Supporting India’s Emerging Steel Industry via the Provision of High Quality Raw Materials

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The global steel industry continues to power on led by China

Chinese crude steel production
CAGR >20% from 2001

Million Tonnes

Source: IISI, BHP Billiton
Metallurgical coal based steel production has entered a new growth phase

Source: IISI, CRU, BHP Billiton
China’s steel demand sustained strong growth

China Steel Demand Outlook

Source: CISA, BHP Billiton
Demand driven by construction, infrastructure & machinery

China Steel Demand by End Use Sectors

- Construction
- Infrastructure
- Machinery
- Automobile
- Consumer durables
- Shipbuilding
- Others

2000 2001 2002 2003 2004 2005

Kt, finished steel

Source: IISI, CRU, BHP Billiton

<table>
<thead>
<tr>
<th>Sector</th>
<th>00-05 CAGR %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>19</td>
</tr>
<tr>
<td>Others</td>
<td>40</td>
</tr>
<tr>
<td>Container</td>
<td>13</td>
</tr>
<tr>
<td>Shipping</td>
<td>21</td>
</tr>
<tr>
<td>Cons. Durables</td>
<td>16</td>
</tr>
<tr>
<td>Automobile</td>
<td>20</td>
</tr>
<tr>
<td>Machinery</td>
<td>19</td>
</tr>
<tr>
<td>Infrastructure</td>
<td>16</td>
</tr>
<tr>
<td>Construction</td>
<td>14</td>
</tr>
</tbody>
</table>

Total kg/capita 2005: 233

CAGR %

Source: IISI, CRU, BHP Billiton
As infrastructure and manufacturing remain very important

![Bar chart showing industry as proportion of GDP for China, India, USA, and EU. China has the highest proportion, followed by India, USA, and EU.]

Source: CRU
India is set to be an economic super power of the 21st century

India is set to become a top four global economy within two decades...

Real GDP*, US$ billion

- India’s rank in GDP

<table>
<thead>
<tr>
<th>Year</th>
<th>GDP, US$ billion</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>Brazil 581, India 11</td>
</tr>
<tr>
<td>2010</td>
<td>Italy 929, India 9</td>
</tr>
<tr>
<td>2015</td>
<td>France 1,411, India 6</td>
</tr>
<tr>
<td>2025</td>
<td>Germany 3,174, India 4</td>
</tr>
<tr>
<td>2035</td>
<td>Japan 7,854, India 3</td>
</tr>
</tbody>
</table>

...and contribute a giant share of the incremental GDP growth amongst major world economies**

<table>
<thead>
<tr>
<th>Year</th>
<th>GDP Growth, Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>2020</td>
<td>2.1</td>
</tr>
<tr>
<td>2050</td>
<td>5.0</td>
</tr>
<tr>
<td>2050</td>
<td>20.1</td>
</tr>
</tbody>
</table>

Goldman Sach’s BRICs report assumes India GDP growth of ~8% p.a.

Even by conservative estimates of (6% p.a.), India will be top 5 economy by 2025

* Base year 2002
** Major world economies considered are the BRIC and G6 countries

Source: Goldman Sachs
Steelmaking Processes – India should favour BF route

Basic Oxygen Furnace
- Iron Ore
- Coal
- Coke
- Sintered ore
- Molten pig iron
- Slag
- CONVERTER (BOF)
- REFINING STAND
- CONTINUOUS CASTING
- ROLLING MILL
- Hot Rolled Coils

Electrical Arc Furnace
- Raw liquid steel
- “Graded” Liquid Steel
- REFining STAND
- THIN SLAB CASTING
- TUNNEL FURNACE
- ROLLING MILL
- Hot Rolled Coils

Major steelmaking route
Advantages of BF based steelmaking for India

• Ability to utilise vast Indian iron ore reserves
  – Lump and fines

• Can make full range of steels
  – Construction to Advanced High Strength steels

• Economies of scale
  – MBF to >5,000m³

• Energy efficiency
  – Significant efficiency gains, greenhouse benefits
  – Further options can be developed

• India well experienced with BF technology
Meeting India’s future steel needs

Requirements

1. Vibrant local steel industry
2. World class domestic mining industry
3. Supplies of excellent hard coking coal

BHP Billiton can provide assistance with 2 and 3 leading to the further development of a successful vibrant steel industry.
India’s steel production has also grown...accelerating??

Current production break-up

- EAF/IF: 35%
- Blast Furnace: 65%

Source: IISI, BHP Billiton

Pig iron 3.5%pa
Crude steel >16%pa
## Indian steel industry structure – predominantly private

### Players

<table>
<thead>
<tr>
<th>ISP</th>
<th>Production Mtpa 2005</th>
<th>Technical/equipment</th>
<th>Products and Markets</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAIL</td>
<td>4.9</td>
<td>Complex production flow (Blast furnaced → Basic oxygen → Furnace → Casting Rolling)</td>
<td>Wide variety of flat and long products including higher value-added products</td>
</tr>
<tr>
<td>Bhilai</td>
<td>4.1</td>
<td></td>
<td>Domestic and International</td>
</tr>
<tr>
<td>Bokaro</td>
<td>2.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Durgapur</td>
<td>1.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rourkela</td>
<td>4.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TISCO</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RINL</td>
<td></td>
<td></td>
<td>Control 50% of steel production</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Steel Majors</th>
<th>Production Mtpa 2005</th>
<th>Technical/equipment</th>
<th>Products and Markets</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESSAR</td>
<td>3</td>
<td>EAF/ Planning Corex unit</td>
<td>Mainly high value flat products</td>
</tr>
<tr>
<td>JVSL</td>
<td>2.4</td>
<td>Corex / Blast Furnace</td>
<td>Domestic and International</td>
</tr>
<tr>
<td>ISPAT</td>
<td>2.4</td>
<td>EAF / Blast Furnace</td>
<td></td>
</tr>
<tr>
<td>OTHERs/EAF*</td>
<td>8.8</td>
<td>Small EAF units</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MBF</th>
<th>Production Mtpa 2005</th>
<th>Technical/equipment</th>
<th>Products and Markets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pig iron unit – 15</td>
<td>2.5</td>
<td>Blast Furnace producing pig iron</td>
<td>Castings, foundries, rolling mills</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sponge Iron/Rollers</th>
<th>Production Mtpa 2005</th>
<th>Technical/equipment</th>
<th>Products and Markets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sponge Iron – 31</td>
<td>10</td>
<td>Single production line (/Electric Arc Furnace/ Induction Furnace → Rolling) or just Hot Rolling</td>
<td>Mainly long products of low quality</td>
</tr>
<tr>
<td>Re-rolling – 2080</td>
<td>22.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HR – 7</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CR – 59</td>
<td>3.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GP/GC – 14</td>
<td>1.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TIN plating – 2</td>
<td>0.18</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Source: India steel, JPC*
Benefits from world class domestic mining industry

- Deep understanding of resource through state of the art exploration
- World class mining technologies
- Maximum utilisation of natural resources
- Environment and community development
- Infrastructure development
- Taxes and royalties to the state
- Merchant ore market promotes downstream industries
- Competitive downstream industries
Ensuring iron ore resources are maximised

Latest geophysical tools

Deep drilling technology at fast rates

Geological Model

Detailed Mine Planning
Developing world class technology for resource understanding

Fundamental studies are designed to understand the link between:

- GEOLOGY, the genesis and dispersal of ore types in the ground,
- MINERALOGY, the type and dispersal of mineral phases within the ore,
- the fundamental PROPERTIES of the ore, and
- its BEHAVIOUR in use
giving the greatest potential for extracting the maximum value from the ore in sinter and ironmaking.
Resource companies develop/operate world class infrastructure

- Logistics key to mineral utilisation and evacuation
- Dedicated heavy haul freight railways
- World record for longest and heaviest freight trains
- Transports 100 Mtpa on a single line
- World class port infrastructure
Proving mining in a responsible environmental friendly manner

1985

BHP Billiton Awarded “Company of the Year” in the Business in the Community Awards, 2005

2004
Trends in global met coal demand

- **New BF capacity and associated coke capacity planned**
  - China, India, Brazil & new integrated steel capacity in Asia eg Korea, Thailand
  - Significant relined and enlarged BF capacity planned
  - New batteries Japan, Korea – remove reliance on merchant market

- **Changes to seaborne balance due to declines in domestic production**
  - Germany
  - USA, esp. low volatile HCC

- **Rise of China as an important met coal importer in medium term**
  - New coastal capacity favouring seaborne imports

- **Move away from SSCC to HCC**
  - Larger, and high BF productivity requiring increased levels of high quality HCC
  - Kyoto supporting moves to lower fuel rates = move away from SSCC to HCC
Traditional and new steelmakers are building / refurbishing and planning new coke capacity:

- Japan new battery for JFE and NSC
- Russia, Ukraine, new capacity proposed
- Malaysia/Thailand: Possible new batteries as part of new steel capacity
- Korea new battery at Pohang, planned with INI steel
- India numerous new batteries, incl. NRRO
- Brazil CST new HRCO at Vittoria
- Brazil various new projects
- US new capacity in Ohio further planned
- S. Africa battery rebuilds Newcastle
- Italy rebuilds at Taranto
- UK proposed new battery at Port Talbot
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Global Increase in met coal demand 2006 - 2007

Total met coal increase 2004 - 7 approx 25Mt or (5%pa)

- PCI total increase +4Mt, (5.0%pa)
- Semi-soft decrease -3Mt, (-3%pa)
- Hard coking coal increase + 28Mt, (6.1%pa)

Source: McCloskey, CRU, industry sources, BHP Billiton
Major met coal issues for India

• Need to import as local coals universally high ash

• New larger capacity BF’s will require high quality coke

• Better coke needed in future due to
  – Increased PCI use to world practices
  – Strong increase in BF productivity

• New HRCO will still require hard coking coals

• Will stamp charging produce coke suitable for large high productivity BF’s at >2.5t/m³.day??
India’s met coal demand will continue to rise

Source: Trade statistics, CRU, McCloskey, BHP Billiton
Major high quality global met coal producing regions

- **USA - Appalachia**
  - LV, MV, HV producer ~300km to coast
  - Reserve depletion, rising costs and logistics challenges

- **Canada - Elk Valley**
  - LV, MV producer, 1200km to coast
  - Logistics complex and partially constrained, rising costs

- **Russia - Kuzbass**
  - LV, MV, HV producer ~4000km to coast
  - Limitations on infrastructure, dependent on subsidised rail transportation
  - Strong domestic demand

- **China - Shanxi Province**
  - LV, MV, HV producer, 800km to coast
  - Strong domestic demand, resource depletion, environmental, safety issues, skilled labour shortages, rising costs

- **Australia - Bowen Basin**
  - LV, MV, HV producer ~300km to coast
  - Shortages of skilled labour, input costs rising, commissioning delays, port capacity

Predominantly export

Predominantly domestic
Queensland selected new projects

Australia and Canada
Majority of new projects are WCC/SSCC and PCI coals
Met Coal Supply Outlook to 2007

**Australia** (62% of global total)
- Exports up strongly
- Further additional supply from Hail Creek, Dendrobrium, Broadmeadows other HCC
- Brownfield creep/expansions
- Delayed new capacity expansions

**China**
- Little HCC exported
- Probable shortage of domestic HCC in future
- Counterbalance high domestic demand with export desires – China first
- Shanxi Province key - hard to predict

**Russia**
- Exports predicted to rise to 2007
- Domestic demand growth/supply tightening
- Most HCC owned by steelmakers
- Further potential, but domestic demand rising exports secondary – price sensitive
- Production costs low but very low rail freights vital

**Canada** (16% of global total)
- Exports increasing from 2004/5
- New capacity NE British Columbia, but mainly PCI, WCC or poorer HCC
- Ramp up Alberta, Cheviot, Grande Cache
- Possible restarts - brownfield expansions

**USA** (12% of global total)
- Difficult to predict after rise in 2004/5
- Outlook further decline, ~ 3-5Mt by 2007
- Possible decrease in HV – power linked
- High cost producer

**Key Takeaways**
- Continued importance of Australia especially in better quality HCC
- Port throughput not mine production the key to export volumes in near term
- Supply becoming more volatile

*Source:* McCloskey, Barlow Jonker, industry sources
Port and rail capacity is the key in the short term

**Russia – rising demand**
Kuzbass
*Ports* – limited spare capacity, long rail hauls

**Canada**
Elk Valley & NE British Columbia
*Ports* – Roberts Bank limited, Ridley spare capacity

**US – rising demand**
Central & Southern Appalachia
*Ports* – limited expansions, rail, logistics limitations

**Australia - Queensland**
Bowen Basin
*Ports* – DBCT, Hay Point at capacity, limited at Gladstone

**Australia - NSW**
Illawarra coalfield
*Ports* – spare capacity
BHP Billiton has numerous growth opportunities to meet market demand

**BHP Billiton Bowen Basin expansions contribute the majority of the growth, predominantly high quality hard coking coal announced Q3 2004**

- 75% hard coking coal
- 12% semi soft coking coal
- 13% thermal coal
- Majority brownfields

**Capacity growth based on:-**

- brown & greenfield expansions in Bowen Basin
- replacement new longwall and potential expansions in Illawarra
- new coking coal basin in Kalimantan, Maruwai
BHP Billiton’s expansion progress
Queensland – Bowen Basin

- Queensland Stage 1 expansion from 52 to 57 Mtpa completed
- Queensland Stage 2 (to 59 Mtpa) underway & due by 2nd half 2006
- Broadmeadow long wall commenced production August 2005
- Poitrel open cut approved and under construction
- Expansion of capacity at Hay Point Coal Terminal on track:
  - Phase 1 to 40 Mtpa (+6) by 2nd half 2006 – underway
  - Phase 2 to 44 Mtpa by 1st qtr 2007 – announced
  - Phases 3&4 to 55-57 Mtpa – being assessed & environ approvals sought.

- Currently evaluating range of further options for expansion subject to market demand and constraints imposed by the current environment
  - resource shortages, lack of skills people and significant cost pressures
BHP Billiton’s expansion progress
Broadmeadow – commenced production August 2005
BHP Billiton’s expansion progress
Poitrel mine

Crushing station

Surge bin

Ultra-fines microcell tanks

Poitrel rail loop

Note: Poitrel mine is a JV with infrastructure sharing
BHP Billiton’s expansion progress
Expansion of existing operations

- Construction of new Blackwater CPP
- Expansion of Saraji CPP
- Expansion of Hay Point
- Additional contract stripping
BHP Billiton’s expansion progress Illawarra and Maruwai

- Dendrobrium UG mine commenced production April 2005
- Further expansion options at Illawarra under feasibility study
- Maruwai moved into feasibility study stage.
Concluding Remarks

• The global steel industry remains on a fast growth track, is India joining in?

• The challenges of meeting India’s “need for steel” can be met with the support of local and major resources companies such as BHP Billiton

• Development of India’s vast iron ore resources would benefit from state of the art exploration, mining and resource utilisation technologies

• BF based steelmaking is the optimal solution for India’s steel needs requiring imported met coal

• The outlook for met coal esp. hard coking coal is strong and challenges to meet market demand are faced by all major producing regions

• BHP Billiton are fully committed to meeting the growth for coking coal, delivering India the confidence and assurance for its future steel needs