

Raw Material Security for Steel Industry



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Global Steel Industry- Trends

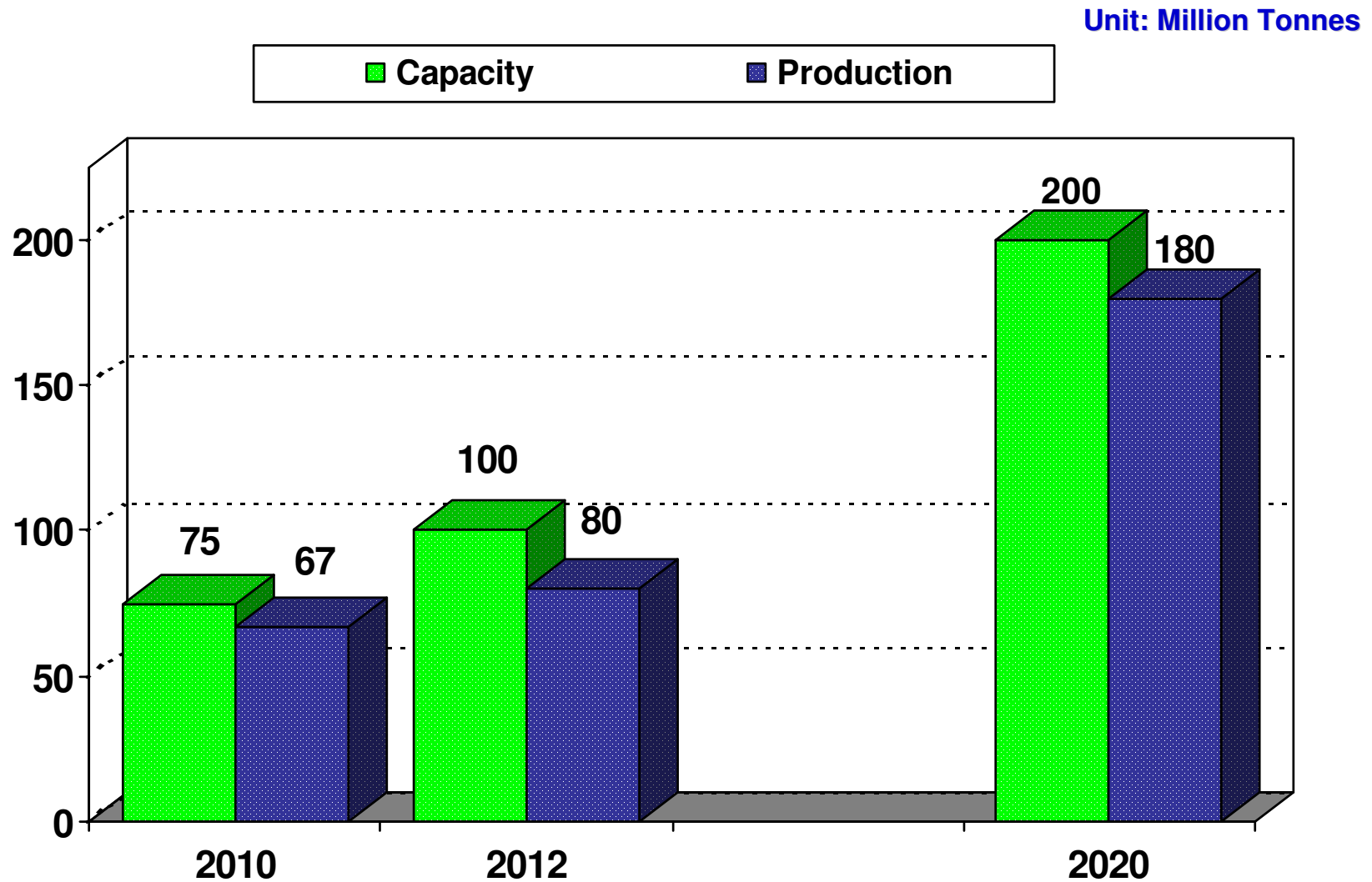
- Crude steel production recorded highest level of 1,414 MT in 2010, recording growth of 15% over 2009.
- Production in Japan and US revived in 2010 after recession of 2008/09, with increase of 25% and 38% respectively.
- Chinese production growth in 2010 reduced to single digit due to higher base, with its share in global steel production declining to 44% from 47% in 2009.
- Growth in global steel production has led to spurt in demand of steel making raw materials, specially iron ore & coking coal.



Indian Steel Industry- Trends

- India to emerge as the 3rd largest producer of crude steel in the world by 2012 from 5th in 2010.
- India is likely to increase the steel production capacity from about 75 MT in 2010 to nearly 100 MT by the year 2012 and 200 MT by 2020.
- Share of Oxygen route in total crude steel production, which showed a downward trend from 2004-05 to 2008-09, may go up significantly as the new capacity being planned is mostly based on Oxygen Steel Making.
- Steel consumption in 2010-11 growing at over 10%, the trend of double digit growth expected to continue for next couple of years also.
- There may be temporary period of surplus steel capacity in the domestic market.

Crude Steel Capacity Augmentation in India

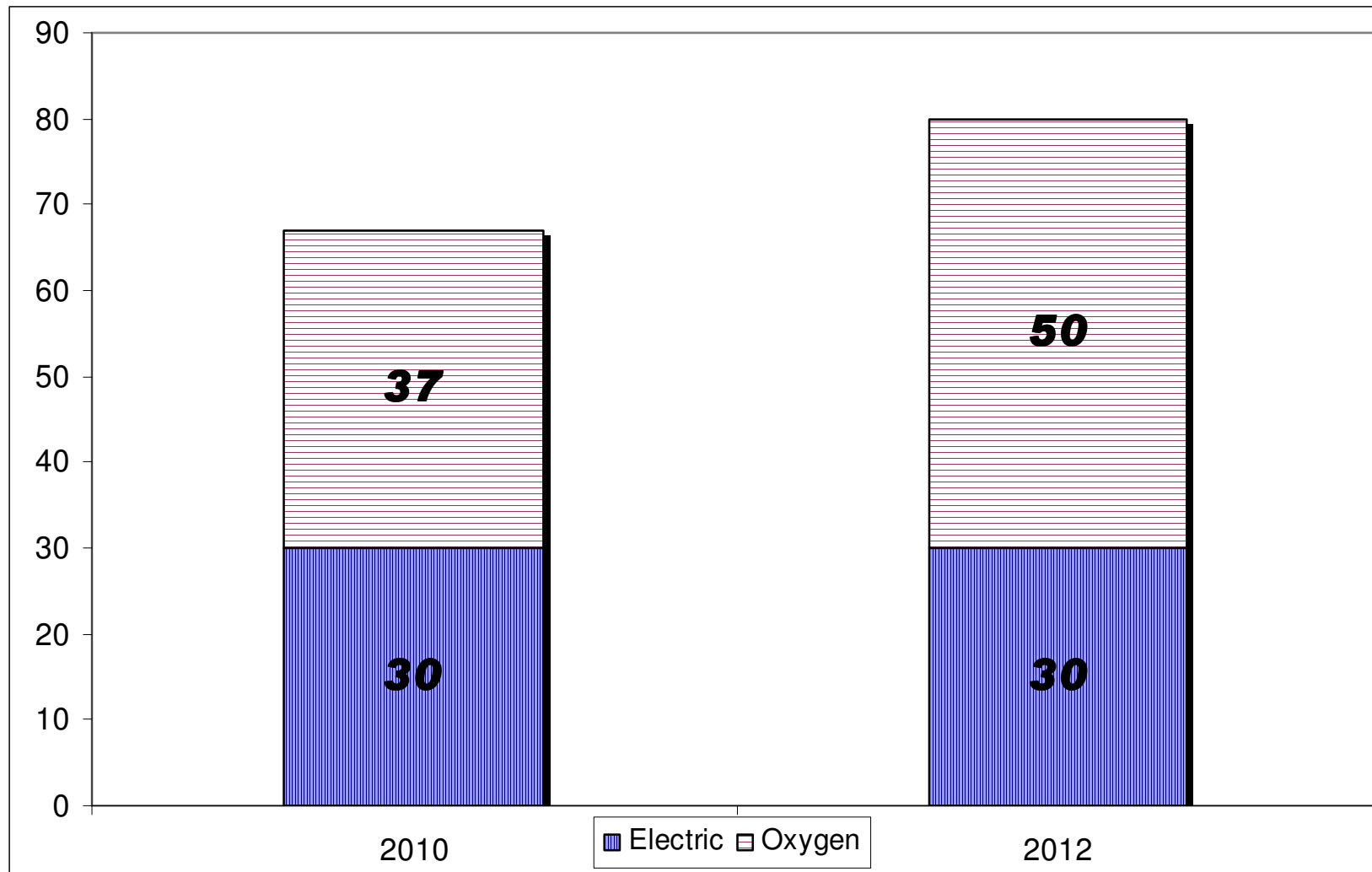


Capacity utilization 80% in 2012 & 90% in 2020



Growth in Oxygen Steel Making

Unit: Million Tonne



Most of the increase projected through Oxygen Steel Making

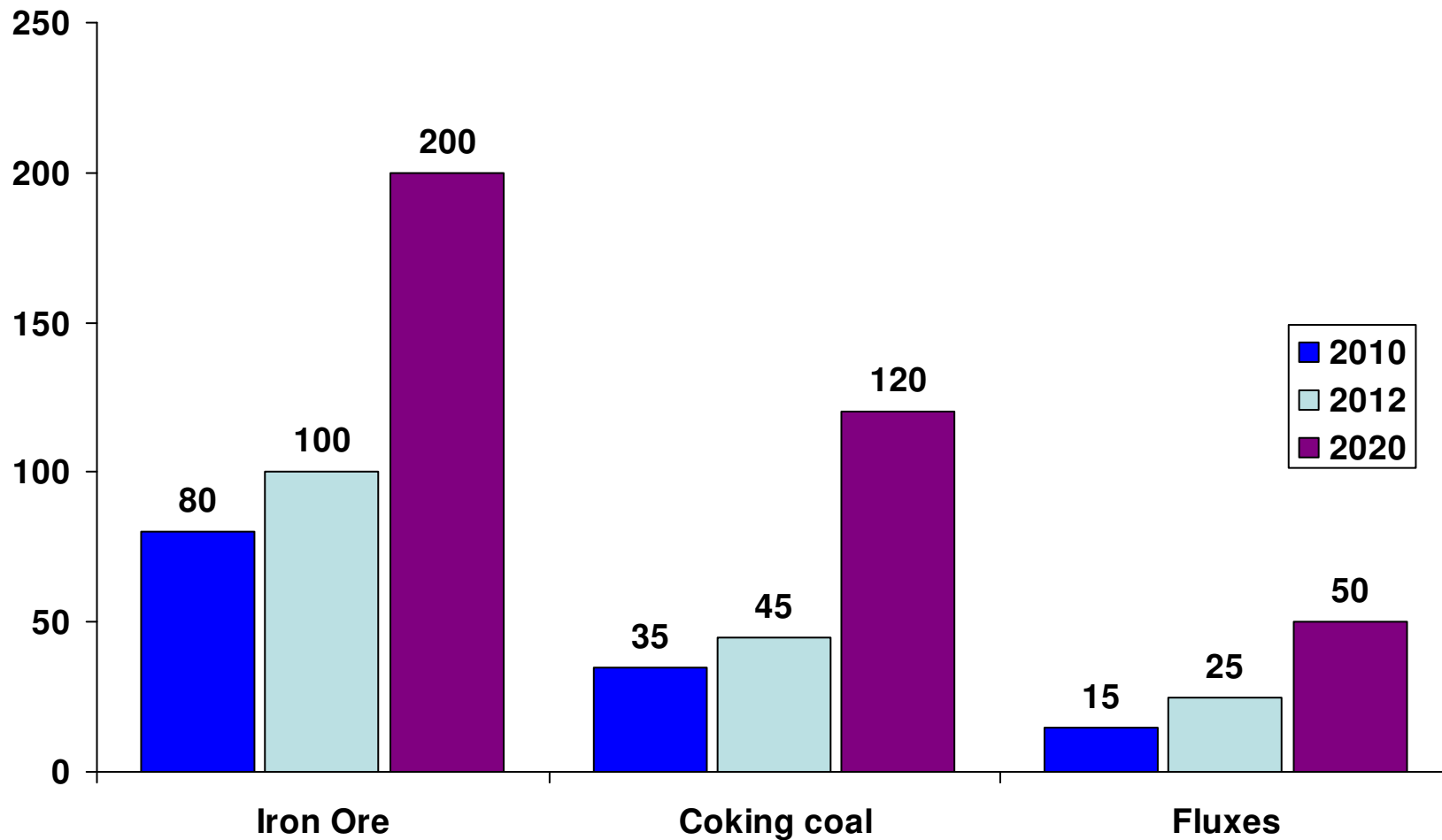
Raw Material Requirement

(Million tonnes)

Item	2010	2012	2020
Iron Ore	80	100	200
Coking Coal	35	45	120
Fluxes	15	25	50



Multifold increase in Raw Material Consumption





Indian Iron Ore Reserves

Unit' Billion T

	Reserves	Resources	Total
Haematite	7.00	7.63	14.63
Magnetite	0.06	10.56	10.62
Total	7.06	18.19	25.25

(Source-IBM)

Reserves are Proved resources.

Resources are indicated and inferred

India has low per capita reserves of iron ore at about 20-22 T against highest of 1417 T for Ukraine.

Iron Ore Export

Unit: Million Tonnes

Year	Export	Production	Export as % of Production
2005-06	89	165	54%
2006-07	94	188	50%
2007-08	94	213	44%
2008-09	106	215	49%
2009-10	128	226	57%



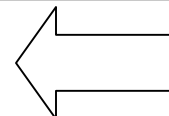
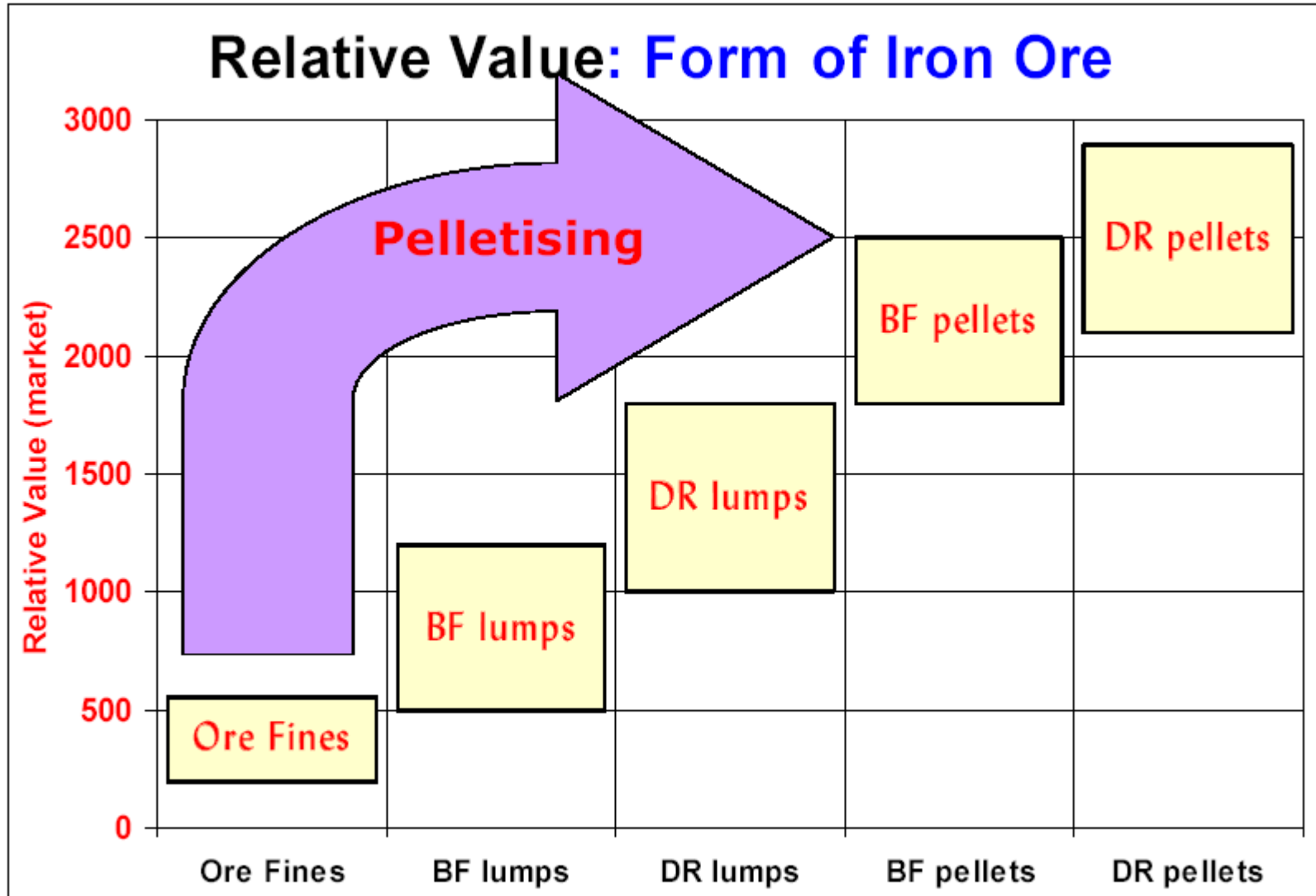
Concerns for iron ore Security

- Earlier thought was that iron ore reserves are in abundance.
- With the expected scenario of steel growth and considering a stable level of 200 MT steel production after 2020 and if the exports of iron ore at 100 MTPA continues, the reserves will last only up to 2050.
- India may have to opt for import of iron ore in long run.
- Long gestation period in acquiring mining lease and other clearances for setting up mines.
- Social issues- displacement/ R & R policy



Strategy for iron ore security

- Exploration of new deposits needs to be undertaken by exploration agencies/users
- As the current reserves are based on 55% Fe cut-off, efforts to be made to use ore <55% Fe by suitable beneficiation and pelletisation techniques.
- Eco-friendly mining and fast restoration of mined out areas.
- 100% utilization of steel plant wastes and tailing generated at mines.
- Curtailing export of iron ore.
- Acquiring assets of iron ore abroad. Some of the companies have already taken steps mainly due to inherent delays in acquiring mines in India.



Imperative – Need for conservation and resource enhancement

Challenges...

- Selective mining of High Grade lump ores (DRI)
- Many low volume producers
- Mismatch in agglomeration capacity and fines generation
- Lower production (33%) routed through beneficiation
- Increasing exports

Conservation....

- o Scientific Mining
- o Agglomeration capacity
- o Beneficiation.
- o Technology for using Slimes
- o Use of pellets
- o Restricting exports.

Enhancement ...

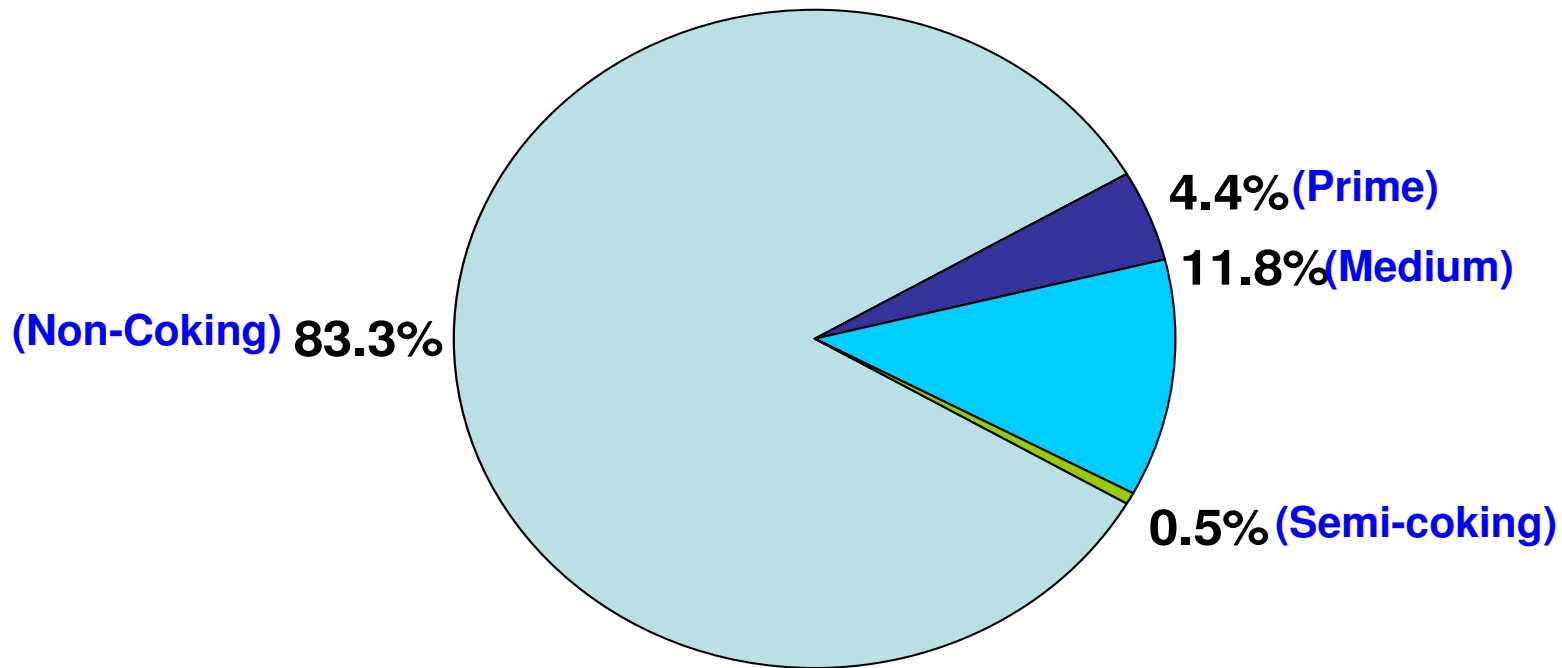
- o Detailed / Scientific Exploration
- o Fe cut-off in iron ore to be reduced to 50%



Coal Reserves In India

Proven reserves of Prime Coking Coal in India are about 4.6 BT, which is 4.4% of total proved coal reserves of about 105.8 BT.

Proven Coal Reserves



Source: Ministry of Coal



Coking Coal Requirement & Reserves

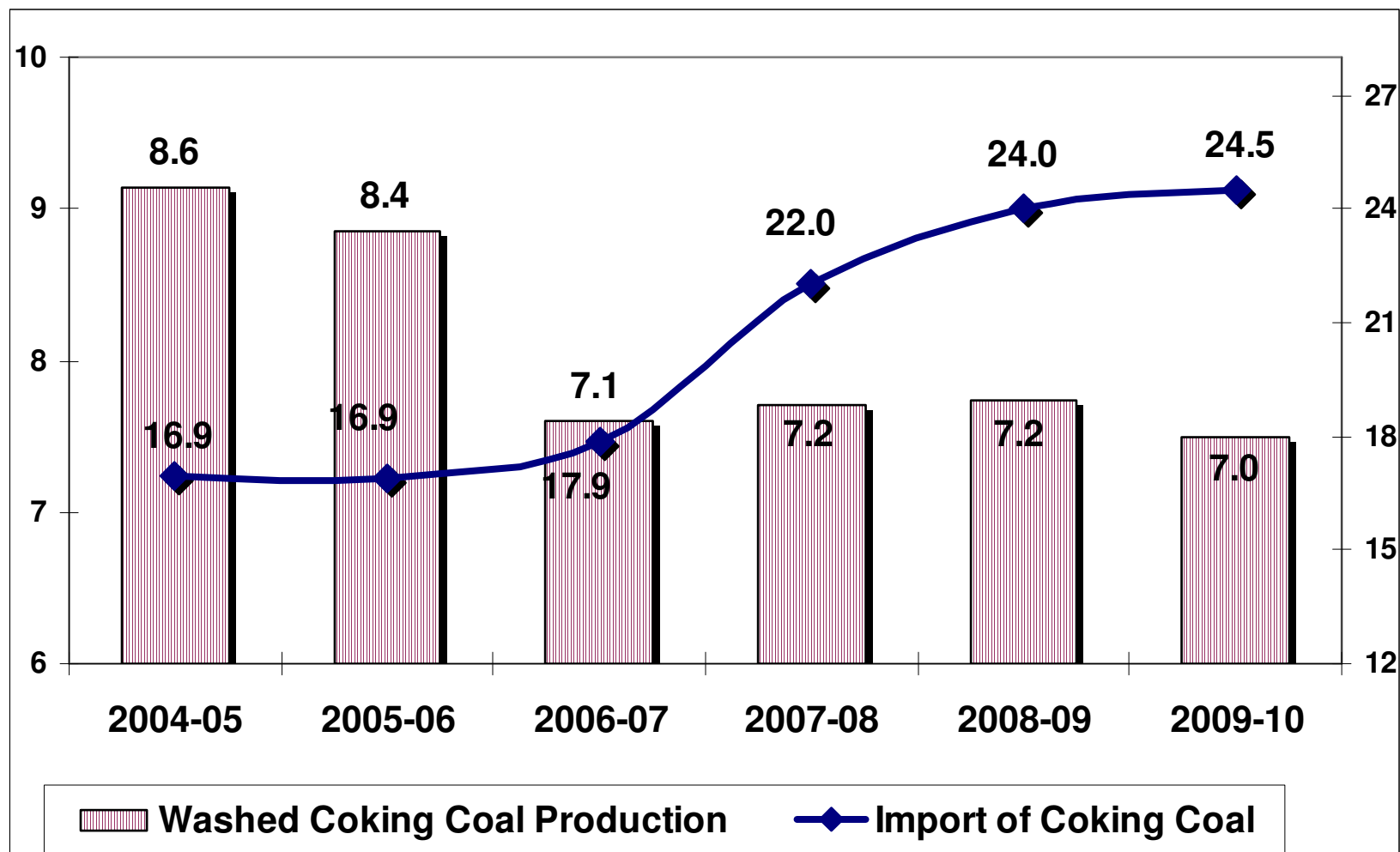
- Category wise coking coal reserves scenario with current consumption pattern

Category	% of Total Coking Coal Reserves	% of Requirement in Blend
Prime Coking Coal	20-25	75-80
Medium Coking Coal	75-80	20-25

- There is an imbalance between reserves and requirement of prime coking coal



Washed Coking Coal Production vis-à-vis Import Of Coking Coal In India



Source: CIL



International Coking Coal Prices

- Bargaining power for coking coal tilted heavily in favour of coking coal companies.
- International coking coal price now more complex due to spurt in Chinese demand and their trend of spot market purchase.
- Price volatility may increase due to move towards monthly pricing for LT agreements.
- Steel producers have found it difficult to pass on impact of sharp increase in coking coal price to the customers, particularly after switching to quarterly pricing.

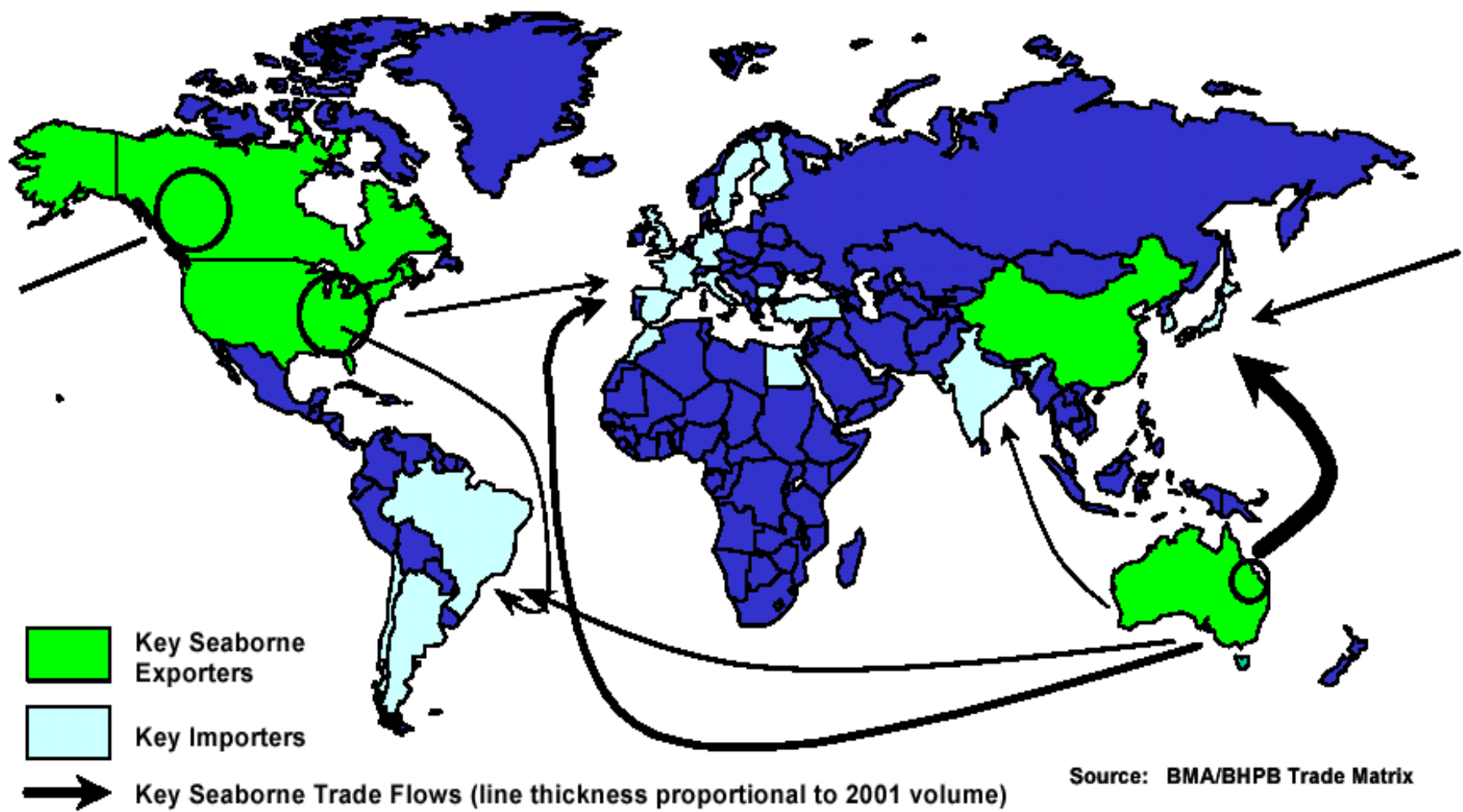


Figure 2. Seaborne metallurgical coal movements



Need For Imported Coking Coal

- Besides reducing supplies, Indigenous coking coals are characterized by high ash, low FSI and low vitrinites.
- Coking coal in India is imported to bridge the qualitative and quantitative gap between requirement and availability of coking coal from indigenous sources.
- Requirement, therefore, is of a compatible imported coking coal having low ash, good rank and blendability characteristics that can be blended with available indigenous coking coal to produce the desired blast furnace coke quality at competitive cost.
- India's dependence on imported coking coal is increasing year after year
- Occasionally, crisis situation arises due to disruption in imported coking coal supplies. Therefore, dependence on imports need to be restricted.

Indian Steel Industry : Road ahead

New Coking coal mines to be allotted only to steel companies

Coal companies are less focused on coking coal as major volumes are in non coking coals

Steel companies may have to acquire know how for faster development of mines

SAIL has formed JV with Tata Steel to develop coking coal resources in India.

Technological Initiatives

Technologies for steel making from low grade raw materials needs to be developed on commercial scale

Coal Beneficiation

Improving the efficiency of washing Low washability of Indian coals needs to be addressed

Jharia development plan

There is an urgent need to expedite the Jharia development plan for coking coal in collaboration with steel companies

Need to conserve scarce coking coal resources

Challenges...

- High ash
- Low domestic availability
- Poor washability
- Over 40% coking coal used for thermal use.
- 80% demand met thro' imports

Conservation...

- o Beneficiating
- o Improving washing capacity/efficiency
- o Technology using medium coking coal for coke making
- o Technology using non-coking coal

Enhancement....

- o Developing new sources
- o Detailed exploration
- o Acquiring coking coal assets abroad



Fluxes : Limestone and Dolomite

Limestone Reserves in India (in Billion T)

Grades	Proved	Probable	Possible	Total
BF	2.00	1.24	11.88	15.12
SMS (OH)	0.51	1.91	4.15	6.57
SMS(LD)	0.16	0.02	0.09	0.27
SMS(OH+LD mixed)		0.06	0.17	0.23
SMS & BF Mixed	0.13	0.20	1.58	1.91
Total	2.80	3.43	17.87	24.10

Source: As per IISI India 2020 study of 2007

- SMS grade available in Rajasthan and Himalayan region
- BF Grade mainly available in Central and Eastern India
- Current consumption is expected around 10 MT.
- May reach to a level of over 30 MT by 2020
- Domestic availability is sufficient



Issues : Limestone

- No large mines operating.
- High freight for limestone from Rajasthan
- Mining in Himalayan region – may not be permitted due to environmental reasons – already stopped in Doon valley
- Cheaper options available thru imports from Gulf countries.
- Coastal based plants taking limestone thru imports and will continue to do so. Imports ~ 5 MT (2010)
- With increasing imports of coking coal, thermal coal, the already saturated ports would become constraint for import of limestone.

Fluxes- Dolomite Reserves

Dolomite Reserves in India

(in Million T)

Grades	Proved	Probable	Possible	Total
BF	337.00	354.00	1373.00	2064.00
SMS(OH)	30.00	72.00	186.00	288.00
SMS(LD)	74.00	73.00	8.00	155.00
SMS(OH+LD mixed)	135.00	66.00	176.00	377.00
SMS & BF Mixed	72.00	75.00	209.00	356.00
Refractory	199.00	109.00	117.00	425.00
BF,SMS & Refractory	2.00	4.00	5.00	11.00
Total	849.00	753.00	2074.00	3676.00

Source: As per IISI India 2020 study of 2007

- Domestic availability is sufficient



Issues: Dolomite

- Reserves mostly in MP, Chattisgarh, AP, Karnataka, Rajasthan and Arunachal Pradesh
- At current level of consumption of around 150 to 200 kg/T of steel, the total reserves may last for 100 years at 200 MT steel production.
- Small mines in operation – mostly semi-mechanised and manual.
- Need for further prospecting and development of dolomite mines.
- Use of Dunite in iron making as a substitute of dolomite:
Dunite reserves in India are estimated at 168 million tonnes.

Challenges & Policies for meeting the growth demand

Challenges

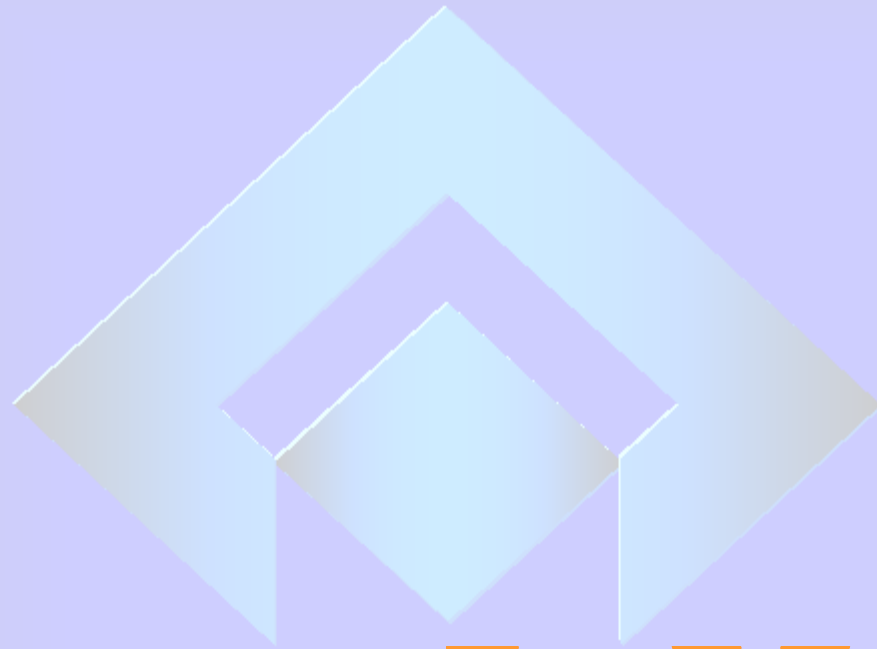
- Limited iron ore / coking coal reserves
- Long drawn process for land/forest/environmental clearance
- Socio/political pressures

Actions

- o Social / Environment cost to be seen in Long Term perspective
- o Technology for detailed exploration
- o Large area prospecting license
- o Linking iron ore resources to integrated steel plants
- o Allotment of coking coal blocks for steel companies
- o Export of iron ore to be discouraged.

Conclusion

- Dependence on coal will continue to be on imports. Coal block acquisition abroad and long term tie up with foreign supplier.
- Iron ore may need imports in long run. Exports to be capped or banned
- Limestone reserves are adequate. But due to logistics and environmental reasons, shore based plants' dependence will continue on imports. Long term tie up to meet the growing requirement
- Development of few large mines for dolomite needed
- Above all, the logistics at ports and inland transportation by rail to be augmented to match the growth.



Thank You