"Will there be metallurgical coke shortages in 2011?"

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Comments on Coke Market

At the start of 2010, world iron output has recovered to 1.05bn tonnes annualized; and coke and coking coal prices have almost doubled over the past 12 months.

In 2009 there were many "unusual" coke transactions; temporary surpluses in Europe and US were shipped to markets where there was need for coke - India as well as other developing countries.

Coke prices "fob China" have lost their previous significance as the main benchmark for the world market. The 40% export tax levied since August 2008 makes most potential transactions unworkable. Little likelihood that China will reverse this tax soon, as from its perspective coke is both a causer of pollution and an energy product. Therefore, production of a surplus for export is discouraged.

As Chinese coke pricing is largely nominal, we have adopted prices for Europe and Indian imports as alternative indicators for the market.

Supply continues from other sources in line with market demand e.g. Poland, Russia, Ukraine, Colombia, Japan etc. Note that most of these sources primarily supply the western hemisphere, whereas demand is growing more in the eastern hemisphere.

We will show that if Chinese coke continues to be kept from the market, there is likely to be a market shortage from 2011. Impossible to conceive how supply from other sources could fill the gap.

Coking coal producers have adopted quarterly pricing from this year, adding a new factor to the coke market.

Adding to market tightness will be 11m tpy of permanent coke capacity closures (mainly in Europe) enforced by the economic crisis of the last two years.

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World Iron Output & Commodity Markets

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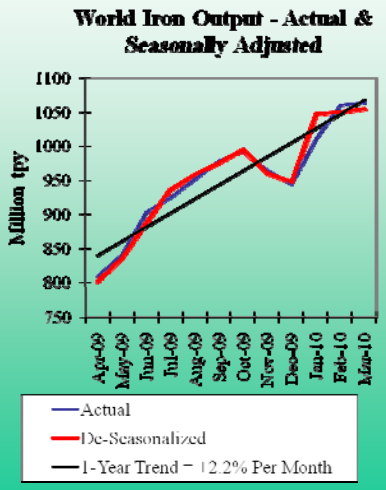
Global Annualized Pig Iron Output Data



- World iron output increased from April 2009 low-point; then it declined in the last two months of the year.
- However, there was a rebound in iron output in Q1 2010 to 1.05bn tonnes annualized.
- Strength in world iron output reflects increasing volumes in both Europe (+0.9% average rise per month from 10/09 to 03/10), Americas (1.0% per month) and Asia (+2.3% per month).

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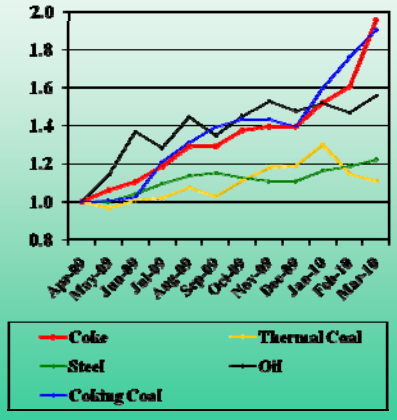
Pricing for Coke Indexed vs Steel & Other Raw Materials – 2009-10



- The past 12 months have seen a recovery in the coke and related commodity markets from the lows of Q2 / Q3 2009, prices almost doubling.
- Prices for BF coke and coking coal (spot) show a correlation as might be expected.
- Coke and coking coal have outperformed the steel market over the past 12 months, also the energy markets (coal, oil).
- Limited supply of coking coal and export tax on Chinese coke means that carbon reductants are a "choke point" for the steel industry.

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Coke & Coking Coal Pricing & Trade

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Monthly Market Prices Reported by "Resource-Net"

Grade	*Basis, $/tonne*	*Market Characterisitcs*
Blast Furnace Coke (30/90mm)	Europe c&f, India c&f, China fob	Main benchmark for the coke market, accounting for most of world trade. In the blast furnace, PCI or injection of other materials can cut coke rate.
Nut (10/25mm)	Europe c&f, China fob	Reductant in some N-F processes (e.g. ferroalloys). Often needs exacting specifications, which can lead to sourcing difficulties. Options exist for coke replacement. Apart from ferroalloys, this market in decline outside China.
Foundry (80/220mm,100/ 250mm)	Delivered Europe (euro), China fob	Cupola furnaces (iron castings, stone wool). Likely capacity shortages in the future, despite long-term decline in iron foundry volumes in developed regions. Europe – quarterly pricing pattern.
Breeze (0/10mm)	Europe c&f	Main uses in ore-sintering and electrodes. Pricing tends to be "localized" due to relatively low value, so limited opportunities for international trade.
Coking Coal (hard)	Export port fob ("spot")	Australia is main reference supplier. Switch to quarterly pricing in 2010.
Anthracite Lumps (10/100m)	Europe c&f	Mainly refers to CIS origin, good quality. Uses in coke replacement especially in soda ash and sugar. Suppliers target 60-70% of coke price.
Anthracite Fines (0/10mm)	Europe c&f	Interchangeable with coke breeze in some applications.

(Prices obtained by informal communication with industry participants i.e. traders, consumers.)

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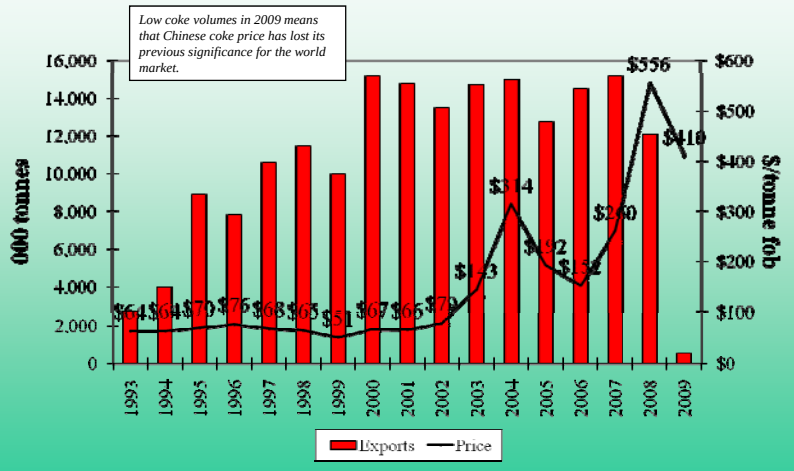
Chinese Coke Price vs Exports



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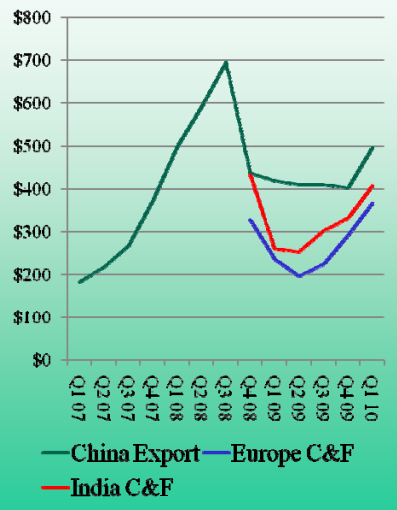
Blast Furnace Coke Pricing



- Due to 40% export tax applied from August 2008, pricing from China was uncompetitive in world markets last year. BF coke exports were very low.
- In March, however, there was renewed interest in Chinese coke by India. The market has risen to a level where it is apparently worthwhile paying 40% tax to export; but this is likely to be short-term phenomenon.
- Activity remains low in Europe as far as coke buying goes; more business going through in other markets (Brazil, Middle East etc).
- Important to note that our European price indicates what end-users in Europe pay; it does not indicate the price at which coke is available for export from Europe to other regions.
- Rise in coke prices in Q1 more reflects higher coking coal prices than high coke demand.

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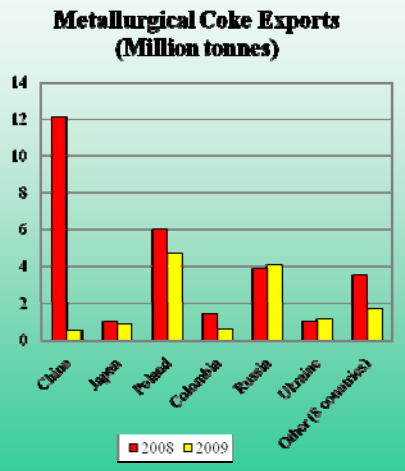
Key World Coke Exporters



- Whatever Chinese coke was exported in 2009 was foundry and undersize grades. Massive decline from 12m tonnes to around 0.5m tonnes explained by export tax rather than world economic situation.
- Japan: exports in long-term decline, but new opportunities arising in Asian markets due to absence of Chinese coke.
- Poland: mainly supplies other European countries, though sales to India, Iran and Pakistan start in last two years.
- Colombia: traditional markets in Latin & North America, but also supplies Europe and India.
- CIS (Russia & Ukraine): becoming important suppliers to Middle East & India in absence of Chinese coke.

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Cross-Border Trade in Coke by World Region

	Coke Imports, million tonnes (As % of Demand)				
	2005	*2006*	*2007*	*2008*	*2009 (e)*
Europe	11.1 (21%)	12.3 (23%)	12.5 (23%)	12.0 (23%)	6.7 (19%)
CIS (fmr Soviet Union)	2.0 (4%)	2.2 (4%)	3.4 (6%)	2.7 (6%)	2.1 (5%)
North America	3.8 (16%)	4.2 (18%)	3.0 (13%)	5.0 (22%)	0.9 (6%)
Latin America	2.1 (19%)	1.9 (16%)	2.2 (17%)	2.6 (20%)	0.5 (5%)
Sub-Saharan Africa	0.4 (14%)	0.4 (12%)	0.6 (16%)	0.5 (15%)	0.3 (13%)
Maghreb & Middle East	1.2 (18%)	1.3 (18%)	1.2 (18%)	1.2 (19%)	1.0 (19%)
Asia	5.8 (2%)	7.4 (2%)	8.8 (2%)	5.5 (1%)	3.1 (1%)
Australia	0.1 (2%)	0.0 (-)	0.1 (3%)	0.1 (3%)	0.0 (-)
Total – a	**26.5 (6%)**	**29.5 (6%)**	**31.8 (6%)**	**29.6 (6%)**	**14.5 (3%)**

a – from all sources, including countries within the region.

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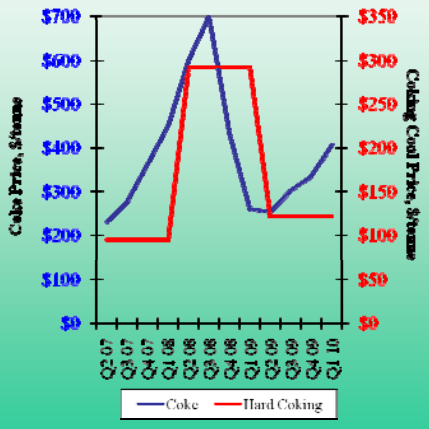
Coke versus Coal Pricing – By Quarter from 2007



- Charts shows coke prices (Indian) against "hard" coking coal price. Most of the time, coke has become "leading indicator" for direction of the hard coking coal price - in our view.
- In last few months, however, coking coal has been pushing up the coke price.
- From Q2 2010, coking price is being fixed quarterly rather than annually on request of the producers. The reasons are:
  - Greater influence of Chinese market, where pricing is shorter term.
  - BHPB's aim to have all its commodities "exchange traded", apparently to raise investor appeal.
- Hard coking coal fixed at $200/tonne fob in Q2 2010, spot price was $230-235/tonne fob in March.

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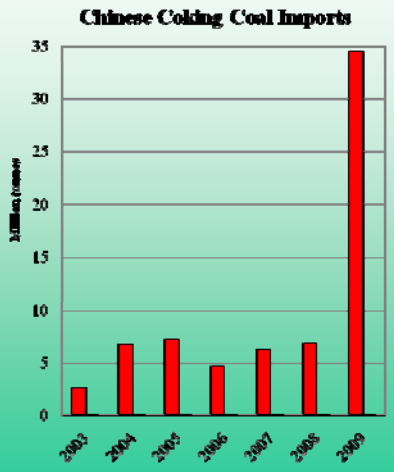
Rise of China's Coking Coal Imports



- **China emerged as major import market for coking coal in 2009.** Last year's imports of 34.4m tonnes are very significant when you consider total world trade in met coal has been at the level of 220-230m tonnes in past few years…
- We estimate that imports of coking coal were equivalent to 7% of total coking demand in China in 2009 (1-2% in previous years).
- Note that China also imported 102,000 tonnes of coke in 2009; so it is clear that its policy is not to return to being a commodities exporter, but supplier of added value products.

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Coke Production & Capacity Outlook

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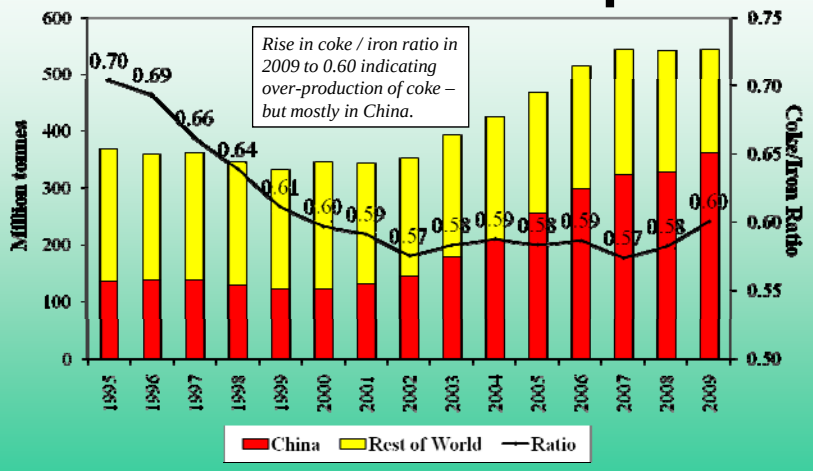
World Coke Output versus Ratio to Iron Output



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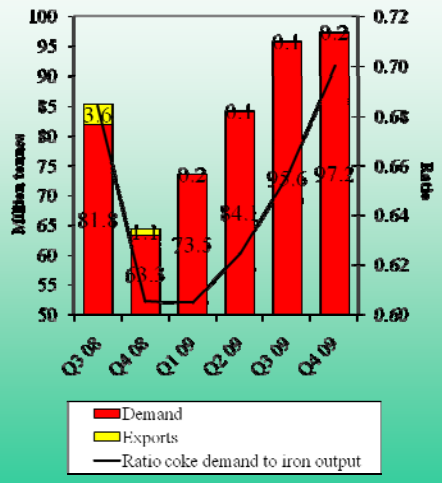
Chinese Coke Demand & Exports



- This chart shows Chinese coke demand (apparent basis = output minus exports) and exports, plus ratio of coke demand to iron production.
- Increase in ***coke demand to iron output ratio*** from Q1 to Q4 2010 shows rising coke availability and stocks in China last year. Downturn in iron production in Q4 led to coke over-supply at year-end.
- Exports of coke minimal in 2009, less than 2% of the total production.

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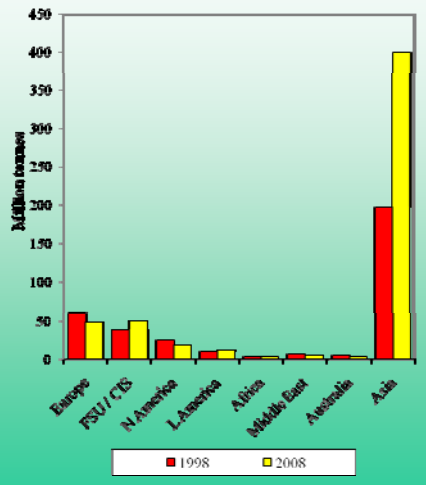
Coke Production by Region



- World coke production has become increasingly dominated by Asia, and in particular China, over the past decade.
- Asian coke production more than doubled from 1998 to 2008.
- In contrast, European coke production has fallen by 18% over the same period. In North America, it has declined by 22% using the same comparison.
- The Fmr Soviet Union (CIS) has also seen some increase in coke production, up by 29% over the past ten years.

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Coke Capacity Developments

Country	*Capacity, M tpy*		*Change over 5 Years*	*Capacity Developements*
	2004	*2009*		
Europe	56.6	52.7	-3.9	Significant permanent battery closures in European countries in 2008-09 (on next slide). Programme of battery rebuilds ongoing in Poland, as well as Bosnia, Czech Rep and Germany. HKM expansion postponed in 2009.
FSU / CIS	66.6	67.3	+0.7	Some replacement batteries ongoing in Russia and Ukraine. Novolipetsk Steel and Zapsib closed capacity in 2008-09.
North America	22.8	22.9	+0.0	Sun Coke recently completed projects at Haverhill and Granite City, construction due to start Middletown. US Steel Clairton rebuild on hold. Indianapolis Coke closed in 2007.
Latin America	10.7	14.8	+4.1	Coke projects completed at Tubarao and Acominas in 2007-08. Usiminas rebuild postponed until 2011. Expansion plans in Colombia from 2009 onwards.
Africa	3.8	4.0	+0.2	ArcelorMittal closed battery in S Africa in 2009. Coke plant completed in Zimbabwe end of 2009 in jv between Hwange and Chinese company.
Maghreb & Middle East	7.4	8.5	+1.1	New plant in Iran completed in 2008. In Turkey, Isdemir rebuilt some coke capacity in 2007-08.
Asia	341.8	502.1	+160.3	China accounts for most new capacity in Asia. Projects in India but status often unclear. In addition, there are projects ongoing in Japan and Korea.
Australia	3.5	3.5	0.0	No new investments in capacity.
Total	**513.1**	**675.6**	**+162.5**	**Excluding China, net rise in world coke capacity was 11.5m tonnes.**

Identified Permanent Coke Battery Closures 2008-09

Location		*Total, M tpy*
Kremikovtzi, Bulgaria	All operations stopped indefinitely October 2008.	1.42
OKK Sverma , Czech Rep	One battery (#3) closed in Q3 2009, #4 to stay open.	0.34
ZKS, Carling, France	No buyer found for plant, it was closed in September 2009.	0.85
ISD Polska, Czestochowa, Poland	One of two batteries closed in May 2009.	0.32
ArcelorMittal, Krakow, Poland	Two of three batteries closed.	0.75
ArcelorMittal, Zdzieszowice, Poland	Two batteries (#1 and #2) closed in 2009.	0.60
ArcelorMittal, Galati, Romania	Five remaining batteries closed in June & July 2009. Coke will be sourced from Poland.	2.26
Novolipetsk, Russia	Two batteries were closed in October 2008, two more in February 2009.	2.46
Zapsib, Novokuznetsk, Russia	One battery closed permanently in 2009.	0.65
US Steel, Clairton	In Q1 2009, batteries #7-9 were allowed to go cold and will not be restarted; no firm date for their replacement.	0.79
ArcelorMittal, Vanderbijlpark, South Africa	Battery #1, dedicated to the merchant market, closed in May 2009.	0.25
Total		**10.69**

Summary & Conclusions

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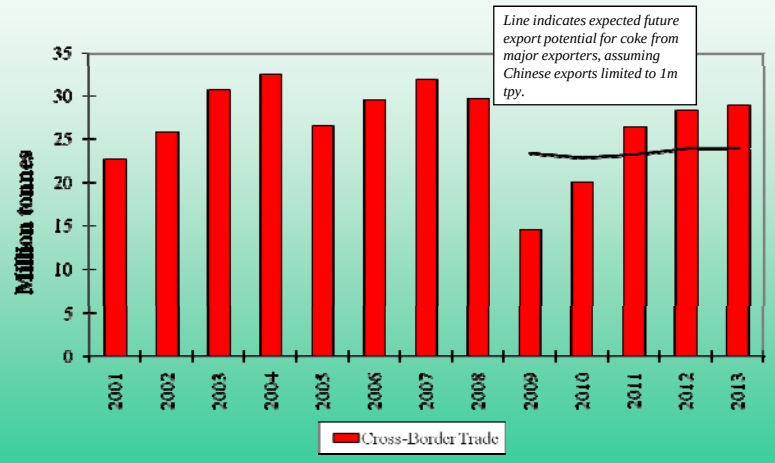
Historical & Forecast Demand for Cross-Border Traded Coke



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Reasons Why Coke Likely to Remain in Short Supply

It is most unlikely that China will reduce the 40% tax on coke exports, despite diplomatic pressure from the EU and the US. Once demand for cross-border coke trade returns to historical level of around 30m tpy (by 2012?), it is impossible to see how other countries can compensate for the loss of China's 14m tpy export capacity.

Permanent closures in 2008-09 of coke capacity totaling almost 11m tpy at 11 sites mainly in eastern Europe, largely enforced by the market collapse (total world capacity outside China = 265m tpy end 2009). This will lead to a reduction in coke export capability from Poland and Czech Republic, two main suppliers of merchant coke to the rest of Europe. Also, in 2009 the HKM coke plant expansion (1.1m tpy) in Germany was postponed for a second time, as well as some other projects around the world. (Expansions in Japan, Korea and US still proceeding.)

Start-ups in 2009-10 of blast furnace capacity in Asia with no associated coke plants e.g. Ann Joo in Malaysia, Tata Steel in Thailand (both 0.5m tpy), and Dragon Steel in Taiwan (2.5m tpy. Adds to large merchant coke demand in India for merchant pig iron, ferroalloys and soda ash production.

Also, coking coal supply will most likely remain under pressure. Development of new reserves in Mongolia and Mozambique will need an era of high prices, as infrastructure in these countries is at low level. (Just as era of "cheap oil" is over, same could be said for coking coal.)

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Resource-Net Field Research: Hwange Gasification Co, Zimbabwe – August 2009

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Resource-Net Field Research: Victoria Falls (Zimbabwean-Zambian border)

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