Introduction:

Coking coal or “coke making coal” is the raw material used to make coke.

In 2003 about 388 million tons of coke was produced world wide of which more than 40% was produced in China.

Coke is used in various industries sectors such as foundry, merchant Pig Iron, lead and zinc smelting, ferrochrome production, production of manganese alloys, soda ash, stone wool or sugar refining .... and, it is also in used in the domestic heating sector.

But the vast majority of coke is used in the steel industry. The bulk of the coke production is used as sized coke that is needed in blast furnaces and coke fines are mainly used as sintering fuel.

As other coke consuming sectors did not evolve so much we focus our analysis on the aspects related to the recent growth in coke and coking coal demand in the steel industry. And, as China plays a dominant role in the coke as well as in the steel industry, we will also review the situation in China.

Economic fundamentals

When demand increases and supply is tight then prices will increase. When prices increase, they will encourage additional supply or open doors for alternative products. These additional or alternative supplies might cause prices to drop or stabilise. This process will go on until market equilibrium is reached. And until price, supply and demand are in equilibrium. This equilibrium will last until the supply and demand balance changes again.

But the market is not perfect and oversupply situations or shortages may last for many years.
Difficulty of price setting

When an oversupply situation lasts for many years then prices are low for many years and then industries get used to that situation.

This is what happened until recently in the coking coal market. For many years, until 2003, we got used to an oversupply of coking coal and low coking coal prices.

This is why the industry did not fully understand the impact that the rise in Pig Iron production, which started in 2002, was going to have on the coking coal demand.

As early 2003 coking coal producers agreed to settle prices at lower levels than the 2002 prices, it is safe to assume that they did not understand the market evolution correctly.

Worse, in 2003 early 2004, whilst the market showed clear signals of extreme tightness some producers still accepted prices which converted in their local currency, are in fact 13% lower than the price they got for their coking coal in 2002.

In other words it is not easy to predict market “swings”. Timing, speed and magnitude of market changes are difficult to predict.

Fast increase in steel production

The magnitude and the speed of the growth of crude steel and Pig Iron production caught most observers and analysts by surprise.

Steel consumption grew a lot faster than average economic growth forecasts suggested.

Today this is explained by the fact that a large portion of the economic growth in 2003 (and still today) comes from China.

While China's GDP represented only a modest 4 percent of world GDP last year, it accounted for fully 13 percent of the world's growth. China was responsible for about one third of global steel consumption in 2003.

This disproportion between economic growth and steel consumption is best explained with the graph of Mr Alves of CVRD presented at the Global Steel Making Raw Materials conference in Rotterdam in May 2003.

It shows the elasticity of steel utilisation in developing economies.
Learning from the evolution of steel consumption in new economies like Taiwan and South Korea, it shows that growth in GDP in developing economies results in a much faster growth of per capita steel consumption than in developed economies.

The reason is that developing economies need to build a lot more infrastructure, roads, ports, railways, and housing than developed economies and thus, proportionally, use more steel than developed economies.

**More growth?**

China was the driver for the recent market evolutions. This graph provides us an indication for the reasons why steel demand in China is growing more rapidly than its booming economy.

What drives China?

There are at least 4 “drivers”:

1. A GDP of US$ 1.2 billion growing at a rate 9% (or more) per year.
2. Heavy governmental investments in infrastructure.
3. High inflows of foreign investment.
4. And the Chinese exports.

Observing the impact that the growing Chinese economy has on the steel industry, it is possible that we are out for more growth. Just imagine what is going to happen when the Indian market starts following the Chinese curve.

China’s Prime Minister once said *“Any small problem multiplied by 1.3 billion will end up being a very big problem”*

If you combine the Chinese and Indian markets then you are talking about a factor that is no longer 1.3 but 2.3 billion. The impact on the market will be even bigger.

The coal industry has to watch the Chinese economy closely but also keep and eye on the Indian- and other developing economies.
China

Today China is the economic powerhouse of Asia and the powerhouse of the global steel industry.

We summarise hereafter some reports mainly from China Daily, “Xinhuanet”, a Chinese news server, and the Economist:

Almost everybody now agrees that the Chinese economy is growing too fast. Premier Wen acknowledged recently that China's booming economy was at risk of overheating, but stressed his government was taking action to ensure a "soft landing".

The key question is: will China’s economy indeed slow gently or will it crash leaving a hangover of excess capacity and deflation?

Investment in new steel works, for example, surged by more than 170% compared to a year ago.

A glut of property or industrial capacity could depress profitability, bankrupt firms and swell bank’s non-performing loans.

The debate over the extent to which China’s economy is overheating is sometimes a bit confused. The term “overheating” is normally used when an economy is suffering form excess demand. But China’s boom has been led by investment which means that supply is booming as well as demand. As a result the biggest risk to the economy is not inflation but overinvestment.

China faces two separate questions:
1. Will its economy slow significantly over the next few years? and
2. Can China sustain rapid growth for another couple of decades?
The answer to both questions might be yes.

To understand the risk and potential of the Chinese economy we have to keep in mind that China’s population above the age of 16 will grow by 5.5 million annually on average in the next 20 years and the total population of working age will reach 940 million by 2020.

In other words, to create enough jobs China needs to maintain a relatively rapid growth of its economy.

What is China’s sustainable growth rate?
- China’s economy is not limited by the supply of labour or capital
- There is a massive scope for productivity gains as workers move from low value-added agriculture to higher-value activities.

In theory, this could allow China to sustain a growth of 8% for another 2 decades.

In practice the limiting factor will be the inability of its financial system to allocate capital efficiently until it carries out financial-market reforms.

In practice the limiting factor will be its ability to avoid bad investment.
China’s bank system does not allocate credit efficiently. Bad debts may already be 40-50% of loans. The government needs to slow the economy to avoid another wave of bad loans.

The combination of a badly functioning banking system, excessively cheap money and heavy government meddling is bound to result in some bad investment results. However, it would be wrong however to dismiss most of China’s investment as wasteful.

The Chinese Government is taking action to keep things under control. In an attempt to halt "redundant" investments the Chinese Government, late April, ordered that no approvals for new steel, aluminium and cement projects be made this year. In its latest attempt to cool the economy, the State Council issued a circular that also called for a nationwide examination of nearly all investment projects including commercial offices, golf courses and shopping malls.

Today, with more encouraging macro-economic reports at hand, there is confidence that the central government tactics are at last proving effective. Beijing’s emergency measures of economic intervention have so far helped to cool down the economy. But these measures are still far from enough to help the investors choose more sensible projects.

A lot more work still has to be done to prevent the economy from overheating time and again.

This being said, while a hard landing can not be ruled out, a soft landing is the more likely outcome for the country’s, high-flying, but apparently earthbound, economy.

Economic Outlook

For above-mentioned reasons we believe that the economic activity in China continues to remain robust with growth projected at 8.4% in 2004 and 7.9% in 2005.

<table>
<thead>
<tr>
<th>GDP growth</th>
<th>2003</th>
<th>2004e</th>
<th>2005e</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>3.0%</td>
<td>4.6%</td>
<td>3.2%</td>
</tr>
<tr>
<td>Sth America</td>
<td>1.9%</td>
<td>3.7%</td>
<td>3.7%</td>
</tr>
<tr>
<td>EU-15</td>
<td>0.8%</td>
<td>2.1%</td>
<td>2.1%</td>
</tr>
<tr>
<td>China</td>
<td>9.1%</td>
<td>8.4%</td>
<td>7.9%</td>
</tr>
<tr>
<td>India</td>
<td>7.3%</td>
<td>6.6%</td>
<td>6.5%</td>
</tr>
<tr>
<td>Japan</td>
<td>2.7%</td>
<td>3.0%</td>
<td>1.2%</td>
</tr>
<tr>
<td>World</td>
<td>3.7%</td>
<td>4.5%</td>
<td>3.9%</td>
</tr>
</tbody>
</table>

The economic growth outlook for the USA, Japan and the EU-15 also reflects a strong recovery that appears to be sustained and is projected to remain positive.

- Growth in the USA is projected to remain strong.
- The outlook for Japan has improved significantly.
- Growth in the EU-15 is projected to improve substantially in the next two years. After bottoming out in 2003 with a growth of only 0.8%, growth in 2004 is projected to be 2.1%.
**Evolution of global steel consumption**

On the basis of these conclusions concerning the general economic outlook the Economic Studies Committee of the IISI projected, in April 2004, global consumption of finished steel products to increase by 6.2% or 53 million tonnes in 2004 and by 4.5% or 41 million metric tonnes in 2005.

**What does that mean in terms of coking coal demand?**

How does this growth in global consumption of finished steel translate into Pig Iron production, coke consumption and coking coal demand?

You find calculations on table below:

<table>
<thead>
<tr>
<th></th>
<th>In million MT</th>
<th>2002</th>
<th>2003</th>
<th>4/04 ann.</th>
<th>2004</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finished Steel</td>
<td></td>
<td>834</td>
<td>860</td>
<td>913</td>
<td>954</td>
<td></td>
</tr>
<tr>
<td>Ratio Cr Steel/Fin St</td>
<td></td>
<td>1.08</td>
<td>1.10</td>
<td>1.09</td>
<td>1.09</td>
<td></td>
</tr>
<tr>
<td>Crude Steel</td>
<td></td>
<td>903</td>
<td>948</td>
<td>994</td>
<td>1040</td>
<td></td>
</tr>
<tr>
<td>Crude Steel in BOF</td>
<td></td>
<td>541</td>
<td>585</td>
<td>614</td>
<td>615</td>
<td></td>
</tr>
<tr>
<td>Ratio BOF/ Cr Steel</td>
<td></td>
<td>59.93%</td>
<td>61.76%</td>
<td>61.76%</td>
<td>61.76%</td>
<td>61.76%</td>
</tr>
<tr>
<td>Pig Iron</td>
<td></td>
<td>608</td>
<td>653</td>
<td>686</td>
<td>685</td>
<td>716</td>
</tr>
<tr>
<td>Ratio Pi/Cr steel</td>
<td></td>
<td>1.124</td>
<td>1.115</td>
<td>1.117</td>
<td>1.115</td>
<td>1.115</td>
</tr>
<tr>
<td>Coke rate (kg/thm)</td>
<td></td>
<td>430</td>
<td>428</td>
<td>425</td>
<td>425</td>
<td>425</td>
</tr>
<tr>
<td>Size coke demand</td>
<td></td>
<td>262</td>
<td>279</td>
<td>291</td>
<td>291</td>
<td>304</td>
</tr>
<tr>
<td>Coke production</td>
<td></td>
<td>308</td>
<td>329</td>
<td>343</td>
<td>343</td>
<td>358</td>
</tr>
<tr>
<td>Coking coal demand</td>
<td></td>
<td>415</td>
<td>444</td>
<td>463</td>
<td>463</td>
<td>483</td>
</tr>
<tr>
<td>Addition</td>
<td></td>
<td>28.39</td>
<td>18.70</td>
<td>20.77</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4/04 ann = 4 first months of 2004 annualized

The ratios and methodology applied:

- We used a ratio of 1.09 to convert Finished steel into Crude steel. The exact formula is a bit more complicated but this rough figure will do for the purpose of this exercise.
- Looking at Crude Steel production by process we notice that the share of Basic Oxygen Furnaces in crude steel slowly increases. Because of shortage of scrap, particularly in China this trend is not likely to change in the short term. In 2003 61.76% of the total crude steel production was produced in Basic Oxygen Furnaces. We used this ratio to calculate BOF crude steel production.
- To calculate the Pig Iron production. We assumed that the ratio of 1.115 will apply for 2004 and 2005. This is based on some historical data. Please note that as Pig Iron is also used in foundry and other steel applications more Pig Iron is produced than needed for basic oxygen steel making alone.
- To calculate the need of sized coke to produce that quantity of Pig Iron we used the coke rate figures published in the Metallurgical Coal Report of the McCloskey group. These figures are pretty consistent with other figures we found in various other sources of information. The use of sized coke tends to reduce slightly every year, because of increased use of PCI in blast furnaces. This trend will continue. PCI use presently averages 133kg/thm world wide and is likely to increase.
- We applied a ratio of 85% to estimate the total quantity of coke production needed to obtain the required quantity of sized coke used in blast furnaces. In other words we estimate that approx 15% of the coke produced are coke fines which generally are either injected in the blast furnace or used as sinter fuel.
Finally we applied a ratio of 1.35 to convert the quantity of coke produced into the quantity of coking coal needed.

On the basis of above-mentioned we calculated the additional quantities of coking coal that are needed.

As can be seen from this table, for the year 2003, we estimate that an additional 28.3 million tons of coking coal were consumed for steel making.

Where did all that additional coal come from?
A large part of the additional coking coal needed was needed in China. China’s production of coking coal has substantially increased but this increase did not cover the full additional requirements world-wide. China withdrew coking coal from the export market and other users had to find new sources of supply.

The additional demand was further covered by:
- Part of the additional demand has been absorbed by coal stock reductions.
- Part of the additional demand came from increased capacity utilisation at coking coal mines and increased production
- Part of the additional demand was covered by a redefinition of what is to be considered a “coking coal” in other words: “flexibility on quality”.

As you see from the table, we estimate that in 2004, the market will again need an addition of approx 18.7 million tons coking coal on top of the 28.3 million increase of last year.

This year the “stock” buffer has gone. These tons can only come from additional production, additional sources and via flexibility and creativity on quality.

The response of coking coal suppliers to this market situation has been dynamic. The high price levels are causing mine owners to re-evaluate planned mine closures and consider further mine developments.
There are tangible plans for more coal out of Australia, Canada, China and elsewhere. This year we also see a surge in US metallurgical coal exports. In the short term US mine operators will divert coals previously supplied to the domestic power market into the international metallurgical coal markets.

We expect that the trend will continue in 2005. In 2005 the market will again need an additional 20 million tons of coking coal on top of the 2003 and 2004 additions.

In other words over the period 2003 to 2005 I expect that the coking coal market will grow by over 67 million tons.
Risks of supply disruption

When talking about “growing” then we are assuming that the “old” production level the production of before 2003 is kept and runs smoothly. The 67 million ton additional requirements do not allow for “accidents”. The risks of supply disruption are not taken into account.

Unfortunately accidents do happen. In 2004 the market had to face numerous problems, amongst others:

- Canadian exports were hit by the most severe winter conditions in a decade.
- Seasonal floods in Queensland hampered rail movements at several mines.
- Problems at the Dalrymple Bay coal loader in Queensland.
- The fire at Southland colliery.
- Delays at Pinnacle mine
- Supply disruption at the Buchanan mine
- Roof fall at the Kestrel mine.
- Not to talk about the numerous accidents in Chinese mines.

The market has to hope for the best.
In the best circumstances stock levels are expected to remain low.

There is no early resolution to the present situation.

This explains why the procurement strategy of metallurgical coal consumers is changing. Buyers are scrutinizing the market much sooner than usual and are seeking longer term deals.

Those buyers counting on a drop in metallurgical coal prices for next year are in for an unpleasant surprise.

Additional quantities

The market needs more coking coal. The response of the suppliers has been dynamic. There are tangible plans for more coal out of Australia, China, Canada and other parts of the world:

- Australia might bring up to 39 million tons new coking coal capacity
- Canada might produce another 20 million tons of coal by end 2007 (of which some 4-5 million might be coming on stream this year)
- And also China is certainly going to increase capacity by a few million tons.
- Russia might bring a few million tons additional capacity
Conclusion

How quickly the all this planned additional capacity can come on stream, and whether it is enough to cover the needs, rebuilt stocks, to cover replacement of capacity that will be lost over time is difficult to predict.

But this will certainly take some time. Short term relief is not in sight.

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