

# Past Peak Coal in China

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In this briefing paper, the Institute for Energy Economics and Financial Analysis (IEEFA) provides an updated review of global coal demand, in particular with respect to China. We examine demand trends in 2015 to estimate the likely change in demand evident globally this year. We also examine trends year to date for seaborne thermal coal in light of recent data reports highlighting a rapid decline in major thermal coal import markets.

## Executive Summary

A review of global coal consumption trends over the past two years suggests it is quite feasible and in fact increasingly likely that the world energy markets will look back on 2013-2015 as having set a succession of peak demand points:

- China's coal production and consumption looks to have peaked in 2013;
- China's thermal coal imports peaked in 2013, having fallen 40% since then;
- World coal consumption peaked in 2013, declined 0.7% in 2014 and is on track to decline an additional 2-4% in 2015;
- Japan's thermal coal imports likely peaked in 2014; and
- Indian thermal coal imports likely peaked in mid-2015.

On the last point, IEEFA places a significant emphasis on the news that SunEdison's 500MW US\$500m auction win in the state of Andhra Pradesh in November 2015 set a new record low solar price of Rs4.63/kWh (US7.1c). It is now clear that electricity generation sourced from a new imported coal fired power plant in India is immediately more expensive than utility scale solar. IEEFA notes also that the ~5% real price deflation implicit in this 25-year power purchase agreement is a key, lasting policy benefit.

A review of global coal consumption trends in the year to date 2015 suggests global coal consumption is on track for a 2-4% decline in 2015. Beyond China's 5.7% year on year decline to date in 2015, U.S. domestic coal consumption is down 11%, Germany is down 3%, the U.K. is down 16%, Japan is down 3%, Canada is down 5%, and Turkey is down 13% year over year. With Russia's economy in recession, we wouldn't expect consumption growth coal there. Korea is flat, Indonesia is down 2% and Mexico is down 1%.

Of the major coal-consuming economies, only two are reporting positive growth in 2015. Indian coal is up 3-6% year on year. And having repealed its price on carbon pollution, Australian coal consumption is up marginally in 2015 – the first year of domestic coal growth since 2008.

History could record 2013-2014 as showing that China coal production and consumption peaked, international coal imports peaked, and global thermal coal consumption peaked as well.

# Peak Coal in China

The International Energy Agency (IEA) in 2012 fairly sized up the coal industry with this statement: “Coal is China. China is Coal.” China produced and consumed half the world's coal over 2012-2014. However, IEEFA notes that China's coal production, consumption and importation of coal most likely peaked in 2013, with the rate of decline in both production and imports accelerating throughout 2014 and 2015.

For the nine months to September 2015, China's domestic raw coal production was 2.73 billion tonnes, down 4.3% year-on-year. China's coal imports in the same period were 0.16 billion tonnes, down 29.8% year-on-year.<sup>i</sup> The weighted average suggests consumption was down 5.7% year on year for the first nine months of 2015. This follows a decline in China's coal production of 2.6% year on year in 2014, with imports also down 11% year on year.

IEEFA has previously documented three forces driving this decline:

First, China has witnessed a decoupling of electricity demand growth from economic growth, with electricity demand in 2015 year to date up 1% relative to gross domestic product (GDP) growth of 7.0%; a ratio of 0.2:1.0. In 2014, electricity demand grew by 3-4% vs GDP growth of 7.3%, a ratio of around 0.5:1.0. For the decade prior to 2013, this ratio averaged 1.0-1.2:1.0. This trend reflects a significant shift in economic activity away from construction, infrastructure and heavy industrial activity toward less energy -intensive sectors such as consumer and services. It also reflects the impact of the Chinese government drive to improve energy efficiency and limit emissions intensity of growth due to the growing need to resolve air, water and particulate pollution.

Second, within the electricity-generation mix, China has been rapidly diversifying away from its historic reliance on coal-fired power generation. China has undertaken a significant and sustained investment program in wind, solar, hydro, nuclear and gas-fired power generation. China recently lifted its expected 2020 solar installation target by 50% from 100GW to 150GW.<sup>ii</sup> IEEFA forecasts that wind and hydro electricity capacity additions could each exceed 20GW annually this decade. China is forecast to commission over 20GW of new nuclear facilities prior to 2020.

Third, Chinese electricity-sector transformation is driving the decline in seaborne thermal coal imports. Coal-fired power generation is down in 2015 year to date. As a result, China's total domestic coal production in the first nine months of 2015 is down 4.3% year over year, but imports have borne a significantly greater share of the decline. Chinese coal imports in the first 10 months of 2015 are down by 30% year over year. This reflects the propensity of China to try to protect its domestic workforce by prioritizing supply from local Chinese coal mines. IEEFA expects thermal coal imports to continue to decline over the next five years.

The commissioning of a significant number of nuclear facilities in the southeast coastal regions of China through to 2020 will replace import coal-fired power demand. Likewise, the opening up of a number of new high-voltage direct current grid connections from the west to the east will allow a significant increase in ‘coal and renewables by wire.’ Meantime, 2015 has seen significant renewable-energy curtailments in the absence of sufficient grid-evacuation capacity, estimated to have reached 15% curtailment.

# Peak Global Coal Consumption Occurred in 2013

For all the references to IEA forecasts that coal demand would continue to grow, the statistics from 2014 and 2015 to date are suggesting global thermal coal consumption peaked in 2013. BP's Statistical Review of World Energy 2015 reports global production of coal tonnages declined in 2014 by 0.7% year over year (yoy).<sup>iii</sup> IEEFA estimates global coal tonnage is on track to decline by another 2-4% in 2015.

A review of global coal consumption trends in 2015 to date suggests global coal consumption is on track for a 2-4% decline in 2015. It is telling that this decline in global coal consumption has occurred notwithstanding coal prices hitting near-decade lows. In a normal cycle, record low prices down 60-70% would stimulate a demand response. For coal, the structural and policy impacts and resulting stranded-asset risks are more than sufficient to outweigh any short-term price stimulus.

The implications of a structural decline in the seaborne coal market are compounded for those companies that undertook expensive, top-of-the-cycle, debt-funded coal acquisitions in 2010-2012, and/or extensive greenfield coal mine development and associated infrastructure expansions. This development has been extremely costly for shareholders of BHP Billiton, RIO Tinto, Teck Resources, Sumitomo and China Shenhua Energy, where write-downs have extended to hundreds of millions or billions of dollars. The addition of extensive financial leverage has been severely damaging to shareholders of firms like Peabody Energy, Alpha Natural Resources, Glencore, Anglo American, Lanco Infratech, GVK Power, Adani Enterprises, Whitehaven Coal, Cockatoo Coal and China Coal Energy Limited.

## Global Coal Consumption: Down 2-4% yoy in 2015

We detail growth trends here in 2015 for the world's 12 largest coal-consuming nations. We calculate a weighted average of these figures to derive an estimated 2-4% yoy decline in global coal consumption in 2015.

**China – 50.3% of 2014 global consumption:** China reports a 5.7% yoy decline year-to-September 2015 in coal consumption, as discussed above.

**U.S. – 11.7% of 2014 global consumption:** With more than 200 coal-fired power plants with a combined 83GW of capacity scheduled for retirement since 2012,<sup>iv</sup> coal-fired power's share of the U.S. electricity market is set to decline to 35% in 2015, down from 50% a decade earlier. Goldman Sachs forecasts a further decline to 30% by 2025, and UBS forecasts a potential decline to 18% by 2030. Peabody Energy in October 2015 forecast that U.S. coal consumption would decline 100Mst in 2015 (-11% yoy),<sup>v</sup> and further in 2016. Record low U.S. gas prices, record high renewable energy build (9GW of wind plus 8GW of solar in 2015 alone) and a decoupling of electricity demand from economic growth are all permanently eroding coal demand. U.S. rail freight shipments of coal fell 35% year over year in October 2015, down 15% year to date,<sup>vi</sup> showing the decline in U.S. coal consumption is accelerating as the year has progressed.

**India – 9.3% of 2014 global consumption:** Indian electricity demand year to date is reported at up only 3.1% year over year,<sup>vii</sup> and steel production has stagnated. This is despite record high Coal India Ltd coal dispatches up 9.9% year over year in April to October 2015,<sup>viii</sup> and the second largest Indian coal producer, Singareni Collieries, posting a 15% year over year increase in dispatches for April-September 2015.<sup>ix</sup>

**Japan – 3.3% of 2014 global consumption:** Japan's power generation was down 2.5% year over year in January-August 2015, according to the Ministry of Economy, Trade and Industry data.<sup>x</sup> Increased renewable-energy output on the back of US\$30bn pa of solar installations (renewable electricity generation is up 33% year over year) and lower power demand both ate into coal-fired generation, as thermal power generation fell 5.2% in total.<sup>xi</sup>

**South Africa – 2.3% of 2014 global consumption:** In South Africa, the state utility Eskom reported a 2.1% year-over-year to October 2015 fall in power output.<sup>xii</sup> As coal makes up well over 90% of Eskom's portfolio, coal-fired generation will have fallen by a similar amount.

**South Korea – 2.2% of 2014 global consumption:** The IEA reports Korea's 2015 electricity production is down 0.2% year to date, with thermal production down 1.2% year over year.<sup>xiii</sup>

**Russia – 2.0% of 2014 global consumption:** No preliminary data is available for Russia, but the country's GDP is projected to contract by 3.4%,<sup>xiv</sup> making it highly likely that coal consumption will fall as well.

**Germany – 2.0% of 2014 global consumption:** The IEA reports Germany's 2015 electricity production is up 2.6% year-over-year in the year to date after a very weak 2014 outcome. In contrast, coal-fired electricity production continues to lose market share, down 2.8% in January-July 2015<sup>xv</sup> after a 5% contraction last calendar year. By contrast, 2015 generation from renewable energy has grown 29% year over year and hydro is up 15%.

**Indonesia – 1.6% of 2014 global consumption:** Domestic Indonesian coal consumption is reported to be down 2% year over year January to August 2015.<sup>xvi</sup>

**Australia – 1.1% of 2014 global consumption:** The IEA reports Australian 2015 electricity production is up 0.3% year over year in the year to date, with thermal production up 0.3%,<sup>xvii</sup> the first increase in eight years.

**Turkey – 0.9% of 2014 global consumption:** The IEA reports Turkey's 2015 electricity production is up 3.0% year over year in the year to date, but in contrast thermal electricity production is down 13.4%.<sup>xviii</sup> By contrast, 2015 electricity generation from renewable energy in Turkey has grown 47% year over year and hydro is up 65% year over year.

**U.K. – 0.8% of 2014 global consumption:** The IEA reports the U.K.'s 2015 electricity production up 0.4% year over year in the year to date.<sup>xix</sup> U.K. coal consumption for power generation in January-June 2015 fell by 16% as coal-fired power plants closed down or converted to biomass.<sup>xx</sup>

# Peak Internationally-Traded Thermal Coal Imports

Following on from the peaking of demand for coal overall, IEEFA models internationally-traded coal as having likely peaked in 2014 at an estimated 1,113Mt. We forecast a 30% decline by 2021 to 762Mtpa. This is predicated on the view that China, Western Europe and Japan have already passed peak import demand in 2013-2014, and that India's thermal coal imports are likely to have also peaked in mid-2015.

IEEFA models that thermal coal imports into China peaked in 2013, far earlier than most commodity forecasters anticipated. Thermal coal imports to China declined 9% in 2014, and year-to-October 2015, coal imports have declined a further 30% year-on-year. As detailed above, this is driven by significant ongoing improvements in energy intensity of growth, a gradual slowing of overall Chinese economic growth and continued efforts to diversify its electricity sector away from an excessive reliance on thermal coal.

Western Europe is forecast to decline materially over this decade due to European Union policy initiatives to accelerate investment in renewables and energy efficiency, combined with the impact of the Large Combustion Plant Directive 2001/80/EC in terms of mandating coal-fired power plant closures or modernization.

Japan is forecast to decline due to the combination of four factors: ongoing economic growth headwinds; continued energy efficiency gains; the addition of 8-10GW pa of new solar installations; any sustained nuclear facility restart (Japan needs to resolve 42GW of idle nuclear capacity one way or another); and the near 60% decline in liquid natural gas import prices since the start of 2014.

In 2014, China imported an estimated 240Mt of thermal coal, 22% of the global total. In 2014 India imported an estimated 180Mt, 16% of global thermal total. Japan is third at 145Mt or 13%.

Bullish forecasts of coal import demand growth are increasingly reliant on India to be the driver of growth for internationally traded coal following the 40% collapse in Chinese coal imports post 2013 and the declining demand profile in Japan.

However, IEEFA is increasingly questioning the scope for Indian thermal coal imports in light of the fact that in November 2014 Energy Minister Piyush Goyal stated: "Possibly in the next two or three years we should be able to stop imports of thermal coal."<sup>xxi</sup> IEEFA's analysis suggests this statement is directionally correct.<sup>xxii</sup> The 27% year-on-year decline in Indian coal imports in September 2015<sup>xxiii</sup> combines with the 5% year-on-year decline reported in October 2015<sup>xxiv</sup> suggests all forecasters of internationally traded coal should revisit their India coal forecasts.

Should Energy Minister Goyal continue to be successful, Indian thermal coal imports would be the first casualty. Why? Because electricity generated from a new imported-coal-fired power plant is now materially more expensive than the cost of utility-scale solar, hydro, wind or gas-fired power, and double the cost of domestic coal-fired power generation.

In November 2015, the 500MW solar tender in Andhra Pradesh saw a record-breaking, winning bid of Rs4.63 (US\$0.071)/kWh.<sup>xxv</sup> The same auction saw another 5GW of unsuccessful bids submitted by 29 other developers. This puts utility-scale solar below India's delivered wholesale cost of electricity of Rs5.15/kWh in 2013/14. Further, India's astute energy minister has an inbuilt deflationary benefit in that most of the renewable energy

power purchase agreements are fixed with zero indexation, meaning that some 5% annual real price declines are locked in for the next 25 years.

IEEFA models that Energy Minister Goyal will be successful, but over five to seven years rather than his hope for cessation of thermal coal imports within two to three years – Figure 1.

**Figure 1: Thermal Coal Import Demand (1990 to 2021)**

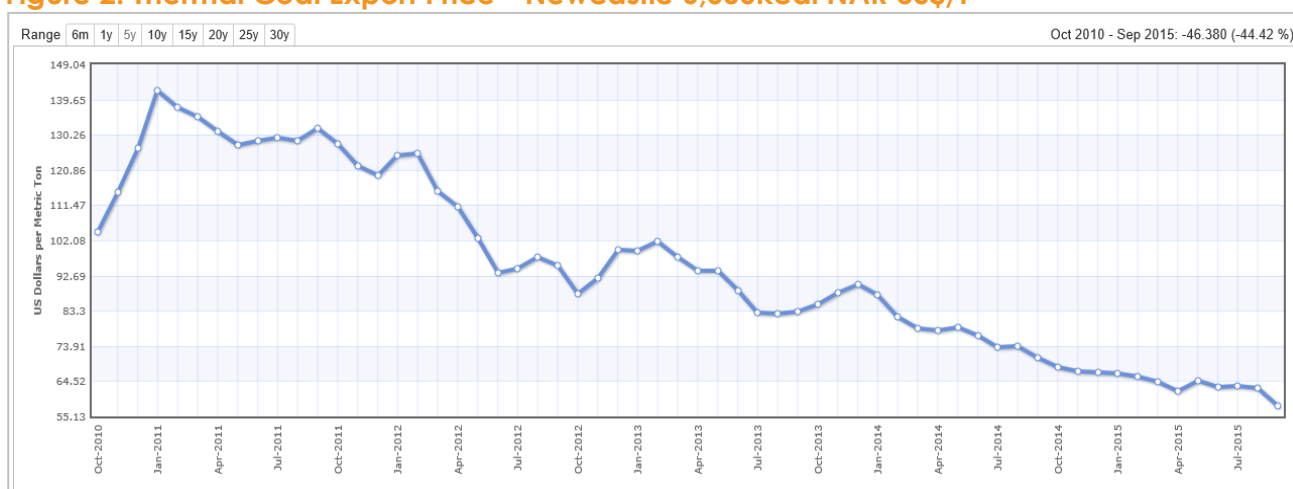
Calendar Year	Actuals			Estimate		Forecasts						
	1990	2000	2010	2013	2014	2015	2016	2017	2018	2019	2020	2021
<b>COUNTRY</b>												
China	11	8	126	264	240	173	142	111	82	56	36	21
India	0	10	81	142	180	189	164	132	98	64	30	0
Japan	42	93	128	142	145	142	139	135	131	128	124	121
Korea	12	45	90	96	98	100	102	104	106	108	111	112
Taiwan	14	40	58	61	63	63	65	66	67	69	70	71
South East Asia (1)	4	14	53	60	63	75	81	87	94	102	111	121
Western Europe (2)	48	80	98	128	114	102	99	95	91	87	83	79
United States	2	10	16	7	7	9	9	10	10	10	10	10
Russia	53	25	24	23	23	21	19	19	19	19	19	19
Rest of world	191	150	172	179	181	184	188	192	196	199	203	208
<b>Total World</b>	<b>378</b>	<b>476</b>	<b>846</b>	<b>1,102</b>	<b>1,113</b>	<b>1,058</b>	<b>1,006</b>	<b>950</b>	<b>895</b>	<b>843</b>	<b>797</b>	<b>762</b>

(1) This includes only Thailand, Philippines, Malaysia, Pakistan and Vietnam  
(2) This includes only United Kingdom, France, Germany, Spain and Italy  
(3) Note - This is global traded thermal coal including lignite, and inclusive of non-seaborne trade.

Source: IEA database, IEEFA forecasts

As such, history could well record 2013-2014 as showing that China coal production and consumption peaked, international coal imports peaked, and global consumption of coal peaked as well.

**Figure 2: Thermal Coal Export Price - Newcastle 6,000kcal NAR US\$/t**



Source: Index Mundi, Australian thermal coal Monthly Price - US Dollars per Metric Tonne

# Institute for Energy Economics and Financial Analysis

The Institute for Energy Economics and Financial Analysis (IEEFA) conducts research and analyses on financial and economic issues related to energy and the environment. The Institute's mission is to accelerate the transition to a diverse, sustainable and profitable energy economy and to reduce dependence on coal and other non-renewable energy resources.

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## About the Authors

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Tim Buckley has 25 years of financial market experience covering the Australian, Asian and global equity markets from both a buy and sell side perspective. Tim was a top rated Equity Research Analyst and has covered most sectors of the Australian economy. Tim was a Managing Director, Head of Equity Research at Citigroup for many years, as well as co-Managing Director of Arkx Investment Management P/L, a global listed clean energy investment company that was jointly owned by management and Westpac Banking Group. Tim has worked at IEEFA since 2013.

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**Tom Sanzillo, director of finance for IEEFA**, is the author of several studies on coal plants, rate impacts, credit analyses, and public and private financial structures for the coal industry. He has testified as an expert witness, taught energy-industry finance training sessions, and is quoted frequently by the media. Sanzillo has 17 years of experience with the City and the State of New York in various senior financial and policy management positions. He is a former first deputy comptroller for the State of New York, where he oversaw the finances of 1,300 units of local government, the annual management of 44,000 government contracts, and where he had oversight of over \$200 billion in state and local municipal bond programs and a \$156 billion pension fund.

Sanzillo recently contributed a chapter to the Oxford Handbook of New York State Government and Politics on the New York State Comptroller's Office.

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- <sup>i</sup> China Shenhua Energy Company Limited, Third Quarterly Report for the year 2015, page14, referencing the National Bureau of Statistics, China Coal Market Network, China Electricity Council.
- <sup>ii</sup> <http://cleantechnica.com/2015/10/19/chinas-solar-pv-capacity-to-reach-150-gw-by-2020-says-xinhua/>
- <sup>iii</sup> <http://www.bp.com/content/dam/bp/pdf/energy-economics/statistical-review-2015/bp-statistical-review-of-world-energy-2015-coal-section.pdf>
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- <sup>xii</sup> <http://www.eskom.co.za/Whatweredoing/SupplyStatus/SupplyStatus/AdeqRep2015w43.swf>
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