TATA STEEL

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Atmanirbharta in Coal for Indian Steel Making

D. B. Sundara Ramam

17th Oct'22

Agenda

1. Future of Coal & Changing Dynamics of India's Steel Market
2. Coking Coal Supply, Consumption, Cost & Mining Scenario
3. Challenges of Coking Coal Supply in India
4. Commercial Coal – Fueling 'Atmanirbharta' for Steel Making
5. Way Forward for Improving Coal Demand for Steel Making

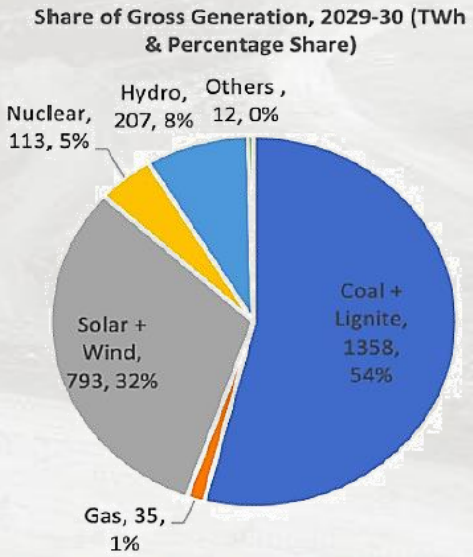
Future of Coal for India

- Coal currently accounts for 70% of the India's electricity generation.
- Expected to contribute 54% by 2030 and 35-40% by 2050 despite optimal energy transition announced in COP26 Glasgow.

- Optimistically Transitioning for **"Phase-down".**

- Five Nectar elements (Panchamrit) announced by GoI:
  - ✓ Non-Fossil energy capacity to 500 GW by 2030.
  - ✓ 50% of energy requirement from renewable by 2030.
  - ✓ **Net Zero by 2070.**
  - ✓ Reduce Carbon Intensity by less than 45% by 2030.
  - ✓ Reduce Carbon emission by 1 billion tonnes from now till 2030.

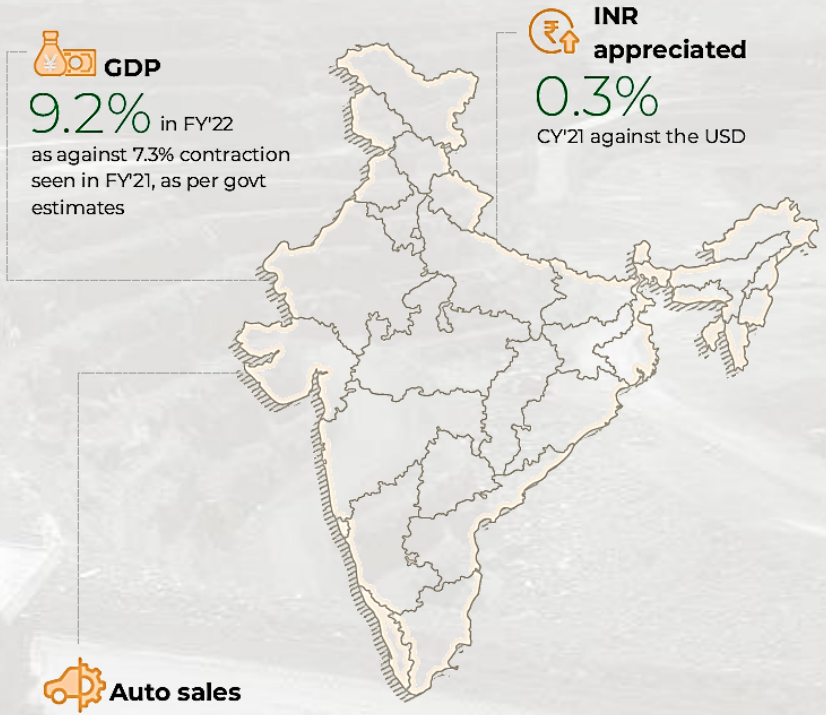
- **Coal to continue to dominate source of energy generation and steel making at least for next 3 decades.**



Source: COP26 Glasgow, CEC and Other Sources

Changing Dynamics of India's Steel Market

- Capacity has expanded from 128MT to 145MT over the last 6 years.
- India continues to remain the world's second-largest steel producer, witnessing a sharp hike of around 18% y-o-y in crude steel output that stood at around 118 mn t in CY'21.
- Production on the Blast Furnace route is 67MT out of a total of 118MT.
- Total imports of met coal during 2021 were 60MT which includes about 10mt of PCI coal.
- National Steel Policy (NSP) is targeting 300MT capacity by 2030.
- BF route should see scaling up to about 120MT by 2030.
- This translates to met coal requirement to double in the next 8-10years.
- Caveat: new innovative technologies that may emerge to replace met coal partially or fully.
- Shift to the DRI route for expansions – brownfield & greenfield.
- Environmentalists clamoring for de-carbonization.



Metallurgical Coal Scenario in India

- Iron ore and coking coal are two most critical raw materials for steel production. India has surplus reserves of iron ore for long term requirement. However, the supply of coking coal needs to be enhanced on account of the following:

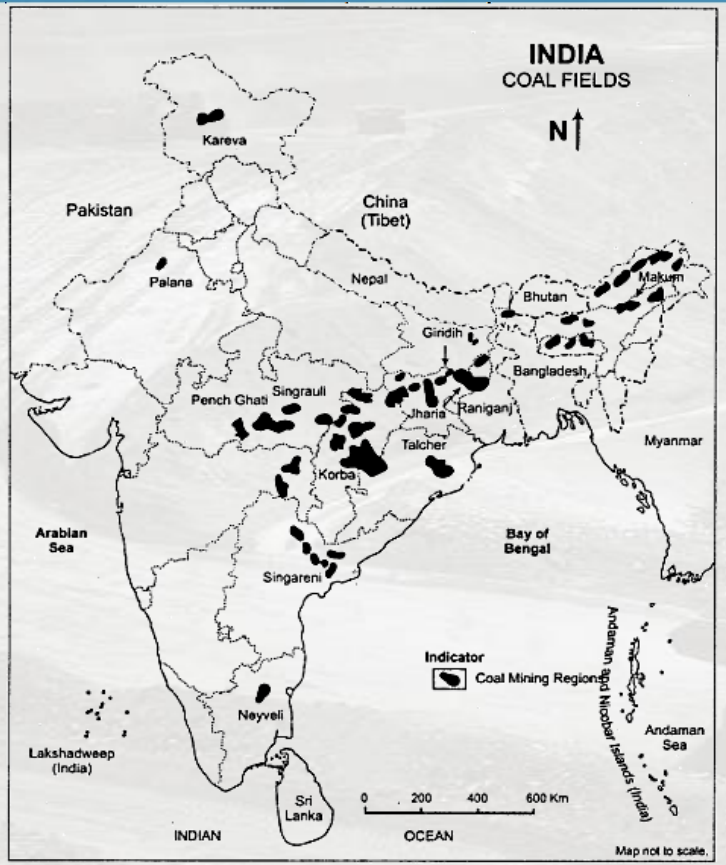
1. **Huge Demand Supply Gap of Coking Coal:** India's domestic reserves are inadequate to meet the demand. Domestic raw and washed coking coal production during last few years has been around ~50 MTPA and ~5 MTPA respectively, whereas import of coking coal stood at ~50 MTPA.

2. **Increase in Domestic Steel Demand:** According to National Steel Policy 2017, to achieve steel making capacity of 300 MTPA (including 181 MTPA through blast furnace route) by FY 2030, huge volumes of coking coal (~170 MT of domestic raw coking coal) would be required.

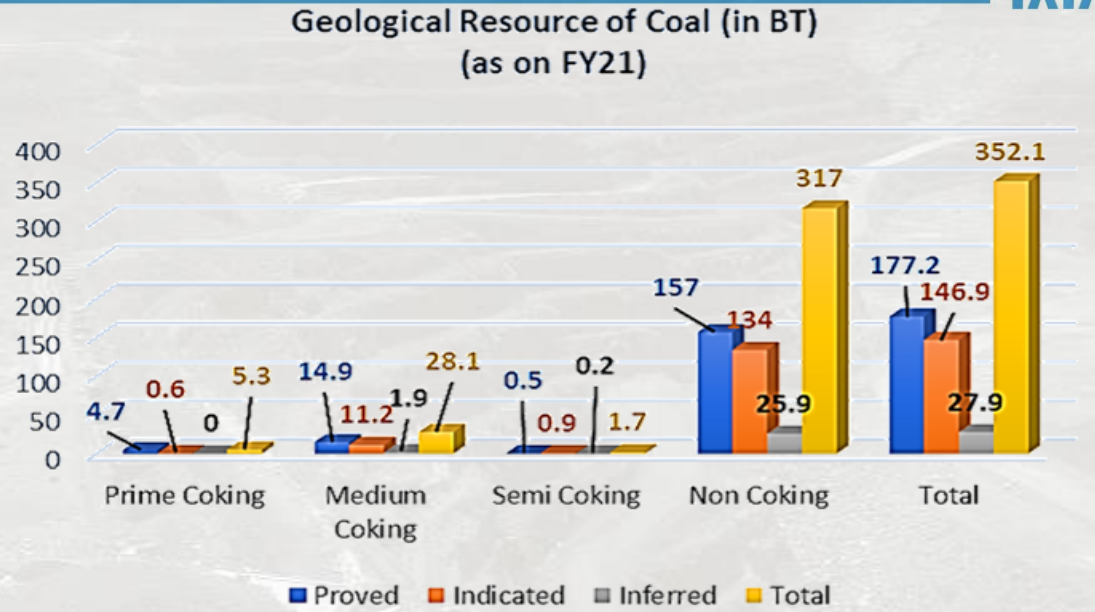
3. **Import Dependent:** Indian steel industry fulfils ~70% of its coking coal requirements through imports. Growth in steel production is expected to push up demand for metallurgical coking coal to 75 MT in FY 2023. Consequently, the share of imports is expected to remain over 76-77% in FY 2022 and FY 2023.

Source: IMC Report on Augmentation and Consumption of Domestic Coking Coal by Steel Sector, Ministry of Coal

India's Coal Resource



Map : Major Coal Fields of India

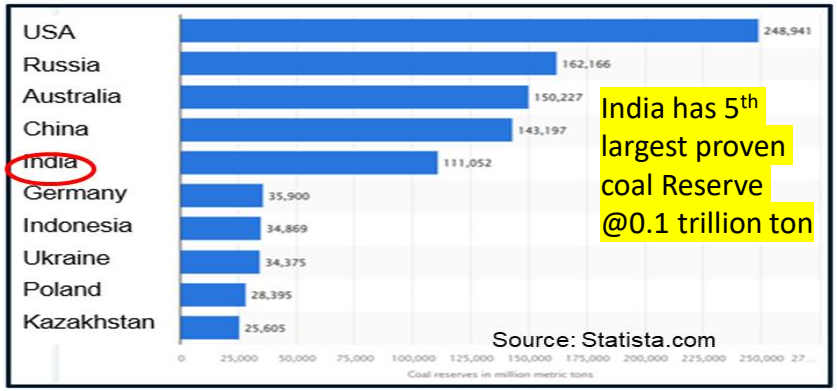


- 88% production from Open Cast Mines.
- 12% production from Underground Mines.
- Coal deposit in 14 states.
- Coal contains generally high ash and low sulphur.

Source: Coal Directory Of India 2020-21 & Coal India

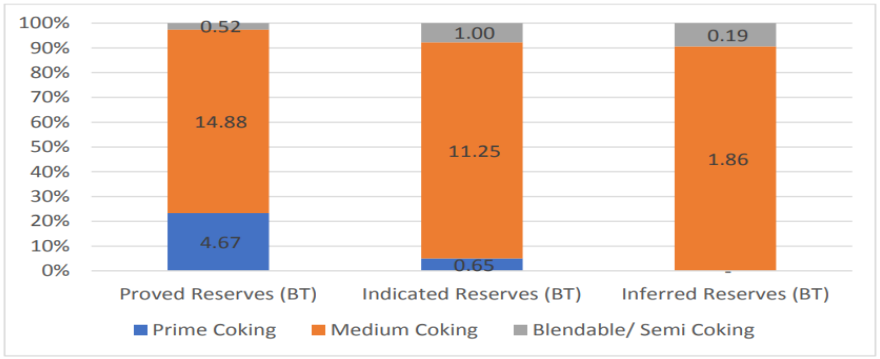
Coking Coal Reserves of India as on April 1, 2020

Proven Coal reserves in the World (in mt)-2020



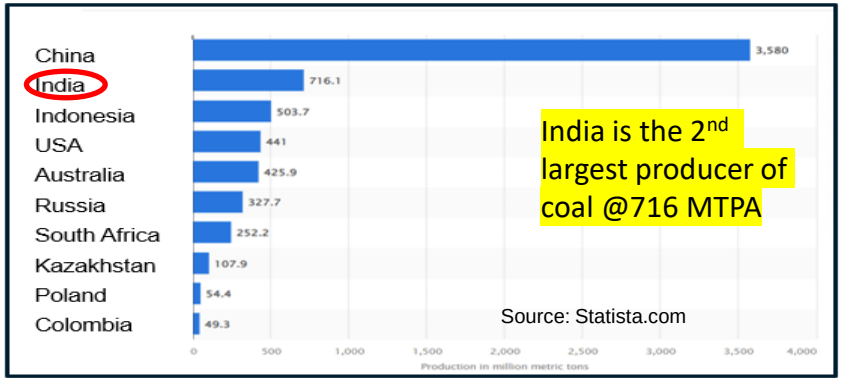
India has 5th largest proven coal Reserve @0.1 trillion ton

Source: Statista.com



Source: Provisional Coal Statistics FY 2020 by CCO

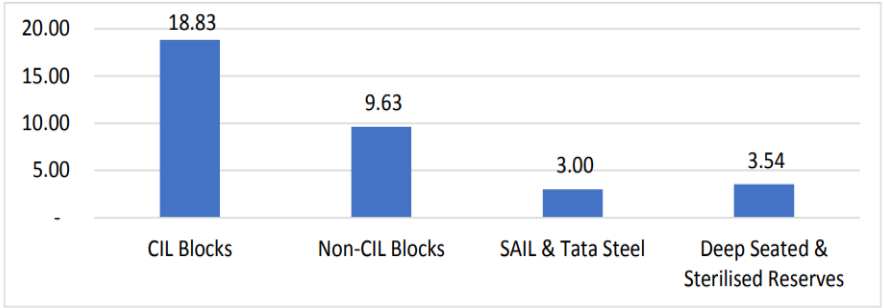
Leading Coal Producers in the World (in mt)-2020



India is the 2nd largest producer of coal @716 MTPA

Source: Statista.com

Company-wise Break-up of Coking Coal Reserves (BT)

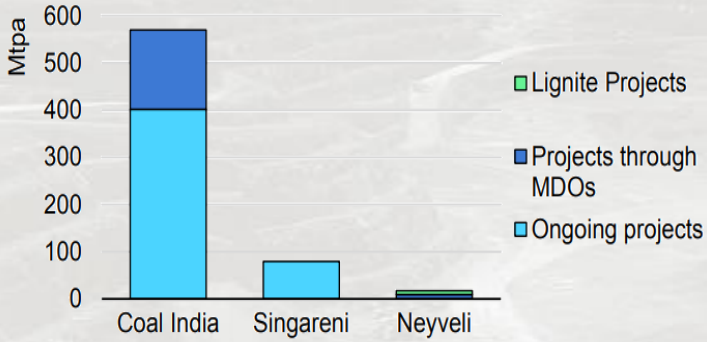


Source: CMPDIL

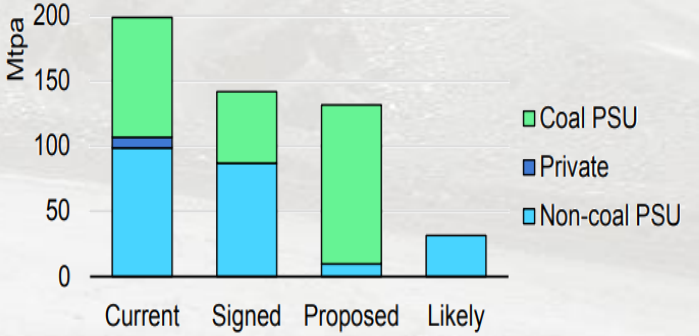
India's Coal Mining Scenario

- CIL, the world's largest coal mining company, operates 345 mines: 151 underground, 172 opencast and 22 mixed.
- More than 95% of CIL's coal comes from opencast mines.
- CIL aiming for 1,000 Mt by fiscal year 2023-24.
- Private steel and energy players operate captive mines.
- Mode of mining favouring Mine Developer and Operator (MDO) model as private miners moved from being outsourced as part of mining operations to providing end-to-end services.
- Ministry of Coal has announced 55 greenfield projects (92 Mtpa of production capacity) and 193 brownfield ventures (310 Mtpa) to be launched by 2024.

Planned increases in India's coal mining capacity by public sector undertaking, 2021-2024



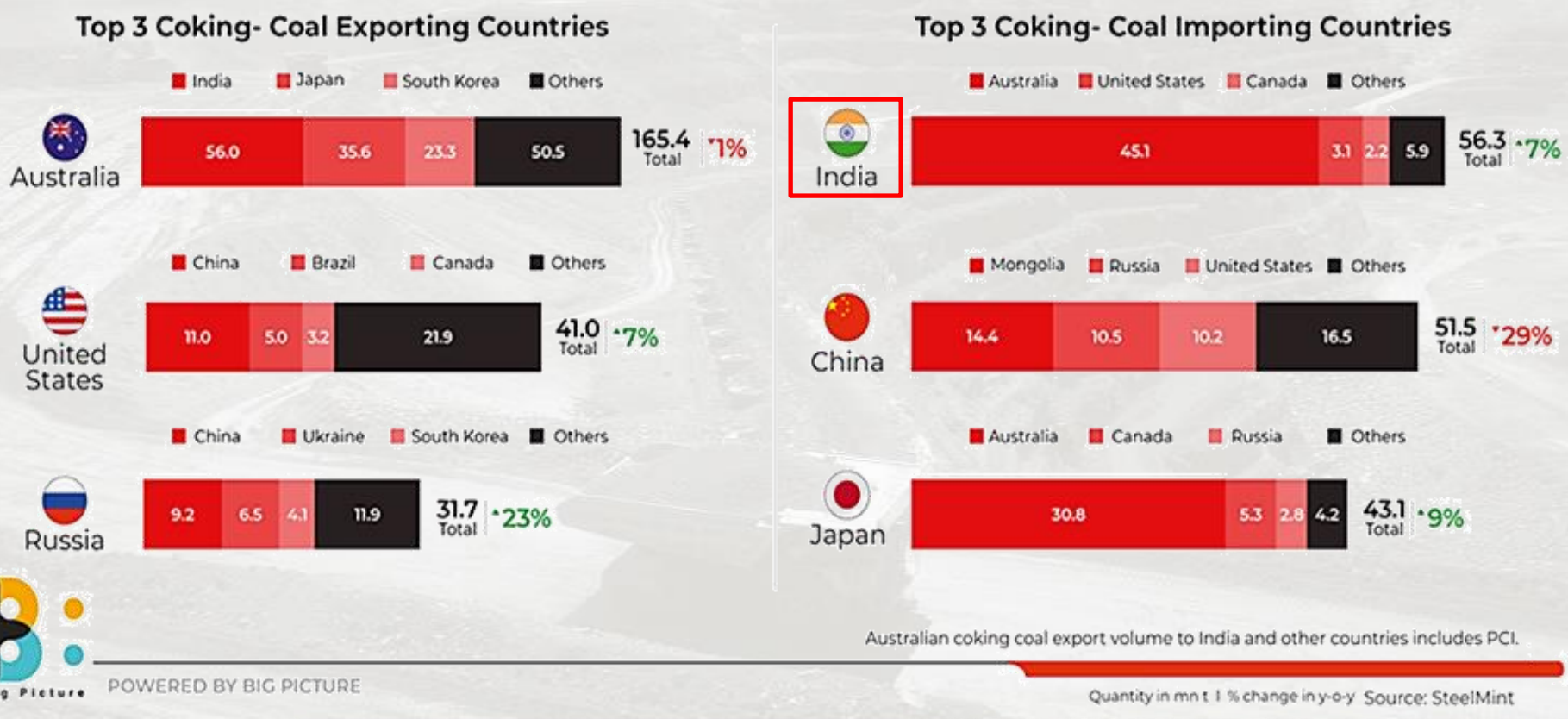
MDO mines in India by status and owner type by 2024



Source: IEA Coal Report 2021

CIL: Coal India Limited

Trade Dynamics of Coking Coal (2021)



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Hot Metal Vs Met Coke Production

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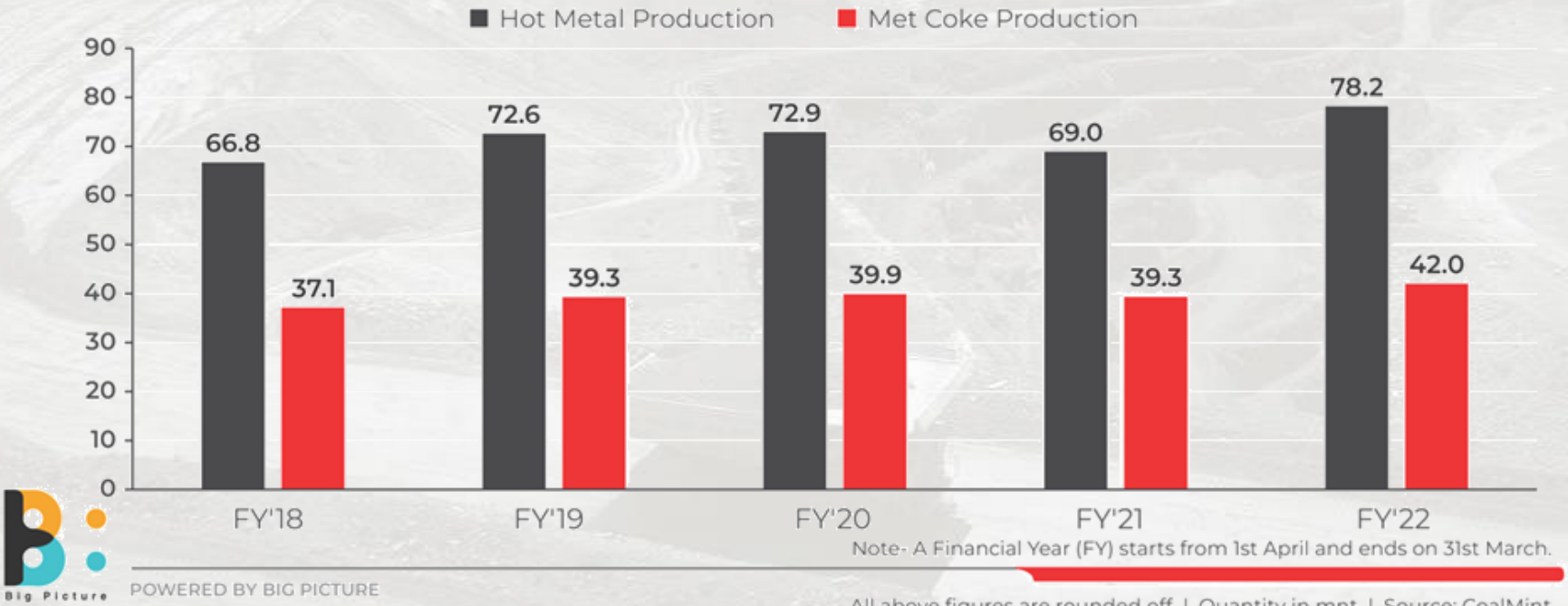
India's Hot Metal and Met Coke Production Comparison (FY'18-FY'22)

CoalMint



Note- A Financial Year (FY) starts from 1st April and ends on 31st March.

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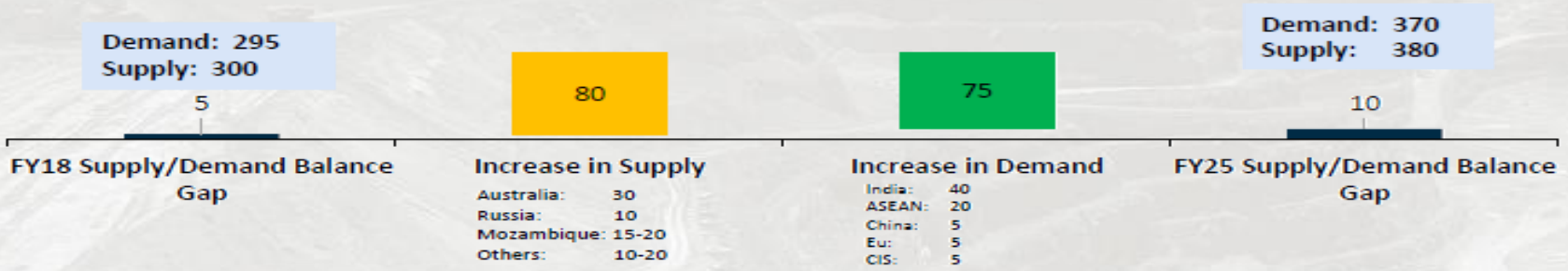
All above figures are rounded off I Quantity in mnt I Source: CoalMint

India expected to be the major consumer of Coking Coal by 2025

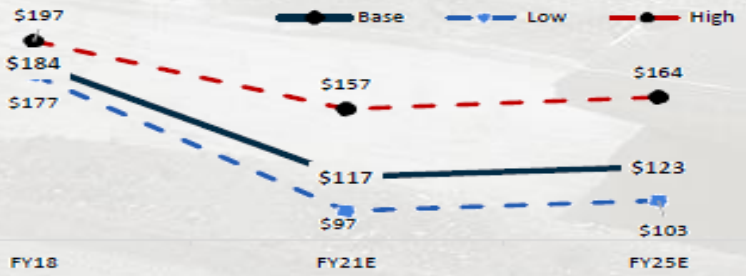
Metallurgical Coal Demand/Supply Balance (seaborne) FY18-FY25

Figures in Mt



Seaborne Prime hard coking coal price forecast-Tata Steel View

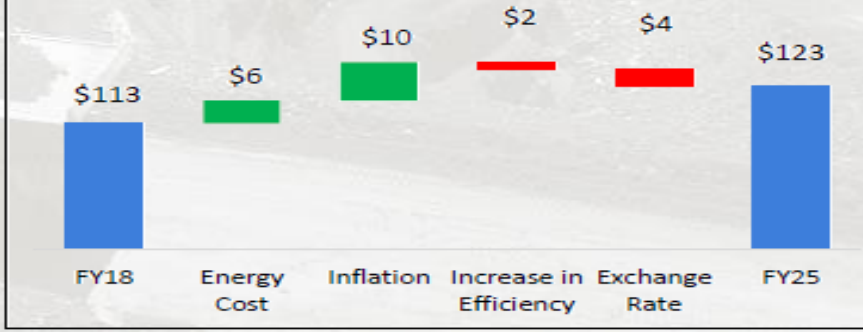
Seaborne Prime Hard Coking Coal price forecast – Tata Steel view



Source: Energy & Metals Consensus forecast August 2017 (base case)

Increase in cash cost to inc by 8% driven by energy costs & inflation. Strengthening of USD and efficiency may bring down the costs moderately

Coking Coal Total Cash Cost ($/t)-FY25 expected

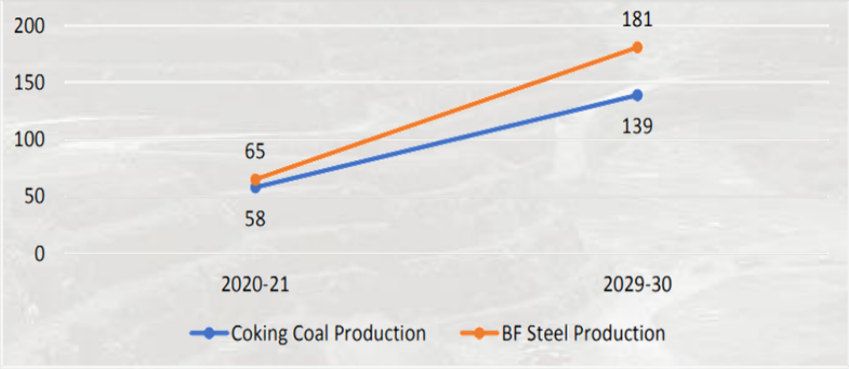


Demand Supply Gap Analysis of Domestic Coking Coal by FY 2030

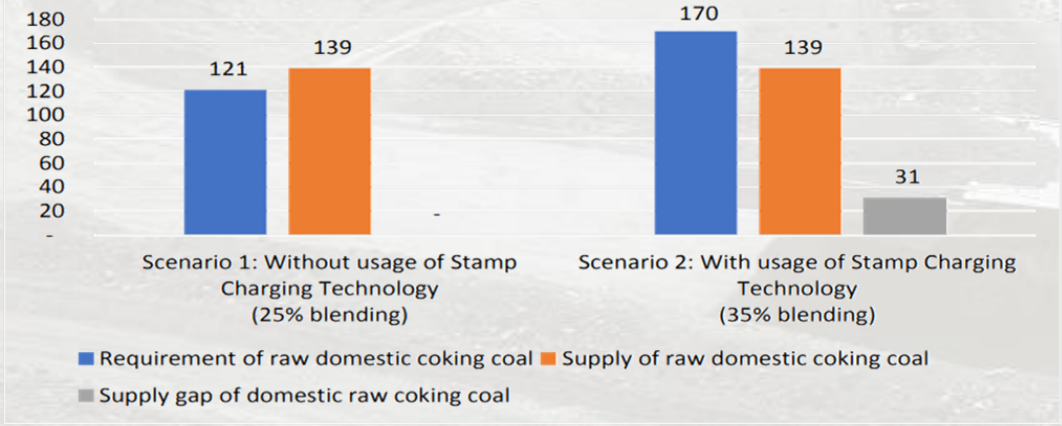
Demand of Coking Coal in India – FY 2030

Particulars (figures in MTPA)	Scenario 1: Without usage of Stamp Charging Technology	Scenario 2: With usage of Stamp Charging Technology
Blending % of domestic coking coal at 18% ash	25%	35%
Imported coking coal requirement	121	105
Requirement of washed domestic coking coal	40	56
Requirement of raw domestic coking coal for meeting remaining washed coal	121	170

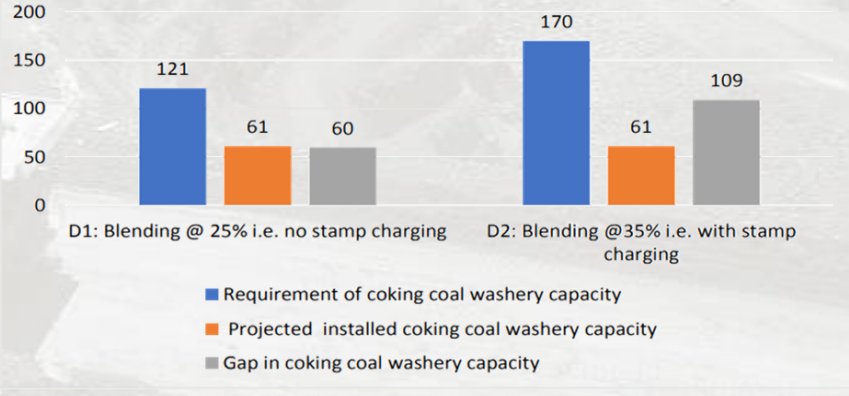
Coking Coal Production Projections (MT)



Demand Supply Gap of Domestic Raw Coking Coal (MT)

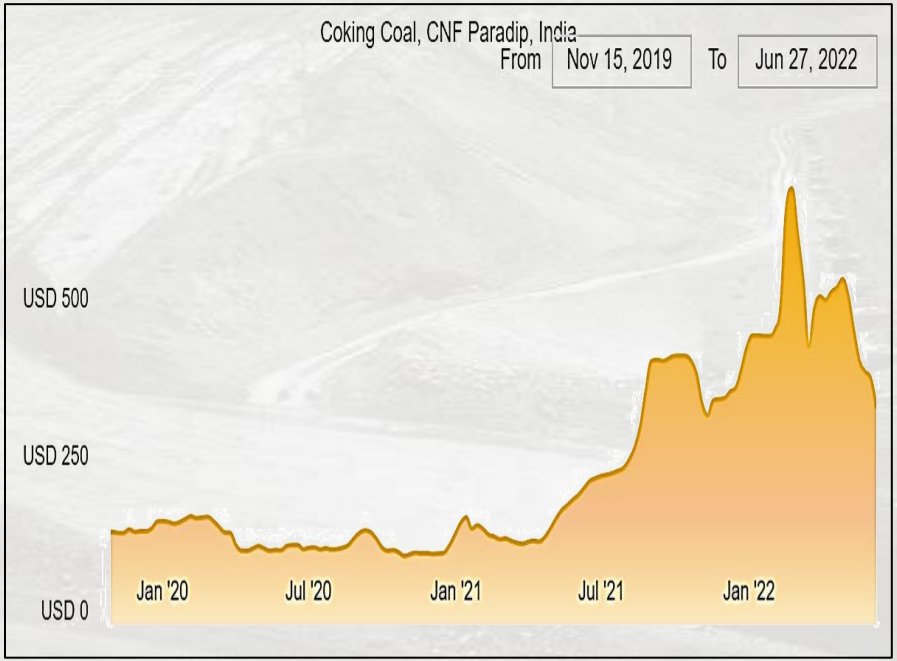


Demand Supply Gap of Coking Coal Washery Capacity (MT)

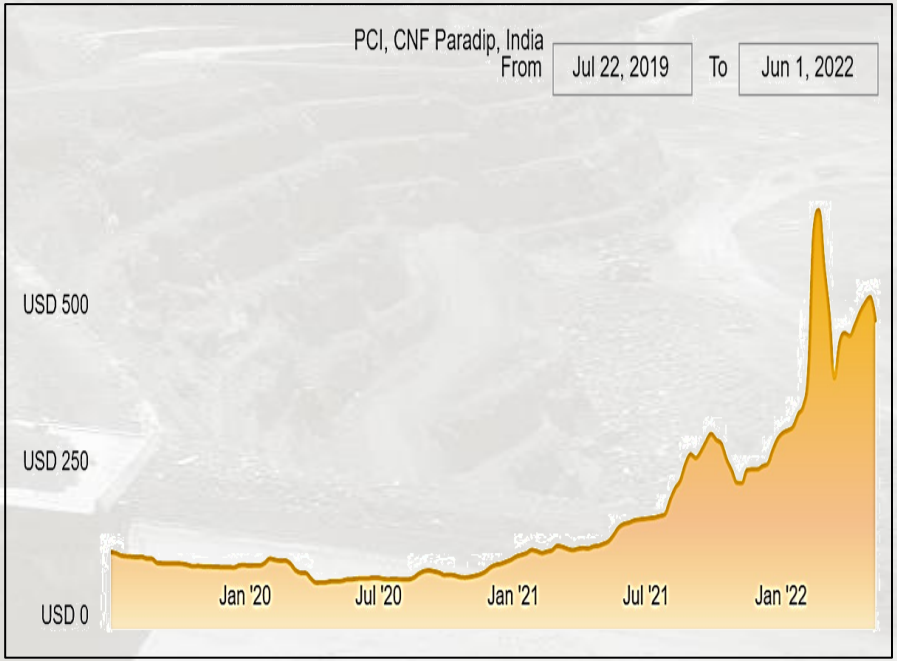


Coking Coal Prices are on the Rise – Concern for Steel Makers

Price of Coking Coal – CNF Paradip



Price of Pulverized Coal Injection (PCI) – CNF Paradip



Source: Steemint

CNF – Cost & Freight (or Cost, no Insurance, Freight)

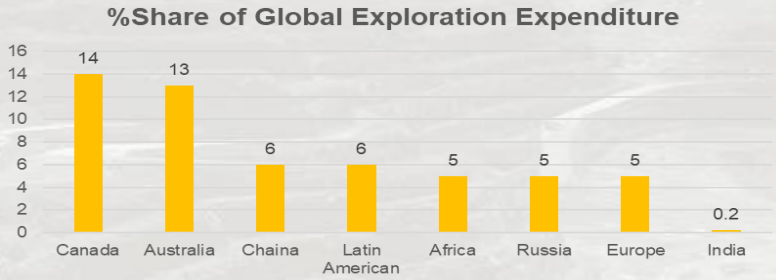
Challenges of Coking Coal Supply in India for Steel Making

- High Ash and low washability.
- Allotment to integrated steel players through Auction process- it makes coal block less economical.
- Many blocks allotted to PSU remain unutilized.
- Unattractive blocks in terms of quality, quantity & location of deposit during previous auctions.
- High dependency on import- affected by price fluctuation and global supply chain constraints.
- Long gestation period owing to tedious process of taking approvals regarding Land Acquisition, Forest Clearance etc.
- Lack of Washing capacity. Due to lack of beneficiation capability, high ash coking coal is often diverted to thermal power plant.

Scenario of Washing Capacity in India

140MTPA Washing capacity required by 2030	23MTPA Washing capacity right now	38 MTPA washing capacity to be added by 2030	79MTPA Gap in 2030

- Limited Exploration:



- Logistics Bottleneck:

1. Congestion of Indian Railway and Availability of rake is a major issue.
2. Dedicated freight routes may ease the problem.
3. Limited number of pipelines.

Commercial Coal – Fueling ‘Atmanirbharta’ for Steel Making

- On 18th Jul 2020, Government of India opened up Coal Sector for Commercial Purpose.
  - ✓ No end-user restriction on participation of Auction
  - ✓ No restriction on sale of coal or exports
  - ✓ 100% FDI through automatic route is allowed

- **43 Coal Blocks** successfully auctioned till date
  - ✓ Divided in several trances.
  - ✓ More than 107 coal blocks to be made available for auction in near future.
  - ✓ Total 209 Coal Mines up for grabs.

- **National Coal Index** implemented to create a transparent, market-based pricing mechanism.
- **Incentives** for **early Coal Production** and utilization in **Coal Gasification/ Liquefaction.**
- **50% of Coal produced from Captive Mines** can be sold in the Open Market after meeting own requirements.
- **Rolling Auction** for non-auctioned blocks and new coal blocks.

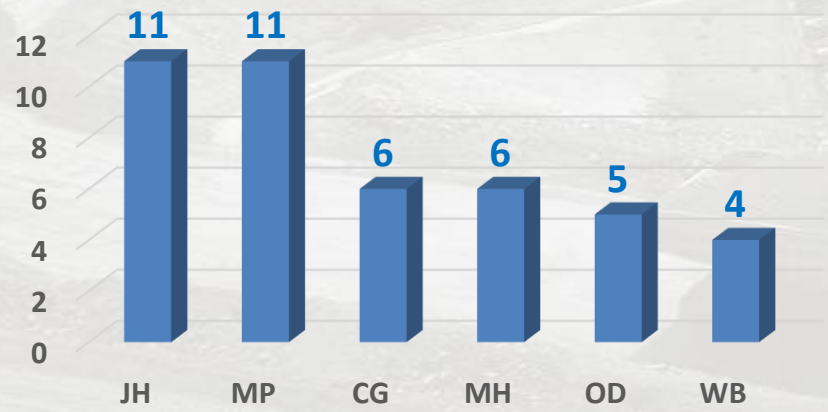
Source: Ministry of Coal

Commercial Coal Auctions – Fact Check

Auctioned and Allotment Blocks

	Total Allocated	Auctioned Blocks	Allotment Blocks	Operational Mines
CMSP	98	39	59	40
MMDR	15	4	11	0
Total	**113**	**43**	**70**	**40**

State Wise Auctioned Blocks



- Geological Reserve of Auctioned Blocks – ~5,386 Million tonnes.
- The total annual revenue generation from three tranches of commercial auction estimated at Rs.4286.53 crore considering production at aggregated Peak Rate Capacity level of 23.77 million tonne per annum.
- Once fully operational, expected to generate employment for 31,954.
- Total investment of Rs.3565.50 crore to be incurred to operationalize these mines.

JH: Jharkhand; MP: Madhya Pradesh; CG: Chhattisgarh; MH: Maharashtra; OD: Odisha; WB: West Bengal

Source: Koyla Darpan, Ministry of Coal, Livemint

MMDR: Mines and Minerals (Development and Regulation) Act;
CMSP: The Coal Mines (Special Provisions) Act, 2015

Policy Interventions for Development of New Coal Mines

Easing Approval

- Extension of CBA Act to non-PSU mines with safeguards; diversion for solar; restoration.
- Flexible compensatory afforestation policies.
- EC policies for expansion.

State Govt. Support

- Incentivizing states to be signatory to CMDPA/ support agreements.
- Setting up of state wise PMUs - To hand hold and facilitate mine clearances and development.

State Govt. Support

- Hub and spoke model for demand centres without supply.
- Railway take off points for auctioned mines.
- Nodal agency for shared evacuation infra.

Power Sector Policies

- Allowing FSA coal for merchant sales.
- Flexibility to state utilities with captive blocks to procure power against coal supplies.

Coal Market

- Commodity exchange for coal.
- Review of linkage auction policies and practices.
- Coal price regulator/ expansion of mandate of coal controller.
- Capacity building/ Institutional strengthening of CIMFR.

Employee Health and Safety

- Increasing diversity.
- Moving away from job for land policies.
- Strengthening of CMPFO.
- Capacity building/ institutional strengthening of DGMS.

Source: KPMG, 2020

CBA: Coal Bearing Areas; EC: Environmental Clearance; PSU: Public sector Undertakings; CMPDA: Coal Mine Development and Production Agreement; PMU: Project monitoring Unit; FSA: Fuel Supply Agreements; CIMFR: Central Institute of Mining and Fuel Research; CMPFO: Coal Mines Provident Fund Organization; DGMS: Directorate General of Mines Safety

Govt. Initiative on Improving the Coking Coal Scenario

- An Inter-Ministerial Committee (IMC) has been set up by the Ministry of Coal, Government of India for suggesting a road map for the country on augmenting the domestic coking coal production and increasing the consumption of the domestic coking coal by steel sector.

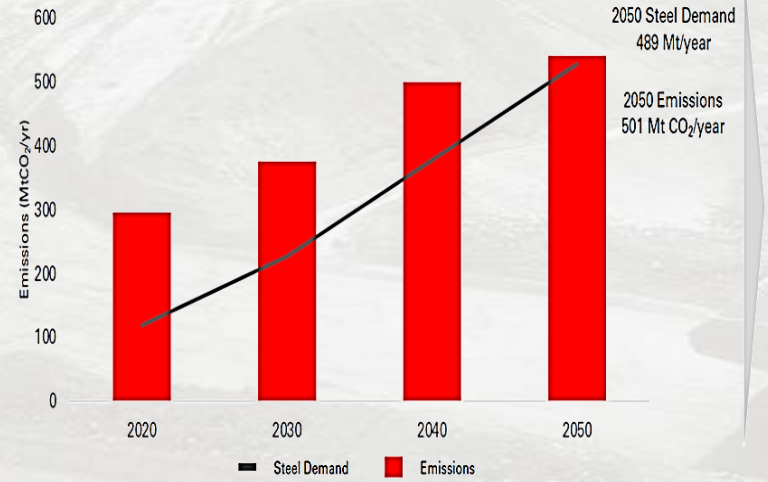
- The Terms of Reference (TOR) of the Inter-Ministerial Committee are:
  - ✓ TOR 1: To suggest national strategy to enhance coking coal and suggest road map to projectise and explore more coking coal block.
  - ✓ TOR 2: To suggest R&D to beneficiate coking coal to reduce ash% with upgraded technology.
  - ✓ TOR 3: Methodology to encourage the private sector to set up coking coal washery.
  - ✓ TOR 4: Examine domestic coking coal and suggest competitive pricing strategy.
  - ✓ TOR 5: Suggest incentive to steel sector to redesign blast furnace.
  - ✓ TOR 6: Address coking coal quality issues and suggest measures to improve coking coal quality.
  - ✓ TOR 7: To incentivize the coking coal production from Underground (UG) mines considering better quality of coal from UG mines – TOR added by IMC members.

Green Steel: Substitution of Coal by Green Hydrogen Fuel

THE BURNING PLATFORM

Indian steel demand is forecast to grow by 5% CAGR to 2050 leading to a 1.5x rise in emissions, increasing from 295Mt CO_2/year today to 501Mt CO_2/year by mid-century (equivalent to ~7% of global)

Indian Steel Sector Demand and Emissions (2020-2050)



Notes: Forecast steel emissions assumes widescale adoption of Best Available Technologies, Energy and Process efficiencies to lower emissions by FY50.
Source: "Towards a Low Carbon Steel Sector", 2020, TERI; "Iron and Steel Technology Roadmap", 2020, IEA; "Annual Report", 2020, GoI Ministry of Steel; Xynteo Analysis.

Equivalence

20%
Proportion of global steel produced in India by 2050 (vs. 5% in 2020)

12th
Emissions ranking if India's steel industry were its own country in 2050

8.3 billion
# of trees it would take to sequester outstanding emissions in 2050

Green hydrogen-based steelmaking to reduce import dependence on coking/non-coking coal and make India self-reliant.

In the Steel Making Process, there are two options:

- Hydrogen Injection into the Blast Furnace to reduce coke consumption applicable for already existing plants
- Producing DRI using Hydrogen as reductant applicable for new upcoming plants

Demand on Hydrogen (Mt)

	2020	2050 – Base line	2050 – Low carbon
India steel production (MTPA)	83	418	418
H_2 demand if 100% steel through H_2	7	33	33
Projected H_2 demand from steel sector	0	2.5	8

Source: "Low and zero emissions in the steel and cement industries", OECD, 2019; Xynteo Analysis | TERI 2020

Way Forward to Meet Coal Demand for Steel Making

- Coking coal production enhancement by Coal India and Long-term contracting with Steel makers for supplying metallurgical coal at an attractive price.
- Increase exploration focused on Coking Coal for Steel making & auction of Coal Mines with good reserve of metallurgical coal. Increase washing capacity of coal in India.
- Other Indian mining companies like Midwest and Sunrise holding concessions be encouraged to develop their concessions.
- Increase usage of PCI in blast furnaces.
- Incentives to Steel players for Stamp charging and recycling and use of more scrap.
- Finding a solution to the Jharia issue: Jharia is the only coalfield in India with deposits of Prime Coking coal (Estimated Deposits: 5313.06 Million Tonnes). However, underground fires burning for centuries and the inability to relocate and rehabilitate the locals has prevented us from mining the reserves.
- Proper Utilization of LVC (Low Volatile Coking) Coals.
- Revisiting the National Steel policy and enhancing the share of electric steelmaking.
- Actively pursue new and alternate technologies including Natural Gas, Syngas and Hydrogen as substitute fuel in DRI route.

Coal reforms: Fuelling *atmanirbharta*

Opening up the sector to private players will attract global investments, raise supply and boost State and commercial revenues

PRALHAD JOSHI

sions) Act, 2015, to return the blocks back to industry via auctions. Similarly, in 2014, two-thirds of the major power plants had critical coal stocks of less than seven days. Today, India is the second-largest producer of coal with its record production at 729 million tonnes (MT) in 2019-20. The coal

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hindustantimes

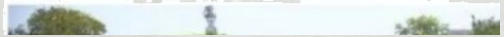
Unveiling reforms in India's coal sector

This will ignite investment, shore up production, create employment and move us towards self-reliance

This is an epoch-making development fo several reasons. One, global coal minin firms, which were so far forbidden fron mining coal in India, can now invest an introduce their best practices. Second Indian industry can invest in a commodit

Coal India begins process to open 20 closed mines to private players

EJAZ KAISER @ Raipur



This is India's Golden Mineral Moment

Pralhad Joshi
Union Minister, Coal & Mines

under PMKKKY is a game-changer in developing the mining-affected areas and improving the lives of people in such regions. DMF has a huge corpus of ₹61,867 crore as of March 2022, which is being continuously and generously used in the development of the mining-affected regions.

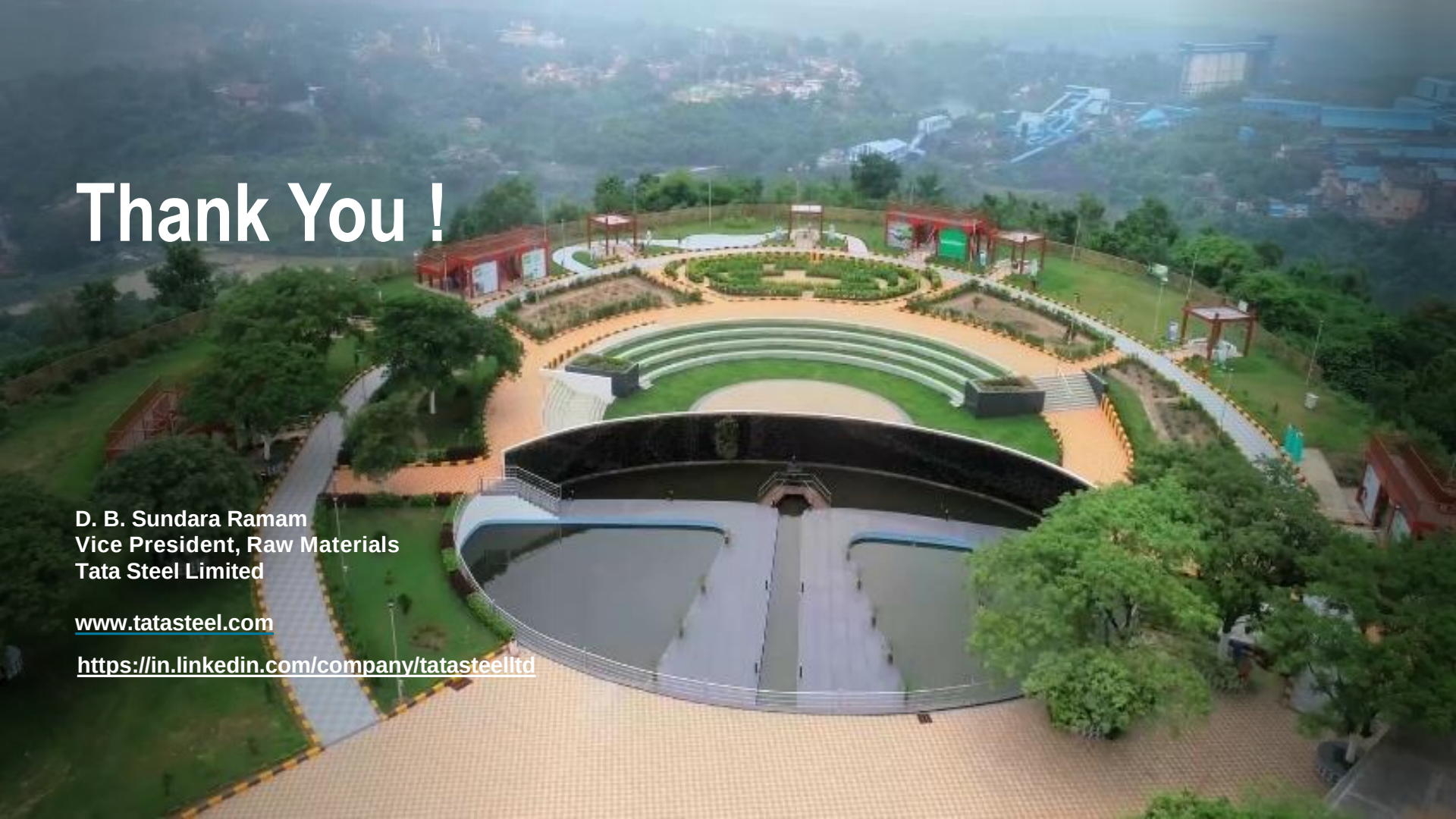
The MMDR Act was further amended in the years 2020 and 2021, along with amendments in the correspon-

EXPLORE MORE TO PRODUCE MORE

We need to increase our mineral exploration to bring identified potential mineral blocks for auction. With this vision, NMET was made into an autonomous body and now private accredited exploration agencies have been carrying out exploration activities.

With continuous efforts towards improving exploration in the last 8 years, our Obvious Geological Po-

Thank You !



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