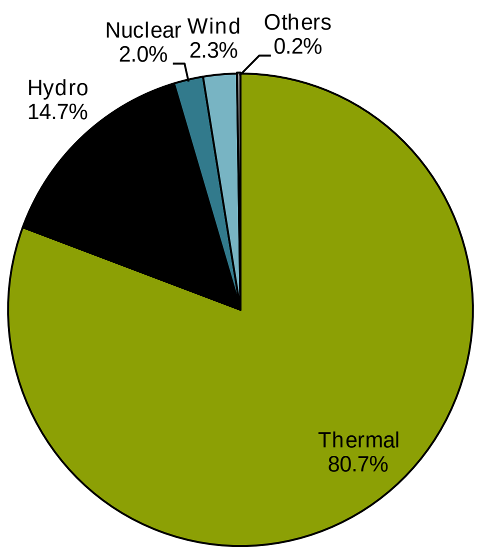


Source: Wiki commons, SX Coal, Public Press, EIA, BREE, RBCT, Bernstein analysis and estimates

Chinese Power – Turn on the Lights, the Party's Over

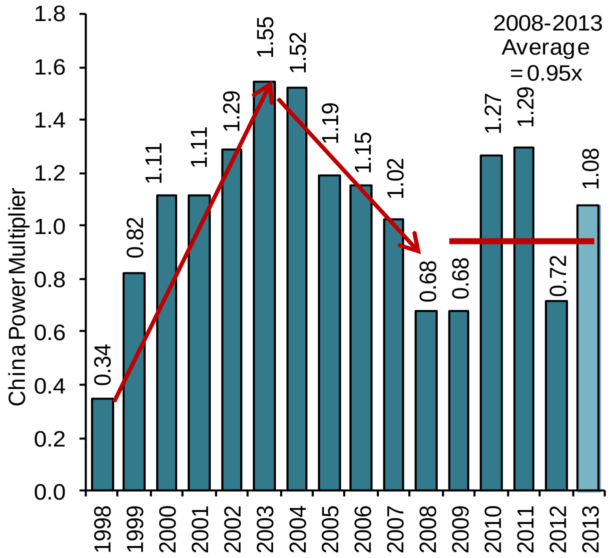
- **China's "power multiplier" over the business cycle since 2007 is ~1x GDP growth.** The power multiplier (power production growth divided by real GDP growth or the amount of electricity required by produce a unit of GDP) was 1.4x from 2003 to 2006, but falling.

China: Power Production Share December 2012 – November 2013



Source: NBS, CEIC, Bernstein estimates and analysis

China: Power Intensity 1998-2013

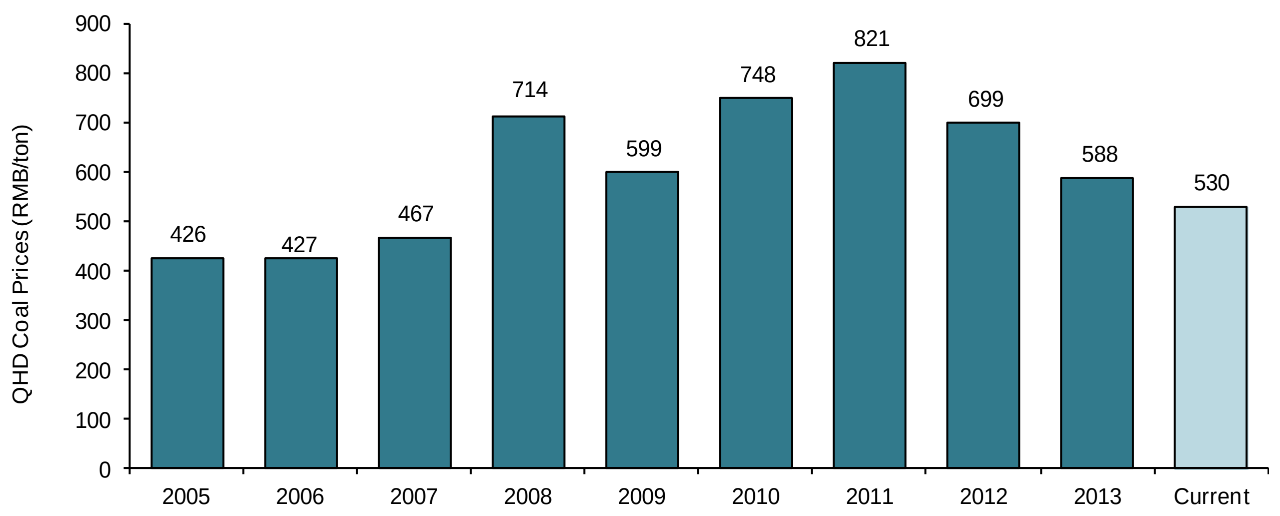


Source : NBS, CEIC, Bernstein estimates and analysis

Chinese Coal – No Diamonds, Plenty of Rough

- Coal prices have declined to RMB530/ton. Coal prices have fallen ~37% since November 2011 when the price touched RMB855/ton. **We are in the longest sustained period of price falling since at least 2006 and there are few signs that this trend is likely to change any time soon.**

Qinhuangdao 5,500kcal/kg Spot Coal Price – 2007-2014current

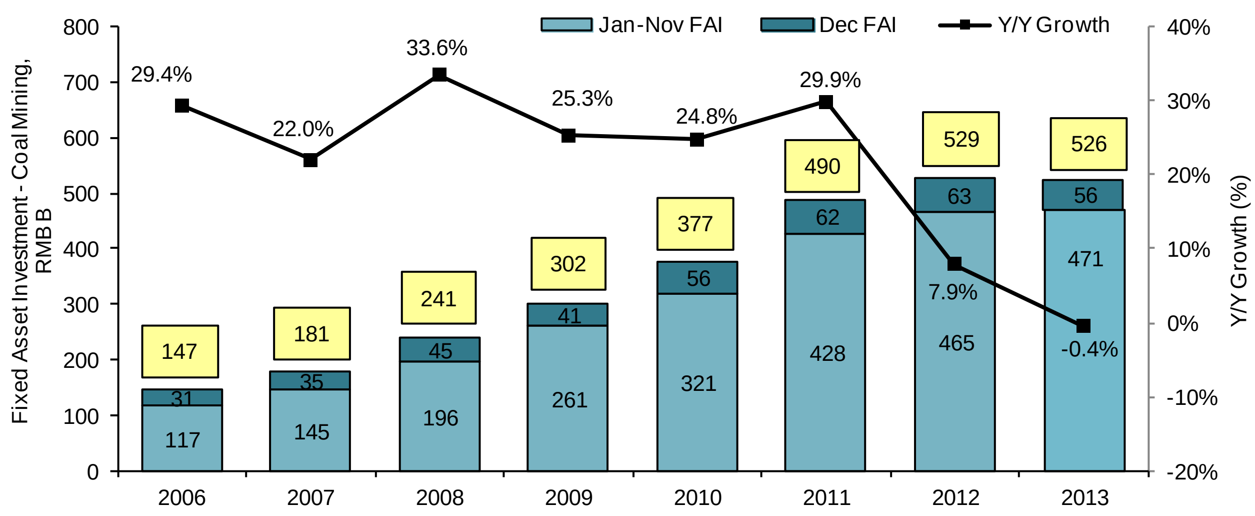


Source: SX Coal, Bernstein analysis

Chinese Coal – No Diamonds, Plenty of Rough

- **No insurmountable economies of scale.** There are some economies of scale, but – in part as a result of the 2008 Shanxi industry consolidation - there are also multiple scaled operators.
- **No lack of investment.** Investment in the coal mining fixed assets in 2011 was up 30% Y/Y. And in 2010, coal mining fixed asset investment increased 24.8%. But in 2012, it was up just 8%, while in 2013, it decreased 0.4%.

Chinese Coal Mining Fixed Asset Investment 2006 –2013

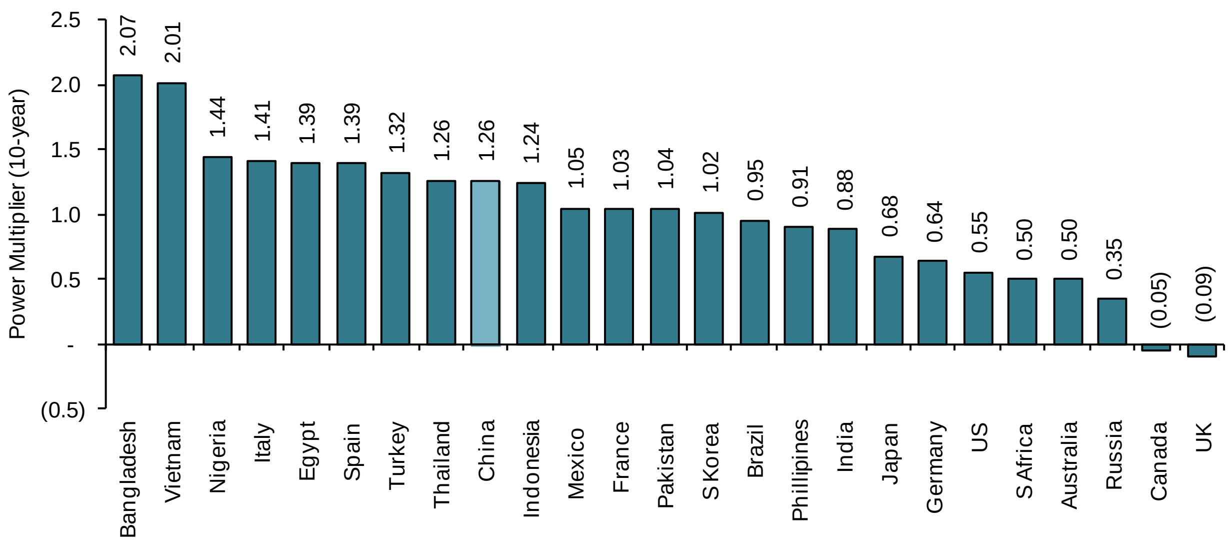


Source: CEIC, NBS, Bernstein analysis

Chinese Coal – Ditching the Bridge & Tunnel Crowd

- Looking at a sample of 25 countries in terms of power intensity over the last ten years, at least five trends are clear.

10-year Power Multipliers – Selection of 25 Developed and Developing Nations

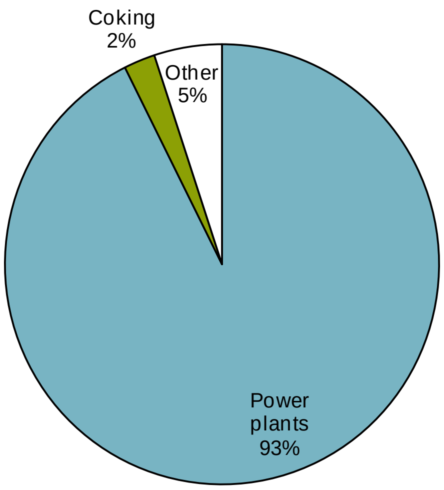


Source: World Bank, IEA, Bernstein analysis

Chinese Coal – No Diamonds, Plenty of Rough

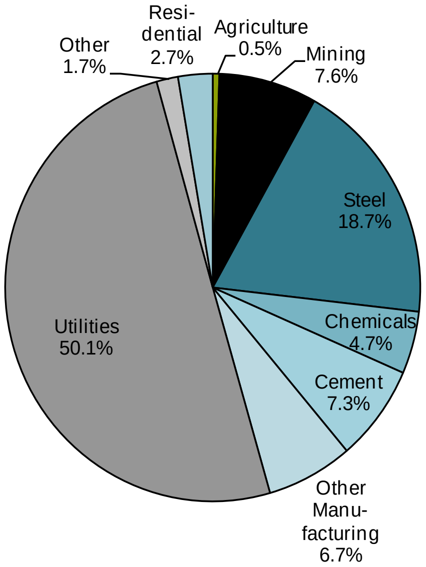
- **Coal-fired power stations account for roughly half of coal consumption in China.** A slowdown in coal consumption by the power sector means that other coal-consuming sectors will need to step up their demand to satisfy new supply
- **We cannot identify any other important coal consuming industries that are filling this gap.**

US Coal Consumption by end Market, 2012



Source: EIA, Bernstein Analysis and estimates

Chinese Coal Consumption by End Market, 2011



Source: NBS, CEIC, Bernstein Analysis, Media Reports

Chinese Coal – No Diamonds, Plenty of Rough

- 2017 Clean Air target by province announced by the Chinese Government State Council

INNER MONGOLIA – by 2017
- PM10: Reduce by 10% from 2012 level
- PM2.5: Reduce by 10% from 2012 level

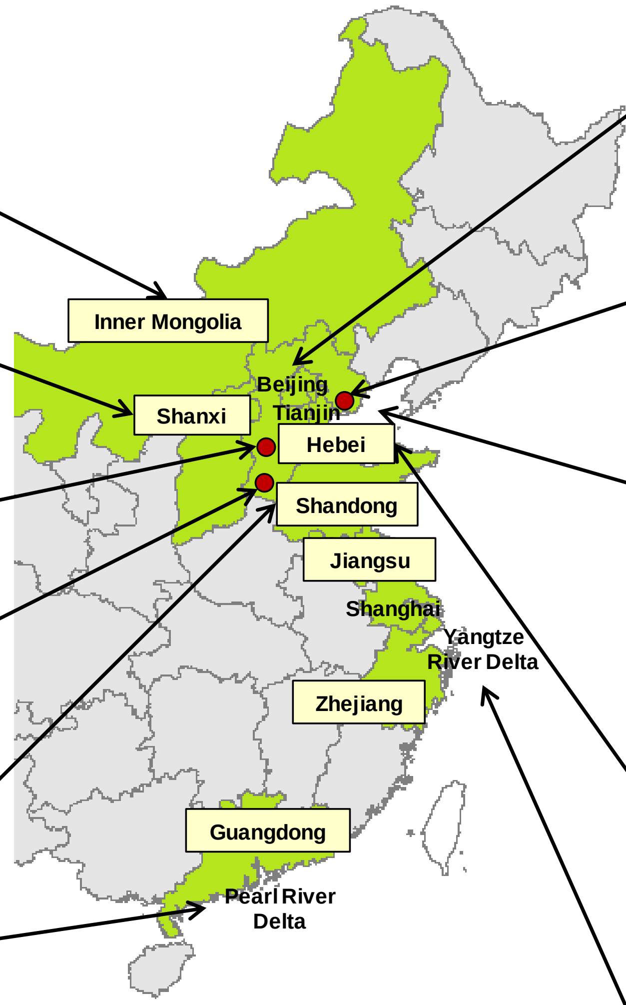
SHANXI – by 2017
- PM10: Reduce by 10% from 2012 level
- PM2.5: Reduce by 20% from 2012 level
- Retire 6.7mt of steel capacity and 18mt of coking capacity.
- % of renewable energy increase to 10%

SHIJIAZHUANG, HEBEI – by 2017
A 15mtpa reduction of coal consumption, 4.82mtpa reduction of steel capacity and 3.74mtpa reduction of iron capacity.

HANDAN, HEBEI – by 2017
A 16.7mtpa reduction of coal consumption, 12.04mtpa reduction of steel capacity and 16.14mtpa reduction of iron capacity.

SHANDONG – by 2017
- PM10: Reduce by 10% from 2012 level
- PM2.5: Reduce by 20% from 2012 level
- Retire 21mt of iron capacity and cap steel capacity at 50mt by 2015; and cap coke capacity at 40mt by 2017
- Coal consumption: reduce 20mt
- % of renewable energy increase to 10%

PEARL RIVER DELTA – by 2017
- PM10: Reduce by 10% from 2012 level
- PM2.5: Reduce by 15% from 2012 level
- Coal consumption: cap at 160mt by 2015
- Negative growth in coal consumption



BEIJING – by 2017
- PM10: Reduce 10% from 2012 level
- PM2.5: Reduce 25% from 2012 level, specifically < 60ug/m3
- Coal consumption: cap at 10mt or a 13mt reduction; % of coal as energy reduce to <10%
- Retire 1,200 high polluting companies
- % of renewable energy increase to 15%
- Negative growth in coal consumption

TANGSHAN, HEBEI – by 2017
A 25.6mtpa reduction in coal consumption; 40mtpa reduction in steel capacity and 28mtpa reduction in iron capacity.

TIANJIN – by 2017
- PM10: Reduce 10% from 2012 level
- PM2.5: Reduce 25% from 2012 level
- Coal consumption: Reduce10mt
- Steel capacity capped at 20mt, cement capped at 5mt and coal-fired installed capacity capped at 14GW
- % of renewable energy increase to 15%
- Negative growth in coal consumption

HEBEI – by 2017
- PM10: Reduce10% from 2012 level
- PM2.5: Reduce 25% from 2012 level
- A 8.75mtpa reduction of coal consumption; 5.86mtpa reduction of steel capacity and 14.47mtpa reduction of iron capacity by 2015
- From 2015-2017, reduce 40.34mtpa, 67.26mtpa and 66.72mtpa of coal consumption, steel capacity and iron capacity
- Retire all <100MW and start retiring <200MW non co-gen coal-fired capacity
- Wind power capacity increase to 11GW
- % of renewable energy increase to 15%
- Negative growth in coal consumption

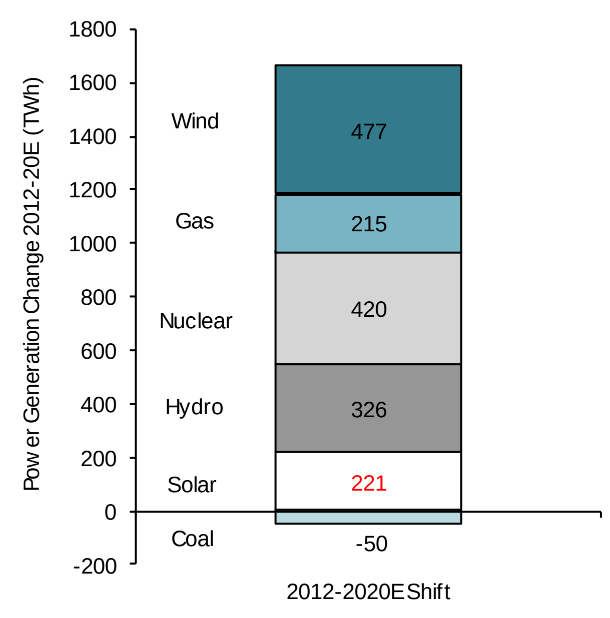
YANGTZE RIVER DELTA (Jiangsu, Zhejiang and Shanghai) - by 2017
- PM10: Reduce by 10% from 2012 level
- PM2.5: Reduce by 20% from 2012 level
- Negative growth in coal consumption

Source: Wikimedia Commons, Chinese Government State Council, Media reports, Bernstein analysis

Chinese Coal – No Diamonds, Plenty of Rough

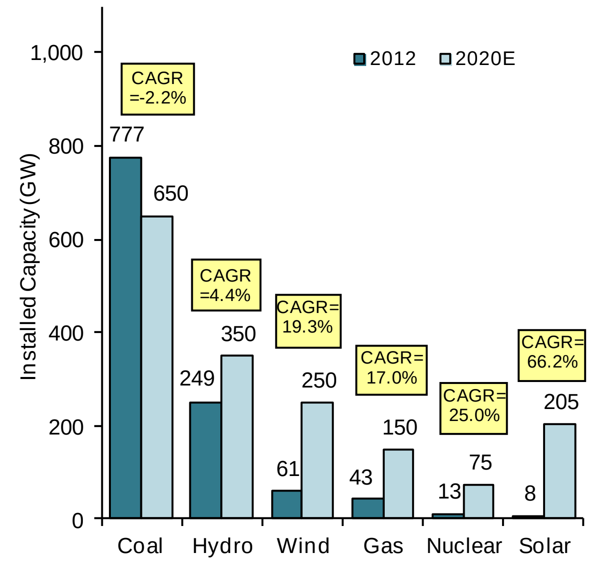
- We believe that coal-fired power generation capacity will fall from ~800GW of installed capacity today to 650GW by the end of the decade as inefficient, small, old power stations are decommissioned. Hydro will increase from ~250GW to 350GW. Gas will go from ~40GW to 150GW. Nuclear will increase from ~13GW to 75GW. Solar and wind will be 200GW and 250GW by the end of the decade, respectively.

Power Generation Shift by Fuel Source, 2012 – 2020E



Source: CIEC, Bernstein estimates

China Installed Capacity by Fuel Source, 2012 and 2020E

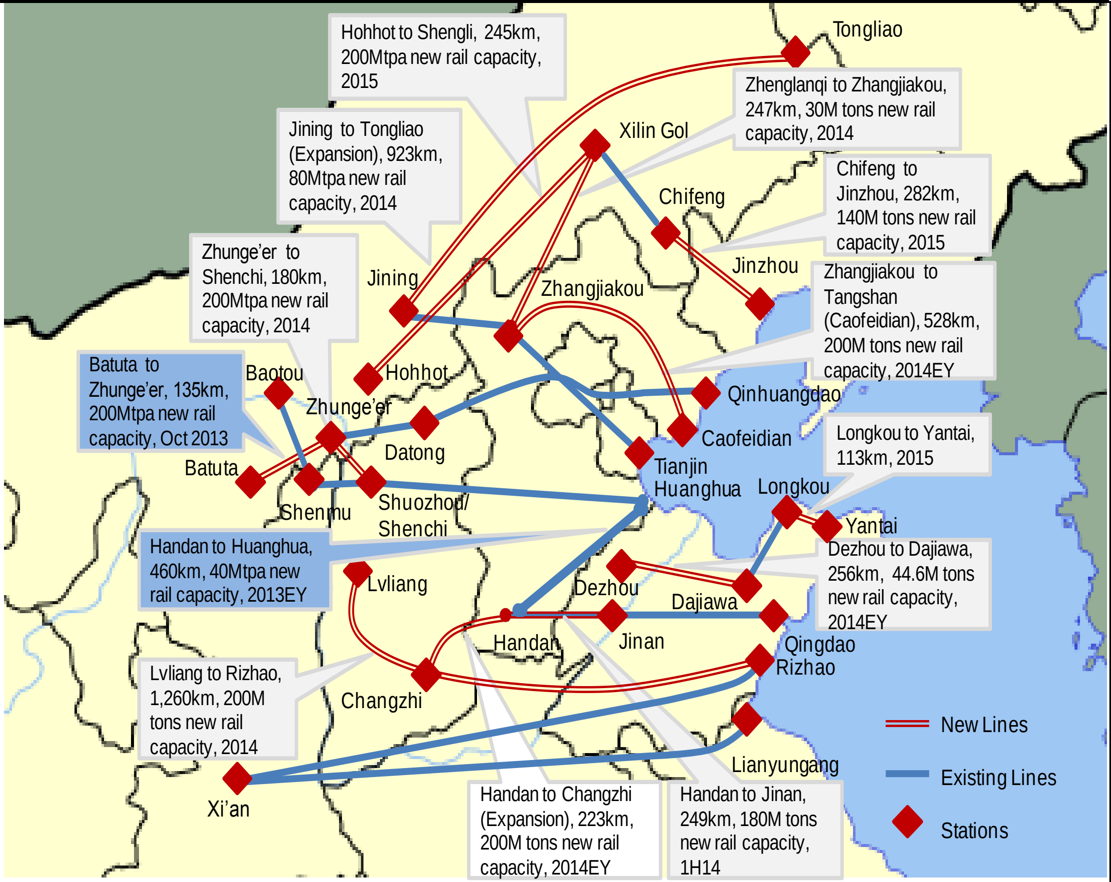


Source: NBS, CEIC, Bernstein estimates and analysis

Chinese Coal – No Diamonds, Plenty of Rough

Xi-to-Sea Projects – Origin and Destination, Distance, Transport Capacity, Target Completion Date

Start Date	Project Location	Distance (km)	Completion Year	Additional Coal Rail Capacity (M tons)
Mar-10	Handan, Hebei to Changzhi, Shanxi (Expansion)	223	2014E	150
Nov-09	Longkou to Yantai, Shandong	113	2014E	9
Apr-10	Dezhou to Dajiawa, Shandong	256	2014E	22
Jun-08	Chifeng, Inner Mongolia to Jinzhou, Liaoning	282	2015E	140
Mar-10	Zhangjiakou to Tangshan (Caofeidian), Hebei	528	2014E	200
Dec-09	Lvliang, Shanxi to Rizhao, Shandong	1,260	2014E	200
Aug-10	Jining to Tongliao, Inner Mongolia (Expansion)	923	2014E	43
Subtotal		**3,585**		**764**



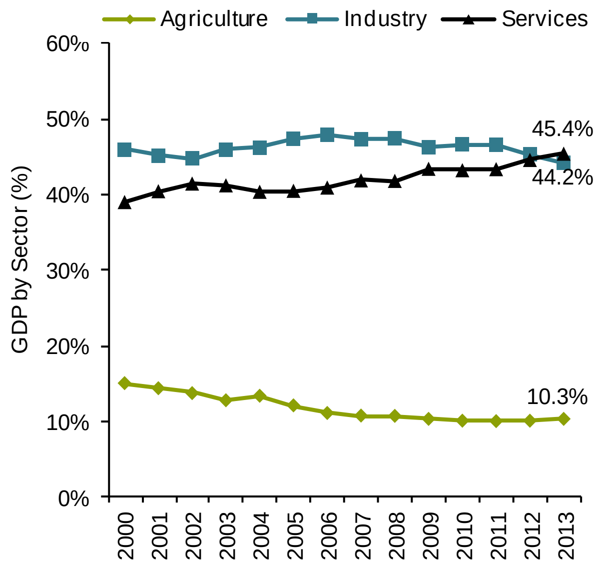
Source: Company Reports, Chinese Ministry of Railways, Media Reports, Bernstein Analysis and estimates

Chinese Power – Turn on the Lights, the Party's Over

- **Low-intensity services sector on the rise.** The GDP share shifts in the last decade have been from agriculture (a moderately energy-intensive activity) to services (a low intensity activity) and manufacturing (a high-intensive activity).

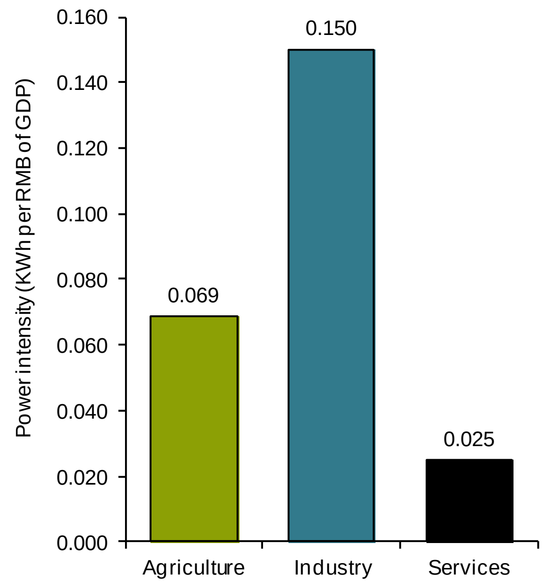
- **Tertiary sector set to gain GDP share**. If primary industry share asymptotes at ~10%, GDP share will shift from secondary industry (high power-intensive activities) to the services sector (low power-intensive activities).

China: GDP Share by Sector: 2000-2013



Source: NBS, CEIC, Bernstein analysis

China: Power Intensity by Sector: 2011

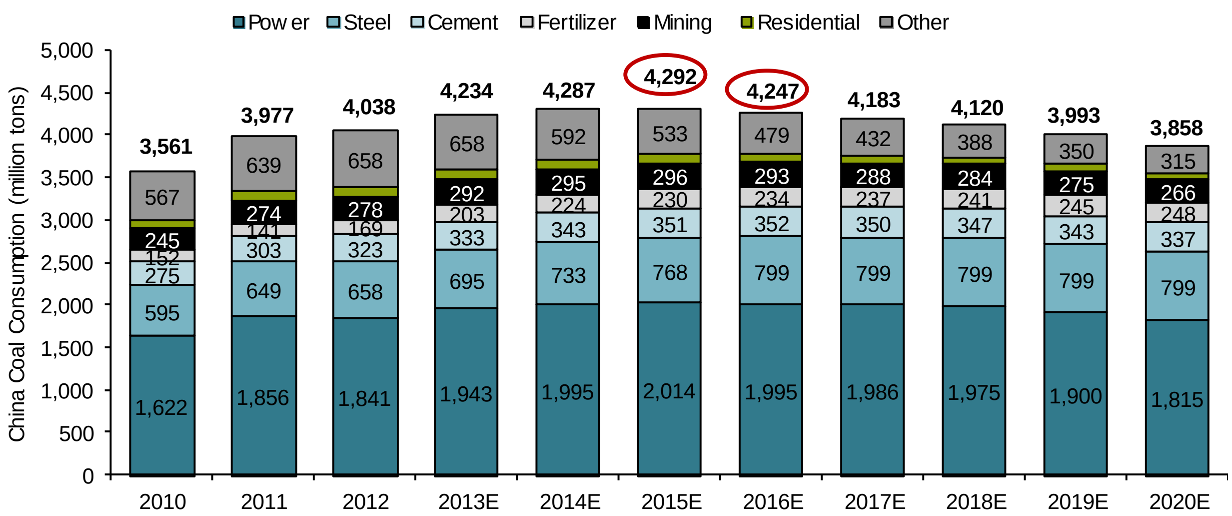


Source: NBS, CEIC, Bernstein analysis

Chinese Coal – Basket Full of Biscuits

- **From 2016, Chinese coal demand will fall in absolute terms, and that trend will never reverse.** There are 5 primary drivers of falling consumption: (i) continuing investment in coal mining and transportation infrastructure; ii) decreasing Chinese power intensity; (iii) increasing power generation capacity from nuclear, gas, hydro and renewables; (iv) falling demand growth for steel, cement and fertilizer and the demise of "inferior" end markets for coal; and (v) the emergence of the environment as a politically sensitive issue in China.

Chinese Coal Consumption by Sector 2010-2020E



Source: CEIC, Bernstein analysis and estimates

Disclosure Appendix

Disclosure Appendix: Valuation Methodology

- Shenhua, China Coal Energy, Yanzhou: P/FE and P/B multiple on 2015 Earnings/Book Value estimates
- Huaneng, Datang, CR Power: P/FE multiple and P/B multiple. Assume A-shares and H-shares appreciate/depreciate in value by the same %

Sector	Company	Ticker	Rating	Target Price	Recent Price (March 13, 2014)	Average Daily Trading Volume (6 months)		Market Cap (USD B)
						(M Shares)	(USD M)	
Chinese Coal	China Shenhua	1088.HK	U	HK$15.00	HK$19.36	17.0	50.7	43.9
	China Coal Energy	1898.HK	U	HK$2.80	HK$3.77	44.2	25.8	8.3
	Yanzhou Coal	1171.HK	U	HK$4.00	HK$5.01	19.9	18.6	4.2
		ADR:YZC		USD5.16	USD6.35	ADR: 0.23	ADR: 2.1	
Chinese Power	Huaneng	902.HK	O	HK$9.00	HK$6.21	20.4	19.6	10.9
		ADR:HNP		USD46.15	USD31.51	ADR: 0.04	ADR: 1.4	
	Datang	991.HK	M	HK$3.20	HK$2.85	11.9	5.2	7.3
	CR Power	836.HK	M	HK$20.00	HK$17.88	5.8	14.0	11.0

Note: The MXAPJ and SPX Indices closed at 458.57 and1,846.34 respectively on March 13,2014.

Disclosure Appendix: Risks

There are numerous risks to our investment thesis. In both China and India, our base case forecasts assume continuing rapid economic growth and moderating levels of inflation. Electricity consumption growth in both markets is sensitive to economic growth. In the event that economic conditions deteriorate significantly, this would have a significant negative effect across the group.

In addition, some sector-specific risks are set out below.

Chinese Coal

There are numerous risks to our investment thesis on Shenhua, China Coal Energy and Yanzhou. Some of these risks are set out below.

First, contrary to our expectations, electricity demand growth may continue to grow at its historically high rate, increasing demand for thermal coal.

Second, contrary to our expectations, steel growth may accelerate, increasing demand for coking coal.

Third, coal production and rail transportation capacity may not increase at the rate that we are forecasting over the long term. As a result, coal pricing may not decline in the manner that we are anticipating. Further, in the event that rail transportation capacity expansion fails to materialize, movement of coal resources across internally-owned logistics and shipping assets may benefit diversified coal and generation companies like Shenhua.

Fourth, the companies may decide to alter their investment strategies or enter into new business segments, changing capital expenditures or dividend pay-out rates and dividend growth rates.

Fifth, China may relax its coal export quotas and India may become a more significant importer of coal than we are forecasting, providing a source of additional growth for the coal companies that are not currently included within our estimates.

Sixth, the global economy may accelerate, leading to higher than anticipated demand for Chinese manufactured goods, increasing demand for Chinese coal and pushing up the price of seaborne coal.

Seventh, the Chinese government may choose to stimulate the economy, resulting in an increase in demand for steel, power, cement and – ultimately- thermal and coking coal.

Chinese Power

There are numerous risks to our investment thesis on Datang, Huaneng and China Resources Power. Some of these risks are set out below.

First, contrary to our expectations, electricity demand growth may continue to grow at is historically high rate, raising utilization rates for all Chinese generation companies.

Second, coal production and rail transportation capacity may not increase at the rate that we are forecasting over the long term. As a result, coal pricing may not decline in the manner that we are anticipating and utilities with coal mining assets may benefit from their internal coal supply to a greater extent than we expect. Further, in the event that rail transportation capacity expansion fails to materialize, movement of coal resources across internally-owned logistics and shipping assets will benefit diversified generation companies.

Third, the companies may decide to alter their investment strategies or enter into new business segments, changing capital expenditures or dividend pay-out rates and dividend growth rates.

Fourth, the tariff process through which the NDRC stipulates the price that power generation plants in China are to receive for electricity generation may be altered. Such changes are difficult to predict. Market-based pricing mechanisms have been discussed and trialed in China on occasion over the last decade. The introduction of such a system would profoundly alter our investment conclusions.

Fifth, given that the electricity generation business in China is highly regulated, changes to regulations – and, in particular, changes to the electricity tariffs - may have a dramatic impact on valuation. Such changes are, almost by definition, difficult to predict but could rapidly improve profitability with little warning.

Disclosure Appendix

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Market-Perform: Stock will perform in line with the market index to within +/-15 pp in the year ahead.

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1088.HK	U (RC) 12/14/11	
1171.HK	U (RC) 12/14/11	
1898.HK	U (RC) 06/13/12	
836.HK	M (RC) 03/07/13	
902.HK	O (RC) 09/12/13	M (RC) 03/07/13
991.HK	M (RC) 03/03/11	

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