Integrated Coal Logistics Plan for Coal Mines/Blocks

(including CIL & Non-CIL)

FINAL REPORT

SEPTEMBER 2023

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Glossary

Abbreviation	Description
~	Approximately
Rs.	Indian Rupee
%	Percentage
BCCL	Bharat Coking Coal Limited
BT	Billion Tonnes
CCL	Central Coalfields Limited
CF	Coalfield
CHP	Coal Handling Plant
CIL	Coal India Limited
CMPDI	Central Mine Planning and Design Institute
ECL	Eastern Coalfields Limited
FMC	First Mile Connectivity
MCL	Mahanadi Coalfields Limited
MGR	Merry-Go-Round
MT	Million Tonnes
NEC	North Eastern Coalfields
NCL	Northern Coalfields Limited
OCP	Opencast Project
RCR	Rail-cum-Road

Abbreviation	Description
RLS	Rapid Loading System
Rly.	Railways
SCCL	Singareni Collieries Company Limited
SECL	South Eastern Coalfields Limited
TPD	Tonnes per day
UG	Underground
TPD	Tonnes per day
WCL	Western Coalfields Limited
WhWall	Wharfwall

Executive Summary

Our Approach

Our approach for coal demand estimation

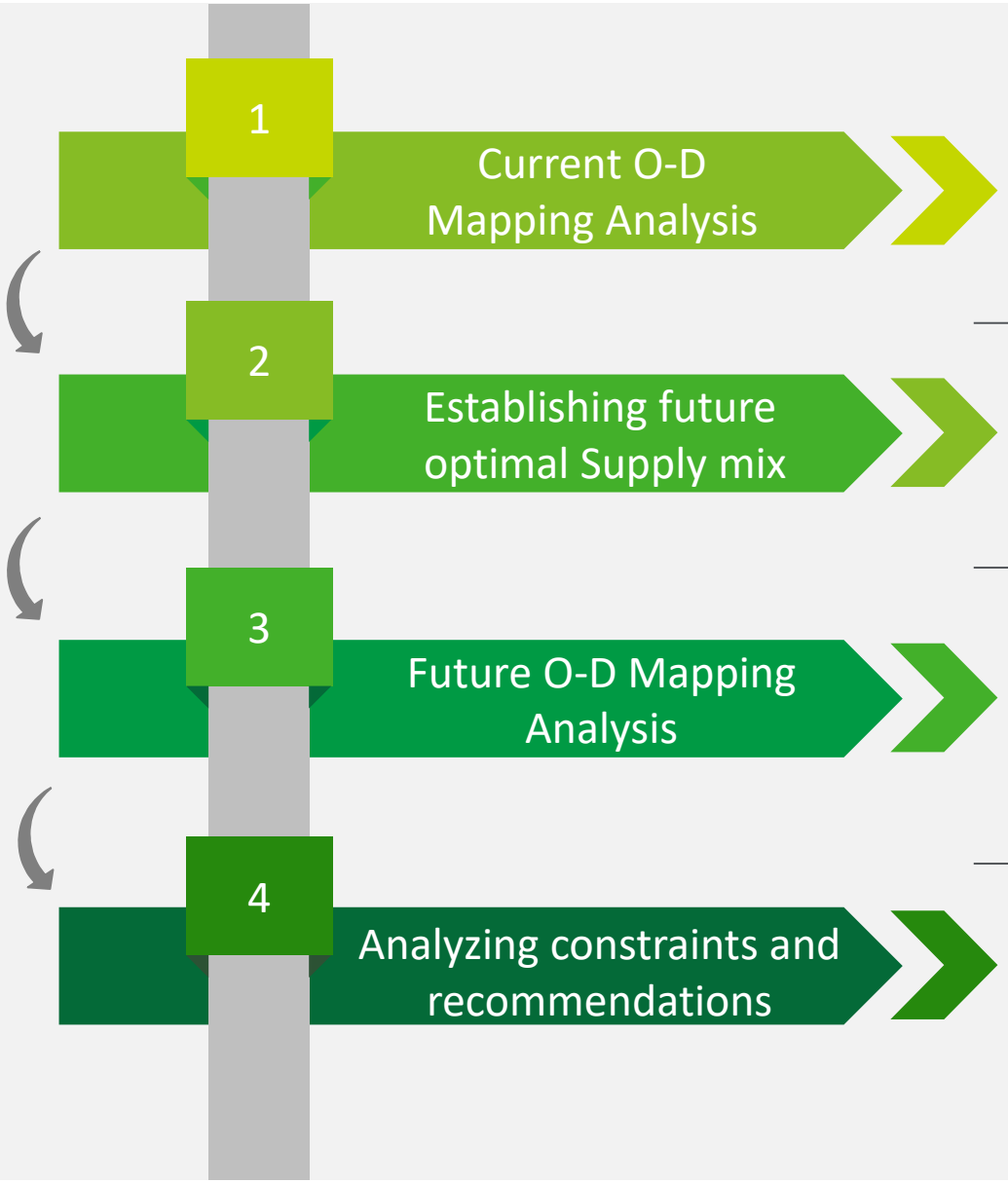
Coal Demand from Power Sector

- Multiple demand scenarios created based on Indian economic growth scenarios, triangulated with CEA's projections
- Coal's share in India's electricity generation mix to drop down to ~62% from current 70%
- Power-plant level coal demand established for FY30, including demand from under-construction power plants
- Coal demand from power sector expected to be 1037 MTPA to 1160 MTPA based on asset-level PLF analysis

Coal Demand from Non-Regulated Sectors

- Sector wise correlation analysis conducted based on projected Indian Macro-economic growth
- Primary and secondary research conducted to understand expansion plans of NRS Assets
- Establishment of ~521 MT Coal demand from NRS based on analysis.
- Out of ~521, ~140 MT of coking coal demand established based on inputs from Ministry of Coal

Our approach for formulation of optimal coal logistics plan



- For CIL, Subsidiary wise, Area wise and Mine-wise analysis of FY22 Despatches (EUP wise)
- Production and Despatches of SCCL, Captive and Commercial blocks (Till 16th Tranche Block Auctions)

- Analysis of power plant level mapping to probable sources based on availability of coal and distance of source from the power plants
- Mapping of NRS assets with CIL, commercial and captive blocks

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- Analysis of future coal traffic on major trunk-lines on a Pan-india level
- Mapping each of the sidings to each of the consumers
- Analysis of road-ways and other plausible modes of transporation such as MGR, Belt, etc.

- Understanding pipeline railway works and estimating capacity utilization for major lines
- Final recommendations on a Pan-india level along with the entire future coal flow of the country mapped. Model is kept dynamic for any future changes.

Detailed approach for **coal demand estimation** encapsulates a multi-pronged philosophy leveraging Market intelligence, Primary and Secondary Data validations and Bottoms Up Analysis

Indian Coal Demand Analysis

Non-Regulated Sector

- **Top-Down Analysis using Indian Macro-economic Forecasts** for Non-Regulated sectors such as CPPs, Cement, Steel, Sponge Iron, and Others
- **Historical correlation analysis of sector wise production (output) versus Indian GDP** growth rate to come up with correlation elasticity (long-term)
- **Using forecasts of more than 14 analysts / investment banks, government bodies**, think tanks to normalize India's projected GDP till 2030
- **Analyzing the growth in sectors and translating that to expected coal consumption** for both thermal as well as coking coal
- **Triangulating coal demand from primary / secondary research of capacity expansion plans, expert committee reports** for coking coal and other such market intelligence sources.

Regulated Sector

Top-Down Approach for Power Sector

- **Top-Down Analysis** using Indian Macro-economic Forecasts for Power Sector
- **Historical correlation analysis of sector wise production (output) versus Indian GDP** growth rate to come up with correlation elasticity (long-term)
- **Using forecasts of more than 14 analysts / investment banks, government bodies,** think tanks to normalize India's projected GDP till 2030
- **Utilizing CEA's National Electricity Plan 2022 and 20th EPS survey for long-term state wise electricity demand forecasts** and analyzing **coal's generation share in the mix.**
- **Translating the overall electricity generation required to coal-based generation required in the country and subsequently the coal consumption required** using assumptions on Specific coal consumption and other losses

Triangulated using both the approach formats

Bottoms-up Approach for Power Sector

- An **optimal PLF-Distance model analysis** was conducted on a power plant level to established **asset wise coal demand forecasts** till 2030
- **Establishing current sourcing mix (Volumes and distance) of all the operational power plants** in the country along with analysis of PLF
- **>140 Power plants mapped** for the analysis. **Multi-variate regression models** conducted for each power plant
- A clear inverse correlation established with models established **(Inverse linear and logarithmic models)** for each of the states
- **Realistic and optimistic PLF scenarios built, and coal demand established** for each of the power plants for future.

+

- **Analysis of Under Construction capacities fit with the clustered model** to estimate coal demand from these power plants at expected PLF levels

~106 MTPA coal demand from UC Capacities

+

~931 – 1046 MTPA coal demand from existing power plants

~1037 to 1160 MTPA coal demand from power sector in 2030

Input for O-D Mapping Analysis

Detailed for formulation of **optimal coal logistics plan** for the country is distributed across four key pillars

1 Current O-D Mapping Analysis

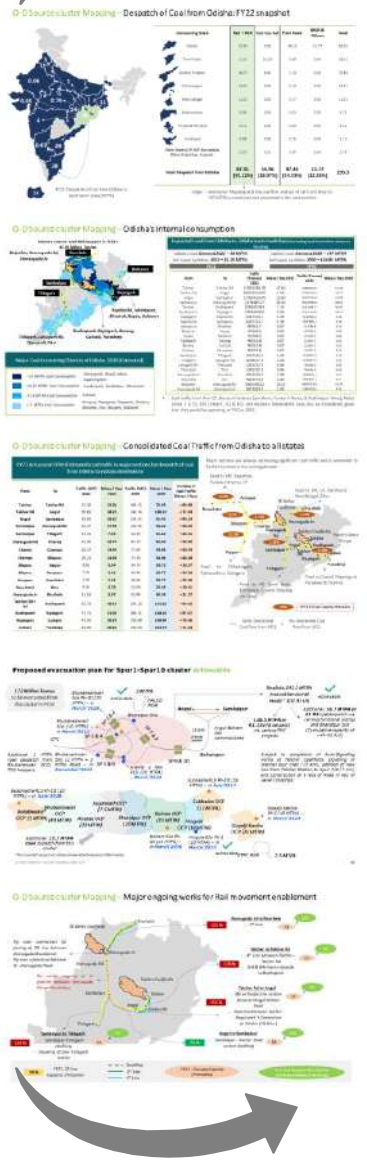
- **Subsidiary wise, Area wise and Mine-wise analysis of current and future production** plans upto 2030
- Aggregation of supplies on a state level.
- Analysis of **current siding wise despatch to various consumers and Origin-destination mapping** of rail traffic on major trunk lines
- Analysis of **captive and commercial blocks including actual despatches for FY22** and estimated consumer-wise despatches for future
- Identification of **currently congested rail junctions and sections** along with mapping current capacity utilizations
- **Specific focus on despatches via RSR mode (from Talcher CF of MCL)** to various power plants in India
- **Analyzing current road despatches along with first mile connectivity analysis** of all the coal blocks in the country – Current as well as future

2 Establishing future optimal Supply mix

- Analysis of **power plant level mapping to probable sources based on availability of coal and distance of source** from the power plants
- Analysis of **Long-term linkage commitments and likely despatches at a power plant level** as per the future asset wise demand estimates
- Detailed **study of all the captive blocks (operational and in pipeline)** to understand likely despatch to destination
- **Analysis of Rail mode Push vs pull models and establishing a surplus coal scenario** where volumes would have to be pushed into the market without clear indication of plausible destinations
- Estimation of despatches for various OD pairs across all modes including**, Road, RCR, MGR, Belt etc**. in line with NGT guidelines
- Creating a **wish-list solution for marketing of coal to exports along with likely coal despatches via E-Auctions** through rail mode

3 Future O-D Mapping Analysis

- Analysis of **future despatches from each of the mines**, areas, subsidiaries as well as all the Non-CIL blocks including captive and commercial blocks
- Mapping of **coal volumes to each of the consumers** and understanding the **estimated coal traffic under various scenarios** i.e. push vs pull scenarios
- Estimation of **despatches to unknown destinations of commercial coal blocks** using **a dynamic excel based model** along with despatches excess coal from CIL's sources
- Analyzing **Coal flow via Rail mode for each of the origin-destination pairs** and highlighting the plausible choke points
- **Inclusion of all the key railway augmentation projects in the pipeline** in the O-D mapping, including but not limited to **impact of DFCs**
- Analysis **of future Road mode evacuation** in terms of volumes and formulating the basis to further understand the motive behind road offtake

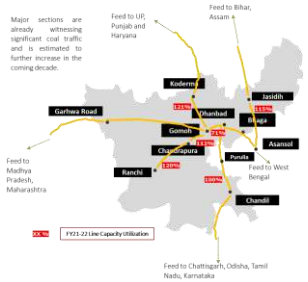


4 Analyzing capacity constraints and recommendations

- **Analysis of the entire section wise coal traffic in future incorporating passenger traffic, other freight traffic etc.**
- **Quantifying the incremental line capacity addition in pipeline** and understanding the over-utilized rail sections for future
- Detailed mapping of all major coalfields along with mapping of all modes including **MGR, Belt etc**. **Mapping of Road Infrastructure in all major coalfields**
- Analysis of the **impact of imported coal in future on major sections** (using O-D analysis) and adding the traffic to the railway load for final recommendations
- Analysis of Port Capacities (for e.g. **detailed study of Paradeep,dhamra port capacities** for enabling coastal shipping etc.)
- **Final recommendations on a Pan-india level along with the entire future coal flow of the country mapped.** Model is kept dynamic for any future changes.

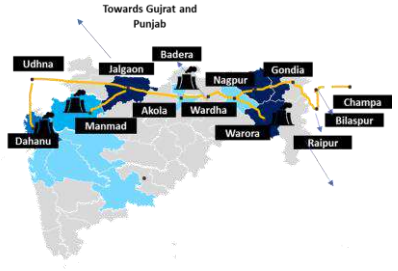
Our key findings include increase in railway traffic for all major coal producing areas

Jharkhand

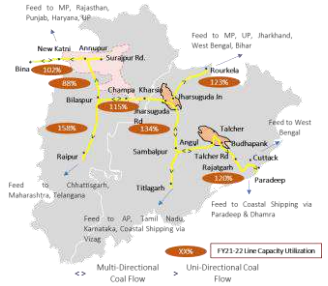


West Bengal

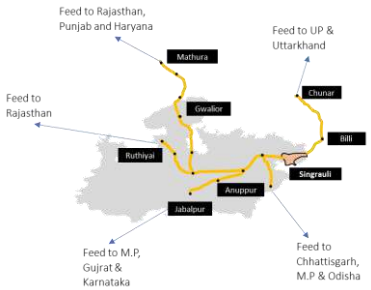
Maharashtra



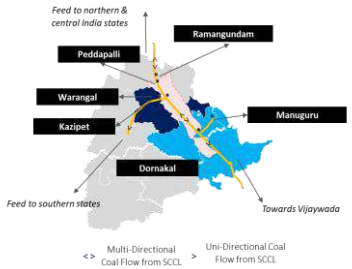
Odisha & Chhattisgarh

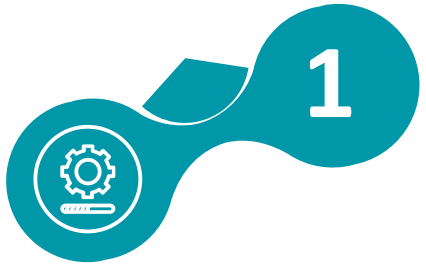


Madhya Pradesh



Telangana





Complete production mapping with plausible consumers, current and future for CIL and Non-CIL blocks along with mapping of coal imports

Establishing future mode wise despatch portfolio to all supply hubs and to all demand hubs. Articulating optimization model's benefits for each of the clusters.

Analyzing capacity constraints and opportunities across all modes of transportation. Recommendations on new infrastructure required to achieve 2030 despatch target

Based on our detailed Pan-India analysis of coal traffic movement, the major coal producing triangle of **Odisha-Chhattisgarh-Jharkhand is projected to see congestion** due to bulk of capacity expansion taking place in this region

Summary of Pan-India Supply-Demand Analysis

Year on Year coal supply snapshot till FY30

	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
CIL	574.48	661.89	703.22	780	850	1000	1030	1055	1090	1120
SCCL	48.51	65.53	67.14	70	74	79	84	89	94	100
Captive & Others (Commercial)	68.4	90.72	122.38	162	224	241	259	276	279	291**
Total Domestic Coal Despatch (Including Coking)	691.39	818.14	892.74	1012	1148	1320	1373	1420	1463	1511
Total Coal Imports	228	205	237	207	184	188	193	192	196	200
Total Coal Supply (Production View)	**919.71**	**1023**	**1130**	**1219**	**1332**	**1509**	**1565**	**1612**	**1659**	**1711**

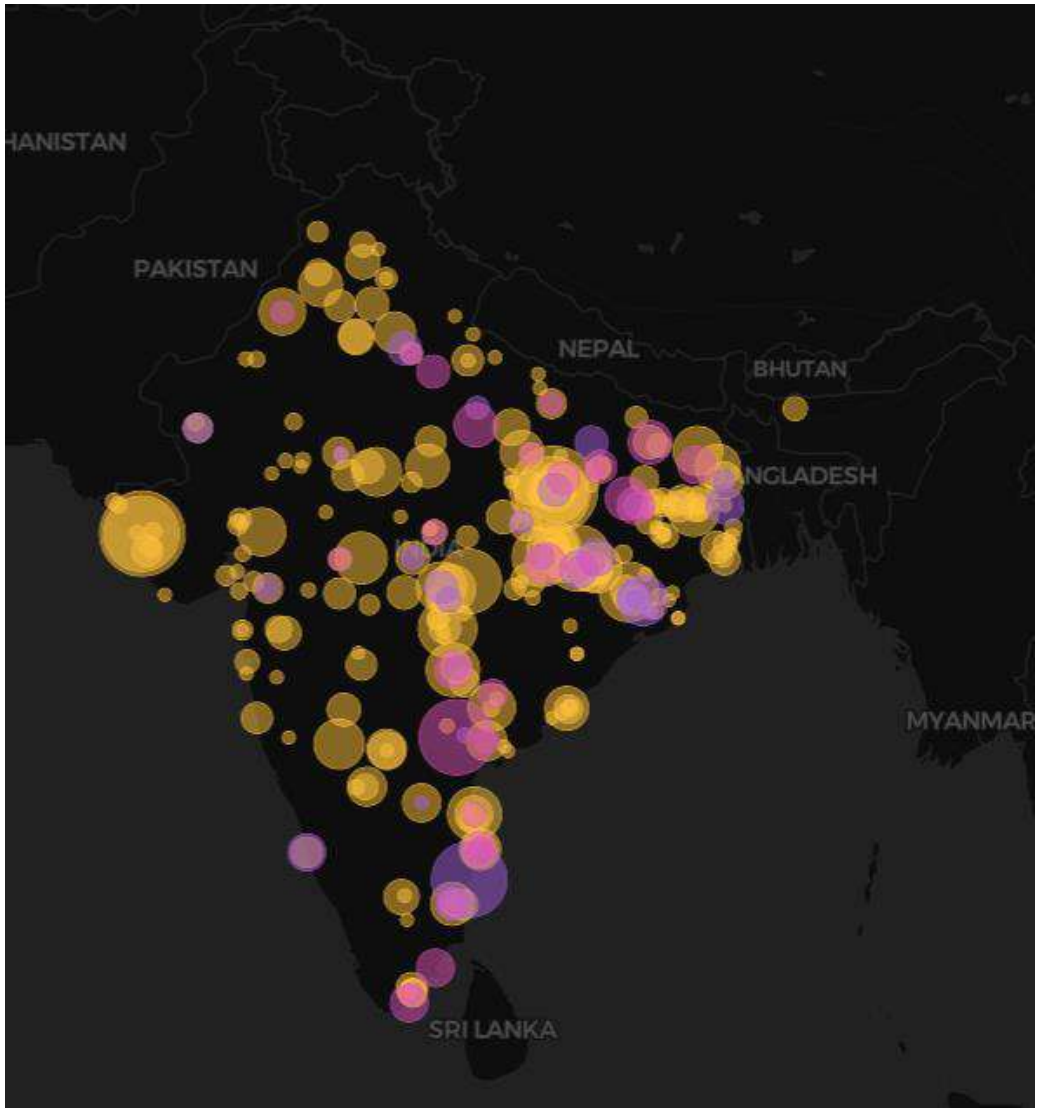
Key Highlights

- **Captive and Commercial coal production forecasts are as per the projections of Ministry of coal, but it shall be noted that the figure could reach in excess of 400 MTPA by FY30 based on Deloitte Analysis. State wise Non-CIL block production values for FY30 have been taken as per deloitte analysis in detailed section.
- *95 Million Tonnes of Non-Substitutable G1-G8 grade Steam and Bituminous coal would still be imported in near to medium term future.
- CIL's share of supply in the domestic production portfolio will decrease from current ~79% in FY23 to ~75% in FY30 due to expected exponential capacity expansion increase in commercial/captive coal mining.

Source: Monthly Statistical Reports, Ministry of Coal, Provisional Coal Statistics, National Rail Plan 2020

Coal to remain a dominant source of fuel supply for electricity generation

India's current and future coal-based generation Capacity



Existing Capacity

~211 GW

Under Construction

~27 GW

With probability of commissioning. Significantly delayed and improbable projects have not been included

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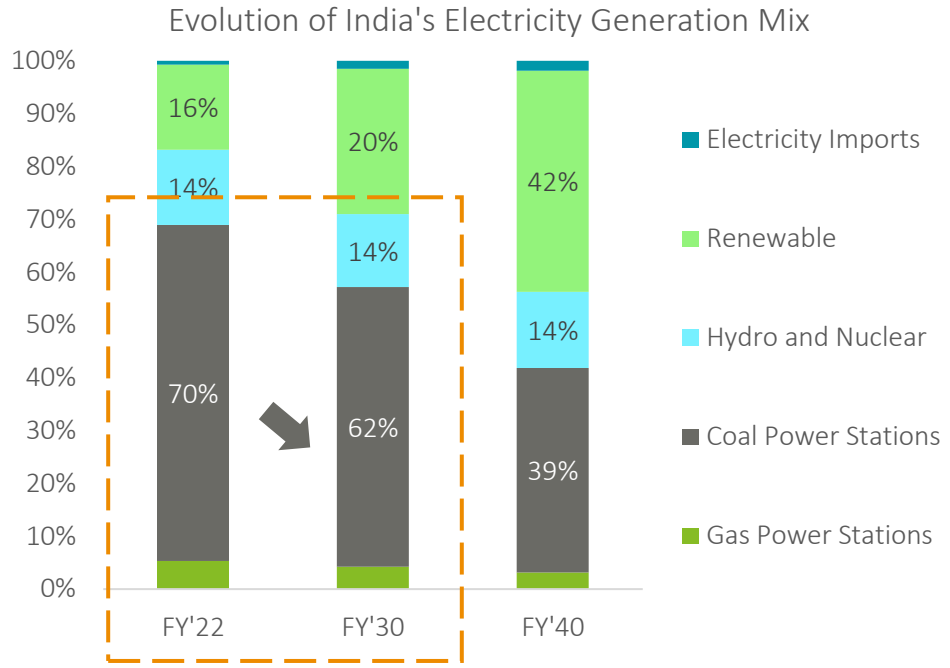
~238 GW

Estimated FY30 Coal Based Capacity

◯ ~2.3 GW



- India's electricy demand highly correlated to GDP growth (X0.74 – Long term elasticity)

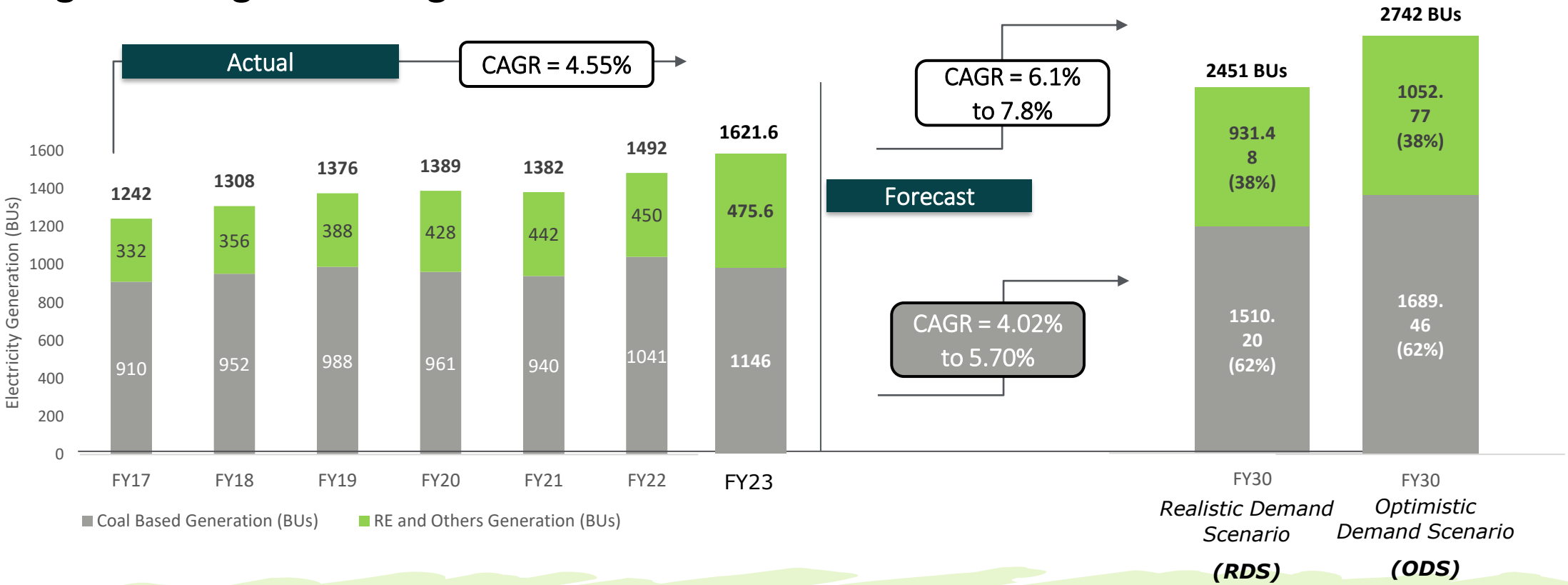
- Costly energy storage to induce partial reliance of coal for coming decades

- Solar tariffs have dropped significantly, but Round-the-Clock supply is a challenges for grid level adoption

RE Driver Coal Driver

Source: Monthly Statistical Reports, Ministry of Coal, Provisional Coal Statistics, National Rail Plan 2020, National Electricity Plan by CEA, 20th EPS Survey by CEA

Electricity generation in India to grow at a substantial CAGR of ~6.1% to 7.8% till 2030, owing to strong demand growth



- In FY23, coal-based generation rose 10.1% to reach 1145.86 Bus, total generation grew ~9% Y-o-Y
- Electricity generation, closely linked to demand, is estimated to be ~2451 to 2742 BU for FY30
- The share of coal in the domestic electricity generation has hovered around ~71% in the last decade.
- It is likely to decline to 62% by FY30 which translates to coal demand ranging from 1037 to 1160 MTPA by FY30

Source: Monthly Statistical Reports, Ministry of Coal, Provisional Coal Statistics, National Rail Plan 2020, National Electricity Plan by CEA, 20th EPS Survey by CEA

Pan-India Coal demand analysis – Power Sector – Realistic Demand Scenario

Bottoms-Up Analysis of Coal Demand	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Electrical Energy Requirement - Ex Bus (TWh)	1275.88	1381.646	1508.14	1600.21	1694.63	1796.63	1907.84	2021.07	2139.13	2279.68
% Change in Electricity Consumption		8.29%	9.16%	5.13%	5.90%	6.02%	6.19%	5.94%	5.84%	6.57%
Average Demand/Generation Ratio	0.93	*Last 6-year average has been 92.92%, FY22 Actual was 92.84%*								
Estimated Grid Generation (TWh) Required	1381.8	1482.78	1621.6	1739.36	1822.19	1931.86	2051.44	2173.20	2300.13	2451.26
Coal Based Generation/Total Generation	68%	70.24%	70.66%	70.73%	68.56%	66.40%	65.00%	64.00%	63.00%	61.61%
Coal Based Generation (TWh)	939.62	1041.46	1145.86	1230.24	1249.37	1282.74	1281.05	1353.85	1429.51	1519.78
Estimated Specific Coal Consumption	0.653	0.678	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68
Realistic Coal Consumption from Power Sector including 1% Transit Losses (MT)	**613.27**	**706.1**	**793.56 (55.6 Imports)**	**844.93**	**858.01**	**880.99**	**915.80**	**955.23**	**995.23**	**1037.20**
Domestic Despatch to Power sector	544.07	677.67	737.93							
Coal Imports by power Sector	69.2	28.43	55.63							
Derived Coal Consumption CAGR (FY22-FY30)	**4.02%**	*Power sector's import reliance increased to 7% in FY23 from 4% in FY22, mainly attributable to significant increase in electricity demand and reliance on coal-based power generation.*								

Key Highlights

- **In FY23, the electricity demand grew 9.16% Y-o-Y to ~1508 Billion Units (Historic high of >1.5 Trillion Units)**
- The Specific Coal Consumption values on Pan-India basis have been kept constant at ~0.68, because of addition of Super-Critical and Ultra-Super Critical capacities coupled with import substitution efforts, which are assumed to negate each others impact.
- **Coal consumption by power sector to reach at ~ 1037 Million Tonnes, growing at ~ 4.02% CAGR (over FY23 base reference year)**

Source: Monthly Statistical Reports, Ministry of Coal, Provisional Coal Statistics, National Rail Plan 2020, National Electricity Plan by CEA, 20th EPS Survey by CEA

Pan-India Coal demand analysis – Power Sector – Optimistic Demand Scenario

Bottoms-Up Analysis of Coal Demand	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Electrical Energy Requirement - Ex Bus (TWh)	1275.88	1381.646	1508.14	1600.21	1726.36	1862.44	2009.25	2167.64	2338.51	2522.85
% Change in Electricity Consumption		8.29%	9.16%	5.13%	7.88%	7.88%	7.88%	7.88%	7.88%	7.88%
Average Demand/Generation Ratio	0.93	*Last 6-year average has been 92.92%, FY22 Actual was 92.84%*								
Estimated Grid Generation (TWh) Required	1381.8	1482.78	1621.6	1739.36	1876.47	2024.39	2183.97	2356.13	2541.86	2742.23
Coal Based Generation/Total Generation	68%	70.24%	70.66%	70.73%	68.56%	66.40%	65.00%	64.00%	63.00%	61.61%
Coal Based Generation (TWh)	939.62	1041.46	1145.86	1230.24	1286.51	1344.20	1419.58	1507.92	1601.37	1689.46
Estimated Specific Coal Consumption	0.653	0.678	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68
Realistic Coal Consumption from Power Sector including 1% Transit Losses (MT)	**613.27**	**706.1**	**793.56 (55.6 Imports)**	**844.93**	**883.58**	**923.19**	**974.97**	**1035.64**	**1099.82**	**1160.22**
Domestic Despatch to Power sector	544.07	677.67								
Coal Imports by power Sector	69.2	28.43	55.63							
Derived Coal Consumption CAGR (FY22-FY30)	**5.70 %**									

Key Highlights

- This scenario assumes a higher growth rate in electricity demand in India @ ~8% as compared to ~6.5% in case of realistic scenario. The rate of penetration of renewables and the share of coal in the portfolio remains the same for both the scenarios
- Coal consumption by power sector to reach at ~ 1160 Million Tonnes, growing at ~ 5.70% CAGR (over FY23 base reference year)

Source: Monthly Statistical Reports, Ministry of Coal, Provisional Coal Statistics, National Rail Plan 2020, National Electricity Plan by CEA, 20th EPS Survey by CEA

Pan-India Coal demand analysis – Power Sector – From Bottoms-Up approach

All figures in million tonnes

Consuming State	FY22: Actual Consumption	FY30 Base	FY30 Realistic	FY30 Optimistic
Bihar	30.0	48.4	52.2	54.4
Madhya Pradesh	83.7	92.2	104.3	111.7
Uttar Pradesh	84.3	114.5	121.3	149.9
Chhattisgarh	103.9	130.5	145.3	147.0
West Bengal	54.2	74.5	76.8	79.5
Gujrat	22.0	32.7	36.5	43.8
Punjab & Haryana	30.2	47.0	49.9	56.9
Jharkhand	19.3	37.0	37.9	39.1
Assam	2.5	2.7	3.0	3.1
Tamil Nadu	27.9	51.5	56.6	65.7

Consuming State	FY22: Actual Consumption	FY30 Base	FY30 Realistic	FY30 Optimistic
Maharashtra	81.9	103.8	111.3	131.4
Odisha	45.3	53.1	57.6	65.2
Telangana	30.6	56.0	59.2	59.6
Andhra Pradesh	40.2	62.0	64.1	72.0
Karnataka	18.4	22.6	22.7	43.2
Rajasthan	22.8	29.2	32.2	37.7
Grand Total	**704.9**	**963.6**	**1037.2**	**1160.2**

In FY23 consumption is estimated to be ~794 MT

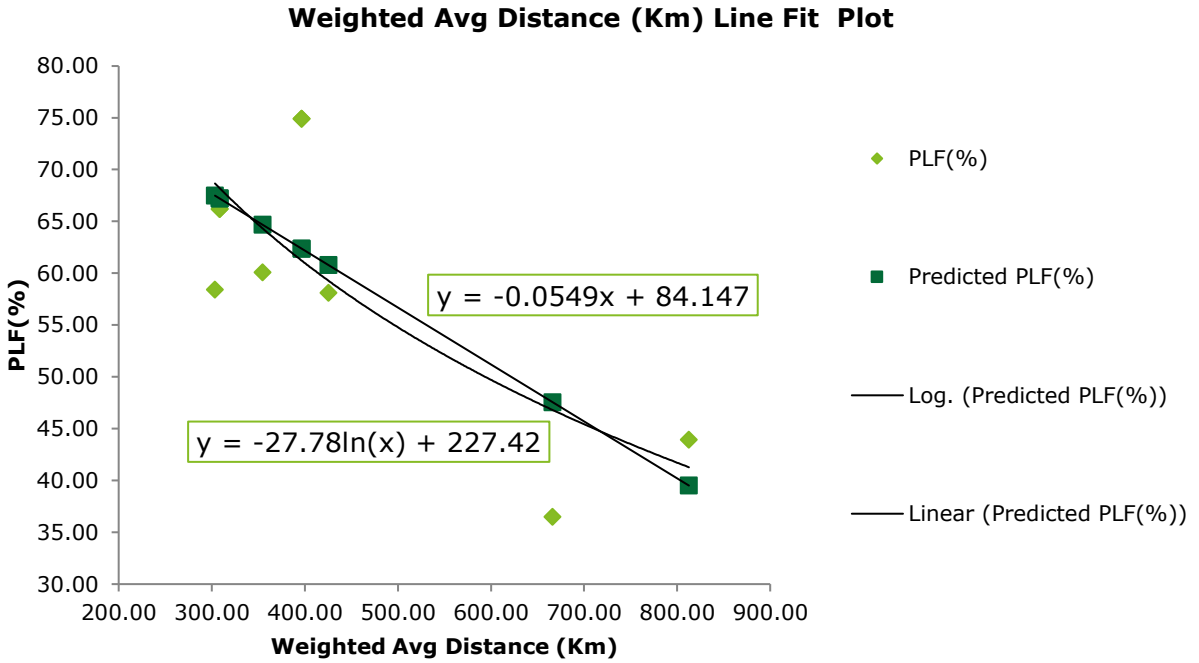
Improvement in PLFs of existing power plants would cater to the increased demand from coal-based power generation by FY30

Existing Capacities with Improved PLF: FY30

State	FY22 Coal Consumption (MTPA)	FY30 Base (MTPA)	FY30 Realistic (MTPA)	FY30 Optimistic (MTPA)	Max Increase Anticipated (MTPA): FY22 to FY30
Odisha	45.33	53.10	57.61	59.30	13.98
Chhattisgarh	103.90	130.55	145.29	147.02	43.13
Uttar Pradesh	84.26	96.21	98.82	120.30	36.04
Madhya Pradesh	83.72	92.20	104.28	111.72	28.00
Gujarat	22.03	32.69	36.53	43.81	21.78
Andhra Pradesh	40.16	55.57	57.44	64.94	24.78
Rajasthan	22.80	29.25	32.19	37.70	14.90
Maharashtra	81.92	101.10	108.31	128.25	46.33
Karnataka	18.43	21.81	21.84	41.59	23.16
Punjab	15.25	24.54	25.34	28.98	13.72
Harayana	14.98	22.47	24.57	27.90	12.91
Telangana	30.57	35.13	37.13	38.80	8.24
Bihar	29.98	37.10	40.00	42.79	12.81
West Bengal	54.19	71.56	73.78	76.61	22.42
Jharkhand	19.26	21.16	21.63	22.87	3.60
Tamil Nadu	27.95	39.54	43.43	50.46	22.52
Assam	2.49	2.67	3.00	3.12	0.63
Total	704.91	866.65	931.18	1046.08	348.95

Maharashtra – Sample state for understanding demand estimation approach (1/3)

Name of TPS	Power Utility	PLF(%)	Weighted Avg Distance (Km)
TIRODA	ADANI POWER MAHARASHTRA LTD.	74.88	396.70
ADANI DAHANU	ADANI ELECTRICITY MUMBAI LIMITED	76.21	1394.35
DHARIWAL INFRASTRUCTURE Ltd.	DHARIWAL INFRASTRUCTURE LIMITED	75.93	476.12
GMR WARORA ENERGY LTD.	GMR WARORA ENERGY LTD.	66.18	308.43
RATNAGIRI	JSW ENERGY LIMITED	47.14	N/A
BHUSAWAL	MSPGCL	58.10	425.44
CHANDRAPUR	MSPGCL	58.61	115.62
KHAPARKHEDA	MSPGCL	60.83	818.88
KORADI	MSPGCL	58.42	303.49
NASHIK	MSPGCL	36.49	666.25
PARLI	MSPGCL	44.90	346.71
PARAS	MSPGCL	60.15	296.83
MOUDA SUPER TPS	NTPC LTD.	60.06	354.55
SOLAPUR SUPER TPS	NTPC LTD.	43.94	812.56
AMARAVATI TPS	RATTANINDIA POWER LTD.	75.10	740.21
TROMBAY	THE TATA POWER COMPANY LIMITED	69.26	N/A
SAI WARDHA POWER Ltd., WARORA	SAI WARDHA POWER GENERATION PVT LTD.	47.77	34.73



Inverse Correlation Equation: 1

PLF(%) = 84.147 – 0.0549 x (Weighted Avg Distance of TPS from Coal Mines: Kms)

Inverse Correlation Equation: 2

PLF(%) = 227.42 – 27.8 Log_e(Weighted Avg Distance of TPS from Coal Mines: Kms)

Assuming Best performance under two correlation scenarios, the PLF of Maharashtra power plants could increase to ~73.16% - 80.23%.

Maharashtra – Sample state for understanding demand estimation approach (2/3)

Name of TPS	Power Utility	State	Installed Capacity (MW)	Coal Consumed (MT): FY22	PLF (%)	PLF Base Scenario	PLF Realistic Scenario	PLF Optimistic Scenario	Coal Consumption Base Scenario: FY30	Realistic Scenario: FY30	Optimistic Scenario: FY30
TIRODA	ADANI POWER MAHARASHTRA LTD.	Maharashtra	3300.00	14.18	74.88	80.23	80.23	95	15.20	15.20	17.99
ADANI DAHANU	ADANI ELECTRICITY MUMBAI LIMITED	Maharashtra	500.00	1.99	76.21	80.23	80.23	95	2.09	2.09	2.48
DHARIWAL INFRASTRUCTURE Ltd.	DHARIWAL INFRASTRUCTURE LIMITED	Maharashtra	600.00	2.72	75.93	80.23	80.23	95	2.88	2.88	3.40
GMR WARORA ENERGY LTD.	GMR WARORA ENERGY LTD.	Maharashtra	600.00	2.32	66.18	73.16	80.23	95	2.56	2.81	3.33
RATNAGIRI	JSW ENERGY LIMITED	Maharashtra	1200.00	2.73	47.14	73.16	80.23	95	4.23	4.64	5.50
BHUSAWAL	MSPGCL	Maharashtra	1210.00	4.74	58.10	73.16	80.23	95	5.97	6.55	7.76
CHANDRAPUR	MSPGCL	Maharashtra	2920.00	11.57	58.61	73.16	80.23	95	14.44	15.84	18.76
KHAPARKHEDA	MSPGCL	Maharashtra	1340.00	6.20	60.83	73.16	80.23	95	7.46	8.18	9.69
KORADI	MSPGCL	Maharashtra	2190.00	8.19	58.42	73.16	80.23	95	10.25	11.24	13.31

Maharashtra – Sample state for understanding demand estimation approach (3/3)

Name of TPS	Power Utility	State	Installed Capacity (MW)	Coal Consumed (MT): FY22	PLF (%)	PLF Base Scenario	PLF Realistic Scenario	PLF Optimistic Scenario	Coal Consumption Base Scenario: FY30	Realistic Scenario: FY30	Optimistic Scenario: FY30
NASHIK	MSPGCL	Maharashtra	630.00	1.68	36.49	73.16	80.23	95	3.36	3.69	4.37
PARLI	MSPGCL	Maharashtra	750.00	1.97	44.90	73.16	80.23	95	3.20	3.51	4.16
PARAS	MSPGCL	Maharashtra	500.00	2.00	60.15	73.16	80.23	95	2.43	2.67	3.16
MOUDA SUPER TPS	NTPC LTD.	Maharashtra	2320.00	8.69	60.06	73.16	80.23	95	10.58	11.60	13.74
SOLAPUR SUPER TPS	NTPC LTD.	Maharashtra	1320.00	3.25	43.94	73.16	80.23	95	5.42	5.94	7.03
AMARAVATI TPS	RATTANINDIA POWER LTD.	Maharashtra	1350.00	5.90	75.10	80.23	80.23	95	6.31	6.31	7.47
TROMBAY	THE TATA POWER COMPANY LIMITED	Maharashtra	750.00	2.31	69.26	73.16	80.23	95	2.44	2.68	3.17
SAI WARDHA POWER Ltd., WARORA	SAI WARDHA POWER GENERATION PVT LTD.	Maharashtra	540.00	1.48	47.77	73.16	80.23	95	2.26	2.48	2.93
				81.92					101.10	108.31	128.25

Under Construction Power Plants and Fuel linkages – Central Sector

#	Project Name	State	Implementing Agency	Units No	Capacity (MW)	Anticipated Year of Commissioning	Fuel Security / Linkage	Coal Quantum (MTPA)	Source from State
1	Barh STPP-I	Bihar	NTPC	Units 2 & 3 - 660x2	1320	2024	Letter of Assurance dtd. 18.11.2010 from CCL, securing 10 MMTPA coal for 03 Units. FSA of Unit-1 (3.333 MTPA) already signed with CCL(all operative mines, G8-G10) as per MoC PD dtd. 17.07.2013. FSA of Unit-2 & 3 to be signed after commissioning in terms of para 1A(i)of SHAKTI-2017 policy.	6.97	Jharkhand
2	Buxar TPP	Bihar	SJVN	Units 1 & 2 - 660x2	1320	2024	Allocated Mine - CCL, Magadh-Amrapali; Distance from mine - 465 km (non pithead). Letter of Assurance (LoA) for 4.976 MTPA of G9 to G14 grade coal issued by Central Coalfields Ltd. (CCL) on 10.12.2018. Coal may be supplied either from Amrapali coal block or Magadh coal block.	5.20	Jharkhand
3	North Karanpura STPP	Jharkhand	NTPC	Units 1,2 & 3 - 660x3	1980	2024	Letter of Assurance dtd. 24.03.2015 from CCL, securing 7.039 MTPA coal (G7-G11) for 03 Units. FSA to be signed after commissioning in terms of para 1A (i) of SHAKTI-2017 policy.	7.05	Jharkhand
4	Patratu STPP	Jharkhand	PVUNL	Units 1,2 & 3 - 800x3	2400	2025	12 MTPA for Ph-I from Banhardih Coal Mine at a distance of about 110 km. Banhardi Coal Mine transferred to PVUNL vide deed of adherence signed on 02.06.2017. Bridge allocation granted by SLC(LT) upto 24-06-2024; Allocation from CCL; Coal quantity quantified is 9.17 MTPA.	9.19	Jharkhand
5	Talcher TPP St-III	Odisha	NTPC	Units 1 & 2 - 660x2	1320	2027	Available. (SLC(LT), MOM dt: 10.04.2018); FSA Agreement with MCL under process; Source: Bhuwaneswari/Jagannath mines of MCL Grade: G-12 Quantity: 5.854 MMTPA	6.36	Odisha
6	Ghatampur TPP	Uttar Pradesh	NUPPL	Units 1,2 & 3 - 660x3	1980	2023	Allocation Date- 03.10.2016. Allocated Mine (Source) - Pachwara South Coal Block (9 MTPA) Grade - G10 Quantity- Net Geological Reserve 373.52 MT. Extractable reserve - 262.84MT; Pachwara South Coal Block will be fully functional by the end of Financial Year 2026-27 and will be able to meet the coal requirement of NUPPL. Hence, NUPPL is seeking coal under bridge linkage by the time Pachwara South Coal Block will be fully functional.	6.83	Jharkhand
7	Khurja SCTPP	Uttar Pradesh	THDC	Units 1 & 2 - 660x2	1320	2024	For Coal linkage, Ministry of Coal, GoI vide allotment order dtd.17.01.2017 has allotted Amelia Coal Mine in District Singraulli, Madhya Pradesh to THDCIL to meet out fuel requirements of the project. Grade of Coal: G9 (Avg. GCV = 4746 Kcal/Kg). Net Geological Reserve in Amelia Coal Mine is 162.05 Million Ton (OC) out of this Extractable Coal Reserve is 139.48 Million Ton.	4.25	Madhya Pradesh
8	Telangana STPP St-I	Telangana	NTPC	Units 1 & 2 - 800x2	1600	2023	Linked with Mandakini-B captive coal mine (PRC-20 MMTPA); however, NTPC has approached MoC on 26.12.2020 for surrendering the coal mine. Tapering linkage against the linked coal mine was initially allocated from WCL cost-plus. In July'2020, the linkage has been shifted to SCCL. Coal quantity quantified by the Coal Controller is 6.846 MTPA.	7.26	Telangana
	Total Central Sector				**13240**			**53.10**	

Source: CEA Broad Status Report Nov 2022, Monthly Statistical Reports, Ministry of Coal, Provisional Coal Statistics, National Rail Plan 2020, National Electricity Plan by CEA, 20th EPS Survey by CEA

Under Construction Power Plants and Fuel linkages – State Sector

1	Dr Narla Tata Rao TPS St-V	Andhra Pradesh	APGENCO	Unit 1	800	2023	Allocated Mine - MCL (non-pithead); Distance from mine - 930 km (non pithead); MCL issued LoI for supply of 3.548 MTPA vide letter dated 12-11-2018. Grade of coal - G13;	3.32	Odisha
2	Sri Damodaram Sanjeevaiah TPP St-II	Andhra Pradesh	APPDCL	Unit 1	800	2023	Allocated Mine - MCL, Talcher (Odisha); Distance from mine - 1225 km (non pithead); MCL has issued LoA to supply 3.548 MTPA vide letter dated 04-03-2018.	3.32	Odisha
3	Jawaharpur STPP	Uttar Pradesh	UPRVUNL	Units 1 & 2 - 660x2	1320	2023	Allocated Mine - Saharpur Jamarpani mines, Jharkhand; Distance from mine - 1190 km (non pithead) Bridge Linkage from CCL/ECL for 4.461 MTPA	3.39	Jharkhand
4	Obra-C STPP	Uttar Pradesh	UPRVUNL	Units 1 & 2 - 660x2	1320	2023	Allocated Mine - Saharpur Jamarpani mines (15 MTPA), Jharkhand; Distance from mine - 651 km (non pithead); Allocation Date: 13.08.2015. Grade of Coal -G10	5.32	Jharkhand
5	Panki TPS Extn	Uttar Pradesh	UPRVUNL	Unit 1	660	2024	Allocated Mine - Saharpur Jamarpani mines (15 MTPA), Jharkhand; Distance from mine - 896 km (non pithead); Allocation Date: 13.08.2015. Grade of Coal -G10. FSA on 30.01.2017	2.68	Jharkhand
6	Ennore SCTPP	Tamil Nadu	TANGEDCO	Units 1 & 2 - 660x2	1320	2024	Allocated Mine - Chandrabila Coal Block, Odisha; Distance from mine - 1300 km (non pithead); Total requirement is 5.95MTPA, comprising of indigenous 3.68 MTPA & imported 2.26 MTPA respectively MoU has already been signed between MMTC & TANGEDCO on 25.06.2012 for the supply of Import coal for this project. Bridge Linkage with SCCL available for indigenous coal.	5.12	Odisha & Imported
7	North Chennai TPP St-III	Tamil Nadu	TANGEDCO	Unit 1	800	2023	Allocated Mine - SCCL; Distance from mine - 606 km (non pithead);. Ministry of Coal recommended for long-term coal linkage for 1.971 MTPA Indigenous coal to SCCL. FSA Executed between TANGEDCO and SCCL for indigenous coal. MoU has been entered with M/s. MMTC for supply of Imported coal of 1.450 MTPA on 25.05.2015.	2.94	Telangana & Imported
8	Udangudi STPP St-I	Tamil Nadu	TANGEDCO	Units 1 & 2 - 660x2	1320	2024	Allocated Mine - Chandrabila Coal Block for indigenous coal of G13 Grade for 3.647 MTPA and MDO selection is under process. Distance from mine (appx) : Railway distance for movement of coal through Rail-cum-Sea route via Paradip port is 200 km.(Chandrabila to Paradip port), from Paradip port to Udangudi captive Port, sea distance is 1224 Nautical Miles. Total requirement is 5.893 MTPA with Indigenous coal of 3.647 MTPA and import coal of 2.246 MTPA. Import coal (2.246 MTPA) will be procured to the requirements. Bridge Linkage with SCCL available for indigenous coal	5.07	Odisha & Imported
9	Yadadri TPS	Telangana	TSGENCO	Units 1,2,3,4 & 5 - 800x5	4000	2024	Allocated Mine - SCCL; Distance from mine - 270 km (non pithead); Ministry of Coal vide File No.23014/1/2018-CLD, Dt:15-02-2018 has granted coal linkage from SCCL for supply of 14 MTPA of coal (grade-G9).	14.85	Telangana
10	Yelanhaka CCPP	Karntaka	KPCL	Unit 1	370	2023	NA - Could Source from Mandakini	0.84	Odisha
11	Bhusawal TPS	Maharashtra	MAHAGENCO	Unit 1	660	2023	Allocated Mine - WCL, Umred/Ghugus; Distance from mine – 403/430km; Allocation Date: 11-09-2020, Source: WCL mines ,Grade: G9/G10, Quantity : 3.18 million tonne.	3.00	Maharashtra
12	Sagardighi TPP, Ph-III	West Bengal	WBPDCL	Unit 1	660	2024	Allocated Mine - Pachhwara (North) Captive Coal Mine of WBPDCL. Distance from mine - 150 km (non pithead); Coal will be sourced mainly from captive coal mines of WBPDCL	3.07	Jharkhand
	Total State Sector				**14030**			**52.92**	
	Grand Total - Under Construction				**27270**			**106.03**	

Source: CEA Broad Status Report Nov 2022, Monthly Statistical Reports, Ministry of Coal, Provisional Coal Statistics, National Rail Plan 2020, National Electricity Plan by CEA, 20th EPS Survey by CEA

Power Plants in Pipeline and Fuel linkages (1/2)

#	Project Name	State	Implementing Agency	Capacity (MW)	Anticipated Year of Commissioning	Fuel Security / Linkage	Coal Quantum (MTPA)	Source from State
1	Lara STPP	Chhattisgarh	NTPC	1600	2027-28	Coal linkage available. NTPC has a captive block, Talaipalli with a PRC of 18 MTPA. Talaipalli has become operational in FY23	8.53	Chhattisgarh
2	Singrauli STPP-III	Uttar Pradesh	NTPC	1600	2027-28 & 2028-29	Singrauli is a pit-head power plant in Uttar Pradesh primarily supplied coal by Northern Coalfields. Long term linkage granted by Standing Linkage Committee (Long-Term) in 10.04.2018 from CIL. In minutes dt. 15.05.2018, CIL shall consult and allocate coal based on coal availability & transportation facility. Expected supply by NCL.	8.53	Uttar Pradesh/Madhya Pradesh
3	Darlipalli-II STPP	Odisha	NTPC	800	2028-29	Application for Long Term linkage under Shakti B(i) yet to be filed as on Jan-2023. NTPC's coal sourcing from Dulanga to meet current capacity of Darlipalli. Additional capacity addition likely to be sourced from MCL	4.26	Odisha
4	Sipat-III, STPP	Chhattisgarh	NTPC	800	2028-29	Application for Long Term linkage under Shakti B(i) yet to be filed. (After FR Approval) Sipat is a pithaed plant with supplies from SECL via MGR.	4.26	Chhattisgarh
5	Meja-II STPP	Uttar Pradesh	NTPC	1320	2028-29 & 2029-30	Application for Long Term linkage under Shakti B(i) yet to be filed. (After FR Approval) Currently Meja has FSAs with both NCL & CCL. However, due to limited growth of NCL, Meja is likely to be allotted coal from CCL	7.08	Jharkhand
6	Raghunathpur TPS, Phase-II	West Bengal	DVC	1320	2027-28 & 2028-29	Long term Linkage granted by SLC (LT) in 08.08.2022. Recommendations on allocation of coal from same source/subsidiary. ECL & CCL currently supplies to Raghunathpur.	7.08	West Bengal/Jharkhand
7	Durgapur TPS	West Bengal	DVC	800	2027-28	Application for Long term linkage under Shakti B(i) yet to be filed. DVC is also considering to participate in coal mine auction. Current FSAs are with MCL & CCL which expire in 2029. Expected new allotment from CCL.	4.29	Jharkhand
8	Koderma TPS	Jharkhand	DVC	1600	2027-28 & 2028-29	Application for Long term linkage under Shakti B(i) yet to be filed. DVC also considering to participate in coal mine auction. Current FSAs are with ECL & BCCL which expire in 2034. Expected new allotment from CCL.	8.58	Jharkhand
9	TPS-II 2nd Expansion	Tamil Nadu	NLC	1320	2027-28 & 2028-29	Basket of Mines in Neyveli. Plant is lignite-based and lignite is to be sources via conveyors from NLC's mines to the proposed power plant.	Not applicable, Lignite based	Tamil Nadu

Source: ACQ Required / available for Thermal Capacity addition up to-2030, Jan 2023, CEA

Power Plants in Pipeline and Fuel linkages (2/2)

#	Project Name	State	Implementing Agency	Capacity (MW)	Anticipated Year of Commissioning	Fuel Security / Linkage	Coal Quantum (MTPA)	Source from State
10	NLC Talabira STPS	Odisha	NLC	2400	2027-28 & 2028-29	Coal to be sources from Talabira II & III captive coal block (PRC: 23 MTPA)	12.79	Odisha
11	Buxar TPP-II STPP	Bihar	SJVNL	660	--	Application for Long Term linkage under Shakti B(i) yet to be filed. (After DPR Approval). For Buxar Unit 1 & 2, Allocated Mine - CCL, Magadh-Amrapali; Distance from mine - 465 km (non pithead). Letter of Assurance (LoA) for 4.976 MTPA of G9 to G14 grade coal issued by Central Coalfields Ltd. (CCL) on 10.12.2018. Coal may be supplied either from Amrapali coal block or Magadh coal block.	3.54	Jharkhand
12	Super Critical TPP, Korba (W)	Chhattisgarh	CSPGCL	1320	2028-29 & 2029-30	FSAs of decommissioned / proposed to be decommissioned Units are available. Matter proposed to be discussed in SLC.	7.04	Chhattisgarh
13	Yamuna Nagar TPP Unit 3	Haryana	HPGCL	800	2027-28	Coal Block yet to be surrendered. Recommendations for Grant of Long Term Linkage already submitted by CEA on HPGCL request. Allocation of coal likely to be from CCL	4.29	Jharkhand
14	Amarkantak TPS	Madhya Pradesh	MPPGCL	660	2027-28	Long term Linkage granted by SLC (LT) in 18.11.2019. Amarkantak is a pithead plant located near Sohagpur & Johilla areas of SECL in Madhya Pradesh. Coal likely to be allocated from these areas	3.54	Madhya Pradesh/ Chhattisgarh
15	Satpura TPP	Madhya Pradesh	MPPGCL	660	2027-28	Long term Linkage granted by SLC (LT) in 18.11.2019. Likely allocation from WCL.	3.54	Maharashtra
16	Chandrapur TPP	Maharashtra	Mahagenco	1320	2029-30	Application for Long Term linkage under Shakti B(i) yet to be filed. (After DPR Approval) Coal likely to be allocated from WCL	7.08	Maharashtra
17	Koradi TPS Replacement	Maharashtra	Mahagenco	660	2027-28	Application for Long Term linkage under Shakti B(i) yet to be filed. Coal currenty sourced from WCL & SECL. Likely additional allocation from SECL due to WCL's continuing supplies and limited growth	3.54	Chhattisgarh
18	Ukai TPC, Tapi	Gujarat	GSECL	800	2027-28	Application for Long Term linkage under Shakti B(i) yet to be filed. Major coal supplies currently from SECL. Allocation likely to be from SECL	4.29	Chhattisgarh
19	Singareni Unit 3	Telangana	SCCL	800	2027-28	Naini captive coal block with PRC of 10 MTPA	4.29	Odisha
		Total		**21,240**			**106.55**	

Source: ACQ Required / available for Thermal Capacity addition up to-2030, Jan 2023, CEA

All India demand of thermal coal from power sector in FY30

State	FY22 Coal Consumption (MTPA)	FY30 Base (MTPA)	FY30 Realistic (MTPA)	FY30 Optimistic (MTPA)	Max Increase Anticipated (MTPA): FY22 to FY30
Existing Capacities with Improved PLF: FY30					
Odisha	45.33	53.10	57.61	59.30	13.98
Chhattisgarh	103.90	130.55	145.29	147.02	43.13
Uttar Pradesh	84.26	96.21	98.82	120.30	36.04
Madhya Pradesh	83.72	92.20	104.28	111.72	28.00
Gujarat	22.03	32.69	36.53	43.81	21.78
Andhra Pradesh	40.16	52.57	54.33	64.84	27.17
Rajasthan	22.80	29.25	32.19	37.70	14.90
Maharashtra	81.92	101.10	108.31	128.25	46.33
Karnataka	18.43	21.81	21.84	41.59	23.16
Punjab	15.25	24.54	25.34	28.98	13.72
Harayana	14.98	22.47	24.57	27.90	12.91
Telangana	30.57	35.13	37.13	38.80	8.24
Bihar	29.98	37.10	40.00	42.79	12.81
West Bengal	54.19	71.56	73.78	76.61	22.42
Jharkhand	19.26	21.16	21.63	22.87	3.60
Tamil Nadu	27.95	39.54	43.43	50.46	22.52
Assam	2.49	2.67	3.00	3.12	0.63
Total	**704.91**	**863.65**	**928.07**	**1046.08**	**+ 351.35**
Upcoming Capacities by FY30					
Bihar	0	11.29	12.17	11.65	11.65
Uttar Pradesh	0	18.32	22.46	29.60	29.60
Jharkhand	0	15.88	16.24	16.21	16.21
Andhra Pradesh	0	6.43	6.65	7.10	7.10
Odisha	0	5.62	6.36	5.85	5.85
Karnataka	0	0.84	0.84	1.60	1.60
Telangana	0	20.91	22.12	20.85	20.85
West Bengal	0	2.96	3.07	2.85	2.85
Maharashtra	0	2.74	3.00	3.18	3.18
Tamil Nadu	0	11.96	13.14	15.26	15.26
Total	**0**	**96.95**	**106.03**	**114.14**	**+ 114.14**
Grand Total	**704.91**	**960.59**	**1034.10**	**1160.22**	**+ 465.49**

Pan-India Coal demand analysis – Non-Regulated Sector

Total Non-Coking Coal demand from NRS

	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal Consumption from **CPPs**: MTPA	120.74	130.52	140.15	148.95	158.44	167.74	177.07	186.93	197.33	208.31
Coal Consumption from **Cement Sector**: MTPA	38.59	47.49	51.02	54.29	57.82	61.32	64.85	68.58	72.54	76.72
Coal Consumption from **DRI/Sponge Iron Sector**: MTPA	48.13	54.64	58.21	61.48	64.99	68.44	71.90	75.53	79.35	83.36
Coal Consumption from Others Sector (**Bricks, Paper, Fertilizer etc.**): MTPA	37.44	7.71	8.16	8.64	9.15	9.68	10.25	10.85	11.49	12.17
Total Non-Coking Coal Consumption from NRS: MTPA	**244.90**	**240.36**	**257.54**	**273.36**	**290.40**	**307.18**	**324.07**	**341.90**	**360.71**	**380.56**

Steel

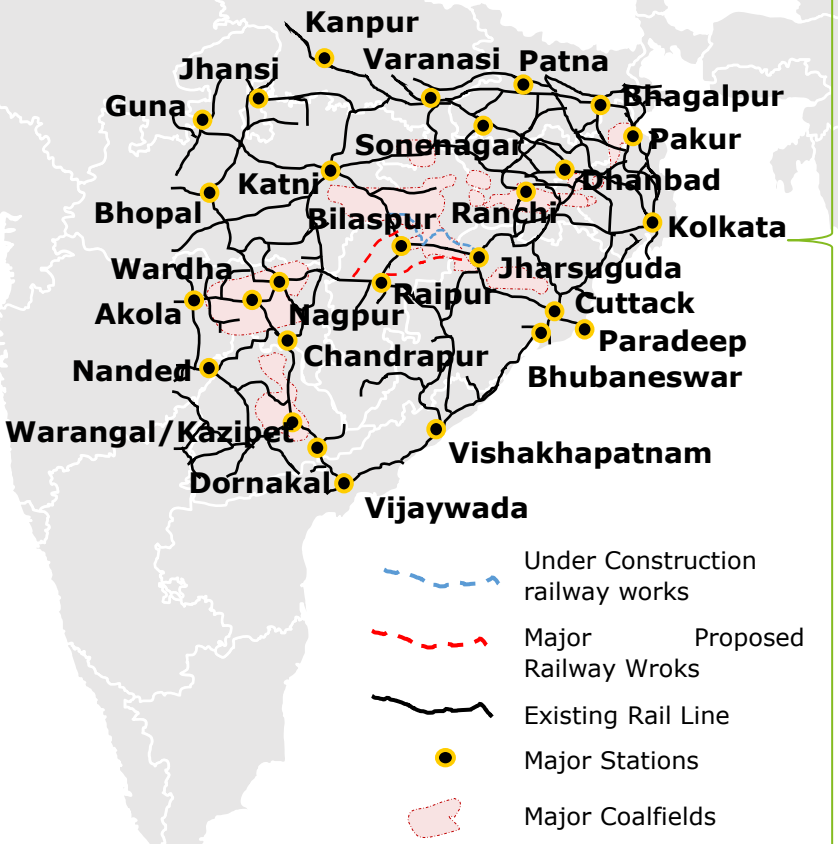
	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Real GDP Growth Rate	-6.60%	8.70%	8.00%	6.90%	7.00%	6.50%	6.20%	6.20%	6.20%	6.20%
Correlation (Elasticity Factor)	0.72	Historical analysis of last 11 years								
Crude Steel Peoduction (Million Tonnes)	104	120	127	137	148	160	173	187	202	219
Coking coal Demand (Million Tonnes)	**62**	**77**	**81**	**88**	**95**	**125**	**134**	**143**	**152**	**161**

Source: Monthly Statistical Reports, Ministry of Coal, Provisional Coal Statistics, National Rail Plan 2020

Summary of Key Rail Projects Identified

Major Railway Lines catering to Coal Traffic in India

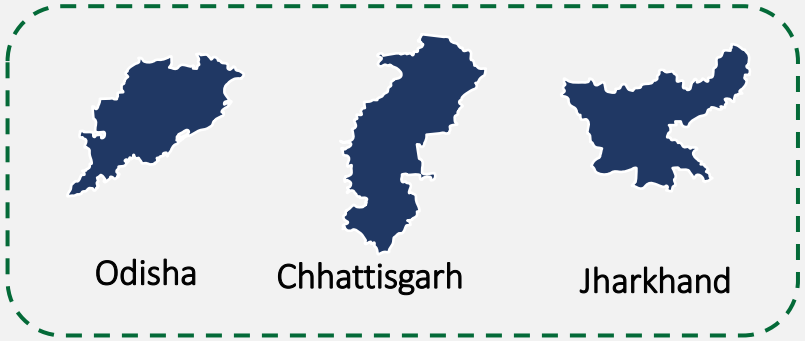
Major coalfields are located in eastern and central parts of India.



20 Key Line Recommendations
Tripling of Jharsuguda-Barpali-Sardega
Doubling of Sardega – Bhalumunda Line
4th Line from Jharsuguda to Rourkela
Doubling of Angul-Balram line
Execution of MCRL Inner and Outer Corridor
Diversion of Coal via Angul – Sukinda new line to Dhamra
Tripling of Korba – Champa Line
4th Line Pendra Rd to Anuppur
4th Line Anuppur to New Katni
Proposed CRCL lines (JSG-Raipur & Katghora-Dongargarh)
Triple Line Ambikapur to Anuppur
Nagpur – Wardha Triple Line
Tripling of Itarsi – Nagpur
Tripling of Chandrapur – Majri
Doubling of Chopan – Chunar line
Shaktinagar-Mahadiya new line
Doubling of Shivpur – Kathautia
Doubling Bhojudih – Pradhan Khunta
Tripling of Kazipet - Bibinagar
Doubling of Rajmahal–Farakka MGR (NTPC)

The major coal producing states of Odisha, Chhattisgarh & Jharkhand along with parts of Madhya Pradesh are the major clusters for coal evacuation, accounting for ~75% of the total domestic raw coal dispatch

Major Growth Areas for Coal Traffic in India



While the major three areas fall under the divisions of East Coast Railways (ECoR), South East Central Railways (SECR) and East Central Railways (ECR), origin-destination mapping has been analyzed for all divisions and minor additional works have been proposed to debottleneck coal traffic movement on a pan-India basis

Key Insights and Recommendations for Indian Railways – **Consolidated** (1/9)

#	Recommendation	Way Forward
1	Doubling (for Sardega – Bhalumunda line) and Tripling (for Jharsuguda Barpali line) for hassle free movement of coal along with additional proposed works such as Automatic Signaling etc.	Captive and Commercial miners, who have been allotted blocks in Ib-Valley CF may initiate dialogues with Ministry of Railways (SECR) to understand possible evacuation arrangements from this cluster. SECR to take up proposed doubling and tripling.
2	For making evacuation of coal feasible via coastal shipping (Jharsuguda to eastern ports) from Ib-valley, it is proposed that Indian Railways should provide freight concessions for RSR traffic to achieve freight parity. Currently, only <5 Million Tonnes of coal is being transported to ports other than Paradeep (~30 MT in FY22). As these shipments usually have a ~ INR 300 / Tonne economic disadvantage as compared to Talcher – Paradeep route, Indian Railways should evaluate freight concessions to those eastern ports to achieve freight parity.	Indian Railways should evaluate freight concessions to all eastern ports having economic disadvantage
3	3rd line from Jharsuguda Jn to Rourkela is under construction. However as per future O-D coal flow mapping, the capacity won't be sufficient. Therefore 4th line has to be planned from Jharsuguda Jn to Rourkela.	Indian Railways
4	High congestion expected on railway lines to enable coastal shipping Concerned lines: Budhapank to Rajatgarh and Cuttack to Paradeep. Heavy Haul Rail Corridor from Salegaon to Cuttack being shelved due to economic constraints. It is of utmost importance to add a third line (Survey under process) and in future a fourth line from Cuttack to Paradeep. MCRL Outer Corridor to be executed to bypass load on Talcher. Timely execution of MCRL inner corridor by FY26 to enable evacuation on Sambalpur – Talcher Rd Section. Also, Doubling of Angul-Balram line is required to be taken up for despatch of ~25-30 Rakes/Day by FY30.	Indian Railways (ECoR)
5	Dhamra Port has plans to increase capacity of coastal shipping + exports to around 20 MTPA. This would lead to diversion of around 14 R/D from Dhamra, via Angul-Sukinda Rd line. Other ports such as Gopalpur, Vizag and Gangavaram should be explored by consumers. Under Construction line from Rairakhol to Gopalpur port should be utilized, subject to adequacy of coastal shipping capacity at ports and favorable economics of coastal movement.	End Consumers / Power Plants, Dhamra Port (DPCL)

Key Insights and Recommendations for Indian Railways – **Consolidated** (2/9)

#	Recommendation	Way Forward
6	Although Auto-Signaling works between Korba and Champa along with Korba Yard modification is underway, a third line between Korba and Champa is required for future evacuation of coal from Korba CF towards Bilaspur.	Indian Railways (SECR)
7	Rail line connectivity exists from Gevra to NTPC Seepat (MGR circuit) and from NTPC Seepat (MGR circuit) to Gatora station on the Champa-Bilaspur main line. Connectivity from Junadih siding (Gevra area) to NTPC Seepat (MGR circuit) -700 m, is underway. Collaboration with NTPC to evacuate coal from Korba CF to Champa-Bilaspur main line bypassing Korba-Champa rail line should be developed to provide additional alternate route.	Commercial terms to be expedited for usage of link
8	4th Line between Pendra Rd to Anuppur & Anuppur to New Katni should be planned	Indian Railways (SECR)
9	Proposed CRCL Lines have to be finalized and executed on priority for diversion of loads directly towards Raipur (for feed to Maharashtra, Karnataka, Gujarat etc.) bypassing Bilaspur.	Indian Railways (SECR). CRCL
10	CERL is expected to join CEWRL at Urga (Korba) via the CERL Phase-II. Therefore, CERL Phase-II needs to be expedited for coal evacuation to northern India from the coalfields of Ib Valley and Mand Raigarh.	Expediting CERL Phase-II. Dialogues may be initiated by coal miners who have been allotted blocks in the Ib Valley region and Mand Raigarh region for future evacuation plans with Ministry of Railways

Key Insights and Recommendations for Indian Railways – **Consolidated** (3/9)

#	Recommendation	Way Forward
11	Triple Line from Anuppur to Ambikapur will be required in future as volumes from CIC CF increases. Auto Signaling of the entire section from Anuppur to Ambikapur has to be taken up for easing the evacuation from the cluster	Indian Railways (SECR)
12	4th Line between Pendra Rd to Anuppur & Anuppur to New Katni has to be planned	Indian Railways (SECR)
13	Ambikapur – Garhwa Rd rail corridor is being planned by railways. After the analysis of current and future coal traffic and O-D mapping, it was found that this line would may not have sufficient coal traffic. Plans for development of this corridor should be re-analyzed by the Indian Railways.	Indian Railways (SECR)
14	Nagpur-Wardha line is currently running at 158%. Due to increased supplies from Chhattisgarh to Maharashtra along with traffic from Odisha and WCL's own traffic, tripling of this line to be expedited.	Tripling of Nagpur-Wardha to be expedited, Indian Railways
15	Tripling of Itarsi-Nagpur (both Itarsi-Amla & Amla-Nagpur currently at >100%) and Chandrapur-Majri (current utilization ~140%) should be expedited to enable future coal evacuation from these areas	Tripling of Chandrapur-Majri-Sonegaon line to be expedited, Indian Railways

Key Insights and Recommendations for Indian Railways – **Consolidated** (4/9)

#	Recommendation	Way Forward
16	Proposed chord line from Chandrapur to Chanda Fort station in the Wardha Valley region to be expedited for traffic moving from Wardha Valley CF to Nagbhir	Chandrapur-Chanda Fort Chord line to be expedited
17	Double Line from Mahadiya to Katni (Bypassing Sanjay tiger Reserve) along with Katni Grade separator project to be executed at the earliest. Singrauli to Mahadiya section double line already commissioned.	Indian Railways (WCR & ECR)
18	Doubling of Anpara to Krishnashila may be executed at the earliest.	Indian Railways (WCR & ECR)
19	Upcoming new BG line between Lalitpur – Singrauli (estimated TDC: 2025-26) shall provide a vital link between northern India and NCL region avoiding Katni junction. This work should be expedited.	Indian Railways (WCR)
20	Doubling of Chopan to Chunar Section should be planned as capacity augmentation of an important feeder line for DFC	Indian Railways (NCR)

Key Insights and Recommendations for Indian Railways – **Consolidated** (5/9)

#	Recommendation	Way Forward
21	Shaktinagar-Mahadiya new BG line feasibility must be explored by Indian Railways	Indian Railways (ECR)
22	Shivpur-Kathautia new BG line is under construction for coal evacuation from North Karanpura CF towards Koderma. Doubling of Shivpur-Kathautia line should be taken up keeping in view future requirements of evacuation from this area	Focused approach to speed up ongoing works & doubling of Shivpur-Kathautia may be explored. Indian Railways
23	Proposed Tori-Chatra is expected to join Chatra-Gaya line (at Kastha/Paraiya) for coal evacuation to northern India from the coalfield of North Karanpura. From Gaya, coal traffic may be diverted to the planned extension of Dedicated Freight Corridor (DFC) line for ease of coal evacuation	Expediting of commissioning lines of Tori-Chatra, Chatra-Gaya and Gaya-Sonenager DFC line. Indian Railways
24	Additional line should be planned to connect Non-CIL Blocks of Badam Dipside, Babupara, Dipside of Rohne Rautpara, Rohne to Hazaribagh-Arigada line with a common Public Freight Terminal	Production commencement plans to be finalized for under exploration blocks in North Karanpura region to aid in planning for additional FMC projects and BG rail line link to Hazaribagh – Arigada line
25	Commissioning of Shivpur-Chhatti Bariatu/Kerandhari, BES/Charhi-Badam new line, Hazaribagh-Banadag new line for bulb connectivity	These lines have been considered as part of New Connectivity for Energy Corridors and to be expedited to ease coal traffic from the North Karanpura CF

Key Insights and Recommendations for Indian Railways – **Consolidated** (6/9)

#	Recommendation	Way Forward
26	New line for Bhabua Road-Dildarnagar section	Line to facilitate coal traffic for Sutlej Jal Vihar Nigam Ltd. (SJVNL)
27	New line from Demu to Tubed mines	Line as part of New Connectivity for Energy Corridor shall facilitate coal traffoc from Tubed mine
28	New line from Biharratoli to Chakla Coal Mines	Rail connecticity for non-CIL Chakla mine
29	Y-Curves should be planned for lines from Magadh, Amrapali & Sanghamitra joining on the Tori-Shivpur line to facilitate coal traffic towards Kathautia.	Y-curves to be planned from major coal mines of CCL to facilitate coal traffic towards Kathautia.
30	Tripling of Barkakhana-Garhwa Road is under progress along with Hazaribagh-Arigada Surface Crossing. Y-connection between Kuju & Ranchi Rd, surface crossing at Arigada and Rail over Rail flyover at Patratu have been proposed to further facilitate coal traffic in this region.	These ongoing works should be expedited

Key Insights and Recommendations for Indian Railways – **Consolidated** (7/9)

#	Recommendation	Way Forward
31	Additional line should be planned to connect Hazaribagh and Barkakhana/Arigada as an alternate to Barkakhana/Arigada – Garhwa Road to reach Gaya via Koderma	Additional evacuation route for under exploration blocks in the region and Kuju area of West Bokaro coalfield, among others
32	Eastern DFC's works may be expedited till Gomo to facilitate coal evacuation from all coalfields of CCL, BCCL & ECL. Further connectivity from major freight terminals to DFC may be planned and implemented to facilitate traffic movement	DFC works may be expedited till Gomo
33	Doubling of Bhojudih-Pradhan Khunta line should be taken up to facilitate BCCL's coal evacuation from the area	Doubling of Bhojudih-Pradhan Khunta line may be taken up
34	New BG line between Godda and Pakur should be expedited to reduce reliance on road transport from the Pachwara blocks to Pakur and Dumka.	Expediting of new line Godda-Pakur
35	Proposed projects of Murari-Pakur 3rd and 4th line to be expedited due to increased coal traffic from Pakur along with Bardhman-Shaktigarh 5th line	Proposed 3rd & 4th line to be expedited

Key Insights and Recommendations for Indian Railways – **Consolidated** (8/9)

#	Recommendation	Way Forward
36	Double line from Ambadhia station (Pakur-Godda line) to Pachwara coal mines (Pachwara North, Pachwara central and Pachwara South) may taken up post discussion by stakeholders with Indian Railways	Double line from Ambadhia station (Pakur-Godda line) to Pachwara coal blocks
37	New BG line from Saharpur-Jamarpani block to Harisingh station to be taken up. This may be extended in future to cater to coal traffic from Deocha-Pachami and other non-operational blocks	New line to Harisinghpur from southern blocks
38	MGR line from Rajmahal to NTPC Farakka may be extended to cover coal evacuation from Chupervita of ECL along with doubling of the NTPC Farakka MGR line. Hura C to Rajmahal MGR (~12 Kms) is being constructed by NTPC for taking coal to either Kahalgaon and Farakka Plants	Doubling of MGR Line and expedition of connectivity from Hura C to Rajmahal. (NTPC)
39	Expediting of Chitra-Basukinath line works along with doubling of Rampurhat-Dumka line to facilitate coal traffic in the Rajmahal CF	Doubling of Rampurhat-Dumka line
40	Due to increased coal production from SCCL's Bhupalpally region, the line connecting Ramagundam to Manuguru via Jayashankar Bhupalpally region which is under contruction to be expedited on priority. Joining of this line will ease traffic on Kazipet-Peddapalli section	Manuguru-Ramagundam (via Bhupalpally) line may be expedited

Key Insights and Recommendations for Indian Railways – **Consolidated** (9/9)

#	Recommendation	Way Forward
41	Ongoing tripling works on sections Vijaywada-Motumari-Dornakal-Kazipet-Odella (near Peddapalli) and section Mandamarri-Manikgarh shall further ease evacuation for congested sections in this region.	Tripling work in the region to be expedited. Additional lines should be evaluated for Peddapalli-Manchiryal section (4th line)
42	Tripling of Kazipet-Bibinagar should be evaluated for easing traffic flowing from SCCL's blocks to southern states along with re-modeling of Kazipet yard for free flow of goods trains	Tripling work for Kazipet-Bibinagar along with rem-modeling of Kazipet yard should be evaluated
43	Doubling of Dornkal- Bhadrachalam Road section & Doubling of Motumari-Vishnupuram section	Doubling of Dornakal-Bhadrachalam Road & Motumari-Vishnupuram sections
44	Automatic signaling implementation across all major coalfields	Indian Railways
45	All doubling/tripling/new line should take into account creation of sufficient yard capacities at major junction points. Works similar to Katni Grade Separator should be planned to cater to enhanced yard capacity requirement.	Indian Railways

Estimated Wagons procurement required by Indian Railways for Coal Traffic by FY30 – Bottoms Up Approach

Production Cluster / Concerned Railway Division	FY22 Avg Lead (KMs)	FY30 Avg Lead (KMs)	% Reduction in Lead due to Network Optimization	Optimized Turnaround Time (Days) for FY30	Additional Rakes / Day Despatch Envisaged	Total Number of Wagons Required to be Procured by FY30 for coal movement	Reduced TAT due to FMC loading	Number of Wagons Required – FMC scenario	Additional Wagons required during Peak Season	Total Wagons to be Procured over Base year 2022
ECoR (For supply from Odisha to all destinations)	428.32	406.09	5.19%	3.03	**235**	41,299	2.86	39023	2927	**41949**
SECR (For Supply from Chhattisgarh to all destinations, including supply from Sohagpur CF in MP)	656.44	592.64	9.72%	4.42	**154**	39,482	4.25	37990	2849	**40840**
ECR, SER, & ER (For Supply from Jharkhand and West Bengal)	525.8	515.86	1.89%	3.85	**108**	24,032	3.68	22989	1724	**24713**
SCR (For Supply from Telangana)	372.07	306.29	17.68%	2.28	**18**	2,380	2.11	2206	165	**2371**
Total					**515**	**1,07,193**		**1,02,208**	**7,666**	**1,09,874**
Due to efforts on Import substitution, the overall coal imports will decline to ~170 MTPA or ~118 R/D by FY30 – This will lead to a reduction of 27 R/D daily despatch of coal from ports to Various destination. Assuming a TAT of 4 Days, the number of wagons that will reduce will be ~ 6,264.										**1,03,610**
As 13,690 Wagons (BOXN + BOBRN) have already been procured by Indian Railways in FY23. We assume that out of these around 48% would be for Coal movement i.e. ~ 6572 Wagons. So we will reduce these wagons from the estimated procurement projection, as they have already been procured										**97,038**

Estimated Wagons procurement required by Indian Railways for Coal Traffic by FY30 – Top Down Approach

Source of Despatch	2022		2030		Additional Requirement	
	Million Tonnes	Rakes / Day	Million Tonnes	Rakes / Day	Million Tonnes	Rakes / Day
Total Despatch of Coal via Rail - Domestic Coal	541	376	1287	894	746	518
Total Despatch of Coal via Rail - Imported Coal	128	89	89	62	-39	-27
Total Volume Handled via Rail Mode	**669**	**465**	**1376**	**956**	**707**	491

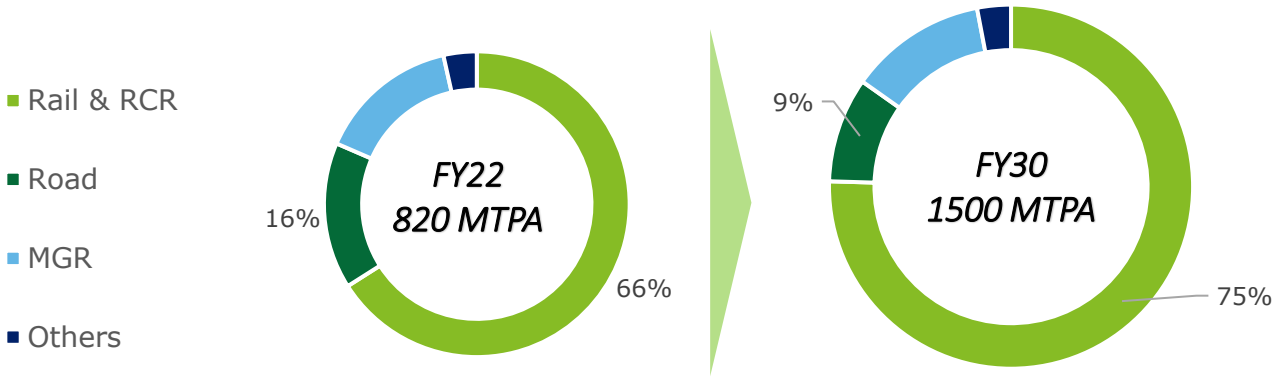
Estimated Number of Rakes required to be procured over and above the FY22 despatch levels. Assuming 5% Reduction TAT due to deployment of various FMC projects	467
Total Number of Rakes to be Procured assuming an average Turnaround time of 3.9 Days per Rake (Assumed based on consultations with Stakeholders)	1.821
Total Number of Wagons to be Procured assuming 58 Wagons per Rake	1,05,618
As 13,690 Wagons (BOXN + BOBRN) have already been procured by Indian Railways in FY23. We assume that out of these around 48% would be for Coal movement i.e. ~ 6572 Wagons. So we will reduce these wagons from the estimated procurement projection, as they have already been procured	99,046
% Deviation between estimates of Bottoms Up and Top-Down Approach	2 %

Therefore, Wagon procurement estimates using both the approaches seem to be within the same range. Therefore, it shall be noted that an estimated 95,000 to 100,000 wagons would need to be procured in order to cater to the coal sector by FY30.

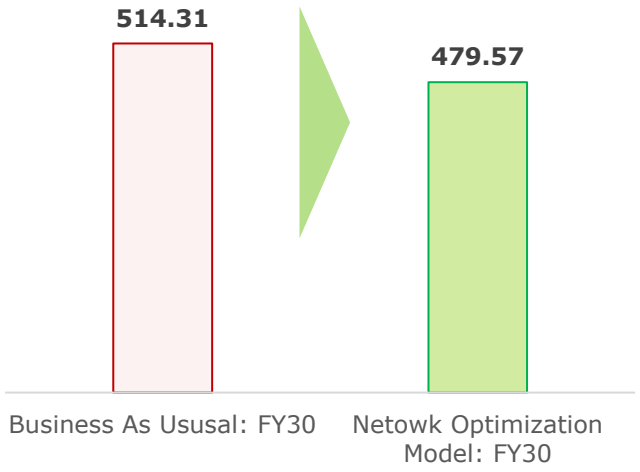
Impact of Network Optimization for coal logistics | Lower costs and lower pollution

Reduction in Avg Transportation leads

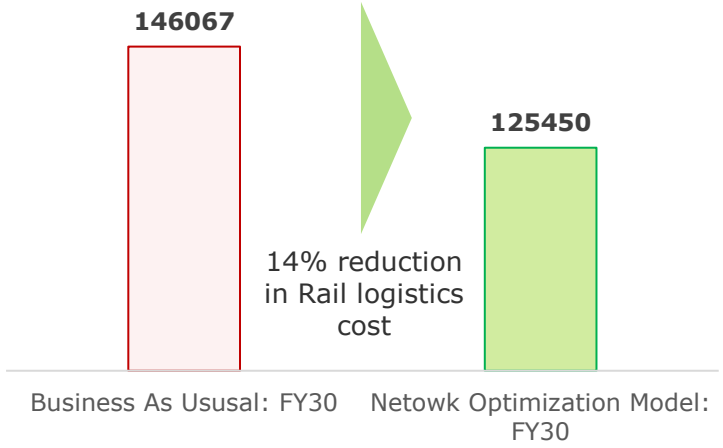
Higher reliance on Railways leading to reduction in Road transport's modal share. Rail's share to increase from 66% in FY22 to 75% in FY30



FY30 Avg Coal Leads (Kms)



Coal Logistics Cost (Rail): INR Crores



Reduction in Costs and Pollution

01 ₹ **21,000 Crores**
or
$ 2.5 Billion USD

Cost Savings
The Network optimization model with increased focus on Railways, MGR systems leading to lower reliance on road transportation, coupled with reduction in overall average railway leads will lead to an opportunity savings of **INR 21 Thousand Crores per Annum in FY30**

02 CO_2 **100,000 Tonnes of CO_2**

Lower Co2 Emissions
With an estimated Co2 emissions of 0.82 Kg/Kwh of electricity produced from grid in India, and 1.75 Kwh of electricity consumed for coal freight trains / '000 Gross tonne-Kms, **there is an estimated potential to lower Co2 emissions by ~100,000 Tonnes Co2 per Annum in FY30** due to **reduction in railway leads and replacement of Road Transportation by Rail**.

Source: Deloitte Analysis, Indian Railways, CEA Estimates

Our approach for analyzing future line capacity utilizations using an example

Sub-Section	2022						2027					
	Passenger	Freight	Others	Total	Capacity (with MB)	% Utilization	Passenger	Freight	Others	Total	Capacity (with MB)	% Utilization
Budhapank to Rajatgarh	44	113.82	1.16	158.98	130	122%	48	180.86	1.70	230.56	218	106%

All numbers (Except Capacity utilization) represent average two-way traffic in Trains/Rakes per day.

Note: Capacity refers to Capacity of line with Maintenance Block (MB)

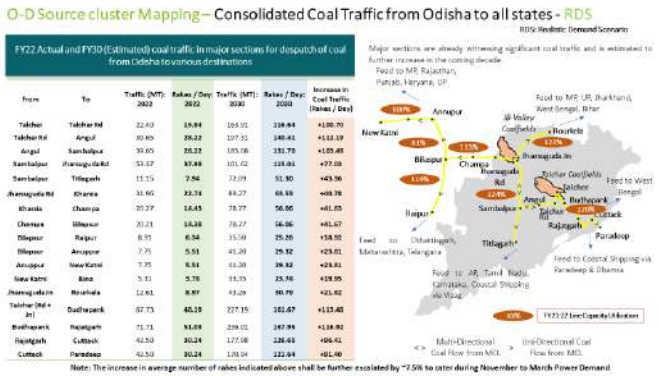
Passenger CAGR	Total Freight CAGR	Total CAGR
1.76%	9.70%	7.72%

The above furnished table (2022 and 2027 forecast values) for the sample Budhapank to Rajatgarh Section **has been taken from Line Capacity Statement 2022 for ECoR.**

CAGR values have been estimated for Passenger, Total Freight etc based on forecast values of Railways.

Using forecast values for 2027, we then predict the overall Rakes/Day for 2030 for this section, as per Railway CAGRs

2030					
Passenger	**Freight**	**Others**	**Total**	**Capacity (with MB)**	**% Utilization**
50.57	238.79 **(149 to 159 R/D is coal)**	1.81	291.17	218 (Capacity increase due to 3rd and 4th line b/w Budhapank and Salegaon	134% to 139%



Using Deloitte's future bottom's up OD mapping analysis, the future coal traffic on Budhapank – Rajatgarh Section is estimated and clearly indicated in the table.

In this case future coal traffic in the section is 168 R/D.

Out of this we estimate further diversion of around 10-15 R/D via Angul-Sukinda Route and Angul – Rairakhol Route.

This gives an average of ~154 R/D (149 to 159 R/D) of coal traffic. This traffic was ~ 51 R/D in FY22 as per Deloitte Estimates.

Source: Line Capacity Statements of Indian Railways, Deloitte Analysis

State-wise key findings and recommendations

Recommendations
for
Odisha

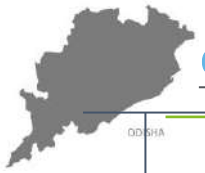
Thermal Coal Supply Analysis summary for Odisha

Odisha

All figures in million tonnes

	Actuals			Projections						
	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal Supply										
Talcher CF	83.9	96.7	112.7	111.8	125.1	165.1	174.1	174.1	181.6	188.6
IB Valley CF	64.1	71.4	80.6	92.2	99.9	124.9	129.3	137.3	143.3	147.3
Total MCL (CIL)	**148**	**168**	**193**	**204**	**225**	**290**	**303**	**311**	**325**	**336**
Captive & Commercial - Talcher CF	0.0	0.0	0.0	7.5	19.8	26.4	35.3	47.1	62.8	83.9
Captive & Commercial - IB Valley CF	6.7	16.9	25.20	25.20	29.3	35.3	42.5	51.1	61.4	73.9
Total Non-CIL	**6.7**	**16.9**	**25.20**	**32.7**	**49.1**	**61.7**	**77.7**	**98.1**	**124.2**	**157.7**
Total Coal Production in Odisha	**155**	**185**	**219**	**237**	**274**	**352**	**381**	**410**	**449**	**494**

MCL has ambitious production capacity expansion plans



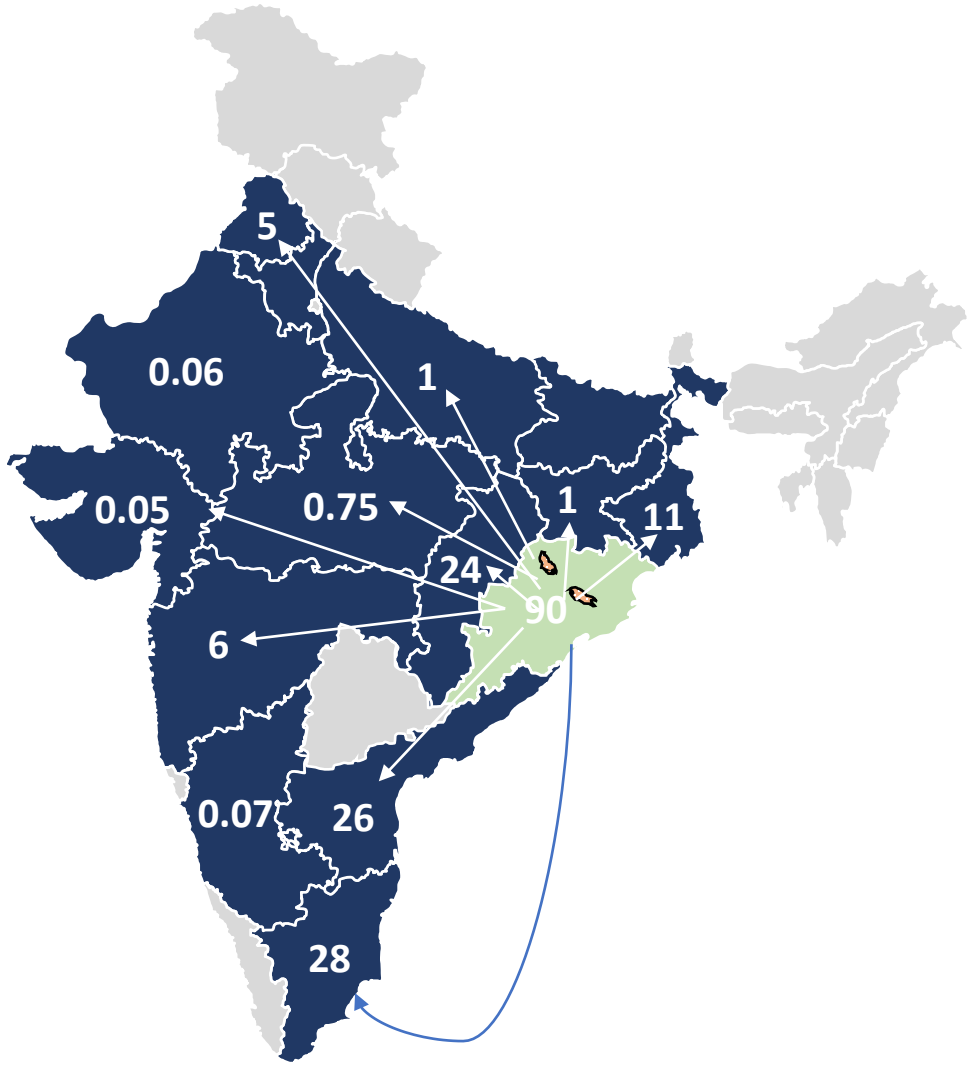
Odisha

Area	Linked Mines	FY22 Actual Despatch (MTPA)					FY25-26 1 BT Plan (MTPA)					FY29-30 Anticipated Dispatch (MTPA)				
		Rail	RCR	Pure Road	MGR & Others	Total	Rail	RCR	Pure Road	MGR & Others	Total	Rail	RCR	Pure Road	MGR & Others	Total
IB Valley	Samaleshwari & Lajkura	7.68	0.00	1.42	0.00	**9.10**	17.81	0.00	1.69	0.00	**19.50**	17.81	0.00	1.69	0.00	**19.50**
Lakhanpur	Lakhanpur, Belpahar & Lilari	20.45	0.00	3.65	4.00	**28.10**	34.19	0.00	1.81	0.00	**36.00**	37.99	0.00	2.01	0.00	**40.00**
Basundhara & Mahalaxmi	Kulda, Garjanbahal, Siarmal, Basundhara (W) Extn	20.01	0.00	16.83	0.00	**36.84**	48.60	0.00	23.00	0.00	**71.60**	79.50	0.00	7.50	0.00	**87.00**
Orient	Hirakhand-Bundia , Orient 1,2,3	0.00	0.00	0.24	0.00	**0.24**	0.82	0.00	0.00	0.00	**0.82**	0.78	0.00	0.00	0.00	**0.78**
IB Valley & Basundhara CF		**48.14**	**0.00**	**22.14**	**4.00**	**74.04**	**101.42**	**0.00**	**26.50**	**0.00**	**127.92**	**136.08**	**0.00**	**11.20**	**0.00**	**147.28**
Lingaraj	Lingaraj OCP	18.89	0.00	2.21	0.00	**21.10**	18.89	0.00	1.11	0.00	**20.00**	17.00	0.00	0.00	0.00	**17.00**
Bhubaneswari, Kaniha, Jaganath, Bharatpur, Hingula, Talcher, Balabhadra, Subhadra	Bhubaneswari, Ananta, Kaniha, Jaganath, Bharatpur, Hingula, Nandira, Balram, Balabhadra, Subhadra	48.90	0.00	23.13	9.24	**81.27**	123.3	0.00	13.31	10.5	**147.08**	145.3	0.00	15.7	10.50	**172.00**
Talcher CF		**67.79**	**0.00**	**25.34**	**9.24**	**102.36**	**142.2**	**0.00**	**14.42**	**10.5**	**167.08**	**162.8**	**0.00**	**15.7**	**10.50**	**189.00**
Total MCL		**115.93**	**0.00**	**47.48**	**13.24**	**176.41**	**248.6**	**0.00**	**40.92**	**10.5**	**295.00**	**298.88**	**0.00**	**26.9**	**10.50**	**336.28**

MCL's despatch is progressing towards higher share of rail from current 66% to a target of 88% by FY30. Ensuring that the evacuation capacity exists is a crucial aspect of the holistic logistics policy.

As pure road despatches would decline from ~47 MTPA to ~27 MTPA (a decrease of 20 MTPA), no new NH and SH level road infrastructure are envisaged.

O-D Source cluster Mapping – Despatch of Coal from Odisha: FY22 snapshot



FY22: Despatch of Coal from Odisha to destination state (MTPA)

All figures in million tonnes

Consuming State	Rail + RCR	Rail-Sea-Rail	Pure Road	MGR & Others	Total
Odisha	32.35	0.00	34.23	23.77	90.35
Tamil Nadu	1.16	26.30	0.66	0.00	28.12
Andhra Pradesh	14.73	8.43	2.33	0.00	25.49
Chhattisgarh	14.33	0.00	9.14	0.00	23.47
West Bengal	11.15	0.00	0.17	0.00	11.31
Maharashtra	5.09	0.00	0.62	0.00	5.71
Punjab & Haryana	5.12	0.00	0.00	0.00	5.12
Jharkhand	0.88	0.00	0.25	0.00	1.13
Other States (UP, MP, Karnataka, Bihar, Rajasthan, Gujarat)	2.50	0.23	0.05	0.00	2.78
Total Despatch from Odisha	**87.31 (45.12%)**	**34.96 (18.07%)**	**47.46 (24.53%)**	**23.77 (12.28%)**	**193.5**

Origin – Destination Mapping and the coal flow analysis of rail trunk lines for ~87 MTPA is conducted and presented in the next sections

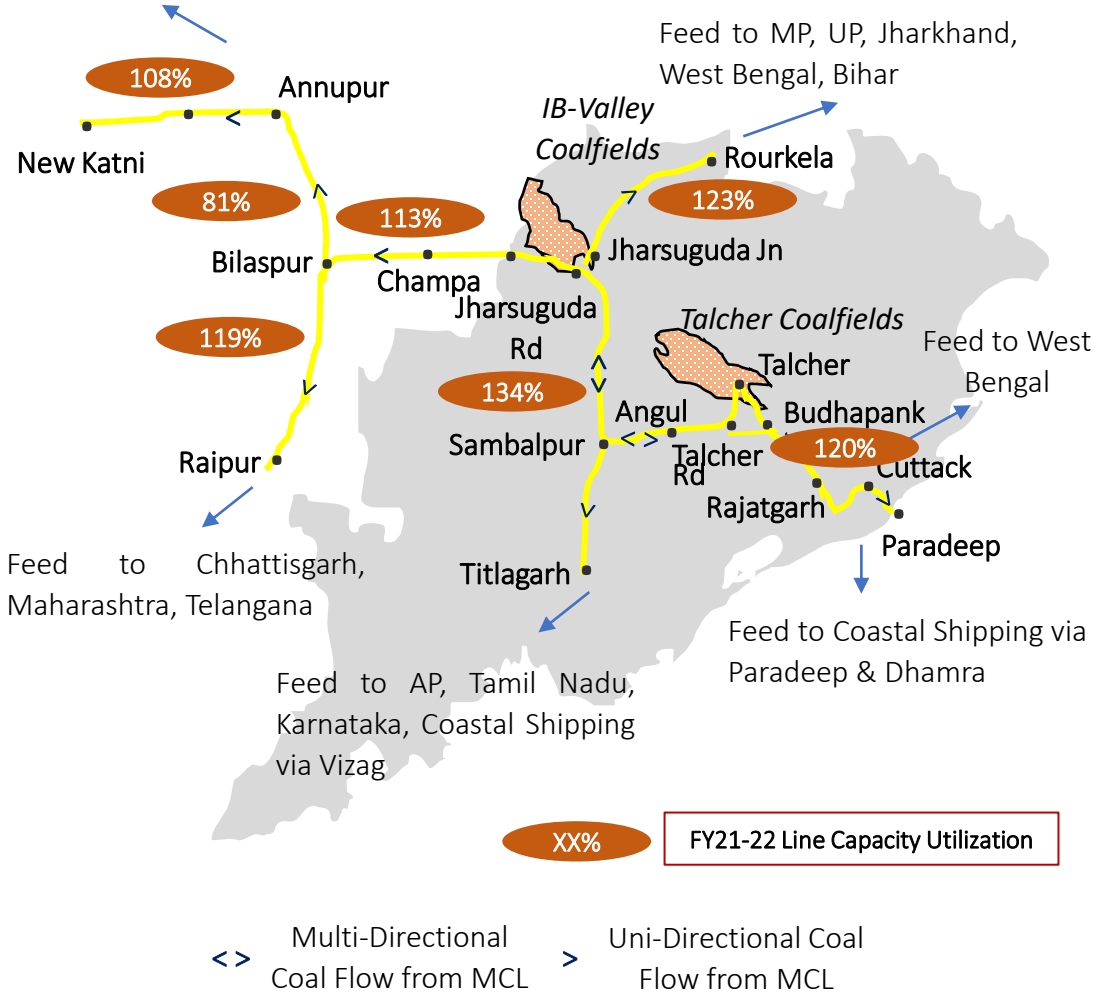
O-D Source cluster Mapping – Consolidated Coal Traffic from Odisha to all states - RDS

RDS: Realistic Demand Scenario

FY22 Actual and FY30 (Estimated) coal traffic in major sections for despatch of coal from Odisha to various destinations

From	To	Traffic (MT): 2022	Rakes / Day: 2022	Traffic (MT): 2030	Rakes / Day: 2030	Increase in Coal Traffic (Rakes / Day)
Talcher	Talcher Rd	22.40	**15.94**	163.91	**116.64**	**+100.70**
Talcher Rd	Angul	39.65	**28.22**	197.31	**140.41**	**+112.19**
Angul	Sambalpur	39.65	**28.22**	185.08	**131.70**	**+103.49**
Sambalpur	Jharsuguda Rd	53.37	**37.98**	161.62	**115.01**	**+77.03**
Sambalpur	Titlagarh	11.15	**7.94**	72.09	**51.30**	**+43.36**
Jharsuguda Rd	Kharsia	31.96	**22.74**	89.27	**63.53**	**+40.78**
Kharsia	Champa	20.27	**14.43**	78.77	**56.06**	**+41.63**
Champa	Bilapsur	20.21	**14.38**	78.77	**56.06**	**+41.67**
Bilapsur	Raipur	8.91	**6.34**	35.50	**25.26**	**+18.92**
Bilapsur	Anuppur	7.75	**5.51**	41.20	**29.32**	**+23.81**
Anuppur	New Katni	7.75	**5.51**	41.20	**29.32**	**+23.81**
New Katni	Bina	5.31	**3.78**	33.35	**23.74**	**+19.95**
Jharsuguda Jn	Rourkela	12.61	**8.97**	43.26	**30.79**	**+21.82**
Talcher (Rd + Jn)	Budhapank	67.73	**48.19**	227.19	**161.67**	**+113.48**
Budhapank	Rajatgarh	71.71	**51.03**	236.01	**167.95**	**+116.92**
Rajatgarh	Cuttack	42.50	**30.24**	177.98	**126.65**	**+96.41**
Cuttack	Paradeep	42.50	**30.24**	170.94	**121.64**	**+91.40**

Major sections are already witnessing significant coal traffic and is estimated to further increase in the coming decade.



Note: The increase in average number of rakes indicated above shall be further escalated by ~7.5% to cater during November to March Power Demand

Our key findings based on detailed analysis of railway traffic for Odisha

Sub-Section	2022		2030						Other Planned Works (New Energy/Other Corridors)	Utilization after of All planned works
	Capacity	% Utilization	Ongoing Works	Passenger	Freight	Total	Capacity	% Utilization		
Talcher to Talcher Rd	50	**139%**	4th line	53	142 (~116 to 125 R/d is coal)	186 to 195	98	**190% to 199%**	Planned MCRL Inner Corridor via Jarapada/Angul to bypass Talcher-Talcher Rd. section, significant offloading of Non-CIL rakes via MCRL. With Angul-Balram Doubling, more rakes can be moved directly via Angul, rather than routing through Talcher road. Corridor won't have impact on sections beyond Angul/Jarapada	**<100%**
Sambalpur to Titlagarh	50	**129%**	Doubling	54	78 (~51 to 55 R/d is coal)	128 to 132	102	**125% to 129%**	Nil	**125% to 129%**
Jharsuguda Jn to Rourkela	144	**122%**	3rd line in progress. 4th line planned for Tatanagar-Rourkela won't impact this section.	80	188 (~30 to 32 R/d is coal)	266 to 268	214	**124% to 125%**	Nil	**124% to 125%**
Jharsuguda Rd to Sambalpur	98	**133%**	Nil	69	173 (~115 to 124 R/d is coal)	232 to 241	98	**236% to 246%**	3rd & 4th line from Jharsuguda to Sambalpur planned as part of Energy Corridor	**<100%**

All numbers (Except Capacity utilization) represent average two-way traffic in Trains/Rakes per day. Passenger also includes Others

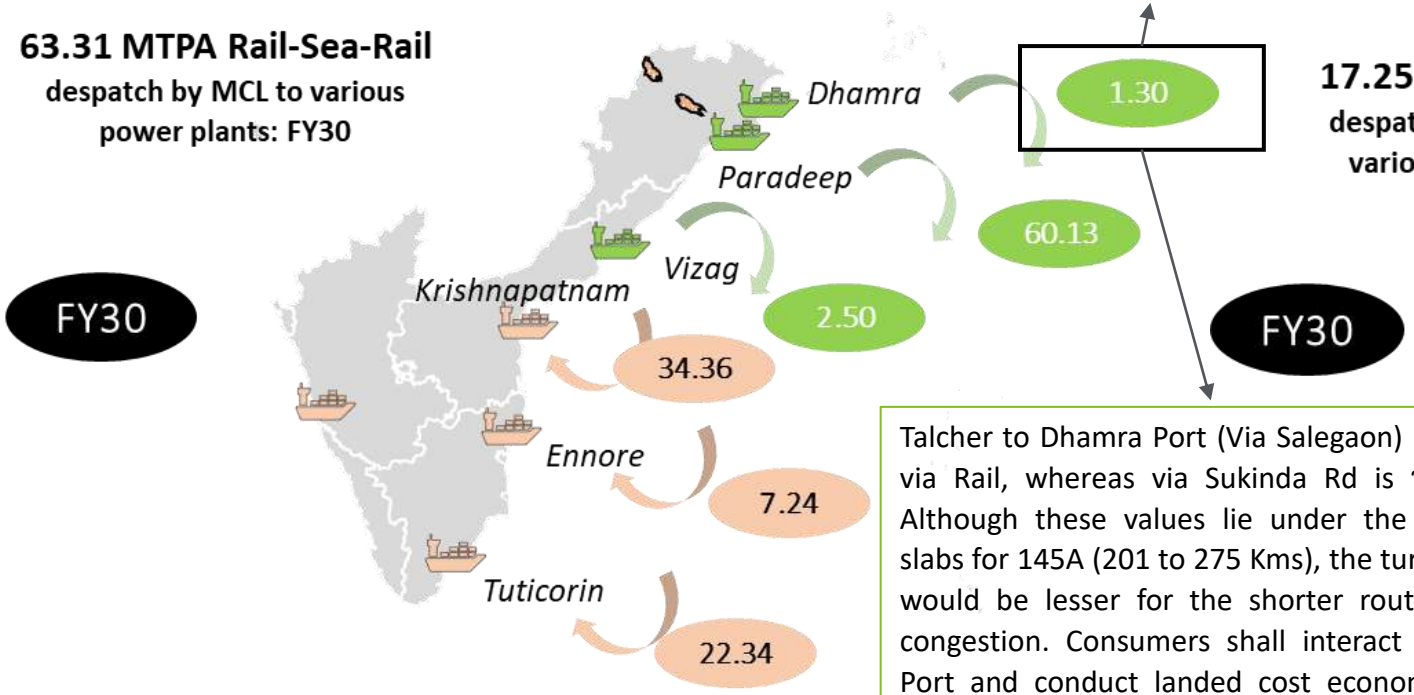
The higher range (for capacity utilization estimates) are based on increase of +7.5% in coal rakes over base value, attributable to Peak Power Demand

Note: Capacity refers to Capacity of line with Maintenance Block (MB)

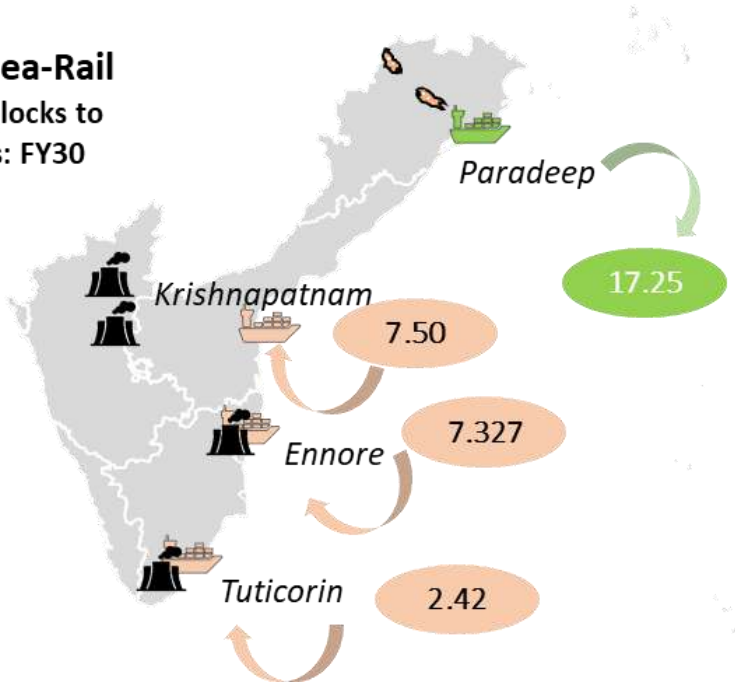
Our key findings based on detailed analysis of coastal shipping

We have also built in a scenario where ~20 MTPA of coal is shipped from Dhamra via Angul-Sukinda line instead of Paradeep

63.31 MTPA Rail-Sea-Rail
despatch by MCL to various power plants: FY30



17.25 MTPA Rail-Sea-Rail
despatch by Non-CIL blocks to various power plants: FY30

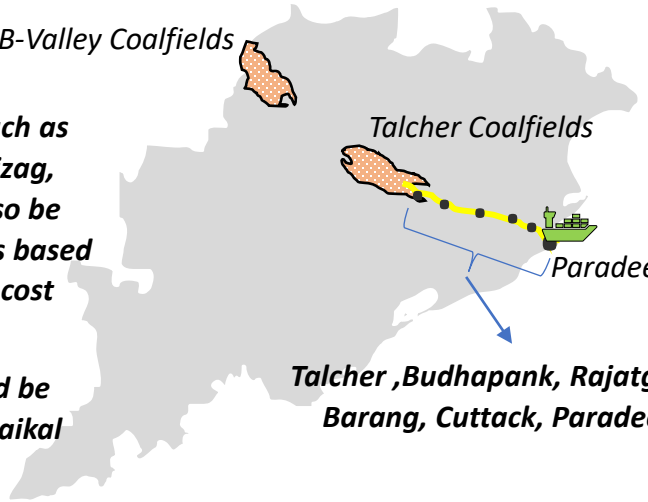


Talcher to Dhamra Port (Via Salegaon) is ~270.2 Kms via Rail, whereas via Sukinda Rd is ~223.82 Kms. Although these values lie under the same freight slabs for 145A (201 to 275 Kms), the turnaround time would be lesser for the shorter route with lesser congestion. Consumers shall interact with Dhamra Port and conduct landed cost economics for their assets.

<u>Key findings on coastal shipping:</u>

- Coastal shipping capacity from Eastern ports exceeds 120 MTPA
- 80-90 MTPA is the realistic coastal shipping volumes for FY30 based on demand-based analysis of power plants and landed cost economics.
- Additional capacity of ~30 MTPA can be utilized for exports to Bangladesh & Sri Lanka. Hence, no idle capacity is envisioned.
- Around ~20 – 25 MTPA, or 14-17 R/d of coastal shipping volume to NRS assets (Steel + Cement) have also been considered
- Apart from Paradeep Port, Dhamra, Gopalpur, Vizag and Gangavaram shall be explored for coastal shipping.

Probable Coastal shipping to NRS Assets (Steel)



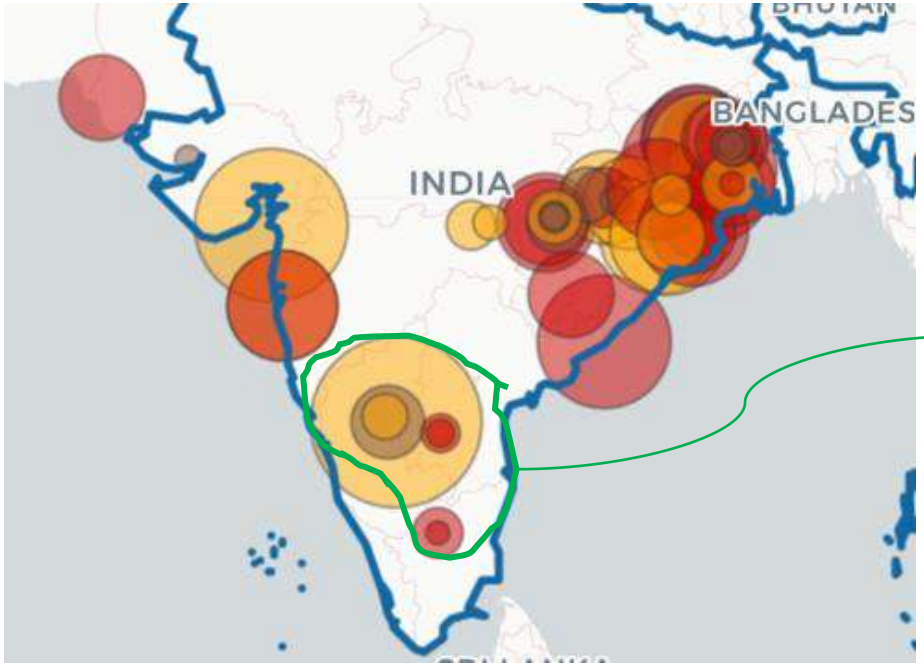
Other Loading ports such as Dhamra, Gopalpur, Vizag, Gangavaram could also be explored by Steel players based on Asset level landed cost economics

Unloading Ports could be Krishnapatnam or Karaikal

Talcher ,Budhapank, Rajatgarh, Barang, Cuttack, Paradeep

MCL Talcher to Paradip Port and Costal Shipping to Southern Steel Clusters

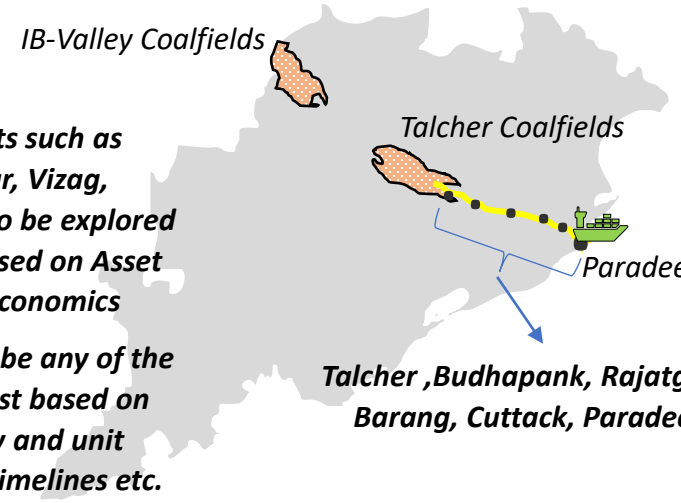
From	To	Traffic (Tonnes)	Rakes / Day
Talcher	Budhapank	22080000	15.33
Budhapank	Rajatgarh	22080000	15.33
Rajatgarh	Barang	22080000	15.33
Barang	Cuttack	22080000	15.33
Cuttack	Paradeep	22080000	15.33



Steel Plant	Capacity (MTPA)
JSW Steel Vijaynagar	12
JSW Steel Vijaynagar BF & BOF Expansion	6.80
BMM Ispat Steel Plant	2.20
Kalyani Steels Hospet Plant	0.86
JSW Steel Salem Plant	1.03
JSW Steel Salem Plant Bf & BOF Expansion	0.23
Arjas Steel Tadipatri Plant	0.33
Arjas Steel Expansion	0.62
Total Capacity (Probable for Coal's Coastal Shipping)	24.07
Estimated Steel Production @80% Capacity Utilization	19.25
Estimated Thermal Coal Requirement (@1.147 MTPA / Crude Steel Production)	22.08

The loading and offloading ports shall be studies (Asset Level) by respective asset owners to make the decision based on feasibility of coastal shipping vs all rail

Probable Coastal shipping to NRS Assets (Cement)



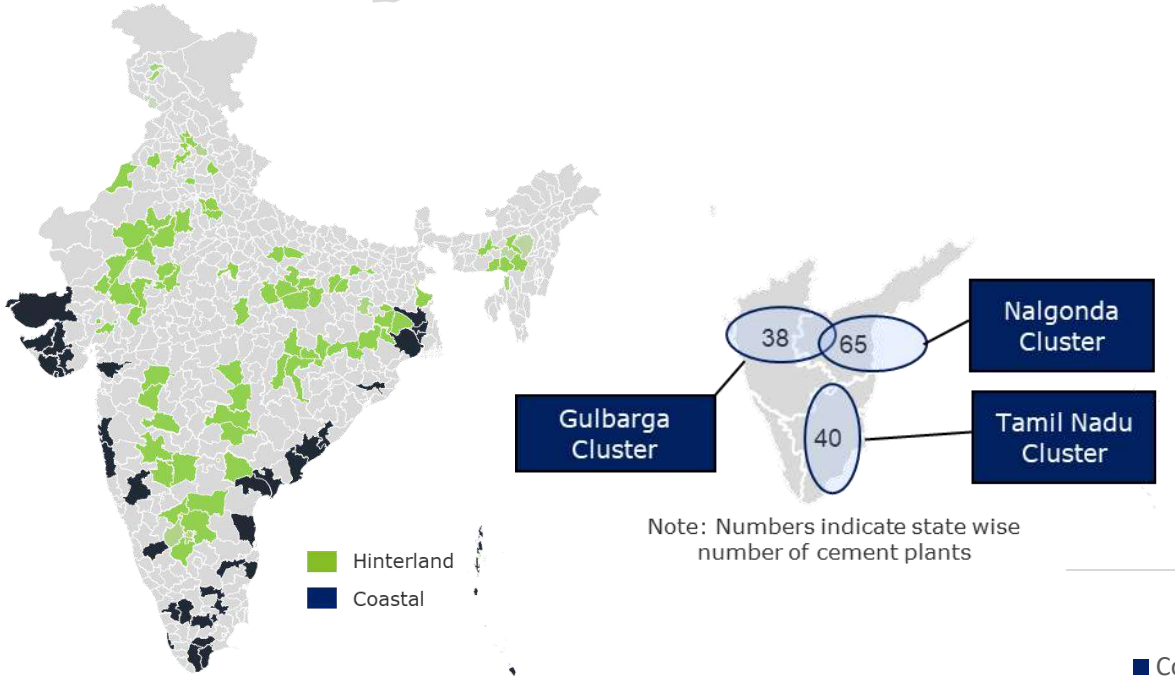
Other Loading ports such as Dhamra, Gopalpur, Vizag, Gangavaram could also be explored by Cement Players based on Asset level landed cost economics

Unloading Ports could be any of the ports on Eastern Coast based on offloading capacity and unit economics, Delivery Timelines etc.

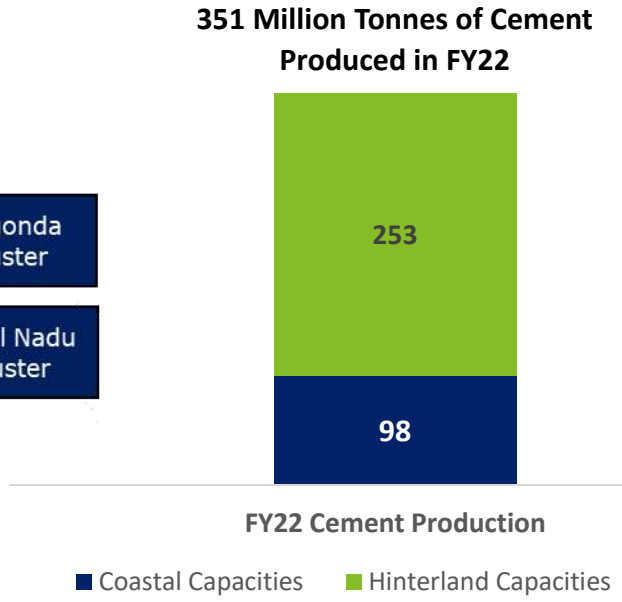
Talcher ,Budhapank, Rajatgarh, Barang, Cuttack, Paradeep

MCL Talcher to Paradip Port and Costal Shipping to Coastal Cement Clusters			
From	**To**	**Traffic (Tonnes)**	**Rakes / Day**
Talcher	Budhapank	1200000	1
Budhapank	Rajatgarh	1200000	1
Rajatgarh	Barang	1200000	1
Barang	Cuttack	1200000	1
Cuttack	Paradeep	1200000	1

Out of the total 8 MTPA coal requirement from Coastal Cement Assets, ~15% (1.2 MTPA) is considered from domestic sources with G9-G14 Grade, that could be supplied by MCL. Remaining would be either imports or High-Grade coal from SECL, ECL, WCL.



Note: Numbers indicate state wise number of cement plants



To produce ~98 MTPA of cement by coastal capacities, around 13.23 MTPA of thermal coal was consumed. Around ~60% of these volumes are towards southern and western india which can leverage coastal shipping.

Hence, there seems to be a potential to supply these power plants around 1 MTPA, for which costal shipping could be utilized. **But at the same time as these are coastal assets, they are more likely to rely on imported coal than MCL's low grade coal**

MCL's marketing team shall hold consultations with the Cement Industry

The loading and offloading ports shall be studies (Asset Level) by respective asset owners to make the decision based on feasibility of coastal shipping vs all rail

Our key findings based on detailed analysis of railway traffic for coastal shipping

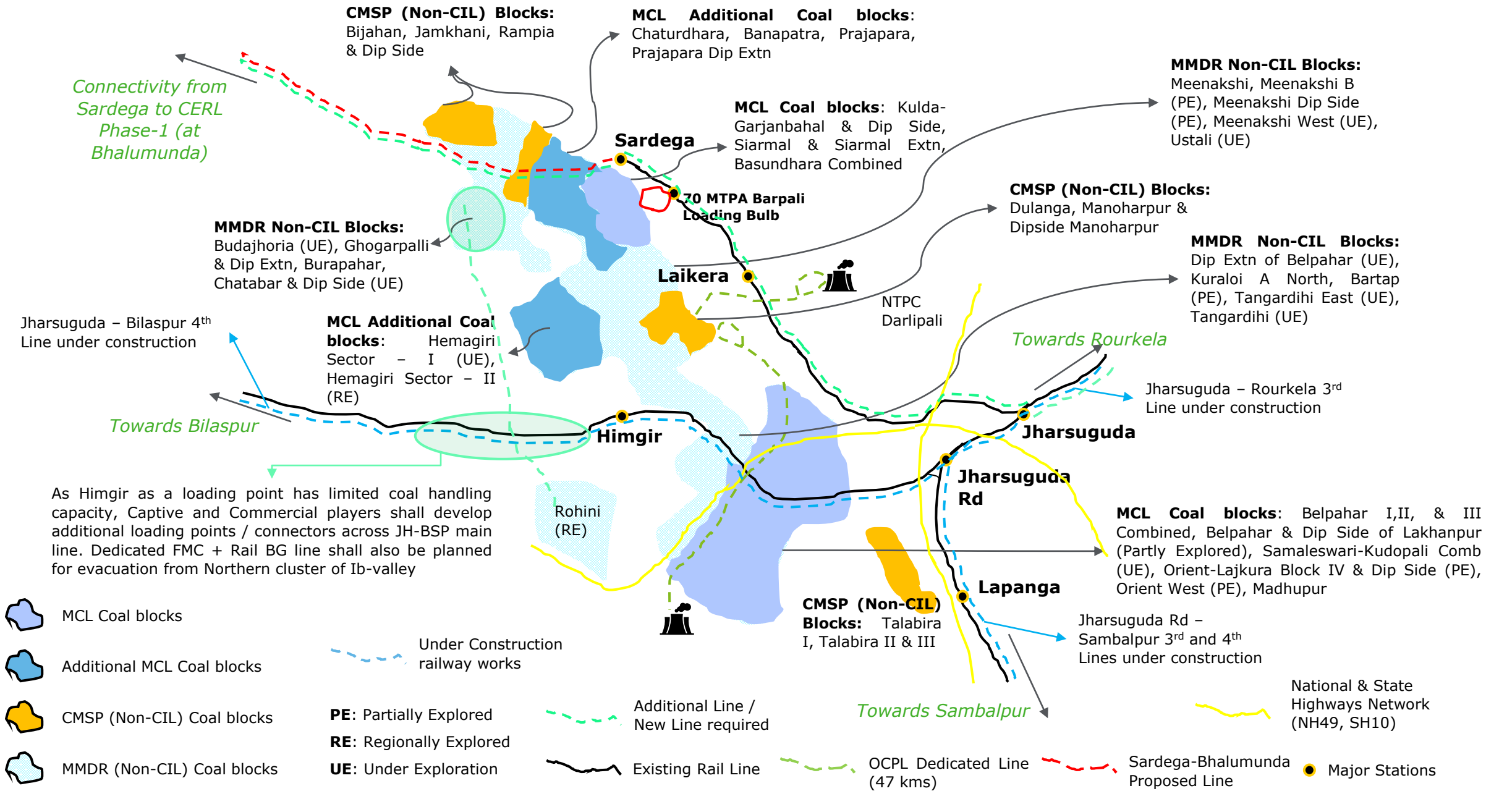
Sub-Section	2022		2030						Other Planned Works (New Energy/Other Corridors)	Utilization after of All planned works
	Capacity	% Utilization	Ongoing Works	Passenger	Freight	Total	Capacity	% Utilization		
Talcher / Talcher Rd to Budhapank	168	**126%**	3rd Line from Talcher to Budhapank, Talcher – Bimalgarh new BG Line	101	287 (~162 to 174 R/d is coal)	375 to 387	280	**134% to 138%**	Planned MCRL Inner Corridor via Jarapada/Angul to bypass Talcher-Talcher Rd. section, significant offloading of Non-CIL rakes via MCRL. With Angul-Balram Doubling, more rakes can be moved directly via Angul, rather than routing through Talcher road.	**<100%**
Budhapank to Rajatgarh	130	**122%**	3rd and 4th Lines planned between Budhapank – Salegaon.	52	238.79 (~ 148 to 159 R/d is coal)	291 to 302	218	**134% to 139%**	Re-routing coal to Dhamra and Paradeep Port via Angul – Sukinda New BG Line. Also Routing some coal from Angul to Rairakhol to Gopalpur Port	**127% to 132%**
Cuttack to Paradeep	100	**72%**	Planned auto-Signaling, Additional loop line at Badabandha.	24	149 (~122 to 131 R/d is coal)	173 to 182	100	**173% to 182%**	Doubling of Paradeep to Haridaspur Line Siju – Paradip Flyover Dhanmandal to Chandikhol Chord. Routing of 20 MTPA coal from Dhamra via Angul – Sukinda Line Routing of coal to Paradeep via Angul – Sukinda Rd – Haridaspur section could further decrease load on Cuttack to Sambalpur and Budhapank to Rajatgarh Sections. Salegaon to Paradip HHRC shelved due to economic unviability	**162% to 171%**

All numbers (Except Capacity utilization) represent average two-way traffic in Trains/Rakes per day. Passenger also includes Others

The higher range (for capacity utilization estimates) are based on increase of +7.5% in coal rakes over base value, attributable to Peak Power Demand

Note: Capacity refers to Capacity of line with Maintenance Block (MB)

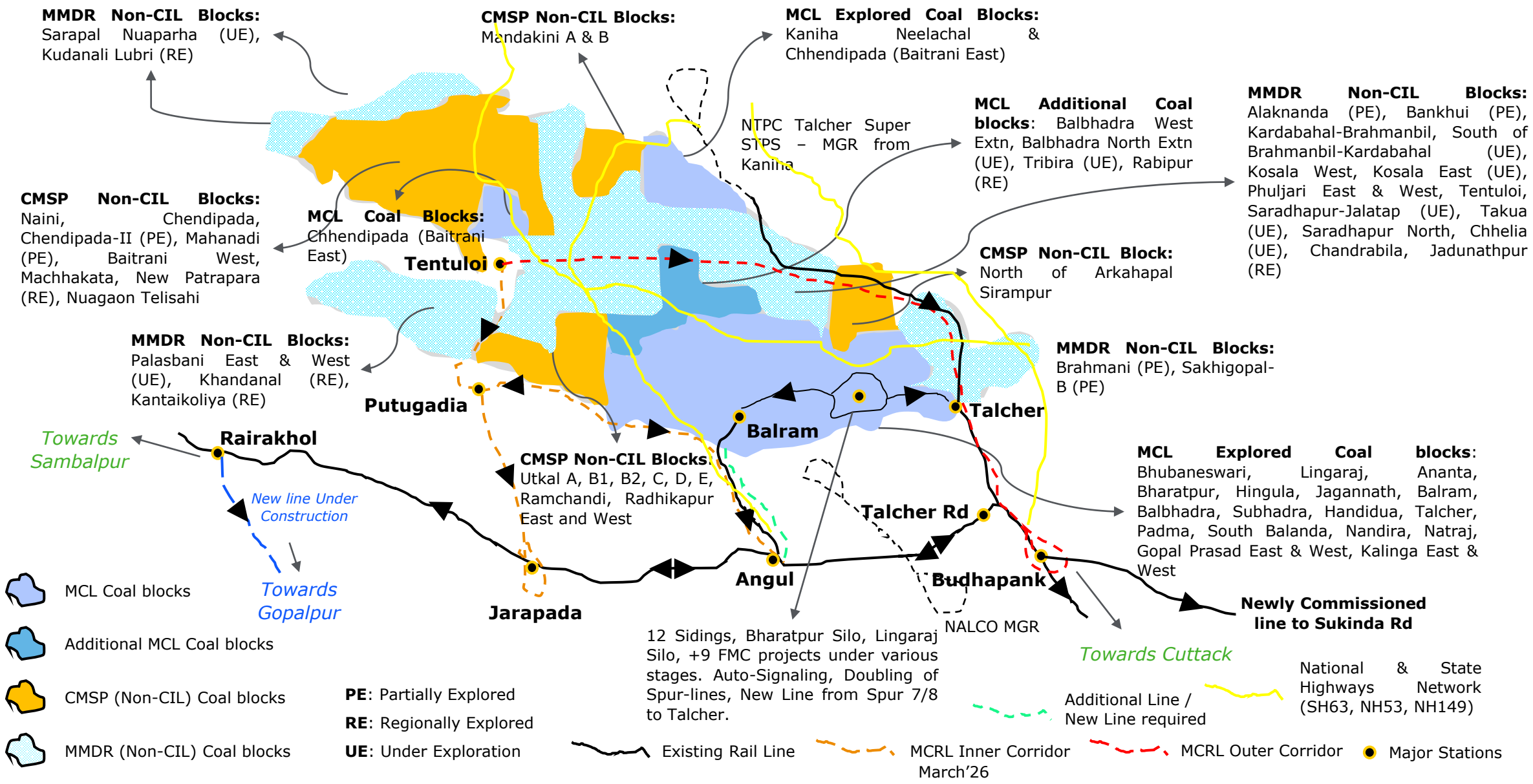
Proposed evacuation plan for IB-Valley CF



Key Insights and Recommendations – **IB Valley Coalfields**

#	Recommendation	Way Forward
1	Evacuation Capacity of Jharsuguda-Barpali Rail Line + Sardega-Bhalumunda Rail Line cumulatively accounts to ~100 MTPA. This is neck to neck with CIL's planned evacuation capacity from IB and Basundhara Coalfields by 2030. In order for commercial and captive players like Vedanta, GMDC, OCPL (surplus coal for commercial sales), to also leverage these lines for evacuation in future, Doubling (for Sardega – Bhalumunda line) and Tripling (for Jharsuguda Barpali line) for hassle free movement of coal along with additional proposed works such as Automatic Signaling etc.	Captive and Commercial miners, who have been allotted blocks in Ib-Valley CF may initiate dialogues with Ministry of Railways (SECR) to understand possible evacuation arrangements from this cluster. SECR to take up proposed doubling and tripling.
2	Additionally, Captive and Commercial miners shall plan to develop First Mile Connectivity projects like Rapid-Loading System with Silos along with Railway connectivity (to nearby major rail lines like Jharsuguda-Bilaspur, Jharsuguda Rd to Sambalpur etc.). Captive and commercial players along with Indian Railways shall jointly conduct a feasibility study for establishing Public Freight Terminals with Mechanized loading and evacuation systems.	Captive and Commercial miners, who have been allotted blocks in Ib-Valley CF shall initiate dialogues with Ministry of Coal regarding their future evacuation plans. Detailed Investment and works plan may be submitted by these miners at the earliest.
3	Automatic Signaling shall be proposed across all major rail sections in the vicinity of IB Valley CF	Indian Railways (SECR)
4	For making evacuation of coal feasible via coastal shipping (Jharsuguda to eastern ports) from Ib-valley, it is proposed that Indian Railways should provide freight concessions for RSR traffic to achieve freight parity. Currently, only <5 Million Tonnes of coal is being transported to ports other than Paradeep (~30 MT in FY22). As these shipments usually have a ~ INR 300 / Tonne economic disadvantage as compared to Talcher – Paradeep route, Indian Railways should evaluate freight concessions to those eastern ports to achieve freight parity.	Indian Railways should evaluate freight concessions to all eastern ports having economic disadvantage
5	3rd line from Jharsuguda Jn to Rourkela is under construction. However as per future O-D coal flow mapping, the capacity won't be sufficient. Therefore 4th line has to be planned from Jharsuguda Jn to Rourkela.	Indian Railways
6	Under-construction FMC Projects of MCL IB-Valley (Including Phase 1,2 & 3) with combined evacuation capacity of ~150 MTPA shall be executed at the earliest to enable coal loading from IB-Valley CF.	Coal India Limited is continuously monitoring and solving various issues to expedite this

Proposed evacuation plan for Talcher CF



Key Insights and Recommendations – Talcher Coalfields

#	Recommendation	Way Forward
1	High congestion expected on railway lines to enable coastal shipping **Concerned lines: Budhapank to Rajatgarh and Cuttack to Paradeep.** Heavy Haul Rail Corridor from Salegaon to Cuttack being shelved due to economic constraints. It is of utmost importance to add a third line (Survey under process) and in future a fourth line from Cuttack to Paradeep. MCRL Outer Corridor to be executed to bypass load on Talcher. Timely execution of MCRL inner corridor by FY26 to enable evacuation on Sambalpur – Talcher Rd Section. **Also, Doubling of Angul-Balram line is required to be taken up for despatch of ~25-30 Rakes/Day by FY30.**	Indian Railways (ECoR)
2	Additionally, Captive and Commercial miners shall plan to develop First Mile Connectivity projects like Rapid-Loading System with Silos along with Railway connectivity. Captive and commercial players along with Indian Railways shall jointly conduct a feasibility study for establishing Public Freight Terminals with Mechanized loading and evacuation systems. PFTs shall connect Non-CIL mines to MCRL Outer and Inner Corridors for evacuation.	Captive and Commercial miners, who have been allotted blocks in Talcher CF shall initiate dialogues with Ministry of Coal regarding their future evacuation plans. Detailed Investment and works plan may be submitted by these miners at the earliest.
3	Automatic Signaling shall be proposed across all major rail sections in the vicinity of Talcher CF	Indian Railways (ECoR)
4	Paradeep Port expected to handle ~90 Rakes/Day for coastal shipping and exports On a best-effort basis with Expansion works in Pipeline, ~65-72 R/d can be handled by the Port (MCHP + PEQP). While this is sufficient for RSR, coal exports will require further capacity addition. Capacity addition of ~ 15-20 R/d is required. Commitments from end-users of coal may be required to take up the investments for additional capacity addition. Additionally, avenues of notification of policies may be explored to make RSR mode attractive to power consumers.	Paradeep Port Trust, Ministry of Coal
5	Execution of National Waterway 5 to execute coastal shipping via inland waterways (Mahanadi River) ~80-90 MTPA or ~55 to 60 R/d could be moved from Talcher to Pardeep and Dhamra Ports for Evacuation via Coastal Shipping. Transaction Advisor has been appointed which will also conduct detailed traffic study. End to End construction of NW-5 is a challenge, although the target for completion is 2030, delays could be expected beyond the stipulated timelines	IWAI, Ministry of Shipping
6	Dhamra Port has plans to increase capacity of coastal shipping + exports to around 20 MTPA. This would lead to diversion of around 14 R/D from Dhamra, via Angul-Sukinda Rd line. Other ports such as Gopalpur, Vizag and Gangavaram should be explored by consumers. Under Construction line from Rairakhol to Gopalpur port should be utilized, subject to adequacy of coastal shipping capacity at ports and favorable economics of coastal movement.	End Consumers / Power Plants, Dhamra Port (DPCL)
7	Under-construction FMC Projects of MCL Talcher (Including Phase 1,2 & 3) with combined evacuation capacity of ~130 MTPA shall be executed at the earliest to enable coal loading from Talcher CF.	Coal India Limited is continuously monitoring and solving various issues to expedite this

Estimated Wagon Procurement requirement by Indian Railways (ECoR - Odisha)

Destination State	Tonne-KMs	Volume (Tonnes)	Weighted Avg Distance of Despatch (KMs)
Andhra Pradesh	13339642102	14730000	977.920
Bihar	201383543.3	281841.76	714.527
Chhattisgarh	3515197174	14330000	245.303
Gujarat	113128560	53419.98	2117.720
Haryana	891694543.5	565130.25	1577.857
Jharkhand	328558191.9	1045798.87	314.170
Karnataka	903160784.9	593006.75	1523.019
Madhya Pradesh	1051843431	1406513.7	747.837
Maharashtra	5146554552	5459403.88	942.695
Odisha	982886922.7	32350000	113.000
Punjab	7676717475	4540123.45	1690.861
Tamil Nadu	31128310206	116000	1545.960
Uttar Pradesh	1039925024	974464.4	1067.176
West Bengal	5042828664	10068027.28	500.876
Coastal Shipping Volume	6712320000	34960000	192.000
Total		121.47 Million Tonnes	

FY22 - Rail

Average Lead for Coal Supply in FY22 (East Coast Railway)

428.32 KMs

Destination State	Tonne-KMs	Volume (Tonnes)	Weighted Avg Distance of Despatch (KMs)
Andhra Pradesh	19480166400	19920000	977.920
Chhattisgarh	986119514.3	4020000	245.303
Jharkhand	58121372.33	185000	314.170
Madhya Pradesh	5560918283	7436000	747.837
Maharashtra	7494427888	7950000	942.695
Odisha	8230920000	72840000	113.000
Punjab	19394175161	11470000	1690.861
West Bengal	3531172602	7050000	500.876
Coastal Shipping Volume	15360000000	80000000	192.000
Additional Push Volumes + Commercial Despatches to be taken as per FY22 avg Leads	106651970411	249000000	428.321
		459.87 Million Tonnes	

FY30 - Rail

Average Lead for Coal Supply in FY30 (East Coast Railway)

406.09 KMs

	FY22	FY30
Average Lead of coal Despatch from Odisha (KMs)	428.32	406.09
Estimated Average Turnaround time of Rakes (Days)	3.19	3.03
Rakes / Day Despatch by Rail + RCR + RSR Mode	84.35	319.35

Additional Rakes/Day Despatch Envisaged	235.00
Estimated Improved TAT (Days)	3.03
Total Number of Rakes Required	711.39
Estimated Wagons to be Procured for Coal till FY30	**41,261**

Additional ~3,094 Wagons would be required for despatches during peak demand period from November to March

Source: Sagarmala Report, Ministry of Ports, Shipping & Waterways, Comprehensive Action Plan for Port Connectivity on Gatishakti NMP 2022, DPIIT]

Recommendations
for
Chhattisgarh

Thermal Coal Supply Analysis summary for Chhattisgarh

Chhattisgarh

All figures in million tonnes

	Actuals			Projections						
Coal Supply	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Mand Raigarh SECL - CIL	12.91	12.8	13.2	15.6	16	31	40	40	43	45
CIC and Korba CF	137.55	129.43	153.8	184	204	228	227	229	231	234
Total SECL	**150**	**142 (156 Despatch)**	**167**	**200**	**220**	**260**	**267**	**269**	**274**	**279**
Captive & Commercial - MandRaigarh CF	1.25	7.26	9.99	13.65	18.72	25.67	35.20	48.26	66.18	105
Captive & Commercial - Hasedo Anand CF	15	15	12.79	17.84	19.45	21.21	23.13	25.23	27.51	30.00
Total Non-CIL	**16.25**	**22.26**	**22.78**	**31.49**	**38.17**	**46.88**	**58.33**	**73.49**	**93.69**	**145**
Total Coal Production in Chhattisgarh	**167**	**165**	**190**	**231**	**263**	**306**	**327**	**345**	**371**	**430**

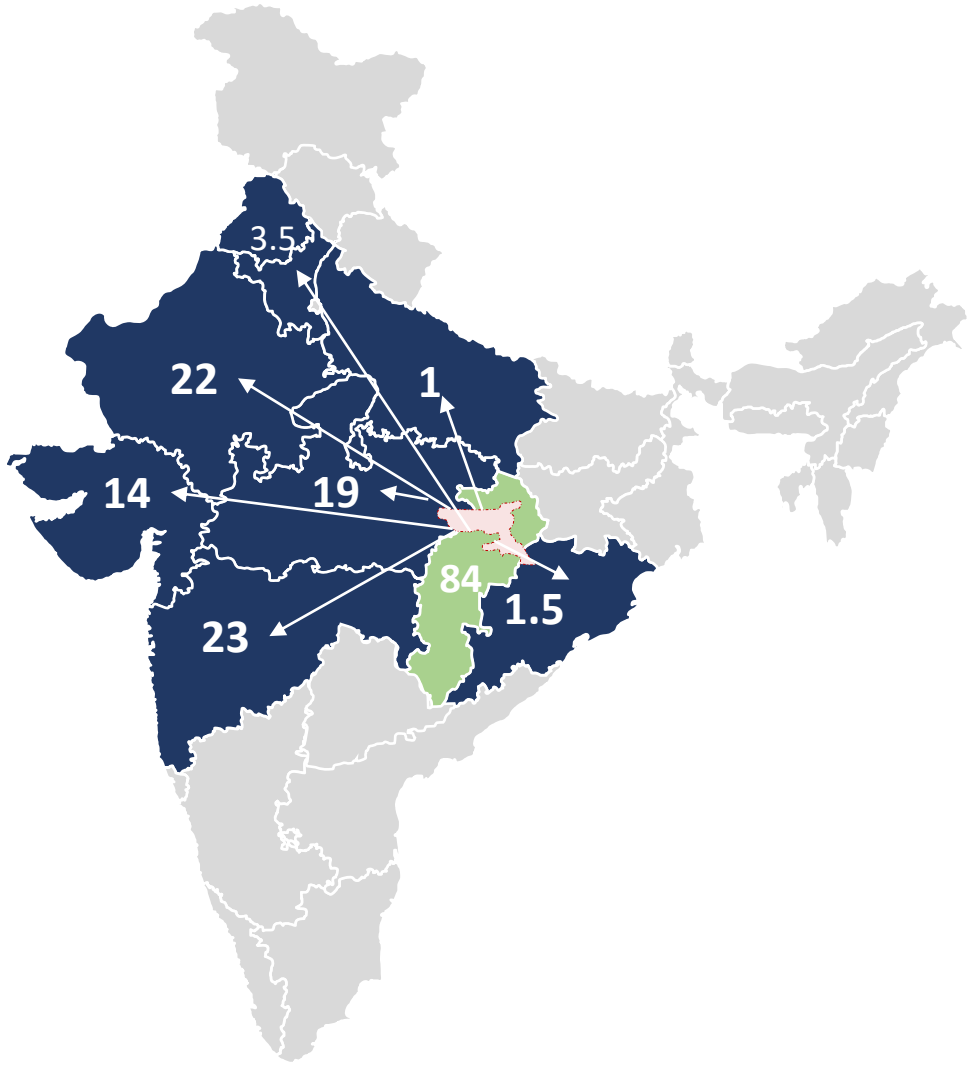
SECL has ambitious production capacity expansion plans

Chhattisgarh

Area	FY22 Actual Despatch (MTPA)					FY25-26 1 BT Plan (MTPA)					FY29-30 Anticipated Dispatch (MTPA)				
	Rail	RCR	Pure Road	MGR & Others	Total	Rail	RCR	Pure Road	MGR & Others	Total	Rail	RCR	Pure Road	MGR & Others	Total
Baikunthpur	2.07	0.00	0.00	0.00	**2.07**	2.74	0.00	0.00	0.00	2.74	2.74	0.00	0.00	0.00	2.74
Bhatgaon	2.54	0.16	0.57	0.00	**3.27**	4.92	0.00	3.96	0.00	8.88	14.91	0.00	0.57	0.00	15.48
Bisrampur	0.00	0.00	0.34	0.00	**0.34**	3.40	0.00	0.28	0.00	3.68	3.87	0.00	0.32	0.00	4.19
Chirmiri	1.55	0.02	0.93	0.00	**2.49**	2.89	0.00	0.00	0.00	2.89	6.09	0.00	0.00	0.00	6.09
Dipka	5.35	12.15	6.23	13.18	**36.91**	21.00	6.00	3.00	15.00	45.00	21.00	6.00	3.00	15.00	45.00
Gevra	19.02	7.30	4.94	13.74	**44.99**	39.50	12.00	4.00	14.50	70.00	39.50	12.00	4.00	14.50	70.00
Hasdeo	1.91	0.03	0.39	0.00	**2.33**	4.00	0.00	1.26	0.00	5.26	5.57	0.00	0.39	0.00	5.96
Jamuna-Kotma	1.48	0.00	0.73	0.00	**2.20**	3.42	0.00	1.08	0.00	4.50	5.77	0.00	0.73	0.00	6.50
Johilla	1.14	0.11	0.41	0.00	**1.67**	2.75	0.00	1.08	0.00	3.83	2.75	0.00	0.00	0.00	2.75
Korba	3.46	0.61	2.72	0.64	**7.42**	4.90	0.00	2.78	1.07	8.75	6.56	0.00	2.99	0.00	9.55
Kusmunda	21.52	1.80	3.73	6.72	**33.78**	55.50	0.00	0.00	7.00	62.50	55.50	0.00	0.00	7.00	62.50
Raigarh	1.96	0.20	11.98	0.00	**14.14**	30.00	0.00	5.00	0.00	35.00	38.14	0.00	6.36	0.00	44.50
Sohagpur	1.69	0.20	1.41	0.86	**4.15**	3.78	2.23	0.93	0.00	6.94	5.46	2.00	1.34	0.00	10.03
Total	**63.68**	**22.58**	**34.37**	**35.14**	**155.77**	**179**	**20**	23	**38**	**260**	**203**	**20**	**19**	**37**	**279**

SECL's despatch is progressing towards higher share of rail from current 55% to a target of 80% by FY30 (including RCR). Ensuring that the evacuation capacity exists is a crucial aspect of the holistic logistics policy. Additional 90 R/d despatch is envisaged from SECL.

O-D Source cluster Mapping – Despatch of Coal from Chhattisgarh: FY22 snapshot



XX FY22: Despatch of Coal from Chhattisgarh to destination state (MTPA)

All figures in million tonnes

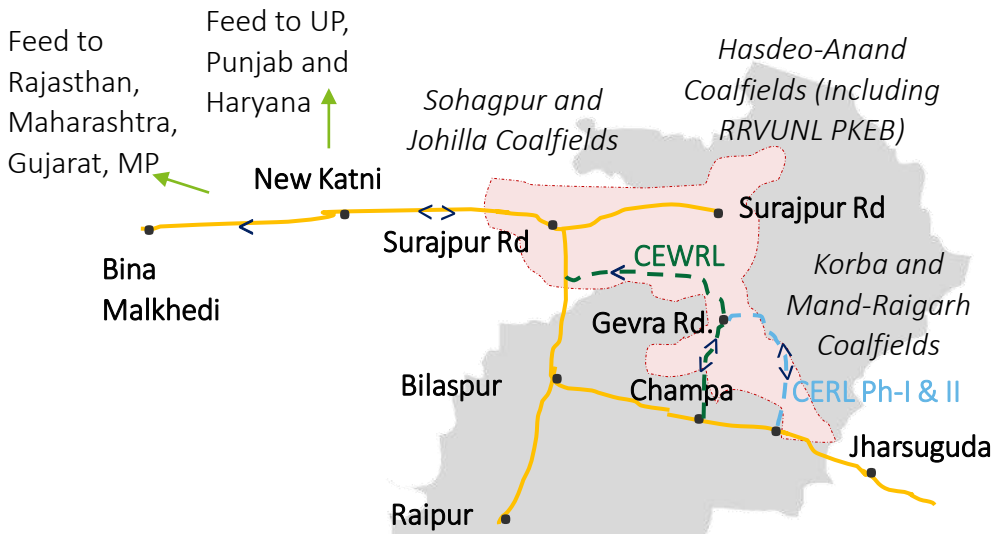
Consuming State	Rail + RCR	Pure Road	MGR & Others	Total
Rajasthan	18.93	2.74	0	**21.67**
Madhya Pradesh	13.97	3.66	0.86	**18.49**
Maharashtra	18.94	4.4	0	**23.34**
Gujarat	8.51	5.78	0	**14.29**
Punjab & Haryana	3.02	0.45	0	**3.47**
Odisha	0.79	0.66	0	**1.45**
Uttar Pradesh	0.77	0.19	0	**0.96**
Chhattisgarh	29.61	20.23	34.28	**84.12**
Other States	0.24	11.19	0	**11.43**
Total Despatch from Chattisgarh (Including Sohagpur and Johilla Areas of MP)	**94.78 (53%)**	**49.3 (28%)**	**35.14 (20%)**	**179.22**

Origin – Destination Mapping and the coal flow analysis of rail trunk lines for ~95 MTPA is conducted and presented in the next sections

Ongoing works to ensure rail evacuation capacity to trunk lines – Adding rail load of CIL on CERL & CEWRL)

Rail Evacuation from Korba & Raigarh Coalfields:

193.7 MTPA out of which
Korba CF: 140.56 MTPA
Mand-Raigarh CF: 38.14 MTPA



Korba CF (Korba, Dipka, Gevra & Kusmunda) as well as Mand-Raigarh CF of SECL to benefit from CEWRL

Trunk Line	Section	Anticipated Traffic for FY30 (MTPA)	Rakes/Day
CERL Ph-I	Raigarh CF-Kharsia	30.0	21.3
CERL Ph-II	Raigarh CF-Gevra Rd.	8.1	5.8
CEWRL	Gevra Rd.-Pendra Rd.	65.0	46.3
Existing Infra with Modifications	Gevra Rd.-Champa	83.7	59.6

- CIL blocks in Mand-Raigarh coalfield to use CERL Ph-I and subsequently CERL Ph-II to join CEWRL at Gevra Road for traffic bound for Anuppur-Katni

Evacuation from Korba Coalfields: Korba, Dipka, Gevra & Kusmunda

187 MTPA out of which Rail: 140.56 MTPA

Evacuation Enabler for coal flow towards Champa

Proposed Solution/Enabler

1) Korba yard Modification (Work in progress)
2) Automatic Signalling from Gevra Road to Champa (Tendering already done by SECR(IR)).
3) Doubling of Line from Dipka to Junadih (Currently single line – under consideration of SECL)
4) 700m Connectivity from Dipka Siding to NTPC Seepat MGR bulb for directly evacuating to Gatora station, bypassing Champa (SECR(IR) and NTPC, under consideration of SECL). Commercial terms to be expedited
5) Speed Enhancement of Trains, Ballasting (Complete track renewal) (works under progress by SECR(IR) and SEC)

*However, even if CEWRL is not commissioned during desirable timelines, leveraging the solutions mentioned above, **SECL would be able to add another 46 MTPA coal evacuation capacity via Rail, which will take up the realistic evacuation capacity from ~223 MTPA to ~260 MTPA***

O-D Source cluster Mapping – Consolidated Coal Traffic on railways from Odisha & Chhattisgarh (including SECL areas in MP) to all states with addition of CERL/CEWRL network - ODS

ODS: Optimistic Demand Scenario

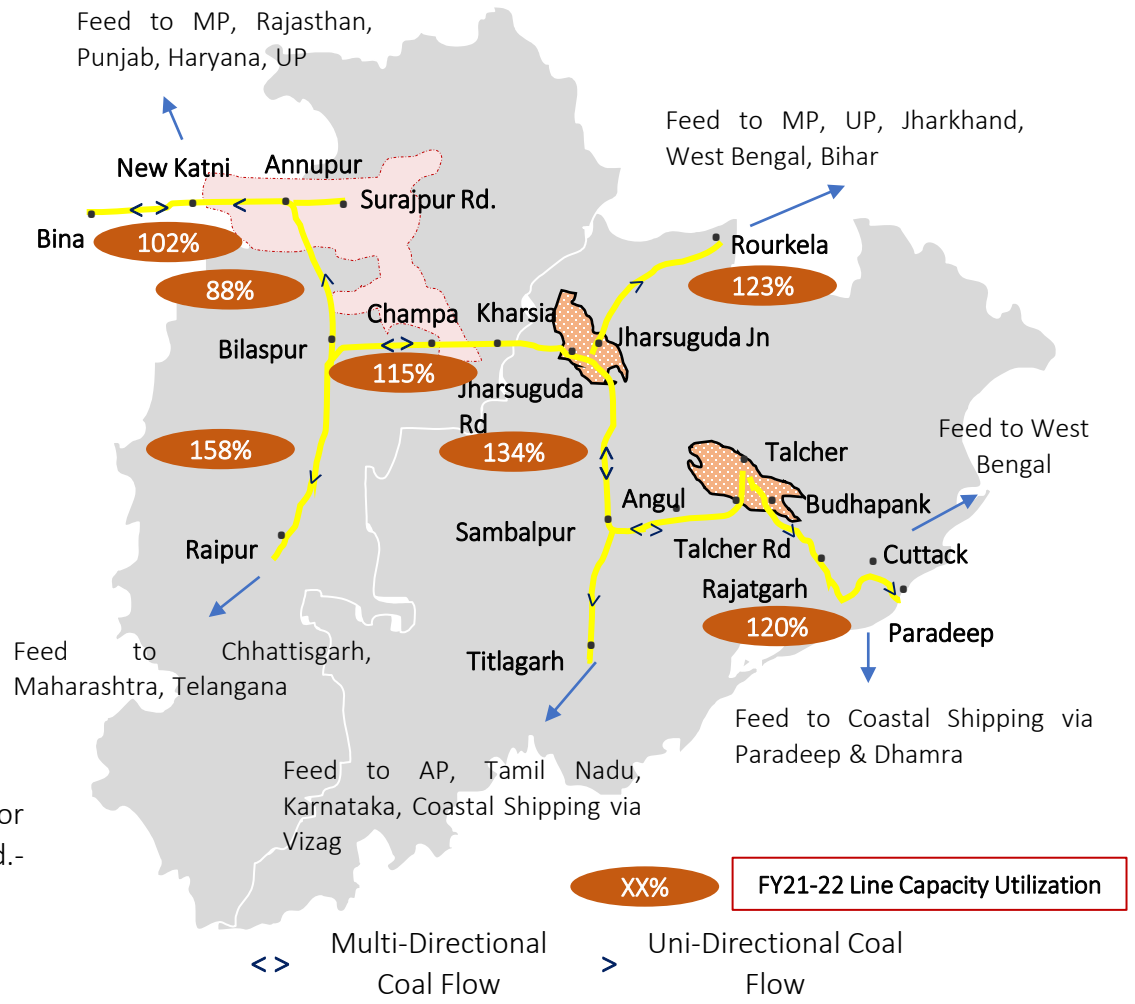
FY22 Actual and FY30 (Estimated) coal traffic in major sections for despatch of coal from Chhattisgarh (Including Sohagpur and Johilla) to various destinations

From	To	Traffic (MT): 2022	Rakes / Day: 2022	Traffic (MT): 2030	Rakes / Day: 2030	Increase in Coal Traffic (Rakes / Day)
Champa	**Bilaspur**	74.06	**52.70**	213.93	152.23	**+99.53**
Bilaspur	**Pendra Road**	24.97	**17.76**	27.23	19.38	**+1.61**
Pendra Road	**Annupur**	24.97	**17.76**	92.23	65.63	**+47.86**
Anuppur	**New Katni**	47.61	**33.87**	167.53	119.22	**+85.34**
New Katni	**Bina Malkhedi**	15.24	**10.84**	96.80	68.88	**+58.04**
Surajpur Road	**Anuppur**	21.86	**15.56**	73.69	52.44	**+36.88**
Bilaspur	**Raipur**	39.55	**28.15**	180.92	128.75	**+100.60**
Baradwar	**Jharsuguda & Jharsuguda Rd**	40.52	**28.83**	143.15	101.87	**+73.03**

CERL & CEWRL lines are expected to decompress load on the Howrah-Mumbai main line, especially for the section Champa-Bilaspur. Bilaspur-Annupur section shall be handle the traffic on the Pendra Rd.-Annupur sub-section, hence overall load on Bilaspur-Annupur shall remain unchanged.

Note: The increase in average number of rakes indicated above shall be further escalated by ~7.5% to cater during November to March Power Demand

Major sections are already witnessing significant coal traffic and is estimated to further increase in the coming decade.



Our key findings based on detailed analysis of railway traffic for major coal producing states (3/7)

	2022		2030							
Sub-Section	Capacity	% Utilization	Ongoing Works	Passenger	Freight	Total	Capacity	% Utilization	Other Planned Works (New Energy/Other Corridors)	Utilization after of All planned works
Champa to Bilaspur	206	**115%**	4th line CERL & CEWRL in progress	117	**255 (~152 to 163 R/d is coal)**	372 to 383	250	**149% to 153%**	CRCL line from Jharsuguda-Balodabazaar-Raipur and Katghora – Salka Rd - Donghargarh Coal traffic from Odisha and Chhattisgarh going towards MH/GJ/KA shall be diverted.	**149% to 153%**
Pendra Rd to Anuppur	98	**88%**	Khodri-Anuppur Line Doubling with F/O at BSP Pendra Rd.-Anuppur 3rd line & Automatic Signaling: Bilaspur-Uslapur-Ghutku are in progress.	71	**120 (~65 to 70 R/d is coal)**	191 to 196	142	**134% to 138%**	With CEWRL line catering to 65 MTPA (Bypassing Champa), load from BSP to APR will drastically reduce. Congestion will be after Pendra Rd.	**134% to 138%**

All numbers (Except Capacity utilization) represent average two-way traffic in Trains/Rakes per day. Passenger also includes Others

Note: Capacity refers to Capacity of line with Maintenance Block (MB)

Note: Capacity refers to Capacity of line with Maintenance Block (MB)

Our key findings based on detailed analysis of railway traffic for major coal producing states (4/7)

Sub-Section	2022		2030						Other Planned Works (New Energy/Other Corridors)	Utilization after of All planned works
	Capacity	% Utilization	Ongoing Works	Passenger	Freight	Total	Capacity	% Utilization		
Anuppur to Shahdol to Katni	116	**98%**	Anuppur – Katni 3rd Line (166.52 Km) in progress	78	158 (~119 to 128 R/d is coal)	235 to 244	164	**143% to 149%**	Nil	**143% to 149%**
Bilaspur to Urukura (Raipur)	206	**158%**	Nil	105	501 (~129 to 138 R/d is coal)	606 to 615	206	**294% to 296%**	CRCL line from Jharsuguda-Balodabazaar-Raipur and Katghora – Salka Rd - Donghargarh Further load shedding on East-West DFC post commissioning	**<100%**
Surajpur Rd (Kotma) to Anuppur	116	**48%**	Ambikapur to Boridand Doubling in Progress	42	82 (~52 to 56 R/d is coal)	124 to 128	116	**107% to 110%**	Nil	**107% to 110%**

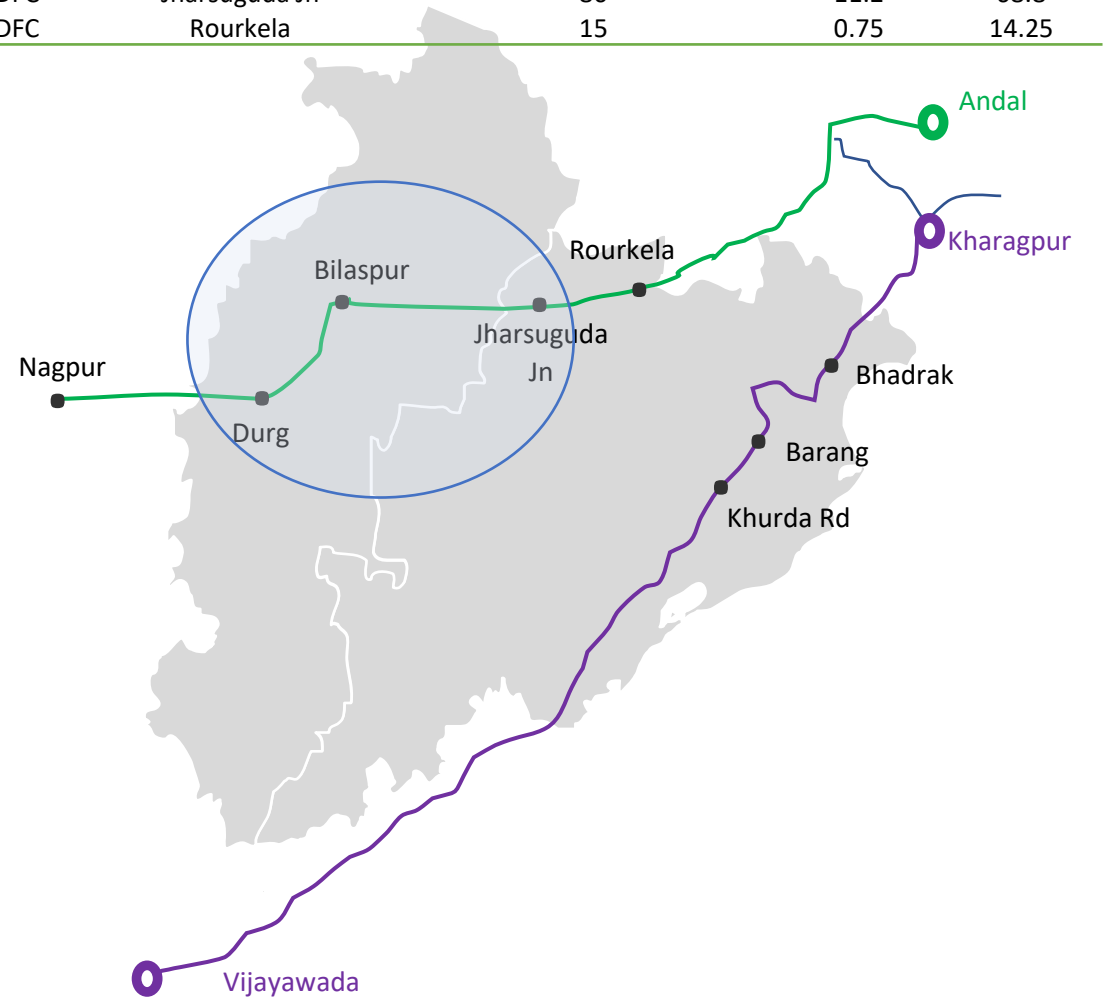
All numbers (Except Capacity utilization) represent average two-way traffic in Trains/Rakes per day. Passenger also includes Others

Note: Capacity refers to Capacity of line with Maintenance Block (MB)

Note: Capacity refers to Capacity of line with Maintenance Block (MB)

Dedicated Freight Corridors – Implications of DFC on Odisha and Chhattisgarh cluster

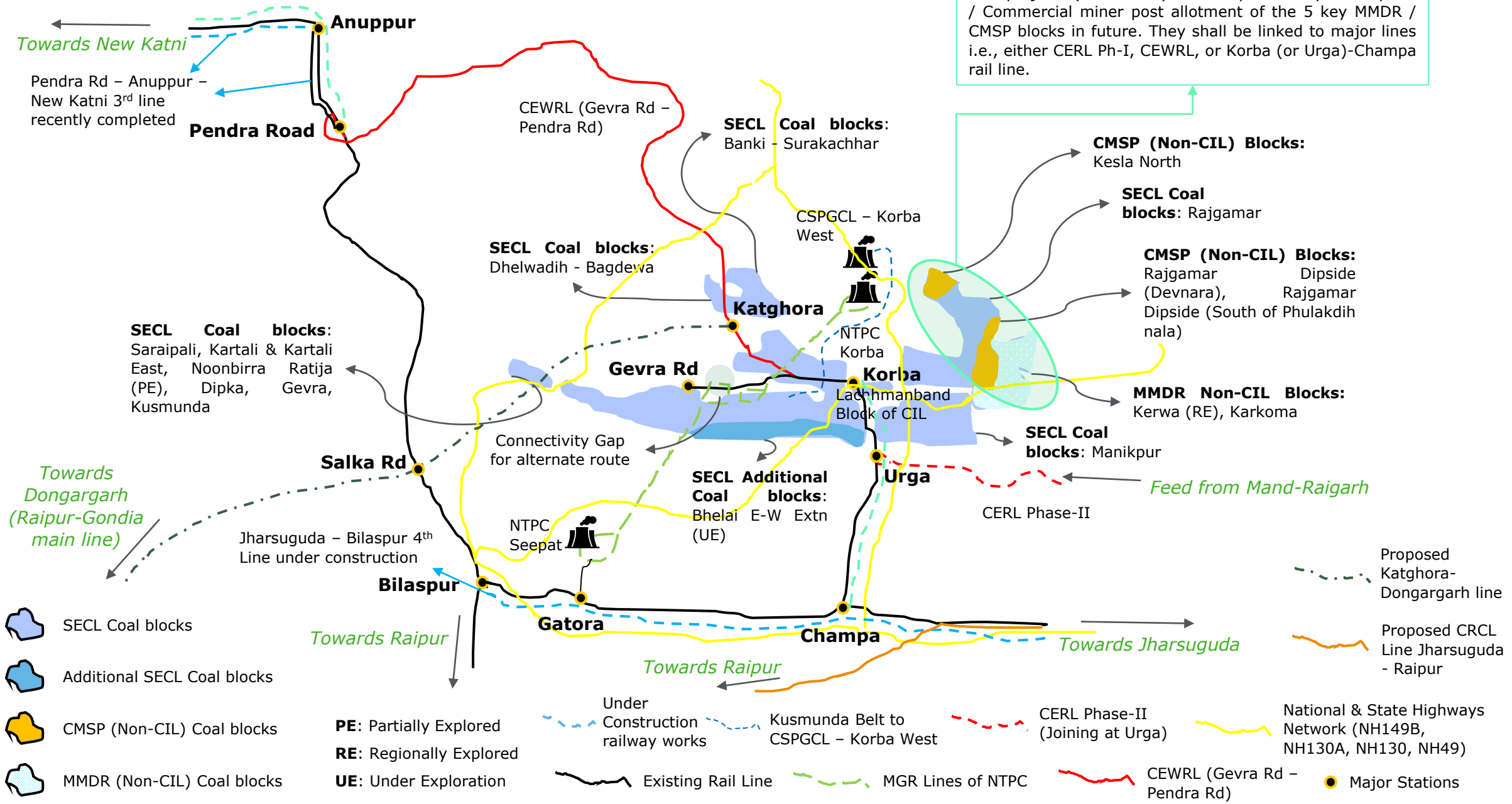
DFC Name	DFC Connector Station / Node	Total Traffic - 2031 (Rakes/Day)	Coal Traffic	Others
E-Co DFC	Barang Jn	241	7.23	233.77
E-W DFC	Bilaspur	20	5	15
E-W DFC	Durg	31	4.65	26.35
E-W DFC	Nagpur	36	2.16	33.84
E-W DFC	Jharsuguda Jn	80	11.2	68.8
E-W DFC	Rourkela	15	0.75	14.25



Commodity	E-W DFC			E-Co DFC		
	2031	2041	2051	2031	2041	2051
Coal	**6.21**	**30.16**	**31.05**	**11.16**	**18.18**	**19.21**
Cement	2.07	12.76	14.85	5.58	9.09	11.3
Fertilizers	1.84	3.48	5.4	3.1	5.05	4.52
Food Grains	0.92	3.48	4.05	2.48	4.04	3.39
Iron Ore	0.46	5.8	6.75	4.96	8.08	14.69
Pig Iron	3.45	10.44	12.15	3.72	6.06	6.78
PoI	0.46	5.8	6.75	4.34	7.07	7.91
Other RM for Steel	0.23	1.16	6.75	0.62	1.01	10.17
Container	0.23	9.28	12.15	2.48	4.04	4.52
BoG	7.36	32.48	33.75	24.18	39.39	30.51
Maximum nos of Rakes / Day	**23**	**116**	**135**	**62**	**101**	**113**

Source: National Rail Plan December 2020

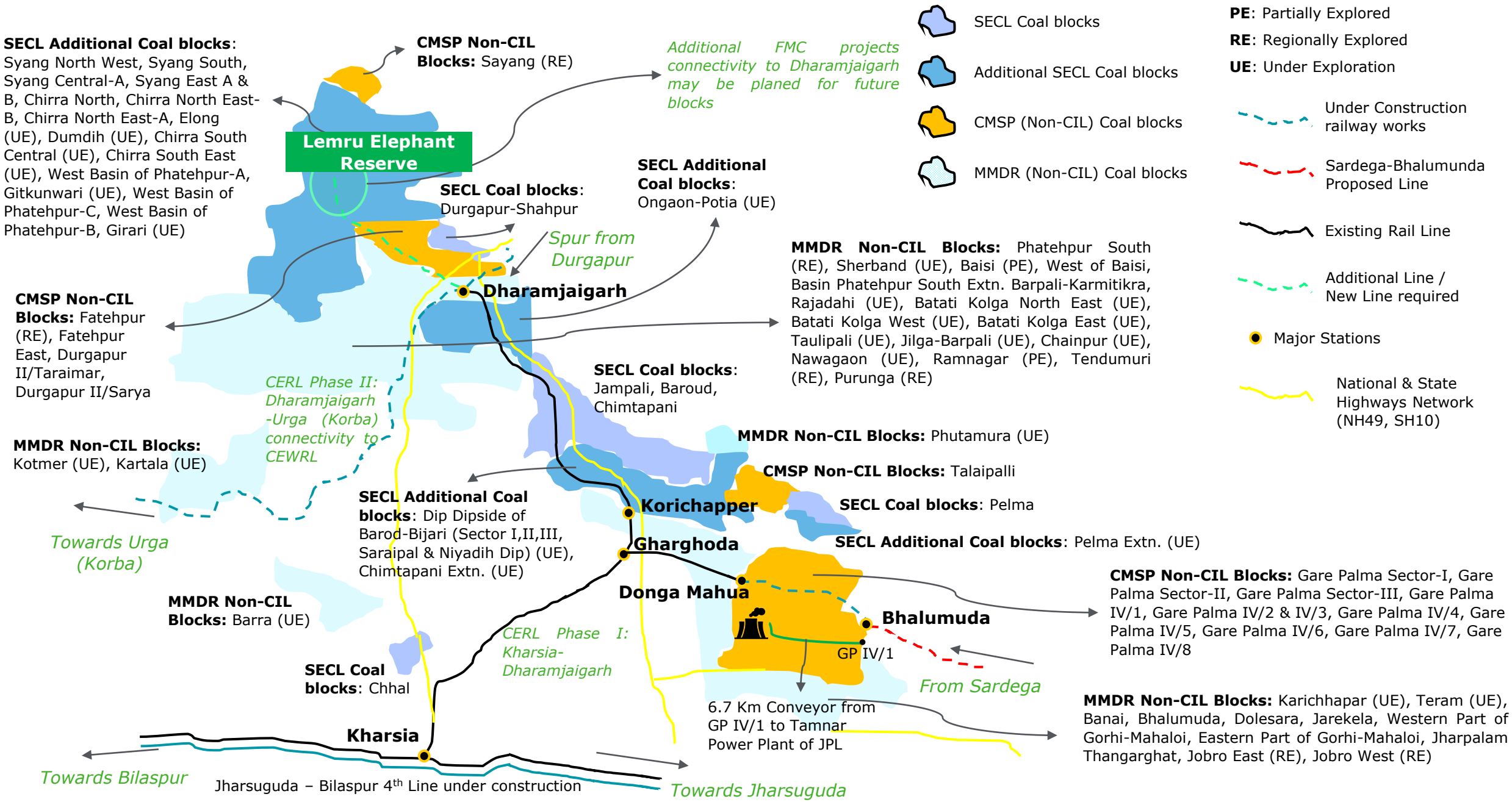
Proposed evacuation plan for Korba CF



Key Insights and Recommendations

#	Recommendation	Way Forward
1	Although Auto-Signaling works between Korba and Champa along with Korba Yard modification is underway, a third line between Korba and Champa is required for future evacuation of coal from Korba CF towards Bilaspur.	Indian Railways (SECR)
2	Rail line connectivity exists from Gevra to NTPC Seepat (MGR circuit) and from NTPC Seepat (MGR circuit) to Gatora station on the Champa-Bilaspur main line. Connectivity from Junadih siding (Gevra area) to NTPC Seepat (MGR circuit) -700 m, is underway. Collaboration with NTPC to evacuate coal from Korba CF to Champa-Bilaspur main line bypassing Korba-Champa rail line should be developed to provide additional alternate route.	Commercial terms to be expedited for usage of link
3	Additionally, Captive and Commercial miners shall plan to develop First Mile Connectivity projects like Rapid-Loading System with Silos along with Railway connectivity (to nearby major rail lines like Korba – Champa , CERL Ph-I, or CEWRL)	Captive and Commercial miners, who have been allotted blocks in Ib-Valley CF may initiate dialogues with Ministry of Coal regarding their future evacuation plans. Detailed Investment and works plan may be submitted by these miners at the earliest.
4	Alternatively, options for commissioning of Public Freight Terminals with facilities of mechanized loading of coal may be evaluated for providing rake loading services to non-CIL blocks to reduce road movement of coal from these regions	Exploration of Public Freight Terminals for mechanized coal loading and coal transport through rail for non-CIL blocks
5	4th Line between Pendra Rd to Anuppur & Anuppur to New Katni should be planned	Indian Railways (SECR)
6	Proposed CRCL Lines have to be finalized and executed on priority for diversion of loads directly towards Raipur (for feed to Maharashtra, Karnataka, Gujarat etc.) bypassing Bilaspur.	Indian Railways (SECR). CRCL

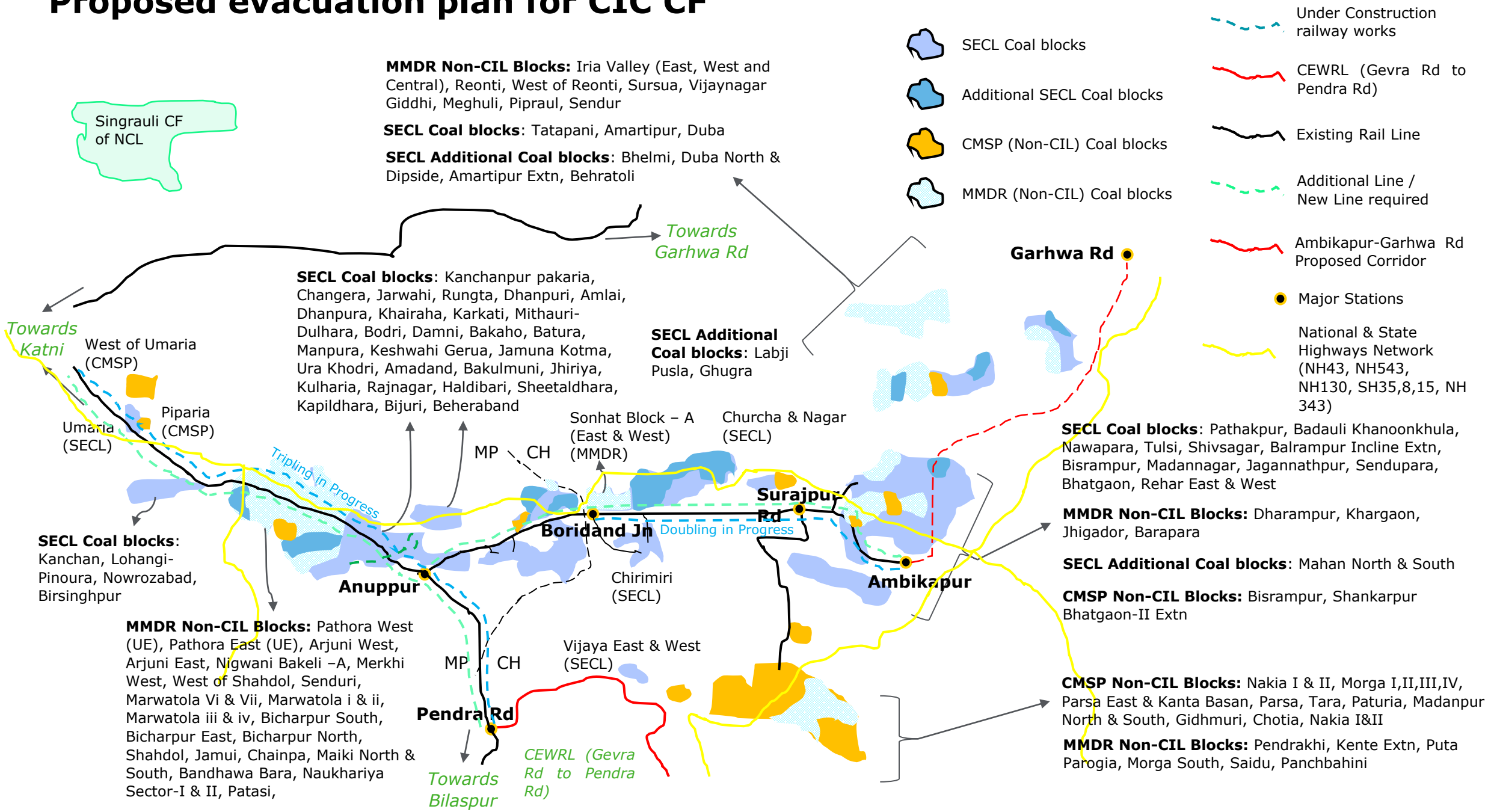
Proposed evacuation plan for Mand Raigarh CF



Key Insights and Recommendations

#	Recommendation	Way Forward
1	The Jharsuguda-Barpali Rail Line + Sardega-Bhalumunda Rail Line has been planned to join CERL at Gharghoda. Expediting this connectivity along with doubling of the said line to be taken explored for improved coal evacuation.	Expediting Sardega-Bhalumunda rail line along with works for doubling may be taken up for easing of coal traffic towards northern India on the Jharsuguda-Bilaspur line
2	CERL is expected to join CEWRL at Urga (Korba) via the CERL Phase-II. Therefore, CERL Phase-II needs to be expedited for coal evacuation to northern India from the coalfields of Ib Valley and Mand Raigarh.	Expediting CERL Phase-II. Dialogues may be initiated by coal miners who have been allotted blocks in the Ib Valley region and Mand Raigarh region for future evacuation plans with Ministry of Railways
3	Automatic Signaling shall be proposed across all major rail sections in the vicinity of Mand Raigarh	Indian Railways (SECR)
4	Additional FMC projects may be planned for the additional coal blocks under CIL/SECL (north-east of Durgapur coal block) which are currently at various stages of exploration. The same may be planned based on production commencement plans for these blocks.	Production commencement plans to be finalized for under exploration blocks in Mand Raigarh region to aid in planning for additional FMC projects link to CERL Phase I/Phase II
5	Options for commissioning of Public Freight Terminals with facilities of mechanized loading of coal may be evaluated for providing rake loading services to non-CIL blocks to reduce road movement of coal from these regions	Exploration of Public Freight Terminals for mechanized coal loading and coal transport through rail for non-CIL blocks

Proposed evacuation plan for CIC CF



Key Insights and Recommendations

#	Recommendation	Way Forward
1	Triple Line from Anuppur to Ambikapur will be required in future as volumes from CIC CF increases. Auto Signaling of the entire section from Anuppur to Ambikapur has to be taken up for easing the evacuation from the cluster	Indian Railways (SECR)
2	Additionally, Captive and Commercial miners shall plan to develop First Mile Connectivity projects like Rapid-Loading System with Silos along with Railway connectivity (to nearby major rail lines like Ambikapur – Anuppur – New Katni)	Captive and Commercial miners, who have been allotted blocks in CIC CF may initiate dialogues with Ministry of Coal regarding their future evacuation plans. Detailed Investment and works plan may be submitted by these miners at the earliest.
3	4th Line between Pendra Rd to Anuppur & Anuppur to New Katni has to be planned	Indian Railways (SECR)
4	Ambikapur – Garhwa Rd rail corridor is being planned by railways. After the analysis of current and future coal traffic and O-D mapping, it was found that this line would may not have sufficient coal traffic. Plans for development of this corridor should be re-analyzed by the Indian Railways.	Indian Railways (SECR)
5	Options for commissioning of Public Freight Terminals with facilities of mechanized loading of coal may be evaluated for providing rake loading services to non-CIL blocks to reduce road movement of coal from these regions	Exploration of Public Freight Terminals for mechanized coal loading and coal transport through rail for non-CIL blocks

Estimated Wagon Procurement requirement by Indian Railways (SECR – Chhattisgarh)

Destination State	Million Tonne - Kms	Volume (Million Tonnes)	Weighted Avg Distance of Despatch (KMs)
Rajasthan	19766.71	18.93	1044.20
Madhya Pradesh	8188.32	13.97	586.14
Maharashtra	13852.53	18.94	731.39
Gujarat	10989.08	8.51	1291.31
Punjab & Haryana	4200.03	3.02	1390.74
Odisha	146.15	0.79	185.00
Uttar Pradesh	492.28	0.77	639.33
Chhattisgarh	4471.94	29.61	151.03
Other States	110.06	0.24	458.58
Total	62217.09	94.78 Million Tonnes	

FY22 - Rail

Average Lead for Coal Supply in FY22 (SECR) for supplies by Odisha

656.44 KMs

Destination State	Million Tonne - Kms	Volume (Million Tonnes)	Weighted Avg Distance of Despatch (KMs)
Rajasthan	31848.10	30.5	1044.20
Madhya Pradesh	25614.14	43.7	586.14
Maharashtra	41250.40	56.4	731.39
Gujarat	27375.86	21.2	1291.31
Punjab & Haryana	3894.07	2.8	1390.74
Odisha	259.00	1.4	185.00
Uttar Pradesh	639.33	1	639.33
Chhattisgarh	14347.66	95	151.03
Additional Push Volumes + Commercial Despatches to be taken as per FY22 avg Leads	42373.01	64.55	656.44
	187601.56	316.55 Million Tonnes	

FY30 - Rail

Average Lead for Coal Supply in FY30 (SECR) for supplies by Odisha

592.64 KMs

	FY22	FY30
Average Lead of coal Despatch from Chhattisgarh (KMs)	656.44	592.64
Estimated Average Turnaround time of Rakes (Days)	4.89	4.42
Rakes / Day Despatch by Rail + RCR + RSR Mode	65.82	219.83

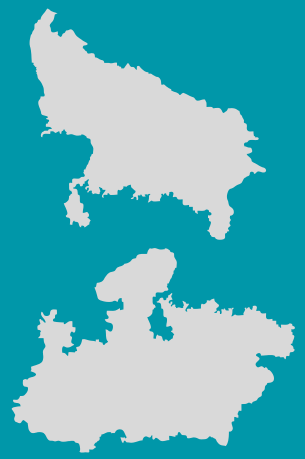
Additional Rakes/Day Despatch Envisaged	154.01
Estimated Improved TAT (Days)	4.42
Total Number of Rakes Required	671.89
Estimated Wagons to be Procured for Coal till FY30	**38,969**

Additional ~2,923 Wagons would be required for despatches during peak demand period from November to March

Source: Sagarmala Report, Ministry of Ports, Shipping & Waterways, Comprehensive Action Plan for Port Connectivity on Gatishakti NMP 2022, DPIIT]

Recommendations
for

Singrauli Coalfields (NCL + Non-CIL blocks)



NCL has ambitious growth plans

All figures in million tonnes ← Actuals → ← Projections →

Name of Mine / Project	Actual 21-22	2022-23 (Act)	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30
Bina	9.00	10.50	10.50	12.00	12.00	13	14	14	14
Block-B	5.47	5.47	7.50	7.50	7.50	8	8	8	8
Dudhichua	22.06	23.03	23.50	23.50	23.50	24	24	24	24
Jayant	24.75	26.66	28.00	29.00	30.00	30	30	30	30
Khadia	14.00	15.00	15.00	16.00	16.00	16	16	16	16
Nigahi	21.00	22.50	22.50	23.00	24.00	25	25	25	25
Amlohri	14.00	15.00	15.00	15.00	15.00	15	15	15	15
Krishnashila	7.00	7.50	7.50	6.00	5.00	4	3	3	3
Kakri	2.41	2.26	1.00	0.00	0.00	0	0	0	0
Jhingurdah	2.74	3.25	2.50	2.00	2.00	0	0	0	0
	122	**131**	**133**	**134**	**135**	**135**	**135**	**135**	**135**

- NCL has a coal evacuation ramp up plan from **131.2 MTPA in FY23** to **135 MTPA by FY30** – an additional ramp-up of **4.9 MTPA** planned.
- **7 FMC projects have been identified** as critical projects to ramp up the evacuation capacity for NCL by FY24-26.
- Out of these, **2 project have been commissioned** – Krishnashila and Khadia CHP Silo
- Block B rail Connectivity completed

Non-CIL blocks Pipeline in Madhya Pradesh – Singrauli Coalfields

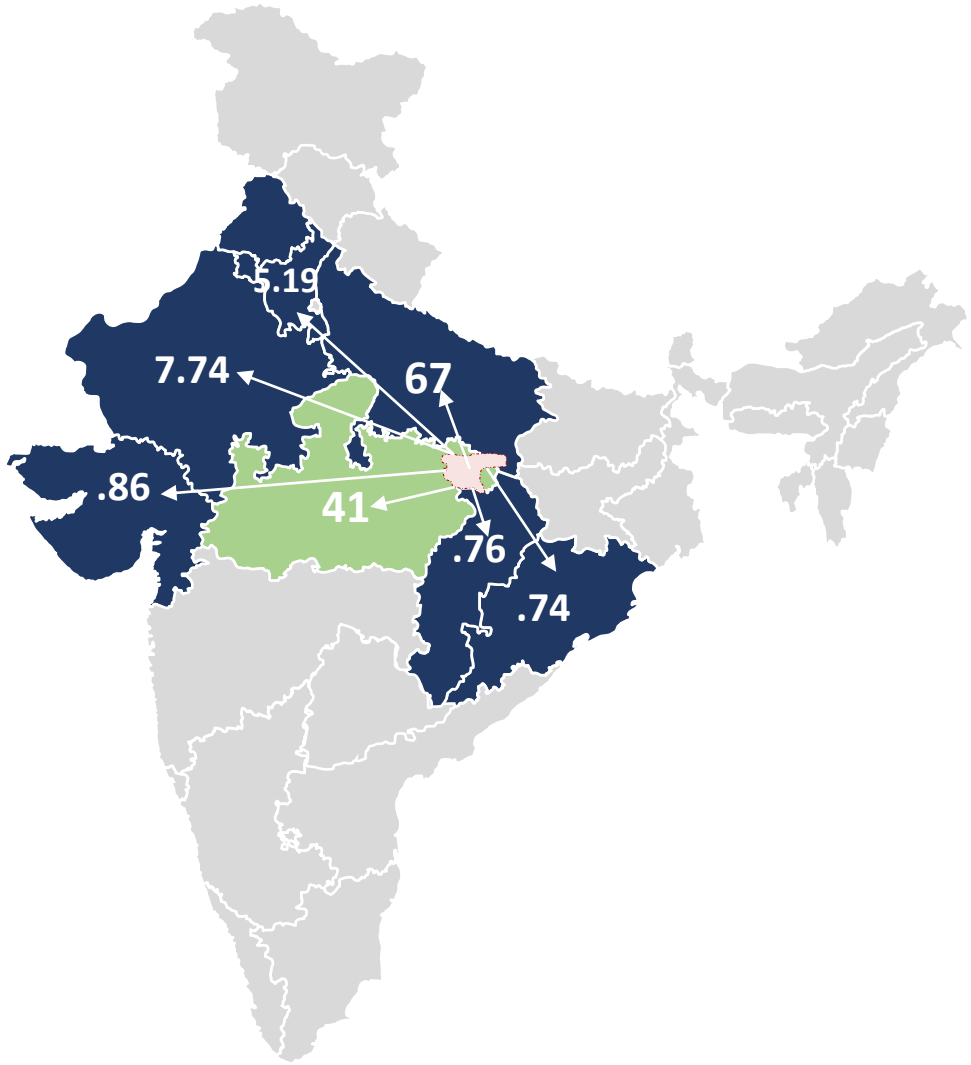
Madhya Pradesh

All figures in million tonnes

Details of Non-CIL blocks in Singrauli Coalfields

#	Name of the Block	Block Owner	PRC	Operational Status	Proposed Loading Point	EUP and other remarks	Actual FY23 Production	Actual FY22 Production
1	Amelia	THDC India Ltd.	5.6	Non - Operational	Shahdol Railway Station (Mine to Station via NH-39)	Khurja STPP, Bulandshahar, U.P., 856 Kms from mine	~0.05	0.0
2	Amelia North	Jaiprakash Power Ventures Limited	2.8	Operational	Majauli Railway Station (Mine to Station via NH-43)	Jaypee Nigrie Super Thermal Power Plant, Singrauli 37 Kms from mine	2.8	2.8
3	Suliayri	Andhra Pradesh Mineral Development Corporation	6	Non - Operational	Gajrabahra Railway Station (Mine to Station via NH-39)	Nearest port Varansi, U.P., 295 Kms from mine	~1.5	0.0
4	Bandha	EMIL Mines and Mineral Resources Limited	3	Non - Operational	Deoragram Railway Station (Mine to Station via NH-39)	Nearest port Paradip., 849 Kms from mine	0.0	0.0
5	Bandha North	Jaiprakash Power Ventures Limited	NA	Non – Operational	Deoragram Railway Station (Mine to Station via NH-39)	Nearest port Paradip., 849 Kms from mine	0.0	0.0
6	Dhirauli	Stratatech Mineral Resources Private Limited	5	Non - Operational	Gajrabahra Railway Station (Mine to Station via NH-39)	Essar Power MP Limited, M.P., 35 Kms from mine	0.0	0.0
7	Moher & Moher-Amlohri Ext.	Sasan Power Ltd.	20	Operational	Overland conveyor system	Sasan UMPP, M.P., 109 Kms from mine	~16.0	18.4
8	Gondbahera Ujheni (Recent 16th tranche)	- MP Natural Resources	4.12	Non - Operational	Majauli Railway Station (Mine to Station via NH-43	Commercial Sales	-	-
9	Mahan	-	1.2	Non-Operational	Significant area under dense forest cover. Loading point to be finalized post auction	Coal block expected to be auctioned in 7th tranche	-	-
Total PRC			**47.72**				**~20.35**	**21.2**

O-D Source cluster Mapping – Despatch of Coal from MP + UP (NCL): FY22 snapshot



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FY22: Despatch of Coal from NCL (MP+UP) to destination state (MTPA)

All figures in million tonnes

Consuming State	Rail + RCR	Pure Road	MGR & Others	Total
Uttar Pradesh	25.41	4.07	37.41	**66.89**
Madhya Pradesh	17.06	2.77	21.25	**41**
Rajasthan	7.74			**7.74**
Punjab & Haryana	5.19			**5.19**
Gujrat	0.86			**0.86**
Chhattisgarh	0.76			**0.76**
Odisha	0.74			**0.74**
Other States	2.23			**2.23**
Total Despatch from NCL (MP+UP) to destination state (MTPA)	**59.98 (48%)**	**6.84 (5%)**	**58.66 (47%)**	**125.49**

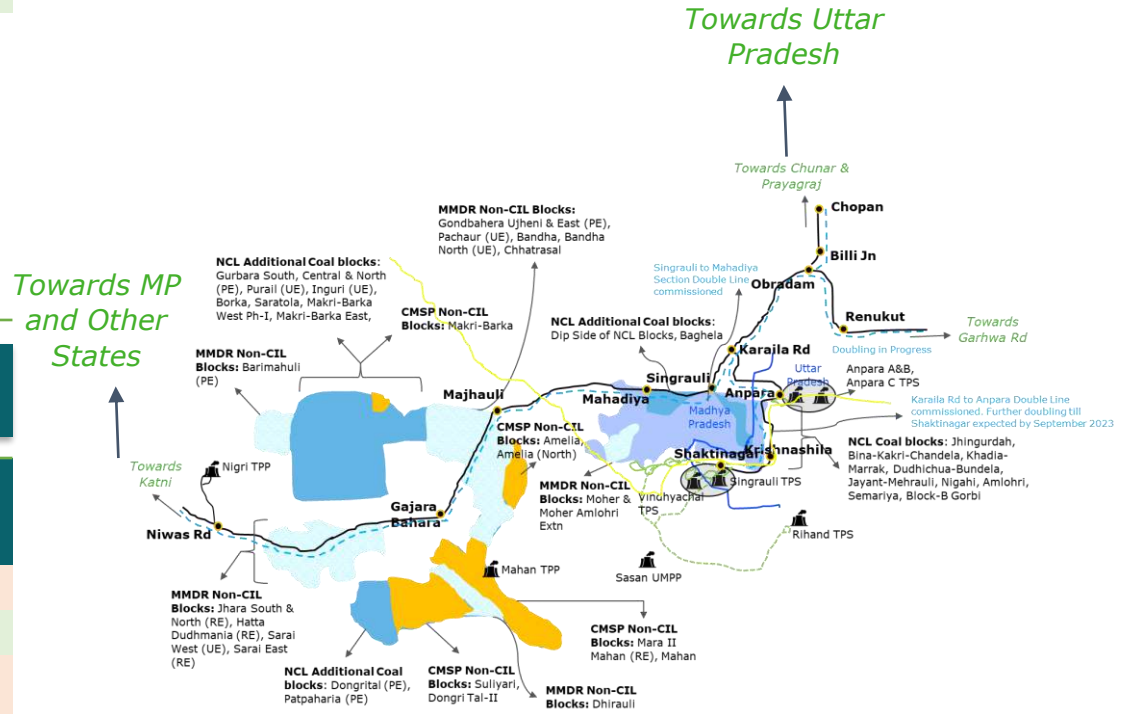
Origin – Destination Mapping and the coal flow analysis of rail trunk lines for ~60 MTPA is conducted and presented in the next sections

O-D Source cluster Mapping – Consolidated Coal Traffic from Singrauli Coalfields to all states

2030 – NCL's coal flow				
State	Rail + RCR	Pure Road	MGR & Belt	Total
Uttar Pradesh	38.59	4.07	39.89	82.55
Madhya Pradesh	13.12	2.77	26.92	42.81
Rajasthan	3.26			3.26
Punjab & Haryana	5.19			5.19
Gujrat	0.32			0.32
Uttarakhand	0.36			0.36
Total	60.84	6.84	66.81	134.49

FY22 Actual and FY30 (Estimated) coal traffic in major sections for Despatch of coal from Madhya Pradesh to various destinations

From	To	Traffic (MT): 2022	Rakes / Day: 2022	Traffic (MT): 2030	Rakes / Day: 2030	Increase in Coal Traffic (Rakes / Day)
Shakti Nagar	Anpara	59.98	41.65	60.84	42.25	+ 0.60
Anpara	Karaila Rd	46.37	32.20	44.31	30.77	- 1.43
Karaila Rd	Obradam	14.02	9.74	35.73	24.81	+ 15.07
Obradam	Billi Jn	14.02	9.74	35.73	24.81	+ 15.07
Billi Jn	Chopan	12.16	8.44	35.73	24.81	+ 16.37
Chopan	Chunar	12.16	8.44	35.73	24.81	+ 16.37
Chunar	Prayagraj	12.16	8.44	35.73	24.81	+ 16.37
Karaila Rd	Singrauli	32.34	22.46	35.20	24.44	+ 1.98
Singrauli	Mahadiya	32.34	22.46	35.20	24.44	+ 1.98
Mahadiya	Majhauli	32.34	22.46	35.20	24.44	+ 1.98
Majhauli	Gajara Bahara	32.34	22.46	38.00	26.39	+ 3.93
Gajara Bahara	Niwas Road	32.34	22.46	38.00	26.39	+ 3.93
Niwas Road	Katni	27.38	19.01	32.17	22.34	+ 3.33



Coal Traffic includes supply from Non-CIL blocks such as Amelia (5.6 MTPA) of THDC to Khurja STPP, Amelia North (2.8 MTPA) of Jaiprakash power ventures limited to Jaypee Nigrie TPP from Majhauli.

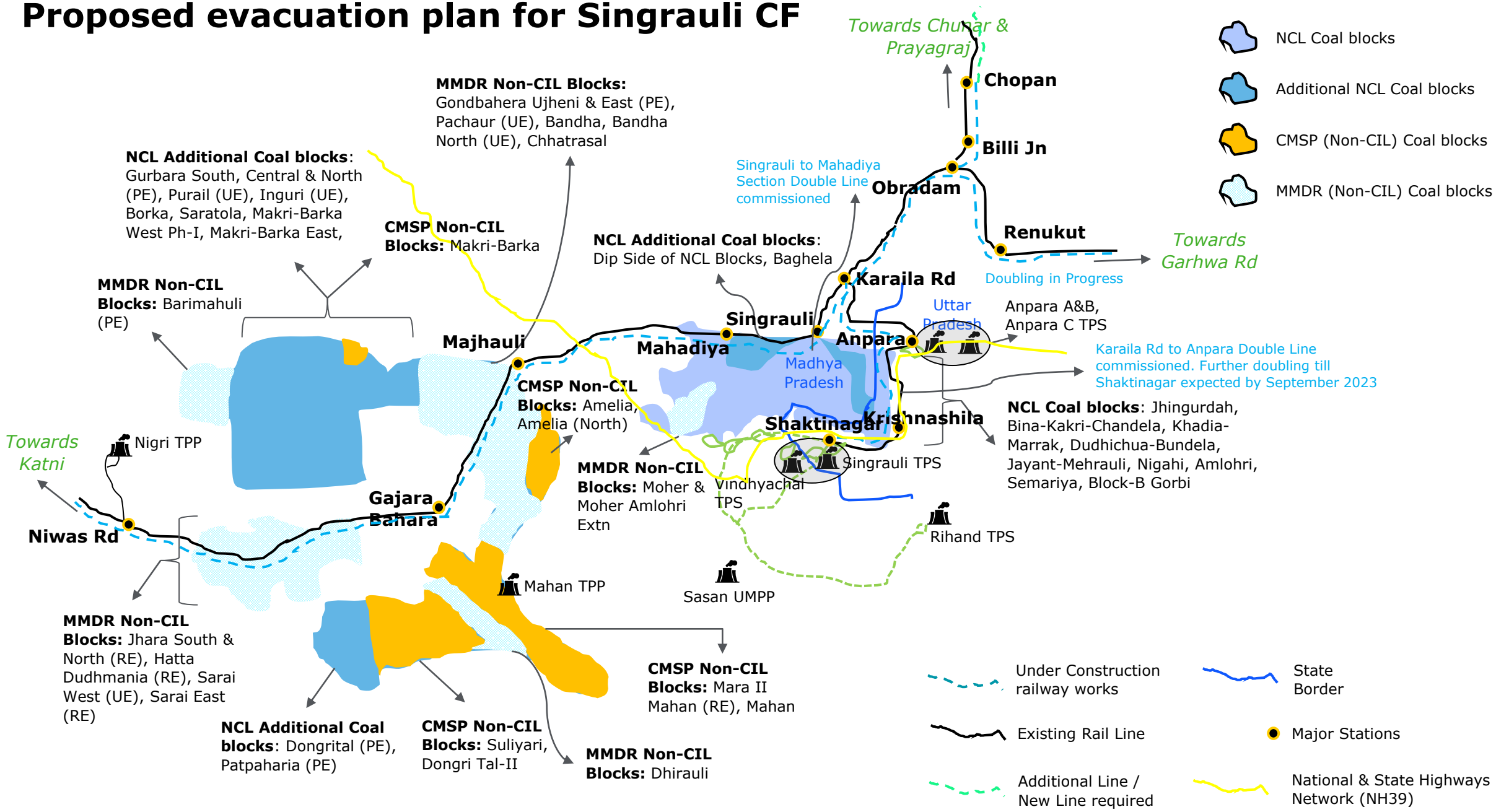
Equal distribution of loads towards Chunar and Katni have been assumed for other blocks which probably will sell in the commercial market. These blocks include Suliyari (6 MTPA APMDC), Bandha (3 MTPA Emil Mines & Minerals), Dhirauli (5 MTPA Stratatech Mineral Resources), Gondbahera Ujheni (4.12 MTPA MP Natural Resources)

O-D Source cluster Mapping – Current and Future line capacity utilization of major sections

Sub-Section	2022						2030						Comments
	Passenger	Freight	Others	Total	Capacity (with MB)	% Utilization	Passenger	Freight	Others	Total	Capacity (with MB)	% Utilization	
Billi to Obradam	17.14	37.4	20.8	75.34	60	126%	18.54	52.47 (25 is coal)	20.80	91.81	120.00	77%	Capacity Sufficient after Patch Doubling
Obradam to Karaila Rd	17.14	45.6	13.6	76.34	60	127%	18.54	60.67 (25 is coal)	13.60	92.81	120.00	77%	Capacity Sufficient after Patch Doubling
Karaila Rd to Singrauli	12	35.8	7.7	55.5	88	63%	13.98	61.10 (25 is coal)	7.70	82.77	176.00	47%	Capacity Sufficient after Patch Doubling
Singrauli to Mahadiya	11.7	42.4	17.6	71.7	106	68%	15.59	55.20 (25 is coal)	17.60	88.39	212.00	42%	Capacity Sufficient after Patch Doubling
Billi to Chopan	12.84	23.6	14.4	50.84	108	47%	18.26	43.44 (25 is coal)	14.40	76.10	216.00	35%	Capacity Sufficient after Patch Doubling
Chopan to Chunar	**24.28**	**38.9**	**12**	**75.18**	**44**	**171%**	**26.26**	**55.27** (25 is coal)	**12.00**	**93.53**	**44.00**	**213%**	**Capacity Insufficient –. Doubling of Chopan to Chunar Line is required – North Central Railway**

- All numbers (Except Capacity utilization) represent average two-way traffic in Trains/Rakes per day

Proposed evacuation plan for Singrauli CF



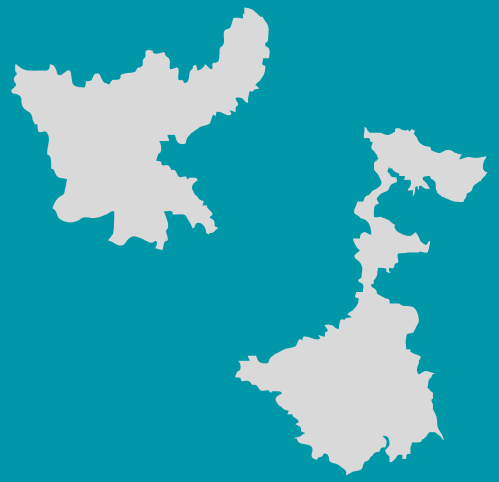
Key Insights and Recommendations

#	Recommendation	Way Forward
1	Double Line from Mahadiya to Katni (Bypassing Sanjay tiger Reserve) along with Katni Grade separator project to be executed at the earliest. Singrauli to Mahadiya section double line already commissioned.	Indian Railways (WCR & ECR)
2	Doubling of Anpara to Krishnashila may be executed at the earliest.	Indian Railways (WCR & ECR)
3	Additionally, Captive and Commercial miners shall plan to develop First Mile Connectivity projects like Rapid-Loading System with Silos along with Railway connectivity (to nearby major rail lines like Singrauli - Katni). Captive and commercial players along with Indian Railways shall jointly conduct a feasibility study for establishing Public Freight Terminals with Mechanized loading and evacuation systems.	Captive and Commercial miners, who have been allotted blocks in Singrauli CF may consult with Ministry of Coal regarding their future evacuation plans. Detailed Investment and works plan may be submitted by these miners at the earliest.
4	Upcoming new BG line between Lalitpur – Singrauli (estimated TDC: 2025-26) shall provide a vital link between northern India and NCL region avoiding Katni junction. This work should be expedited.	Indian Railways (WCR)
5	7 under-construction FMC Projects of NCL with combined evacuation capacity of ~63 MTPA shall be executed at the earliest to enable coal loading from NCL.	Coal India Limited is continuously monitoring and solving various issues to expedite this
6	Doubling of Chopan to Chunar Section should be planned as capacity augmentation of an important feeder line for DFC	Indian Railways (NCR)
7	Shaktinagar-Mahadiya new BG line feasibility must be explored by Indian Railways	Indian Railways (ECR)

Recommendations
for

Jharkhand &

West Bengal



CCL has ambitious growth plans

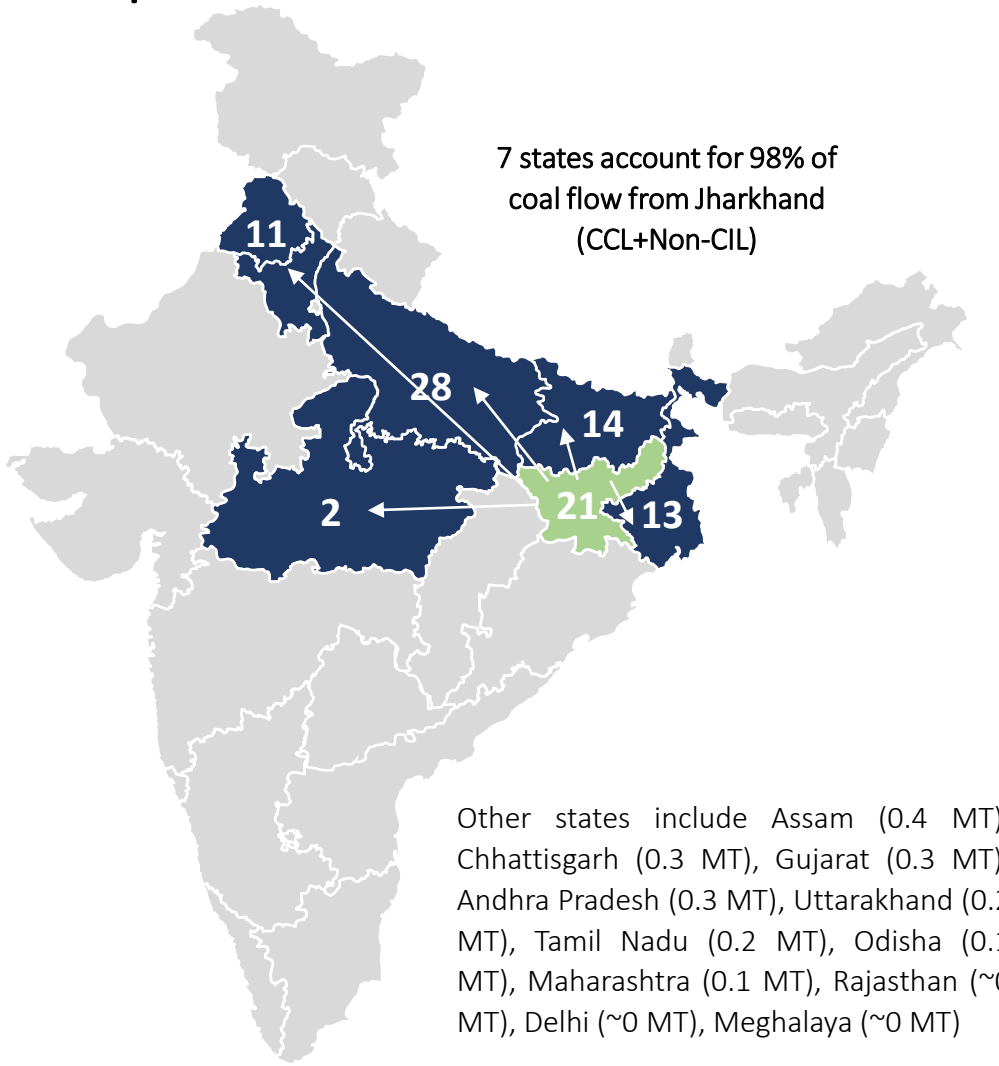
All figures in million tonnes

Actuals → | ← Projections →

#	CCL Coalfields	FY21-22	FY22-23	FY23-24	FY24-25	FY25-26	FY26-27	FY27-28	FY28-29	FY29-30
1	North Karanpura	45.34	47.87	52.0	65.5	84.62	91.52	97.92	106.92	113.92
2	South Karanpura	5.41	6.76	8.0	6.98	10.98	11.7	11.7	12.5	12.5
3	East Bokaro	12.58	14.46	16.4	21.82	24.82	25.1	27.15	28.15	29.15
4	West Bokaro	4.54	5.48	5.8	8.9	11.78	10.33	10.33	12.33	12.33
5	Ramgarh	0.88	1.33	1.5	2.5	2.5	3.0	3.0	3.0	3.0
6	Giridih	0.10	0.20	0.3	0.3	0.3	0.1	0.1	0.1	0.1
	Total	**68.85 (dispatch of 71.86)**	**76**	**84**	**106**	**135**	**142**	**150**	**163**	**171**

- North Karanpura & East Bokaro are the major coalfields contributing to current production of CCL.
- Till FY30, CCL is expected to grow from current ~76 MT (FY23) to ~171 MT (FY30), with a CAGR growth of ~12.3%
- CCL's planned growth from ~72 MT dispatch in FY22 to ~171 MT in FY30 is majorly based on production ramp-up from its North Karanpura coalfields, which shall contribute ~73% of the additional coal production for CCL

O-D Source cluster Mapping – Despatch of Coal from Jharkhand (CCL & Non-CIL): FY22 snapshot



7 states account for 98% of coal flow from Jharkhand (CCL+Non-CIL)

Other states include Assam (0.4 MT), Chhattisgarh (0.3 MT), Gujarat (0.3 MT), Andhra Pradesh (0.3 MT), Uttarakhand (0.2 MT), Tamil Nadu (0.2 MT), Odisha (0.1 MT), Maharashtra (0.1 MT), Rajasthan (~0 MT), Delhi (~0 MT), Meghalaya (~0 MT)

FY22: Despatch of Coal from Jharkhand to destination state (MTPA)

All figures in million tonnes

Consuming State	Rail	Road + RCR	MGR & Others	Total
Jharkhand	13.07	7.76	0	**20.83**
Uttar Pradesh	24.77	3.01	0	**27.78**
Bihar	13.79	0.44	0	**14.23**
Punjab & Haryana	7.30	3.51	0	**10.81**
West Bengal	10.82	2.16	0	**12.98**
Madhya Pradesh	1.57	0.45	0	**2.02**
Others	1.46	0.29	0	**1.76**
Total Despatch from Jharkhand (Including CCL & Non-CIL blocks)	72.79	17.61	0	90.41

Origin – Destination Mapping and the coal flow analysis of rail trunk lines for ~73 MTPA is conducted and presented in the next sections

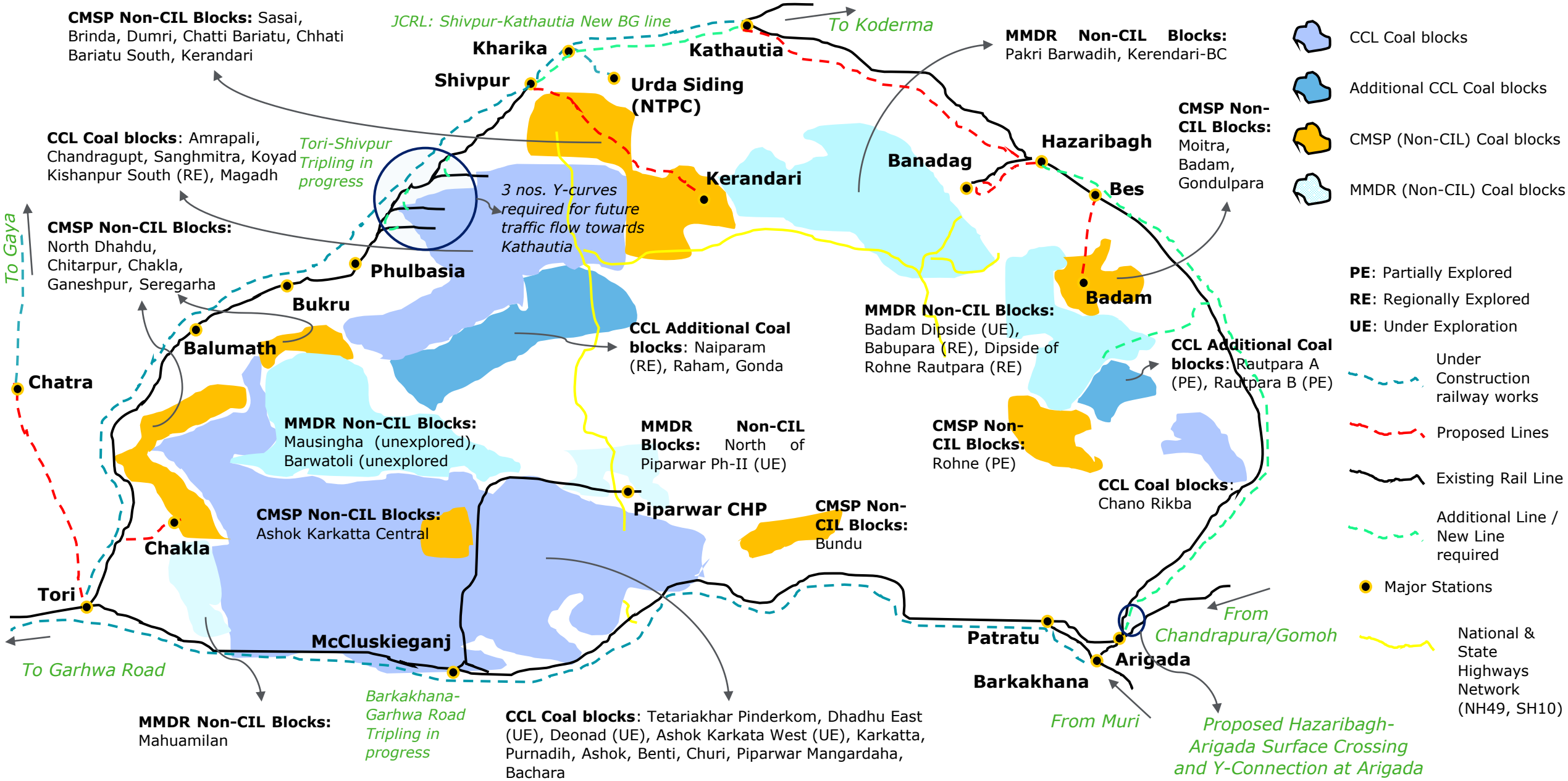
CCL would need to push certain volumes in order to match the production levels

Figures in million tonnes

Destination State	North Karanpura CF	South Karanpura CF	East & West Bokaro and Ramgarh CF	Total CCL
Jharkhand	22.45	1.88	11.68	36.01
Bihar	22.73	1.02	2.14	25.89
Uttar Pradesh	24.72	1.19	1.77	27.69
Punjab & Haryana	30.08	1.25	1.37	32.70
Total for 2030	99.97	5.35	16.96	122.38
Dispatch Plan for CCL	115	13	44	171
Identified Potential Gap	15.03	7.65	27.04	48.62
Assuming all plants sourcing from CCL run at 95% PLF (optimistic scenario) & additional demand from those plants in these states are sourced from CCL				28.83
E-auction Sales Rail Mode @50% of 10% of Long-term rail mode commitment for FY30				~ 5
Remaining Potential Gap		14.79		

A proactive marketing strategy needs to be articulated by the marketing team to further push surplus production volumes from CCL. Strict competition from captive & commercial mines as well as CIL's other subsidiaries expected.

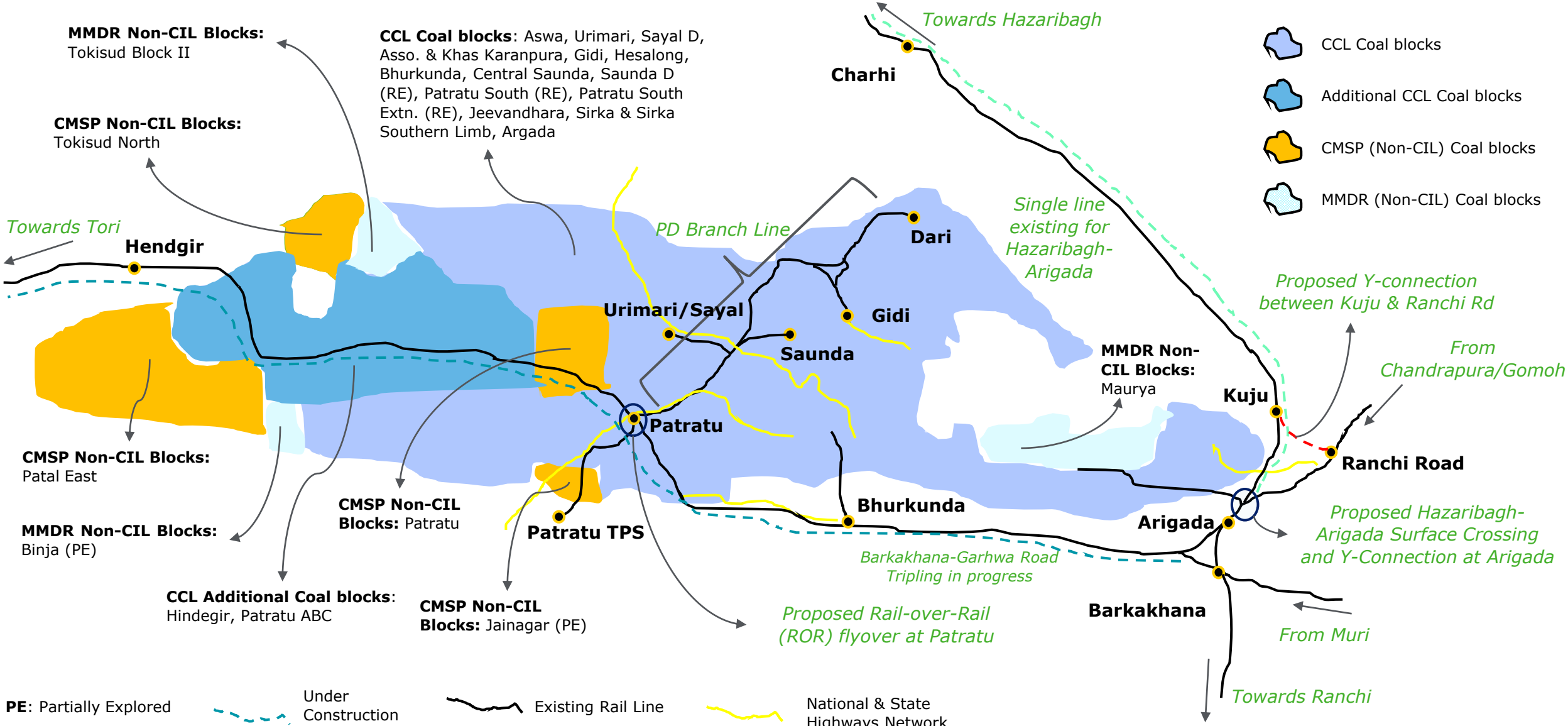
Proposed evacuation plan for North Karanpura CF



Key Insights and Recommendations

#	Recommendation	Way Forward
1	Shivpur-Kathautia new BG line is under construction for coal evacuation from North Karanpura CF towards Koderma. Doubling of Shivpur-Kathautia line should be taken up keeping in view future requirements of evacuation from this area	Focused approach to speed up ongoing works & doubling of Shivpur-Kathautia may be explored. Indian Railways
2	Proposed Tori-Chatra is expected to join Chatra-Gaya line for coal evacuation to northern India from the coalfield of North Karanpura. From Gaya, coal traffic may be diverted to the planned extension of Dedicated Freight Corridor (DFC) line for ease of coal evacuation	Expediting of commissioning lines of Tori-Chatra, Chatra-Gaya and Gaya-Sonenager DFC line. Indian Railways
3	Automatic Signaling may be proposed across all major rail sections in the vicinity of North Karanpura CF	Indian Railways (ECR)
4	Additional line should be planned to connect Non-CIL Blocks of Badam Dipside, Babupara, Dipside of Rohne Rautpara, Rohne to Hazaribagh-Arigada line with a common Public Freight Terminal	Production commencement plans to be finalized for under exploration blocks in North Karanpura region to aid in planning for additional FMC projects and BG rail line link to Hazaribagh – Arigada line
5	Y-Curves should be planned for lines from Magadh, Amrapali & Sanghamitra joining on the Tori-Shivpur line to facilitate coal traffic towards Kathautia.	Y-curves to be planned from major coal mines of CCL to facilitate coal traffic towards Kathautia.
6	Major junctions at Tori & Garhwa Road shall witness substantial coal traffic passing through these stations. Grade separator works (similar to Katni Grade Separator) or bypass works may be planned to ease congestions at junctions	Additional works (such as Katni Grade Separator etc.) to be planned at Tori & Garhwa Road to ease traffic at junctions
7	Options for commissioning of Public Freight Terminals with facilities of mechanized loading of coal may be evaluated for providing rake loading services to non-CIL blocks to reduce road movement of coal from these regions	Exploration of Public Freight Terminals for mechanized coal loading and coal transport through rail for non-CIL blocks

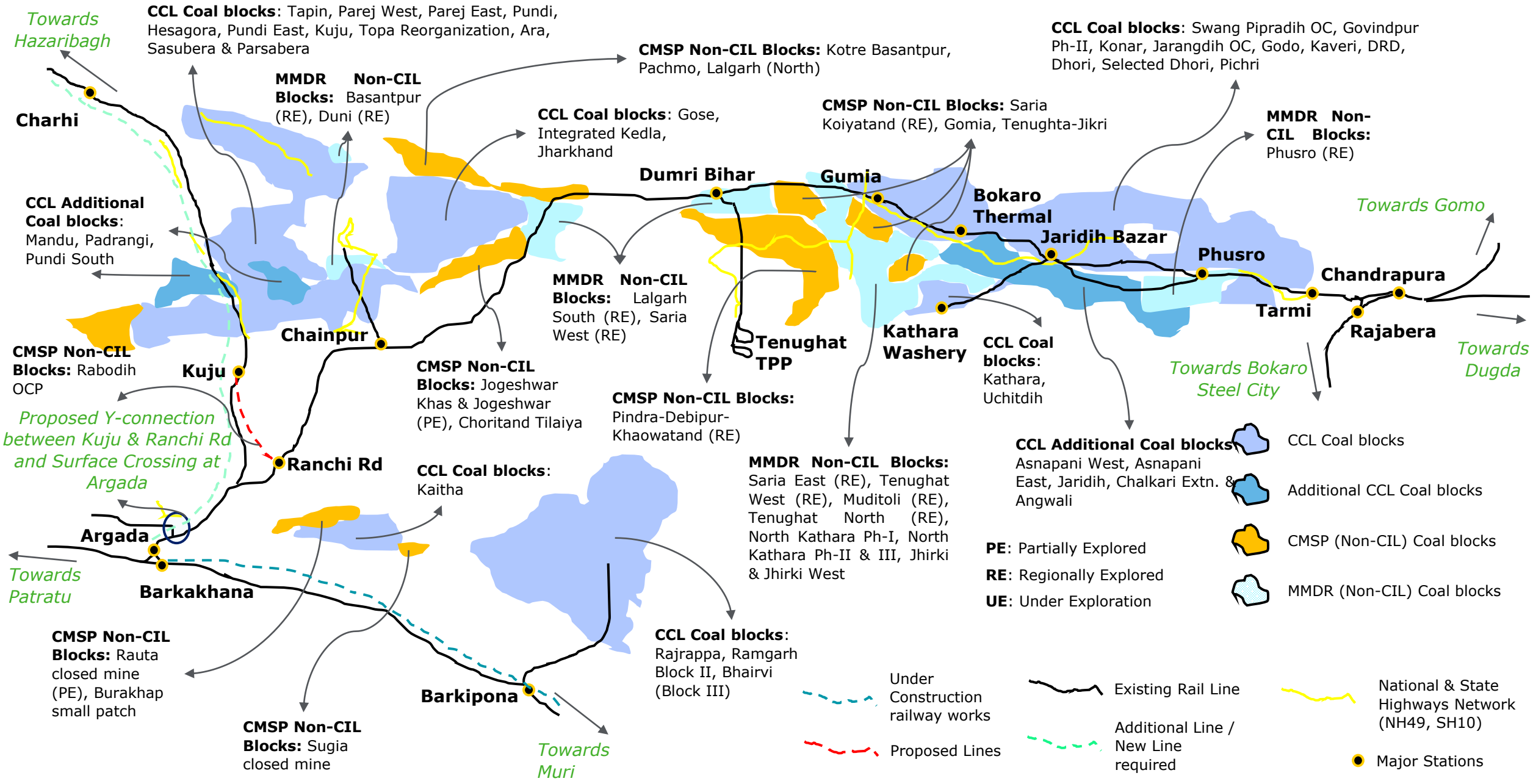
Proposed evacuation plan for South Karanpura CF



Key Insights and Recommendations

#	Recommendation	Way Forward
1	Tripling of Barkakhana-Garhwa Road is under progress along with Hazaribagh-Arigada Surface Crossing. Y-connection between Kuju & Ranchi Rd, surface crossing at Arigada and Rail over Rail flyover at Patratu have been proposed to further facilitate coal traffic in this region.	These ongoing works should be expedited
2	Proposed Tori-Chatra is expected to join Chatra-Gaya line for coal evacuation to northern India from the coalfield of North Karanpura. From Gaya, coal traffic may be diverted to the planned extension of Dedicated Freight Corridor (DFC) line for ease of coal evacuation	Expediting of commissioning lines of Tori-Chatra, Chatra-Gaya and Gaya-Sonenager DFC line. Indian Railways
3	Additional line should be planned to connect Hazaribagh and Barkakhana/Arigada as an alternate to Barkakhana/Arigada – Garhwa Road to reach Gaya via Koderma	Additional evacuation route for under exploration blocks in the region and Kuju area of West Bokaro coalfield, among others
4	Public Fright Terminals may be developed along with connecting roadways from coal blocks to facilitate coal evacuation from private sector coal block owners and blocks owners with no dedicated sidings	Development of Public Freight Terminals (PFTs) along with proper road connectivity
5	Automatic Signaling may be proposed across all major rail sections in the vicinity of South Karanpura CF	Indian Railways (ECR)

Proposed evacuation plan for East Bokaro, West Bokaro & Ramgarh CF



Key Insights and Recommendations

#	Recommendation	Way Forward
1	Tripling of Barkakhana-Garhwa Road is under progress along with Hazaribagh-Arigada Surface Crossing. Y-connection between Kuju & Ranchi Rd, surface crossing at Arigada and Rail over Rail flyover at Patratu have been proposed to further facilitate coal traffic in this region.	These ongoing works should be expedited
2	Additional line should be planned to connect Hazaribagh and Barkakhana/Arigada as an alternate to Barkakhana/Arigada – Garhwa Road to reach Gaya via Koderma	Additional evacuation route for under exploration blocks in the region and Kuju area of West Bokaro coalfield, among others
3	Eastern DFC's works may be expedited till Gomo to facilitate coal evacuation from all coalfields of CCL, BCCL & ECL	DFC works may be expedited till Gomo
4	Doubling of Bhojudih-Pradhan Khunta line should be taken up to facilitate BCCL's coal evacuation from the area	Doubling of Bhojudih-Pradhan Khunta line may be taken up
5	Options for commissioning of Public Freight Terminals with facilities of mechanized loading of coal may be evaluated for providing rake loading services to non-CIL blocks to reduce road movement of coal from these regions	Exploration of Public Freight Terminals for mechanized coal loading and coal transport through rail for non-CIL blocks
6	Automatic Signaling may be proposed across all major rail sections in the vicinity of East Bokaro, West Bokaro & Ramgarh CF	Indian Railways (ECR)

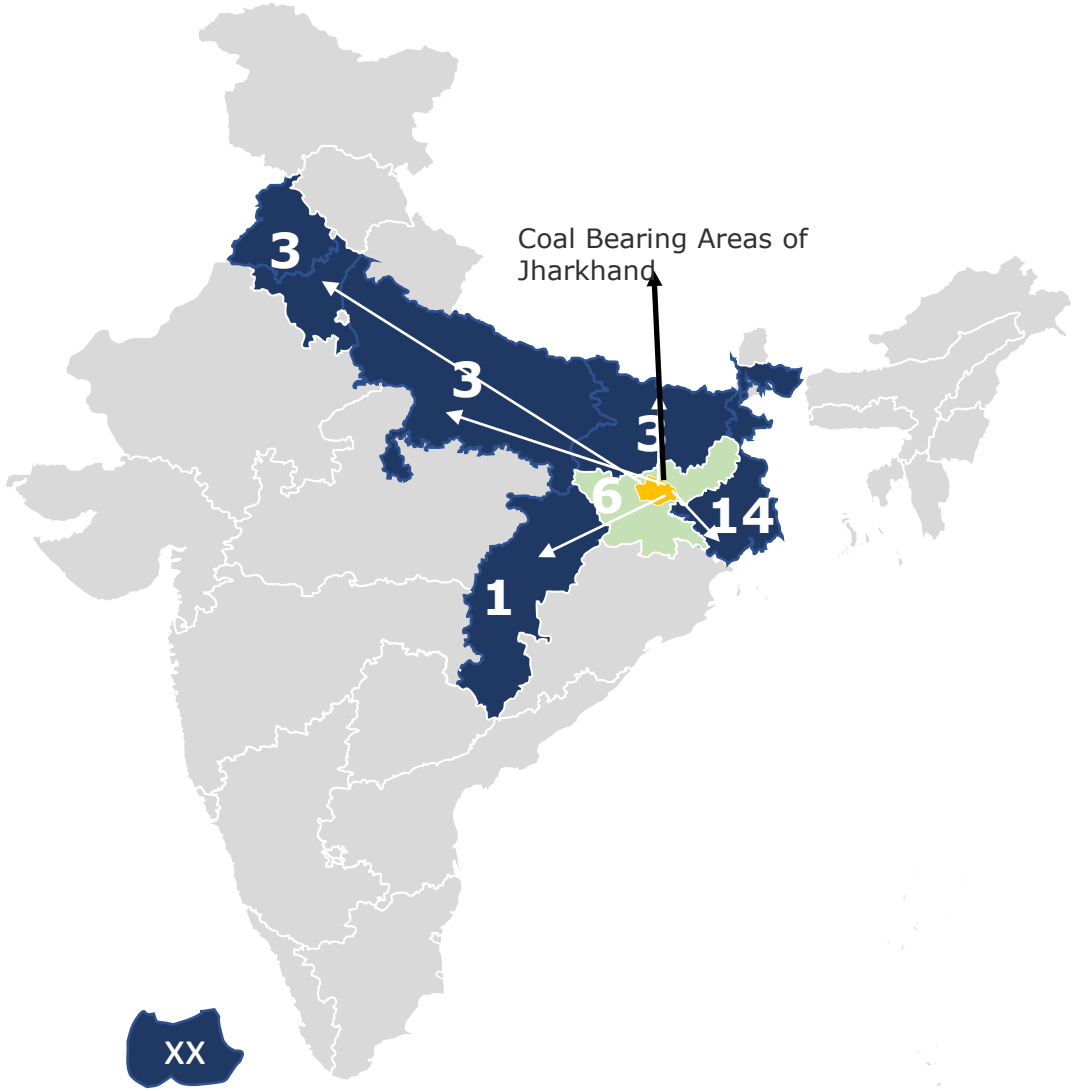
BCCL has ambitious production capacity expansion plans

Jharkhand

All figures in million tonnes

	Actuals		Projections						
Coal Supply from BCCL	FY22 Actual	FY23 Actual	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Barora	1.94	2.45	3.90	4.87	5.20	5.57	5.90	6.00	6.27
Block II	3.70	4.68	4.57	4.90	5.40	5.61	5.71	6.53	6.91
Govindpur	0.79	0.85	1.45	2.06	2.08	2.36	2.71	2.85	2.86
Katras	4.25	3.95	4.95	5.05	5.10	5.20	5.81	5.81	5.81
Sijua	3.43	3.76	4.12	4.29	4.31	4.78	4.78	4.78	4.99
Kusunda	5.05	6.13	5.70	5.78	5.78	5.80	5.80	6.00	6.00
Pootkee Balihari (PB)	0.23	0.17	0.25	0.26	0.27	0.27	0.27	0.27	0.27
Bastacolla	5.11	6.17	5.50	5.62	5.62	5.70	5.70	5.80	6.20
Lodna	3.81	6.05	4.57	4.58	4.60	4.63	4.83	4.83	4.90
Eastern Jharia	0.67	0.79	1.20	1.39	1.39	1.53	1.88	1.88	2.08
Chanch Victoria (CV)	0.94	0.63	0.90	1.90	1.95	2.05	2.69	2.85	2.85
Western Jharia (WJ)	0.59	0.55	0.90	2.30	3.30	3.50	3.92	4.41	4.86
Total BCCL (CIL) in Jharkhand	**31**	**36**	**41**	**45**	**50**	**50**	**50**	**52**	**54**

O-D Source cluster Mapping – Despatch of Coal from BCCL in Jharkhand: FY22 snapshot



FY22: Despatch of Coal from BCCL Jharkhand to destination states (MTPA)

All figures in million tonnes

Consuming State	Rail + RCR (Mn Te)	Pure Road (Mn Te)	Total
Jharkhand	2.09	3.62	5.71
West Bengal	12.95	0.73	13.68
Chattisgarh	0.16	0	0.16
Uttar Pradesh	3.32	0	3.32
Punjab & Haryana	3.02	0	3.02
Bihar	3.18	0.1	3.28
Total Despatch from BCCL Coal Mines in Jharkhand	**24.72 (84.74 %)**	**4.45 (15.26 %)**	**29.17**

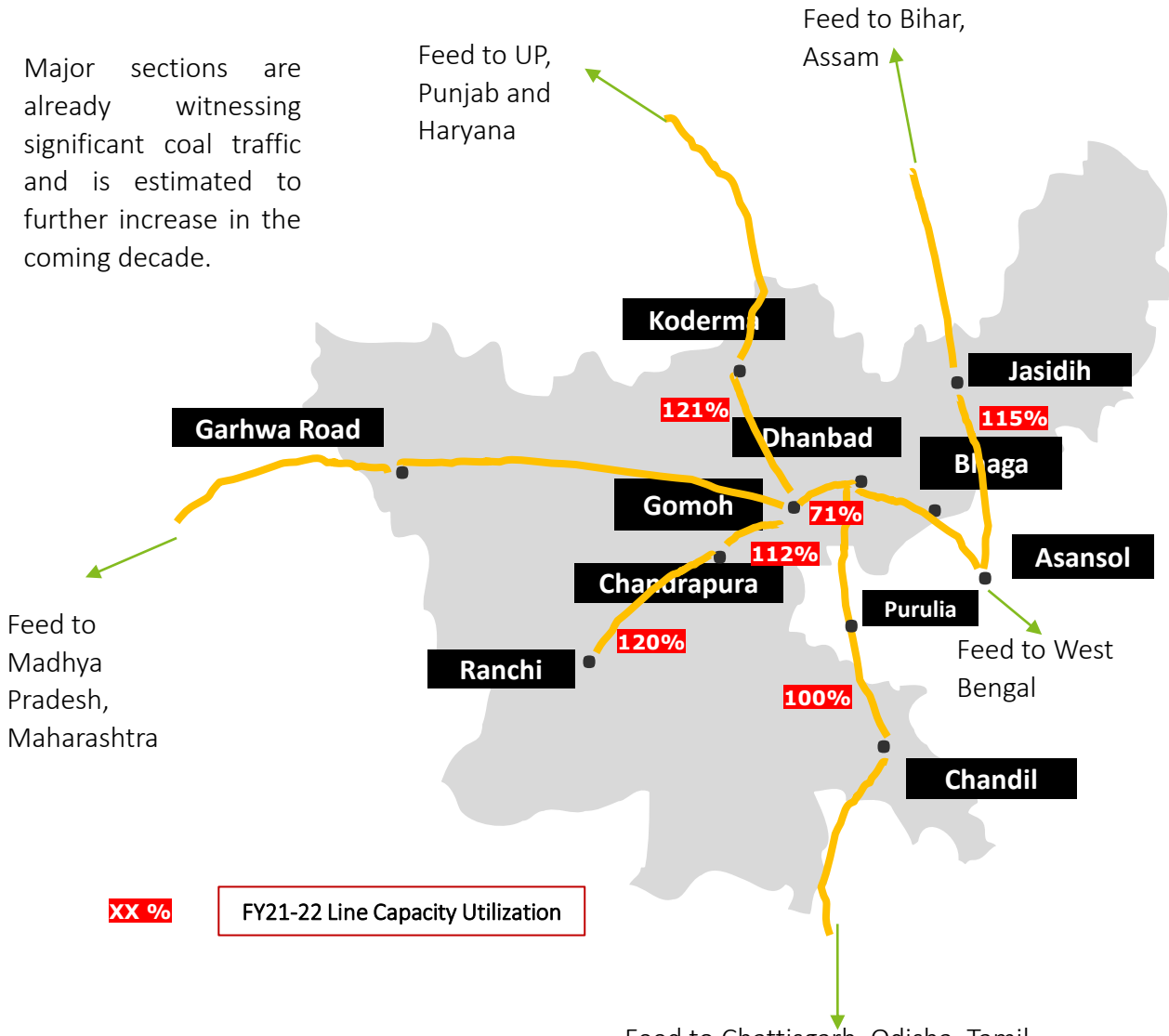
Origin – Destination Mapping and the coal flow analysis of rail trunk lines is conducted and presented in the next sections. Balance quantity is for e-auction small quantities

O-D Source cluster Mapping – Consolidated Coal Traffic from Jharkhand to all states (Incl. CIL and Non-CIL Blocks)

FY22 Actual and FY30 (Estimated) coal traffic in major sections for Despatch of coal from Jharkhand to various destinations

From	To	Traffic (MT): 2022	Rakes / Day: 2022	Traffic (MT): 2030	Rakes / Day: 2030	Increase in Coal Traffic (Rakes / Day)
Koderma	Barh	0.00	0.00	7.44	5.29	5.29
Demu	Barkakana	0.00	0.00	11.00	7.83	7.83
Koderma	Deen Dayal	15.04	10.71	38.95	27.71	17.01
Deen Dayal	Varanasi	13.94	9.92	27.84	19.81	9.89
Deen Dayal	Chunar	1.14	0.81	11.15	7.93	7.12
Varanasi	Ayodha	6.16	4.39	15.87	11.29	6.91
Varanasi	Unchahar	6.49	4.62	10.30	7.33	2.71
Gomoh	Koderma	3.51	2.49	9.95	7.08	4.59
Chandil	Jharsuguda	0.49	0.35	6.61	4.70	4.36
Garwa Road	New Katni	0.49	0.35	7.52	5.35	5.00
Dhanbad	Asansol	4.54	3.23	12.90	9.18	5.95
Tori	Garwa Rd	30.43	21.65	69.14	49.20	27.55
Patratu	Tori	3.05	2.17	8.16	5.81	3.64
Hazaribagh	Gaya	3.15	2.24	6.55	4.66	2.42
Varanasi	Prayagraj	12.41	8.83	23.92	17.02	8.19
Gumia	Chandrapura	10.28	7.32	20.48	14.57	7.26
Patna	Muzzaffarpur	5.64	4.01	14.13	10.06	6.04
Prayagraj	Kanpur Goods	12.41	8.83	23.92	17.02	8.19
Kanpur Goods	Shikohabad	12.41	8.83	23.92	17.02	8.19

Major sections are already witnessing significant coal traffic and is estimated to further increase in the coming decade.



Our key findings based on detailed analysis of railway traffic for major coal producing states (5/7)

Sub-Section	2022		2030						Other Planned Works (New Energy/Other Corridors)	Utilization after of All planned works
	Capacity	% Utilization	Ongoing Works	Passenger	Freight	Total	Capacity	% Utilization		
Sonnagar to Sasaram	168	**135%**	Nil	80	213	293	168	**174%**	Eastern DFC planned to cover Sonnagar-Sasaram-DDU section. Coal traffic could be diverted onto DFC network as per NRP 2020.	**<100%**
Sasaram to Deen Dayal Upadhaya	150	**152%**	Nil	82	213	294	150	**196%**		**<100%**
Purulia to Chandil	110	**100%**	Chandil-Anara-Burnpur 3rd line in progress (DPR stage)	75	110	185	110	**168%**	Nil	**168%**

All numbers (Except Capacity utilization) represent average two-way traffic in Trains/Rakes per day. Passenger also includes Others

Note: Capacity refers to Capacity of line with Maintenance Block (MB)

Our key findings based on detailed analysis of railway traffic for major coal producing states (6/7)

Sub-Section	2022		2030						Other Planned Works (New Energy/Other Corridors)	Utilization after of All planned works
	Capacity	% Utilization	Ongoing Works	Passenger	Freight	Total	Capacity	% Utilization		
Gaya to Sonnagar	134	**110%**	Nil	91	110	201	134	**150%**	Nil	**150%**
Garhwa Road to Sonnagar	116	**124%**	3rd Line in progress	34	150	183	156	**117%**	Nil	**117%**
Tori to Barwadih	84	**147%**	Patratu-Garhwa Rd.-Sonnagar 3rd line in progress	29	107	136	110	**123%**	Nil	**123%**
Barwadih to Garhwa Road	78	**175%**	Patratu-Garhwa Rd.-Sonnagar 3rd line in progress	39	139	178	118	**151%**	Nil	**151%**

All numbers (Except Capacity utilization) represent average two-way traffic in Trains/Rakes per day. Passenger also includes Others

Note: Capacity refers to Capacity of line with Maintenance Block (MB)

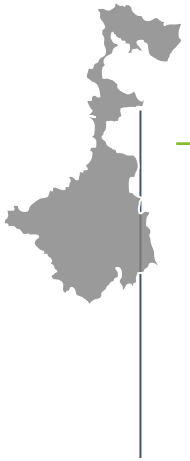
Our key findings based on detailed analysis of railway traffic for major coal producing states (7/7)

Sub-Section	2022		2030						Other Planned Works (New Energy/Other Corridors)	Utilization after of All planned works
	Capacity	% Utilization	Ongoing Works	Passenger	Freight	Total	Capacity	% Utilization		
Gomoh to Chandrapura	70	**112%**	NIL (as per ECR Line Capacity Statement FY2022)	41	55	96	70	**137%**	Nil	**137%**
Gomoh to Koderma	94	**121%**		59	88	147	94	**156%**		**156%**
Koderma to Bandhua	94	**129%**		59	95	155	94	**164%**		**164%**
Bandhua to Manpur	94	**112%**		59	73	132	94	**140%**		**140%**
Manpur to Gaya	154	**138%**		129	132	261	154	**170%**		**170%**

All numbers (Except Capacity utilization) represent average two-way traffic in Trains/Rakes per day. Passenger also includes Others

Note: Capacity refers to Capacity of line with Maintenance Block (MB)

ECL has ambitious production capacity expansion plans



West Bengal

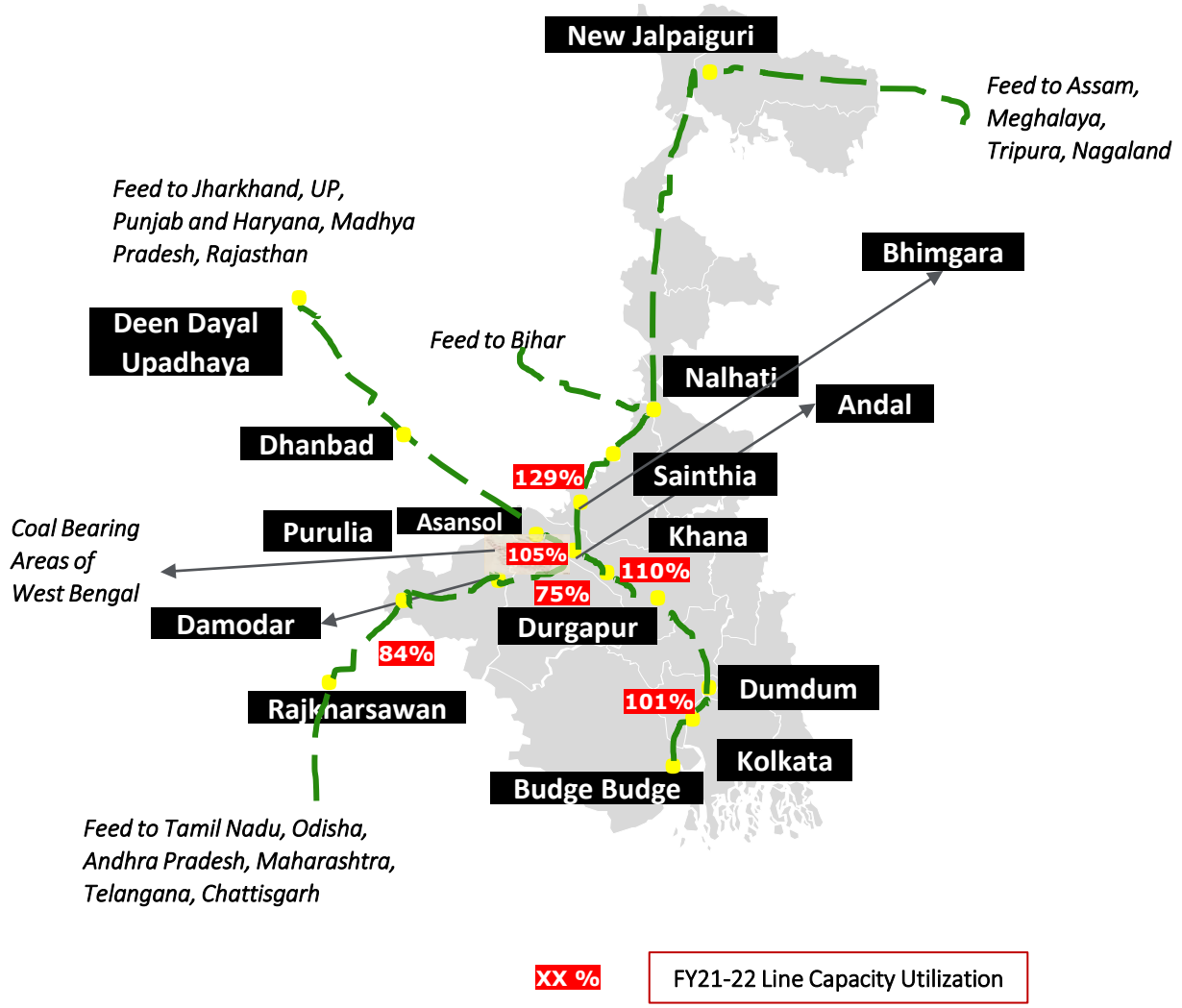
All figures in million tonnes

	Actuals		Projections						
Coal Supply from ECL	FY22 Actual	FY23 Actual	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Deoghar/Saharjuri Coal Field	0.99	1.03	1.6	2.0	2.5	2.7	2.5	2.5	2.5
Mugma-Salanpur Coal Field	5.18	4.86	7.1	8.1	8.9	9.5	10.3	10.3	11.4
Rajmahal Coal Field	5.47	5.62	16.4	14.0	22.5	22.5	22.5	23.5	23.5
Raniganj Coal Field	20.78	23.50	25.9	28.9	31.0	32.2	32.6	32.6	32.5
Total ECL (CIL) in West Bengal	**32**	**35**	**51**	**52**	**60**	**65**	**68**	**69**	**70**

- Currently, Raniganj Coal Field is the primary source of coal for ECL. However, for FY30 Rajmahal CF is expected to become the largest source of coal for ECL
- Other major coal fields are Deoghar/Saharjuri CF and the Mugma-Salanpur CF.
- ECL has set an ambitious target towards achieving the 1 BT programme of Coal India Limited, and further augment the production till FY 2030.

O-D Source cluster Mapping – Consolidated Coal Traffic from West Bengal to all states

FY22 Actual and FY30 (Estimated) coal traffic in major sections for Despatch of coal from West Bengal to various destinations						
From	To	Traffic (MT): 2022	Rakes / Day: 2022	Traffic (MT): 2030	Rakes / Day: 2030	Increase in Coal Traffic (Rakes / Day)
Andal	Damodar	4.84	3.44	8.59	6.11	2.67
Damodar	Ramkanali	5.41	3.85	9.27	6.60	2.75
Ramkanali	Purulia	3.24	2.30	5.10	3.63	1.32
Purulia	Chandil	3.20	2.28	5.04	3.59	1.31
Chandil	Sini	3.01	2.14	4.72	3.36	1.22
Sini	Rajkharsawan	3.01	2.14	4.72	3.36	1.22
Andal	Khana	4.20	2.99	7.36	5.24	2.25
Bhimgara	Sainthia	10.48	7.46	18.55	13.20	5.75
Asansol	Andal	6.69	4.76	10.42	7.42	2.66
Andal	Bhimgara	6.59	4.69	12.84	9.14	4.44
Sainthia	Nalhati	8.63	6.14	14.91	10.61	4.47
Nalhati	Barharwa	7.77	5.53	13.49	9.60	4.07
Andal	Bardhamann	2.74	1.95	4.54	3.23	1.28
Asansol	Deen Dayal Upadhaya	3.65	2.60	6.05	4.31	1.71

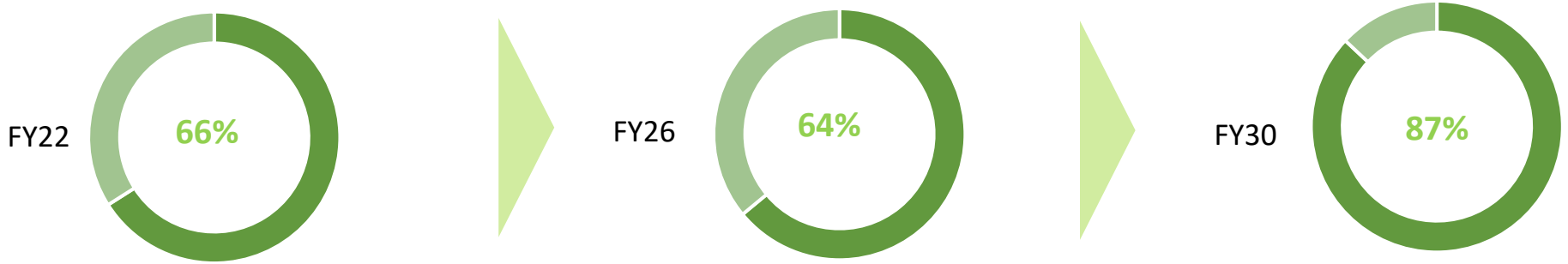


Logistical Outlook – Eastern Coalfields Limited (ECL)

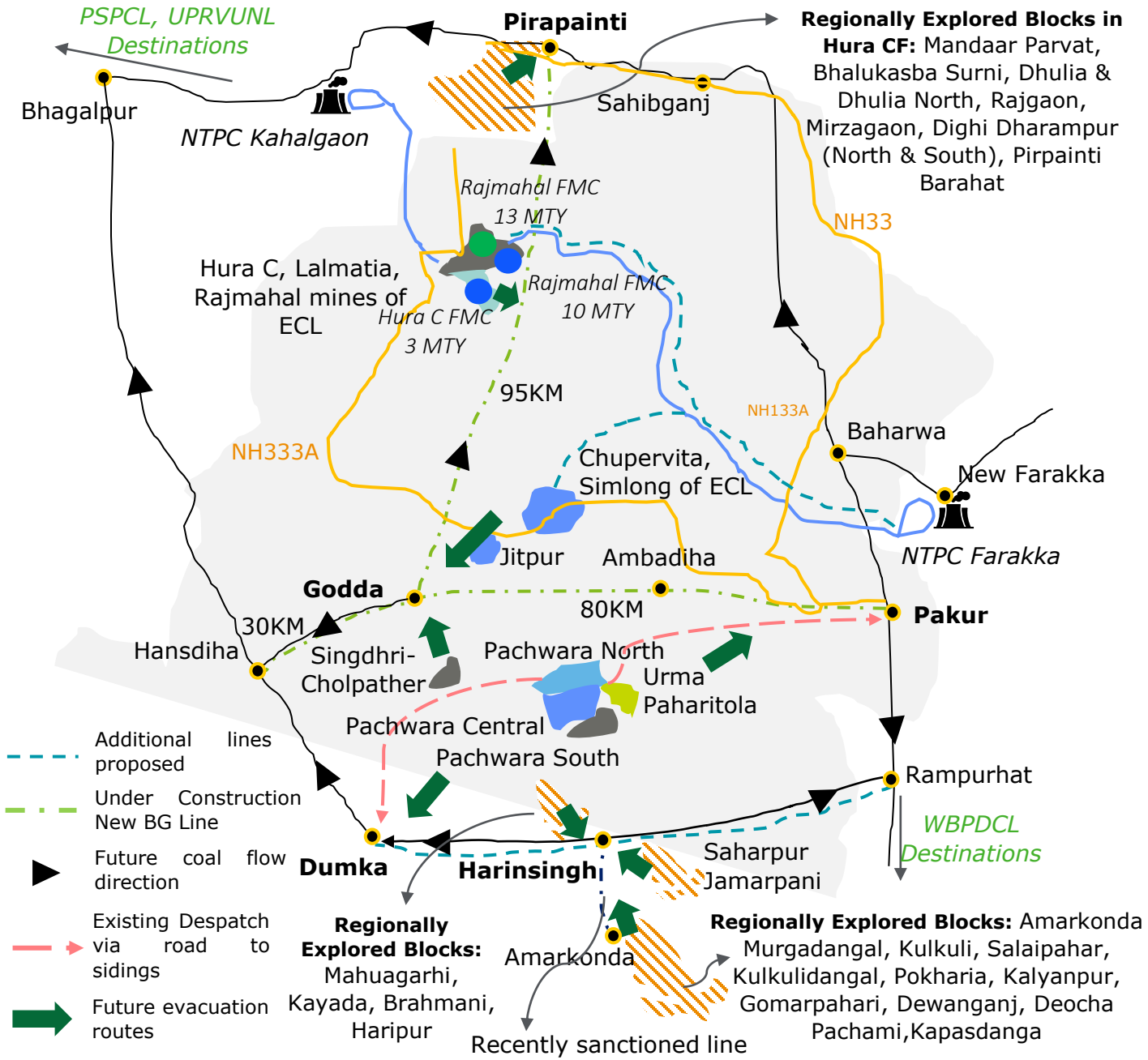
ECL's despatch is progressing towards higher share of rail from current 67% to close to 88 % by FY30. Ensuring that the evacuation capacity exists is a crucial aspect of the holistic logistics policy

AREAS	FY 22 ACTUAL DISPATCH (MT)					FY 26 DISPATCH 1 BT PLAN (MT)					FY 30 ANTICIPATED DISPATCH (MT)				
	RAIL	ROAD	MGR	OTHERS	TOTAL	RAIL	ROAD	MGR	OTHERS	TOTAL	RAIL	ROAD	MGR	OTHERS	TOTAL
BANKOLA	1.9	0.18	0	0	2.08	2.14	0	0	0	2.14	5.4	0	0	0	5.4
JHANJRA	3.59	0.05	0	0	3.64	3.5	0	0	0	3.5	5	0	0	0	5
KAJORA	0.72	0.72	0	0	1.44	1.83	0	0	0	1.83	1.6	0	0	0	1.6
KENDA	0.84	0.17	0	0	1.01	3.46	0	0	0	3.46	2.8	0	0	0	2.8
SATGRAM	0.58	0.12	0	0	0.7	0.97	0	0	0	0.97	1.3	0	0	0	1.3
SRIPUR	0.17	0.02	0	0	0.19	0.75	0	0	0	0.75	0.5	0	0	0	0.5
KUNUSTORIA	0.74	0.1	0	0	0.84	1.81	0	0	0	1.81	1.8	0	0	0	1.8
SALANPUR	2.28	0.94	0	0	3.22	5.2	0	0	0	5.2	9.4	0	0	0	9.4
MUGMA	1.54	0.29	0	0	1.83	2.11	0	0	0	2.11	2	0	0	0	2
SP MINES	0.88	0.23	0	0	1.11	2.5	0	0	0	2.5	2.5	0	0	0	2.5
SONEPUR BAZARI	9.75	0.48	0	0	10.23	12	0	0	0	12	12	0	0	0	12
PANDAVESHWAR	1.35	0.23	0	0	1.58	2.82	0	0	0	2.82	2	0	0	0	2
RAJMAHAL	0	0.08	8.21	0	8.29	-	0	22.5	0	22.5	14.4	0.1	9	0	23.5
SODEPUR	0.31	0.1	0	0	0.41	0.31	0	0	0	0.31	0.3	0	0	0	0.3
TOTALS	24.65	3.71	8.21	0	36.57	39.4	0	22.5	0	61.9	61	0.1	9	0	70.1

Rail's share progression for ECL



Proposed evacuation plan for Rajmahal CF areas cluster achievable



Total Evacuation of 23.5 MTPA from 4 mines of ECL by FY30

Proposed 14.4 MTPA evacuation via rail mode ~ 10.25 r/d	FMC Projects: 23 MTPA (~16.27 rakes per day) capacity will exist by FY30 Evacuation via Wharf Wall/Railway Sidings would not be required
Proposed 9 MTPA evacuation via MGR mode ~ 6.4 r/d	Existing evacuation to NTPC Kahalgaon and Farakka in FY 2022 has been 8.2 MTPA. It is expected to evacuate upto 9 MTPA in FY 2030.

Remaining Smaller Quantities by Road

Evacuation of 36.5 MTPA from Non-CIL Mines by FY30

For Saharpur Jamarpani (UPRVUNL) , the evacuation would be from Rampurhat and would move towards dumka – Bhagalpur to power plants in Uttar Pradesh.

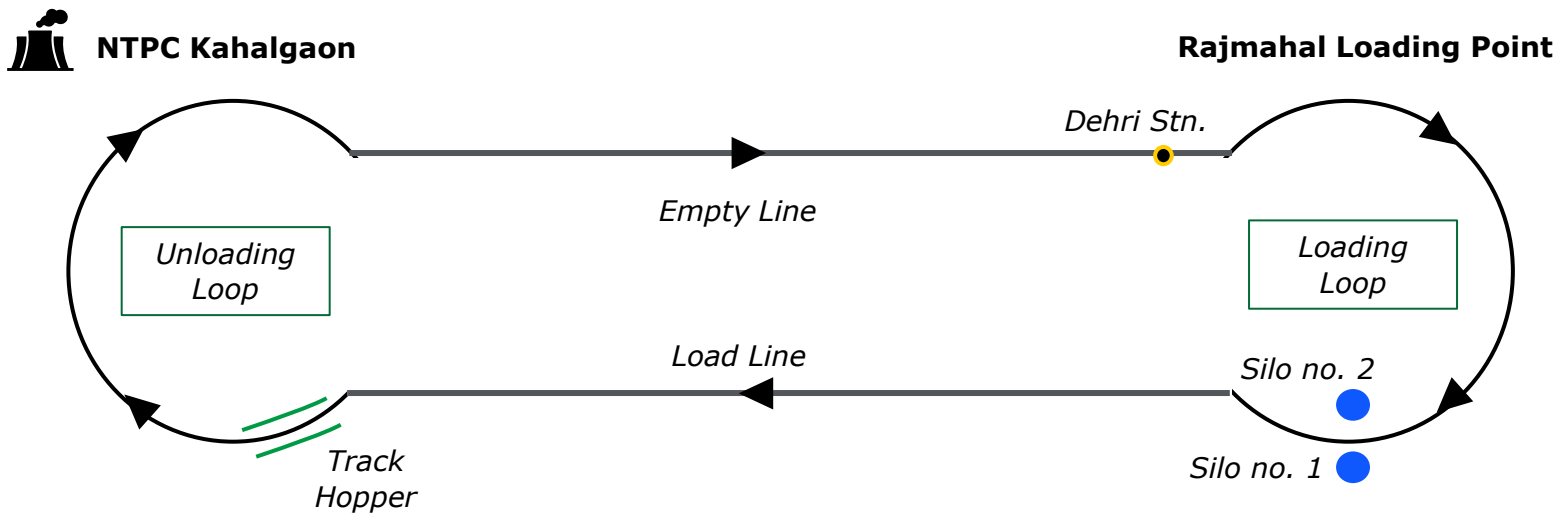
For Pachwara Central (PSPCL), Pachwara North (WBPDCL), and Pachwara South (NUPL) will leverage Pakur Railway Station for loading. Godda – Pirapainti can also be leveraged for north movements by PSPCL and NUPL. These coal block owners have formed a SPV with equity participation for development of coal siding at Pakur for shared use.

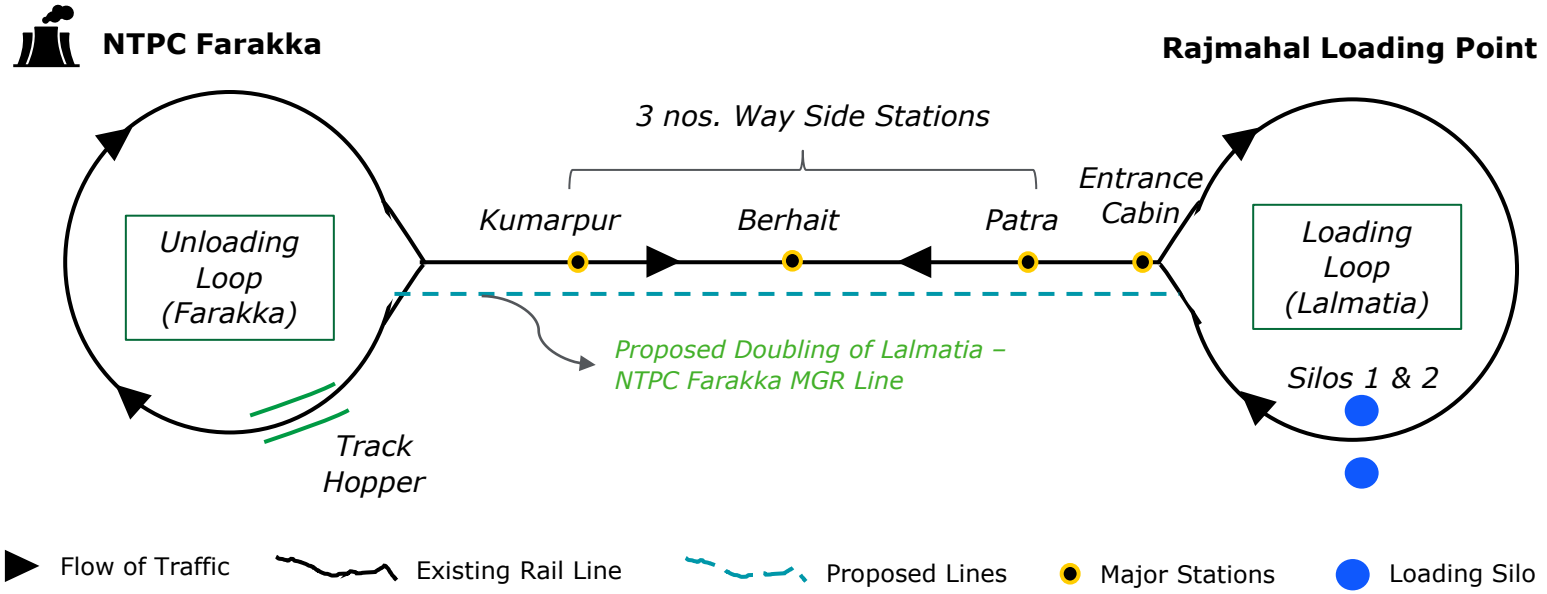
WBPDCL currently taking coal via road to both Dumka and Pakur stations for despatch to its power plants

Detailed evacuation routes for under exploration blocks have been mapped in the list attached

Expected commissioning of railway works: Godda-Pirpainti Line TDC by FY28-FY29 | Godda-Pakur Line TDC by FY28-FY29

Proposed Doubling of Rajmahal – NTPC Farakka MGR Line





Flow of Traffic | Existing Rail Line | Proposed Lines | Major Stations | Loading Silo

Details of Existing MGR Lines

MGR Line for NTPC Kahalgaon	Double rail line already exists between two bulb points for coal evacuation to NTPC Kahalgaon
MGR Line for NTPC Farakka	For NTPC Farakka, there is only single rail line between two bulb points

Details of Enhanced Loading Capacity

- 10 MTPA SILO is being commissioned at Rajmahal for transport of coal to plants of NTPC under CIL's FMC projects, in addition to existing silo
- Further, another 3 MTPA SILO is being commissioned at Hura-C coal mine for transport of coal to plants of NTPC under CIL's FMC projects.
- For smooth transport of coal from augmented silo capacity i.e., on FMC project completion, it is proposed that doubling of rail line from Rajmahal to NTPC Farakka may be evaluated

Key Insights and Recommendations

#	Recommendation	Way Forward
1	New BG line between Godda and Pakur should be expedited to reduce reliance on road transport from the Pachwara blocks to Pakur and Dumka.	Expediting of new line Godda-Pakur
2	At the same time, FMC projects with requisite capacities may be planned by block owners for the Pachwara blocks for efficient loading of coal	FMC projects to be taken up/expedited
3	Proposed projects of Murari-Pakur 3rd and 4th line to be expedited due to increased coal traffic from Pakur along with Bardhman-Shaktigarh 5th line	Proposed 3rd & 4th line to be expedited
4	Double line from Ambadhia station (Pakur-Godda line) to Pachwara coal mines (Pachwara North, Pachwara central and Pachwara South) may taken up post discussion by stakeholders with Indian Railways	Double line from Ambadhia station (Pakur-Godda line) to Pachwara coal blocks
5	New BG line from Saharpur-Jamarpani block to Harisingh station to be taken up. This may be extended in future to cater to coal traffic from Deocha-Pachami and other non-operational blocks	New line to Harisinghpur from southern blocks
6	MGR line from Rajmahal to NTPC Farakka may be extended to cover coal evacuation from Chupervita of ECL along with doubling of the NTPC Farakka MGR line. Hura C to Rajmahal MGR (~12 Kms) is being constructed by NTPC for taking coal to either Kahalgaon and Farakka Plants	Doubling of MGR Line and expedition of connectivity from Hura C to Rajmahal. NTPC
7	Expediting of Chitra-Basukinath line works along with doubling of Rampurhat-Dumka line to facilitate coal traffic in the Rajmahal CF	Doubling of Rampurhat-Dumka line
8	Options for commissioning of Public Freight Terminals with facilities of mechanized loading of coal may be evaluated for providing rake loading services to non-CIL blocks to reduce road movement of coal from these regions	Exploration of Public Freight Terminals for mechanized coal loading and coal transport through rail for non-CIL blocks
9	Automatic Signaling may be proposed across all major rail sections in the vicinity of Rajmahal CF	Indian Railways

Estimated Wagon Procurement requirement by Indian Railways (ECR, SER, ER – Jharkhand & West Bengal)

Destination State	Million Tonne - Kms	Volume (Million Tonnes)	Weighted Avg Distance of Despatch (KMs)
Jharkhand	3075.80	19.04	161.54
West Bengal	8097.04	38.18	212.07
Uttar Pradesh	25024.23	30.60	817.92
Bihar	7128.65	19.73	361.31
Punjab & Haryana	17924.77	13.03	1375.97
Others	7181.25	9.58	750
Total	68431.74	130.15 Million Tonnes	

FY22 - Rail

Average Lead for Coal Supply in FY22 for supplies by Jharkhand & West Bengal

525.80 KMs

Destination State	Million Tonne - Kms	Volume (Million Tonnes)	Weighted Avg Distance of Despatch (KMs)
Jharkhand	6671.76	41.30	161.54
West Bengal	12490.92	58.90	212.07
Uttar Pradesh	45803.46	56.00	817.92
Bihar	13982.70	38.70	361.31
Punjab & Haryana	45407.04	33.00	1375.97
Additional Push Volumes + Commercial Despatches to be taken as per FY22 avg Leads	22726.64	57.22	397.18
Total	147082.53	285.12 Million Tonnes	

FY30 - Rail

Average Lead for Coal Supply in FY30 for supplies by Jharkhand & West Bengal

515.86 KMs

	FY22	FY30
Average Lead of coal Despatch from JH + WB (KMs)	525.80	515.86
Estimated Average Turnaround time of Rakes (Days)	3.92	3.85
Rakes / Day Despatch by Rail + RCR + RSR Mode	90.38	198

Additional Rakes/Day Despatch Envisaged	107.62
Estimated Improved TAT (Days)	3.85
Total Number of Rakes Required	414.34
Estimated Wagons to be Procured for Coal till FY30	**24,032**

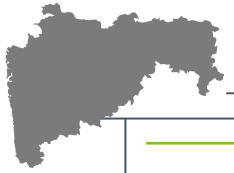
Additional ~1,803 Wagons would be required for despatches during peak demand period from November to March

Source: Sagarmala Report, Ministry of Ports, Shipping & Waterways, Comprehensive Action Plan for Port Connectivity on Gatishakti NMP 2022, DPIIT]

Recommendations
for

Maharashtra

WCL has ambitious production capacity expansion plans



Maharashtra (WCL)

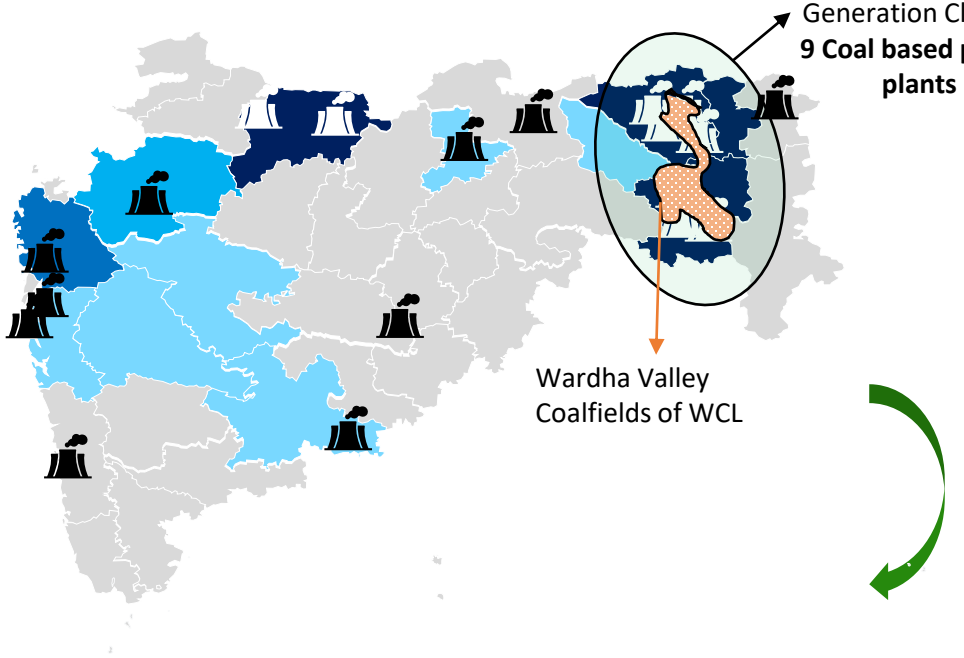
All figures in million tonnes

Coal Supply from WCL	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Pench Kanhan & Tawa Valley CF	2.97	2.84	3.3	3.71	4.59	4.59	4.59	4.59	4.59
Wardha Valley, Umrer, Kamptee & Bander CF	54.74	61.426	63.7	64.30	65.42	65.42	65.42	65.42	65.42
Total WCL (CIL)	58	64	67	68	70	70	70	70	70

- Wardha Valley, Umrer, Kamptee and Bander coalfields are the major coalfields contributing to current production of WCL.
- Till FY30, WCL is expected to grow from current ~64 MT (FY23) to ~70 MT (FY30), with a CAGR growth of ~1.3%
- WCL's major coal producing area of Wardha Valley has produced ~40 MT in FY23 with plans to produce ~40 MT in FY30. Hence, this area has already reached its target of FY30 with existing evacuation infrastructure.

Maharashtra's coal-based power generation clusters

Maharashtra's Total Coal Demand from Power Sector in FY22: 82 Million Tonnes



Major Coal Consuming Districts of Maharashtra: 2030 (Estimated)

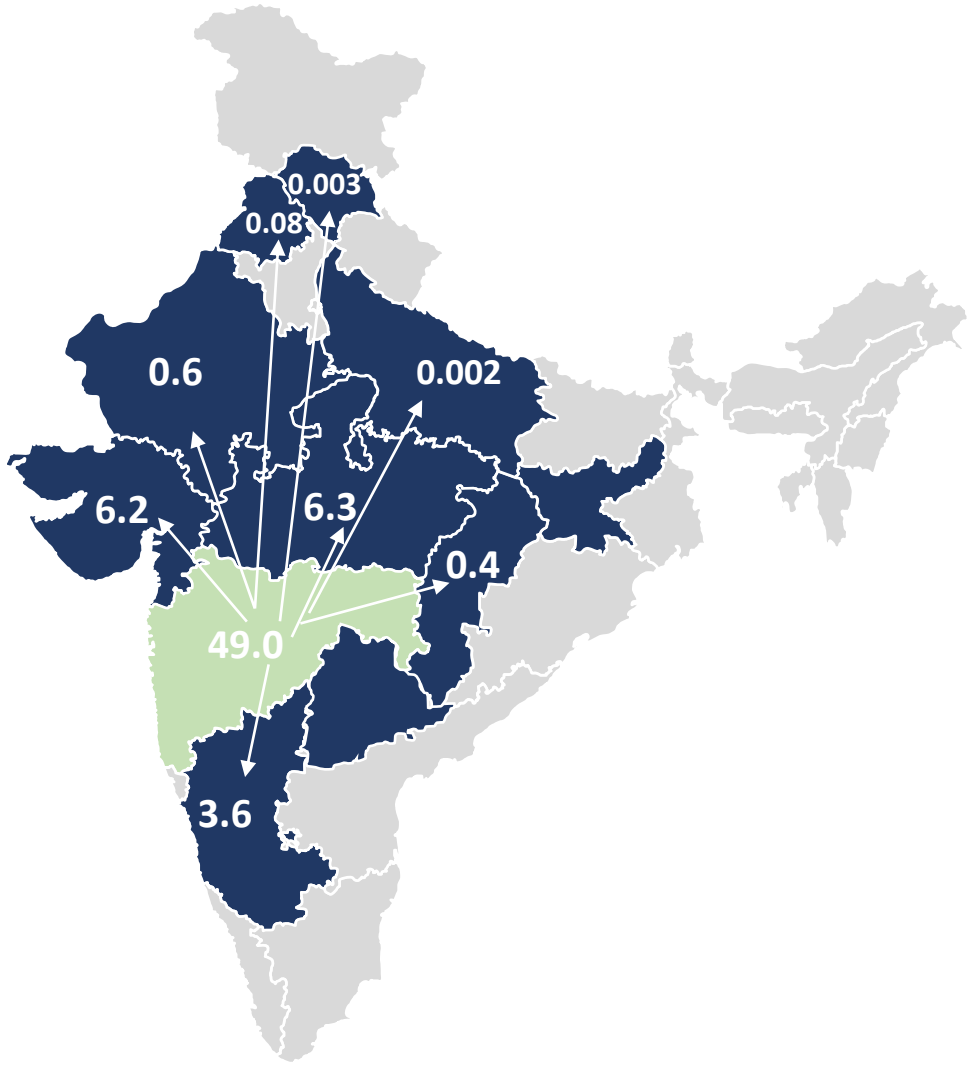
>15 MTPA Coal Consumption	*Nagpur, Chandrapur, Bhandara, Jalgaon*
10-15 MTPA Coal Consumption	*Palghar/Thane*
5-10 MTPA Coal Consumption	*Nashik*
1-5 MTPA Coal Consumption	*Solapur, Pune, Raigad, Ahmednagar, Wardha & Akola*

Major Coal Based Power Plants in Maharashtra

Name of TPS	Power Utility	Installed Capacity (MW)	Coal Consumed in FY22 (MMT)
Tiroda	Adani Power Maharashtra Lttd	3300	14.1826
Adani Dahanu	Adani Electricity Mumbai Ltd	500	1.989
Dhariwal	Dhariwal Infrastructure Ltd	600	2.721
GMR Warora	GMR Warora Energy Ltd	600	2.3192
Ratnagiri	JSW Energy Ltd	1200	2.7286
Bhusawal	MAHAGENCO	1210	4.7446
Chandrapur	MAHAGENCO	2920	11.5712
Khaparkheda	MAHAGENCO	1340	6.2042
Koradi	MAHAGENCO	2190	8.1874
Nashik	MAHAGENCO	630	1.6781
Parli	MAHAGENCO	750	1.9664
Paras	MAHAGENCO	500	1.9981
Mouda Super TPS	NTPC Ltd	2320	8.6862
Solapur Super TPS	NTPC Ltd	1320	3.2532
Amravati TPS	RattanIndia Power Ltd.	1350	5.9049
Trombay	The TATA Power Company Ltd	750	2.31
Sai Wardha Power Ltd, Warora	Sai Wardha Power Generation Pvt Ltd	540	1.4753
	Total	**22020**	**81.92**

+ Under Construction 660 MW Bhusawal STPP Unit 1 being developed by MAHAGENCO

O-D Source cluster Mapping – Despatch of Coal from Maharashtra: FY22 snapshot



XX FY22: Despatch of Coal from Maharashtra to destination state (MTPA)

All figures in million tonnes

Consuming State	Rail + RCR	Rail-Sea-Rail	Pure Road	MGR & Others	Total
Maharashtra	31.42	0.00	15.12	2.06	48.60
Gujrat	5.76	0.00	0.47	0.00	6.24
Karnataka	3.57	0.00	0.06	0.00	3.63
Chhattisgarh	0.30	0.00	0.11	0.00	0.41
Madhya Pradesh	5.16	0.00	1.16	0.02	6.34
Rajasthan	0.55	0.00	0.005	0.00	0.55
Punjab & Haryana	0.08	0.00	0.00	0.00	0.08
Other States (UP, Jharkhand & Telengana)	0.001	0.00	0.05	0.015	0.016
Total Despatch from Maharashtra	**46.85 (71.12%)**	**0.00 (0.00%)**	**16.95 (25.73%)**	**2.07 (3.15%)**	**65.87**

Origin – Destination Mapping and the coal flow analysis of rail trunk lines for ~47 MTPA is conducted and presented in the next sections

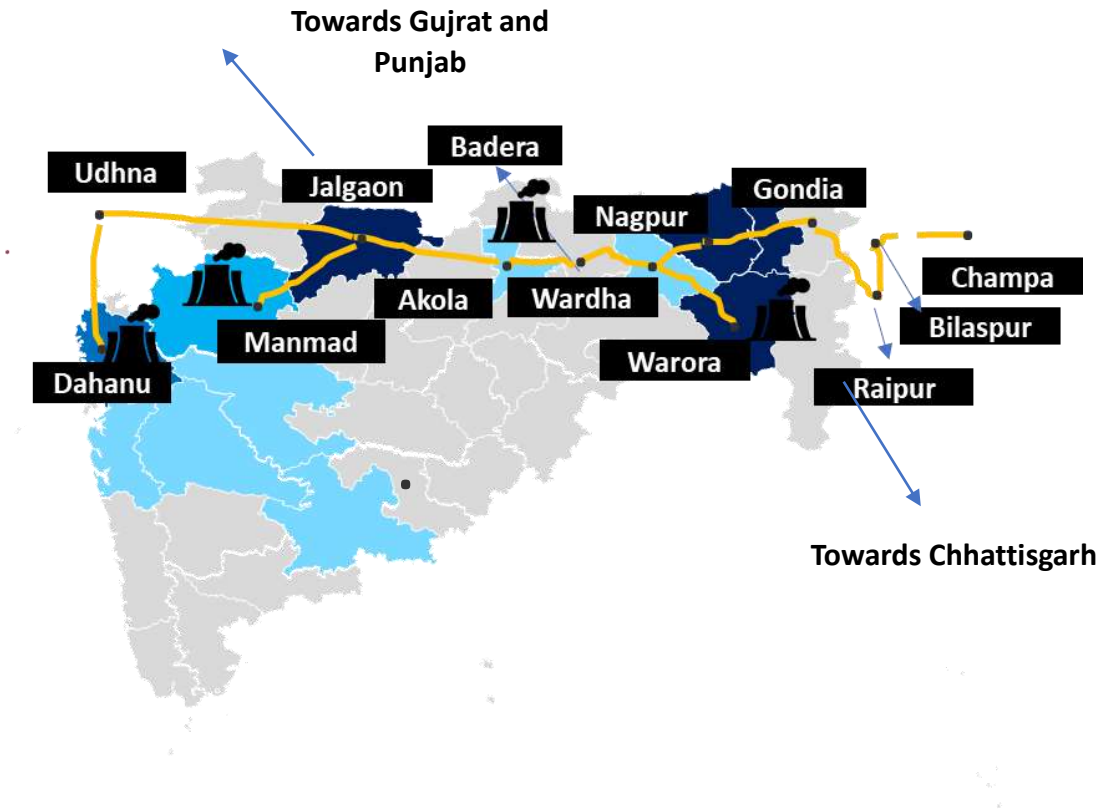
O-D Source cluster Mapping – Consolidated Coal Traffic from Maharashtra to all states

FY22 Actual and FY30 (Estimated) coal traffic in major sections for Despatch of coal from Maharashtra to various destinations

From	To	Traffic (MT): 2022	Rakes / Day: 2022	Traffic (MT): 2030	Rakes / Day: 2030	Increase in Coal Traffic (Rakes / Day)
Wardha	Nagpur	12.81	9.12	16.74	11.91	+2.80
Chandrapur	Majri	10.70	7.61	13.98	9.95	+2.34
Wardha	Akola	13.49	9.60	17.63	12.55	+2.94
Nagpur	Akola	6.54	4.65	8.54	6.08	+1.43
Akola	Bhusaval	14.15	10.07	18.49	13.15	+3.09

Major sections are already witnessing significant coal traffic and is estimated to further increase in the coming decade.

Currently. Almost all of these sections are operating at >100% capacity utilization levels and hence solutions shall be in place to ensure seamless coal flow in future\.

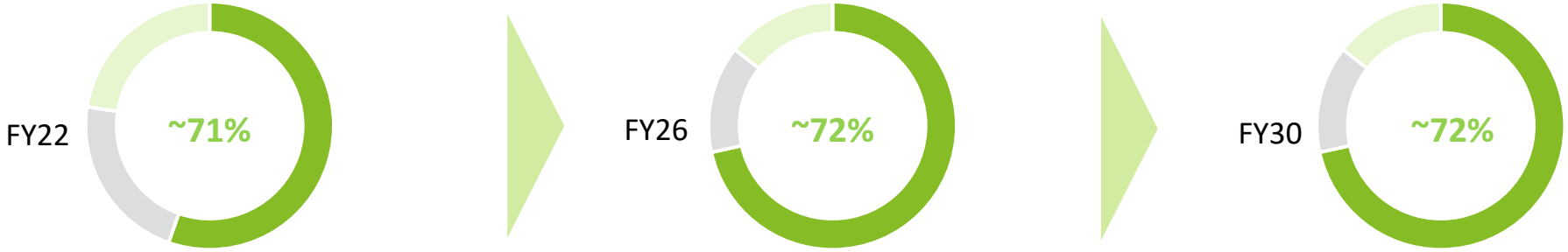


Logistical Outlook – Western Coalfields Limited (WCL)

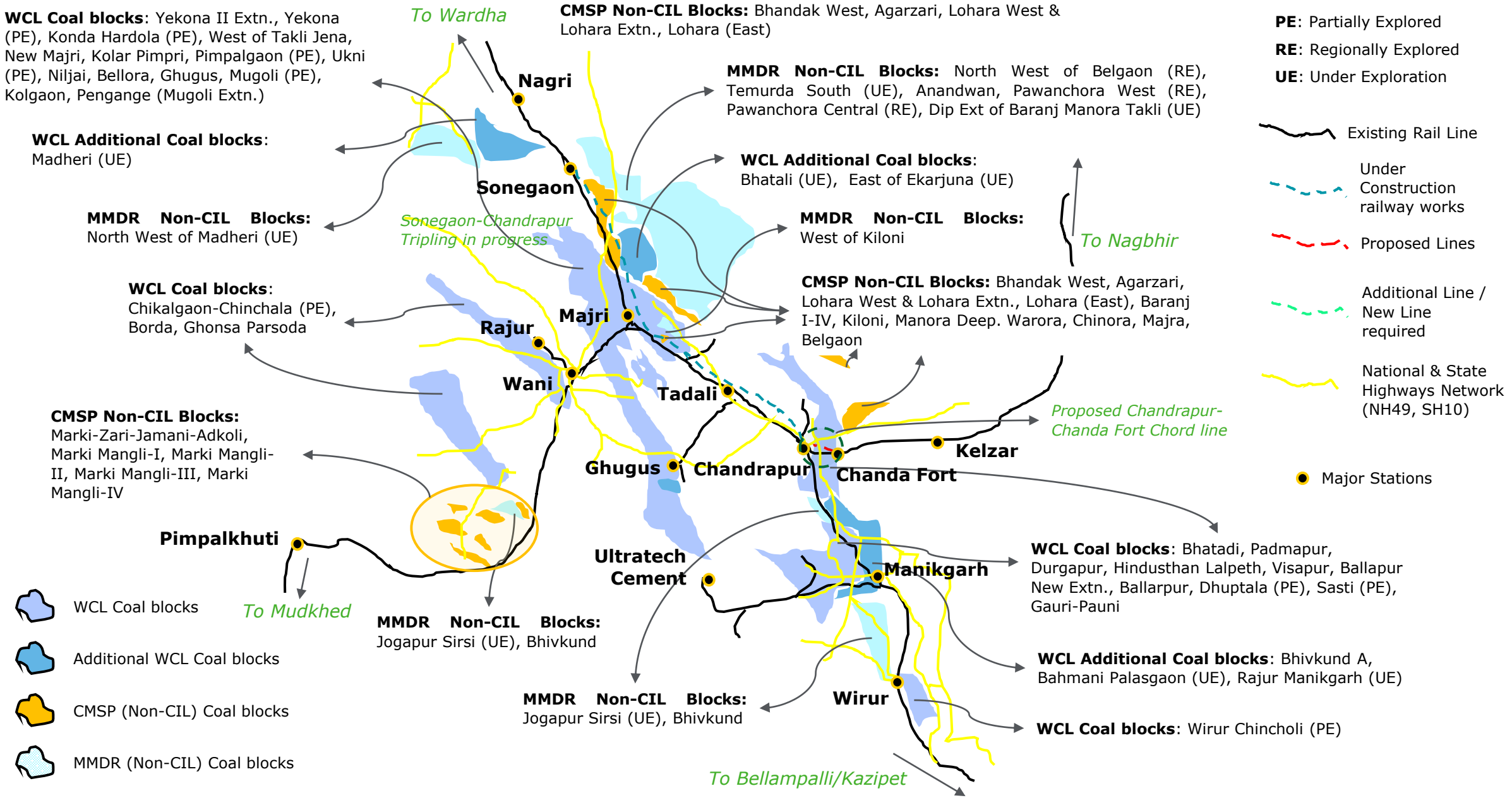
WCL's despatch is expected to continue its share of rail from current ~71% to ~71%-72% by FY30 with sufficient existing evacuation capacity

Area	FY22 Actual Despatch (MTPA)					FY25-26 1 BT Plan (MTPA)					FY29-30 Anticipated Dispatch (MTPA)				
	Rail	RCR	Pure Road	MGR & Others	Total	Rail	RCR	Pure Road	MGR & Others	Total	Rail	RCR	Pure Road	MGR & Others	Total
Ballarpur	4.68	0.66	2.16	0.00	**7.50**	10.26	0.70	3.29	0.00	**14.25**	10.26	0.70	3.29	0.00	**14.25**
Chandrapur	1.13	0.00	1.34	1.99	**4.47**	2.13	0.00	1.00	2.50	**5.63**	2.13	0.00	1.00	2.50	**5.63**
Kanhan	0.34	0.00	0.36	0.00	**0.70**	0.22	0.00	0.21	0.00	**0.43**	0.22	0.00	0.21	0.00	**0.43**
Pench	0.65	0.55	0.07	0.00	**1.27**	1.98	0.00	0.41	0.00	**2.39**	1.98	0.00	0.41	0.00	**2.39**
Majri	3.67	0.11	1.96	0.00	**5.74**	4.14	0.15	1.46	0.00	**5.75**	4.14	0.15	1.46	0.00	**5.75**
Nagpur	4.09	4.80	0.00	0.06	**8.95**	6.78	0.00	1.28	2.50	**10.56**	6.78	0.00	1.28	2.50	**10.56**
Patherkhera	0.00	1.10	0.00	0.02	**1.12**	0.00	0.00	1.77	0.00	**1.77**	0.00	0.00	1.77	0.00	**1.77**
Umrer	8.67	0.00	3.45	0.00	**12.12**	9.95	0.00	2.25	0.00	**12.20**	9.95	0.00	2.25	0.00	**12.20**
Wani	11.76	0.60	5.83	0.00	**18.19**	7.74	1.50	1.51	0.00	**10.75**	7.74	1.50	1.51	0.00	**10.75**
Wani North	2.99	0.09	1.02	0.00	**4.10**	4.52	0.10	1.66	0.00	**6.28**	4.52	0.10	1.66	0.00	**6.28**
Total	**37.99**	**7.90**	**16.20**	**2.07**	**64.16**	**47.72**	**2.45**	**14.84**	**5.00**	**70.00**	**47.72**	**2.45**	**14.84**	**5.00**	**70.00**

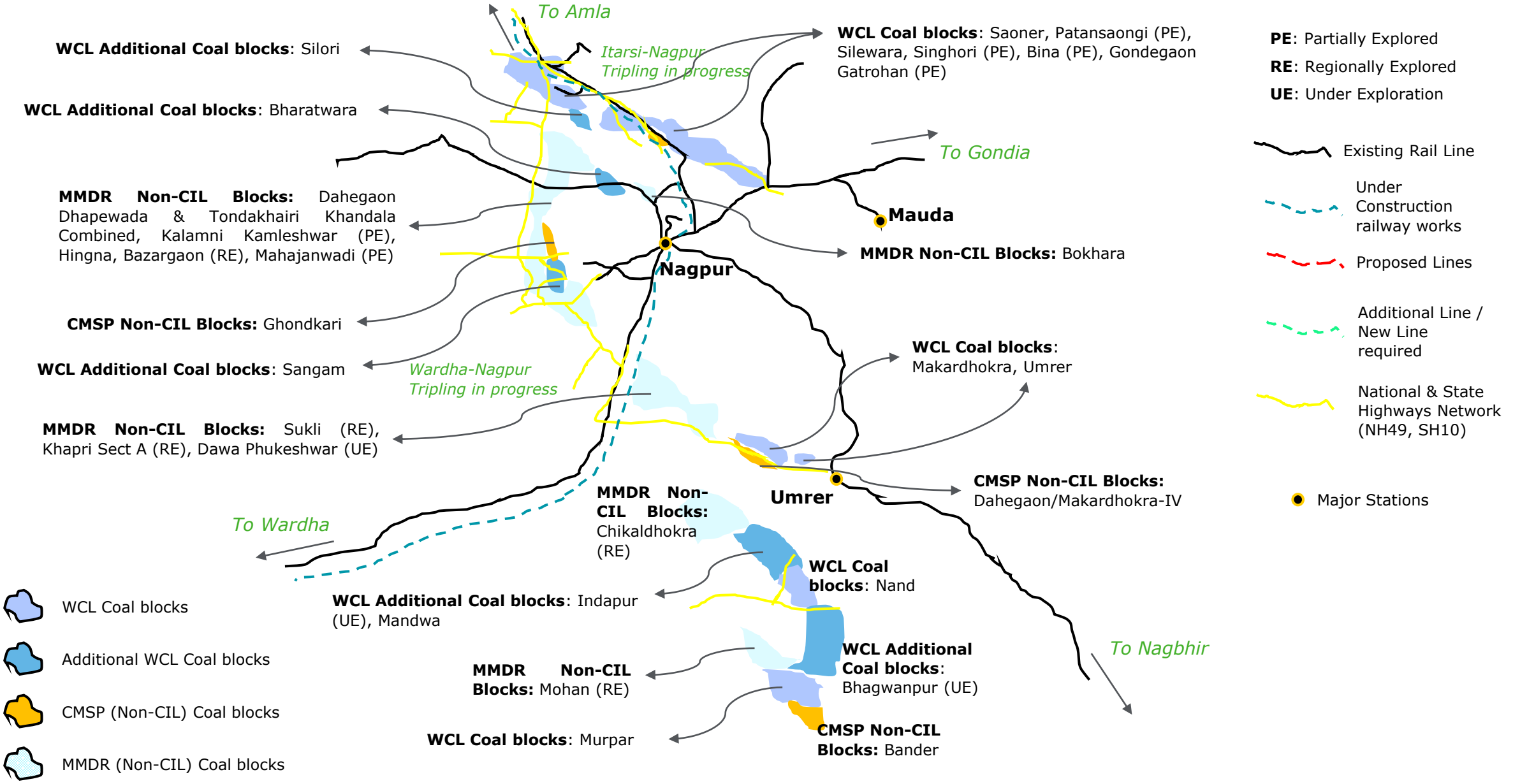
Rail's share progression for WCL



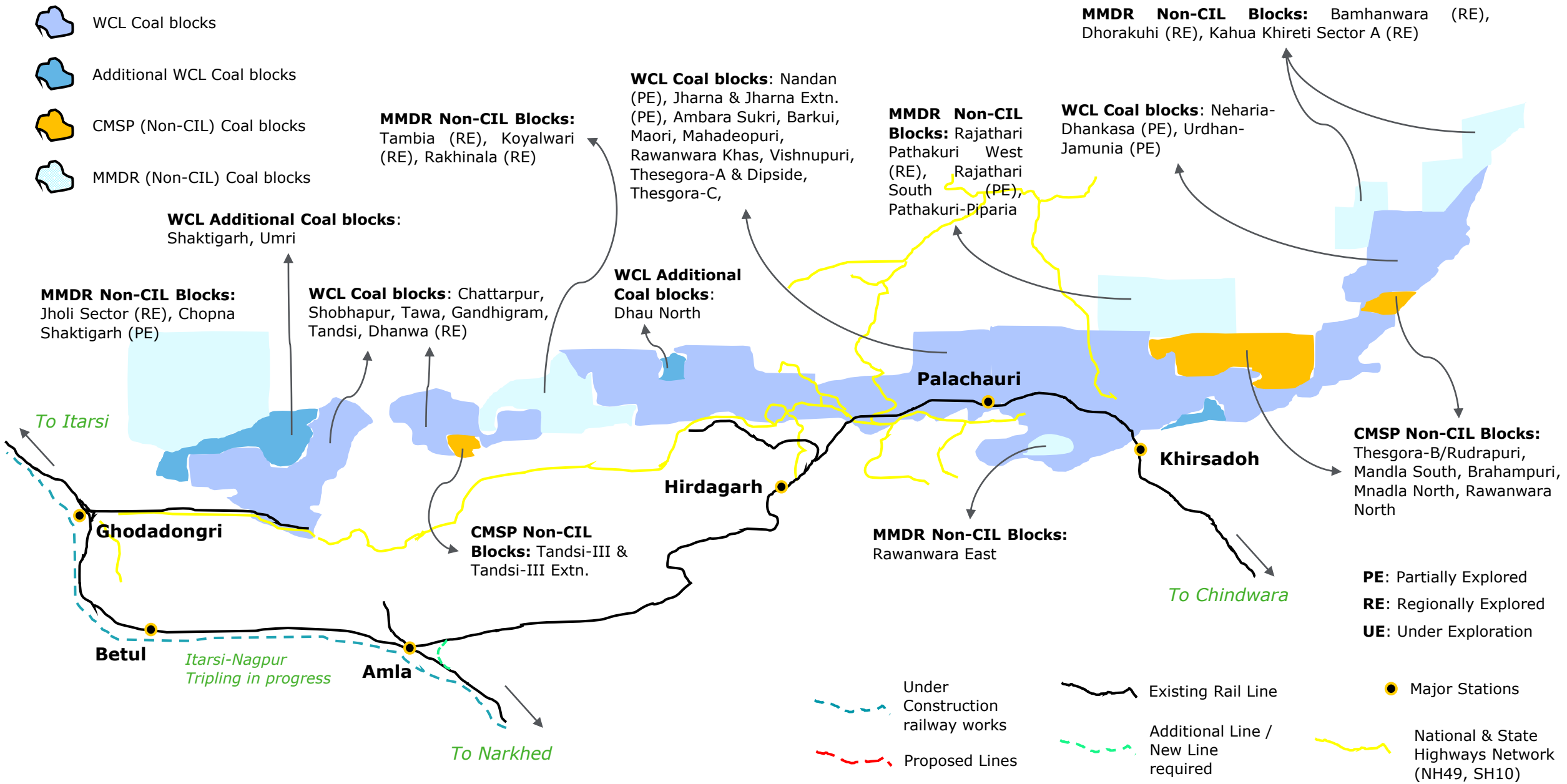
Proposed evacuation plan for Wardha Valley CF



Proposed evacuation plan for Bander, Kamptee, Katol & Umrer CF



Proposed evacuation plan for Pench-Kanhan CF



Key Insights and Recommendations

#	Recommendation	Way Forward
1	Nagpur-Wardha line is currently running at 158%. Due to increased supplies from Chhattisgarh to Maharashtra along with traffic from Odisha and WCL's own traffic, tripling of this line to be expedited.	Tripling of Nagpur-Wardha to be expedited, Indian Railways
2	Tripling of Itarsi-Nagpur (both Itarsi-Amla & Amla-Nagpur currently at >100%) and Chandrapur-Majri (current utilization ~140%) should be expedited to enable future coal evacuation from these areas	Tripling of Chandrapur-Majri-Sonegaon line to be expedited, Indian Railways
3	Proposed chord line from Chandrapur to Chanda Fort station in the Wardha Valley region to be expedited for traffic moving from Wardha Valley CF to Nagbhir	Chandrapur-Chanda Fort Chord line to be expedited
4	Options for commissioning of Public Freight Terminals with facilities of mechanized loading of coal may be evaluated for providing rake loading services to non-CIL blocks to reduce road movement of coal from these regions	Exploration of Public Freight Terminals for mechanized coal loading and coal transport through rail for non-CIL blocks
5	Automatic Signaling may be proposed across all major rail sections in the vicinity of coal blocks in Maharashtra	Indian Railways (CR)

Recommendations
for
Telangana

Telangana (SCCL and Non-SCCL) - Production Capacity Expansion Plans

SCCL

All figures in million tonnes

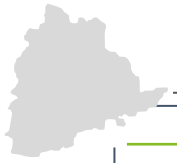
Coal Supply from SCCL	FY22 Actual	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Ramp-up from Existing Mines	~65	~67	70	72	74	81	82	82	80
Mahaveer Khani OC (Telangana)	0	0	0	0.2	0.8	1.5	1.8	2	2
Naini (Odisha)	0	0	5	7.5	10	10	10	10	10
Other New Mine(s)	0	0	0	0	0	2	3	4	6
Total SCCL	**65**	**67**	**75**	**80**	**85**	**94**	**97**	**98**	**100**

Note: New Patrapara coal block in Odisha has been surrendered by SCCL. The block has a PRC of 15 MTPA and SCCL had ramp-up plans up to 8 MTPA within the period FY27 to FY30. However, due to the surrender, a gap of 8 MT for SCCL's growth vision is existing, which can be fulfilled by either ramp-up from existing blocks & participation in new coal block auctions.

Non-SCCL blocks in Telangana

#	Name of the Block	Block Owner	PRC	Operational Status	Proposed Loading Point	EUP and other remarks	Actual FY23 Production	Actual FY22 Production
1	Tadicherla-I	Telangana State Power Generation Corporation Limited. (TSGENCO)	2.5	Operational	Conveyor belt of 17.2 km in length has been proposed as an evacuation method Currently coal is being evacuated through road mode	Kakatiya Thermal Power Project (1 X 600 MW) EUP is 54 km from mine by road	2.48 MT	2.21 MT
	Total PRC		**2.5**					

Coal Blocks to be Auctioned in 7th Tranche



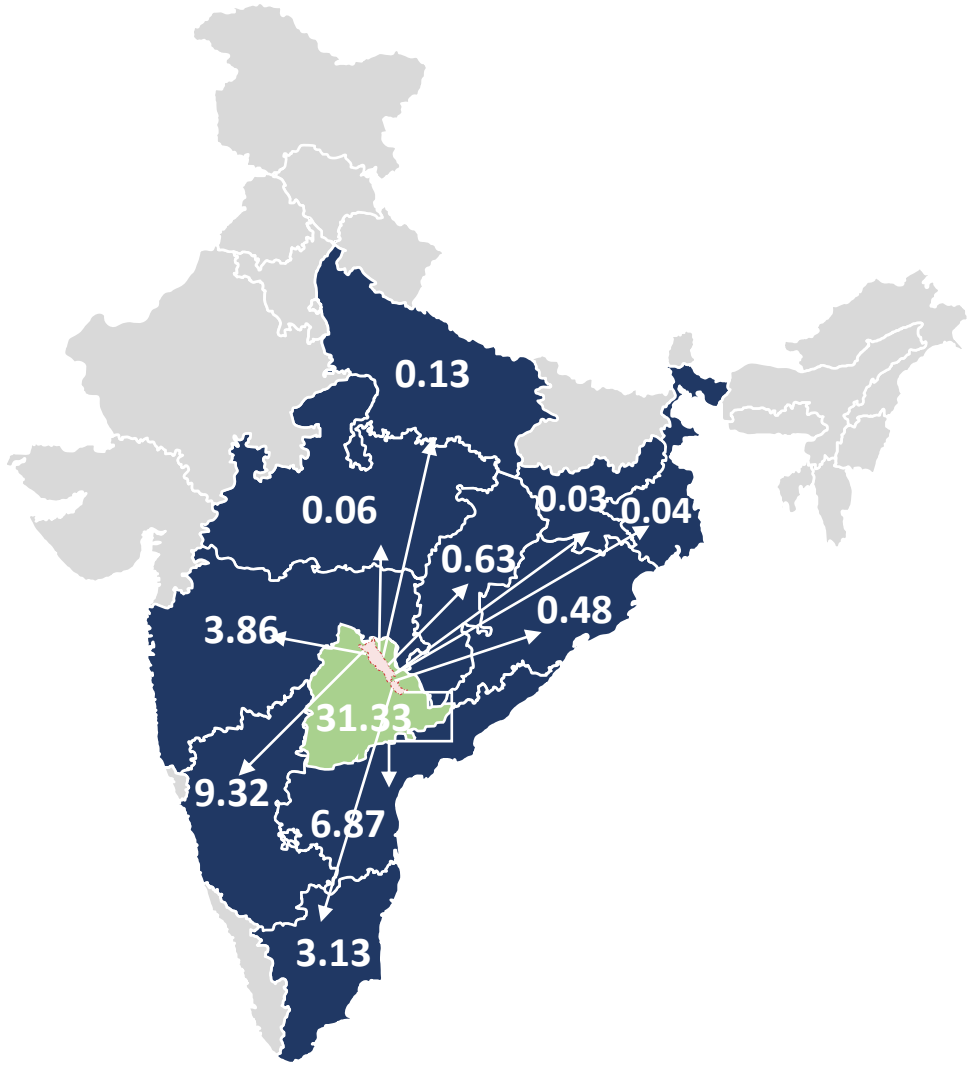
Telangana (including blocks in Pranhita Godavari CF, Andhra Pradesh)

All figures in million tonnes

Block Name	Coalfield	State	PRC (MT)
Chintalpudi Sector A1 (NW Part)	Pranhita Godavari Valley	Andhra Pradesh	0.3
Chintalpudi Sector A1 (SE Part)	Pranhita Godavari Valley	Andhra Pradesh	0.5
Penagaddppa	Godavari Valley	Telangana	1.5
Somavaram East	Godavari Valley	Andhra Pradesh	0.12
Somavaram West (Northern Part)	Pranhita Godavari Valley	Andhra Pradesh	0.5
Somavaram West (Southern Part)	Pranhita Godavari Valley	Andhra Pradesh	0.5
Sravanapalli (Revised)	Godavari Valley	Telangana	2.3
Total			**5.72**

Due to smaller PRC of mines to be auctioned in Telangana (including blocks in Pranhita Godavari CF, Andhra Pradesh), coal from these blocks are expected to be commercial sales in nature and hence road transport is envisioned for blocks except Penagaddppa and Sravanapalli (Revised). For these two blocks, rail traffic is expected to increase by ~3.8 MTPA

O-D Source cluster Mapping – Despatch of Coal from Telangana: FY22 snapshot



FY22: Despatch of Coal from Telangana to destination state (MTPA)

Quantity in million tonnes

Consuming State	Rail + RCR	Pure Road	MGR & Others	Total
Telangana	16.02	8.08	7.23	31.33
Karnataka	9.32	0	0	9.32
Andhra Pradesh	6.87	0	0	6.87
Maharashtra	3.86	0	0	3.86
Tamil Nadu	3.13	0	0	3.13
Chhattisgarh	0.63	0	0	0.63
Odisha	0.48	0	0	0.48
Other States (UP, Madhya Pradesh, West Bengal, Jharkhand)	0.25	0	0	0.25
Non-Power Consumers	4.81	6.51	0.56	11.88
Total Dispatch from Telangana	**45.36 (66.97%)**	**14.59 (21.54%)**	**7.79 (11.50%)**	**67.74**

Origin – Destination Mapping and the coal flow analysis of rail trunk lines for ~40 MTPA is conducted and presented in the next sections

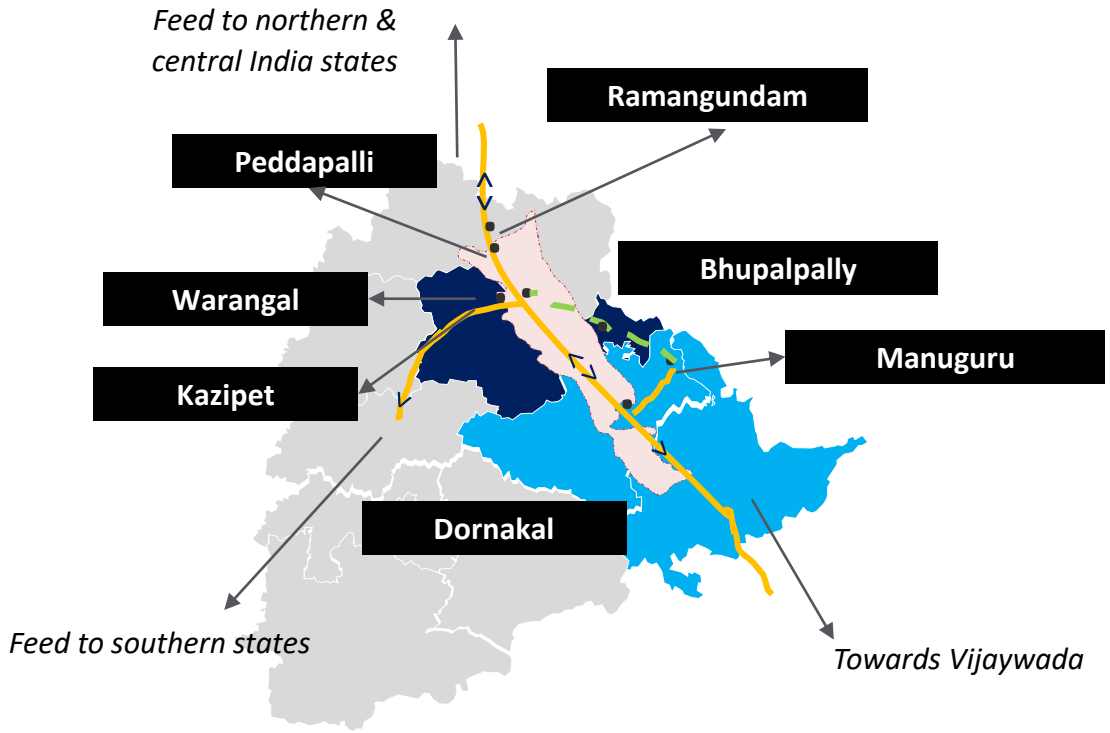
O-D Source cluster Mapping – Consolidated Coal Traffic from Telangana to all states

FY22 Actual and FY30 (Estimated) coal traffic in major sections for despatch of coal from Telangana to various destinations

From	To	Traffic (MT): 2022	Rakes / Day: 2022	Traffic (MT): 2030	Rakes / Day: 2030	Increase in Coal Traffic (Rakes / Day)
Manuguru	Bhadrachalam Road	6.76	**4.81**	7.65	5.45	**+0.63**
Bhadrachalam Road	Karepalli	12.71	**9.04**	13.30	9.47	**+0.42**
Karepalli	Dornakal	15.90	**11.32**	17.66	12.57	**+1.25**
Dornakal	Warangal	5.62	**4.00**	10.22	7.27	**+3.27**
Dornakal	Motumari	11.16	**7.94**	13.67	9.73	**+1.79**
Warangal	Peddapalli	2.16	**1.54**	5.53	3.94	**+2.40**
Peddapalli	Kazipet	5.68	**4.04**	21.70	15.45	**+11.40**
Peddapalli	Manchiryal	8.62	**6.14**	25.15	17.89	**+11.76**
Manchiryal	Mandamari	10.43	**7.42**	23.66	16.83	**+9.41**
Kazipet	Bibinagar	8.83	**6.28**	25.85	18.39	**+12.11**
Motumari	Vijaywada	11.16	**7.94**	13.38	9.52	**+1.58**

Major sections are already witnessing significant coal traffic and is estimated to further increase in the coming decade.

Increase in traffic majorly expected in sections serving the state of Telangana for which coal supply has been allocated to SCCL for upcoming power plants



<> Multi-Directional Coal Flow from SCCL

> Uni-Directional Coal Flow from SCCL

In addition, the **line connecting Manuguru with Ramagundam via Jayashankar Bhupalpally** shall further ease coal evacuation from this area. The construction of this **new BG line is to be expedited**

Key Insights and Recommendations

#	Recommendation	Way Forward
1	Due to increased coal production from SCCL's Bhupalpally region, the line connecting Ramagundam to Manuguru via Jayashankar Bhupalpally region which is under contruction to be expedited on priority. Joining of this line will ease traffic on Kazipet-Peddapalli section	Manuguru-Ramagundam (via Bhupalpally) line may be expedited
2	Ongoing tripling works on sections Vijaywada-Motumari-Dornakal-Kazipet-Odella (near Peddapalli) and section Mandamarri-Manikgarh shall further ease evacuation for congested sections in this region.	Tripling work in the region to be expedited. Additional lines may be evaluated for Peddapalli-Manchiryal section (4th line)
3	Doubling of Dornkal- Bhadrachalam Road section & Doubling of Motumari-Vishnupuram section	Doubling of Dornakal-Bhadrachalam Road & Motumari-Vishnupuram sections
4	Tripling of Kazipet-Bibinagar should be evaluated for easing traffic flowing from SCCL's blocks to southern states along with re-modeling of Kazipet yard for free flow of goods trains	Tripling work for Kazipet-Bibinagar along with rem-modeling of Kazipet yard should be evaluated
5	Automatic Signaling may be proposed across all major rail sections in the vicinity of coal blocks in Telangana	Indian Railways (SCR)

Estimated Wagon Procurement requirement by Indian Railways (SCR - Telangana)

Destination State	Million Tonne - Kms	Volume (Million Tonnes)	Weighted Avg Distance of Despatch (KMs)
Telangana	2198.58	16.02	137.24
Karnataka	5766.82	9.32	618.76
Andhra Pradesh	1699.57	6.87	247.39
Maharashtra	1301.05	3.86	337.06
Tamil Nadu	3055.77	3.13	976.28
Others	2858.85	6.17	463.35
Total	16880.64	**45.37 Million Tonnes**	

FY22 - Rail

Average Lead for Coal Supply in FY22 (SCR) by Telangana
372.07 KMs

Destination State	Million Tonne - Kms	Volume (Million Tonnes)	Weighted Avg Distance of Despatch (KMs)
Telangana	5386.67	39.25	137.24
Karnataka	5816.32	9.4	618.76
Andhra Pradesh	2152.29	8.7	247.39
Maharashtra	0.00	0	337.06
Tamil Nadu	3846.56	3.94	976.28
Additional Push Volumes + Commercial Despatches to be taken as per FY22 avg Leads	4633.46	10	463.35
Total	21835.30	**71.29 Million Tonnes**	

FY30 - Rail

Average Lead for Coal Supply in FY30 (SCR) by Telangana
306.29 KMs

	FY22	FY30
Average Lead of coal Despatch from SCCL (KMs)	372.07	306.29
Estimated Average Turnaround time of Rakes (Days)	2.77	2.28
Rakes / Day Despatch by Rail + RCR + RSR Mode	31.51	49.51

Additional Rakes/Day Despatch Envisaged	18
Estimated Improved TAT (Days)	2.28
Total Number of Rakes Required	41
Estimated Wagons to be Procured for Coal till FY30	**2,384**

Additional ~179 Wagons would be required for despatches during peak demand period from November to March

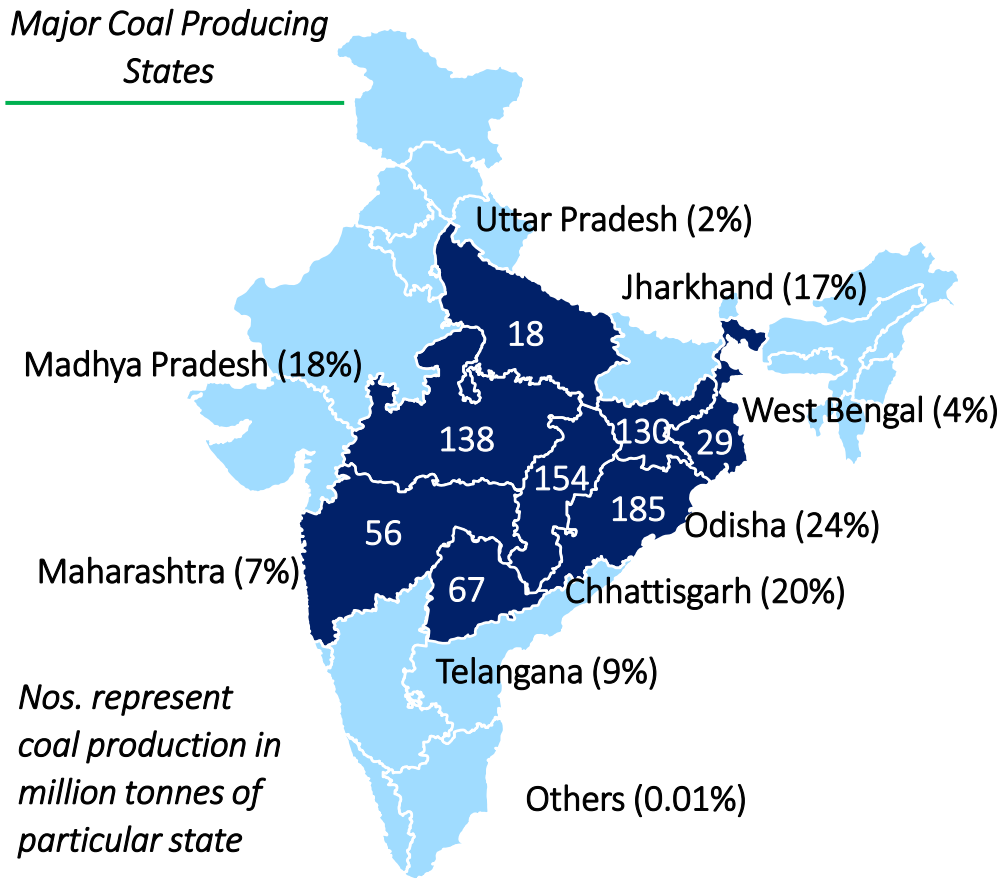
Source: Sagarmala Report, Ministry of Ports, Shipping & Waterways, Comprehensive Action Plan for Port Connectivity on Gatishakti NMP 2022, DPIIT]

Detailed Report

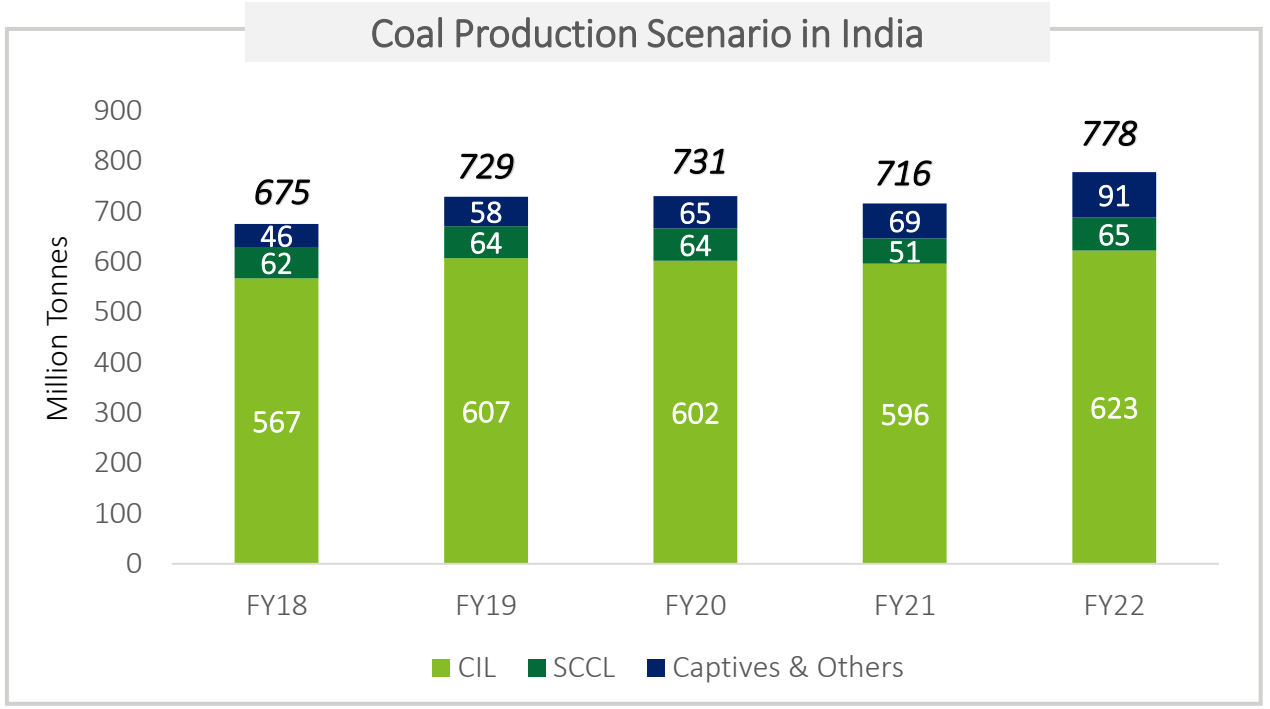
Detailed Demand-Supply Analysis

Coal Production Centers in India

Total Coal Production of India in FY22 stood at ~778 MT



5 states viz., Odisha, Chhattisgarh, Madhya Pradesh, Jharkhand & Telangana contribute ~*87%* of the domestic coal production of the nation

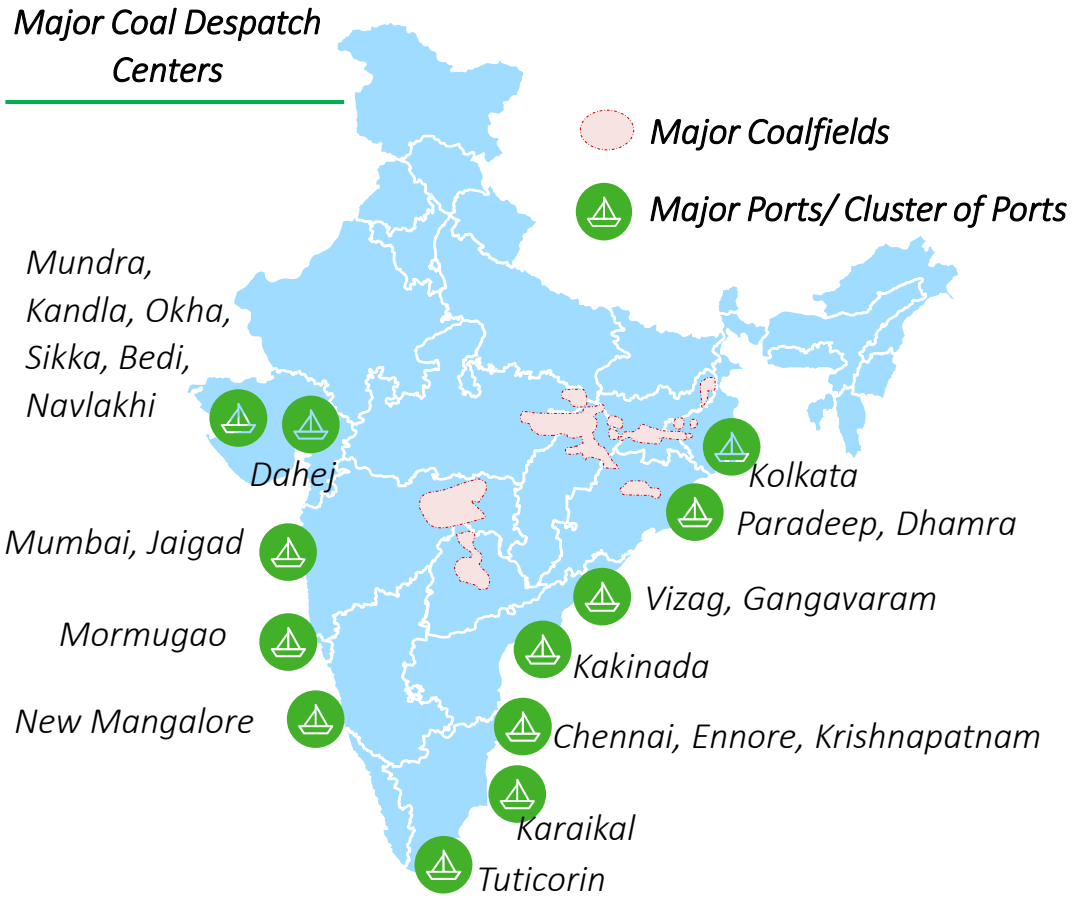


- *CIL accounts for >80% of the domestic coal production with its subsidiaries MCL, SECL, CCL & NCL producing ~65% of the domestic coal production in FY22*
- *Captive coal production has grown tremendously in the last 5 years registering a CAGR of ~19% over the period of FY19-FY22 owing to recent coal block auctions*

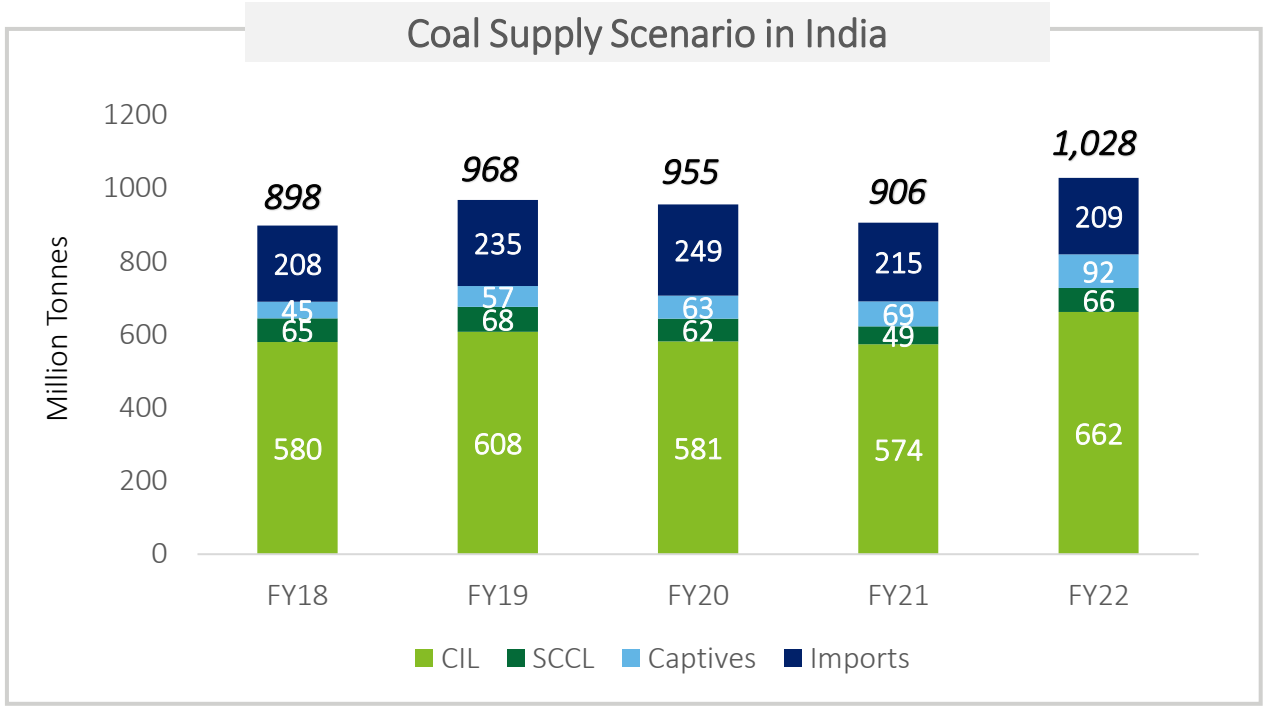
Source: Monthly Statistical Reports, Ministry of Coal, Provisional Coal Statistics

Major Coal Despatch Centers in India

Total Coal Supply in India for FY22 stood at ~1,028 MT



Major coalfields are located in eastern and central parts of India. In addition, only 6 ports viz., Dhamra, Mundra, Gangavaram, Paradeep, Krishnapatnam & Jaigad handle ~*48%* of coal imports



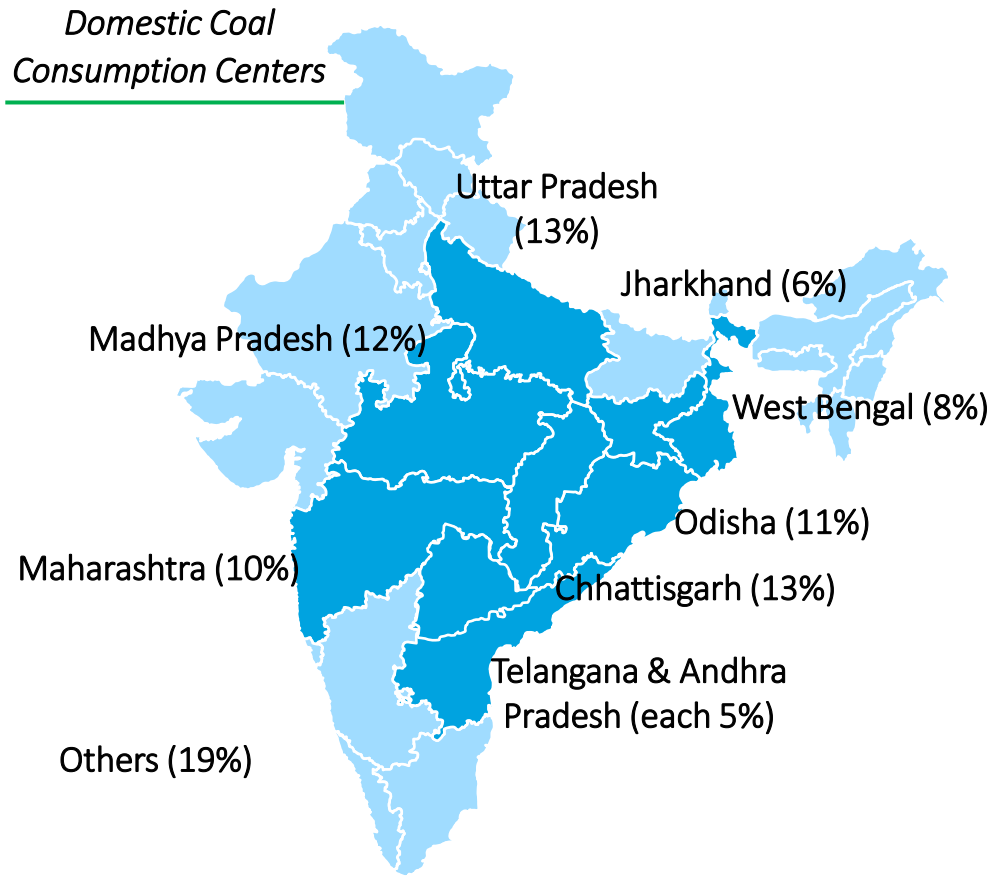
- *The major coal producing states of Odisha, Chhattisgarh & Jharkhand along with parts of Madhya Pradesh are the major clusters for coal evacuation for FY22, accounting for ~75% of the total domestic raw coal despatch*

- *Share of coal imports has tapered down from ~23% in FY18, with a high of ~26% in FY20, to ~20% in FY22*

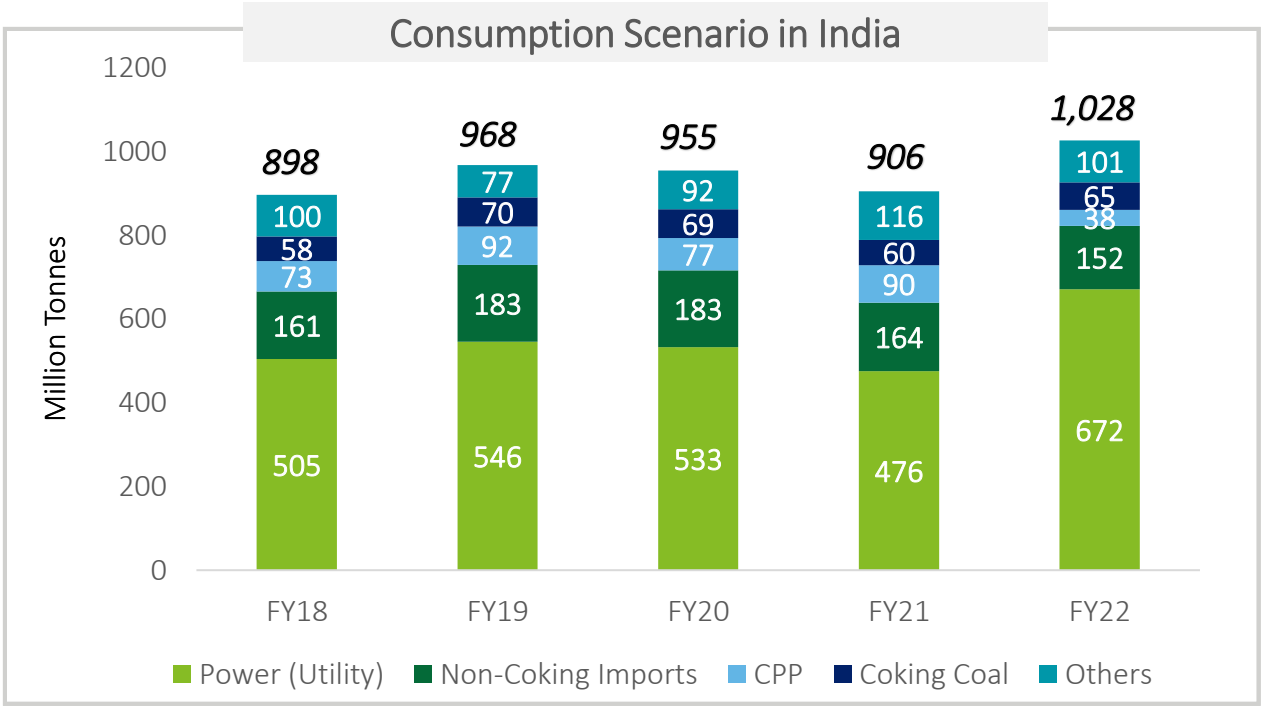
Source: Monthly Statistical Reports, Ministry of Coal, Provisional Coal Statistics

Major Coal Consumption Centers in India

Coal Consumption in India for FY22 stood at ~1,028 MT



9 states, viz., UP, Chhattisgarh, MP, Jharkhand, WB, Odisha, Maharashtra, AP & Telangana, cumulatively consume ~*85%* of domestic coal supply. Other major consumers such as Gujarat, Tamil Nadu are import reliant

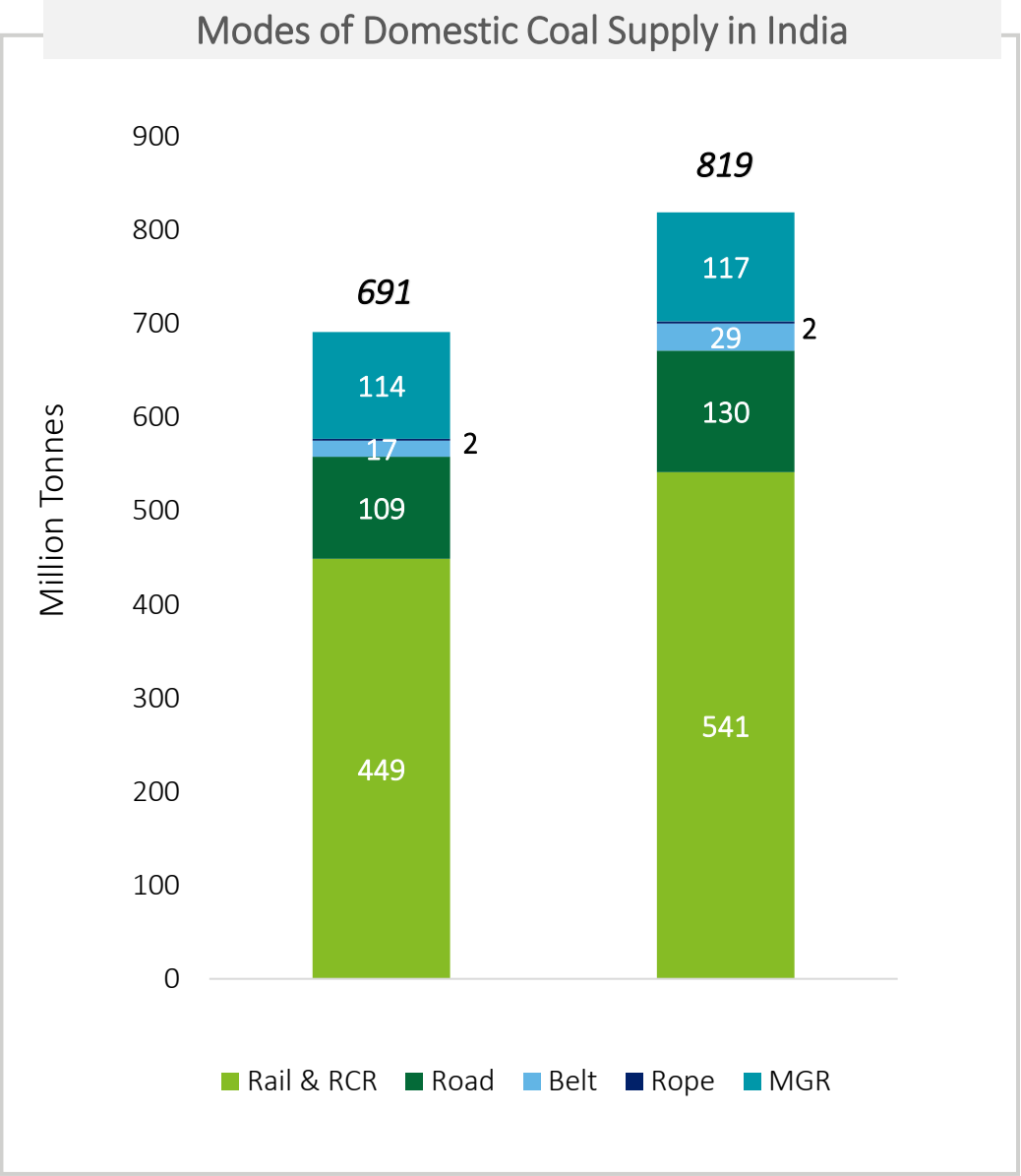


- *~83% of domestic coal consumption was from power sector (barring CPPs)*
- *Combining the locations of domestic production with locations of domestic consumption, a significant locational mismatch becomes apparent, which has led to demand for strengthened evacuation & transportation infrastructure*

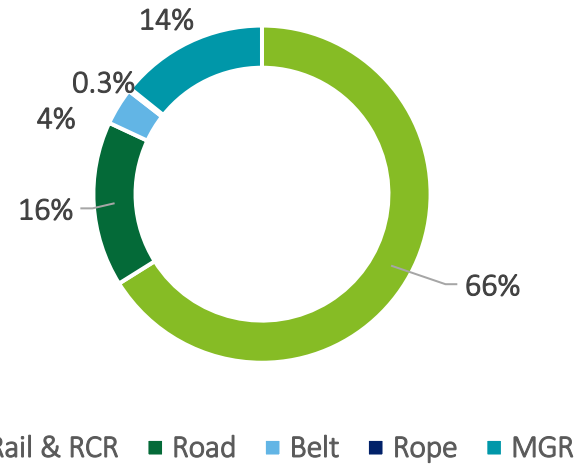
Note: Coking coal includes consumption by steel, coke ovens, private cokeries; Others include sponge iron/DRI, cement & colliery consumption;

Source: Monthly Statistical Reports, Ministry of Coal, Provisional Coal Statistics, National Rail Plan 2020, Energy Dashboard, NITI Aayog

Modal Share of Coal Logistics



Modal Share of Domestic Coal Logistics in FY22



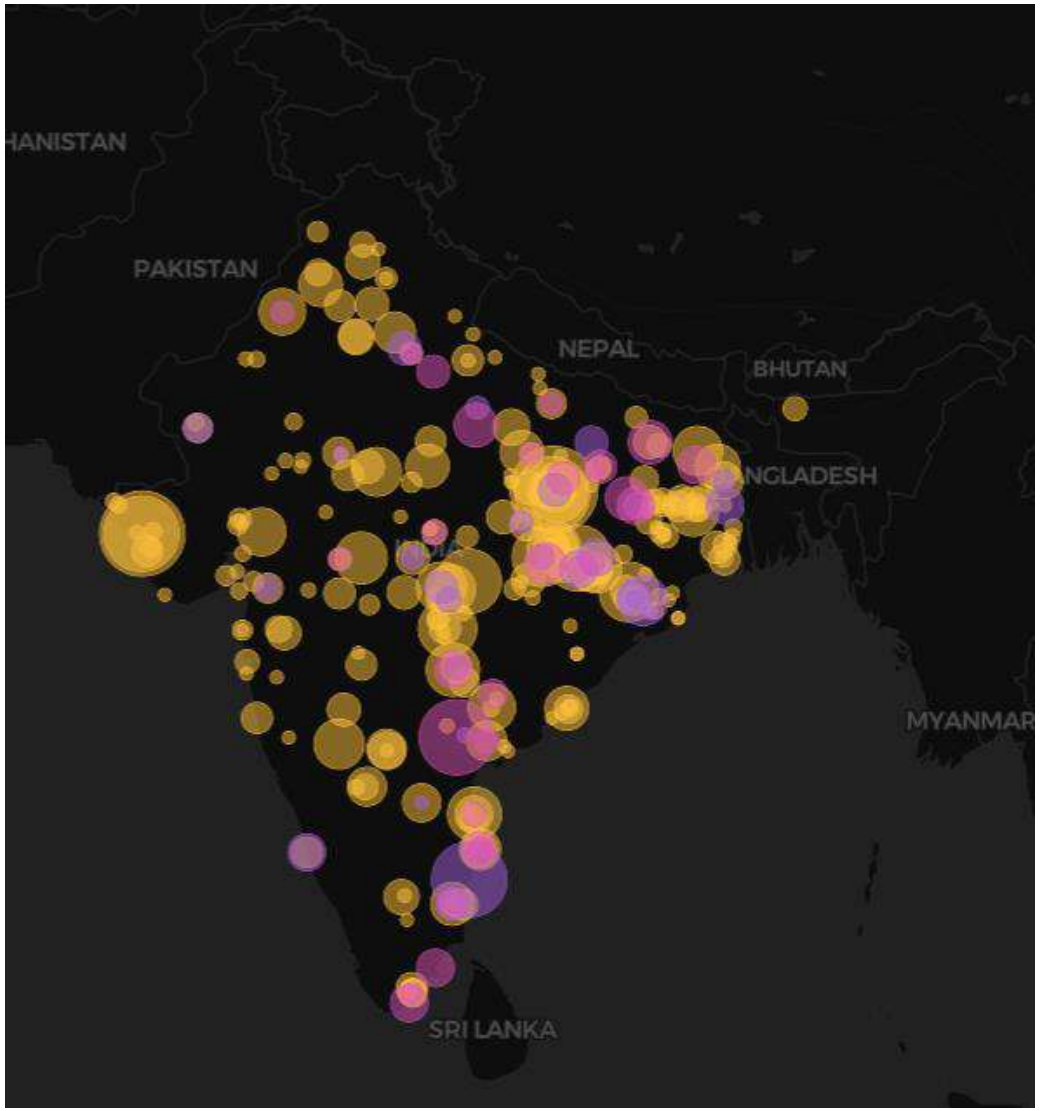
Under the PM Gatishakti plan, rail remains the dominant evacuation mode for coal with an aim to expand its current modal share to 75% by FY 2030

Infrastructure boost in evacuation capacity including laying of railway lines, construction of railway sidings and setting up of coal handling plants with Rapid Loading Systems (RLS) shall be instrumental in increasing the modal share of railways

Source: Monthly Statistical Reports, Ministry of Coal, Provisional Coal Statistics, National Rail Plan 2020

Coal to remain a dominant source of fuel supply for electricity generation

India's current and future coal-based generation Capacity



Existing Capacity

~211 GW

Under Construction

~27 GW

With probability of commissioning. Significantly delayed and improbable projects have not been included

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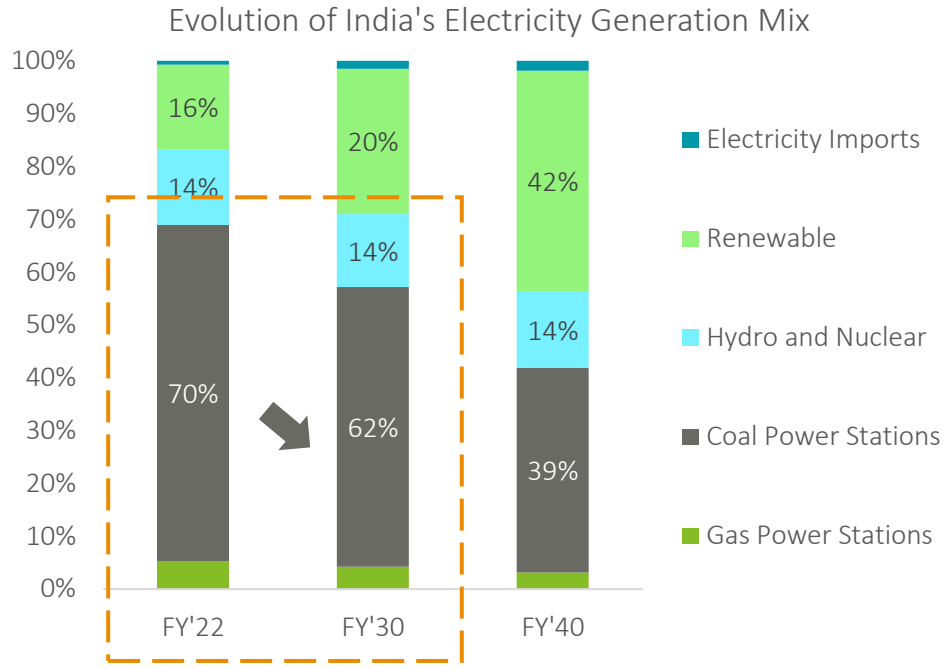
~238 GW

Estimated FY30 Coal Based Capacity

◯ ~2.3 GW



- India's electricy demand highly correlated to GDP growth (X0.74 – Long term elasticity)

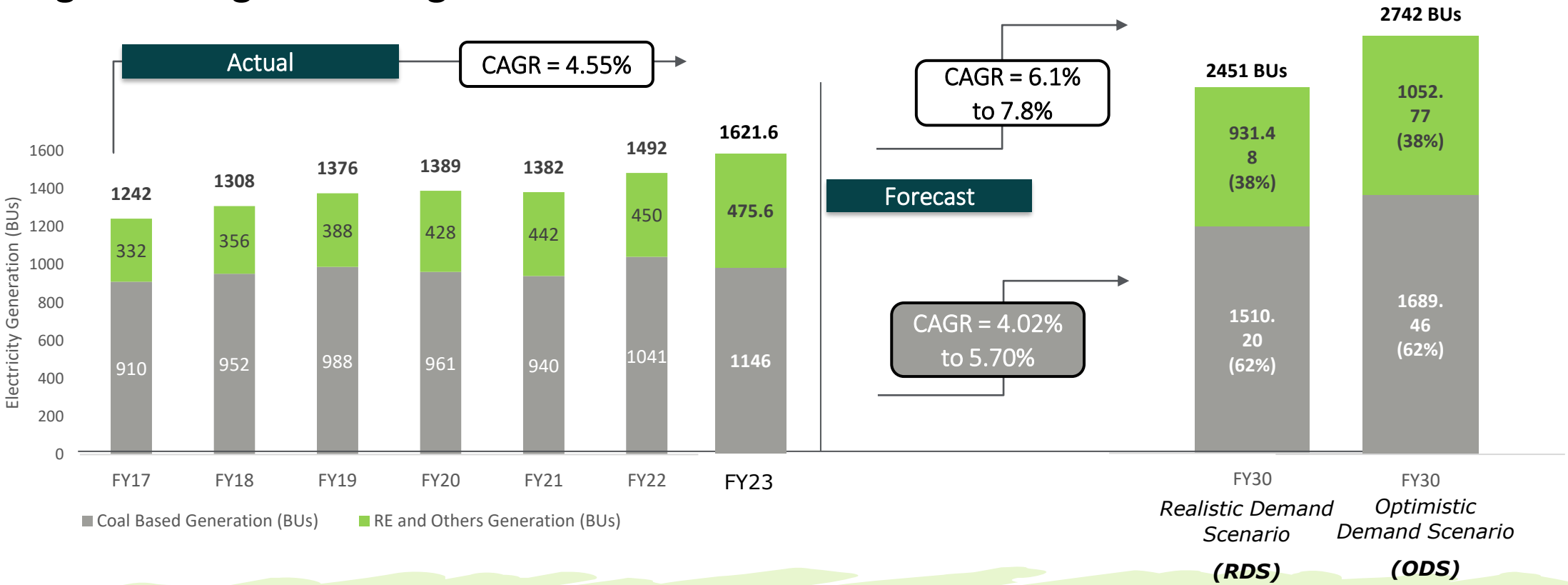
- Costly energy storage to induce partial reliance of coal for coming decades

- Solar tariffs have dropped significantly, but Round-the-Clock supply is a challenges for grid level adoption

RE Driver Coal Driver

Source: Monthly Statistical Reports, Ministry of Coal, Provisional Coal Statistics, National Rail Plan 2020, National Electricity Plan by CEA, 20th EPS Survey by CEA

Electricity generation in India to grow at a substantial CAGR of ~6.1% to 7.8% till 2030, owing to strong demand growth



- In FY23, coal-based generation rose 10.1% to reach 1145.86 Bus, total generation grew ~9% Y-o-Y
- Electricity generation, closely linked to demand, is estimated to be ~2451 to 2742 BU for FY30
- The share of coal in the domestic electricity generation has hovered around ~71% in the last decade.
- It is likely to decline to 62% by FY30 which translates to coal demand ranging from 1037 to 1160 MTPA by FY30

Source: Monthly Statistical Reports, Ministry of Coal, Provisional Coal Statistics, National Rail Plan 2020, National Electricity Plan by CEA, 20th EPS Survey by CEA

Pan-India Coal demand analysis – Power Sector – Realistic Demand Scenario

Bottoms-Up Analysis of Coal Demand	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Electrical Energy Requirement - Ex Bus (TWh)	1275.88	1381.646	1508.14	1600.21	1694.63	1796.63	1907.84	2021.07	2139.13	2279.68
% Change in Electricity Consumption		8.29%	9.16%	5.13%	5.90%	6.02%	6.19%	5.94%	5.84%	6.57%
Average Demand/Generation Ratio	0.93	*Last 6-year average has been 92.92%, FY22 Actual was 92.84%*								
Estimated Grid Generation (TWh) Required	1381.8	1482.78	1621.6	1739.36	1822.19	1931.86	2051.44	2173.20	2300.13	2451.26
Coal Based Generation/Total Generation	68%	70.24%	70.66%	70.73%	68.56%	66.40%	65.00%	64.00%	63.00%	61.61%
Coal Based Generation (TWh)	939.62	1041.46	1145.86	1230.24	1249.37	1282.74	1281.05	1353.85	1429.51	1519.78
Estimated Specific Coal Consumption	0.653	0.678	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68
Realistic Coal Consumption from Power Sector including 1% Transit Losses (MT)	**613.27**	**706.1**	**793.56 (55.6 Imports)**	**844.93**	**858.01**	**880.99**	**915.80**	**955.23**	**995.23**	**1037.20**
Domestic Despatch to Power sector	544.07	677.67	737.93							
Coal Imports by power Sector	69.2	28.43	55.63							
Derived Coal Consumption CAGR (FY22-FY30)	**4.02%**	*Power sector's import reliance increased to 7% in FY23 from 4% in FY22, mainly attributable to significant increase in electricity demand and reliance on coal-based power generation.*								

Key Highlights

- **In FY23, the electricity demand grew 9.16% Y-o-Y to ~1508 Billion Units (Historic high of >1.5 Trillion Units)**
- The Specific Coal Consumption values on Pan-India basis have been kept constant at ~0.68, because of addition of Super-Critical and Ultra-Super Critical capacities coupled with import substitution efforts, which are assumed to negate each others impact.
- **Coal consumption by power sector to reach at ~ 1037 Million Tonnes, growing at ~ 4.02% CAGR (over FY23 base reference year)**

Source: Monthly Statistical Reports, Ministry of Coal, Provisional Coal Statistics, National Rail Plan 2020, National Electricity Plan by CEA, 20th EPS Survey by CEA

Pan-India Coal demand analysis – Power Sector – Optimistic Demand Scenario

Bottoms-Up Analysis of Coal Demand	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Electrical Energy Requirement - Ex Bus (TWh)	1275.88	1381.646	1508.14	1600.21	1726.36	1862.44	2009.25	2167.64	2338.51	2522.85
% Change in Electricity Consumption		8.29%	9.16%	5.13%	7.88%	7.88%	7.88%	7.88%	7.88%	7.88%
Average Demand/Generation Ratio	0.93	*Last 6-year average has been 92.92%, FY22 Actual was 92.84%*								
Estimated Grid Generation (TWh) Required	1381.8	1482.78	1621.6	1739.36	1876.47	2024.39	2183.97	2356.13	2541.86	2742.23
Coal Based Generation/Total Generation	68%	70.24%	70.66%	70.73%	68.56%	66.40%	65.00%	64.00%	63.00%	61.61%
Coal Based Generation (TWh)	939.62	1041.46	1145.86	1230.24	1286.51	1344.20	1419.58	1507.92	1601.37	1689.46
Estimated Specific Coal Consumption	0.653	0.678	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68
Realistic Coal Consumption from Power Sector including 1% Transit Losses (MT)	**613.27**	**706.1**	**793.56 (55.6 Imports)**	**844.93**	**883.58**	**923.19**	**974.97**	**1035.64**	**1099.82**	**1160.22**
Domestic Despatch to Power sector	544.07	677.67								
Coal Imports by power Sector	69.2	28.43	55.63							
Derived Coal Consumption CAGR (FY22-FY30)	**5.70 %**									

Key Highlights

- This scenario assumes a higher growth rate in electricity demand in India @ ~8% as compared to ~6.5% in case of realistic scenario. The rate of penetration of renewables and the share of coal in the portfolio remains the same for both the scenarios
- Coal consumption by power sector to reach at ~ 1160 Million Tonnes, growing at ~ 5.70% CAGR (over FY23 base reference year)

Source: Monthly Statistical Reports, Ministry of Coal, Provisional Coal Statistics, National Rail Plan 2020, National Electricity Plan by CEA, 20th EPS Survey by CEA

Pan-India Coal demand analysis – Non-Regulated Sector

Captive Power Generation

	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
CPP Generation (Bus)	239.57	260.83	282.10	301.96	323.52	344.97	366.79	389.98	414.65	440.87
Correlation (Elasticity Factor)	**1.02**									
Specific Coal Consumption (Kg/Kwh)	0.63									
Coal Based Generation - CPPs (%)	80.00%	79.43%	78.86%	78.30%	77.74%	77.18%	76.63%	76.08%	75.54%	75%
Coal Based Generation - CPPs (BU)	191.65	207.17	222.47	236.42	251.50	266.25	281.07	296.71	313.22	330.65
Realistic Coal Consumption from CPPs (MT)	**120.74**	**130.52**	**140.15**	**148.95**	**158.44**	**167.74**	**177.07**	**186.93**	**197.33**	**208.31**
Derived Coal Consumption CAGR (FY22-FY30)	6.02%									

Cement Manufacturing

	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Cement Production (Million Tonnes)	284.913	350.595	376.648	400.801	426.875	452.661	478.743	506.328	535.502	566.357
Correlation (Elasticity Factor)	**0.93**									
Specific Coal Consumption for Cement Industries	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135	0.135
Realistic Consumption from Cement Sector (MT)	**38.59**	**47.49**	**51.02**	**54.29**	**57.82**	**61.32**	**64.85**	**68.58**	**72.54**	**76.72**
Derived Coal Consumption CAGR (FY22-FY30)	6.18%									

Source: Monthly Statistical Reports, Ministry of Coal, Provisional Coal Statistics, National Rail Plan 2020

Pan-India Coal demand analysis – Non-Regulated Sector

Sponge Iron and Steel

	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Sponge Iron / DRI Production (Million Tonnes)	34.376	39.032	41.577	43.916	46.423	48.884	51.355	53.952	56.679	59.545
Correlation (Elasticity Factor)	**0.82**									
Specific Coal Consumption for Sponge Iron Industries	1.4									
Realistic Consumption from Sponge Iron Sector (MT)	**48.13**	**54.64**	**58.21**	**61.48**	**64.99**	**68.44**	**71.90**	**75.53**	**79.35**	**83.36**
Derived Coal Consumption CAGR (FY22-FY30)	5.42%									

Others

	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal Consumption from Others Sector (MT)	**37.44**	**7.71**	**8.160**	**8.639**	**9.147**	**9.684**	**10.253**	**10.855**	**11.492**	**12.167**
Estiamted Growth (Average of other NR industries)	5.87%									

Total Non-Coking Coal demand from NRS

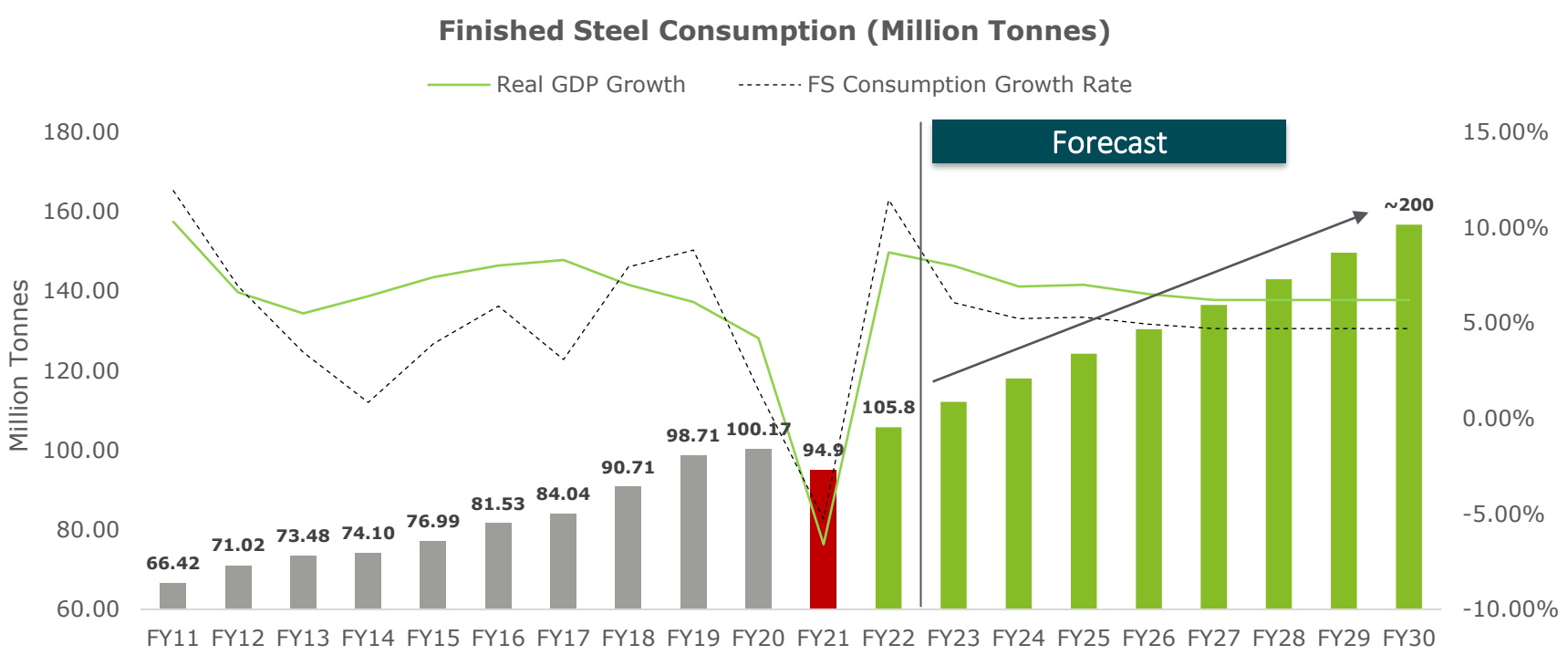
	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal Consumption from CPPs	120.74	130.52	140.15	148.95	158.44	167.74	177.07	186.93	197.33	208.31
Coal Consumption from Cement Sector	38.59	47.49	51.02	54.29	57.82	61.32	64.85	68.58	72.54	76.72
Coal Consumption from DRI/Sponge Iron Sector	48.13	54.64	58.21	61.48	64.99	68.44	71.90	75.53	79.35	83.36
Coal Consumption from Others Sector (Bricks, Paper, Fertilizer etc.)	37.44	7.71	8.16	8.64	9.15	9.68	10.25	10.85	11.49	12.17
Total Non-Coking Coal Consumption from NRS (MT)	**244.90**	**240.36**	**257.54**	**273.36**	**290.40**	**307.18**	**324.07**	**341.90**	**360.71**	**380.56**

Source: Monthly Statistical Reports, Ministry of Coal, Provisional Coal Statistics, National Rail Plan 2020

Coking coal demand summary – Steel sector

Steel

	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Real GDP Growth Rate	-6.60%	8.70%	8.00%	6.90%	7.00%	6.50%	6.20%	6.20%	6.20%	6.20%
Correlation (Elasticity Factor)	0.72	Historical analysis of last 11 years								
Crude Steel Peoduction (Million Tonnes)	104	120	127	137	148	160	173	187	202	219
Coking coal Demand (Million Tonnes)	62	77	81	88	95	125	134	143	152	161



Rising Domestic Demand

160 Kg Per capita Steel consumption expected by FY30, from a current level of 75 kg per capita in 2020

Government Push

Government push for "Atmanirbhar Bharat" will boost the infrastructure sector and steel requirement, supported by PLI and other schemes

Source: Monthly Statistical Reports, Ministry of Coal, Provisional Coal Statistics, National Rail Plan 2020

Year on Year coal supply snapshot till FY30

	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
CIL	574.48	661.89	703.22	780	850	1000	1030	1055	1090	1120
SCCL	48.51	65.53	67.14	70	74	79	84	89	94	100
Captive & Others (Commercial)	68.4	90.72	122.38	162	224	241	259	276	279	291**
Total Domestic Coal Despatch (Including Coking)	691.39	818.14	892.74	1012	1148	1320	1373	1420	1463	1511
Total Coal Imports	228	205	237	207	184	188	193	192	196	200
Total Coal Supply (Production View)	**919.71**	**1023**	**1130**	**1219**	**1332**	**1509**	**1565**	**1612**	**1659**	**1711**

Key Highlights

- **Captive and Commercial coal production forecasts are as per the projections of Ministry of coal, but it shall be noted that the figure could reach in excess of 400 MTPA by FY30 based on Deloitte Analysis. State wise Non-CIL block production values for FY30 have been taken as per deloitte analysis in detailed section.
- *95 Million Tonnes of Non-Substitutable G1-G8 grade Steam and Bituminous coal would still be imported in near to medium term future.
- CIL's share of supply in the domestic production portfolio will decrease from current ~79% in FY23 to ~75% in FY30 due to expected exponential capacity expansion increase in commercial/captive coal mining.

Source: Monthly Statistical Reports, Ministry of Coal, Provisional Coal Statistics, National Rail Plan 2020

Power-Plant level coal demand estimates for FY30

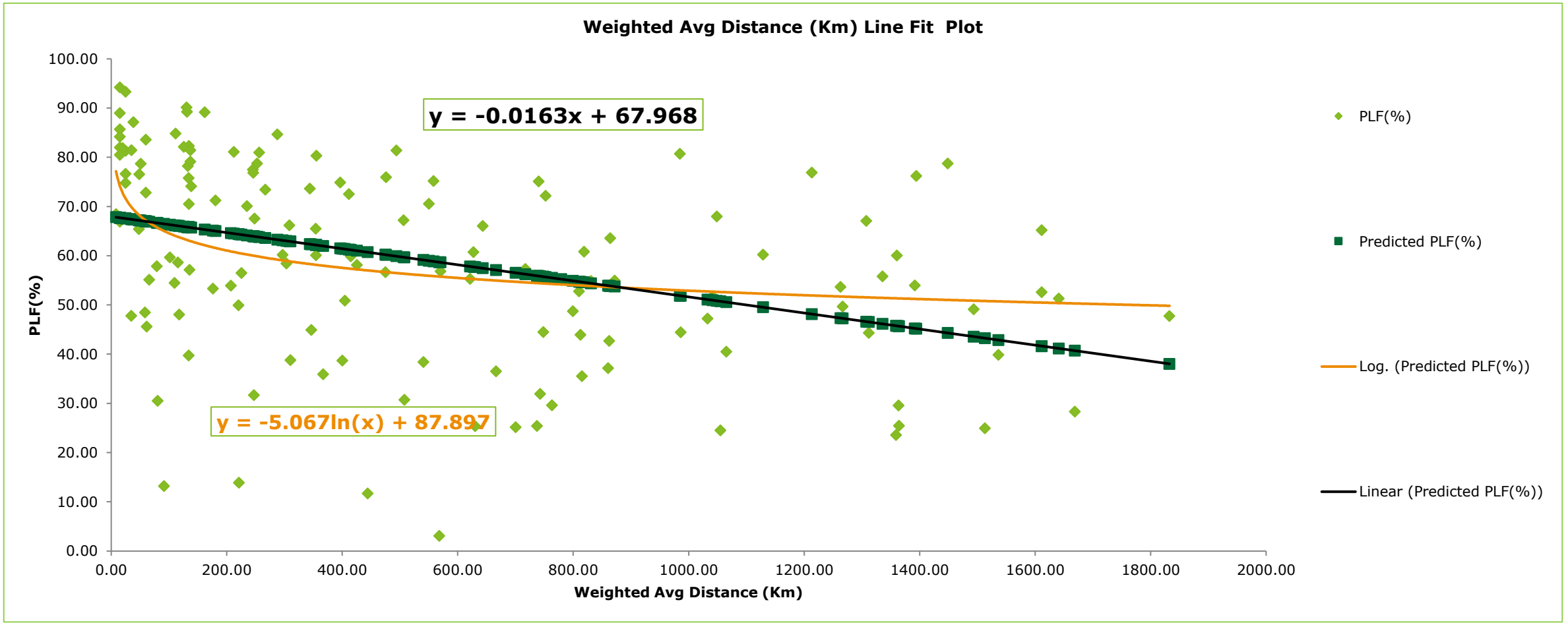
Snapshot of State-wise coal demand from Power sector: Current FY22 and Future FY30

All figures in million tonnes

Consuming State	FY22: Actual Consumption	FY30 Base	FY30 Realistic	FY30 Optimistic
Bihar	30.0	48.4	52.2	54.4
Madhya Pradesh	83.7	92.2	104.3	111.7
Uttar Pradesh	84.3	114.5	121.3	149.9
Chhattisgarh	103.9	130.5	145.3	147.0
West Bengal	54.2	74.5	76.8	79.5
Gujrat	22.0	32.7	36.5	43.8
Punjab & Haryana	30.2	47.0	49.9	56.9
Jharkhand	19.3	37.0	37.9	39.1
Assam	2.5	2.7	3.0	3.1
Tamil Nadu	27.9	51.5	56.6	65.7

Consuming State	FY22: Actual Consumption	FY30 Base	FY30 Realistic	FY30 Optimistic
Maharashtra	81.9	103.8	111.3	131.4
Odisha	45.3	53.1	57.6	65.2
Telangana	30.6	56.0	59.2	59.6
Andhra Pradesh	40.2	62.0	64.1	72.0
Karnataka	18.4	22.6	22.7	43.2
Rajasthan	22.8	29.2	32.2	37.7
Grand Total	**704.9**	**963.6**	**1037.2**	**1160.2**

Pan-India Analysis of PLF(%) vs Distance from Coal Source (Kms)



Inverse Correlation Equation: 1

PLF(%) = 67.968 – 0.0163 x (Weighted Avg Distance of TPS from Coal Mines: Kms)

Inverse Correlation Equation: 2

PLF(%) = 87.897 – 5.067 Log_e(Weighted Avg Distance of TPS from Coal Mines: Kms)

Pan-India Analysis of more than 140 Power plants spanning across states elucidates a strong inverse correlation between estimated PLF(%) and the distance of TPS from the coal source.

For a power plant at ~534 kms (Weighted Average for India) from the source, estimated PLF comes out to be in range of 57% to 60%. Actual for FY22 was ~58.26%

Improvement in PLFs of existing power plants would cater to the increased demand from coal-based power generation by FY30

Existing Capacities with Improved PLF: FY30

State	FY22 Coal Consumption (MTPA)	FY30 Base (MTPA)	FY30 Realistic (MTPA)	FY30 Optimistic (MTPA)	Max Increase Anticipated (MTPA): FY22 to FY30
Odisha	45.33	53.10	57.61	59.30	13.98
Chhattisgarh	103.90	130.55	145.29	147.02	43.13
Uttar Pradesh	84.26	96.21	98.82	120.30	36.04
Madhya Pradesh	83.72	92.20	104.28	111.72	28.00
Gujarat	22.03	32.69	36.53	43.81	21.78
Andhra Pradesh	40.16	55.57	57.44	64.94	24.78
Rajasthan	22.80	29.25	32.19	37.70	14.90
Maharashtra	81.92	101.10	108.31	128.25	46.33
Karnataka	18.43	21.81	21.84	41.59	23.16
Punjab	15.25	24.54	25.34	28.98	13.72
Harayana	14.98	22.47	24.57	27.90	12.91
Telangana	30.57	35.13	37.13	38.80	8.24
Bihar	29.98	37.10	40.00	42.79	12.81
West Bengal	54.19	71.56	73.78	76.61	22.42
Jharkhand	19.26	21.16	21.63	22.87	3.60
Tamil Nadu	27.95	39.54	43.43	50.46	22.52
Assam	2.49	2.67	3.00	3.12	0.63
Total	704.91	866.65	931.18	1046.08	348.95

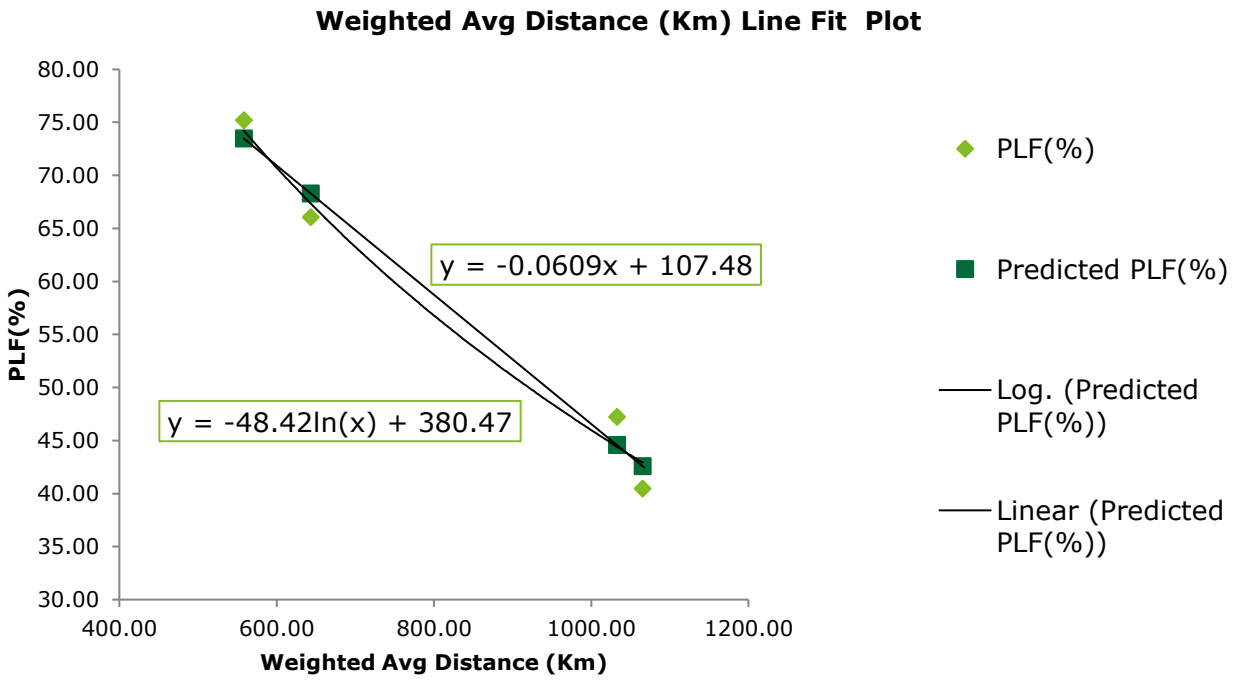
Andhra Pradesh

Name of TPS	Power Utility	Installed Capacity (MW)	Coal Consumed (MT)	Generation (MU)	PLF(%)	Total Sourced (MT)	MCL			ECL			SCCL	CCL	
							Ib-Valley	Talcher	RSR TLHR to Paradip to Krishnapatnam	Mugma-Salanpur CF (Jharkhand)	Raniganj CF (West Bengal)	Deogarh CF (Jharkhand)	SCCL	East Bokaro CF	Ramgarh CF
Dr. N.T.R TPS	APGENCO	1760.00	9.20	11591.18	75.18	9.30	1272657	3519264					4509000		
RAYALSEEMA	APGENCO	1650.00	5.12	6828.52	47.24	4.83	489319	796082	1400000				2149000		
SRI DAMODARAM SANJEEVAIAH	APPDCL	1600.00	3.62	5672.41	40.47	4.12		1792196	2280000				45000		
Vizag TPP	HINDUJA NATIONAL POWER CORPORATION LIMITED	1040.00	0.21	281.39	3.09	0.10	26318	72488							
SIMHADRI SUPER	NTPC LTD.	2000.00	8.94	11570.21	66.04	9.14	5364536	2621653		136733.57	807483.36	3608.61	198000	3571.63	3909.98
PAINAMPURAM TPP	SEMBCORP ENERGY INDIA LTD.	1320.00	5.65	9331.61	80.70	4.91	147075		4759318.41						

Name of TPS	Power Utility	Siding Code	Weighted Avg Distance (Km)	MCL			ECL			SCCL	CCL	
				Ib-Valley: BOCM	Talcher: TLHR	RSR TLHR to Paradip to Krishnapatnam	Mugma-Salanpur CF (Jharkhand): BJSP	Raniganj CF (West Bengal): ACSR	Deogarh CF (Jharkhand): JMT	SCCL: SCRM	East Bokaro CF: JRGD	Ramgarh CF: RWGR
Dr. N.T.R TPS	APGENCO	TPAK	558.26	940.3	910.53	977.50				175.48		
RAYALSEEMA	APGENCO	RTPM	1032.73	1370.03	1340.26	1221.09				719.3		
SRI DAMODARAM SANJEEVAIAH	APPDCL	KAPT	1065.09	1221.06	1191.29	977.50				477.44		
Vizag TPP	HINDUJA NATIONAL POWER CORPORATION LIMITED	VZP	567.91	589.75	559.98	681.36				537.62		
MEENAKSHI ENERGY LIMITED	MEENAKSHI ENERGY LIMITED											
SIMHADRI SUPER	NTPC LTD.	STDV	643.19	614.63	584.86	0	999.08	982.2	1018.49	541.57	994.03	967.06
PAINAMPURAM TPP	SEMBCORP ENERGY INDIA LTD.	KAPT	984.80	1221.06	1191.29	977.50				477.44		

Andhra Pradesh

Name of TPS	Power Utility	PLF(%)	Weighted Avg Distance (Km)
Dr. N.T.R TPS	APGENCO	75.18	558.26
RAYALSEEMA	APGENCO	47.24	1032.73
SRI DAMODARAM SANJEEVAIAH	APPDCL	40.47	1065.09
SIMHADRI SUPER	NTPC LTD.	66.04	643.19
PAINAMPURAM TPP	SEMBCORP ENERGY INDIA LTD.	80.70	984.80



Inverse Correlation Equation: 1

PLF(%) = 107.48 – 0.0609 x (Weighted Avg Distance of TPS from Coal Mines: Kms)

Inverse Correlation Equation: 2

PLF(%) = 380.47 – 48.42 Log_e(Weighted Avg Distance of TPS from Coal Mines: Kms)

Assuming Best performance under two correlation scenarios, the PLF of AP power plants could increase to ~77% - 79.6%.

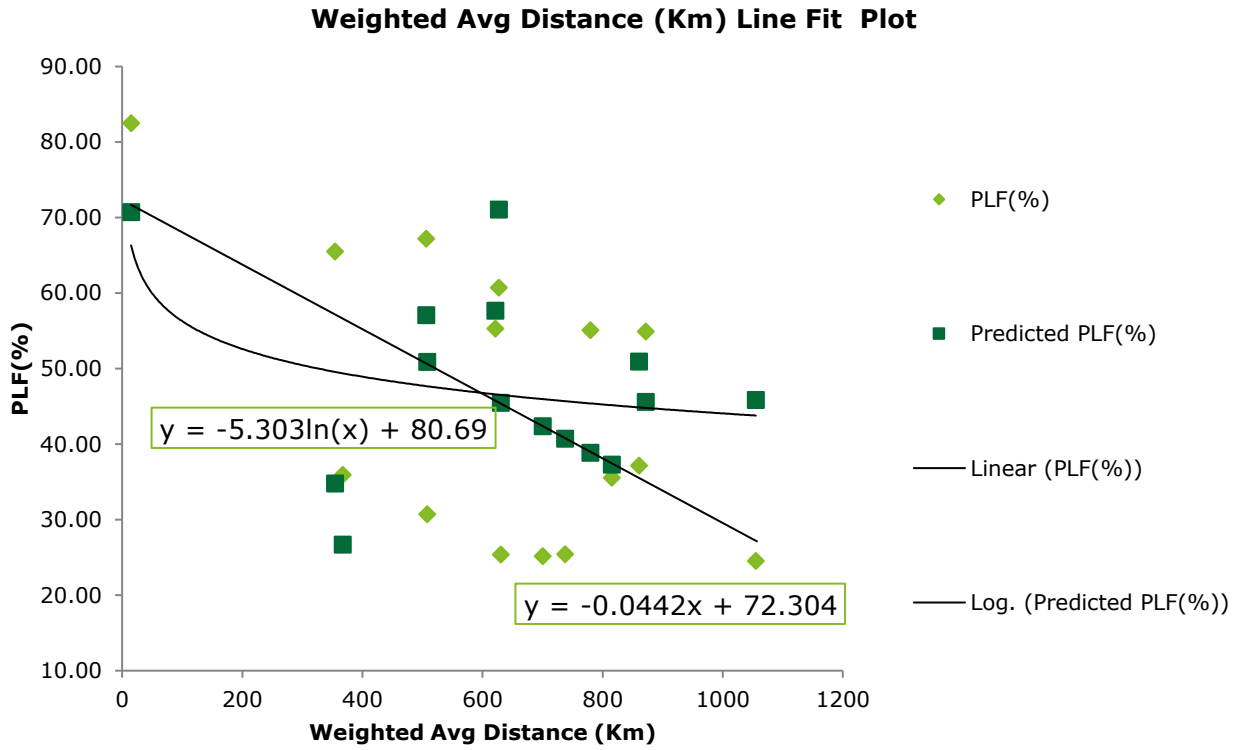
Best Performance scenario is defined at an aspirational level where the TPS in the range of 500 to 1000 Kms behaves in a way that it is at ~500 Km distance from the source

Andhra Pradesh

#	Name of TPS	Power Utility	State	Installed Capacity (MW)	PLF(%)	Coal Consumed (MT): FY 22	PLF Base Scenario	PLF Realistic Scenario	PLF Optimistic Scenario	Coal Consumption Base Scenario: FY30	Realistic Scenario: FY30	Optimistic Scenario: FY30
1	Dr. N.T.R TPS	APGENCO	Andhra Pradesh	1760.00	75.18	9.20	77.02	79.60	90.00	9.42	9.74	11.01
2	RAYALSEEMA	APGENCO	Andhra Pradesh	1650.00	47.24	5.12	77.02	79.60	90.00	8.35	8.63	9.76
3	SRI DAMODARAM SANJEEVAIAH	APPDCL	Andhra Pradesh	1600.00	40.47	3.62	77.02	79.60	90.00	6.89	7.12	8.05
4	Vizag TPP	HINDUJA NATIONAL POWER CORPORATION LIMITED	Andhra Pradesh	1040.00	3.09	0.21	77.02	79.60	90.00	5.23	5.40	6.11
5	MEENAKSHI ENERGY LIMITED	MEENAKSHI ENERGY LIMITED	Andhra Pradesh	300.00	16.07	0.30	77.02	79.60	90.00	1.46	1.51	1.71
6	SIMHADRI SUPER	NTPC LTD.	Andhra Pradesh	2000.00	66.04	8.94	77.02	79.60	90.00	10.43	10.78	12.19
7	PAINAMPURAM TPP	SEMBCORP ENERGY INDIA LTD.	Andhra Pradesh	1320.00	80.70	5.65	77.02	79.60	90.00	5.39	5.57	6.30
8	SGPL TPP	SEMBCORP ENERGY INDIA LTD.	Andhra Pradesh	1320.00	65.98	4.62	77.02	79.60	90.00	5.39	5.57	6.30
		Total				40.16				52.57	54.33	61.43

Uttar Pradesh

Name of TPS	Power Utility	PLF(%)	Weighted Avg Distance (Km)
BARKHERA	Bajaj Energy Limited	25.39	737
KHAMBHAR KHERA	Bajaj Energy Limited	25.36	630
KUNDARKI	Bajaj Energy Limited	35.52	815
MAQSOODAPUR	Bajaj Energy Limited	25.16	700
UTRAULA	Bajaj Energy Limited	30.72	508
LALITPUR	LALITPUR POWER GENERATION COMPANY LIMITED	55.07	779
FEROZE GANDHI UNCHAHAR	NTPC LTD.	60.71	627
TANDA	NTPC LTD.	55.29	621
PRAYAGRAJ TPS	PRAYAGRAJ POWER GENERATION COMPANY LTD.	67.20	506
ROSA TPP	ROSA POWER SUPPLY COMPANY LIMITED	54.92	872
HARDUAGANJ	UPRVUNL	24.52	1055
PARICHHA	UPRVUNL	37.14	861
MEJA TPP	MUNPL-NTPC JV	65.49	354
DADRI	NTPC LTD.	35.90	985
SINGRAULI	NTPC LTD.	82.50	15
RIHAND	NTPC LTD.	85.26	15
ANPARA 'A' & 'B'	UPRVUNL	75.65	15
ANPARA 'C' TPS	LANCO ANPARA POWER LIMITED	78.68	51
OBRA	UPRVUNL	48.46	58



Inverse Correlation Equation: 1

PLF(%) = 72.304 – 0.0442 x (Weighted Avg Distance of TPS from Coal Mines: Kms)

Inverse Correlation Equation: 2

PLF(%) = 80.69 – 5.303 Log_e(Weighted Avg Distance of TPS from Coal Mines: Kms)

Assuming Best performance under two correlation scenarios, the PLF of UP power plants could increase to ~47.4% - 64.5%.

Best Performance scenario is defined at an aspirational level where the TPS in the range of 500 to 1000 Kms and <500 Kms behaves in a way that it is at ~500 Km and 200 KM distance from the source respectively

Uttar Pradesh (1/2)

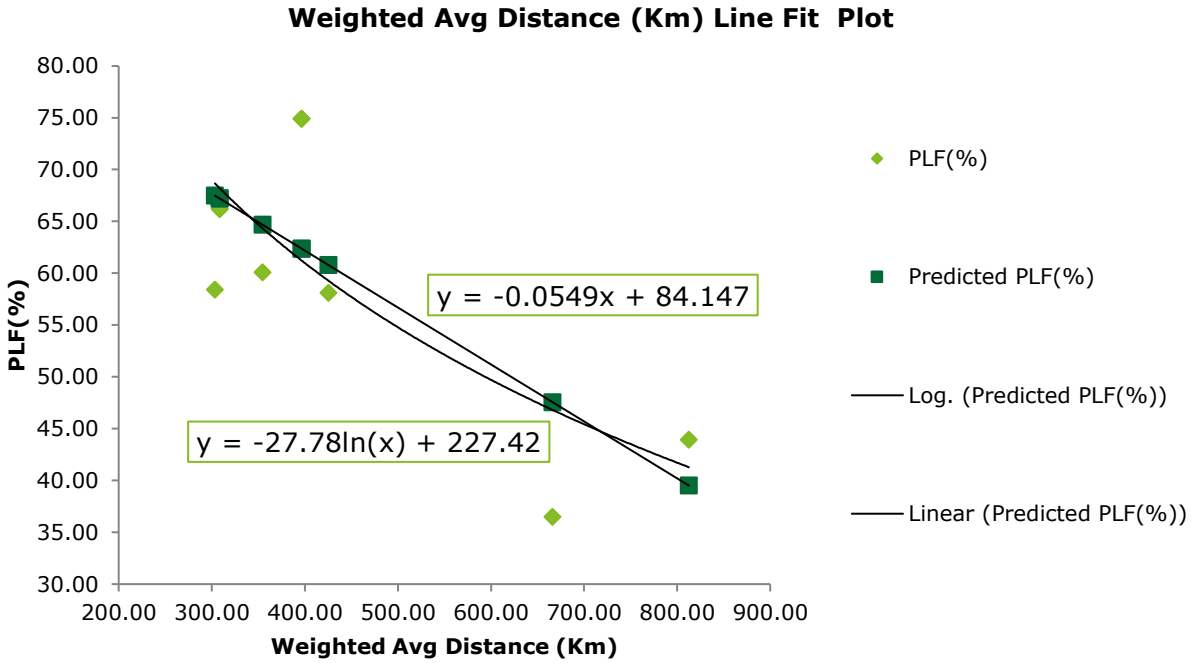
Name of TPS	Power Utility	State	Installed Capacity (MW)	PLF(%)	Coal Consumed (MT): FY 22	PLF Base Scenario	PLF Realistic Scenario	PLF Optimistic Scenario	Coal Consumption Base Scenario: FY30	Realistic Scenario: FY30	Optimistic Scenario: FY30
BARKHERA	Bajaj Energy Limited	Uttar Pradesh	90.00	25.39	0.16	47.7	51.2	85	0.30	0.32	0.54
KHAMBHAR KHERA	Bajaj Energy Limited	Uttar Pradesh	90.00	25.36	0.16	47.7	51.2	85	0.30	0.32	0.53
KUNDARKI	Bajaj Energy Limited	Uttar Pradesh	90.00	35.52	0.21	47.7	51.2	85	0.29	0.31	0.51
MAQSOODAPUR	Bajaj Energy Limited	Uttar Pradesh	90.00	25.16	0.16	47.7	51.2	85	0.30	0.32	0.53
UTRAULA	Bajaj Energy Limited	Uttar Pradesh	90.00	30.72	0.19	47.7	51.2	85	0.29	0.32	0.52
LALITPUR	LALITPUR POWER GENERATION COMPANY LIMITED	Uttar Pradesh	1980.00	55.07	5.87	55.07	55.07	85	5.87	5.87	9.06
ANPARA 'C' TPS	LANCO ANPARA POWER LIMITED	Uttar Pradesh	1200.00	78.68	5.24	82.44	82.44	85	5.49	5.49	5.66
MEJA TPP	MEJA URJA NIGAM PRIVATE LIMITED (NTPC-JV)	Uttar Pradesh	1320.00	65.49	5.05	65.49	65.49	85	5.05	5.05	6.55

Uttar Pradesh (2/2)

Name of TPS	Power Utility	State	Installed Capacity (MW)	PLF(%)	Coal Consumed (MT): FY 22	PLF Base Scenario	PLF Realistic Scenario	PLF Optimistic Scenario	Coal Consumption Base Scenario: FY30	Realistic Scenario: FY30	Optimistic Scenario: FY30
DADRI	NTPC LTD.	Uttar Pradesh	1820.00	35.90	3.70	52.6	64.5	85	5.42	6.65	8.76
SINGRAULI	NTPC LTD.	Uttar Pradesh	2000.00	82.50	9.42	95.00	95.00	95	10.85	10.85	10.85
RIHAND	NTPC LTD.	Uttar Pradesh	3000.00	85.26	13.48	95.00	95.00	95	15.02	15.02	15.02
FEROZE GANDHI UNCHAHAR	NTPC LTD.	Uttar Pradesh	1550.00	60.71	5.53	60.71	60.71	85	5.53	5.53	7.74
TANDA	NTPC LTD.	Uttar Pradesh	1760.00	55.29	5.46	61.50	61.50	85	6.07	6.07	8.39
PRAYAGRAJ TPS	PRAYAGRAJ POWER GENERATION COMPANY LTD.	Uttar Pradesh	1980.00	67.20	7.22	67.20	67.20	85	7.22	7.22	9.13
ROSA TPP	ROSA POWER SUPPLY COMPANY LIMITED	Uttar Pradesh	1200.00	54.92	3.65	64.22	64.22	85	4.27	4.27	5.65
ANPARA 'A' & 'B'	UPRVUNL	Uttar Pradesh	2630.00	75.65	11.39	95	95	95	14.31	14.31	14.31
HARDUAGANJ	UPRVUNL	Uttar Pradesh	1270.00	24.52	1.28	47.7	51.2	85	2.49	2.67	4.44
OBRA	UPRVUNL	Uttar Pradesh	1000.00	48.46	3.45	52.6	64.5	85	3.74	4.59	6.05
PARICHHA	UPRVUNL	Uttar Pradesh	920.00	37.14	2.65	47.7	51.2	85	3.41	3.66	6.07
					84.26				**96.21**	**98.82**	**120.30**

Maharashtra

Name of TPS	Power Utility	PLF(%)	Weighted Avg Distance (Km)
TIRODA	ADANI POWER MAHARASHTRA LTD.	74.88	396.70
ADANI DAHANU	ADANI ELECTRICITY MUMBAI LIMITED	76.21	1394.35
DHARIWAL INFRASTRUCTURE Ltd.	DHARIWAL INFRASTRUCTURE LIMITED	75.93	476.12
GMR WARORA ENERGY LTD.	GMR WARORA ENERGY LTD.	66.18	308.43
RATNAGIRI	JSW ENERGY LIMITED	47.14	N/A
BHUSAWAL	MSPGCL	58.10	425.44
CHANDRAPUR	MSPGCL	58.61	115.62
KHAPARKHEDA	MSPGCL	60.83	818.88
KORADI	MSPGCL	58.42	303.49
NASHIK	MSPGCL	36.49	666.25
PARLI	MSPGCL	44.90	346.71
PARAS	MSPGCL	60.15	296.83
MOUDA SUPER TPS	NTPC LTD.	60.06	354.55
SOLAPUR SUPER TPS	NTPC LTD.	43.94	812.56
AMARAVATI TPS	RATTANINDIA POWER LTD.	75.10	740.21
TROMBAY	THE TATA POWER COMPANY LIMITED	69.26	N/A
SAI WARDHA POWER Ltd., WARORA	SAI WARDHA POWER GENERATION PVT LTD.	47.77	34.73



Inverse Correlation Equation: 1

PLF(%) = 84.147 – 0.0549 x (Weighted Avg Distance of TPS from Coal Mines: Kms)

Inverse Correlation Equation: 2

PLF(%) = 227.42 – 27.8 Log_e(Weighted Avg Distance of TPS from Coal Mines: Kms)

Assuming Best performance under two correlation scenarios, the PLF of Maharashtra power plants could increase to ~73.16% - 80.23%.

Maharashtra

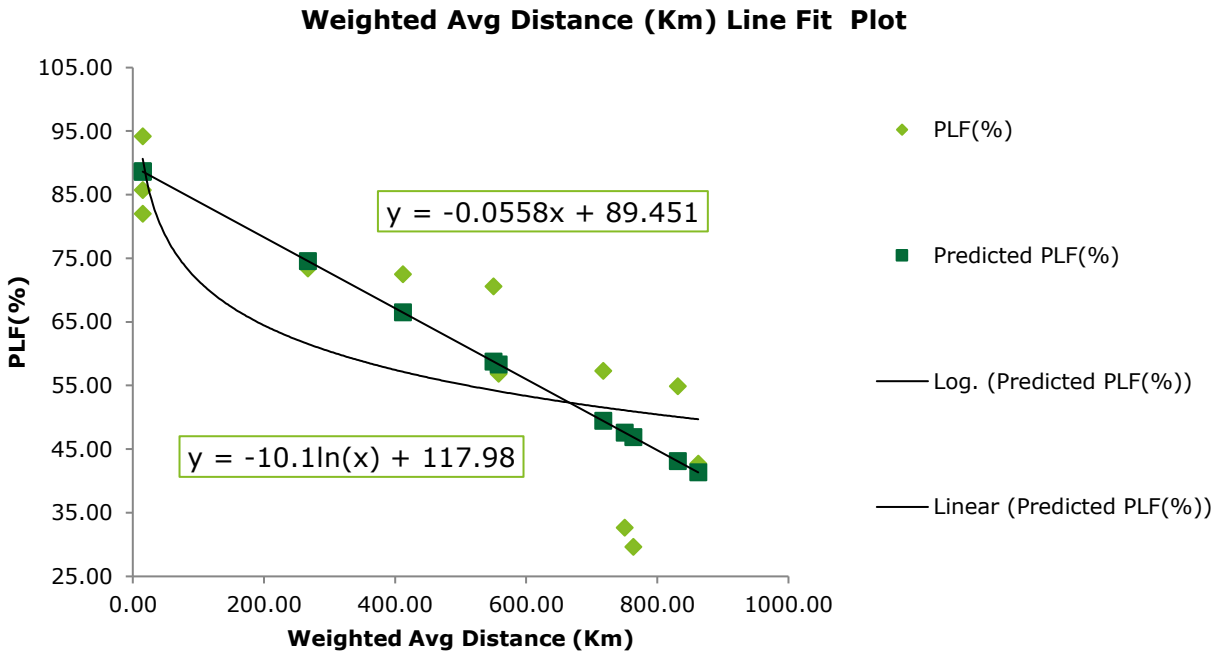
Name of TPS	Power Utility	State	Installed Capacity (MW)	Coal Consumed (MT): FY22	PLF (%)	PLF Base Scenario	PLF Realistic Scenario	PLF Optimistic Scenario	Coal Consumption Base Scenario: FY30	Realistic Scenario: FY30	Optimistic Scenario: FY30
TIRODA	ADANI POWER MAHARASHTRA LTD.	Maharashtra	3300.00	14.18	74.88	80.23	80.23	95	15.20	15.20	17.99
ADANI DAHANU	ADANI ELECTRICITY MUMBAI LIMITED	Maharashtra	500.00	1.99	76.21	80.23	80.23	95	2.09	2.09	2.48
DHARIWAL INFRASTRUCTURE Ltd.	DHARIWAL INFRASTRUCTURE LIMITED	Maharashtra	600.00	2.72	75.93	80.23	80.23	95	2.88	2.88	3.40
GMR WARORA ENERGY LTD.	GMR WARORA ENERGY LTD.	Maharashtra	600.00	2.32	66.18	73.16	80.23	95	2.56	2.81	3.33
RATNAGIRI	JSW ENERGY LIMITED	Maharashtra	1200.00	2.73	47.14	73.16	80.23	95	4.23	4.64	5.50
BHUSAWAL	MSPGCL	Maharashtra	1210.00	4.74	58.10	73.16	80.23	95	5.97	6.55	7.76
CHANDRAPUR	MSPGCL	Maharashtra	2920.00	11.57	58.61	73.16	80.23	95	14.44	15.84	18.76
KHAPARKHEDA	MSPGCL	Maharashtra	1340.00	6.20	60.83	73.16	80.23	95	7.46	8.18	9.69
KORADI	MSPGCL	Maharashtra	2190.00	8.19	58.42	73.16	80.23	95	10.25	11.24	13.31

Maharashtra

Name of TPS	Power Utility	State	Installed Capacity (MW)	Coal Consumed (MT): FY22	PLF (%)	PLF Base Scenario	PLF Realistic Scenario	PLF Optimistic Scenario	Coal Consumption Base Scenario: FY30	Realistic Scenario: FY30	Optimistic Scenario: FY30
NASHIK	MSPGCL	Maharashtra	630.00	1.68	36.49	73.16	80.23	95	3.36	3.69	4.37
PARLI	MSPGCL	Maharashtra	750.00	1.97	44.90	73.16	80.23	95	3.20	3.51	4.16
PARAS	MSPGCL	Maharashtra	500.00	2.00	60.15	73.16	80.23	95	2.43	2.67	3.16
MOUDA SUPER TPS	NTPC LTD.	Maharashtra	2320.00	8.69	60.06	73.16	80.23	95	10.58	11.60	13.74
SOLAPUR SUPER TPS	NTPC LTD.	Maharashtra	1320.00	3.25	43.94	73.16	80.23	95	5.42	5.94	7.03
AMARAVATI TPS	RATTANINDIA POWER LTD.	Maharashtra	1350.00	5.90	75.10	80.23	80.23	95	6.31	6.31	7.47
TROMBAY	THE TATA POWER COMPANY LIMITED	Maharashtra	750.00	2.31	69.26	73.16	80.23	95	2.44	2.68	3.17
SAI WARDHA POWER Ltd., WARORA	SAI WARDHA POWER GENERATION PVT LTD.	Maharashtra	540.00	1.48	47.77	73.16	80.23	95	2.26	2.48	2.93
				81.92					**101.10**	**108.31**	**128.25**

Madhya Pradesh

Name of TPS	Power Utility	PLF(%)	Weighted Avg Distance (Km)
MAHAN	MAHAN ENERGEN LTD.	32.64	750.00
JAYPEE BINA TPP	JAIPRAKSH POWER VENTURES LIMITED	57.28	717.39
JAYPEE NIGRIE SUPER TPP	JAIPRAKSH POWER VENTURES LIMITED	72.49	411.76
SATPURA	MADHYA PRADESH POWER GENERATING COMPANY LIMITED	29.61	763.32
AMARKANTAK	MADHYA PRADESH POWER GENERATING COMPANY LIMITED	81.97	15.00
SHREE SINGAJI TPS	MADHYA PRADESH POWER GENERATING COMPANY LIMITED	42.67	862.31
JHABUA POWER LIMITED	JHABUA POWER LIMITED	70.55	550.20
ANUPPUR TPS	MB POWER (MADHYA PRADESH) LIMITED	73.40	266.97
VINDHYACHAL	NTPC LTD.	85.69	15.00
GADARWARA SUPER	NTPC LTD.	56.83	557.88
SASAN UMPP TPP	REILIANCE POWER LIMITED	94.19	15.00
KHARGONE SUPER THERMAL POWER STATION	NTPC LTD.	54.86	830.94
SANJAY GANDHI	MADHYA PRADESH POWER GENERATING COMPANY LIMITED	56.49	225.73



Inverse Correlation Equation: 1

PLF(%) = 89.451 – 0.0558 x (Weighted Avg Distance of TPS from Coal Mines: Kms)

Inverse Correlation Equation: 2

PLF(%) = 117.98 – 10.1 Log_e(Weighted Avg Distance of TPS from Coal Mines: Kms)

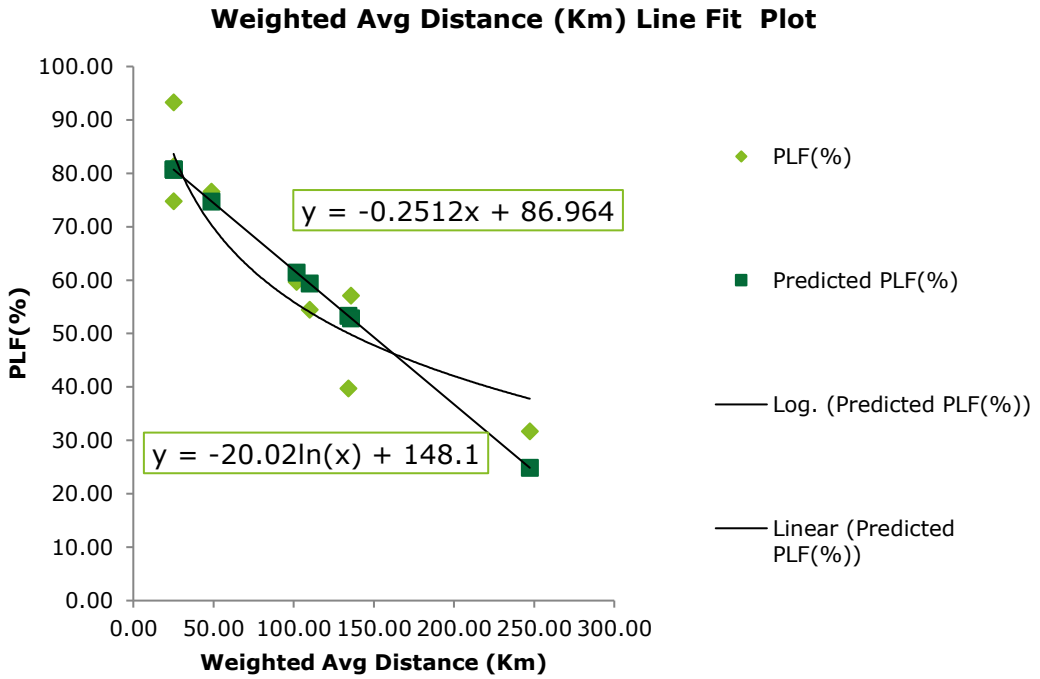
Assuming Best performance under two correlation scenarios, the PLF of Madhya Pradesh power plants could increase to ~62.21% - 75.50%.

Madhya Pradesh

Name of TPS	Power Utility	State	Installed Capacity (MW)	Coal Consumed (MT): FY22	PLF (%)	PLF Base Scenario	PLF Realistic Scenario	PLF Optimistic Scenario	Coal Consumption Base Scenario: FY30	Realistic Scenario: FY30	Optimistic Scenario: FY30
MAHAN	MAHAN ENERGEN LTD.	Madhya Pradesh	1200.00	2.38	32.64	62.21	75.5	85	4.53	5.49	6.19
JAYPEE BINA TPP	JAIPRAKSH POWER VENTURES LIMITED	Madhya Pradesh	500.00	1.78	57.28	62.21	75.5	85	1.94	2.35	2.65
JAYPEE NIGRIE SUPER TPP	JAIPRAKSH POWER VENTURES LIMITED	Madhya Pradesh	1320.00	4.97	72.49	75.5	75.5	85	5.17	5.17	5.83
SANJAY GANDHI	MPPGCL	Madhya Pradesh	1340.00	4.93	56.49	62.21	75.5	85	5.43	6.59	7.42
SATPURA	MPPGCL	Madhya Pradesh	1330.00	2.22	29.61	62.21	75.5	85	4.67	5.67	6.39
AMARKANTAK	MPPGCL	Madhya Pradesh	210.00	0.99	81.97	81.97	95.00	95	0.99	1.15	1.15
SHREE SINGAJI TPS	MPPGCL	Madhya Pradesh	2520.00	6.88	42.67	62.21	75.5	85	10.04	12.18	13.71
JHABUA POWER LIMITED	JHABUA POWER LIMITED	Madhya Pradesh	600.00	2.55	70.55	62.21	75.5	85	2.25	2.73	3.08
ANUPPUR TPS	MB POWER (MADHYA PRADESH) LIMITED	Madhya Pradesh	1200.00	5.44	73.40	62.21	75.5	85	4.61	5.59	6.29
VINDHYACHAL	NTPC LTD.	Madhya Pradesh	4760.00	24.28	85.69	85.69	95.00	95	24.28	26.92	26.92
GADARWARA SUPER	NTPC LTD.	Madhya Pradesh	1600.00	5.14	56.83	62.21	75.5	85	5.63	6.83	7.69
SASAN UMPP TPP	REILIANCE POWER LIMITED	Madhya Pradesh	3960.00	18.31	94.19	94.19	94.19	95	18.31	18.31	18.47
KHARGONE SUPER THERMAL POWER STATION	NTPC LTD.	Madhya Pradesh	1320.00	3.84	54.86	62.21	75.5	85	4.35	5.29	5.95
				83.72					**92.20**	**104.28**	**111.72**

Chhattisgarh

Name of TPS	Power Utility	PLF(%)	Weighted Avg Distance (Km)
KASAIPALI	ACB (INDIA) Ltd.	39.73	134.03
Atal Bihari Vajpayee TPP	Chattisgarh State Power Generation Company Ltd.	55.11	65.90
Dr. Shyama Prasad Mukharjee TPP	Chattisgarh State Power Generation Company Ltd.	89.23	131.43
Hasdeo TPP	Chattisgarh State Power Generation Company Ltd.	74.78	25.00
BALCO TPP	BALCO	65.41	47.81
O.P.Jindal Super TPP (Stage-I)	JINDAL POWER LIMITED	59.66	101.81
TAMNAR TPP	JINDAL POWER LIMITED	45.60	63.92
KMPCL - NARIYARA	KSK MAHANADI POWER COMPANY LIMITED	57.11	135.75
LANCO AMARKANTAK TPS	LANCO AMARKANTAK POWER LIMITED	76.56	48.71
MCCPL BANDHAKHAR	MARUTI CLEAN COAL AND POWER LIMITED	82.30	134.39
BHILAI PP - III	NTPC - SAIL POWER COMPANY LIMITED (NTPC-JV)	80.31	355.22
KORBA SUPER	NTPC LTD.	93.28	25.00
SIPAT SUPER	NTPC LTD.	81.29	25.00
R.K.M. POWERGEN PVT. LTD	R.K.M. POWERGEN PVT. LTD	54.48	109.86
RAIPUR TPP	RAIPUR ENERGEN LIMITED	73.61	343.86
RATIJA TPS	ACB (INDIA) Ltd.	75.77	134.03
SKS POWER GENERATION (CH) LTD.	SKS POWER GENERATION (CHHATTISGARH) LIMITED	31.66	247.25
RAIGARH TPP	TRN ENERGY PRIVATE LIMITED	13.20	91.33
LARA SUPER TPS	NTPC LTD.	81.09	212.28
RAIGARH TPP	RAIGARH ENERGY GENERATION LIMITED	70.49	134.64
DB POWER	DB POWER LIMITED	82.13	125.79



Inverse Correlation Equation: 1

PLF(%) = 86.964 – 0.2512 x (Weighted Avg Distance of TPS from Coal Mines: Kms)

Inverse Correlation Equation: 2

PLF(%) = 148.1 – 20.02 Log_e(Weighted Avg Distance of TPS from Coal Mines: Kms)

Assuming Best performance under two correlation scenarios, the PLF of Chhattisgarh power plants could increase to ~83.2% - 93.88%.

Best Performance scenario is defined at an aspirational level where the TPS performs like a Pit-head TPS

Chhattisgarh

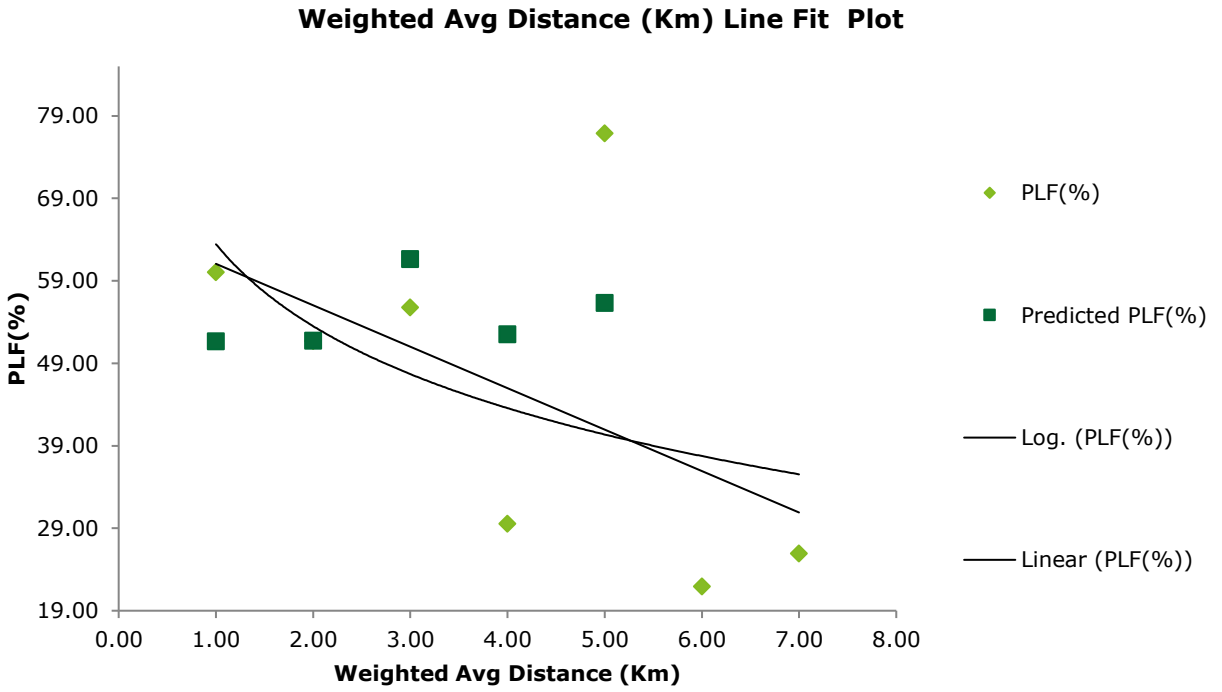
Name of TPS	Power Utility	State	Installed Capacity (MW)	Coal Consumed (MT): FY22	PLF (%)	PLF Base Scenario	PLF Realistic Scenario	PLF Optimistic Scenario	Coal Consumption Base Scenario: FY30	Realistic Scenario: FY30	Optimistic Scenario: FY30
KASAIPALI	ACB (INDIA) Ltd.	Chhattisgarh	270.00	1.55	39.73	83.2	93.88	95	3.25	3.67	3.71
Atal Bihari Vajpayee TPP	Chattisgarh State Power Generation Company Ltd.	Chhattisgarh	1000.00	3.57	55.11	83.2	93.88	95	5.39	6.09	6.16
Dr. Shyama Prasad Mukharjee TPP	Chattisgarh State Power Generation Company Ltd.	Chhattisgarh	500.00	2.81	89.23	89.23	93.88	95	2.81	2.95	2.99
Hasdeo TPP	Chattisgarh State Power Generation Company Ltd.	Chhattisgarh	1340.00	6.72	74.78	83.2	93.88	95	7.48	8.44	8.54
BALCO TPP	BALCO	Chhattisgarh	1200.00	5.31	65.41	83.2	93.88	95	6.75	7.62	7.71
O.P.Jindal Super TPP (Stage-I)	JINDAL POWER LIMITED	Chhattisgarh	1000.00	4.15	59.66	83.2	93.88	95	5.78	6.52	6.60
TAMNAR TPP	JINDAL POWER LIMITED	Chhattisgarh	2400.00	7.86	45.60	83.2	93.88	95	14.34	16.19	16.38
KMPCL - NARIYARA	KSK MAHANADI POWER COMPANY LIMITED	Chhattisgarh	1800.00	5.85	57.11	83.2	93.88	95	8.52	9.61	9.73
LANCO AMARKANTAK TPS	LANCO AMARKANTAK POWER LIMITED	Chhattisgarh	600.00	2.76	76.56	83.2	93.88	95	3.00	3.39	3.43
MCCPL BANDHAKHAR	MARUTI CLEAN COAL AND POWER LIMITED	Chhattisgarh	300.00	1.52	82.30	83.2	93.88	95	1.54	1.73	1.75

Chhattisgarh

Name of TPS	Power Utility	State	Installed Capacity (MW)	Coal Consumed (MT): FY22	PLF (%)	PLF Base Scenario	PLF Realistic Scenario	PLF Optimistic Scenario	Coal Consumption Base Scenario: FY30	Realistic Scenario: FY30	Optimistic Scenario: FY30
BHILAI PP - III	NTPC - SAIL POWER COMPANY LIMITED (NTPC-JV)	Chhattisgarh	500.00	2.66	80.31	83.2	93.88	95	2.76	3.11	3.15
KORBA SUPER	NTPC LTD.	Chhattisgarh	2600.00	13.95	93.28	93.88	93.88	95	14.04	14.04	14.21
SIPAT SUPER	NTPC LTD.	Chhattisgarh	2980.00	14.09	81.29	83.2	93.88	95	14.42	16.27	16.46
R.K.M. POWERGEN PVT. LTD	R.K.M. POWERGEN PVT. LTD	Chhattisgarh	1440.00	5.27	54.48	83.2	93.88	95	8.04	9.07	9.18
RAIPUR TPP	RAIPUR ENERGEN LIMITED	Chhattisgarh	1370.00	6.19	73.61	83.2	93.88	95	6.99	7.89	7.98
RATIJA TPS	ACB (INDIA) Ltd.	Chhattisgarh	100.00	0.82	75.77	83.2	93.88	95	0.90	1.01	1.02
SKS POWER GENERATION (CH) LTD.	SKS POWER GENERATION (CHHATTISGARH) LIMITED	Chhattisgarh	600.00	1.23	31.66	83.2	93.88	95	3.23	3.65	3.69
RAIGARH TPP	TRN ENERGY PRIVATE LIMITED	Chhattisgarh	600.00	0.55	13.20	83.2	93.88	95	3.47	3.91	3.96
LARA SUPER TPS	NTPC LTD.	Chhattisgarh	1600.00	7.81	81.09	83.2	93.88	95	8.01	9.04	9.15
RAIGARH TPP	RAIGARH ENERGY GENERATION LIMITED	Chhattisgarh	600.00	2.77	70.49	83.2	93.88	95	3.27	3.69	3.73
DB POWER	DB POWER LIMITED	Chhattisgarh	1200.00	6.47	82.13	83.2	93.88	95	6.56	7.40	7.49
				103.90					130.55	145.29	147.02

Gujarat

Name of TPS	Power Utility	PLF(%)	Weighted Avg Distance (Km)
GANDHINAGAR	GSECL	60.04	1360.70
UKAI	GSECL	51.71	1041.33
WANAKBORI	GSECL	55.78	1335.74
MUNDRA TPS	ADANI POWER (MUNDRA) LIMITED	29.56	1363.42
SABARMATI TPS	TORRENT POWER LTD.	76.88	1213.08
SIKKA	Gujarat State Electricity Corporation Limited	21.97	N/A
MUNDRA UMPP	Coastal Gujarat Power Limited	25.94	N/A



Inverse Correlation Equation: 1

PLF(%) = 93.8742 – 0.03095 x (Weighted Avg Distance of TPS from Coal Mines: Kms)

Assuming Best performance under two correlation scenarios, the PLF of Gujarat power plants could increase to ~62.93% - 70.66%.

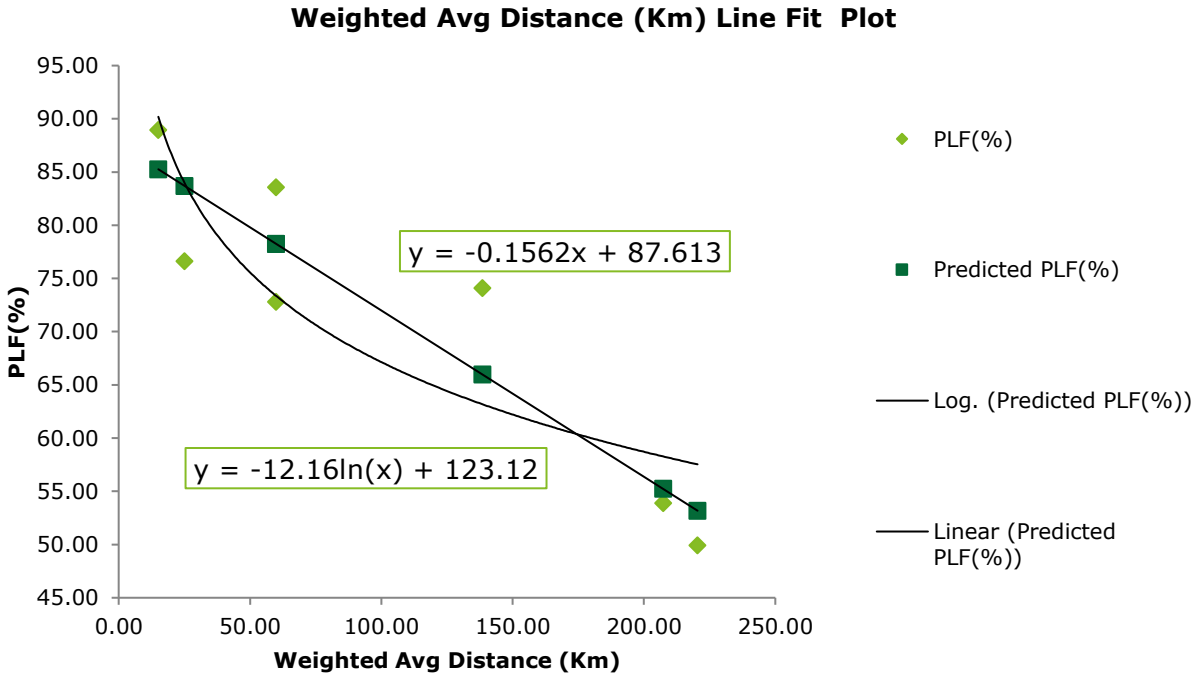
Best Performance scenario is defined at an aspirational level where the TPS performs in the range of 750 to 1000 Kms

Gujarat

Name of TPS	Power Utility	State	Installed Capacity (MW)	Coal Consumed (MT): FY22	PLF (%)	PLF Base Scenario	PLF Realistic Scenario	PLF Optimistic Scenario	Coal Consumption Base Scenario: FY30	Realistic Scenario: FY30	Optimistic Scenario: FY30
MUNDRA TPS	ADANI POWER (MUNDRA) LIMITED	Gujarat	4620.00	6.58	29.56	62.93	70.66	85	14.02	15.74	18.93
MUNDRA UMPP	Coastal Gujarat Power Limited	Gujarat	4150.00	0.37	25.94	62.93	70.66	85	0.90	1.01	1.21
GANDHINAGAR	Gujarat State Electricity Corporation Limited	Gujarat	630.00	2.22	60.04	62.93	70.66	85	2.33	2.61	3.14
SIKKA	Gujarat State Electricity Corporation Limited	Gujarat	500.00	0.47	21.97	62.93	70.66	85	1.34	1.50	1.81
UKAI	Gujarat State Electricity Corporation Limited	Gujarat	1110.00	3.43	51.71	62.93	70.66	85	4.18	4.69	5.64
WANAKBORI	Gujarat State Electricity Corporation Limited	Gujarat	2270.00	7.58	55.78	62.93	70.66	85	8.55	9.61	11.55
SABARMATI TPS	TORRENT POWER LTD.	Gujarat	362.00	1.38	76.88	76.88	76.88	85	1.38	1.38	1.52
				22.03					**32.69**	**36.53**	**43.81**

Telangana

Name of TPS	Power Utility	PLF(%)	Weighted Avg Distance (Km)
RAMAGUNDAM SUPER	NTPC LTD.	76.62	25.00
SINGARENI TPP	THE SINGARENI COLLIERIES COMPANY LIMITED	88.97	15.00
RAMAGUNDAM 'B'	TSPGCL	49.93	220.45
KOTHAGUDEM-V & VI	TSPGCL	72.80	59.91
KOTHAGUDEM-VII	TSPGCL	83.57	59.91
KAKATIYA (Stage-I&II)	TSPGCL	74.11	138.57
Bhadradri TPP	TSPGCL	53.89	207.34



Inverse Correlation Equation: 1

PLF(%) = 87.613 – 0.1562 x (Weighted Avg Distance of TPS from Coal Mines: Kms)

Inverse Correlation Equation: 2

PLF(%) = 123.12 – 12.16 $\log_e$(Weighted Avg Distance of TPS from Coal Mines: Kms)

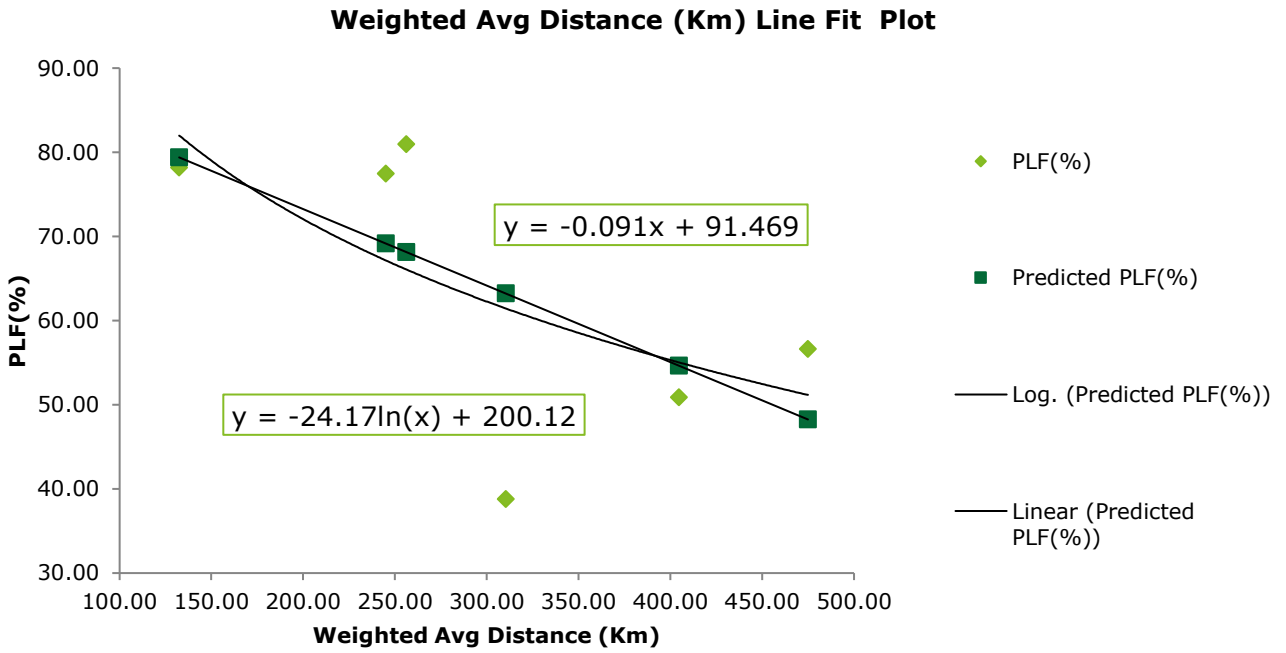
Assuming Best performance under two correlation scenarios, the PLF of Telangana power plants could increase to ~85.27% - 90.19%.

Telangana

Name of TPS	Power Utility	State	Installed Capacity (MW)	Coal Consumed (MT): FY22	PLF (%)	PLF Base Scenario	PLF Realistic Scenario	PLF Optimistic Scenario	Coal Consumption Base Scenario: FY30	Realistic Scenario: FY30	Optimistic Scenario: FY30
RAMAGUNDAM SUPER	NTPC LTD.	Telangana	2600.00	10.82	76.62	85.27	90.19	95	12.04	12.73	13.41
SINGARENI TPP	SCCL	Telangana	1200.00	5.36	88.97	90.19	95	95	5.43	5.72	5.72
RAMAGUNDAM 'B'	TSPGCL	Telangana	62.50	0.21	49.93	85.27	90.19	95	0.36	0.38	0.40
KOTHAGUDEM-V & VI	TSPGCL	Telangana	1000.00	4.21	72.80	85.27	90.19	95	4.94	5.22	5.50
KOTHAGUDEM-VII	TSPGCL	Telangana	800.00	2.90	83.57	85.27	90.19	95	2.96	3.13	3.30
KAKATIYA (Stage-I&II)	TSPGCL	Telangana	1100.00	4.12	74.11	85.27	90.19	95	4.75	5.02	5.29
Bhadradri TPP	TSPGCL	Telangana	1080.00	2.94	53.89	85.27	90.19	95	4.66	4.93	5.19
				30.57					**35.13**	**37.13**	**38.80**

Bihar

Name of TPS	Power Utility	PLF(%)	Weighted Avg Distance (Km)
NABINAGAR- BRBCL	BHARATIYA RAIL BIJLEE COMPANY LIMITED (NTPC-JV)	77.47	245.14
KANTI BIJLEE UTPADAN NIGAM LIMITED	KANTI BIJLEE UTPADAN NIGAM LIMITED	56.63	474.92
KAHALGAON SUPER	NTPC LTD.	78.19	132.56
BARH SUPER TPS	NTPC LTD.	50.86	404.77
BARAUNI	NTPC LTD.	38.76	310.48
NABINAGAR-NPGC	NPGC (NTPC-JV)	80.95	256.28



Inverse Correlation Equation: 1

PLF(%) = 91.469 – 0.091 x (Weighted Avg Distance of TPS from Coal Mines: Kms)

Inverse Correlation Equation: 2

PLF(%) = 200.12 – 24.17 Log_e(Weighted Avg Distance of TPS from Coal Mines: Kms)

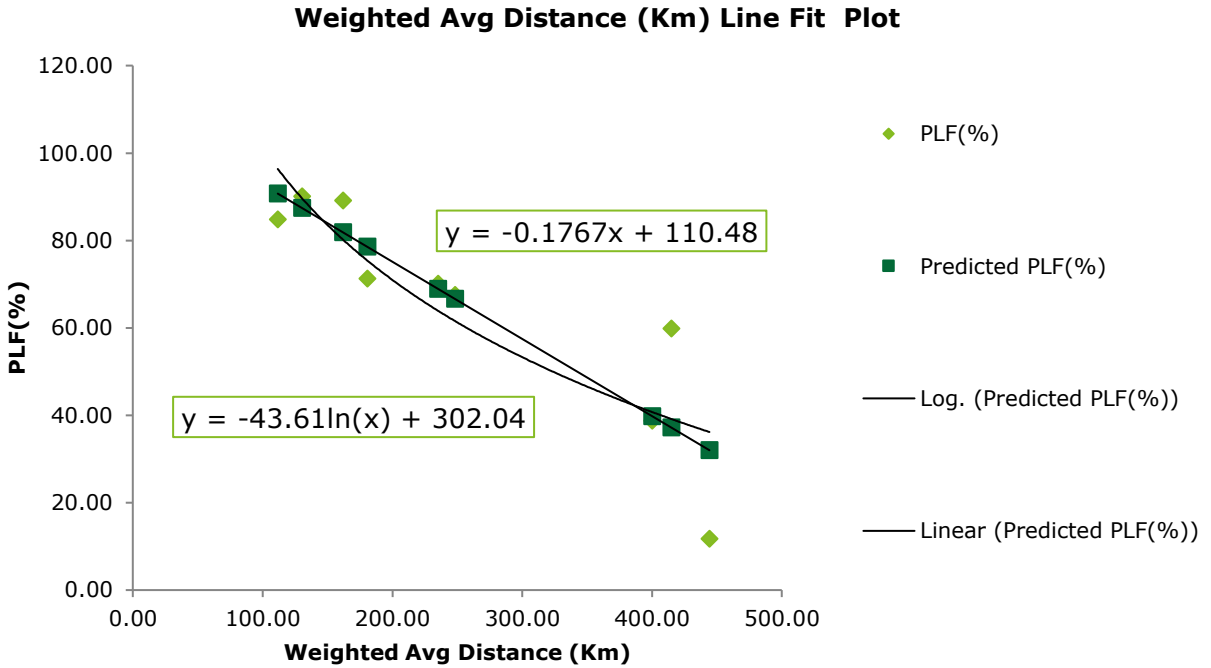
Assuming Best performance under two correlation scenarios, the PLF of Bihar power plants could increase to ~82.37% - 88.81%.

Bihar

Name of TPS	Power Utility	State	Installed Capacity (MW)	Coal Consumed (MT): FY22	PLF (%)	PLF Base Scenario	PLF Realistic Scenario	PLF Optimistic Scenario	Coal Consumption Base Scenario: FY30	Realistic Scenario: FY30	Optimistic Scenario: FY30
NABINAGAR-BRBCL	BHARATIYA RAIL BIJLEE COMPANY LIMITED (NTPC-JV)	Bihar	1000.00	3.94	77.47	82.37	88.81	95	4.19	4.52	4.84
KANTI BIJLEE UTPADAN NIGAM LIMITED	KANTI BIJLEE UTPADAN NIGAM LIMITED	Bihar	610.00	2.06	56.63	82.37	88.81	95	3.00	3.24	3.46
KAHALGAON SUPER	NTPC LTD.	Bihar	2340.00	11.83	78.19	82.37	88.81	95	12.47	13.44	14.38
BARH SUPER TPS	NTPC LTD.	Bihar	1980.00	5.67	50.86	82.37	88.81	95	9.19	9.91	10.60
BARAUNI	NTPC LTD.	Bihar	610.00	1.51	38.76	82.37	88.81	95	3.21	3.46	3.71
NABINAGAR-NPGC	NPGC (NTPC-JV)	Bihar	1320.00	4.95	80.95	82.37	88.81	95	5.04	5.43	5.81
				29.98					**37.10**	**40.00**	**42.79**

West Bengal

Name of TPS	Power Utility	PLF(%)	Weighted Avg Distance (Km)
Budge Budge Generating Station	CESC Ltd.	84.66	287.58
Southern Generating Station	CESC Ltd.	13.87	221.18
DURGAPUR	Damodar Valley Corporation	11.69	444.24
MEJIA	Damodar Valley Corporation	71.22	180.54
DURGAPUR STEEL	Damodar Valley Corporation	70.07	235.09
RAGHUNATHPUR	Damodar Valley Corporation	57.85	79.05
THE DURGAPUR PROJECTS POWER STATION	THE DURGAPUR PROJECTS LIMITED	53.29	176.07
HALDIA ENERGY LIMITED	HALDIA ENERGY LIMITED	81.37	493.72
FARAKKA SUPER	NTPC LTD.	67.52	248.14
KOLAGHAT	WBPDCL	38.70	400.18
SAGARDIGHI	WBPDCL	84.80	111.63
BANDEL	WBPDCL	59.85	414.90
SANTALDIH TPS	WBPDCL	89.13	161.91
BAKRESWAR	WBPDCL	90.11	130.42



Inverse Correlation Equation: 1

PLF(%) = 110.48 – 0.1767 x (Weighted Avg Distance of TPS from Coal Mines: Kms)

Inverse Correlation Equation: 2

PLF(%) = 302.04 – 43.6 Log_e(Weighted Avg Distance of TPS from Coal Mines: Kms)

Assuming Best performance under two correlation scenarios, the PLF of West Bengal power plants could increase to ~88.39% - 91.48%.

West Bengal

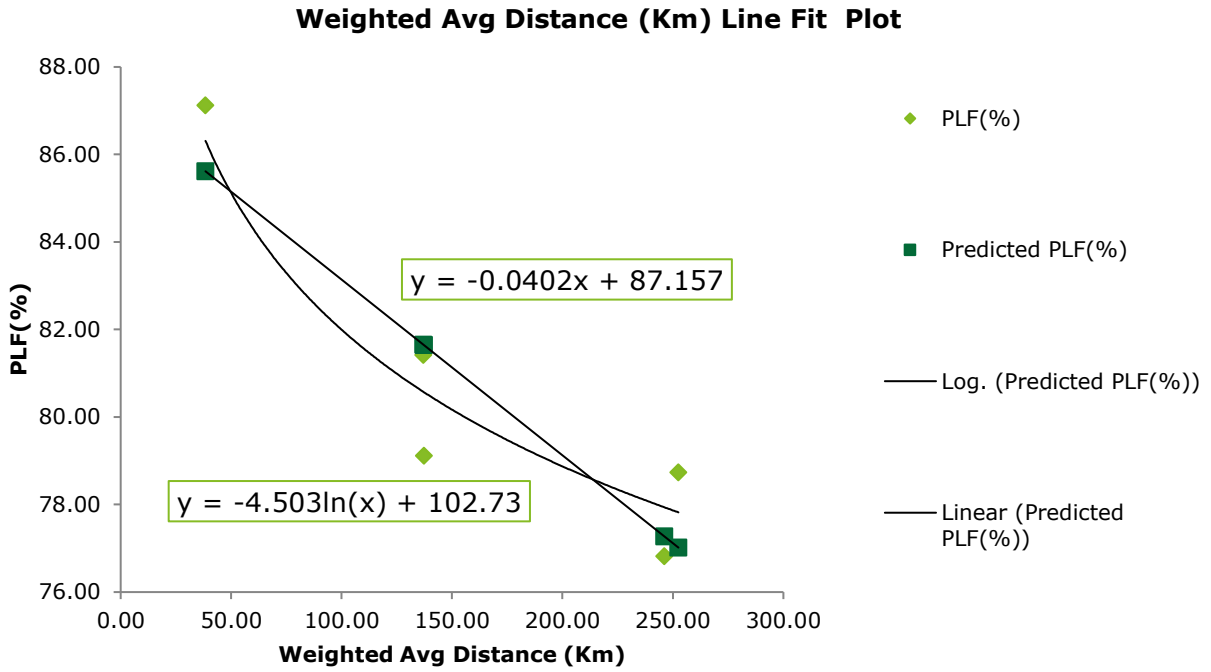
Name of TPS	Power Utility	State	Installed Capacity (MW)	Coal Consumed (MT): FY22	PLF (%)	PLF Base Scenario	PLF Realistic Scenario	PLF Optimistic Scenario	Coal Consumption Base Scenario: FY30	Realistic Scenario: FY30	Optimistic Scenario: FY30
Budge Budge Generating Station	CESC Ltd.	West Bengal	750.00	3.24	84.66	88.39	91.48	95	3.38	3.50	3.63
Southern Generating Station	CESC Ltd.	West Bengal	135.00	0.13	13.87	88.39	91.48	95	0.84	0.87	0.90
DURGAPUR	Damodar Valley Corporation	West Bengal	210.00	0.25	11.69	88.39	91.48	95	1.90	1.96	2.04
MEJIA	Damodar Valley Corporation	West Bengal	2340.00	9.67	71.22	88.39	91.48	95	12.00	12.42	12.90
DURGAPUR STEEL	Damodar Valley Corporation	West Bengal	1000.00	4.12	70.07	88.39	91.48	95	5.20	5.38	5.59
RAGHUNATHPUR	Damodar Valley Corporation	West Bengal	1200.00	3.94	57.85	88.39	91.48	95	6.02	6.23	6.47

West Bengal

Name of TPS	Power Utility	State	Installed Capacity (MW)	Coal Consumed (MT): FY22	PLF (%)	PLF Base Scenario	PLF Realistic Scenario	PLF Optimistic Scenario	Coal Consumption Base Scenario: FY30	Realistic Scenario: FY30	Optimistic Scenario: FY30
THE DURGAPUR PROJECTS POWER STATION	THE DURGAPUR PROJECTS LIMITED	West Bengal	550.00	1.78	53.29	88.39	91.48	95	2.95	3.05	3.17
HALDIA ENERGY LIMITED	HALDIA ENERGY LIMITED	West Bengal	600.00	2.94	81.37	88.39	91.48	95	3.19	3.30	3.43
FARAKKA SUPER	NTPC LTD.	West Bengal	2100.00	8.10	67.52	88.39	91.48	95	10.61	10.98	11.40
KOLAGHAT	WBPDCL	West Bengal	1260.00	3.37	38.70	88.39	91.48	95	7.71	7.98	8.28
SAGARDIGHI	WBPDCL	West Bengal	1600.00	7.29	84.80	88.39	91.48	95	7.60	7.86	8.17
BANDEL	WBPDCL	West Bengal	335.00	1.39	59.85	88.39	91.48	95	2.05	2.12	2.20
SANTALDIH TPS	WBPDCL	West Bengal	500.00	2.78	89.13	91.48	91.48	95	2.85	2.85	2.96
BAKRESWAR	WBPDCL	West Bengal	1050.00	5.20	90.11	91.48	91.48	95	5.28	5.28	5.48
				54.19					**71.56**	**73.78**	**76.61**

Jharkhand

Name of TPS	Power Utility	PLF(%)	Weighted Avg Distance (Km)
ADHUNIK POWER & NATURAL RESOURCES LTD.	ADHUNIK POWER & NATURAL RESOURCES LTD.	78.73	252.58
BOKARO	Damodar Valley Corporation	68.42	8.35
CHANDRAPURA	Damodar Valley Corporation	87.12	38.36
KODERMA	Damodar Valley Corporation	79.11	137.27
MAITHON RIGHT BANK TPP	MAITHON POWER LIMITED	81.42	137.10
JOJOBERA	THE TATA POWER COMPANY LIMITED	76.82	246.21
TENUGHAT TPS	TENUGHAT VIDHYUT NIGAM LIMITED	48.03	117.77



Inverse Correlation Equation: 1

PLF(%) = 87.157 – 0.0402 x (Weighted Avg Distance of TPS from Coal Mines: Kms)

Inverse Correlation Equation: 2

PLF(%) = 102.73 – 4.503 Log_e(Weighted Avg Distance of TPS from Coal Mines: Kms)

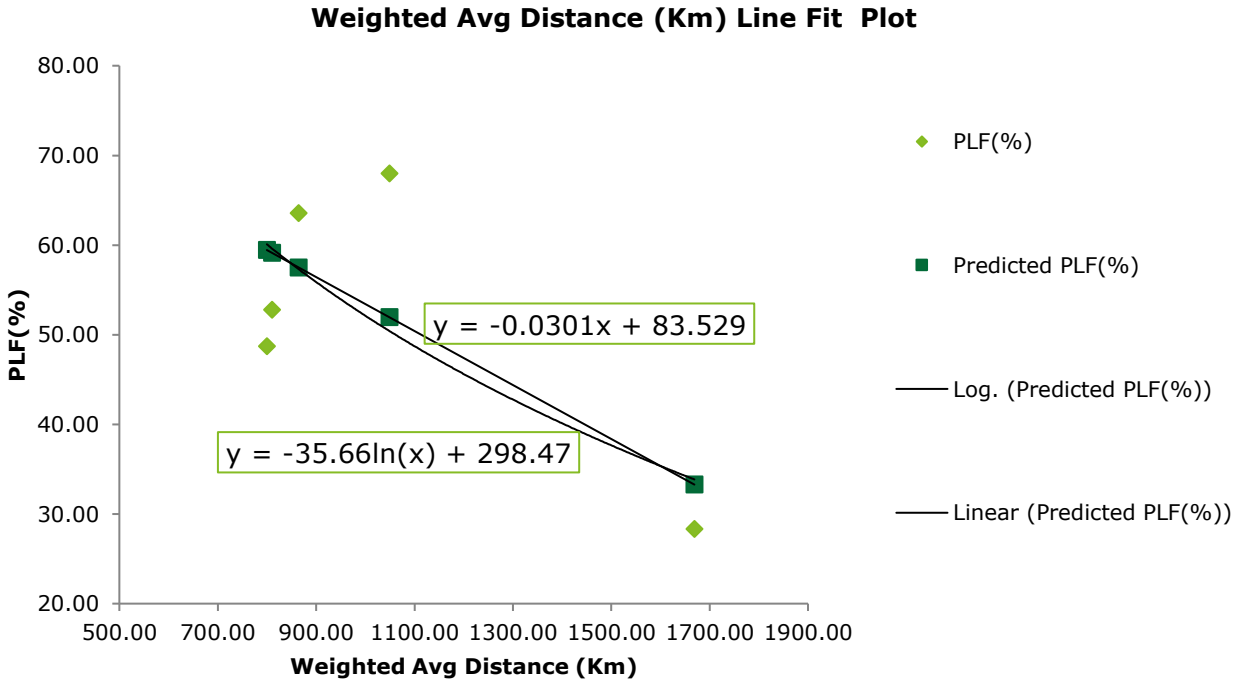
Assuming Best performance under two correlation scenarios, the PLF of Jharkhand power plants could increase to ~83.29% - 85.15%.

Jharkhand

Name of TPS	Power Utility	State	Installed Capacity (MW)	Coal Consumed (MT): FY22	PLF (%)	PLF Base Scenario	PLF Realistic Scenario	PLF Optimistic Scenario	Coal Consumption Base Scenario: FY30	Realistic Scenario: FY30	Optimistic Scenario: FY30
ADHUNIK POWER & NATURAL RESOURCES LTD.	ADHUNIK POWER & NATURAL RESOURCES LTD.	Jharkhand	540.00	2.55	78.73	83.29	85.15	90	2.70	2.76	2.91
BOKARO	Damodar Valley Corporation	Jharkhand	500.00	1.73	68.42	83.29	85.15	90	2.11	2.15	2.28
CHANDRAPURA	Damodar Valley Corporation	Jharkhand	500.00	2.35	87.12	83.29	85.15	90	2.25	2.30	2.43
KODERMA	Damodar Valley Corporation	Jharkhand	1000.00	4.24	79.11	83.29	85.15	90	4.47	4.57	4.83
MAITHON RIGHT BANK TPP	MAITHON POWER LIMITED	Jharkhand	1050.00	4.58	81.42	83.29	85.15	90	4.68	4.79	5.06
JOJOBERA	THE TATA POWER COMPANY LIMITED	Jharkhand	547.50	2.55	76.82	83.29	85.15	90	2.76	2.82	2.98
TENUGHAT TPS	TENUGHAT VIDHYUT NIGAM LIMITED	Jharkhand	420.00	1.27	48.03	83.29	85.15	90	2.20	2.25	2.38
				19.26					**21.16**	**21.63**	**22.87**

Rajasthan

Name of TPS	Power Utility	PLF(%)	Weighted Avg Distance (Km)
CHHABRA	RRVUNL	52.77	810.11
SURATGARH	RRVUNL	28.32	1668.84
KALISINDH SUPER TPP	RRVUNL	67.97	1048.83
KOTA SUPER THERMAL POWER STATION	RRVUNL	63.56	864.32
CHHABRA SUPER CRITICAL TPP	RRVUNL	48.72	799.61
KAWAI	ADANI POWER RAJASTHAN LTD.	72.18	752.19



Inverse Correlation Equation: 1

PLF(%) = 83.529 – 0.0301 x (Weighted Avg Distance of TPS from Coal Mines: Kms)

Inverse Correlation Equation: 2

PLF(%) = 298.47 – 35.66 Log_e(Weighted Avg Distance of TPS from Coal Mines: Kms)

Assuming Best performance under two correlation scenarios, the PLF of Rajasthan power plants could increase to ~68.47% - 76.85%.

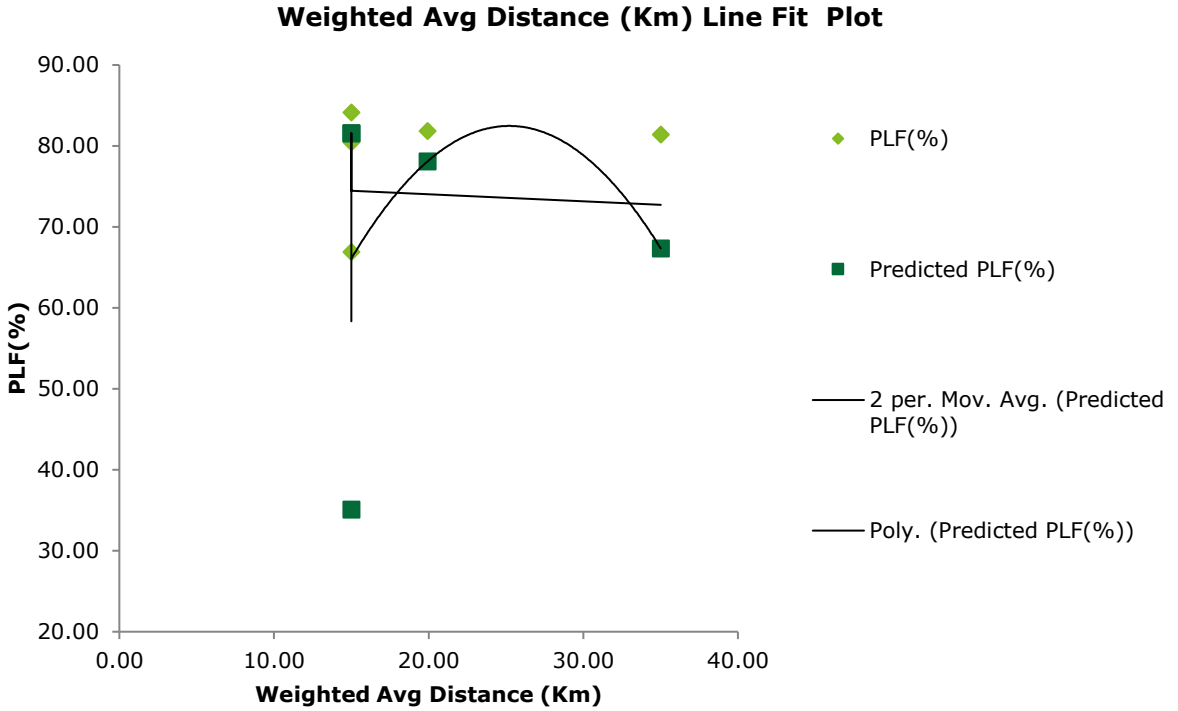
Best Performance scenario is defined at an aspirational level where the TPS in the range of 500 to 1000 Kms behaves in a way that it is at ~500 Km distance from the source

Rajasthan

Name of TPS	Power Utility	State	Installed Capacity (MW)	Coal Consumed (MT)	PLF (%)	PLF Base Scenario	PLF Realistic Scenario	PLF Optimistic Scenario	Coal Consumption Base Scenario: FY30	Realistic Scenario: FY30	Optimistic Scenario: FY30
KAWAI	ADANI POWER RAJASTHAN LTD.	Rajasthan	1320.00	4.86	72.18	76.86	76.86	90	5.17	5.17	6.05
CHHABRA	RRVUNL	Rajasthan	1000.00	2.96	52.77	68.48	76.86	90	3.84	4.31	5.04
SURATGARH	RRVUNL	Rajasthan	1500.00	2.50	28.32	68.48	76.86	90	6.04	6.78	7.94
KALISINDH SUPER TPP	RRVUNL	Rajasthan	1200.00	4.37	67.97	68.48	76.86	90	4.40	4.94	5.78
KOTA SUPER THERMAL POWER STATION	RRVUNL	Rajasthan	1240.00	4.91	63.56	68.48	76.86	90	5.29	5.94	6.96
CHHABRA SUPER CRITICAL TPP	RRVUNL	Rajasthan	1320.00	3.20	48.72	68.48	76.86	90	4.50	5.06	5.92
				22.80					**29.25**	**32.19**	**37.70**

Odisha

Name of TPS	Power Utility	PLF(%)	Weighted Avg Distance (Km)
GMR KAMALANGA TPP	GMR KAMALANGA ENERGY LTD.	81.87	19.93
DERANG TPP	JINDAL ITPL	81.42	35.00
TALCHER - KANIHA	NTPC LTD.	84.18	15
IB VALLEY	OPGCL	66.91	15
DARLIPALI SUPER TPS	NTPC LTD.	80.50	15
VEDANTA LTD TPP	VEDANTA LIMITED	30.52	80.36



Inverse Correlation Equation: 1

PLF(%) = 92.279 – 0.7115 x (Weighted Avg Distance of TPS from Coal Mines: Kms)

Assuming Best performance under two correlation scenarios, the PLF of Odisha power plants could increase to ~92.28%.

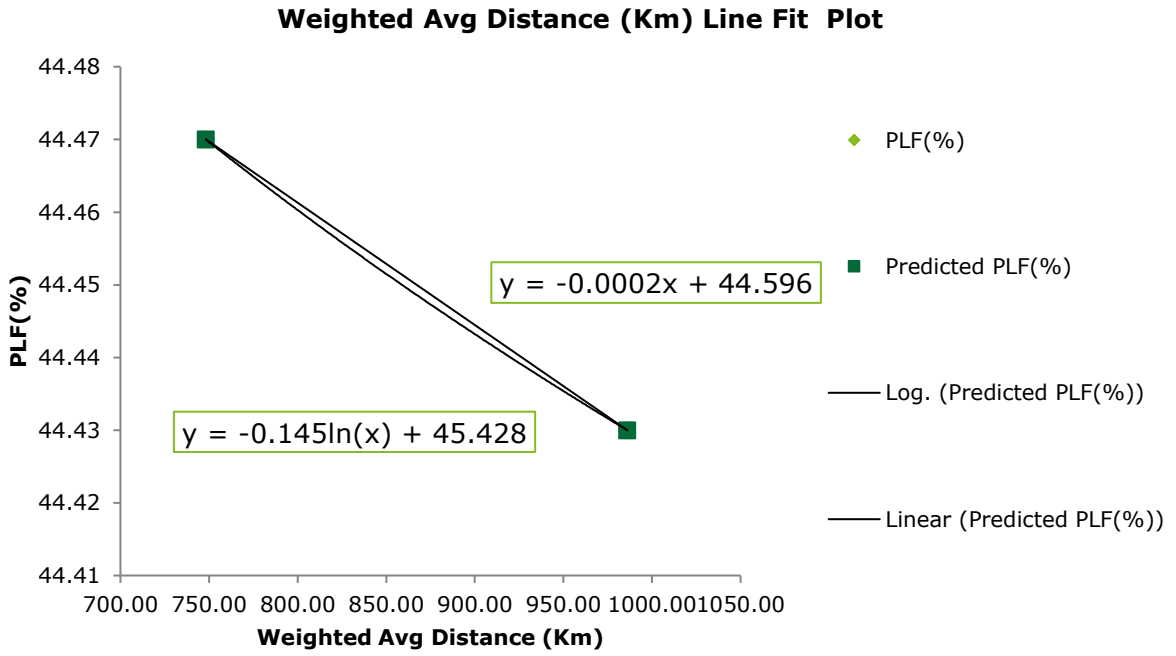
Best Performance scenario is defined at an aspirational level where the TPS in the range of 0-100 Kms behaves in a way that it is a Pit-head power plant with negligible distance from the source

Odisha

Name of TPS	Power Utility	State	Installed Capacity (MW)	Coal Consumed (MT): FY22	PLF (%)	PLF Base Scenario	PLF Realistic Scenario	PLF Optimistic Scenario	Coal Consumption Base Scenario: FY30	Realistic Scenario: FY30	Optimistic Scenario: FY30
GMR KAMALANGA TPP	GMR KAMALANGA ENERGY LTD.	Odisha	1050.00	5.46	81.87	81.87	92.28	95.00	5.46	6.15	6.33
DERANG TPP	JINDAL INDIA THERMAL POWER LIMITED	Odisha	1200.00	5.86	81.42	81.61	92.28	95.00	5.87	6.64	6.83
TALCHER - KANIHA	NTPC LTD.	Odisha	3000.00	16.88	84.18	92.28	92.28	95.00	18.51	18.51	19.05
IB VALLEY	ODISHA POWER GENERATION CORPORATION LIMITED	Odisha	1740.00	8.01	66.91	81.61	92.28	95.00	9.77	11.05	11.38
VEDANTA LTD TPP	VEDANTA LIMITED	Odisha	2400.00	2.56	30.52	81.61	92.28	95.00	6.85	7.74	7.97
DARLIPALI SUPER TPS	NTPC LTD.	Odisha	1600.00	6.56	80.50	81.61	92.28	95.00	6.65	7.52	7.74
				45.33					**53.10**	**57.61**	**59.30**

Karnataka

Name of TPS	Power Utility	PLF(%)	Weighted Avg Distance (Km)
VIJAYANAGAR	JSW ENERGY LIMITED	44.94	N/A
UDUPI	UDUPI POWER CORPORATION LIMITED	16.29	N/A
RAICHUR POWER PLANT	KPCL	44.47	748.12
BALLARI	KPCL	44.43	986.07
KUDGI	NTPC LTD.	31.91	742.82
YERAMARUS TPS	RPCL	38.39	540.58



Inverse Correlation Equation: 1

PLF(%) = 44.596 – 0.0002 x (Weighted Avg Distance of TPS from Coal Mines: Kms)

Inverse Correlation Equation: 2

PLF(%) = 45.428 – 0.145 Log_e(Weighted Avg Distance of TPS from Coal Mines: Kms)

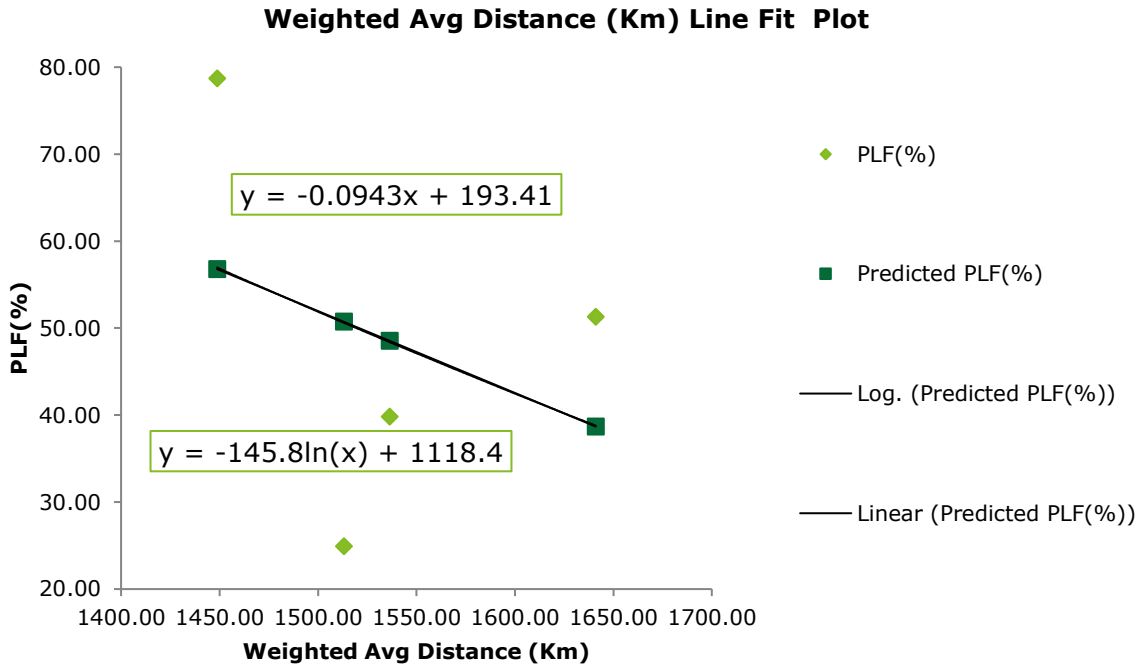
Assuming Best performance under two correlation scenarios, the PLF of Karnataka power plants could increase to ~44.55% - 44.60%.

Karnataka

Name of TPS	Power Utility	State	Installed Capacity (MW)	Coal Consumed (MT): FY22	PLF (%)	PLF Base Scenario	PLF Realistic Scenario	PLF Optimistic Scenario	Coal Consumption Base Scenario: FY30	Realistic Scenario: FY30	Optimistic Scenario: FY30
VIJAYANAGAR	JSW ENERGY LIMITED	Karnataka	860.00	1.34	44.94	44.94	44.94	85.00	1.34	1.34	2.54
RAICHUR POWER PLANT	KPCL	Karnataka	1720.00	4.74	44.47	44.55	44.60	85.00	4.75	4.75	9.06
BALLARI	KPCL	Karnataka	1700.00	4.36	44.43	44.55	44.60	85.00	4.37	4.38	8.34
KUDGI	NTPC LTD.	Karnataka	2400.00	3.97	31.91	44.55	44.60	85.00	5.55	5.55	10.58
YERAMARUS TPS	RPCL	Karnataka	1600.00	3.29	38.39	44.55	44.60	85.00	3.82	3.82	7.28
UDUPI	UDUPI POWER CORPORATION LIMITED	Karnataka	1200.00	0.73	16.29	44.55	44.60	85.00	1.99	1.99	3.79
				18.43					**21.81**	**21.84**	**41.59**

Punjab

Name of TPS	Power Utility	PLF(%)	Weighted Avg Distance (Km)
RAJPURA TPS	NABHA POWER LIMITED	78.72	1448.75
GURU HARGOBIND TPP, LEHRA MOHABAT	PSPCL	24.91	1513.06
GURU GOBIND SINGH TPP, ROPAR	PSPCL	23.57	1359.12
GVK POWER (GOINDWALSAHIB) LTD.	PSPCL	39.83	1536.29
TALWANDI SABO POWER LTD	TALWANDI SABO POWER LTD.	51.29	1640.90



Inverse Correlation Equation: 1

PLF(%) = 193.41 – 0.0943 x (Weighted Avg Distance of TPS from Coal Mines: Kms)

Inverse Correlation Equation: 2

PLF(%) = 1118.4 – 145.8 Log_e(Weighted Avg Distance of TPS from Coal Mines: Kms)

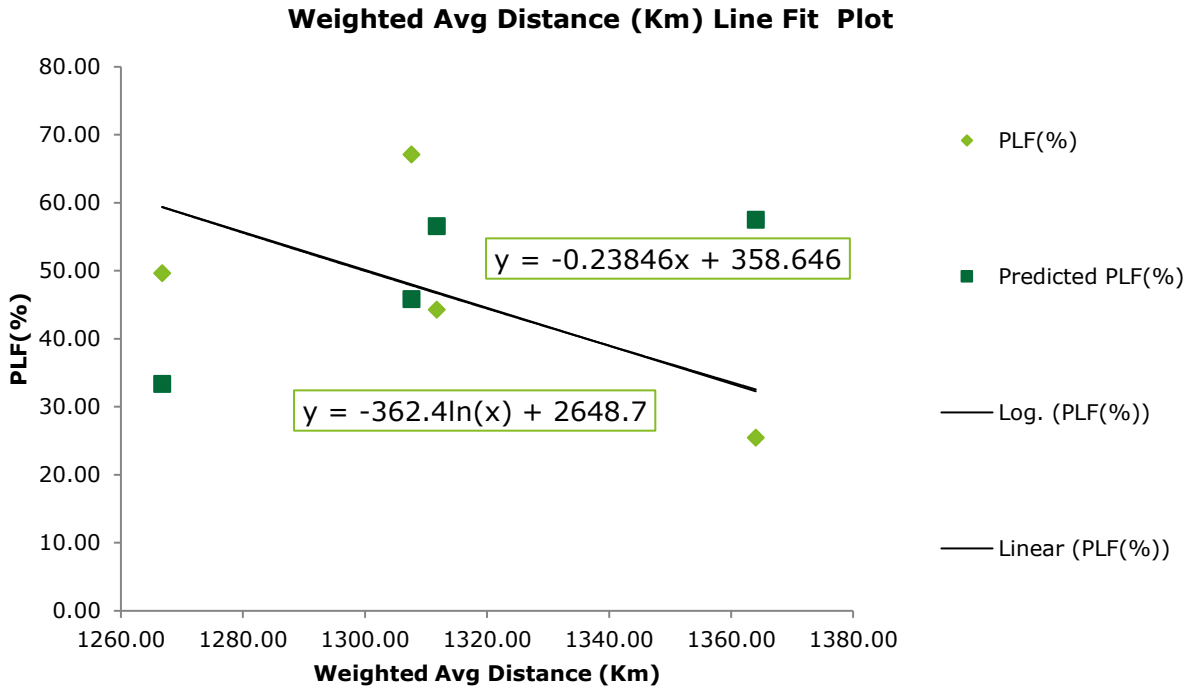
Assuming Best performance under two correlation scenarios, the PLF of Punjab power plants could increase to ~75.54% - 78.71%.

Punjab

Name of TPS	Power Utility	State	Installed Capacity (MW)	Coal Consumed (MT): FY22	PLF (%)	PLF Base Scenario	PLF Realistic Scenario	PLF Optimistic Scenario	Coal Consumption Base Scenario: FY30	Realistic Scenario: FY30	Optimistic Scenario: FY30
RAJPURA TPS	NABHA POWER LIMITED	Punjab	1400.00	5.44	78.72	78.72	78.72	90.00	5.44	5.44	6.22
GURU HARGOBIND TPP, LEHRA MOHABAT	PSPCL	Punjab	920.00	1.32	24.91	75.54	78.71	90.00	4.00	4.16	4.76
GURU GOBIND SINGH TPP, ROPAR	PSPCL	Punjab	840.00	1.18	23.57	75.54	78.71	90.00	3.77	3.93	4.49
GVK POWER (GOINDWALSAHIB) LTD.	PSPCL	Punjab	540.00	1.30	39.83	75.54	78.71	90.00	2.47	2.58	2.95
TALWANDI SABO POWER LTD	TALWANDI SABO POWER LTD.	Punjab	1980.00	6.02	51.29	75.54	78.71	90.00	8.86	9.24	10.56
				15.25					**24.54**	**25.34**	**28.98**

Haryana

Name of TPS	Power Utility	PLF(%)	Weighted Avg Distance (Km)
INDIRA GANDHI	ARAVALI POWER CORPORATION PVT LTD	53.66	1262.87
RAJIV GANDHI TPP,Hissar	HPGCL	25.44	1364.04
Deen Bandhu Chhotu Ram TPS, YAMUNANAGAR	HPGCL	49.66	1266.76
PANIPAT	HPGCL	44.29	1311.78
MAHATMA GANDHI TPP	JHAJJAR POWER LIMITED	67.08	1307.61



Inverse Correlation Equation: 1

PLF(%) = 358.646 – 0.23846 x (Weighted Avg Distance of TPS from Coal Mines: Kms)

Inverse Correlation Equation: 2

PLF(%) = 2648.7 – 362.4 $\log_e$(Weighted Avg Distance of TPS from Coal Mines: Kms)

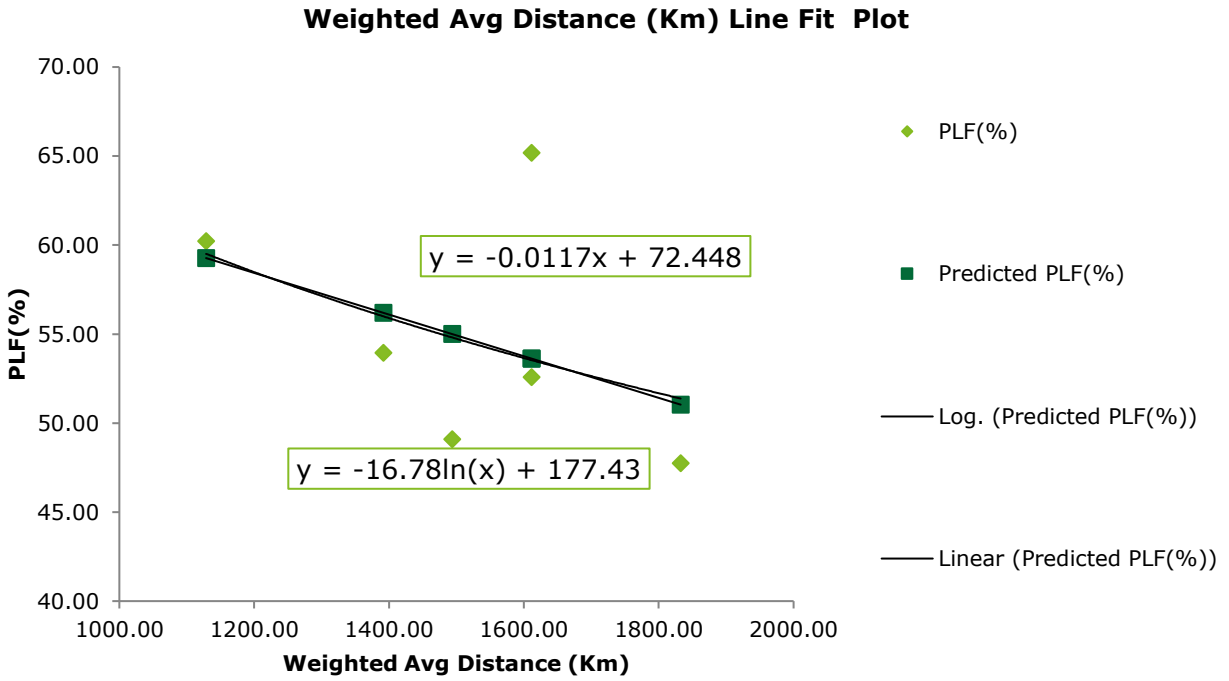
Assuming Best performance under two correlation scenarios, the PLF of Haryana power plants could increase to ~72.49% - 79.26%.

Haryana

Name of TPS	Power Utility	State	Installed Capacity (MW)	Coal Consumed (MT): FY22	PLF (%)	PLF Base Scenario	PLF Realistic Scenario	PLF Optimistic Scenario	Coal Consumption Base Scenario: FY30	Realistic Scenario: FY30	Optimistic Scenario: FY30
INDIRA GANDHI	ARAVALI POWER CORPORATION PVT LTD	Haryana	1500.00	4.67	53.66	72.49	79.26	90	6.31	6.90	7.83
RAJIV GANDHI TPP,Hissar	HPGCL	Haryana	1200.00	1.85	25.44	72.49	79.26	90	5.27	5.77	6.55
Deen Bandhu Chhotu Ram TPS, YAMUNANAGAR	HPGCL	Haryana	600.00	1.84	49.66	72.49	79.26	90	2.69	2.94	3.34
PANIPAT	HPGCL	Haryana	710.00	1.88	44.29	72.49	79.26	90	3.08	3.37	3.82
MAHATMA GANDHI TPP	JHAJJAR POWER LIMITED	Haryana	1320.00	4.74	67.08	72.49	79.26	90	5.12	5.60	6.36
				14.98					**22.47**	**24.57**	**27.90**

Tamil Nadu

Name of TPS	Power Utility	PLF(%)	Weighted Avg Distance (Km)
MUTIARA	COASTAL ENERGEN PVT. LTD	11.62	N/A
IL & FS TAMIL NADU POWER COMPANY LTD.	IL & FS TAMIL NADU POWER COMPANY LIMITED	29.43	N/A
NLC TAMILNADU POWER Ltd	NLC TAMIL NADU POWER LIMITED	47.75	1832.61
VALLUR	NTPC TAMILNADU ENERGY COMPANY LTD (NTECL) (NTPC-JV)	60.22	1128.64
TUTICORIN	TANGEDCO	53.95	1391.60
METTUR-I	TANGEDCO	65.18	1611.39
METTUR-II	TANGEDCO	52.58	1611.39
NORTH CHENNAI-I & II	TANGEDCO	49.09	1493.79



Inverse Correlation Equation: 1

PLF(%) = 72.448 – 0.0117 x (Weighted Avg Distance of TPS from Coal Mines: Kms)

Inverse Correlation Equation: 2

PLF(%) = 177.43 – 16.78 Log_e(Weighted Avg Distance of TPS from Coal Mines: Kms)

Assuming Best performance under two correlation scenarios, the PLF of Tamil Nadu power plants could increase to ~66.61% - 73.15%.

Tamil Nadu

Name of TPS	Power Utility	State	Installed Capacity (MW)	Coal Consumed (MT): FY22	PLF (%)	PLF Base Scenario	PLF Realistic Scenario	PLF Optimistic Scenario	Coal Consumption Base Scenario: FY30	Realistic Scenario: FY30	Optimistic Scenario: FY30
MUTIARA	COASTAL ENERGEN PVT. LTD	Tamil Nadu	1200.00	0.80	11.62	66.61	73.15	85.00	4.59	5.04	5.86
IL & FS TAMIL NADU POWER COMPANY LTD.	IL & FS TAMIL NADU POWER COMPANY LIMITED	Tamil Nadu	1200.00	1.67	29.43	66.61	73.15	85.00	3.77	4.14	4.81
NLC TAMILNADU POWER Ltd	NLC TAMIL NADU POWER LIMITED	Tamil Nadu	1000.00	3.04	47.75	66.61	73.15	85.00	4.24	4.66	5.42
VALLUR	NTPC TAMILNADU ENERGY COMPANY LTD (NTECL) (NTPC- JV)	Tamil Nadu	1500.00	5.96	60.22	66.61	73.15	85.00	6.59	7.24	8.41
TUTICORIN	TANGEDCO	Tamil Nadu	1050.00	4.28	53.95	66.61	73.15	85.00	5.28	5.80	6.74
METTUR-I	TANGEDCO	Tamil Nadu	840.00	3.86	65.18	66.61	73.15	85.00	3.95	4.33	5.04
METTUR-II	TANGEDCO	Tamil Nadu	600.00	2.16	52.58	66.61	73.15	85.00	2.74	3.01	3.50
NORTH CHENNAI-I & II	TANGEDCO	Tamil Nadu	1830.00	6.18	49.09	66.61	73.15	85.00	8.38	9.20	10.70
				27.95					**39.54**	**43.43**	**50.46**

Coal Demand from Under-Construction Capacities – Central Sector

#	Project Name	State	Implementing Agency	Units No	Capacity (MW)	Anticipated Year of Commissioning	PLF Base Scenario	PLF Realistic Scenario	Coal Consumption Base Scenario: FY30	Realistic Scenario: FY30	Optimistic Scenario: FY30
			Central Sector								
1	Barh STPP-I	Bihar	NTPC	Units 2 & 3 - 660x2	1320	2024	82.37	88.81	6.46	6.97	6.67
2	Buxar TPP	Bihar	SJVN	Units 1 & 2 - 660x2	1320	2024	82.37	88.81	4.82	5.20	4.976
3	North Karanpura STPP	Jharkhand	NTPC	Units 1,2 & 3 - 660x3	1980	2024	83.29	85.15	6.90	7.05	7.039
4	Patratu STPP	Jharkhand	PVUNL	Units 1,2 & 3 - 800x3	2400	2025	83.29	85.15	8.99	9.19	9.17
5	Talcher TPP St-III	Odisha	NTPC	Units 1 & 2 - 660x2	1320	2027	81.67	92.28	5.62	6.36	5.854
6	Ghatampur TPP	Uttar Pradesh	NUPPL	Units 1,2 & 3 - 660x3	1980	2023	52.6	64.5	5.57	6.83	9
7	Khurja SCTPP	Uttar Pradesh	THDC	Units 1 & 2 - 660x2	1320	2024	52.6	64.5	3.47	4.25	5.6
8	Telangana STPP St-I	Telangana	NTPC	Units 1 & 2 - 800x2	1600	2023	85.27	90.19	6.87	7.26	6.846
	Total Central Sector				13240				48.70	53.10	55.16

Coal Demand from Under-Construction Capacities – State Sector

1	Dr Narla Tata Rao TPS St-V	Andhra Pradesh	APGENCO	Unit 1	800	2023	77.02	79.60	3.21	3.32	3.548
2	Sri Damodaram Sanjeevaiah TPP St-II	Andhra Pradesh	APPDCL	Unit 1	800	2023	77.02	79.60	3.21	3.32	3.548
3	Jawaharpur STPP	Uttar Pradesh	UPRVUNL	Units 1 & 2 - 660x2	1320	2023	52.6	64.5	2.76	3.39	4.461
4	Obra-C STPP	Uttar Pradesh	UPRVUNL	Units 1 & 2 - 660x2	1320	2023	52.6	64.5	4.34	5.32	7.009
5	Panki TPS Extn	Uttar Pradesh	UPRVUNL	Unit 1	660	2024	52.6	64.5	2.18	2.68	3.53
6	Ennore SCTPP	Tamil Nadu	TANGEDCO	Units 1 & 2 - 660x2	1320	2024	66.61	73.15	4.66	5.12	5.95
7	North Chennai TPP St-III	Tamil Nadu	TANGEDCO	Unit 1	800	2023	66.61	73.15	2.68	2.94	3.421
8	Udangudi STPP St-I	Tamil Nadu	TANGEDCO	Units 1 & 2 - 660x2	1320	2024	66.61	73.15	4.62	5.07	5.893
9	Yadadri TPS	Telangana	TSGENCO	Units 1,2,3,4 & 5 - 800x5	4000	2024	85.27	90.19	14.04	14.85	14
10	Yelanhaka CCPP	Karntaka	KPCL	Unit 1	370	2023	44.55	44.60	0.84	0.84	1.597
11	Bhusawal TPS	Maharashtra	MAHAGENCO	Unit 1	660	2023	73.16	80.23	2.74	3.00	3.180
12	Sagardighi TPP, Ph-III	West Bengal	WBPDCL	Unit 1	660	2024	88.39	91.48	2.96	3.07	2.848
	Total State Sector				**14030**				**48.25**	**52.92**	**58.98**
	Grand Total - Under Construction				**27270**				**96.95**	**106.03**	**114.14**

Under Construction Power Plants and Fuel linkages – Central Sector

#	Project Name	State	Implementing Agency	Units No	Capacity (MW)	Anticipated Year of Commissioning	Fuel Security / Linkage	Coal Quantum (MTPA)	Source from State
1	Barh STPP-I	Bihar	NTPC	Units 2 & 3 - 660x2	1320	2024	Letter of Assurance dtd. 18.11.2010 from CCL, securing 10 MMTPA coal for 03 Units. FSA of Unit-1 (3.333 MTPA) already signed with CCL(all operative mines, G8-G10) as per MoC PD dtd. 17.07.2013. FSA of Unit-2 & 3 to be signed after commissioning in terms of para 1A(i)of SHAKTI-2017 policy.	6.97	Jharkhand
2	Buxar TPP	Bihar	SJVN	Units 1 & 2 - 660x2	1320	2024	Allocated Mine - CCL, Magadh-Amrapali; Distance from mine - 465 km (non pithead). Letter of Assurance (LoA) for 4.976 MTPA of G9 to G14 grade coal issued by Central Coalfields Ltd. (CCL) on 10.12.2018. Coal may be supplied either from Amrapali coal block or Magadh coal block.	5.20	Jharkhand
3	North Karanpura STPP	Jharkhand	NTPC	Units 1,2 & 3 - 660x3	1980	2024	Letter of Assurance dtd. 24.03.2015 from CCL, securing 7.039 MTPA coal (G7-G11) for 03 Units. FSA to be signed after commissioning in terms of para 1A (i) of SHAKTI-2017 policy.	7.05	Jharkhand
4	Patratu STPP	Jharkhand	PVUNL	Units 1,2 & 3 - 800x3	2400	2025	12 MTPA for Ph-I from Banhardih Coal Mine at a distance of about 110 km. Banhardi Coal Mine transferred to PVUNL vide deed of adherence signed on 02.06.2017. Bridge allocation granted by SLC(LT) upto 24-06-2024; Allocation from CCL; Coal quantity quantified is 9.17 MTPA.	9.19	Jharkhand
5	Talcher TPP St-III	Odisha	NTPC	Units 1 & 2 - 660x2	1320	2027	Available. (SLC(LT), MOM dt: 10.04.2018); FSA Agreement with MCL under process; Source: Bhuwaneswari/Jagannath mines of MCL Grade: G-12 Quantity: 5.854 MMTPA	6.36	Odisha
6	Ghatampur TPP	Uttar Pradesh	NUPPL	Units 1,2 & 3 - 660x3	1980	2023	Allocation Date- 03.10.2016. Allocated Mine (Source) - Pachwara South Coal Block (9 MTPA) Grade - G10 Quantity- Net Geological Reserve 373.52 MT. Extractable reserve - 262.84MT; Pachwara South Coal Block will be fully functional by the end of Financial Year 2026-27 and will be able to meet the coal requirement of NUPPL. Hence, NUPPL is seeking coal under bridge linkage by the time Pachwara South Coal Block will be fully functional.	6.83	Jharkhand
7	Khurja SCTPP	Uttar Pradesh	THDC	Units 1 & 2 - 660x2	1320	2024	For Coal linkage, Ministry of Coal, GoI vide allotment order dtd.17.01.2017 has allotted Amelia Coal Mine in District Singraulli, Madhya Pradesh to THDCIL to meet out fuel requirements of the project. Grade of Coal: G9 (Avg. GCV = 4746 Kcal/Kg). Net Geological Reserve in Amelia Coal Mine is 162.05 Million Ton (OC) out of this Extractable Coal Reserve is 139.48 Million Ton.	4.25	Madhya Pradesh
8	Telangana STPP St-I	Telangana	NTPC	Units 1 & 2 - 800x2	1600	2023	Linked with Mandakini-B captive coal mine (PRC-20 MMTPA); however, NTPC has approached MoC on 26.12.2020 for surrendering the coal mine. Tapering linkage against the linked coal mine was initially allocated from WCL cost-plus. In July'2020, the linkage has been shifted to SCCL. Coal quantity quantified by the Coal Controller is 6.846 MTPA.	7.26	Telangana
	Total Central Sector				**13240**			**53.10**	

Source: CEA Broad Status Report Nov 2022, Monthly Statistical Reports, Ministry of Coal, Provisional Coal Statistics, National Rail Plan 2020, National Electricity Plan by CEA, 20th EPS Survey by CEA

Under Construction Power Plants and Fuel linkages – State Sector

1	Dr Narla Tata Rao TPS St-V	Andhra Pradesh	APGENCO	Unit 1	800	2023	Allocated Mine - MCL (non-pithead); Distance from mine - 930 km (non pithead); MCL issued LoI for supply of 3.548 MTPA vide letter dated 12-11-2018. Grade of coal - G13;	3.32	Odisha
2	Sri Damodaram Sanjeevaiah TPP St-II	Andhra Pradesh	APPDCL	Unit 1	800	2023	Allocated Mine - MCL, Talcher (Odisha); Distance from mine - 1225 km (non pithead); MCL has issued LoA to supply 3.548 MTPA vide letter dated 04-03-2018.	3.32	Odisha
3	Jawaharpur STPP	Uttar Pradesh	UPRVUNL	Units 1 & 2 - 660x2	1320	2023	Allocated Mine - Saharpur Jamarpani mines, Jharkhand; Distance from mine - 1190 km (non pithead) Bridge Linkage from CCL/ECL for 4.461 MTPA	3.39	Jharkhand
4	Obra-C STPP	Uttar Pradesh	UPRVUNL	Units 1 & 2 - 660x2	1320	2023	Allocated Mine - Saharpur Jamarpani mines (15 MTPA), Jharkhand; Distance from mine - 651 km (non pithead); Allocation Date: 13.08.2015. Grade of Coal -G10	5.32	Jharkhand
5	Panki TPS Extn	Uttar Pradesh	UPRVUNL	Unit 1	660	2024	Allocated Mine - Saharpur Jamarpani mines (15 MTPA), Jharkhand; Distance from mine - 896 km (non pithead); Allocation Date: 13.08.2015. Grade of Coal -G10. FSA on 30.01.2017	2.68	Jharkhand
6	Ennore SCTPP	Tamil Nadu	TANGEDCO	Units 1 & 2 - 660x2	1320	2024	Allocated Mine - Chandrabila Coal Block, Odisha; Distance from mine - 1300 km (non pithead); Total requirement is 5.95MTPA, comprising of indigenous 3.68 MTPA & imported 2.26 MTPA respectively MoU has already been signed between MMTC & TANGEDCO on 25.06.2012 for the supply of Import coal for this project. Bridge Linkage with SCCL available for indigenous coal.	5.12	Odisha & Imported
7	North Chennai TPP St-III	Tamil Nadu	TANGEDCO	Unit 1	800	2023	Allocated Mine - SCCL; Distance from mine - 606 km (non pithead);. Ministry of Coal recommended for long-term coal linkage for 1.971 MTPA Indigenous coal to SCCL. FSA Executed between TANGEDCO and SCCL for indigenous coal. MoU has been entered with M/s. MMTC for supply of Imported coal of 1.450 MTPA on 25.05.2015.	2.94	Telangana & Imported
8	Udangudi STPP St-I	Tamil Nadu	TANGEDCO	Units 1 & 2 - 660x2	1320	2024	Allocated Mine - Chandrabila Coal Block for indigenous coal of G13 Grade for 3.647 MTPA and MDO selection is under process. Distance from mine (appx) : Railway distance for movement of coal through Rail-cum-Sea route via Paradip port is 200 km.(Chandrabila to Paradip port), from Paradip port to Udangudi captive Port, sea distance is 1224 Nautical Miles. Total requirement is 5.893 MTPA with Indigenous coal of 3.647 MTPA and import coal of 2.246 MTPA. Import coal (2.246 MTPA) will be procured to the requirements. Bridge Linkage with SCCL available for indigenous coal	5.07	Odisha & Imported
9	Yadadri TPS	Telangana	TSGENCO	Units 1,2,3,4 & 5 - 800x5	4000	2024	Allocated Mine - SCCL; Distance from mine - 270 km (non pithead); Ministry of Coal vide File No.23014/1/2018-CLD, Dt:15-02-2018 has granted coal linkage from SCCL for supply of 14 MTPA of coal (grade-G9).	14.85	Telangana
10	Yelanhaka CCPP	Karntaka	KPCL	Unit 1	370	2023	NA - Could Source from Mandakini	0.84	Odisha
11	Bhusawal TPS	Maharashtra	MAHAGENCO	Unit 1	660	2023	Allocated Mine - WCL, Umred/Ghugus; Distance from mine – 403/430km; Allocation Date: 11-09-2020, Source: WCL mines ,Grade: G9/G10, Quantity : 3.18 million tonne.	3.00	Maharashtra
12	Sagardighi TPP, Ph-III	West Bengal	WBPDCL	Unit 1	660	2024	Allocated Mine - Pachhwara (North) Captive Coal Mine of WBPDCL. Distance from mine - 150 km (non pithead); Coal will be sourced mainly from captive coal mines of WBPDCL	3.07	Jharkhand
	Total State Sector				**14030**			**52.92**	
	Grand Total - Under Construction				**27270**			**106.03**	

Source: CEA Broad Status Report Nov 2022, Monthly Statistical Reports, Ministry of Coal, Provisional Coal Statistics, National Rail Plan 2020, National Electricity Plan by CEA, 20th EPS Survey by CEA

Power Plants in Pipeline and Fuel linkages (1/2)

#	Project Name	State	Implementing Agency	Capacity (MW)	Anticipated Year of Commissioning	Fuel Security / Linkage	Coal Quantum (MTPA)	Source from State
1	Lara STPP	Chhattisgarh	NTPC	1600	2027-28	Coal linkage available. NTPC has a captive block, Talaipalli with a PRC of 18 MTPA. Talaipalli has become operational in FY23	8.53	Chhattisgarh
2	Singrauli STPP-III	Uttar Pradesh	NTPC	1600	2027-28 & 2028-29	Singrauli is a pit-head power plant in Uttar Pradesh primarily supplied coal by Northern Coalfields. Long term linkage granted by Standing Linkage Committee (Long-Term) in 10.04.2018 from CIL. In minutes dt. 15.05.2018, CIL shall consult and allocate coal based on coal availability & transportation facility. Expected supply by NCL.	8.53	Uttar Pradesh/Madhya Pradesh
3	Darlipalli-II STPP	Odisha	NTPC	800	2028-29	Application for Long Term linkage under Shakti B(i) yet to be filed as on Jan-2023. NTPC's coal sourcing from Dulanga to meet current capacity of Darlipalli. Additional capacity addition likely to be sourced from MCL	4.26	Odisha
4	Sipat-III, STPP	Chhattisgarh	NTPC	800	2028-29	Application for Long Term linkage under Shakti B(i) yet to be filed. (After FR Approval) Sipat is a pithaed plant with supplies from SECL via MGR.	4.26	Chhattisgarh
5	Meja-II STPP	Uttar Pradesh	NTPC	1320	2028-29 & 2029-30	Application for Long Term linkage under Shakti B(i) yet to be filed. (After FR Approval) Currently Meja has FSAs with both NCL & CCL. However, due to limited growth of NCL, Meja is likely to be allotted coal from CCL	7.08	Jharkhand
6	Raghunathpur TPS, Phase-II	West Bengal	DVC	1320	2027-28 & 2028-29	Long term Linkage granted by SLC (LT) in 08.08.2022. Recommendations on allocation of coal from same source/subsidiary. ECL & CCL currently supplies to Raghunathpur.	7.08	West Bengal/Jharkhand
7	Durgapur TPS	West Bengal	DVC	800	2027-28	Application for Long term linkage under Shakti B(i) yet to be filed. DVC is also considering to participate in coal mine auction. Current FSAs are with MCL & CCL which expire in 2029. Expected new allotment from CCL.	4.29	Jharkhand
8	Koderma TPS	Jharkhand	DVC	1600	2027-28 & 2028-29	Application for Long term linkage under Shakti B(i) yet to be filed. DVC also considering to participate in coal mine auction. Current FSAs are with ECL & BCCL which expire in 2034. Expected new allotment from CCL.	8.58	Jharkhand
9	TPS-II 2nd Expansion	Tamil Nadu	NLC	1320	2027-28 & 2028-29	Basket of Mines in Neyveli. Plant is lignite-based and lignite is to be sources via conveyors from NLC's mines to the proposed power plant.	Not applicable, Lignite based	Tamil Nadu

Source: ACQ Required / available for Thermal Capacity addition up to-2030, Jan 2023, CEA

Power Plants in Pipeline and Fuel linkages (2/2)

#	Project Name	State	Implementing Agency	Capacity (MW)	Anticipated Year of Commissioning	Fuel Security / Linkage	Coal Quantum (MTPA)	Source from State
10	NLC Talabira STPS	Odisha	NLC	2400	2027-28 & 2028-29	Coal to be sources from Talabira II & III captive coal block (PRC: 23 MTPA)	12.79	Odisha
11	Buxar TPP-II STPP	Bihar	SJVNL	660	--	Application for Long Term linkage under Shakti B(i) yet to be filed. (After DPR Approval). For Buxar Unit 1 & 2, Allocated Mine - CCL, Magadh-Amrapali; Distance from mine - 465 km (non pithead). Letter of Assurance (LoA) for 4.976 MTPA of G9 to G14 grade coal issued by Central Coalfields Ltd. (CCL) on 10.12.2018. Coal may be supplied either from Amrapali coal block or Magadh coal block.	3.54	Jharkhand
12	Super Critical TPP, Korba (W)	Chhattisgarh	CSPGCL	1320	2028-29 & 2029-30	FSAs of decommissioned / proposed to be decommissioned Units are available. Matter proposed to be discussed in SLC.	7.04	Chhattisgarh
13	Yamuna Nagar TPP Unit 3	Haryana	HPGCL	800	2027-28	Coal Block yet to be surrendered. Recommendations for Grant of Long Term Linkage already submitted by CEA on HPGCL request. Allocation of coal likely to be from CCL	4.29	Jharkhand
14	Amarkantak TPS	Madhya Pradesh	MPPGCL	660	2027-28	Long term Linkage granted by SLC (LT) in 18.11.2019. Amarkantak is a pithead plant located near Sohagpur & Johilla areas of SECL in Madhya Pradesh. Coal likely to be allocated from these areas	3.54	Madhya Pradesh/ Chhattisgarh
15	Satpura TPP	Madhya Pradesh	MPPGCL	660	2027-28	Long term Linkage granted by SLC (LT) in 18.11.2019. Likely allocation from WCL.	3.54	Maharashtra
16	Chandrapur TPP	Maharashtra	Mahagenco	1320	2029-30	Application for Long Term linkage under Shakti B(i) yet to be filed. (After DPR Approval) Coal likely to be allocated from WCL	7.08	Maharashtra
17	Koradi TPS Replacement	Maharashtra	Mahagenco	660	2027-28	Application for Long Term linkage under Shakti B(i) yet to be filed. Coal currenty sourced from WCL & SECL. Likely additional allocation from SECL due to WCL's continuing supplies and limited growth	3.54	Chhattisgarh
18	Ukai TPC, Tapi	Gujarat	GSECL	800	2027-28	Application for Long Term linkage under Shakti B(i) yet to be filed. Major coal supplies currently from SECL. Allocation likely to be from SECL	4.29	Chhattisgarh
19	Singareni Unit 3	Telangana	SCCL	800	2027-28	Naini captive coal block with PRC of 10 MTPA	4.29	Odisha
		Total		**21,240**			**106.55**	

Source: ACQ Required / available for Thermal Capacity addition up to-2030, Jan 2023, CEA

All India demand of thermal coal from power sector in FY30

State	FY22 Coal Consumption (MTPA)	FY30 Base (MTPA)	FY30 Realistic (MTPA)	FY30 Optimistic (MTPA)	Max Increase Anticipated (MTPA): FY22 to FY30
Existing Capacities with Improved PLF: FY30					
Odisha	45.33	53.10	57.61	59.30	13.98
Chhattisgarh	103.90	130.55	145.29	147.02	43.13
Uttar Pradesh	84.26	96.21	98.82	120.30	36.04
Madhya Pradesh	83.72	92.20	104.28	111.72	28.00
Gujarat	22.03	32.69	36.53	43.81	21.78
Andhra Pradesh	40.16	52.57	54.33	64.84	27.17
Rajasthan	22.80	29.25	32.19	37.70	14.90
Maharashtra	81.92	101.10	108.31	128.25	46.33
Karnataka	18.43	21.81	21.84	41.59	23.16
Punjab	15.25	24.54	25.34	28.98	13.72
Harayana	14.98	22.47	24.57	27.90	12.91
Telangana	30.57	35.13	37.13	38.80	8.24
Bihar	29.98	37.10	40.00	42.79	12.81
West Bengal	54.19	71.56	73.78	76.61	22.42
Jharkhand	19.26	21.16	21.63	22.87	3.60
Tamil Nadu	27.95	39.54	43.43	50.46	22.52
Assam	2.49	2.67	3.00	3.12	0.63
Total	**704.91**	**863.65**	**928.07**	**1046.08**	**+ 351.35**
Upcoming Capacities by FY30					
Bihar	0	11.29	12.17	11.65	11.65
Uttar Pradesh	0	18.32	22.46	29.60	29.60
Jharkhand	0	15.88	16.24	16.21	16.21
Andhra Pradesh	0	6.43	6.65	7.10	7.10
Odisha	0	5.62	6.36	5.85	5.85
Karnataka	0	0.84	0.84	1.60	1.60
Telangana	0	20.91	22.12	20.85	20.85
West Bengal	0	2.96	3.07	2.85	2.85
Maharashtra	0	2.74	3.00	3.18	3.18
Tamil Nadu	0	11.96	13.14	15.26	15.26
Total	**0**	**96.95**	**106.03**	**114.14**	**+ 114.14**
Grand Total	**704.91**	**960.59**	**1034.10**	**1160.22**	**+ 465.49**

Detailed analysis
for
Odisha

Thermal Coal Supply Analysis summary for Odisha

Odisha

All figures in million tonnes

	Actuals			Projections						
	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Coal Supply										
Talcher CF	83.9	96.7	112.7	111.8	125.1	165.1	174.1	174.1	181.6	188.6
IB Valley CF	64.1	71.4	80.6	92.2	99.9	124.9	129.3	137.3	143.3	147.3
Total MCL (CIL)	**148**	**168**	**193**	**204**	**225**	**290**	**303**	**311**	**325**	**336**
Captive & Commercial - Talcher CF	0.0	0.0	0.0	7.5	19.8	26.4	35.3	47.1	62.8	83.9
Captive & Commercial - IB Valley CF	6.7	16.9	25.20	25.20	29.3	35.3	42.5	51.1	61.4	73.9
Total Non-CIL	**6.7**	**16.9**	**25.20**	**32.7**	**49.1**	**61.7**	**77.7**	**98.1**	**124.2**	**157.7**
Total Coal Production in Odisha	**155**	**185**	**219**	**237**	**274**	**352**	**381**	**410**	**449**	**494**

MCL has ambitious production capacity expansion plans

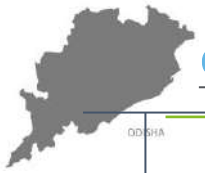
Odisha

All figures in million tonnes

Coal Supply from MCL	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Talcher CF	84	97	112.7	111.8	123	165	174	174	182	189
IB Valley CF	64	71	80.6	92.2	102	125	129	137	143	147
Total MCL (CIL)	148	168	193.3	204	225	290	303	311	325	336

Coalfield	AREA	Name of Mine / Project	Distt	Type (UG / OC)	PR Capacity (MTY)	EC Capacity (MTY)	Actual 21-22	2022-23 (T)	2022-23 (Act)	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31
Talcher	Jagannath	Jagannath OCP	Angul	OC	6.00	7.50	7.03	7.50	7.50	7.50	7.50	7.50	7.5	7.5	7.5	7.5	7.5
Talcher	Jagannath	Ananta OCP	Angul	OC	15.00	20.00	13.58	14.00	17.10	16.00	18.70	20.00	20	20	20	20	20
Talcher	Jagannath	Bhubaneswari OCP	Angul	OC	40.00	30.00	28.00	28.00	30.00	30.00	30.00	36.00	40	40	40	40	40
Talcher	Bharatpur	Bharatpur OCP	Angul	OC	20.00	20.00	9.25	10.00	9.25	10.24	15.00	20.00	20	20	20	20	20
Talcher	Lingaraj	Lingaraj OCP	Angul	OC	16.00	20.00	14.46	14.00	16.51	15.00	17.00	20.00	20	17	17	17	17
Talcher	Kaniha	Kaniha OCP	Angul	OC	30.00	14.00	10.10	10.00	12.15	13.00	14.00	18.00	24	24	24	25	25
Talcher	Hingula	Hingula OCP	Angul	OC	15.00	15.00	7.74	10.00	12.38	12.00	13.00	20.00	18	18	18	18	18
Talcher	Hingula	Balaram OCP	Angul	OC	15.00	8.00	6.53	6.50	7.74	8.00	8.00	11.00	12.5	12.5	15	15	15
Talcher	subhadra	Subhadra OCP	Angul	OC	25.00	0.00	0.00	0.00		0.00	0.00	5.00	7	10	15	21	25
Talcher	Hingula	Balabhadra OCP	Angul	OC	10.00	0.00	0.00	0.00		0.00	0.00	0.00	2	5	5.5	5.5	5.5
Talcher	Talcher	Nandira UG	Angul	UG	0.33	0.33	0.06	0.06	0.06	0.06	0.06	0.06	0.08	0.08	0.08	0.08	0.08
Ib Valley	Ib Valley	Lajkura OCP	Jharsuguda	OC	2.50	4.50	4.50	4.50	4.50	4.50	4.50	4.50	4.5	4.5	4.5	4.5	4.5
Ib Valley	Ib Valley	Samaleswari OCP	Jharsuguda	OC	12.00	15.00	5.19	5.00	6.44	8.00	13.00	15.00	15	15	15	15	15
Ib Valley	Lakhanpur	Belpahar OCP	Jharsuguda	OC	8.00	9.00	7.25	7.50	7.51	9.00	9.00						
Ib Valley	Lakhanpur	Lakhanpur OCP	Jharsuguda	OC	15.00	22.50	21.00	21.00	22.50	22.50	22.50						
Ib Valley	Lakhanpur	Int. LBL OCP#	Jharsuguda	OC	30.00	0.00	0.00					40.00	40	40	40	40	40
Ib Valley	Mahalaxmi	Basundhara West OCP	Sundargarh	OC	7.00	8.00	1.00	0.90	0.95	0.60	3.14	7.54	7	7	7	7	7
Ib Valley	Mahalaxmi	Siarmal OCP	Sundargarh	OC	50.00	50.00	0.00	3.00	0.00	8.00	10.00	25.00	25	30	36	40	40
Ib Valley	Basundhara	Kulda OCP	Sundargarh	OC	15.00	21.00	18.50	18.50	21.00	21.00	21.00						
Ib Valley	Basundhara	Garjanbahal OCP	Sundargarh	OC	10.00	18.20	13.55	15.16	17.29	18.20	18.20						
Ib Valley	Basundhara	Kulda Garjanbahal Int.*	Sundargarh	OC	40.00	0.00	0.00					40.00	40	40	40	40	40
Ib Valley	Orient	Orient Colliery - 1&2	Jharsuguda	UG	0.87	0.87	0.20	0.20	0.19	0.20	0.20	0.20	0.2	0.2	0.2	0.2	0.2
Ib Valley	Orient	Hirakhand Bundia Mine	Jharsuguda	UG	0.95	0.95	0.23	0.18	0.19	0.20	0.20	0.20	0.22	0.22	0.22	0.22	0.22
					383.7	**284.9**	**168.2**	**176.0**	**193.3**	**204.0**	**225.0**	**290.0**	**303.0**	**311.0**	**325.0**	**336.0**	**340.0**

MCL has ambitious production capacity expansion plans



Odisha

Area	Linked Mines	FY22 Actual Despatch (MTPA)					FY25-26 1 BT Plan (MTPA)					FY29-30 Anticipated Dispatch (MTPA)				
		Rail	RCR	Pure Road	MGR & Others	Total	Rail	RCR	Pure Road	MGR & Others	Total	Rail	RCR	Pure Road	MGR & Others	Total
IB Valley	Samaleshwari & Lajkura	7.68	0.00	1.42	0.00	**9.10**	17.81	0.00	1.69	0.00	**19.50**	17.81	0.00	1.69	0.00	**19.50**
Lakhanpur	Lakhanpur, Belpahar & Lilari	20.45	0.00	3.65	4.00	**28.10**	34.19	0.00	1.81	0.00	**36.00**	37.99	0.00	2.01	0.00	**40.00**
Basundhara & Mahalaxmi	Kulda, Garjanbahal, Siarmal, Basundhara (W) Extn	20.01	0.00	16.83	0.00	**36.84**	48.60	0.00	23.00	0.00	**71.60**	79.50	0.00	7.50	0.00	**87.00**
Orient	Hirakhand-Bundia , Orient 1,2,3	0.00	0.00	0.24	0.00	**0.24**	0.82	0.00	0.00	0.00	**0.82**	0.78	0.00	0.00	0.00	**0.78**
IB Valley & Basundhara CF		**48.14**	**0.00**	**22.14**	**4.00**	**74.04**	**101.42**	**0.00**	**26.50**	**0.00**	**127.92**	**136.08**	**0.00**	**11.20**	**0.00**	**147.28**
Lingaraj	Lingaraj OCP	18.89	0.00	2.21	0.00	**21.10**	18.89	0.00	1.11	0.00	**20.00**	17.00	0.00	0.00	0.00	**17.00**
Bhubaneswari, Kaniha, Jaganath, Bharatpur, Hingula, Talcher, Balabhadra, Subhadra	Bhubaneswari, Ananta, Kaniha, Jaganath, Bharatpur, Hingula, Nandira, Balram, Balabhadra, Subhadra	48.90	0.00	23.13	9.24	**81.27**	123.3	0.00	13.31	10.5	**147.08**	145.3	0.00	15.7	10.50	**172.00**
Talcher CF		**67.79**	**0.00**	**25.34**	**9.24**	**102.36**	**142.2**	**0.00**	**14.42**	**10.5**	**167.08**	**162.8**	**0.00**	**15.7**	**10.50**	**189.00**
Total MCL		**115.93**	**0.00**	**47.48**	**13.24**	**176.41**	**248.6**	**0.00**	**40.92**	**10.5**	**295.00**	**298.88**	**0.00**	**26.9**	**10.50**	**336.28**

MCL's despatch is progressing towards higher share of rail from current 66% to a target of 88% by FY30. Ensuring that the evacuation capacity exists is a crucial aspect of the holistic logistics policy.

As pure road despatches would decline from ~47 MTPA to ~27 MTPA (a decrease of 20 MTPA), no new NH and SH level road infrastructure are envisaged.

Non-CIL blocks Pipeline in Odisha – Talcher Region

Odisha

Details of Non-Cil blocks in Talcher Region

#	Name of the Block	Block Owner	PRC	Operational Status	Proposed Loading Point	EUP and other remarks	Actual FY23 Production	Actual FY22 Production
1	Naini	The Singareni Collieries Co Ltd	10	Not operational (Expected to Produce 5 MTPA in FY24)	Jarpada Railway Station (Mine to Station via SH-63)	Singareni Thermal Power Plant, Telangana, 1185 Kms from the mine	0	0
2	Utkal E, Utkal D	NALCO	4	Utkal-E Operational, Utkal-D Non-Operational	Angul Railway Siding, feed via MCRL inner corridor	CPP Nalco, Angul, Odisha, 42 Kms from the mine	0	0
3	Baitrani West	GMDC	15	Not operational	MCRL corridor using Angul Railway Siding, Angul-Budhapank-Paradip line for coastal shipping	Commercial sales, EUP not decided yet	0	0
4	New Patrapara (Surrendered)	The Singareni Collieries Co Ltd	15	Not operational	MCRL corridor using Angul Railway Siding, Angul-Budhapank-Paradip line for coastal shipping	Commercial sales, EUP not decided yet (Surrendered)	0	0
5	Mandakini	Karnataka Power Corporation Ltd.	7.5	Not operational	Angul Railway Siding and Coastal shipping from Paradip to New Mangalore Port	Ballari TPS Unit-1, Yeramarus TPS Unit-1 & 2, Karnataka, 1477 & 1556 Kms respectively	0	0
6	Radhikapur East	EMIL Mines and Mineral Resources Ltd	5	Not operational	Jarpada Railway Station (50 kms from mine)	Commercial Sales, EUP not fixed	0	0
7	Radhikapur West	Vedanta Ltd	6	Not Operational	Jarpada Railway Station (10 kms from mine)	Jharsuguda Plant, 173 Kms from the mine	0	0
8	Chandrabila	TANGEDCO	10	Not Operational	Talcher Railway Station (20 Kms from mine)	ETPS (660), Ennore SEZ (2x660) Udangudi Stage – 1 (2x660). 2087, 1359 and 3002 Kms from the mine respectively	0	0
9	Brahmani	The Orissa Minerals Development Co. Ltd.	NA	Not Operational	Block is under exploration phase, Mining Plan not prepared		0	0
10	Sarapal-Nuapara	Odisha Mineral Development Co Ltd	-	Not Operational	Requested to surrender of this block vide letter dated 09.11.2020		0	0
Total PRC			72.5					

Other than those listed above, Utkal-C with 3.37 MTPA PRC of G-12 Grade coal was allotted to JSPL @ 45% FPO, Bankhul partially explored block of G-12 grade coal was allotted to Yazdani Steel & power @18% FPO, and Utkal B1&B2 with 8 MTPA was allotted to JSPL @ 15.25% FPO. Chendipada and Sakhigopal-B partially explored blocks were allotted to Rungta Sons in the latest 16th Tranche block auctions.

Non-CIL blocks Pipeline in Odisha – Talcher Region – Upcoming 7th Tranche

Odisha

Details of Non-CIL blocks in Talcher Region – Upcoming 7th Tranche Auctions – Explored Blocks

#	Name of the Block	PRC
1	Kosala West (Eastern Part)	1
2	Kosala East (Western Part)	1
3	Machhakata (Revised)	30
4	North of Arkhapal Srirampur	12
5	Ramchandi Promotion Block (Revised)	12
6	Saradhapur North (Revised)	6
Total PRC		62 MTPA

Other than the already auctioned and allotted blocks, 6 explored blocks with a cumulative PRC of ~62 MTPA are also up for auctions under the upcoming 7th Tranche of Auctions. These blocks will lead to additional load of ~62 MTPA or 43 R/d coal traffic in rail lines of Odisha.

Non-CIL blocks Pipeline in Odisha – IB-Valley Region

Odisha

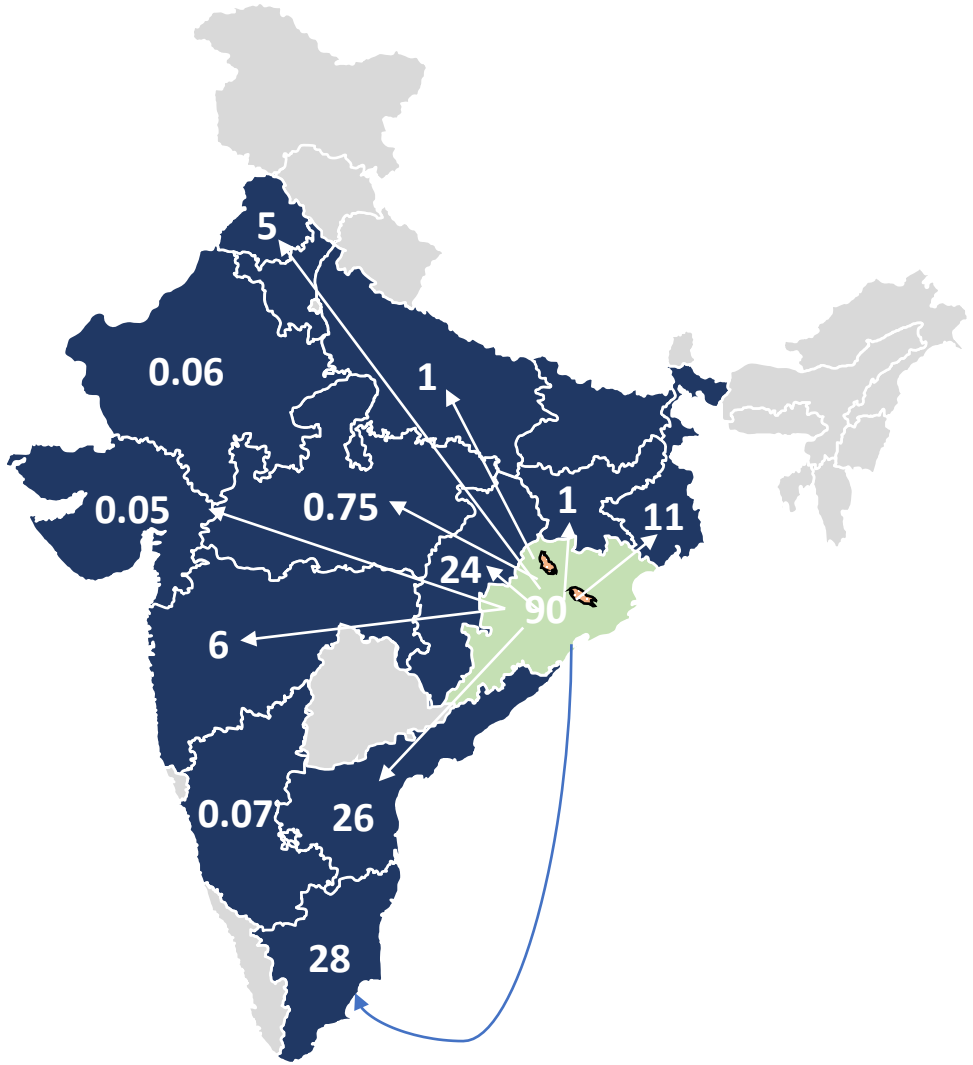
Details of Non-Cil blocks in IB-Valley Region

#	Name of the Block	Block Owner	PRC	Operational Status	Proposed Loading Point	EUP and other remarks	Actual FY23 Production	Actual FY22 Production
1	Dulanga	NTPC Ltd	7	Operational	Dedicated MGR system under construction	Darlipalli TPS, Odisha, 32 Kms from the mine	7	5.29
2	Manoharpur	Odisha Coal & Power Limited	8	Operational	Himgir Railway Siding, dedicated line	OPGCL TPS, Odisha, 47 Kms from the mine	8	5.24
3	Manoharpur Dip Side	Odisha Coal & Power Limited	8	Not operational	Himgir Railway Siding	Commercial sales, EUP not decided yet, coastal shipping also possible via Jharsuguda-Sambalpur-Budhapank-Paradip	0	0
4	Talabira II & III	NLC	20	Operational	Lapanga Railway Siding (40 Kms from the mine). Sambalpur-Angul-Budhapank-Cuttack railway line to Paradip Port	NLC Tamil Nadu TPS, NLC Talabira TPP, 1571 Kms and 5 Kms from the mine respectively	10	6.34
5	Talabira I	GMR Chhattisgarh Energy Limited (Currently under legal dispute)	3	Not-Operational - Under development	Lapanga Railway Siding (40 Kms from the mine).	Ballari TPS Unit-1, Yeramarus TPS Unit-1 & 2, Karnataka, 1477 & 1556 Kms respectively	0	0
6	Jamkhani	Vedanta Ltd	2.6	Not-Operational	Himgir Railway Siding (30 Kms from the mine). Himgir-Jharsuguda Rd Railway line	Jharsuguda, 57 Kms from the mine	0.2	0
7	Kuraloi A North	Vedanta Ltd	8	Not Operational	Belpahar Railway Station (1 kms from mine). Belpahar-Jharsuguda Rd Railway line	Jharsuguda, 35 Kms from the mine and for commercial sales	0	0
Total PRC			56.6				25.20	16.87

Other than those listed above, Bijahan with 5.26 MTPA PRC of G-11 Grade coal was allotted to Mahanadi Mines & Minerals @ 14% FPO and Meenakshi Block with 12 MTPA PRC of G-12 Grade Coal was allotted to Hindalco Industries Limited @ 10.25% FPO.

Origin – Destination Cluster Mapping for Odisha

O-D Source cluster Mapping – Despatch of Coal from Odisha: FY22 snapshot



FY22: Despatch of Coal from Odisha to destination state (MTPA)

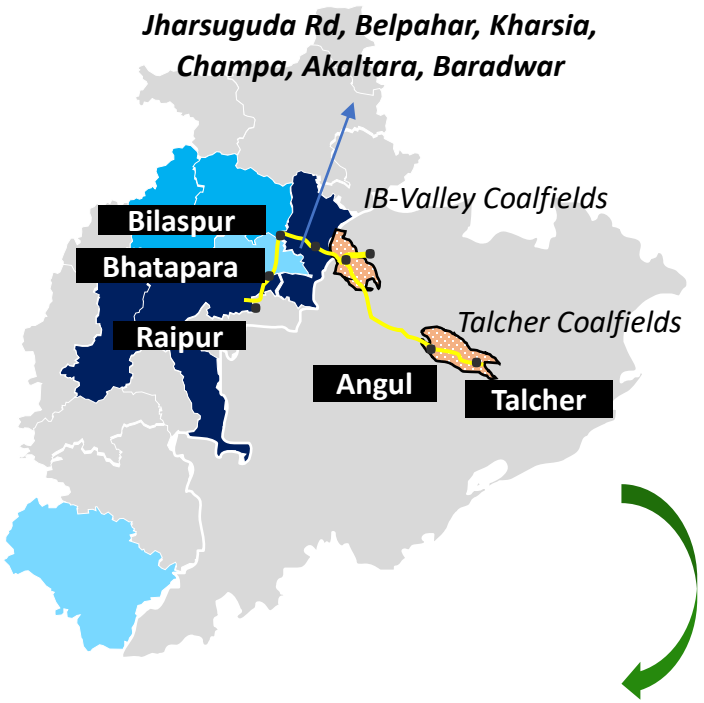
All figures in million tonnes

Consuming State	Rail + RCR	Rail-Sea-Rail	Pure Road	MGR & Others	Total
Odisha	32.35	0.00	34.23	23.77	90.35
Tamil Nadu	1.16	26.30	0.66	0.00	28.12
Andhra Pradesh	14.73	8.43	2.33	0.00	25.49
Chhattisgarh	14.33	0.00	9.14	0.00	23.47
West Bengal	11.15	0.00	0.17	0.00	11.31
Maharashtra	5.09	0.00	0.62	0.00	5.71
Punjab & Haryana	5.12	0.00	0.00	0.00	5.12
Jharkhand	0.88	0.00	0.25	0.00	1.13
Other States (UP, MP, Karnataka, Bihar, Rajasthan, Gujarat)	2.50	0.23	0.05	0.00	2.78
Total Despatch from Odisha	**87.31 (45.12%)**	**34.96 (18.07%)**	**47.46 (24.53%)**	**23.77 (12.28%)**	**193.5**

Origin – Destination Mapping and the coal flow analysis of rail trunk lines for ~87 MTPA is conducted and presented in the next sections

O-D Source cluster Mapping – Odisha to Chhattisgarh

Odisha to Chhattisgarh total Rail Despatch in FY22 = 14.33 Million Tonnes



Expected Load from Odisha to Chhattisgarh main trunk lines (Excluding load from other states on this line)

Chhattisgarh's Coal ***Demand 2022 ~ 134.2 MTPA***
Rail Supply by Odisha ***2022 ~ 14.33 MTPA***

Chhattisgarh's Coal ***Demand 2030 ~ 179.3 MTPA***
Rail Supply by Odisha ***2030 ~ 4 MTPA***

		FY22		FY30	
From	**To**	**Traffic (Tonnes) 2022**	**Rakes / Day 2022**	**Traffic (Tonnes) 2030**	**Rakes / Day 2030**
Talcher	Angul	1835057.3	1.3	46140.1	0.03
Angul	Jharsuguda Road	1835057.3	1.3	46140.1	0.03
Jharsuguda Road	Belpahar	1835057.3	1.3	46140.1	0.03
Belpahar (IB Section)	Kharsia	13392287.2	4	10411672.2	2.78
Kharsia	Champa	7119702.9	4	1995561.7	2.78
Champa	Bilaspur	7058585.1	2.2	1995564.0	1.42
Bilaspur	Bhatapara (Raipur Section)	3112378.9	2.2	574866.2	0.41
Bhatapara (Raipur Section)	Raipur	2990778.2	2.1	302610.4	0.22
Jharsuguda Jn	Kharsia	2849891.66	2.0	9773766.8	6.96

Major Coal Consuming Districts of Chhattisgarh: 2030 (Estimated)

>15 MTPA Coal Consumption	*Raipur, Raigarh, Durg*
5-10 MTPA Coal Consumption	*Korba, Bilaspur*
1-5 MTPA Coal Consumption	*Janjgir-Champa, Bijapur-Dantewada-Sukma cluster*

- Major Consumers in Chhattisgarh sourcing coal from MCL include ACC Bhatapara plant, Sipat STPS, NTPC Sail, Raipur Energen, KSK Mahanadi, DB power, RKM Energen, Korba STPS, BALCO, Lara TPS, Jindal Steel and Power Ltd, Raigarh Energy, JSPL, Mahendra Sponge etc.
- From a O-D cluster perspective, Block GP IV/1,2,3 & Sector-1 (28 MTPA), have been allotted to Jindal Power limited, which currently sources ~ 1.1 MTPA from MCL.. In future JPL's reliance on MCL is not foreseen due to captive supply capabilities.
- NLC also despatched 1.65 Million Tonnes to NTPC Lara via road in FY22.

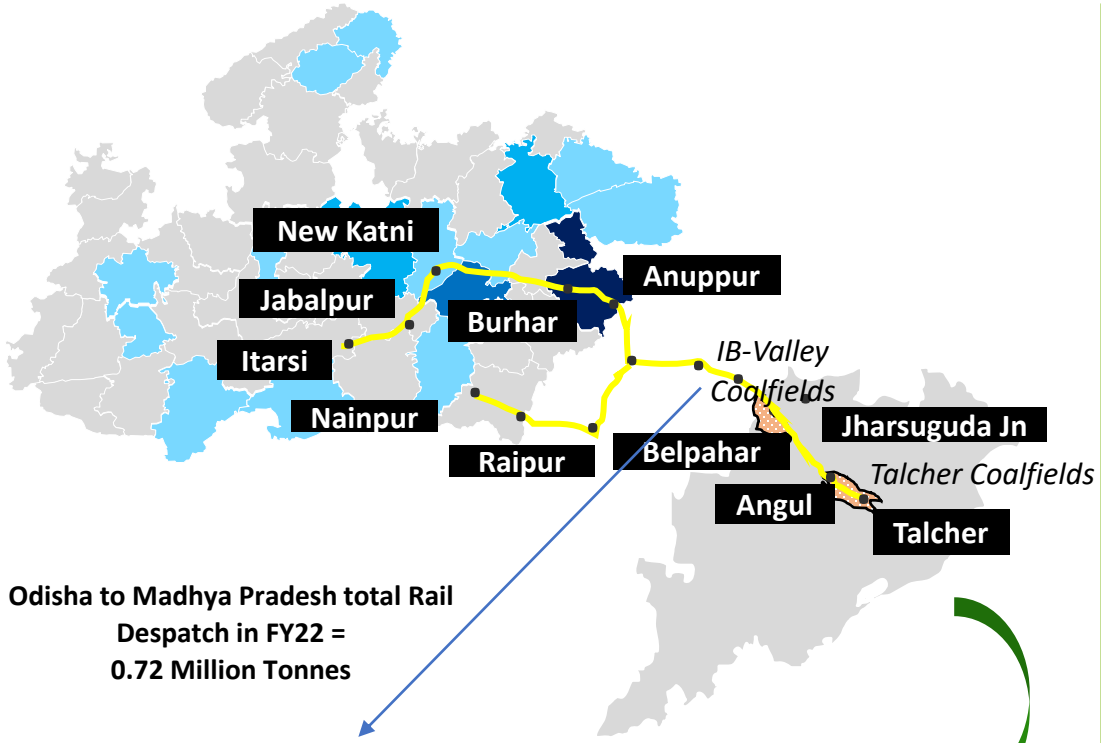
O-D Source cluster Mapping – Chhattisgarh's power plants to reduce reliance on Odisha

All figures in million tonnes

Name of TPS	Utility	IB-Valley	Talcher	Total Odisha	SECL	Captive	Others	Total Coal Consumed	Estimated Coal Consumption (FY30)	Supply from IB-Valley 2030	Supply from Talcher 2030	Odisha's Supply in FY30	Sourced from SECL/Captive
BALCO TPP	BALCO	0.01	0.00	0.01	5.29	0.00	0.00	5.31	7.62	0	0	0	7.62
O.P.Jindal Super TPP (Stage-I)	JINDAL POWER LIMITED	4.09	0.05	4.15	0.00	0.00	0.00	4.15	6.52	0.00	0.00	0.00	6.52
TAMNAR TPP	JINDAL POWER LIMITED	1.37	0.00	1.37	5.91	0.29	0.29	7.86	16.19	0.00	0.00	**0.00**	16.19 (GP iv/1,2,3, Sector-I + SECL)
KMPCL - NARIYARA	KSK MAHANADI POWER COMPANY LIMITED	0.57	0.08	0.65	4.34	0.00	0.86	5.85	9.61	1.40	0.04	**1.42**	8.19
BHILAI PP - III	NTPC - SAIL POWER COMPANY LIMITED (NTPC-JV)	0.40	0.23	0.62	1.48	0.00	0.56	2.66	3.11	0.00	0.00	0.00	3.11
R.K.M. POWERGEN PVT. LTD	R.K.M. POWERGEN PVT. LTD	0.09	0.00	0.09	3.55	0.00	1.62	5.27	9.07	0.00	0.00	0.00	9.07
RAIPUR TPP	RAIPUR ENERGEN LIMITED	0.44	1.47	1.92	1.17	0.00	3.11	6.19	7.89	0.00	0.00	0.00	7.89
SKS POWER GENERATION (CH) LTD.	SKS POWER GENERATION (CHHATTISGARH) LIMITED	0.13	0.00	0.13	1.09	0.00	0.01	1.23	3.65	0.00	0.00	0.00	3.65
LARA SUPER TPS	NTPC LTD.	5.04	1.66	6.70	0.27	0.00	0.83	7.81	9.04	0.00	0.00	**0.00**	9.04 (Talaipalli)
RAIGARH TPP	RAIGARH ENERGY GENERATION LIMITED	1.51	0.69	2.20	0.56	0.00	0.00	2.77	3.69	2.57	0.00	**2.57**	1.12
DB POWER	DB POWER LIMITED	2.11	0.42	2.53	3.94	0.00	0.00	6.47	7.40	0.00	0.00	0.00	7.40
KORBA SUPER	NTPC LTD.	0.03	0.00	0.03	13.92	0.00	0.00	13.95	14.04	0.00	0.00	0.00	14.04
SIPAT SUPER	NTPC LTD.	0.43	0.00	0.43	13.56	0.00	0.10	14.09	16.27	0.00	0.00	0.00	16.27
				20.83	**55.10**	**0.29**	**7.37**	**83.59**	**114.10**	**3.99**	**0.04**	**4.03**	**110.07**

- It has been assumed that due to increase in availability of coal from SECL, only power plants with binding FSAs with MCL would be sourcing coal from MCL and remaining power plants would prefer SECL's coal due to proximity of assets to SECL mines. Therefore, plants such as DB Power, Raipur Energen, OP Jindal, Bhilai PP, NTPC Lara etc. would stop sourcing coal from MCL altogether. Jindal Power will have sufficient captive capacity by FY30 and would stop sourcing coal from MCL.
- NTPC Lara would shift entirely to NTPC's Talaipalli Block (In Mand Raigarh Region) which would further reduce MCL's IB Valley despatch potential.

O-D Source cluster Mapping – Odisha to Madhya Pradesh



Odisha to Madhya Pradesh total Rail Despatch in FY22 = 0.72 Million Tonnes

Kharsia, Champa, Bilaspur

Major Coal Consuming Districts of MP: 2030 (Estimated)

>15 MTPA Coal Consumption	*Shahdol*
10-15 MTPA Coal Consumption	*Jabalpur*
5-10 MTPA Coal Consumption	*Satna, Sagar*
1-5 MTPA Coal Consumption	*Sidhi, Singrauli, Rewa, Katni, Damoh, Betul, Khandwa, Ujjain, Indore, Bhind, Gwalior, Bhopal, Seoni*

Expected Load from Odisha to Madhya Pradesh main trunk lines (Excluding load from other states on this line)

MP's Coal ***Demand 2022 ~ 84.33 MTPA***
Rail Supply by Odisha ***2022 ~ 2.13 MTPA***

MP's Coal ***Demand 2030 ~ 110.20 MTPA***
Rail Supply by Odisha ***2030 ~ 7.436 MTPA***

		FY22		FY30	
From	**To**	**Traffic (Tonnes) 2022**	**Rakes / Day 2022**	**Traffic (Tonnes) 2030**	**Rakes / Day 2030**
Talcher	Angul	110740.2	0.08	0.0	0.00
Angul	Jharsuguda Road	110740.2	0.08	0.0	0.00
Jharsuguda Road	Belpahar	110740.2	0.08	3336000	2.37
Belpahar (IB Section)	Kharsia	722762.0	0.51	7432035.7	5.29
Kharsia	Champa	722762.0	0.51	7432035.7	5.29
Champa	Bilaspur	722762.0	0.51	7432035.7	5.29
Bilaspur	Anuppur	313273.9	0.22	6790035.7	4.83
Anuppur	Burhar	313273.9	0.22	6790035.7	4.83
Burhar	New Katni	313273.9	0.22	6790035.7	4.83
New Katni	Jabalpur	225493.4	0.16	6790035.7	4.83
Jabalpur	Gadarwara (Itarsi section)	225493.4	0.16	0.0	0.00
Bilaspur	Raipur	409488.1	0.29	642000.0	0.46
Raipur	Gondiya	409488.1	0.29	642000.0	0.46
Gondiya	Nainpur	409488.1	0.29	642000.0	0.46
Nainpur	Chindawar (towards Amla)	409488.1	0.29	642000.0	0.46

- Major consumers include NTPC Gadarwara, Khargone, MB power and Jhabua Power.
- Supply from Meenakshi Block to Hindalco's Mahan Smelter (~3.45 MTPA) considered under this mapping for FY30

O-D Source cluster Mapping – Only 2 Power plants to source coal from Odisha in FY30

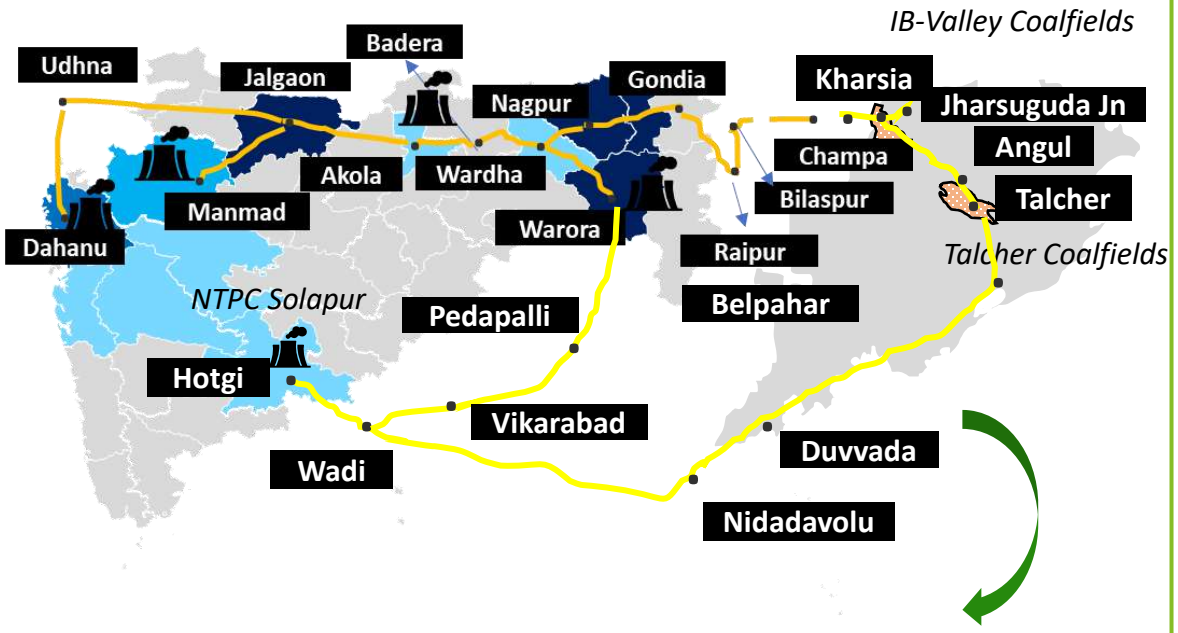
All figures in million tonnes

Name of TPS	Utility	IB-Valley	Talcher	Total Odisha	SECL	NCL	Others	Total Coal Consumed	Estimated Coal Consumption (FY30)	Supply from IB-Valley 2030	Supply from Talcher 2030	Odisha's Supply in FY30	Sourced from SECL/NCL Others
JHABUA POWER LIMITED	JHABUA POWER LIMITED	0.41	0.00	0.41	1.65	0.50	0.00	2.55	2.73	0.64	0.00	0.64	2.09
ANUPPUR TPS	MB POWER (MADHYA PRADESH) LIMITED	0.00	0.09	0.09	4.77	0.17	0.40	5.44	5.59	0.00	0.00	0.00	5.59
GADARWARA SUPER	NTPC LTD.	0.59	0.02	0.62	0.53	2.60	1.40	5.14	6.83	0.00	0.00	0.00	6.83
KHARGONE SUPER THERMAL POWER STATION	NTPC LTD.	1.02	0.00	1.02	0.80	2.00	0.02	3.84	5.29	3.336	0.00	3.336	1.954
Total				2.13	7.75	5.26	1.83	16.97	20.44	3.976	0.00	3.976	16.464

- It has been assumed that due to increase in availability of coal from SECL, and limited from NCL, only power plant with binding FSA with MCL would be sourcing coal from MCL and remaining power plants would prefer SECL's and NCL's coal due to proximity of assets to SECL and NCL mines. Therefore, apart from Jhabua Power and NTPC Khargone, other plants such as MB Power and NTPC Gadarwara would stop sourcing coal from MCL altogether.

O-D Source cluster Mapping – Odisha to Maharashtra

Odisha to Chhattisgarh total Rail Despatch in FY22 = 5.09 Million Tonnes



Major Coal Consuming Districts of Maharashtra: 2030 (Estimated)

>15 MTPA Coal Consumption	*Nagpur, Chandrapur, Bhandara, Jalgaon*
10-15 MTPA Coal Consumption	*Palghar/Thane*
5-10 MTPA Coal Consumption	*Nashik*
1-5 MTPA Coal Consumption	*Solapur, Pune, Raigad, Ahmednagar, Wardha & Akola*

Expected Load from Odisha to Maharashtra main trunk lines (Excluding load from other states on this line)

*Maharashtra's Coal **Demand 2022 ~ 84 MTPA***
*Rail Supply by Odisha **2022 ~ 5.09 MTPA***

*Maharashtra's Coal **Demand 2030 ~ 111 MTPA***
*Rail Supply by Odisha **2030 ~ 7.95 MTPA***

		FY22		FY30	
From	To	Traffic (Tonnes) 2022	Rakes / Day 2022	Traffic (Tonnes) 2030	Rakes / Day 2030
Talcher	Angul	419405.7	0.30	306324.8	0.22
Angul	Jharsuguda Road	419405.7	0.30	306324.8	0.22
Jharsuguda Road	Belpahar	419405.7	0.30	306324.8	0.22
Belpahar (IB Section)	Kharsia	5388417.6	3.83	7953130.3	5.66
Kharsia	Champa	5388417.6	3.83	7953130.3	5.66
Champa	Bilaspur	5388417.6	3.83	7953130.3	5.66
Bilaspur	Bhatapara (Raipur Section)	5388417.6	3.83	7953130.3	5.66
Bhatapara (Raipur Section)	Raipur	5388417.6	3.83	7953130.3	5.66
Raipur	Gondia	5388417.6	3.83	7953130.3	5.66
Gondia	Nagpur	4577560.4	3.26	4093479.4	2.91
Nagpur	Wardha	111362.2	0.08	2833000.0	2.02
Wardha	Warora	111362.2	0.08	0.0	0.00
Wardha	Badera	96519.4	0.07	0.0	0.00
Badera	Akola	96519.4	0.07	0.0	0.00
Akola	Jalgaon	96519.4	0.07	0.0	0.00
Jalgaon	Udhna	96519.4	0.07	0.0	0.00
Udhna	Dahanu	96519.4	0.07	0.0	0.00
Warora	Pedapalli	3546.7	0.00	2833000.0	2.02
Pedapalli	Vikarabad	3546.7	0.00	2833000.0	2.02
Vikarabad	Wadi	3546.7	0.00	2833000.0	2.02
Talcher	Budhapank	242910.8	0.17	0.0	0.00
Budhapank	Wadi	242910.8	0.17	0.0	0.00
Jharsuguda Jn	Kharsia	1868380.3	1.33	7787.5	0.01

- Major consumers include Adani Electricity, NTPC Mouda & Solapur plants, Mahagenco's Koradi, Chandrapur & Khaperkheda plants, Adani Power's Gondia Power Plant

O-D Source cluster Mapping – Slight increase of supplies from Odisha to Maharashtra

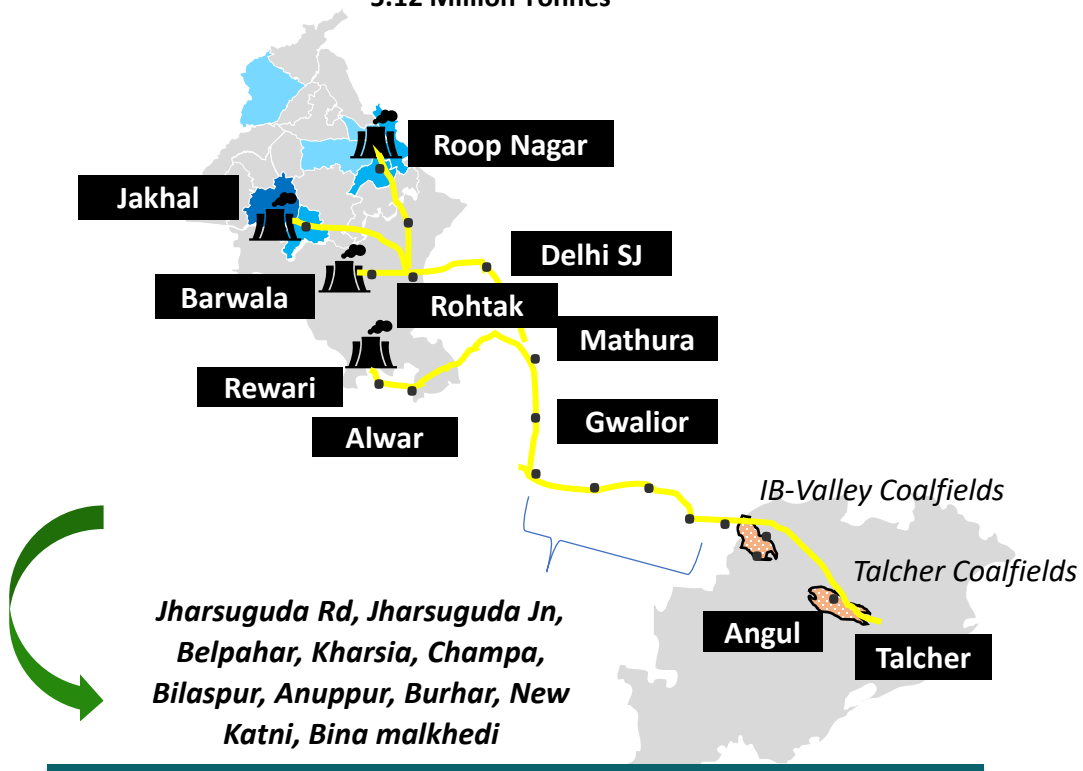
All figures in million tonnes

Name of TPS	Utility	IB-Valley	Talcher	Total Odisha	SECL	WCL	Others	Total Coal Consumed	Estimated Coal Consumption (FY30)	Supply from IB-Valley 2030	Supply from Talcher 2030	Odisha's Supply in FY30	Sourced from WCL/SECL Others
TIRODA	ADANI POWER MAHARASHTRA LTD.	0.75	0.06	0.81	6.72	3.53	3.12	14.18	15.20	1.03	0.00	1.03	14.17
CHANDRAPUR	MSPGCL	0.01	0.00	0.01	0.61	6.90	4.04	11.57	15.84	0.00	0.00	0.00	15.84 (To be partially supplied by GP-III – 23.6 MTPA PRC)
KHAPARKHEDA	MSPGCL	2.43	0.31	2.73	0.46	2.90	0.11	6.20	8.18	3.57	0.31	3.88	4.30
MOUDA SUPER TPS	NTPC LTD.	1.27	0.38	1.66	0.39	3.98	2.66	8.69	11.60	0.21	0.00	0.21	11.40
SOLAPUR SUPER TPS	NTPC LTD.	0.00	0.24	0.25	0.00	1.27	1.74	3.25	5.94	2.83	0.00	2.83	3.11
	Total			**5.46**	**8.19**	**18.58**	**11.67**	**43.90**	**56.76**	**7.64**	**0.31**	**7.95**	**48.82**

- It has been assumed that due to increase in availability of coal from SECL and WCL, only power plants with binding FSAs with MCL would be sourcing coal from MCL and remaining power plants would prefer SECL's and WCL's coal due to proximity of assets to SECL mines. Therefore, while some supplies are envisaged from Tiroda, Khaparkheda, Mouda and Solapur Power Plants, no despatch is envisaged to MSPGCL's Chandrapur Power Plant
- Adani Power's Tiroda and NTPC's Mouda power plant, which are sourcing some quantities from SECL's Raigarh area, could be replaced by MCL's IB-Valley supplies.

O-D Source cluster Mapping – Odisha to Punjab & Haryana

Odisha to Punjab & Haryana total Rail Despatch in FY22 = 5.12 Million Tonnes



Major Coal Consuming Districts of Punjab: 2030 (Estimated)

10-15 MTPA Coal Consumption	*Bhatinda*
5-10 MTPA Coal Consumption	*Mansa, Fatehgarh Sahib, Rupnagar*
1-5 MTPA Coal Consumption	*Amritsar, Tarn Taran, Ludhiana, Nawashahr*

Expected Load from Odisha to Punjab & Haryana main trunk lines (Excluding load from other states on this line)

Pb & Hr Coal ***Demand 2022 ~ 33.01 MTPA***
Rail Supply by Odisha ***2022 ~ 5.12 MTPA***

Pb & Hr Coal ***Demand 2030 ~ 43.13 MTPA***
Rail Supply by Odisha ***2030 ~ 11.47 MTPA***

		FY22		FY30	
From	To	Traffic (Tonnes) 2022	Rakes / Day 2022	Traffic (Tonnes) 2030	Rakes / Day 2030
Jharsuguda Jn	Belpahar	799687.82	0.57	7467895.4	5.31
Belpahar	Kharsia	5124253.2	3.65	11817674.2	8.41
Kharsia	Champa	5124253.2	3.65	11817674.2	8.41
Champa	Bilaspur	5124253.2	3.65	11817674.2	8.41
Bilaspur	Anuppur	5124253.2	3.65	11817674.2	8.41
Anuppur	Katni	5124253.2	3.65	11817674.2	8.41
Katni	Bina Malkhedi	5124253.2	3.65	11817674.2	8.41
Bina Malkhedi	Gwalior	5124253.2	3.65	11817674.2	8.41
Gwalior	Mathura	5124253.2	3.65	11817674.2	8.41
Mathura	Delhi-SJ	4884409.7	3.48	8662538.6	6.16
Delhi-SJ	Rohtak	4884409.7	3.48	8662538.6	6.16
Rohtak	Barwala	325286.7	0.23	900000.0	0.64
Rohtak	Jakhal	4540123.5	3.23	7720000.0	5.49
Talcher	Angul	1457844.0	1.04	3449778.8	2.45
Angul	Jharsuguda Road	1457844.0	1.04	3449778.8	2.45
Jharsuguda Road	Belpahar	1457844.0	1.04	3449778.8	2.45
Mathura	Alwar	239843.5	0.17	3155135.6	2.25
Alwar	Rewari	239843.5	0.17	3155135.6	2.25
Rohtak	Rajupra	18999.5	0.01	42538.6	0.03
Rajupra	Roop Nagar	18999.5	0.01	42538.6	0.03

- Major Consumers in Punjab & Haryana sourcing coal from MCL include Rajiv Gandhi TPS, Indira Gandhi TPS, Talwandi Sabo, and Ambuja Cements

O-D Source cluster Mapping – Slight increase of supplies from Odisha to Punjab & Haryana

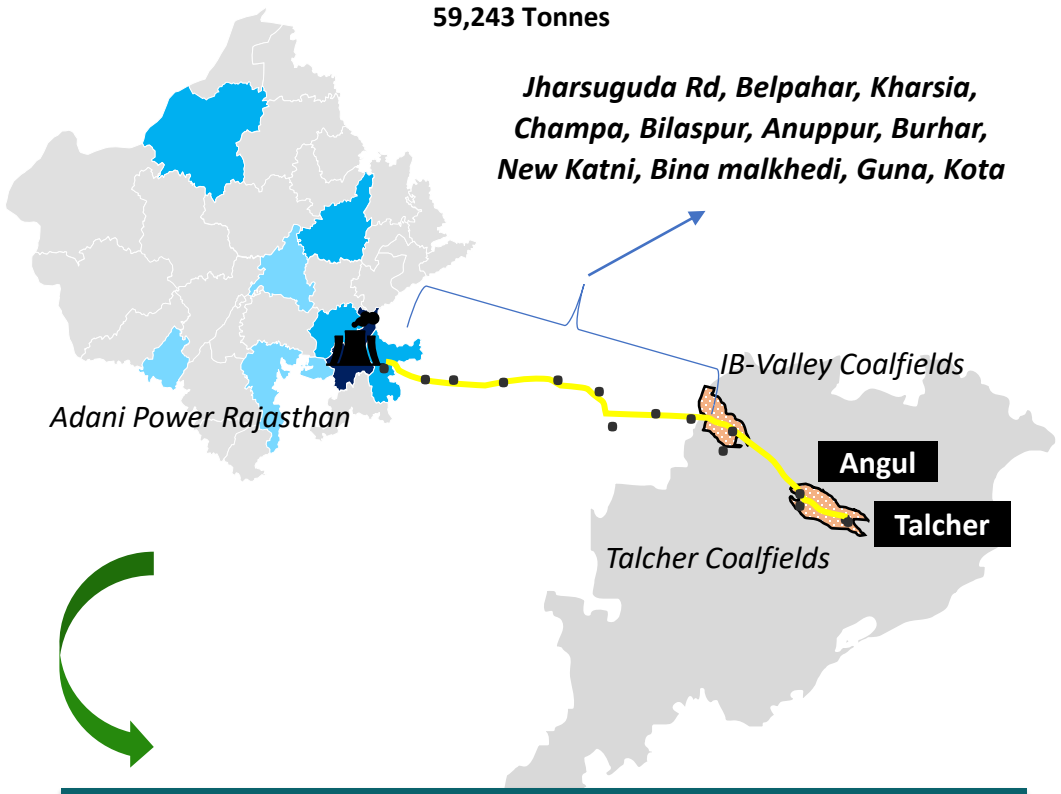
All figures in million tonnes

Name of TPS	Utility	IB-Valley	Talcher	Total Odisha	ECL + CCL	NCL	Others	Total Coal Consumed	Estimated Coal Consumption (FY30)	Supply from IB-Valley 2030	Supply from Talcher 2030	Odisha's Supply in FY30	Sourced from ECL/CCL/NCL Others
INDIRA GANDHI	ARAVALI POWER CORPORATION PVT LTD	0.04	0.20	0.24	0.87	2.29	1.26	4.67	6.90	3.16	0.00	**3.16**	3.74
RAJIV GANDHI TPP,Hissar	HPGCL	0.33	0.00	0.33	0.29	1.17	0.06	1.85	5.77	0.90	0.00	**0.90**	4.87
TALWANDI SABO POWER LTD	TALWANDI SABO POWER LTD.	2.54	2.00	4.54	1.01	0.20	0.27	6.02	9.24	4.31	3.41	**7.72**	1.52
Total				**5.11**	**2.17**	**3.67**	**1.59**	**12.54**	**21.90**	**8.37**	**3.41**	**11.78**	**10.12**

- Power Plants such as Rajiv Gandhi TPP and Talwandi Sabo Power currently source coal from MCL and have long standing FSAs (Post NCDP) which are valid and binding till FY30. It is assumed that these power plants will keep on sourcing coal from MCL as per the commitments and the increase in coal consumption throughout P&H would be sourced by NCL, ECL, CCL and MCL.
- For Indira Gandhi TPS, it is assumed that Supplies from IB-Valley would be highly competitive with sourcing from ECL, CCL and BCCL and hence with the right volume push and proactive marketing MCL would be able to sell coal to Indira Gandhi TPS as well.

O-D Source cluster Mapping – Odisha to Rajasthan

Odisha to Rajasthan total Rail Despatch in FY22 = 59,243 Tonnes



Major Coal Consuming Districts of Rajasthan: 2030 (Estimated)

>15 MTPA Coal Consumption	*Kota*
5-10 MTPA Coal Consumption	*Bundi, Baran, Jaipur, Bikaner*
1-5 MTPA Coal Consumption	*Ajmer, Nimach, Chittorgarh, Pratapgarh, Jalor*

Expected Load from Odisha to Rajasthan main trunk lines (Excluding load from other states on this line)

Rajasthan's Coal ***Demand 2022 ~ 28.86 MTPA***
Rail Supply by Odisha ***2022 ~ 0.06 MTPA***

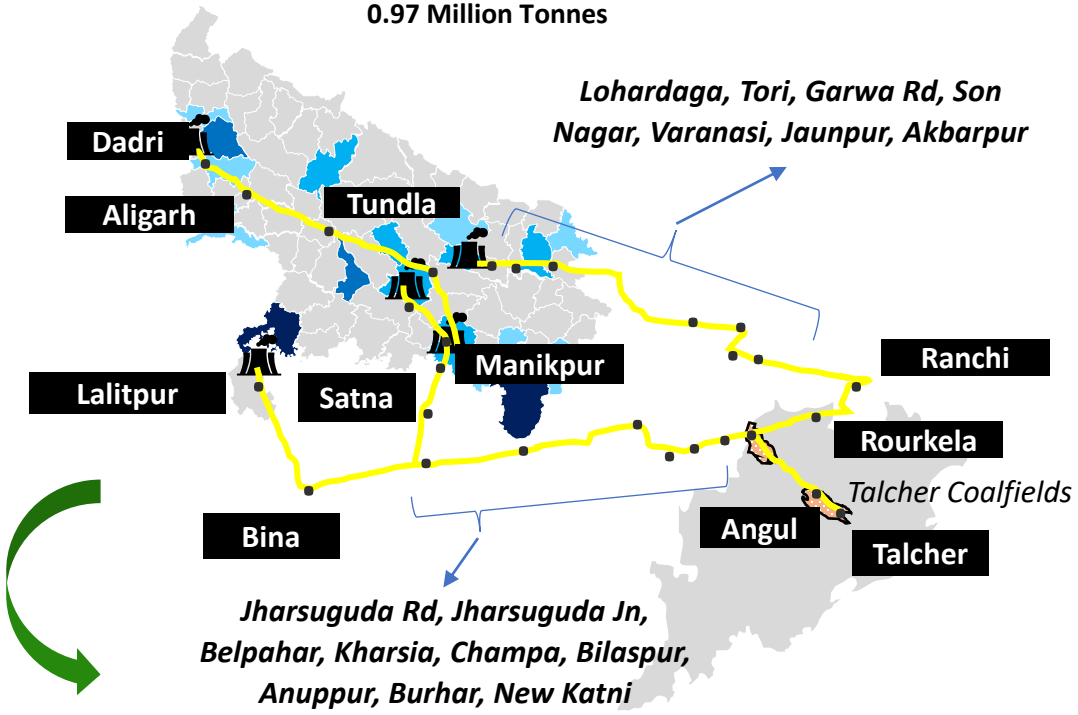
Rajasthan's Coal ***Demand 2030 ~ 59.1 MTPA***
Rail Supply by Odisha ***2030 ~ 0 MTPA***

		FY22		FY30	
From	**To**	**Traffic (Tonnes) 2022**	**Rakes / Day 2022**	**Traffic (Tonnes) 2030**	**Rakes / Day 2030**
Talcher	Angul	59243.0	0.04	No volume is expected to flow from Odisha to Rajasthan in Future. SECL, NCL and RRVUNL Captive blocks in Chhattisgarh would be sufficient to cater to demand of Rajasthan	
Angul	Jharsuguda Road	59243.0	0.04		
Jharsuguda Road	Belpahar	59243.0	0.04		
Belpahar (IB Section)	Kharsia	59243.0	0.04		
Kharsia	Champa	59243.0	0.04		
Champa	Bilaspur	59243.0	0.04		
Bilaspur	Annupur	59243.0	0.04		
Annupur	Burhar	59243.0	0.04		
Burhar	New Katni	59243.0	0.04		
New Katni	Bina Malkhedi	59243.0	0.04		
Bina Malkhedi	Guna	59243.0	0.04		
Guna	Kota	59243.0	0.04		

- Major Consumers in Rajasthan sourcing coal from MCL include Adani Power Rajasthan and Lakheri Cement Ltd

O-D Source cluster Mapping – Odisha to Uttar Pradesh

Odisha to Uttar Pradesh total Rail Despatch in FY22 = 0.97 Million Tonnes



Major Coal Consuming Districts of UP: 2030 (Estimated)

>15 MTPA Coal Consumption	*Jhansi, Sonbhadra*
10-15 MTPA Coal Consumption	*Bulandsahar, Kanpur*
5-10 MTPA Coal Consumption	*Prayagraj, Rae Bareli, Lucknow, Shahjahanpur, Ambedkar Nagar, Gorakhpur*
1-5 MTPA Coal Consumption	*Ghaziabad, Hapur, Gautam Buddha Nagar, Aligarh, Agra, Kushinagar, Gonda*

Expected Load from Odisha to Uttar Pradesh main trunk lines (Excluding load from other states on this line)

*UP Coal **Demand 2022 ~ 87 MTPA***

*Rail Supply by Odisha **2022 ~ 0.97 MTPA***

*UP Coal **Demand 2030 ~ 114 MTPA***

*Rail Supply by Odisha **2030 ~ 4.02 MTPA***

		FY22		FY30	
From	To	Traffic (Tonnes) 2022	Rakes / Day 2022	Traffic (Tonnes) 2030	Rakes / Day 2030
Jharsuguda Jn	Belpahar	462665.39	0.33	4015707.3	2.86
Belpahar	Kharsia	434317.6	0.31		
Kharsia	Champa	434317.6	0.31		
Champa	Bilaspur	434317.6	0.31		
Bilaspur	Anuppur	434317.6	0.31		
Anuppur	Katni	434317.6	0.31		
Katni	Bina Malkhedi	129521.3	0.09		
Bina Malkhedi	Lalitpur	129521.3	0.09		
Talcher	Angul	389259.4	0.28		
Angul	Jharsuguda Road	389259.4	0.28		
Jharsuguda Road	Belpahar	324733.1	0.23		
Katni	Satna	335913.3	0.24		
Satna	Bansapahar	150602.8	0.11		
Bansapahar	Khairar	150602.8	0.11		
Khairar	Bhimsen	150602.8	0.11		
Bhimsen	Tundla	150602.8	0.11		
Tundla	Aligarh	150602.8	0.11		
Aligarh	Dadri	150602.8	0.11		
Satna	Manikpur	185310.5	0.13		
Manikpur	Prayagraj	154193.6	0.11		
Prayagraj	Unchahar	154193.6	0.11		
Jharsuguda Jn	Rourkela	509029.7	0.36	4015707.3	2.86
Rourkela	Ranchi	509029.7	0.36	4015707.3	2.86
Ranchi	Lohardaga Bs	509029.7	0.36	4015707.3	2.86
Lohardaga Bs	Tori	509029.7	0.36	4015707.3	2.86
Tori	Garwa Rd Jn	509029.7	0.36	4015707.3	2.86
Garwa Rd Jn	Son Nagar	509029.7	0.36	0.0	0.00
Son Nagar	Varanasi	509029.7	0.36	0.0	0.00
Varanasi	Jaunpur	509029.7	0.36	0.0	0.00
Jaunpur	Akbarpur	509029.7	0.36	0.0	0.00
Akbarpur	Tanda	509029.7	0.36	0.0	0.00

Only Meenakshi's supply to Hindalco's Renukoot Smelter would lead to this traffic.
Supply from Odisha to Power Plants in Uttar Pradesh will stop entirely in future as production of CCL and other captive blocks is ramped up

- Major Consumers in Uttar Pradesh sourcing coal from MCL Lalitpur power generation, NTPC Dadri, NTPC Tanda, NTPC Unchahar, Hindalco Renukoot and Prayagraj Power generation ltd

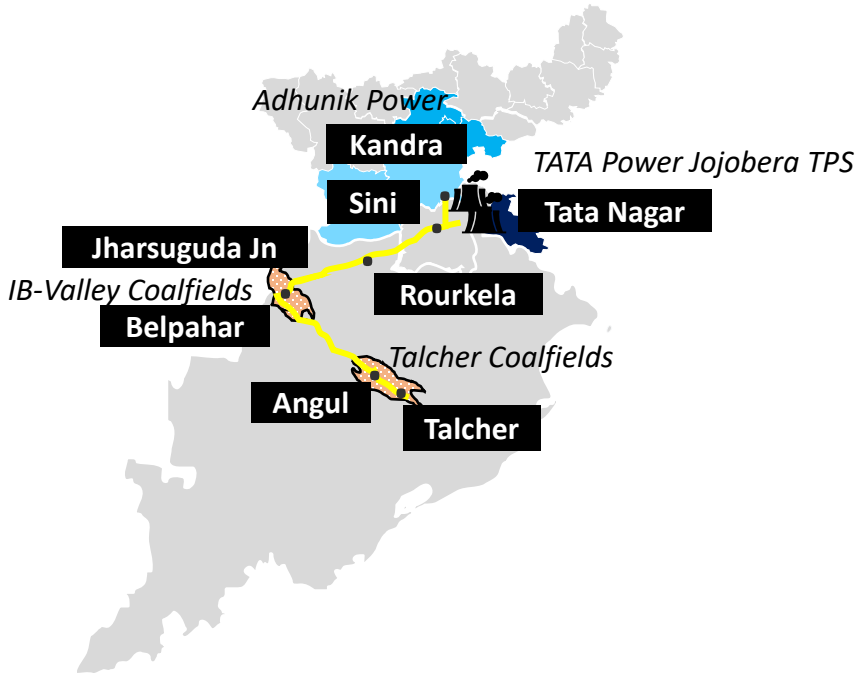
O-D Source cluster Mapping – Odisha will not supply to Power plants in Uttar Pradesh

All figures in million tonnes

Name of TPS	Utility	IB-Valley	Talcher	Total Odisha	SECL	CCL	NCL	Captive & Others	Total Coal Consumed	Estimated Coal Consumption (FY30)	Supply from IB-Valley 2030	Supply from Talcher 2030	Odisha's Supply in FY30	Sourced from CCL/NCL/Captive Others
LALITPUR	LALITPUR POWER GENERATION COMPANY LIMITED	0.09	0.04	0.13	0.95	2.66	2.36	0.00	5.87	5.87	0.00	0.00	0.00	**5.87** (SECL, NCL and CCL)
DADRI	NTPC LTD.	0.05	0.10	0.15	0.00	0.63	2.02	0.90	3.70	6.65	0.00	0.00	0.00	**6.65** (~ 2MTPA by NCL, remaining by CCL, ECL)
FEROZE GANDHI UNCHAHAR	NTPC LTD.	0.00	0.15	0.15	0.00	3.33	0.00	2.05	5.53	5.53	0.00	0.00	0.00	**5.53** (Pakri Barwadih - 4 MTPA and Remaining by BCCL - 2.3 MTPA FSA in place)
TANDA	NTPC LTD.	0.44	0.06	0.51	0.00	3.38	0.00	1.57	5.46	6.07	0.00	0.00	0.00	**6.07** (To be fed by Kerandari (6 MTPA))
PRAYAGRAJ TPS	PRAYAGRAJ POWER GENERATION COMPANY LTD.	0.00	0.03	0.03	0.00	0.16	7.25	0.00	7.22	7.22	0.00	0.00	0.00	**7.22** (To be fed entirely by NCL)
		0.00	**0.00**	**0.97**	**0.95**	**10.16**	**11.63**	**4.51**	**27.77**	**31.33**	**0.00**	**0.00**	**0.00**	**31.33**

O-D Source cluster Mapping – Odisha to Jharkhand

Odisha to Jharkhand total Rail Despatch in FY22 = 0.88 Million Tonnes



Major Coal Consuming Districts of Jharkhand: 2030 (Estimated)

>15 MTPA Coal Consumption	*East Singhbhum*
10-15 MTPA Coal Consumption	-
5-10 MTPA Coal Consumption	*Bokaro, Hazaribagh*
1-5 MTPA Coal Consumption	*Simdega, Gumla, Khunti, Ranchi, Saraikela-Kharsawan*

Expected Load from Odisha to Jharkhand main trunk lines (Excluding load from other states on this line)

*Jharkhand Coal **Demand 2022 ~ 52.31 MTPA***
*Rail Supply by Odisha **2022 ~ 0.88 MTPA***

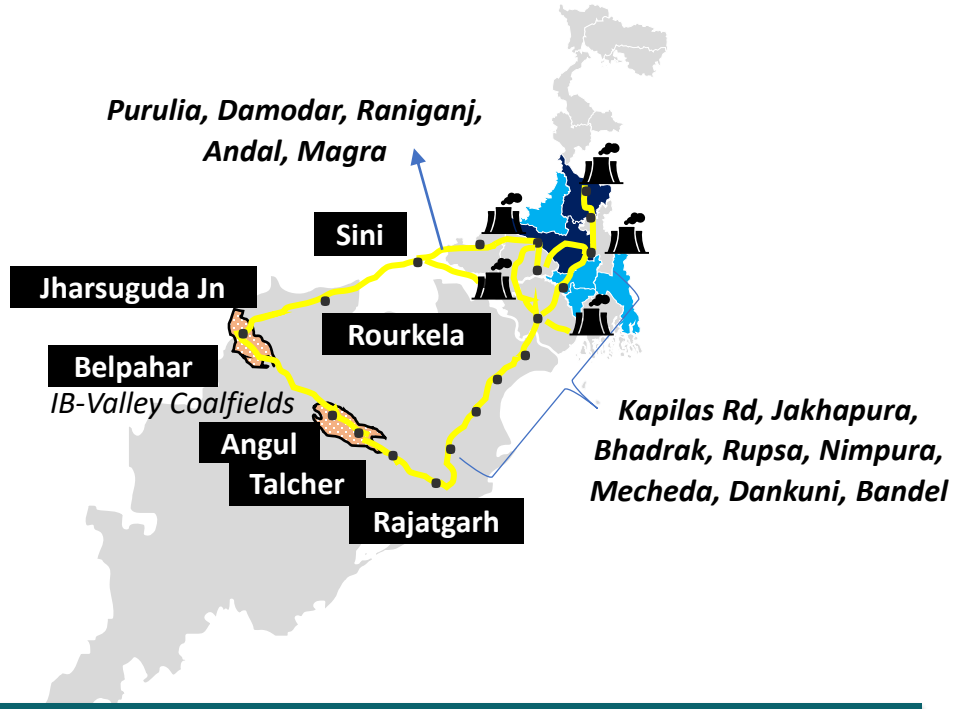
*Jharkhand Coal **Demand 2030 ~ 68.35 MTPA***
*Rail Supply by Odisha **2030 ~ 0.185 MTPA***

		FY22		FY30	
From	**To**	**Traffic (Tonnes) 2022**	**Rakes / Day 2022**	**Traffic (Tonnes) 2030**	**Rakes / Day 2030**
Talcher	Angul	150808.24	0.11	0.0	0.00
Angul	Jharsuguda Jn	150808.2	0.11	0.0	0.00
Jharsuguda Jn	Rourkela	1039500.6	0.74	185000.0	0.13
Rourkela	Sini	1039500.6	0.74	185000.0	0.13
Sini	Kandra	874241.9	0.62	0.0	0.00
Belpahar	Jharsuguda Jn	265817.6	0.19	149523.1	0.11
Sini	Tatnagar	165258.7	0.12	185000.0	0.13

- Major Consumers in Jharkhand sourcing coal from MCL are TATA Power and Adhunik Power
- In Future, supply from Odisha will only be to TATA Power (Jojobera TPS) i.e. 185,000 TPA from Ib-Valley as per Shakti B(ii) which is valid till 2031.

O-D Source cluster Mapping – Odisha to West Bengal

Odisha to West Bengal total Rail Despatch in FY22 = 11.15 Million Tonnes



Major Coal Consuming Districts of WB: 2030 (Estimated)

>15 MTPA Coal Consumption	*Murshidabad, Paschim Bardaman, Purba Bardaman*
10-15 MTPA Coal Consumption	-
5-10 MTPA Coal Consumption	*Hooghly, Howrah, North 24 Parganas*
1-5 MTPA Coal Consumption	-

Expected Load from Odisha to West Bengal main trunk lines (Excluding load from other states on this line)

West Bengal Coal ***Demand 2022 ~ 54.96 MTPA***

Rail Supply by Odisha ***2022 ~ 11.15 MTPA***

West Bengal Coal ***Demand 2030 ~ 71.81 MTPA***

Rail Supply by Odisha ***2030 ~ 7.05 MTPA***

		FY22		FY30	
From	To	Traffic (Tonnes) 2022	Rakes / Day 2022	Traffic (Tonnes) 2030	Rakes / Day 2030
Belpahar	Jharsuguda Jn	2902760.13	2.07	2983874.9	2.12
Jharsuguda Jn	Rourkela	6746881.7	4.80	2983874.9	2.12
Rourkela	Sini	6746881.7	4.80	2983874.9	2.12
Sini	Tatnagar	2066860.4	1.47	760874.9	0.54
Tatnagar	Ghatsila	2066860.4	1.47	760874.9	0.54
Ghatsila	Nimpura GS	2066860.4	1.47	760874.9	0.54
Talcher	Budhapank	4504879.8	3.21	4391498.5	3.13
Budhapank	Rajatgarh	4504879.8	3.21	4391498.5	3.13
Rajatgarh	Kapilas Rd	4504879.8	3.21	4391498.5	3.13
Kapilas Rd	Jakhapura	4504879.8	3.21	4391498.5	3.13
Jakhapura	Bhadrak	4504879.8	3.21	4391498.5	3.13
Bhadrak	Rupsa	4504879.8	3.21	4391498.5	3.13
Rupsa	Nimpura	4504879.8	3.21	4391498.5	3.13
Sini	Purulia	4680021.2	3.33	2223000.0	1.58
Purulia	Damodar	4256295.8	3.03	2223000.0	1.58
Damodar	Raniganj	4725185.1	3.36	2723000.0	1.94
Raniganj	Bhimgara	126059.0	0.09	500000.0	0.36
Raniganj	Andal	3093055.5	2.20	2223000.0	1.58
Nimpura GS	Tamluk	3376012.4	2.40	4074500.0	2.90
Nimpura GS	Mecheda	2468736.2	1.76	0.0	0.00
Nimpura GS	Damodar	468889.3	0.33	500000.0	0.36
Andal	Khana	132156.3	0.09	0.0	0.00
Khana	Magra	132156.3	0.09	0.0	0.00
Mecheda	Dankuni	923572.9	0.66	0.0	0.00
Dankuni	Bandel	574836.5	0.41	0.0	0.00
Andal	Sainthia	527279.3	0.38	0.0	0.00
Sainthia	Tildanga	612220.0	0.44	0.0	0.00
Dankuni	Sainthia	84940.7	0.06	0.0	0.00
Dankuni	Ballygune	263795.6	0.19	0.0	0.00
Purulia	Santaldih	423725.5	0.30	0.0	0.00

- Major Consumers in West Bengal sourcing coal from MCL are JSW Cement, Durgapur Projects, WBPDCL (Kolaghat, Bakreswar, Santaldih, Bandel), CESC, NTPC Farakka, Haldia Energy, Orissa Metaliks

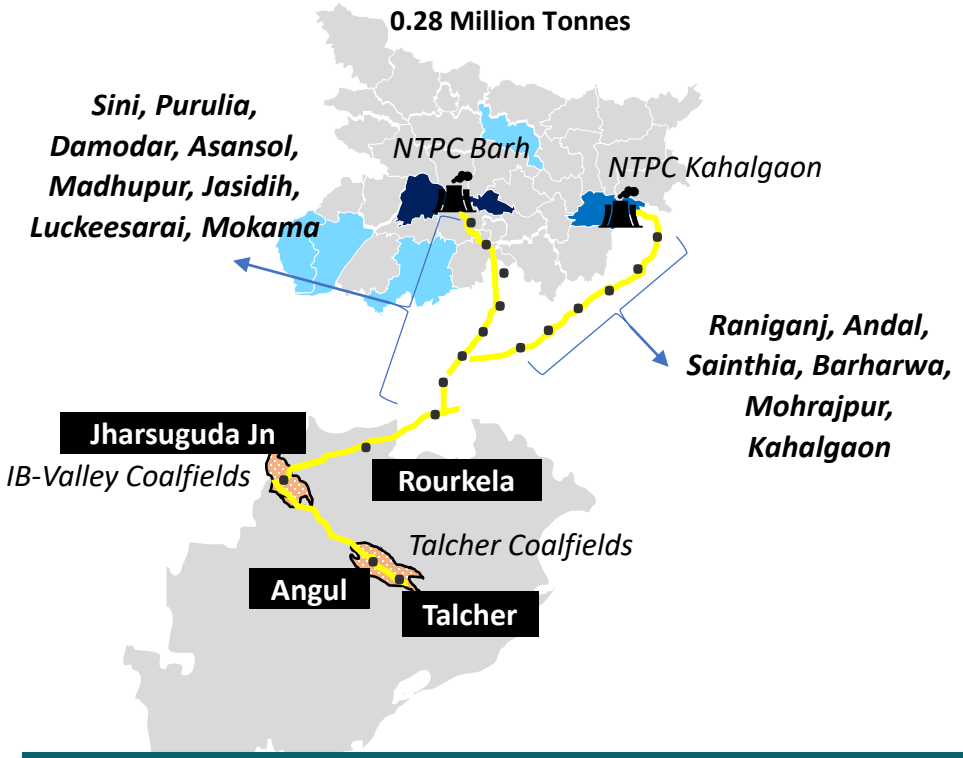
O-D Source cluster Mapping – Odisha's supply to WB Power plants will reduce

All figures in million tonnes

Name of TPS	Utility	IB-Valley	Talcher	Total Odisha	ECL	BCCL	Captive Blocks	Others	Total Coal Consumed	Estimated Coal Consumption (FY30)	Supply from IB-Valley 2030	Supply from Talcher 2030	Odisha's Supply in FY30	Sourced from ECL/BCCL/Captive Others	Possible Sources for Others
Budge Budge Generating Station	CESC Ltd.	0.00	0.25	0.25	0.94	0.31	1.54	0.20	3.24	3.50	0.00	0.00	**0.00**	3.50	Sarisatolli Coal Block
DURGAPUR	Damodar Valley Corporation	0.64	0.00	0.64	0.02	0.02	0.00	0.00	0.25	1.96	0.28	0.00	**0.28**	1.68	ECL, BCCL and CCL
MEJIA	Damodar Valley Corporation	1.33	0.18	1.51	1.47	6.24	0.00	0.46	9.67	12.42	0.00	0.00	**0.00**	12.42	ECL, BCCL and CCL and Tubed block of DVC (6 MTPA)
DURGAPUR STEEL	Damodar Valley Corporation	1.05	0.30	1.34	1.84	0.54	0.00	0.40	4.12	5.38	1.41	0.00	**1.41**	3.97	ECL, BCCL and CCL
THE DURGAPUR PROJECTS POWER STATION	THE DURGAPUR PROJECTS LIMITED	0.45	0.00	0.45	0.26	0.61	0.49	0.00	1.78	3.05	0.53	0.00	**0.53**	2.52	1 MTPA Trans Damodar and remaining by ECL/BCCL
HALDIA ENERGY LIMITED	HALDIA ENERGY LIMITED	0.52	1.95	2.48	0.04	0.00	0.00	0.42	2.94	3.30	0.00	2.57	**2.57**	0.73	ECL and CCL
FARAKKA SUPER	NTPC LTD.	0.53	0.07	0.59	5.97	0.29	0.00	1.26	8.10	10.98	0.00	0.00	**0.00**	10.98	ECL (9 MTPA) & CCL
KOLAGHAT	WBPDCL	1.07	0.50	1.56	0.32	0.42	0.19	0.88	3.37	7.98	0.00	0.00	**0.00**	7.98	
BANDEL	WBPDCL	0.13	0.54	0.67	0.25	0.00	0.24	0.23	1.39	2.12	0.00	0.00	**0.00**	2.12	Pachwara North, Bajora, Bajora North, Gangaramchak
SANTALDIH TPS	WBPDCL	0.42	0.00	0.42	0.03	1.04	0.34	0.95	2.78	2.85	0.00	0.00	**0.00**	2.85	
BAKRESWAR	WBPDCL	0.13	0.02	0.15	1.03	0.58	3.22	0.21	5.20	5.28	0.50	0.00	**0.50**	4.78	
Hiranmaye	Hiranmaye Energy Limited	0.41	0.47	0.88	0.00	0.00	0.00	0.00	0.88	1.90	0.75	0.75	**1.50**	0.40	ECL, BCCL and CCL
				10.95	**12.15**	**10.04**	**6.02**	**5.02**	**43.71**	**60.72**	**3.48**	**3.32**	**6.80**	**53.93**	

O-D Source cluster Mapping – Odisha to Bihar

Odisha to Bihar total Rail Despatch in FY22 = 0.28 Million Tonnes



Major Coal Consuming Districts of Bihar: 2030 (Estimated)

>15 MTPA Coal Consumption	*Patna*
10-15 MTPA Coal Consumption	*Bhagalpur*
5-10 MTPA Coal Consumption	-
1-5 MTPA Coal Consumption	*Bhabua, Rohtas, Gaya, Darbhanga*

Expected Load from Odisha to Bihar main trunk lines (Excluding load from other states on this line)

*Bihar Coal **Demand 2022 ~ 29.98 MTPA***

*Rail Supply by Odisha **2022 ~ 0.28 MTPA***

*Bihar Coal **Demand 2030 ~ 39.17 MTPA***

*Rail Supply by Odisha **2030 ~ 0.00 MTPA***

FY22				FY30	
From	To	Traffic (Tonnes) 2022	Rakes / Day 2022	Traffic (Tonnes) 2030	Rakes / Day 2030
Belpahar	Jharsuguda Jn	226941.05	0.16		
Jharsuguda Jn	Rourkela	246548.2	0.18		
Rourkela	Sini	246548.2	0.18		
Sini	Purulia	246548.2	0.18		
Purulia	Damodar	246548.2	0.18		
Damodar	Asansol	274733.4	0.20		
Asansol	Madhupur	274733.4	0.20		
Madhupur	Jasidih	274733.4	0.20		
Jasidih	Luckeesarai	274733.4	0.20		
Luckeesarai	Mokama	274733.4	0.20		
Talcher	Budhapank	31513.4	0.02		
Budhapank	Rajatgarh	31513.4	0.02		
Rajatgarh	Kapilas Rd	31513.4	0.02		
Kapilas Rd	Jakhapura	31513.4	0.02		
Jakhapura	Bhadrak	31513.4	0.02		
Bhadrak	Rupsa	31513.4	0.02		
Rupsa	Nimpura	31513.4	0.02		
Nimpura	Damodar	31513.4	0.02		
Damodar	Raniganj	3328.2	0.00		
Raniganj	Andal	3328.2	0.00		
Andal	Sainthia	3328.2	0.00		
Sainthia	Barharwa	3328.2	0.00		
Barharwa	Mohrajpur	3328.2	0.00		
Mohrajpur	Kahalgaon	3328.2	0.00		

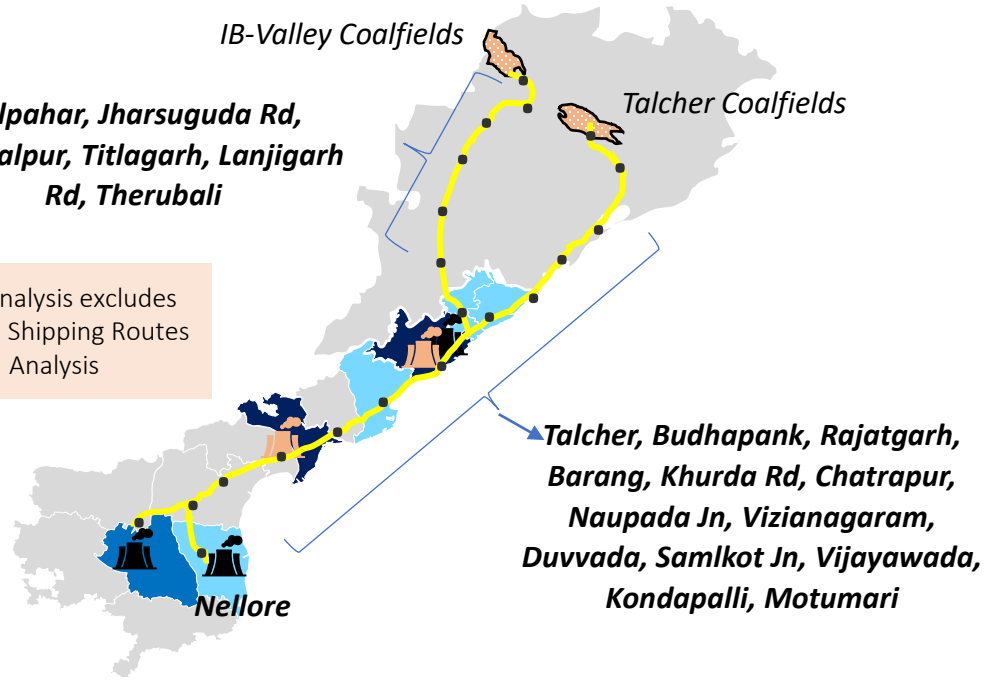
Power Plants such as NTPC's Kahalgaon and Barh, which were sourcing small quantities from MCL will stop taking coal from MCL altogether.

Coal to these plants will be sourced entirely from ECL, CCL, BCCL and NTPC's Chatti-Bariatu and Pakri-Barwadih Mines

- Major Consumers in Bihar sourcing coal from MCL are NTPC's Barh and Kahalgaon Power plants

O-D Source cluster Mapping – Odisha to Andhra Pradesh

Odisha to Andhra Pradesh total Rail Despatch in FY22 = 25.94 Million Tonnes (Including 8.44 MT RSR)



Major Coal Consuming Districts of AP: 2030 (Estimated)

>15 MTPA Coal Consumption	*Krishna, Visakhapatnam*
10-15 MTPA Coal Consumption	*Kadapa*
5-10 MTPA Coal Consumption	*NA*
1-5 MTPA Coal Consumption	*Nellore, East Godavari, Vizianagaram, Srikakulam*

Expected Load from Odisha to AP main trunk lines (Excluding load from other states on this line)

*AP Coal **Demand 2022 ~ 40.16 MTPA***

*Rail Supply by Odisha **2022 ~ 25.94 MTPA***

*AP Coal **Demand 2030 ~ 64.10 MTPA***

*Rail Supply by Odisha **2030 ~ 50.44 MTPA***

FY22				FY30	
From	To	Traffic (Tonnes) 2022	Rakes / Day 2022	Traffic (Tonnes) 2030	Rakes / Day 2030
Jharsuguda Jn	Jharsuguda Rd	264497	0.19	7856208	5.59
Belpahar	Jharsuguda Rd	3526125	2.51	477945	0.34
Jharsuguda Rd	Sambalpur	3790622	2.70	8334152	5.93
Sambalpur	Titlagarh	3790622	2.70	8334152	5.93
Titlagarh	Lanjigarh Rd	3790622	2.70	8334152	5.93
Lanjigarh Rd	Therubali	3790622	2.70	8334152	5.93
Therubali	Vizianagram Jn	3790622	2.70	8334152	5.93
Vizianagram Jn	Duvadda	15785032	11.23	14981009	10.66
Duvadda	Samalkot Jn	13508212	9.61	4199572	2.99
Samalkot Jn	Vijayawada Jn	13508212	9.61	4093900	2.91
Vijayawada Jn	Nellore	4906393	3.49	0	0.00
Vijayawada Jn	Guntur	3149117	2.24	0	0.00
Guntur	Yerraguntla	3149117	2.24	0	0.00
Talcher	Budhapank	7375536	5.25	11585302	8.24
Budhapank	Rajatgarh	7375536	5.25	11585302	8.24
Rajatgarh	Barang	7375536	5.25	11585302	8.24
Barang	Khurda Rd	7375536	5.25	11585302	8.24
Khurda Rd	Chatrapur	7375536	5.25	11585302	8.24
Chatrapur	Naupada Jn	7375536	5.25	11585302	8.24
Naupada Jn	Vizianagram Jn	7375536	5.25	11585302	8.24
Samalkot Jn	Rajahmundry	47198	0.03	105672	0.08
Vijayawada Jn	Kondapalli	3945695	2.81	4093900	2.91
Kondapalli	Motumari Jn	608718	0.43	1781900	1.27
Vizianagram Jn	Mallividu	95995	0.07	273851	0.19

- Major Consumers in AP sourcing coal from MCL are APGENCO, Sembcorp Energy, Andhra paper, RINL, Simhadri STPS, Steel Exchange, Vizag TPS and other consumers of coastal shipping

O-D Source cluster Mapping – Significant increase in coastal shipping to Andhra Pradesh

All figures in million tonnes

Name of TPS	Utility	IB-Valley	Talcher	RSR	Total Odisha	SCCL	ECL	Others	Total Coal Consumed	Estimated Coal Consumption (FY30)	Supply from IB-Valley 2030	Supply from Talcher 2030	Odisha RSR 2030	Odisha's Supply in FY30	Sourced from SCCL and Imports
Dr. N.T.R TPS	APGENCO	1.27	3.52	0.00	4.79	4.51	0.00	0.00	9.20	9.74	0.61	1.70	0.00	2.31	7.42
RAYALSEEMA	APGENCO	0.00	0.00	1.40	1.40	2.15	0.00	1.57	5.12	8.63	0.00	0.00	7.36	7.36	1.27
SRI DAMODARAM SANJEEVAIAH	APPDCL	0.00	0.00	2.28	2.28	0.05	0.00	0.00	3.62	7.12	0.00	0.00	7.12	7.12	0.00
Vizag TPP	HINDUJA NATIONAL POWER CORPORATION LIMITED	0.03	0.07	0.00	0.10	0.00	0.00	0.11	0.21	5.40	0.00	4.62	0.00	4.62	0.78
SIMHADRI SUPER	NTPC LTD.	5.36	2.62	0.00	7.99	0.20	0.95	0.00	8.94	10.78	7.24	3.54	0.00	10.78	0.00
PAINAMPURAM TPP	SEMBCORP ENERGY INDIA LTD.	0.00	0.00	4.76	4.76	0.00	0.00	0.89	5.65	5.57	0.00	0.00	5.57	5.57	0.00
SGPL TPP	SEMBCORP ENERGY INDIA LTD.	2.31	2.31	0.00	4.62	0.00	0.00	0.00	4.62	5.57	0.00	0.00	5.57	5.57	0.00
		8.97	**8.52**	**8.44**	**25.94**	**6.90**	**0.95**	**2.58**	**37.36**	**52.82**	**7.86**	**9.86**	**25.63**	**43.35**	**9.47**
Dr Narla Tata Rao TPS St-V	APGENCO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.55	0.00	0.00	3.55	3.55	0.00
Sri Damodaram Sanjeevaiah TPP St-II	APPDCL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.55	0.00	0.00	3.55	3.55	0.00
Total										**59.92**	**7.86**	**9.86**	**32.73**	**50.44**	9.47

- 2 Under-Construction power plants namely APGENCO's Dr NTR TPS Unit-V and Sri Damodaram Sanjeevaiah TPP St-II to consume ~7.10 Million Tonnes of Coal for which FSA's are in place with MCL. Coastal Shipping will be more cost effective than transporting directly via rail to these power plants.
- From the overall increase in demand from power sector in Andhra Pradesh, majority will be catered by mines of MCL (either via coastal shipping or complete Rail mode) and the remaining to be catered by SCCL. Some quantities being sourced by ECL and SCCL by NTPC Simhadri could also be substituted with MCL's coal. This substitution has been assumed under the analysis. 1 – 2 Million Tonnes of Imported coal for blending would happen for these power plants.

O-D Source cluster Mapping – Significant increase in coastal shipping to Tamil Nadu

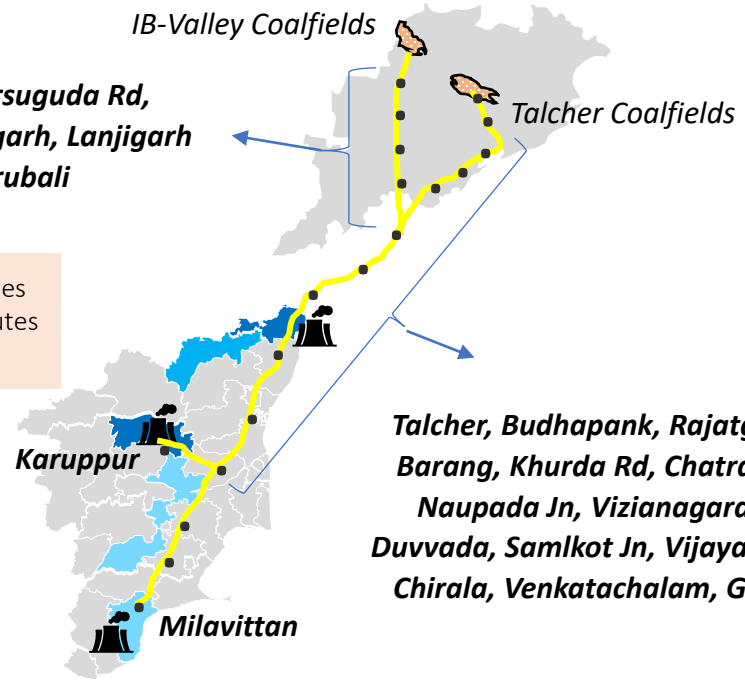
All figures in million tonnes

Name of TPS	Utility	IB-Valley	Talcher	RSR	Total Odisha	SCCL	ECL	Others (Incl Imports)	Total Coal Consumed	Estimated Coal Consumption (FY30)	Supply from IB-Valley 2030	Supply from Talcher 2030	Odisha RSR 2030	Odisha's Supply in FY30	Sourced from SCCL & Imports
MUTIARA	COASTAL ENERGEN PVT. LTD	0.00	0.00	0.00	0.00	0.00	0.00	0.80	0.80	5.04	0.00	0.00	0.50	0.50	4.54
IL & FS TAMIL NADU POWER COMPANY LTD.	IL & FS TAMIL NADU POWER COMPANY LIMITED	0.00	0.00	0.00	0.00	0.00	0.00	1.67	1.67	4.14	0.00	0.00	0.41	0.41	3.73
NLC TAMILNADU POWER Ltd	NLC TAMIL NADU POWER LIMITED	0.00	0.00	0.97	0.97	0.00	0.42	1.65	3.04	4.66	0.00	0.00	4.66	4.66	0.00
VALLUR	NTPC TAMILNADU ENERGY COMPANY LTD (NTECL) (NTPC- JV)	0.00	0.02	5.57	5.59	0.31	0.06	0.00	5.96	7.24	0.00	0.00	7.24	7.24	0.00
TUTICORIN	TANGEDCO	0.00	0.12	3.27	3.39	0.00	0.01	0.88	4.28	5.80	0.00	0.00	4.61	4.61	1.19
METTUR-I	TANGEDCO	0.00	1.32	3.16	4.48	1.28	0.00	0.00	3.86	4.33	0.00	0.00	3.05	3.05	1.28
METTUR-II	TANGEDCO	0.00	1.32	1.82	1.82	1.28	0.00	0.00	2.16	3.01	0.00	0.00	2.32	2.32	0.69
NORTH CHENNAI-I & II	TANGEDCO	0.00	0.24	5.18	5.42	0.00	0.00	0.76	6.18	9.20	0.00	0.00	9.20	9.20	0.00
		0.00	**1.71**	**19.96**	**21.67**	**2.87**	**0.49**	**5.76**	**27.95**	**43.43**	**0.00**	**0.00**	**32.00**	**32.00**	**11.43**
Ennore SCTPP	TANGEDCO									5.12	0.00	0.00	3.68	3.68	1.44
Udangudi STPP St-I	TANGEDCO									5.07	0.00	0.00	3.65	3.65	1.42
North Chennai TPP St-III	TANGEDCO									2.94	0.00	0.00	0.00	0.00	2.94
										56.56	**0.00**	**0.00**	**39.32**	**39.32**	**17.24**

- 2 Under-Construction power plants namely APGENCO's Dr NTR TPS Unit-V and Sri Damodaram Sanjeevaiah TPP St-II to consume ~7.10 Million Tonnes of Coal for which FSA's are in place with MCL. Coastal Shipping will be more cost effective than transporting directly via rail to these power plants.
- From the overall increase in demand from power sector in Andhra Pradesh, majority will be catered by mines of MCL (either via coastal shipping or complete Rail mode) and the remaining to be catered by SCCL. Some quantities being sourced by ECL and SCCL by NTPC Simhadri could also be substituted with MCL's coal. This substitution has been assumed under the analysis. 1 – 2 Million Tonnes of Imported coal for blending would happen for these power plants.

O-D Source cluster Mapping – Odisha to Tamil Nadu

Odisha to Tamil Nadu total Rail Despatch in FY22 = 21.67 Million Tonnes (Including 19.96 MT RSR)



This Analysis excludes Coastal Shipping Routes Analysis

Major Coal Consuming Districts of TN: 2030 (Estimated)

>15 MTPA Coal Consumption	*NA*
10-15 MTPA Coal Consumption	*Salem, Thiruvallur*
5-10 MTPA Coal Consumption	*Vellore*
1-5 MTPA Coal Consumption	*Tuticorin, Madurai, Tiruchirapalli*

Expected Load from Odisha to TN main trunk lines (Excluding load from other states on this line)

*TN Coal **Demand 2022 ~ 27.95 MTPA***

*Rail Supply by Odisha **2022 ~ 21.12 MTPA***

*AP Coal **Demand 2030 ~ 56.56 MTPA***

*Rail Supply by Odisha **2030 ~ 47.29 MTPA***

FY22				FY30	
From	To	Traffic (Tonnes) 2022	Rakes / Day 2022	Traffic (Tonnes) 2030	Rakes / Day 2030
Belpahar	Jharsuguda Rd	470862	0.34		
Jharsuguda Rd	Sambalpur	593711	0.42		
Sambalpur	Titlagarh	593711	0.42		
Titlagarh	Lanjigarh Rd	593711	0.42		
Lanjigarh Rd	Therubali	593711	0.42		
Therubali	Vizianagram Jn	593711	0.42		
Vizianagram Jn	Duvadda	2844396	2.02		
Duvadda	Samalkot Jn	2844396	2.02		
Samalkot Jn	Vijayawada Jn	2844396	2.02		
Vijayawada Jn	Chirala	2844396	2.02		
Chirala	Venkatachalam	2844396	2.02		
Venkatachalam	Gudur	2844396	2.02		
Gudur	Renigunta	2262748	1.61		
Renigunta	Arakkonam	2262748	1.61		
Arakkonam	Katpadi	2262748	1.61		
Katpadi	Jolarpettai	2262748	1.61		
Jolarpettai	Karuppur	2262748	1.61		
Talcher	Budhapank	2250685	1.60		
Budhapank	Rajatgarh	2250685	1.60		
Rajatgarh	Barang	2250685	1.60		
Barang	Khurda Rd	2250685	1.60		
Khurda Rd	Chatrapur	2250685	1.60		
Chatrapur	Naupada Jn	2250685	1.60		
Naupada Jn	Vizianagram Jn	2250685	1.60		
Gudur	Ennore	458799.9	0.33		
Ennore	Milavittan	113785.1	0.08		
Jharsuguda Jn	Jharsuguda Rd	122848.6	0.09		
Ennore	Tiruvallur	122848.6	0.09		

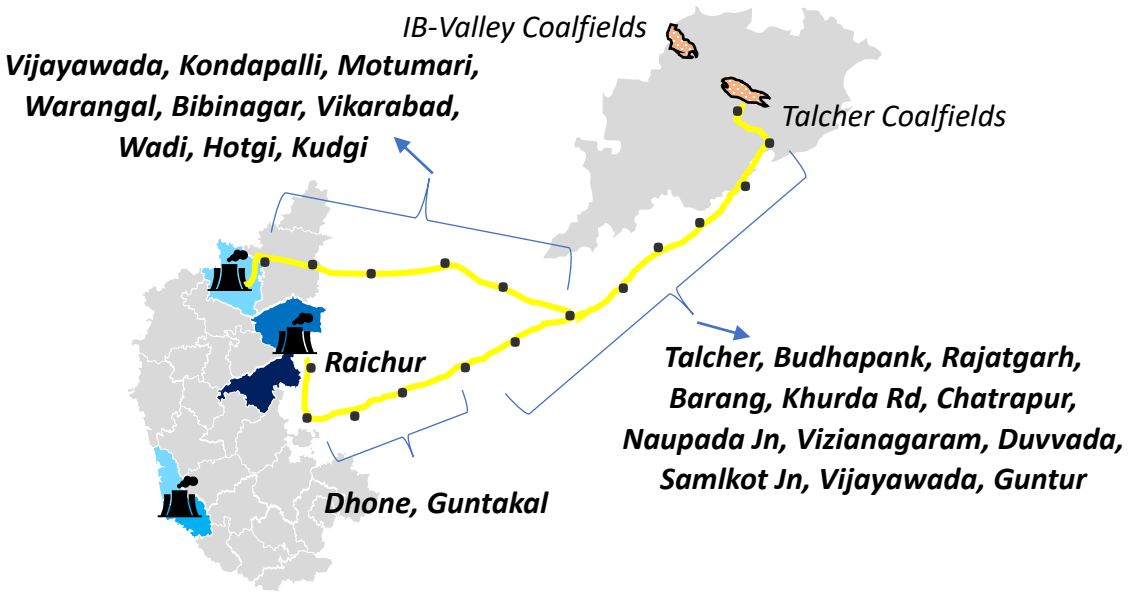
The entire transportation from MCL to Tamil Nadu's Power plants would shift to coastal shipping in Near Future.

This has been covered separately under the Coastal Shipping Analysis.

- Major Consumers in TN sourcing coal from MCL are TANGEDCO, NTPC-TECL Vallur, NLC Tamil Nadu Power Ltd, Coastal Energen, OPG Power Generation Pvt Ltd. and other consumers of coastal shipping

O-D Source cluster Mapping – Odisha to Karnataka

Odisha to Karnataka total Rail Despatch in FY22 = 0.593 Million Tonnes (Including 0.23 MT RSR)



Major Coal Consuming Districts of Karnataka: 2030 (Estimated)

>15 MTPA Coal Consumption	*Ballari*
10-15 MTPA Coal Consumption	*Raichur*
5-10 MTPA Coal Consumption	*Dakshina Kanadda*
1-5 MTPA Coal Consumption	*Bijapur, Udupi*

Expected Load from Odisha to Karnataka main trunk lines (Excluding load from other states on this line)

*Karnataka Coal **Demand 2022 ~ 18.43 MTPA***

*Rail Supply by Odisha **2022 ~ 0.593 MTPA***

*Karnataka Coal **Demand 2030 ~ 21.84 MTPA***

*Rail Supply by Odisha **2030 ~ 0 MTPA***

FY22				FY30	
From	To	Traffic (Tonnes) 2022	Rakes / Day 2022	Traffic (Tonnes) 2030	Rakes / Day 2030
Talcher	Budhapank	440297	0.31		
Budhapank	Rajatgarh	440297	0.31		
Rajatgarh	Barang	440297	0.31		
Barang	Khurda Rd	440297	0.31		
Khurda Rd	Chatrapur	440297	0.31		
Chatrapur	Naupada Jn	440297	0.31		
Naupada Jn	Vizianagram Jn	440297	0.31		
Vizianagram Jn	Duvadda	440297	0.31		
Duvadda	Samalkot Jn	440297	0.31		
Samalkot Jn	Vijayawada Jn	440297	0.31		
Vijayawada Jn	Guntur	423292	0.30		
Guntur	Dhone Jn	423292	0.30		
Dhone Jn	Guntakal Jn	423292	0.30		
Guntakal Jn	Raichur	423292	0.30		
Vijayawada Jn	Kondapalli	17005	0.01		
Kondapalli	Motumari Jn	17005	0.01		
Motumari Jn	Warangal	17005	0.01		
Warangal	Bibinagar	17005	0.01		
Bibinagar	Vikarabad	17005	0.01		
Vikarabad	Wadi	17005	0.01		
Wadi	Hotgi	17005	0.01		
Hotgi	Kudgi	17005	0.01		

MCL's Talcher would only supply to KPCL Raichur via Coastal Shipping.

Supply to NTPC's Kudgi Thermal Power plant highly unlikely as supply from SCCL would be at almost half the distance to assets as compared to supply by MCL.

Coastal Shipping covered in separate section.

- Major Consumers in Karnataka sourcing coal from MCL are KCPL's Raichur and Kudgi assets

O-D Source cluster Mapping – MCL would only Supply to Raichur and Ballari via Coastal shipping

All figures in million tonnes

Name of TPS	Utility	IB-Valley	Talcher	RSR	Total Odisha	SCCL	WCL	Captive Blocks	Others (Incl Imports)	Total Coal Consumed	Estimated Coal Consumption (FY30)	Supply from IB-Valley 2030	Supply from Talcher 2030	Odisha RSR 2030	Odisha's Supply in FY30	Sourced from SCCL, WCL, Captive & Imports
VIJAYANAGAR	JSW ENERGY LIMITED	0.00	0.00	0.00	0.00	1.55	0.00	0.00	0.00	1.34	1.34	0.00	0.00	0.00	0.00	1.34
RAICHUR POWER PLANT	KPCL	0.00	0.35	0.23	0.58	1.85	0.00	1.11 (Durgapur – Raigarh)	1.21	4.74	4.75	0.00	0.00	4.75	4.75	0.00
BALLARI	KPCL	0.00	0.00	0.00	0.00	1.69	0.13	0.96 (Baranj Blocks in MH)	1.59	4.36	4.38	0.00	0.00	4.38	4.38	0.00
KUDGI	NTPC LTD.	0.00	0.02	0.00	0.02	3.25	0.00	0.00	0.71	3.97	5.55	0.00	0.00	0.00	0.00	5.55
		0.00	**0.00**	**0.00**	**0.59**	**8.33**	**0.13**	**2.07**	**3.50**	**14.42**	**16.03**	**0.00**	**0.00**	**9.13**	**9.13**	**6.90**
Yelanhaka CCPP	KPCL										1.60	0.00	0.00	0.00	0.00	**1.60 ((Baranj Blocks in MH)**
					Total						**17.62**	**0.00**	**0.00**	**9.13**	**9.13**	**8.49**

TPS	Mandakini – Talcher (FY30)	MCL – Talcher (FY30)	Total (FY30)
Raichur	3.74	1.01	**4.75**
Ballari	3.76	0.62	**4.38**
Total RSR from Paradeep	**7.50**	**1.63**	**9.13**

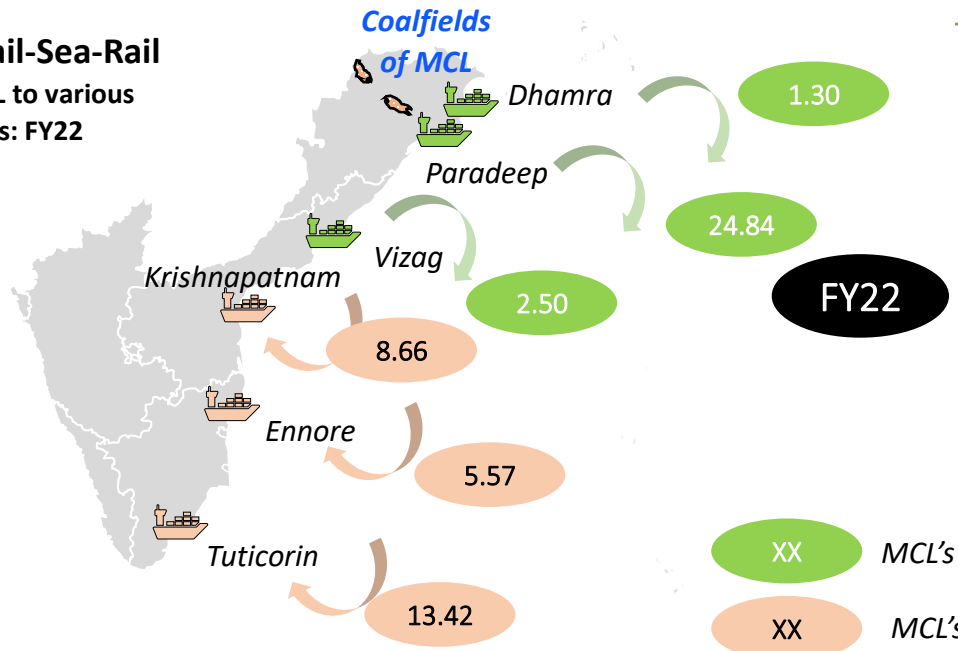
- NTPC's Kudgi as well as JSW's Vijayanagar would most probably source from SCCL. Plants such as Yeramarus TPP and Udupi don't source coal from MCL and are dependent on SCCL and Imports. This trend is expected to continue further as SCCL has plans to expand coal production to 100 MTPA by FY30.

O-D Source cluster Mapping – Coastal Shipping traffic from MCL

Consumers	Paradip Port (MT)	Dhamra Port (MT)	Vizag Port (MT)	Total Despatch: FY22 (In MT)
APGENCO/Rayalseema TPP (Andhra Pradesh)	1.40	0	0	1.40
APPDCL-Sri Damodaran Sanjeevaih TPS (Andhra Pradesh)	2.28	0	0	2.28
NTECL-VALLUR (Tamil Nadu)	4.27	1.3	0	5.57
NLC-TPL (Tamil Nadu)	0.97	0	0	0.97
KPCL (Karnataka)	0.23	0	0	0.23
TANGEDCO (Tamil Nadu)	10.92	0	2.5	13.42
SEMBCORP ENERGY INDIA LTD (Andhra Pradesh)	4.75	0	0	4.75
Total	24.84	1.3	2.5	28.64

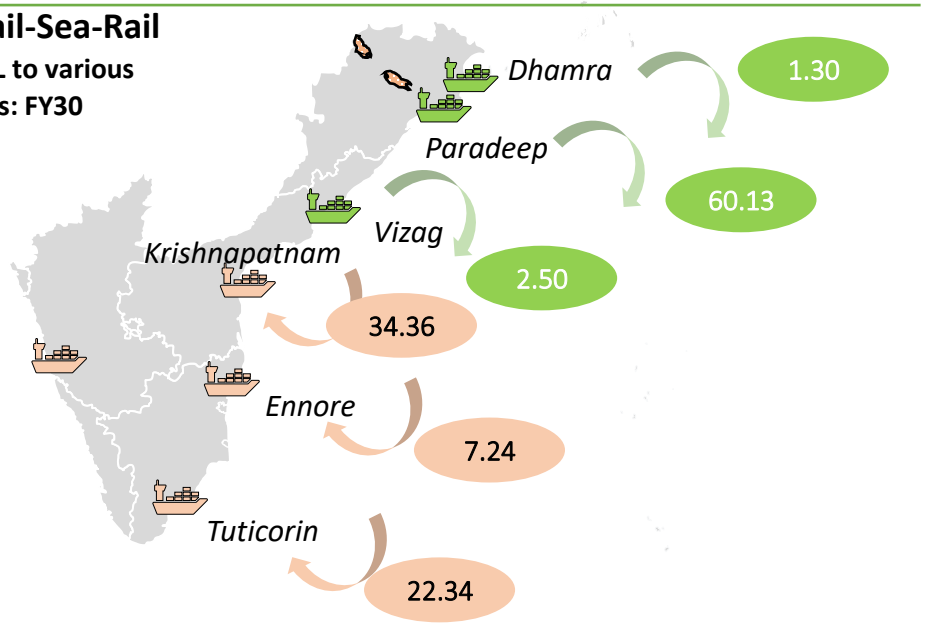
Consumer / Utility	Paradeep	Dhamra	Vizag	Total	Port of Entry
APGECO - RAYALSEEMA	7.36	0	0	7.36	Krishnapatnam
APPDCL - SRI DAMODARAM SANJEEVAIAH	7.12	0	0	7.12	Krishnapatnam
Sembcorp Energy - PAINAMPURAM TPP	5.57	0	0	5.57	Krishnapatnam
Sembcorp Energy - SGPL TPP	5.57	0	0	5.57	Krishnapatnam
APGECO - Dr Narla Tata Rao TPS St-V	3.55	0	0	3.55	Krishnapatnam
APPDCL - Sri Damodaram Sanjeevaiah TPP St-II	3.55	0	0	3.55	Krishnapatnam
Coastal Energen - MUTIARA	0.50	0	0	0.50	Tuticorin
IL & FS TAMIL NADU POWER COMPANY LTD.	0.41	0	0	0.41	Tuticorin
NLC TAMILNADU POWER Ltd	2.24	0	0	2.24	Tuticorin
VALLUR - NTECL	5.94	1.30	0	7.24	Ennore
TUTICORIN / TANGEDCO	2.11	0	2.50	4.61	Tuticorin
METTUR-I / TANGEDCO	3.05	0	0	3.05	Tuticorin
METTUR-II / TANGEDCO	2.32	0	0	2.32	Tuticorin
NORTH CHENNAI-I & II / TANGEDCO	9.20	0	0	9.20	Tuticorin
KPCL - Raichur TPP	1.01	0	0	1.01	Krishnapatnam
KPCL - Ballari TPP	0.62	0.00	0.00	0.62	Krishnapatnam
	60.13	1.30	2.50	63.93	

28.64 MTPA Rail-Sea-Rail
despatch by MCL to various power plants: FY22



FY22 → FY30

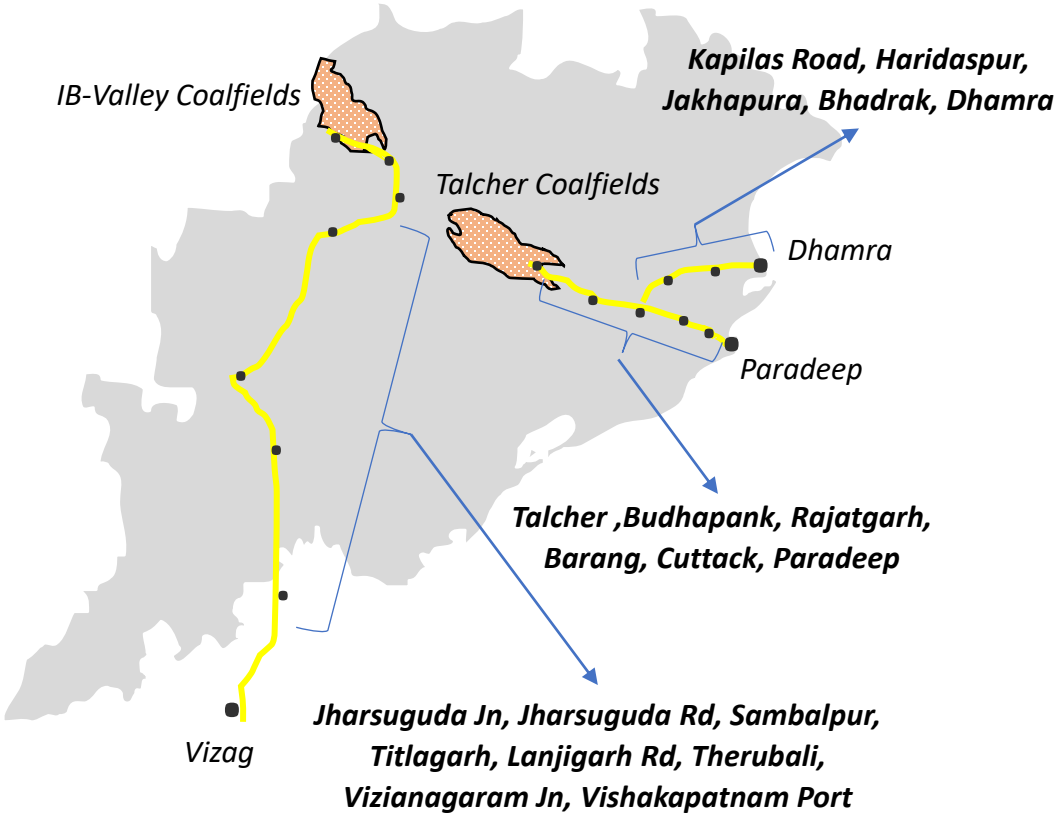
63.31 MTPA Rail-Sea-Rail
despatch by MCL to various power plants: FY30



XX *MCL's Outbound Coal*

XX *MCL's Inbound Coal*

O-D Source cluster Mapping – Coastal Shipping traffic on major trunklines - MCL



From	To	Traffic (Tonnes) 2022	Rakes / Day 2022	Traffic (Tonnes) 2030	Rakes / Day 2030
Jharsuguda Jn	Jharsuguda Rd	2500000	1.78	2500000.0	1.78
Jharsuguda Rd	Sambalpur	2500000	1.78	2500000.0	1.78
Sambalpur	Titlagarh	2500000	1.78	2500000.0	1.78
Titlagarh	Lanjigarh Rd	2500000	1.78	2500000.0	1.78
Lanjigarh Rd	Thrubali	2500000	1.78	2500000.0	1.78
Thrubali	Vizianagaram Jn	2500000	1.78	2500000.0	1.78
Vizianagaram Jn	Vishakapatnam Port	2500000	1.78	2500000.0	1.78
Talcher	Budhapank	26140000	18.60	60811679.0	43.72
Budhapank	Rajatgarh	26140000	18.60	60811679.0	43.72
Rajatgarh	Kapilas Rd	1300000	0.93	1300000.0	0.93
Kapilas Rd	Jakhapura	1300000	0.93	1300000.0	0.93
Jakhapura	Bhadrak	1300000	0.93	1300000.0	0.93
Bhadrak	Dhamra	1300000	0.93	1300000.0	0.93
Rajatgarh	Barang	24840000	17.68	59511679.0	42.79
Barang	Cuttack	24840000	17.68	59511679.0	42.79
Cuttack	Paradeep	24840000	17.68	59511679.0	42.79

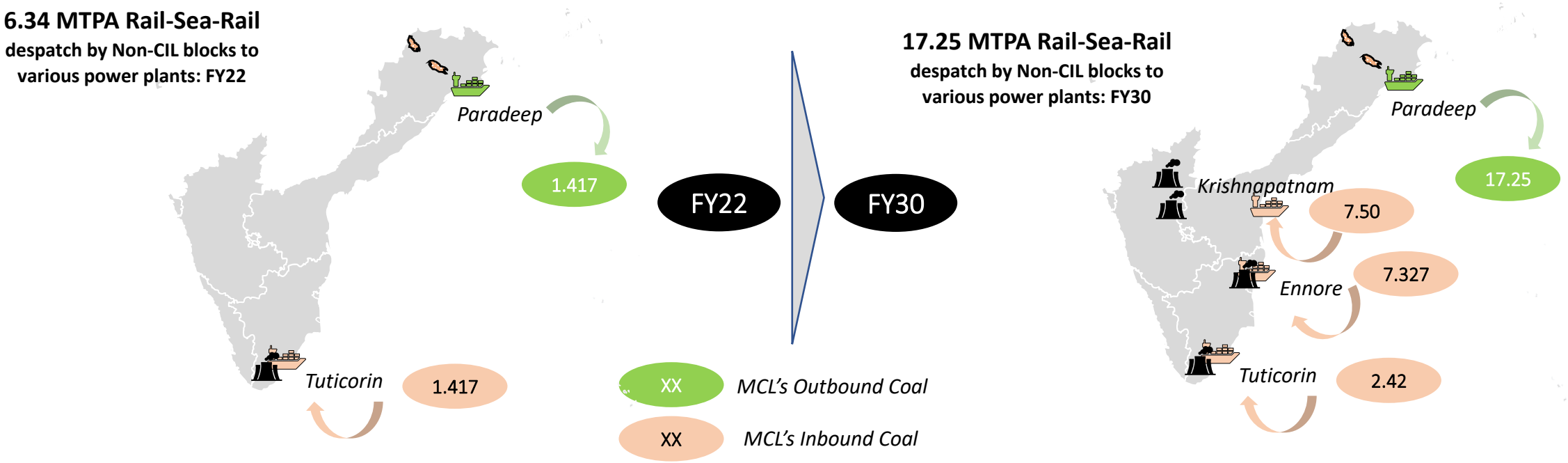
From	To	Capacity Utilization (FY22)
Bhadrak	Jakhapura	**143%**
Jakhapura	Haridaspur	**96%**
Barang	Cuttack	**99%**
Barang	Rajatgarh	**48%**
Rajatgarh	Budhapank	**122%**
Budhapank	Talcher	**120%**
Budhapank	Taclher Rd	**135%**
Talcher	Talcher Rd	**139%**
Cuttack	Paradeep	**73%**
Haridaspur	Paradeep	**64%**

As per ECR's Line Capacity Statement FY21-22

High Congestion sections

O-D Source cluster Mapping – Coastal Shipping traffic on major trunklines: Non-CIL

Captive Block / Owner	Name of Power Plant	Total Despatch: FY22 (In MT)	Total Despatch: FY30 (In MT)	Port of Entry	Type of Asset
Mandakini (Talcher) / KPCL	Raichur & Ballari	0	7.5 (3.74 + 3.76)	Krishnapatnam	Hinterland
Chandrabila (Talcher) / TANGEDCO	Ennore SCTPP, Udangudi STPP Unit 1,2	0	7.327 (3.68+3.65)	Ennore	Coastal
Talabira II & III (IB Valley) / NLC	NLC New Tamil Nadu TPS	1.417	2.42	Tuticorin	Coastal
Total		**1.417**	**17.25**		



O-D Source cluster Mapping – Potential INR ~50 Cr per annum savings for KPCL by RSR

Raichur Thermal Power Plant of KPCL

Costal Shipping	Ennore	Krishnapatnam
Rail Freight Talcher to Paradip Port	706.1	706.1
Handling Charges at Paradip Port	190.0	190.0
Sea Freight	480.0	434.0
Handling Charges at Unloading Port	442.0	200.0
Rail Freight from unloading port to Raichur TPS	1468.6	1289.4
Total Transportation Cost (INR/T)	**3286.8**	**2819.5**

All Rail from Mandakini Coal Block in Talcher Talcher to Raichur TPS All Rail Freight (INR/T) Total Estimated supply from Mandakini = 3.74 Million Tonnes	**2854.95**

Estimated INR 13.25 Crore per Annum Saving in Transportation cost for Raichur Plant if RSR is adopted rather than all rail.

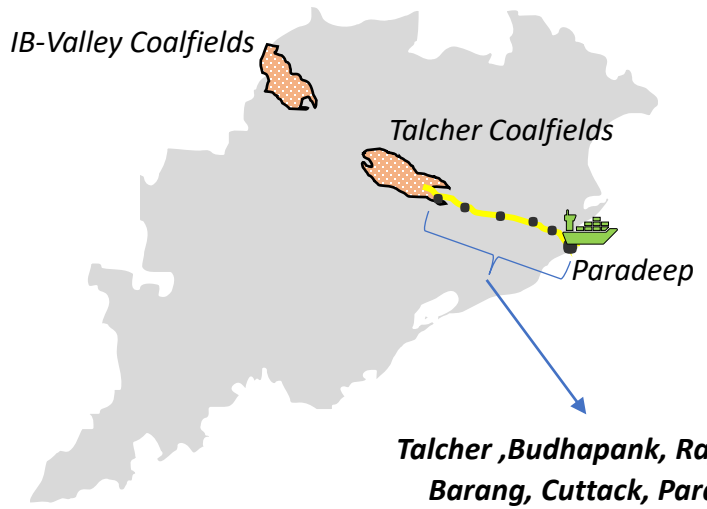
Ballari Thermal Power Plant of KPCL

Costal Shipping	Ennore	Krishnapatnam
Rail Freight Talcher to Paradip Port	706.1	706.1
Handling Charges at Paradip Port	190.0	190.0
Sea Freight	480.0	434.0
Handling Charges at Unloading Port	442.0	200.0
Rail Freight from unloading port to Ballari TPS	1289.4	1106.7
Total Transportation Cost (INR/T)	**3107.5**	**2636.8**

All Rail from Mandakini Coal Block in Talcher Talcher to Ballari TPS All Rail Freight (INR/T) Total Estimated supply from Mandakini = 3.76 Million Tonnes	**2725.91**

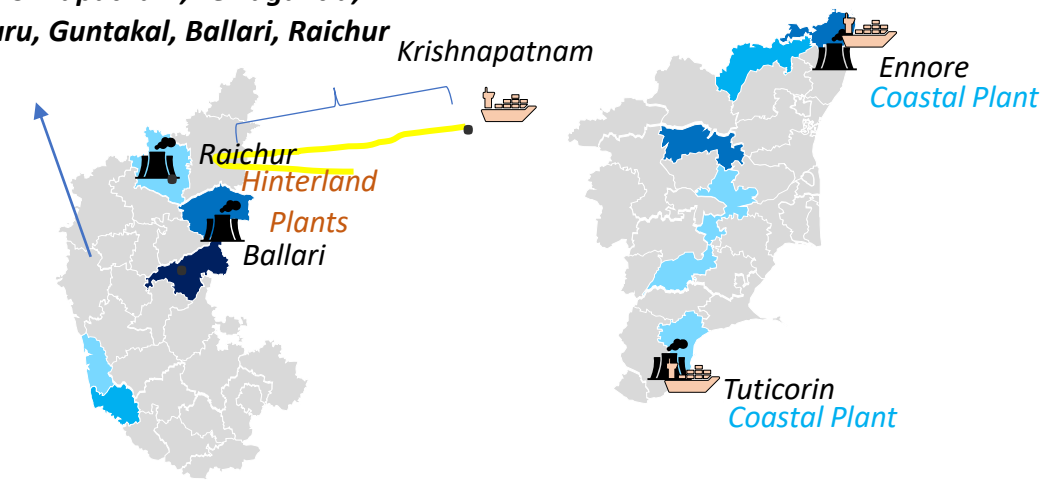
Estimated INR 33.49 Crore per Annum Saving in Transportation cost for Ballari Plant if RSR is adopted rather than all rail.

O-D Source cluster Mapping – Coastal Shipping traffic on major trunklines – Non-CIL



Talcher ,Budhapank, Rajatgarh, Barang, Cuttack, Paradeep

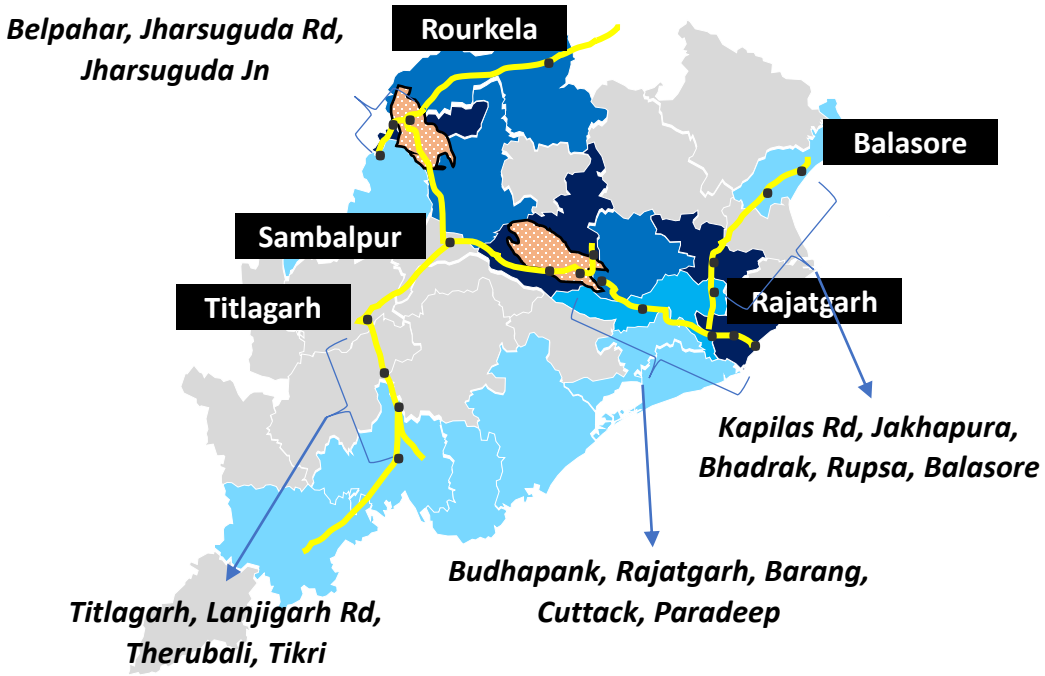
Krishnapatnam, Yerraguntla, Juturu, Guntakal, Ballari, Raichur



From	To	Traffic (Tonnes) 2022	Rakes / Day 2022	Traffic (Tonnes) 2030	Rakes / Day 2030
Angul	Talcher Rd	1417000	1.01	17247000	12.27
Talcher Rd	Budhapank	1417000	1.01	17247000	12.27
Budhapank	Rajatgarh	1417000	1.01	17247000	12.27
Rajatgarh	Barang	1417000	1.01	17247000	12.27
Barang	Cuttack	1417000	1.01	17247000	12.27
Cuttack	Paradeep	1417000	1.01	17247000	12.27
Krishnapatnam	Yerraguntla	0	0.00	7500000	5.34
Yerraguntla	Juturu	0	0.00	7500000	5.34
Juturu	Guntakal Jn	0	0.00	7500000	5.34
Guntakal Jn	Ballari Jn	0	0.00	3760000	2.68
Guntakal	Raichur	0	0.00	3740000	2.66
Jharsuguda Rd	Sambalpur	1417000	1.01	2420000	1.72
Sambalpur	Angul	1417000	1.01	2420000	1.72

O-D Source cluster Mapping – Odisha's internal consumption

Odisha's internal total Rail Despatch in FY22 = 32.35 Million Tonnes



Major Coal Consuming Districts of Odisha: 2030 (Estimated)

>15 MTPA Coal Consumption	*Jharsuguda, Angul, Jajpur, Jagatsinghpur*
10-15 MTPA Coal Consumption	*Sundergarh, Sambalpur, Dhenkanal*
5-10 MTPA Coal Consumption	*Cuttack*
1-5 MTPA Coal Consumption	*Koraput, Rayagada, Gagapati, Ganjam, Khordha, Puri, Bargarh, Balasore*

Expected Load from Odisha-to-Odisha main trunk lines (Excluding load from other states on this line)

Odisha's Coal ***Demand 2022 ~ 99 MTPA***
Rail Supply by Odisha ***2022 ~ 32.35 MTPA***

Odisha's Coal ***Demand 2030 ~ 147 MTPA***
Rail Supply by Odisha ***2030 ~ 124.82 MTPA***

		FY22		FY30	
From	**To**	**Traffic (Tonnes) 2022**	**Rakes / Day 2022**	**Traffic (Tonnes) 2030**	**Rakes / Day 2030**
Talcher	Talcher Rd	17982389.19	12.80	43808733.7	31.18
Talcher Rd	Angul	8353929.433	5.94	27082782.4	19.27
Angul	Sambalpur	17990410.85	12.80	32297324.0	22.98
Sambalpur	Jharsuguda Rd	23784871.7	16.93	56103364.5	39.92
Talcher	Budhapank	10056519.4	7.16	51516987.7	36.66
Budhapank	Rajatgarh	14036430.9	9.99	51247719.5	36.47
Rajatgarh	Kapilas Rd	6307313.1	4.49	6267866.2	4.46
Kapilas Rd	Jakhapura	6307313.1	4.49	6267866.2	4.46
Jakhapura	Bhadrak	95932.7	0.07	214786.8	0.15
Bhadrak	Rupsa	47966.3	0.03	107393.4	0.08
Rupsa	Balasore	47966.3	0.03	107393.4	0.08
Rajatgarh	Barang	95051.8	0.07	212814.7	0.15
Barang	Cuttack	95051.8	0.07	212814.7	0.15
Cuttack	Paradeep	95051.8	0.07	212814.7	0.15
Sambalpur	Titlagarh	4267163.9	3.04	3169307.0	2.26
Titlagarh	Lanjigarh Rd	4218577.0	3.00	3169307.0	2.26
Lanjigarh Rd	Therubali	1345372.9	0.96	754036.4	0.54
Therubali	Tikiri	1345372.9	0.96	754036.4	0.54
Jharsuguda Jn	Rourkela	4063470.8	2.89	9097837.1	6.47
Rourkela	Sini	4063470.8	2.89	9097837.1	6.47
Belpahar	Jharsuguda Rd	19002492.2	13.52	46065370.5	32.78
Jharsuguda Rd	Jharsuguda Jn	3973020.9	2.83	12963703.1	9.23

- Coal traffic from Non-CIL blocks of Vedanta (Jamkhani, Kuraloi A North, & Radhikapur West), Nalco (Utkal E & D), JSPL (Utkal C, B1 & B2), and Hindalco (Meenakshi) have also be considered, given that they would be operating at PRC by 2030.

O-D Source cluster Mapping – Odisha's supply to in-state power plants to increase

All figures in million tonnes

Name of TPS	Utility	IB-Valley	Talcher	Total Odisha	Others	Total Coal Consumed	Estimated Coal Consumption (FY30)	Supply from IB-Valley 2030	Supply from Talcher 2030	Odisha 2030	By Rail
GMR KAMALANGA TPP	GMR KAMALANGA ENERGY LTD.	0.06	5.24	5.29	0.16	5.46	6.15	0.00	6.15	6.15	6.15
DERANG TPP	JINDAL INDIA THERMAL POWER LIMITED	0.00	5.86	5.86	0.00	5.86	6.64	0.00	6.64	6.64	6.64
TALCHER - KANIHA	NTPC LTD.	0.00	16.88	16.88	0.00	16.88	18.51	0.00	18.51	18.51 (7.5 MTPA supply by MGR, remaining by rail)	11.01
IB VALLEY	ODISHA POWER GENERATION CORPORATION LIMITED	8.01	0.00	8.01	0.00	8.01	11.05	11.05	0.00	11.05 (Supply by Captive blocks – Manoharpur + Dip-side by MGR)	0.00
VEDANTA LTD TPP	VEDANTA LIMITED	1.91	0.48	2.40	0.16	2.56	7.74	6.18	1.56	7.74	7.74
DARLIPALI SUPER TPS	NTPC LTD.	6.56	0.00	6.56	0.00	6.56	7.52	7.52	0.00	7.52 (Supply by Dulanga)	0.00
		16.54	**28.46**	**45.00**	**0.33**	**45.33**	**57.61**	**24.75**	**32.85**	**57.61**	**31.54**
Talcher TPP St-III	NTPC	0.00	0.00	0.00	0.00	0.00	6.36	6.36	0.00	6.36	6.36
		0.00	0.00	0.00	0.00	0.00	**63.97**	**31.11**	**32.85**	**63.97**	**37.90**

- OPGC (Pre-NCDP FSA with MCL of 2.7 MTPA would expire in 2029, unlikely to be renewed) and NTPC Darlipalli would be completely reliant on their own captive blocks for fuel security. For NTPC's Talcher Kaniha as well as new Talcher STPP St-III, they are likely to source coal from MCL's IB Valley.

O-D Source cluster Mapping – Vedanta's sourcing from MCL and Captive blocks

Vedanta Ltd (jharsuguda and Lanjigarh)

Vedanta Ltd sourced ~ 15113355.53 Tonnes from MCL in FY22

Around ~ 10.12 MT was sourced via rail whereas ~5 MT was sourced via road

Vedanta Jharsuguda sourced ~ 14.5 MTPA (12.5 from IB valley and 2 from Talcher)

Vedanta Lanjigarh sourced ~ 0.5 MTPA (0.25 from IB valley and 2 from Talcher)

Vedanta Ltd has many commercial/captive coal blocks in Pipeline

In IB Valley CF

Coal Block	PRC (2030)
Jamkhani	2.6
Kuraloi A North	8
Total IB-Vedanta	10.6

In Talcher CF

Coal Block	PRC (2030)
Radhikapur West	6

Vedanta Jharsuguda Coal consumption

2022	2030
14.5	16.31

Sourcing Portfolio for 2030

Source	Quantity (MTPA)
Basundhara Area - Ca	2.6
Other IB-Valley - Cap	8
MCL IB-Valley	5.71

Vedanta Lanjigarh Coal consumption

2022	2030
0.40	2.075

Sourcing Portfolio for 2030

Source	Quantity (MTPA)
Talcher - Captive	2.075

Assuming expansion of refinery to 5 MTPA (0.415 KG coal is consumed per tonne of alumina)

Remaining Quantity from Radhikapur West to be sold in the open market

3.925 MTPA

1.9625 to be despatched towards Budhapank-Rajatgarh

1.9625 To be despacthed towards Talcher Rd-Angul-Sambalpur

2030 Revised traffic estimates for the O-D pair (Jharsuguda)

MCL Mahalaxmi, Basundhara (Sardega) & Jamkhani to Jharsuguda - Vedanta Ltd

From	To	Traffic (Tonnes)	Rakes / Day
Jharsuguda Jn	Jharsuguda Rd	4657167.825	3.31
Jharsuguda Rd	damal (Sambalpur Sec	4657167.825	3.31

MCL Lakhanpur, IB Valley Area and Basundhara (kanika) to Unknown

From	To	Traffic (Tonnes)	Rakes / Day
Belpahar	Jharsuguda Rd	13513858.59	9.62
Jharsuguda Rd	damal (Sambalpur Sec	13513858.59	9.62

Radhikapur West Surplus Coal Supply to Unknown

From	To	Traffic (Tonnes)	Rakes / Day
Talcher	Talcher Rd	3742440.368	2.66
Talcher Rd	Angul	3742440.368	2.66
Angul	Sambalpur	3742440.368	2.66
Talcher	Budhapank	3742440.368	2.66
Budhapank	Rajatgarh	3742440.368	2.66

2030 Revised traffic estimates for the O-D pair (Lanjigarh)

MCL Lakhanpur, IB Valley, Basundhara (kanika) to Unknown

From	To	Traffic (Tonnes)	Rakes / Day
Belpahar	Jharsuguda Rd	340270.59	0.24
Jharsuguda Rd	Sambalpur	340270.59	0.24
Sambalpur	Titlagarh	340270.59	0.24
Titlagarh	Lanjigarh Rd	340270.59	0.24

Radhikapur West to Lanjigarh and MCL Talcher to Unknown

From	To	Traffic (Tonnes)	Rakes / Day
Talcher	Talcher Rd	2353004.69	1.67
Talcher Rd	Angul	2353004.69	1.67
Angul	Sambalpur	2353004.69	1.67
Sambalpur	Titlagarh	2075000.00	1.48
Titlagarh	Lanjigarh Rd	2075000.00	1.48
Talcher	Budhapank	278004.69	0.20
Budhapank	Rajatgarh	278004.69	0.20

O-D Source cluster Mapping – NALCO's sourcing from MCL and Captive blocks

Nalco (Angul and Damanjodi)

Nalco Angul sourced ~ 5.36 Million Tonnes from MCL in FY22

Around ~ 2.97 MT was sourced via rail, ~2.15 MT via MGR, 0.24 MT via Road

Nalco Angul sourced entire quantitiy from Talcher CF

Nalco Damanjodi sourced ~ 0.99 million tonnes from MCL and 0.118 million tonnes from NCL in FY22

Around 52000 was soruced via RCR from MCL Basundhara and the remaining via rail (out of which 0.673 million tonnes so

2030 MCL Supply to Other destinations (Currently unknown)

MCL Hingula, Bharatpur, Lingaraj, Jagannath, Bhubaneswari to Unknown

From	To	Traffic (Tonnes)	Rakes / Day
Talcher	Talcher Rd	1021293.896	0.73
Talcher Rd	Angul	1021293.896	0.73
Angul	Sambalpur	1021293.896	0.73
Talcher	Budhapank	1021293.896	0.73
Budhapank	Rajatgarh	1021293.896	0.73

NALCO has two captive coal blocks

In Talcher CF

Coal Block	PRC (2030)
Utkal E & D (2+2)	4

Nalco Angul Coal consumption	
2022	**2030**
5.68	15.00
Smelter Expansion of capacity from 0.46 to 1.06 M	

Sourcing Portfolio for 2030

Source	Quantity (MTPA)
Talcher Area Captive	4
MCL Talcher MGR	3.00
MCL Talcher Rail	8.00

Nalco Damanjodi Coal consumption	
2022	**2030**
1.35	2.00
Refinery Expansion of capacity from 2.275 to 3.1	

Sourcing Portfolio for 2030

Source	Quantity (MTPA)
MCL IB Valley	1.000
MCL Talcher	0.500
MCL Talcher	0.500

NALCO's Coal Logistic Plan for Utkal D & E Coal Mines

- Coal Evacuation from Utkal D & E Coal Mine through proposed railway siding at Sankerjung: Coal from Utkal-D & E coal mine is planned to be evacuated from Utkal-D coal mine to proposed railway siding at Sankerjung after covering a distance of 18 kms by road and subsequently to CPP of NALCO though railway siding via Budhapank. PMC contract has been awarded to M/s. RITES and physical possession of the railway siding area is under progress.

- Coal evacuation from Utkal D & E coal mine through MCRL Corridor: The road-rail combination arrangement is proposed to continue till MCRL Rail Coal Corridor is commissioned. Afterwards the evacuation will take place directly from pit head to railway siding which is coming up in the close proximity of southern lease boundary of Utkal D coal block, doing away with the requirement of road transportation as mentioned in above point.

- Coal evacuation through road as Stop Gap arrangement: As commissioning of railway siding at Sankerjung & proposed Rail Corridor by MCRL are yet to be completed, presently coal is being evacuated from Utkal D coal mine to CPP NALCO through SH-63 & NH-55 by covering a total distance of 40 kms (approx.) as a stop gap arrangement, for a temporary period.

O-D Source cluster Mapping – JSPL's sourcing from MCL and Captive blocks

JSPL Angul

JSPL Angul sourced ~ 4485969.46 Tonnes from MCL in FY22

Around ~ 0.849 MT was sourced via rail, ~3.64 MTPA sourced via road

JSPL Angul sourced entire quantitiy from Talcher CF

Almost the entire quantity is sourced from Talcher CF (Only 963.38 Tonnes is sourced via road from Basundhara Area)

JSPL currently has 3 commercial/captive coal blocks in Pipeline

In Talcher CF

Coal Block	**PRC (2030)**
Utkal-C	3.37
Utkal B1 & B2 (5.5 + 2.2)	8
Total Talcher to JSPL	11.37

JSPL Angul Coal consumption

2022	**2030**
5.53	11.62

Sourcing Portfolio for 2030

Source	**Quantity (MTPA)**
Utkal B1, B2 and C	11.37
MCL Talcher	0.25

Capacity expansion to 25.2 MTPA from 6 MTPA by 2030, but only Half of it is via BOF route

2030 Revised traffic estimates for the O-D pair (JSPL Angul)

MCL Talcher and Utkal B1,B2 & C to JSPL Angul and MCL Talcher to Unknown

From	To	Traffic (Tonnes)	Rakes / Day
Talcher	Talcher Rd	12445933.73	8.86
Talcher Rd	Angul	12445933.73	8.86
Angul	Sambalpur	825933.73	0.59
Talcher	Budhapank	825933.73	0.59
Budhapank	Rajatgarh	825933.73	0.59

O-D Source cluster Mapping – Hindalco's sourcing from MCL and Captive blocks

Hindalco

Hindalco Industries Ltd sourced ~ 5146041.05 Tonnes from MCL in FY22

Around ~ 1.347 MT was sourced via rail whereas ~3.799 MT was sourced via road

Hindalco Smelters, Refineries and CPPs (Except Utkal Alumina) sourced ~ 4.797 MTPA (337926 from IB valley and 1424472.81 from Talcher)

Out of this, 1131685.71 was sourced via Rail and 3665693.1 was sourced via Road

Utkal Alumina sourced ~ 348622.24 (almost entirely from Talcher)

Out of this, 214963.76 was sourced via Rail and 133698.48 was sourced via Road

2030 Supply from Meenakshi to Aditya and Hirakud

IB Valley Meenakshi Coal Block to Aditya and Hirakud Smelters - Hindalco			
Belpahar	Jharsuguda Rd	4532128.68	3.23
Jharsuguda Rd	Sambalpur	4532128.68	3.23

Hindalco currently has 1 commercial/captive coal block in Pipeline in Odisha

In IB Valley CF

Coal Block	**PRC (2030)**
Meenakshi	12

Utkal Alumina Coal Consumption

2022	**2030**
0.88	0.88

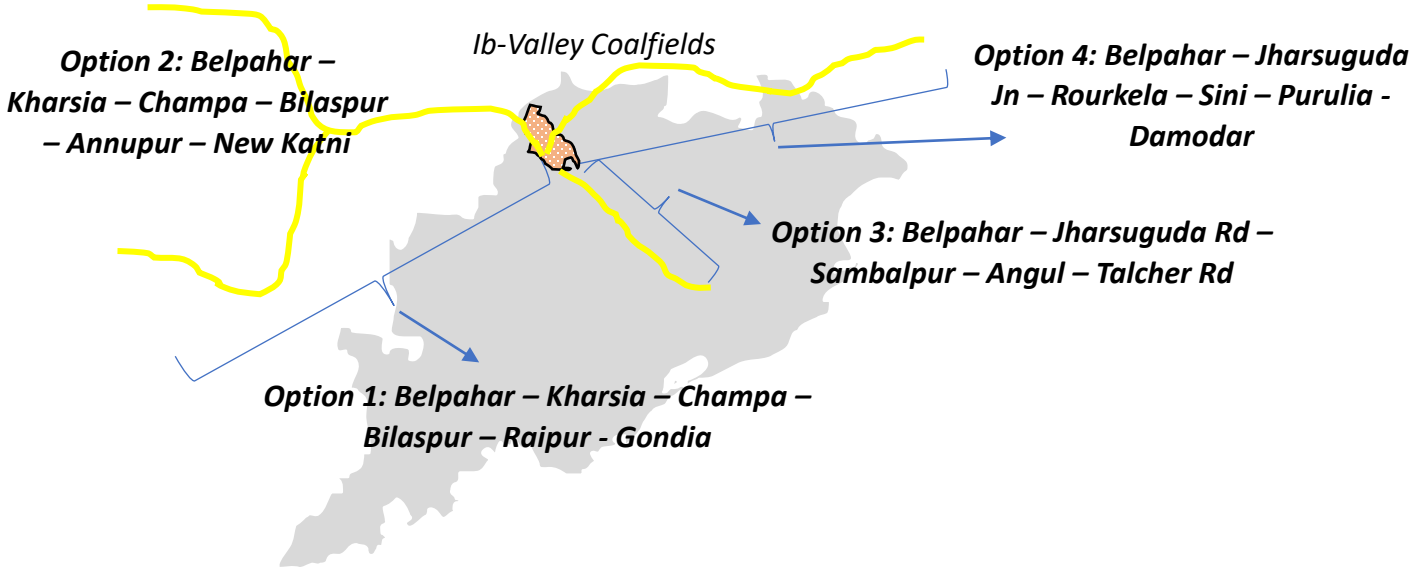
Sourcing Portfolio for 2030

Source	**Quantity (MTPA)**	
Meenakshi	0	Would make more economical sense to source from Talcher CF of MCL due to logistics cost
MCL Talcher	0.88	

No further capacity expansion plans in near future

Smelter	2022 Capacity	Coal Consumption	State	2030 Capacity	Coal Consumption	Supply From Captive Gare Palma Blocks in Chhattisgarh	Supply from Meenakshi	Remaining supply would be from Jh
Aditya	0.36	4.04	Odisha	0.41	4.61	1.25	3.36	0.00
Mahan	0.36	4.04	MP	0.36	4.04	0	3.45	0.59
Hirakud	0.216	2.43	Odisha	0.216	2.43	1.25	1.18	0.00
Renukoot	0.41	4.61	UP	0.41	4.61	0	4.02	0.59
	1.346	**15.12**		**1.396**	**15.68**	**2.5**	**12.00**	**1.18**

O-D Source cluster Mapping – Other Commercial Non-CIL blocks in IB-Valley CF



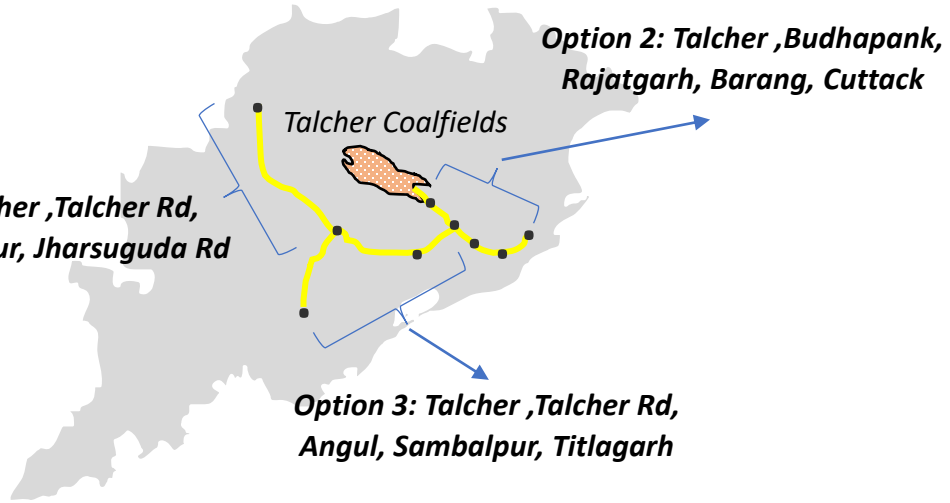
Owner	Block	PRC (MTPA)	Route Options for
Odisha Coal & Power Ltd	Manoharpur Dip Side	6 MTPA Commercial (8 MTPA PRC, remaining despatch to IB TPS – OPGC)	• **Option 1:** Belpahar – Kharsia – Champa – Bilaspur – Raipur - Gondia • **Option 2:** Belpahar – Kharsia – Champa – Bilaspur – Annupur – New Katni • **Option 3:** Belpahar – Jharsuguda Rd – Sambalpur – Angul – Talcher Rd • **Option 4:** Belpahar – Jharsuguda Jn – Rourkela – Sini – Purulia - Damodar
Mahanadi Mines & Minerals	Bijhan	5.26	
NLC	Talabira II & III	20 (17.58 Commercial and 2.42 to NLC New Tamil Nadu TPS)	
GMDC	Burapahar	6 MTPA Commercial	

As it is not prudent to assume the future EUPs/destination of coal from commercial mines, the estimated traffic has been distributed equally among possible route options (trunk lines0 for evacuation

Consolidated traffic from 3 Non-CIL blocks in Ib-Valley CF

From	To	Traffic 2030 (Tonnes)	Rakes/Day
Belpahar	Kharsia	15420000	10.97
Kharsia	Champa	15420000	10.97
Champa	Bilapsur	15420000	10.97
Bilapsur	Raipur	7710000	5.49
Raipur	Gondia	7710000	5.49
Bilapsur	Anuppur	7710000	5.49
Anuppur	New katni	7710000	5.49
Belpahar	Jharsuguda Rd	7710000	5.49
Jharsuguda Rd	Sambalpur	7710000	5.49
Sambalpur	Angul	7710000	5.49
Angul	Talcher Rd	7710000	5.49
Talcher Rd	Budhapank	0	0
Budhapank	Rajatgarh	0	0
Belpahar	Jharsuguda Jn	7710000	5.49
Jharsuguda Jn	Rourkela	7710000	5.49
Rourkela	Sini	7710000	5.49
Sini	Purulia	7710000	5.49
Purulia	Damodar	7710000	5.49

O-D Source cluster Mapping – Other Commercial Non-CIL blocks in Talcher CF



Owner	Block	PRC (MTPA)	Route Options for
GMDC	Baitrani West	15	• **Option 1:** Talcher – Talcher Rd – Angul – Sambalpur – Jharsuguda Rd • **Option 2:** Talcher – Budhapank – Rajatgarh – Barang – Cuttack • **Option 3:** Talcher – Talcher Rd – Angul – Sambalpur – Titlagarh
SCCL (Surrendered)	New Patrapara	15	
SCCL	Naini	10	
EMIL mines & Minerals	Radhikapur East	5	
6 Blocks under 7th Tranche Auctions	6 Blocks under 7th Tranche Auctions	~62	

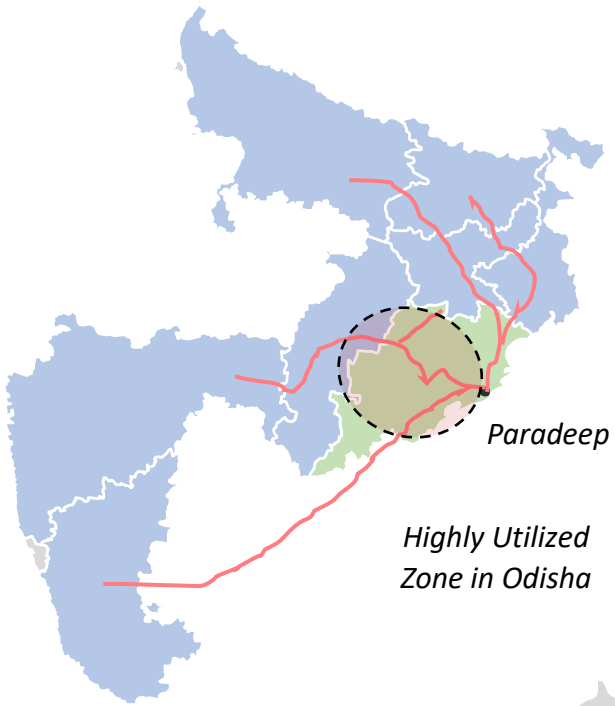
As it is not prudent to assume the future EUPs/destination of coal from commercial mines, the estimated traffic has been distributed equally among possible route options (trunk lines0 for evacuation

Consolidated traffic from 4 Non-CIL blocks in Talcher CF

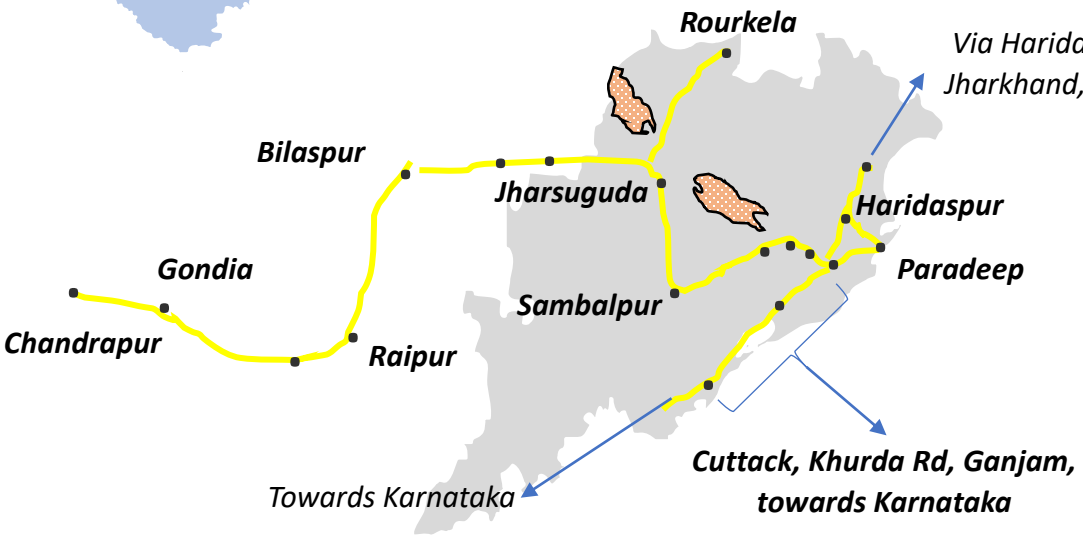
From	To	Traffic 2030 (Tonnes)	Rakes/Day
Talcher	Talcher Rd	96300000.0	68.53
Talcher Rd	Angul	96300000.0	68.53
Angul	Sambalpur	96300000.0	68.53
Sambalpur	Jharsuguda Rd	48150000.0	34.26
Sambalpur	Titlagarh	48150000.0	34.26
Talcher	Budhapank	39400000.0	28.04
Budhapank	Rajatgarh	39400000.0	28.04
Rajatgarh	Barang	39400000.0	28.04
Barang	Cuttack	39400000.0	28.04

O-D Source cluster Mapping – Coal Inflow from Paradeep port

Total Coal Imports from Paradip Port Stood at ~24.78 MTPA in FY22



Total Inflow From Paradip FY22	Volumes (MTPA)	Via Cuttack	Via Haridaspur
State	**24.78**	**14.47**	**10.31**
Odisha	17.42	12.22	5.19
West bengal	2.10		2.10
Jharkhand	2.34		2.34
Chhattisgarh	2.14	2.14	0
Bihar	0.51		0.51
Uttar Pradesh	0.14		0.14
Madhya Pradesh	0.02		0.02
Maharashtra	0.10	0.10	
Karnataka	0.01	0.01	
Assam	0.01		0.01



From	To	Traffic (Tonnes) 2022	Rakes / Day 2022	Traffic (Tonnes) 2030	Rakes / Day 2030
Paradeep	Cuttack	14472286	10.30	11771716	8.38
Cuttack	Barang	14472286	10.30	11771716	8.38
Barang	Rajatgarh	14472286	10.30	11771716	8.38
Rajatgarh	Budhapank	8823786	6.28	7177242	5.11
Budhapank	Talcher Rd	7076581	5.04	5756071	4.10
Talcher Rd	Angul	7076581	5.04	5756071	4.10
Angul	Sambalpur	4459762	3.17	3627557	2.58
Sambalpur	Jharsuguda Rd	4443806	3.16	3614579	2.57
Jharsuguda Rd	Kharsia	3263046	2.32	2654152	1.89
Kharsia	Champa	1180760	0.84	960427	0.68
Champa	Bilapsur	1180760	0.84	960427	0.68
Bilapsur	Raipur	1172782	0.83	953937	0.68
Raipur	Gondia	1124913	0.80	915001	0.65
Gondia	Chandrapur	1124913	0.80	915001	0.65
Jharsuguda Jn	Rourkela	1180760	0.84	960427	0.68

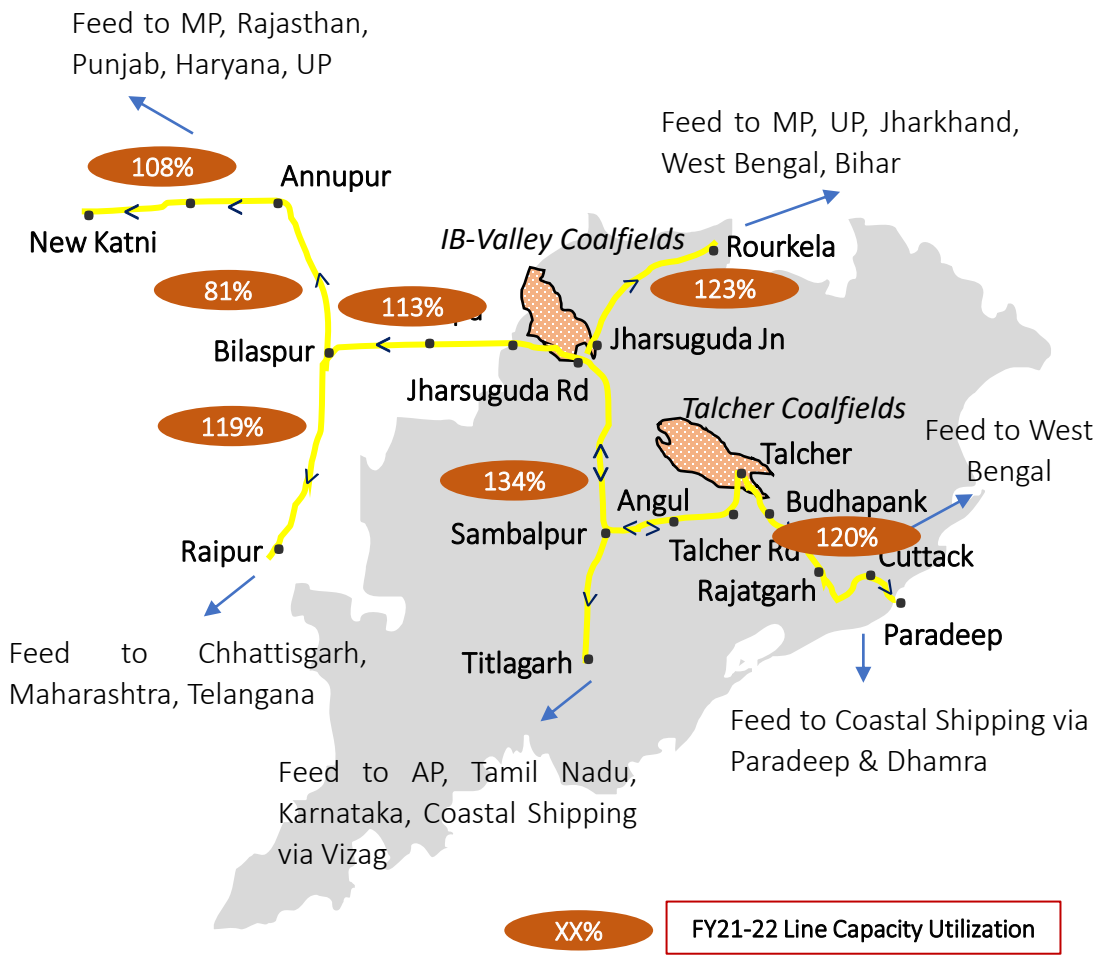
Thermal coal imports to decline moderately over long run due to increased domestic production leading to import substitution. Coking coal imports to increase moderately due to lack of domestic production of coking coal and increase in domestic steel production

O-D Source cluster Mapping – Consolidated Coal Traffic from Odisha to all states

FY22 Actual and FY30 (Estimated) coal traffic in major sections for despatch of coal from Odisha to various destinations

From	To	Traffic (MT): 2022	Rakes / Day: 2022	Traffic (MT): 2030	Rakes / Day: 2030	Increase in Coal Traffic (Rakes / Day)
Talcher	Talcher Rd	22.40	**15.94**	144.04	**102.50**	**+ 86.56**
Talcher Rd	Angul	46.73	**33.25**	163.75	**116.52**	**+ 83.27**
Angul	Sambalpur	44.11	**31.39**	151.52	**107.82**	**+ 76.43**
Sambalpur	Jharsuguda Rd	57.81	**41.14**	137.99	**98.20**	**+ 57.06**
Sambalpur	Titlagarh	11.15	**7.94**	62.15	**44.23**	**+ 36.29**
Jharsuguda Rd	Kharsia	35.22	**25.07**	61.88	**44.04**	**+ 18.97**
Kharsia	Champa	21.45	**15.27**	51.39	**36.57**	**+ 21.30**
Champa	Bilapsur	21.39	**15.22**	51.39	**36.57**	**+ 21.34**
Bilapsur	Raipur	10.08	**7.18**	21.81	**15.52**	**+ 8.34**
Bilapsur	Anuppur	7.75	**5.51**	27.51	**19.58**	**+ 14.06**
Anuppur	New Katni	7.75	**5.51**	27.51	**19.58**	**+ 14.06**
New Katni	Bina	5.31	**3.78**	19.66	**13.99**	**+ 10.21**
Jharsuguda Jn	Rourkela	13.79	**9.81**	29.57	**21.04**	**+ 11.23**
Talcher (Rd + Jn)	Budhapank	74.80	**53.23**	188.26	**133.97**	**+ 80.74**
Budhapank	Rajatgarh	80.53	**57.31**	197.08	**140.25**	**+ 82.94**
Rajatgarh	Cuttack	56.97	**40.54**	143.05	**101.80**	**+ 61.25**
Cuttack	Paradeep	56.97	**40.54**	145.94	**103.85**	**+ 63.31**

Major sections are already witnessing significant coal traffic and is estimated to further increase in the coming decade.



MCL would need to push certain volumes in order to match the production levels

All figures in million tonnes

Destination State	IB Valley (MTPA)	Talcher (MTPA)	Total MCL Supply via Rail in 2030
Chhattisgarh	3.98	0.05	4.02
Madhya Pradesh	3.98	0.00	3.98
Maharashtra	7.65	0.31	7.95
Punjab & Haryana	8.37	3.45	11.82
Jharkhand	0.00	0.19	0.19
West Bengal	3.48	3.89	7.38
Odisha	43.02	29.82	72.84
Coastal Shipping	2.50	61.43	63.93
Andhra Pradesh	8.33	11.59	19.92
Total for 2030	**81.30**	**110.72**	**192.02**
MCL's 2030 Rail Despatch Plan	**136.08**	**162.8**	**298.88**
Identified Gap	**+ 54.78**	**+ 52.08**	**+ 106.86**

Identified Gap	**+ 54.78**	**+ 52.08**	**+ 106.86**
Rail E-AUCTION Sales @10% of Long-term Sales	- 8.44	- 11.07	- 19.51
Expected FSA COMMITMENT POWER- to GSECL's Ukai and Wanakbori Plants	0	- 1.01	- 1.01
Expected Linkage under SHAKTI B (iii) Long/Medium Term PPA- Tacnhe III	- 2.5	0	- 2.5
Gap still remaining	**+ 44.15**	**+ 40.00**	**+ 84.15**

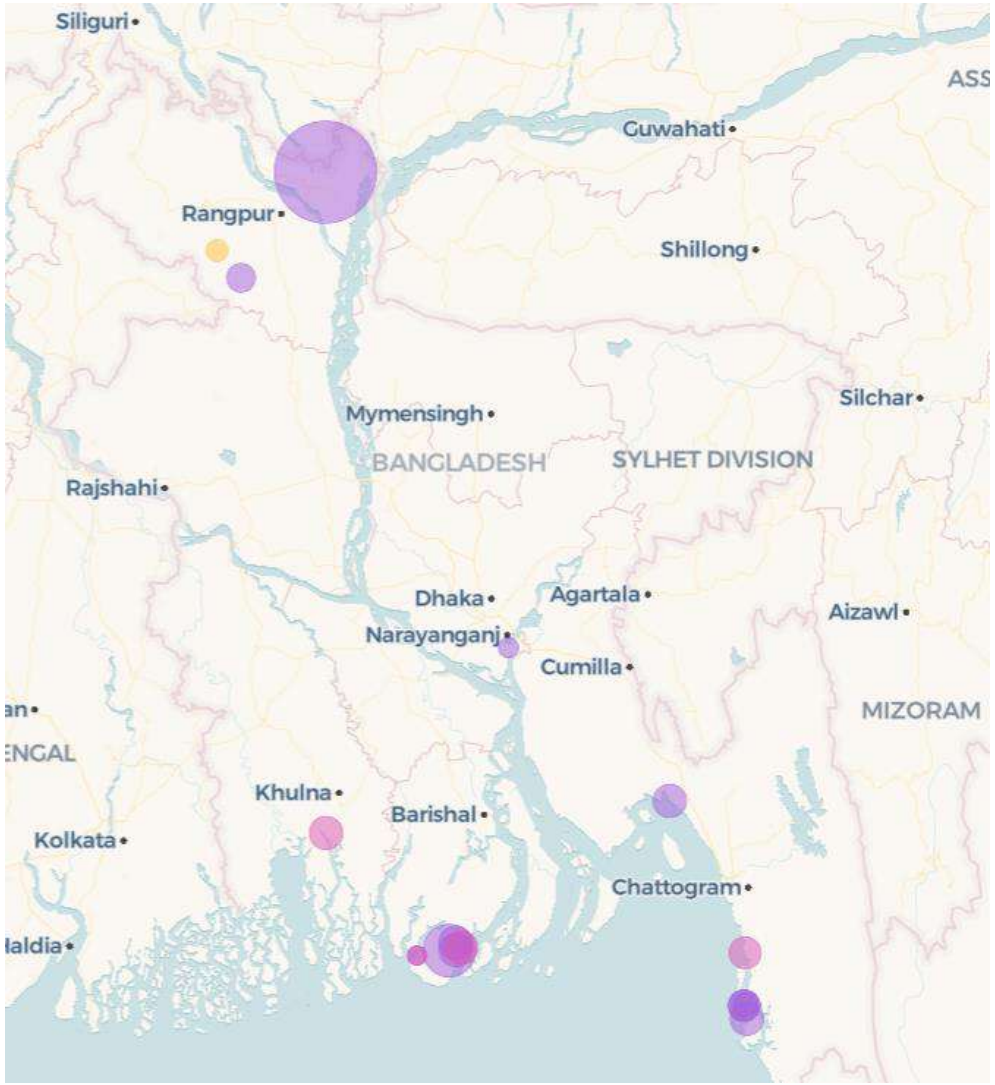
A Proactive marketing strategy needs to be articulated by the marketing team to further push surplus production volumes from IB-Valley CF. Strict competition from Commercial mines

~ 25-30 MTPA of Thermal coal from Talcher could be exported to Bangladesh and Sri Lanka by 2030. This would solve the problem for Talcher

This could range from 62 to 84 MTPA for Optimistic or Realistic demand scenarios

Out of 23 GW planned coal based capacities, Bangladesh to scrap cumulative capacity of ~17 GW

Bangladesh's current and upcoming coal based power generation capacity



~2.64 GW

Existing Capacity (Barapukuria Coal Power Plant)

~0.525 GW

Under Construction (Upcoming)

~5.414 GW

Planned Capacity

~17.22 GW

These Planned Capacities have minimal probability of commissioning due to latest announcements of Bangladesh's shift away from coal due to financing and Indonesian coal availability issues etc.

~6-7.3 GW

Estimated FY30 Coal Based Capacity

Planned Capacities (Uncertain/Scrapped)	Capacity (MW)	Estimated Annual Coal Requirement (Million Tonnes)
Phulbari Coal Project (China Gezhouba)	6000	20.498
Patuakali Power Station (Ashuganj)	2640	9.019
Patuakali Power Station (RPCL/NORINCO)	1320	4.510
Sena Kalyan Sangstha Power Station	1320	4.510
Mirsarai Power Station (Hangzhou Jinjiang)	1320	4.510
Maheshkali Power Station (Huadian)	1320	4.510
Matarbari Power Station	1200	4.100
Dighipara Power Station	1000	3.416
Matarbari Kohelia Power Station	700	2.391
Munshiganj Power Station	400	1.367
Total	**17.22 GW**	**58.83 Million Tonnes**

Under Construction Capacities	Capacity (MW)	Estimated Annual Coal Requirement (Million Tonnes)
Payra Power Station - Phase 1	1320	4.510
Rampal Power Station	1320	4.510
Banshkali Power Station (S Alam)	1224	4.182
Matarbari Power Station	1200	4.100
Barisal Power Station	350	1.196
Total	**5.414 GW**	**18.50 Million Tonnes**

Source: CarbonBrief, Rystad Energy Research and Analysis, Deloitte Analysis

An additional 19-23 Million Tonnes of annual coal export opportunity would exist for international exporters

Bangladesh's current and upcoming coal-based power generation capacity

Under-construction coal-based capacities in Bangladesh

Under Construction Capacities	Capacity (MW)	Estimated Annual Coal Requirement (Million Tonnes)
Payra Power Station - Phase 1	1320	4.510
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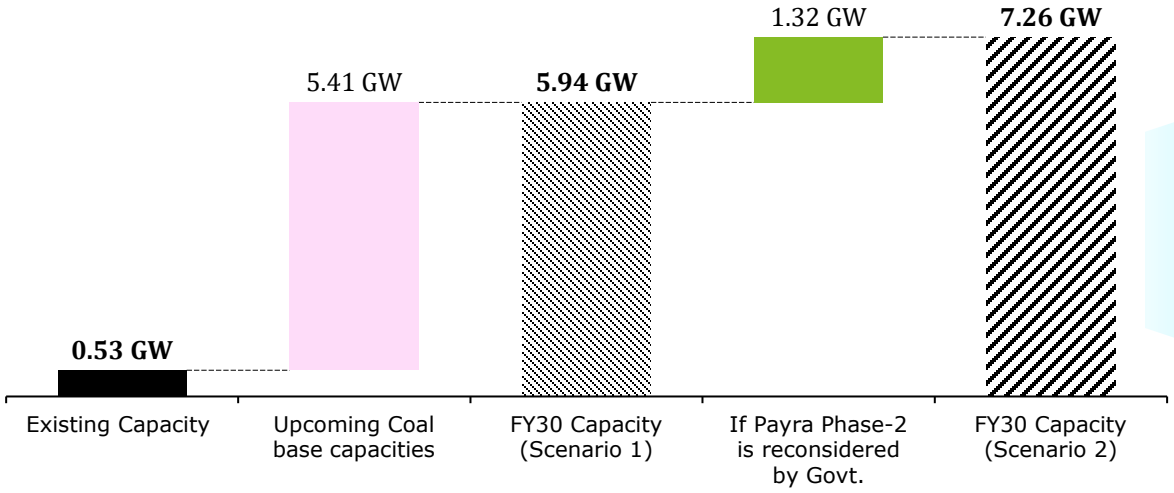
Total	**5.414 GW**	**18.50 Million Tonnes**

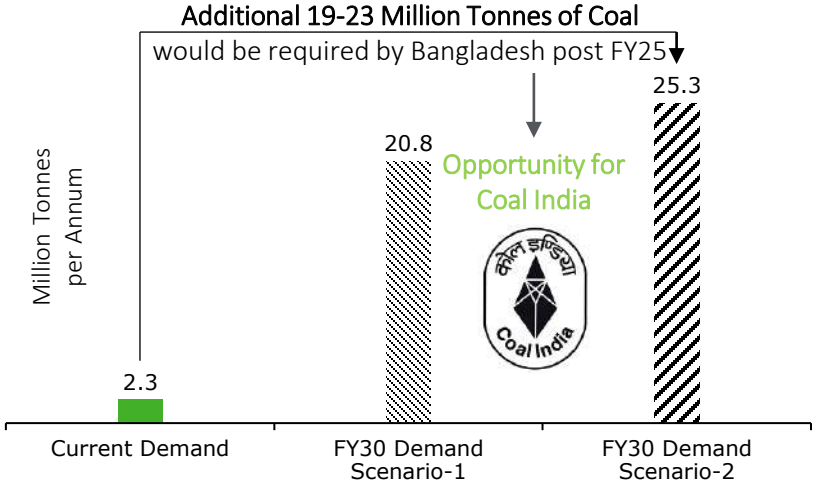
A number of factors have contributed to the decision of scrapping coal based power projects, ranging from the high cost of imported coal to the drop in financial support from overseas investors. Procuring coal had become a major problem after China struck a three-year supply deal in November to buy nearly $1.5bn worth of thermal coal from Indonesia — Bangladesh's main coal supplier.

Annual thermal coal demand for power generation is forecast to rise from the present 2.3 million tonnes to 21-25 million tonnes by 2025 to fuel the new coal-based capacities.

Opportunity for coal india to tap into Bangladesh's upcoming coal demand potential



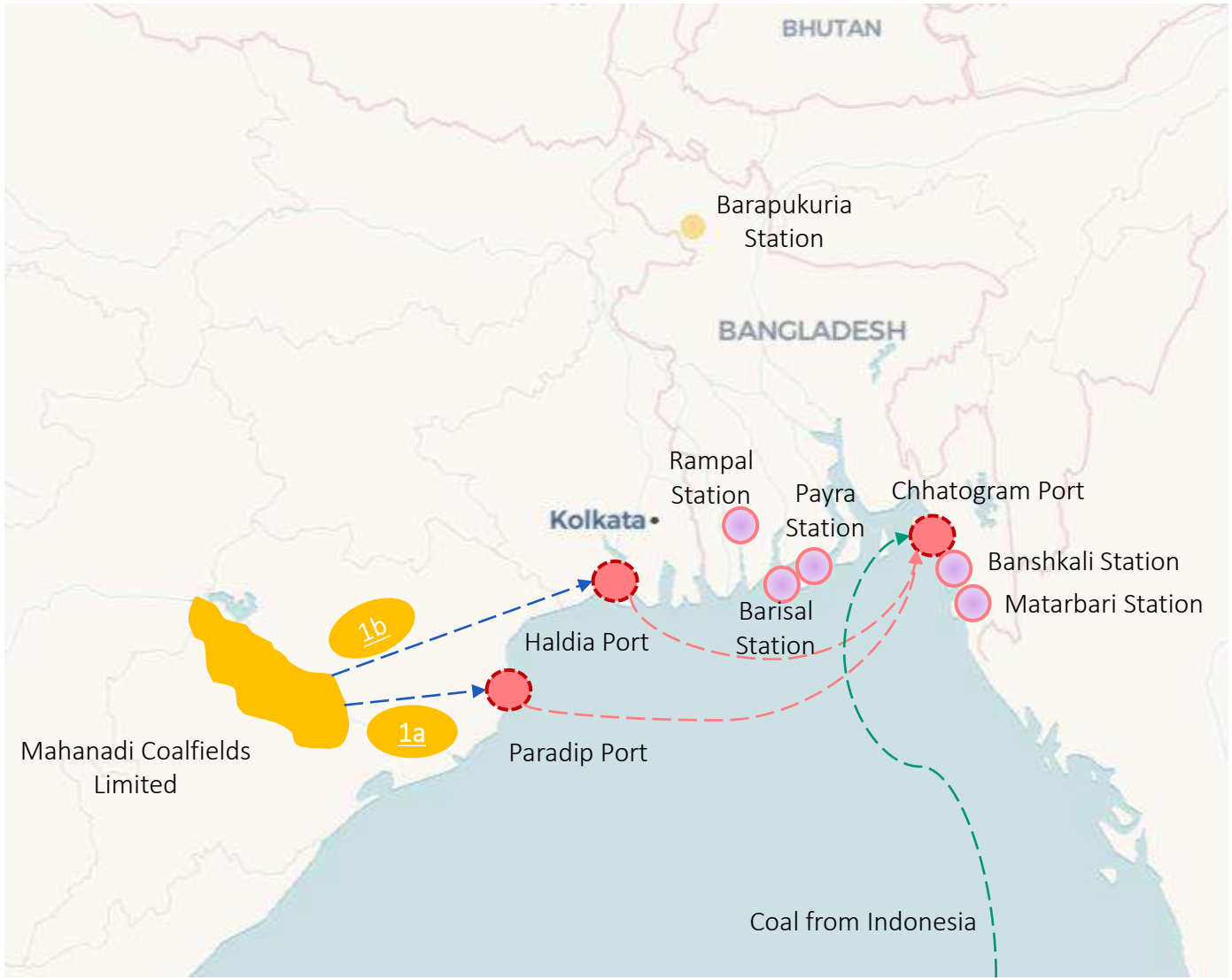
Coal Consumption Outlook: Bangladesh Power Sector



Source: CarbonBrief, Rystad Energy Research and Analysis, Deloitte Analysis

Multiple options analyzed to elucidate CIL's coal export economics and price competitiveness with Indonesian exporters

Potential Options for exporting coal to cater to Bangladesh's emerging power market



Currently we are analyzing 2 different plausible options in order to understand economic viability and pricing competitiveness of Indian Non-coking Coal. Actual Exporting dynamics would require Mine (CIL Source) wise and EUP wise economic analysis

Option 1: Transporting coal from Mahanadi Coalfields Limited

- **Option 1a:** Chhatogram Port via Paradip Port
- **Option 2b:** Talcher to Haldia via Rail and further to Power plants via Indo-Bangladesh Protocol Route

Source: CarbonBrief, Rystad Energy Research and Analysis, Coal Directory FY20, Deloitte Analysis

Analyzing landed cost to Bangladesh port for different grades of coal from MCL

Option 1a: MCL-Paradip-Chhatogram

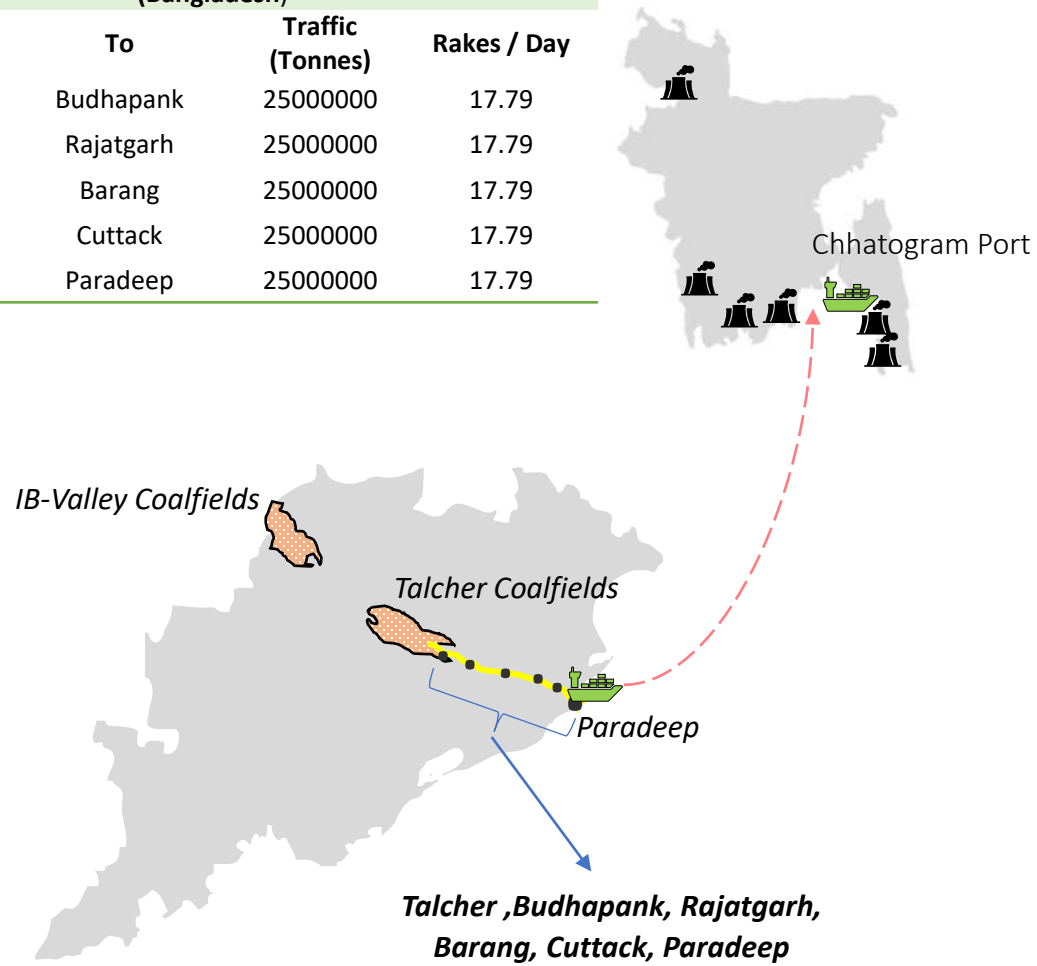
	G15	G14	G13	G12
Avg GCV	2950	3250	3550	3850
Base Price	718	907	990	1073
Royalty (@14%)	100.52	126.98	138.6	150.22
DMF (@30%)	30.16	38.09	41.58	45.07
NMET (@2%)	2.01	2.54	2.77	3.00
Evacuation Facility Charge	50	50	50	50
Sizing Charges	87	87	87	87
Management Charge	1	1	1	1
STC (Estimated average for lead <10 KM)	60	60	60	60
Taxable Ampunt	1048.69	1272.61	1370.95	1469.29
CGST (@2.5%)	26.22	31.82	34.27	36.73
IGST (@2.5%)	26.22	31.82	34.27	36.73
GST Compensation Cess	400	400	400	400
Toal Ex-works (MCL): INR/Ton	1501.12	1736.24	1839.50	1942.75
Toal Ex-works (MCL): INR/'000kcal	0.51	0.53	0.52	0.50
Transportation from MCL to Paradip Port	532	532	532	532
Port Loading and Handling Cost	201	201	201	201
FOB Paradip	2234.05	2469.17	2572.43	2675.68
Approximate Freight to Chhatogram Port	300	300	300	300
CFR Bangladesh: INR/Ton	**2534.05**	**2769.17**	**2872.43**	**2975.68**
CFR Bangladesh: INR/'000 Kcal	**0.859**	**0.852**	**0.809**	**0.773**

Index/Source/Reference Point	Indonesian Coal Indexed on ICI3: 4200 GAR (USD/T)
Index Value (FoB): Average for June, approximate (USD/T)	89
Estimated Premium Charged by Supplier ove the Index (As per latest Industry Trends) @7.5%	6.675
Estimated FoB Price Charged (USD/T)	95.675
Estimated Freight Rate to Bangladesh (USD/T); Panamax benchmark	17
Insurance Charges taken at 0.05 USD/T	0.05
CIF Bangladesh (USD/T)	112.725
CIFBangladesh (INR/'000 Kcal)	2.147

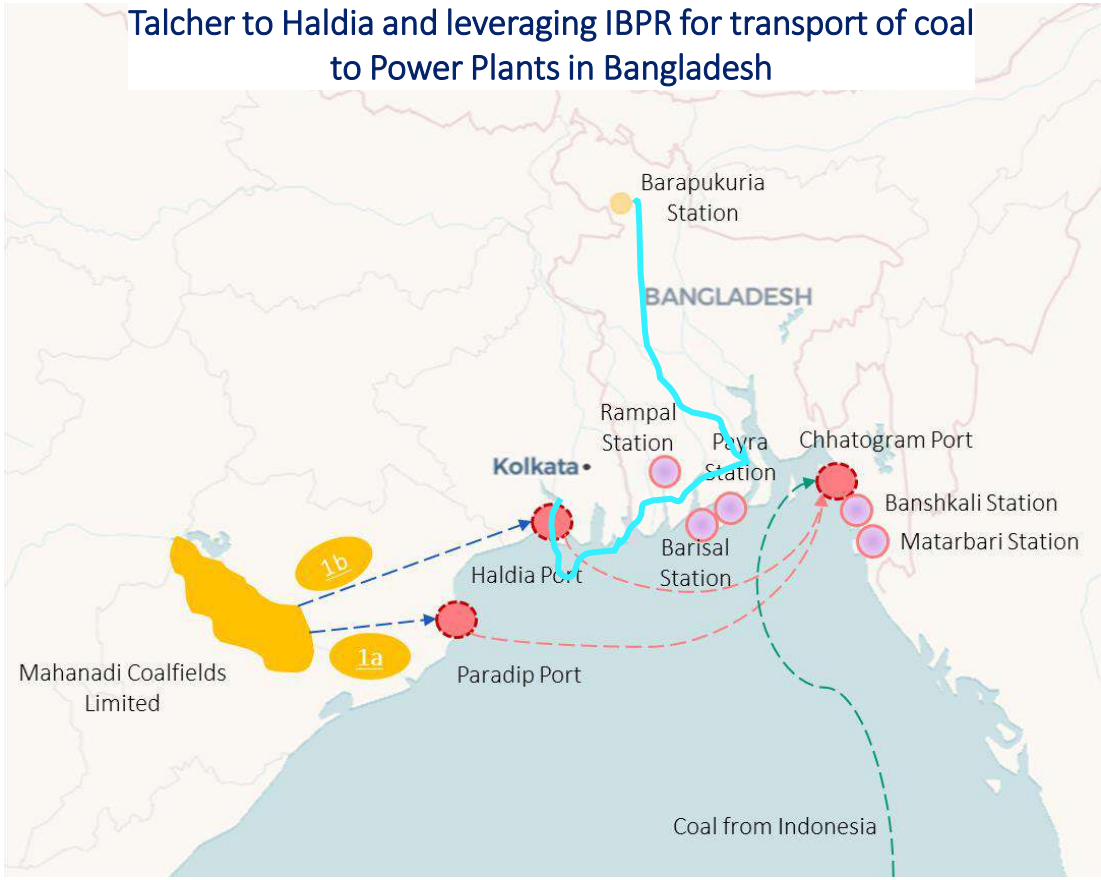
From a landed-cost on an energy basis comparative analysis, the 4 major grades of MCL are well placed to replace Indonesian coal from Bangladesh market and create a long-term sustainable export-oriented coal market

Anticipated increase in coastal shipping traffic due to coal exports to Bangladesh

MCL Talcher to Paradip Port and Export to Chhatogram Port (Bangladesh)			
From	**To**	**Traffic (Tonnes)**	**Rakes / Day**
Talcher	Budhapank	25000000	17.79
Budhapank	Rajatgarh	25000000	17.79
Rajatgarh	Barang	25000000	17.79
Barang	Cuttack	25000000	17.79
Cuttack	Paradeep	25000000	17.79



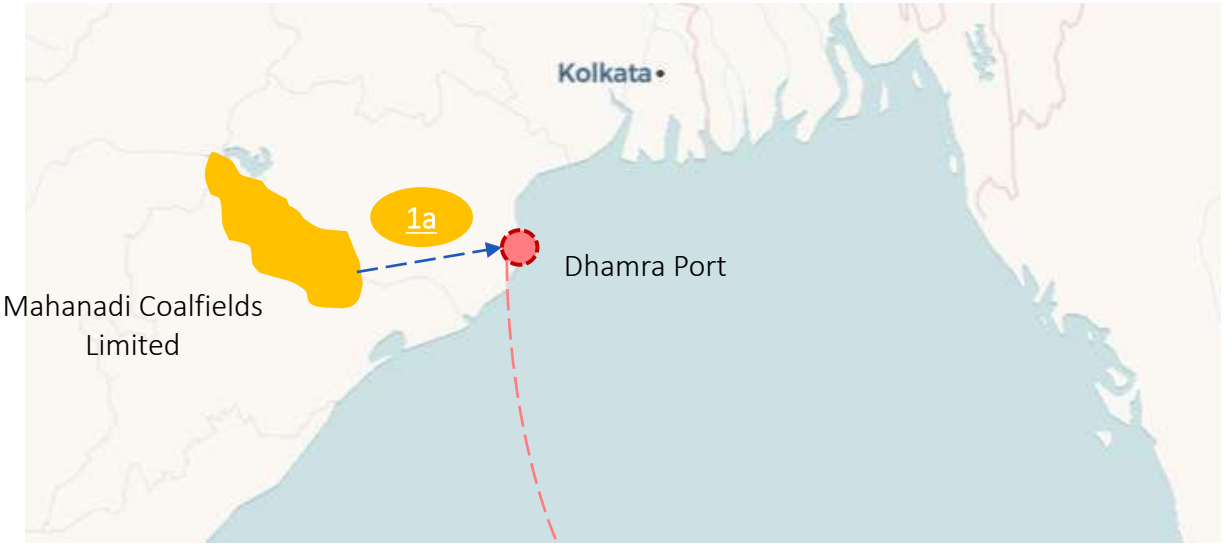
Talcher to Haldia and leveraging IBPR for transport of coal to Power Plants in Bangladesh



~15 to 17 MTPA of coal can be exported to Bangladesh leveraging IBPR, with Indian Port being Haldia and Bangladeshi port being Mongla, Khulna, Narayanganj, Pangaon and Sirajganj

Multiple options analyzed to elucidate CIL's coal export economics and price competitiveness with SA exporters

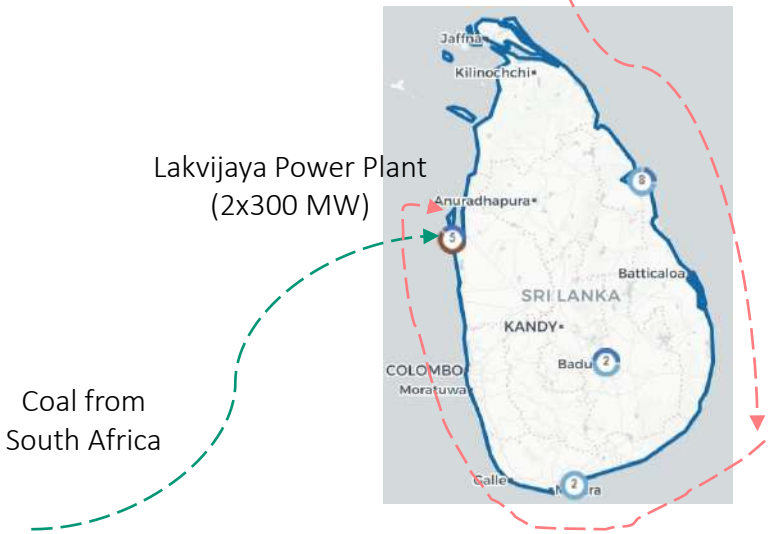
Potential Options for exporting coal to cater to Sri Lanka's operational Coal Fired Power Plant

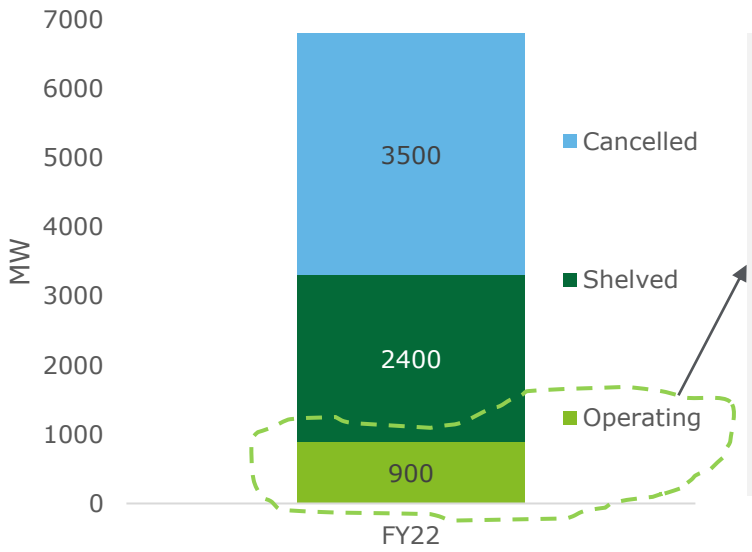


Currently we are analyzing a single option in order to understand economic viability and pricing competitiveness of Indian Non-coking Coal. Actual Exporting dynamics would require Mine (CIL Source) wise and EUP wise economic analysis

Option 1: Transporting coal from Mahanadi Coalfields Limited

Option 1a: to Lakvijaya's unloading coal jetty via Dhamra Port





~ 4 MTPA of coal (G-12/13 grade) from MCL could be exported to Lakvijaya 900 MW project.

Around 2400 MW of coal-based projects were shelved and ~3500 MW of coal-based projects were cancelled recently as the country aims toward a greener energy mix for future.

MCL could look into entering into a long-term fuel supply agreement with the Lanka Coal company (which is responsible for supplying coal to coal powered plants in Sri Lanka)

Source: CarbonBrief, Rystad Energy Research and Analysis, Coal Directory FY20, Deloitte Analysis

Analyzing landed cost to Sri-Lanka for different grades of coal from MCL

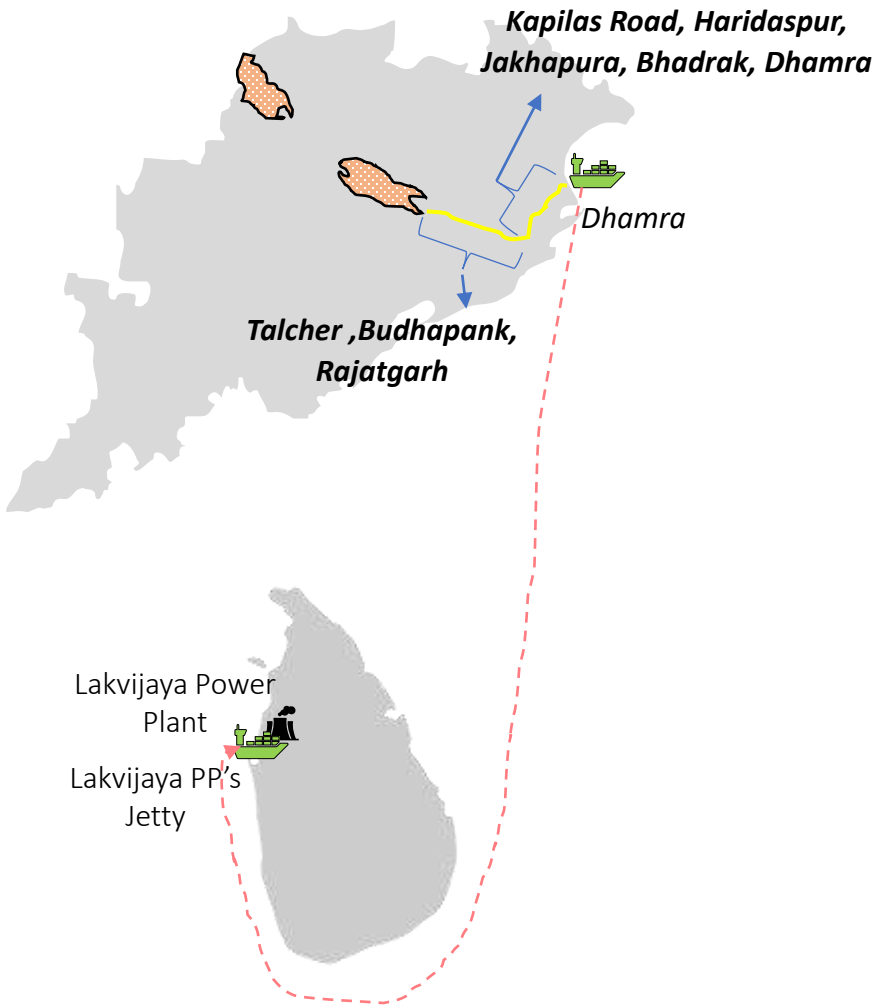
Option 1a: MCL-Paradip-Chhatogram

	G15	G14	G13	G12
Avg GCV	2950	3250	3550	3850
Base Price	718	907	990	1073
Royalty (@14%)	100.52	126.98	138.6	150.22
DMF (@30%)	30.16	38.09	41.58	45.07
NMET (@2%)	2.01	2.54	2.77	3.00
Evacuation Facility Charge	50	50	50	50
Sizing Charges	87	87	87	87
Management Charge	1	1	1	1
STC (Estimated average for lead <10 KM)	60	60	60	60
Taxable Ampunt	**1048.69**	**1272.61**	**1370.95**	**1469.29**
CGST (@2.5%)	26.22	31.82	34.27	36.73
IGST (@2.5%)	26.22	31.82	34.27	36.73
GST Compensation Cess	400	400	400	400
Toal Ex-works (MCL): INR/Ton	**1501.12**	**1736.24**	**1839.50**	**1942.75**
Toal Ex-works (MCL): INR/'000kcal	**0.51**	**0.53**	**0.52**	**0.50**
Transportation from MCL to Dhamra Port	532	532	532	532
Port Loading and Handling Cost	201	201	201	201
FOB Paradip	**2234.05**	**2469.17**	**2572.43**	**2675.68**
Approximate Freight to Sri Lanka Pvt Jetty	854.31	854.31	854.31	854.31
CFR Sri Lanka: INR/Ton	3088.37	3323.49	3426.74	3530.00
CFR Sri Lanka: INR/'000 Kcal	1.047	1.023	0.965	0.917

Index/Source/Reference Point	Richards Bay FoB: 4800 NAR / 5100 GAR (USD/T)
South Africa (FoB) Richards Bay: Average September, 2022 (USD/T)	139.57
Estimated Premium Charged by Supplier ove the Index (As per latest Industry Trends) @7.5%	10.47
Estimated FoB Price Charged (USD/T)	150.04
Estimated Freight Rate to Srilanka (USD/T); Panamax benchmark	22
Insurance Charges taken at 0.05 USD/T	0.05
CIF Sri Lanka (USD/T)	172.09
CIF Sri Lanka (INR/'000 Kcal)	2.70

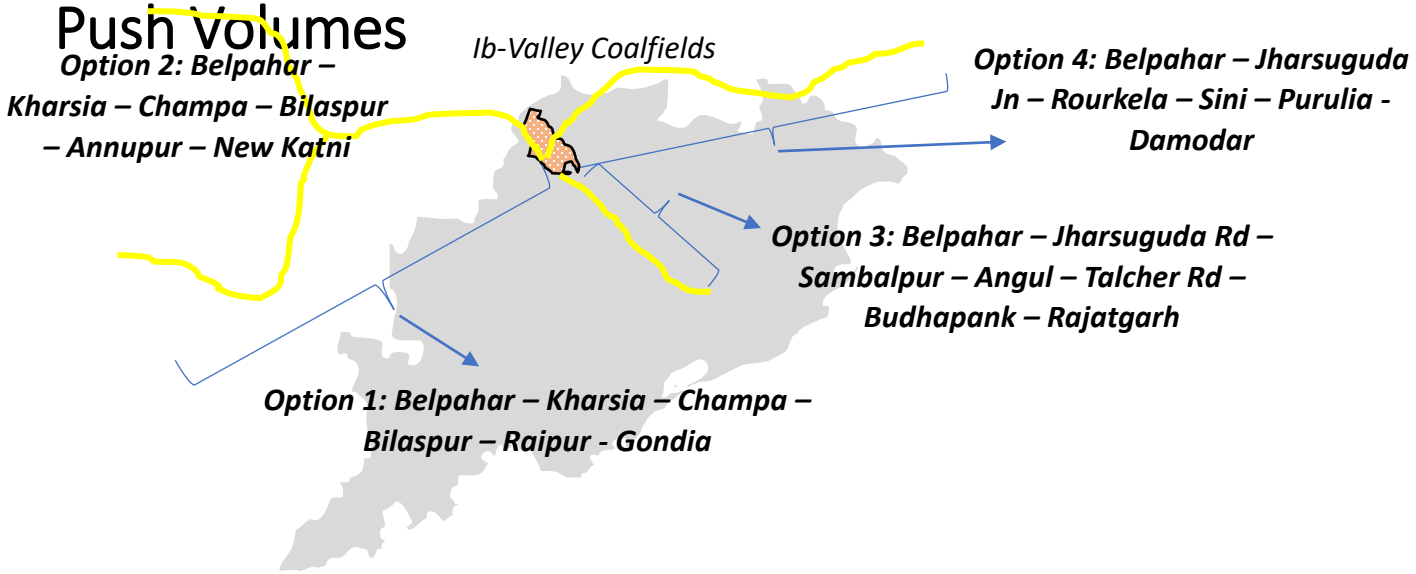
From a landed-cost on an energy basis comparative analysis, the 4 major grades of MCL are well placed to replace current South African Coal from Sri Lankan market and create a long-term sustainable export-oriented coal market

Anticipated increase in coastal shipping traffic due to coal exports to Sri Lanka



MCL Talcher to Dhamra Port and Export to Lakvijaya Power Plant's Jetty			
From	**To**	**Traffic (Tonnes)**	**Rakes / Day**
Talcher	Budhapank	4000000	2.85
Budhapank	Rajatgarh	4000000	2.85
Rajatgarh	Kapilas Rd	4000000	2.85
Kapilas Rd	Jakhapura	4000000	2.85
Jakhapura	Bhadrak	4000000	2.85
Bhadrak	Dhamra	4000000	2.85

O-D Source cluster Mapping – Additional supply from MCL (IB-Valley) – E-AUCTION Sales + Push Volumes

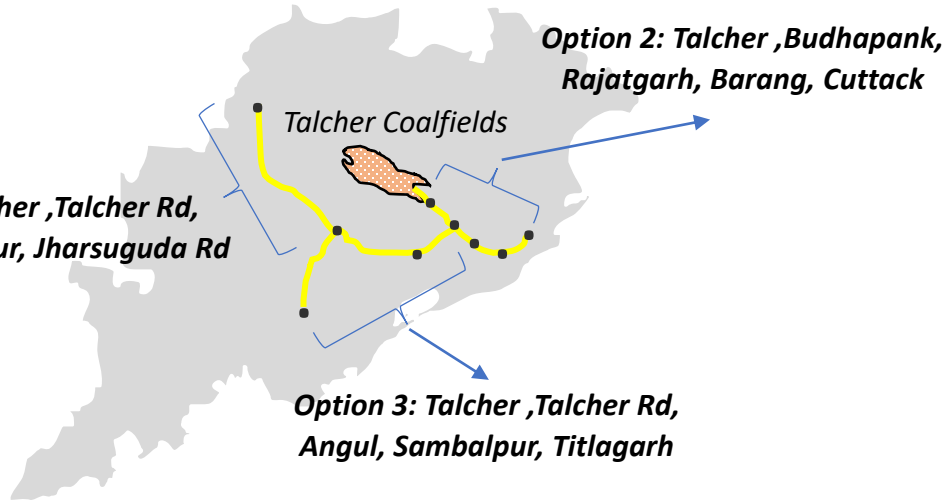


Source	Volumes to be pushed in the Market in 2030	Competition from blocks	Route Options for
MCL's IB Valley Coalfields	51.70 Million Tonnes per Annum (46.25 MTPA pushed volumes to the market + 8.17 MTPA E-AUCTION Sales via Rail mode)	- Dipside Manoharpur (OPCL) - Bijhan (Mahanadi Mines & Minerals) - Talabira II & III (NLC) - Baitrani West (GMDC) - New Patrapara & Naini (SCCL) - Radhikapur East (Emil mines & minerals) - Burapahar (GMDC)	• **Option 1:** Belpahar – Kharsia – Champa – Bilaspur – Raipur - Gondia • **Option 2:** Belpahar – Kharsia – Champa – Bilaspur – Annupur – New Katni • **Option 3:** Belpahar – Jharsuguda Rd – Sambalpur – Angul – Talcher Rd – Budhapank – Rajatgarh • **Option 4:** Belpahar – Jharsuguda Jn – Rourkela – Sini – Purulia - Damodar

As it is not prudent to assume the future EUPs/destination of this surplus coal to be pushed into the market at this stage, the estimated traffic has been distributed proportionately among possible route options (trunk lines for evacuation)

From	To	Traffic 2030 (Tonnes)	Rakes/Day
Belpahar	Kharsia	25851730.93	18.40
Kharsia	Champa	25851730.93	18.40
Champa	Bilapsur	25851730.93	18.40
Bilapsur	Raipur	12925865.46	9.20
Raipur	Gondia	12925865.46	9.20
Bilapsur	Anuppur	12925865.46	9.20
Anuppur	New katni	12925865.46	9.20
Belpahar	Jharsuguda Rd	12925865.46	9.20
Jharsuguda Rd	Sambalpur	12925865.46	9.20
Sambalpur	Angul	12925865.46	9.20
Angul	Talcher Rd	12925865.46	9.20
Talcher Rd	Budhapank		0.00
Budhapank	Rajatgarh	0	0.00
Belpahar	Jharsuguda Jn	12925865.46	9.20
Jharsuguda Jn	Rourkela	12925865.46	9.20
Rourkela	Sini	12925865.46	9.20
Sini	Purulia	12925865.46	9.20
Purulia	Damodar	12925865.46	9.20

O-D Source cluster Mapping – Additional supply from MCL (Talcher) – E-AUCTION Sales + Push Volumes

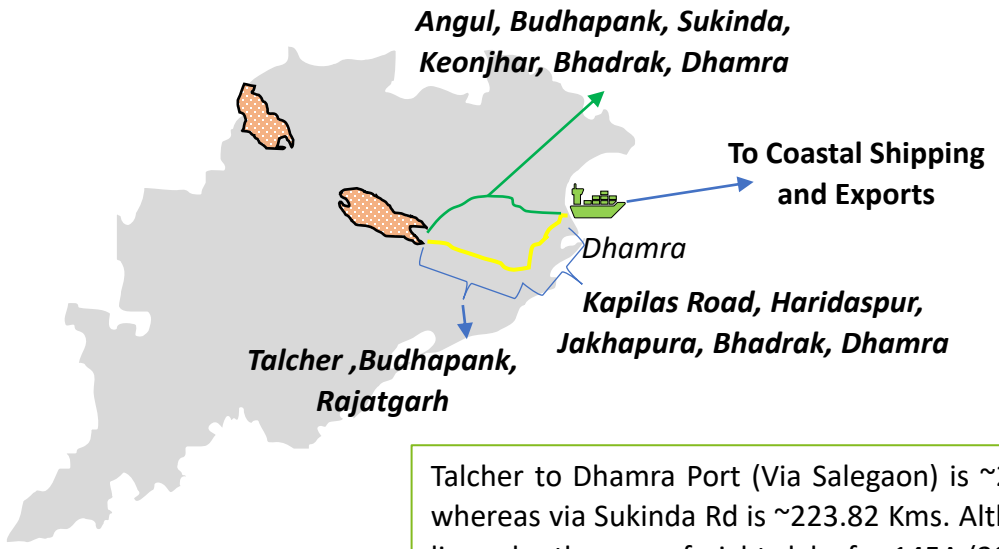


Source	Volumes to be pushed in the Market in 2030	Competition from blocks	Route Options for
MCL's Talcher Coalfields	22.07 Million Tonnes per Annum (11 MTPA pushed volumes to the market + 11.07 MTPA E-AUCTION Sales via Rail mode)	- Dipside Manoharpur (OPCL) - Bijhan (Mahanadi Mines & Minerals) - Talabira II & III (NLC) - Baitrani West (GMDC) - New Patrapara & Naini (SCCL) - Radhikapur East (Emil mines & minerals) - Burapahar (GMDC)	• **Option 1:** Talcher – Talcher Rd – Angul – Sambalpur – Jharsuguda Rd • **Option 2:** Talcher – Budhapank – Rajatgarh – Barang – Cuttack • **Option 3:** Talcher – Talcher Rd – Angul – Sambalpur – Titlagarh

As it is not prudent to assume the future EUPs/destination of this surplus coal to be pushed into the market at this stage, the estimated traffic has been distributed proportionately among possible route options (trunk lines for evacuation)

From	To	Traffic 2030 (Tonnes)	Rakes/Day
Talcher	Talcher Rd	19865958.2	14.14
Talcher Rd	Angul	19865958.2	14.14
Angul	Sambalpur	19865958.2	14.14
Sambalpur	Jharsuguda Rd	9932979.1	7.07
Sambalpur	Titlagarh	9932979.1	7.07
Talcher	Budhapank	9932979.1	7.07
Budhapank	Rajatgarh	9932979.1	7.07
Rajatgarh	Barang	9932979.1	7.07
Barang	Cuttack	9932979.1	7.07

O-D Source cluster Mapping – Routing of Coastal Shipping / Coal Export volumes from Dhamra via utilizing Angul-Sukinda Rd new line



Talcher to Dhamra Port (Via Salegaon) is ~270.2 Kms via Rail, whereas via Sukinda Rd is ~223.82 Kms. Although these values lie under the same freight slabs for 145A (201 to 275 Kms), the turnaround time would be lesser for the shorter route with lesser congestion. Consumers shall interact with Dhamra Port and conduct landed cost economics for their assets.

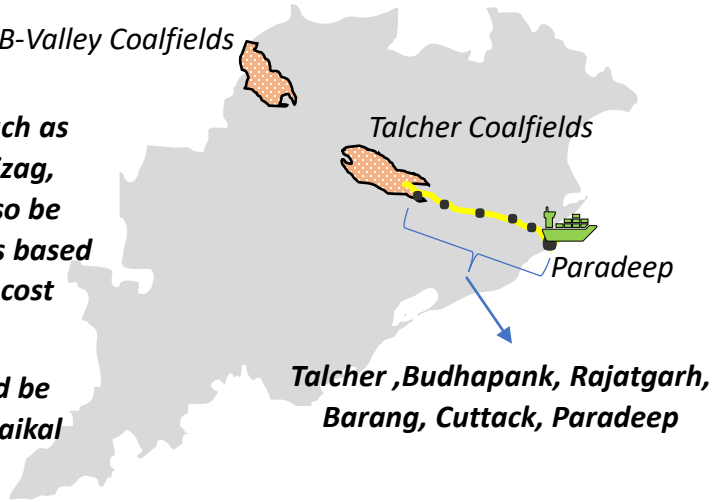
~20 Million Tonnes of Coal, for coastal shipping as well as exports could be moved from Dhamra, utilizing the new Angul – Sukinda BG line.

This would ease the congestion on major lines such as Budhapank to Rajatgarh and Cuttack to Paradeep.

Dhamra Port can handle ~20 MTPA of thermal coal for coastal shipping / export purposes

From	To	Traffic 2030 (Tonnes)	Rakes/Day
Angul	Budhapank	20000000	13.89
Budhapank	Sukinda Rd	20000000	13.89
Sukinda Rd	Jajpur Keonjhar Rd	20000000	13.89
Jajpur Keonjhar Rd	Baudpur	20000000	13.89
Baudpur	Bhadrak	20000000	13.89
Bhadrak	Dhamra	20000000	13.89

O-D Source cluster Mapping – Probable Coastal shipping to NRS Assets (Steel)



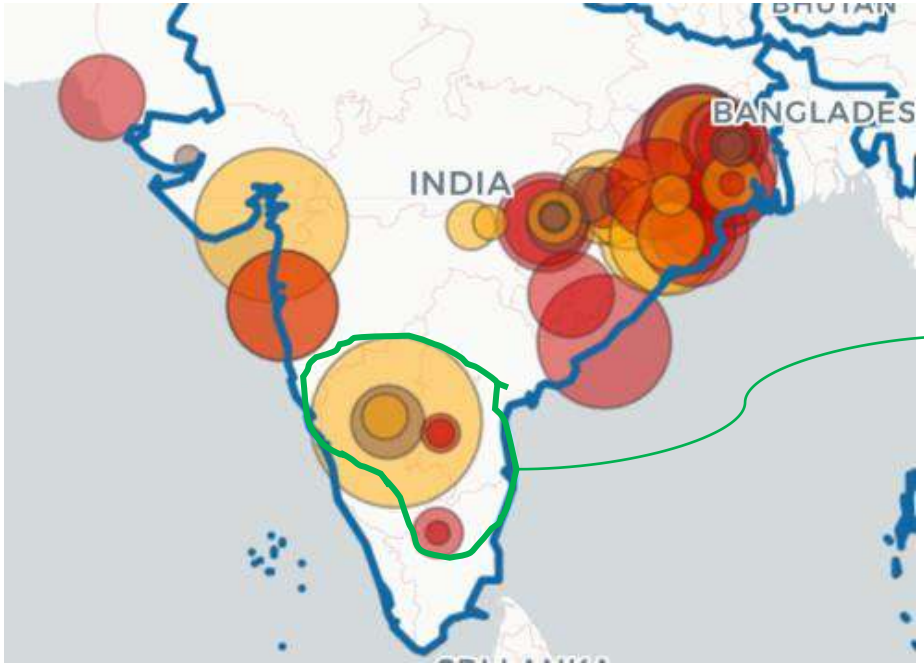
Other Loading ports such as Dhamra, Gopalpur, Vizag, Gangavaram could also be explored by Steel players based on Asset level landed cost economics

Unloading Ports could be Krishnapatnam or Karaikal

Talcher ,Budhapank, Rajatgarh, Barang, Cuttack, Paradeep

MCL Talcher to Paradip Port and Costal Shipping to Southern Steel Clusters

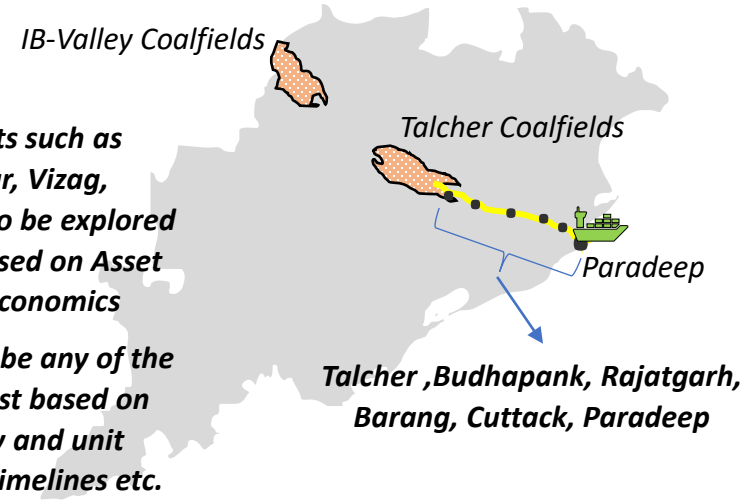
From	To	Traffic (Tonnes)	Rakes / Day
Talcher	Budhapank	22080000	15.33
Budhapank	Rajatgarh	22080000	15.33
Rajatgarh	Barang	22080000	15.33
Barang	Cuttack	22080000	15.33
Cuttack	Paradeep	22080000	15.33



Steel Plant	Capacity (MTPA)
JSW Steel Vijaynagar	12
JSW Steel Vijaynagar BF & BOF Expansion	6.80
BMM Ispat Steel Plant	2.20
Kalyani Steels Hospet Plant	0.86
JSW Steel Salem Plant	1.03
JSW Steel Salem Plant Bf & BOF Expansion	0.23
Arjas Steel Tadipatri Plant	0.33
Arjas Steel Expansion	0.62
Total Capacity (Probable for Coal's Coastal Shipping)	24.07
Estimated Steel Production @80% Capacity Utilization	19.25
Estimated Thermal Coal Requirement (@1.147 MTPA / Crude Steel Production)	22.08

The loading and offloading ports shall be studies (Asset Level) by respective asset owners to make the decision based on feasibility of coastal shipping vs all rail

O-D Source cluster Mapping – Probable Coastal shipping to NRS Assets (Cement)



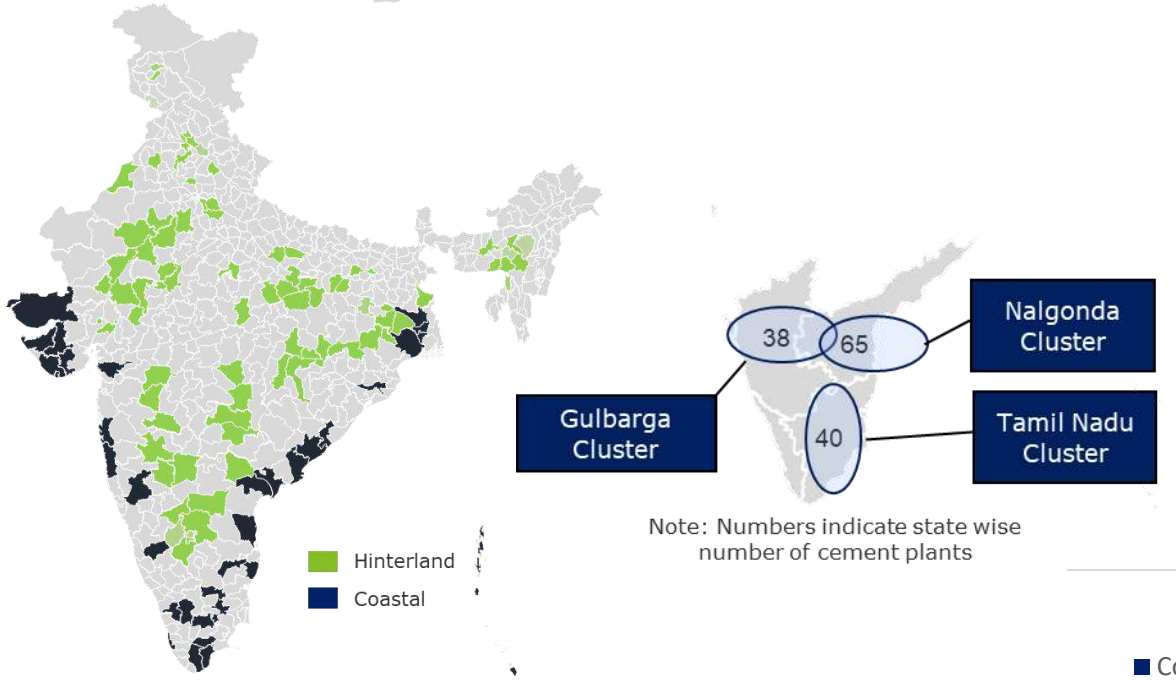
Other Loading ports such as Dhamra, Gopalpur, Vizag, Gangavaram could also be explored by Cement Players based on Asset level landed cost economics

Unloading Ports could be any of the ports on Eastern Coast based on offloading capacity and unit economics, Delivery Timelines etc.

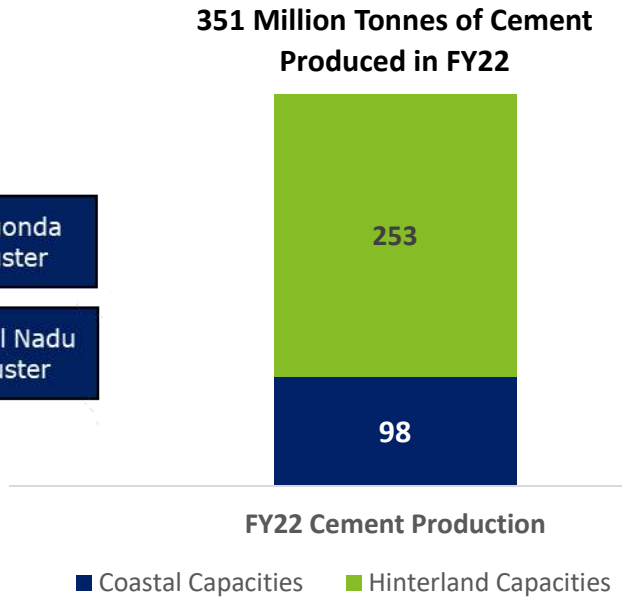
Talcher ,Budhapank, Rajatgarh, Barang, Cuttack, Paradeep

MCL Talcher to Paradip Port and Costal Shipping to Coastal Cement Clusters			
From	**To**	**Traffic (Tonnes)**	**Rakes / Day**
Talcher	Budhapank	1200000	1
Budhapank	Rajatgarh	1200000	1
Rajatgarh	Barang	1200000	1
Barang	Cuttack	1200000	1
Cuttack	Paradeep	1200000	1

Out of the total 8 MTPA coal requirement from Coastal Cement Assets, ~15% (1.2 MTPA) is considered from domestic sources with G9-G14 Grade, that could be supplied by MCL. Remaining would be either imports or High-Grade coal from SECL, ECL, WCL.



Note: Numbers indicate state wise number of cement plants



To produce ~98 MTPA of cement by coastal capacities, around 13.23 MTPA of thermal coal was consumed. Around ~60% of these volumes are towards southern and western india which can leverage coastal shipping.

Hence, there seems to be a potential to supply these power plants around 1 MTPA, for which costal shipping could be utilized. **But at the same time as these are coastal assets, they are more likely to rely on imported coal than MCL's low grade coal**

MCL's marketing team shall hold consultations with the Cement Industry

The loading and offloading ports shall be studies (Asset Level) by respective asset owners to make the decision based on feasibility of coastal shipping vs all rail

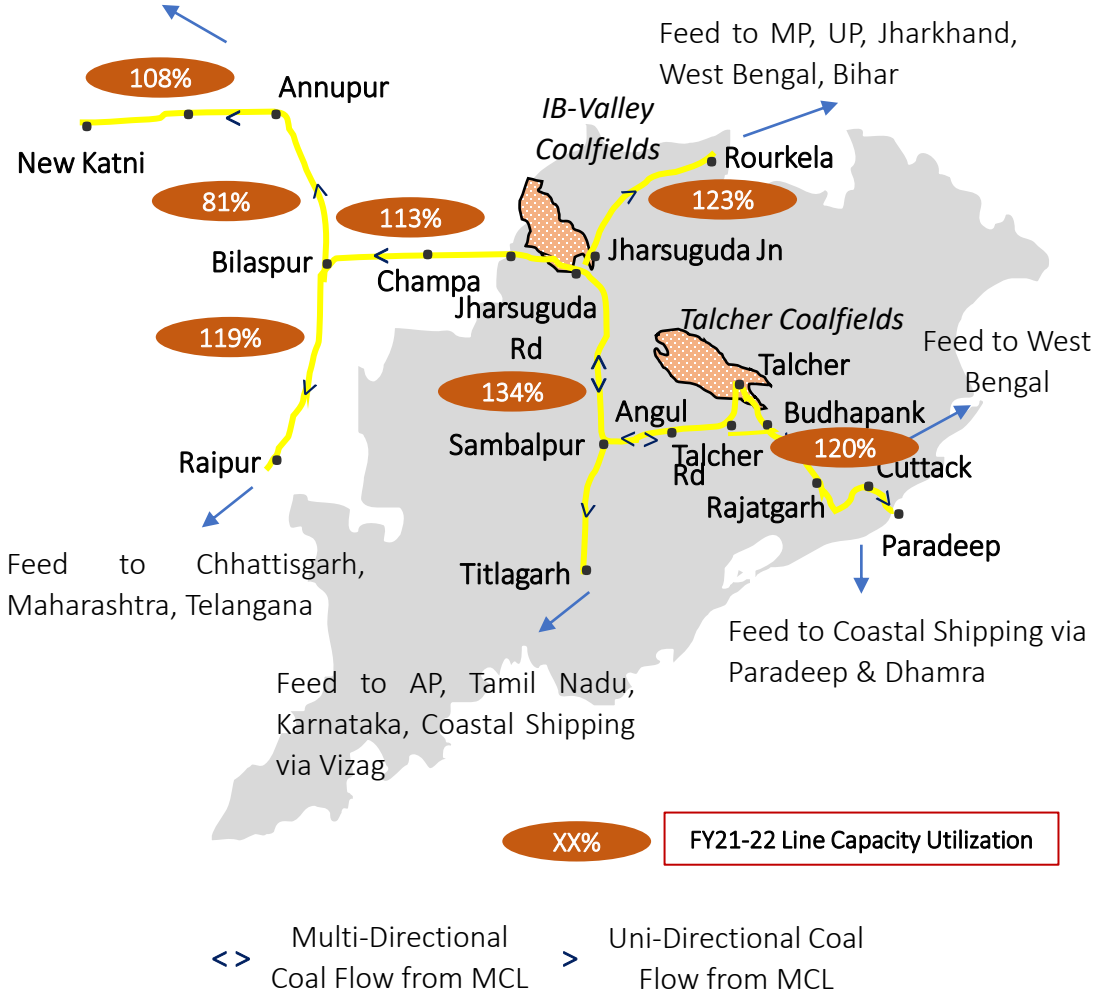
O-D Source cluster Mapping – Consolidated Coal Traffic from Odisha to all states - RDS

RDS: Realistic Demand Scenario

FY22 Actual and FY30 (Estimated) coal traffic in major sections for despatch of coal from Odisha to various destinations

From	To	Traffic (MT): 2022	Rakes / Day: 2022	Traffic (MT): 2030	Rakes / Day: 2030	Increase in Coal Traffic (Rakes / Day)
Talcher	Talcher Rd	22.40	**15.94**	163.91	**116.64**	**+100.70**
Talcher Rd	Angul	39.65	**28.22**	197.31	**140.41**	**+112.19**
Angul	Sambalpur	39.65	**28.22**	185.08	**131.70**	**+103.49**
Sambalpur	Jharsuguda Rd	53.37	**37.98**	161.62	**115.01**	**+77.03**
Sambalpur	Titlagarh	11.15	**7.94**	72.09	**51.30**	**+43.36**
Jharsuguda Rd	Kharsia	31.96	**22.74**	89.27	**63.53**	**+40.78**
Kharsia	Champa	20.27	**14.43**	78.77	**56.06**	**+41.63**
Champa	Bilapsur	20.21	**14.38**	78.77	**56.06**	**+41.67**
Bilapsur	Raipur	8.91	**6.34**	35.50	**25.26**	**+18.92**
Bilapsur	Anuppur	7.75	**5.51**	41.20	**29.32**	**+23.81**
Anuppur	New Katni	7.75	**5.51**	41.20	**29.32**	**+23.81**
New Katni	Bina	5.31	**3.78**	33.35	**23.74**	**+19.95**
Jharsuguda Jn	Rourkela	12.61	**8.97**	43.26	**30.79**	**+21.82**
Talcher (Rd + Jn)	Budhapank	67.73	**48.19**	227.19	**161.67**	**+113.48**
Budhapank	Rajatgarh	71.71	**51.03**	236.01	**167.95**	**+116.92**
Rajatgarh	Cuttack	42.50	**30.24**	177.98	**126.65**	**+96.41**
Cuttack	Paradeep	42.50	**30.24**	170.94	**121.64**	**+91.40**

Major sections are already witnessing significant coal traffic and is estimated to further increase in the coming decade.



Note: The increase in average number of rakes indicated above shall be further escalated by ~7.5% to cater during November to March Power Demand

O-D Source cluster Mapping – Consolidated Coal Traffic on railways from Odisha & Chhattisgarh (including SECL areas in MP) to all states with addition of CERL/CEWRL network - ODS

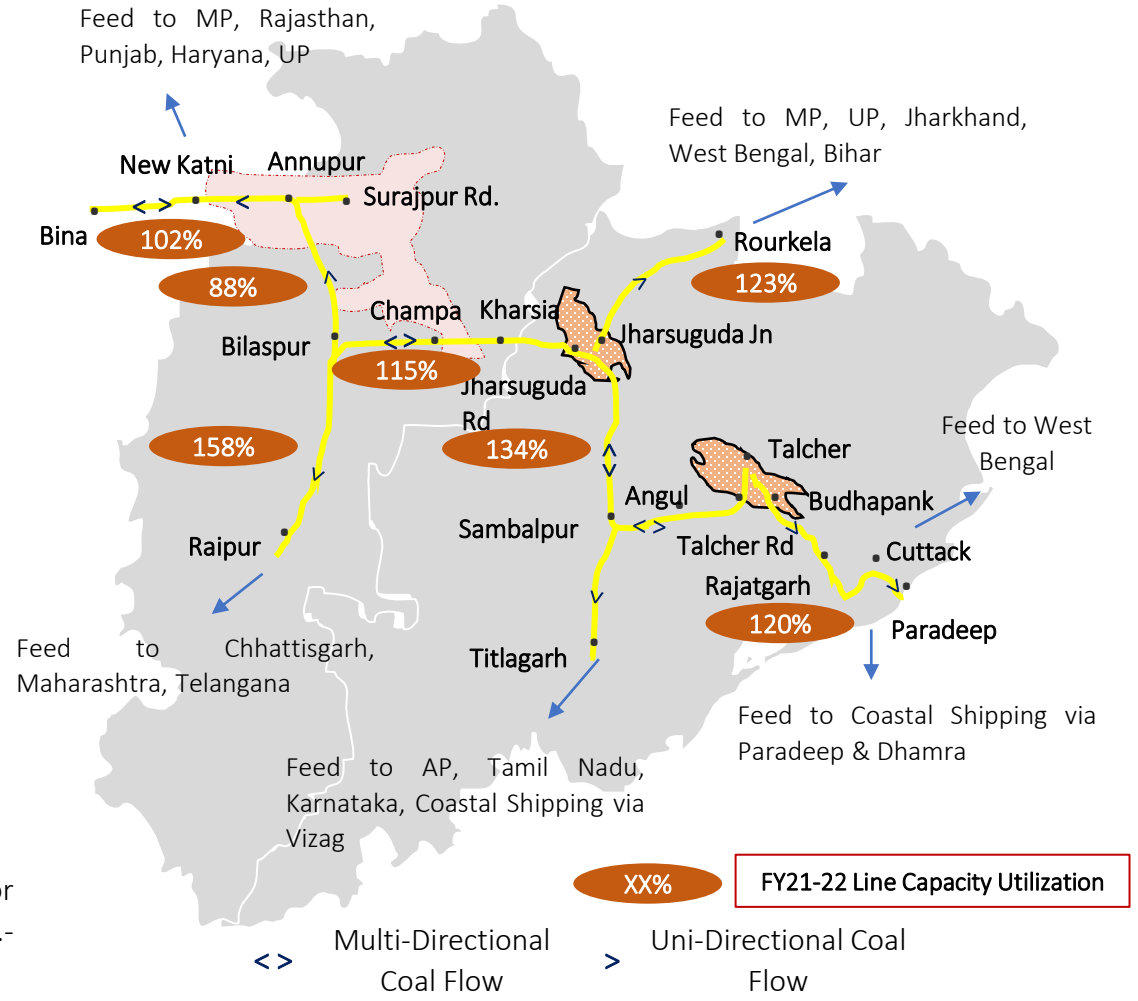
ODS: Optimistic Demand Scenario

FY22 Actual and FY30 (Estimated) coal traffic in major sections for despatch of coal from Chhattisgarh (Including Sohagpur and Johilla) to various destinations

From	To	Traffic (MT): 2022	Rakes / Day: 2022	Traffic (MT): 2030	Rakes / Day: 2030	Increase in Coal Traffic (Rakes / Day)
Champa	**Bilaspur**	74.06	**52.70**	169.80	**120.83**	**+68.13**
Bilaspur	**Anuppur**	24.97	**17.76**	61.93	**44.07**	**+26.30**
Anuppur	**New Katni**	47.61	**33.87**	124.71	**88.74**	**+54.86**
New Katni	**Bina Malkhedi**	15.24	**10.84**	53.98	**38.41**	**+27.57**
Surajpur Road	**Anuppur**	21.86	**15.56**	65.89	**46.89**	**+31.33**
Bilaspur	**Raipur**	39.55	**28.15**	147.31	**104.83**	**+76.68**
Baradwar	**Jharsuguda & Jharsuguda Rd**	40.52	**28.83**	132.96	**94.61**	**+65.78**

CERL & CEWRL lines are expected to decompress load on the Howrah-Mumbai main line, especially for the section Champa-Bilaspur. Bilaspur-Annupur section shall be handle the traffic on the Pendra Rd.-Annupur sub-section, hence overall load on Bilaspur-Annupur shall remain unchanged.

Major sections are already witnessing significant coal traffic and is estimated to further increase in the coming decade.



Our key findings based on detailed analysis of railway traffic for Odisha (1/3)

Sub-Section	2022		2030						Other Planned Works (New Energy/Other Corridors)	Utilization after of All planned works
	Capacity	% Utilization	Ongoing Works	Passenger	Freight	Total	Capacity	% Utilization		
Talcher to Talcher Rd	50	**139%**	4th line	53	142 (~116 to 125 R/d is coal)	186 to 195	98	**190% to 199%**	Planned MCRL Inner Corridor via Jarapada/Angul to bypass Talcher-Talcher Rd. section, significant offloading of Non-CIL rakes via MCRL. With Angul-Balram Doubling, more rakes can be moved directly via Angul, rather than routing through Talcher road. Corridor won't have impact on sections beyond Angul/Jarapada	**<100%**
Sambalpur to Titlagarh	50	**129%**	Doubling	54	78 (~51 to 55 R/d is coal)	128 to 132	102	**125% to 129%**	Nil	**125% to 129%**

All numbers (Except Capacity utilization) represent average two-way traffic in Trains/Rakes per day. Passenger also includes Others

The higher range (for capacity utilization estimates) are based on increase of +7.5% in coal rakes over base value, attributable to Peak Power Demand

Note: Capacity refers to Capacity of line with Maintenance Block (MB)

Our key findings based on detailed analysis of railway traffic for Odisha (2/3)

	2022		2030							
Sub-Section	Capacity	% Utilization	Ongoing Works	Passenger	Freight	Total	Capacity	% Utilization	Other Planned Works (New Energy/Other Corridors)	Utilization after of All planned works
Jharsuguda Jn to Rourkela	144	**122%**	3rd line in progress. 4th line planned for Tatanagar-Rourkela won't impact this section.	80	188 (~30 to 32 R/d is coal)	266 to 268	214	**124% to 125%**	Nil	**124%**
Jharsuguda Rd to Sambalpur	98	**133%**	Nil	69	173 (~115 to 124 R/d is coal)	232 to 241	98	**236% to 246%**	3rd & 4th line from Jharsuguda to Sambalpur planned as part of Energy Corridor	**<100%**

Detailed layout of cluster in following slide

All numbers (Except Capacity utilization) represent average two-way traffic in Trains/Rakes per day. Passenger also includes Others

The higher range (for capacity utilization estimates) are based on increase of +7.5% in coal rakes over base value, attributable to Peak Power Demand

Note: Capacity refers to Capacity of line with Maintenance Block (MB)

Our key findings based on detailed analysis of railway traffic for Odisha (3/3)

	2022		2030							
Sub-Section	Capacity	% Utilization	Ongoing Works	Passenger	Freight	Total	Capacity	% Utilization	Other Planned Works (New Energy/Other Corridors)	Utilization after of All planned works
Champa to Bilaspur	206	**115%**	4th line CERL & CEWRL in progress	117	264 (~116 to 125 R/d is coal)	372 to 381	250	**149% to 152%**	CRCL line from Jharsuguda-Balodabazaar-Raipur (310 km) Coal traffic from Odisha going towards MH/KA shall be diverted.	**138% to 140%**
Bilaspur to Anuppur	98	**88%**	Pendra Rd.-Anuppur 3rd line & Automatic Signaling: Bilaspur-Uslapur-Ghutku are in progress.	71	124 (~49 to 53 R/d is coal)	191 to 195	142	**131% to 137%**	Nil	**131% to 137%**

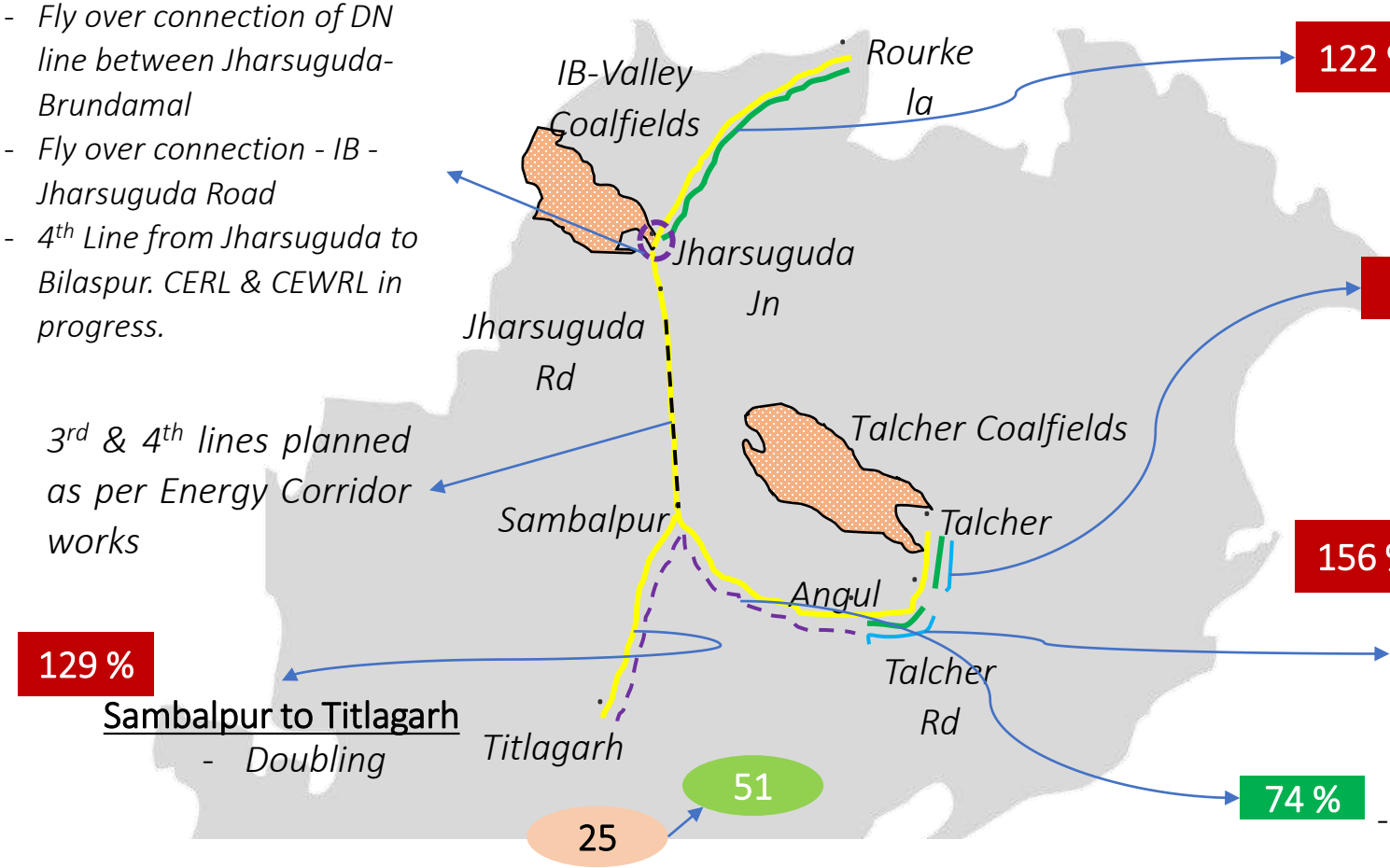
All numbers (Except Capacity utilization) represent average two-way traffic in Trains/Rakes per day. Passenger also includes Others

The higher range (for capacity utilization estimates) are based on increase of +7.5% in coal rakes over base value, attributable to Peak Power Demand

Note: Capacity refers to Capacity of line with Maintenance Block (MB)

Major ongoing works of railways for capacity enhancement

- *Fly over connection of DN line between Jharsuguda-Brundamal*
- *Fly over connection - IB - Jharsuguda Road*
- *4th Line from Jharsuguda to Bilaspur. CERL & CEWRL in progress.*



3rd & 4th lines planned as per Energy Corridor works

Jharsuguda Jn to Rourkela
- *3rd Line*

122 %

72 → 107

Talcher to Talcher Rd
- *4th Line between Talcher – Talcher Rd*
- *3rd & 4th line ex-Jarpada to Budhapank*

139 %

25 → 49

Talcher Rd to Angul
- *IBS on Single Line section between Angul-Talcher Road*
- *New line between Talcher-Angul with Y-Connection at Talcher (15 Kms.)*

156 %

27 → 95

Angul to Sambalpur
- *Sambalpur - Talcher Road section doubling*

74 %

61 → 105

129 %

Sambalpur to Titlagarh
- *Doubling*

25 → 51

XX % — *FY21-22 Line Capacity Utilization*

Doubling
3rd Line
4th Line

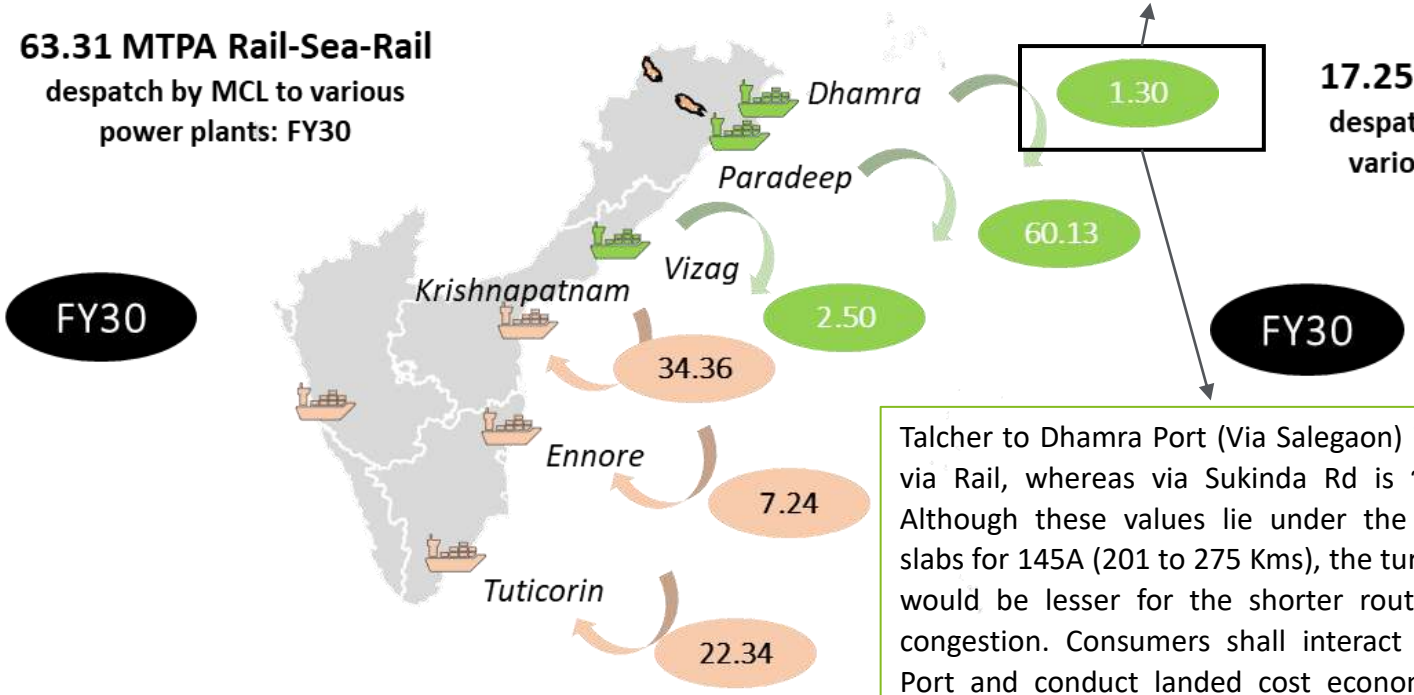
FY22 – One way Capacity (Trains/Day)

One way Capacity after Pipeline works by Railways (Trains/Day)

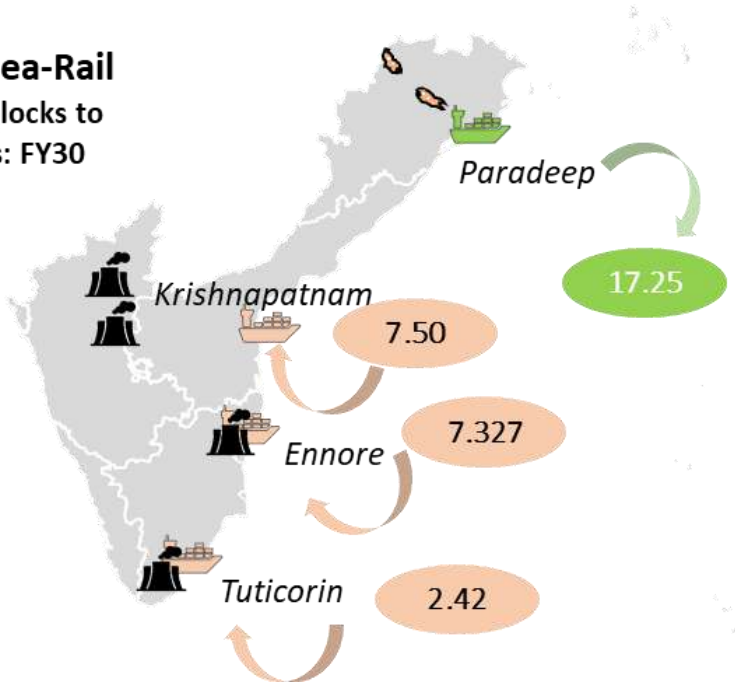
Our key findings based on detailed analysis of coastal shipping

We have also built in a scenario where ~20 MTPA of coal is shipped from Dhamra via Angul-Sukinda line instead of Paradeep

63.31 MTPA Rail-Sea-Rail
despatch by MCL to various power plants: FY30



17.25 MTPA Rail-Sea-Rail
despatch by Non-CIL blocks to various power plants: FY30



Talcher to Dhamra Port (Via Salegaon) is ~270.2 Kms via Rail, whereas via Sukinda Rd is ~223.82 Kms. Although these values lie under the same freight slabs for 145A (201 to 275 Kms), the turnaround time would be lesser for the shorter route with lesser congestion. Consumers shall interact with Dhamra Port and conduct landed cost economics for their assets.

<u>Key findings on coastal shipping:</u>

- Coastal shipping capacity from Eastern ports exceeds 120 MTPA
- 80-90 MTPA is the realistic coastal shipping volumes for FY30 based on demand-based analysis of power plants and landed cost economics.
- Additional capacity of ~30 MTPA can be utilized for exports to Bangladesh & Sri Lanka. Hence, no idle capacity is envisioned.
- Around ~20 – 25 MTPA, or 14-17 R/d of coastal shipping volume to NRS assets (Steel + Cement) have also been considered
- Apart from Paradeep Port, Dhamra, Gopalpur, Vizag and Gangavaram shall be explored for coastal shipping.

Our key findings based on detailed analysis of railway traffic for coastal shipping (1/2)

	2022		2030							
Sub-Section	Capacity	% Utilization	Ongoing Works	Passenger	Freight	Total	Capacity	% Utilization	Other Planned Works (New Energy/Other Corridors)	Utilization after of All planned works
Talcher / Talcher Rd to Budhapank	168	**126%**	3rd Line from Talcher to Budhapank, Talcher – Bimalgarh new BG Line	101	287 (~162 to 174 R/d is coal)	375 to 387	280	**134% to 138%**	Planned MCRL Inner Corridor via Jarapada/Angul to bypass Talcher-Talcher Rd. section, significant offloading of Non-CIL rakes via MCRL. With Angul-Balram Doubling, more rakes can be moved directly via Angul, rather than routing through Talcher road.	**<100%**
Budhapank to Rajatgarh	130	**122%**	3rd and 4th Lines planned between Budhapank – Salegaon.	52	238.79 (~ 148 to 159 R/d is coal)	291 to 302	218	**134% to 139%**	Re-routing coal to Dhamra and Paradeep Port via Angul – Sukinda New BG Line. Also Routing some coal from Angul to Rairakhol to Gopalpur Port	**127% to 132%**

All numbers (Except Capacity utilization) represent average two-way traffic in Trains/Rakes per day. Passenger also includes Others

The higher range (for capacity utilization estimates) are based on increase of +7.5% in coal rakes over base value, attributable to Peak Power Demand

Note: Capacity refers to Capacity of line with Maintenance Block (MB)

Our key findings based on detailed analysis of railway traffic for coastal shipping (2/2)

	2022		2030							
Sub-Section	Capacity	% Utilization	Ongoing Works	Passenger	Freight	Total	Capacity	% Utilization	Other Planned Works (New Energy/Other Corridors)	Utilization after of All planned works
Cuttack to Paradeep	100	**72%**	Planned auto-Signaling, Additional loop line at Badabandha.	24	149 (~122 to 131 R/d is coal)	173 to 182	100	**173% to 182%**	Doubling of Paradeep to Haridaspur Line Siju – Paradip Flyover Dhanmandal to Chandikhol Chord. Routing of 20 MTPA coal from Dhamra via Angul – Sukinda Line Routing of coal to Paradeep via Angul – Sukinda Rd – Haridaspur section could further decrease load on Cuttack to Sambalpur and Budhapank to Rajatgarh Sections. Salegaon to Paradip HHRC shelved due to economic unviability	**162% to 171%**

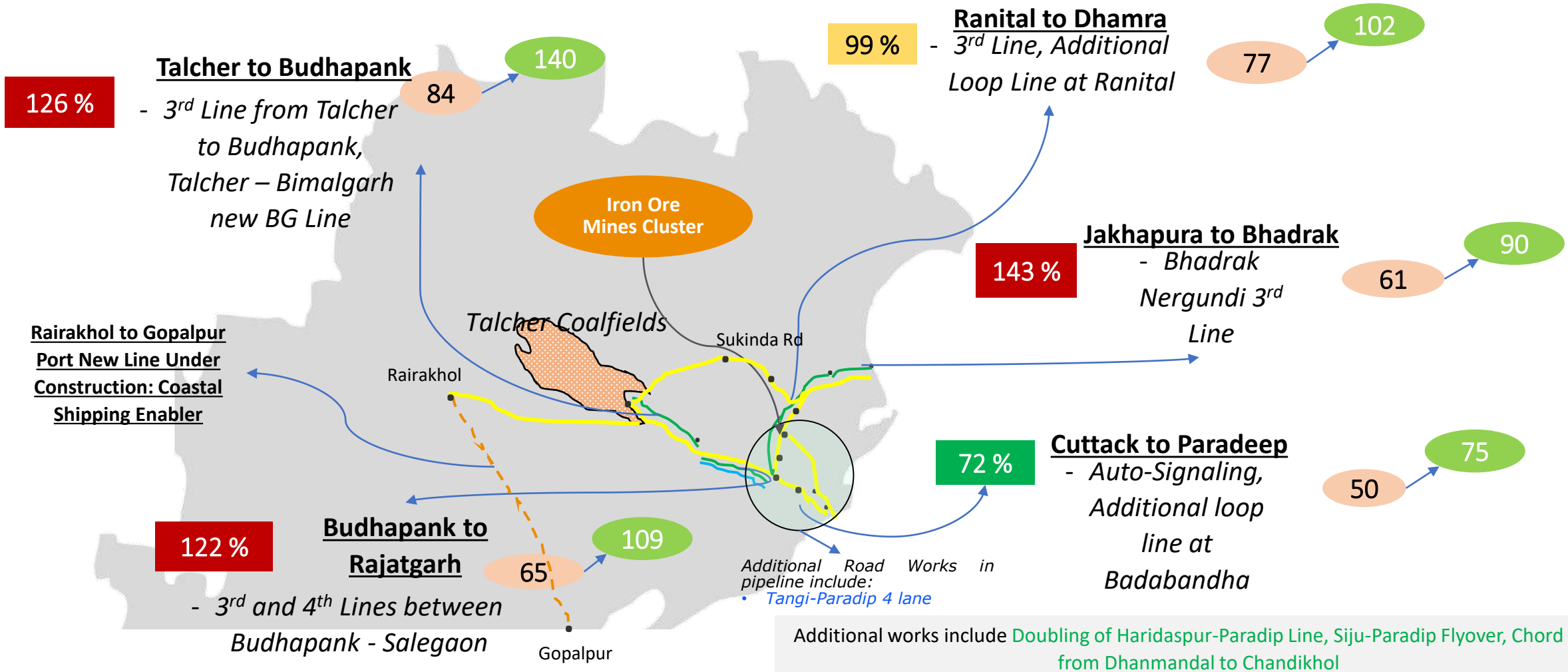
Detailed layout of cluster in following slide

All numbers (Except Capacity utilization) represent average two-way traffic in Trains/Rakes per day. Passenger also includes Others

The higher range (for capacity utilization estimates) are based on increase of +7.5% in coal rakes over base value, attributable to Peak Power Demand

Note: Capacity refers to Capacity of line with Maintenance Block (MB)

Major ongoing works of railways for coastal shipping enablement



Additional works include Doubling of Haridaspur-Paradip Line, Siju-Paradip Flyover, Chord Line from Dhanmandal to Chandikhol

XX % — *FY21-22 Line Capacity Utilization*

Doubling
3rd Line
4th Line

FY22 – One way Capacity (Trains/Day)

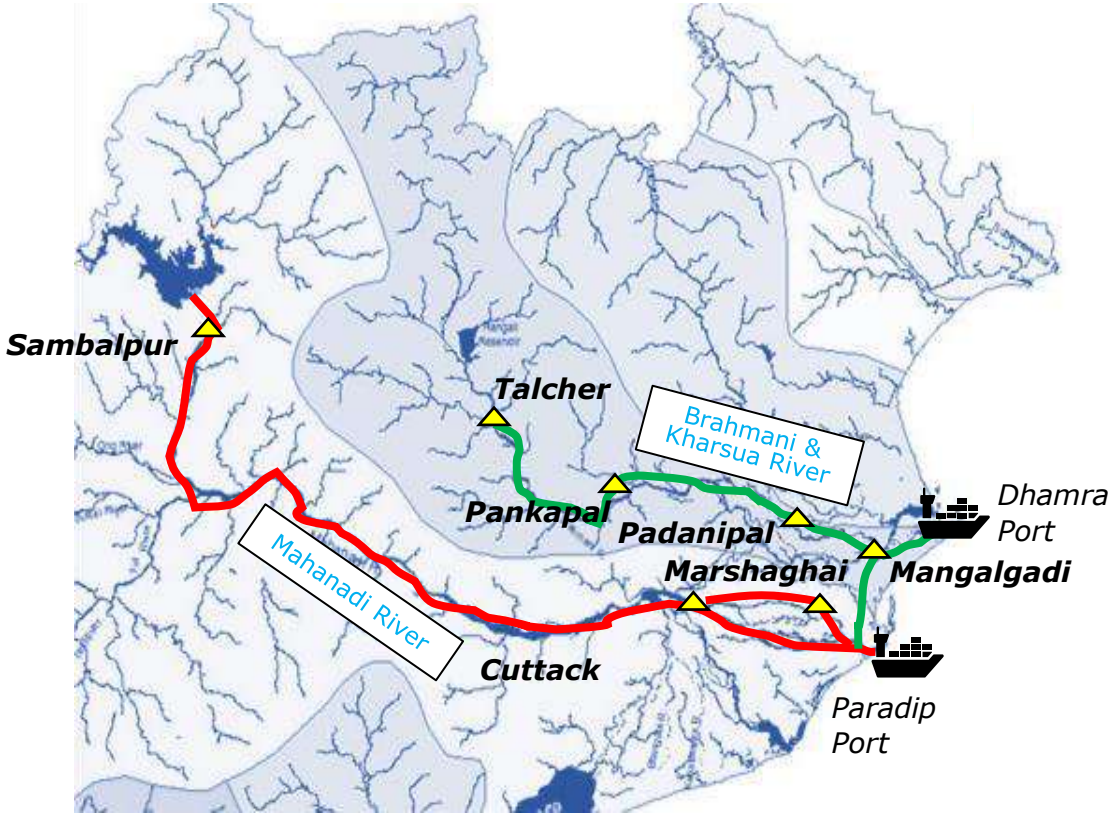
One way Capacity after Pipeline works by Railways (Trains/Day)

Our key findings based on detailed analysis of coastal shipping (2/2)

#	Key Findings/Recommendations	Potential Responsibility
1	• High congestion expected on railway lines to enable coastal shipping • **Concerned lines:** Budhapank to Rajatgarh and Cuttack to Paradeep. Heavy Haul Rail Corridor from Salegaon to Cuttack being shelved due to economic constraints. It is of utmost importance to add a third line (Survey under process) and in future a fourth line from Cuttack to Paradeep.	Indian Railways/ECoR
2	• Paradeep Port expected to handle ~90 Rakes/Day for coastal shipping and exports • On a best-effort basis with Expansion works in Pipeline, ~65-72 R/d can be handled by the Port (MCHP + PEQP). While this is sufficient for RSR, coal exports will require further capacity addition. • Capacity addition of ~ 15-20 R/d is required. Commitments from end-users of coal may be required to take up the investments for additional capacity addition. Additionally, avenues of notification of policies may be explored to make RSR mode attractive to power consumers.	Paradeep Port Trust, Ministry of Coal
3	• Execution of National Waterway 5 to execute coastal shipping via inland waterways (Brahmani River) • ~80-90 MTPA or ~55 to 60 R/d could be moved from Talcher to Pardeep and Dhamra Ports for Evacuation via Coastal Shipping. Transaction Advisor has been appointed which will also conduct detailed traffic study. • End to End construction of NW-5 is a challenge, although the target for completion is 2030, delays could be expected beyond the stipulated timelines	IWAI, Ministry of Shipping
4	• Assess Marketability of coal to Bangladesh & Sri Lanka from Talcher • Further utilizing Indo-Bangladesh Protocol Route (through Haldia) for delivery to Bangladesh	IWAI, Ministry of Shipping CIL Marketing team, MoC
5	• Utilizing other ports such as Dhamra for decongestion of Traffic as well as to reduce load on Paradeep Port • Dhamra Port has plans to increase capacity of coastal shipping + exports to around 20 MTPA. This would lead to diversion of around 14 R/D from Dhamra, via Angul-Sukinda Rd line	Ministry of Shipping
6	• Other ports such as Gopalpur, Vizag and Gangavaram shall also be explored. Under Construction line from Rairakhol to Gopalpur port could be utilized for coastal shipping going forward, given the coastal shipping capacity at the port is sufficient and coastal movement economics work out.	Ministry of Shipping, Indian Railways, MoC

Inland waterways in Odisha could complement coastal shipping and imports

National Waterway	Status
National Waterway 5	EoI issued by IWAI for developing following stretches of NW-5 • Padanipal-Paradip (89 Km) • Padanipal-Dhamra (50 Km)
National Waterway 64	EoI issued by IWAI for developing • Marshaghai-Paradip (35 km) stretch of NW-64

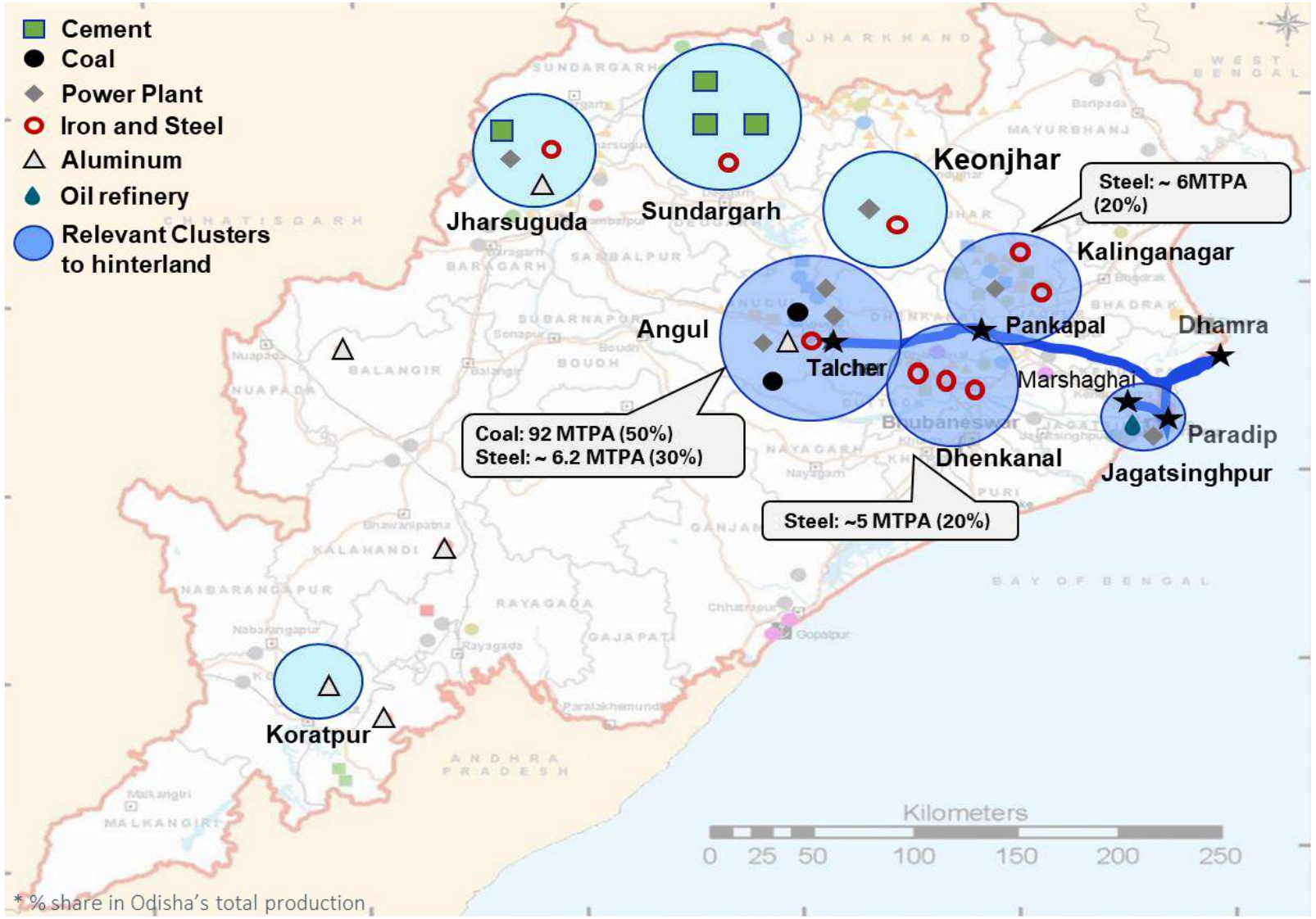


Source: Sagarmala Report, Ministry of Ports, Shipping & Waterways, IWAI

National Waterway – 5 could also be used in future for Coastal Shipping as well as coal imports

National Waterway 5 (NW5) runs through the states of Odisha and West Bengal along the Mahanadi River. The main rationale for NW5 is its proximity to the Talcher–Paradip region, which is abundant in resources and provides opportunities for evacuation of coal as well as other commodities like coking coal and iron ore. **An external study conducted on NW5 established a potential of 80 to 90 MTPA of coal and about 12.5 MTPA of coking coal in back haul in addition to some potential for iron ore transport. While the capacity of the waterway is limited to around 20-22 MTPA using a conventional system, it can be enhanced if barge trains are used.** The viability of using tugged barges, however, would need to be established through a detailed technical study. Based on high-level estimates, the investment to operationalize NW5 could be INR 5,000 cr for dredging purposes, INR 900 cr for terminal development at Talcher and Paradip and INR 200 cr for annual maintenance. For tugged barges, the overall capital expenditure will be higher. The revenues to the developer—assumed to be the Inland Waterways Authority of India (IWAI)—would consist of a usage fee of INR 1 per tonne km, vessel berthing fee of INR 750 per terminal and cargo-handling fees of INR 1 per tonne at each terminal. For barge operators, this revenue would be an operating cost. In addition, they would incur INR 2.4 cr per barge towards fuel, manning and repair and maintenance. On the capex front, operators will need to invest about INR 700 cr. The revenue for barge operators is assumed to be INR 1.2 per tonne km, based on benchmarking with alternative modes of transport. Based on a single barge configuration of 20 MTPA with a draught of 2.5 metres over 55–60 km with five navigational locks and three barge terminals. This yields an estimated return of 13 per cent to the IWAI as the developer, whereas barge operators would earn 18 per cent

NW 5 & 64 are uniquely placed amidst cargo clusters connecting EXIM gateways



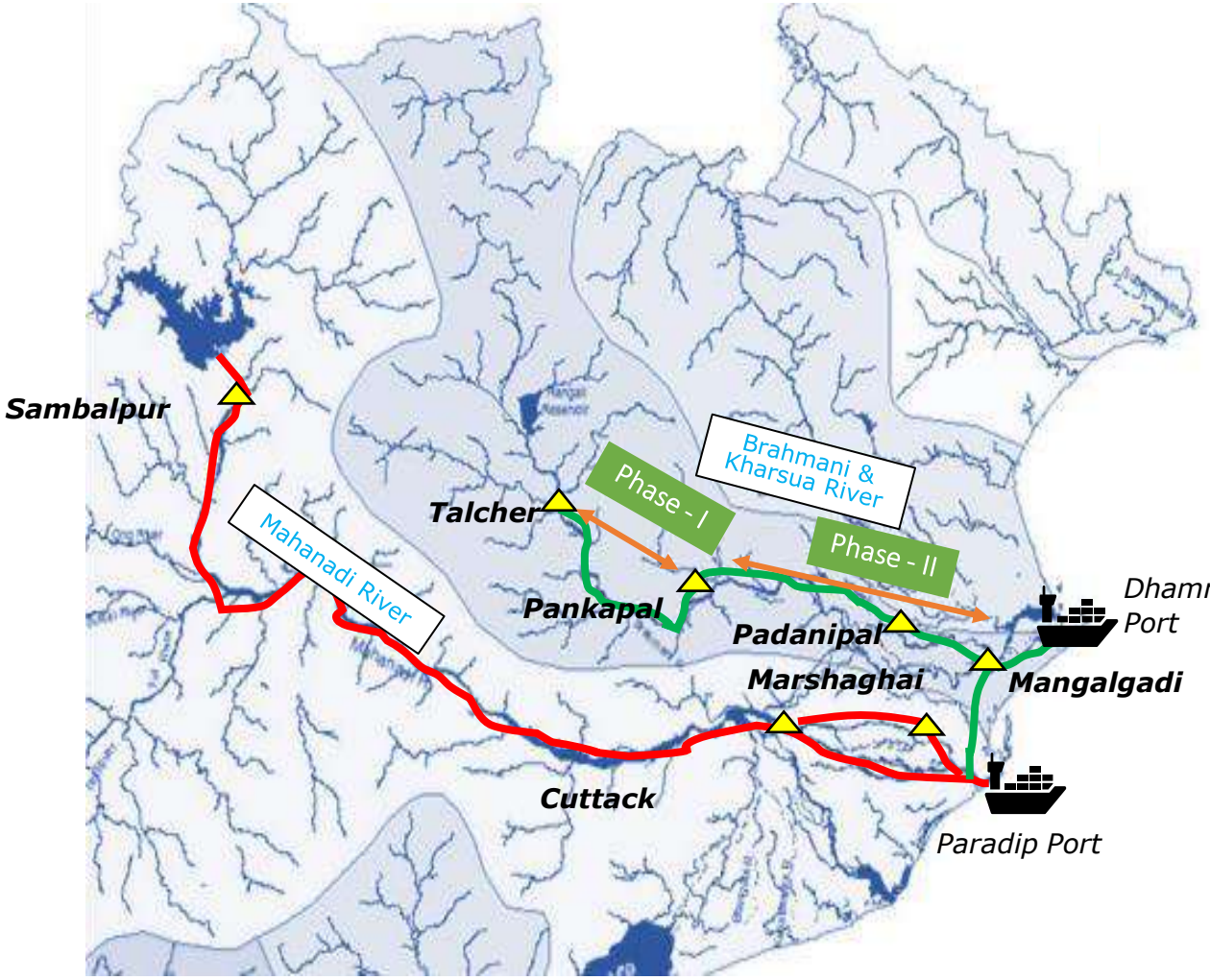
Potential for Inland Waterways - Key Players and Commodities in Odisha's hinterland

Industrial Cluster	Key players	Input/Raw material	Key Outputs
Angul	MCL, NALCO, NTPC	Bauxite	Coal, aluminum
Kalinganagar	Tata Steel, Jindal Industries	Iron ore, coal, limestone	Pig iron, sponge iron, steel
Dhenkanal	Nave Bharat Ferro Alloys, Nilachal Refractories	Coke, iron, alumina, fireclay	Ferro alloys, refractory products
Jagatsinghpur	IFFCO, Paradeep Phosphates, AMNS	Phosphate, sulphuric acid, iron ore	Fertilizers, gypsum, iron pellets

Source: Inland Waterways of India (IWAI) Reports

Cargo moving to & from Paradip and Dharma Port would contribute to NW5 traffic

Overview of the waterways under proposed project by IWAI

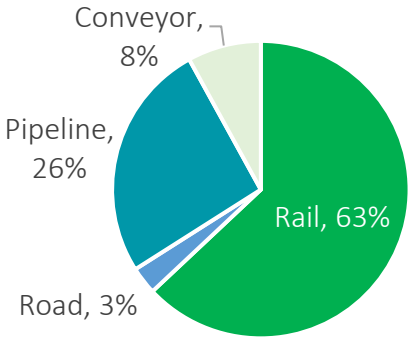


Key Details of the waterways under proposed project by IWAI

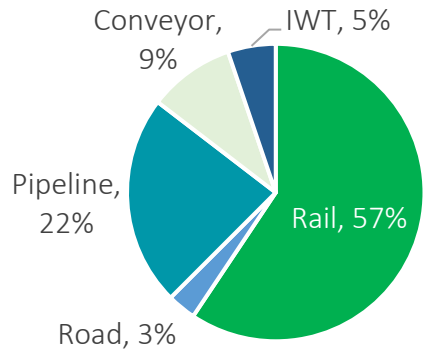
Section	Distance (km)	Least Available Depth (LAD) (m)
Talcher-Pankapal	120	0.7 – 7
Pankapal-Padanipal	90	1.5 – 6
Padanipal-Mangalgadi	27	1.5 – 6 with 1 m tidal variation
Mangalgadi-Dhamra	28	1.2 with 1 m tidal variation
Mangalgadi-Paradip	67	**1.2 with 1 m tidal variation**
Marshagai-Paradip	35	0.8 - 13.4 **with 1 m tidal variation**

Impact of the waterways under proposed project by IWAI

Modal Share of Concerned Area



2022-23 Act



2030 Projected

IWAI has targeted a modal share of 5% with potential IWT volume of 13.25 MMT by 2030

Note: For 2030, projections considered as per IWAI, balance 4% shall be interchangeable between various modes

Source: Inland Waterways of India (IWAI) Reports

IWT mode being natural transport channels has advantages over other modes of transport

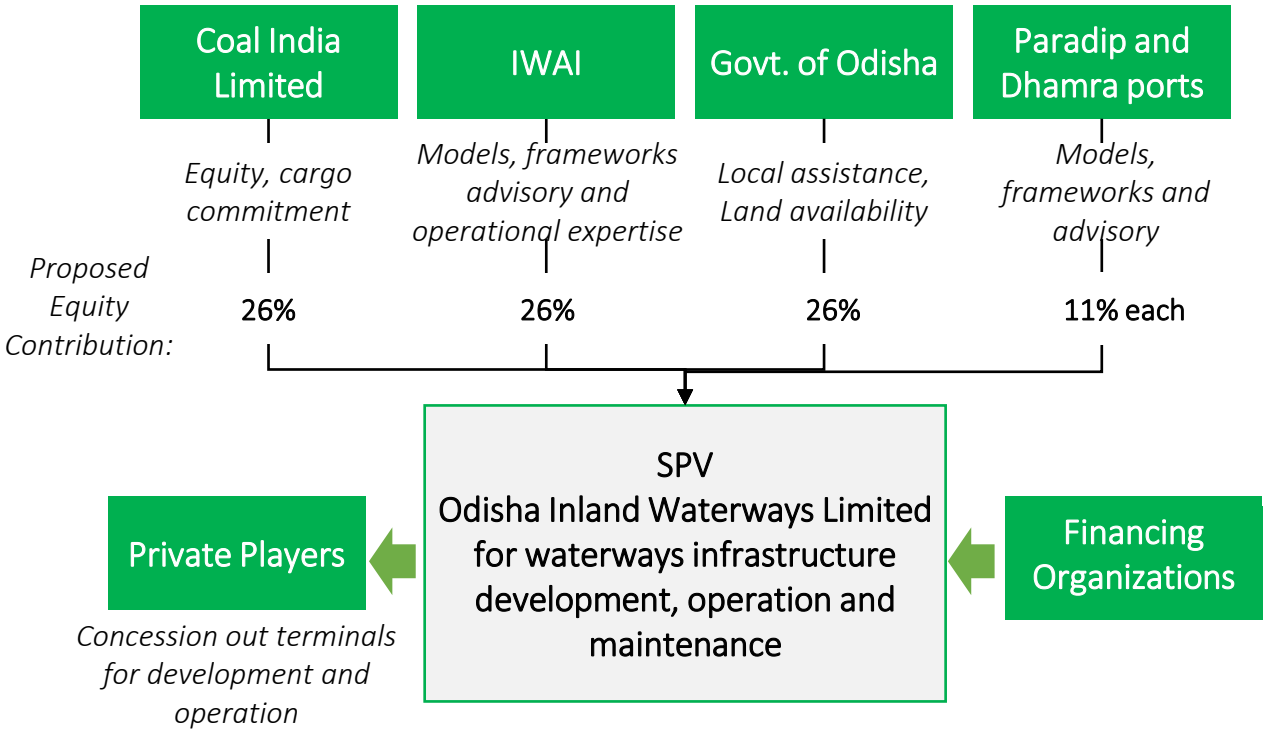
Mode	Carrier Type	Capacity	Tentative Operating Cost	Tentative Emissions (g/CO2/Tkm)	Tentative Energy Consumption (Litre/Tkm)	Tentative Land Requirement
	Rake with 54 wagons	3,400 T	INR 1.36 T/km	11.5	0.0089	High; major challenge
	Inland waterways vessels	2,000 T	INR 1.06 T/km	11	0.0048	Negligible
	Truck (20-wheeler)	24 T	INR 2.5 T/km	101	0.0313	High; major challenge

With countries across globe working towards sustainable development and climate protection, availability of Green Financing through multilateral financing program is picking up pace which may be used to aid greener modes of transportation

Source: Inland Waterways of India (IWAI) Reports

Necessary interventions for operationalization of NW-5 as proposed by IWAI

Proposed Project Implementation framework by IWAI



Key Interventions Required:

- Land Acquisition
- Terminal Development
- Market Development
- Modification/ Relocation of Existing Infrastructure
- Fairway Development and Maintenance

Tentative Capex as per Feasibility Reports

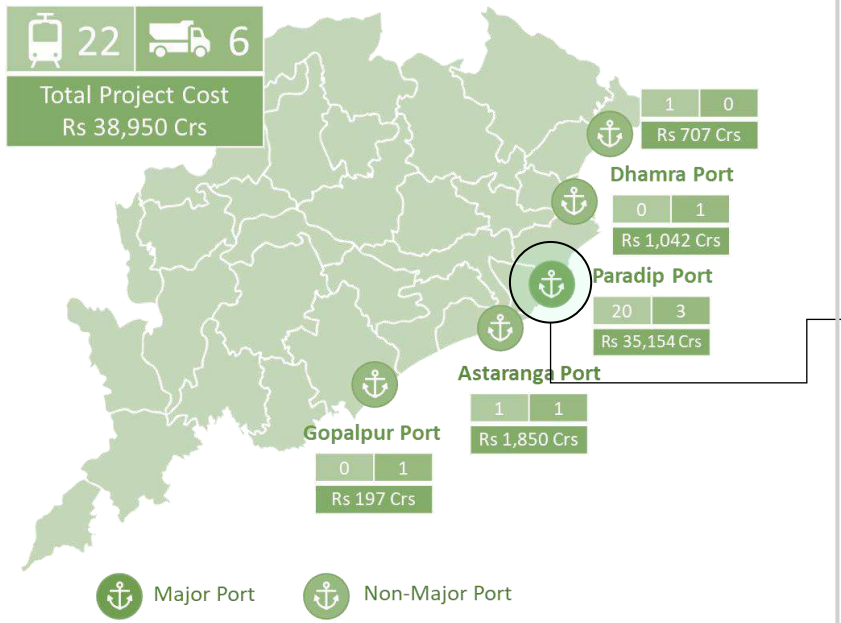
Particulars	Proposed responsible parties	Stretch I (Pankapal to Ports)	Stretch II (Talcher to Pankapal)	Total Cost in INR Cr
Dredging & Protection Measures	SPV	1,091	474	1,565
Weirs with Navigational Lock	SPV	2,440	7,263	9,703
Total for SPV	**SPV**	**3,531**	**7,737**	**11,268**
Terminals (~4 terminals planned – Talcher, Pankapal, Paradip and Dhamra)	Private Sector	1,317	439	1,756
Relocation/Modification of Bridges	State Government, MoRTH, MoR	879	743	1,261

IWAI estimates project completion within ~ 4.5 years from the date of SPV formation, considering the identified interventions are executed timely and efficiently.

Source: Inland Waterways of India (IWAI) Reports

Paradip Port has sufficient capacity to handle RSR movement of coal by FY30

PM Gatishakti NMP has significant focus on connectivity to Paradip Port



While Paradip port has sufficient capacity to handle costal shipping to various power plants (65 to 70 R/d), additional capacity could be required in future if coal exports materialize.

Available Infrastructure and Rake Unloading Capacity

Berth	Berth Capacity	Draft	Berth Length	Stackyard Area
MCHP (2 berths)	41.2 MTPA	14.5 m	520 m (Continuous)	1.22 Lacs Sqm
PEQCTPL- JSW (3 Berths)	30 MTPA	14.5 m	685 m (Continuous)	1.45 Lacs Sqm
IOHP	3/15.6 MTPA	13 m	275 m	1.04 Lacs Sqm

75 MTPA

DATE	MCHP	PEQCTPL (JSW)	IOHP	MANUAL	TOTAL
Optimal Rake Handling Capacity	30	26	3	3	62 Rakes / Day

Available Infrastructure and Rake Unloading Capacity

Mechanized Coal Handling Plant (MCHP)- PPAP	Paradip East Quay Coal Terminal (PEQP)
Capacity 42 MTY i.e., 30 rakes/day	**Capacity** 50 MTY i.e., 35 rakes/day
Rake Type – BOXN & BOBRN	**Rake Type** - Only BOBRN
2 track hoppers	**2 track hoppers**
Unloading of 4 wagons at a time	**Unloading of 6 wagons** at a time
Unloading Speed – 4000 tes/hr	**Unloading Speed** – 7000 tes/hr
Unloading Time - 2.5 hrs	**Unloading Time** – 2 hrs
Unloading Charges Rs 180/te	**Unloading Charges** Rs 210/te

Source: Sagarmala Report, Ministry of Ports, Shipping & Waterways, Comprehensive Action Plan for Port Connectivity on Gatishakti NMP 2022, DPIIT]

Estimated Wagon Procurement requirement by Indian Railways (ECoR - Odisha)

Destination State	Tonne-KMs	Volume (Tonnes)	Weighted Avg Distance of Despatch (KMs)
Andhra Pradesh	13339642102	14730000	977.920
Bihar	201383543.3	281841.76	714.527
Chhattisgarh	3515197174	14330000	245.303
Gujarat	113128560	53419.98	2117.720
Haryana	891694543.5	565130.25	1577.857
Jharkhand	328558191.9	1045798.87	314.170
Karnataka	903160784.9	593006.75	1523.019
Madhya Pradesh	1051843431	1406513.7	747.837
Maharashtra	5146554552	5459403.88	942.695
Odisha	982886922.7	32350000	113.000
Punjab	7676717475	4540123.45	1690.861
Tamil Nadu	31128310206	116000	1545.960
Uttar Pradesh	1039925024	974464.4	1067.176
West Bengal	5042828664	10068027.28	500.876
Coastal Shipping Volume	6712320000	34960000	192.000
Total		121.47 Million Tonnes	

FY22 - Rail

Average Lead for Coal Supply in FY22 (East Coast Railway)

428.32 KMs

Destination State	Tonne-KMs	Volume (Tonnes)	Weighted Avg Distance of Despatch (KMs)
Andhra Pradesh	19480166400	19920000	977.920
Chhattisgarh	986119514.3	4020000	245.303
Jharkhand	58121372.33	185000	314.170
Madhya Pradesh	5560918283	7436000	747.837
Maharashtra	7494427888	7950000	942.695
Odisha	8230920000	72840000	113.000
Punjab	19394175161	11470000	1690.861
West Bengal	3531172602	7050000	500.876
Coastal Shipping Volume	15360000000	80000000	192.000
Additional Push Volumes + Commercial Despatches to be taken as per FY22 avg Leads	106651970411	249000000	428.321
		459.87 Million Tonnes	

FY30 - Rail

Average Lead for Coal Supply in FY30 (East Coast Railway)

406.09 KMs

	FY22	FY30
Average Lead of coal Despatch from Odisha (KMs)	428.32	406.09
Estimated Average Turnaround time of Rakes (Days)	3.19	3.03
Rakes / Day Despatch by Rail + RCR + RSR Mode	84.35	319.35

Additional Rakes/Day Despatch Envisaged	235.00
Estimated Improved TAT (Days)	3.03
Total Number of Rakes Required	711.39
Estimated Wagons to be Procured for Coal till FY30	**41,261**

Additional ~3,094 Wagons would be required for despatches during peak demand period from November to March

Source: Sagarmala Report, Ministry of Ports, Shipping & Waterways, Comprehensive Action Plan for Port Connectivity on Gatishakti NMP 2022, DPIIT]

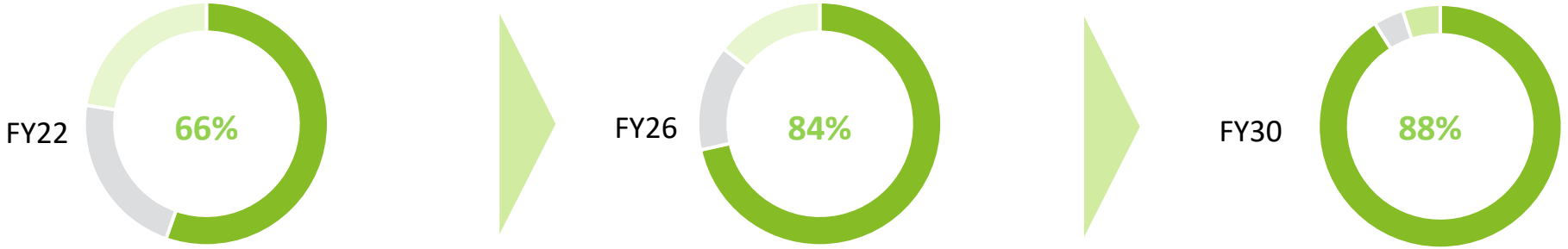
First Mile Connectivity Analysis of MCL

Logistical Outlook – Mahanadi Coalfields Limited (MCL)

MCL's despatch is progressing towards higher share of rail from current 66% to a target of 91% by FY30. Ensuring that the evacuation capacity exists is a crucial aspect of the holistic logistics policy

Area	Linked Mines	FY22 Actual Despatch (MTPA)					FY25-26 1 BT Plan (MTPA)					FY29-30 Anticipated Dispatch (MTPA)				
		Rail	RCR	Pure Road	MGR & Others	Total	Rail	RCR	Pure Road	MGR & Others	Total	Rail	RCR	Pure Road	MGR & Others	Total
IB Valley	Samaleshwari & Lajkura	7.68	0.00	1.42	0.00	**9.10**	17.81	0.00	1.69	0.00	**19.50**	17.81	0.00	1.69	0.00	**19.50**
Lakhanpur	Lakhanpur, Belpahar & Lilari	20.45	0.00	3.65	4.00	**28.10**	34.19	0.00	1.81	0.00	**36.00**	37.99	0.00	2.01	0.00	**40.00**
Basundhara & Mahalaxmi	Kulda, Garjanbahal, Siarmal, Basundhara (W) Extn	20.01	0.00	16.83	0.00	**36.84**	48.60	0.00	23.00	0.00	**71.60**	79.50	0.00	7.50	0.00	**87.00**
Orient	Hirakhand-Bundia , Orient 1,2,3	0.00	0.00	0.24	0.00	**0.24**	0.82	0.00	0.00	0.00	**0.82**	0.78	0.00	0.00	0.00	**0.78**
IB Valley & Basundhara CF		**48.14**	**0.00**	**22.14**	**4.00**	**74.04**	**101.42**	**0.00**	**26.50**	**0.00**	**127.92**	**136.08**	**0.00**	**11.20**	**0.00**	**147.28**
Lingaraj	Lingaraj OCP	18.89	0.00	2.21	0.00	**21.10**	18.89	0.00	1.11	0.00	**20.00**	17.00	0.00	0.00	0.00	**17.00**
Bhubaneswari, Kaniha, Jaganath, Bharatpur, Hingula, Talcher, Balabhadra, Subhadra	Bhubaneswari, Ananta, Kaniha, Jaganath, Bharatpur, Hingula, Nandira, Balram, Balabhadra, Subhadra	48.90	0.00	23.13	9.24	**81.27**	123.3	0.00	13.31	10.5	**147.08**	145.3	0.00	15.7	10.50	**172.00**
Talcher CF		**67.79**	**0.00**	**25.34**	**9.24**	**102.36**	**142.2**	**0.00**	**14.42**	**10.5**	**167.08**	**162.8**	**0.00**	**15.7**	**10.50**	**189.00**
Total MCL		**115.93**	**0.00**	**47.48**	**13.24**	**176.41**	**248.6**	**0.00**	**40.92**	**10.5**	**295.00**	**298.88**	**0.00**	**26.9**	**10.50**	**336.28**

Rail's share progression for MCL



Logistical Outlook – Mahanadi Coalfields Limited (MCL)

MCL's siding-wise despatch summary with destination states for FY21-22

Siding	Despatch in Tonnes	Despatch in Million Tonnes	Estimated Rakes/Day	Andhra Pradesh	Jharkhand	Odisha	Chhattisgarh	Maharashtra	Tamil Nadu	West Bengal	Madhya Pradesh	Karnataka	Bihar	Uttar Pradesh	Haryana	Punjab
Bharatpur Silo 1	2069078.51	2.07	**1.47**	1.0	0.0	0.1	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bharatpur Silo 2	1193587.9	1.19	**0.85**	0.5	0.0	0.1	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Spur 1	5904201.36	5.90	**4.20**	1.5	0.0	0.8	0.1	0.1	1.0	0.4	0.0	0.1	0.0	0.0	0.0	0.2
Spur 2	5818731.5	5.82	**4.14**	1.3	0.0	0.9	0.1	0.1	0.9	0.5	0.0	0.1	0.0	0.0	0.0	0.2
Spur 3	3477567.73	3.48	**2.47**	0.9	0.0	0.7	0.1	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Spur 4	3411347.37	3.41	**2.43**	0.8	0.0	0.6	0.2	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Spur 5	7189207.65	7.19	**5.12**	1.8	0.0	0.9	0.1	0.0	1.3	0.7	0.0	0.1	0.0	0.0	0.0	0.2
Spur 6	7215058.76	7.22	**5.13**	1.6	0.0	0.9	0.2	0.0	1.3	0.7	0.0	0.1	0.0	0.0	0.0	0.2
Spur 7	4476675.51	4.48	**3.19**	0.9	0.0	1.1	0.1	0.0	0.8	0.2	0.0	0.0	0.0	0.0	0.0	0.1
Spur 8	1993386.53	1.99	**1.42**	0.5	0.0	0.3	0.0	0.1	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Spur 9	6147511.35	6.15	**4.37**	1.1	0.0	1.2	0.1	0.0	1.5	0.3	0.0	0.0	0.0	0.0	0.0	0.1
Lingaraj Silo	5946739.16	5.95	**4.23**	1.1	0.0	1.6	0.2	0.0	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lingaraj SPUR3-P	1075652	1.08	**0.77**	0.2	0.0	0.2	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LMGT 1	3829284.66	3.83	**2.72**	0.1	0.0	2.5	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LMGT 2	3749139.89	3.75	**2.67**	0.0	0.0	2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Deulbera	4288665.1	4.29	**3.05**	0.5	0.0	0.5	0.1	0.1	1.7	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Total Talcher CF	**67785834.98**	**67.79**	**48.24**	**13.8**	**0.1**	**15.0**	**1.4**	**0.4**	**12.4**	**3.1**	**0.1**	**0.5**	**0.0**	**0.3**	**0.1**	**1.0**
BOCM 1	1070288.7	1.07	**0.76**	0.1	0.0	0.0	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1
BOCM 2	2261600.29	2.26	**1.61**	0.2	0.0	0.1	0.4	0.3	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.2
BOCM 3	6270129.92	6.27	**4.46**	0.5	0.0	0.5	1.0	0.7	0.6	0.3	0.1	0.0	0.0	0.1	0.0	0.6
BOCM 6	5281325.06	5.28	**3.76**	0.5	0.0	0.2	1.2	0.5	0.6	0.3	0.1	0.0	0.0	0.1	0.1	0.2
BOCM 7	5571486.23	5.57	**3.96**	0.5	0.0	0.4	1.3	0.4	0.4	0.3	0.1	0.0	0.0	0.0	0.1	0.4
Kanika	7208433.3	7.21	**5.13**	0.2	0.0	3.6	0.6	0.2	0.1	0.3	0.0	0.0	0.0	0.0	0.0	0.0
Kanika Store	855703.3	0.86	**0.61**	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SARDEGA SDG	11949861.29	11.95	**8.50**	0.2	0.4	1.9	2.3	0.3	0.1	2.7	0.0	0.0	0.0	0.1	0.1	0.5
LOCM 1	3271218.13	3.27	**2.33**	0.2	0.1	0.5	0.7	0.2	0.2	0.4	0.0	0.0	0.0	0.1	0.0	0.0
LOCM 2	279767.01	0.28	**0.20**	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LOCM 3	4124784.03	4.12	**2.94**	0.2	0.0	0.2	1.1	0.4	0.3	0.4	0.1	0.0	0.0	0.0	0.0	0.2
Total IB-Valley CF	**48144597.26**	**48.14**	**34.26**	**2.7**	**0.5**	**8.0**	**8.8**	**3.2**	**2.6**	**4.8**	**0.4**	**0.0**	**0.2**	**0.4**	**0.3**	**2.3**
Total MCL	115930432.2	115.93	**82.50**	16.5	0.6	23.0	10.2	3.6	15.0	7.9	0.5	0.5	0.2	0.7	0.4	3.2

Logistical Outlook – Lakhanpur-Belpahar Area

MCL's siding-wise despatch summary with destination states for FY21-22

Siding	Despatch in Tonnes	Despatch in Million Tonnes	Estimated Rakes/Day	Andhra Pradesh	Jharkhand	Odisha	Chhattisgarh	Maharashtra	Tamil Nadu	West Bengal	Gujarat	Madhya Pradesh	Karnataka	Bihar	Uttar Pradesh	Haryana	Punjab	Rajasthan
BOCM 1	1070288.7	1.07	**0.76**	0.1	0.0	0.0	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
BOCM 2	2261600.29	2.26	**1.61**	0.2	0.0	0.1	0.4	0.3	0.2	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.2	0.0
BOCM 3	6270129.92	6.27	**4.46**	0.5	0.0	0.5	1.0	0.7	0.6	0.3	0.0	0.1	0.0	0.0	0.1	0.0	0.6	0.0
BOCM 6	5281325.06	5.28	**3.76**	0.5	0.0	0.2	1.2	0.5	0.6	0.3	0.0	0.1	0.0	0.0	0.1	0.1	0.2	0.0
BOCM 7	5571486.23	5.57	**3.96**	0.5	0.0	0.4	1.3	0.4	0.4	0.3	0.0	0.1	0.0	0.0	0.0	0.1	0.4	0.0
Total Lakhanpur-Belpahar	**20454830.2**	**20.45**	**14.56**	**1.78**	**0.11**	**1.28**	**4.01**	**2.09**	**1.89**	**0.97**	**0.00**	**0.34**	**0.00**	**0.10**	**0.20**	**0.22**	**1.55**	**0.00**

Consumer	Despatch from BOCM Sidings of Lakhanpur-Belpahar Area: R/D
ADANI POWER MAHARASHTRA LTD	0.53
BAKRESWAR THERMAL POWER STATION	0.07
BANDEL THERMAL POWER STATION	0.06
BARH SUPER THERMAL POWER STATION	0.10
DADRI THERMAL POWER STATION	0.02
DR. NARLA TATA RAO POWER STATION	0.77
DURGAPUR STEEL THERMAL POWER	0.33
GADARWARA THERMAL POWER PLANT	0.10
JHABUA POWER LTD	0.24
JINDAL POWER LTD	0.61
KHAPERKHEDA THERMAL POWER STATION	0.80
KOLAGHAT THERMAL POWER STATION	0.29
KORADI THERMAL POWER STATION	0.12
KSK MAHANADI POWER	0.18
KSK MAHANADI POWER COMPANY LIMITED	0.13
LARA SUPER THERMAL POWER STATION	1.04
MEJIA THERMAL POWER PLANT	0.11
METTUR THERMAL POWER STATION	0.28
MOUDA SUPER THERMAL POWER PLANT	0.63
NALCO - DAMONJODI	0.03
NTPC SAIL POWER COMPANY LIMITED	0.09
RAIGARH ENERGY GENERATION LTD	0.51
RAJIV GANDHI THERMAL POWER STATION	0.19
RAYALSEEMA THERMAL POWER PROJECT	0.30
ROURKELA STEEL PLANT	0.05
SIMHADRI SUPER THERMAL POWER	0.63
SIPAT SUPER THERMAL POWER STATION	0.16
TALWANDI SABO POWER LTD	1.55
TANDA THERMAL POWER STATION	0.18
TUTICORIN THERMAL POWER PROJECT	1.41
VEDANTA LTD - BHURKAMUNDA	0.05
ARAVALI POWER COMPANY PVT LTD	0.02
CHANDRAPUR SUPER THERMAL POWER	0.00
DURGAPUR THERMAL POWER STATION	0.10
GMR KAMALANGA ENERGY LTD	0.04
HIRAMAYE ENERGY LIMITED	0.01
NTECL VALLUR THERMAL POWER PROJECT	0.20
RASTRIYA ISPAT NIGAM LTD	0.01
THE TATA POWER COMPANY LTD	0.08
VEDANTA LTD - BANJARI	0.71
VEDANTA LTD - LANJIGARH	0.03
VIZAG THERMAL POWER PLANT	0.01
ADHUNIK POWER AND NATURAL RESOURCES	0.03
BHUSHAN POWER AND STEEL LIMITED	0.05
BHUSHAN POWER AND STEEL LTD	0.01
DB POWER LTD	0.60
HINDALCO INDUSTRIES LIMITED	0.28
HIRANMAYE ENERGY LIMITED	0.00
JINDAL STEEL AND POWER LTD	0.05
KORBA SUPER THERMAL POWER STATION	0.01
R K M POWER GEN PVT LTD	0.30
RAIPUR ENERGEN LIMITED	0.24
SEMBCORP ENERGY INDIA LIMITED	0.06
MSP STEEL AND POWER LIMITED	0.03
R K M POWERGEN PRIVATE LIMITED	0.06
SHYAM METALICS AND ENERGY LTD	0.05
SOLAPUR SUPER THERMAL POWER PROJECT	0.00
LALITPUR POWER GENERATION COMPANY	0.00
Total Despatch	**14.56**

Logistical Outlook – Samaleswari-Lajkura Area

MCL's siding-wise despatch summary with destination states for FY21-22

Siding	Despatch in Tonnes	Despatch in Million Tonnes	Estimated Rakes/Day	Andhra Pradesh	Jharkhand	Odisha	Chhattisgarh	Maharashtra	Tamil Nadu	West Bengal	Gujarat	Madhya Pradesh	Karnataka	Bihar	Uttar Pradesh	Haryana	Punjab	Rajasthan
LOCM 1	3271218.13	3.27	**2.33**	0.2	0.1	0.5	0.7	0.2	0.2	0.4	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
LOCM 2	279767.01	0.28	**0.20**	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LOCM 3	4124784.03	4.12	**2.94**	0.2	0.0	0.2	1.1	0.4	0.3	0.4	0.0	0.1	0.0	0.0	0.0	0.0	0.2	0.0
Total Samaleswari-Lajkura	7675769.17	7.68	5.46	0.47	0.08	0.67	1.82	0.59	0.54	0.82	0.00	0.08	0.00	0.04	0.08	0.04	0.23	0.00

Consumer	Despatch from LOCM Sidings of Samaleswari-Lajkura Area: R/D
ADANI POWER MAHARASHTRA LTD	0.01
ADHUNIK POWER AND NATURAL RESOURCES	0.07
BAKRESWAR THERMAL POWER STATION	0.02
BARH SUPER THERMAL POWER STATION	0.04
BHUSHAN POWER AND STEEL LIMITED	0.04
BHUSHAN POWER AND STEEL LTD	0.03
CHANDRAPUR SUPER THERMAL POWER	0.00
DADRI THERMAL POWER STATION	0.01
DR. NARLA TATA RAO POWER STATION	0.10
DURGAPUR STEEL THERMAL POWER	0.19
DURGAPUR THERMAL POWER STATION	0.19
HINDALCO INDUSTRIES LIMITED	0.29
JHABUA POWER LTD	0.05
JINDAL STAINLESS LTD JAJPUR PLANT	0.02
JK PAPER MILLS	0.00
KHAPERKHEDA THERMAL POWER STATION	0.37
KOLAGHAT THERMAL POWER STATION	0.12
KORBA SUPER THERMAL POWER STATION	0.01
KSK MAHANADI POWER	0.02
LARA SUPER THERMAL POWER STATION	0.83
MEJIA THERMAL POWER PLANT	0.30
METTUR THERMAL POWER STATION	0.05
MOUDA SUPER THERMAL POWER PLANT	0.20
MSP STEEL AND POWER LIMITED	0.01
NTECL VALLUR THERMAL POWER PROJECT	0.12
NTPC SAIL POWER COMPANY LIMITED	0.13
RAJIV GANDHI THERMAL POWER STATION	0.04
RAYALSEEMA THERMAL POWER PROJECT	0.04
SEMBCORP ENERGY INDIA LIMITED	0.04
SHYAM METALICS AND ENERGY LTD	0.02
SHYAM STEEL INDUSTRIES LTD	0.00
SIMHADRI SUPER THERMAL POWER	0.27
SIPAT SUPER THERMAL POWER STATION	0.10
TALWANDI SABO POWER LTD	0.23
TANDA THERMAL POWER STATION	0.07
THE TATA POWER COMPANY LTD	0.01
TUTICORIN THERMAL POWER PROJECT	0.37
UTKAL ALUMINA INTERNATIONAL LTD	0.01
VEDANTA LTD - BANJARI	0.26
VEDANTA LTD - LANJIGARH	0.00
VIZAG THERMAL POWER PLANT	0.01
ARAVALI POWER COMPANY PVT LTD	0.00
DB POWER LTD	0.46
GADARWARA THERMAL POWER PLANT	0.03
GMR KAMALANGA ENERGY LTD	0.00
JINDAL POWER LTD	0.06
KORADI THERMAL POWER STATION	0.02
KSK MAHANADI POWER COMPANY LIMITED	0.05
NALCO - DAMONJODI	0.01
R K M POWER GEN PVT LTD	0.14
R K M POWERGEN PRIVATE LIMITED	0.00
RASTRIYA ISPAT NIGAM LTD	0.01
ROURKELA STEEL PLANT	0.00
Total Despatch	**5.46**

Logistical Outlook – IB-Valley Area – Kanika Siding

MCL's siding-wise despatch summary with destination states for FY21-22

Siding	Despatch in Tonnes	Despatch in Million Tonnes	Estimated Rakes/Day	Andhra Pradesh	Jharkhand	Odisha	Chhattisgarh	Maharashtra	Tamil Nadu	West Bengal	Gujarat	Madhya Pradesh	Karnataka	Bihar	Uttar Pradesh	Haryana	Punjab	Rajasthan
Kanika	7208433.3	7.21	**5.13**	0.2	0.0	3.6	0.6	0.2	0.1	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Kanika Store	855703.3	0.86	**0.61**	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total IB-Valley Kanika	8064136.60	8.06	5.74	0.26	0.00	4.17	0.65	0.19	0.13	0.27	0.00	0.01	0.00	0.02	0.03	0.00	0.01	0.00

Consumer	Despatch from Kanika Sidings in IB Valley: R/D
DR. NARLA TATA RAO POWER STATION	0.04
RASTRIYA ISPAT NIGAM LTD	0.12
RAYALSEEMA THERMAL POWER PROJECT	0.01
SIMHADRI SUPER THERMAL POWER	0.10
VIZAG THERMAL POWER PLANT	0.00
BARH SUPER THERMAL POWER STATION	0.02
AMBUJA CEMENTS LIMITED - BHATAPARA	0.02
JINDAL STEEL AND POWER LTD	0.07
JSW ISPAT SPECIAL PRODUCTS LIMITED	0.01
KSK MAHANADI POWER	0.01
KSK MAHANADI POWER COMPANY LIMITED	0.01
LARA SUPER THERMAL POWER STATION	0.47
MAHENDRA SPONGE AND POWER LIMITED	0.01
MSP STEEL AND POWER LIMITED	0.01
NTPC SAIL POWER COMPANY LIMITED	0.18
GADARWARA THERMAL POWER PLANT	0.01
CHANDRAPUR SUPER THERMAL POWER	0.00
KHAPERKHEDA THERMAL POWER STATION	0.11
MOUDA SUPER THERMAL POWER PLANT	0.07
BARGARH CEMENT WORKS	0.01
BHUSHAN POWER AND STEEL LTD	0.06
DALMIA CEMENT (BHARAT) LIMITED	0.00
HINDALCO INDUSTRIES LIMITED	0.17
NALCO - DAMONJODI	0.28
ROURKELA STEEL PLANT	0.18
VEDANTA LTD - BANJARI	1.16
VEDANTA LTD - BHURKAMUNDA	2.12
VEDANTA LTD - LANJIGARH	0.08
TALWANDI SABO POWER LTD	0.01
METTUR THERMAL POWER STATION	0.01
TUTICORIN THERMAL POWER PROJECT	0.12
DADRI THERMAL POWER STATION	0.00
TANDA THERMAL POWER STATION	0.03
BAKRESWAR THERMAL POWER STATION	0.00
BANDEL THERMAL POWER STATION	0.02
DURGAPUR STEEL THERMAL POWER	0.05
DURGAPUR THERMAL POWER STATION	0.02
JSW CEMENT LIMITED	0.00
KOLAGHAT THERMAL POWER STATION	0.10
MEJIA THERMAL POWER PLANT	0.08
Total Despatch	**5.74**

Logistical Outlook – IB-Valley Area – Sardega Siding

MCL's siding-wise despatch summary with destination states for FY21-22

Siding	Despatch in Tonnes	Despatch in Million Tonnes	Estimated Rakes/Day	Andhra Pradesh	Jharkhand	Odisha	Chhattisgarh	Maharashtra	Tamil Nadu	West Bengal	Gujarat	Madhya Pradesh	Karnataka	Bihar	Uttar Pradesh	Haryana	Punjab	Rajasthan
SARDEGA SDG	11949861.29	11.95	8.50	0.2	0.4	1.9	2.3	0.3	0.1	2.7	0.0	0.0	0.0	0.0	0.1	0.1	0.5	0.0

Consumer	Despatch from Sardega Siding in IB Valley: R/D
ADHUNIK POWER AND NATURAL RESOURCES	0.33
AMBUJA CEMENTS LIMITED - BHATAPARA	0.07
ARAVALI POWER COMPANY PVT LTD	0.08
BAIKUNTH CEMENT WORKS	0.01
BANDEL THERMAL POWER STATION	0.01
BARGARH CEMENT WORKS	0.03
BARH SUPER THERMAL POWER STATION	0.01
BHUSHAN POWER AND STEEL LIMITED	0.07
DALMIA CEMENT (BHARAT) LIMITED	0.01
DB POWER LTD	0.35
DURGAPUR PROJECTS LIMITED	0.32
DURGAPUR STEEL THERMAL POWER	0.18
DURGAPUR THERMAL POWER STATION	0.14
FARAKKA SUPER THERMAL POWER STATION	0.38
HALDIA ENERGY LIMITED	0.17
HALDIA ENERGY LTD	0.20
HINDALCO INDUSTRIES LIMITED	0.02
HIRAMAYE ENERGY LIMITED	0.06
HIRANMAYE ENERGY LIMITED	0.26
JINDAL POWER LTD	0.08
JK PAPER LIMITED - JK PAPER MILLS	0.02
KAHALGAON SUPER THERMAL POWER	0.00
KHAPERKHEDA THERMAL POWER STATION	0.05
KOLAGHAT THERMAL POWER STATION	0.25
KORBA SUPER THERMAL POWER STATION	0.01
LALITPUR POWER GENERATION	0.03
LALITPUR POWER GENERATION COMPANY L	0.02
LARA SUPER THERMAL POWER STATION	0.30
MAHENDRA SPONGE AND POWER LIMITED	0.07
MEJIA THERMAL POWER PLANT	0.45
MOUDA SUPER THERMAL POWER PLANT	0.25
MSP STEEL AND POWER LIMITED	0.01
NALCO - DAMONJODI	0.17
NTPC SAIL POWER COMPANY LIMITED	0.01
OPG POWER GENERATION PVT LTD	0.09
R K M POWER GEN PVT LTD	0.24
RAIPUR ENERGEN LIMITED	1.10
ROURKELA STEEL PLANT	0.03
SANTALDIH THERMAL POWER STATION	0.30
SHYAM METALICS AND ENERGY LTD	0.02
SIMHADRI SUPER THERMAL POWER	0.19
SIPAT SUPER THERMAL POWER STATION	0.04
TALWANDI SABO POWER LTD	0.49
TANDA THERMAL POWER STATION	0.05
THE TATA POWER COMPANY LTD	0.03
TUTICORIN THERMAL POWER PROJECT	0.00
VEDANTA LTD - BANJARI	1.11
VEDANTA LTD - BHURKAMUNDA	0.37
ACC LTD	0.00
JK PAPER MILLS	0.00
	8.50

Logistical Outlook – Talcher Area – Spur Sidings and Bharatpur Silos

MCL's siding-wise despatch summary with destination states for FY21-22

Siding	Despatch in Tonnes	Despatch in Million Tonnes	Estimated Rakes/Day	Andhra Pradesh	Jharkhand	Odisha	Chhattisgarh	Maharashtra	Tamil Nadu	West Bengal	Madhya Pradesh	Karnataka	Bihar	Uttar Pradesh	Haryana	Punjab
Bharatpur Silo 1	2069078.51	2.07	**1.47**	1.0	0.0	0.1	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bharatpur Silo 2	1193587.9	1.19	**0.85**	0.5	0.0	0.1	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Spur 1	5904201.36	5.90	**4.20**	1.5	0.0	0.8	0.1	0.1	1.0	0.4	0.0	0.1	0.0	0.0	0.0	0.2
Spur 2	5818731.5	5.82	**4.14**	1.3	0.0	0.9	0.1	0.1	0.9	0.5	0.0	0.1	0.0	0.0	0.0	0.2
Spur 3	3477567.73	3.48	**2.47**	0.9	0.0	0.7	0.1	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Spur 4	3411347.37	3.41	**2.43**	0.8	0.0	0.6	0.2	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Spur 5	7189207.65	7.19	**5.12**	1.8	0.0	0.9	0.1	0.0	1.3	0.7	0.0	0.1	0.0	0.0	0.0	0.2
Spur 6	7215058.76	7.22	**5.13**	1.6	0.0	0.9	0.2	0.0	1.3	0.7	0.0	0.1	0.0	0.0	0.0	0.2
Spur 7	4476675.51	4.48	**3.19**	0.9	0.0	1.1	0.1	0.0	0.8	0.2	0.0	0.0	0.0	0.0	0.0	0.1
Spur 8	1993386.53	1.99	**1.42**	0.5	0.0	0.3	0.0	0.1	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Spur 9	6147511.35	6.15	**4.37**	1.1	0.0	1.2	0.1	0.0	1.5	0.3	0.0	0.0	0.0	0.0	0.0	0.1
Total	48896354.17	48.90	34.80	11.95	0.08	7.54	1.01	0.36	9.05	3.02	0.00	0.08	0.44	0.02	0.24	0.05

Consumer	Despatch from Spur Sidings in Talcher: R/D
APPDCL - SRI DAMODARAM SANJEEVAIAH	1.64
RAYALSEEMA THERMAL POWER PROJECT	1.53
SEMBCORP ENERGY INDIA LIMITED	3.17
SIMHADRI SUPER THERMAL POWER	2.79
LARA SUPER THERMAL POWER STATION	0.54
NTPC SAIL POWER COMPANY LIMITED	0.12
R K M POWER GEN PVT LTD	0.15
ADHUNIK POWER AND NATURAL RESOURCES	0.08
RAICHUR THERMAL POWER STATION	0.43
MB POWER (MADHYA PRADESH) LTD	0.06
GMR KAMALANGA ENERGY LTD	2.36
NALCO - ANGUL	2.02
TALCHER SUPER THERMAL POWER STATION	0.02
VEDANTA LTD - BANJARI	0.87
METTUR THERMAL POWER STATION	2.39
NORTH CHENNAI THERMAL POWER STATION	3.05
NTECL VALLUR THERMAL POWER PROJECT	1.99
TUTICORIN THERMAL POWER PROJECT	1.52
HALDIA ENERGY LIMITED	0.63
HALDIA ENERGY LTD	0.73
MEJIA THERMAL POWER PLANT	0.11
ANDHRA PAPER LIMITED	0.03
DR. NARLA TATA RAO POWER STATION	2.29
MAA MAHAMAYA INDUSTRIES LTD	0.01
RASTRIYA ISPAT NIGAM LTD	0.42
STEEL EXCHANGE INDIA	0.00
STEEL EXCHANGE INDIA LTD	0.01
VIZAG THERMAL POWER PLANT	0.05
IND SYNERGY LTD	0.01
KSK MAHANADI POWER	0.00
KSK MAHANADI POWER COMPANY LIMITED	0.05
ARAVALI POWER COMPANY PVT LTD	0.05
KUDGI SUPER THERMAL POWER STATION	0.01
GADARWARA THERMAL POWER PLANT	0.02
ADANI ELECTRICITY MUMBAI LIMITED	0.03
ADANI POWER MAHARASHTRA LTD	0.04
KHAPERKHEDA THERMAL POWER STATION	0.13
MOUDA SUPER THERMAL POWER PLANT	0.02
SOLAPUR SUPER THERMAL POWER PROJECT	0.14
AARTI STEELS LTD	0.11
DALMIA CEMENT (BHARAT) LIMITED	0.01
EMAMI PAPER MILLS LTD	0.03
FACOR POWER LIMITED	0.07
FACOR POWER LIMITED - ODISHA	0.08
INDIAN FARMERS FERTILIZER	0.07
INDIAN METALS AND FERRO ALLOYS LTD	0.21
JINDAL STAINLESS LTD JAJPUR PLANT	0.16
JINDAL STEEL AND POWER LTD	0.60
JK PAPER LIMITED - JK PAPER MILLS	0.04
JK PAPER MILLS	0.02
NALCO - DAMONJODI	0.23
UTKAL ALUMINA INTERNATIONAL LTD	0.14
VEDANTA LTD - LANJIGARH	0.17
TALWANDI SABO POWER LTD	0.90
OPG POWER GENERATION PVT LTD	0.09
DADRI THERMAL POWER STATION	0.06
FEROZE GANDHI UNCHAHAR	0.08
LALITPUR POWER GENERATION COMPANY	0.00
TANDA THERMAL POWER STATION	0.04
BANDEL THERMAL POWER STATION	0.36
CESC LTD	0.18
DURGAPUR STEEL THERMAL POWER	0.15
FARAKKA SUPER THERMAL POWER STATION	0.04
HIRAMAYE ENERGY LIMITED	0.08
HIRANMAYE ENERGY LIMITED	0.20
JSW CEMENT LIMITED	0.00
KOLAGHAT THERMAL POWER STATION	0.30
SHYAM STEEL INDUSTRIES LTD	0.01
SUPER SMELTERS LTD	0.02
AMBUJA CEMENTS LIMITED - ROPAR	0.01
ITC LTD - PAPERBOARDS AND SPECIALIT	0.01
VIMLA INFRASTRUCTURE (INDIA)	0.00
LALITPUR POWER GENERATION COMPANY L	0.01
SHYAM STEEL MANUFACTURING LTD	0.01
BHARAT ALUMINIUM COMPANY LTD	0.02
JINDAL POWER LTD	0.04
RAIGARH ENERGY GENERATION LTD	0.04
HINDALCO INDUSTRIES LIMITED	0.05
SENDOZ COMMERCIALS PVT LTD	0.03
TATA STEEL BSL LTD	0.23
LALITPUR POWER GENERATION	0.02
PRAYAGRAJ POWER GENERATION	0.02
BARH SUPER THERMAL POWER STATION	0.02
RAIPUR ENERGEN LIMITED	0.03
ADANI POWER RAJASTHAN LTD	0.04
ITC LTD	0.01
ORISSA METALIKS PRIVATE LIMITED	0.14
LAKHERI CEMENT WORKS	0.00
COASTAL ENERGEN PRIVATE LIMITED	0.00
VEDANTA LTD - BHURKAMUNDA	0.03
GODAVARI COMMODITIES LTD	0.01
ORISSA METALIKS PVT LTD	0.01
RASHMI METALIKS LIMITED	0.01
Total	**34.80**

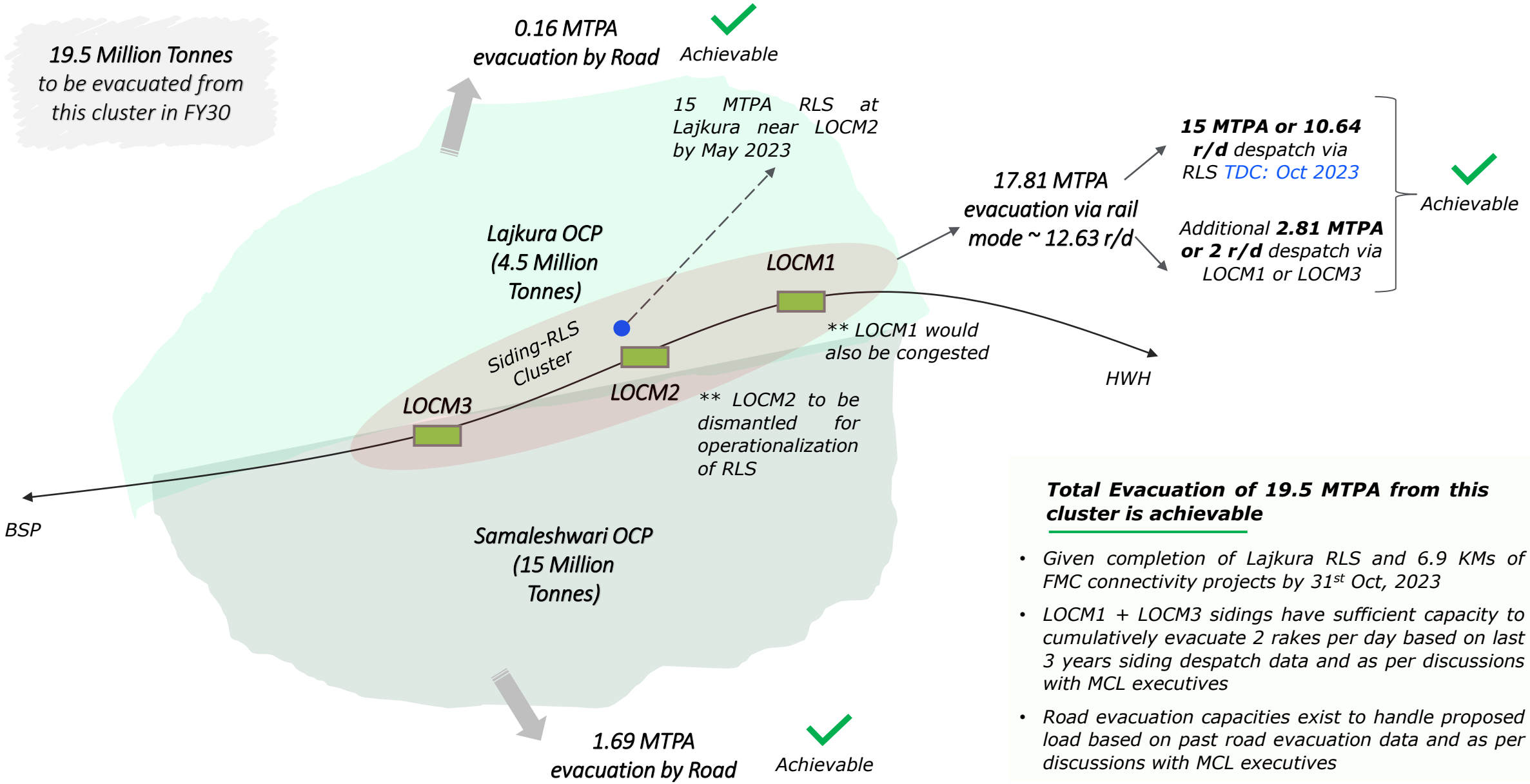
Logistical Outlook – Talcher Area – Lingaraj & Deulbera Sidings

MCL's siding-wise despatch summary with destination states for FY21-22

Siding	Despatch in Tonnes	Despatch in Million Tonnes	Estimated Rakes/Day	Andhra Pradesh	Jharkhand	Odisha	Chhattisgarh	Maharashtra	Tamil Nadu	West Bengal	Madhya Pradesh	Karnataka	Bihar	Uttar Pradesh	Haryana	Punjab
Lingaraj Silo	5946739.16	5.95	**4.23**	1.1	0.0	1.6	0.2	0.0	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lingaraj SPUR3-P	1075652	1.08	**0.77**	0.2	0.0	0.2	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LMGT 1	3829284.66	3.83	**2.72**	0.1	0.0	2.5	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LMGT 2	3749139.89	3.75	**2.67**	0.0	0.0	2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Deulbera	4288665.1	4.29	**3.05**	0.5	0.0	0.5	0.1	0.1	1.7	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Total	18889480.81	18.89	13.44	1.83	0.00	7.49	0.44	0.08	3.33	0.11	0.00	0.00	0.04	0.00	0.04	0.02

Consumer	Despatch from Lingaraj & Deulbera in Talcher: R/D
ADANI ELECTRICITY MUMBAI LIMITED	0.01
ADANI POWER MAHARASHTRA LTD	0.00
ARAVALI POWER COMPANY PVT LTD	0.02
BANDEL THERMAL POWER STATION	0.02
BARH SUPER THERMAL POWER STATION	0.00
DADRI THERMAL POWER STATION	0.01
DR. NARLA TATA RAO POWER STATION	0.08
DURGAPUR STEEL THERMAL POWER	0.01
FARAKKA SUPER THERMAL POWER STATION	0.01
FEROZE GANDHI UNCHAHAR	0.03
GMR KAMALANGA ENERGY LTD	0.29
HALDIA ENERGY LTD	0.02
HIRAMAYE ENERGY LIMITED	0.01
KHAPERKHEDA THERMAL POWER STATION	0.03
KOLAGHAT THERMAL POWER STATION	0.03
LARA SUPER THERMAL POWER STATION	0.41
MEJIA THERMAL POWER PLANT	0.01
METTUR THERMAL POWER STATION	0.53
NALCO - ANGUL	0.13
NALCO - DAMONJODI	0.00
NORTH CHENNAI THERMAL POWER STATION	1.00
NTECL VALLUR THERMAL POWER PROJECT	1.46
NTPC SAIL POWER COMPANY LIMITED	0.03
RAICHUR THERMAL POWER STATION	0.04
RASTRIYA ISPAT NIGAM LTD	0.01
RAYALSEEMA THERMAL POWER PROJECT	0.03
SEMBCORP ENERGY INDIA LIMITED	0.22
SIMHADRI SUPER THERMAL POWER	1.49
SOLAPUR SUPER THERMAL POWER PROJECT	0.03
TALCHER SUPER THERMAL POWER STATION	6.83
TALWANDI SABO POWER LTD	0.06
TUTICORIN THERMAL POWER PROJECT	0.34
VEDANTA LTD - BANJARI	0.23
LALITPUR POWER GENERATION	0.00
MOUDA SUPER THERMAL POWER PLANT	0.00
TANDA THERMAL POWER STATION	0.00
Total	**13.44**

Proposed evacuation plan for Samaleshwari and Lajkura cluster achievable

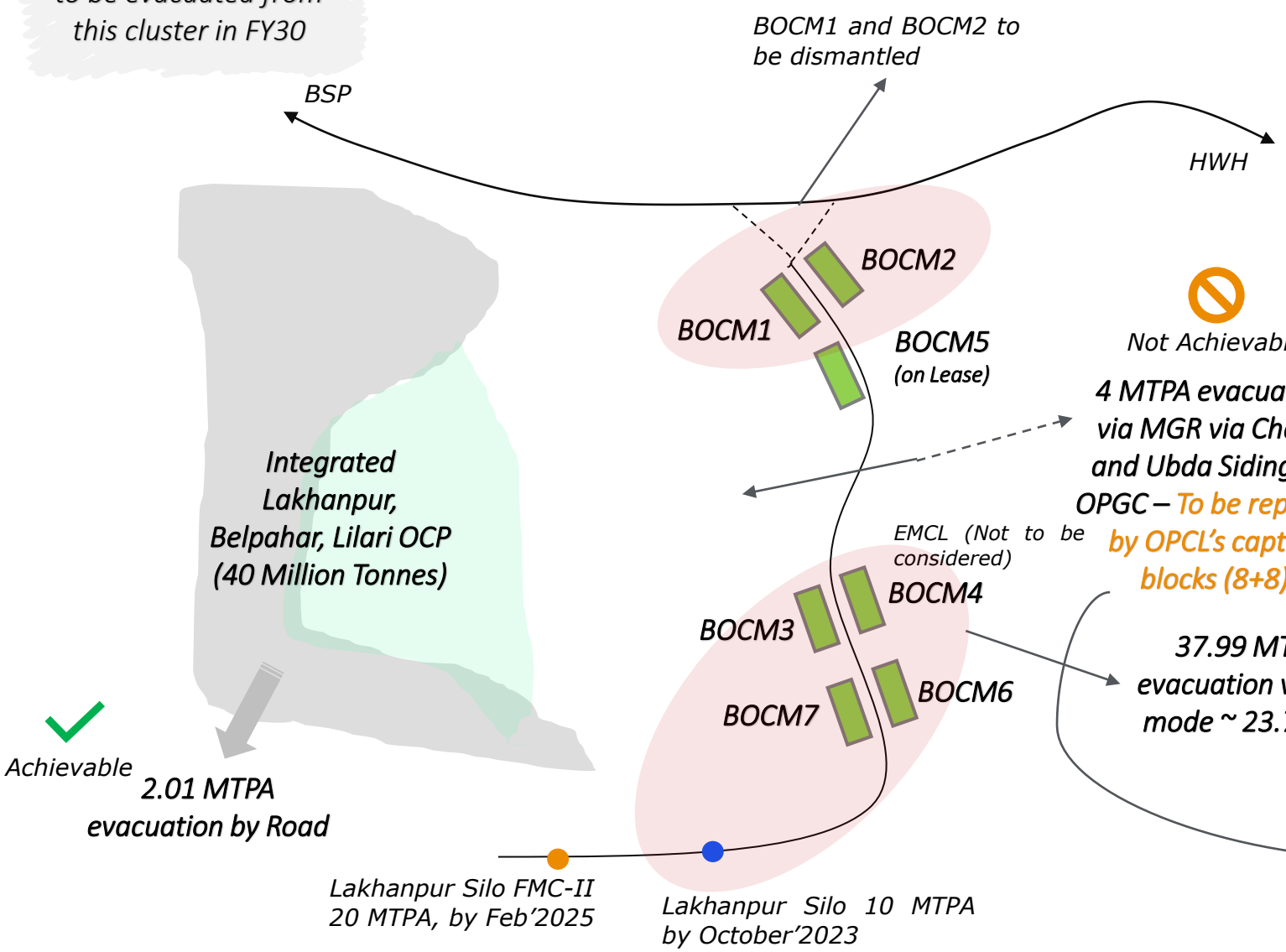


Total Evacuation of 19.5 MTPA from this cluster is achievable

- *Given completion of Lajkura RLS and 6.9 KMs of FMC connectivity projects by 31st Oct, 2023*
- *LOCM1 + LOCM3 sidings have sufficient capacity to cumulatively evacuate 2 rakes per day based on last 3 years siding despatch data and as per discussions with MCL executives*
- *Road evacuation capacities exist to handle proposed load based on past road evacuation data and as per discussions with MCL executives*

Proposed evacuation plan for Lakhanpur & Belpahar cluster achievable

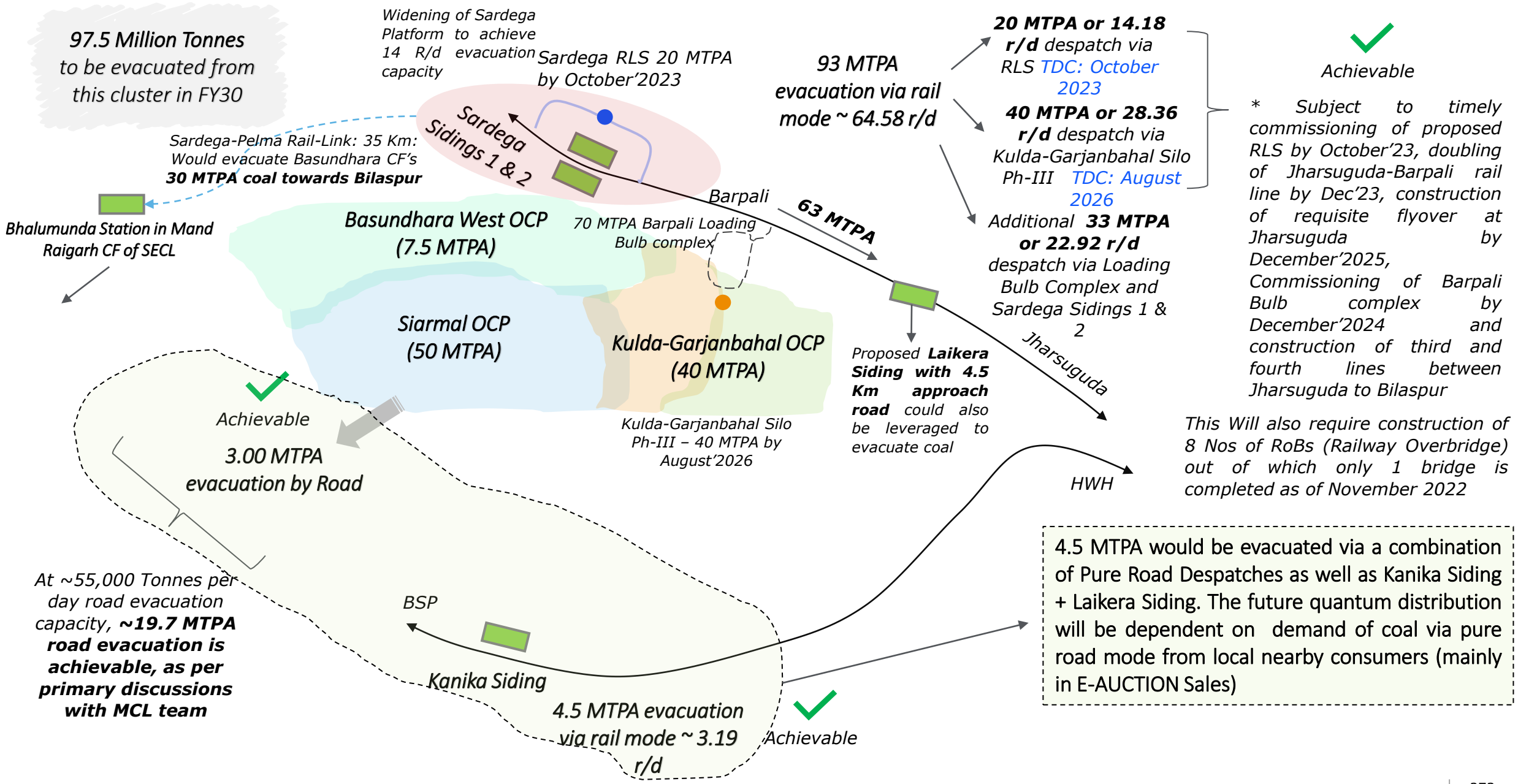
40 Million Tonnes to be evacuated from this cluster in FY30



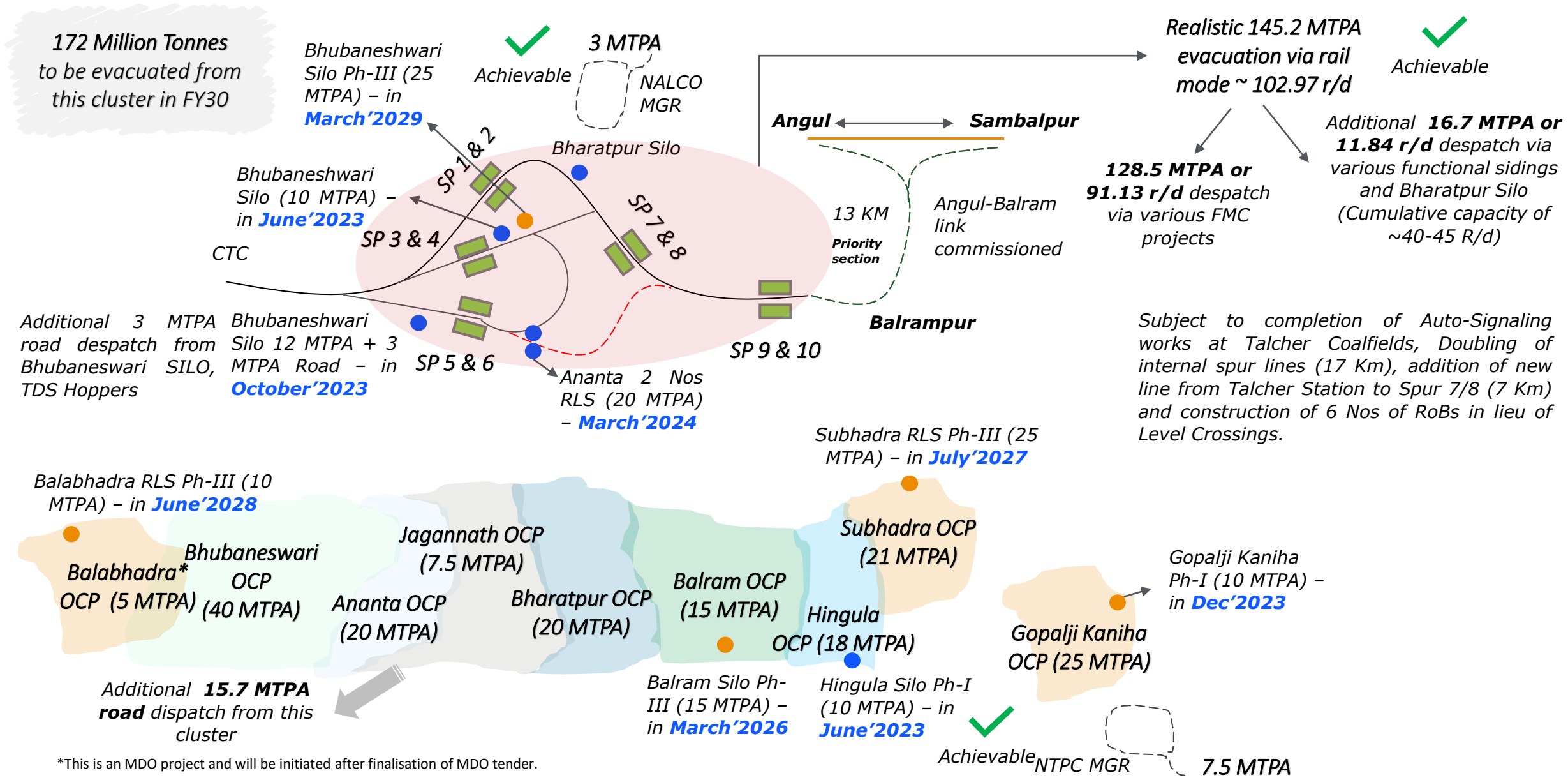
Total Evacuation of 40 MTPA from this cluster is achievable

- *Given completion of Lakhanpur RLS and 8.3 KMs of FMC connectivity projects by October'2023*
- *Given completion of Lakhanpur Silo Ph-II by Feb'2025*
- *Based on past 2 years data, BOCM-3, 6, and 7 sidings have around 10.2 r/d capacity which is much more than the envisaged despatch of ~2.51 r/d from wharfwall sidings*
- *Road evacuation capacities exceed the proposed load based on past road evacuation data and as per discussions with MCL executives*
- *OCPL's Manoharpur block will replace Lakhanpur as a source for OPGC (This is a risk for evacuating that additional 4 MTPA to other customers in future)*

Proposed evacuation plan for Basundhara CF achievable



Proposed evacuation plan for Spur1-Spur10 cluster achievable



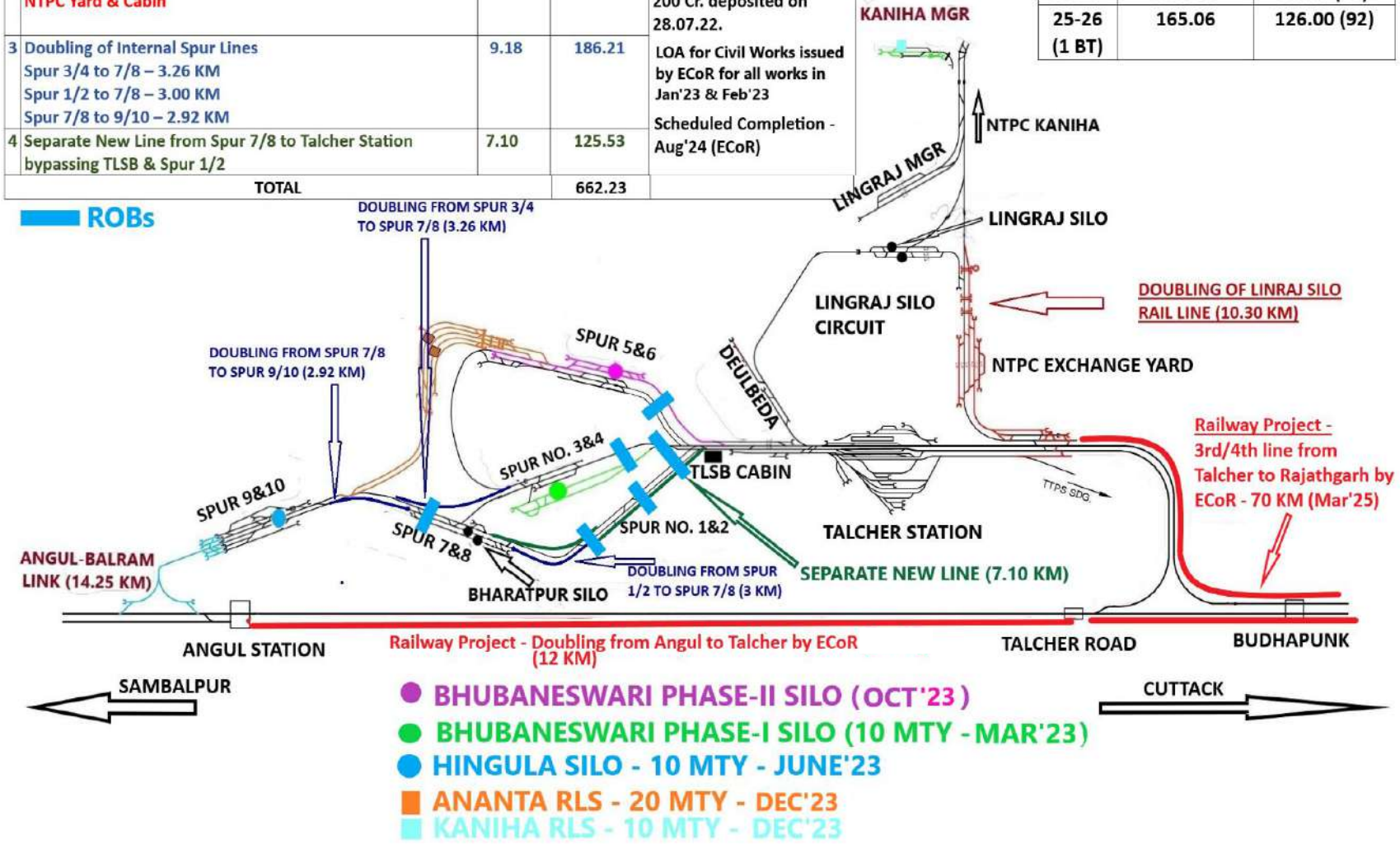
*This is an MDO project and will be initiated after finalisation of MDO tender.

Details of works in progress for evacuation from Talcher Coalfields

RAIL INFRASTRUCTURE WORKS AT TALCHER COALFIELD

SN	PARTICULARS	LENGTH (KM)	EST. COST (Rs in Cr.)	REMARKS
1	Construction of 06 nos. ROBs		139.96	Awarded to ECoR.
2	Doubling of Lingraj SILO Rail Line with augmentation of NTPC Yard & Cabin	10.30	210.53	Advance of Rs 200 Cr. deposited on 28.07.22.
3	Doubling of Internal Spur Lines Spur 3/4 to 7/8 – 3.26 KM Spur 1/2 to 7/8 – 3.00 KM Spur 7/8 to 9/10 – 2.92 KM	9.18	186.21	LOA for Civil Works issued by ECoR for all works in Jan'23 & Feb'23
4	Separate New Line from Spur 7/8 to Talcher Station bypassing TLSB & Spur 1/2	7.10	125.53	Scheduled Completion - Aug'24 (ECoR)
	TOTAL		662.23	

YEAR	PROD. (TCF) (in MT)	RAIL IN MT (RAK/DAY)
21-22	96.69	67.21 (51)
22-23	112.70	68.70(52)
23-24	107.55	77.50 (58)
24-25	126.20	95.00 (68)
25-26 (1 BT)	165.06	126.00 (92)



Achievable

Realistic 145.2 MTPA evacuation via rail mode ~ 102.97 r/d

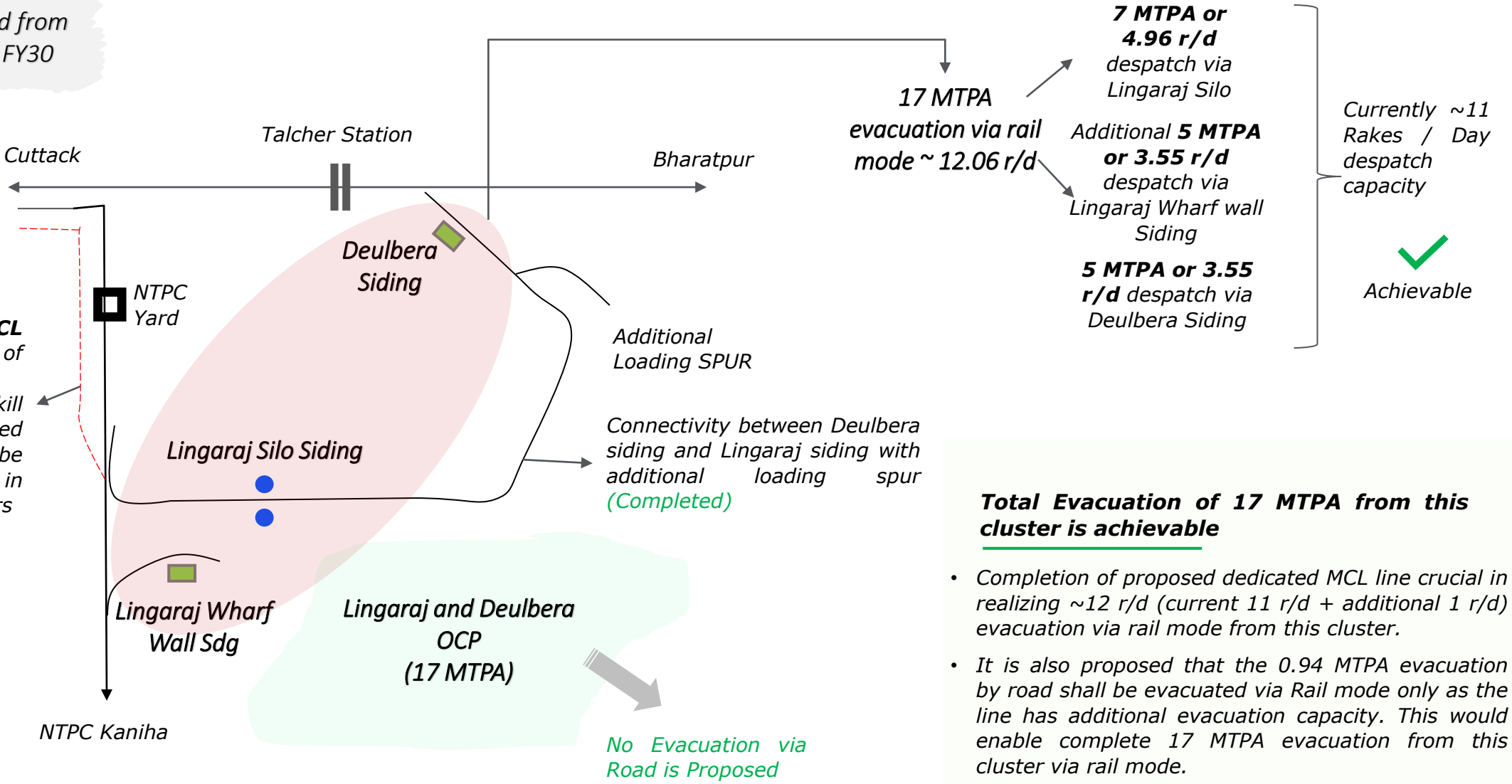
Out of the total rail evacuation of ~145.2 MTPA or ~103 R/D, around 25-30 R/D will be evacuated Towards Angul directly leveraging the Angul – Balram line. Doubling of Angul Balram Line has already been recommended as part of the key projects identified for evacuation from TCF.

Remaining 75 R/D will be despatched from Talcher for which 3rd an 4th lines from Talcher to Rajatgarh and Doubling of line from Angul to Talcher is already under progress.

For Internal Spur movement of coal, Doubling of Spur lines, 6 RoBs and separate line from Spur 7/8 to Talcher Station is already under progress

Proposed evacuation plan for Lingaraj and Deulbera cluster achievable

17 Million Tonnes to be evacuated from this cluster in FY30



Total Evacuation of 17 MTPA from this cluster is achievable

- *Completion of proposed dedicated MCL line crucial in realizing ~12 r/d (current 11 r/d + additional 1 r/d) evacuation via rail mode from this cluster.*
- *It is also proposed that the 0.94 MTPA evacuation by road shall be evacuated via Rail mode only as the line has additional evacuation capacity. This would enable complete 17 MTPA evacuation from this cluster via rail mode.*

Broad Status of MCL's FMC projects (1/2)

SL. NO.	PROJECT	PR CAPACITY (MTY)	PR Approval Status	Existing	PH-I Capacity (MTY)	PH-II Capacity (MTY)	PH-III Capacity (MTY)	Anticipated Timelines
1	SARDEGA RLS SIDING	SIDING	Approved	-	20.00	-	-	• Phase I – 31st October 2023
2	BHUBANESWARI EXPANSION	40.00	Approved	-	10.00	-	25.00	• Phase I – 31st June 2023 • Phase III – 31st March 2029
				-	15.00	-	-	• Phase I – 30th October 2023
3	LAKHANPUR BELPAHAR LILARI	30.00	Approved	-	10.00	20.00	-	• Phase I – 31st October 2023 • Phase II – 28th February 2025
4	GOPALJI-KANIHA EXPANSION	30.00	Approved	-	10.00	-	-	• Phase I – 31st December 2023
5	SUBHADRA	25.00	Approved	-	-	-	25.00	• Phase III – 31st July 2027
6	BHARATPUR REORGANISATION	20.00	Approved	20.00				• Already existing

Broad Status of MCL's FMC projects (2/2)

SL. NO.	PROJECT	PR CAPACITY (MTY)	PR Approval Status	Existing	PH-I Capacity (MTY)	PH-II Capacity (MTY)	PH-III Capacity (MTY)	Anticipated Timelines
8	BALARAM EXPANSION	15.00	Approved	-	-	-	15.00	• Phase III – 31st March 2026
9	LINGARAJ	16.00	Approved	-	16.00	-	-	• Phase I – Commissioned on 31st March 2020
10	ANANTA EXPN	15.00	Approved	-	20.00	-	-	• Phase I – 31st March 2024
11	LAJKURA-SAMLESWARI	14.50	Approved	-	15.00	-	-	• Phase I – 31st Oct 2023
12	HINGULA	15.00	Approved	-	10.00	-	-	• Phase I – 30th June 2023
13	SIARMAL	50.00	Approved	-	-	-	50.00	• Phase III – 31st August 2026
14	KULDA GARJANBAHAL	40.00	Approved	-	-	-	40.00	• Phase III – 31st August 2026
15	BALABHADRA*	10.00	Approved	-	-	-	10.00	• Phase III – 30th June 2028
	Total	**320.50**		**20**	**126**	**20**	**165**	

Important roads in the vicinity of Talcher CF

#	Roads	Type of Road	Description
1	National Highway 53 (Previously – NH 6)	National Highway	Connects Surat, Gujarat to Sambalpur then to Paradip port in Odisha
2	National Highway 55 (Previously – NH 42)	National Highway	Highway which connects Angul district to Cuttack
3	National Highway 149	National Highway	Passes through Talcher to Connecting Pallahara and Nuahata near Angul
4	State Highway 63	State Highway	It starts near Budhapal and passed through Chhendipara, Kosala and terminates near Angul
5	State Highway 24	State Highway	SH 24 starts near Reamal and passes through Paikmal, Rendakhol and terminates near Baudhgarh on NH 57
6	State Highway 10	State Highway	It starts near Rourkela and passes through Sundargarh, Jharsuguda and terminates at Sambalpur
7	Angul- Talcher Road	Local Road	Connects Angul to Talcher
8	Angul-Rengali Metalled Road	Local Road	Connects Angul to Rengali
9	Kanihla-Angul Road	Local Road	Connects Angul to Kanihla
10	Chendipada-Jarapada Road	Local Road	Connects Chendipada to Jarapada
11	Kosala-Brahmanbil Road	Local Road	Connects Kosala to Brahmanbil
12	Kosala Road	Local Road	Connects Kosala to Kumunda

Important roads in the vicinity of Talcher CF

- National Highway-6, National Highway-55, National Highway-23, and National Highway-149 pass through the Angul district. National Highway-55 (Previously NH-42) connecting Cuttack-Angul-Sambalpur passes more or less parallel to the southern fringe of the coalfield at about 5 to 7 km. National Highway-23 connecting Talcher-Samal-Pallahara passes through the eastern part of the coalfield.
- Another prominent district road is Angul-Chhendipada-Deogarh road passing through the central part of the coalfield. National Highway-53 originating from Chandikhol, also passes through north-eastern part of the coalfield and joins with National Highway-23. Recently a 2-Lane concrete road from Basundhara West Extension Check post to Sardega Railway Siding has been completed.
- Paradip is connected to Cuttack, Chandikhole by SH-12 and NH-5A, respectively, which are two of the major cities in Odisha. The following table lists the important roads providing connectivity to Talcher coalfield

In addition to this following are a few projects which are ongoing:

a) Construction of CT roads with a length of 35 km.

b) Widening of road from 2 lane to 4 lane from Bankibahal to Kanika Railway Siding for 27 km.

c) Construction of separate 4-Lane (modified 2-lane) dedicated coal corridor road from Bankibahal to Bhedabhal (on SH-10) in Sundargarh dist. with a length of 33 km.

d) 4-laning of the Birmitrapur-Barkote section of NH-23 is in progress. This route connects Ranchi to Rourkela, the pre-eminent steel city of Odisha and goes further up to the Angul-Talcher belt, the coal, power, and industrial hub. The corridor crosses NH-6 (New NH No. 49) at Barkote.

As per District Vision Plan 2020, the condition of National Highway-23 is poor and requires immediate attention. In many cases, kuccha road/ Village / Panchayat Road connects the block to State or National highways.

A transport road of length 22 km having at least 7.5meter width through villages has been proposed for movements of coal trucks from mines to State Highways. Accordingly, the strengthening and widening of village road need to be taken up with State Govt. on a priority basis.

Regular maintenance of these roads needs to be taken care as these roads are used by heavy vehicles due to which abrasion of these roads is frequent and thus the road's average life span is low.

Important roads in the vicinity of IB-Valley and Basundhara CF

#	Roads	Type of Road	Description
1	National Highway 53 (Previously – NH 6)	National Highway	Connects Surat, Gujarat to Sambalpur then to Paradip port in Odisha
2	National Highway 49 (combination of old NH 6 and NH 200)	National Highway	The highway which connects Bilaspur, CH to Kharagpur, WB. It passes through Jharsuguda.
3	State Highway 10	State Highway	It starts near Budhapal and passed through Chhendipara, Kosala and terminates near Angul
4	Himgir Road	Local Road	Connects Himgir to Kanika
5	Sundargarh Garjanbahal-Hemgir Road	Local Road	Connects Sundargarh to Hemgir

- National Highway 49 (a merger of the old NH 6 and the new NH 200) is a major highway. This highway runs from Bilaspur in the Indian state of Chhattisgarh to Kharagpur in West Bengal. It runs from NH 130 near Bilaspur to NH 16 near Kharagpur in West Bengal. It provides East-West connectivity to coal blocks in IB Valley and is, on average, only a kilometer away from the mines.
- State Highway 10 runs from Rourkela to Sambalpur. It is part of Biju Expressway (a 650 km dual carriageway route from Chandili, Koraput to Rourkela).
- Hemgir road and Sundargarh-Garjanbahal-Hemgir road (also known as Sundargarh -Raigarh road) are important district roads which give the coal blocks route towards the state and national highways. These roads must be in excellent condition because they may become bottlenecks in evacuation before reaching highways and railway stations.

CIL (MCL) blocks in Odisha – IB-Valley CF

#	Name of the Block	Exploration Status	Operational Status	Evacuation Route	Nearest major rail line for evacuation
1	Belpahar I,II, & III Combined	Explored	Operational	For Samaleswari and Lajkura Cluster, loading points would be LOCM1, LOCM3 and Lajkura RLS (15 MTPA). For Lakhanpur, Belpahar and Lilari Cluster (Integrated), loading points would be BOCM 3, 6, 7, Lakhanpur Silo (10 MTPA) and Lakhanpur Silo (Phase-II, 20 MTPA) The cluster lies in proximity of the SECR main line Jharsuguda – Bilaspur (Passes through the boundary of Samaleswari and Lajkura blocks) and hence could be used for evacuation in both the directions	<15 Kms from Jharsuguda – Bilaspur main line
2	Belpahar & Dip Side of Lakhanpur	Partly Explored	Operational		
3	Samaleswari Kudopali Combined & Dip Extn	Under Exploration	Operational		
4	Orient-Lajkura Block IV & Dip Side	Partly Explored	Operational		
5	Orient West (Goutamdhara)	Partly Explored	Non-Operational		
6	Madhupur	Explored	Non-Operational		
7	Kulda-Garjanbahal & Dip Side	Explored	Operational	For loading of coal, Sardega Wharfwall Sidings, Sardega RLS (20 MTPA), Kulda-Garjanbahal Silo Ph-III (40 MTPA), Laikera Siding, and 70 MTPA Barpali Loading Bulb Complex would be used. For evacuation via railway lines, Jharsuguda-Barpali rail line would be leveraged (Flyover works at Jharsuguda Jn in progress) for evacuation towards West Bengal, Jharkhand, Odisha and other Southern States. For evacuation towards Chhattisgarh, MP, Maharashtra, Karnataka, UP, Punjab, Haryana, Rajasthan, etc. the proposed new Sardega to Bhalumunda (Pelma) line with 30 MTPA capacity could be utilized. Doubling of Jharsuguda-Barpali (Along with Auto-Signaling) and Sardega – Bhalumunda lines required for hassle free evacuation	Hemagiri Blocks < 15 Kms from Jharsuguda – Bilaspur Line (Kanika Siding) & <30 Kms from Barpali Loading Bulb / Jharsuguda – Barpali Rail line. All other blocks closer to the Jharsuguda – Barpali Rail line (<15 Kms)
8	Siarmal & Siarmal Extn	Explored	Operational		
9	Basundhara Combined	Explored	Operational		
10	Hemagiri Sector – I	Under Exploration	Non-Operational		
11	Hemagiri Sector - II	Regionally Explored	Non-Operational		
12	Chaturdhara	Explored	Non-Operational		
13	Banapatra	Explored	Non-Operational		
14	Prajapara	Explored	Non-Operational		
15	Prajapara Dip Extn	Explored	Non-Operational		

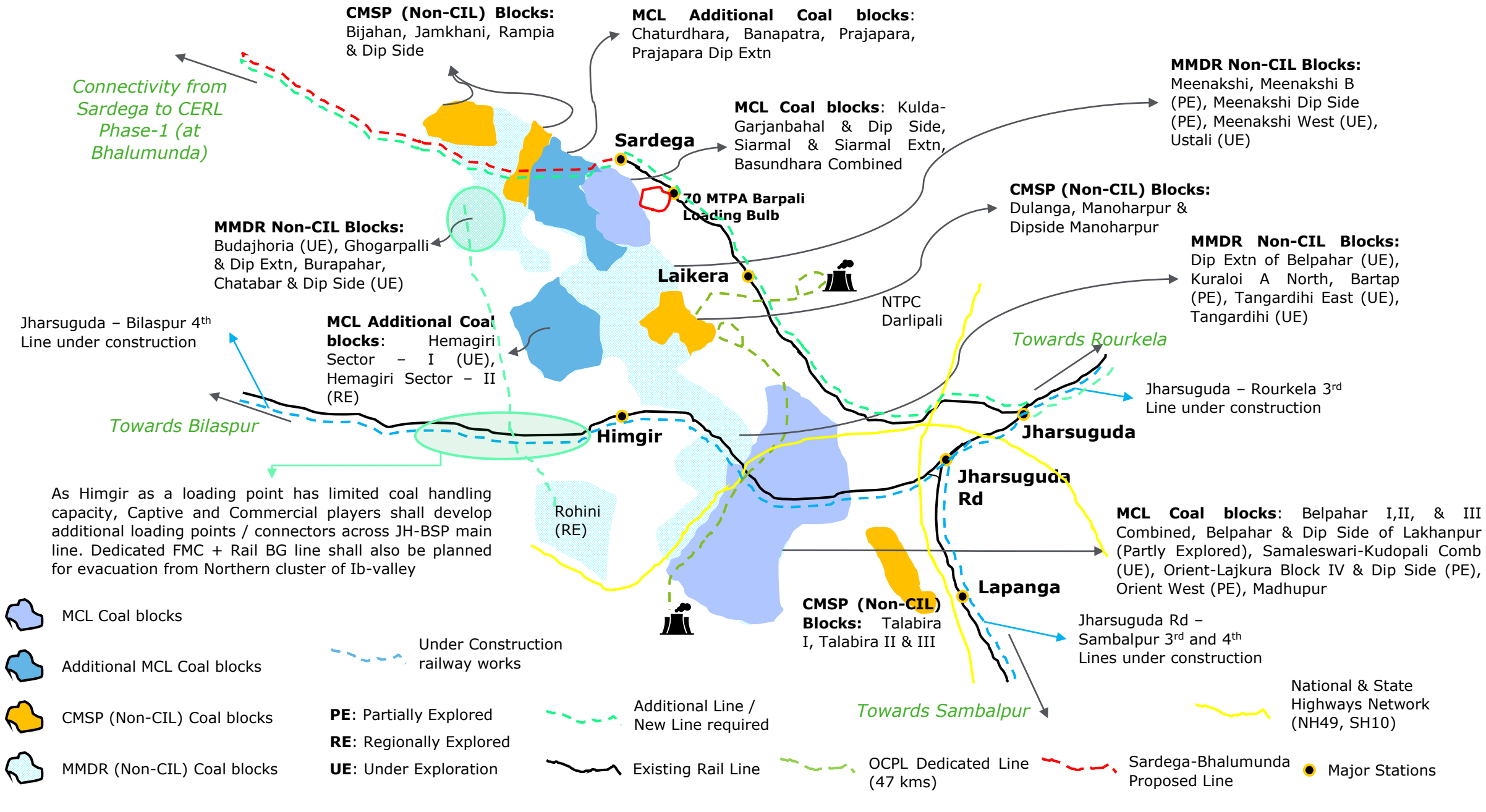
Non-CIL blocks in Odisha – IB-Valley CF

#	Name of the Block	Exploration Status	Operational Status	Evacuation Route	Nearest major rail line for evacuation
1	Talabira I	Explored	Non-Operational	Currently having local sales via road. In Future Lapanga Railway Station would be used for transportation via Rail to various EUPS. For Coastal Shipping, it would leverage Lapanga-Sambalpur-Angul-Talcher Rd-Budhapank-Rajatgarh-Cuttack-Paradeep. RLS along with rail connectivity to Lapanga shall be planned for smoother evacuation	~15 km from Lapanga Railway Station (on Jharsuguda Rd – Sambalpur rail line)
2	Talabira II & III	Explored	Operational (NLC)		
3	Rohini	Regionally Explored	Non-Operational	Loading Points to be developed by Captive / Commercial player after allotment. Himgir / Belpahar Railway Station could also be leveraged for loading. Dedicated RLS (to be developed by Captive / commercial players) along with railway connectivity to main lines (Jharsuguda-Bilaspur and Jharsuguda Rd – Sambalpur) shall be planned accordingly. For transportation towards Jharkhand, Odisha, West Bengal, Southern States, the coal would move towards Jharsuguda Jn and further. For transportation towards, Chhattisgarh, Maharashtra, UP, MP, Punjab, Haryana, etc. the coal would move towards Bilaspur and further.	< 20 Kms from Himgir RS (on Jharsuguda – Bilaspur Main Line)
4	Dip Extn of Belpahar	Under Exploration	Non-Operational		
5	Kuraloi A North	Explored	Non-Operational (Vedanta Ltd)		
6	Bartap	Partly Explored	Non-Operational		
7	Tangardihi East	Under Exploration	Non-Operational		
8	Tangardihi	Under Exploration	Non-Operational		
9	Ustali	Under Exploration	Non-Operational		
10	Meenakshi B	Partly Explored	Non-Operational	Loading Points to be developed by Captive / Commercial player after allotment. For evacuation via railway lines, Jharsuguda-Barpali rail line would be leveraged (Flyover works at Jharsuguda Jn in progress) for evacuation towards West Bengal, Jharkhand, Odisha and other Southern States. For evacuation towards Chhattisgarh, MP, Maharashtra, Karnataka, UP, Punjab, Haryana, Rajasthan, etc. the proposed new Sardega to Bhalumunda (Pelma) line with 30 MTPA capacity could be utilized.	< 30 Kms from Jharsuguda – Barpali Main Line
11	Meenakshi Dip-Side	Partly Explored	Non-Operational		
12	Meenakshi West	Under Exploration	Non-Operational		
13	Meenakshi	Explored	Non-Operational		

Non-CIL blocks in Odisha – IB-Valley CF

#	Name of the Block	Exploration Status	Operational Status	Evacuation Route	Nearest major rail line for evacuation
14	Rampia & Dip Side of Rampia	Explored	Non-Operational (Jhar Mineral Resources)	At this stage, given priority of MCL over Jharsuguda-Barpali and Sardega – Bhalumunda Pelma Lines, and limited capacity of both the lines, it is not feasible to include the load from these blocks in future on these two lines. Doubling works on both these lines is required for hassle free evacuation of coal after significant Captive and Commercial blocks start production Railways in collaboration with players like Vedanta can develop a dedicated line from Northern cluster to Jharsuguda-Bilaspur line, which will help evacuation of coal from these lines. Coal from these blocks could be taken to Himgir Railway Siding on Jharsuguda-Bilaspur Main line for evacuation (30-35 Kms by Road) For transportation towards Jharkhand, Odisha, West Bengal, Southern States, the coal would move towards Jharsuguda Jn and further. For transportation towards, Chhattisgarh, Maharashtra, UP, MP, Punjab, Haryana, etc. the coal would move towards Bilaspur and further. MCL could also think about leasing the Kanika Siding to some of the private players for their use, which could be a win-win situation for all.	<15 Kms from proposed Sardega – Bhalumunda (Pelma) line < 30 Kms from Jharsuguda-Barpali Main line
15	Budajhoria	Under Exploration	Non-Operational		
16	Ghogarpalli & Dip Side	Explored	Non-Operational (Vedanta)		
17	Burapahar	Explored	Non-Operational (GMDC)		
18	Bijahan	Explored	Non-Operational (Mahanadi Mines & Minerals)		
19	Jamkhani	Explored	Non-Operational (Vedanta Ltd)		
20	Kendudihi	Regionally Explored	Non-Operational		
21	Chhatabar & Dip-Side	Under Exploration	Non-Operational		
22	Dulanga	Explored	Operational (NTPC)	Dedicated MGR system under construction. Presently coal is transported using road as an interim arrangement for two years i.e., till completion of construction of permanent coal evacuation system by MGR. NTPC's Darlipalli plant is 32 Kms from the block.	~32 Kms from Darlipalli Plant
23	Manoharpur & Dip-Side	Explored	Operational (OCPL)	Dedicated ~47 Km rail line from the block to OPGC's IB-Valley power plant. For Commercial sales, Himgir / Kanika Siding could be leveraged	~47 Kms from the EUP

Proposed evacuation plan for IB-Valley CF



Key Insights and Recommendations – **IB Valley Coalfields**

#	Recommendation	Way Forward
1	Evacuation Capacity of Jharsuguda-Barpali Rail Line + Sardega-Bhalumunda Rail Line cumulatively accounts to ~100 MTPA. This is neck to neck with CIL's planned evacuation capacity from IB and Basundhara Coalfields by 2030. In order for commercial and captive players like Vedanta, GMDC, OCPL (surplus coal for commercial sales), to also leverage these lines for evacuation in future, Doubling (for Sardega – Bhalumunda line) and Tripling (for Jharsuguda Barpali line) for hassle free movement of coal along with additional proposed works such as Automatic Signaling etc.	Captive and Commercial miners, who have been allotted blocks in Ib-Valley CF may initiate dialogues with Ministry of Railways (SECR) to understand possible evacuation arrangements from this cluster. SECR to take up proposed doubling and tripling.
2	Additionally, Captive and Commercial miners shall plan to develop First Mile Connectivity projects like Rapid-Loading System with Silos along with Railway connectivity (to nearby major rail lines like Jharsuguda-Bilaspur, Jharsuguda Rd to Sambalpur etc.). Captive and commercial players along with Indian Railways shall jointly conduct a feasibility study for establishing Public Freight Terminals with Mechanized loading and evacuation systems.	Captive and Commercial miners, who have been allotted blocks in Ib-Valley CF shall initiate dialogues with Ministry of Coal regarding their future evacuation plans. Detailed Investment and works plan may be submitted by these miners at the earliest.
3	Automatic Signaling shall be proposed across all major rail sections in the vicinity of IB Valley CF	Indian Railways (SECR)
4	For making evacuation of coal feasible via coastal shipping (Jharsuguda to eastern ports) from Ib-valley, it is proposed that Indian Railways should provide freight concessions for RSR traffic to achieve freight parity. Currently, only <5 Million Tonnes of coal is being transported to ports other than Paradeep (~30 MT in FY22). As these shipments usually have a ~ INR 300 / Tonne economic disadvantage as compared to Talcher – Paradeep route, Indian Railways should evaluate freight concessions to those eastern ports to achieve freight parity.	Indian Railways should evaluate freight concessions to all eastern ports having economic disadvantage
5	3rd line from Jharsuguda Jn to Rourkela is under construction. However as per future O-D coal flow mapping, the capacity won't be sufficient. Therefore 4th line has to be planned from Jharsuguda Jn to Rourkela.	Indian Railways
6	Under-construction FMC Projects of MCL IB-Valley (Including Phase 1,2 & 3) with combined evacuation capacity of ~150 MTPA shall be executed at the earliest to enable coal loading from IB-Valley CF.	Coal India Limited is continuously monitoring and solving various issues to expedite this

CIL (MCL) blocks in Odisha – Talcher CF

#	Name of the Block	Exploration Status	Operational Status	Evacuation Route	Nearest major rail line for evacuation
1	Bhubaneswari OCP	Explored	Operational	Spurs 1 to 10 along with planned FMC projects at Bhubaneswari silos, Bharatpur silo, Anant 2 nos. RLS, Balabhadra RLS, Balram silo, Hingula silo, Kaniha Ph-I, Subhadra RLS (Ph-III) shall be used for loading of coal. Additionally, 2 nos. MGR – NTPC & NALCO MGR exist for coal evacuation from Kaniha & Bharatpur respectively. Coal loaded from FMC projects and wharfwall sidings from this area to be evacuated via Angul-Balram rail link, which has already been commissioned joining the Indian Railway main line at Angul. Other evacuation route is via Talcher railway station. From Angul, traffic bound for North & West India shall move on the Angul-Jarapada-Jharsuguda line towards Chhattisgarh and beyond. From Angul, traffic bound for East India as well as coastal shipping to Southern states shall move on the Angul-Talcher-Budhapank line towards eastern Odisha and further towards Paradeep/Dhamra for coastal shipping. Post development of the MCRL Inner Corridor Phase-II from Balram to Putagadia, traffic bound for Northern and Western states may move on this line and meet main line at Jarapada to decongest Angul-Jarapada section.	~8 km from Angul-Balram link
2	Lingaraj OCP	Explored	Operational		~5 km from Talcher station
3	Ananta OCP	Explored	Operational		~5 km from Talcher station
4	Kaniha OCP	Explored	Operational		MGR available, Planed MCRL Outer corridor beside mine
5	Bharatpur OCP	Explored	Operational		MGR available, ~5 km from Angul-Balram link
6	Hingula OCP	Explored	Operational		~8 km from Angul-Balram link
7	Jagannath OCP	Explored	Operational		~7 km from Angul-Balram link ~7 km from Talcher station
8	Balaram OCP	Explored	Operational		Near Angul-Balram link
9	Balabhadra OCP	Explored	Non-Operational		~9 km from Angul-Balram link, Planed MCRL Inner corridor to be closer to mine
10	Balabhadra West Extn	Explored	Non-Operational		~9 km from Angul-Balram link, MCRL outer corridor may be used post completion
11	Balabhadra North Extn	Under Exploration	Non-Operational		
12	Padma	Explored	Non-Operational		~5 km from Talcher station
13	Subhadra OCP	Explored	Non-Operational		Near Angul-Balram link

CIL (MCL) blocks in Odisha – Talcher CF

#	Name of the Block	Exploration Status	Operational Status	Evacuation Route	Nearest major rail line for evacuation
14	South Balanda	Explored	Non-Operational		~9 km from Talcher station
15	Talcher	Explored	Non-Operational	Spurs 1 to 10 along with planned FMC projects at Bhubaneswari silos, Bharatpur silo, Anant 2 nos. RLS, Balabhadra RLS, Balram silo, Hingula silo, Kaniha Ph-I, Subhadra RLS (Ph-III) shall be used for loading of coal.	~4 km from Talcher station
16	Handidua	Explored	Non-Operational	Additionally, 2 nos. MGR – NTPC & NALCO MGR exist for coal evacuation from Kaniha & Bharatpur respectively.	Near Talcher station
17	Nandira	Explored	Operational	Coal loaded from FMC projects and wharfwall sidings from this area to be evacuated via Angul-Balram rail link, which has already been commissioned joining the Indian Railway main line at Angul. Other evacuation route is via Talcher railway station.	~6 from Angul-Balram link
18	Natraj	Explored	Non-Operational	From Angul, traffic bound for North & West India shall move on the Angul-Jarapada-Jharsuguda line towards Chhattisgarh and beyond.	Near Angul-Balram link
19	Gopal Prasad East	Explored	Non-Operational	From Angul, traffic bound for East India as well as coastal shipping to Southern states shall move on the Angul-Talcher-Budhapank line towards eastern Odisha and further towards Paradeep/Dhamra for coastal shipping.	~9 km from Angul-Balram link, planned MCRL Inner Corridor beside block
20	Gopal Prasad West	Explored	Non-Operational		
21	Kalinga East	Explored	Non-Operational	Post development of the MCRL Inner Corridor Phase-II from Balram to Putagadia, traffic bound for Northern and Western states may move on this line and meet main line at Jarapada to decongest Angul-Jarapada section	Near Angul-Balram link
22	Kalinga West	Explored	Non-Operational		Near Angul-Balram link
23	Tribira	Under Exploration	Non-Operational	Production from blocks not planned till FY30. RLS/other FMC options may be explored once MCRL outer corridor is commissioning for coal to be evacuated to MCRL outer corridor. Traffic to join Indian Railway main line at Jarapada station	Beside MCRL outer corridor
24	Rabipur	Regionally Explored	Non-Operational		
25	Konark-Subadhra West	Partly Explored	Non-Operational		
26	Chhendipada OCP Extn (Baitrani East)	Explored	Non-Operational	Coal to be evacuated via Tentuloi and onto MCRL Outer Corridor and joining India Railway main line at Jarapada	~6 km from Tentuloi

Non-CIL blocks in Odisha – Talcher CF

#	Name of the Block	Exploration Status	Operational Status	Evacuation Route	Nearest major rail line for evacuation
1	Brahmani	Partly Explored	Non-Operational	Coal from this block is expected use roads to cross the Brahmani river to reach Talcher area for loading onto rakes	~16 km from Talcher
2	Sakhigopal-B & Northern Extn	Partly Explored	Non-Operational	Coal evacuation from these blocks to be evacuated via Talcher-NTPC Kaniha rail line and onward to Talcher. From Talcher, traffic bound for northern and western India to move via Talcher-Angul-Jharsuguda to Chhattisgarh and beyond. For eastern bound traffic as well as traffic bound for southern states through coastal shipping, traffic projected to move via Talcher-Budhapank-Pradeep/Dhamra line. Post development of the MCRL Inner Corridor Phase-II from Balram to Putagadia, traffic bound for Northern and Western states may move on this line and meet main line at Jarapada to decongest Angul-Jarapada section.	All blocks within ~20 km from Talcher-NTPC Kaniha line
3	North of Arkhapal Srirampur	Explored	Non-Operational		
4	Jadunathpur	Under Exploration	Non-Operational		
5	Jadunathpur North	Regionally Explored	Non-Operational		
6	Chandrabila	Explored	Non-Operational		
7	Chhelia	Under Exploration	Non-Operational		
8	Saradhapur North	Explored	Non-Operational		
9	Saradhapur Jalatap	Under Exploration	Non-Operational	Coal evacuation from these blocks to be evacuated via proposed MCRL Outer Corridor, which lies north of this cluster, to reach Jarapada via Tentuloi and Putagadia From Jarapada, traffic bound for North & West India shall move on the Jarapada-Jharsuguda line towards Chhattisgarh and beyond. From Jarapada, traffic bound for East India as well as coastal shipping to Southern states shall move on the Jarapada-Angul-Talcher-Budhapank line towards eastern Odisha and further towards Paradeep/Dhamra for coastal shipping.	All blocks within ~30 km from Tentuloi
10	Takua	Under Exploration	Non-Operational		
11	South of Bramhanbil - Kardabahal	Under Exploration	Non-Operational		
12	Kardabahal - Bramhanbil	Explored	Non-Operational		
13	Kosala East	Under Exploration	Non-Operational		
14	Kosala West	Explored	Non-Operational		
15	Phuljari East & West	Explored	Non-Operational		
16	Tentuloi	Explored	Non-Operational		

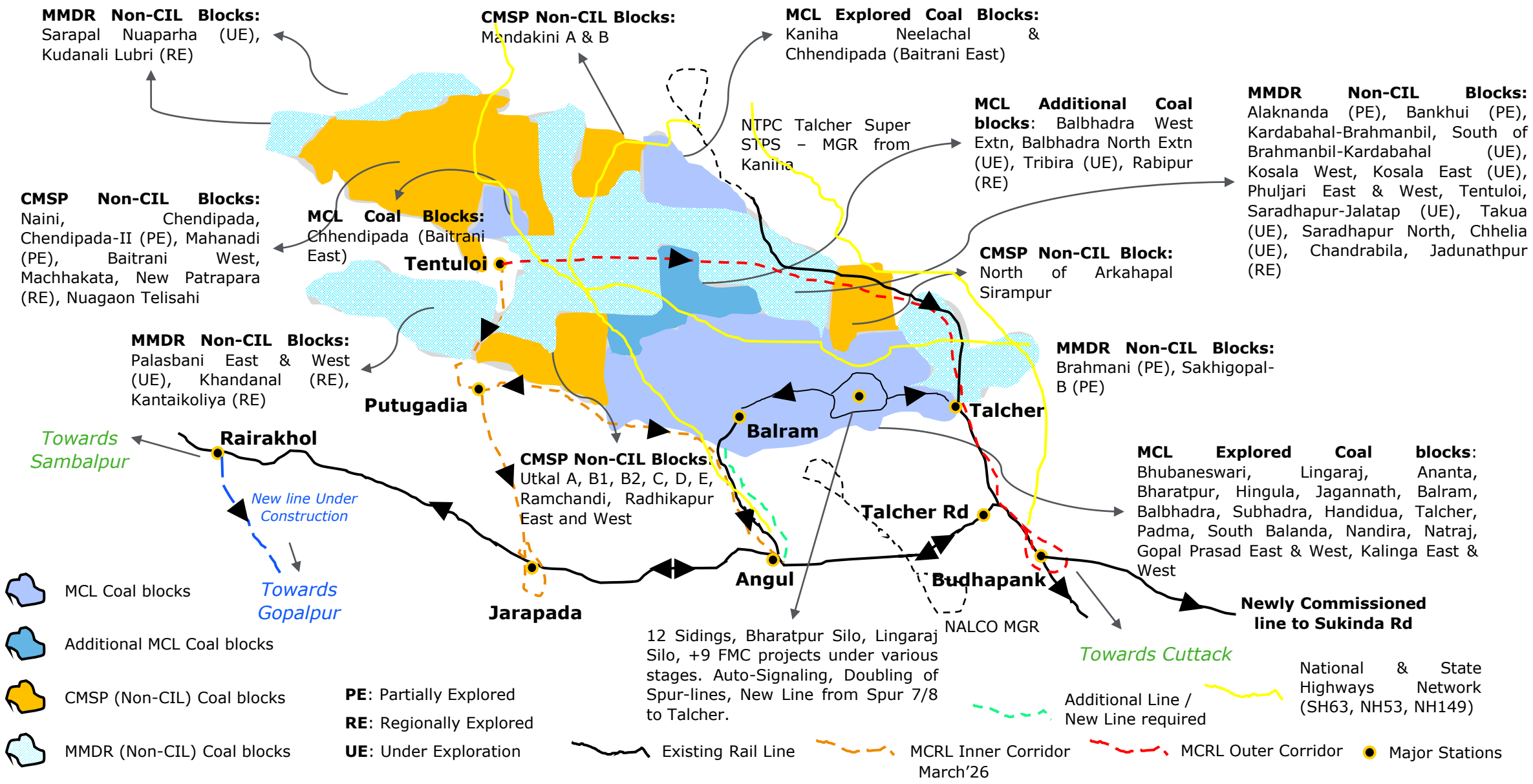
Non-CIL blocks in Odisha – Talcher CF

#	Name of the Block	Exploration Status	Operational Status	Evacuation Route	Nearest major rail line for evacuation
17	Bankhui	Partly Explored	Non-Operational	Coal evacuation from these blocks to be evacuated via proposed MCRL Outer Corridor, which lies south of most of the mine from this cluster, to reach Jarapada via Tentuloi and Putagadia. From Jarapada, traffic bound for North & West India shall move on the Jarapada-Jharsuguda line towards Chhattisgarh and beyond. From Jarapada, traffic bound for East India as well as coastal shipping to Southern states shall move on the Jarapada-Angul-Talcher-Budhapank line towards eastern Odisha and further towards Paradeep/Dhamra for coastal shipping.	All blocks within ~20-25 km from Tentuloi
18	Alaknanda	Partly Explored	Non-Operational		
19	Palasbani East	Under Exploration	Non-Operational		
20	Palasbani West	Under Exploration	Non-Operational		
21	Mandakini A	Explored	Non-Operational		
22	Mandakini B	Explored	Non-Operational		
23	Baitrani West	Explored	Non-Operational		
24	Machakatta	Explored	Non-Operational		
25	Naini	Explored	Non-Operational		
26	Chendipada-I	Explored	Non-Operational		
27	Chendipada-II	Partly Explored	Non-Operational		
28	Mahanadi	Partly Explored	Non-Operational		
29	Machhakata	Explored	Non-Operational		
30	New Patrapara	Partly Explored	Non-Operational		
31	Nuagaon Telisahi	Explored	Non-Operational		
32	Kudanali Lubri	Regionally Explored	Non-Operational		
33	Sarapal-Nuapara	Under Exploration	Non-Operational		
34	Khandanal	Regionally Explored	Non-Operational		
35	Kankaitoliya	Regionally Explored	Non-Operational		

Non-CIL blocks in Odisha – Talcher CF

#	Name of the Block	Exploration Status	Operational Status	Evacuation Route	Nearest major rail line for evacuation
36	Utkal A	Explored	Non-Operational	Coal evacuation from these blocks to be evacuated via proposed MCRL Inner Corridor, which lies south of this cluster, to reach Jarapada via Putagadia. From Jarapada, traffic bound for North & West India shall move on the Jarapada-Jharsuguda line towards Chhattisgarh and beyond. From Jarapada, traffic bound for East India as well as coastal shipping to Southern states shall move on the Jarapada-Angul-Talcher-Budhapank line towards eastern Odisha and further towards Paradeep/Dhamra for coastal shipping.	All blocks within ~20-25 km from Putagadia
37	Utkal B1 & B2	Explored	Non-Operational		
38	Ramchandi Promotion	Explored	Non-Operational		
39	Utkal C	Explored	Non-Operational		
40	Utkal D	Explored	Non-Operational		
41	Utkal E	Explored	Operational		
42	Radhikapur East	Explored	Non-Operational		
43	Radhikapur West	Explored	Non-Operational		

Proposed evacuation plan for Talcher CF



Key Insights and Recommendations – Talcher Coalfields

#	Recommendation	Way Forward
1	High congestion expected on railway lines to enable coastal shipping **Concerned lines: Budhapank to Rajatgarh and Cuttack to Paradeep.** Heavy Haul Rail Corridor from Salegaon to Cuttack being shelved due to economic constraints. It is of utmost importance to add a third line (Survey under process) and in future a fourth line from Cuttack to Paradeep. MCRL Outer Corridor to be executed to bypass load on Talcher. Timely execution of MCRL inner corridor by FY26 to enable evacuation on Sambalpur – Talcher Rd Section. **Also, Doubling of Angul-Balram line is required to be taken up for despatch of ~25-30 Rakes/Day by FY30.**	Indian Railways (ECoR)
2	Additionally, Captive and Commercial miners shall plan to develop First Mile Connectivity projects like Rapid-Loading System with Silos along with Railway connectivity. Captive and commercial players along with Indian Railways shall jointly conduct a feasibility study for establishing Public Freight Terminals with Mechanized loading and evacuation systems. PFTs shall connect Non-CIL mines to MCRL Outer and Inner Corridors for evacuation.	Captive and Commercial miners, who have been allotted blocks in Talcher CF shall initiate dialogues with Ministry of Coal regarding their future evacuation plans. Detailed Investment and works plan may be submitted by these miners at the earliest.
3	Automatic Signaling shall be proposed across all major rail sections in the vicinity of Talcher CF	Indian Railways (ECoR)
4	Paradeep Port expected to handle ~90 Rakes/Day for coastal shipping and exports On a best-effort basis with Expansion works in Pipeline, ~65-72 R/d can be handled by the Port (MCHP + PEQP). While this is sufficient for RSR, coal exports will require further capacity addition. Capacity addition of ~ 15-20 R/d is required. Commitments from end-users of coal may be required to take up the investments for additional capacity addition. Additionally, avenues of notification of policies may be explored to make RSR mode attractive to power consumers.	Paradeep Port Trust, Ministry of Coal
5	Execution of National Waterway 5 to execute coastal shipping via inland waterways (Mahanadi River) ~80-90 MTPA or ~55 to 60 R/d could be moved from Talcher to Pardeep and Dhamra Ports for Evacuation via Coastal Shipping. Transaction Advisor has been appointed which will also conduct detailed traffic study. End to End construction of NW-5 is a challenge, although the target for completion is 2030, delays could be expected beyond the stipulated timelines	IWAI, Ministry of Shipping
6	Dhamra Port has plans to increase capacity of coastal shipping + exports to around 20 MTPA. This would lead to diversion of around 14 R/D from Dhamra, via Angul-Sukinda Rd line. Other ports such as Gopalpur, Vizag and Gangavaram should be explored by consumers. Under Construction line from Rairakhol to Gopalpur port should be utilized, subject to adequacy of coastal shipping capacity at ports and favorable economics of coastal movement.	End Consumers / Power Plants, Dhamra Port (DPCL)
7	Under-construction FMC Projects of MCL Talcher (Including Phase 1,2 & 3) with combined evacuation capacity of ~130 MTPA shall be executed at the earliest to enable coal loading from Talcher CF.	Coal India Limited is continuously monitoring and solving various issues to expedite this

Detailed analysis
for

Chhattisgarh

Thermal Coal Supply Analysis summary for Chhattisgarh

Chhattisgarh

All figures in million tonnes

	Actuals			Projections						
Coal Supply	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Mand Raigarh SECL - CIL	12.91	12.8	13.2	15.6	16	31	40	40	43	45
CIC and Korba CF	137.55	129.43	153.8	184	204	228	227	229	231	234
Total SECL	**150**	**142 (156 Despatch)**	**167**	**200**	**220**	**260**	**267**	**269**	**274**	**279**
Captive & Commercial - MandRaigarh CF	1.25	7.26	9.99	13.65	18.72	25.67	35.20	48.26	66.18	105
Captive & Commercial - Hasedo Anand CF	15	15	12.79	17.84	19.45	21.21	23.13	25.23	27.51	30.00
Total Non-CIL	**16.25**	**22.26**	**22.78**	**31.49**	**38.17**	**46.88**	**58.33**	**73.49**	**93.69**	**145**
Total Coal Production in Chhattisgarh	**167**	**165**	**190**	**231**	**263**	**306**	**327**	**345**	**371**	**430**

SECL has ambitious production capacity expansion plans

Chhattisgarh

All figures in million tonnes

Coal Supply from SECL	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Mandraigarh SECL - CIL	12.91	12.8	13.2	15.6	16	31	40	40	43	45
CIC and Korba CF	137.55	129.43	153.8	184	204	228	227	229	231	234
Total SECL	**150**	**142 (156 Despatch)**	**167**	**200**	**220**	**260**	**267**	**269**	**274**	**279**

Coalfield	Name of Mine / Project	Type (UG / OC)	PR Capacity (MTY)	Actual 21-22	Actual 2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30
Korba	AMBIKA	OC	1.00			0.00	0.50	0.50	1	1	1	1
Korba	BAGDEVA	UG	0.75	0.37	0.34	0.40	0.40	0.50	0.45	0.45	0.45	0.75
Korba	BALGI	UG	0.60	0.08	0.07	0.08	0.08		0	0	0	0
Korba	DHELWADIH	UG	0.27	0.13	0.12	0.15	0.25	0.33	0.33	0.33	0.33	0.33
Korba	MANIKPUR	OC	3.50	4.90	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25
Korba	RAJGAMAR 4&5/6&7	UG	0.30	0.05	0.03	0.15	0.33	0.45	0.33	0.33	0.33	0.33
Korba	SARAIPALI	OC	1.40	1.40	1.57	1.40	1.68	2.10	1.4	1.4	1.4	1.4
Korba	SINGHALI	UG	0.24	0.18	0.13	0.16	0.16	0.66	0.2	0.2	0.2	0.2
Korba	SURAKACHHAR 3&4	UG		0.05	0.03	0.08	0.15	0.15	0.15	0.15	0.15	0.15
Korba	SURAKACHHAR MAIN	UG		0.11	0.03	0.05	0.14	0.14	0.14	0.14	0.14	0.14
Korba	DIPKA EXPN	OC	40.00	34.37	32.15	40.00	40.00	45.00	45	45	45	45
Korba	GEVRA EXPN	OC	70.00	41.45	52.50	60.00	65.00	70.00	70	70	70	70
Korba	KUSMUNDA EXPN	OC	50.00	28.90	43.05	50.00	60.00	62.50	62.5	62.5	62.5	62.5

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Chhattisgarh

All figures in million tonnes

Mand Raigarh	BAROUD EXPN	OC	10.00	2.52	3.50	4.00	5.75	10.00	10	10	10	10
Mand Raigarh	BIJARI	OC		1.03	0.76	2.00			0	0	0	0
Mand Raigarh	CHHAL OC Seam III	OC	6.00	3.34	3.85	3.80	6.00	6.00	7.5	7.5	7.5	7.5
Mand Raigarh	DURGAPUR OC	OC	6.00					3.00	4	4	4	4
Mand Raigarh	GARE PALMA IV/2&3	OC	6.25	2.91	2.05	2.75			0	0	0	0
Mand Raigarh	JAMPALI	OC	2.00	3.00	3.00	3.00	3.00	3.60	3	3	3	3
Mand Raigarh	PELMA	OC	15.00				0.00	7.00	10	10	12	12
Mand Raigarh	PORDA-CHIMTAPANI	OC	10.00					2.00	5	5	6	8
CIC	CHURCHA	UG	1.35	1.29	1.03	1.65	1.72	1.72	1.72	1.72	1.72	1.72
CIC	JHILIMILI	UG	0.50	0.33	0.31	0.35	0.50	0.50	0.5	0.5	0.5	0.5
CIC	KATKONA 1&2 (Coking)	UG	0.27	0.23	0.25	0.25	0.25	0.40	0.27	0.27	0.27	0.27
CIC	PANDAVPARA	UG	0.21	0.23	0.22	0.25	0.25	0.25	0.25	0.25	0.25	0.25
CIC	BHATGAON	UG	0.50	0.26	0.23	0.20	0.20	0.20	0	0	0	0
CIC	JAGANNATHPUR	OC	3.00	1.78	2.26	3.00	3.50	3.50	3.5	3.5	3.5	3.5
CIC	MADAN NAGAR	OC	12.00				0.00	4.00	6	6	8	10
CIC	MAHAMAYA OC	OC	1.50				0.25	1.50	1.5	1.5	1.5	1.5
CIC	NAVAPARA UG	UG	0.36	0.10	0.08	0.12	0.16	0.18	0.18	0.18	0.18	0.18
CIC	SHIWANI	UG	0.27	0.20	0.18	0.25	0.26	0.30	0.3	0.3	0.3	0.3
CIC	AMERA	OC	1.00		0.00	0.20	1.00	1.50	1	1	1	1
CIC	AMGAON	OC	1.00		0.74	1.00	1.00	1.00	1	1	1	1
CIC	BALRAMPUR UG	UG	0.54	0.04	0.10	0.05						
CIC	GAYATRI	UG	0.30	0.12	0.19	0.71	0.85	0.88	0.88	0.88	0.88	0.88
CIC	KETKI	UG	0.87		0.00	0.30	0.30	0.50	0.8	0.8	0.8	0.8
CIC	KUMDA UG	UG	0.60	0.02	0.02	0.05						
CIC	REHAR	UG	0.31	0.10	0.07	0.25	0.25	0.31	0.31	0.31	0.31	0.31
CIC	BARTUNGA HILL	UG		0.13	0.02				0	0	0	0
CIC	CHIRIMIRI OC	OC	1.00	0.92	0.70	1.60	1.70	1.70	1.7	1.7	1.7	1.7
CIC	KURASIA UG	UG		0.21	0.20	0.25						
CIC	N.C.P.H.(NEW)	UG	0.41	0.30	0.24	0.29	0.29	0.29	0.29	0.41	0.41	0.41
CIC	RANI ATARI	UG	0.48	0.41	0.48	0.48	0.48	0.48	0.4	0.4	0.4	0.48
CIC	VIJAY WEST UG	UG	0.50	0.49	0.50	0.50	0.50	0.50	0.5	0.5	0.5	0.5

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Chhattisgarh

All figures in million tonnes

CIC	BEHRABAND	UG	0.60	0.42	0.56	0.60	0.60	0.60	0.6	0.6	0.6	0.6
CIC	BIJURI	UG	0.48	0.12	0.14							
CIC	HALDI BARI	UG	0.42	0.60	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66
CIC	JHIRIA UG	UG	0.33	0.17	0.15	0.25	0.25	0.25	0.33	0.33	0.33	0.33
CIC	JHIRIA WEST	OC	1.50			0.30	0.50	1.50	1.5	1.5	1.5	1.5
CIC	KAPILDHARA UG	UG	0.24	0.14	0.13				0	0	0	0
CIC	KURJA-SHEETALDHARA	UG	0.88	0.54	0.64	0.80	0.80	0.80	0.8	0.8	0.8	0.8
CIC	RAJNAGAR RO	UG	0.72	0.21	0.19	0.20	0.20	0.21	0.2	0.2	0.2	0.2
CIC	RAJNAGAR RPR	OC	1.70		0.00	0.20	0.50	0.80	1	1	1	1.7
CIC	WEST JKD	UG	0.16	0.12	0.12	0.17	0.17	0.17	0.17	0.17	0.17	0.17
CIC	AMADAND RPR	OC	4.00	1.67	0.87	3.00	3.40	4.00	4	4	4	4
CIC	BARTARAI	UG	0.47	0.17	0.16	0.17	0.17	0.17	0.17	0.17	0.17	0.17
CIC	BHADRA 7& 8	UG	0.23	0.10	0.13	0.15	0.15	0.18	0.15	0.15	0.15	0.15
CIC	JAMUNA 1&2/5&6	UG	0.20	0.09	0.06	0.10	0.18	0.18	0.18	0.18	0.18	0.18
CIC	JAMUNA 9&10	UG	0.10	0.17	0.13	0.17	0.17		0	0	0	0
CIC	MEERA	UG	0.60	0.07	0.08	0.08						
CIC	BIRSINGPUR	UG						0.20				
CIC	KANCHAN RPR	OC	2.00	0.75	0.51	1.75	2.00	2.00	2	2	2	2
CIC	NOWROZABAD(W)	UG		0.09	0.10	0.10			0	0	0	0
CIC	PALI	UG	0.50	0.13	0.11	0.10			0	0	0	0
CIC	PIPARIYA	UG	0.24	0.09	0.11	0.12	0.12	0.13	0.13	0.13	0.13	0.13
CIC	UMARIA	UG	0.30	0.11	0.13	0.12	0.12	0.20	0.2	0.2	0.2	0.2
CIC	VINDHYA	UG	0.71	0.51	0.49	0.42	0.42	0.42	0.42	0.42	0.42	0.42
CIC	AMALAI	OC	1.50	1.32	2.03	2.00	2.00	2.00	2	3	3	3
CIC	BANGWAR	UG	0.36	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65
CIC	DAMINI	UG	0.48	0.30	0.28	0.35	0.35	0.72	0.35	0.48	0.48	0.48
CIC	KHAIRAHA UG	UG	0.59	0.82	0.88	0.82	0.82	0.82	0.8	0.8	0.8	0.8
CIC	RAJENDRA	UG	0.64	0.16	0.16	0.15	0.20	0.50	0.25	0.25	0.25	0.25
CIC	RAMPUR BATURA OC	OC	4.00		0.05	0.75	2.60	2.60	3	3	3	3
CIC	SHARDA HIGHWALL	UG	0.60	0.32	0.66	0.80	0.85	0.85	0.85	0.85	0.85	0.85
CIC	DHANPURI OC	OC	1.25	0.45	0.52			0.50	0	0	0	0

SECL has ambitious production capacity expansion plans

Chhattisgarh

All figures in million tonnes

Central India	Mahan	OC	0.36	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Central India	Navapara ug	UG	0.36	0.10	0.16	0.16	0.16	0.18	0.18	0.18	0.18	0.18	0.18
Central India	Binkara	UG	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.20
Central India	Bangwar	UG	0.36	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65
Central India	Jhiria UG	UG	0.33	0.18	0.23	0.25	0.25	0.33	0.33	0.33	0.33	0.33	0.33
Central India	Rehar	UG	0.31	0.10	0.18	0.25	0.25	0.31	0.31	0.31	0.31	0.31	0.31
Central India	Gayatri	UG	0.3	0.12	0.30	0.80	0.80	0.88	0.88	0.88	0.88	0.88	0.88
Central India	Umaria	UG	0.3	0.11	0.00	0.12	0.12	0.20	0.20	0.20	0.20	0.20	0.20
Korba	Rajgamar 4&5/6&7	UG	0.3	0.05	0.10	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33
Central India	Katkona 1&2 (Coking)	UG	0.27	0.26	0.25	0.25	0.25	0.27	0.27	0.27	0.27	0.27	0.27
Central India	Shiwani	UG	0.27	0.20	0.26	0.26	0.26	0.30	0.30	0.30	0.30	0.30	0.30
Korba	Dhelwadih	UG	0.27	0.13	0.23	0.23	0.25	0.33	0.33	0.33	0.33	0.33	0.33
Central India	Kapildhara UG	UG	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Central India	Pipariya	UG	0.24	0.09	0.10	0.10	0.11	0.13	0.13	0.13	0.13	0.13	0.13
Korba	Singhali	UG	0.24	0.18	0.15	0.16	0.16	0.20	0.20	0.20	0.20	0.20	0.20
Central India	Bhadra 7& 8	UG	0.23	0.10	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
Central India	Pandavpara	UG	0.21	0.27	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Central India	Jamuna 1&2/5&6	UG	0.2	0.09	0.12	0.12	0.15	0.18	0.18	0.18	0.18	0.18	0.18
Central India	West JKD	UG	0.16	0.12	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
Central India	Jamuna 9&10	UG	0.1	0.17	0.17	0.17	0.17	0.00	0.00	0.00	0.00	0.00	0.00
Central India	Kurasia	UG		0.21	0.24	0.24	0.25	0.00	0.00	0.00	0.00	0.00	0.00
Central India	Nowrozabad(W)	UG		0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Korba	Surak Main	UG		0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
Korba	Surak 3&4	UG		0.05	0.10	0.10	0.15	0.15	0.15	0.15	0.15	0.15	0.15
			283.41	**142.34**	**166.9**	**200.00**	**225.00**	**259.61**	**268.61**	**271.26**	**277.26**	**285.14**	**288.14**

SECL has ambitious production capacity expansion plans

Chhattisgarh

Area	FY22 Actual Despatch (MTPA)					FY25-26 1 BT Plan (MTPA)					FY29-30 Anticipated Dispatch (MTPA)				
	Rail	RCR	Pure Road	MGR & Others	Total	Rail	RCR	Pure Road	MGR & Others	Total	Rail	RCR	Pure Road	MGR & Others	Total
Baikunthpur	2.07	0.00	0.00	0.00	**2.07**	2.74	0.00	0.00	0.00	2.74	2.74	0.00	0.00	0.00	2.74
Bhatgaon	2.54	0.16	0.57	0.00	**3.27**	4.92	0.00	3.96	0.00	8.88	14.91	0.00	0.57	0.00	15.48
Bisrampur	0.00	0.00	0.34	0.00	**0.34**	3.40	0.00	0.28	0.00	3.68	3.87	0.00	0.32	0.00	4.19
Chirmiri	1.55	0.02	0.93	0.00	**2.49**	2.89	0.00	0.00	0.00	2.89	6.09	0.00	0.00	0.00	6.09
Dipka	5.35	12.15	6.23	13.18	**36.91**	21.00	6.00	3.00	15.00	45.00	21.00	6.00	3.00	15.00	45.00
Gevra	19.02	7.30	4.94	13.74	**44.99**	39.50	12.00	4.00	14.50	70.00	39.50	12.00	4.00	14.50	70.00
Hasdeo	1.91	0.03	0.39	0.00	**2.33**	4.00	0.00	1.26	0.00	5.26	5.57	0.00	0.39	0.00	5.96
Jamuna-Kotma	1.48	0.00	0.73	0.00	**2.20**	3.42	0.00	1.08	0.00	4.50	5.77	0.00	0.73	0.00	6.50
Johilla	1.14	0.11	0.41	0.00	**1.67**	2.75	0.00	1.08	0.00	3.83	2.75	0.00	0.00	0.00	2.75
Korba	3.46	0.61	2.72	0.64	**7.42**	4.90	0.00	2.78	1.07	8.75	6.56	0.00	2.99	0.00	9.55
Kusmunda	21.52	1.80	3.73	6.72	**33.78**	55.50	0.00	0.00	7.00	62.50	55.50	0.00	0.00	7.00	62.50
Raigarh	1.96	0.20	11.98	0.00	**14.14**	30.00	0.00	5.00	0.00	35.00	38.14	0.00	6.36	0.00	44.50
Sohagpur	1.69	0.20	1.41	0.86	**4.15**	3.78	2.23	0.93	0.00	6.94	5.46	2.00	1.34	0.00	10.03
Total	**63.68**	**22.58**	**34.37**	**35.14**	**155.77**	**179**	**20**	23	**38**	**260**	**203**	**20**	**19**	**37**	**279**

SECL's despatch is progressing towards higher share of rail from current 55% to a target of 80% by FY30 (including RCR). Ensuring that the evacuation capacity exists is a crucial aspect of the holistic logistics policy. Additional 90 R/d despatch is envisaged from SECL.

Non-CIL blocks Pipeline in Chhattisgarh – Mandraigarh (1/2)

Chhattisgarh

Details of Non-CIL blocks in Mand-Raigarh Region

#	Name of the Block	Block Owner	PRC	Operational Status	Proposed Loading Point	EUP and other remarks	Actual FY23 Production	Actual FY22 Production
1	Durgapur-II/Taraimar	Karnataka Power Corporation Ltd.	4	Not operational	Dharamjaigarh Railway Siding (Mine to Siding via road - 5 Kms)	Godhna Thermal Power Project, Chhattisgarh, 150 Kms from the mine. KPCL plans to use Janjgir railway siding. Dharamjaigarh-Korba / Dharamjaigarh-Kharsia Route (CERL) to reach Janjgir siding. TPS is 27 Kms from Janjgir/Naila Siding	0	
2	Durgapur-II/Sarya	Karnataka Power Corporation Ltd.	2	Operational	Dharamjaigarh Railway Siding (Mine to Siding via road - 1 Km)	Godhna Thermal Power Project, Chhattisgarh, 150 Kms from the mine. KCPL plans to use Janjgir railway siding. Dharamjaigarh-Korba / Dharamjaigarh-Kharsia Route (CERL) to reach Janjgir siding. TPS is 27 Kms from Janjgir/Naila Siding	1.38	1.11
3	Gare Palma Sector-I	Jindal Power Ltd	15	Non-Operational	Coal expected transported by Cross Country Pipe Conveyor (CCPC) located near Gare Palma IV/1 block	Jindal Power's power plants in Chhattisgarh	0	0
4	Gare Palma Sector-II	Maharashtra State Power Generation Co Ltd.	23.6	Not operational	Raigarh Railway Siding - Kharsia to Pelma rail network of CERL (Mine to Siding via road - 35 Kms)	Chandrapur Super Thermal Power Station (2x500 MW) - 790 KMs from Mine, Koradi Thermal Power Station (3x660 MW) - 585 KMs from Mine, Parli Thermal Power Station (1x250 MW) - 1136 KMs from Mine, All stations in maharashtra. Plants have own railway sidings.	0	0
5	Gare Palma Sector-III	Chhattisgarh State Power Generation Co Ltd	5	Operational	Robertson Railway Siding (Mine to Siding via road - 80 Kms)	Atal Bihari Vajpayee TPP - 155 KMs from Mine. Railway Siding available at plant. Robertson to champa Jn railway line.	3.60	3.58
6	Gare Palma IV/1	Jindal Power Ltd	6	Operational	Coal from mine to mine head CHP is transported by road (5 Km). From CHP to JPL Power Plant, coal is transported by Cross Country Pipe Conveyor (CCPC)	Tamnar Power Plant - 22 Kms from the mine	5.66	0.29
7	Gare Palma IV/4	Hindalco	1.5	Operational	Currently, using road directly to EUPS. In future Bhalumunda Railway Siding could be used which is 15 Kms from the mine. In case of absence of Bhalumunda siding, Raigarh siding could be used which is 50 Kms from the mine.	CPP- Aditya Alumina (1MT to be sourced from mine) - 144 Kms from the mine, CPP - Hirakud Smelter (0.5MT to be sourced from mine) - 175 Kms from the mine.	~0.61	0.56

Non-CIL blocks Pipeline in Chhattisgarh – Mandraigarh (2/2)

Chhattisgarh

Details of Non-CIL blocks in Mand-Raigarh Region

#	Name of the Block	Block Owner	PRC	Operational Status	Proposed Loading Point	EUP and other remarks	Actual FY23 Production	Actual FY22 Production
8	Gare Palma IV/2 & IV/3	Jindal Power Ltd	7	Non-Operational	Dedicated closed conveyor to Jindal Power's power plants	Jindal Power's power plants in Chhattisgarh	0	0
9	Gare Palma IV/5	Hindalco	1	Under Development - Operational	Currently, using road directly to EUPS. In future Bhalumunda Railway Siding could be used which is 15 Kms from the mine. In case of absence of Bhalumunda siding, Raigarh siding could be used which is 50 Kms from the mine.	CPP- Aditya Alumina - 144 Kms from the mine, CPP - Hirakud Smelter - 175 Kms from the mine.	0	0
10	Gare Palma IV/7	Sarda Energy and Minerals Ltd	1.2	Operational	Evacuation via railways using Raigarh Siding which is 50 Kms from the mine	Captive consumption as well as commercial sale	~1.15	0.38
11	Gare Palma IV/8	Ambuja Cements Ltd	1.2	Operational	Currently road transportation is being used via NH43 along with RCR mode. The owner has applied for rail siding plant. Nearest rail siding is Raigarh, 50 Kms from the mine.	Ambuja Cement Bhatapara - 222 Kms from the mine	~1.20	0.81
12	Talaipalli	NTPC Ltd	18.75	Operational	Korichhaper Railway Siding, 25 Kms from the mine MGR under construction	NTPC Lara Stage-I (2x800 MW), Stage-II (3x800 MW), 62 Kms from the mine	~2.26	0.41
13	Banai – Bhalumunda	JSW Steel	12	Non-Operational	Nearest rail head options: Gharghoda/Raigarh/Kharsia. Coal may be transported via road until dedicated siding is commissioned	JSW Steel has works at Dolvi (powered through a combination of co-generation plants), Torangallu (imported based CPP) and Salem (~0.5 MTPA coal based) Commercial usage mine	0	0
Total PRC			**106..25**				**9.99**	**7.26**

Other than those listed above, GP-IV/6 with 4 MTPA PRC of G-10 Grade coal was allotted to JSPL @ 85.25% FPO, Bhaskarpara block of G-7 grade coal was allotted to Prakash Industries @55.75% FPO, and Jhigador and Khargaon Blocks with 4 MTPA was allotted to CG Natural Resources @ 6% FPO, Purunga (partially explored)was allotted to CG Narutal Resources @6% FPO

Non-CIL blocks Pipeline in Chhattisgarh – Hasdeo-Anand

Chhattisgarh

Details of Non-CIL blocks in Hasdeo-Anand Region

#	Name of the Block	Block Owner	PRC	Operational Status	Proposed Loading Point	EUP and other remarks	Actual FY23 Production
1	Gidmuhi, paturia	Chhattisgarh State Power Generation Co Ltd	5.6	Not Operational	Surajpur Station is 131 Kms from the mine and the EUP is 24 Kms from the mine so the transportation would be either completely by Road using NH-130 or by a CHP-conveyor system, feasibility of which is cuurently under investigation.	ICPL Premnagar Power Plant - 24 Kms from the mine. Development of End-use plant is still in progress	0*
2	Parsa	Rajasthan Rajya Vidyut Utpadan Nigam Limited (RRUVNL)	5	Not Operational (Under Development Stage)	Surajpur Road Station/Siding - 5 Kms from the mine	Chhabra Thermal Power Station (Units 3-6 - 1.2 MTPA) - 797 KMs from Mine, Kalisindh Thermal Power Station (Unit 1&2 - 1.1 MTPA) - 1049 KMs from Mine, Suratgarh Supercritical Thermal Power Plant - 1.6 MTPA - 1664 KMs from Mine, All stations in Rajasthan. Plants have own railway sidings. Daritolli-Boridand-Annupur railway line will be used for transportation of coal	0
3	Parsa East and Kanta Basan	Rajasthan Rajya Vidyut Utpadan Nigam Limited (RRUVNL)	15	Operational	Surajpur Road Station/Siding - 5 Kms from the mine	Chhabra Thermal Power Station (Units 3-6) - 797 KMs from Mine, Kalisindh Thermal Power Station (Unit 1&2) - 1049 KMs from Mine, Suratgarh Supercritical Thermal Power Plant - 1664 KMs from Mine, All stations in Rajasthan. Plants have own railway sidings. Daritolli-Boridand-Annupur railway line will be used for transportation of coal	~11.51
4	Kente Extension	Rajasthan Rajya Vidyut Utpadan Nigam Limited (RRUVNL)	9	Not Operational (Under Development Stage)	Surajpur Road Station/Siding - 5 Kms from the mine	Chhabra Thermal Power Station (Units 3-6) - 797 KMs from Mine, Suratgarh Supercritical Thermal Power Plant - 1664 KMs from Mine, All stations in Rajasthan. Plants have own railway sidings. Daritolli-Boridand-Annupur railway line will be used for transportation of coal	0
5	Chotia	BALCO	1	Operational	Transportation of coal via road to EUP. NH130 and NH 149B is used for evacuation of coal	BALCO CPP in Korba, 70 Kms from the mine	~0.92
6	Madanpur South	APMDCL	5.4	Not-Operational	Surajpur Road Station/Siding or PSRS Railway Siding - 5 Kms from the mine. NH-130 can also be used for road transportation	For commercial use, EUP not decided yet	0*
7	Datima	Shree Cement	0.36	Not-Operational	Coal to be transported via roadways	Shree Cement plant at Baloda Bazar Bhatapara	0
	Total PRC		**41.36**				**12.43**

*Blocks of CSPGCL and APMDCL is risky as it falls under Lemru Elephant Reserve: https://www.hindustantimes.com/india-news/no-quarrying-in-gidhmuri-paturia-madanpur-south-coal-blocks-baghel-to-centre-101641666361717.html

Non-CIL blocks Pipeline in Madhya Pradesh – Sohagpur CF

Madhya Pradesh

Block Name	Allocated to	PRC (MT)	Operational Status	Proposed Loading point	EUP and other remarks	FY23 Production (MT)
Bicharpur	Ultratech Cement Ltd	0.75	Operational	Coal is transported through pure road mode via NH 43	Sidhi, Maihar & Bela Cement Works Madhya Pradesh	~0.36
Bikram	Birla Corporation Ltd	0.36	Non-Operational	Coal is transported via roadways to Satna. For Rajasthan, railheads near Sohagpur may be used in future	Birla Vikas Satna MP & Madhav Nagar Rajasthan	0
Sahapur west	Sarda Energy and Mineral Ltd	0.6	Non-Operational	Coal may be transported via NH 43	Commercial Usage	0
Sahapur East	Chowgule and Company Pvt Ltd	0.7	Non-Operational	Coal may be transported via NH 43	Commercial Usage	0
Urtan North	JMS Mining Pvt Ltd	0.6	Non-Operational	Coal may be transported via NH 43	Commercial Use	0
Urtan.	JMS Mining Pvt Ltd	0.65	Non-Operational	Roadways will be used to deliver coal to Kotma Jn(distance from mine is approx.- 5 Kms)	Commercial use	0
		3.66				**~0.36**

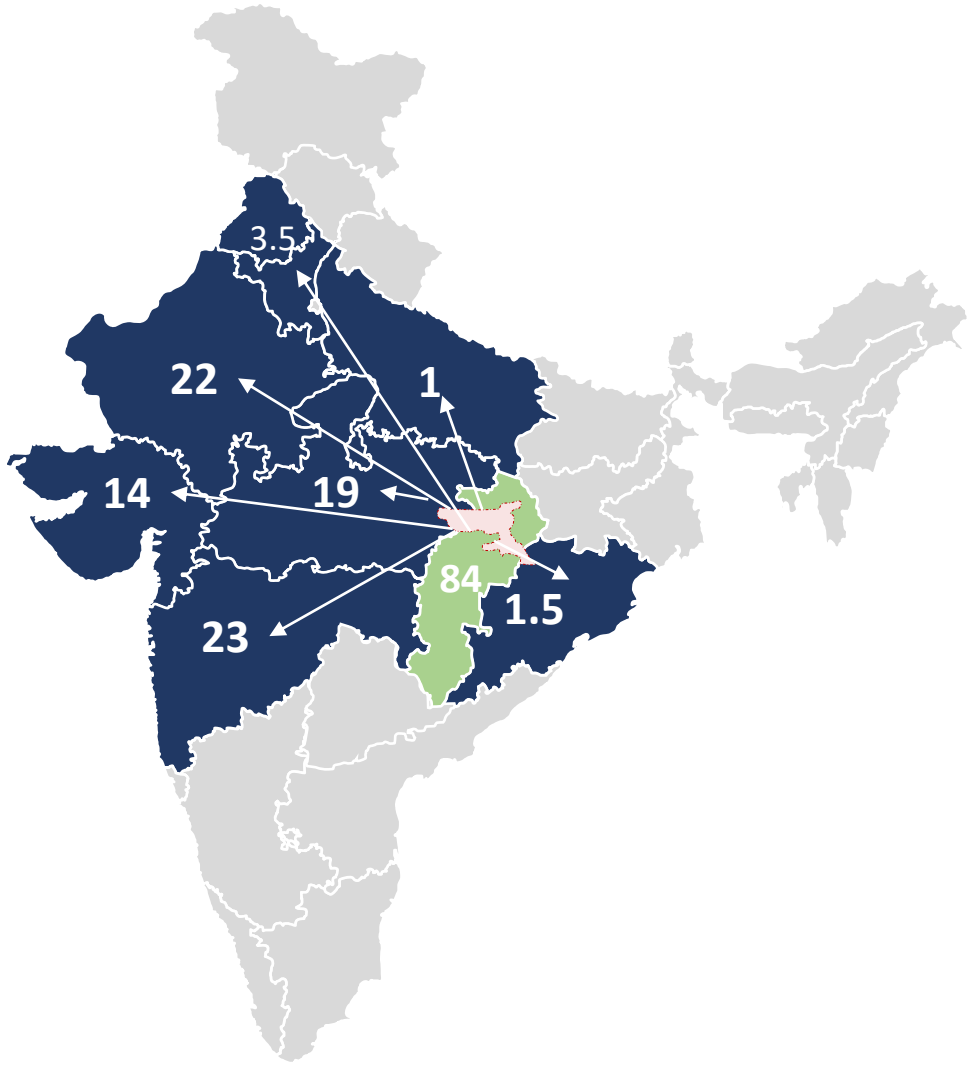
Coal Blocks to be Auctioned in 7th Tranche

Chhattisgarh & MP (Sohagpur CF)

Block Name	Coalfield	State	PRC (MT)
Baisi West (Revised)	Mand-Raigarh	Chhattisgarh	2
Barpali-Karmitikra (Revised)	Mand-Raigarh	Chhattisgarh	1.5
Bicharpur East (Revised)	Sohagpur	Madhya Pradesh	0.87
Chainpa (Revised)	Sohagpur	Madhya Pradesh	1
Gorhi Mahaloi-Amlidhonda	Mand Raigarh	Chhattisgarh	0.87
Gorhi Mahaloi-Bijna	Mand Raigarh	Chhattisgarh	0.87
Gorhi-Mahaloi-Devgaon	Mand Raigarh	Chhattisgarh	0.87
Gorhi-Mahaloi-Kasdol	Mand Raigarh	Chhattisgarh	0.87
Karkoma	Korba	Chhattisgarh	1.5
Koilar	Mand-Raigarh	Chhattisgarh	2
Tara	Hasdeo-Arand	Chhattisgarh	6
West of Shahdol	Sohagpur	Madhya Pradesh	1.5
Total			**19.85**

Origin – Destination Cluster Mapping for Chhattisgarh

O-D Source cluster Mapping – Despatch of Coal from Chhattisgarh: FY22 snapshot



XX FY22: Despatch of Coal from Chhattisgarh to destination state (MTPA)

All figures in million tonnes

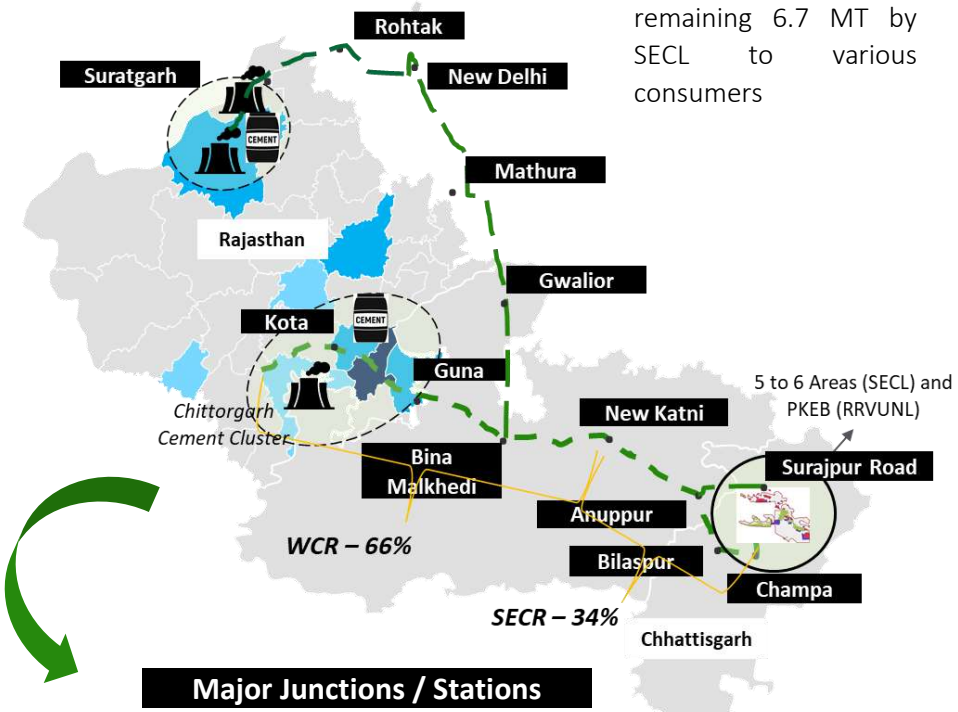
Consuming State	Rail + RCR	Pure Road	MGR & Others	Total
Rajasthan	18.93	2.74	0	**21.67**
Madhya Pradesh	13.97	3.66	0.86	**18.49**
Maharashtra	18.94	4.4	0	**23.34**
Gujarat	8.51	5.78	0	**14.29**
Punjab & Haryana	3.02	0.45	0	**3.47**
Odisha	0.79	0.66	0	**1.45**
Uttar Pradesh	0.77	0.19	0	**0.96**
Chhattisgarh	29.61	20.23	34.28	**84.12**
Other States	0.24	11.19	0	**11.43**
Total Despatch from Chattisgarh (Including Sohagpur and Johilla Areas of MP)	**94.78 (53%)**	**49.3 (28%)**	**35.14 (20%)**	**179.22**

Origin – Destination Mapping and the coal flow analysis of rail trunk lines for ~95 MTPA is conducted and presented in the next sections

O-D Source cluster Mapping – Chhattisgarh to Rajasthan

Chhattisgarh (including Sohagpur and Johilla areas in MP) to Rajasthan total Rail Despatch in FY22 = 21.67 Million Tonnes

15 MTPA despatch by PKEB to RRVUNL and remaining 6.7 MT by SECL to various consumers



Major Junctions / Stations

Expected Load from Chhattisgarh to Rajasthan main trunk lines (Excluding load from other states on this line)

Rajasthan's Coal ***Demand 2022 ~ 28.86 MTPA***

Total Rail Supply by Chhattisgarh ***2022 ~ 21.67 MTPA***

FY22

From	To	Traffic (Tonnes)	Rakes / Day
Baikunthpur Road	Annupur	15348479	11
Champa	Bilaspur	4858369	3
Bilaspur	Annupur	4858369	3
Kharsia	Champa	848261	1
Annupur	New Katni	20875812	15
Burhar	New Katni	287045	0.2
New Katni	Bina Malkhedi	21162858	15
Bina Malkhedi	Guna	18760098	13
Guna	Kota	18760098	13
Bina Malkhedi	Gwalior	2402759	2
Gwalior	Mathura	2402759	2
Mathura	New Delhi	2402759	2
New Delhi	Rohtak	2402759	2
Rohtak	Suratgarh	2402759	2

Rajasthan's Coal ***Demand 2030 ~ 59.1 MTPA***

Total Rail Supply by Chhattisgarh ***2030 ~ 30.55 MTPA***

FY30

From	To	Traffic (Tonnes)	Rakes / Day
Baikunthpur Road	Annupur	28333894	20
Champa	Bilaspur	1823386	1
Bilaspur	Annupur	1823386	1
Kharsia	Champa	300000	0.2
Annupur	New Katni	30185241	21
Burhar	New Katni	366752	0.3
New Katni	Bina Malkhedi	30551993	22
Bina Malkhedi	Guna	23773820	17
Guna	Kota	23773820	17
Bina Malkhedi	Gwalior	6778173	5
Gwalior	Mathura	6778173	5
Mathura	New Delhi	6778173	5
New Delhi	Rohtak	6778173	5
Rohtak	Suratgarh	6778173	5

Major Coal Consuming Districts of Rajasthan: 2030 (Estimated)

>15 MTPA Coal Consumption	*Kota*
5-10 MTPA Coal Consumption	*Bundi, Baran, Jaipur, Bikaner*
1-5 MTPA Coal Consumption	*Ajmer, Nimach, Chittorgarh, Pratapgarh, Jalor*

- **Major Non-Power consumers in Rajasthan currently taking coal from SECL** include Birla Cement Works, Grasim Industries, Ambuja Cements, ACC Ltd, JK Cements, Mangalam Cements, Sriram Cements, and Hindustan Zinc Limited. Adani Power Rajasthan sourced ~ 1.3 MTPA coal from SECL.
- **RRUVNL Procured ~ 2.5 MTPA coal from SECL, as they are sourcing ~15 MTPA (~75% of their demand) from PKEB** mine in Chhattisgarh. For future requirements of RRUVNL, they also have Kente Extension (9 MTPA) and Parsa (5 MTPA) in pipeline.
- Quantity transported to Rajasthan by road in 2022 (2.74 MT) has been considered to be supplied through RCR mode in 2030 (with 20% of quantity being considered as rejects)

O-D Source cluster Mapping – Significant increase in Chhattisgarh supply to Rajasthan

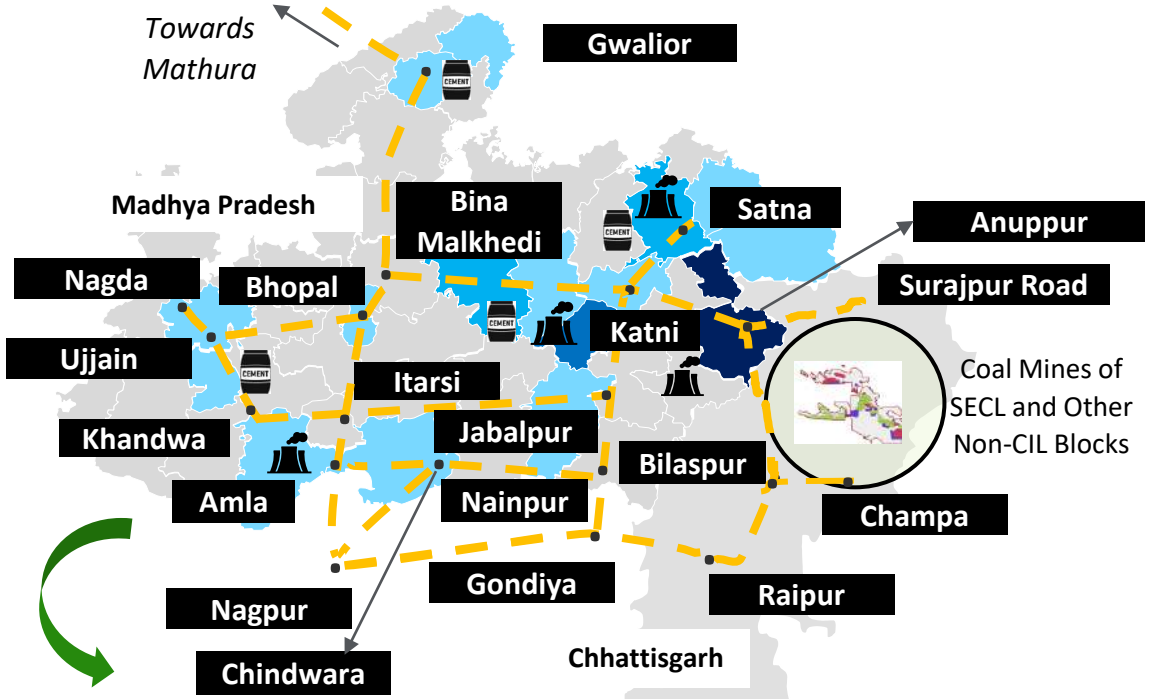
All figures in million tonnes

Name of TPS	Utility	Korba CF	Raigarh CF	CIC CF	Captive	Total Chhattisgarh	Others	Total Coal Consumed FY22	Total Coal Consumption FY30	Supply from Korba CF	Supply from Raigarh CF	Supply from CIC CF	Supply form Captive	Total Chhattisgarh	Others
KAWAI	ADANI POWER RAJASTHAN LTD.	0.8	0.0	0.5	0.0	1.3	3.6	4.9	5.2	1.5	0.3	0.5	0.0	2.3	2.9
CHHABRA	RRVUNL	0.7	0.0	0.0	3.2	4.0	0.0	3.0	4.3	0.0	0.0	0.0	4.3	4.3	0.0
SURATGARH	RRVUNL	2.3	0.2	0.3	0.0	2.7	0.0	2.5	6.8	0.0	0.0	0.0	6.8	6.8	0.0
KALISINDH SUPER TPP	RRVUNL	0.0	0.0	0.0	5.4	5.4	0.0	4.4	4.9	0.0	0.0	0.0	4.9	4.9	0.0
KOTA SUPER THERMAL POWER STATION	RRVUNL	0.9	0.4	0.3	0.0	1.6	3.3	4.9	5.9	0.0	0.0	0.0	5.9	5.9	0.0
CHHABRA SUPER CRITICAL TPP	RRVUNL	0.0	0.0	0.0	4.2	4.2	0.0	3.2	5.1	0.0	0.0	0.0	5.1	5.1	0.0
Total		**4.7**	**0.6**	**1.0**	**12.8**	**19.1**	**6.9**	**22.8**	**32.2**	**1.5**	**0.3**	**0.5**	**27.0**	**29.3**	**2.9**

- Rajasthan Rajya Vidyut Utpadan Nigam Ltd. (RRVUNL) has an operational captive block of PRC 15 MTPA in Chhattisgarh (PEKB). Further, 2 nos. blocks – Parsa (PRC: 5 MTPA) & Kente Extension (PRC: 9 MTPA) are expected to be operational by FY23-24 and FY24-25 respectively. With all three blocks of RRVUNL operational in FY30 with combined PRC of 29 MTPA, RRVUNL is expected to source 100% of its coal requirement from its captive blocks.
- Adani Power's Kawai plant has FSA with NCL (~2.9 MT) and is expected to source the balance quantity from SECL.(FSA with Korea Rewa CF)

O-D Source cluster Mapping – Chhattisgarh to Madhya Pradesh

Chhattisgarh (including Sohagpur and Johilla areas in MP) to Madhya Pradesh total Rail Despatch in FY22 = 15.11 MT (incl. RCR mode)



Major Coal Consuming Districts of MP: 2030 (Estimated)

>15 MTPA Coal Consumption	*Shahdol*
10-15 MTPA Coal Consumption	*Jabalpur*
5-10 MTPA Coal Consumption	*Satna, Sagar*
1-5 MTPA Coal Consumption	*Sidhi, Singrauli, Rewa, Katni, Damoh, Betul, Khandwa, Ujjain, Indore, Bhind, Gwalior, Bhopal, Seoni*

Expected Load from Chhattisgarh to MP main trunk lines (Excluding load from other states on this line)

MP's Coal ***Demand 2022 ~ 84.33 MTPA***

Total Rail Supply by Chhattisgarh ***2022 ~ 15.11 MTPA***

FY22

From	To	Traffic (Tonnes)	Rakes / Day
Surajpur Road	Anuppur	3545858	2.52
Anuppur	Katni	11340507	8.07
Kharsia	Champa	323786	0.23
Champa	Bilaspur	9075468	6.46
Bilaspur	Anuppur	7406708	5.27
Katni	Satna	484888	0.35
Katni	Bina Malkhedi	1880083	1.34
Katni	Jabalpur	1333285	0.95
Katni	Billi	118400	0.08
Bina Malkhedi	Bhopal	1035952	0.74
Bhopal	Itarsi	1032023	0.73
Jabalpur	Itarsi	1266747	0.90
Itarsi	Khandwa	1784987	1.27
Itarsi	Amla	414098	0.29
Bhopal	Ujjain	3929	0.00
Ujjain	Nagda	3929	0.00
Bilaspur	Raipur	1998044	1.42
Raipur	Gondiya	1646094	1.17
Gondiya	Nagpur	374334	0.27
Nagpur	Amla	374334	0.27
Gondiya	Nainpur	1623710	1.16
Nainpur	Chindawar	1623710	1.16

MP's Coal ***Demand 2030 ~ 110.20 MTPA***

Total Rail Supply by Chhattisgarh ***2030 ~ 42.5 MTPA***

FY30

From	To	Traffic (Tonnes)	Rakes / Day
Surajpur Road	Anuppur	25057948	17.83
Anuppur	Katni	36375397	25.89
Kharsia	Champa	0	0.00
Champa	Bilaspur	7683110	5.47
Bilaspur	Anuppur	7683110	5.47
Katni	Satna	7503420	5.34
Katni	Bina Malkhedi	12594642	8.96
Katni	Jabalpur	9687893	6.89
Katni	Billi	0	0.00
Bina Malkhedi	Bhopal	10799361	7.69
Bhopal	Itarsi	10794154	7.68
Jabalpur	Itarsi	7596482	5.41
Itarsi	Khandwa	5285081	3.76
Itarsi	Amla	5672317	4.04
Bhopal	Ujjain	5207	0.00
Ujjain	Nagda	5207	0.00
Bilaspur	Raipur	0	0.00
Raipur	Gondiya	0	0.00
Gondiya	Nagpur	0	0.00
Nagpur	Amla	0	0.00
Gondiya	Nainpur	0	0.00
Nainpur	Chindawar	0	0.00

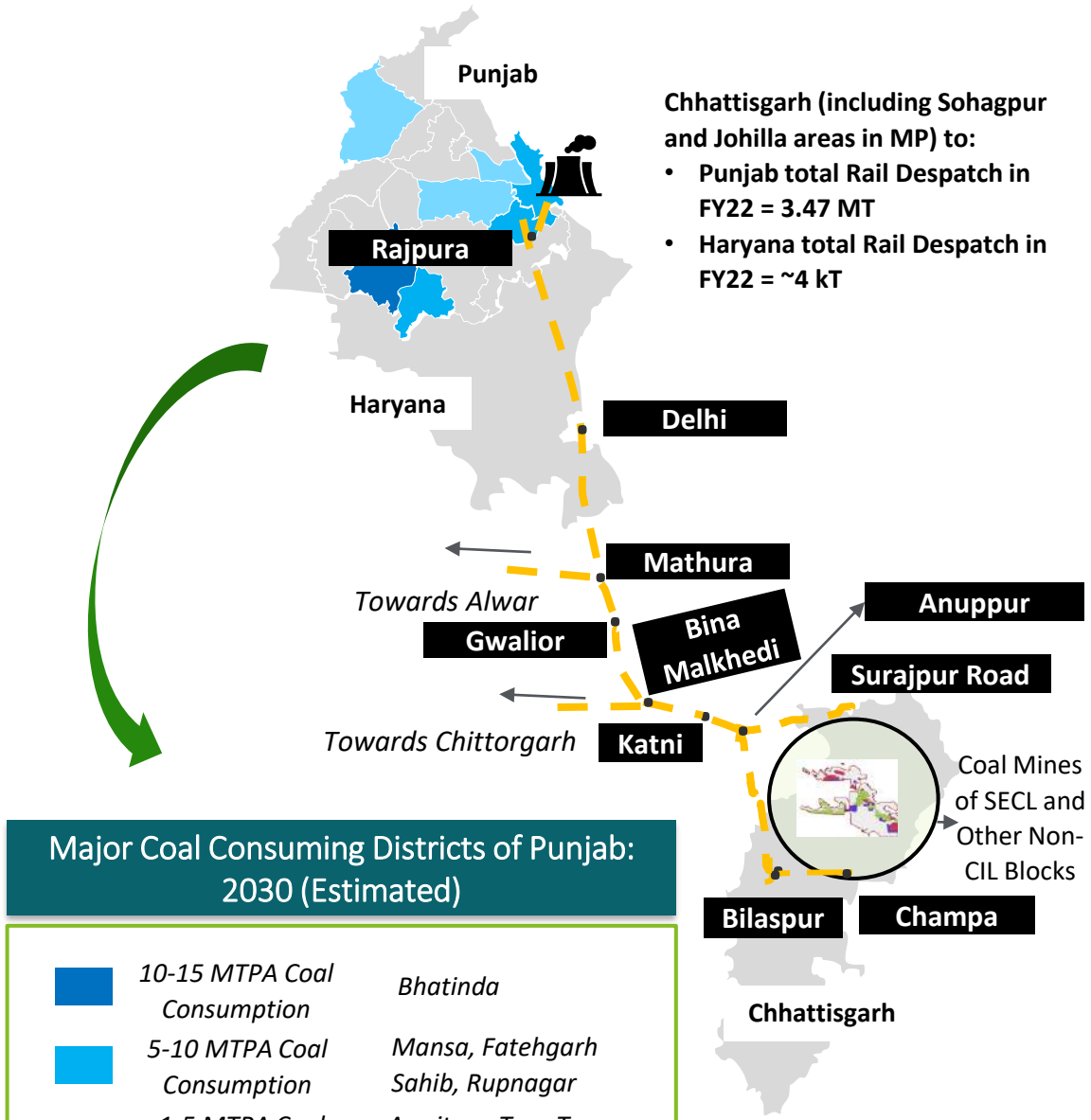
O-D Source cluster Mapping – Significant increase in Chhattisgarh supply to MP

All figures in million tonnes

Name of TPS	Utility	Korba CF	Raigarh CF	CIC CF	Captive	Total Chhattisgarh	Others	Total Coal Consumed FY22	Total Coal Consumption FY30	Supply from Korba CF	Supply from Raigarh CF	Supply from CIC CF	Supply form Captive	Total Chhattisgarh	Others
MAHAN	MAHAN ENERGEN LTD.	0.0	0.0	0.0	0.0	0.0	2.4	2.4	5.5	0.0	0.0	5.5	0.0	5.5	0.0
JAYPEE BINA TPP	JVPL	0.7	0.1	0.0	0.0	0.8	1.0	1.8	2.4	0.0	0.0	1.4	0.0	1.4	0.9
JAYPEE NIGRIE SUPER TPP	JVPL	0.0	0.1	0.0	0.0	0.1	4.8	5.0	5.2	0.0	0.0	1.3	0.0	1.3	3.9
SANJAY GANDHI	MPPGCL	1.8	0.1	3.0	0.0	4.9	0.0	4.9	6.6	0.0	0.0	6.6	0.0	6.6	0.0
SATPURA	MPPGCL	0.4	0.0	0.0	0.0	0.4	1.8	2.2	5.7	0.0	0.0	5.7	0.0	5.7	0.0
AMARKANTAK	MPPGCL	0.0	0.0	1.0	0.0	0.0	0.0	1.0	1.1	0.0	0.0	1.1	0.0	1.1	0.0
SHREE SINGAJI TPS	MPPGCL	2.4	0.0	0.0	0.0	2.4	4.5	6.9	12.2	0.0	0.0	5.1	0.0	5.1	7.1
JHABUA POWER LIMITED	JHABUA POWER LIMITED	1.7	0.0	0.0	0.0	1.7	0.9	2.6	2.7	0.0	0.0	2.1	0.0	2.1	0.6
ANUPPUR TPS	MB POWER (MADHYA PRADESH) LIMITED	4.1	0.2	0.4	0.0	4.8	0.7	5.4	5.6	0.0	0.0	5.6	0.0	5.6	0.0
VINDHYACHAL	NTPC LTD.	0.0	0.0	0.0	0.0	0.0	24.3	24.3	26.9	0.0	0.0	0.0	0.0	0.0	26.9
GADARWARA SUPER	NTPC LTD.	0.5	0.0	0.0	0.0	0.5	4.6	5.1	6.8	2.3	0.0	0.0	0.0	2.3	4.5
SASAN UMPP TPP	REILIANCE POWER	0.0	0.0	0.0	0.0	0.0	18.3	18.3	18.3	0.0	0.0	0.0	0.0	0.0	18.3
KHARGONE STPS	NTPC LTD.	0.2	0.0	0.6	0.0	0.8	3.0	3.8	5.3	5.3	0.0	0.0	0.0	5.3	0.0
Total		**11.8**	**0.6**	**5.1**	**0.0**	**17.5**	**67.2**	**83.7**	**104.3**	**7.6**	**0.0**	**34.4**	**0.0**	**42.0**	**62.3**

- Chhattisgarh (specifically SECL) has the potential to supply coal due to demand growth for power sector (~42 MT) with coal supply to MP's power plants remaining constant from other sources. Other sources include NCL (~34 MT), Captives (~22 MT from Amelia North for JVPL & Moher for Sasan UMPP), WCL (~4 MT), MCL (~0.6 MT) & CCL (~0.9 MT).
- CIC Coalfield (including Sohagpur & Johilla areas in MP) is expected to be the leading coal supplier to power plants in MP. However, plants like Gadarwara & Khargone may continue to source from Korba CF.

O-D Source cluster Mapping – Chhattisgarh to Punjab & Haryana



Chhattisgarh (including Sohagpur and Johilla areas in MP) to:

- **Punjab total Rail Despatch in FY22 = 3.47 MT**
- **Haryana total Rail Despatch in FY22 = ~4 kT**

Major Coal Consuming Districts of Punjab: 2030 (Estimated)

10-15 MTPA Coal Consumption	*Bhatinda*
5-10 MTPA Coal Consumption	*Mansa, Fatehgarh Sahib, Rupnagar*
1-5 MTPA Coal Consumption	*Amritsar, Tarn Taran, Ludhiana, Nawashahr*

Expected Load from Chhattisgarh to Punjab & Haryana main trunk lines (Excluding load from other states on this line)

Punjab's Coal ***Demand 2022 ~ 18.03 MTPA***

Total Rail Supply by Chhattisgarh ***2022 ~ 3.47 MTPA***

FY22

From	To	Traffic (Tonnes)	Rakes / Day
Surajpur Road	Anuppur	255898	0.18
Burhar	Katni	477610	0.34
Kharsia	Champa	23496	0.02
Champa	Bilaspur	2679678	1.91
Bilaspur	Anuppur	2679678	1.91
Anuppur	Katni	2935576	2.09
Katni	Bina Malkhedi	3413186	2.43
Bina Malkhedi	Gwalior	3413186	2.43
Gwalior	Mathura	3413186	2.43
Mathura	Rajpura	3413186	2.43

Punjab's Coal ***Demand 2030 ~ 23.56 MTPA***

Total Rail Supply by Chhattisgarh ***2030 ~ 2.81 MTPA***

FY30

From	To	Traffic (Tonnes)	Rakes / Day
Surajpur Road	Anuppur	30006	0.02
Burhar	Katni	0	0.00
Kharsia	Champa	0	0.00
Champa	Bilaspur	2775000	1.97
Bilaspur	Anuppur	2775000	1.97
Anuppur	Katni	2805006	2.00
Katni	Bina Malkhedi	2805006	2.00
Bina Malkhedi	Gwalior	2805006	2.00
Gwalior	Mathura	2805006	2.00
Mathura	Rajpura	2805006	2.00

Note: Coal demand of Haryana and estimated consumption covered in later part of report

- Major Power consumers in Punjab currently taking coal from SECL include Nabha Power Ltd., Rajpura and Punjab State Power Corporation Limited's plant in Ropar.
- Haryana does not source coal from Chhattisgarh with the exception of Haryana Khadi & Village Industries Board sourcing ~4 kt coal in FY22.

O-D Source cluster Mapping – Slight decrease in Chhattisgarh's supply to Punjab & Haryana

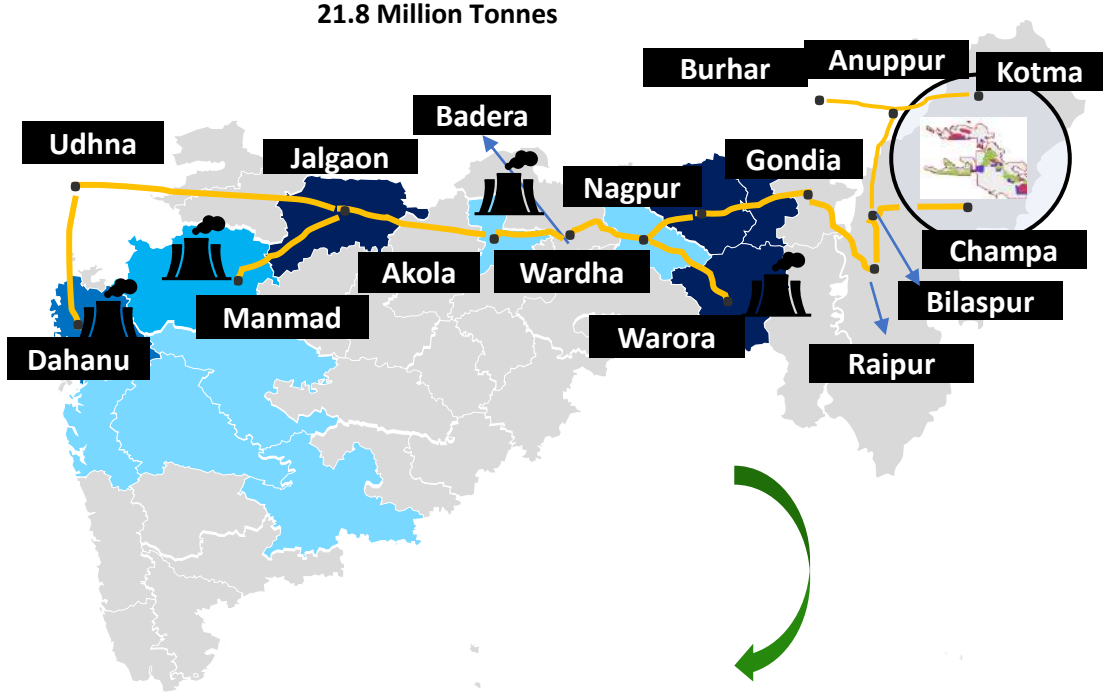
All figures in million tonnes

Name of TPS	Utility	Korba CF	Raigarh CF	CIC CF	Captive	Total Chhattisgarh	Others	Total Coal Consumed FY22	Total Coal Consumption FY30	Supply from Korba CF	Supply from Raigarh CF	Supply from CIC CF	Supply form Captive	Total Chhattisgarh	Others
RAJPURA TPS	NABHA POWER LIMITED	2.7	0.0	0.3	0.0	3.0	2.4	5.4	5.4	2.8	0.0	0.0	0.0	2.8	2.5
GURU HARGOBIND TPP, LEHRA MOHABAT	PSPCL	0.0	0.0	0.0	0.0	0.0	1.3	1.3	4.2	0.0	0.0	0.0	0.0	0.0	4.2
GURU GOBIND SINGH TPP, ROPAR	PSPCL	0.0	0.0	0.4	0.0	0.4	0.7	1.2	3.9	0.0	0.0	0.0	0.0	0.0	3.9
GVK POWER (GOINDWALSAHIB) LTD.	PSPCL	0.0	0.0	0.0	0.0	0.0	1.3	1.3	2.6	0.0	0.0	0.0	0.0	0.0	2.6
TALWANDI SABO POWER LTD	TALWANDI SABO POWER LTD.	0.0	0.0	0.0	0.0	0.0	6.0	6.0	9.2	0.0	0.0	0.0	0.0	0.0	9.2
INDIRA GANDHI	ARAVALI POWER	0.0	0.0	0.0	0.0	0.0	4.7	4.7	6.9	0.0	0.0	0.0	0.0	0.0	6.9
RAJIV GANDHI TPP,Hissar	HPGCL	0.0	0.0	0.0	0.0	0.0	1.9	1.9	5.8	0.0	0.0	0.0	0.0	0.0	5.8
Deen Bandhu Chhotu Ram TPS, YAMUNANAGAR	HPGCL	0.0	0.0	0.0	0.0	0.0	1.8	1.8	2.9	0.0	0.0	0.0	0.0	0.0	2.9
PANIPAT	HPGCL	0.0	0.0	0.0	0.0	0.0	1.9	1.9	3.4	0.0	0.0	0.0	0.0	0.0	3.4
MAHATMA GANDHI TPP	JHAJJAR POWER LIMITED	0.0	0.0	0.0	0.0	0.0	4.7	4.7	5.6	0.0	0.0	0.0	0.0	0.0	5.6
Total		**2.7**	**0.0**	**0.8**	**0.0**	**3.5**	**18.3**	**21.8**	**38.0**	**2.8**	**0.0**	**0.0**	**0.0**	**2.8**	**35.0**

- SECL in Chhattisgarh is expected to supply coal to only Nabha Power Ltd. in Punjab due to long term commitment in form of FSA of 2.8 MT. No coal is currently supplied to Haryana (except for 1 rake qty for a trader) and the same is projected for FY30.
- PSPCL's Pachwara North block in Jharkhand with PRC of 7 MTPA shall be supplying coal to its plants in Lehra Mobabat & Ropar. Other than PSPCL's captive block, CCL is positioned to supply Punjab & Haryana's power sector demand (~9.29 MT). MCL also holds 11.78 MT of FSAs with plants from Punjab & Haryana. Other suppliers include NCL (6.18 MT) & small quantities from ECL due to binding FSA (~1 MT).

O-D Source cluster Mapping – Chhattisgarh to Maharashtra

Chhattisgarh (including Sohagpur and Johilla areas in MP) to Maharashtra total Rail Despatch in FY22 = 21.8 Million Tonnes



Major Coal Consuming Districts of Maharashtra: 2030 (Estimated)

>15 MTPA Coal Consumption	*Nagpur, Chandrapur, Bhandara, Jalgaon*
10-15 MTPA Coal Consumption	*Palghar/Thane*
5-10 MTPA Coal Consumption	*Nashik*
1-5 MTPA Coal Consumption	*Solapur, Pune, Raigad, Ahmednagar, Wardha & Akola*

Expected Load from Chhattisgarh to Maharashtra main trunk lines (Excluding load from other states on this line)

MH's Coal ***Demand 2022 ~ 85 MTPA***
Total Rail Supply by Chhattisgarh ***2022 ~ 21.8 MTPA***

MH's Coal ***Demand 2030 ~ 111 MTPA***
Total Rail Supply by Chhattisgarh ***2022 ~ 56.38 MTPA***

		FY22		FY30	
From	To	Traffic (Tonnes) 2022	Rakes / Day 2022	Traffic (Tonnes) 2030	Rakes / Day 2030
Surajpur Road	Chhulha (Bypassing Anuppur)	514057	0.4	2232179	1.6
Chhulha (Bypassing Anuppur)	Ghutku (Bypassing Bilaspur)	514057	0.4	2232179	1.6
Ghutku (Bypassing Bilaspur)	Raipur	514057	0.4	2232179	1.6
Burhar	Anuppur	101841	0.1	0	0.0
Anuppur	Ghutku (Bypassing Bilaspur)	101841	0.1	0	0.0
Kharsia	Champa	95094	0.1	24123479	17.2
Champa	Bilaspur	20382948	14.5	56305668	40.1
Bilaspur	Raipur	20382948	14.5	56305668	40.1
Raipur	Gondia	20382948	14.5	56305668	40.1
Gondia	Nagpur	14159606	10.1	39247625	27.9
Nagpur	Wardha	10256097	7.3	33085069	23.5
Wardha	Warora	2882292	2.1	12493911	8.9
Wardha	Badera	7373805	5.2	20591158	14.7
Badera	Akola	1887298	1.3	9608494	6.8
Akola	Jalgaon	1887298	1.3	7122813	5.1
Jalgaon	Udhna	1887298	1.3	2448406	1.7
Udhna	Dahanu	1887298	1.3	2448406	1.7

- Major Power plants in Maharashtra include that of Adani Electricity, Adani Power, GMR, NTPC and MAHAHENCO.
- MAHAGENCO has a coal block i.e., Gare Palma Sector-II (23.6 MTPA) in Mandraigarh CF of Chhattisgarh, which could start feeding to Chandrapur and Koradih thermal power plants in Maharashtra. This could replace SECL's coal supply to these two power plants post expiry of FSAs in 2029. Although the load on the circuits would remain the same.

O-D Source cluster Mapping – Significant increase in Chhattisgarh supply to Maharashtra (1/2)

All figures in million tonnes

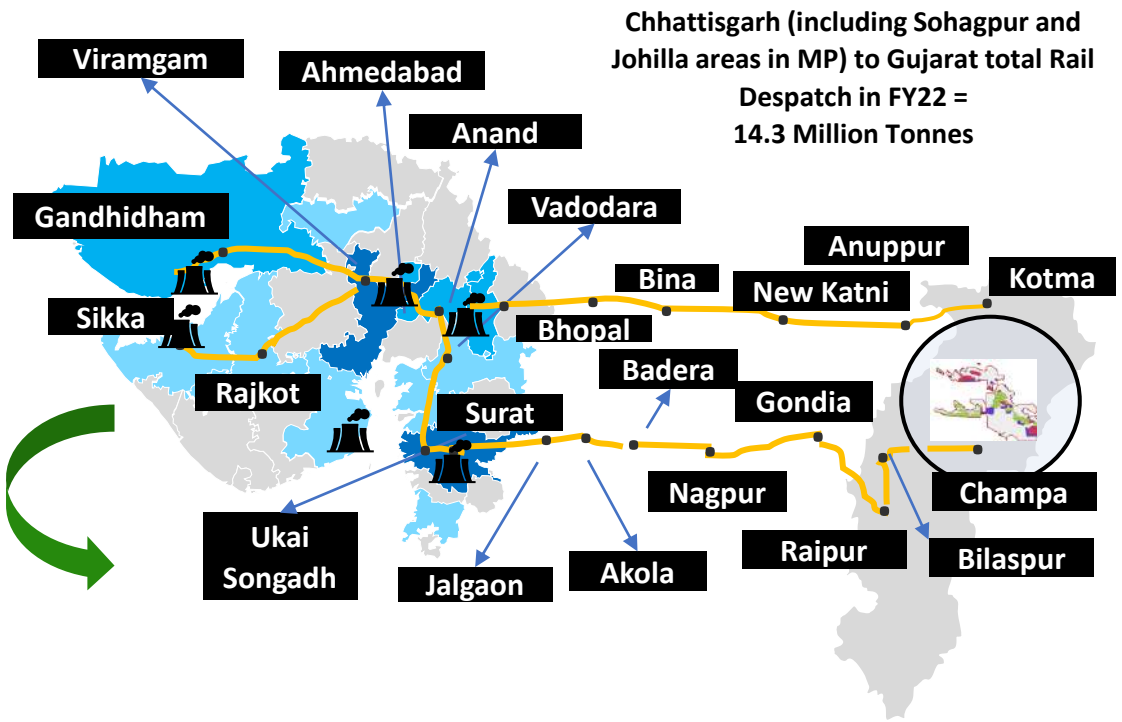
Name of TPS	Utility	Korba CF	Raigarh CF	CIC CF	Captive	Total Chhattisgarh	Others	Total Coal Consumed FY22	Total Coal Consumption FY30	Supply from Korba CF	Supply from Raigarh CF	Supply from CIC CF	Supply form Captive	Total Chhattisgarh	Others
TIRODA	ADANI POWER MAHARASHTRA LTD.	6.2	0.0	0.5	0.0	6.7	7.5	14.2	15.2	7.2	2.0	2.2	0.0	11.4	3.8
ADANI DAHANU	ADANI ELECTRICITY MUMBAI LIMITED	1.5	0.0	0.1	0.0	1.6	0.4	2.0	2.1	1.6	0.5	0.0	0.0	2.1	0.0
DHARIWAL INFRASTRUCTURE Ltd.	DHARIWAL INFRASTRUCTURE LIMITED	1.3	0.0	0.0	0.0	1.3	1.4	2.7	2.9	2.2	0.0	0.0	0.0	2.2	0.7
GMR WARORA ENERGY LTD.	GMR WARORA ENERGY LTD.	1.0	0.0	0.0	0.0	1.0	1.3	2.3	2.8	0.4	0.0	0.0	0.0	0.4	2.4
RATNAGIRI	JSW ENERGY LIMITED	0.0	0.0	0.0	0.0	0.0	2.7	2.7	4.6	0.0	0.0	0.0	0.0	0.0	4.6
BHUSAWAL	MSPGCL	0.0	0.0	0.0	0.0	0.0	4.7	4.7	6.6	3.3	0.0	0.0	0.0	3.3	3.2
CHANDRAPUR	MSPGCL	0.6	0.0	0.0	0.0	0.6	11.0	11.6	15.8	0.0	0.0	0.0	9.9	9.9	6.0
KHAPARKHEDA	MSPGCL	0.5	0.0	0.0	0.0	0.5	5.7	6.2	8.2	2.9	0.0	0.0	0.0	2.9	5.3
KORADI	MSPGCL	3.6	0.1	0.0	0.0	3.7	4.5	8.2	11.2	0.0	0.0	0.0	11.2	11.2	0.0
NASHIK	MSPGCL	0.0	0.0	0.0	0.0	0.0	1.7	1.7	3.7	1.3	0.0	0.0	0.0	1.3	2.4
PARLI	MSPGCL	0.0	0.0	0.0	0.0	0.0	2.0	2.0	3.5	0.0	0.0	0.0	2.5	2.5	1.0
PARAS	MSPGCL	0.0	0.0	0.0	0.0	0.0	2.0	2.0	2.7	0.0	0.0	0.0	0.0	0.0	2.7

O-D Source cluster Mapping – Significant increase in Chhattisgarh supply to Maharashtra (2/2)

Name of TPS	Utility	Korba CF	Raigarh CF	CIC CF	Captive	Total Chhattisgarh	Others	Total Coal Consumed FY22	Total Coal Consumption FY30	Supply from Korba CF	Supply from Raigarh CF	Supply from CIC CF	Supply form Captive	Total Chhattisgarh	Others
MOUDA SUPER TPS	NTPC LTD.	0.3	0.0	0.1	0.0	0.4	8.3	8.7	11.6	1.9	0.0	0.0	0.0	1.9	9.7
SOLAPUR SUPER TPS	NTPC LTD.	0.0	0.0	0.0	0.0	0.0	3.3	3.3	5.9	0.0	0.0	0.0	0.0	0.0	5.9
AMARAVATI TPS	RATTANINDIA POWER LTD.	5.6	0.0	0.0	0.0	5.6	0.3	5.9	6.3	6.3	0.0	0.0	0.0	6.3	0.0
TROMBAY	THE TATA POWER COMPANY LIMITED	0.0	0.0	0.0	0.0	0.0	2.3	2.3	2.7	0.0	0.0	0.0	0.0	0.0	2.7
SAI WARDHA POWER Ltd., WARORA	SAI WARDHA POWER GENERATION PVT LTD.	0.0	0.0	0.0	0.0	0.0	1.5	1.5	2.5	0.0	0.0	0.0	0.0	0.0	2.5
Total		**20.6**	**0.1**	**0.7**	**0.0**	**21.4**	**60.5**	**81.9**	**108.3**	**27.2**	**2.5**	**2.2**	**23.6**	**55.5**	**52.8**

- It has been assumed that due to increase in availability of coal from SECL, power plants would prefer each area's coal due to proximity of assets to the respective SECL areas and SECL mines.
- With WCL's limited growth potential from current dispatch of ~64 MT in FY22 to ~70 MT in FY30, growth of ~2-3 MT considered as quantity for auctions due to potential of higher premiums. WCL's dispatch to Maharashtra's power plants in FY22 was ~37.5 MT and is expected to increase slightly to ~41 MT for FY30.
- Additional demand from power sector in Maharashtra would have to be catered by SECL (~32 MT) and Mahagenco's captive GP Sector II block (~23.6 MT) from Chhattisgarh
- The balance power sector demand is envisaged to be met by MCL's FSAs (~8 MT) and imported coal for plants like Trombay and blending for JSW Energy Ratnagiri (~3.8 MT)

O-D Source cluster Mapping – Chhattisgarh to Gujarat



Chhattisgarh (including Sohagpur and Johilla areas in MP) to Gujarat total Rail Despatch in FY22 = 14.3 Million Tonnes

Major Coal Consuming Districts of Gujarat: 2030 (Estimated)

>15 MTPA Coal Consumption	*NA*
10-15 MTPA Coal Consumption	*Ahmedabad, Surat, Tapi*
5-10 MTPA Coal Consumption	*Kachchh, Gandhinagar, Kheda*
1-5 MTPA Coal Consumption	*Valsad, Bharuch, Vadodara, Chhota udepur, Patan, Jamnagar, Dwarka, Bhavnagar*

Expected Load from Chhattisgarh to Gujarat main trunk lines (Excluding load from other states on this line)

*Gujarat's Coal **Demand 2022 ~ 30 MTPA***

*Rail Supply by Chhattisgarh **2022 ~ 7.06 MTPA***

*Gujarat's Coal **Demand 2030 ~ 39 MTPA***

*Rail Supply by Chhattisgarh **2030 ~ 21.99 MTPA***

		FY22		FY30	
From	To	Traffic (Tonnes) 2022	Rakes / Day 2022	Traffic (Tonnes) 2030	Rakes / Day 2030
Kharsia	Champa	116570	0.1	414274	0.3
Champa	Bilaspur	5714580	4.1	19658560	14.0
Bilaspur	Raipur	5714580	4.1	19658560	14.0
Raipur	Gondia	5714580	4.1	19658560	14.0
Gondia	Nagpur	5714580	4.1	19658560	14.0
Nagpur	Wardha	5714580	4.1	19658560	14.0
Wardha	Badera	5714580	4.1	19658560	14.0
Badera	Akola	5714580	4.1	19658560	14.0
Akola	Jalgaon	5714580	4.1	19658560	14.0
Jalgaon	Ukai Songadh	5776533	4.1	19658560	14.0
Ukai Songadh	Vadodara	4491588	3.2	15836933	11.3
Vadodara	Anand	4491588	3.2	15836933	11.3
Anand	Ahmedabad	3615604	2.6	9307384	6.6
Ahmedabad	Viramgam	1455836	1.0	5352453	3.8
Viramgam	Gandhidham	1455836	1.0	5352453	3.8
Surajpur Road	Anuppur	1948367	1.4	1964027	1.4
Anuppur	New Katni	1948367	1.4	1964027	1.4
Burhar	New Katni	947881	0.7	370399	0.3
New Katni	Bina Malkhedi	2896248	2.1	2334426	1.7
Bina Malkhedi	Bhopal	2896248	2.1	2334426	1.7
Bhopal	Itarsi	61953	0.0	0	0.0
Itarsi	Khandwa	61953	0.0	0	0.0
Khandwa	Jalgaon	61953	0.0	0	0.0
Bhopal	Nagda	2834296	2.0	2334426	1.7
Nagda	Godhra	2834296	2.0	2334426	1.7
Godhra	Anand	1672895	1.2	1341656	1.0
Godhra	Vadodara	132212	0.1	578497	0.4

O-D Source cluster Mapping – Increase in Chhattisgarh's supply to Gujarat

All figures in million tonnes

Name of TPS	Utility	Korba CF	Raigarh CF	CIC CF	Captive	Total Chhattisgarh	Others	Total Coal Consumed FY22	Total Coal Consumption FY30	Supply from Korba CF	Supply from Raigarh CF	Supply from CIC CF	Supply form Captive	Total Chhattisgarh	Others
MUNDRA TPS	ADANI POWER (MUNDRA) LIMITED	1.5	0.0	0.0	0.0	1.5	5.1	6.6	15.7	5.4	0.0	0.0	0.0	5.4	10.4
MUNDRA UMPP	Coastal Gujarat Power Limited	0.0	0.0	0.0	0.0	0.0	0.4	0.4	1.0	0.0	0.0	0.0	0.0	0.0	1.0
GANDHINAGAR	Gujarat State Electricity Corporation Limited	1.4	0.0	0.4	0.0	1.8	0.4	2.2	2.6	2.6	0.0	0.0	0.0	2.6	0.0
SIKKA	Gujarat State Electricity Corporation Limited	0.0	0.0	0.0	0.0	0.0	0.5	0.5	1.5	0.0	0.0	0.0	0.0	0.0	1.5
UKAI	Gujarat State Electricity Corporation Limited	2.5	0.0	0.1	0.0	2.6	0.9	3.4	4.7	3.8	0.0	0.0	0.0	3.8	0.9
WANAKBORI	Gujarat State Electricity Corporation Limited	5.9	0.1	1.0	0.0	7.0	0.5	7.6	9.6	7.5	0.4	0.4	0.0	8.3	1.3
SABARMATI TPS	TORRENT POWER LTD.	0.0	0.0	1.2	0.0	1.2	0.2	1.4	1.4	0.0	0.0	1.1	0.0	1.1	0.3
Total		**11.3**	**0.1**	**2.7**	**0.0**	**14.1**	**7.9**	**22.0**	**36.5**	**19.2**	**0.4**	**1.5**	**0.0**	**21.2**	**15.4**

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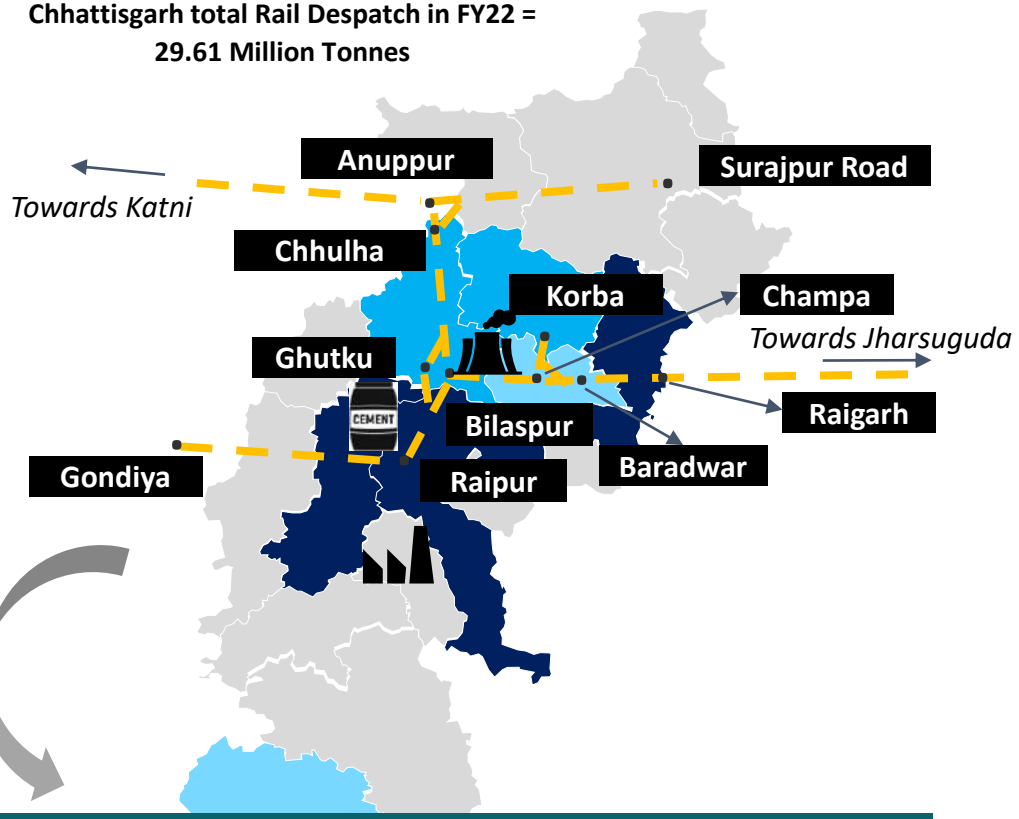
- Adani Power's Mundra plant sourced ~1.5 MT from SECL and ~1.87 MT from WCL in FY22, accounting for a total domestic coal consumption of ~50% even though the plant is listed as 'Power Plants designed on Imported Coal' by CEA. Further optimizing import to 40% in FY30 by Adani Power-Mundra, SECL has the opportunity to supply additional coal, other than existing FSA with WCL.
- Due to presence of import-based & imported coal-blending based power plants, expected coal supply from imports is the majority of the 'Others' at ~8.86 MT followed by WCL (~5.22) and NCL (~1 MT).

O-D Source cluster Mapping – Chhattisgarh's internal consumption

Chhattisgarh (including Sohagpur and Johilla areas in MP) to Chhattisgarh total Rail Despatch in FY22 = 29.61 Million Tonnes



Major Coal Consuming Districts of Chhattisgarh: 2030 (Estimated)

>15 MTPA Coal Consumption	*Raipur, Raigarh, Durg*
5-10 MTPA Coal Consumption	*Korba, Bilaspur*
1-5 MTPA Coal Consumption	*Janjgir-Champa, Bijapur-Dantewada-Sukma cluster*

Expected Load from Chhattisgarh to Chhattisgarh main trunk lines (Excluding load from other states on this line)

Chhattisgarh's Coal ***Demand 2022 ~ 124.47 MTPA***

Rail Supply by Chhattisgarh ***2022 ~ 29.61 MTPA***

FY22

From	To	Traffic (MTPA)	Rakes / Day
Burhar	Anuppur	47866	0.03
Anuppur	Chhulha	47866	0.03
Surajpur Road	Chhulha	1636130	1.16
Chhulha	Ghutku	830640	0.59
Chhulha	Bilaspur	814358	0.58
Champa	Bilaspur	11008090	7.83
Champa	Baradwar	10137281	7.21
Baradwar	Kharsia	18444196	13.13
Kharsia	Jharsuguda	7900239	5.62
Ghutku	Raipur	830640	0.59
Bilaspur	Raipur	3604064	2.56
Raipur	Gondiya	1787163	1.27

Chhattisgarh's Coal ***Demand 2030 ~ 162.64 MTPA***

Rail Supply by Chhattisgarh ***2030 ~ 93.38 MTPA***

FY30

From	To	Traffic (MTPA)	Rakes / Day
Burhar	Anuppur	185860	0.13
Anuppur	Chhulha	185860	0.13
Surajpur Road	Chhulha	3097028	2.20
Chhulha	Ghutku	2015597	1.43
Chhulha	Bilaspur	1215604	0.87
Champa	Bilaspur	45592153	32.44
Champa	Baradwar	25715719	18.30
Baradwar	Kharsia	40936193	29.13
Kharsia	Jharsuguda	44561917	31.71
Ghutku	Raipur	2015597	1.43
Bilaspur	Raipur	14876656	10.59
Raipur	Gondiya	4106187	2.92

- Quantities of Lanco Amarkantak, BALCO, NTPC Sipat, Korba West and NTPC Korba have not been considered in trunk line analysis as these are located in Korba district
- Chhattisgarh Steel & Power Ltd., located in Janjgir-Champa district, quantity has not been considered in trunk line analysis as it located on the Champa-Korba line *(Quantity: 43.93 kT)*
- Traffic on Baradwar-Champa, Kharsia-Baradwar & Champa-Bilaspur sections have been considered for both ways
- The stations of Chhulha, Ghutku and Baradwar considered for traffic bypassing junctions of Anuppur, Bilaspur and Champa respectively

O-D Source cluster Mapping – Significant increase in Chhattisgarh's internal consumption (1/2)

All figures in million tonnes

Name of TPS	Utility	Korba CF	Raigarh CF	CIC CF	Captive	Total Chhattisgarh	Others	Total Coal Consumed FY22	Total Coal Consumption FY30	Supply from Korba CF	Supply from Raigarh CF	Supply from CIC CF	Supply form Captive	Total Chhattisgarh	Others
KASAIPALI	ACB (INDIA) Ltd.	0.5	0.0	0.0	0.0	0.5	1.1	1.6	3.7	3.7	0.0	0.0	0.0	3.7	0.0
Atal Bihari Vajpayee TPP: Korba East	CSPGCL	2.4	0.0	0.0	1.1	3.6	0.0	3.6	6.1	1.1	0.0	0.0	5.0	6.1	0.0
Dr. Shyama Prasad Mukharjee TPP: Marwa	CSPGCL	0.3	0.1	0.0	2.5	2.9	0.0	2.8	3.0	2.0	1.0	0.0	0.0	3.0	0.0
Hasdeo TPP: Korba West	CSPGCL	6.7	0.0	0.0	0.0	6.7	0.0	6.7	8.4	8.4	0.0	0.0	0.0	8.4	0.0
BALCO TPP	BALCO	5.2	0.1	0.0	0.0	5.3	0.0	5.3	7.6	6.6	0.0	0.0	1.0	7.6	0.0
O.P.Jindal Super TPP (Stage-I)	JINDAL POWER LIMITED	0.0	0.0	0.0	0.0	0.0	4.1	4.1	6.5	0.0	6.5	0.0	0.0	6.5	0.0
TAMNAR TPP	JINDAL POWER LIMITED	1.4	4.5	0.0	0.3	6.2	1.7	7.9	16.2	0.0	10.8	0.0	0.0	10.8	5.4
KMPCL - NARIYARA	KSK MAHANADI POWER COMPANY LIMITED	3.7	0.0	0.6	0.0	4.3	1.5	5.8	9.6	8.4	0.0	1.2	0.0	9.6	0.0
LANCO AMARKANTAK TPS	LANCO AMARKANTAK POWER LIMITED	2.2	0.2	0.0	0.0	2.4	0.4	2.8	3.4	3.4	0.0	0.0	0.0	3.4	0.0
MCCPL BANDHAKHAR	MARUTI CLEAN COAL AND POWER LIMITED	1.2	0.0	0.0	0.0	1.2	0.3	1.5	1.7	1.7	0.0	0.0	0.0	1.7	0.0
BHILAI PP - III	NTPC - SAIL POWER COMPANY LIMITED (NTPC-JV)	1.4	0.1	0.0	0.0	1.5	1.2	2.7	3.1	3.0	0.1	0.0	0.0	3.1	0.0

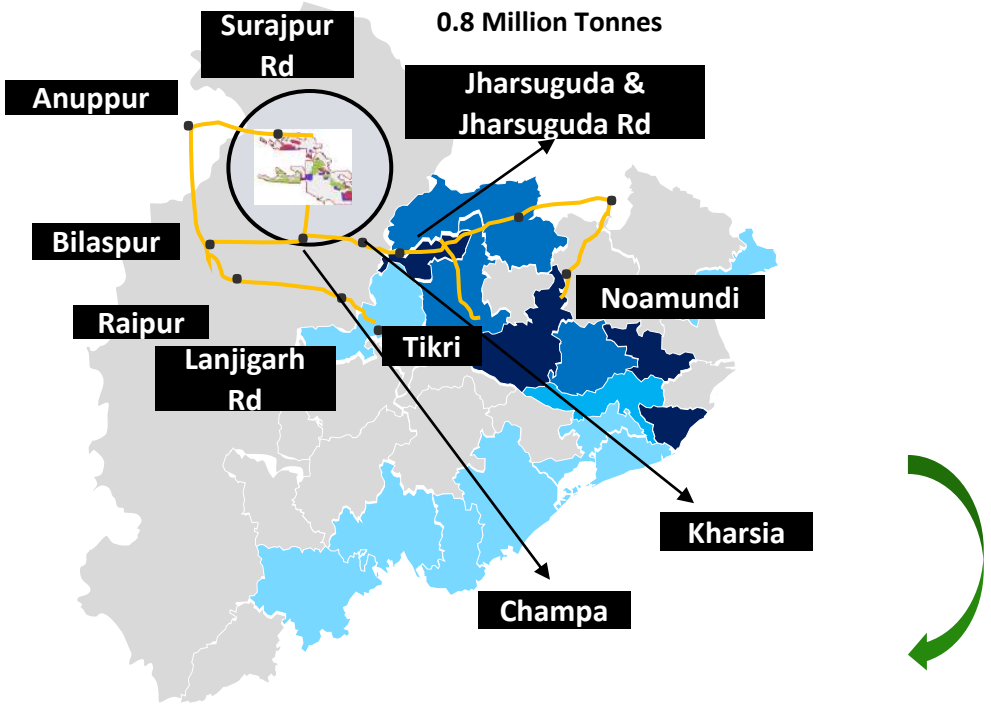
O-D Source cluster Mapping – Significant increase in Chhattisgarh's internal consumption (2/2)

Name of TPS	Utility	Korba CF	Raigarh CF	CIC CF	Captive	Total Chhattisgarh	Others	Total Coal Consumed FY22	Total Coal Consumption FY30	Supply from Korba CF	Supply from Raigarh CF	Supply from CIC CF	Supply form Captive	Total Chhattisgarh	Others
KORBA SUPER	NTPC LTD.	13.9	0.0	0.0	0.0	13.9	0.0	13.9	14.0	14.0	0.0	0.0	0.0	14.0	0.0
SIPAT SUPER	NTPC LTD.	14.1	0.0	0.0	0.0	14.1	0.0	14.1	16.3	16.3	0.0	0.0	0.0	16.3	0.0
R.K.M. POWERGEN PVT. LTD	R.K.M. POWERGEN PVT. LTD	2.9	0.7	0.0	0.0	3.6	1.7	5.3	9.1	7.3	1.8	0.0	0.0	9.1	0.0
RAIPUR TPP	RAIPUR ENERGEN LIMITED	1.1	0.0	0.0	0.0	1.2	5.0	6.2	7.9	7.9	0.0	0.0	0.0	7.9	0.0
RATIJA TPS	ACB (INDIA) Ltd.	0.8	0.0	0.0	0.0	0.8	0.0	0.8	1.0	1.0	0.0	0.0	0.0	1.0	0.0
SKS POWER GENERATION (CH) LTD.	SKS POWER GENERATION (CHHATTISGARH) LIMITED	0.8	0.3	0.0	0.0	1.1	0.1	1.2	3.6	0.0	3.6	0.0	0.0	3.6	0.0
RAIGARH TPP	TRN ENERGY PRIVATE LIMITED	0.1	0.3	0.0	0.0	0.4	0.1	0.6	3.9	0.0	3.9	0.0	0.0	3.9	0.0
LARA SUPER TPS	NTPC LTD.	0.0	0.0	0.3	0.0	0.3	7.5	7.8	9.0	0.0	0.0	0.0	9.0	9.0	0.0
RAIGARH TPP	RAIGARH ENERGY GENERATION LIMITED	0.4	0.2	0.0	0.0	0.6	2.2	2.8	3.7	0.0	1.1	0.0	0.0	1.1	2.6
DB POWER	DB POWER LIMITED	2.4	1.5	0.0	0.0	3.9	2.5	6.5	7.4	7.4	0.0	0.0	0.0	7.4	0.0
Total		**61.6**	**8.1**	**0.9**	**3.9**	**74.4**	**29.5**	**103.9**	**145.3**	**92.2**	**28.9**	**1.2**	**15.0**	**137.3**	**8.0**

- It has been assumed that due to increase in availability of coal from SECL, power plants would prefer each area's coal due to proximity of assets to the respective areas. SECL mines. Therefore, plants such as DB Power, Raipur Energen, OP Jindal, Bhilai PP, NTPC Lara etc. would stop sourcing coal from MCL altogether.
- NTPC Lara would shift entirely to NTPC's Talaipalli Block (In Mand Raigarh Region) with additional capacity from Talaipalli block available for NTPC's other power plants

O-D Source cluster Mapping – Chhattisgarh to Odisha

Chhattisgarh (including Sohagpur and Johilla areas in MP) to Odisha total Rail Despatch in FY22 = 0.8 Million Tonnes



Major Coal Consuming Districts of Odisha: 2030 (Estimated)

>15 MTPA Coal Consumption	*Jharsuguda, Angul, Jajpur, Jagatsinghpur*
10-15 MTPA Coal Consumption	*Sundergarh, Sambalpur, Dhenkanal*
5-10 MTPA Coal Consumption	*Cuttack*
1-5 MTPA Coal Consumption	*Koraput, Rayagada, Gagapati, Ganjam, Khordha, Puri, Bargarh, Balasore*

Expected Load from Chhattisgarh to Odisha main trunk lines (Excluding load from other states on this line)

*Odisha's Coal **Demand 2022 ~ 99 MTPA***

*Rail Supply by Chhattisgarh **2022 ~ 0.8 MTPA***

*Odisha's Coal **Demand 2030 ~ 147 MTPA***

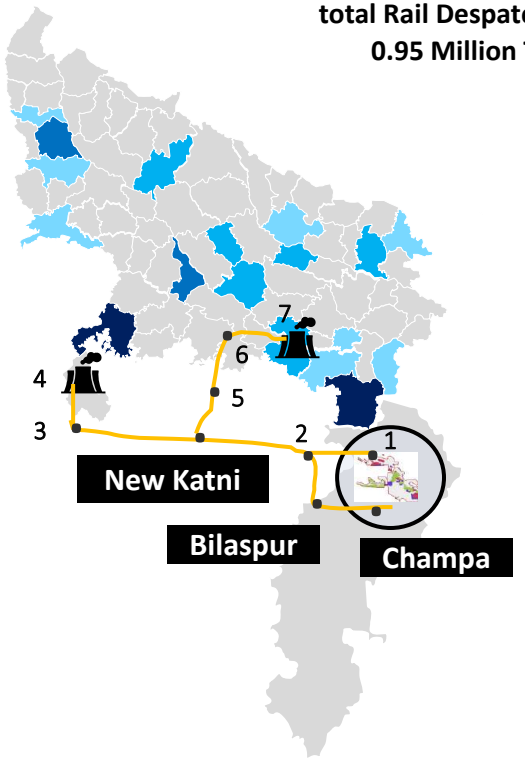
*Rail Supply by Chhattisgarh **2030 ~ 1.44 MTPA***

		FY22		FY30	
From	To	Traffic (Tonnes) 2022	Rakes / Day 2022	Traffic (Tonnes) 2030	Rakes / Day 2030
Surajpur Road	Chhulha (Bypassing Anuppur)	27189.4	0.02	36036	0.03
Chhulha (Bypassing Anuppur)	Ghutku (Bypassing Bilaspur)	7655.7	0.01	10147	0.01
Chhulha (Bypassing Anuppur)	Bilaspur	19533.7	0.01	25890	0.02
Ghutku (Bypassing Bilaspur)	Raipur	7655.7	0.01	10147	0.01
Raipur	Titlagarh	113812.2	0.08	182903	0.13
Titlagarh	Lanjigarh Road	113812.2	0.08	182903	0.13
Lanjigarh Road	Tikri	113812.2	0.08	182903	0.13
Champa	Bilaspur	106156.5	0.08	172756	0.12
Bilaspur	Raipur	106156.5	0.08	172756	0.12
Kharsia	Champa	101972.5	0.07	164568	0.12
Bilaspur	Champa	19533.7	0.01	25890	0.02
Champa	Kharsia	19533.7	0.01	25890	0.02
Kharsia	Jharsuguda	19533.7	0.01	25890	0.02
Jharsuguda	Rourkela	19533.7	0.01	25890	0.02
Rourkela	Barabambo	19533.7	0.01	25890	0.02
Barabambo	Noamundi	19533.7	0.01	25890	0.02
Baradwar	Kharsia	635835.1	0.45	1236783	0.88
Kharsia	Jharsuguda Rd	643204.1	0.46	1236783	0.88
Jharsuguda Rd	Brundamal	643204.1	0.46	1236783	0.88
Brundamal	Lapanga	616917.1	0.44	1236783	0.88

- Only NRS sector in Odisha is sourcing coal from SECL. Hindalco's Gare Palma IV-5 (PRC of 1 MTPA) could replace the small quantities of coal being procured by SECL (for Utkal Alumina as well as Aditya Aluminium)
- Other consumers include Vedanta Limited and Rungta Mines

O-D Source cluster Mapping – Chhattisgarh to Uttar Pradesh

Chhattisgarh (including Sohagpur and Johilla areas in MP) to UP total Rail Despatch in FY22 = 0.95 Million Tonnes



1	Surajpur Road
2	Anuppur
3	Bina Malkhedi
4	Lalitpur
5	Satna
6	Manikpur
7	Prayagraj Chheoki

Major Coal Consuming Districts of UP: 2030 (Estimated)

>15 MTPA Coal Consumption	*Jhansi, Sonbhadra*
10-15 MTPA Coal Consumption	*Bulandsahar, Kanpur*
5-10 MTPA Coal Consumption	*Prayagraj, Rae Bareli, Lucknow, Shahjahanpur, Ambedkar Nagar, Gorakhpur*
1-5 MTPA Coal Consumption	*Ghaziabad, Hapur, Gautam Buddha Nagar, Aligarh, Agra, Kushinagar, Gonda*

Expected Load from Chhattisgarh to UP main trunk lines (Excluding load from other states on this line)

*UP's Coal **Demand 2022 ~ 87 MTPA***
*Rail Supply by Chhattisgarh **2022 ~ 0.95 MTPA***

*UP's Coal **Demand 2030 ~ 114 MTPA***
*Rail Supply by Chhattisgarh **2030 ~ 1 MTPA***

		FY22		FY30	
From	**To**	**Traffic (Tonnes) 2022**	**Rakes / Day 2022**	**Traffic (Tonnes) 2030**	**Rakes / Day 2030**
Baikunthpur Road	Annupur	556244	0.40	1000000	0.71
Annupur	New Katni	563976	0.40	1000000	0.71
Burhar	New Katni	352035	0.25	0	0.00
New Katni	Bina Malkhedi	908280	0.65	1000000	0.71
Bina Malkhedi	Lalitpur	908280	0.65	1000000	0.71
New Katni	Satna	7732	0.01	0	0.00
Satna	Manikpur	7732	0.01	0	0.00
Manikpur	Prayagraj Chheoki	7732	0.01	0	0.00
Champa	Bilaspur	7732	0.01	0	0.00
Bilaspur	Annupur	7732	0.01	0	0.00

- Around ~6.6 GW of coal-based capacity is under construction in Uttar Pradesh, which is likely to increase the coal demand substantially for the state.
- Currently only Meja Urja Nigam Pvt Limited and Lalitpur Power Generation Company Limited are the two power plants sourcing coal from SECL. Meja is sourcing from Dipka and Kusmunda areas while Lalitpur Power G Ltd is sourcing from Bhatgaon, Chirimiri, Hasdeo and Sohagpur areas. Only Lalitpur is expected to source coal from SECL in FY30 due to binding FSA from Korea Rewa CF

SECL would need to push certain volumes in order to match the production levels

All figures in million tonnes

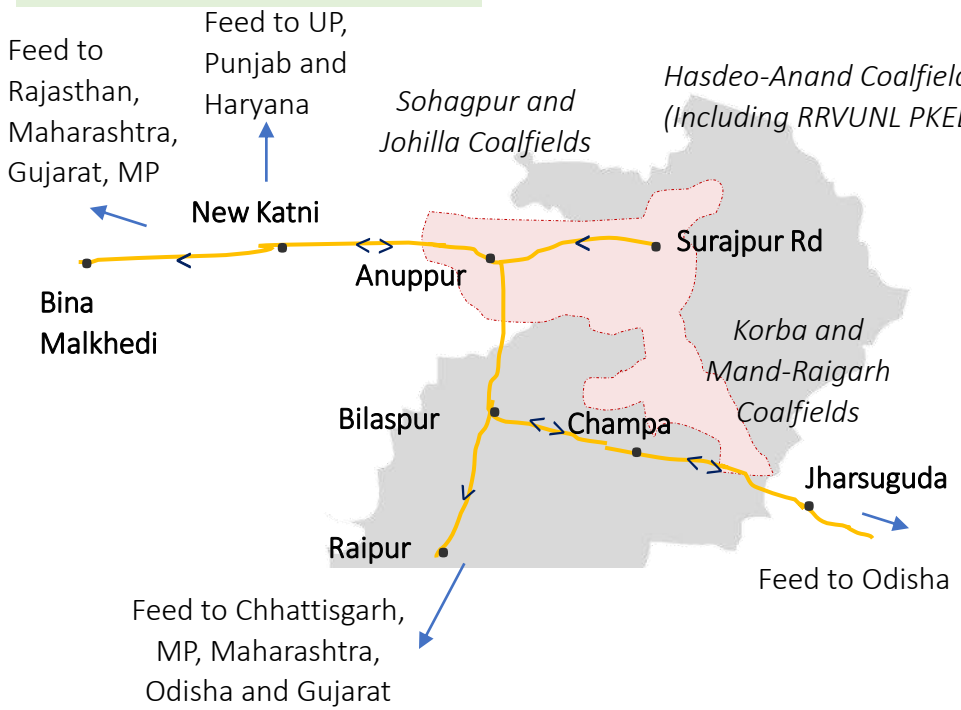
Destination State	Korba CF	Raigarh CF	CIC CF	Total SECL
Chhattisgarh	57.9	28.9	3.3	90.0
Madhya Pradesh	8.2	0.0	35.5	43.7
Maharashtra	28.0	2.5	2.2	32.8
Punjab & Haryana	2.8	0.0	0.0	2.8
Rajasthan	1.5	0.3	1.7	3.5
Gujarat	19.2	0.4	1.5	21.2
Odisha	1.4	0.0	0.0	1.4
Uttar Pradesh	0.0	0.0	1.0	1.0
Total for 2030	**119.0**	**32.1**	**45.3**	**196.4**
Rail Dispatch Plan for SECL	**140.6**	**38.1**	**50**	**229**
Identified Gap	**21.6**	**6.0**	**5.1**	**32.7**

Identified Gap	21.6	6.0	5.1	32.7
E-auction Sales Rail Mode @50% of 14.42% of Long-term rail mode commitment for FY30	8.6	2.3	3.3	14.2
Remaining Gap	13.0	3.7	1.8	18.5

A proactive marketing strategy needs to be articulated by the marketing team to further push surplus production volumes from SECL. Strict competition from captive & commercial mines expected.

O-D Source cluster Mapping – Additional supply from SECL (e-auctions + push volumes) & Other Commercial Mines (such as Banai-Bhalumunda of JSW Steel etc.)

Option 1: Towards Champa-Bilaspur-Annupur-onwards



Option 2: Towards Champa-Bilaspur-Raipur-onwards

Option 3: Towards Odisha

Option 3 is unviable due to excess push volumes from MCL and no additional demand from Odisha, except for JSW Steel's Banai-Bhalumunda block which shall feed to its plants in Odisha

Adding estimated traffic to possible routes

As it is not prudent to assume the future EUPs/destination of this surplus coal to be pushed into the market at this stage, the estimated traffic has been distributed proportionately among possible route options (trunk lines for evacuation)

From	To	Traffic 2030 (Tonnes)	Rakes/Day
Champa	Bilaspur	29.4	20.95
Bilaspur	Anuppur	23.1	16.44
Anuppur	New Katni	35.6	25.36
New Katni	Bina Malkhedi	35.6	25.36
Surajpur Road	Anuppur	7.8	5.55
Bilaspur	Raipur	26.1	18.58
Baradwar/Kharsia	Jharsuguda & Jharsuguda Rd	7.5	5.34

SECL to face stiff competition from blocks in vicinity of SECL & MCL both

Illustrative Competition from blocks:

- Dipside Manoharpur (OPCL)
- Bijhan (Mahanadi Mines & Minerals)
- Talabira II & III (NLC)
- Baitrani West (OMC)
- New Patrapara & Naini (SCCL)
- Radhikapur East (Emil mines & minerals)
- Bhaskarpara Block (Prakash Industries)

O-D Source cluster Mapping – Consolidated Coal Traffic from Chhattisgarh (including SECL areas in MP) to all states including push volumes - ODS

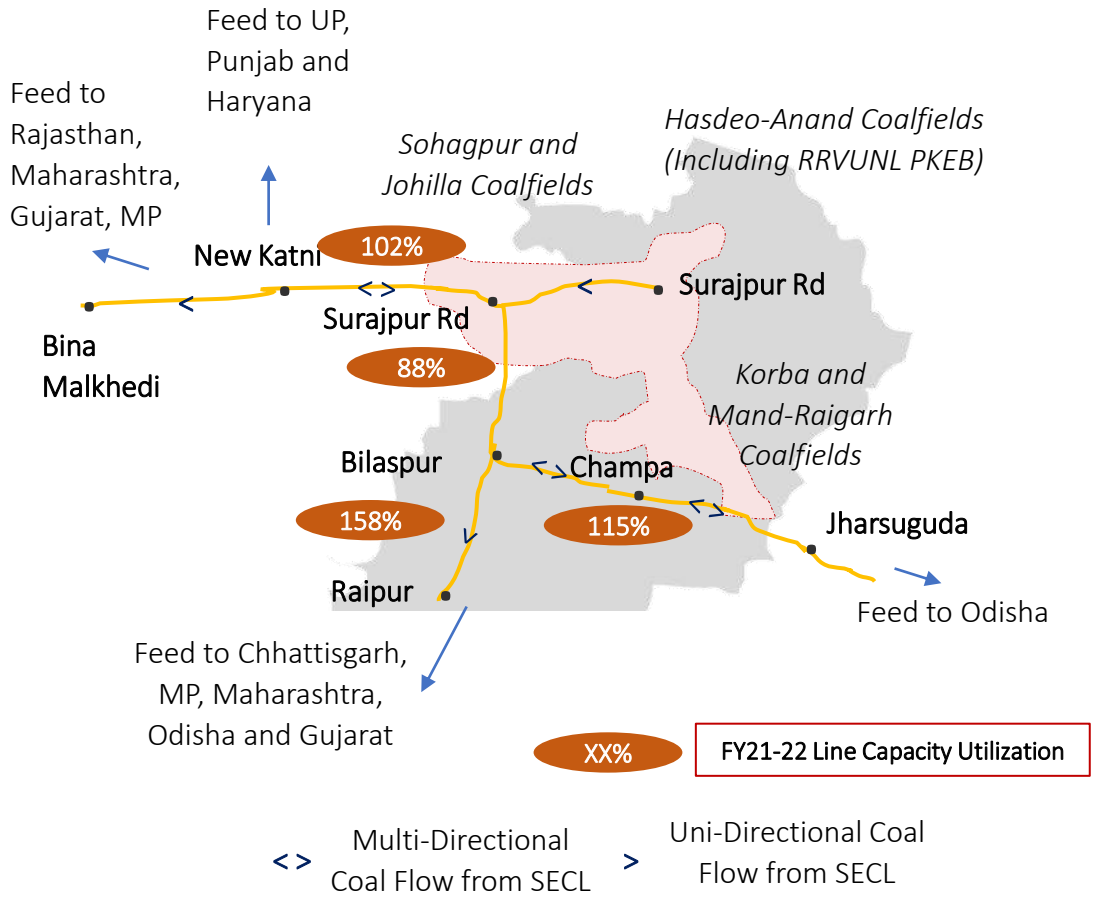
ODS: Optimistic Demand Scenario

FY22 Actual and FY30 (Estimated) coal traffic in major sections for despatch of coal from Chhattisgarh (Including Sohagpur and Johilla) to various destinations

From	To	Traffic (MT): 2022	Rakes / Day: 2022	Traffic (MT): 2030	Rakes / Day: 2030	Increase in Coal Traffic (Rakes / Day)
Champa	**Bilaspur**	53.85	**38.32**	200.16	**142.43**	**+104.11**
Bilaspur	**Anuppur**	17.21	**12.25**	51.03	**36.31**	**+24.06**
Anuppur	**New Katni**	39.88	**28.38**	126.33	**89.90**	**+61.53**
New Katni	**Bina Malkhedi**	9.95	**7.08**	63.45	**45.15**	**+38.09**
Surajpur Road	**Anuppur**	21.88	**15.57**	73.69	**52.44**	**+36.88**
Bilaspur	**Raipur**	30.64	**21.81**	145.42	**103.48**	**+81.68**
Baradwar	**Jharsuguda & Jharsuguda Rd**	8.56	**6.09**	53.88	**38.34**	**+32.25**

Major sections are already witnessing significant coal traffic and is estimated to further increase in the coming decade.

Currently. Almost all of these sections are operating at >100% capacity utilization levels and hence solutions shall be in place to ensure seamless coal flow in future



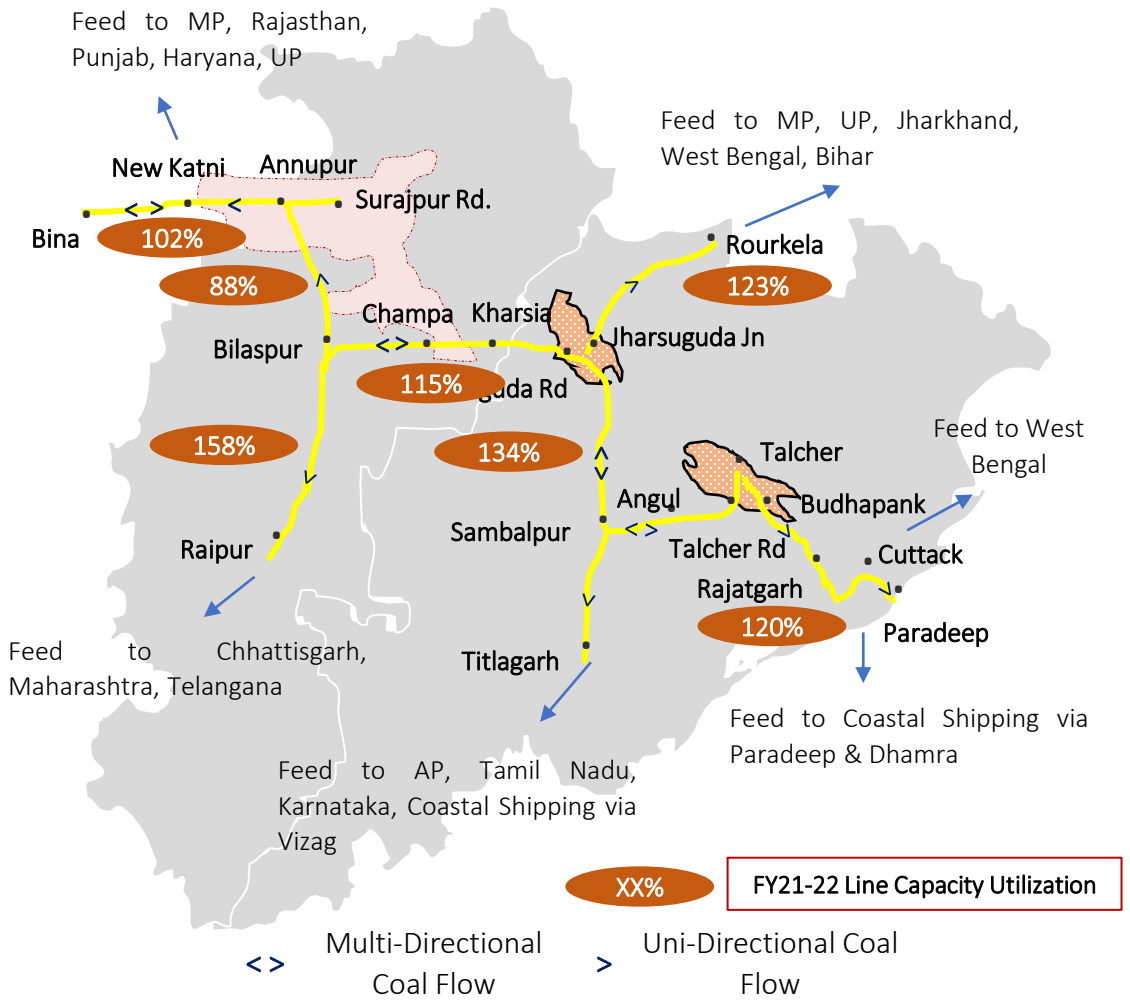
O-D Source cluster Mapping – Consolidated Coal Traffic on railways from Odisha & Chhattisgarh (including SECL areas in MP) to all states - ODS

ODS: Optimistic Demand Scenario

FY22 Actual and FY30 (Estimated) coal traffic in major sections for despatch of coal from Chhattisgarh (Including Sohagpur and Johilla) to various destinations

From	To	Traffic (MT): 2022	Rakes / Day: 2022	Traffic (MT): 2030	Rakes / Day: 2030	Increase in Coal Traffic (Rakes / Day)
Champa	**Bilaspur**	74.06	**52.70**	278.93	198.49	**+145.79**
Bilaspur	**Anuppur**	24.97	**17.76**	92.23	65.63	**+47.87**
Anuppur	**New Katni**	47.61	**33.87**	167.53	119.22	**+85.34**
New Katni	**Bina Malkhedi**	15.24	**10.84**	96.80	68.88	**+58.04**
Surajpur Road	**Anuppur**	21.86	**15.56**	73.69	52.44	**+36.88**
Bilaspur	**Raipur**	39.55	**28.15**	180.92	128.75	**+100.60**
Baradwar	**Jharsuguda & Jharsuguda Rd**	40.52	**28.83**	143.15	101.87	**+73.03**

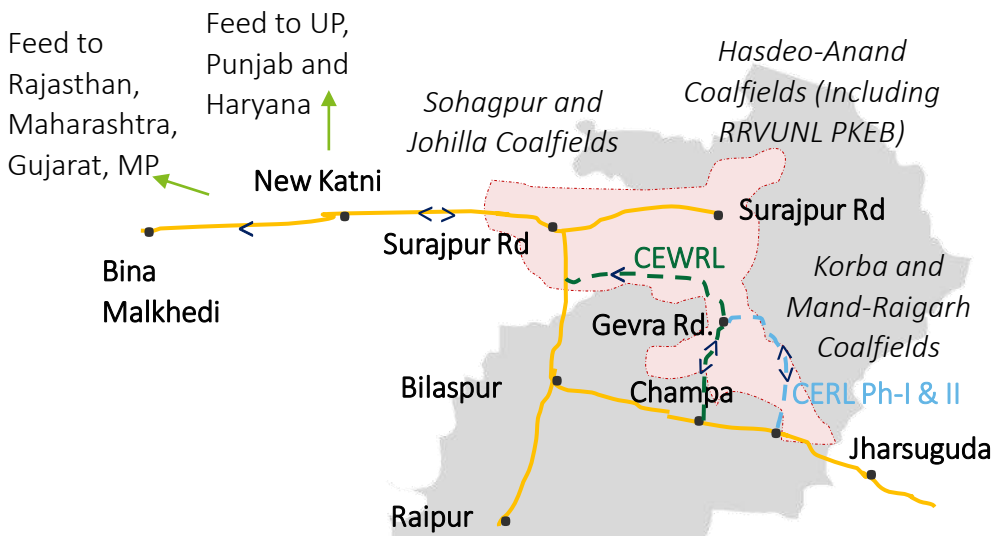
Major sections are already witnessing significant coal traffic and is estimated to further increase in the coming decade.



Ongoing works to ensure rail evacuation capacity to trunk lines – Adding rail load of CIL on CERL & CEWRL)

Rail Evacuation from Korba & Raigarh Coalfields:

193.7 MTPA out of which
Korba CF: 140.56 MTPA
Mand-Raigarh CF: 38.14 MTPA



Korba CF (Korba, Dipka, Gevra & Kusmunda) as well as Mand-Raigarh CF of SECL to benefit from CEWRL

Trunk Line	Section	Anticipated Traffic for FY30 (MTPA)	Rakes/Day
CERL Ph-I	Raigarh CF-Kharsia	30.0	21.3
CERL Ph-II	Raigarh CF-Gevra Rd.	8.1	5.8
CEWRL	Gevra Rd.-Pendra Rd.	65.0	46.3
Existing Infra with Modifications	Gevra Rd.-Champa	83.7	59.6

- CIL blocks in Mand-Raigarh coalfield to use CERL Ph-I and subsequently CERL Ph-II to join CEWRL at Gevra Road for traffic bound for Anuppur-Katni

Evacuation from Korba Coalfields: Korba, Dipka, Gevra & Kusmunda

187 MTPA out of which Rail: 140.56 MTPA

Evacuation Enabler for coal flow towards Champa

Proposed Solution/Enabler

1) Korba yard Modification (Work in progress)
2) Automatic Signalling from Gevra Road to Champa (Tendering already done by SECR(IR)).
3) Doubling of Line from Dipka to Junadih (Currently single line – under consideration of SECL)
4) 700m Connectivity from Dipka Siding to NTPC Seepat MGR bulb for directly evacuating to Gatora station, bypassing Champa (SECR(IR) and NTPC, under consideration of SECL). Commercial terms to be expedited
5) Speed Enhancement of Trains, Ballasting (Complete track renewal) (works under progress by SECR(IR) and SEC)

*However, even if CEWRL is not commissioned during desirable timelines, leveraging the solutions mentioned above, **SECL would be able to add another 46 MTPA coal evacuation capacity via Rail, which will take up the realistic evacuation capacity from ~223 MTPA to ~260 MTPA***

O-D Source cluster Mapping – Consolidated Coal Traffic on railways from Odisha & Chhattisgarh (including SECL areas in MP) to all states with addition of CERL/CEWRL network - ODS

ODS: Optimistic Demand Scenario

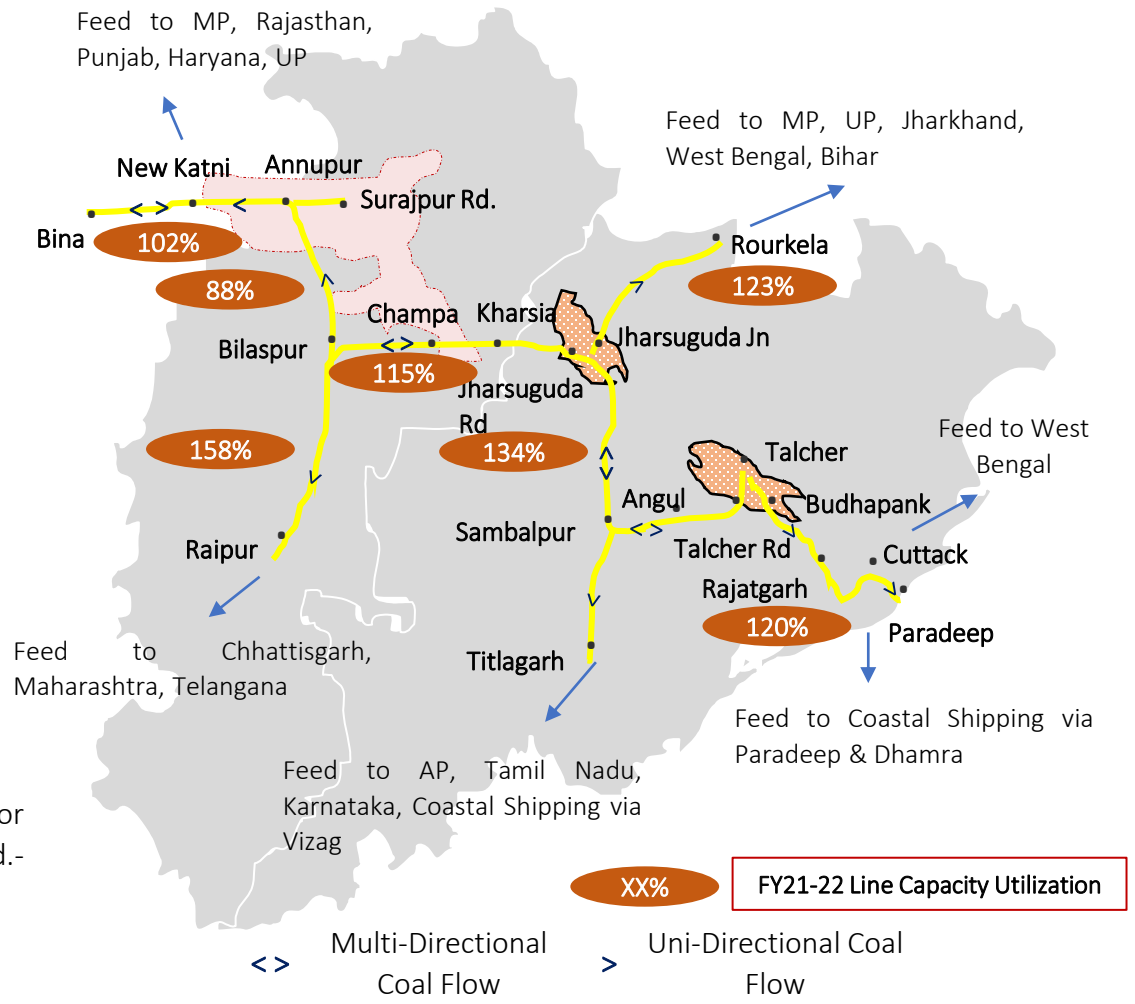
FY22 Actual and FY30 (Estimated) coal traffic in major sections for despatch of coal from Chhattisgarh (Including Sohagpur and Johilla) to various destinations

From	To	Traffic (MT): 2022	Rakes / Day: 2022	Traffic (MT): 2030	Rakes / Day: 2030	Increase in Coal Traffic (Rakes / Day)
Champa	**Bilaspur**	74.06	**52.70**	213.93	152.23	**+99.53**
Bilaspur	**Pendra Road**	24.97	**17.76**	27.23	19.38	**+1.61**
Pendra Road	**Annupur**	24.97	**17.76**	92.23	65.63	**+47.86**
Anuppur	**New Katni**	47.61	**33.87**	167.53	119.22	**+85.34**
New Katni	**Bina Malkhedi**	15.24	**10.84**	96.80	68.88	**+58.04**
Surajpur Road	**Anuppur**	21.86	**15.56**	73.69	52.44	**+36.88**
Bilaspur	**Raipur**	39.55	**28.15**	180.92	128.75	**+100.60**
Baradwar	**Jharsuguda & Jharsuguda Rd**	40.52	**28.83**	143.15	101.87	**+73.03**

CERL & CEWRL lines are expected to decompress load on the Howrah-Mumbai main line, especially for the section Champa-Bilaspur. Bilaspur-Annupur section shall be handle the traffic on the Pendra Rd.-Annupur sub-section, hence overall load on Bilaspur-Annupur shall remain unchanged.

Note: The increase in average number of rakes indicated above shall be further escalated by ~7.5% to cater during November to March Power Demand

Major sections are already witnessing significant coal traffic and is estimated to further increase in the coming decade.



Our key findings based on detailed analysis of railway traffic for major coal producing states (3/7)

	2022		2030							
Sub-Section	Capacity	% Utilization	Ongoing Works	Passenger	Freight	Total	Capacity	% Utilization	Other Planned Works (New Energy/Other Corridors)	Utilization after of All planned works
Champa to Bilaspur	206	**115%**	4th line CERL & CEWRL in progress	117	**255 (~152 to 163 R/d is coal)**	372 to 383	250	**149% to 153%**	CRCL line from Jharsuguda-Balodabazaar-Raipur and Katghora – Salka Rd - Donghargarh Coal traffic from Odisha and Chhattisgarh going towards MH/GJ/KA shall be diverted.	**149% to 153%**
Pendra Rd to Anuppur	98	**88%**	Khodri-Anuppur Line Doubling with F/O at BSP Pendra Rd.-Anuppur 3rd line & Automatic Signaling: Bilaspur-Uslapur-Ghutku are in progress.	71	**120 (~65 to 70 R/d is coal)**	191 to 196	142	**134% to 138%**	With CEWRL line catering to 65 MTPA (Bypassing Champa), load from BSP to APR will drastically reduce. Congestion will be after Pendra Rd.	**134% to 138%**

All numbers (Except Capacity utilization) represent average two-way traffic in Trains/Rakes per day. Passenger also includes Others

Note: Capacity refers to Capacity of line with Maintenance Block (MB)

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Our key findings based on detailed analysis of railway traffic for major coal producing states (4/7)

Sub-Section	2022		2030						Other Planned Works (New Energy/Other Corridors)	Utilization after of All planned works
	Capacity	% Utilization	Ongoing Works	Passenger	Freight	Total	Capacity	% Utilization		
Anuppur to Shahdol to Katni	116	**98%**	Anuppur – Katni 3rd Line (166.52 Km) in progress	78	158 (~119 to 128 R/d is coal)	235 to 244	164	**143% to 149%**	Nil	**143% to 149%**
Bilaspur to Urukura (Raipur)	206	**158%**	Nil	105	501 (~129 to 138 R/d is coal)	606 to 615	206	**294% to 296%**	CRCL line from Jharsuguda-Balodabazaar-Raipur and Katghora – Salka Rd - Donghargarh Further load shedding on East-West DFC post commissioning	**<100%**
Surajpur Rd (Kotma) to Anuppur	116	**48%**	Ambikapur to Boridand Doubling in Progress	42	82 (~52 to 56 R/d is coal)	124 to 128	116	**107% to 110%**	Nil	**107% to 110%**

All numbers (Except Capacity utilization) represent average two-way traffic in Trains/Rakes per day. Passenger also includes Others

Note: Capacity refers to Capacity of line with Maintenance Block (MB)

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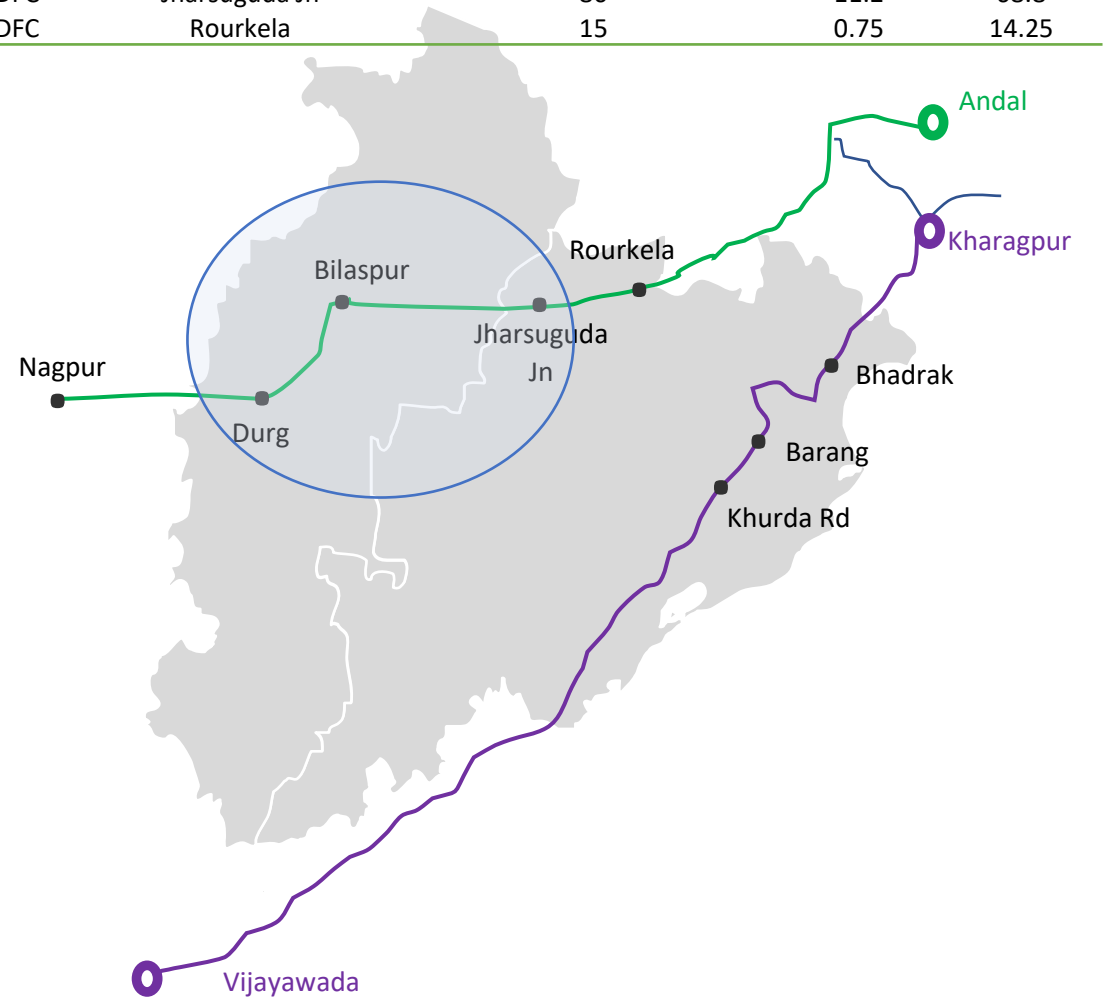
Dedicated Freight Corridors – Implications of DFC on Odisha and Chhattisgarh cluster

DFC Name	DFC Connector Station / Node	Total Traffic - 2031 (Rakes/Day)	Coal Traffic	Others
E-Co DFC	Barang Jn	241	7.23	233.77
E-W DFC	Bilaspur	20	5	15
E-W DFC	Durg	31	4.65	26.35
E-W DFC	Nagpur	36	2.16	33.84
E-W DFC	Jharsuguda Jn	80	11.2	68.8
E-W DFC	Rourkela	15	0.75	14.25



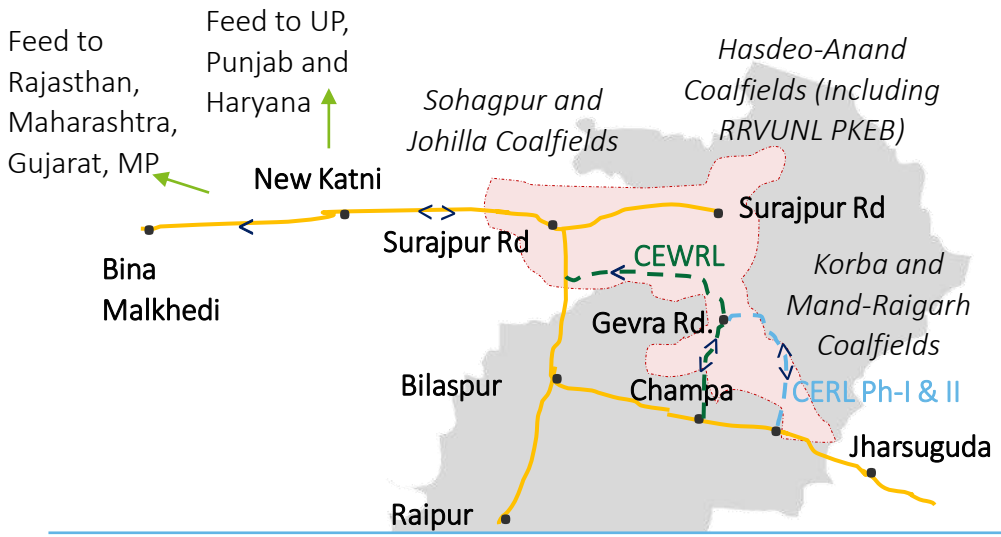
Commodity	E-W DFC			E-Co DFC		
	2031	2041	2051	2031	2041	2051
Coal	**6.21**	**30.16**	**31.05**	**11.16**	**18.18**	**19.21**
Cement	2.07	12.76	14.85	5.58	9.09	11.3
Fertilizers	1.84	3.48	5.4	3.1	5.05	4.52
Food Grains	0.92	3.48	4.05	2.48	4.04	3.39
Iron Ore	0.46	5.8	6.75	4.96	8.08	14.69
Pig Iron	3.45	10.44	12.15	3.72	6.06	6.78
PoI	0.46	5.8	6.75	4.34	7.07	7.91
Other RM for Steel	0.23	1.16	6.75	0.62	1.01	10.17
Container	0.23	9.28	12.15	2.48	4.04	4.52
BoG	7.36	32.48	33.75	24.18	39.39	30.51
Maximum nos of Rakes / Day	**23**	**116**	**135**	**62**	**101**	**113**

Source: National Rail Plan December 2020

Ongoing works to ensure rail evacuation capacity to trunk lines – Alternative scenario - load of CIL & Non-CIL on CERL & CEWRL)

Rail Evacuation from Korba & Raigarh Coalfields (incl. Non-CIL):

193.7 MTPA out of which
Korba CF: 140.56 MTPA
Mand-Raigarh CF: 61.74 MTPA (incl. Non-CIL)



Korba CF as well as Mand-Raigarh CF of SECL & non-CIL blocks (GP-III) may benefit from CERL/CEWRL

Trunk Line	Section	Anticipated Traffic for FY30 (MTPA)	Rakes/Day
CERL Ph-I	Raigarh CF-Kharsia	45.0 (capacity of 35)	24.9
CERL Ph-II	Raigarh CF-Gevra Rd.	16.74	12.9
CEWRL	Gevra Rd.-Pendra Rd.	75 (capacity of 65)	46.3
Existing Infra with Modifications	Gevra Rd.-Champa	127.3	66.7

- *Non-CIL blocks such as Gare Palma Sector-III (PRC: 23.6 MTPA) may benefit* from infrastructure addition
- If Non-CIL blocks are allowed to use CERL & CEWRL, *additional capacity may be planned to accommodate the same*

Evacuation from Korba Coalfields: Korba, Dipka, Gevra & Kusmunda

187 MTPA out of which Rail: 140.56 MTPA

Evacuation Enabler for coal flow towards Champa

Proposed Solution/Enabler

1) Korba yard Modification (Work in progress)
2) Automatic Signalling from Gevra Road to Champa (Tendering already done by SECR(IR)).
3) Doubling of Line from Dipka to Junadih (Currently single line – under consideration of SECL)
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*However, even if CEWRL is not commissioned during desirable timelines, leveraging the solutions mentioned above, **SECL would be able to add another 46 MTPA coal evacuation capacity via Rail, which will take up the realistic evacuation capacity from ~223 MTPA to ~260 MTPA***

Estimated Wagon Procurement requirement by Indian Railways (SECR – Chhattisgarh)

Destination State	Million Tonne - Kms	Volume (Million Tonnes)	Weighted Avg Distance of Despatch (KMs)
Rajasthan	19766.71	18.93	1044.20
Madhya Pradesh	8188.32	13.97	586.14
Maharashtra	13852.53	18.94	731.39
Gujarat	10989.08	8.51	1291.31
Punjab & Haryana	4200.03	3.02	1390.74
Odisha	146.15	0.79	185.00
Uttar Pradesh	492.28	0.77	639.33
Chhattisgarh	4471.94	29.61	151.03
Other States	110.06	0.24	458.58
Total	62217.09	94.78 Million Tonnes	

FY22 - Rail

Average Lead for Coal Supply in FY22 (SECR) for supplies by Odisha

656.44 KMs

Destination State	Million Tonne - Kms	Volume (Million Tonnes)	Weighted Avg Distance of Despatch (KMs)
Rajasthan	31848.10	30.5	1044.20
Madhya Pradesh	25614.14	43.7	586.14
Maharashtra	41250.40	56.4	731.39
Gujarat	27375.86	21.2	1291.31
Punjab & Haryana	3894.07	2.8	1390.74
Odisha	259.00	1.4	185.00
Uttar Pradesh	639.33	1	639.33
Chhattisgarh	14347.66	95	151.03
Additional Push Volumes + Commercial Despatches to be taken as per FY22 avg Leads	42373.01	64.55	656.44
	187601.56	316.55 Million Tonnes	

FY30 - Rail

Average Lead for Coal Supply in FY30 (SECR) for supplies by Odisha

592.64 KMs

	FY22	FY30
Average Lead of coal Despatch from Chhattisgarh (KMs)	656.44	592.64
Estimated Average Turnaround time of Rakes (Days)	4.89	4.42
Rakes / Day Despatch by Rail + RCR + RSR Mode	65.82	219.83

Additional Rakes/Day Despatch Envisaged	154.01
Estimated Improved TAT (Days)	4.42
Total Number of Rakes Required	671.89
Estimated Wagons to be Procured for Coal till FY30	**38,969**

Additional ~2,923 Wagons would be required for despatches during peak demand period from November to March

Source: Sagarmala Report, Ministry of Ports, Shipping & Waterways, Comprehensive Action Plan for Port Connectivity on Gatishakti NMP 2022, DPIIT]

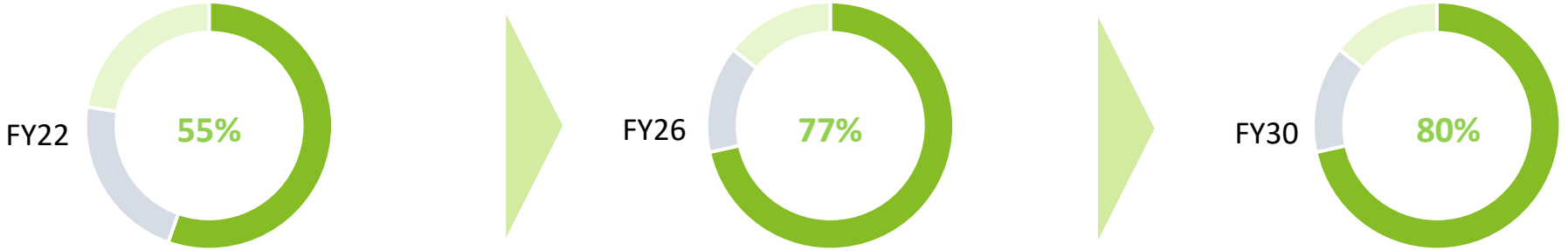
First Mile Connectivity Analysis for Chhattisgarh

SECL has ambitious production capacity expansion plans

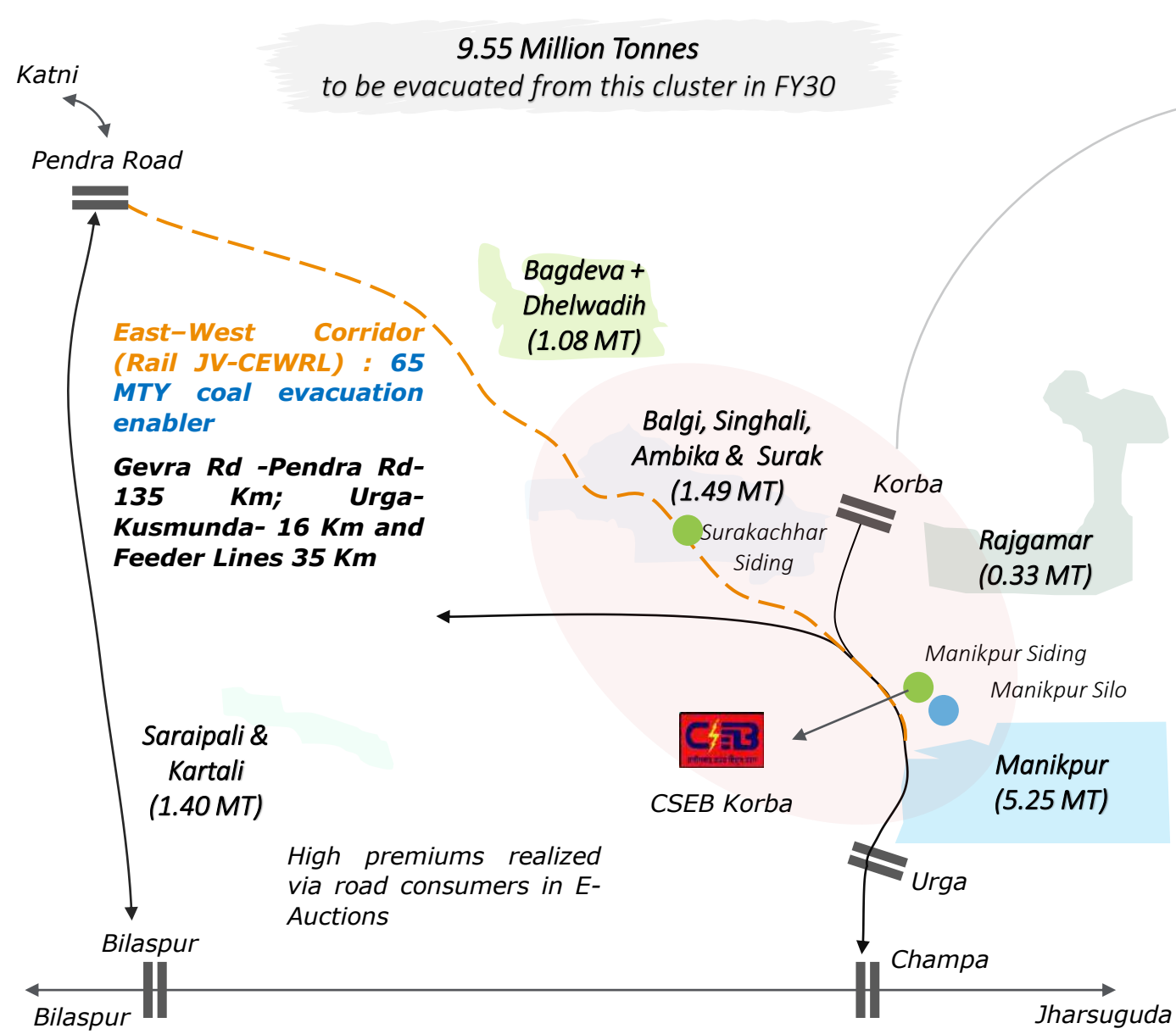
Chhattisgarh

Area	FY22 Actual Despatch (MTPA)					FY25-26 1 BT Plan (MTPA)					FY29-30 Anticipated Dispatch (MTPA)				
	Rail	RCR	Pure Road	MGR & Others	Total	Rail	RCR	Pure Road	MGR & Others	Total	Rail	RCR	Pure Road	MGR & Others	Total
Baikunthpur	2.07	0.00	0.00	0.00	**2.07**	2.74	0.00	0.00	0.00	2.74	2.74	0.00	0.00	0.00	2.74
Bhatgaon	2.54	0.16	0.57	0.00	**3.27**	4.92	0.00	3.96	0.00	8.88	14.91	0.00	0.57	0.00	15.48
Bisrampur	0.00	0.00	0.34	0.00	**0.34**	3.40	0.00	0.28	0.00	3.68	3.87	0.00	0.32	0.00	4.19
Chirmiri	1.55	0.02	0.93	0.00	**2.49**	2.89	0.00	0.00	0.00	2.89	6.09	0.00	0.00	0.00	6.09
Dipka	5.35	12.15	6.23	13.18	**36.91**	21.00	6.00	3.00	15.00	45.00	21.00	6.00	3.00	15.00	45.00
Gevra	19.02	7.30	4.94	13.74	**44.99**	39.50	12.00	4.00	14.50	70.00	39.50	12.00	4.00	14.50	70.00
Hasdeo	1.91	0.03	0.39	0.00	**2.33**	4.00	0.00	1.26	0.00	5.26	5.57	0.00	0.39	0.00	5.96
Jamuna-Kotma	1.48	0.00	0.73	0.00	**2.20**	3.42	0.00	1.08	0.00	4.50	5.77	0.00	0.73	0.00	6.50
Johilla	1.14	0.11	0.41	0.00	**1.67**	2.75	0.00	1.08	0.00	3.83	2.75	0.00	0.00	0.00	2.75
Korba	3.46	0.61	2.72	0.64	**7.42**	4.90	0.00	2.78	1.07	8.75	6.56	0.00	2.99	0.00	9.55
Kusmunda	21.52	1.80	3.73	6.72	**33.78**	55.50	0.00	0.00	7.00	62.50	55.50	0.00	0.00	7.00	62.50
Raigarh	1.96	0.20	11.98	0.00	**14.14**	30.00	0.00	5.00	0.00	35.00	38.14	0.00	6.36	0.00	44.50
Sohagpur	1.69	0.20	1.41	0.86	**4.15**	3.78	2.23	0.93	0.00	6.94	5.46	2.00	1.34	0.00	10.03
Total	**63.68**	**22.58**	**34.37**	**35.14**	**155.77**	**179**	**20**	23	**38**	**260**	**203**	**20**	**19**	**37**	**279**

Rail's share progression for SECL



Proposed evacuation plan for Korba Area achievable



Proposed 5.41 MTPA evacuation via rail mode ~ 3.84 r/d	Surakachhar Siding – 1.41 MTPA or 1 R/d Manikpur RLS – 4 MTPA or 2.84 R/d	✓ Achievable
Proposed 2.99 MTPA evacuation via road mode	Includes road despatch to consumers, private washeries and Private Good sheds	✓ Achievable
Proposed 1.15 MTPA evacuation via OWS	Manikpur Siding – 1.15 MTPA or ~ 0.82 R/d to CSEB Korba	✓ Achievable

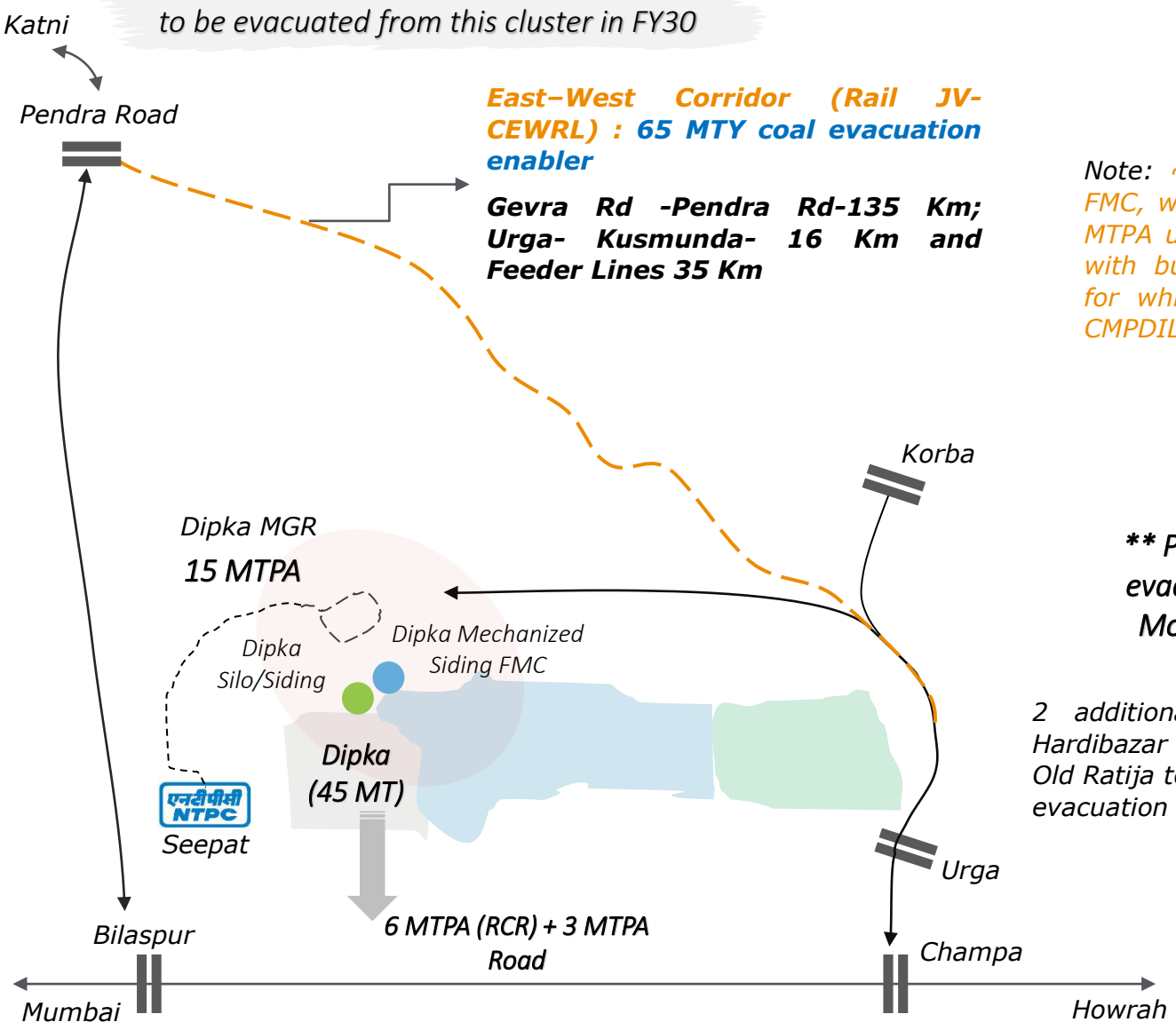
Total Evacuation of 9.55 MTPA from this cluster is achievable

- *Given completion of Manikpur RLS by 31 Jan 2024*
- *Siding based loading capacity data has been cross-referenced from SECL's Siding and marketing department.*
- *Road evacuation capacities exceed the proposed load based on past road evacuation data but can be achieved as per discussions with SECL marketing and Civil team.*

Total R/d load on railway circuit: ***4.66 r/d***

Proposed evacuation plan for Dipka Area achievable

45 Million Tonnes
to be evacuated from this cluster in FY30



Proposed 21 MTPA evacuation via rail mode ~ 14.89 r/d

- *21 MTPA or ~ 14.89 R/d from Dipka Mechanized Siding FMC*
- *In case Dipka FMC system is only able to achieve 15 MTPA, Dipka Wharfwall Siding (5-6 MTY) could be used to complement rail evacuation*

✓ *Achievable*

Note: ~7 KMs lead from face to Dipka FMC, would only be able to achieve ~15 MTPA unless Ph-2 Conveyor belt system with bunkers is introduced, note sheet for which has already been passed to CMPDIL last week

Proposed 15 MTPA evacuation via MGR

MGR evacuation to NTPC Seepat, would only be dependent on demand from the plant. ~13.18 MT was supplied via MGR to Seepat Plant in FY22

✓ *Achievable*

**** Proposed 9 MTPA evacuation via Road Mode (Inclusive of RCR)**

Out of the estimated ~9 MTPA evacuation via Road Mode, ~6 MTPA is despatched to Dipka Siding I & II (Washeries of SCPL) and other private good sheds. 3 MTPA would be despatched to consumers directly via pure road

✓ *Achievable*

2 additional exits at Hardibazar road and Old Ratija to strengthen evacuation

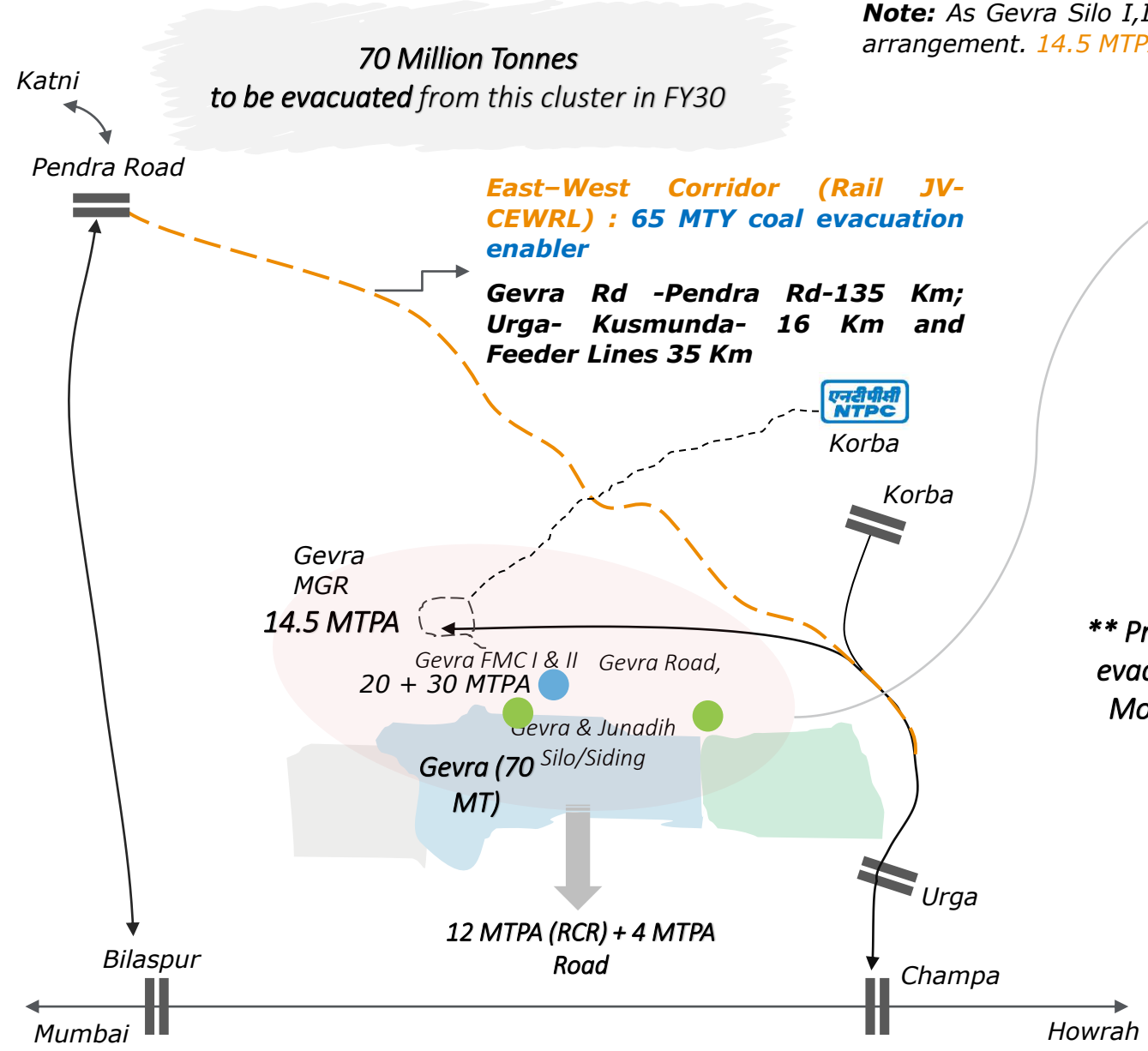
Total Evacuation of 45 MTPA from this cluster is achievable

- *Given completion of Upcoming Dipka Mechanized Siding FMC project (25 MTY) by September'2023. Would be achieved as per SECL headquarters and area management team.*
- *After completion of CEWRL PH-I by December'2024 some quantity of coal would be evacuated from that line (towards Anuppur) reducing load on Champa and Bilaspur*

Total R/d load on railway circuit: ***19.15 r/d (including 4.26 r/d from RCR)***

Proposed evacuation plan for Gevra Area achievable

Note: *As Gevra Silo I,II,III & IV are single line, ~28 MTPA is the max evacuation capacity from the arrangement. 14.5 MTPA evacuation via MGR would leave ~12.5 MTPA evacuation from Silo I&II*



Realistic 39.5 MTPA evacuation via rail mode ~ 28 r/d

- *12.5 MTPA or ~8.87 r/d from Gevra Silo III & IV*
- *Gevra RLS would evacuate 20 MTPA or ~14.19 r/d*
- *Remaining quantity would be evacuated via Gevra silo 5&6 and Wharfwall siding of Gevra: 7 MTPA or ~5 r/d*

✓ *Achievable*

Note: *Excess loading capacity exists for dispatch via rail, this offers flexibility in shifting loading/dispatch points*

Proposed 14.5 MTPA evacuation via MGR

MGR evacuation to NTPC Korba, would only be dependent on demand from the plant. ~13.74 MT was supplied via MGR to Korba Plant in FY22

✓ *Achievable*

**** Proposed 16 MTPA evacuation via Road Mode (Inclusive of RCR)**

Out of the estimated ~16 MTPA evacuation via Road Mode, ~12 MTPA will be despatched to Junadih Siding III & IV (Washeries of ACBPL) and other private good sheds. 4 MTPA would be despatched to consumers directly (FSAs and E-Auctions)

✓ *Achievable*

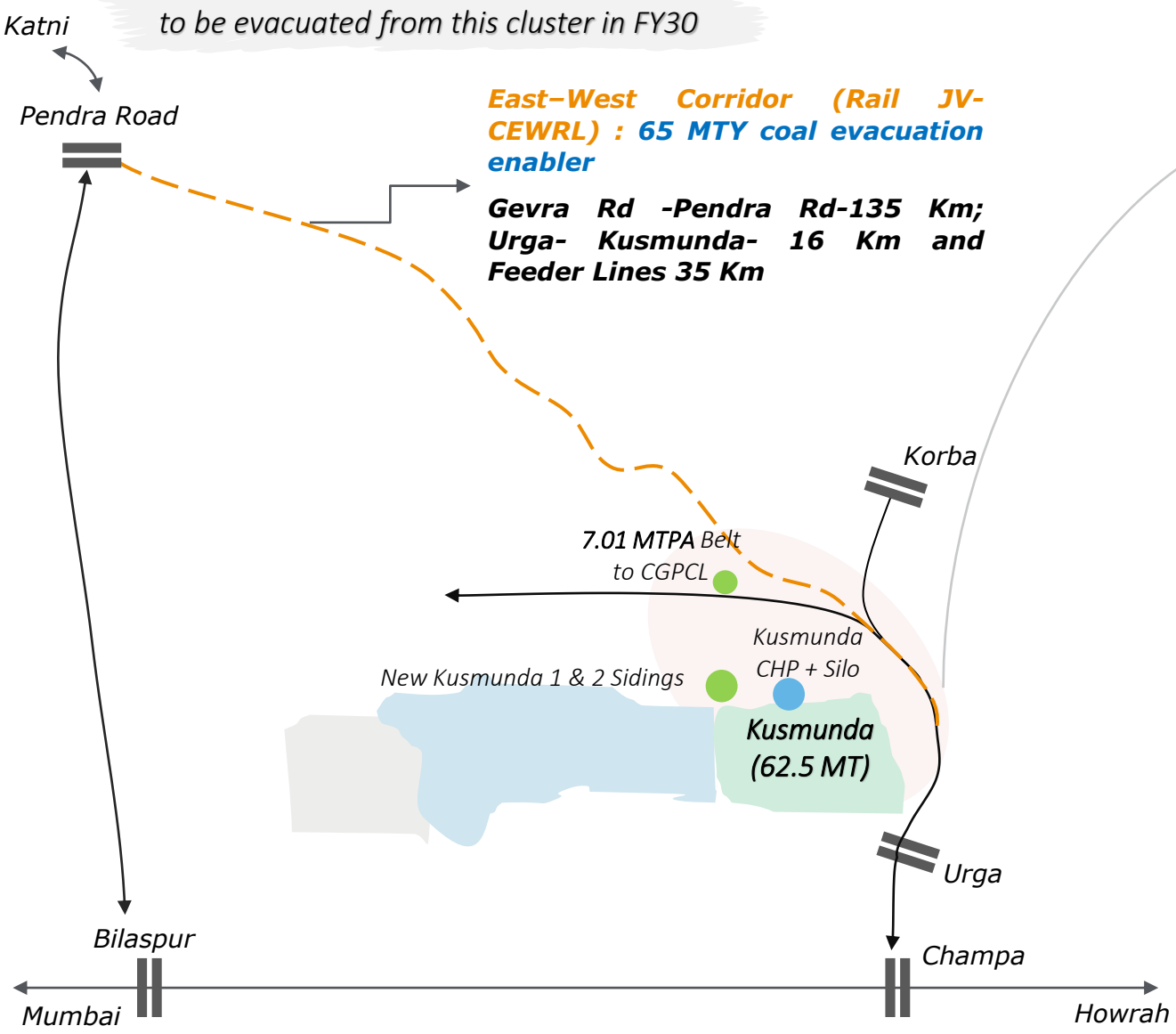
Total Evacuation of 70 MTPA from this cluster is achievable

- *After completion of CEWRL PH-I by December'2024 some quantity of coal would be evacuated from that line (towards Anuppur) reducing load on Champa and Bilaspur.*

Total R/d load on railway circuit: ***36.51 r/d (including 8.51 r/d from RCR)***

Proposed evacuation plan for Kusmunda Area achievable

62.5 Million Tonnes
to be evacuated from this cluster in FY30



Total R/d load on railway circuit: ***39.4 r/d***

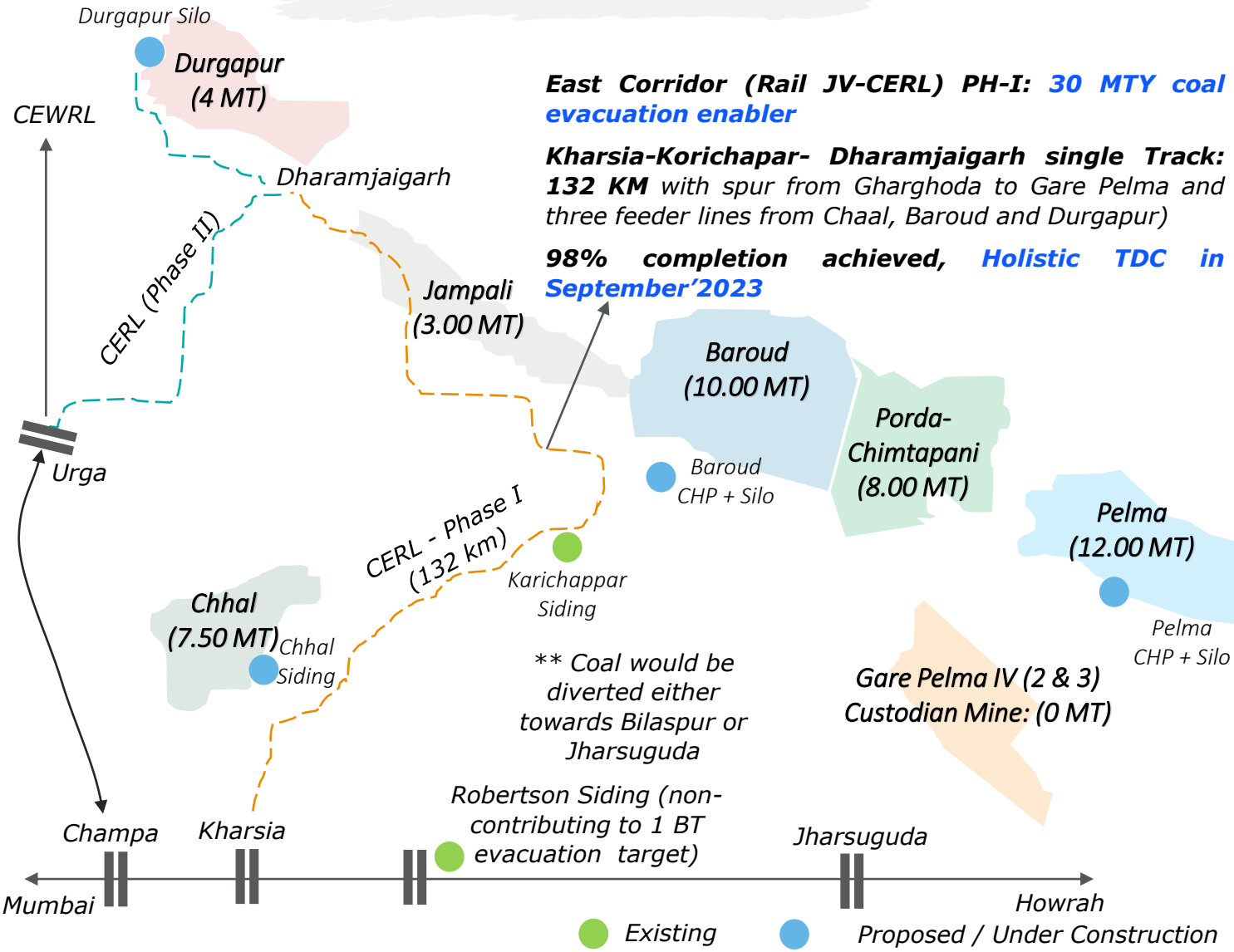
Proposed 55.5 MTPA evacuation via rail mode ~ 39.4 r/d	*40 MTPA or ~ 28.37 R/d from Kusmunda Silo + Ph-III CHP (TDC- 31st August'2023)* *2 Kusmunda Wharfwall Sidings + Gevra Line Siding would be used to enable additional ~15.5 MTPA evacuation or 11 R/d*	✓ *Achievable*
Proposed 7.01 MTPA evacuation via Belt Mode	*Has a capacity of 11 MTPA. Also referring to the past performance, 7.01 MTPA is achievable*	✓ *Achievable*

Total Evacuation of 60 MTPA from this cluster is achievable

- *Given completion of 40 MTPA Kusmunda CHP Ph-III by Sep'2023*
- *After completion of CEWRL PH-I by December'2024 some quantity of coal would be evacuated from that line (towards Anuppur) reducing load on Champa and Bilaspur.*
- *No road-based evacuation is envisaged from this area as rail and belt modes are sufficient to meet evacuation requirements for the envisaged production of 62.5 MTPA by FY30.*

Proposed evacuation plan for Raigarh Area achievable

44.50 Million Tonnes to be evacuated from this cluster in FY30



East Corridor (Rail JV-CERL) PH-I:** **30 MTY coal evacuation enabler

***Kharsia-Korichapar- Dharamjaigarh single Track: 132 KM** with spur from Gharghoda to Gare Pelma and three feeder lines from Chaal, Baroud and Durgapur)*

98% completion achieved, Holistic TDC in September'2023

Proposed 38.14 MTPA evacuation via rail mode ~ 27 r/d

- *Pelma FMC Ph3– 15 MTPA or 10.64 R/d. TDC: March 2028*
- *Korichapper Siding – 3.14 MTPA or 2.23 R/d*
- *Durgapur Silo – 4 MTPA or 2.84 R/d. TDC: March 2027*
- *Chhal Siding and Baroud RLS – 16 MTPA or ~11.35 R/d. TDC: September 2023*

✓ *Achievable*

Proposed 6.36 MTPA evacuation via road mode

Includes road despatch to consumers, private washeries and Private Good sheds

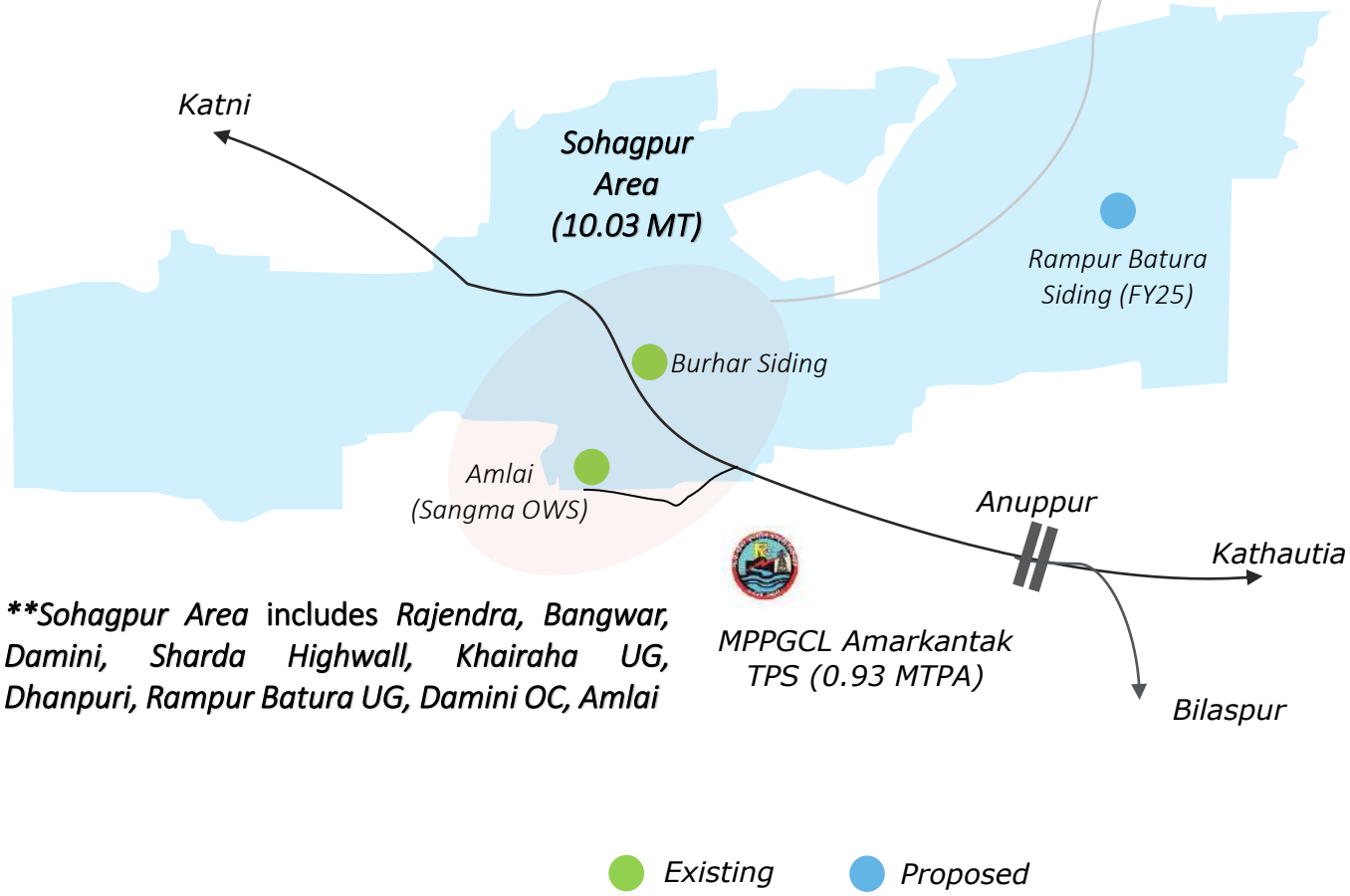
✓ *Achievable*

Total Evacuation of 44.50 MTPA from this cluster is achievable

- *After completion of CERL PH-I by September'2023 around 30 MTY capacity decongestion would occur*
- *~ 27 r/d is the total anticipated load on the rail circuit from Raigarh area in FY30.*
- *There is further scope modal shift from road to rail as Korichapper siding could handle additional 2-3 r/d i.e. 3 to 4 MTPA. The actual road dispatch would depend on the demand from road consumers.*

Proposed evacuation plan for Sohagpur Area achievable

10.03 Million Tonnes
to be evacuated from this cluster in FY30



Sohagpur Area** includes **Rajendra, Bangwar, Damini, Sharda Highwall, Khairaha UG, Dhanpuri, Rampur Batura UG, Damini OC, Amlai

Realistic 5.46 MTPA evacuation via rail mode ~ 3.87 r/d

5.46 MTPA or ~ 3.87 R/d from Burhar Siding including Despatch to MPPGCL Amarkantak TPP – 0.93 MTPA or ~ 1 R/d

✓ *Achievable*

Realistic 4.56 MTPA evacuation via Road Mode (Inclusive of RCR)

Out of the estimated ~4.56 MTPA evacuation via Road Mode, ~3.22 (70-755% benchmark assumed as per marketing team and DT P&P) MTPA is despatched via RCR mode. This will add ~2.28 r/d load on railways

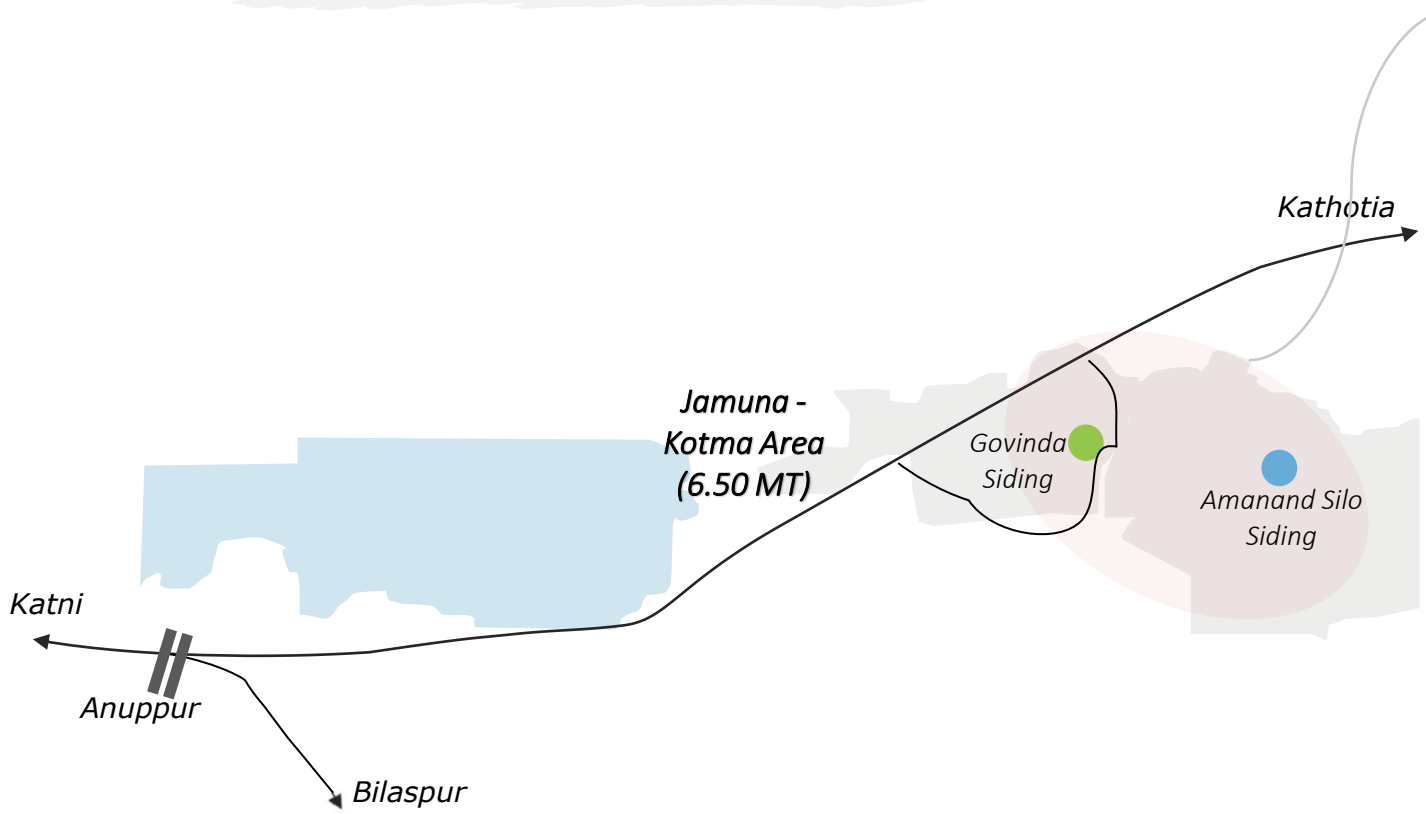
✓ *Achievable*

Total Evacuation of 10.03 MTPA from this cluster is achievable

- *The loading from Burhar Siding (4 R/d despatch envisaged) shall be streamlined to achieve the rail evacuation projections. Rampur Batura Siding can also be used for evacuation in future.*
- *Minimal Rail congestion exists in this cluster i.e., Pendra road to Katni line, hence rail evacuation won't be a challenge – CFTM, Bilaspur SECR & DT P&P and DT OP*
- *Evacuation via Road mode won't be a challenge as ~2 MTPA of road evacuation was achieved from the area last year. Depending on demand from road consumers, further modal shift towards railways is plausible.*

Proposed evacuation plan for Jamuna - Kotma Area achievable

6.50 Million Tonnes
to be evacuated from this cluster in FY30



**Jamuna - Kotma Area includes Jamuna 1 & 2/ 5 & 6, Bhadra 7 & 8, Bartarai, Amanand RPR

Existing Proposed

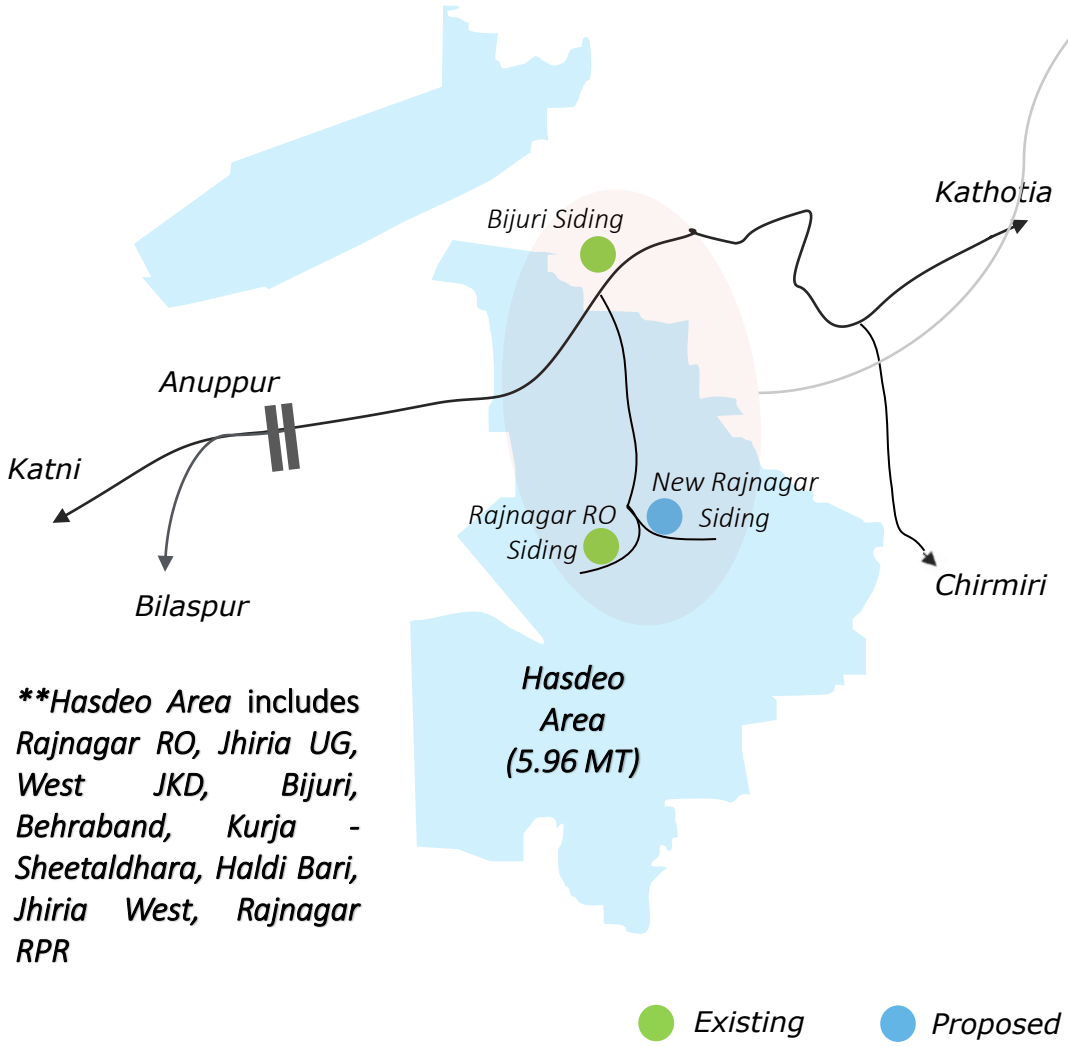
Realistic 5.77 MTPA evacuation via rail mode ~ 4.1 r/d	*5.77 MTPA or ~ 4.1 R/d from Govinda Siding. Amanand Silo Siding could also be leveraged in future once it is operational*	✓ *Achievable*
Realistic 0.73 MTPA evacuation via Road Mode	*Estimated 0.73 MTPA evacuation via road mode to consumers via FSAs and E-Auctions. This assumption is based on actual FY22 rad despatch. We have capped the road supply from this area to FY22 despatch as excess rail evacuation capacity exists.*	✓ *Achievable*

Total Evacuation of 6.50 MTPA from this cluster is achievable

- *The loading from Govinda Siding (4.1 R/d despatch envisaged) shall be streamlined to achieve the rail evacuation projections. Amanand Silo Siding could also be leveraged in future once it is operational*
- *Minimal Rail congestion exists in this cluster i.e., Kathotia to Katni line and towards Bilaspur also, hence rail evacuation won't be a challenge – CFTM, Bilaspur SECR & DT P&P and DT OP*
- *Evacuation vis Road mode won't be a challenge as ~0.73 MTPA of road evacuation was achieved from the area last year. Depending on demand from road consumers, further modal shift towards railways is plausible.*

Proposed evacuation plan for Hasdeo Area achievable

5.96 Million Tonnes
to be evacuated from this cluster in FY30



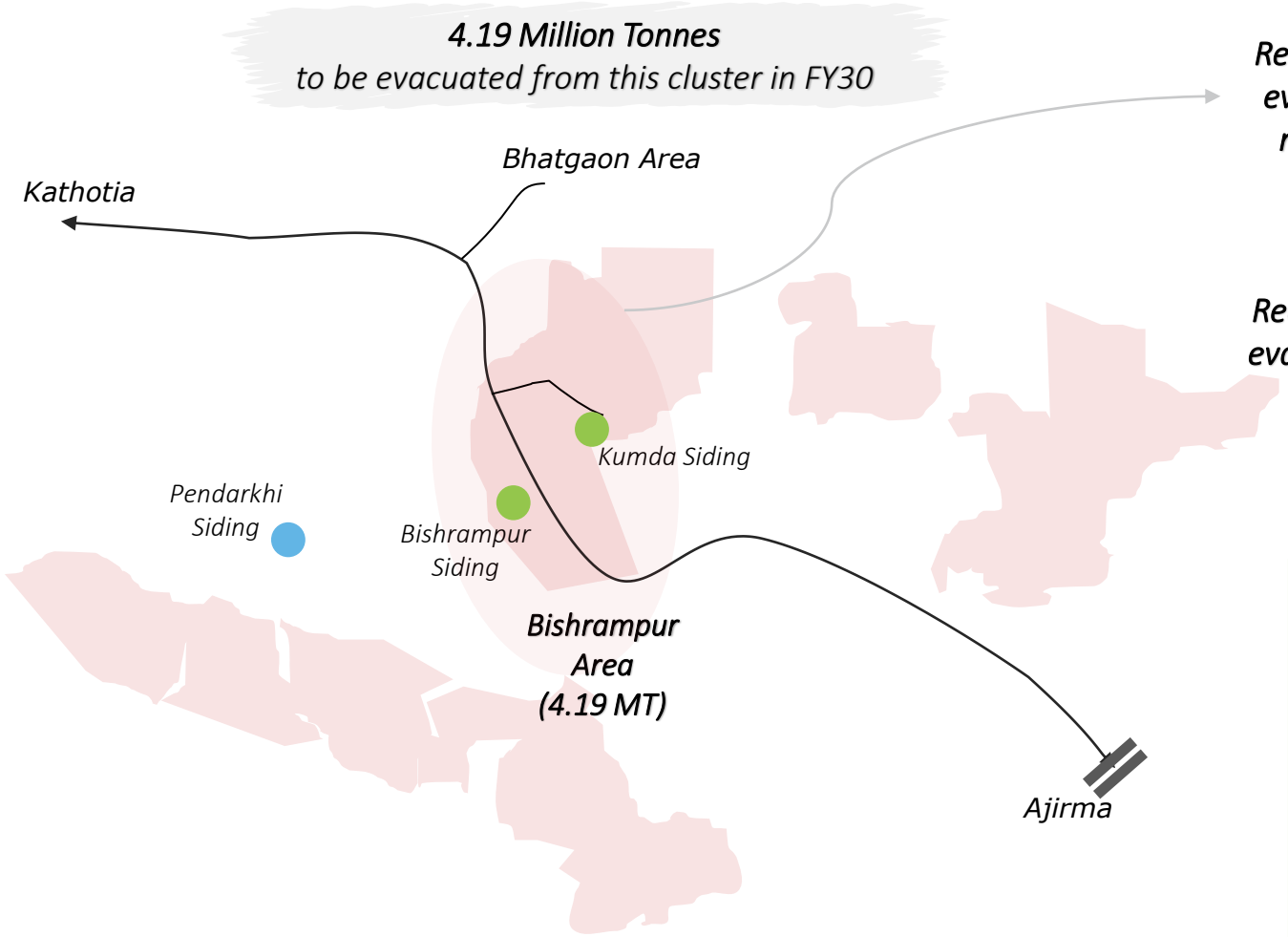
**Hasdeo Area includes Rajnagar RO, Jhiria UG, West JKD, Bijuri, Behraband, Kurja - Sheetaldhara, Haldi Bari, Jhiria West, Rajnagar RPR

Realistic 5.57 MTPA evacuation via rail mode ~ 3.95 r/d	*5.57 MTPA or ~ 4 R/d from Rajnagar RO and Bijuri Wharfwall Siding. New Rajnagar Siding could be leveraged in future once it is operational*	✓ *Achievable*
Realistic 0.39 MTPA evacuation via Road Mode	*Estimated 0.39 MTPA evacuation via road mode to consumers via E-Auctions. This assumption is based on actual FY22 rad despatch. We have capped the road supply from this area to FY22 despatch as excess rail evacuation capacity exists.*	✓ *Achievable*

Total Evacuation of 5.96 MTPA from this cluster is achievable

- *The loading from existing wharfwall sidings shall be streamlined to achieve the rail evacuation projections. Rajnagar Siding could be leveraged in future once it is operational*
- *Minimal Rail congestion exists in this cluster i.e., Kathotia to Katni line via Anuppur, hence rail evacuation won't be a challenge – CFTM, Bilaspur SECR & DT P&P and DT OP*
- *Evacuation vis Road mode won't be a challenge as ~0.39 MTPA of road evacuation was achieved from the area last year. Depending on demand from road consumers, further modal shift towards railways is plausible.*

Proposed evacuation plan for Bisrampur Area achievable



**Bishrampur Area includes Rehar, Gayatri, Ketki, Amgaon, Amera

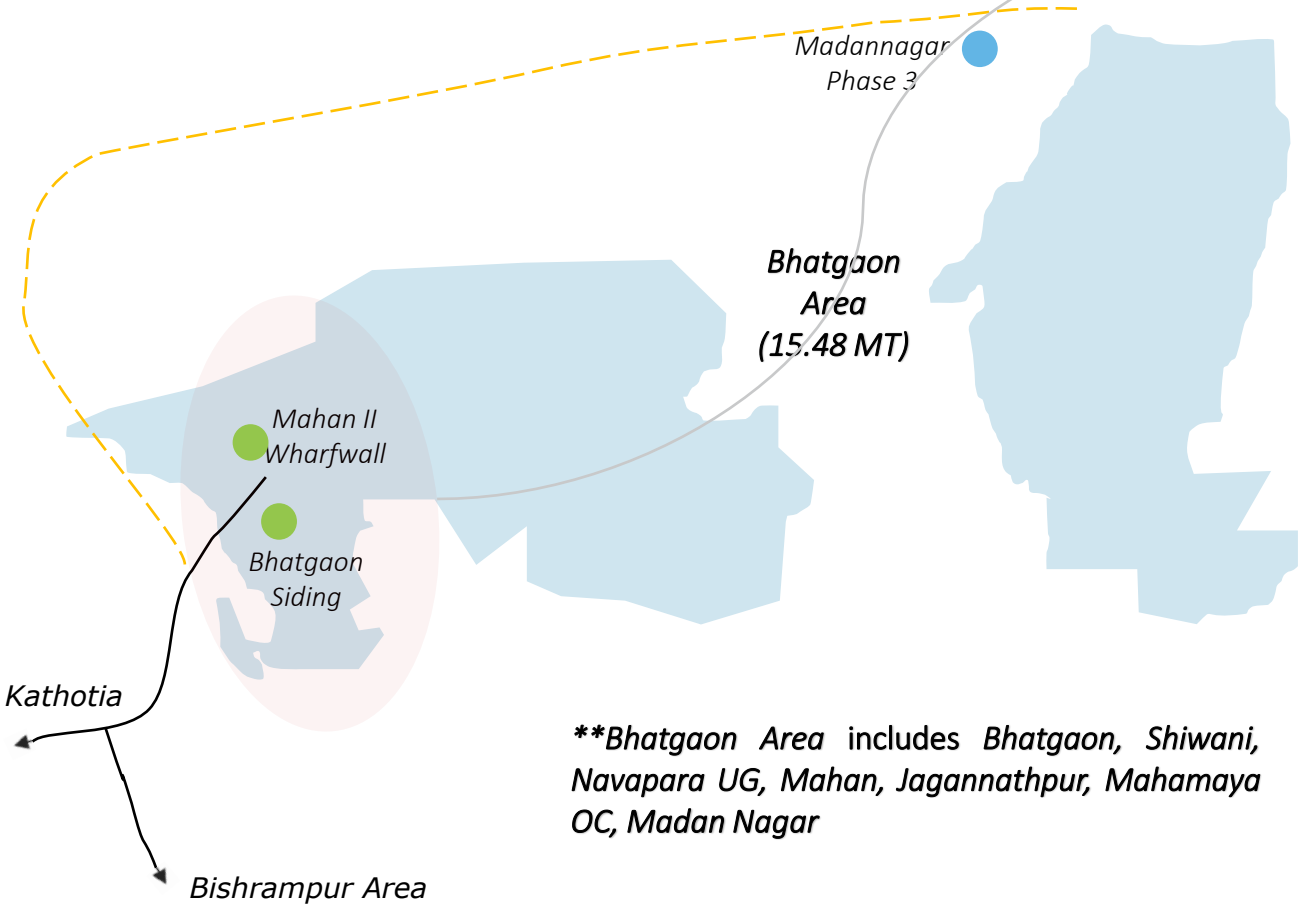
Realistic 3.87 MTPA evacuation via rail mode ~ 2.74 r/d	3.87 MTPA or ~ 2.74 R/d from Kumda and Bisrampur Wharfwall sidings. Pendarkhi Siding could be leveraged in future once it is operational	✓ Achievable
Realistic 0.32 MTPA evacuation via Road Mode	Estimated 0.32 MTPA evacuation via road mode to consumers via E-Auctions. This assumption is based on actual FY22 rad despatch. We have capped the road supply from this area to FY22 despatch as excess rail evacuation capacity exists.	✓ Achievable

Total Evacuation of 4.19 MTPA from this cluster is achievable

- The loading from existing wharfwall sidings shall be streamlined to achieve the rail evacuation projections. Pendarkhi Siding could be leveraged in future once it is operational
- Minimal Rail congestion exists in this cluster i.e., Ajirma to Kathotia Line, hence rail evacuation won't be a challenge – CFTM, Bilaspur SECR & DT P&P and DT OP
- Evacuation via Road mode won't be a challenge as ~0.32 MTPA of road evacuation was achieved from the area last year. Depending on demand from road consumers, further modal shift towards railways is plausible.

Proposed evacuation plan for Bhatgaon Area achievable

15.48 Million Tonnes
to be evacuated from this cluster in FY30



Realistic 14.91 MTPA evacuation via rail mode ~ 10.57 r/d

10 MTPA or ~ 7.1 R/d from Madannagar FMC project. TDC: March 2028

4.91 MTPA or ~ 3.48 R/d from Bhatgaon and Mahan II Wharfwall sidings

✓ *Achievable*

Realistic 0.57 MTPA evacuation via Road Mode

Estimated 0.57 MTPA evacuation via road mode to consumers via E-Auctions. Achievable as Diversion of village road for advancement of Mahan -II OCM, Bhatgaon already completed in Feb'2021. Resurfacing & strengthening of coal transportation road from Sangara to Jagannathpur and Mahan II OCP to also be completed in 2022. This assumption is based on actual FY22 rad despatch. We have capped the road supply from this area to FY22 despatch as excess rail evacuation capacity exists.

✓ *Achievable*

***Bhatgaon Area** includes Bhatgaon, Shiwani, Navapara UG, Mahan, Jagannathpur, Mahamaya OC, Madan Nagar*

Existing ***Proposed***

Total Evacuation of 15.48 MTPA from this cluster is achievable

- *The loading from existing wharfwall sidings shall be streamlined to achieve the rail evacuation projections. Madannagar (to be operational by March 2028) will evacuate 10 MTPA coal (Madan Nagar's envisaged production in 2030)*
- *Minimal Rail congestion exists in this cluster and hence rail evacuation won't be a challenge – CFTM, Bilaspur SECR & DT P&P and DT OP*
- *Evacuation via Road mode won't be a challenge as major road projects would enable sufficient evacuation from the cluster*

Proposed evacuation from Baikunthpur, Chirmiri & Johilla Areas achievable

Area	FY22 Actual Despatch					FY30 Anticipated Despatch					Siding to be used for evacuation
	Rail	Road	MGR	Belt	Total	Rail	Road	MGR	Belt	Total	
Baikunthpur	2.07	-	-	-	2.07	2.74	-	-	-	2.74	Churcha and Katora Sidings
Chirmiri	1.55	0.95	-	-	2.49	6.09	-	-	-	6.09	Duman Hill, NCPH and Chirimiri Sidings
Johilla	1.25	0.41	-	-	1.67	2.75	-	-	-	2.75	Nowrozabad Siding

Source: Deloitte Analysis, Interviews with SECL Headquarters (Siding, Marketing, Civil, P&P), TS to CMD SECL, Director Technical OP & Director Technical PP and CFTM SECR Bilaspur

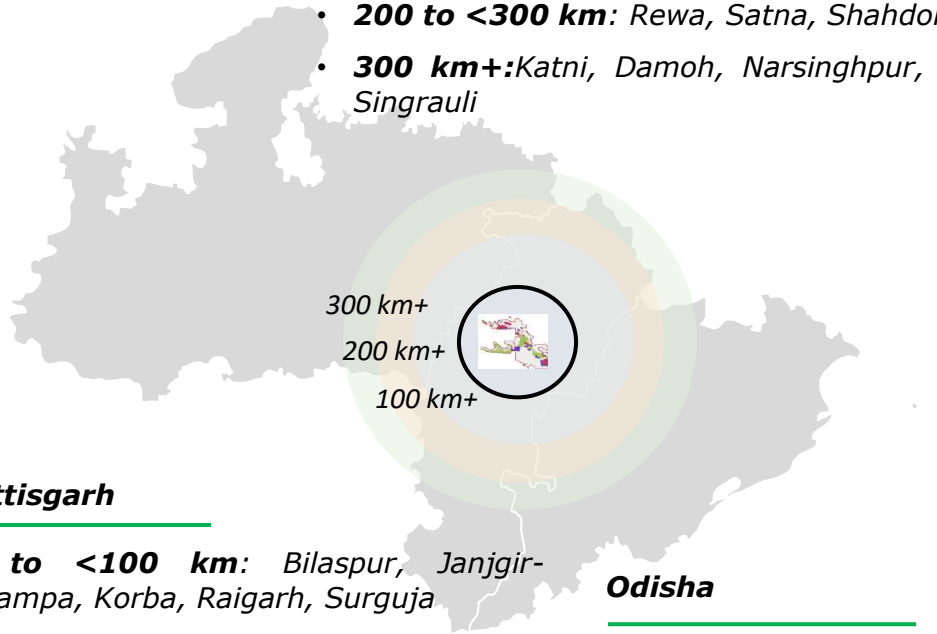
Proposed Evacuation from these 3 smaller areas in CIC coalfields is achievable

Analyzing SECL's Coal Evacuation by Pure Road – Chhattisgarh to Chhattisgarh, Madhya Pradesh & Odisha

Major Coal Consuming Districts sourcing coal through road mode from SECL:

Madhya Pradesh

- ***0 to <100 km**: Annuppur, Shahdol, Umaria*
- ***100 to <200 km**: Rewa, Satna, Sidhi*
- ***200 to <300 km**: Rewa, Satna, Shahdol, Sidhi*
- ***300 km+:**Katni, Damoh, Narsinghpur, Seoni, Singrauli*



Chhattisgarh

- ***0 to <100 km**: Bilaspur, Janjgir-Champa, Korba, Raigarh, Surguja*
- ***100 to <200 km**: Raipur, Baloda-Bazaar Bhatapara, Raigarh, Korba*
- ***200 to <300 km**: Durg, Raipur, Baloda-Bazaar Bhatapara, Raigarh*
- ***300 km+:** Raipur, Raigarh, Durg*

Odisha

- ***100 to <200 km**: Sambalpur, Jharsuguda*
- ***200 to <300 km**: Sambalpur, Jharsuguda*
- ***300 km+:** Rayagada, Sundergarh, Dhenkanal*

Coal Consumption through Road Mode based on Distance from Source

FY22

Figures in Million tonnes

Destination State	0 to <100 km	100 to <200 km	200 to <300 km	300+ km	Total
Chhattisgarh	12.30	4.97	1.43	0.06	18.75
Madhya Pradesh	0.45	1.30	0.35	0.13	2.23
Odisha	0.00	0.04	0.25	0.41	0.70
Total	**12.75**	**6.31**	**2.02**	**0.60**	**21.68**

FY30

Figures in Million tonnes

Destination State	0 to <100 km	100 to <200 km	200 to <300 km	300+ km	Total
Chhattisgarh	11.18	4.51	1.29	0.06	**17.04**
Madhya Pradesh	0.41	1.18	0.32	0.12	**2.03**
Odisha	0.00	0.04	0.23	0.37	**0.64**
Total	**11.58**	**5.74**	**1.84**	**0.54**	**19.70**

Conversion to rail/RCR mode: ***Recommended*** ***Necessary***

- Power Sector Consumers located 300+ km from sources for Chhattisgarh, Madhya Pradesh & Odisha, viz., Raipur Energen Ltd., Jaypee Bina thermal Power Plant, Jaypee Nigrie Super Thermal Power Plant, Jhabua Power Ltd. and MPPGCL Shree Singhaji TPS have been considered on rail network
- Due to NGT Order 24.06.2021 in matter of Shivpal Bhagat & Ors. Vs. Union of India & Ors., no road tranposrt expected to power plants of JPL, JSPL and others. Currently conveyor is being used to transport coal from Raigarh region to these plants

SECL: Details of recently completed Concrete Roads

SN	Name of Work	Area	Road Type	Estimated Value (in Rs.)	Status	Remarks
1	GEVRA: Construction of Cement Concrete CT Road -					
(i)	From West MTK junction via jungle Road to Amgaon including RCC Box Culvert					
(ii)	From AB Stock to WB NO.10, 11, parallel to existing CC Road and loop[road for empty vehicles	Gevra Area	CONCRETE ROAD	38,00,00,000	Estimate Prepared & to be approved by 05.10.2021	Tender Invitation- 09.10.2021 Award of Work- 15.12.2021 Work Start- 25.12.2021 Work Completion- 25.09.2022
(iii)	At level crossing nos.7, 8 & 9 with Conc. Drain in both sides					
(iv)	from west Dozer Junction to crushing point via Anand Vatika at Gevra Project					

SN	Name of Work	Area	Road Type	Estimated Value (in Rs.)	Status	Remarks
2	Dipka : Construction of Cement Concrete CT Road -					
(i)	From hopper No 18/19 to NTPC wharf wall siding					
(ii)	From erection Yard to Shramik Chowk					
(iii)	From WB no 12 to railway siding via WB no 6 & 16	Dipka Area	CONCRETE ROAD		Estimate Prepared & to be approved by 05.10.2021	Tender Invitation- 09.10.2021 Award of Work- 15.12.2021 Work Start- 25.12.2021 Work Completion- 25.09.2022
(iv)	From WB no 3 junction to Old hardi Bazar road junction					
(v)	From Erection Yard to TRS No 1 & 2 with side drain					
(vi)	From coal stock yard No 17 to haul road junction behind MTK no 02.					

SN	Name of Work	Area	Road Type	Estimated Value (in Rs.)	Status	Remarks
(vii)	From old CHP pump house to feeder breaker no 3/4 of old CHP and junction of CTR from coal stock no 17.					
(viii)	On approach ramp of WB No 1,8,3,9,21,4,10 & 11 with retaining wall	Dipka Area	CONCRETE ROAD	51,20,000,00	Estimate Prepared & to be approved by 05.10.2021	Tender Invitation- 09.10.2021 Award of Work- 15.12.2021 Work Start- 25.12.2021 Work Completion- 25.09.2022
(ix)	In front of Neem Bagicha up to junction of CTR from coal stock no 17.					
(x)	Near TRS1 & TRS2 unloading platform at Dipka Expansion project of Dipka Area.					
(xi)	Near TLS & approach to siding road at Dipka Expansion project of Dipka Area.					

SN	Name of Work	Area	Road Type	Estimated Value (in Rs.)	Status	Remarks
3.	Kusmunda: Construction of Cement Concrete CT Road -					
(i)	From Satrakata chowk upto TRS-2 including road from W.B. No. (02) to Samanvay chowk.	Kusmunda Area	CONCRETE ROAD	31,00,00,000	Estimate Prepared & to be approved by 05.10.2021	Tender Invitation- 09.10.2021 Award of Work- 15.12.2021 Work Start- 25.12.2021 Work Completion- 25.09.2022
(ii)	From Sample collection room upto RB Canal via CISF Check post Barrier No. (04) at KOCP. (with drain, Box culvert & retaining wall).					
(iii)	From Chhatri chowk upto Laxman Mines Gate at KOCP. (including Box Culverts with drain)					
4.	Korba: Construction of Cement Concrete CT Road -					
(i)	at Manikpur OCM of Korba Area.	Korba Area	CONCRETE ROAD	8,00,00,000	Estimate Prepared & to be approved by 07.10.2021	Tender Invitation- 15.10.2021 Award of Work- 15.12.2021 Work Start- 25.12.2021 Work Completion- 25.07.2022

SN	Name of Work	Area	Road Type	Estimated Value (in Rs.)	Status	Remarks
5.	Raigarh: Construction of Cement Concrete CT Road -					
	(i) From Khedapali junction to weigh bridge and other branch road at Chhal (ii) From State Highway to TRS(Silo/CHP) at Chhal (iii) From mine to proposed wharf wall of Railway Siding At Baroud (iv) From State Highway to Mine Entrance for Jampali OCP”	Raigarh Area	CONCRETE ROAD	28,69,00,000	Estimate Prepared & to be approved by 07.10.2021	Estimate Approval- 07.10.2021 Tender Invitation- 15.10.2021 Award of Work- 15.12.2021 Work Start- 25.12.2021 Work Completion- 25.09.2022

SECL: Details of Major Roads Status

Evacuation Capacity Augmentation for coal transportation roads at SECL (1/2)

		Length (Km)	Carriage Width (m)
SECL	**Road Projects already taken up**		
	Construction of cement concrete pavement for coal transportation road from control tower junction towards north ramp road upto dump no 4 of Gevra Area	2	15
	Construction of cement concrete pavement for coal transportation from barrier of old Dipka to West dozer section and loop road from W.B No.7 to CISF barrier via L&T bunker of old Dipka unit including 4 Nos. RCC Box culverts at GEVRA OCP,Gevra	3.8	15
	Strengthening existing approach road with CC Pavement to New helipad barrier at Gevra area	0.25	10 m
	Providing concrete pavement on approach road to siding near Shramik Chowk turning of Dipka area	0.8	10
	Strengthening of existing coal transportation road by concrete pavement on approach road near hopper no 18 & 19 of Dipka area	1.54	10
	Strengthening of existing coal transportation road by concrete pavement from 11-12 bunker to 8 no barrier & weigh bridge no 3 turning junction of Dipka area	1.61	14.00 & 7.00 m
	Construction of CC coal transportation road from near W.B. No. (2) to TRS, Phase (I) including box culvert across the conveyor near Satarkata Chowk of Kusmunda Area.	2.5	15
	Strengthening & development of Satarakata Chowk area including ramp of W.B. No. 19 & 20 of Kusmunda Area.	8969 sqm	

Evacuation Capacity Augmentation for coal transportation roads at SECL (2/2)

		Length (Km)	Carriage Width (m)
SECL	**Proposed Road Projects**		
	Gevra Area		
	(i) from West MTK junction via jungle Road to Amgaon including RCC Box Culvert of Gevra Area	5.5	14
	(ii) AB Stock to WB NO.10, 11, parallel to existing CC Road and loop[road for empty vehicles of Gevra Area	0.85	24
	(iii) to level crossing nos.7, 8 & 9 with Conc.Drain in both sides	0.55	14
	(iv) west Dozer Junction to crushing point via Anand Vatika at Gevra Project	1.4	14
	DIPKA AREA		
	(i) From hopper No 18/19 to NTPC wharf wall siding	2	7.00 mtrs
	(ii) From erection Yard to Shramik Chowk	0.8	7.00 mtrs
	(iii)From WB no 12 to railway siding via WB no 6 & 16	1	7.00 mtrs
	(iv) From WB no 3 junction to Old hardi Bazar road junction	1	7.00 mtrs
	(v)From Erection Yard to TRS No 1 & 2 with side drain	2.15	7.00 mtrs
	(vi)From coal styock yard No 17 to haul road junction behind MTK no 02.	1.95	7.00 mtrs
	(vii)From old CHP pump house to feeder breaker no 3/4 of old CHP and junction of CTR from coal stock no 17.	1.1	7.00 mtrs
	(viii) On approach ramp of WB No 1,8,3,9,21,4,10 & 11 with retaining wall	1.5	7.00 mtrs
	(ix) In front of Neem Bagicha up to junction of CTR from coal stock no 17.	0.9	7.00 mtrs
	x) Near TRS1 & TRS2 unloading platform at Dipka Expansion project of Dipka Area.	0.2	20 mtrs
	(xi) Near TLS & approach to siding road at Dipka Expansion project of Dipka Area.	0.36	60 mtrs
	KUSMUNDA AREA		
	(i) From Satrakata chwock upto TRS-2 including road from W.B. No. (02) to Samanvay chowk.	1.45	14
	(ii) From Sample collection room upto RB Canal via CISF Check post Barrier No. (04) at KOCP (with drain, Box culvert & retaining wall).	2.3	7
	(iii) From Chhatri chowk upto Laxman Mines Gate at KOCP. (including Box Culverts with drain)	2.5	7
	Main Barrier to Odiya Stock of MANIKPUR OCP, KORBA AREA	1.23	7
	NSPL Camp to bajrang Chowk, Champa Road, via RUB of MANIKPUR OCP, KORBA AREA	1.42	7

SECL: Details of Proposed Major Roads

SN	Name of Work	Area	Road Type	Tender Value/Awarded Value (incl GST)	Status	Remarks
1	Construction of Road: Hardibazar-Tarda-Sarvmangala-Imlichapar (Deposit Basis to State Govt CG PWD.)	Gevra Area	Concrete Road	1,72,10,00,000	Civil Construction Work is in Progress. For land acquisition of Private land of 12 Nos. villages, falling in the Road stretch of Tarda to Hardibazar, Public Hearing proceedings under section-4 of Land Acquisition process has been completed.	First installment of Rs. 39.84 crore has been released to District Collector, Korba. Anticipated completion-30.06.2023

Broad Summary of FMC projects in SECL

SL. NO.	PROJECT	PR CAPACITY (MTY)	PR Approval Status	Existing	PH-I Capacity (MTY)	PH-III Capacity (MTY)	Anticipated Timelines
1	GEVRA EXPN	70.00	Approved	30.00	30.00	-	• Phase I – 31st Dec 2023
					20.00	-	• Phase I – 31st Dec 2023
2	KUSMUNDA EXPN	50.00	Approved	-	50.00	-	• Silos with 50 MTY capacity commissioned • Phase I (in-pit conveyor) – 30th Sep 2023
3	CHHAL EXPN	6.00	Approved	-	6.00	-	• Phase I – 30th September 2023
4	MANIKPUR EXPN	3.50	Approved	-	5.00	-	• Phase I – 31st Jan 2024
5	DIPKA EXPN.	40.00	Approved	15.00	25.00	-	• Phase I – 30th September 2023
6	PELMA	15.00	Approved	-	-	15.00	• Phase III – 31st March 2028**
7	MADANNAGAR	12.00	Approved	-	-	12.00	• Phase III – 31st March 2028**
8	BAROUD EXPN	10.00	Approved	-	10.00	-	• Phase I – 30th September 2023
9	DURGAPUR	6.00	Approved	-	-	6.00	• Phase III – 31st March 2027**
	Total	**226.50**		**45**	**146**	**33**	

** The timelines are tentative and subject to finalisation of MDO tenders

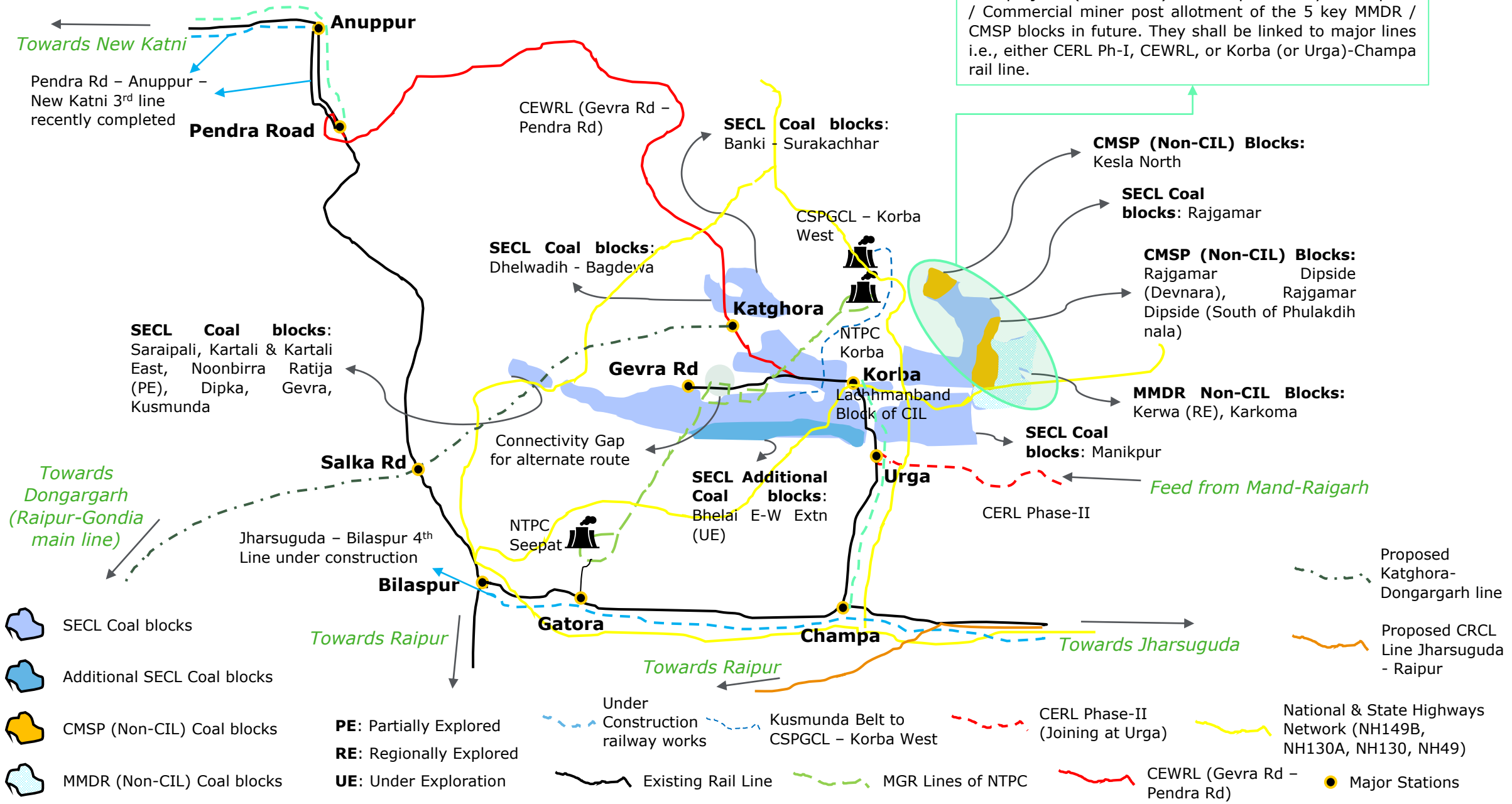
CIL (SECL) blocks in Chhattisgarh – Korba CF

#	Name of the Block	Exploration Status	Operational Status	Evacuation Route	Nearest major rail line for evacuation
1	Noonbirra Ratija	Partly Explored	Non-Operational	For Dipka and Gevra ~29.5 (15 + 14.5) MTPA would be evacuated to NTPC Seepat and Korba respectively via MGR. Dipka Mechanized Siding FMC, Dipka Wharfwall sidings, Gevra Silo III & IV, Gevra RLS, Gevra Silo V & VI and Wharfwall Sidings, would be used for coal loading for other rail despatch. For Kusmunda ~7 MTPA would be evacuated via belt to CGPCL and remaining would be despatched via Kusmunda Silo + Ph-III CHP. 2 Kusmunda Wharfwall Sidings would be utilized for remaining despatch. These cluster of CIL blocks would leverage Surakachhar Siding, Manikpur siding (for despatch to CSEB Korba) and Manikpur RLS for loading / evacuation of coal. For Evacuation via Railway Lines for all blocks in Korba CF, Urga-Champa (Gevra Rd-Champa) line would be leveraged for movement within Chhattisgarh, and other states such as Odisha (Champa to Jharsuguda and beyond), Maharashtra, Karnataka etc. (Champa to Bilaspur to Raipur & Beyond), Jharkhand & West Bengal (Champa to Jharsuguda to Rourkela & Beyond) For movement of coal towards northern and central states such as UP, MP, Punjab & Haryana, Rajasthan etc. CEWRL (Gevra Rd – Pendra Rd) rail corridor would be leveraged (upto 65 MTPA) and remaining would be evacuated via Champa – Bilaspur – Annupur and beyond.	All blocks in proximity to Gevra Rd – Korba – Urga – Champa Line and the CEWRL (Gevra Rd – Pendra Rd) Rail Corridor. All the blocks in this cluster are in the range of 30-45 Kms from the Jharsuguda – Bilaspur Main line
2	Dipka	Explored	Operational		
3	Gevra	Explored	Operational		
4	Kusmunda	Explored	Operational		
5	Bhelai E-W Extn	Under Exploration	Non-Operational		
6	Saraipali	Explored	Operational		
7	Kartali & Kartali East	Explored	Non-Operational		
8	Dhelwadi-Bagdewa	Explored	Operational		
9	Banki-Surakachhar	Explored	Operational		
10	Lachhmanband	Explored	Non-Operational		
11	Manikpur	Under Exploration	Operational		
12	Rajgamar	Explored	Operational		

Non-CIL blocks in Chhattisgarh – Korba CF

#	Name of the Block	Exploration Status	Operational Status	Evacuation Route	Nearest major rail line for evacuation
1	Kesla North	Explored	Non-Operational	FMC projects (RLS + Silo + Railway connectivity projects) shall be planned by Captive / commercial players after allocation / allotment of coal blocks, for hassle free evacuation from despatch points and feed into the major rail trunk lines. For Evacuation via Railway Lines for all blocks in Korba CF, Urga-Champa (Gevra Rd-Champa) line would be leveraged for movement within Chhattisgarh, and other states such as Odisha (Champa to Jharsuguda and beyond), Maharashtra, Karnataka etc. (Champa to Bilaspur to Raipur & Beyond), Jharkhand & West Bengal (Champa to Jharsuguda to Rourkela & Beyond) For movement of coal towards northern and central states such as UP, MP, Punjab & Haryana, Rajasthan etc. CEWRL (Gevra Rd – Pendra Rd) rail corridor would be leveraged (upto 65 MTPA) and remaining would be evacuated via Champa – Bilaspur – Annupur and beyond.	All blocks in proximity to Gevra Rd – Korba – Urga – Champa Line and the CEWRL (Gevra Rd – Pendra Rd) Rail Corridor. All the blocks in this cluster are in the range of 30-45 Kms from the Jharsuguda – Bilaspur Main line
2	Rajgamar Dipside (Devnara)	Explored	Non-Operational		
3	Rajgamar Dipside (South of Phulakdih Nala)	Explored	Non-Operational		
4	Kerwa	Regionally Explored	Non-Operational (Kerwa Coal Ltd)		
5	Karkoma	Explored	Non-Operational		

Proposed evacuation plan for Korba CF



Key Insights and Recommendations

#	Recommendation	Way Forward
1	Although Auto-Signaling works between Korba and Champa along with Korba Yard modification is underway, a third line between Korba and Champa is required for future evacuation of coal from Korba CF towards Bilaspur.	Indian Railways (SECR)
2	Rail line connectivity exists from Gevra to NTPC Seepat (MGR circuit) and from NTPC Seepat (MGR circuit) to Gatora station on the Champa-Bilaspur main line. Connectivity from Junadih siding (Gevra area) to NTPC Seepat (MGR circuit) -700 m, is underway. Collaboration with NTPC to evacuate coal from Korba CF to Champa-Bilaspur main line bypassing Korba-Champa rail line should be developed to provide additional alternate route.	Commercial terms to be expedited for usage of link
3	Additionally, Captive and Commercial miners shall plan to develop First Mile Connectivity projects like Rapid-Loading System with Silos along with Railway connectivity (to nearby major rail lines like Korba – Champa , CERL Ph-I, or CEWRL)	Captive and Commercial miners, who have been allotted blocks in Ib-Valley CF may initiate dialogues with Ministry of Coal regarding their future evacuation plans. Detailed Investment and works plan may be submitted by these miners at the earliest.
4	Alternatively, options for commissioning of Public Freight Terminals with facilities of mechanized loading of coal may be evaluated for providing rake loading services to non-CIL blocks to reduce road movement of coal from these regions	Exploration of Public Freight Terminals for mechanized coal loading and coal transport through rail for non-CIL blocks
5	4th Line between Pendra Rd to Anuppur & Anuppur to New Katni should be planned	Indian Railways (SECR)
6	Proposed CRCL Lines have to be finalized and executed on priority for diversion of loads directly towards Raipur (for feed to Maharashtra, Karnataka, Gujarat etc.) bypassing Bilaspur.	Indian Railways (SECR). CRCL

CIL (SECL) blocks in Chhattisgarh – Mandraigarh CF

#	Name of the Block	Exploration Status
1	Chhal	Explored
2	Pelma	Explored
3	Chimtapani	Explored
4	Baroud	Explored
5	Jampali	Partly Explored
6	Chimtapani Extn	Under Exploration
7	Pelma Extn	Under Exploration
8	Dip Side of Barod-Bijari (Sector I,II,III, Saraipal & Niyadih Dip)	Under Exploration
9	Ongaon-Potia	Under Exploration
10	Durgapur-Shahpur	Explored
11	Sayang Northwest	Explored
12	Sayang South	Explored
13	Sayang Central A	Explored
14	Sayang East A & B	Explored
15	Chirra	Explored
16	Chirra Northeast A	Explored
17	Chirra Northeast B	Explored
18	Elong	Under Exploration
19	Dumdih	Under Exploration
20	Chirra South Central	Under Exploration
21	Chirra Southeast	Under Exploration
22	Gitkunwari	Under Exploration
23	West of Basin – Phatehpur A	Explored
24	West of Basin – Phatehpur B	Explored
25	West of Basin – Phatehpur C	Explored
26	Girari	Under Exploration

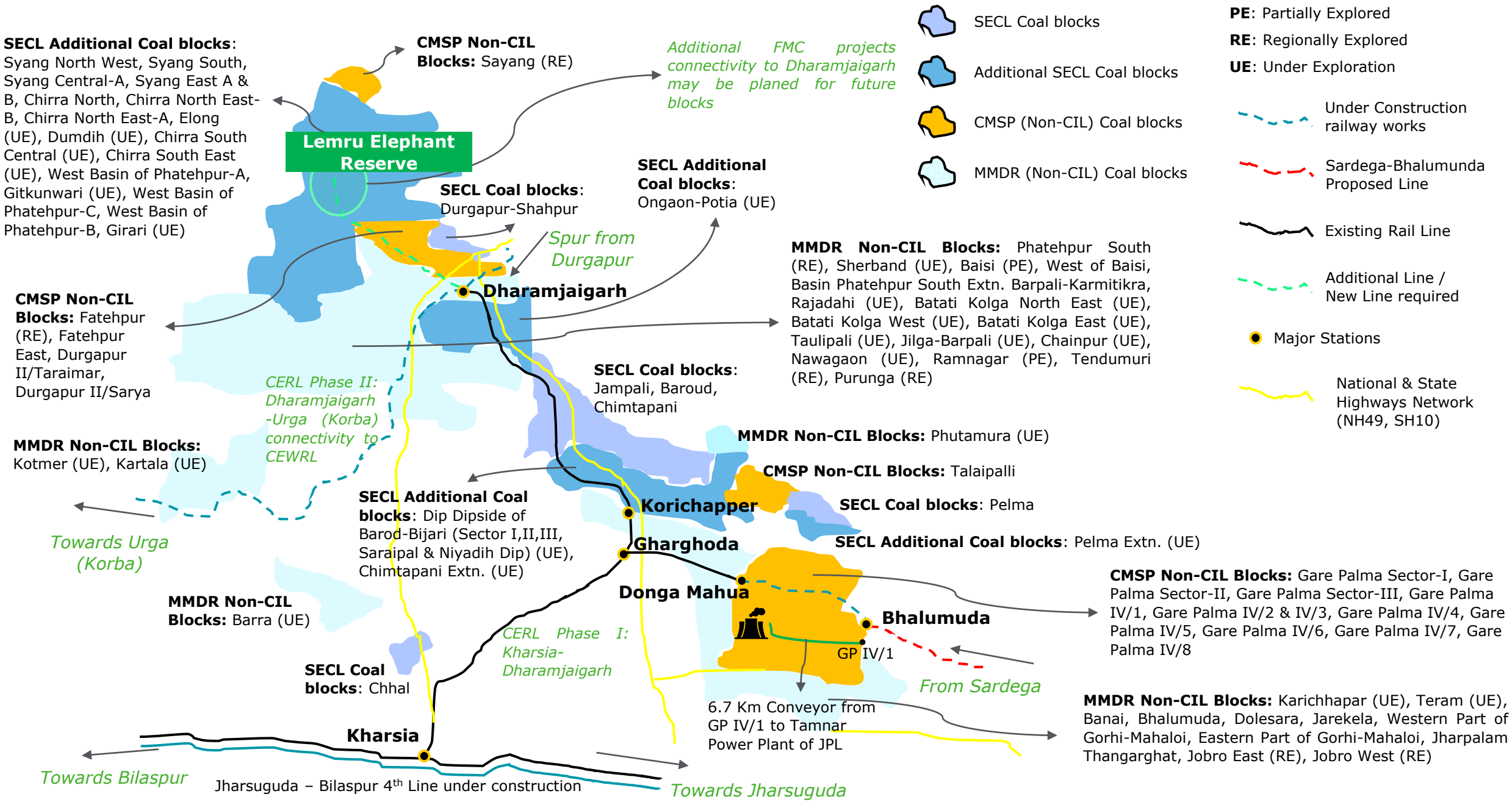
Non-CIL blocks in Chhattisgarh – Mandraigarh CF

#	Name of the Block	Exploration Status
1	Sayang	Regionally Explored
2	Batati Kolga West	Under Exploration
3	Batati Kolga East	Under Exploration
4	Batati Kolga Northeast	Under Exploration
5	Taulipali	Under Exploration
6	Rajadahi	Under Exploration
7	Jilga Barpali	Under Exploration
8	Barpali - Karmitikra	Explored
9	Phatehpur South	Regionally Explored
10	Fatehpur	Regionally Explored
11	Fatehpur East	Explored
12	Durgapur-II / Taraimar	Explored
13	Durgapur-II / Sarya	Explored
14	Chainpur	Under Exploration
15	Ramnagar	Partly Explored
16	Tendumuri	Regionally Explored
17	Purunga	Regionally Explored
18	Basin Phatehpur South Extn	Explored
19	Baisi	Partly Explored
20	West of Baisi	Explored
21	Sherband	Under Exploration
22	Nawagaon	Under Exploration
23	Kartala	Under Exploration
24	Kotmer	Under Exploration
25	Barra	Under Exploration
26	Phutamura	Under Exploration

Non-CIL blocks in Chhattisgarh – Mandraigarh CF

#	Name of the Block	Exploration Status
26	Talaipalli	Explored
27	Karichappar	Under Exploration
28	Teram	Under Exploration
29	Banai - Bhalumunda	Explored
30	Dolesara	Explored
31	Jarekela	Explored
32	Western Part of Gorhi-Mahaloi	Explored
33	Eastern Part of Gorhi-Mahaloi	Explored
34	Jobro East	Regionally Explored
35	Jobro West	Regionally Explored
36	Jharpalam - Thangarghat	Explored
37	Gare-Pelma Sector-I	Explored
38	Gare-Pelma Sector-II	Explored
39	Gare-Pelma IV/1	Explored
40	Gare-Pelma IV/2 & IV/3	Explored
41	Gare-Pelma IV/6	Explored
42	Gare-Pelma IV/4	Explored
43	Gare-Pelma IV/5	Explored
44	Gare-Pelma IV/7	Explored
45	Gare-Pelma IV/8	Explored
46	Gare-Pelma Sector-III	Explored

Proposed evacuation plan for Mand Raigarh CF



Key Insights and Recommendations

#	Recommendation	Way Forward
1	The Jharsuguda-Barpali Rail Line + Sardega-Bhalumunda Rail Line has been planned to join CERL at Gharghoda. Expediting this connectivity along with doubling of the said line to be taken explored for improved coal evacuation.	Expediting Sardega-Bhalumunda rail line along with works for doubling may be taken up for easing of coal traffic towards northern India on the Jharsuguda-Bilaspur line
2	CERL is expected to join CEWRL at Urga (Korba) via the CERL Phase-II. Therefore, CERL Phase-II needs to be expedited for coal evacuation to northern India from the coalfields of Ib Valley and Mand Raigarh.	Expediting CERL Phase-II. Dialogues may be initiated by coal miners who have been allotted blocks in the Ib Valley region and Mand Raigarh region for future evacuation plans with Ministry of Railways
3	Automatic Signaling shall be proposed across all major rail sections in the vicinity of Mand Raigarh	Indian Railways (SECR)
4	Additional FMC projects may be planned for the additional coal blocks under CIL/SECL (north-east of Durgapur coal block) which are currently at various stages of exploration. The same may be planned based on production commencement plans for these blocks.	Production commencement plans to be finalized for under exploration blocks in Mand Raigarh region to aid in planning for additional FMC projects link to CERL Phase I/Phase II
5	Options for commissioning of Public Freight Terminals with facilities of mechanized loading of coal may be evaluated for providing rake loading services to non-CIL blocks to reduce road movement of coal from these regions	Exploration of Public Freight Terminals for mechanized coal loading and coal transport through rail for non-CIL blocks

CIL (SECL) blocks in Chhattisgarh – CIC CF Cluster (1/3)

#	Coalfield	Name of the Block	Exploration Status
1	Bishrampur	Bhatgaon Colliery	Explored
2	Bishrampur	Sendupara	Explored
3	Bishrampur	Jagannathpur	Explored
4	Bishrampur	Madannagar	Explored
5	Bishrampur	Pathakpur	Explored
6	Bishrampur	Badauli-Khanookhula	Partly Explored
7	Bishrampur	Nawapara	Explored
8	Bishrampur	Tulsi	Explored
9	Bishrampur	Shivsagar	Regionally Explored
10	Bishrampur	Balrampur Incline Extn.	Explored
11	Bishrampur	Bisrampur OC	Explored
12	Bishrampur	Mahan North	Partly Explored
13	Bishrampur	Mahan South	Partly Explored
14	Chirimiri	Chirimiri	Explored
15	Chirimiri	Bartunga-Anjan Hill	Explored
16	Johilla	Kanchan	Explored
17	Johilla	Lohangi-Pinaura	Explored
18	Johilla	Nowrozabad	Explored
19	Johilla	Birsinghpur (Pali)	Explored
20	Jhilimili	Katkona	Explored
21	Jhilimili	Girijapur	Explored
22	Lakhanpur	Rehar West	Explored
23	Lakhanpur	Rehar East	Partly Explored
24	Sendurgarh	Vijay West	Explored
25	Sendurgarh	Vijay East	Explored
26	Sohagpur	Ghunghuti	Under Exploration

CIL (SECL) blocks in Chhattisgarh – CIC CF Cluster (2/3)

#	Coalfield	Name of the Block	Exploration Status
27	Sohagpur	Panwari	Regionally Explored
28	Sohagpur	Malachua	Explored
29	Sohagpur	Singhpur North	Under Exploration
30	Sohagpur	Singhpur	Under Exploration
31	Sohagpur	Dhanpura New	Under Exploration
32	Sohagpur	Changera	Regionally Explored
33	Sohagpur	Kanchanpur-Pakaria	Partly Explored
34	Sohagpur	Jarwahi	Regionally Explored
35	Sohagpur	Rungta	Explored
36	Sohagpur	Dhanpuri Minor Scheme of Burhar No. I & III Mines	Explored
37	Sohagpur	Bakaho	Explored
38	Sohagpur	Amlai	Explored
39	Sohagpur	Dhanpuri OC	Explored
40	Sohagpur	Bangwar	Explored
41	Sohagpur	Karkati	Explored
42	Sohagpur	Damni	Explored
43	Sohagpur	Khairaha	Explored
44	Sohagpur	Bodri	Explored
45	Sohagpur	Mithauri-Dulahara	Regionally Explored
46	Sohagpur	Dhanpura	Under Exploration
47	Sohagpur	Batura	Explored
48	Sohagpur	Manpura	Partly Explored
49	Sohagpur	Keshwahi Gerua	Regionally Explored
50	Sohagpur	Jamuna Kotma	Explored
51	Sohagpur	Ura Khodri	Explored
52	Sohagpur	Amadand OC	Explored

CIL (SECL) blocks in Chhattisgarh – CIC CF Cluster (3/3)

#	Coalfield	Name of the Block	Exploration Status
53	Sohagpur	Bakulmuni	Explored
54	Sohagpur	Jhiriya	Explored
55	Sohagpur	Kulhariya	Explored
56	Sohagpur	Rajnagar Dola West & North JKD	Explored
57	Sohagpur	Haldibari	Partly Explored
58	Sohagpur	Sheetaldhara	Explored
59	Sohagpur	Kapildhara	Explored
60	Sohagpur	Bijuri	Explored
61	Sohagpur	Beheraband	Under Exploration
62	Sohagpur	Chulaha Bhulia	Under Exploration
63	Sonhat	Nagar	Explored
64	Sonhat	Churcha	Explored
65	Sonhat	Ghugra	Explored
66	Sonhat	Labji-Pusla	Under Exploration
67	Sonhat	Labji-Pusla (West)	Under Exploration
68	Sonhat	Up Dipside of Labji-Pusla (West)	Under Exploration
69	Tatapani-Ramkola	Bhelmi	Under Exploration
70	Tatapani-Ramkola	Duba	Explored
71	Tatapani-Ramkola	Duba Dipside	Under Exploration
72	Tatapani-Ramkola	Duba North	Under Exploration
73	Tatapani-Ramkola	Amartipur	Under Exploration
74	Tatapani-Ramkola	Amartipur Extn.	Under Exploration
75	Tatapani-Ramkola	Tatapani	Under Exploration
76	Tatapani-Ramkola	Behratoli	Under Exploration
77	Umaria	Umaria	Explored

Non-CIL blocks in Chhattisgarh – CIC CF Cluster (1/3)

#	Coalfield	Name of the Block	Exploration Status
1	Bishrampur	Dharampur	Partly Explored
2	Bishrampur	Jhigador	Partly Explored
3	Bishrampur	Barapara	Partly Explored
4	Bishrampur	Datima	Explored
5	Bishrampur	Shankarpur Bhatgaon II Extn.	Explored
6	Bishrampur	Khargaon	Partly Explored
7	Hasdeo-Arand	Chotia	Explored
8	Hasdeo-Arand	Panchbahani	Partly Explored
9	Hasdeo-Arand	Morga-I	Regionally Explored
10	Hasdeo-Arand	Morga-II	Regionally Explored
11	Hasdeo-Arand	Morga-III	Regionally Explored
12	Hasdeo-Arand	Morga-IV	Regionally Explored
13	Hasdeo-Arand	Madanpur (North)	Explored
14	Hasdeo-Arand	Madanpur South	Explored
15	Hasdeo-Arand	Paturia	Explored
16	Hasdeo-Arand	Gidhmuri	Explored
17	Hasdeo-Arand	Morga South	Explored
18	Hasdeo-Arand	Saidu	Under Exploration
19	Hasdeo-Arand	Tara	Explored
20	Hasdeo-Arand	Parsa	Explored
21	Hasdeo-Arand	Parsa East & Kanta Basan	Explored
22	Hasdeo-Arand	Kente Extn.	Explored
23	Hasdeo-Arand	Pendrakhi	Regionally Explored
24	Hasdeo-Arand	Bhakurma-Matringa	Regionally Explored
25	Hasdeo-Arand	Nakia I	Explored
26	Hasdeo-Arand	Nakia II	Explored

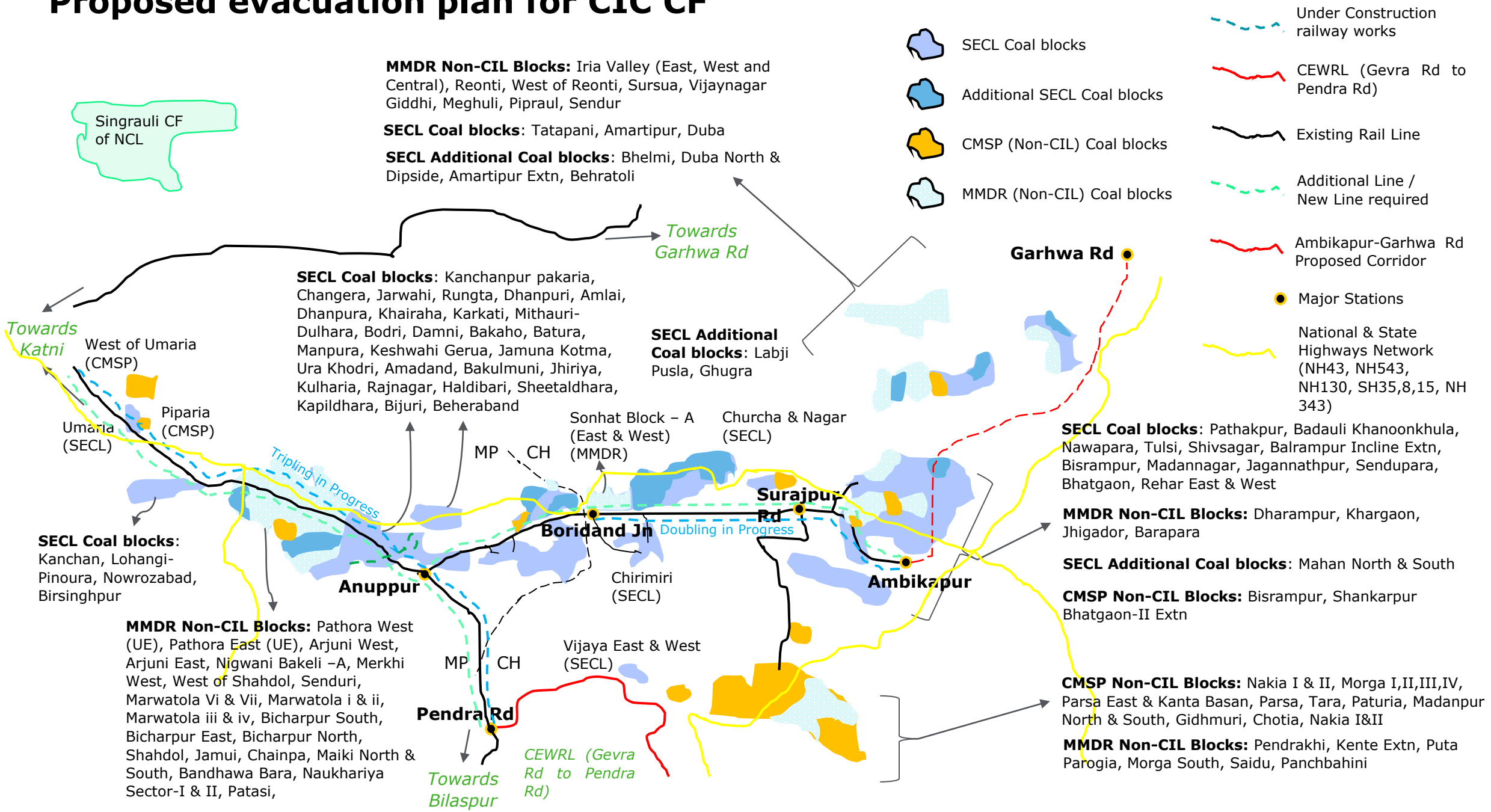
Non-CIL blocks in Chhattisgarh – CIC CF Cluster (2/3)

#	Coalfield	Name of the Block	Exploration Status
27	Hasdeo-Arand	Nakiya-III	Regionally Explored
28	Jhilimili	Bhaskarpara	Explored
29	Korar	West of Umaria	Regionally Explored
30	Sendurgarh	Vijay Central	Explored
31	Sohagpur	Nigwani Bakeli-A	Regionally Explored
32	Sohagpur	Pathora West	Under Exploration
33	Sohagpur	Pathora East	Under Exploration
34	Sohagpur	Arjuni West	Partly Explored
35	Sohagpur	Arjuni East	Explored
36	Sohagpur	Merkhi West	Partly Explored
37	Sohagpur	Marwatola I & II	Under Exploration
38	Sohagpur	Marwatola III & IV	Under Exploration
39	Sohagpur	West of Shahdol	Under Exploration
40	Sohagpur	Shahdol	Explored
41	Sohagpur	Maiki North	Regionally Explored
42	Sohagpur	Maiki South	Partly Explored
43	Sohagpur	Chainpa	Explored
44	Sohagpur	Jamui	Explored
45	Sohagpur	Bicharpur	Explored
46	Sohagpur	Bicharpur North	Explored
47	Sohagpur	Bicharpur East	Explored
48	Sohagpur	Bicharpur South	Under Exploration
49	Sohagpur	Senduri	Under Exploration
50	Sohagpur	Marwatola VI & VII Combined	Explored
51	Sohagpur	Sahapur East	Explored
52	Sohagpur	Sahapur West	Explored

Non-CIL blocks in Chhattisgarh – CIC CF Cluster (3/3)

#	Coalfield	Name of the Block	Exploration Status
53	Sohagpur	Bandhawa Bara	Regionally Explored
54	Sohagpur	Patasi	Regionally Explored
55	Sohagpur	Naukhariya Sector-I	Regionally Explored
56	Sohagpur	Naukhariya Sector-II	Regionally Explored
57	Sohagpur	Bikram	Explored
58	Sohagpur	Urtan	Explored
59	Sohagpur	Urtan North	Explored
60	Sohagpur	Beheraband North Extn.	Partly Explored
61	Sonhat	Ghutra	Partly Explored
62	Sonhat	Sonhat Block-A West	Unexplored
63	Sonhat	Sonhat Block-A East	Regionally Explored
64	Tatapani-Ramkola	Iria Valley West	Under Exploration
65	Tatapani-Ramkola	Iria Valley Central	Under Exploration
66	Tatapani-Ramkola	Iria Valley East	Under Exploration
67	Tatapani-Ramkola	Reonti	Partly Explored
68	Tatapani-Ramkola	West of Reonti Extn.	Regionally Explored
69	Tatapani-Ramkola	Sondiha	Explored
70	Tatapani-Ramkola	Sursa	Explored
71	Tatapani-Ramkola	Meghuli	Explored
72	Tatapani-Ramkola	Vijaynagar Giddhi	Under Exploration
73	Tatapani-Ramkola	Pipraul	Partly Explored
74	Tatapani-Ramkola	Sendur	Regionally Explored
75	Umaria	Semaria/Piparia	Explored

Proposed evacuation plan for CIC CF

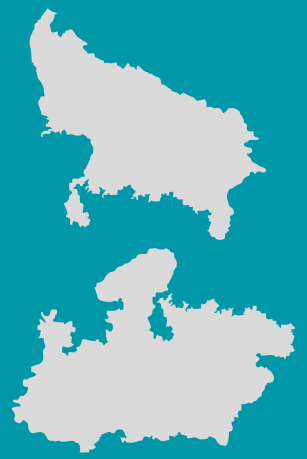


Key Insights and Recommendations

#	Recommendation	Way Forward
1	Triple Line from Anuppur to Ambikapur will be required in future as volumes from CIC CF increases. Auto Signaling of the entire section from Anuppur to Ambikapur has to be taken up for easing the evacuation from the cluster	Indian Railways (SECR)
2	Additionally, Captive and Commercial miners shall plan to develop First Mile Connectivity projects like Rapid-Loading System with Silos along with Railway connectivity (to nearby major rail lines like Ambikapur – Anuppur – New Katni)	Captive and Commercial miners, who have been allotted blocks in CIC CF may initiate dialogues with Ministry of Coal regarding their future evacuation plans. Detailed Investment and works plan may be submitted by these miners at the earliest.
3	4th Line between Pendra Rd to Anuppur & Anuppur to New Katni has to be planned	Indian Railways (SECR)
4	Ambikapur – Garhwa Rd rail corridor is being planned by railways. After the analysis of current and future coal traffic and O-D mapping, it was found that this line would may not have sufficient coal traffic. Plans for development of this corridor should be re-analyzed by the Indian Railways.	Indian Railways (SECR)
5	Options for commissioning of Public Freight Terminals with facilities of mechanized loading of coal may be evaluated for providing rake loading services to non-CIL blocks to reduce road movement of coal from these regions	Exploration of Public Freight Terminals for mechanized coal loading and coal transport through rail for non-CIL blocks

Detailed analysis for

Singrauli Coalfields (NCL + Non-CIL blocks)



NCL has ambitious growth plans

All figures in million tonnes

Actuals → | ← Projections →

Name of Mine / Project	Actual 21-22	2022-23 (Act)	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30
Bina	9.00	10.50	10.50	12.00	12.00	13	14	14	14
Block-B	5.47	5.47	7.50	7.50	7.50	8	8	8	8
Dudhichua	22.06	23.03	23.50	23.50	23.50	24	24	24	24
Jayant	24.75	26.66	28.00	29.00	30.00	30	30	30	30
Khadia	14.00	15.00	15.00	16.00	16.00	16	16	16	16
Nigahi	21.00	22.50	22.50	23.00	24.00	25	25	25	25
Amlohri	14.00	15.00	15.00	15.00	15.00	15	15	15	15
Krishnashila	7.00	7.50	7.50	6.00	5.00	4	3	3	3
Kakri	2.41	2.26	1.00	0.00	0.00	0	0	0	0
Jhingurdah	2.74	3.25	2.50	2.00	2.00	0	0	0	0
	122	**131**	**133**	**134**	**135**	**135**	**135**	**135**	**135**

- NCL has a coal evacuation ramp up plan from **131.2 MTPA in FY23** to **135 MTPA by FY30** – an additional ramp-up of **4.9 MTPA** planned.
- **7 FMC projects have been identified** as critical projects to ramp up the evacuation capacity for NCL by FY24-26.
- Out of these, **2 project have been commissioned** – Krishnashila and Khadia CHP Silo
- Block B rail Connectivity completed

Non-CIL blocks Pipeline in Madhya Pradesh – Singrauli Coalfields

Madhya Pradesh

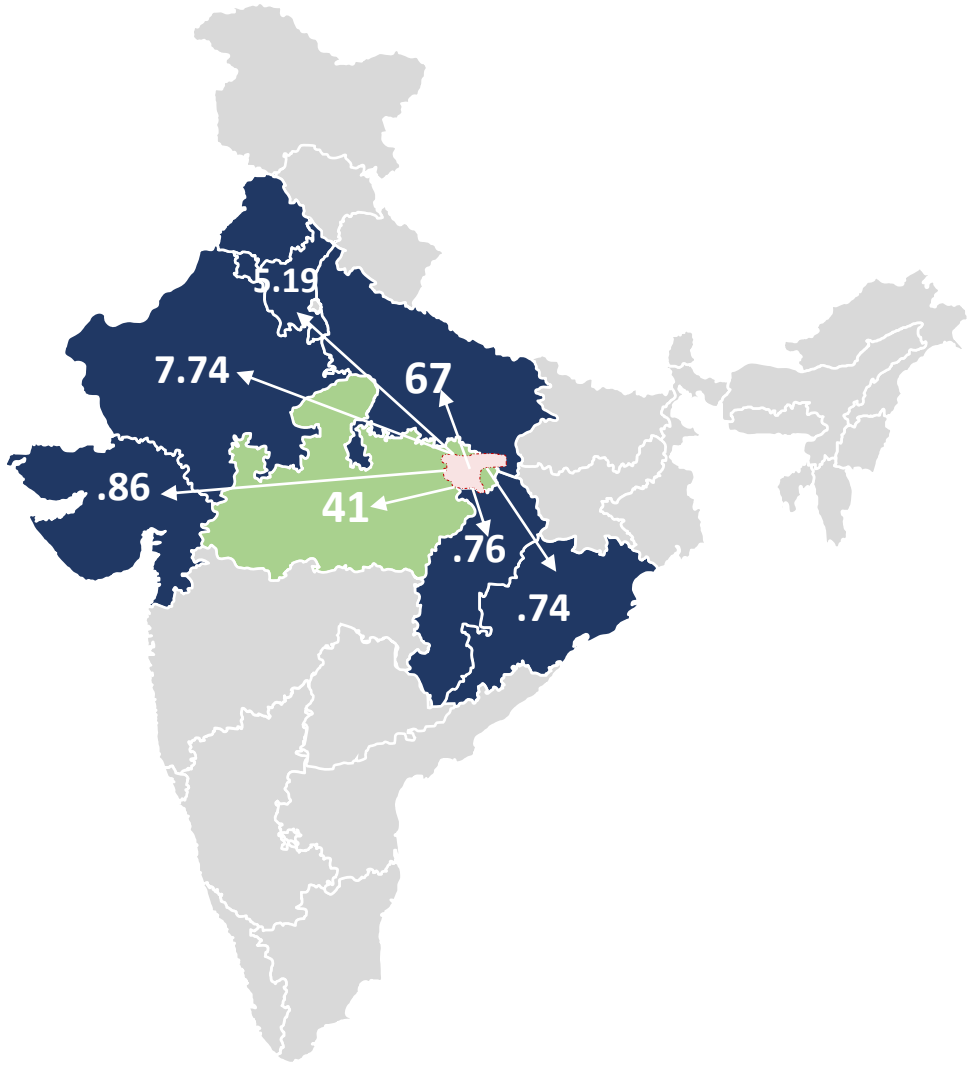
All figures in million tonnes

Details of Non-CIL blocks in Singrauli Coalfields

#	Name of the Block	Block Owner	PRC	Operational Status	Proposed Loading Point	EUP and other remarks	Actual FY23 Production	Actual FY22 Production
1	Amelia	THDC India Ltd.	5.6	Non - Operational	Shahdol Railway Station (Mine to Station via NH-39)	Khurja STPP, Bulandshahar, U.P., 856 Kms from mine	~0.05	0.0
2	Amelia North	Jaiprakash Power Ventures Limited	2.8	Operational	Majauli Railway Station (Mine to Station via NH-43)	Jaypee Nigrie Super Thermal Power Plant, Singrauli 37 Kms from mine	2.8	2.8
3	Suliayri	Andhra Pradesh Mineral Development Corporation	6	Non - Operational	Gajrabahra Railway Station (Mine to Station via NH-39)	Nearest port Varansi, U.P., 295 Kms from mine	~1.5	0.0
4	Bandha	EMIL Mines and Mineral Resources Limited	3	Non - Operational	Deoragram Railway Station (Mine to Station via NH-39)	Nearest port Paradip., 849 Kms from mine	0.0	0.0
5	Bandha North	Jaiprakash Power Ventures Limited	NA	Non – Operational	Deoragram Railway Station (Mine to Station via NH-39)	Nearest port Paradip., 849 Kms from mine	0.0	0.0
6	Dhirauli	Stratatech Mineral Resources Private Limited	5	Non - Operational	Gajrabahra Railway Station (Mine to Station via NH-39)	Essar Power MP Limited, M.P., 35 Kms from mine	0.0	0.0
7	Moher & Moher-Amlohri Ext.	Sasan Power Ltd.	20	Operational	Overland conveyor system	Sasan UMPP, M.P., 109 Kms from mine	~16.0	18.4
8	Gondbahera Ujheni (Recent 16th tranche)	- MP Natural Resources	4.12	Non - Operational	Majauli Railway Station (Mine to Station via NH-43	Commercial Sales	-	-
9	Mahan	-	1.2	Non-Operational	Significant area under dense forest cover. Loading point to be finalized post auction	Coal block expected to be auctioned in 7th tranche	-	-
Total PRC			**47.72**				**~20.35**	**21.2**

Origin – Destination Cluster Mapping for MP & UP (NCL)

O-D Source cluster Mapping – Despatch of Coal from MP + UP (NCL): FY22 snapshot



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FY22: Despatch of Coal from NCL (MP+UP) to destination state (MTPA)

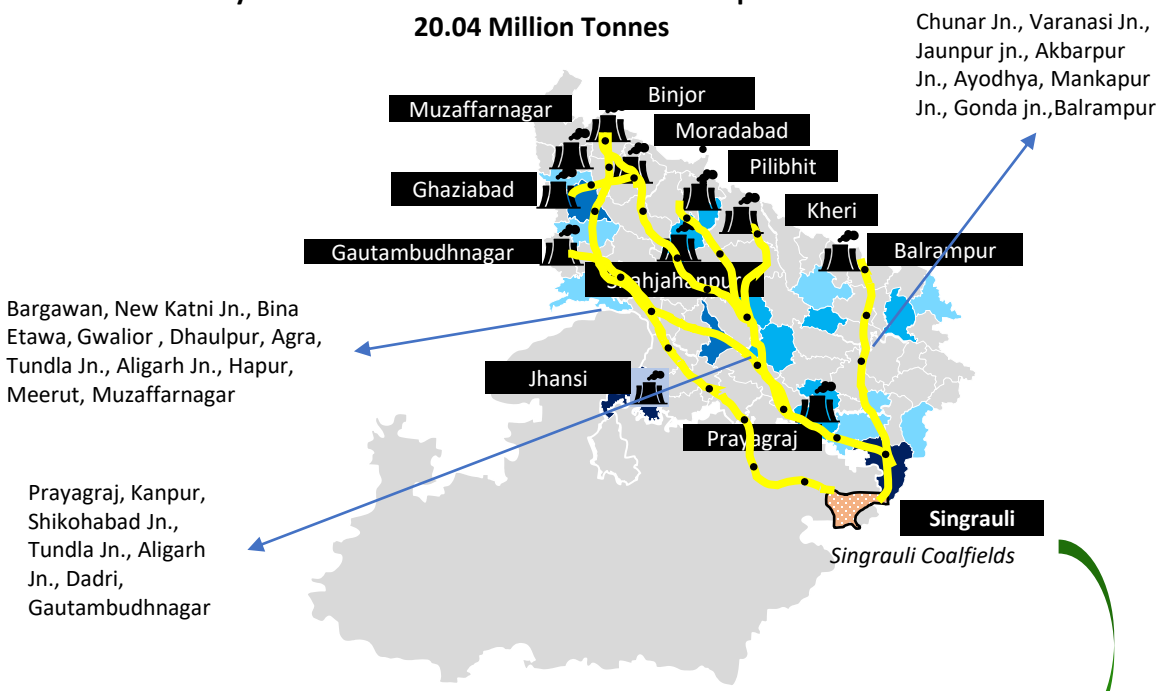
All figures in million tonnes

Consuming State	Rail + RCR	Pure Road	MGR & Others	Total
Uttar Pradesh	25.41	4.07	37.41	**66.89**
Madhya Pradesh	17.06	2.77	21.25	**41**
Rajasthan	7.74			**7.74**
Punjab & Haryana	5.19			**5.19**
Gujrat	0.86			**0.86**
Chhattisgarh	0.76			**0.76**
Odisha	0.74			**0.74**
Other States	2.23			**2.23**
Total Despatch from NCL (MP+UP) to destination state (MTPA)	**59.98 (48%)**	**6.84 (5%)**	**58.66 (47%)**	**125.49**

Origin – Destination Mapping and the coal flow analysis of rail trunk lines for ~60 MTPA is conducted and presented in the next sections

O-D Source cluster Mapping – Madhya Pradesh to Uttar Pradesh(1/2)

Madhya Pradeshto Uttar Pradesh total Rail Despatch in FY22 = 20.04 Million Tonnes



Major Coal Consuming Districts of UP: 2030 (Estimated)

>15 MTPA Coal Consumption	*Jhansi, Sonbhadra*
10-15 MTPA Coal Consumption	*Bulandsahar, Kanpur*
5-10 MTPA Coal Consumption	*Prayagraj, Rae Bareli, Lucknow, Shahjahanpur, Ambedkar Nagar, Gorakhpur*
1-5 MTPA Coal Consumption	*Ghaziabad, Hapur, Gautam Buddha Nagar, Aligarh, Agra, Kushinagar, Gonda*

Expected Load from Madhya Pradesh to Uttar Pradesh main trunk lines (Excluding load from other states on this line)

*UP Coal **Demand 2022 ~ 87 MTPA***

*Rail Supply by Madhya Pradesh **2022 ~ 25.41 MTPA***

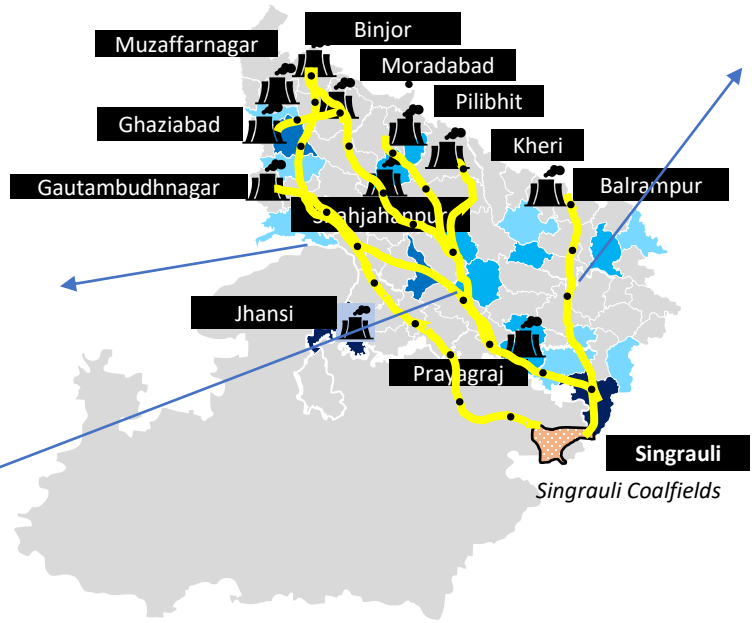
*UP Coal **Demand 2030 ~ 114 MTPA***

*Rail Supply by Madhya Pradesh **2030 ~ 38.59 MTPA***

FY22				FY30	
From	To	Traffic (Tonnes) 2022	Rakes / Day 2022	Traffic (Tonnes) 2030	Rakes / Day 2030
Billi	Chunar	9,068,401.78	6.45	9,702,634.89	6.90
Chunar	Prayagraj	8,542,212.71	6.08	9,170,884.72	6.53
Prayagraj	Unchahar	2,093,828.88	1.49	2,106,235.79	1.50
Unchahar	Rae Bareli	2,093,828.88	1.49	2,106,235.79	1.50
Rae Bareli	Lucknow	2,093,828.88	1.49	2,106,235.79	1.50
Lucknow	Roza	926,007.67	0.66	887,220.57	0.63
Roza	Pilibhit Jn	459,345.64	0.33	442,000.81	0.31
Lucknow	Kheri	471675.416	0.34	458,676.73	0.33
Lucknow	Shahjahanpur	696145.796	0.50	760,338.49	0.54
Shahjahanpur Jn.	Bareilly Jn.	696145.796	0.50	760,338.49	0.54
Bareilly Jn.	Rampur	696145.796	0.50	760,338.49	0.54
Rampur	Moradabad Jn.	647233.246	0.46	695,880.20	0.50
Moradabad Jn.	Ghaziabad	66403.71	0.05	87,508.62	0.06
Moradabad Jn.	Bijnor	41579.29	0.03	54,794.32	0.04
Roza	Shahjahanpur Jn.	466662.036	0.33	445,219.77	0.32
Prayagraj	Kanpur	2653083.456	1.89	2,933,550.64	2.09
Kanpur	Shikohabad Jn.	2653083.456	1.89	2,933,550.64	2.09
Shikohabad Jn.	Tundla Jn.	2653083.456	1.89	2,933,550.64	2.09
Tundla Jn.	Aligarh Jn.	2653083.456	1.89	2,933,550.64	2.09
Aligarh Jn.	Dadri	2653083.456	1.89	2,933,550.64	2.09
Dadri	Gautambudhnagar	2653083.456	1.89	2,933,550.64	2.09

O-D Source cluster Mapping – Madhya Pradesh to Uttar Pradesh (2/2)

Madhya Pradeshto Uttar Pradesh total Rail Despatch in FY22 = 20.04 Million Tonnes



Prayagraj, Kanpur, Shikohabad Jn., Tundla Jn., Aligarh Jn., Dadri, Gautambudhnagar

Major Coal Consuming Districts of UP: 2030 (Estimated)

>15 MTPA Coal Consumption	*Jhansi, Sonbhadra*
10-15 MTPA Coal Consumption	*Bulandsahar, Kanpur*
5-10 MTPA Coal Consumption	*Prayagraj, Rae Bareli, Lucknow, Shahjahanpur, Ambedkar Nagar, Gorakhpur*
1-5 MTPA Coal Consumption	*Ghaziabad, Hapur, Gautam Buddha Nagar, Aligarh, Agra, Kushinagar, Gonda*

Expected Load from Madhya Pradesh to Uttar Pradesh main trunk lines (Excluding load from other states on this line)

*UP Coal **Demand 2022 ~ 87 MTPA***
*Rail Supply by Madhya Pradesh **2022 ~ 25.41 MTPA***

*UP Coal **Demand 2030 ~ 114 MTPA***
*Rail Supply by Madhya Pradesh **2030 ~ 38.49 MTPA***

		FY22		FY30	
From	To	Traffic (Tonnes) 2022	Rakes / Day 2022	Traffic (Tonnes) 2030	Rakes / Day 2030
Chunar Jn.	Varanasi Jn.	526189.076	0.37	531,750.17	0.38
Varanasi Jn.	Jaunpur jn.	440502.576	0.31	422,698.20	0.30
Jaunpur jn.	Akbarpur Jn.	440502.576	0.31	422,698.20	0.30
Akbarpur Jn.	Ayodhya	440502.576	0.31	422,698.20	0.30
Ayodhya	Mankapur Jn.	440502.576	0.31	422,698.20	0.30
Mankapur Jn.	Gonda jn.	440502.576	0.31	422,698.20	0.30
Gonda jn.	Balrampur	440502.576	0.31	422,698.20	0.30
Varanasi Jn.	Partapgarh Jn.	85686.5	0.06	109,051.97	0.08
Partapgarh Jn.	Sultanpur	85686.5	0.06	109,051.97	0.08
Bargawan	New Katni Jn.	8896020.028	6.33	9,194,389.92	6.54
New Katni Jn.	Bina Etawa	3063431.572	2.18	3,200,505.86	2.28
Bina Etawa	Gwalior	343466.15	0.24	452,629.04	0.32
Gwalior	Dhaulpur	417921.3	0.30	550,748.06	0.39
Dhaulpur	Agra Cantt	417921.3	0.30	550,748.06	0.39
Agra	Tundla Jn.	417921.3	0.30	550,748.06	0.39
Tundla Jn.	Aligarh Jn.	417921.3	0.30	550,748.06	0.39
Aligarh Jn.	Hapur jn.	417921.3	0.30	550,748.06	0.39
Hapur jn.	Meerut	417921.3	0.30	550,748.06	0.39
Meerut	Muzaffarnagar	245746.5	0.17	323,851.42	0.23
Bina Etawa	Lalitpur	2719965.422	1.94	2,747,876.83	1.96
Lalitpur	Jhansi	978408.456	0.70	968,863.48	0.69
Jhansi	Gwalior Jn.	74455.15	0.05	98,119.02	0.07
Meerut	Saharanpur Jn.	74455.15	0.05	98,119.02	0.07
New Katni Jn.	Katni Jn	5832588.456	4.15	5,993,884.06	4.27
Katni Jn	Satna	5832588.456	4.15	5,993,884.06	4.27
Satna	Manikpur Jn.	5832588.456	4.15	5,993,884.06	4.27
Manikpur Jn.	Allahabad	5832588.456	4.15	5,993,884.06	4.27
Krishnashila	Sonbhadra	5844602.766	4.16	5,130,960.35	3.65
Renukut	Sonbhadra	167694.32	0.12	220,992.14	0.16
Shakti Nagar	Sonbhadra	723535.47	0.51	920,833.12	0.66

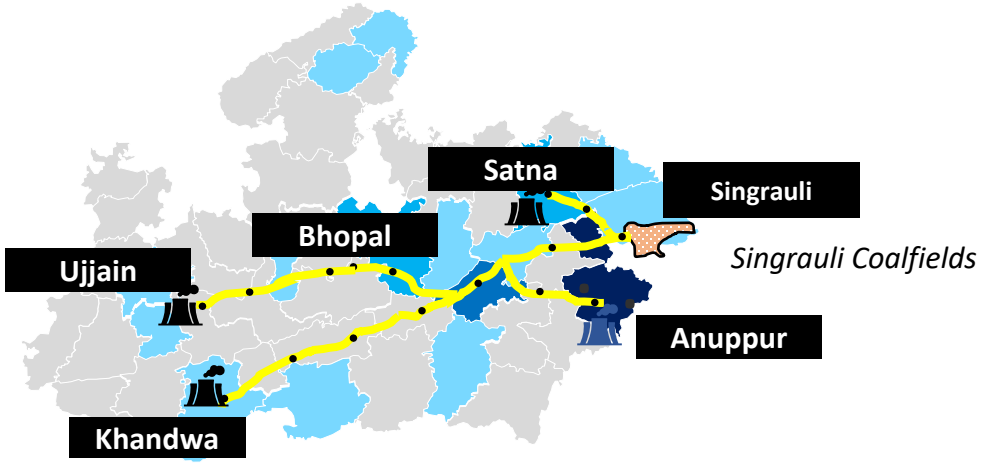
O-D Source cluster Mapping – Supplies to UP to increase slightly

All figures in million tonnes

Name of TPS	Power Utility	NCL Singrauli	CCL	Others including Captive	Total Consumed FY22	Estimated Coal Consumption (FY30)	Supply from NCL	Supply from CCL	Supply from Others i.e SECL, ECL etc	Captive Supply	
BARKHERA	Bajaj Energy Limited	0.16	0.00	0.00	0.16	0.32	0.16	0.16	0.00	0.00	
KHAMBHAR KHERA	Bajaj Energy Limited	0.18	0.00	0.00	0.18	0.32	0.18	0.14	0.00	0.00	
KUNDARKI	Bajaj Energy Limited	0.20	0.00	0.02	0.21	0.31	0.20	0.11	0.00	0.00	
MAQSOODAPUR	Bajaj Energy Limited	0.18	0.00	0.00	0.18	0.32	0.18	0.14	0.00	0.00	
UTRAULA	Bajaj Energy Limited	0.15	0.00	0.04	0.19	0.32	0.15	0.17	0.00	0.00	
LALITPUR	LALITPUR POWER GENERATION COMPANY LIMITED	2.36	2.66	0.84	5.87	5.87	2.36	2.66	0.84	0.00	
ANPARA 'C' TPS	LANCO ANPARA POWER LIMITED	5.15	0.00	0.09	5.24	5.49	5.49	0.00	0.00	0.00	
MEJA TPP	MEJA URJA NIGAM PRIVATE LIMITED (NTPC-JV)	3.27	1.55	0.23	5.05	5.05	3.27	1.78	0.00	0.00	
DADRI	NTPC LTD.	2.02	0.63	1.05	3.70	6.65	2.02	4.63	0.00	0.00	
SINGRAULI	NTPC LTD.	9.42	0.00	0.00	9.42	10.85	10.85	0.00	0.00	0.00	
RIHAND	NTPC LTD.	14.07	0.00	0.00	14.07	15.02	15.02	0.00	0.00	0.00	
FEROZE GANDHI UNCHAHAR	NTPC LTD.	0.00	3.33	2.20	5.53	5.53	0.00	3.53	0.00	2.00	Pakri-Barwadih
TANDA	NTPC LTD.	0.00	3.38	2.07	5.46	6.07	0.00	0.00	0.00	6.07	Kerandari
PRAYAGRAJ TPS	PRAYAGRAJ POWER GENERATION COMPANY LTD.	7.25	0.16	0.03	7.43	7.43	6.95	0.48	0.00	0.00	
ROSA TPP	ROSA POWER SUPPLY COMPANY LIMITED	0.00	3.52	0.13	3.65	4.27	0.00	4.27	0.00	0.00	
ANPARA 'A' & 'B'	UPRVUNL	11.39	0.00	0.00	11.39	14.31	14.31	0.00	0.00	0.00	
HARDUAGANJ	UPRVUNL	0.00	0.79	0.49	1.28	2.67	0.00	2.39	0.28	0.00	
OBRA	UPRVUNL	3.40	0.00	0.05	3.45	4.59	4.59	0.00	0.00	0.00	
PARICHHA	UPRVUNL	0.72	0.96	0.97	2.65	3.66	1.33	0.00	2.33	0.00	
Total		59.91	16.97	8.23	85.11	99.04	67.04	20.47	3.46	8.07	
Under Construction / Pipeline Capacities											
Ghatampur TPP	NUPPL					6.83	0	0	0	6.83	Pachwara South
Khurja SCTPP	THDC					4.25	0	0	0	4.25	Amelia
Jawaharpur STPP	UPRVUNL					3.39	0	0	0	3.39	Saharpur Jampani
Obra C-STPP	UPRVUNL					5.32	0	0	0	5.32	
Panki TPS Extn	UPRVUNL					2.68	0	0	0	2.68	
Singrauli STPP-III	NTPC LTD.					8.53	8.53	0	0	0	
Meja -II STPP	NTPC LTD.					7.08	0	7.08	0	0	
Grand Total						137.12	75.57	27.55	3.46	30.54	

O-D Source cluster Mapping – Madhya Pradesh's Internal Consumption

Madhya Pradesh's internal total Rail Despatch in FY22 = 10.34 Million Tonnes



Bargawan, Singrauli, New Katni, Jabalpur, Khandwa

Major Coal Consuming Districts of MP: 2030 (Estimated)

>15 MTPA Coal Consumption	*Shahdol*
10-15 MTPA Coal Consumption	*Jabalpur*
5-10 MTPA Coal Consumption	*Satna, Sagar*
1-5 MTPA Coal Consumption	*Sidhi, Singrauli, Rewa, Katni, Damoh, Betul, Khandwa, Ujjain, Indore, Bhind, Gwalior, Bhopal, Seoni*

Expected Load from Madhya Pradesh to Madhya Pradesh main trunk lines (Excluding load from other states on this line)

MP's Coal ***Demand 2022 ~ 84.33 MTPA***

Rail Supply by Madhya Pradesh ***2022 ~ 17.06 MTPA***

MP's Coal ***Demand 2030 ~ 110.2 MTPA***

Rail Supply by Madhya Pradesh ***2030 ~ 13.12 MTPA***

		FY22		FY30	
From	To	Traffic (Tonnes) 2022	Rakes / Day 2022	Traffic (Tonnes) 2030	Rakes / Day 2030
Bargawan	Singrauli	835,248.45	0.59	711,128.7	0.51
Bargawan	New Katni	12,577,762.99	8.95	10,481,577.3	7.46
New Katni	Anuppur	230,919.78	0.16	293,888.3	0.21
New Katni Jn	Katni Jn	103,222.65	0.07	136,029.6	0.10
New Katni	Jabalpur	12,998,977.75	9.25	11,007,767.7	7.83
Jabalpur	Seoni	1,043,266.29	0.74	987,116.1	0.70
Jabalpur	Narsinghpur	4,521,798.28	3.22	3,509,674.5	2.50
Katni Jn	Satna	35,490.97	0.03	46,771.0	0.03
Katni jn	Bina Jn.	115,722.21	0.08	152,501.9	0.11
Bina Jn.	Bhopal Jn.	115,722.21	0.08	152,501.9	0.11
Bhopal Jn.	Maksi	115,722.21	0.08	152,501.9	0.11
Maksi	Ujjain Jn.	115,722.21	0.08	152,501.9	0.11
Ujjain Jn.	Nagda Jn.	115,722.21	0.08	152,501.9	0.11
Jabalpur	Itarsi	6,562,833.77	4.67	5,402,366.9	3.84
Itarsi	Khargone	3,935,520.77	2.80	3,005,672.5	2.14
Itarsi	Khandwa	2,627,313.00	1.87	2,396,694.4	1.71
Shaktinagar	Singrauli	3650986.198	2.60	4,539,567.1	3.23

- Major consumers include NTPC Gadarwara, DB power, MB power and Jhabua Power.

O-D Source cluster Mapping – Internal Consumption to remain at similar levels by FY30

All figures in million tonnes

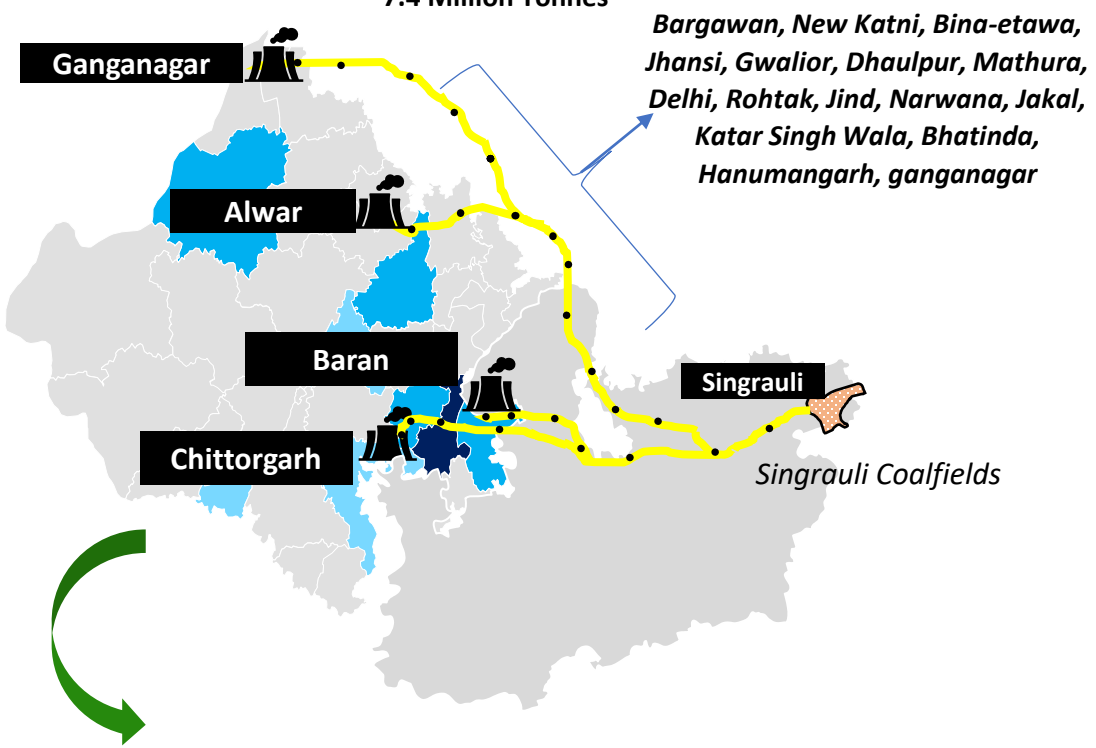
Name of TPS	Power Utility	NCL Singrauli	SECL	Others including Captive	Total Coal Consumed FY22	Estimated Coal Consumption (FY30)	Supply from NCL	Supply from SECL	Supply from Others i.e CCL, WCL	Captive Supply
MAHAN	MAHAN ENERGEN LTD.	0.00	0.00	2.38	2.38	6.19	0.00	0.00	6.19	0.00
JAYPEE BINA TPP	JAIPRAKSH POWER VENTURES LIMITED	0.46	0.83	0.50	1.78	2.65	0.00	2.65	0.00	0.00
JAYPEE NIGRIE SUPER TPP	JAIPRAKSH POWER VENTURES LIMITED	2.00	0.15	2.82	4.97	5.83	0.20	2.83	0.00	2.80
SANJAY GANDHI	MPPGCL	0.00	4.90	0.03	4.93	7.42	0.00	7.42	0.00	0.00
SATPURA	MPPGCL	0.00	0.41	1.81	2.22	6.39	0.00	6.39	0.00	0.00
AMARKANTAK	MPPGCL	0.00	0.00	0.99	0.99	1.15	0.00	1.15	0.00	0.00
SHREE SINGAJI TPS	MPPGCL	2.25	2.40	2.23	6.88	13.71	2.25	9.23	2.23	0.00
JHABUA POWER LIMITED	JHABUA POWER LIMITED	0.50	1.67	0.39	2.55	3.08	0.00	2.58	0.50	0.00
ANUPPUR TPS	MB POWER (MADHYA PRADESH) LIMITED	0.17	4.77	0.49	5.44	6.29	0.00	6.29	0.00	0.00
VINDHYACHAL	NTPC LTD.	24.28	0.00	0.00	24.28	26.92	26.92	0.00	0.00	0.00
GADARWARA SUPER	NTPC LTD.	2.60	0.53	2.02	5.14	7.69	3.99	2.30	1.40	0.00
SASAN UMPP TPP	REILIANCE POWER LIMITED	0.00	0.00	18.31	18.31	18.47	0.00	0.00	0.00	18.47
KHARGONE SUPER THERMAL POWER STATION	NTPC LTD.	2.00	0.80	1.04	3.84	5.95	2.61	0.00	3.34	0.00
Total		34.24	16.47	33.00	83.72	111.72	35.97	40.83	13.65	21.27
Under Construction / Pipeline Capacities										
AMARKANTAK TPS	MPPGCL					3.54	0.00	3.54	0.00	0.00
SATPURA TPS	MPPGCL					3.54	0.00	0.00	3.54	0.00
Grand Total						118.80	35.97	44.37	17.19	21.27

Amelia North

- Marginal anticipated increase in coal despatches from NCL to power plants such as NTPC's Vindhyachal Unit (MGR), Gadarwara and Khargone power plants via Rail mode. Power plants such as Jaypee Nigrie, Jaypee Bina, Jhabua Power, Anuppur TPS etc. will majorly rely on SECL and CCL for the anticipated increase in coal consumption.

O-D Source cluster Mapping – Madhya Pradesh to Rajasthan

Madhya Pradesh to Rajasthan total Rail Despatch in FY22 = 7.4 Million Tonnes



Major Coal Consuming Districts of Rajasthan: 2030 (Estimated)

>15 MTPA Coal Consumption	*Kota*
5-10 MTPA Coal Consumption	*Bundi, Baran, Jaipur, Bikaner*
1-5 MTPA Coal Consumption	*Ajmer, Nimach, Chittorgarh, Pratapgarh, Jalor*

Expected Load from Madhya Pradesh to Rajasthan main trunk lines (Excluding load from other states on this line)

Rajasthan's Coal ***Demand 2022 ~ 28.86 MTPA*** *Rajasthan's Coal* ***Demand 2030 ~ 59.1 MTPA***

Rail Supply by Madhya Pradesh ***2022 ~ 7.74 MTPA*** *Rail Supply by Madhya Pradesh* ***2030 ~ 3.26 MTPA***

		FY22		FY30	
From	To	Traffic (Tonnes) 2022	Rakes / Day 2022	Traffic (Tonnes) 2030	Rakes / Day 2030
Bargawan	New Katni Jn.	7,736,988.94	5.51	7,955,871.44	5.66
New Katni Jn.	Bina Etawa	7,736,988.94	5.51	7,955,871.44	5.66
Bina Etawa	Jhansi	705,033.88	0.50	714,347.64	0.51
Jhansi	Gwalior Jn.	705,033.88	0.50	714,347.64	0.51
Gwalior Jn.	Dhaulpur	705,033.88	0.50	714,347.64	0.51
Dhaulpur	Agra Cantt	705,033.88	0.50	714,347.64	0.51
Agra Cantt	Mathura	705,033.88	0.50	714,347.64	0.51
Mathura	Delhi	700,954.44	0.50	708,971.65	0.50
Delhi	Rohtak Jn.	700,954.44	0.50	708,971.65	0.50
Rohtak Jn.	Jind Jn.	700,954.44	0.50	708,971.65	0.50
Jind Jn.	Narwana Jn.	700,954.44	0.50	708,971.65	0.50
Narwana Jn.	Jakhal Jn.	700,954.44	0.50	708,971.65	0.50
Jakhal Jn.	Katar Singh Wala	700,954.44	0.50	708,971.65	0.50
Jakhal Jn.	Katar Singh Wala	700,954.44	0.50	708,971.65	0.50
Katar Singh Wala	Bathinda Jn.	700,954.44	0.50	708,971.65	0.50
Bathinda Jn.	Hanumangarh Jn.	700,954.44	0.50	708,971.65	0.50
Hanumangarh Jn.	Suratgarh Jn.	700,954.44	0.50	708,971.65	0.50
Suratgarh Jn.	Ganganagr	700,954.44	0.50	708,971.65	0.50
Bina Etawa	Ruthiyai	7031955.06	5.00	7,241,523.80	5.15
Ruthiyai	kota	3966658.4	2.82	3,876,101.11	2.76
kota	Chittorgarh	187969.31	0.13	247,711.07	0.18
Mathura	Alwar	4079.44	0.00	5,376.00	0.00
Ruthiyai	Baran	3065296.66	2.18	3,365,422.68	2.39

O-D Source cluster Mapping – Supplies to Rajasthan will decline due to captive supplies

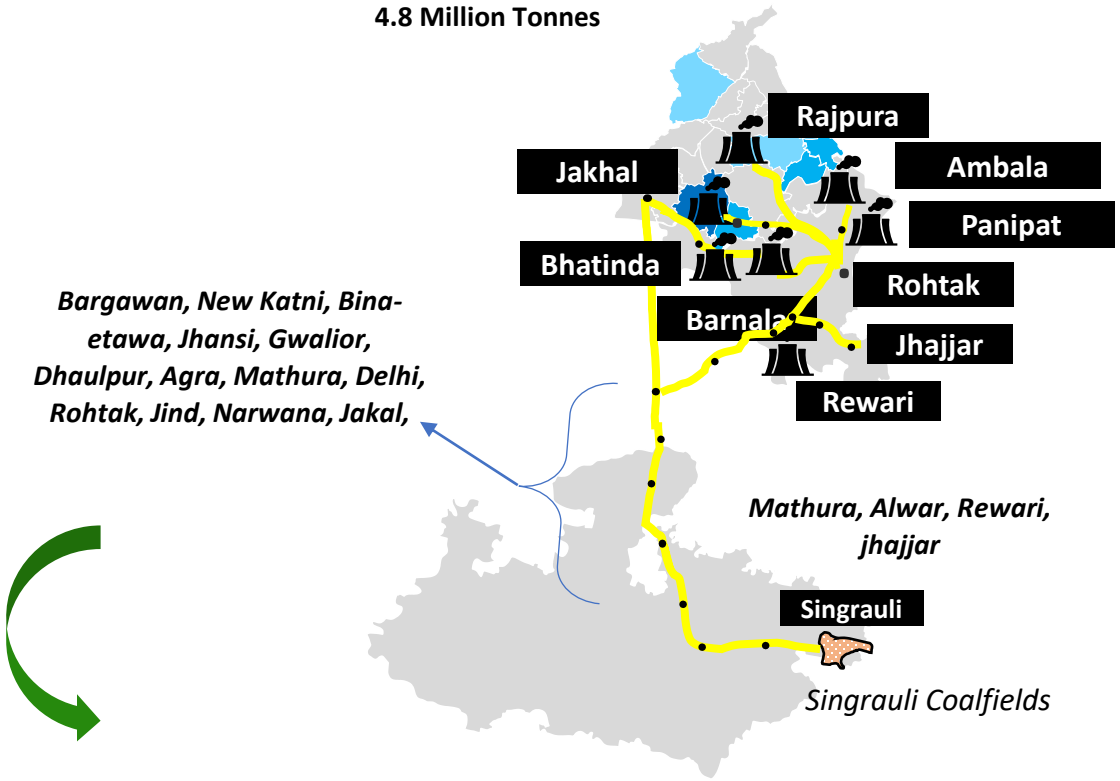
All figures in million tonnes

Name of TPS	Power Utility	NCL Singrauli	SECL	Others including Captive	Total Consumed in FY22	Estimated Coal Consumption (FY30)	Supply from NCL	Supply from SECL	Supply from Others	Captive Supply
KAWAI	ADANI POWER RAJASTHAN LTD.	2964127.59	1260333.33	631539.08	4856000	5170852.87	2964127.59	2206725.28		
CHHABRA	RRVUNL	11963.32	747716.17	2197820.51	2957500	4307626.49	0			4307626.49
SURATGARH	RRVUNL	747688.59	2734719.94	0	3482408.53	6778172.67	0			6778172.67
KALISINDH SUPER TPP	RRVUNL	0	0	4367900	4367900	4939190.73	0			4939190.73
KOTA SUPER THERMAL POWER STATION	RRVUNL	3717359.39	1579812.97	0	5297172.36	5940687.89	0			5940687.89
CHHABRA SUPER CRITICAL TPP	RRVUNL	0	0	3204600	3204600	5055532.76	0			5055532.76
Total		**7441138.89**	**6322582.41**	**10401859.59**	**24165580.89**	**32192063.40**	**2964127.59**	**2206725.28**	**0.00**	**27021210.54**

- Power plants of RRVUNL will completely rely on captive supplies from PKEB, Parsa and Kente Extension with a total cumulative PRC of 28 MTPA. This would lead to lower supplies to Rajasthan from NCL. Marginal increase in supplies to Kawai would be fed from SECL, NCL to remain the ACQ levels of 2.9 MTPA due to limited production capacity.

O-D Source cluster Mapping – Madhya Pradesh to Punjab & Haryana

Madhya Pradesh to Punjab & Haryana total Rail Despatch in FY22 = 4.8 Million Tonnes



Major Coal Consuming Districts of Punjab: 2030 (Estimated)

10-15 MTPA Coal Consumption	*Bhatinda*
5-10 MTPA Coal Consumption	*Mansa, Fatehgarh Sahib, Rupnagar*
1-5 MTPA Coal Consumption	*Amritsar, Tarn Taran, Ludhiana, Nawashahr*

Expected Load from Madhya Pradesh to Punjab & Haryana main trunk lines (Excluding load from other states on this line)

Pb & Hr Coal ***Demand 2022 ~ 33.01 MTPA***

Rail Supply by Madhya Pradesh ***2022 ~ 5.19 MTPA***

Pb & Hr Coal ***Demand 2030 ~ 43.13 MTPA***

Rail Supply by Madhya Pradesh ***2030 ~ 5.19 MTPA***

FY22				FY30	
From	To	Traffic (Tonnes) 2022	Rakes / Day 2022	Traffic (Tonnes) 2030	Rakes / Day 2030
Bargawan	New Katni Jn.	5,185,143.08	3.69	Traffic to remain like FY22. Additional coal demand from Power Plants of Punjab & Haryana would source from CCL	
New Katni Jn.	Bina Etawa	5,185,143.08	3.69		
Bina Etawa	Jhansi	1,130,174.28	0.80		
Jhansi	Gwalior Jn.	1,130,174.28	0.80		
Gwalior Jn.	Dhaulpur	5,185,143.08	3.69		
Dhaulpur	Agra Cantt	5,185,143.08	3.69		
Agra Cantt	Mathura	5,185,143.08	3.69		
Mathura	Delhi	2,434,340.51	1.73		
Delhi	Rohtak Jn.	1,614,703.57	1.15		
Rohtak Jn.	Jind Jn.	442575.4575	0.31		
Jind Jn.	Narwana Jn.	442575.4575	0.31		
Narwana Jn.	Jakhal Jn.	442575.4575	0.31		
Jakhal Jn.	Katar Singh Wala	39974.0575	0.03		
Katar Singh Wala	Bathinda Jn.	39974.0575	0.03		
Jakhal Jn.	Dhuri Jn.	43877.8875	0.03		
Dhuri Jn.	Barnala	43877.8875	0.03		
Delhi	Panipat	819,636.94	0.58		
Panipat	Kurukshetra Jn.	687598.8225	0.49		
Kurukshetra Jn.	Ambala Cantt. Jn.	687598.8225	0.49		
Ambala Cantt. Jn.	Rajpura Jn.	687598.8225	0.49		
Bina Etawa	Gwalior	4,054,968.80	2.89		
Mathura	Alwar	2,750,802.57	1.96		
Alwar	Rewari	2,750,802.57	1.96		
Rewari	Jhajjar	2,750,802.57	1.96		
Rohtak	Bhiwani	1,172,128.11	0.83		
Bhiwani	Hisar	1,172,128.11	0.83		
Hisar	Barwala	1,172,128.11	0.83		

O-D Source cluster Mapping – Supplies to Punjab & Haryana to remain stagnant

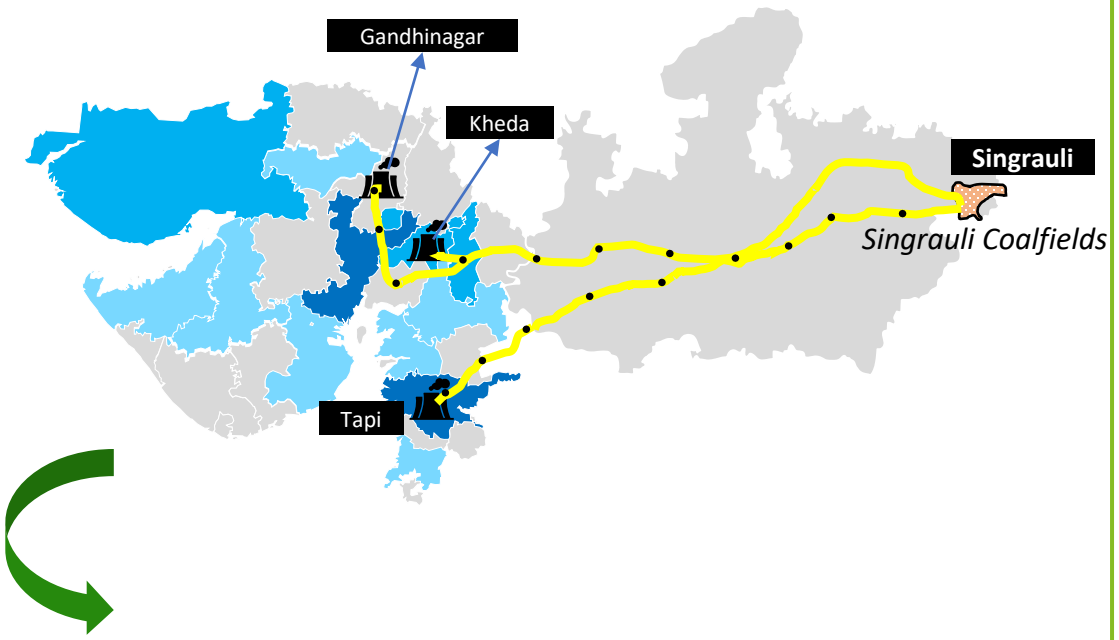
All figures in million tonnes

Name of TPS	Power Utility	NCL Singrauli	CCL	Others including SECL,ECL, BCCL, MCL Captive	Total Consumed in FY22	Estimated Coal Consumption (FY30)	Supply from NCL	CCL	Others including SECL,ECL, BCCL, MCL	Captive Supply
RAJPURA TPS	NABHA POWER LIMITED	0.82	0.34	4.28	**5.44**	**5.44**	**0.82**	1.81	2.80	0.00
GURU HARGOBIND TPP, LEHRA MOHABAT	PSPCL	0.00	0.33	0.99	**1.32**	**4.16**	**0.00**	0.00	0.00	4.16
GURU GOBIND SINGH TPP, ROPAR	PSPCL	0.00	0.32	0.86	**1.18**	**3.93**	**0.00**	3.60	0.33	1.44
GVK POWER (GOINDWALSAHIB) LTD.	PSPCL	0.00	1.10	0.21	**1.30**	**2.58**	**0.00**	1.70	0.88	0.00
TALWANDI SABO POWER LTD	TALWANDI SABO POWER LTD.	0.20	0.57	5.24	**6.02**	**9.24**	**0.20**	1.31	7.72	0.00
INDIRA GANDHI	ARAVALI POWER CORPORATION PVT LTD	2.29	0.13	2.25	**4.67**	**6.90**	**2.29**	4.60	0.00	0.00
RAJIV GANDHI TPP,Hissar	HPGCL	1.17	0.10	0.58	**1.85**	**5.77**	**1.17**	3.29	1.30	0.00
Deen Bandhu Chhotu Ram TPS, YAMUNANAGAR	HPGCL	0.00	0.96	0.88	**1.84**	**2.94**	**0.00**	2.80	0.14	0.00
PANIPAT	HPGCL	0.13	0.27	1.48	**1.88**	**3.37**	**0.13**	2.07	1.17	0.00
MAHATMA GANDHI TPP	JHAJJAR POWER LIMITED	0.43	1.70	2.61	**4.74**	**5.60**	**0.43**	5.17	0.00	0.00
Total		**5.05**	**5.80**	**19.38**	**30.23**	**49.91**	**5.05**	**26.36**	**14.33**	**5.60**

- Pachwara Central (5.6 MTPA) would cater to the demand of power plants of PSPCL. Increase in demand from power plants would be majorly catered by CCL due to the limited scope of production enhancement of NCL. NCL's despatch to power plants of Punjab & Haryana will remain same as current levels.

O-D Source cluster Mapping – Madhya Pradesh to Gujarat

Madhya Pradesh to Gujarat total Rail Despatch in FY22 = 0.73 Million Tonnes



Major Coal Consuming Districts of Gujarat: 2030 (Estimated)

>15 MTPA Coal Consumption	*NA*
10-15 MTPA Coal Consumption	*Ahmedabad, Surat, Tapi*
5-10 MTPA Coal Consumption	*Kachchh, Gandhinagar, Kheda*
1-5 MTPA Coal Consumption	*Valsad, Bharuch, Vadodara, Chhota udepur, Patan, Jamnagar, Dwarka, Bhavnagar*

Expected Load from Madhya Pradesh to Gujarat main trunk lines (Excluding load from other states on this line)

*Gujarat's Coal **Demand 2022 ~ 30 MTPA***

*Rail Supply by Madhya Pradesh **2022 ~ 0.73 MTPA***

*Gujarat's Coal **Demand 2030 ~ 39 MTPA***

*Rail Supply by Madhya Pradesh **2030 ~ 0.949 MTPA***

		FY22		FY30	
From	To	Traffic (Tonnes) 2022	Rakes / Day 2022	Traffic (Tonnes) 2030	Rakes / Day 2030
Bargawan	New Katni Jn.	857450.43	0.61	998792.06	0.71
New Katni Jn.	Bina Etawa	679631.39	0.48	814276.36	0.58
New Katni Jn.	Katni Jn.	177819.04	0.13	184515.70	0.13
Katni Jn.	Jabalpur	177819.04	0.13	184515.70	0.13
Jabalpur	Itarsi	177819.04	0.13	184515.70	0.13
Itarsi	Khandwa	177819.04	0.13	184515.70	0.13
Khandwa	Jalgaon	177819.04	0.13	184515.70	0.13
Jalgaon	Tapi	177819.04	0.13	184515.70	0.13
Bina Etawa	Bhopal Jn.	679631.39	0.48	814276.36	0.58
Bhopal Jn.	Maksi	679631.39	0.48	814276.36	0.58
Maksi	Ujjain Jn.	679631.39	0.48	814276.36	0.58
Ujjain Jn.	Nagda	679631.39	0.48	814276.36	0.58
Nagda	Ratlam	679631.39	0.48	814276.36	0.58
Ratlam	Godhra	679631.39	0.48	814276.36	0.58
Godhra	Kheda	271715.14	0.19	345807.93	0.25
Godhra	Anand Jn.	322356.72	0.23	410840.37	0.29
Anand Jn.	Nadiad Jn.	407916.25	0.29	468468.43	0.33
Nadiad Jn.	Sabarmati Jn.	407916.25	0.29	468468.43	0.33
Sabarmati Jn.	Ghandhinagar	407916.25	0.29	468468.43	0.33

O-D Source cluster Mapping – Supplies to Gujarat will remain stagnant

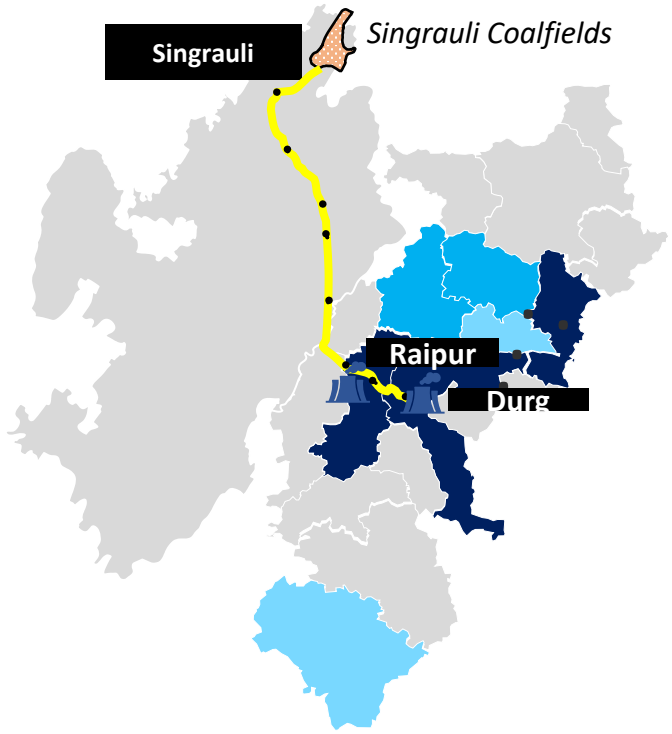
All figures in million tonnes

Name of TPS	Power Utility	NCL Singrauli	SECL	Others including WCL, CCL & Others	Total Consumed in FY22	Estimated Coal Consumption (FY30)	Supply from NCL	SECL	Others including WCL, CCL & Others	Captive Supply
MUNDRA TPS	ADANI POWER (MUNDRA) LIMITED	0.00	0.00	6.58	6.58	15.74	0.00	5.40	10.34	0.00
MUNDRA UMPP	Coastal Gujarat Power Limited	0.00	0.00	0.37	0.37	1.01	0.00	0.00	1.01	0.00
GANDHINAGAR	Gujarat State Electricity Corporation Limited	0.29	1.85	0.08	2.22	2.61	0.00	2.60	0.01	0.00
SIKKA	Gujarat State Electricity Corporation Limited	0.00	0.00	0.47	0.47	1.50	0.00	0.00	1.50	0.00
UKAI	Gujarat State Electricity Corporation Limited	0.18	2.56	0.69	3.43	4.69	0.08	3.80	0.89	0.00
WANAKBORI	Gujarat State Electricity Corporation Limited	0.27	7.04	0.28	7.58	9.61	0.12	8.30	1.31	0.00
SABARMATI TPS	TORRENT POWER LTD.	0.00	1.19	0.18	1.38	1.38	0.00	1.10	0.28	0.00
Total		**0.74**	**12.64**	**8.66**	**22.03**	**36.53**	**0.20**	**21.20**	**15.33**	**0.00**
Under Construction / Pipeline Capacities										
Ukai TPS – Tapi	Gujarat State Electricity Corporation Limited					4.29	0	4.29	0	0
Grand Total						**40.82**	**0.20**	**25.49**	**15.33**	**0.00**

- Supplies to Gujarat Utilities will decrease from NCL to around ~0.2 MTPA from current 0.74 MTPA based on the effective ACQs. Coastal shipping from Talcher to GSECL plants, FSA for which have been signed earlier this year could further scale if economic viability is proven. Remaining quantum would be sourced from SECL.

O-D Source cluster Mapping – Madhya Pradesh to Chhattisgarh

Madhya Pradesh to Chhattisgarh total Rail Despatch in FY22 = 0.01 Million Tonnes



Major Coal Consuming Districts of Chhattisgarh: 2030 (Estimated)

>15 MTPA Coal Consumption	*Raipur, Raigarh, Durg*
5-10 MTPA Coal Consumption	*Korba, Bilaspur*
1-5 MTPA Coal Consumption	*Janjgir-Champa, Bijapur-Dantewada-Sukma cluster*

Expected Load from Madhya Pradesh to Chhattisgarh main trunk lines (Excluding load from other states on this line)

*Chhattisgarh's Coal **Demand 2022 ~ 124.47 MTPA***
*Rail Supply by Madhya Pradesh **2022 ~ 0.01 MTPA***

*Chhattisgarh's Coal **Demand 2030 ~ 162.64 MTPA***
*Rail Supply by Madhya Pradesh **2030 – 0 MTPA***

FY22 | **FY30**

From	To	Traffic (Tonnes) 2022	Rakes / Day 2022
Bargawan	New Katni Jn.	759893.67	0.54
New Katni Jn.	Anuppur Jn.	759893.67	0.54
Anuppur Jn.	Ghutku	759893.67	0.54
Ghutku	Raipur Jn.	759893.67	0.54
Raipur Jn.	Durg	381981.07	0.27

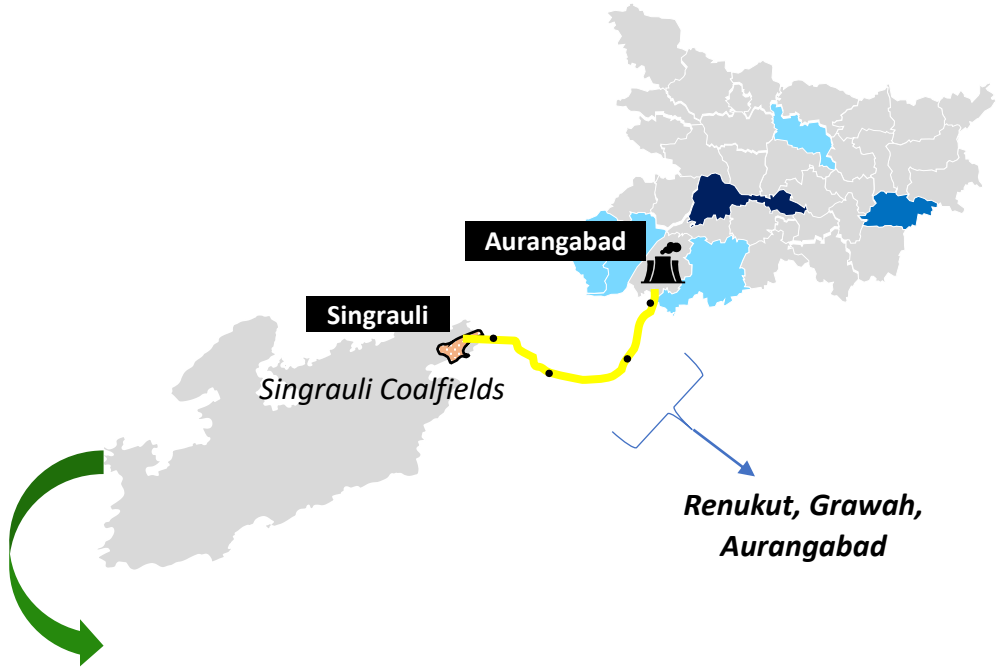
Would be catered by SECL in future.

No Traffic from NCL is projected in future to Chhattisgarh.

- Major Consumers in Chhattisgarh sourcing coal from NCL include ACC LTD. ,JAMUL plant and Vandana Global Limited.

O-D Source cluster Mapping – Madhya Pradesh to Bihar

Madhya Pradesh to Bihar total Rail Despatch in FY22 = 0.64 Million Tonnes



Major Coal Consuming Districts of Bihar: 2030 (Estimated)

>15 MTPA Coal Consumption	*Patna*
10-15 MTPA Coal Consumption	*Bhagalpur*
5-10 MTPA Coal Consumption	-
1-5 MTPA Coal Consumption	*Bhabua, Rohtas, Gaya, Darbhanga*

Expected Load from Madhya Pradesh to Bihar main trunk lines (Excluding load from other states on this line)

*Bihar Coal **Demand 2022 ~ 29.98 MTPA***

*Rail Supply by Madhya Pradesh **2022 ~ 0.64 MTPA***

*Bihar Coal **Demand 2030 ~ 39.17 MTPA***

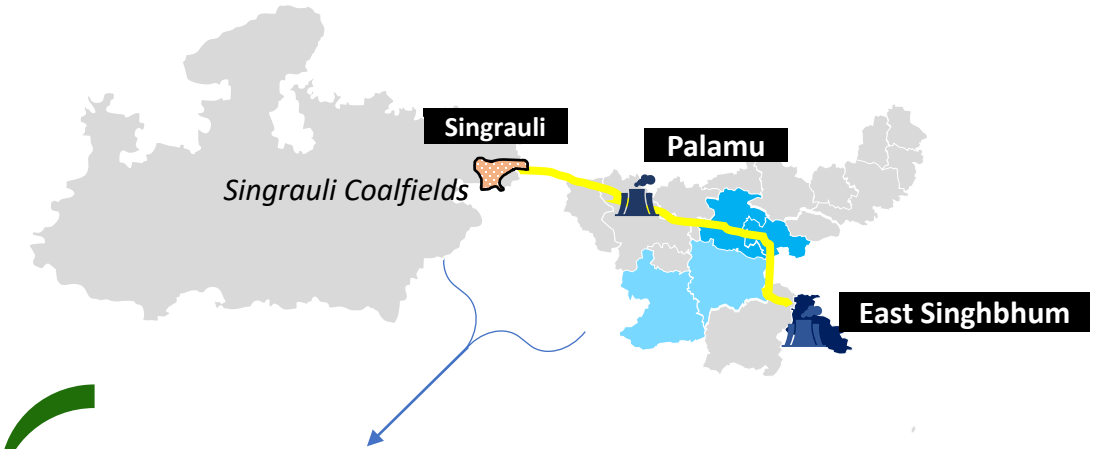
*Rail Supply by Madhya Pradesh **2030 ~ 0 MTPA***

FY22				FY30	
From	To	Traffic (Tonnes) 2022	Rakes / Day 2022	Traffic (Tonnes) 2030	Rakes / Day 2030
Renukut	Grawah	648377.16	0.46	Would be catered by CCL and ECL in future. No Traffic from NCL is projected in future to Bihar.	
Garhwa	Aurangabad	648377.16	0.46		

- Major Consumers in Bihar sourcing coal from NCL are NTPC's Aurangabad.

O-D Source cluster Mapping – Madhya Pradesh to Jharkhand

Madhya Pradesh to Jharkhand total Rail Despatch in FY22 = 0.07 Million Tonnes



Major Coal Consuming Districts of Jharkhand: 2030 (Estimated)

>15 MTPA Coal Consumption	*East Singhbhum*
10-15 MTPA Coal Consumption	-
5-10 MTPA Coal Consumption	*Bokaro, Hazaribagh*
1-5 MTPA Coal Consumption	*Simdega, Gumla, Khunti, Ranchi, Saraikela-Kharsawan*

Expected Load from Madhya Pradesh to Jharkhand main trunk lines (Excluding load from other states on this line)

Jharkhand Coal ***Demand 2022 ~ 52.31 MTPA***
Rail Supply by Madhya Pradesh ***2022 ~ 0.07 MTPA***

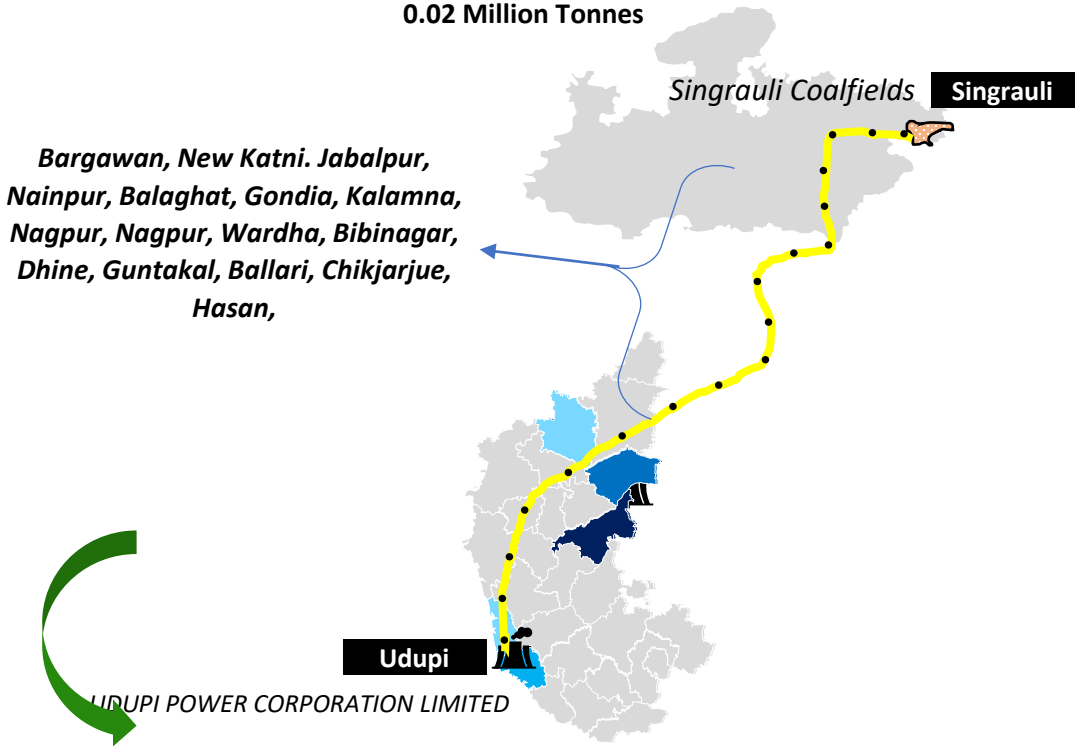
Jharkhand Coal ***Demand 2030 ~ 68.35 MTPA***
Rail Supply by Madhya Pradesh ***2030 ~ 0 MTPA***

FY22				FY30	
From	To	Traffic (Tonnes) 2022	Rakes / Day 2022	Traffic (Tonnes) 2030	Rakes / Day 2030
Renukut	Garhwa	324837.53	0.23	Would be catered by CCL and ECL in future. No Traffic from NCL is projected in future to Jharkhand.	
Garhwa	Palamu	186203.75	0.13		
Garhwa	Richughuta	138633.79	0.10		
Richughuta	Muri	138633.785	0.10		
Muri	Adityapur	138633.785	0.10		
Adityapur	Tata Nagar	138633.785	0.10		
Tata Nagar	East Singhbhum	138633.785	0.10		

- Major Consumers in Jharkhand sourcing coal from NCL are Grasim Industries Ltd. Chemical Division, Rehla and The Tata Power Company Limited

O-D Source cluster Mapping – Madhya Pradesh to Karnataka

Madhya Pradesh to Karnataka total Rail Despatch in FY22 = 0.02 Million Tonnes



Major Coal Consuming Districts of Karnataka: 2030 (Estimated)

>15 MTPA Coal Consumption	*Ballari*
10-15 MTPA Coal Consumption	*Raichur*
5-10 MTPA Coal Consumption	*Dakshina Kanadda*
1-5 MTPA Coal Consumption	*Bijapur, Udupi*

Expected Load from Madhya Pradesh to Karnataka main trunk lines (Excluding load from other states on this line)

Karnataka Coal ***Demand 2022 ~ 18.51 MTPA***
Rail Supply by Madhya Pradesh ***2022 ~ 0.02 MTPA***

Karnataka Coal ***Demand 2030 ~ 24.19 MTPA***
Rail Supply by Madhya Pradesh ***2030 ~ 0 MTPA***

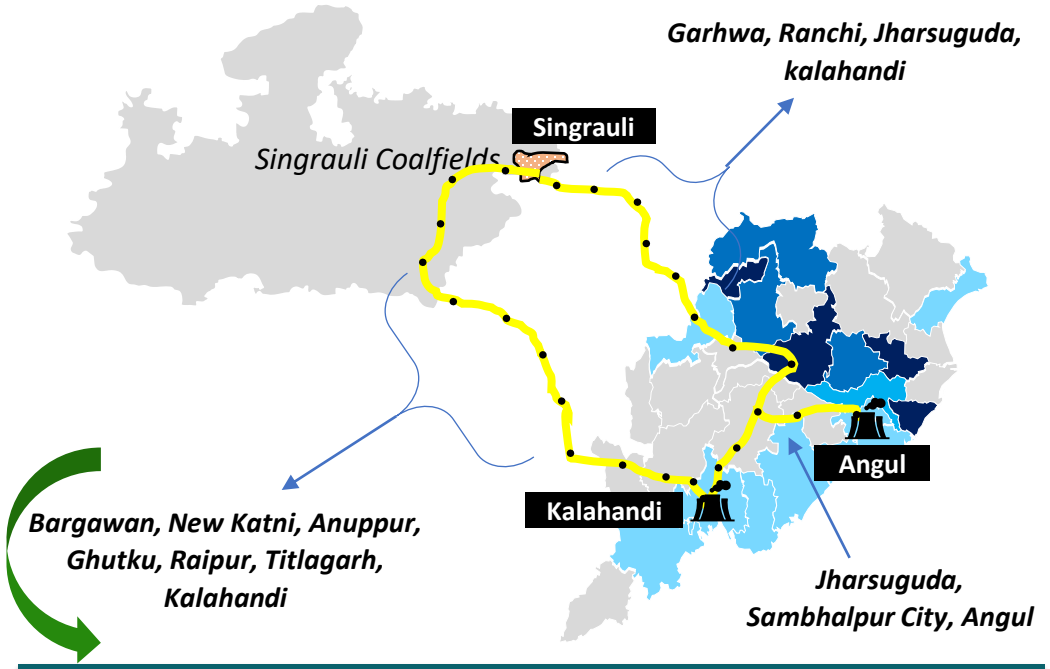
FY22				FY30	
From	To	Traffic (Tonnes) 2022	Rakes / Day 2022	Traffic (Tonnes) 2030	Rakes / Day 2030
Bargawan	New Katni Jn.	19829.3	0.01		
New Katni Jn.	Jabalpur	19829.3	0.01		
Jabalpur	Nainpur Jn.	19829.3	0.01		
Nainpur Jn.	Balaghat Jn.	19829.3	0.01		
Balaghat Jn.	Gondia Jn.	19829.3	0.01		
Gondia Jn.	Kalamna	19829.3	0.01		
Kalamna	Nagpur	19829.3	0.01		
Nagpur	Buti Bori	19829.3	0.01		
Buti Bori	Wardha Jn.	19829.3	0.01		
Wardha Jn.	Chandrapur	19829.3	0.01		
Chandrapur	Kazipet Jn.	19829.3	0.01		
Kazipet Jn.	Bibinagar Jn.	19829.3	0.01		
Bibinagar Jn.	Malkajgiri	19829.3	0.01		
Malkajgiri	Dhone Jn	19829.3	0.01		
Dhone Jn	Guntakal Jn.	19829.3	0.01		
Guntakal Jn.	Ballari Jn.	19829.3	0.01		
Ballari Jn.	Chikjajur Jn.	19829.3	0.01		
Chikjajur Jn.	Hassan	19829.3	0.01		
Hassan	Udupi	19829.3	0.01		

Would be catered by RSR – Coastal shipping from Talcher CF. SECL and SCCL are also potential options. Udupi Power plant mainly relies on Imported Coal

No Traffic from NCL is projected in future to Karnataka.

O-D Source cluster Mapping – Madhya Pradesh to Odisha

Madhya Pradesh to Odisha total Rail Despatch in FY22 = 0.23 Million Tonnes



Major Coal Consuming Districts of Odisha: 2030 (Estimated)

>15 MTPA Coal Consumption	*Jharsuguda, Angul, Jajpur, Jagatsinghpur*
10-15 MTPA Coal Consumption	*Sundergarh, Sambalpur, Dhenkanal*
5-10 MTPA Coal Consumption	*Cuttack*
1-5 MTPA Coal Consumption	*Koraput, Rayagada, Gagapati, Ganjam, Khordha, Puri, Bargarh, Balasore*

Expected Load from Madhya Pradesh to Odisha main trunk lines (Excluding load from other states on this line)

Odisha's Coal ***Demand 2022 ~ 99 MTPA***

Rail Supply by Madhya Pradesh ***2022 ~ 0.23 MTPA***

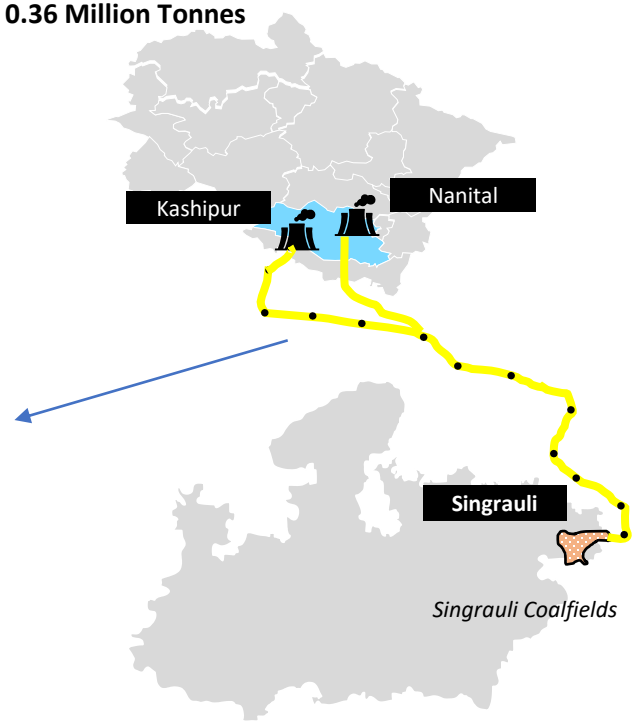
Odisha's Coal ***Demand 2030 ~ 147 MTPA***

Rail Supply by Madhya Pradesh ***2030 ~ 0 MTPA***

		FY22		FY30	
From	**To**	**Traffic (Tonnes) 2022**	**Rakes / Day 2022**	**Traffic (Tonnes) 2030**	**Rakes / Day 2030**
Bargawan	New Katni Jn.	539749.05	0.38	Would be catered by MCL in future. No Traffic from NCL is projected in future to Odisha.	
New Katni Jn.	Anuppur Jn.	539749.05	0.38		
Anuppur Jn.	Ghutku	539749.05	0.38		
Ghutku	Raipur	539749.05	0.38		
Raipur	Titlagarh	539749.05	0.38		
Titlagarh	Kalahandi	539749.05	0.38		
Renukut	Garhwa	202059.09	0.14		
Garhwa	Ranchi	202059.09	0.14		
Ranchi	Jharsuguda	202059.09	0.14		
Jharsuguda	kalahandi	44865.14	0.03		
Jharsuguda	Sambalpur City	157193.95	0.11		
Sambalpur City	Angul	157193.95	0.11		

O-D Source cluster Mapping – Madhya Pradesh to Uttarakhand

Madhya Pradesh to Uttarakhand total Rail Despatch in FY22 = 0.36 Million Tonnes



Major Coal Consuming Districts of Uttarakhand: 2030 (Estimated)

	>15 MTPA Coal Consumption	*NA*
	10-15 MTPA Coal Consumption	*NA*
	5-10 MTPA Coal Consumption	*NA*
	1-5 MTPA Coal Consumption	*Nainatal*

Expected Load from Madhya Pradesh to Uttarakhand main trunk lines (Excluding load from other states on this line)

Uttarakhand's Coal ***Demand 2022 ~ 0.57 MTPA***

Rail Supply by Madhya Pradesh ***2022 ~ 0.36 MTPA***

Uttarakhand's Coal ***Demand 2030 ~ 0.74 MTPA***

Rail Supply by Madhya Pradesh ***2030 ~ 0.36 MTPA***

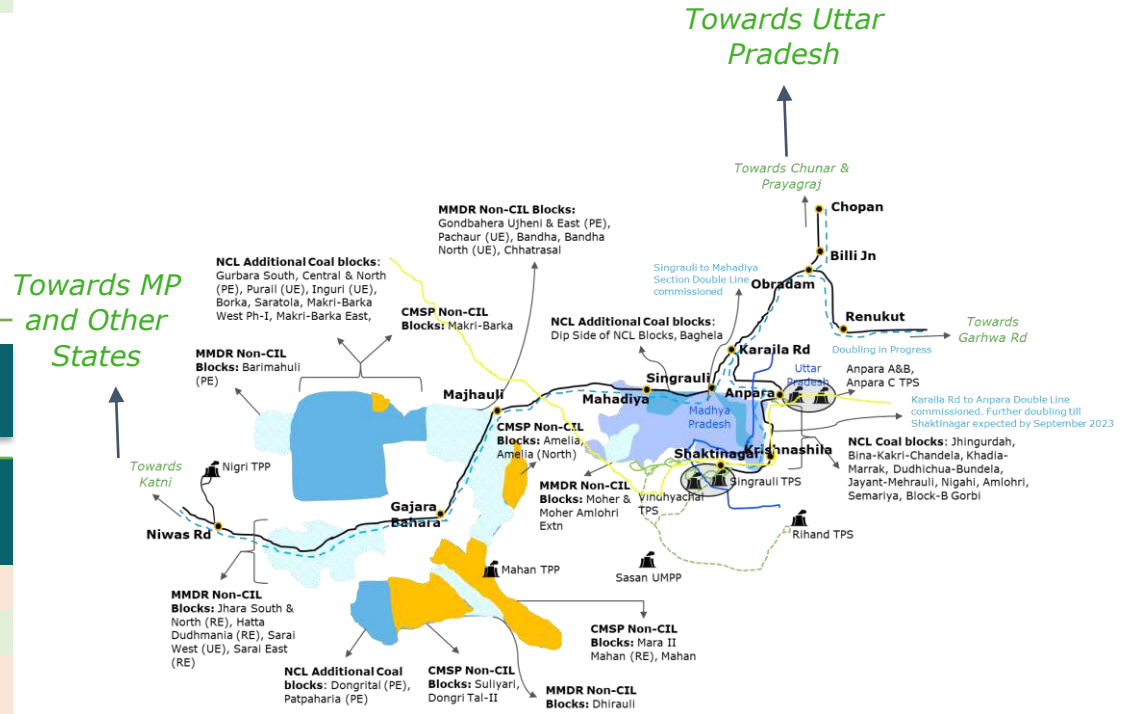
		FY22		FY30	
From	**To**	**Traffic (Tonnes) 2022**	**Rakes / Day 2022**	**Traffic (Tonnes) 2030**	**Rakes / Day 2030**
Billi	Chunar	361,521.78	0.26	Traffic to remain like FY22. Small NRS supplies to Uttarakhand would continue as these players would prefer NCL's coal	
Chunar	Prayagraj	361,521.78	0.26		
Prayagraj	Unchahar	361,521.78	0.26		
Unchahar	Rae Bareli	361,521.78	0.26		
Rae Bareli	Lucknow	361,521.78	0.26		
Lucknow	Roza	361,521.78	0.26		
Roza	Shahjahanpur	361,521.78	0.26		
Shahjahanpur	Bareilly	361,521.78	0.26		
Bareilly	Rampur	120,178.27	0.09		
Rampur	Moradabad	120,178.27	0.09		
Moradabad	Kashipur Jn.	120,178.27	0.09		
Bareilly	Lalkuan	241,343.51	0.17		
Lalkuan	Nanital	241,343.51	0.17		

O-D Source cluster Mapping – Consolidated Coal Traffic from Singrauli Coalfields to all states

2030 – NCL's coal flow				
State	Rail + RCR	Pure Road	MGR & Belt	Total
Uttar Pradesh	38.59	4.07	39.89	82.55
Madhya Pradesh	13.12	2.77	26.92	42.81
Rajasthan	3.26			3.26
Punjab & Haryana	5.19			5.19
Gujrat	0.32			0.32
Uttarakhand	0.36			0.36
Total	60.84	6.84	66.81	134.49

FY22 Actual and FY30 (Estimated) coal traffic in major sections for Despatch of coal from Madhya Pradesh to various destinations

From	To	Traffic (MT): 2022	Rakes / Day: 2022	Traffic (MT): 2030	Rakes / Day: 2030	Increase in Coal Traffic (Rakes / Day)
Shakti Nagar	Anpara	59.98	41.65	60.84	42.25	+ 0.60
Anpara	Karaila Rd	46.37	32.20	44.31	30.77	- 1.43
Karaila Rd	Obradam	14.02	9.74	35.73	24.81	+ 15.07
Obradam	Billi Jn	14.02	9.74	35.73	24.81	+ 15.07
Billi Jn	Chopan	12.16	8.44	35.73	24.81	+ 16.37
Chopan	Chunar	12.16	8.44	35.73	24.81	+ 16.37
Chunar	Prayagraj	12.16	8.44	35.73	24.81	+ 16.37
Karaila Rd	Singrauli	32.34	22.46	35.20	24.44	+ 1.98
Singrauli	Mahadiya	32.34	22.46	35.20	24.44	+ 1.98
Mahadiya	Majhauli	32.34	22.46	35.20	24.44	+ 1.98
Majhauli	Gajara Bahara	32.34	22.46	38.00	26.39	+ 3.93
Gajara Bahara	Niwas Road	32.34	22.46	38.00	26.39	+ 3.93
Niwas Road	Katni	27.38	19.01	32.17	22.34	+ 3.33



Coal Traffic includes supply from Non-CIL blocks such as Amelia (5.6 MTPA) of THDC to Khurja STPP, Amelia North (2.8 MTPA) of Jaiprakash power ventures limited to Jaypee Nigrie TPP from Majhauli.

Equal distribution of loads towards Chunar and Katni have been assumed for other blocks which probably will sell in the commercial market. These blocks include Suliyari (6 MTPA APMDC), Bandha (3 MTPA Emil Mines & Minerals), Dhirauli (5 MTPA Stratatech Mineral Resources), Gondbahera Ujheni (4.12 MTPA MP Natural Resources)

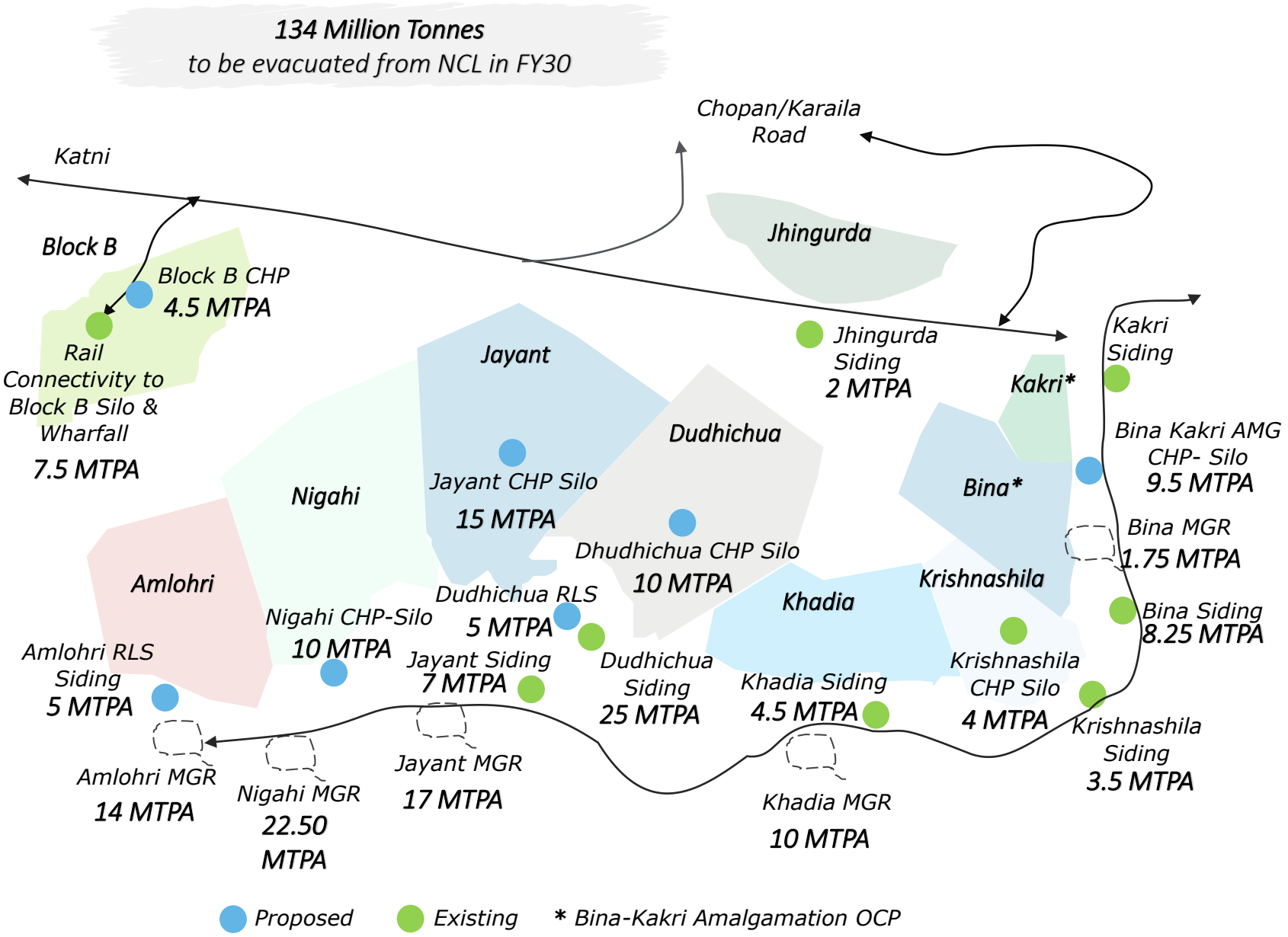
O-D Source cluster Mapping – Current and Future line capacity utilization of major sections

Sub-Section	2022						2030						Comments
	Passenger	Freight	Others	Total	Capacity (with MB)	% Utilization	Passenger	Freight	Others	Total	Capacity (with MB)	% Utilization	
Billi to Obradam	17.14	37.4	20.8	75.34	60	126%	18.54	52.47 (25 is coal)	20.80	91.81	120.00	77%	Capacity Sufficient after Patch Doubling
Obradam to Karaila Rd	17.14	45.6	13.6	76.34	60	127%	18.54	60.67 (25 is coal)	13.60	92.81	120.00	77%	Capacity Sufficient after Patch Doubling
Karaila Rd to Singrauli	12	35.8	7.7	55.5	88	63%	13.98	61.10 (25 is coal)	7.70	82.77	176.00	47%	Capacity Sufficient after Patch Doubling
Singrauli to Mahadiya	11.7	42.4	17.6	71.7	106	68%	15.59	55.20 (25 is coal)	17.60	88.39	212.00	42%	Capacity Sufficient after Patch Doubling
Billi to Chopan	12.84	23.6	14.4	50.84	108	47%	18.26	43.44 (25 is coal)	14.40	76.10	216.00	35%	Capacity Sufficient after Patch Doubling
Chopan to Chunar	**24.28**	**38.9**	**12**	**75.18**	**44**	**171%**	**26.26**	**55.27** (25 is coal)	**12.00**	**93.53**	**44.00**	**213%**	**Capacity Insufficient –. Doubling of Chopan to Chunar Line is required – North Central Railway**

- All numbers (Except Capacity utilization) represent average two-way traffic in Trains/Rakes per day

Analyzing Evacuation Capacity for NCL

Proposed Evacuation Plan for FY30 of NCL



All figures in million tonnes

Project	Siding	MGR	Pipe Conveyor	Road
Jayant (28 MT)	8	17	-	3
Dudhichua (25 MT)	25	-	-	-
Amlohri (14 MT)	-	14	-	-
Nigahi (25 MT)	2	22.5	-	0.5
Khadia (16)	5	10	-	1
Kishnashila (4 MT)	1	-	3	-
Bina-Kakri (14 MT)	11.25	1.75	-	1
Jhingurda (0 MT)	-	-	-	-
Block B (8 MT)	8	-	-	-
Total (134 MT)	**60.25**	**65.25**	**3**	**5.5**

Evacuation Capacity Augmentation

All figures in million tonnes

#	Project Name	Project Capacity	EC Capacity	Existing Capacity CHP/SILO	Under Construction CHP/SILO under FMC Programme	Total Evacuation Planned	Anticipated Completion
1	Amlohri OCP	10	14	12	5	17	September 2023
2	Krishnashila OCP	4	7	4	0	4	Commissioned
3	Nigahi OCP	25	22.5	15	10	25	December 2023
4	Jayant OCP	20	25	10.5	15	25.5	June 2023
5	Bina-Kakri Amalgamation OCP	14	10.5	8 (4.5+3.5)	9.5	17.5	December 2023
6	Dudhichua OCP	20	25	10	15	25	August 2023
7	Khadia OCP	16	15	10	0	10	Commissioned
8	Block - B	8	5.47	3.5	4.5	8	February 2024
	Total	**117**	**124**	**69**	**63**	**132**	

***** *Data As on 4th April 2023*

Note: *List consists only of CHP/Silo. Wharfwall sidings not listed here*

Evacuation Capacity Augmentation for coal transportation roads at NCL

NCL Road Projects already taken up	Length (Km)	Carriage Width (m)
Construction of CC road coal transportation from weigh bridge 3rd/4th bench at Jayant Project	2.5	7
Proposed Road Projects		
Construction of coal transportation roads in mines of NCL	**49.641**	10.5
BREAK UP-	5	10.5
Coal transport Road from coal yard No.5 to old CHP Junction near coal yard No.1 of KHADIA AREA		
CT Road from workshop back side corner to New Haul Road starting junction point of KHADIA AREA	0.35	10.5
CC Road from weighbridge no. 3 to back side of workshop and upto barrier of KHADIA AREA	1.26	10.5
Road from Coal stock yard no. 23 to Nigahi Wharfwall of NIGAHI AREA	3	10.5
Road for surface miner's coal transportation from Jhandi Man Coal Yard No. 3 to Weigh Bridge No. 1 of BINA AREA	2.9	10.5
Transportation Road from Weigh Bridge No. 2 to Coal Yard No. 1 & Deshaling Weigh Bridge BINA AREA	1.9	10.5
Providing Concrete road from barrier No. 1 upto CHP canteen along with roadside development & protection work AT Amlohri project of AMLOHRI AREA	0.92	10.5
Road for Khadia coal transportation to CHP at Krishnashila Project of KRISHNASHILA AREA	3.2	10.5
Road for Surface miner's coal transportation to Coal Yard at Krishnashila of KRISHNASHILA AREA	3.5	10.5
Existing road for weighment (A-B-A-C) of DUDHICHUA AREA	0.45	10.5
Existing coal transportation road (C-D) of DUDHICHUA AREA	1.6	10.5
Existing coal transportation road alignment may be changed after taken barrier coal (D-E) of DUDHICHUA AREA	1.3	10.5
Circular Near new W/B (development of new W/B area (F-G) of DUDHICHUA AREA	0.4	10.5
Coal Despatch road(H-I-J) of DUDHICHUA AREA	2.3	10.5
Other CC Roads of DUDHICHUA AREA	3.95	10.5
Jayant Coal Yard to Receiving Point of CHP and WB No. 1, 2 & 6 of JAYANT AREA	2.5	10.5
Jayant Coal Yard to receiving Point of CHP and WB No. 1, 2 & 6 to West Section Coal Yard of JAYANT AREA	3	10.5
West Coal Yard to West Barrier of JAYANT AREA	1	10.5
East Coal Yard to Dudhichua Boundary of JAYANT AREA	0.5	10.5
W.B. No. 4 to Base Workshop Juntion of JAYANT AREA	1	10.5
Block B CTR	3.38	10.5
Block B Existing CTR	2.66	10.5
Block B Existing CTR	0.82	10.5
Total for MP Projects of NCL (Jayant, Dudhichua, Nigahi, Amlohri and Block B)	**28.781**	
Total for UP Projects of NCL (Bina, Krishnashila and Khadia)	**18.11**	
Details of Kakri and Jhingurda area not included above but tendered	2.75	

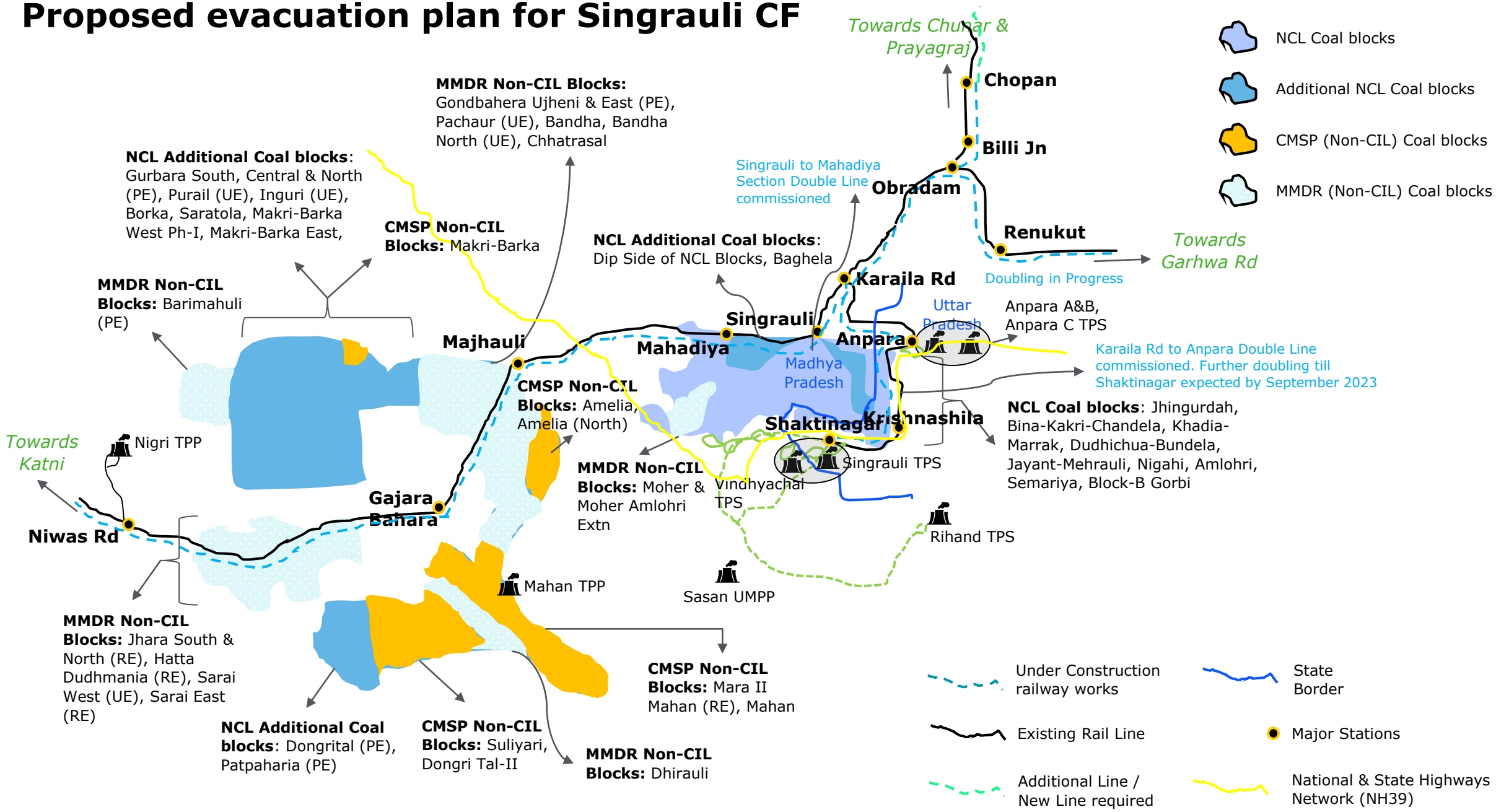
CIL (NCL) blocks in Madhya Pradesh – Singrauli CF Cluster

#	Name of the Block	Exploration Status
1	Jhingurdah	Explored
2	Bina-Kakri-Chandel	Explored
3	Khadia-Marrak	Explored
4	Dudhichua-Bundela	Explored
5	Jayant-Mehrauli	Explored
6	Nigahi	Explored
7	Amlohri	Explored
8	Semariya	Explored
9	Block-B Gorbi	Explored
10	Dip-Side of MCL Blocks	Explored
11	Baghela	Explored
12	Dongrital	Partly Explored
13	Patpaharia	Partly Explored
14	Gurbara South	Partly Explored
15	Gurbara Central	Partly Explored
16	Gurbara North	Partly Explored
17	Purail	Under Exploration
18	Inguri	Under Exploration
19	Borka	Explored
20	Saratola	Explored
21	Makri-Barka West Ph-I & East	Explored

Non-CIL blocks in Madhya Pradesh – Singrauli CF Cluster

#	Name of the Block	Exploration Status
1	Moher & Moher Amlohri Extn	Explored
2	Amelia	Explored
3	Amelia North	Explored
4	Mara-II Mahan	Regionally Explored
5	Mahan	Explored
6	Dhirauli	Partly Explored
7	Suliyari	Explored
8	Dongrital-II	Partly Explored
9	Jhara South & North	Regionally Explored
10	Sarai West	Under Exploration
11	Sarai East	Regionally Explored
12	Barimahuli	Partially Explored
13	Gondbahera Ujheni & East	Partially Explored
14	Makri Barka	Explored
15	Pachaur	Under Exploration
16	Bandha	Explored
17	Bandha North	Under Exploration
18	Chhatrasal	Explored

Proposed evacuation plan for Singrauli CF



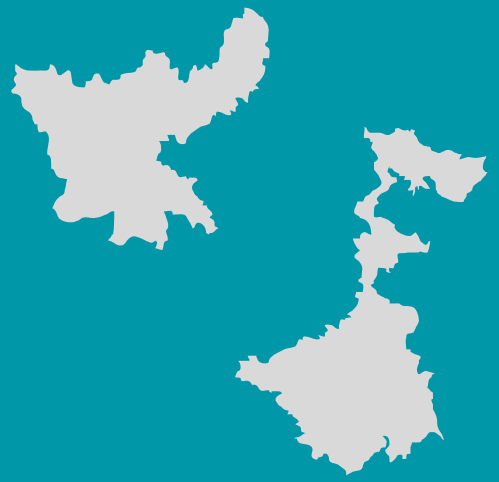
Key Insights and Recommendations

#	Recommendation	Way Forward
1	Double Line from Mahadiya to Katni (Bypassing Sanjay tiger Reserve) along with Katni Grade separator project to be executed at the earliest. Singrauli to Mahadiya section double line already commissioned.	Indian Railways (WCR & ECR)
2	Doubling of Anpara to Krishnashila may be executed at the earliest.	Indian Railways (WCR & ECR)
3	Additionally, Captive and Commercial miners shall plan to develop First Mile Connectivity projects like Rapid-Loading System with Silos along with Railway connectivity (to nearby major rail lines like Singrauli - Katni). Captive and commercial players along with Indian Railways shall jointly conduct a feasibility study for establishing Public Freight Terminals with Mechanized loading and evacuation systems.	Captive and Commercial miners, who have been allotted blocks in Singrauli CF may consult with Ministry of Coal regarding their future evacuation plans. Detailed Investment and works plan may be submitted by these miners at the earliest.
4	Upcoming new BG line between Lalitpur – Singrauli (estimated TDC: 2025-26) shall provide a vital link between northern India and NCL region avoiding Katni junction. This work should be expedited.	Indian Railways (WCR)
5	7 under-construction FMC Projects of NCL with combined evacuation capacity of ~63 MTPA shall be executed at the earliest to enable coal loading from NCL.	Coal India Limited is continuously monitoring and solving various issues to expedite this
6	Doubling of Chopan to Chunar Section should be planned as capacity augmentation of an important feeder line for DFC	Indian Railways (NCR)
7	Shaktinagar-Mahadiya new BG line feasibility must be explored by Indian Railways	Indian Railways (ECR)

Detailed Analysis
for

Jharkhand &

West Bengal



Jharkhand (CCL)

CCL has ambitious growth plans

All figures in million tonnes

Actuals → | ← Projections →

#	CCL Coalfields	FY21-22	FY22-23	FY23-24	FY24-25	FY25-26	FY26-27	FY27-28	FY28-29	FY29-30
1	North Karanpura	45.34	47.87	52.0	65.5	84.62	91.52	97.92	106.92	113.92
2	South Karanpura	5.41	6.76	8.0	6.98	10.98	11.7	11.7	12.5	12.5
3	East Bokaro	12.58	14.46	16.4	21.82	24.82	25.1	27.15	28.15	29.15
4	West Bokaro	4.54	5.48	5.8	8.9	11.78	10.33	10.33	12.33	12.33
5	Ramgarh	0.88	1.33	1.5	2.5	2.5	3.0	3.0	3.0	3.0
6	Giridih	0.10	0.20	0.3	0.3	0.3	0.1	0.1	0.1	0.1
	Total	**68.85 (dispatch of 71.86)**	**76**	**84**	**106**	**135**	**142**	**150**	**163**	**171**

- North Karanpura & East Bokaro are the major coalfields contributing to current production of CCL.
- Till FY30, CCL is expected to grow from current ~76 MT (FY23) to ~171 MT (FY30), with a CAGR growth of ~12.3%
- CCL's planned growth from ~72 MT dispatch in FY22 to ~171 MT in FY30 is majorly based on production ramp-up from its North Karanpura coalfields, which shall contribute ~73% of the additional coal production for CCL

CCL has ambitious production capacity expansion plans

Jharkhand

All figures in million tonnes

Coalfield	Mine	Type (UG/.OC)	PRC	2021-22 Act	2022-23 Act	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30
North Karanpura	Magadh OC	OC	51	11.50	15.575	18	28	42	45	45	48	49
North Karanpura	Amrapali OC	OC	25	16.59	18.001	21	24	25	25	25	25	25
North Karanpura	Chandragupta OC	OC	15	0.00		0	2.8	4.5	5	5	6	8
North Karanpura	Sanghmitra OC	OC	20	0.00		0	0	2	1.5	5	10	14
North Karanpura	Rohini Karkata OC	OC	10	0.68	0.314	0.6	0.4	0.5	3	5	5	5
North Karanpura	Churi-Benti UGP	UG	0.81	0.58	0.706	0.65	0.65	0.7	0.75	0.75	0.75	0.75
East Bokaro	EPR Karo OC	OC	11	2.75	1.519	2.3	5	8	8	10	11	11
North Karanpura	EPR Ashok OC	OC	20	13.13	10.718	7.5	4	3.5	4.5	4.5	4.5	4.5
East Bokaro	EPR Konar OC	OC	8	4.24	6.323	6.5	8	8	8	8	8	8
South Karanpura	North Urimari OC	OC	7.5	3.60	4.199	4.5	4.5	7.5	7.5	7.5	7.5	7.5
West Bokaro	Kotre B & P OC	OC	5	0.00		0	1.5	3	1.5	1.5	3	3
Ramgarh	Rajrappa RCE OC	OC	3	0.88	1.33	1.5	2.5	2.5	3	3	3	3
West Bokaro	Tapin South OC	OC	2	0.85	1.104	1	2	2	1	1	1	1
East Bokaro	Kathara RCE OC	OC	1.9	0.14	0.292	0.8	1	1	0.5	0.5	0.5	0.5

CCL has ambitious production capacity expansion plans

Jharkhand

All figures in million tonnes

Coalfield	Mine	Type (UG/.OC)	PRC	2021-22 Act	2022-23 Act	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30
West Bokaro	Jharkhand Laiyo OC	OC	1	0.50	0.37	0.5	0.5	0.7	0.7	0.7	0.7	0.7
West Bokaro	KARMA OC	OC	1	0.83	0.72	1	1	1	1	1	1	1
East Bokaro	Bokaro(Bermo) OC	OC	0.8	0.15	0.31	0.2	0.1	0.1	0.5	0.5	0.5	0.5
South Karanpura	Sayal D OC	OC	1	0.00	0.169	0.6	0.5	1	1	1	1	1
North Karanpura	Tetariakhar OC	OC	2.5	1.02	0.91	1.35	2	2.5	2	2.5	2.5	2.5
West Bokaro	Pundi RO OC	OC	5	0.00	0	0		0.5	1.5	1.5	2	2
South Karanpura	Sirka OC	OC	1.5	0.00	0	0.45			1	1	1	1
West Bokaro	Chainpur OC	OC	1	0.00	0	0			0	0	0	0
East Bokaro	Amlo (AAD OC)	OC	2.5	1.94	2.473	3.5	3.5	3.5	3	3	3	3
West Bokaro	Tapin OC	OC	2.5	1.51	2.055	2.1	2.2	2.5	2.5	2.5	2.5	2.5
East Bokaro	Sel Dhori OC	OC	2.25	1.95	1.381	1.1	1.2	1.2	1.25	1.25	1.25	1.25
South Karanpura	Urimari EPR OC	OC	2	0.75	0.761	0.9	0.5	1	1	1	1	1
West Bokaro	Parej East OC	OC	1.75	0.40	0.416	0.4	0.45	0.45	0.4	0.4	0.4	0.4
East Bokaro	Jarangdih OC	OC	1.5	0.37	0.872	0.65	0.9	0.9	0.85	0.85	0.85	0.85

CCL has ambitious production capacity expansion plans

Jharkhand

All figures in million tonnes

Coalfield	Mine	Type (UG/.OC)	PRC	2021-22 Act	2022-23 Act	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30
East Bokaro	Govindpur Phase II	OC	1.2	0.89	1.137	1.25	2	2	1.6	1.6	1.6	1.6
West Bokaro	Topa RO OC	OC	1.2	0.44	0.817	0.8	1.2	1.2	1.2	1.2	1.2	1.2
West Bokaro	Kedla OC	OC	0.7	0.00	0	0	0.05	0.05	0.1	0.1	0.1	0.1
South Karanpura	Giddi A OC	OC	0.6	0.23	0.233	0.2	0.23	0.23	0.2	0.2	0.6	0.6
South Karanpura	New Giddi C OC	OC	0.6	0.33	0.484	0.35	0.3	0.3	0.2	0.2	0.6	0.6
Giridih	Kabribad/Giridih OC	OC	0.5	0.10	0.195	0.3	0.3	0.3	0.1	0.1	0.1	0.1
South Karanpura	Religara OC	OC	0.5	0.50	0.499	0.5	0.55	0.55	0.55	0.55	0.55	0.55
South Karanpura	Sangam OC	OC	0.24	0.00		0.5	0.4	0.4	0.25	0.25	0.25	0.25
North Karanpura	KD Hesalong OC	OC	4.5	0.95	0.432	1	1.4	1.5	2.1	2.5	2.5	2.5
North Karanpura	Rajhara OC	OC	0.5	0.00	0	0.05	0.05	0.05	0.05	0.05	0.05	0.05
North Karanpura	Purnadih OC	OC	3	0.40	0.731	1.5	1.5	1.5	1.5	1.5	1.5	1.5
North Karanpura	Dakra Bukbuka OC	OC	1.3	0.49	0.478	0.35	0.2	0	0.25	0.25	0.25	0.25
East Bokaro	Tarmi OC	OC	1	0.00		0	0		0	0	0	1

CCL has ambitious production capacity expansion plans

Jharkhand

All figures in million tonnes

Coalfield	Mine	Type (UG/.OC)	PRC	2021-22 Act	2022-23 Act	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30
East Bokaro	Govindpur UG	UG	0.8	0.03	0.029	0			0.05	0.05	0.05	0.05
East Bokaro	Kargali OC	OC	0.75	0.00	0	0	0		0.05	0.1	0.1	0.1
East Bokaro	Dhori Khas UG	UG	0.00	0.13	0.128	0.1	0.12	0.12	0.1	0.1	0.1	0.1
South Karanpura	Bhurkunda UG	UG	0.00	0.00	0.41	0	0	0	0	0	0	0
West Bokaro	Kedla UG	UG	0.00	0.01	0	0			0.05	0.05	0.05	0.05
East Bokaro	Pichri OCP	OC	1.2	0		0			1.2	1.2	1.2	1.2
North Karanpura	Piparwar UG Ph-I	UG	0.87	0	0	0	0.5	0.87	0.87	0.87	0.87	0.87
West Bokaro	Parej East UG	UG	0.51	0				0.38	0.38	0.38	0.38	0.38
Total				**68.85**	**76.09**	**84**	**106**	**135**	**141.75**	**150**	**163**	**171**

- CCL's planned growth from ~72 MT dispatch in FY22 to ~171 MT in FY30 is majorly based on production ramp-up from its North Karanpura coalfields, which shall contribute ~73% of the additional coal production for CCL

Non-CIL blocks Pipeline in Jharkhand – North Karanpura CF (1/2)

Jharkhand

All figures in million tonnes

#	Name of the Block	Block Owner	PRC	Operational Status	Proposed Loading Point	EUP and other remarks	Actual FY23 Production	Actual FY22 Production
1	Moitra	JSW Steel Ltd.	1	Not operational	Bes Railway Siding (Mine to Washery to Siding via road - 7 Kms)	Salem Works, TN: 2081 kms from mine Dolvi Works, Maharashtra: 1831 kms from mine Vijayanagar Works, Karnataka: 1873 kms from mine	0	0
2	Badam	NTPC Ltd.	3	Not Operational	Bes Railway Siding (Mine to Siding via road - 8 Kms)	NTPC Barauni, Begusarai, Bihar: 314 kms from mine	0	0
3	Dumri	Hindalco Industries Ltd.	1	Not operational	Ray Railway Siding (Mine to Siding via road - 40 Kms)	CPP Aditya Aluminium, Sambalpur, Odisha: 489 kms from mine; CPP Mahan Aluminium, Singrauli, MP: 427 kms from mine; CPP Hirakud Complex, Sambalpur, Odisha: 520 kms from mine.	0	0
4	Chatti Bariatu and Chatti Bariatu South	NTPC Ltd.	7	Not operational	Shivpur Railway Siding (Mine to Siding via road - 16 Kms)	NTPC Barh (Stage II), Bihar: 494 kms from mine	0.45	0
5	Kerandari	NTPC Ltd.	6	Not Operational	Shivpur Railway Siding (Mine to Siding via pipe conveyor – 18.5 Kms)	NTPC Tanda (Stage II), UP: 591 kms from mine	0	0

Non-CIL blocks Pipeline in Jharkhand – North Karanpura CF (2/2)

Jharkhand

All figures in million tonnes

#	Name of the Block	Block Owner	PRC	Operational Status	Proposed Loading Point	EUP and other remarks	Actual FY23 Production	Actual FY22 Production
6	Pakri-Barwadih	NTPC Ltd.	18	Operational	Banadag Railway Siding. (Currently, coal is transported to railway siding by roads. A 14-kilometre-long belt conveyor is now under development)	Basket mine for NTPC's plants	12.86	8.88
7	Chakla	Hindalco Industries Ltd.	5.3	Not Operational	Biratoli Railway Siding (3 kms from mine).	Since the coal from this block is designated for commercial use, it can be used by any end-use plant	0	0
8	Gondulpara	GMR Chattisgarh Energy Ltd.	4	Not Operational	Bes Railway Siding (Mine to Siding via road - 13 Kms). Badam-Hazaribagh road is nearby and can be used to deliver coal to plants nearby and railway stations	The coal from this coal block is allocated for commercial purposes, and hence coal can be utilized by any end-use plant	0	0
9	North Dhadu (Eastern Part)	-	4	Not Operational	Block lies east of Shivpur-Tori line.	Coal block expected to be auctioned in 7th tranche of coal block auctions	-	-
10	North Dhadu (Western Part)	-	3	Not Operational	Block lies east of Shivpur-Tori line.	Coal block expected to be auctioned in 7th tranche of coal block auctions	-	-
Total PRC			**52.3**				**13.31**	**8.88**

Non-CIL blocks Pipeline in Jharkhand – Auranga CF

Jharkhand

All figures in million tonnes

Details of Non-CIL blocks in Auranga CF

#	Name of the Block	Block Owner	PRC	Operational Status	Proposed Loading Point	EUP and other remarks	Actual FY23 Production	Actual FY22 Production
1	Tubed	DVC	6	Non Operational	East Central Railway has approved a 17-kilometre railway line from the coal block to Demu railway station, with construction and commissioning estimated to take three years	Mejia Thermal Power Station, WB: 340 kms from the mine; Chandrapura Thermal Power Station, Jharkhand: 240 kms from the mine;	0.02	0
2	Rajbar E&D	Tenughat Vidyut Nigam Ltd	10	Non Operational	Chetar Railway Station (Mine to station via belt conveyor-13.7 kms)	Tenughat Thermal Power Extension, Dumri, Jharkhand- 160 kms from mine	0	0
3	Banhardih	Patratu Vidyut Utpadan Nigam Ltd.	11	Non Operational	Chetar Railway Station (Mine to station via existing CHP and railway siding- 6 kms)	Patratu Thermal Power Extension, Patratu, Jharkhand- 75 kms from mine	0	0
Total PRC			**27.0**				**0.02**	**0**

Non-CIL blocks Pipeline in Jharkhand – Daltonganj CF

Jharkhand

All figures in million tonnes

Details of Non-CIL blocks in Daltonganj CF

#	Name of the Block	Block Owner	PRC	Operational Status	Proposed Loading Point	EUP and other remarks	Actual FY23 Production	Actual FY22 Production
1	Kathautia	Hindalco	0.8	Operational	Coal is currently transported via the Rajhara railway siding. A 3-kilometre-long conveyor belt will be added to the Kajri Railway Rapid Loading System in the future	Mahan Power Plant and Refinery, MP: 242 kms from the mine	0.11	0.32
2	Lohari	Aranya Mines Pvt. Ltd.	0.2	Non Operational	Coal expected to be transported via roads	Commercial usage expected	0	0
3	Meral	Trimula Industries Ltd.	0.44	Non Operational	Initially, the evacuation will take place on the road. According to the allocatee, the viability of rail siding will be investigated during mine operation via the nearest railhead at Kajri, which is roughly 3 kilometres away from the coal block	Trimula Industries, Singrauli, MP: 200 kms from mine	0	0
4	Rajhara North	Fairmine Carbons Pvt. Ltd.	0.75	Non Operational	The coal will be transported by road from the mine to the nearest railhead head at Rajhaura, which is 1 km away	The coal has been designated for commercial use. As a result, any end-use facility can use coal from this block.	0	0
Total PRC			**2.19**				**0.11**	**0.32**

Non-CIL blocks Pipeline in Jharkhand – Rajmahal CF

Jharkhand

All figures in million tonnes

Details of Non-CIL blocks in Rajmahal CF

#	Name of the Block	Block Owner	PRC	Operational Status	Proposed Loading Point	EUP and other remarks	Actual FY23 Production	Actual FY22 Production
1	Pachwara Central	Punjab State Power Corp Ltd.	5.6	Non Operational	Pakur Railway Station (Mine to Station via local roads- 55 km)	Guru Gobind Singh STPP, Ropar, Punjab: 1701 kms from the mine; Guru Hargobind Singh TPP, Bathinda, Punjab: 1672 kms from the mine	~0.28	0
2	Pachwara North	WB Power development Corp Ltd.	15	Operational	The coal is currently being transported by road. RITES Ltd. has prepared the DPR for the development of a rail siding for this coal block	Sagardigih TPP, WB: 151 kms from the mine; Bakreshwar TPP, WB: 171 kms from the mine Bandel TPP, WB: 284 kms from the mine Santhaldih TPP, WB: 284 kms from the mine Kolaghat TPP, WB: 360 kms from the mine	~14.0	9.08
3	Urma Paharitola	Aurobindo Reality and Infra Pvt. Ltd.	15	Non Operational	The coal will be transported by road NH-114A, from the mine to the nearest railhead at Muraraj, which is 37 km away	Since the coal from this coal block has been designated for commercial use, it can be used by any end-use plant	0	0
4	Saharpur Jamarpani	UP Rajya Vidyut Utpadan Nigam Ltd.	1	Non Operational	The coal will be transported by road NH-114A, from the mine to the nearest railhead at Rampurhat, which is 55 km away	Harduaganj Ext-ll TPP, Aligarh,UP: 1150 kms from the mine; Obra C TPP, Sonebhadra, UP: 500 kms from the mine Jawaharpur TPS, UP: 1050 kms from the mine.	0	0
5	Pachwara South	Neyveli UP Power Ltd.	9	Non Operational	Pakur Railway Station (Mine to Siding via conveyor belt)	Ghatampur TPP, Kanpur, UP: 978 kms from mine.	0	0
Total PRC			**35.6**				**14.28**	**9.08**

Non-CIL blocks Pipeline in Jharkhand – Ramgarh, South Karanpura & Giridih CF

Jharkhand

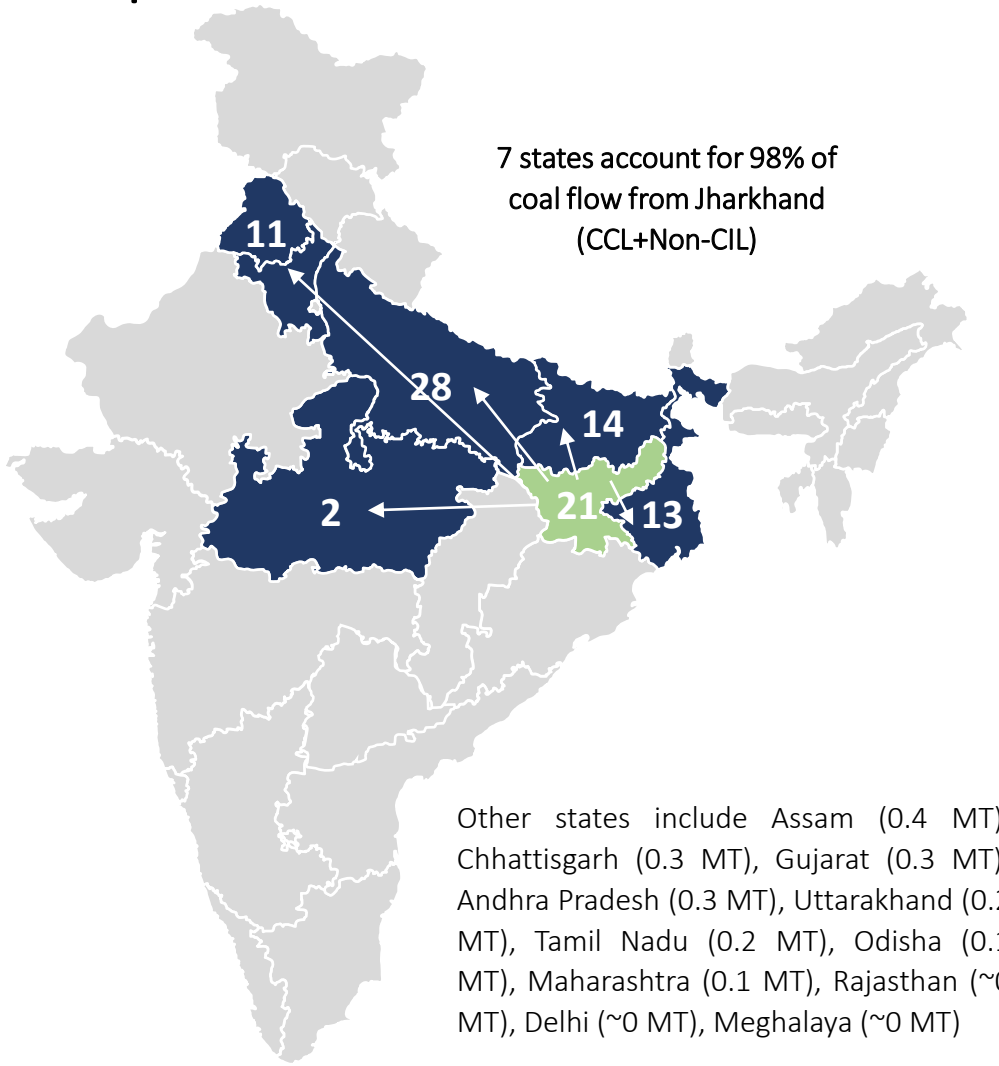
All figures in million tonnes

Details of Non-CIL blocks in Ramgarh, South Karanpura & Giridih CF

#	Name of the Block	Block Owner	PRC	Operational Status	Proposed Loading Point	EUP and other remarks	Actual FY23 Production	Actual FY22 Production
1	Sugia Closed Mine	Jharkhand State Mineral Development Corp Ltd.	0.4	Non Operational	Ramgarh Cantt. Railway Station (Mine to Station via road- 14 km)	Since it is allocated for commercial purposes, coal from the mine can be used in any end-user facility	0	0
2	Tokisud North	NMDC Ltd.	2.32	Non Operational	Tokisud Railway Siding, which is still under construction, is about 2.5 km away from the block. Around 4.5 km away, a CHP has been planned. Coal will be transported locally from the pit head to the CHP and railway siding via a road distance of around 7 kms	It is a commercial mine, and the suitable clients have not been identified yet	0	0
3	Patal East	JSMDC Ltd..	-		Road transportation expected for coal from this block	Commercial usage of coal	0	0
4	Brahmadiha	Andhra Pradesh Mineral Development Corp. Ltd.	0.15	Non Operational	Road transportation of coal is proposed. NH 114A is located around 1 km from the block.	The coal has been designated for commercial use. Coal extracted from this mine will be used in any nearby end-use plant.	0	0
Total PRC			**2.87**				**0.00**	**0.00**

Origin – Destination Cluster Mapping for Jharkhand (CCL)

O-D Source cluster Mapping – Despatch of Coal from Jharkhand (CCL & Non-CIL): FY22 snapshot



7 states account for 98% of coal flow from Jharkhand (CCL+Non-CIL)

Other states include Assam (0.4 MT), Chhattisgarh (0.3 MT), Gujarat (0.3 MT), Andhra Pradesh (0.3 MT), Uttarakhand (0.2 MT), Tamil Nadu (0.2 MT), Odisha (0.1 MT), Maharashtra (0.1 MT), Rajasthan (~0 MT), Delhi (~0 MT), Meghalaya (~0 MT)

FY22: Despatch of Coal from Jharkhand to destination state (MTPA)

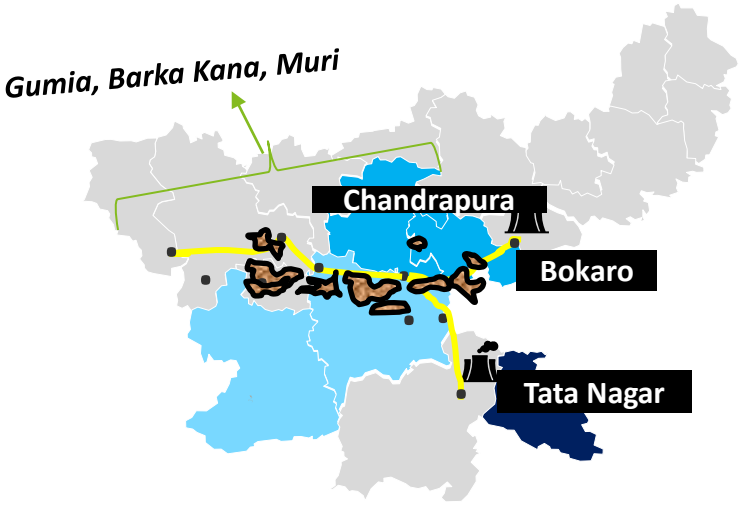
All figures in million tonnes

Consuming State	Rail	Road + RCR	MGR & Others	Total
Jharkhand	13.07	7.76	0	**20.83**
Uttar Pradesh	24.77	3.01	0	**27.78**
Bihar	13.79	0.44	0	**14.23**
Punjab & Haryana	7.30	3.51	0	**10.81**
West Bengal	10.82	2.16	0	**12.98**
Madhya Pradesh	1.57	0.45	0	**2.02**
Others	1.46	0.29	0	**1.76**
Total Despatch from Jharkhand (Including CCL & Non-CIL blocks)	72.79	17.61	0	90.41

Origin – Destination Mapping and the coal flow analysis of rail trunk lines for ~73 MTPA is conducted and presented in the next sections

O-D Source cluster Mapping – Jharkhand's internal consumption

Jharkhand to Jharkhand total Rail Despatch in FY22 = 13.07 Million Tonnes



Major Coal Consuming Districts of Jharkhand: 2030 (Estimated)

>15 MTPA Coal Consumption	*East Singhbhum*
10-15 MTPA Coal Consumption	-
5-10 MTPA Coal Consumption	*Bokaro, Hazaribagh*
1-5 MTPA Coal Consumption	*Simdega, Gumla, Khunti, Ranchi, Saraikela-Kharsawan*

Expected Load from Jharkhand to Jharkhand main trunk lines (Excluding load from other states on this line)

*Jharkhand Coal **Demand 2022 ~ 48.91 MTPA***
*Rail Supply by Jharkhand **2022 ~ 13.07 MTPA***

*Jharkhand Coal **Demand 2030 ~ 63.91 MTPA***
*Rail Supply by Jharkhand **2030 ~ 42 MTPA***

		FY22		FY30	
From	To	Traffic (Tonnes) 2022	Rakes / Day 2022	Traffic (Tonnes) 2030	Rakes / Day 2030
Mcckluskieganj	Barkakana	2051958	1.46	5102419	3.63
Khalari	Barkakana	2746718	1.95	6830014	4.86
Ray	Barkakana	3530606	2.51	8779239	6.25
Patratu	Barkakana	4516927	3.21	11508557	8.19
Barkakana	Gumia	2526981	1.80	6616789	4.71
Barkakana	Muri	1206156	0.86	3051139	2.17
Barkakana	Dumri Bihar	707591	0.50	1759502	1.25
Gumia	Tenughat	4885016	3.48	8448380	6.01
Gumia	Chandrapura	1012059	0.72	2262631	1.61
Jarangdih	Gumia	9943873	7.08	19531855	13.90
Muri	Adityapur	2335162	1.66	3858819	2.75
Adityapur	TATA	2621867	1.87	4332593	3.08
Phusro	Purulia	1206156	0.86	3051139	2.17
Purulia	Adityapur	1297858	0.92	3330652	2.37

- Major Consumers in Uttar Pradesh sourcing coal from CCL is Thenughat Thermal & Bokaro Thermal

O-D Source cluster Mapping – Significant increase in Jharkhand's internal consumption

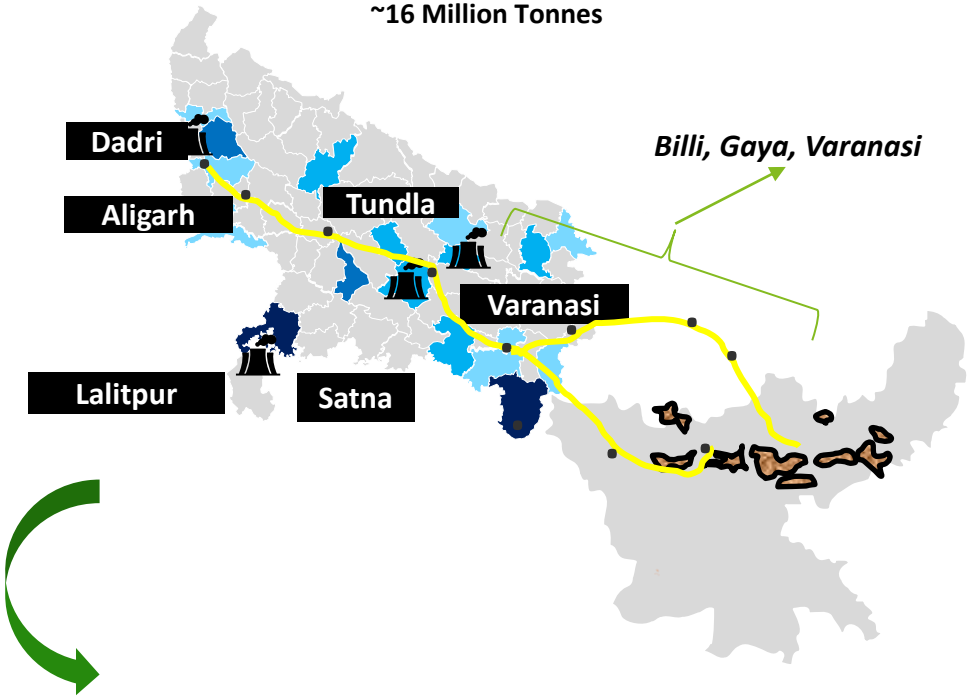
All figures in million tonnes

Name of TPS	Utility	North Karanpura	South Karanpura	Other CCL	Captive	BCCL	Total Jharkhand	Others (Incl Imports)	Total Coal Consumed FY22	Estimated Coal Consumption (FY30)	Supply from NK 2030	Supply from SK 2030	Supply from CCL others 2030	Supply from Captive 2030	Supply from BCCL 2030	Jharkhand's Supply in FY30	Others
ADHUNIK POWER & NATURAL RESOURCES LTD.	ADHUNIK	1.0	0.2	0.3	0.0	0.0	1.6	1.0	2.5	2.8	1.8	0.3	0.6	0.0	0.0	2.8	0.0
BOKARO	DVC	0.0	0.0	2.3	0.0	0.0	2.4	0.0	1.7	2.2	0.0	0.0	2.2	0.0	0.0	2.2	0.0
CHANDRAPURA	DVC	0.1	0.0	2.2	0.0	0.0	2.3	0.1	2.3	2.3	0.1	0.0	2.1	0.0	0.2	2.3	0.0
KODERMA	DVC	0.1	0.0	3.0	0.0	0.9	4.0	0.2	4.2	4.6	0.1	0.0	2.4	0.0	1.8	4.3	0.3
MAITHON RIGHT BANK TPP	MAITHON POWER LIMITED	0.9	0.7	0.7	0.0	1.6	3.9	0.7	4.6	4.8	0.8	0.6	0.6	0.0	1.8	3.8	0.0
JOJOBERA	TATA POWER	0.6	0.1	0.3	0.0	0.0	0.9	1.7	2.5	2.8	1.7	0.2	0.7	0.0	0.0	2.6	0.3
TENUGHAT TPS	TENUGHAT VIDHYUT NIGAM LTD	0.7	0.0	0.4	0.0	0.0	1.1	0.2	1.3	2.3	2.0	0.0	0.3	0.0	0.0	2.3	0.0
North Karanpura STPP	NTPC									0.0	9.6	0.0	0.0	0.0	0.0	9.6	0.0
Patratu STPP	PVUNL									0.0	0.6	0.0	0.0	11.0	0.0	11.6	0.0
Total		**3.5**	**0.9**	**9.2**	**0.0**	**2.5**	**16.1**	**3.8**	**19.3**	**21.6**	**16.7**	**1.1**	**8.8**	**11.0**	**3.8**	**41.3**	**0.6**

- 2 Under-Construction power plants namely North Karanpura STPP (NTPC) and Patratu STPP (PVUNL) to consume ~9.6 MT and ~11.6 MT of Coal. While for North Karanpura which letter of assurance are in place with CCL, Patratu STPP is expected to source from Banhardi captive mine with the mine transferred to PVUNL vide deed of adherence signed on 02.06.2017.
- From the overall increase in demand from power sector in Jharkhand, majority will be catered by mines of CCL. Some quantities being sourced by BCCL due to active FSAs. ECL is expected to supply ~0.4 MT due to binding FSAs and MCL is expected to supply 0.19 MT to Tata Power (Jojobera) due to active FSA

O-D Source cluster Mapping – Jharkhand to Uttar Pradesh

Jharkhand to Uttar Pradesh total Rail Despatch in FY22 = ~16 Million Tonnes



Major Coal Consuming Districts of UP: 2030 (Estimated)

>15 MTPA Coal Consumption	*Jhansi, Sonbhadra*
10-15 MTPA Coal Consumption	*Bulandsahar, Kanpur*
5-10 MTPA Coal Consumption	*Prayagraj, Rae Bareli, Lucknow, Shahjahanpur, Ambedkar Nagar, Gorakhpur*
1-5 MTPA Coal Consumption	*Ghaziabad, Hapur, Gautam Buddha Nagar, Aligarh, Agra, Kushinagar, Gonda*

Expected Load from Jharkhand to Uttar Pradesh main trunk lines (Excluding load from other states on this line)

*UP Coal **Demand 2022 ~ 87 MTPA***

*Rail Supply by Jharkhand **2022 ~ 16 MTPA***

*UP Coal **Demand 2030 ~ 114 MTPA***

*Rail Supply by Jharkhand **2030 ~ 56 MTPA***

		FY22		FY30	
From	To	Traffic (Tonnes) 2022	Rakes / Day 2022	Traffic (Tonnes) 2030	Rakes / Day 2030
Phulbasia	Tori	6306199	4.49	15738143	11.20
Patratu	Tori	808752	0.58	2231433	1.59
Tori	Garhwa	15322126	10.90	30899567	21.99
Garwa	Pandit Deen Dayal	11442236	8.14	22176826	15.78
Garwa	Billi	3931261	2.80	8864894	6.31
Pandit Deen Dayal	Varanasi	12167650	8.66	23604864	16.80
Pandit Deen Dayal	Unchdih	24290	0.02	59639	0.04
Pandit Deen Dayal	Manikpur	29973	0.02	97376	0.07
Varanasi	Prayagraj	8990965	6.40	15784178	11.23
Prayagraj	Kanpur Goods	8990965	6.40	15784178	11.23
Kanpur Goods	Shikohabad	8990965	6.40	15784178	11.23
Shikohabad	Dadri	7251123	5.16	11285150	8.03
Varanasi	Lucknow	3461454	2.46	8745856	6.22
Shikohabad	Harduaganj	1739842	1.24	4499028	3.20
Billi	Chunar	3931261	2.80	8864894	6.31
Chunar	Prayagraj	2593516	1.85	7179260	5.11
Chunar	Unchdih	1337745	0.95	1685634	1.20
Prayagraj	Manikpur	2437400	1.73	6791061	4.83
Manikpur	Upaipura	2467373	1.76	6888437	4.90
Lucknow	Pt Ram prasad bismil	2471313	1.76	6283764	4.47
Jarangdih	Chandrapura	255707	0.18	422552	0.30
Chandrapura	Gomoh	593847	0.42	981322	0.70
Gomoh	Gaya	897276	0.64	1967116	1.40
Ranchi Road	Gaya	303430	0.22	985794	0.70
Koderma	Gaya	927249	0.66	2064492	1.47
Hazaribagh	Gaya	137197	0.10	445732	0.32
Gaya	Pandit Deen Dayal	1064446	0.76	2510224	1.79

O-D Source cluster Mapping – Significant increase in Jharkhand's supply to Uttar Pradesh (1/2)

All figures in million tonnes

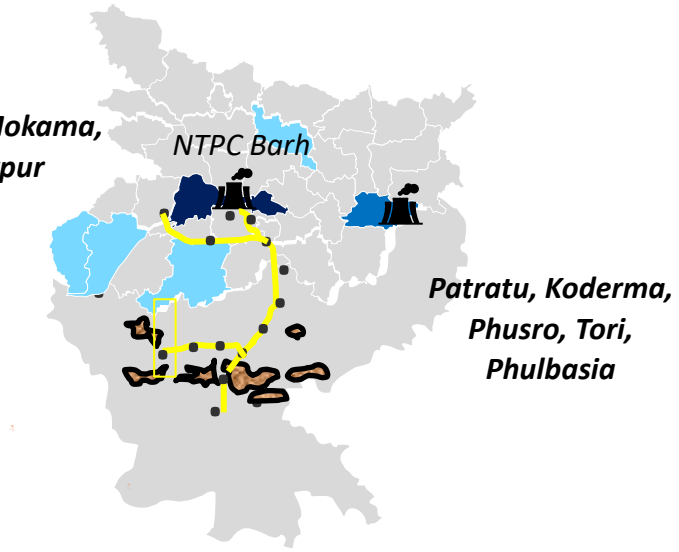
Name of TPS	Utility	North Karanpura	South Karanpura	Other CCL	Captive	BCCL	Total Jharkhand	Others (Incl Imports)	Total Coal Consumed FY22	Estimated Coal Consumption (FY30)	Supply from NK 2030	**Supply from SK 2030**	**Supply from CCL others 2030**	**Supply from Captive 2030**	Supply from BCCL 2030	Jharkhand's Supply in FY30	Others
BARKHERA	Bajaj Energy Limited	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.3	0.2	0.0	0.0	0.0	0.0	0.2	0.2
KHAMBHAR KHERA	Bajaj Energy Limited	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.3	0.1	0.0	0.0	0.0	0.0	0.1	0.2
KUNDARKI	Bajaj Energy Limited	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.3	0.1	0.0	0.0	0.0	0.0	0.1	0.2
MAQSOODAPUR	Bajaj Energy Limited	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.3	0.1	0.0	0.0	0.0	0.0	0.1	0.2
UTRAULA	Bajaj Energy Limited	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.3	0.2	0.0	0.0	0.0	0.0	0.2	0.1
LALITPUR	LALITPUR POWER GENERATION COMPANY LIMITED	2.3	0.1	0.3	0.0	0.0	2.7	3.2	5.9	5.9	2.3	0.1	0.3	0.0	0.0	2.7	3.2
ANPARA 'C' TPS	LANCO ANPARA POWER LIMITED	0.0	0.0	0.0	0.0	0.0	0.0	5.2	5.2	5.5	0.0	0.0	0.0	0.0	0.0	0.0	5.5
MEJA TPP	MEJA URJA NIGAM PRIVATE LIMITED (NTPC-JV)	1.3	0.0	0.2	0.0	0.0	1.5	3.5	5.0	5.0	1.5	0.0	0.2	0.0	0.0	1.8	3.3

O-D Source cluster Mapping – Significant increase in Jharkhand's supply to Uttar Pradesh (2/2)

All figures in million tonnes

Name of TPS	Utility	North Karanpura	South Karanpura	Other CCL	Captive	BCCL	Total Jharkhand	Others (Incl Imports)	Total Coal Consumed FY22	Estimated Coal Consumption (FY30)	Supply from NK 2030	Supply from SK 2030	Supply from CCL others 2030	Supply from Captive 2030	Supply from BCCL 2030	Jharkhand's Supply in FY30	Others
DADRI	NTPC LTD.	0.6	0.0	0.0	0.0	0.2	0.8	2.9	3.7	6.6	4.4	0.0	0.2	0.0	0.0	4.6	2.0
SINGRAULI	NTPC LTD.	0.0	0.0	0.0	0.0	0.0	0.0	9.4	9.4	10.8	0.0	0.0	0.0	0.0	0.0	0.0	10.8
RIHAND	NTPC LTD.	0.0	0.0	0.0	0.0	0.0	0.0	13.5	13.5	15.0	0.0	0.0	0.0	0.0	0.0	0.0	15.0
FEROZE GANDHI UNCHAHAR	NTPC LTD.	3.0	0.0	0.3	2.0	1.0	6.3	0.0	5.5	5.5	3.2	0.0	0.4	2.0	0.0	5.5	0.0
TANDA	NTPC LTD.	2.5	0.2	0.7	2.0	0.7	6.0	0.0	5.5	6.1	0.0	0.0	0.0	6.1	0.0	6.1	0.0
PRAYAGRAJ TPS	PRAYAGRAJ POWER GENERATION	0.2	0.0	0.0	0.0	0.0	0.2	7.1	7.2	7.4	0.5	0.0	0.0	0.0	0.0	0.5	7.0
ROSA TPP	ROSA POWER SUPPLY CO	2.7	0.7	0.1	0.0	0.0	3.5	0.1	3.7	4.3	3.3	0.9	0.1	0.0	0.0	4.3	0.0
ANPARA 'A' & 'B'	UPRVUNL	0.0	0.0	0.0	0.0	0.0	0.0	11.4	11.4	14.3	0.0	0.0	0.0	0.0	0.0	0.0	14.3
HARDUAGANJ	UPRVUNL	0.7	0.0	0.0	0.0	0.4	1.2	0.1	1.3	2.7	0.0	0.0	0.0	2.7	0.0	2.7	0.0
OBRA	UPRVUNL	0.0	0.0	0.0	0.0	0.0	0.0	3.4	3.4	4.6	0.0	0.0	0.0	0.0	0.0	0.0	4.6
PARICHHA	UPRVUNL	0.9	0.0	0.0	0.0	0.7	1.7	1.0	2.7	3.7	0.0	0.0	0.0	0.0	1.9	1.9	1.8
Khurja SCTPP	THDC									4.3	0.0	0.0	0.0	0.0	0.0	0.0	4.3
Ghatampur	NUPPL									6.8	0.0	0.0	0.0	6.8	0.0	6.8	0.0
Jawaharpur STPP	UPRVUNL									3.4	0.0	0.0	0.0	3.4	0.0	3.4	0.0
Obra-C STPP	UPRVUNL									5.3	0.0	0.0	0.0	5.3	0.0	5.3	0.0
Panki TPS Extn.	UPRVUNL									2.7	0.0	0.0	0.0	2.7	0.0	2.7	0.0
Singrauli STPP-III	NTPC LTD.									8.5	0.0	0.0	0.0	0.0	0.0	0.0	8.5
Meja -II STPP	NTPC LTD.									7.1	7.1	0.0	0.0	0.0	0.0	7.1	0.0
Total		**14.1**	**1.0**	**1.8**	**4.0**	**2.9**	**23.9**	**61.8**	**84.3**	**137.1**	**23.0**	**0.9**	**1.3**	**29.0**	**1.9**	**56.0**	**81.1**

O-D Source cluster Mapping – Jharkhand to Bihar



Jharkhand to Bihar total Rail Despatch in FY22 = 13.64 Million Tonnes

Major Coal Consuming Districts of Bihar: 2030 (Estimated)

>15 MTPA Coal Consumption	*Patna*
10-15 MTPA Coal Consumption	*Bhagalpur*
5-10 MTPA Coal Consumption	-
1-5 MTPA Coal Consumption	*Bhabua, Rohtas, Gaya, Darbhanga*

Expected Load from Jharkhand to Bihar main trunk lines (Excluding load from other states on this line)

Bihar Coal ***Demand 2022 ~ 29.98 MTPA***
Rail Supply by Jharkhand ***2022 ~ 13.78 MTPA***

Bihar Coal ***Demand 2030 ~ 39.17 MTPA***
Rail Supply by Jharkhand ***2030 ~ 38 MTPA***

		FY22		FY30	
From	**To**	**Traffic (Tonnes) 2022**	**Rakes / Day 2022**	**Traffic (Tonnes) 2030**	**Rakes / Day 2030**
Phulbasia	Patratu	1828837	1.30	4647504	3.31
Patratu	Koderma	3814145	2.71	9721679	6.92
Koderma	Luckeesarai	2740433	1.95	7361385	5.24
Phusro	Chandrapura	833012	0.59	1959504	1.39
Chandrapura	Dhanbad	677737	0.48	1702916	1.21
Dhanbad	Madhupur	677737	0.48	1702916	1.21
Madhupur	Luckeesarai	677737	0.48	1702916	1.21
Luckeesarai	Mokama	3418171	2.43	9064301	6.45
Phulbasia	Tori	864906	0.62	2150684	1.53
Patratu	Tori	197627	0.14	574668	0.41
Tori	Garwa Rd	3829379	2.73	9605416	6.84
Garwa Rd	Nabinagar	3829379	2.73	9605416	6.84
Hazaribagh	Gaya	1949159	1.39	5204483	3.70
Chandrapura	Gaya	155274	0.11	256588	0.18
Gaya	Son nagar	2104434	1.50	5461072	3.89
Son Nagar	Nabinagar	493471	0.35	493471	0.35
Gaya	patna	1610963	1.15	4105736	2.92
Patna	Muzzaffarpur	5640351	4.01	14125251	10.05
Son Nagar	Patna	4029388	2.87	10019515	7.13

O-D Source cluster Mapping – Significant increase in Jharkhand's supply to Bihar

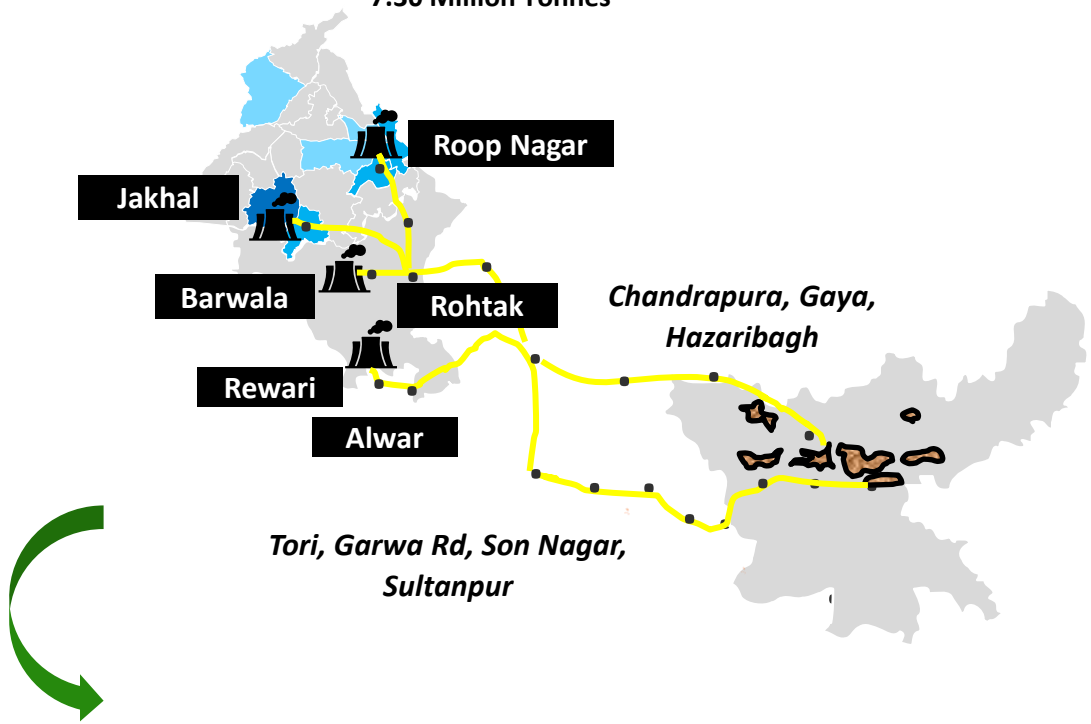
All figures in million tonnes

Name of TPS	Utility	North Karanpura	South Karanpura	Other CCL	Captive	BCCL	Total Jharkhand	Others (Incl Imports)	Total Coal Consumed FY22	Estimated Coal Consumption (FY30)	Supply from NK 2030	Supply from SK 2030	Supply from CCL others 2030	Supply from Captive 2030	Supply from BCCL 2030	Jharkhand's Supply in FY30	Others
NABINAGAR-BRBCL	BHARATIYA RAIL BIJLEE (NTPC-JV)	3.6	0.1	0.6	0.0	0.0	4.3	0.0	3.9	4.5	3.8	0.2	0.5	0.0	0.0	4.5	0.0
KANTI BIJLEE UTPADAN NIGAM LIMITED	KANTI BIJLEE UTPADAN NIGAM	1.3	0.4	0.4	0.0	0.0	2.1	0.0	2.1	3.2	2.1	0.5	0.6	0.0	0.0	3.2	0.0
KAHALGAON SUPER	NTPC	0.0	0.0	0.0	0.0	0.7	0.7	11.2	11.8	13.4	0.0	0.0	0.0	0.0	0.0	0.0	13.4
BARH SUPER TPS	NTPC	1.6	0.4	1.0	0.0	2.3	5.3	0.4	5.7	9.9	6.9	0.0	0.0	3.0	0.0	9.9	0.0
BARAUNI	NTPC	0.2	0.1	0.1	0.9	0.0	1.2	0.4	1.5	3.5	0.0	0.0	0.0	3.5	0.0	3.5	0.0
NABINAGAR-NPGC	NPGC (NTPC-JV)	3.5	0.1	0.5	0.0	0.2	4.3	0.7	5.0	5.4	4.6	0.3	0.5	0.0	0.0	5.4	0.0
Barh STPP-I	NTPC									7.0	0.0	0.0	0.0	7.0	0.0	7.0	0.0
Buxar TPP	SJVN									5.2	5.2	0.0	0.0	0.0	0.0	5.2	0.0
Total		**10.1**	**1.0**	**2.6**	**0.9**	**3.2**	**17.8**	**12.6**	**30.0**	**52.2**	**22.7**	**1.0**	**1.6**	**13.4**	**0.0**	**38.7**	**13.4**

- 2 Under-Construction power plants namely Barh STPP-I (NTPC) and Buxar TPP (PVUNL) to consume ~7 MT and ~5.2 MT of Coal. For Buxar TPP, allocated mine of CCL is Magadh-Amrapali vide letter of Assurance (LoA) for G9 to G14 grade coal issued by Central Coalfields Ltd. (CCL) on 10.12.2018. Coal may be supplied either from Amrapali coal block or Magadh coal block in the North Karanpura coalfield.
- NTPC's Barauni plant has plans to source coal from Badam coal block (PRC: 3 MTPA) with balance quantity probable to be sourced from Pakri Barwadih coal block which NTPC has plans to use as a basket mine. Further, NTPC's Barh plant has plans to source from Chatti-Bariatu (PRC: 7 MTPA) and from CCL due to existing FSAs along with quantity from Pakri Barwadih being likely.

O-D Source cluster Mapping – Jharkhand to Punjab & Haryana

Odisha to Punjab & Haryana total Rail Despatch in FY22 = 7.30 Million Tonnes



Major Coal Consuming Districts of Punjab: 2030 (Estimated)

10-15 MTPA Coal Consumption	*Bhatinda*
5-10 MTPA Coal Consumption	*Mansa, Fatehgarh Sahib, Rupnagar*
1-5 MTPA Coal Consumption	*Amritsar, Tarn Taran, Ludhiana, Nawashahr*

Expected Load from Odisha to Punjab & Haryana main trunk lines (Excluding load from other states on this line)

*Pb & Hr Coal **Demand 2022 ~ 33.01 MTPA***
*Rail Supply by Jharkhand **2022 ~ 7.30 MTPA***

*Pb & Hr Coal **Demand 2030 ~ 43.13 MTPA***
*Rail Supply by Jharkhand **2030 ~ 33 MTPA***

		FY22		FY30	
From	To	Traffic (Tonnes) 2022	Rakes / Day 2022	Traffic (Tonnes) 2030	Rakes / Day 2030
Patratu	Tori	1191616	0.85	3222162	2.29
Tori	Garwa Rd	9318900	6.63	23431543	16.67
Garwa Rd	Son Nagar	9318900	6.63	23431543	16.67
Son Nagar	Varanasi (via DDU)	10279838	7.32	25459998	18.12
Varanasi (via DDU)	Sultanpur	10279838	7.32	25459998	18.12
Sultanpur	Lucknow	10279838	7.32	25459998	18.12
Lucknow	Shahjhanpur	10279838	7.32	25459998	18.12
Shahjhanpur	Bareilly Jn.	10279838	7.32	25459998	18.12
Bareilly Jn.	Moradabad	10279838	7.32	25459998	18.12
Moradabad	Saharanpur Jn	10279838	7.32	25459998	18.12
Saharanpur Jn	Rajpura	6858441	4.88	16744261	11.92
Rajpura	Dhuri	6858441	4.88	16744261	11.92
Dhuri	Lehra Muhabbat	6858441	4.88	16744261	11.92
Bermo	Chandrapura	668664	0.48	1104956	0.79
Chandrapura	Gaya	684983	0.49	1131924	0.81
Hazaribagh	Gaya	275954	0.20	896531	0.64
Gaya	Son Nagar	960937	0.68	2028455	1.44
Varanasi (via DDU)	Prayagraj	3419690	2.43	8138263	5.79
Prayagraj	Kanpur Goods	3419690	2.43	8138263	5.79
Kanpur Goods	Shikohabad	3419690	2.43	8138263	5.79
Shikohabad	Ghaziabad	618792.88	0.44	1137958	0.81
Ghaziabad	Rohtak	618792.88	0.44	1137958	0.81
Rohtak	Jakhal	618792.88	0.44	1137958	0.81
Shikohabad	Bharatpur	3337966	2.38	8335787	5.93
Bharatpur	Alwar	3337966	2.38	8335787	5.93
Alwar	Rewari	865803	0.62	2158368	1.54
Shahjhanpur	Bareilly Jn.	3421397	2.43	8715737	6.20
Bareilly Jn.	Moradabad	3421397	2.43	8715737	6.20
Moradabad	Saharanpur Jn	3421397	2.43	8715737	6.20
Saharanpur Jn	Rajpura	821560	0.58	2123864	1.51

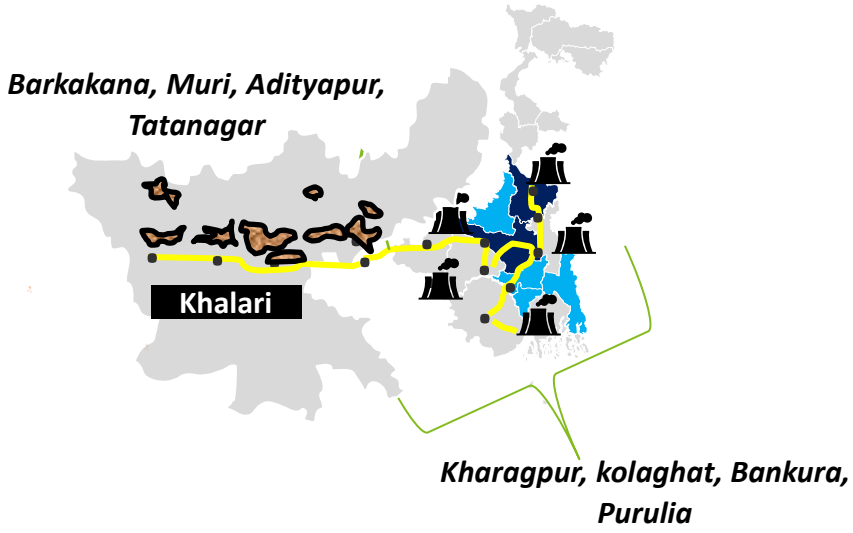
O-D Source cluster Mapping – Significant increase in Jharkhand's supply to Punjab & Haryana

All figures in million tonnes

Name of TPS	Utility	North Karanpura	South Karanpura	Other CCL	Captive	BCCL	Total Jharkhand	Others (Incl Imports)	Total Coal Consumed FY22	Estimated Coal Consumption (FY30)	Supply from NK 2030	Supply from SK 2030	Supply from CCL others 2030	Supply from Captive 2030	Supply from BCCL 2030	Jharkhand's Supply in FY30	Others
RAJPURA TPS	NABHA POWER	0.3	0.0	0.0	0.0	0.0	0.3	5.1	5.4	5.4	1.8	0.0	0.0	0.0	0.0	1.8	3.6
GURU HARGOBIND TPP, LEHRA MOHABAT	PSPCL	0.3	0.0	0.0	0.0	0.4	0.7	0.6	1.3	4.2	0.0	0.0	0.0	4.2	0.0	4.2	0.0
GURU GOBIND SINGH TPP, ROPAR	PSPCL	0.3	0.0	0.0	0.0	0.0	0.3	0.9	1.2	3.9	2.5	0.0	0.0	1.4	0.0	3.9	0.0
GVK POWER (GOINDWALSAHIB) LTD.	PSPCL	1.1	0.0	0.0	0.0	0.0	1.1	0.2	1.3	2.6	2.6	0.0	0.0	0.0	0.0	2.6	0.0
TALWANDI SABO POWER LTD	TSPL	0.6	0.0	0.0	0.0	0.0	0.6	5.4	6.0	9.2	1.3	0.0	0.0	0.0	0.0	1.3	7.9
INDIRA GANDHI	ARAVALI POWER	0.1	0.0	0.0	0.0	0.0	0.2	4.5	4.7	6.9	4.6	0.0	0.0	0.0	0.0	4.6	2.3
RAJIV GANDHI TPP,Hissar	HPGCL	0.1	0.0	0.0	0.0	0.0	0.1	1.7	1.9	5.8	3.3	0.0	0.0	0.0	0.0	3.3	2.5
Deen Bandhu Chhotu Ram TPS, YAMUNANAGAR	HPGCL	1.0	0.0	0.0	0.0	0.3	1.3	0.5	1.8	2.9	2.8	0.0	0.0	0.0	0.1	2.9	0.0
PANIPAT	HPGCL	0.3	0.0	0.0	0.0	0.8	1.1	0.8	1.9	3.4	2.1	0.0	0.0	0.0	1.2	3.2	0.1
MAHATMA GANDHI TPP	JHAJJAR POWER	1.7	0.0	0.0	0.0	1.1	2.8	1.9	4.7	5.6	5.2	0.0	0.0	0.0	0.0	5.2	0.4
Total		**5.8**	**0.0**	**0.0**	**0.0**	**2.7**	**8.5**	**21.7**	**30.2**	**49.9**	**26.2**	**0.0**	**0.0**	**5.6**	**1.3**	**33.1**	**16.8**

- Punjab-Haryana cluster of power plants is likely to source additional coal from Jharkhand due to growth in plant performance and corresponding availability of coal at CCL which shall significantly result in higher PLF.
- PSPCL's captive block, Pachwara Central (PRC: 5.6 MTPA) is expected to supply to PSPCL's Guru Hargobind TPP, Lehra Mohabat and Guru Gobind Singh TPP, Ropar.
- In FY22, power plants in Punjab and Haryana sourced 100% of their supply from CCL from the North Karanpura coalfield which is expected to continue in FY30 due to significant growth in coal production in the region

O-D Source cluster Mapping – Jharkhand to West Bengal



Odisha to West Bengal total Rail Despatch in FY22 =1.09 Million Tonnes

Major Coal Consuming Districts of WB: 2030 (Estimated)

>15 MTPA Coal Consumption	*Murshidabad, Paschim Bardaman, Purba Bardaman*
10-15 MTPA Coal Consumption	-
5-10 MTPA Coal Consumption	*Hooghly, Howrah, North 24 Parganas*
1-5 MTPA Coal Consumption	-

Expected Load from Odisha to West Bengal main trunk lines (Excluding load from other states on this line)

West Bengal Coal ***Demand 2022 ~ 54.96 MTPA***
Rail Supply by Jharkhand ***2022 ~ 1.09 MTPA***

West Bengal Coal ***Demand 2030 ~ 71.81 MTPA***
Rail Supply by Jharkhand ***2030 ~ 42 MTPA***

		FY22		FY30	
From	**To**	**Traffic (Tonnes) 2022**	**Rakes / Day 2022**	**Traffic (Tonnes) 2030**	**Rakes / Day 2030**
Khalari	Barkakana	232835	0.17	578970	0.41
Barkakana	Muri	286874	0.20	745696	0.53
Muri	Adityapur	286874	0.20	745696	0.53
Adityapur	Tatanagar	286874	0.20	745696	0.53
Tatanagar	Kharagpur	286874	0.20	745696	0.53
Kharagpur	Durgachak	211523	0.15	531121	0.38
Kharagpur	Kolaghat	514500	0.37	940261	0.67
Bermo	Chandrapura Jn	439149	0.31	725686	0.52
Chandrapura Jn	Mahuda	439149	0.31	725686	0.52
Mahuda	Bankura	439149	0.31	725686	0.52
Bankura	Kharagpur	439149	0.31	725686	0.52
Bermo	Rajbera	54180	0.04	89532	0.06
Rajbera	Bokaro	241595	0.17	399231	0.28
Bokaro	Purulia	152941	0.11	252732	0.18

O-D Source cluster Mapping – Significant increase in Jharkhand's supply to West Bengal

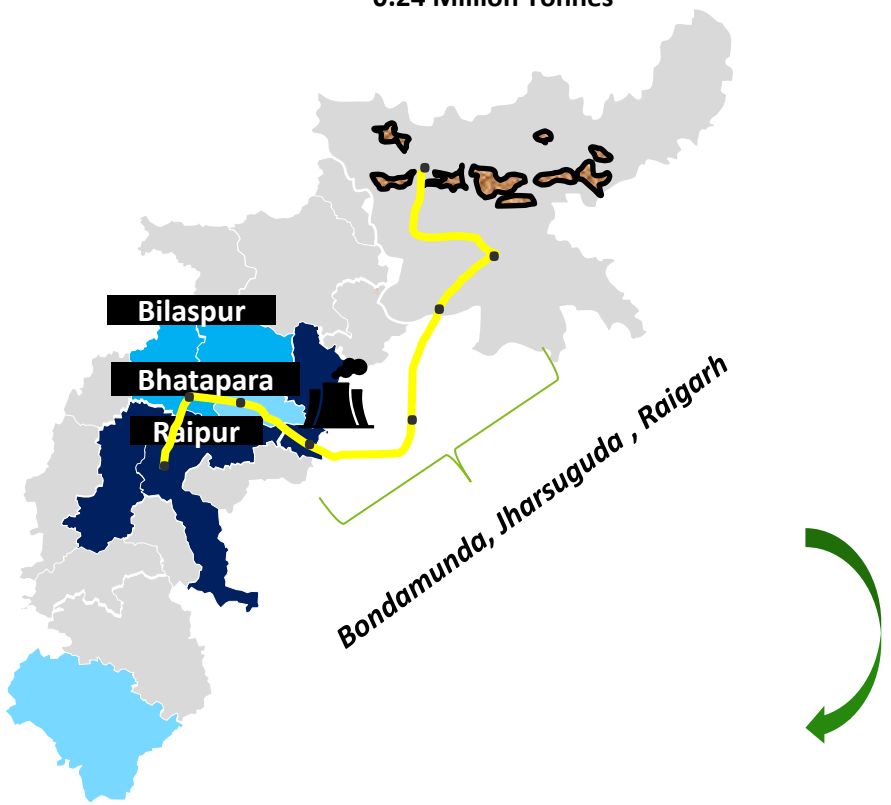
All figures in million tonnes

Name of TPS	Utility	North Karanpura	South Karanpura	Other CCL	Captive	BCCL	Total Jharkhand	Others (Incl Imports)	Total Coal Consumed FY22	Estimated Coal Consumption (FY30)	Supply from NK 2030	Supply from SK 2030	Supply from CCL others 2030	Supply from Captive 2030	Supply from BCCL 2030	Jharkhand's Supply in FY30	Others
Budge Budge Generating Station	CESC	0.2	0.0	0.0	1.5	0.3	2.0	1.2	3.2	3.5	0.0	0.0	0.0	0.0	3.1	3.1	0.4
Southern Generating Station	CESC	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.9
DURGAPUR	DVC	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.3	2.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0
MEJIA	DVC	0.0	0.0	0.0	0.0	6.2	6.3	3.4	9.7	12.4	0.0	0.0	0.0	3.0	6.2	9.2	3.2
DURGAPUR STEEL	DVC	0.0	0.0	0.0	0.0	0.5	0.6	3.6	4.1	5.4	0.0	0.0	0.0	0.0	1.8	1.8	3.6
RAGHUNATHPUR	DVC	0.0	0.0	0.2	0.0	3.0	3.2	0.8	3.9	6.2	0.0	0.0	0.0	3.0	3.0	6.0	0.3
DURGAPUR PROJECTS POWER STATION	DPL	0.0	0.0	0.0	0.5	0.6	1.1	0.7	1.8	3.1	0.0	0.0	0.0	0.0	0.8	0.8	2.3
HALDIA ENERGY LIMITED	HALDIA ENERGY	0.3	0.0	0.0	0.0	0.0	0.4	2.6	2.9	3.3	0.0	0.0	0.0	0.0	0.0	0.0	3.3
FARAKKA SUPER	NTPC	0.0	0.0	0.0	0.0	0.3	0.3	7.8	8.1	11.0	0.0	0.0	0.0	0.0	0.0	0.0	11.0
KOLAGHAT	WBPDCL	0.0	0.0	0.3	0.2	0.4	0.9	2.5	3.4	8.0	0.0	0.0	0.0	4.0	2.0	6.0	2.0
SAGARDIGHI	WBPDCL	0.0	0.0	0.0	6.7	0.5	7.2	0.1	7.3	7.9	0.0	0.0	0.0	4.6	1.6	6.2	1.6
BANDEL	WBPDCL	0.0	0.0	0.0	0.2	0.0	0.2	1.1	1.4	2.1	0.0	0.0	0.0	1.1	0.5	1.6	0.5
SANTALDIH TPS	WBPDCL	0.0	0.0	0.1	0.3	1.0	1.4	1.3	2.8	2.9	0.0	0.0	0.0	1.4	0.7	2.1	0.7
BAKRESWAR	WBPDCL	0.0	0.0	0.1	3.2	0.6	3.9	1.3	5.2	5.3	0.0	0.0	0.0	2.4	1.2	3.6	1.7
Sagardighi TPP, Ph-III	WBPDCL									3.1	0.0	0.0	0.0	1.5	0.8	2.3	0.8
Total		**0.5**	**0.0**	**0.7**	**12.7**	**13.5**	**27.5**	**26.7**	**54.2**	**76.8**	**0.0**	**0.0**	**0.0**	**21.0**	**21.6**	**42.6**	**34.2**

- Power plants in West Bengal sourced ~1.3 MT from CCL in FY22. BCCL supplied major quantities to Mejia plant (DVC) and Raghunathpur plant (DVC) in FY22.
- For FY30, plants in West Bengal are not likely to source coal from CCL given the growth of coal production in ECL & BCCL. Another source of major coal traffic shall be witnessed due to growth in captive blocks' production majorly from WBPDCL's in the Pakur region. Others include majorly ECL with some minor quantities from MCL due to standing FSAs.

O-D Source cluster Mapping – Jharkhand to Chhattisgarh

Jharkhand to Chhattisgarh total Rail Despatch in FY22 = 0.24 Million Tonnes



Major Coal Consuming Districts of Chhattisgarh: 2030 (Estimated)

>15 MTPA Coal Consumption	*Raipur, Raigarh, Durg*
5-10 MTPA Coal Consumption	*Korba, Bilaspur*
1-5 MTPA Coal Consumption	*Janjgir-Champa, Bijapur-Dantewada-Sukma cluster*

Expected Load from Jharkhand to Chhattisgarh main trunk lines (Excluding load from other states on this line)

Chhattisgarh's Coal ***Demand 2022 ~ 124.47 MTPA*** *Chhattisgarh's Coal* ***Demand 2030 ~ 162.64 MTPA***

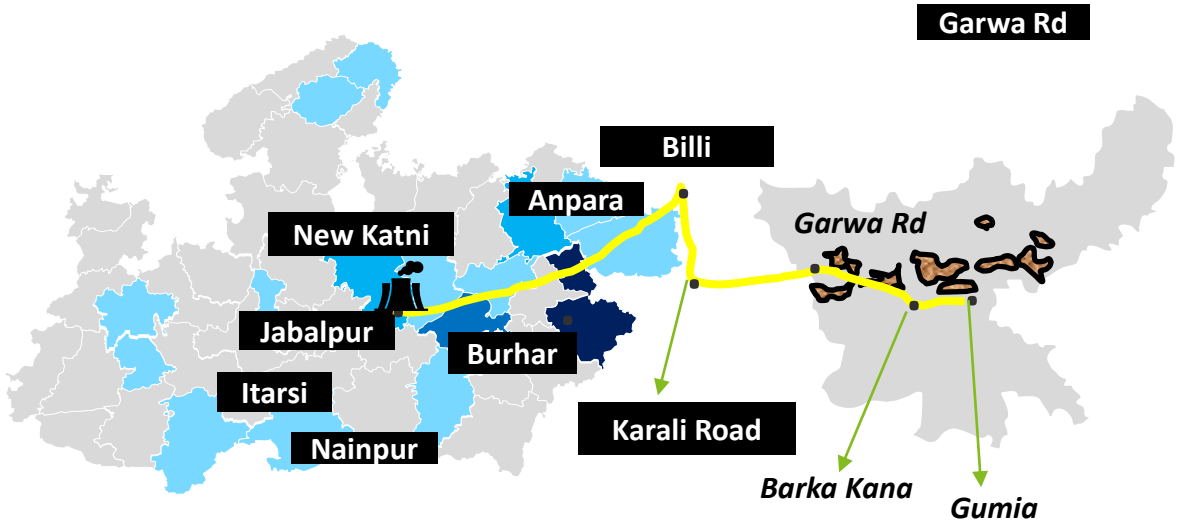
Rail Supply by Jhanrkhand ***2022 ~ 0.24 MTPA*** *Rail Supply by Jharkhand* ***2030 ~ 0 MTPA***

		FY22		FY30	
From	**To**	**Traffic (Tonnes) 2022**	**Rakes / Day 2022**	**Traffic (Tonnes) 2030**	**Rakes / Day 2030**
Tori	Ranchi	208323	0.15	Shall be catered by SECL. No Traffic envisaged from Jharkhand to this state in FY30	
Ranchi	Bondamunda	208323	0.15		
Bondamunda	Jharsuguda	208323	0.15		
Jharsuguda	Raigarh	77874	0.06		
Raigarh	Champa	130450	0.09		
Champa	Bilaspur	77874	0.06		
Bilaspur	Badri	77874	0.06		
Badri	Raipur	77874	0.06		

- Major Consumers in Chhattisgarh are ACC Bhatapara plant, Sipat STPS, NTPC Sail, Raipur Energen, KSK Mahanadi, DB power, RKM Energen, Korba STPS, BALCO, Lara TPS, Jindal Steel and Power Ltd, Raigarh Energy

- Major consumer of coal from Jharkhand are Raipur Energen, Raigarh Power & RKM Powergen.

O-D Source cluster Mapping – Jharkhand to Madhya Pradesh



Jharkhand to Madhya Pradesh total Rail Despatch in FY22 = 1.53 Million Tonnes

Major Coal Consuming Districts of MP: 2030 (Estimated)

>15 MTPA Coal Consumption	*Shahdol*
10-15 MTPA Coal Consumption	*Jabalpur*
5-10 MTPA Coal Consumption	*Satna, Sagar*
1-5 MTPA Coal Consumption	*Sidhi, Singrauli, Rewa, Katni, Damoh, Betul, Khandwa, Ujjain, Indore, Bhind, Gwalior, Bhopal, Seoni*

Expected Load from Jharkhand to Madhya Pradesh main trunk lines (Excluding load from other states on this line)

MP's Coal ***Demand 2022 ~ 84.33 MTPA***
Rail Supply by Jharkhand ***2022 ~ 1.15 MTPA***

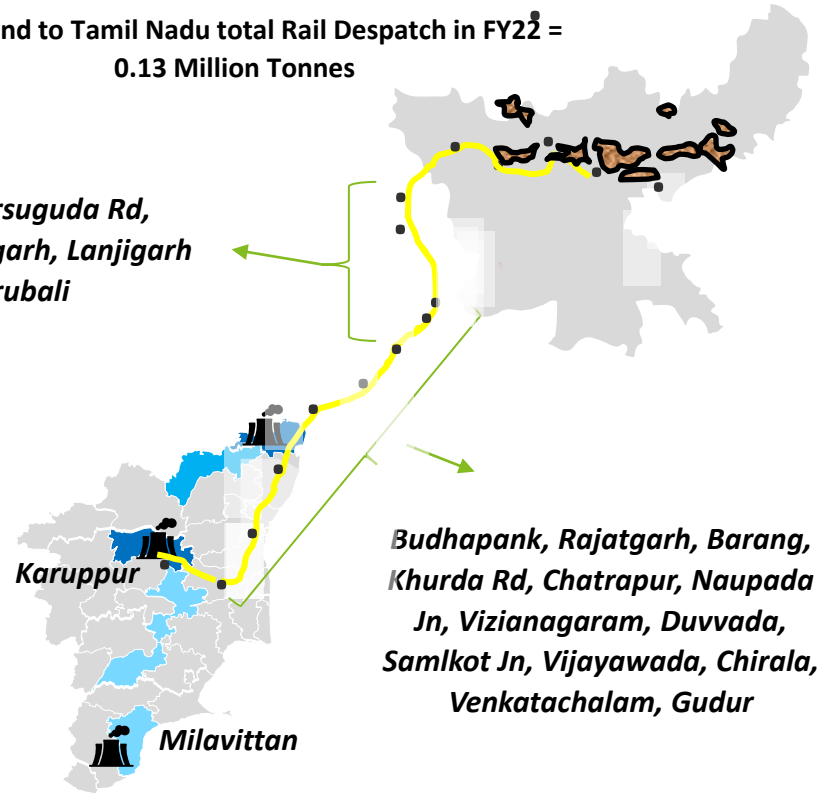
MP's Coal ***Demand 2030 ~ 110.20 MTPA***
Rail Supply by Jharkhand ***2030 ~ 0 MTPA***

		FY22		FY30	
From	To	Traffic (Tonnes) 2022	Rakes / Day 2022	Traffic (Tonnes) 2030	Rakes / Day 2030
Gumia	Barka Kana	19352	0.01	Shall be catered by NCL & SECL. No Traffic envisaged from Jharkhand to this state in FY30	
Barka Kana	Patratu	19352	0.01		
Phulbasa	Tori	701755	0.50		
Patratu	Tori	848894	0.60		
Khalari	Tori	932183	0.66		
Tori	Garwa Rd Jn	1534981	1.09		
Garwa Rd Jn	Billi	1534981	1.09		
Billi	Katni	1534981	1.09		
Katni	NTPC Gadwara	1534981	1.09		

- Major consumers include NTPC Gadarwara, Jaypee Bina Thermal, Mahan Energy Ltd. and Jaypee Nigri.

O-D Source cluster Mapping – Jharkhand to Tamil Nadu

Jharkhand to Tamil Nadu total Rail Despatch in FY22 = 0.13 Million Tonnes



Major Coal Consuming Districts of TN: 2030 (Estimated)

>15 MTPA Coal Consumption	*NA*
10-15 MTPA Coal Consumption	*Salem, Thiruvallur*
5-10 MTPA Coal Consumption	*Vellore*
1-5 MTPA Coal Consumption	*Tuticorin, Madurai, Tiruchirapalli*

Expected Load from Jharkhand to TN main trunk lines (Excluding load from other states on this line)

*TN Coal **Demand 2022 ~ 50.03 MTPA***

*Rail Supply by Jharkhand **2022 ~ 0.13MTPA***

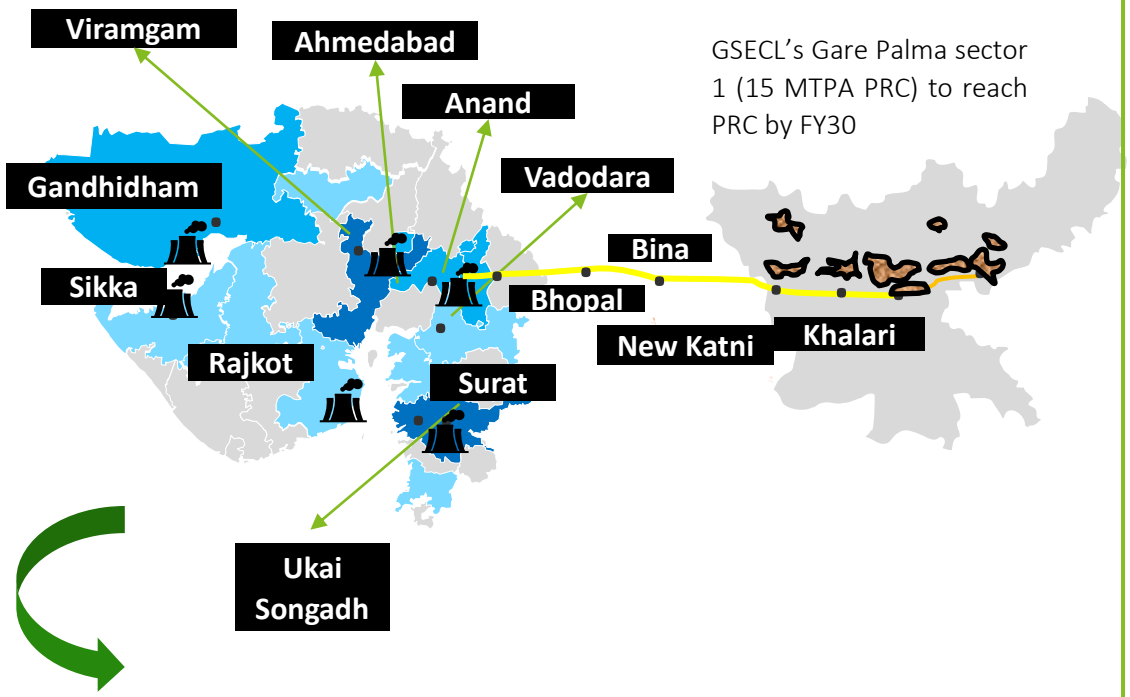
*AP Coal **Demand 2030 ~ 65.37 MTPA***

*Rail Supply by Jharkhand **2030 ~ 0 MTPA***

		FY22		FY30	
From	**To**	**Traffic (Tonnes) 2022**	**Rakes / Day 2022**	**Traffic (Tonnes) 2030**	**Rakes / Day 2030**
Patratu	Muri	33599	0.02	Shall be catered by SCCL & MCL (through coastal shipping) No Traffic envisaged from Jharkhand to this state in FY30	
Muri	Chandil	33599	0.02		
Chandil	Sini	33599	0.02		
Sini	Bisra	33599	0.02		
Jharsuguda Rd	Sambalpur	33599	0.02		
Sambalpur	Titlagarh	33599	0.02		
Titlagarh	Lanjigarh Rd	33599	0.02		
Lanjigarh Rd	Therubali	33599	0.02		
Therubali	Vizianagram Jn	33599	0.02		
Vizianagram Jn	Duvadda	33599	0.02		
Duvadda	Samalkot Jn	33599	0.02		
Samalkot Jn	Vijayawada Jn	33599	0.02		
Vijayawada Jn	Chirala	33599	0.02		
Chirala	Venkatachalam	33599	0.02		
Venkatachalam	Gudur	33599	0.02		
Gudur	Tiruvottiyur	33599	0.02		

O-D Source cluster Mapping – Jharkhand to Gujarat

Jharkhand to Gujarat total Rail Despatch in FY22 = 0.43 Million Tonnes



GSECL's Gare Palma sector 1 (15 MTPA PRC) to reach PRC by FY30

Major Coal Consuming Districts of Gujarat: 2030 (Estimated)

>15 MTPA Coal Consumption	*NA*
10-15 MTPA Coal Consumption	*Ahmedabad, Surat, Tapi*
5-10 MTPA Coal Consumption	*Kachchh, Gandhinagar, Kheda*
1-5 MTPA Coal Consumption	*Valsad, Bharuch, Vadodara, Chhotaudepur, Patan, Jamnagar, Dwarka, Bhavnagar*

Expected Load from Jharkhand to Gujarat main trunk lines (Excluding load from other states on this line)

Gujarat's Coal ***Demand 2022 ~ 30 MTPA***

Rail Supply by Jharkhand ***2022 ~ 0.43 MTPA***

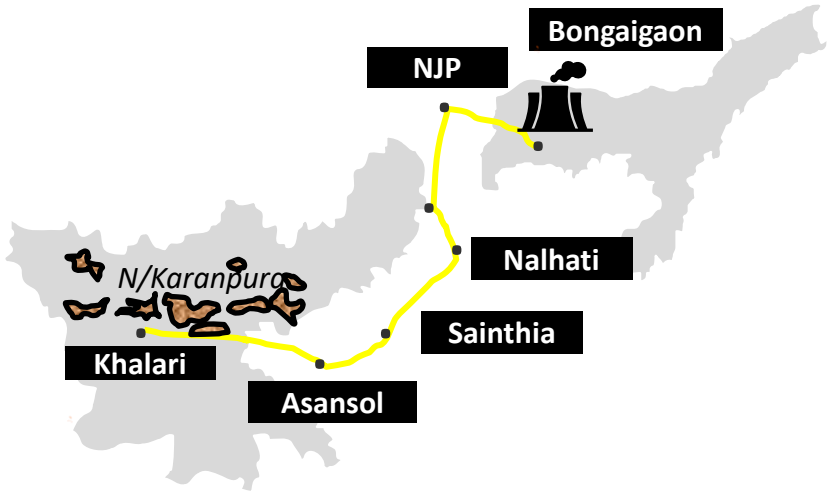
Gujarat's Coal ***Demand 2030 ~ 39 MTPA***

Rail Supply by Jharkhand ***2030 ~ 0.56 MTPA***

FY22		FY30			
From	**To**	**Traffic (Tonnes) 2022**	**Rakes / Day 2022**	**Traffic (Tonnes) 2030**	**Rakes / Day 2030**
Tori	Garhwa	429204	0.31	Shall be catered by SECL & MCL (through coastal shipping) No Traffic envisaged from Jharkhand to this state in FY30	
Garhwa	Billi	429204	0.31		
Billi	Katni	429204	0.31		
Katni	Bina	429204	0.31		
Bina	Bhopal	429204	0.31		
Bhopal	Maksi	429204	0.31		
Maksi	Ujjain	429204	0.31		
Ujjain	Nagda	429204	0.31		
Nagda	Ratlam	429204	0.31		
Ratlam	Anand	429204	0.31		

O-D Source cluster Mapping – Jharkhand to Assam

Jharkhand to Assam total Rail Despatch in FY22 = 0.33 Million Tonnes



Major Coal Consuming Districts of Assam: 2030 (Estimated)

	>15 MTPA Coal Consumption	*NA*
	10-15 MTPA Coal Consumption	*NA*
	5-10 MTPA Coal Consumption	*NA*
	1-5 MTPA Coal Consumption	*NA*

Expected Load from Jharkhand to Assam main trunk lines (Excluding load from other states on this line)

*Rail Supply by Jharkhand **2022 ~ 0.33 MTPA***

*Rail Supply by Odisha **2030 ~ 0.44 MTPA***

FY22				FY30	
From	To	Traffic (Tonnes) 2022	Rakes / Day 2022	Traffic (Tonnes) 2030	Rakes / Day 2030
Khalari	Gumia	94416	0.07	Traffic to remain like FY22. Small supplies to Assam would continue as these players would prefer CCL's coal	
Gumia	Chandrapura	333773	0.24		
Chandrapura	Kusunda	337524	0.24		
Kusunda	Asansol	337524	0.24		
Asansol	Sainthia	337524	0.24		
Sainthia	Nalhati	337524	0.24		
Nalhati	NJP	337524	0.24		
NJP	Bongaigaon	337524	0.24		

- Major Consumer in Assam is Bongaigon Thermal Power Plant

CCL would need to push certain volumes in order to match the production levels

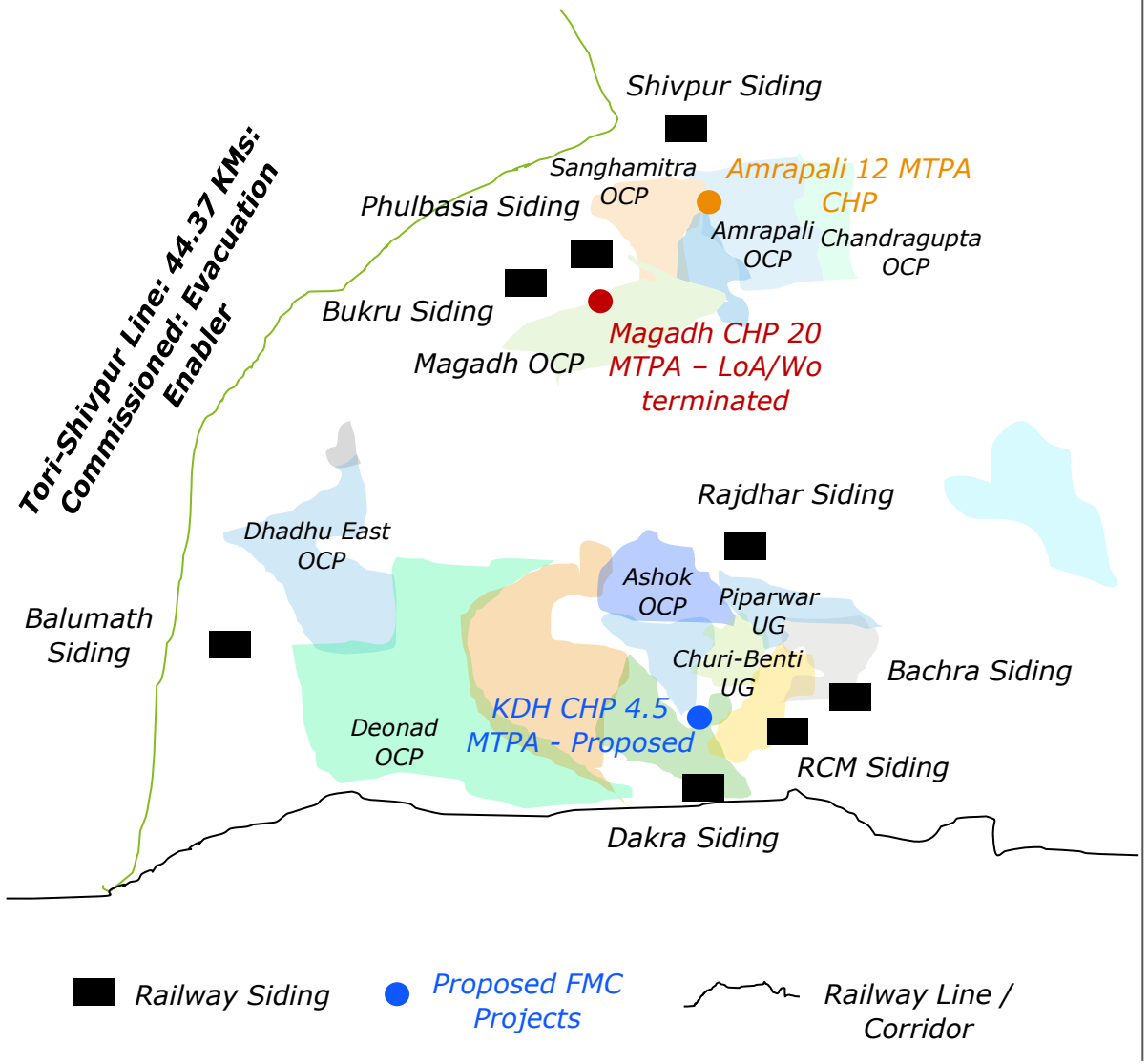
Figures in million tonnes

Destination State	North Karanpura CF	South Karanpura CF	East & West Bokaro and Ramgarh CF	Total CCL
Jharkhand	22.45	1.88	11.68	36.01
Bihar	22.73	1.02	2.14	25.89
Uttar Pradesh	24.72	1.19	1.77	27.69
Punjab & Haryana	30.08	1.25	1.37	32.70
Total for 2030	99.97	5.35	16.96	122.38
Dispatch Plan for CCL	115	13	44	171
Identified Potential Gap	15.03	7.65	27.04	48.62
Assuming all plants sourcing from CCL run at 95% PLF (optimistic scenario) & additional demand from those plants in these states are sourced from CCL				28.83
E-auction Sales Rail Mode @50% of 10% of Long-term rail mode commitment for FY30				~ 5
Remaining Potential Gap		14.79		

A proactive marketing strategy needs to be articulated by the marketing team to further push surplus production volumes from CCL. Strict competition from captive & commercial mines as well as CIL's other subsidiaries expected.

Analyzing Evacuation Capacity for Jharkhand (CCL)

Realistic (achievable) evacuation plan for NK CF



Mine/Project	PRC (MTPA)	FY30 (MTPA)	Rail Mode (75% MT)	Rakes/Day Required	Connected Sidings and Capacity (r/d)
Magadh OCP	51	49	37	26.25	Balumath – 5 Phulbasia – 8 Bukru – 3
Amrapali OCP	25	25	19	13.39	Shivpur – 16 Piparwar W – 2
Ashok Expn OCP	20	5	4	2.68	Bachra – 8 RCM – 6 Rajdhar – 5
Sanghamitra OCP	20	14	11	7.50	Phulbasia & Bukru Sanghamitra Siding - 4
Chandragupta OCP	15	8	6	4.29	Phulbasia & Shivpur
Rohini Karketta OCP	10	5	4	2.68	Dakra – 2
KDH	4.5	3	2	1.61	KDH – 4
Others	8.5	6	5	3.21	Misc.
Total North Karanpura	**154**	**115**	**86**	**61.61**	**63 (~88 MTPA)**

While it is estimated that ~86 MTPA or ~62 Rakes/Day is to be despatched via rail from North-Karanpura Area, it is estimated that the cumulative capacity of existing sidings and upcoming KDH CHP would be sufficient to enable evacuation of 62 R/d or ~88 MTPA in FY30.

Whilst Magadh CHP's LoA/Wo has been terminated due to FC issues, Amrapali CHP is also facing multiple EC Issues. Once resolved, these projects shall contribute further to evacuation capacity.

✓ *Achievable*

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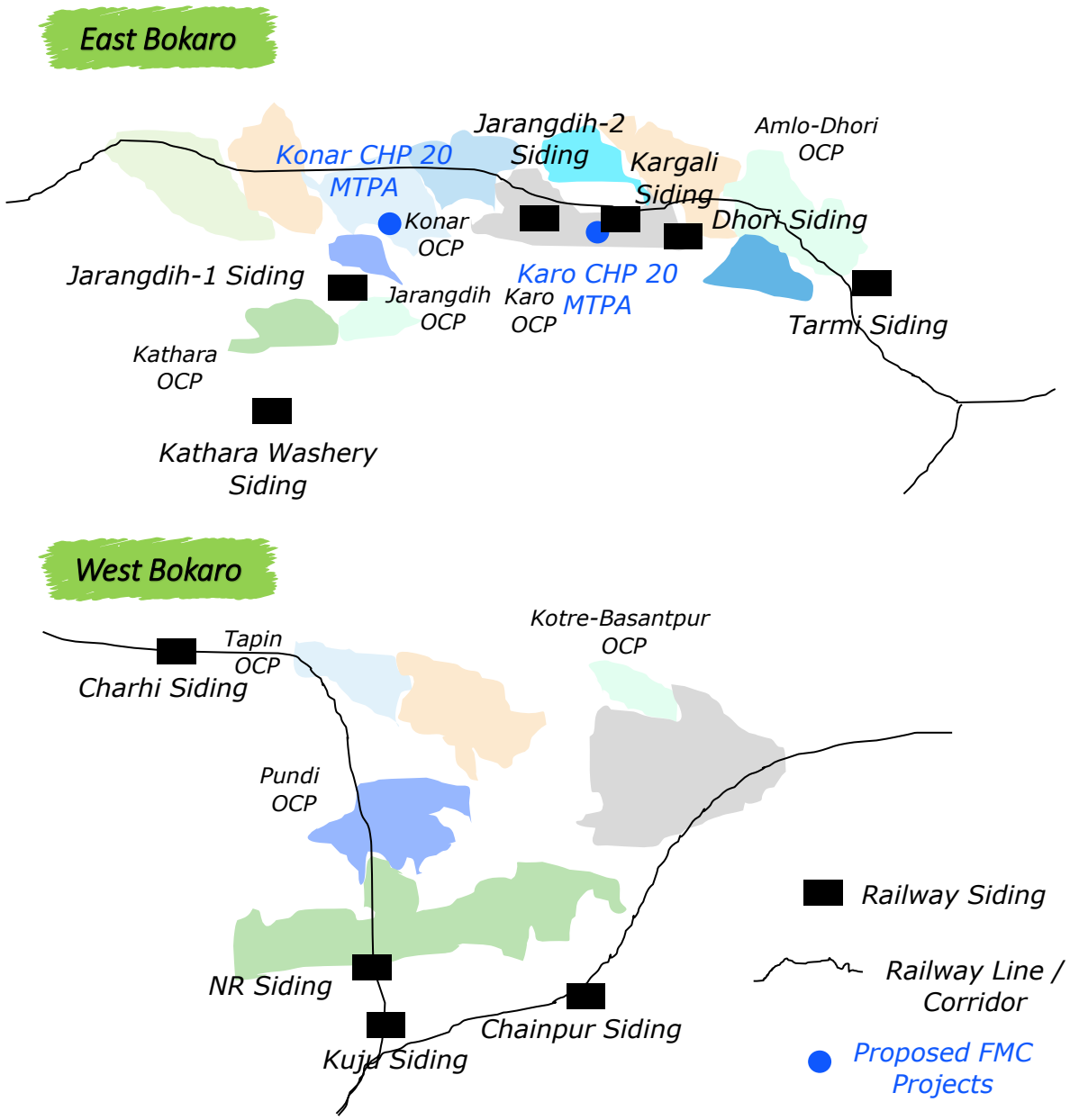
Realistic (achievable) evacuation plan for East and West Bokaro CF



Mine/Project	PRC (MTPA)	FY30 (MTPA)	Rail Mode (75% MT)	Rakes/Day Required	Connected Sidings and Capacity (r/d)
Karo OCP	11	11	8.3	6	Kargali – 4 Konar – 4
Amlo-Dhori OCP	2.5	3	2.3	1.6	Dhori – 6
Konar OCP	8	8	6	4.3	Jarangdih – 5
Others	11.5	16	4.6	3.3	Jarangdih, Tarmi,
Total East Bokaro	**33**	**38**	**21.1**	**15.1**	**19 r/d (~26 MTPA)**
Tapin OCP	2.5	2.5	1.9	1.34	Charhi – 2
Kotre-Basantpur OCP	5	3	2.3	1.61	Kedla W – 4
Pundi OCP	5	2	1.5	1.07	Kuju - 5
Others	8.5	4.5	3.4	2.41	Chainpur, NR Siding
Total West Bokaro	**21**	**8.2**	**9.0**	**6.4**	**15 r/d (~21 MTPA)**

For both the Coalfields i.e., East Bokaro and West Bokaro, the total rake loading and evacuation capacity is sufficient to handle the evacuation from coalfields at 75% rail mode.

It shall also be noted that as there is surplus loading capacity, more rail evacuation can be envisaged from these two coalfields.

Remaining evacuation via road mode is also feasible.

Other blocks include Govindpur Ph-II, Kathara, Jarangdih, Giridih, Tarmi etc. for East Bokaro and Karma, Topa, etc. for West Bokaro

✓ *Achievable*

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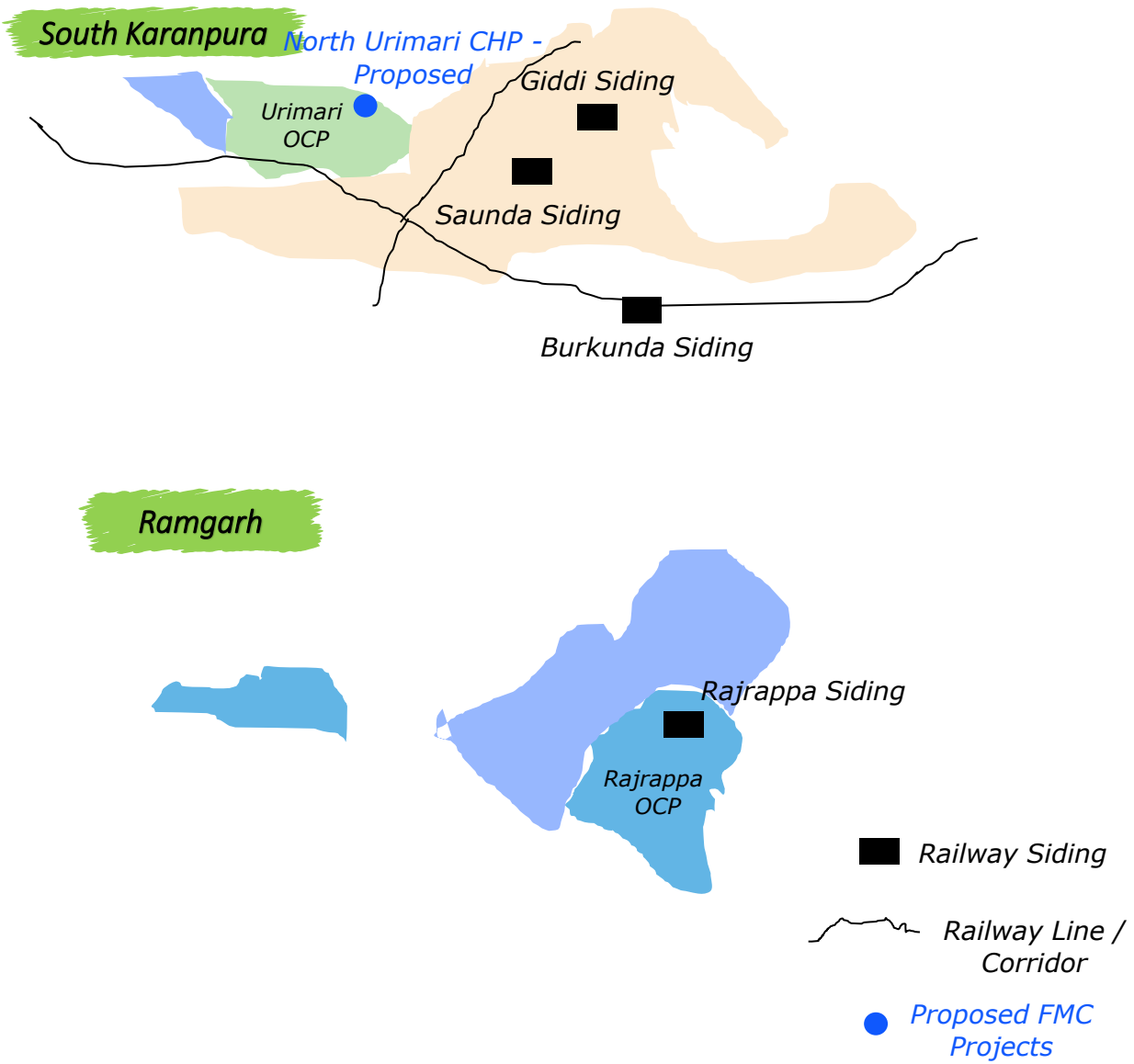
Realistic (achievable) evacuation plan for South Karanpura and Ramgarh CF



Mine/Project	PRC (MTPA)	FY30 (MTPA)	Rail Mode (75% MT)	Rakes/Day Required	Connected Sidings and Capacity (nos. of rake)
North Urimari OCP	7.5	7.5	5.6	4.0	Saunda-6
Others	5.5	5.5	4.1	2.9	Giddi & Burkunda
Total South Karanpura	**13**	**13**	**9.8**	**7.0**	
Rajrappa OCP	3	3	2.25	1.6	Rajrappa – 2
Total Ramgarh	**3**	**3**	**2.25**	**1.6**	

For both the Coalfields i.e., South Karanpura & Ramgarh, the total rake loading and evacuation capacity is sufficient to handle the evacuation from coalfields at 75% rail mode.

It shall also be noted that as there is surplus loading capacity, more rail evacuation can be envisaged from these two coalfields.

Remaining evacuation via road mode is also feasible.

Other blocks include Sayal, Giddi, Sirka, Sangam, Religarha etc. for South Karanpura

✓ *Achievable*

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Details of FMC projects of CCL

Name of the Project	Capacity (MTPA)	Contractor	Awarded Value (Rs Cr.)	Expenditure till date (Nov'22)	Financial Progress	Physical Progress	LOA issued	Site Handed over	Sch. Completion	Ant. Completion	Delay	Status
Magadh OCP CHP-SILO	20	HEC Ltd.	₹ 527.12									LOA Cancelled due to FC issues
Amrapali OCP CHP-SILO	12	L&T Ltd.	₹ 299.81									LOA Cancelled due to FC issues
Konar OCP CHP-SILO	5	Hamtek Technologies India Pvt. Ltd.	₹ 212.00	₹ 0.00	0%		17-Mar-22	10-Oct-22	30-Sep-24	30-Sep-24	0	Survey work started
North Urimari OCP CHP-SILO	7.5	L&T Ltd.	₹ 280.91	₹ 226.04	80%	87%	31-Dec-20	25-Feb-21	25-Feb-23	30-Sep-23	217	FC for 11 Ha for rail connectivity awaited. Diversion of CTR ongoing. Hard rock being removed from 100mtr area both sides of Silo

Source : CIL Database, Deloitte Analysis

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Evacuation Capacity Augmentation for coal transportation roads at CCL

		Length (Km)	Carriage Width (m)
CCL	**Road Projects already taken up**		
	Construction of Road from Honhe to Shivpur (Road from Coal Stock to WB No. 06)	4.6	10
	Road from Honhe to Shivpur Railway Siding by RCD, Govt. of Jharkhand	3.6	10
	Proposed Road Projects		
	Road from Manwatongri to WB No. 08 & 09 junction under Amrapali OCP of Amrapali-Chandragupta Area	2.5	10
	Road from Coal Stock to Binglat under Amrapali OCP	1.25	10
	Road from mines to Konar Railway Siding of AKK OCP under B&K Area	2	10

CIL (CCL) blocks in Jharkhand – North Karanpura CF

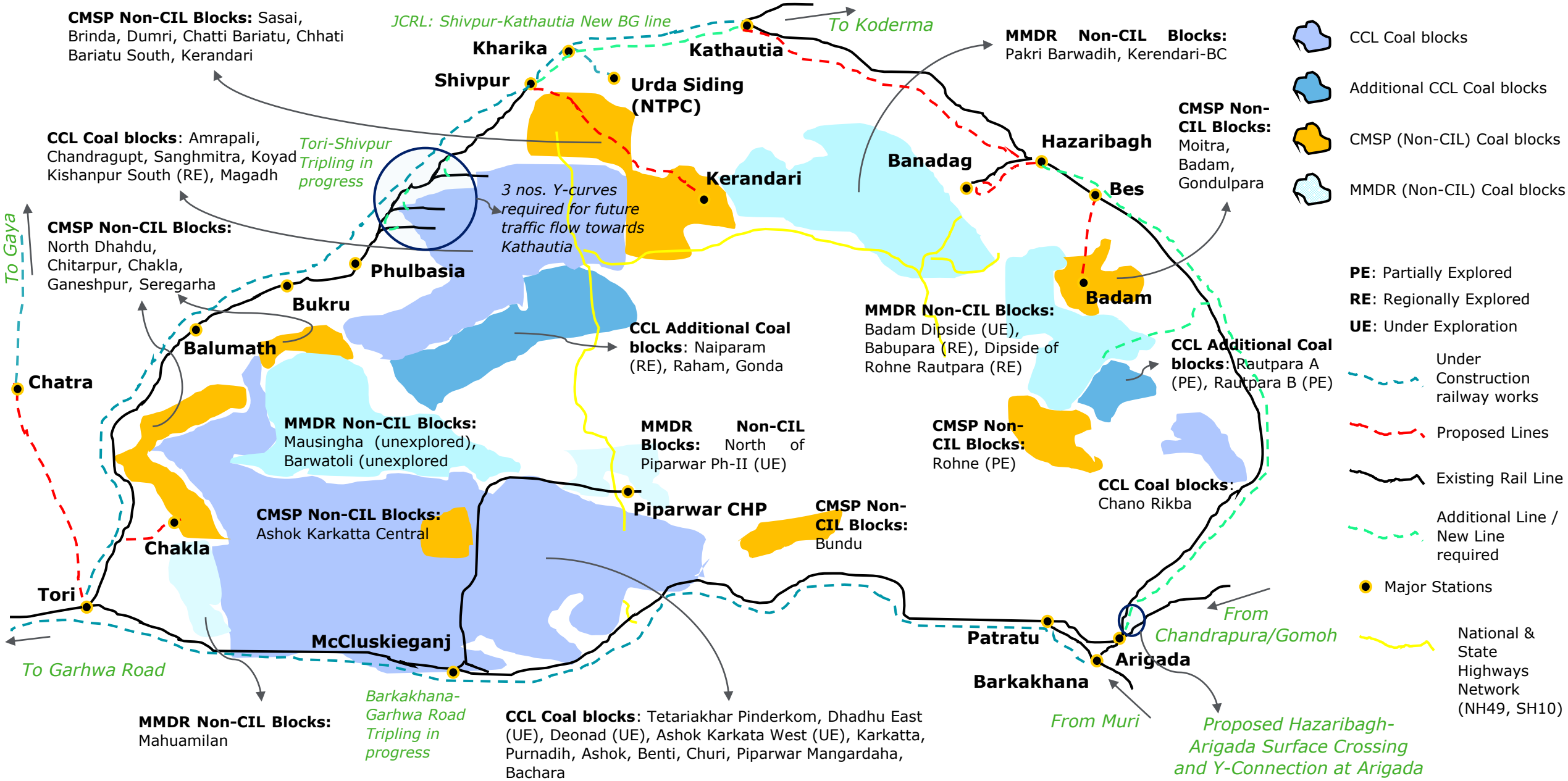
#	Name of the Block	Exploration Status
1	Amrapali	Explored
2	Chandragupt	Explored
3	Sanghmitra	Explored
4	Koyad Kishanpur South	Regionally Explored
5	Magadh	Explored
6	Tetariakhar Pinderkom	Explored
7	Dhadhu East	Under Exploration
8	Deonad	Under Exploration
9	Ashok Karkata West	Under Exploration
10	Karkatta	Explored
11	Purnadih	Explored
12	Ashok	Explored
13	Benti	Explored
14	Piparwar Mangardaha	Explored
15	Churi	Explored
16	Bachara	Explored
17	Gonda	Explored
18	Raham	Explored
19	Naiparam	Regionally Explored
20	Chano Rikba	Explored
21	Rautpara A	Partly Explored
22	Rautpara A	Partly Explored

Non-CIL blocks in Jharkhand – North Karanpura CF

#	Name of the Block	Exploration Status
1	Sasai	Explored
2	Brinda	Explored
3	Dumri	Explored
4	Kerandari	Explored
5	Chhati Bariatu	Explored
6	Chhati Bariatu South	Explored
7	Seregarha	Explored
8	Ganeshpur	Explored
9	North Dhadhu	Explored
10	Chitarpur	Explored
11	Chakla	Explored
12	Mahuamilan	Explored

#	Name of the Block	Exploration Status
13	Ashok Karkatta Central	Explored
14	Bundu	Explored
15	North of Piparwar Ph-II	Under Exploration
16	Barwatoli	Unexplored
17	Mausingha	Unexplored
18	Kerendari-BC	Explored
19	Pakri Barwadih	Explored
20	Badam	Explored
21	Badam Dipside	Under Exploration
22	Gondulpara	Explored
23	Moitra	Explored
24	Babupara	Regionally Explored
25	Rohne	Partly Explored
26	Dipside of Rohne Rautpara	Regionally Explored

Proposed evacuation plan for North Karanpura CF



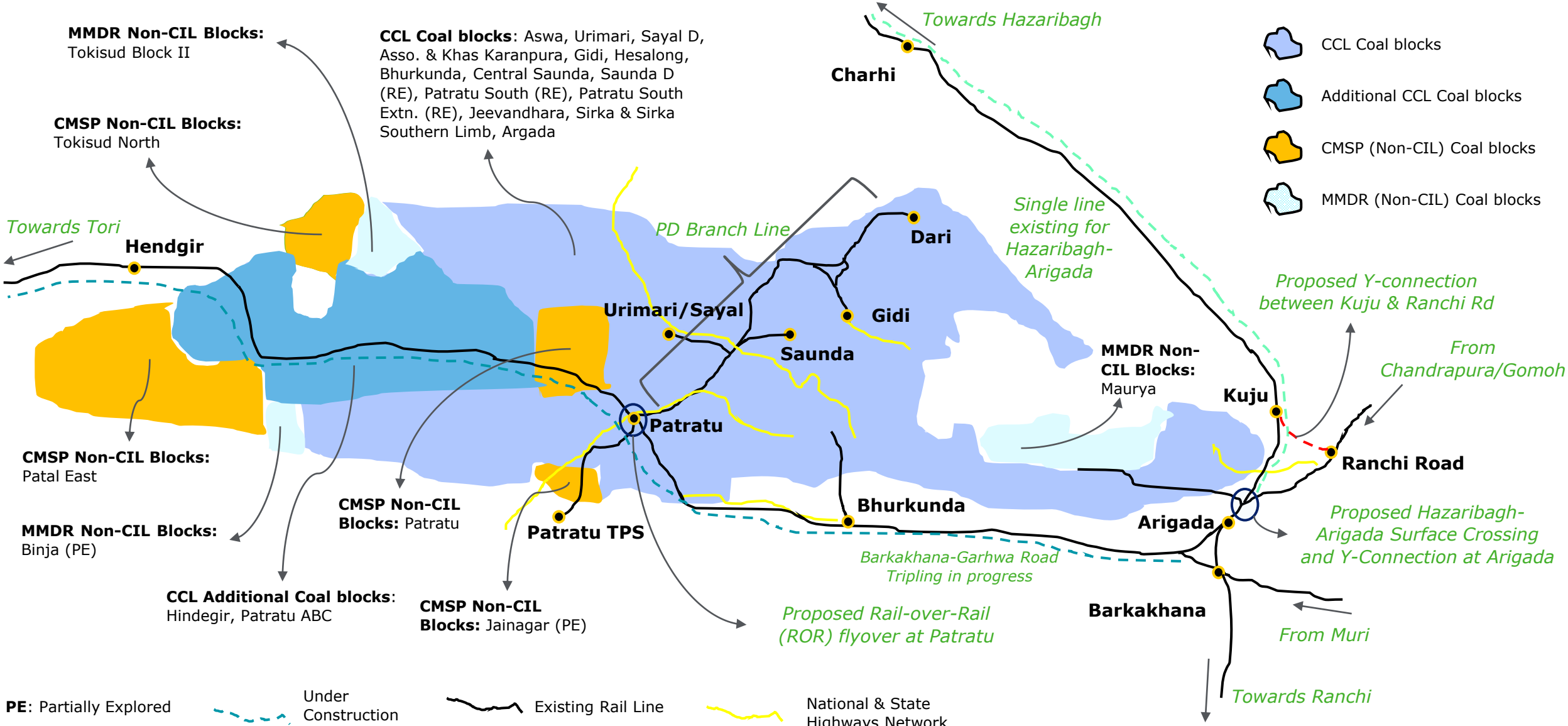
Key Insights and Recommendations

#	Recommendation	Way Forward
1	Shivpur-Kathautia new BG line is under construction for coal evacuation from North Karanpura CF towards Koderma. Doubling of Shivpur-Kathautia line should be taken up keeping in view future requirements of evacuation from this area	Focused approach to speed up ongoing works & doubling of Shivpur-Kathautia may be explored. Indian Railways
2	Proposed Tori-Chatra is expected to join Chatra-Gaya line for coal evacuation to northern India from the coalfield of North Karanpura. From Gaya, coal traffic may be diverted to the planned extension of Dedicated Freight Corridor (DFC) line for ease of coal evacuation	Expediting of commissioning lines of Tori-Chatra, Chatra-Gaya and Gaya-Sonenager DFC line. Indian Railways
3	Automatic Signaling may be proposed across all major rail sections in the vicinity of North Karanpura CF	Indian Railways (ECR)
4	Additional line should be planned to connect Non-CIL Blocks of Badam Dipside, Babupara, Dipside of Rohne Rautpara, Rohne to Hazaribagh-Arigada line with a common Public Freight Terminal	Production commencement plans to be finalized for under exploration blocks in North Karanpura region to aid in planning for additional FMC projects and BG rail line link to Hazaribagh – Arigada line
5	Y-Curves should be planned for lines from Magadh, Amrapali & Sanghamitra joining on the Tori-Shivpur line to facilitate coal traffic towards Kathautia.	Y-curves to be planned from major coal mines of CCL to facilitate coal traffic towards Kathautia.
6	Major junctions at Tori & Garhwa Road shall witness substantial coal traffic passing through these stations. Grade separator works (similar to Katni Grade Separator) or bypass works may be planned to ease congestions at junctions	Additional works (such as Katni Grade Separator etc.) to be planned at Tori & Garhwa Road to ease traffic at junctions
7	Options for commissioning of Public Freight Terminals with facilities of mechanized loading of coal may be evaluated for providing rake loading services to non-CIL blocks to reduce road movement of coal from these regions	Exploration of Public Freight Terminals for mechanized coal loading and coal transport through rail for non-CIL blocks

CIL (CCL) & Non-CIL blocks in Jharkhand – South Karanpura CF

#	Name of the Block	CIL/Non-CIL Block	Exploration Status
1	Aswa	CIL (CCL)	Explored
2	Urimari	CIL (CCL)	Explored
3	Asso. & Khas Karanpura	CIL (CCL)	Explored
4	Gidi	CIL (CCL)	Explored
5	Hesalong	CIL (CCL)	Explored
6	Bhurkunda	CIL (CCL)	Explored
7	Central Saunda	CIL (CCL)	Explored
8	Sayal D	CIL (CCL)	Explored
9	Saunda D (SW)	CIL (CCL)	Regionally Explored
10	Patratu South	CIL (CCL)	Regionally Explored
11	Patratu South Extn.	CIL (CCL)	Regionally Explored
12	Patratu ABC	CIL (CCL)	Explored
13	Hindegir	CIL (CCL)	Explored
14	Jeevandhara	CIL (CCL)	Explored
15	Sirka & Sirka Southern Limb	CIL (CCL)	Explored
16	Argada	CIL (CCL)	Explored
17	Tokisud Block II	Non-CIL	Explored
18	Tokisud North	Non-CIL	Explored
19	Patal East	Non-CIL	Explored
20	Binja	Non-CIL	Partly Explored
21	Patratu	Non-CIL	Explored
22	Jainagar	Non-CIL	Partly Explored
23	Maurya	Non-CIL	Explored

Proposed evacuation plan for South Karanpura CF



Key Insights and Recommendations

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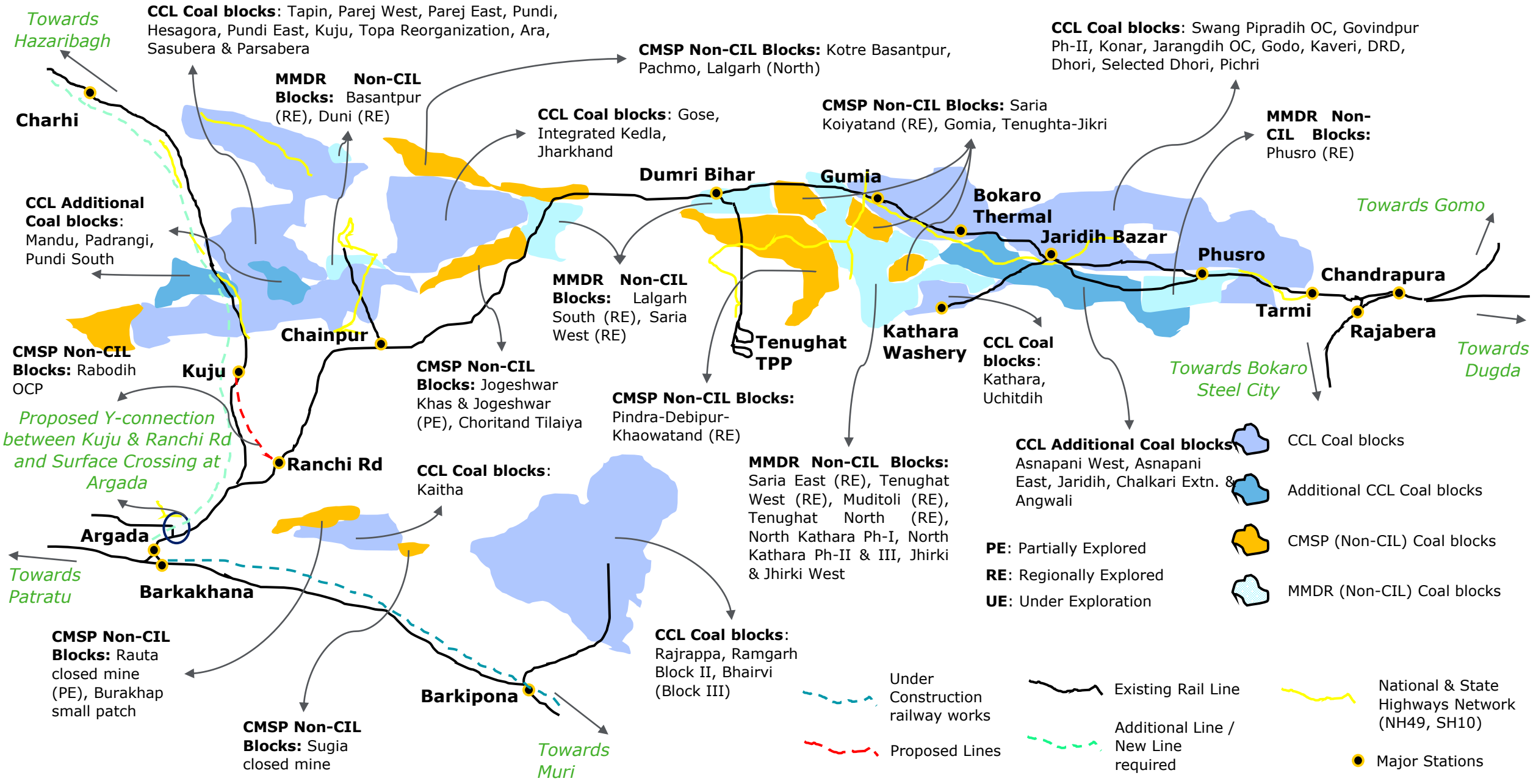
1	Tripling of Barkakhana-Garhwa Road is under progress along with Hazaribagh-Arigada Surface Crossing. Y-connection between Kuju & Ranchi Rd, surface crossing at Arigada and Rail over Rail flyover at Patratu have been proposed to further facilitate coal traffic in this region.	These ongoing works should be expedited
2	Proposed Tori-Chatra is expected to join Chatra-Gaya line for coal evacuation to northern India from the coalfield of North Karanpura. From Gaya, coal traffic may be diverted to the planned extension of Dedicated Freight Corridor (DFC) line for ease of coal evacuation	Expediting of commissioning lines of Tori-Chatra, Chatra-Gaya and Gaya-Sonenager DFC line. Indian Railways
3	Additional line should be planned to connect Hazaribagh and Barkakhana/Arigada as an alternate to Barkakhana/Arigada – Garhwa Road to reach Gaya via Koderma	Additional evacuation route for under exploration blocks in the region and Kuju area of West Bokaro coalfield, among others
4	Public Fright Terminals may be developed along with connecting roadways from coal blocks to facilitate coal evacuation from private sector coal block owners and blocks owners with no dedicated sidings	Development of Public Freight Terminals (PFTs) along with proper road connectivity
5	Automatic Signaling may be proposed across all major rail sections in the vicinity of South Karanpura CF	Indian Railways (ECR)

Proposed evacuation plan for East Bokaro, West Bokaro & Ramgarh CF



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2	Additional line should be planned to connect Hazaribagh and Barkakhana/Arigada as an alternate to Barkakhana/Arigada – Garhwa Road to reach Gaya via Koderma	Additional evacuation route for under exploration blocks in the region and Kuju area of West Bokaro coalfield, among others
3	Eastern DFC's works may be expedited till Gomo to facilitate coal evacuation from all coalfields of CCL, BCCL & ECL	DFC works may be expedited till Gomo
4	Doubling of Bhojudih-Pradhan Khunta line should be taken up to facilitate BCCL's coal evacuation from the area	Doubling of Bhojudih-Pradhan Khunta line may be taken up
5	Options for commissioning of Public Freight Terminals with facilities of mechanized loading of coal may be evaluated for providing rake loading services to non-CIL blocks to reduce road movement of coal from these regions	Exploration of Public Freight Terminals for mechanized coal loading and coal transport through rail for non-CIL blocks
6	Automatic Signaling may be proposed across all major rail sections in the vicinity of East Bokaro, West Bokaro & Ramgarh CF	Indian Railways (ECR)

Jharkhand (BCCL)

BCCL has ambitious production capacity expansion plans

Jharkhand

All figures in million tonnes

	Actuals		Projections						
Coal Supply from BCCL	FY22 Actual	FY23 Actual	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Barora	1.94	2.45	3.90	4.87	5.20	5.57	5.90	6.00	6.27
Block II	3.70	4.68	4.57	4.90	5.40	5.61	5.71	6.53	6.91
Govindpur	0.79	0.85	1.45	2.06	2.08	2.36	2.71	2.85	2.86
Katras	4.25	3.95	4.95	5.05	5.10	5.20	5.81	5.81	5.81
Sijua	3.43	3.76	4.12	4.29	4.31	4.78	4.78	4.78	4.99
Kusunda	5.05	6.13	5.70	5.78	5.78	5.80	5.80	6.00	6.00
Pootkee Balihari (PB)	0.23	0.17	0.25	0.26	0.27	0.27	0.27	0.27	0.27
Bastacolla	5.11	6.17	5.50	5.62	5.62	5.70	5.70	5.80	6.20
Lodna	3.81	6.05	4.57	4.58	4.60	4.63	4.83	4.83	4.90
Eastern Jharia	0.67	0.79	1.20	1.39	1.39	1.53	1.88	1.88	2.08
Chanch Victoria (CV)	0.94	0.63	0.90	1.90	1.95	2.05	2.69	2.85	2.85
Western Jharia (WJ)	0.59	0.55	0.90	2.30	3.30	3.50	3.92	4.41	4.86
Total BCCL (CIL) in Jharkhand	**31**	**36**	**41**	**45**	**50**	**50**	**50**	**52**	**54**

BCCL has ambitious production capacity expansion plans

Jharkhand

All figures in million tonnes

Subsidiary	Area	Mine	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30
BCCL	BARORA	Amal. Muraidih Phularitand Colliery	2.200	3.750	4.670	5.200	5.570	5.900	6.000	6.266
BCCL	BARORA	Damoda Colliery	0.500	0.150	0.200	0.000	0.000	0.000	0.000	0.000
BCCL	BLOCK II	Amalgmated Block-II OCP Mine	4.075	4.565	4.900	5.400	5.610	5.710	6.525	6.910
BCCL	GOVINDPUR	Jogidih	0.020	0.030	0.030	0.030	0.030	0.030	0.030	0.030
BCCL	GOVINDPUR	Kharkharee	0.010	0.040	0.120	0.120	0.450	0.600	0.600	0.600
BCCL	GOVINDPUR	Maheshpur	0.038	0.050	0.000	0.000	0.000	0.000	0.000	0.000
BCCL	GOVINDPUR	New Akashkinaree Colliery	0.532	0.720	0.880	1.330	1.130	1.130	1.130	1.130
BCCL	GOVINDPUR	Amal. Block-IV GVP	0.300	0.605	1.030	0.600	0.750	0.950	1.090	1.100
BCCL	KATRAS	Salanpur UG (discontd)	0.000	0.000	0.050	0.080	0.200	0.810	0.810	0.810
BCCL	KATRAS	AKWMC	4.100	4.650	4.700	4.720	4.700	4.600	4.600	4.600
BCCL	KATRAS	AGKCC	0.300	0.300	0.300	0.300	0.300	0.400	0.400	0.400
BCCL	SIJUA	Tetulmari colliery	0.250	0.820	0.650	0.530	0.530	0.530	0.530	0.530
BCCL	SIJUA	Loyabad UG	0.000	0.000	0.050	0.500	0.800	0.800	0.800	0.800
BCCL	SIJUA	Nichitpur Colliery	1.450	0.800	0.730	0.692	0.750	0.750	0.750	1.154
BCCL	SIJUA	Mudidih Colliery	0.400	0.850	1.100	1.000	1.000	1.000	1.000	0.000
BCCL	SIJUA	Basdeopur	0.100	0.000	0.000	0.000	0.000	0.000	0.000	0.000
BCCL	SIJUA	Sendra Bansjora Colliery	1.100	0.500	0.380	0.292	0.350	0.350	0.350	0.754
BCCL	SIJUA	Kankanee Colliery	0.200	1.150	1.380	1.292	1.350	1.350	1.350	1.754
BCCL	KUSUNDA	Dhansar(ADI)	0.450	1.050	0.980	1.300	1.300	0.700	0.700	0.700

BCCL has ambitious production capacity expansion plans

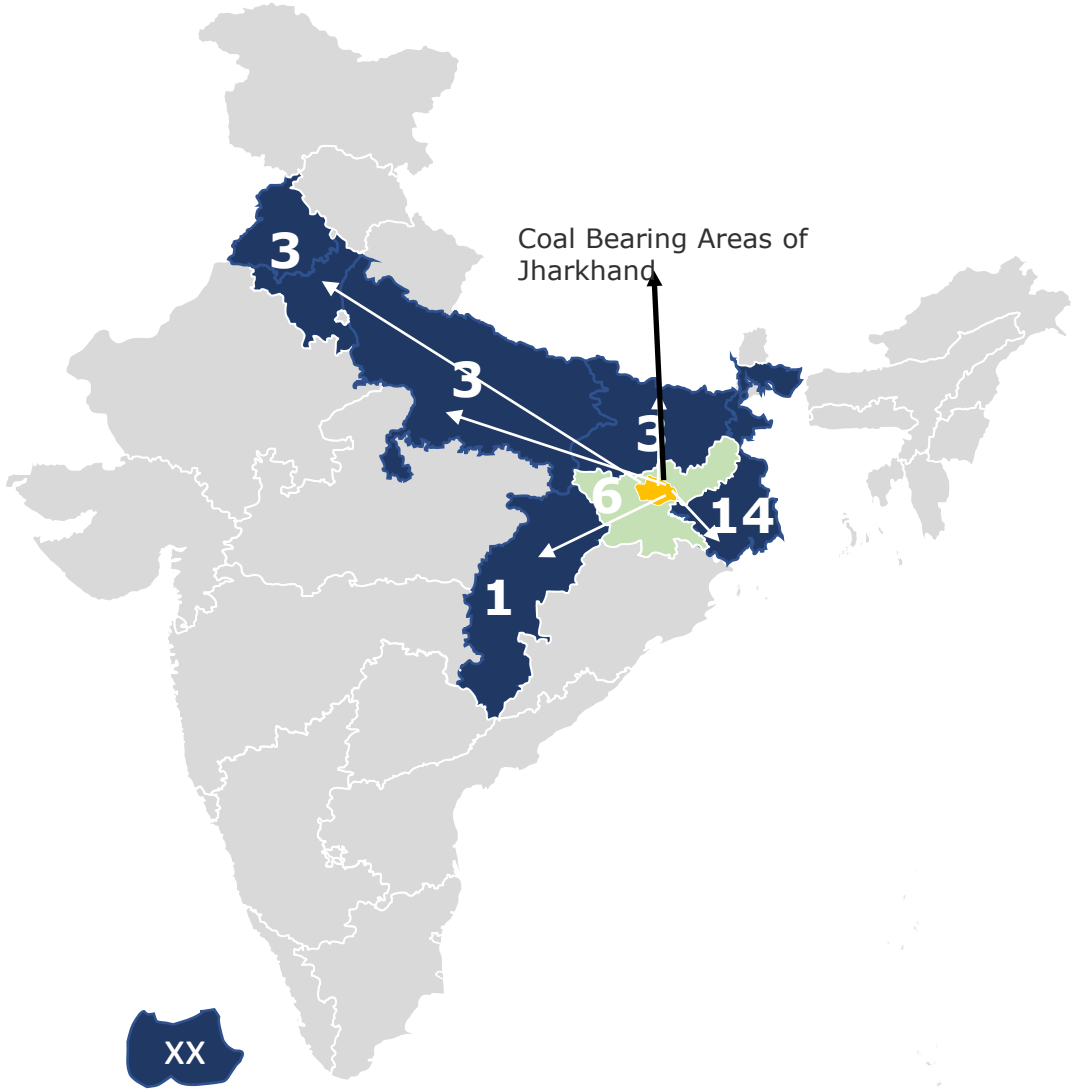
Jharkhand

All figures in million tonnes

Subsidiary	Area	Mine	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30
BCCL	KUSUNDA	New Godhur Kusunda Colliery	1.000	1.100	1.500	0.000	0.000	0.000	0.000	0.000
BCCL	KUSUNDA	Ena Cilliery	2.200	2.600	2.600	2.600	2.600	2.600	2.600	2.600
BCCL	KUSUNDA	East Bassuriya Colliery	0.000	0.350	0.100	0.000	0.000	0.000	0.000	0.000
BCCL	KUSUNDA	Gondudih Khas Kusunda Colliery	2.000	0.600	0.600	1.880	1.900	2.500	2.700	2.700
BCCL	P.B.	P.B. Project Colliery	0.000	0.000	0.050	0.050	0.050	0.050	0.050	0.050
BCCL	P.B.	Gopalichuk Colliery	0.170	0.250	0.210	0.224	0.224	0.024	0.024	0.024
BCCL	P.B.	Hurriladih Colliery	0.000	0.000	0.000	0.000	0.000	0.200	0.200	0.200
BCCL	BASTACOLLA	Bastacolla Colliery	1.700	1.600	1.500	1.500	0.000	0.000	0.000	0.000
BCCL	BASTACOLLA	Kuya Colliery	2.650	2.600	2.600	2.200	2.800	3.250	3.250	3.450
BCCL	BASTACOLLA	Rajapur/South Jharia Colliery	1.200	1.300	1.000	1.200	1.900	2.450	2.550	2.750
BCCL	BASTACOLLA	Dobari Kuya Colliery	0.000	0.000	0.520	0.720	1.000	0.000	0.000	0.000
BCCL	LODNA	Amal. NT-ST Jeenagora.	5.050	4.100	3.800	3.820	3.902	4.102	4.102	4.302
BCCL	LODNA	Kujama	0.050	0.470	0.780	0.780	0.724	0.724	0.724	0.600
BCCL	E. Jharia	Bhowrah (N)	0.000	0.000	0.025	0.050	0.200	1.000	1.000	1.000
BCCL	E. Jharia	Amlabad UG (Discontd)	0.000	0.000	0.000	0.010	0.010	0.010	0.010	0.010
BCCL	E. Jharia	Bhowra (S)	0.400	0.670	0.750	0.320	0.170	0.170	0.170	0.170
BCCL	E. Jharia	ASP Colliery	0.430	0.530	0.615	1.010	1.150	0.700	0.700	0.900
BCCL	C. Victoria	Damagoria/Kalyaneshwari	0.000	0.100	0.700	0.700	0.800	1.239	1.800	1.800
BCCL	C. Victoria	Dahibari Basanti Mata Colliery	0.500	0.800	1.200	1.250	1.250	1.450	1.050	1.050
BCCL	W. Jharia	Moonidih Colliery	0.625	0.900	2.300	3.100	3.100	3.100	3.100	3.100
BCCL	W. Jharia	Kapuria Colliery	0.000	0.000	0.000	0.200	0.400	0.821	1.305	1.756

Origin – Destination Cluster Mapping for Jharkhand (BCCL & Non-CIL BLOCKS)

O-D Source cluster Mapping – Despatch of Coal from BCCL in Jharkhand: FY22 snapshot



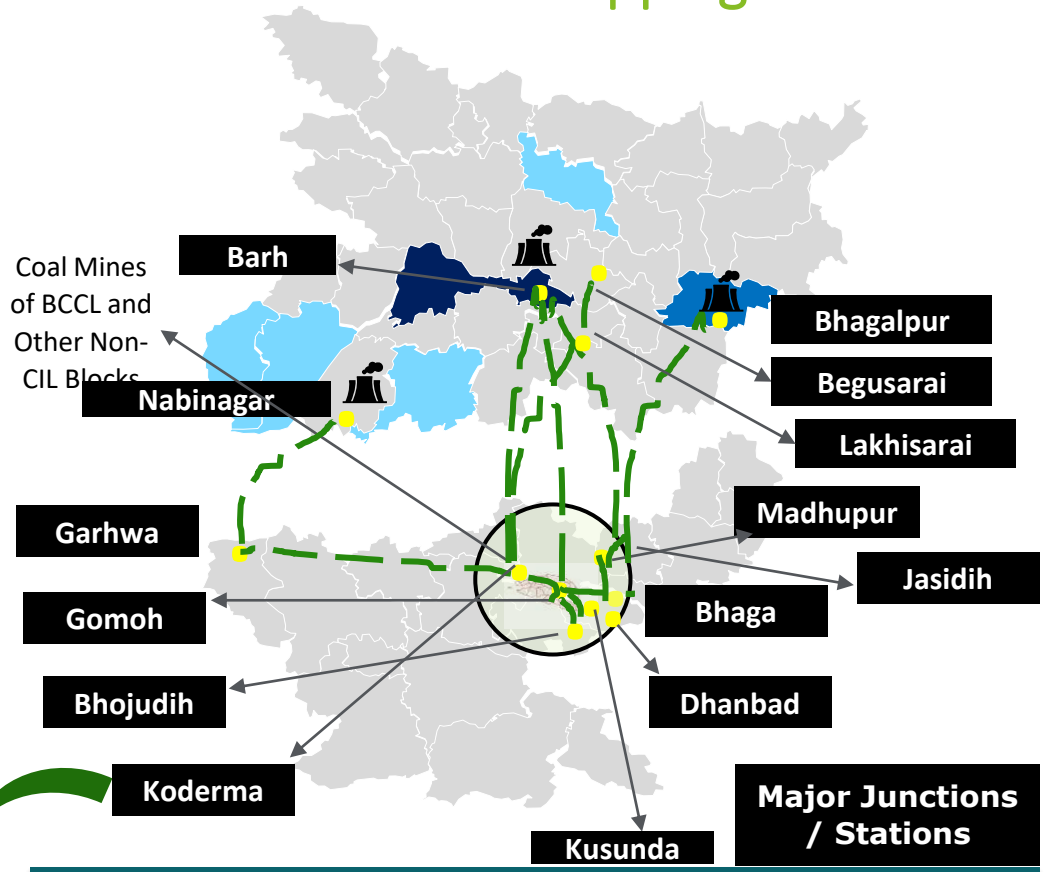
FY22: Despatch of Coal from BCCL Jharkhand to destination states (MTPA)

All figures in million tonnes

Consuming State	Rail + RCR (Mn Te)	Pure Road (Mn Te)	Total
Jharkhand	2.09	3.62	5.71
West Bengal	12.95	0.73	13.68
Chattisgarh	0.16	0	0.16
Uttar Pradesh	3.32	0	3.32
Punjab & Haryana	3.02	0	3.02
Bihar	3.18	0.1	3.28
Total Despatch from BCCL Coal Mines in Jharkhand	**24.72 (84.74 %)**	**4.45 (15.26 %)**	**29.17**

Origin – Destination Mapping and the coal flow analysis of rail trunk lines is conducted and presented in the next sections. Balance quantity is for e-auction small quantities

O-D Source cluster Mapping – Jharkhand to Bihar (BCCL & Non CIL Blocks)



Major Coal Consuming Districts of Bihar: 2030 (Estimated)

>15 MTPA Coal Consumption	*Patna*
5-10 MTPA Coal Consumption	*Bhagalpur, Aurangabad*
1-5 MTPA Coal Consumption	*Bhabua, Gaya, Rohtas, Darbhanga*

Expected Load from Jharkhand to Bihar main trunk lines (Excluding load from other states on this line)

FY22

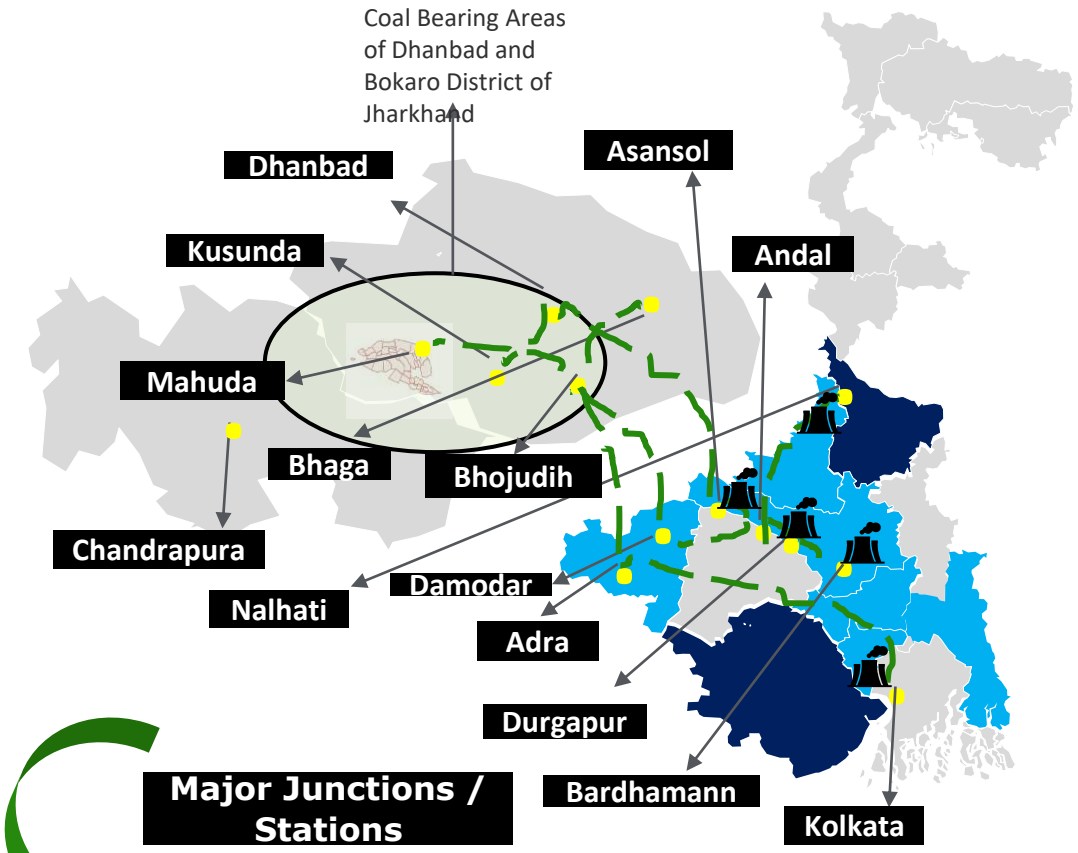
From	To	Traffic (Tonnes)	Rakes / Day
Gomoh	Garwha	239679	0.17
Kusunda	Gomoh	73626	0.05
Bhaga	Gomoh	36874	0.03
Gomoh	Dhanbad	76201	0.05
Dhanbad	Madhupur	1005019	0.72
Madhupur	Jasidih	2241643	1.60
Jasidih	Bhagalpur	294907	0.21
Kusunda	Dhanbad	928818	0.66
Bhaga	Bhojudih	1584163	1.13
Bhojudih	Bhagalpur	365406	0.26
Gomoh	Barh	333313	0.24
Jasidih	Barh	1946736	1.39
Koderma	Teghra	0	0.00
Koderma	Bhaktiyarpur	0	0.00
Bhaktiyarpur	Barh	0	0.00

FY30

From	To	Traffic (Tonnes)	Rakes / Day
Gomoh	Garwha	313180	0.22
Kusunda	Gomoh	96205	0.07
Bhaga	Gomoh	48182	0.03
Gomoh	Dhanbad	99569	0.07
Dhanbad	Madhupur	1313223	0.93
Madhupur	Jasidih	2929077	2.08
Jasidih	Bhagalpur	385345	0.27
Kusunda	Dhanbad	1213654	0.86
Bhaga	Bhojudih	2069971	1.47
Bhojudih	Bhagalpur	477463	0.34
Gomoh	Barh	435528	0.31
Jasidih	Barh	2543732	1.81
Koderma	Teghra	3000000	2.13
Koderma	Bhaktiyarpur	7435528	5.29
Bhaktiyarpur	Barh	7435528	5.29

- **Major Power consumers in Bihar currently taking coal from BCCL** include NTPC Kahalgaon (Bhagalpur), NTPC Barh (Patna), and NTPC Nabinagar (Aurangabad).

O-D Source cluster Mapping – Jharkhand to West Bengal (BCCL & Non CIL Blocks)



Major Coal Consuming Districts of West Bengal: 2030 (Estimated)

>15 MTPA Coal Consumption	*Murshidabad, Purba Mednipur, Paschim Mednipur*
5-10 MTPA Coal Consumption	*Purulia, Paschim Bardhamann, Purba Bardhamann, North 24 Parganas, Howrah, Hugli, Birbhum*

Expected Load from Jharkhand to West Bengal main trunk lines (Excluding load from other states on this line)

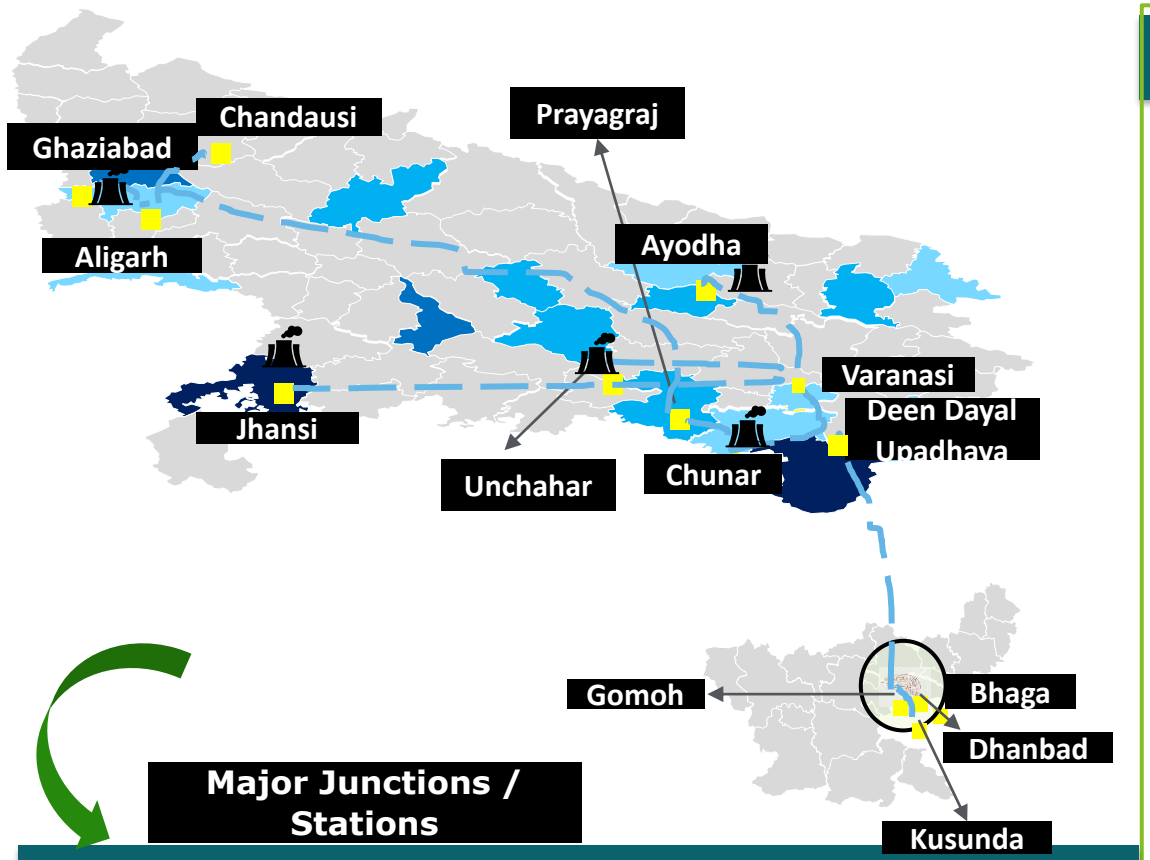
FY22

From	To	Traffic (Tonnes)	Rakes / Day
Bhaga	Bhojudih	3991718	2.84
Bhojudih	Damodar	3488275	2.48
Damodar	Andal	1392265	0.99
Andal	Bhimgara	1320050	0.94
Bhimgara	Barharwa	2737881	1.95
Mahuda	Bhojudih	1976319	1.41
Kusunda	Dhanbad	5003041	3.56
Asansol	Bardhamann	4209231	3.00
Bhimgara	Ahmadpur	582169	0.41
Dhanbad	Asansol	4350164	3.10
Asansol	Andal	237218	0.17
Bhojudih	Adra	3695204	2.63
Adra	Kolkata	421435	0.30
Andal	Budge Budge	309433	0.22
Damodar	Bardhamann	2096010	1.49
Dhanbad	Bhojudih	585630	0.42
Chandrapura	Kusunda	1075000	0.76
Sainthia	Ahmadpur	2000000	1.42
Ahmadpur	Khana	2000000	1.42
Khana	Kolkata	2000000	1.42

FY30

From	To	Traffic (Tonnes)	Rakes / Day
Bhaga	Bhojudih	5215839	3.71
Bhojudih	Damodar	4558007	3.24
Damodar	Andal	1819224	1.29
Andal	Bhimgara	1724863	1.23
Bhimgara	Barharwa	3964163	2.82
Mahuda	Bhojudih	2582387	1.84
Kusunda	Dhanbad	8132634	5.79
Asansol	Bardhamann	7095390	5.05
Bhimgara	Ahmadpur	760699.9	0.54
Dhanbad	Asansol	7279543	5.18
Asansol	Andal	309964.5	0.22
Bhojudih	Adra	4828394	3.44
Adra	Kolkata	550674.4	0.39
Andal	Budge Budge	404325.3	0.29
Damodar	Bardhamann	2738783	1.95
Dhanbad	Bhojudih	765222.3	0.54
Chandrapura	Kusunda	3000000	2.13
Sainthia	Ahmadpur	3000000	2.13
Ahmadpur	Khana	3000000	2.13
Khana	Kolkata	3000000	2.13

O-D Source cluster Mapping –Jharkhand to Uttar Pradesh (BCCL & Non CIL Blocks)



Major Coal Consuming Districts of Uttar Pradesh: 2030 (Estimated)

>15 MTPA Coal Consumption	*Jhansi, Sonbhadra*
10-15 MTPA Coal Consumption	*Bulandsahar, Kanpur*
5-10 MTPA Coal Consumption	*Prayagraj, Rae Bareli, Lucknow, Shahjahanpur, Ambedkar Nagar, Gorakhpur*
1-5 MTPA Coal Consumption	*Ghaziabad, Hapur, Gautam Buddha Nagar, Aligarh, Agra, Kushinagar, Gonda*

Expected Load from Jharkhand to Uttar Pradesh main trunk lines (Excluding load from other states on this line)

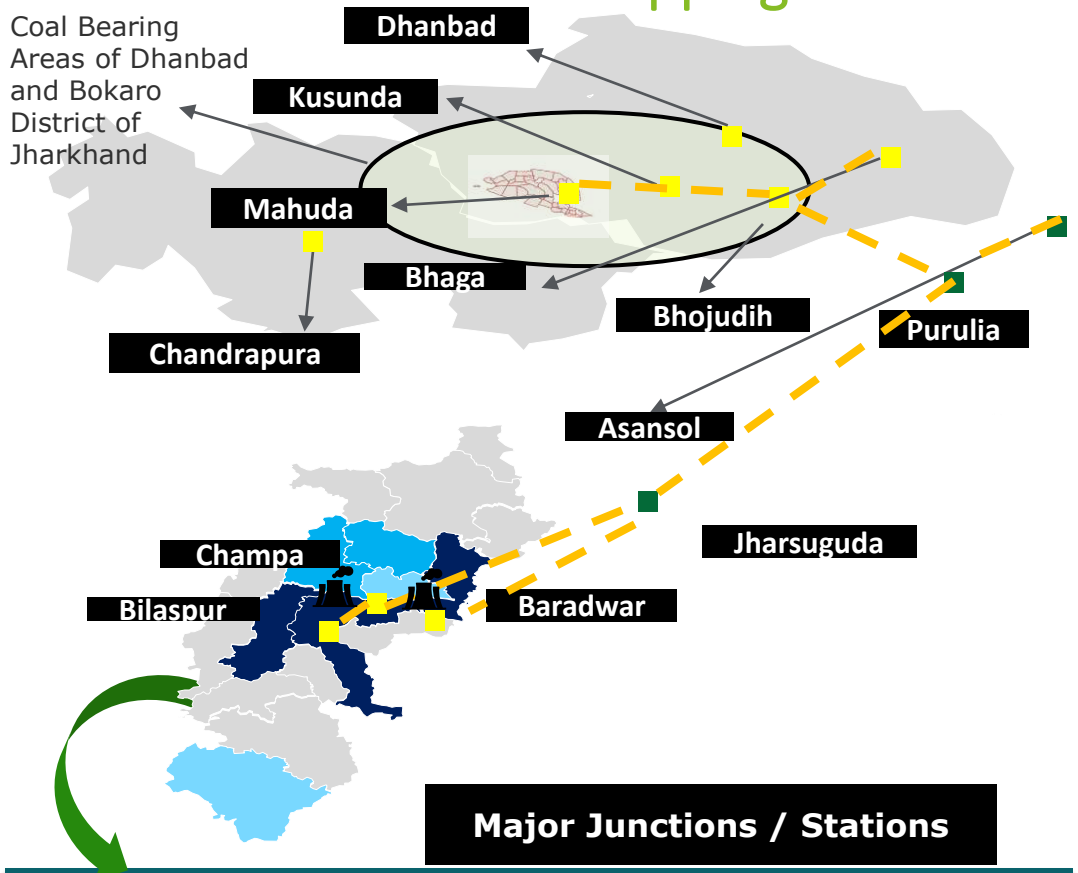
FY22

From	To	Traffic (Tonnes)	Rakes / Day
Koderma	Deen Dayal Upadhaya	14318327	10.19
Deen Dayal Upadhaya	Chunar	979692	0.70
Chunar	Aligarh	533380	0.38
Aligarh	Ghaziabad	164905	0.12
Bhaga	Gomoh	993689	0.71
Kusunda	Gomoh	642306	0.46
Dhanbad	Gomoh	95841	0.07
Aligarh	Chandausi	368475	0.26
Chunar	Prayagraj	409976	0.29
Deen Dayal Upadhaya	Varanasi	13374971	9.52
Varanasi	Ayodha	6164991	4.39
Varanasi	Jhansi	717736	0.51
Varanasi	Unchahar	6492244	4.62
Gomoh	Koderma	3318327	2.36
Jasidih	Kiul	0	0.00
Kiul	Manpur	0	0.00
Garwa Road	Son Nagar	0	0.00
Sainthia	Etah	0	0.00
Barharwa	Kanpur	0	0.00

FY30

From	To	Traffic (Tonnes)	Rakes / Day
Koderma	Deen Dayal Upadhaya	37995942	27.04
Deen Dayal Upadhaya	Chunar	10940129	7.79
Chunar	Aligarh	1026949	0.73
Aligarh	Ghaziabad	215476	0.15
Bhaga	Gomoh	1298419	0.92
Kusunda	Gomoh	839279	0.60
Dhanbad	Gomoh	125232	0.09
Aligarh	Chandausi	811473	0.58
Chunar	Prayagraj	535701	0.38
Deen Dayal Upadhaya	Varanasi	27103292	19.29
Varanasi	Ayodha	15868921	11.29
Varanasi	Jhansi	937841	0.67
Varanasi	Unchahar	10296531	7.33
Gomoh	Koderma	4335942	3.09
Jasidih	Kiul	660000	0.47
Kiul	Manpur	9660000	6.87
Garwa Road	Son Nagar	6000000	4.27
Sainthia	Etah	330000	0.23
Barharwa	Kanpur	9000000	6.40

O-D Source cluster Mapping – Jharkhand to Chattisgarh (BCCL and Non CIL Blocks)



Major Coal Consuming Districts of Chattisgarh: 2030 (Estimated)

- *>15 MTPA Coal Consumption Raipur, Raigarh, Durg*
- *5-10 MTPA Coal Consumption Korba, Bilaspur*
- *1-5 MTPA Coal Consumption Janjgir-Champa, Bijapur-Dantewada-Sukma cluster*

Expected Load from Jharkhand to Chattisgarh main trunk lines (Excluding load from other states on this line)

FY22

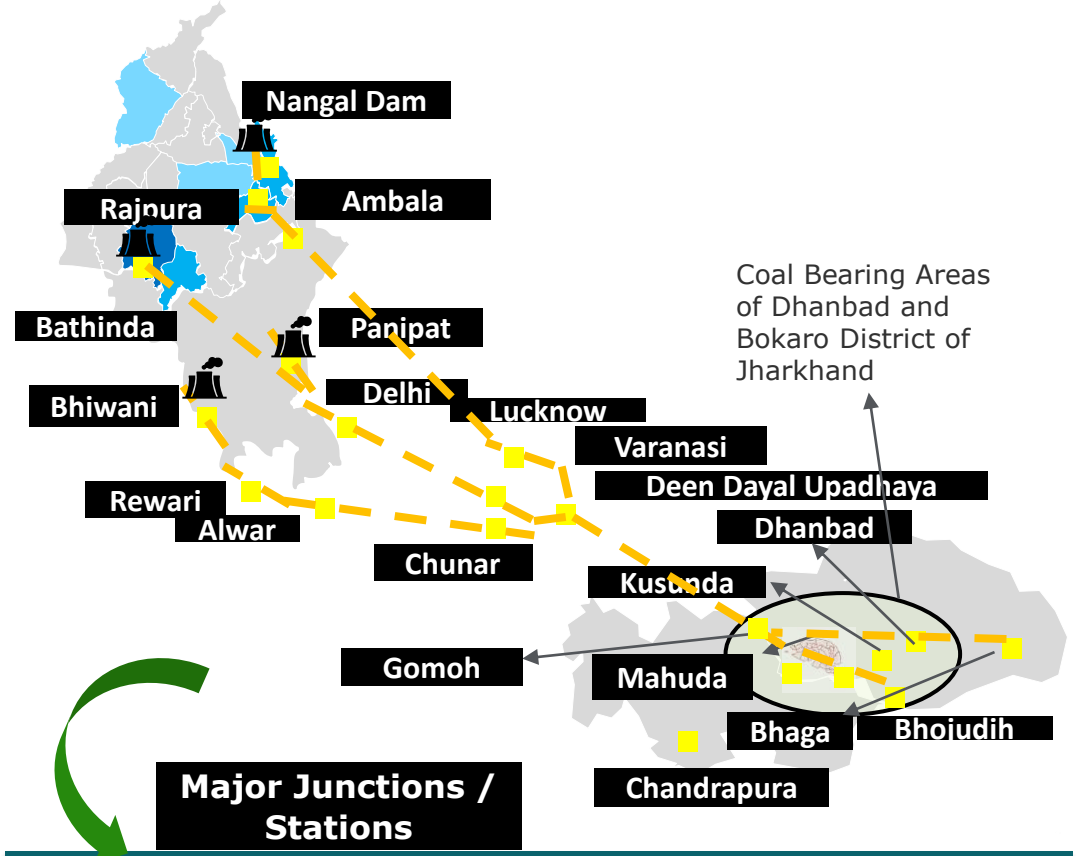
From	To	Traffic (Tonnes)	Rakes / Day
Kusunda	Bhojudih	88299	0.06
Bhojudih	Purulia	159912	0.11
Jharsuguda	Bilaspur	52832	0.04
Bhaga	Bhojudih	23895	0.02
Mahuda	Bhojudih	47718	0.03
Jharsuguda	Naya Baradwar	110509	0.08
Asansol	Purulia	3429	0.00
Purulia	Jharsuguda	163341	0.12
Jharsuguda	Champa	52832	0.04
Champa	Bilaspur	52832	0.04

FY30

From	To	Traffic (Tonnes)	Rakes / Day
Kusunda	Bhojudih	128483	0.09
Bhojudih	Purulia	232687	0.17
Jharsuguda	Bilaspur	76875	0.05
Bhaga	Bhojudih	34769	0.02
Mahuda	Bhojudih	69434	0.05
Jharsuguda	Naya Baradwar	160801	0.11
Asansol	Purulia	4990	0.00
Purulia	Jharsuguda	237676	0.17
Jharsuguda	Champa	76875	0.05
Champa	Bilaspur	76875	0.05

- **Major Power consumers in Chattisgarh taking coal from BCCL** include NTPC Lara and NTPC Sipat.
- The major coal consuming districts of Chattisgarh (i.e. Bilaspur and Raigarh) procure coal through the trunk line via Purulia (WB), and Jharsuguda (Odisha)

O-D Source cluster Mapping – Jharkhand to Punjab and Haryana (BCCL & Non CIL Blocks)



Major Coal Consuming Districts of Haryana: 2030 (Estimated)

- *>15 MTPA Coal Consumption* — *Bhatinda*
- *5-10 MTPA Coal Consumption* — *Mansa, Fatehgarh Sahib, Rupnagar*
- *1-5 MTPA Coal Consumption* — *Amritsar, Tarn Taran, Ludhiana, Nawashahr*

Expected Load from Jharkhand to Haryana main trunk lines (Excluding load from other states on this line)

FY22

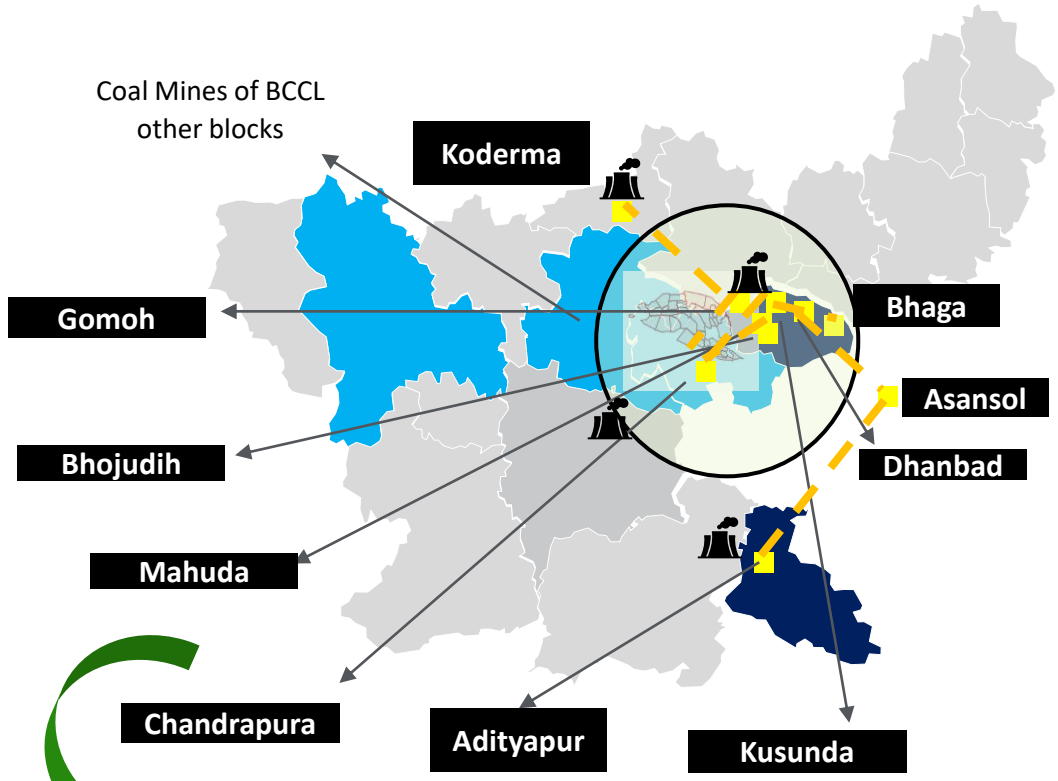
From	To	Traffic (Tonnes)	Rakes / Day
Kusunda	Gomoh	810068	0.58
Gomoh	Tundla	2293400	1.63
Tundla	Bhiwani	1135751	0.81
Bhaga	Gomoh	452652	0.32
Tundla	Panipat	568661	0.40
Gomoh	Deen Dayal Upadhaya	726359	0.52
Deen Dayal Upadhaya	Chunar	159298	0.11
Deen Dayal Upadhaya	Varanasi	567061	0.40
Rajpura	Nangal Dam	157666	0.11
Chunar	Bhatinda	159298	0.11
Varanasi	Roza	567061	0.40
Roza	Bhatinda	567061	0.40
Barharwa	Roza	0	0.00

FY30

From	To	Traffic (Tonnes)	Rakes / Day
Kusunda	Gomoh	1058488	0.75
Gomoh	Tundla	2996706	2.13
Tundla	Bhiwani	1484046	1.06
Bhaga	Gomoh	591465	0.42
Tundla	Panipat	743050	0.53
Gomoh	Deen Dayal Upadhaya	949108	0.68
Deen Dayal Upadhaya	Chunar	208149	0.15
Deen Dayal Upadhaya	Varanasi	740959	0.53
Rajpura	Nangal Dam	486017	0.35
Chunar	Bhatinda	208149	0.15
Varanasi	Roza	740959	0.53
Roza	Bhatinda	1020959	0.73
Barharwa	Roza	560000	0.40

- **Major Power consumers in Punjab taking coal from BCCL** include State Govt. operated plants at Ropar, Nangal Dam, Lehra Mohabbat, and Bhatinda
- **Major Power consumers in Haryana taking coal from BCCL** include NTPC Aravali and State Govt. operated plants at Panipat and Jhajjar.

O-D Source cluster Mapping – Jharkhand Internal Consumption (BCCL & Non CIL Blocks)



Major Coal Consuming Districts of Jharkhand: 2030 (Estimated)

- *>15 MTPA Coal Consumption* — *Dhanbad, Purba Singhbhum*
- *5-10 MTPA Coal Consumption* — *Bokaro, Ramgarh, Hazaribagh, Palamu, Latehar*
- *1-5 MTPA Coal Consumption* — *Ranchi*

Expected Load for Jharkhand's main trunk lines (Excluding load from other states on this line)

FY22

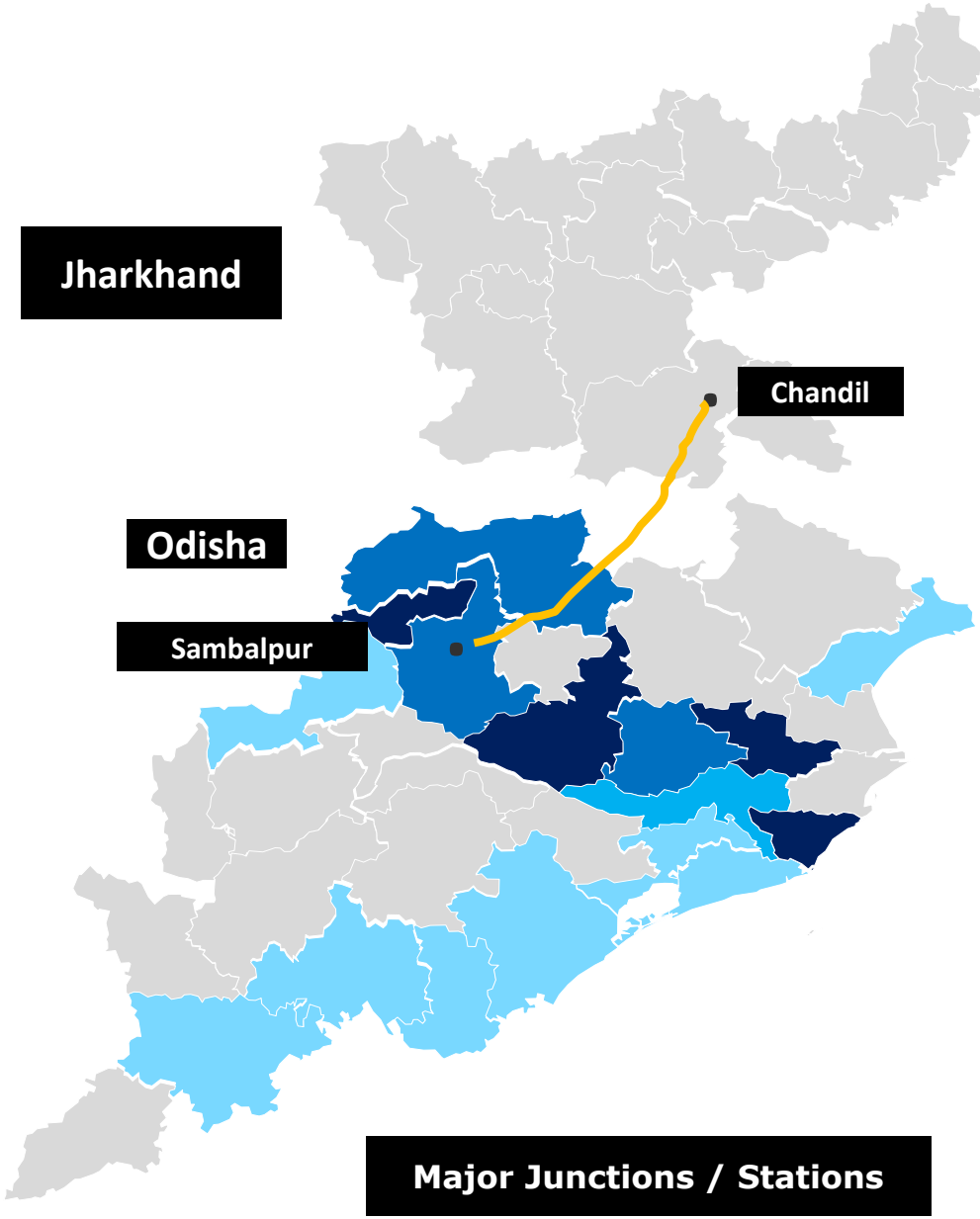
From	To	Traffic (Tonnes)	Rakes / Day
Mahuda	Chandrapura	59050	0.04
Kusunda	Chandrapura	5546	0.00
Bhaga	Mahuda	91307	0.06
Kusunda	Dhanbad	84279	0.06
Dhanbad	Asansol	103002	0.07
Gomoh	Koderma	854310	0.61
Mahuda	Gomoh	87647	0.06
Kusunda	Gomoh	149028	0.11
Asansol	Adityapur	19756	0.01

FY30

From	To	Traffic (Tonnes)	Rakes / Day
Mahuda	Chandrapura	85923	0.06
Kusunda	Chandrapura	8070	0.01
Bhaga	Mahuda	132860	0.09
Kusunda	Dhanbad	122634	0.09
Dhanbad	Asansol	149877	0.11
Gomoh	Koderma	1243099	0.88
Mahuda	Gomoh	127534	0.09
Kusunda	Gomoh	216849	0.15
Asansol	Adityapur	28747	0.02

- Major consumers in Jharkhand taking coal from BCCL are DVC Maithon, Chandrapura, Koderma
- Presence of Private Players such as M/s Adhunik also operate thermal power plants around Jamshedpur.

O-D Source cluster Mapping – Jharkhand to Odisha (BCCL & Non CIL Blocks)



Expected Load from Jharkhand to Odisha main trunk lines (Excluding load from other states on this line)

FY22

From	To	Traffic (Tonnes)	Rakes / Day
Chandil	Sambalpur	0	0

FY30

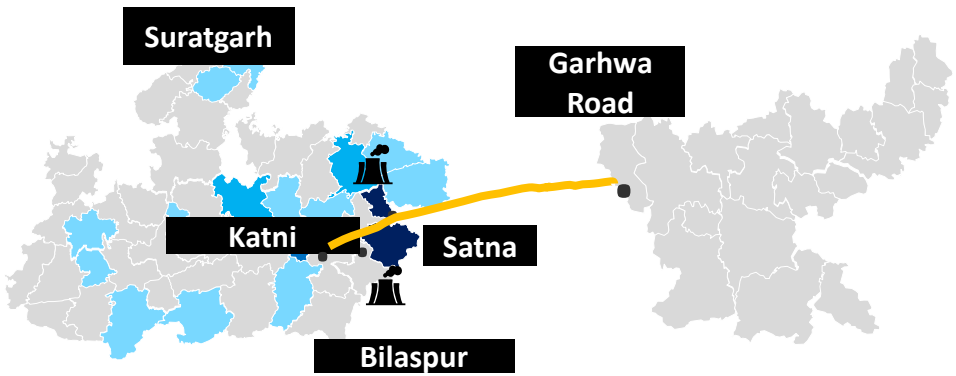
From	To	Traffic (Tonnes)	Rakes / Day
Chandil	Sambalpur	660000	0.47

- **Major Coal consumers in Odisha taking coal from Non CIL Blocks** include Hindalco Group (Aditya Aluminium and Hirakud Complex)
- The major coal consuming districts of Odisha are Jharsuguda, Angul and Jagpur.

Major Coal Consuming Districts of Odisha: 2030 (Estimated)

>15 MTPA Coal Consumption	*Jharsuguda, Angul, Jagpur, Jagatsinghpur*
10-15 MTPA Coal Consumption	*Sundergarh, Sambalpur, Dhenkanal*
5-10 MTPA Coal Consumption	*Cuttack*
1-5 MTPA Coal Consumption	*Koraput, Rayagada, Gagapati, Ganjam, Khordha, Puri, Bargarh, Balasore*

O-D Source cluster Mapping – Jharkhand to Madhya Pradesh (BCCL & Non CIL Blocks)



Major Junctions / Stations

Major Coal Consuming Districts of MP: 2030 (Estimated)

>15 MTPA Coal Consumption	*Shahdol*
10-15 MTPA Coal Consumption	*Jabalpur*
5-10 MTPA Coal Consumption	*Satna, Sagar*
1-5 MTPA Coal Consumption	*Sidhi, Singrauli, Rewa, Katni, Damoh, Betul, Khandwa, Ujjain, Indore, Bhind, Gwalior, Bhopal, Seoni*

Expected Load from Jharkhand to Madhya Pradesh main trunk lines (Excluding load from other states on this line)

FY22

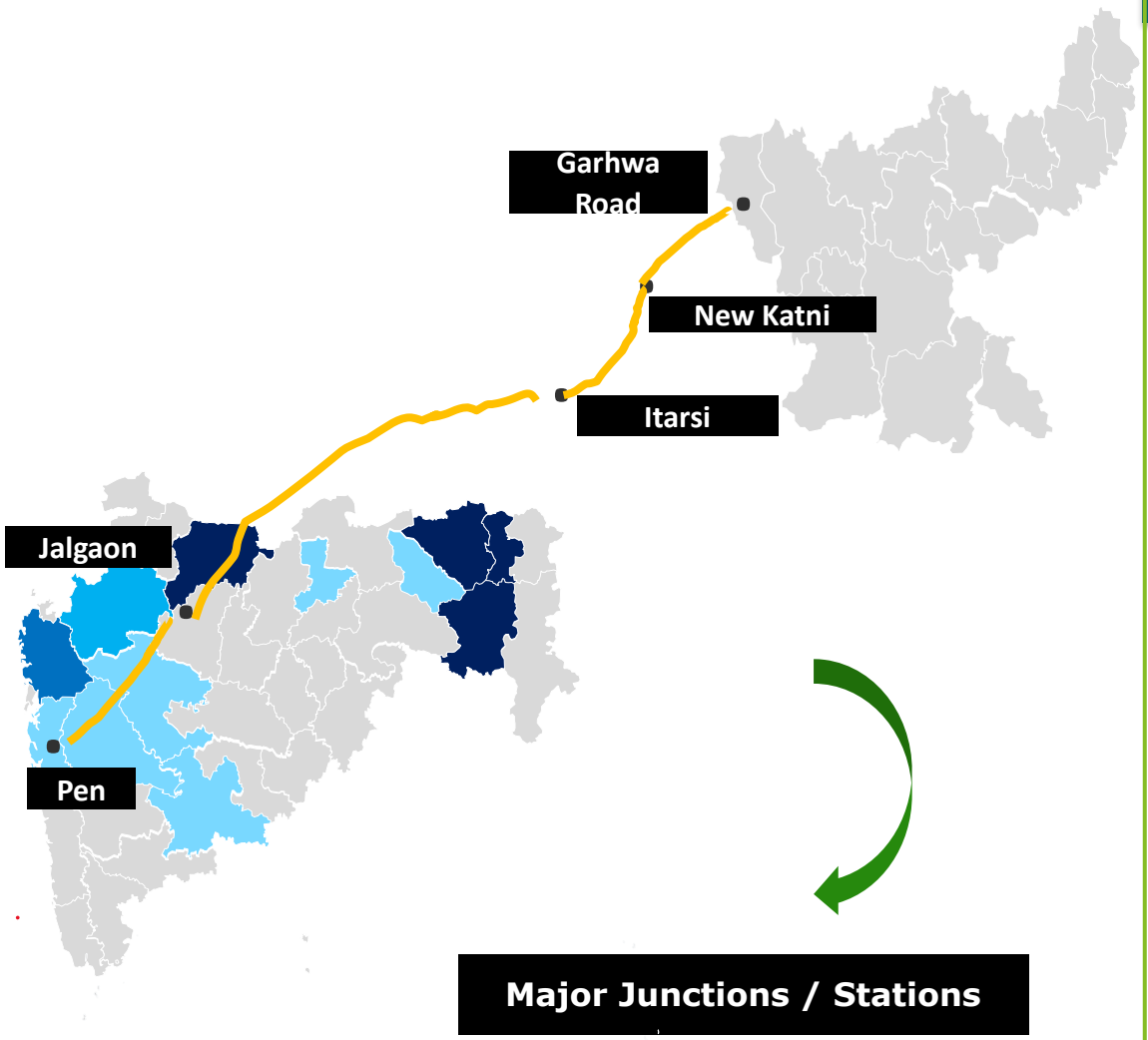
From	To	Traffic (Tonnes)	Rakes / Day
Garhwa Road	New Katni	0	0

FY30

From	To	Traffic (Tonnes)	Rakes / Day
Garhwa Road	New Katni	1570000	1.12

- Major Coal consumers in Madhya Pradesh taking coal from Non CIL Blocks include Hindalco Group (Mahan Aluminium)\
- The major coal consuming district of Madhya Pradesh is Shahdol and Jabalpur.
- Singrauli in Madhya Pradesh attracts the highest traffic of coal from Non CIL coal bearing blocks.
- New Coal blocks in Jharkhand supplying coal to Madhya Pradesh are Dumri, Meral and Katahutia Coal Blocks.

O-D Source cluster Mapping – Jharkhand to Maharashtra (BCCL & Non CIL Blocks)



Expected Load from Jharkhand to Maharashtra main trunk lines (Excluding load from other states on this line)

FY22

From	To	Traffic (Tonnes)	Rakes / Day
Garwa Road	New Katni	300000	0.213
New Katni	Itarsi	300000	0.213
Itarsi	Bhusaval	300000	0.213
Bhusaval	Jalgaon	300000	0.213
Jalgaon	Pachora	300000	0.213
Pachora	Chalisgaon	300000	0.213
Chalisgaon	Manmad	300000	0.213
Manmad	Kalyan	300000	0.213
Kalyan	Vasco	300000	0.213

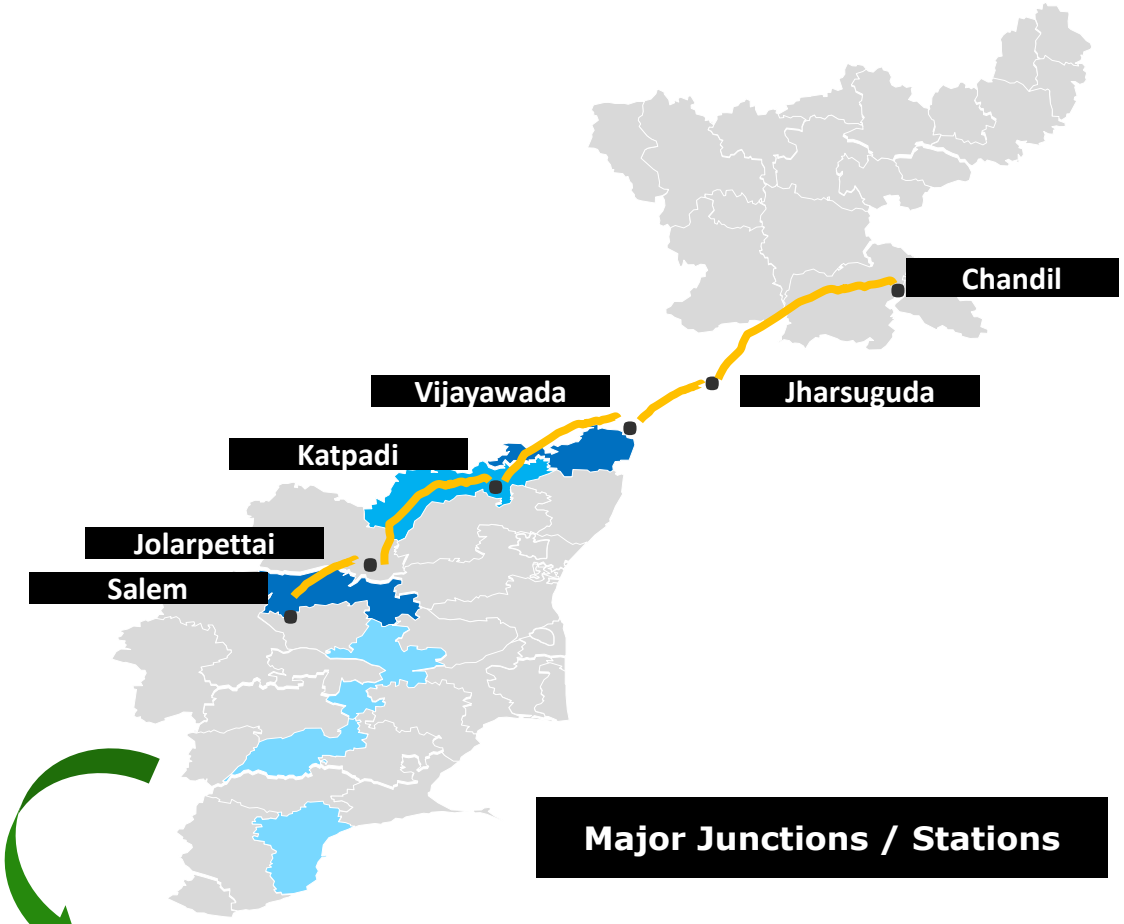
FY30

From	To	Traffic (Tonnes)	Rakes / Day
Garwa Road	New Katni	330000	0.235
New Katni	Itarsi	330000	0.235
Itarsi	Bhusaval	330000	0.235
Bhusaval	Jalgaon	330000	0.235
Jalgaon	Pachora	330000	0.235
Pachora	Chalisgaon	330000	0.235
Chalisgaon	Manmad	330000	0.235
Manmad	Kalyan	330000	0.235
Kalyan	Vasco	330000	0.235

Major Coal Consuming Districts of Maharashtra: 2030 (Estimated)

>15 MTPA Coal Consumption	*Nagpur, Chandrapur & Bhandara*
10-15 MTPA Coal Consumption	*Palghar/Thane*
5-10 MTPA Coal Consumption	*Nashik*
1-5 MTPA Coal Consumption	*Solapur, Pune, Raigad, Ahmednagar, Wardha & Akola*

O-D Source cluster Mapping – Jharkhand to Tamil Nadu (BCCL & Non CIL Blocks)



Major Coal Consuming Districts of Tamil Nadu: 2030 (Estimated)

>15 MTPA Coal Consumption	*NA*
10-15 MTPA Coal Consumption	*Salem, Thiruvallur*
5-10 MTPA Coal Consumption	*Vellore*
1-5 MTPA Coal Consumption	*Tuticorin, Madurai, Tiruchirappalli*

Prepared by DTTILLP

Expected Load from Jharkhand to Tamil Nadu main trunk lines (Excluding load from other states on this line)

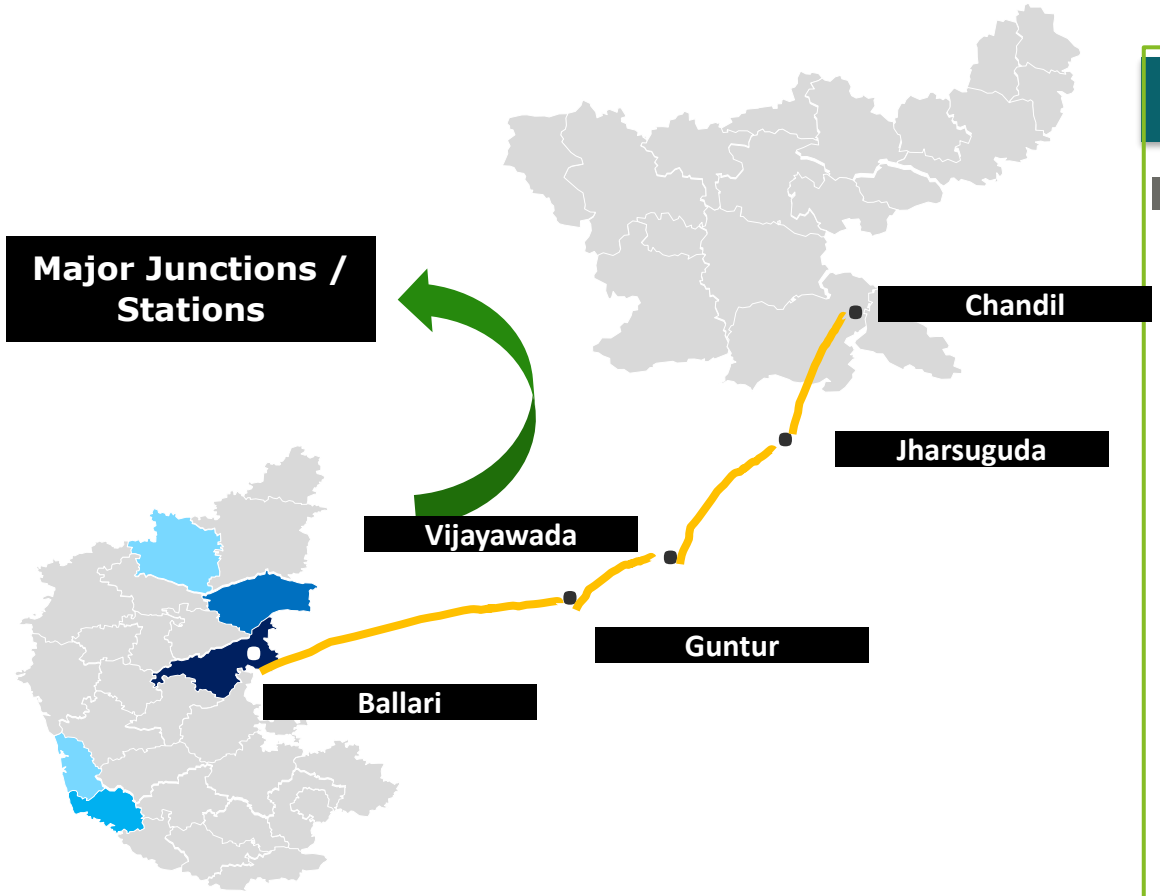
FY22

From	To	Traffic (Tonnes)	Rakes / Day
Chandil	Sini	300000	0.213
Sini	Rajkharsawan	300000	0.213
Rajkharsawan	Bondamunda	300000	0.213
Bondamunda	Jharsuguda	300000	0.213
Jharsuguda	Sarla	300000	0.213
Sarla	Bobbili	300000	0.213
Bobbili	Vizianagaram	300000	0.213
Vizianagaram	Samalkot	300000	0.213
Samalkot	Nidadavolu	300000	0.213
Nidadavolu	Vijayawada	300000	0.213
Vijayawada	Krishna Canal	300000	0.213
Krishna Canal	Tenali	300000	0.213
Tenali	Gudur	300000	0.213
Gudur	Renigunta	300000	0.213
Renigunta	Arrakkonam	300000	0.213
Arrakkonam	Katpadi	300000	0.213
Katpadi	Jolarpettai	300000	0.213
Jolarpettai	Magnesite	300000	0.213
Magnesite	Salem	300000	0.213

FY30

From	To	Traffic (Tonnes)	Rakes / Day
Chandil	Sini	330000	0.235
Sini	Rajkharsawan	330000	0.235
Rajkharsawan	Bondamunda	330000	0.235
Bondamunda	Jharsuguda	330000	0.235
Jharsuguda	Sarla	330000	0.235
Sarla	Bobbili	330000	0.235
Bobbili	Vizianagaram	330000	0.235
Vizianagaram	Samalkot	330000	0.235
Samalkot	Nidadavolu	330000	0.235
Nidadavolu	Vijayawada	330000	0.235
Vijayawada	Krishna Canal	330000	0.235
Krishna Canal	Tenali	330000	0.235
Tenali	Gudur	330000	0.235
Gudur	Renigunta	330000	0.235
Renigunta	Arrakkonam	330000	0.235
Arrakkonam	Katpadi	330000	0.235
Katpadi	Jolarpettai	330001	0.235
Jolarpettai	Magnesite	330002	0.235
Magnesite	Salem	330003	0.235

O-D Source cluster Mapping – Jharkhand to Karnataka (BCCL & Non CIL Blocks)



Major Coal Consuming Districts of Karnataka: 2030 (Estimated)

>15 MTPA Coal Consumption	*Ballari*
10-15 MTPA Coal Consumption	*Raichur*
5-10 MTPA Coal Consumption	*Dakshina Kanadda*
1-5 MTPA Coal Consumption	*Bijapur, Udupi*

Expected Load from Jharkhand to Karnataka main trunk lines (Excluding load from other states on this line)

FY22

From	To	Traffic (Tonnes)	Rakes / Day
Chandil	Sini	300000	0.213
Sini	Rajkharsawan	300000	0.213
Rajkharsawan	Bondamunda	300000	0.213
Bondamunda	Jharsuguda	300000	0.213
Jharsuguda	Sarla	300000	0.213
Sarla	Bobbili	300000	0.213
Bobbili	Vizianagaram	300000	0.213
Vizianagaram	Samalkot	300000	0.213
Samalkot	Nidadavolu	300000	0.213
Nidadavolu	Vijayawada	300000	0.213
Vijayawada	Krishna Canal	300000	0.213
Krishna Canal	Guntur	300000	0.213
Guntur	Dhone	300000	0.213
Dhone	Guntakal	300000	0.213
Guntakal	Ballari	300000	0.213
Ballari	Tornagallu	300000	0.213

FY30

From	To	Traffic (Tonnes)	Rakes / Day
Chandil	Sini	330000	0.235
Sini	Rajkharsawan	330000	0.235
Rajkharsawan	Bondamunda	330000	0.235
Bondamunda	Jharsuguda	330000	0.235
Jharsuguda	Sarla	330000	0.235
Sarla	Bobbili	330000	0.235
Bobbili	Vizianagaram	330000	0.235
Vizianagaram	Samalkot	330000	0.235
Samalkot	Nidadavolu	330000	0.235
Nidadavolu	Vijayawada	330000	0.235
Vijayawada	Krishna Canal	330000	0.235
Krishna Canal	Guntur	330000	0.235
Guntur	Dhone	330000	0.235
Dhone	Guntakal	330000	0.235
Guntakal	Ballari	330000	0.235
Ballari	Tornagallu	330000	0.235

Analyzing Evacuation Capacity for Jharkhand (BCCL)

Details of Infrastructure projects of BCCL (Railway siding, wharf wall etc.)

Name of the Project	Status	Length (km)	Contract Value (Rs Cr.)	Commissioning Date
NT-ST Siding #	Under Construction	10	112.6	
Renovation/strengthening of existing Railway Siding for 2.5 Mtpa Patherdih NLW Washery	Under Construction	7.29	90.0	2022
Renovation/strengthening of existing Railway Siding for 2.0 Mtpa Bhojudih NLW Washery	Under Construction	8.50	90.0	31.03.23
MAHESHPUR SILO RLS	Under Construction	7.705	82.5	05.10.24
Renovation/strengthening of existing Railway Siding for 5.0 Mtpa Patherdih NLW Washery	Under Construction	12.95	56	30.06.23
NL OC Extension of Siding	Under Construction	0.75	10.94	31.03.24
Dugdha Washery #	Envisaged		170.55	Presently on hold
Dahibari NLW washery #	Envisaged	7	107.5	Presently on hold
Tetulmari #	Envisaged		75.86	
Renovation/strengthening of existing Railway Siding for 2.5 Mtpa Moonidih Coking Coal Washery	Envisaged	4	50	2023
Sudamdih Siding No.5-Electrification	Envisaged	0.9	11.63	

Source : CIL Database, Deloitte Analysis

Details of Infrastructure projects of BCCL (Coal Trunk Roads etc.)

Name of the Project	Nature of Road	Length (km)	Width (m)	Contract Value (Rs Cr.)	Completion	Status
Construction of Cement Concrete pavement road for coal transportation from 25 no. coal dump to patherdih coal washery through Parbad under Lodna Area	PQC	6.2	7.5	15.26	nil	
Construction of PQC road from South Tisra workshop to Jayrampur via CISF checkpost under Lodna Area	PQC	2.5	7	5.32	15%	Work in progress
Construction of PQC coal transportation road from GKKC coal dump to Indra chowk with both side drain via Shiv Mandir under Kusunda Area	PQC	1.7	7	2.93	5%	Work in progress
Construction of PQC Coal transportation road along with 2 Nos. of R.C.C Box culvert at (i) DBOCP & (ii) DOCP , of CV Area	PQC	1.913	7.5	3.39	3%	Work in progress
Construction of PCC Road, RCC Culvert and RCC Drain along both sides of the road at PCW under EWZ Area	PQC	1.1	7.2	4.37	15%	Work in progress
Construction of PQC coal transportation road from Nudkhurkee feeder breaker to KKC main siding under Block II Area of BCCL	PQC	2.7	7	4.78	35%	Work in progress
Construction of PQC coal transportation road from Muraidih entrance gate to Satabdi CISF check post under Barora Area	PQC	2.2	7	3.8	3%	Work in progress

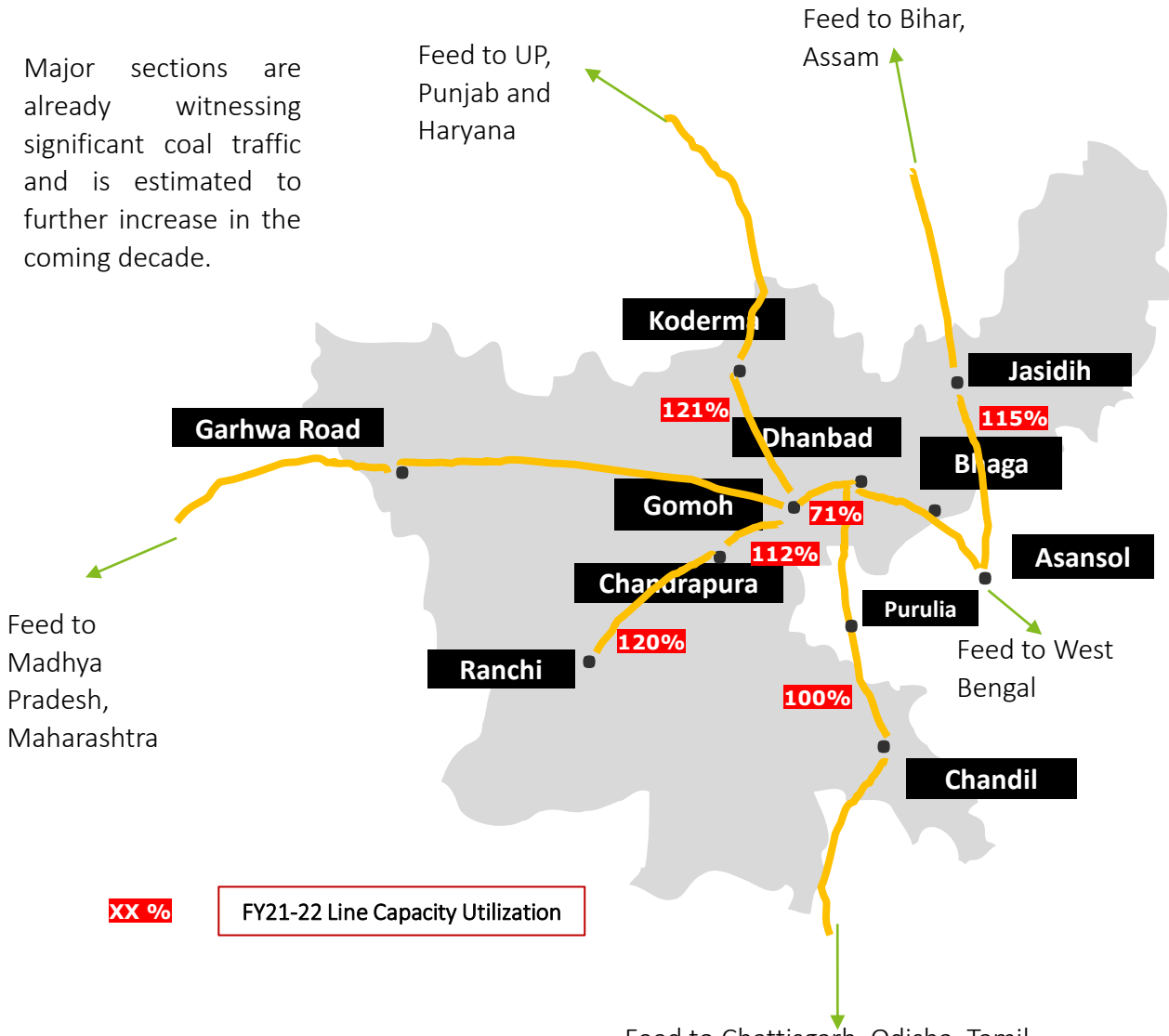
Source : CIL Database, Deloitte Analysis

O-D Source cluster Mapping – Consolidated Coal Traffic from Jharkhand to all states (Incl. CIL and Non-CIL Blocks)

FY22 Actual and FY30 (Estimated) coal traffic in major sections for Despatch of coal from Jharkhand to various destinations

From	To	Traffic (MT): 2022	Rakes / Day: 2022	Traffic (MT): 2030	Rakes / Day: 2030	Increase in Coal Traffic (Rakes / Day)
Koderma	Barh	0.00	0.00	7.44	5.29	5.29
Demu	Barkakana	0.00	0.00	11.00	7.83	7.83
Koderma	Deen Dayal	15.04	10.71	38.95	27.71	17.01
Deen Dayal	Varanasi	13.94	9.92	27.84	19.81	9.89
Deen Dayal	Chunar	1.14	0.81	11.15	7.93	7.12
Varanasi	Ayodha	6.16	4.39	15.87	11.29	6.91
Varanasi	Unchahar	6.49	4.62	10.30	7.33	2.71
Gomoh	Koderma	3.51	2.49	9.95	7.08	4.59
Chandil	Jharsuguda	0.49	0.35	6.61	4.70	4.36
Garwa Road	New Katni	0.49	0.35	7.52	5.35	5.00
Dhanbad	Asansol	4.54	3.23	12.90	9.18	5.95
Tori	Garwa Rd	30.43	21.65	69.14	49.20	27.55
Patratu	Tori	3.05	2.17	8.16	5.81	3.64
Hazaribagh	Gaya	3.15	2.24	6.55	4.66	2.42
Varanasi	Prayagraj	12.41	8.83	23.92	17.02	8.19
Gumia	Chandrapura	10.28	7.32	20.48	14.57	7.26
Patna	Muzzaffarpur	5.64	4.01	14.13	10.06	6.04
Prayagraj	Kanpur Goods	12.41	8.83	23.92	17.02	8.19
Kanpur Goods	Shikohabad	12.41	8.83	23.92	17.02	8.19

Major sections are already witnessing significant coal traffic and is estimated to further increase in the coming decade.



Our key findings based on detailed analysis of railway traffic for major coal producing states (5/7)

Sub-Section	2022		2030						Other Planned Works (New Energy/Other Corridors)	Utilization after of All planned works
	Capacity	% Utilization	Ongoing Works	Passenger	Freight	Total	Capacity	% Utilization		
Sonnagar to Sasaram	168	**135%**	Nil	80	213	293	168	**174%**	Eastern DFC planned to cover Sonnagar-Sasaram-DDU section. Coal traffic could be diverted onto DFC network as per NRP 2020.	**<100%**
Sasaram to Deen Dayal Upadhaya	150	**152%**	Nil	82	213	294	150	**196%**		**<100%**
Purulia to Chandil	110	**100%**	Chandil-Anara-Burnpur 3rd line in progress (DPR stage)	75	110	185	110	**168%**	Nil	**168%**

All numbers (Except Capacity utilization) represent average two-way traffic in Trains/Rakes per day. Passenger also includes Others

Note: Capacity refers to Capacity of line with Maintenance Block (MB)

Our key findings based on detailed analysis of railway traffic for major coal producing states (6/7)

Sub-Section	2022		2030						Other Planned Works (New Energy/Other Corridors)	Utilization after of All planned works
	Capacity	% Utilization	Ongoing Works	Passenger	Freight	Total	Capacity	% Utilization		
Gaya to Sonnagar	134	**110%**	Nil	91	110	201	134	**150%**	Nil	**150%**
Garhwa Road to Sonnagar	116	**124%**	3rd Line in progress	34	150	183	156	**117%**	Nil	**117%**
Tori to Barwadih	84	**147%**	Patratu-Garhwa Rd.-Sonnagar 3rd line in progress	29	107	136	110	**123%**	Nil	**123%**
Barwadih to Garhwa Road	78	**175%**	Patratu-Garhwa Rd.-Sonnagar 3rd line in progress	39	139	178	118	**151%**	Nil	**151%**

All numbers (Except Capacity utilization) represent average two-way traffic in Trains/Rakes per day. Passenger also includes Others

Note: Capacity refers to Capacity of line with Maintenance Block (MB)

Our key findings based on detailed analysis of railway traffic for major coal producing states (7/7)

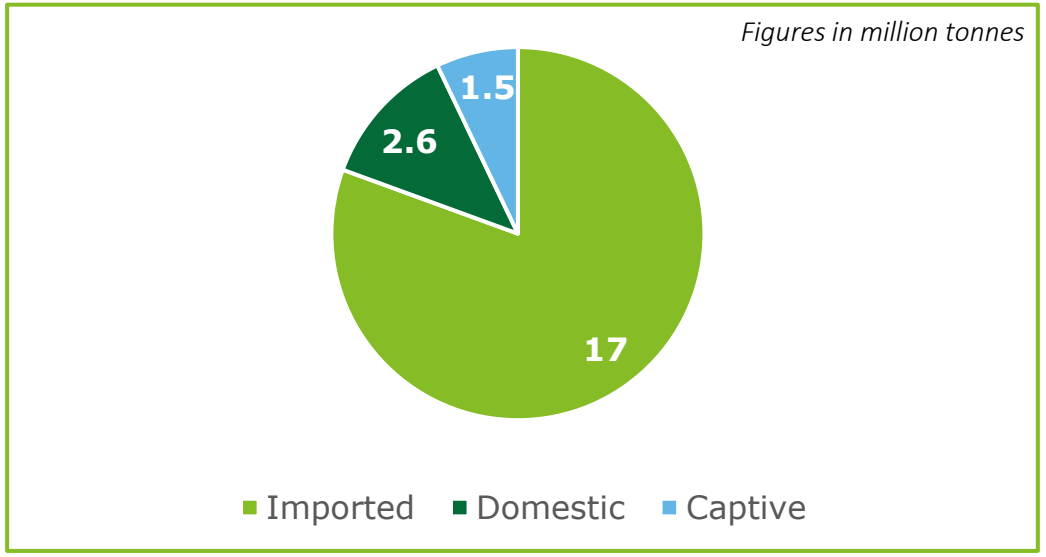
Sub-Section	2022		2030						Other Planned Works (New Energy/Other Corridors)	Utilization after of All planned works
	Capacity	% Utilization	Ongoing Works	Passenger	Freight	Total	Capacity	% Utilization		
Gomoh to Chandrapura	70	**112%**	NIL (as per ECR Line Capacity Statement FY2022)	41	55	96	70	**137%**	Nil	**137%**
Gomoh to Koderma	94	**121%**		59	88	147	94	**156%**		**156%**
Koderma to Bandhua	94	**129%**		59	95	155	94	**164%**		**164%**
Bandhua to Manpur	94	**112%**		59	73	132	94	**140%**		**140%**
Manpur to Gaya	154	**138%**		129	132	261	154	**170%**		**170%**

All numbers (Except Capacity utilization) represent average two-way traffic in Trains/Rakes per day. Passenger also includes Others

Note: Capacity refers to Capacity of line with Maintenance Block (MB)

Issues faced by major steel players such as SAIL

SAIL's Coking Coal Sourcing Portfolio



- SAIL imports coking Coal currently through ports located in Eastern Coast of India namely Vizag, Gangavaram, Gopalpur, Paradip, Dhamra and Haldia
- Domestic coking coal for SAIL is sourced from BCCL within the Adra division of SER, Ranchi division of SE and Dhanbad division of ECR
- SAIL also dispatches ~1.5 MT from its mines in Chasnalla
- ~4.0 MT of Thermal coal required for SAIL CPPs are sourced from MCL (Talcher), BCCL, CCL, ECL & SECL which includes ROM as well as middling coal from coal washeries

Key Issues faced by SAIL

- Issue of en-route congestion leading to loading restrictions
- Congestion on lines such as Raipur-Vizainagaram & routes in Odisha such as in Sambalpur & Khurda Road division of East Coast Railways and Adra&Kharagpur division of South Eastern Railways

SAIL's Rake Projections on Specific Lines

- Vizag to Bhilai Steel Plant (BSPC) via Raipur-Vizainagaram: **8 R/D**
- Paradip to Rourkela Steel Plant (HSPG): **4 R/D** via JSG, Angul
- Dhamra to Bokaro steel Plant (BSCS): **4 R/D** via Bhadrak, Adra
- Haldia to Bokaro, Durgapur &IISCO Steel Plant: **9 R/D**

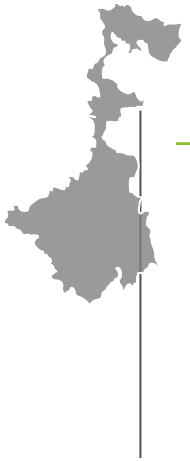
Even though a number of projects have been taken up which have been highlighted in other sections of this report, ***it is recommended to plan for connecting major plants such as SAIL plants to DFC network for ease of traffic movement.***

While the key issues faced by SAIL has been highlighted for illustrative purposes only, ***similar considerations taken into account while planning for additional lines and infrastructure required for efficient coal logistics***.

Issues in rake availability has been analyzed based on railway divisions, viz., SECR, ECoR etc. and attached as part of overall recommendations.

West Bengal

ECL has ambitious production capacity expansion plans



West Bengal

All figures in million tonnes

	Actuals		Projections						
Coal Supply from ECL	FY22 Actual	FY23 Actual	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Deoghar/Saharjuri Coal Field	0.99	1.03	1.6	2.0	2.5	2.7	2.5	2.5	2.5
Mugma-Salanpur Coal Field	5.18	4.86	7.1	8.1	8.9	9.5	10.3	10.3	11.4
Rajmahal Coal Field	5.47	5.62	16.4	14.0	22.5	22.5	22.5	23.5	23.5
Raniganj Coal Field	20.78	23.50	25.9	28.9	31.0	32.2	32.6	32.6	32.5
Total ECL (CIL) in West Bengal	**32**	**35**	**51**	**52**	**60**	**65**	**68**	**69**	**70**

- Currently, Raniganj Coal Field is the primary source of coal for ECL. However, for FY30 Rajmahal CF is expected to become the largest source of coal for ECL
- Other major coal fields are Deoghar/Saharjuri CF and the Mugma-Salanpur CF.
- ECL has set an ambitious target towards achieving the 1 BT programme of Coal India Limited, and further augment the production till FY 2030.

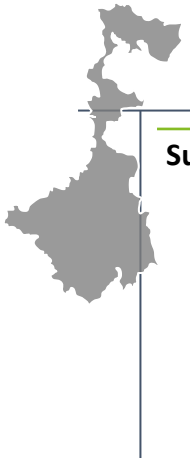
ECL's production capacity expansion plans (1/7)

West Bengal

All figures in million tonnes

Subsidiary	Area	Mine	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30
ECL	Bankola	Khandra	0.075	0.090	0.080	0.080	0.070	0.070	0.070	0.070
ECL	Bankola	Kumardih-A	0.085	0.100	0.085	0.085	0.080	0.080	0.080	0.080
ECL	Bankola	Kumardih-B								
ECL	Bankola	Bankola	0.170	0.200	0.170	0.170	0.150	0.150	0.150	0.150
ECL	Bankola	Shankarpur	0.250	0.180	0.000	0.000				
ECL	Bankola	SSPur incl. Sarpi	0.620	0.690	0.900	1.000	1.500	1.500	1.500	1.500
ECL	Bankola	Tilaboni	0.140	0.140	0.140	0.600	0.800	0.800	0.800	0.800
ECL	Bankola	Kumardih B CM	0.840	0.900	1.000	1.000	1.000	1.000	1.000	1.000
ECL	Bankola	Nakrakonda Kumardih-B OCP	0.600	0.900	1.500	1.750	1.700	1.750	1.750	1.750
ECL	Jhanjhra	Jhanjhra	2.795	3.600	4.000	4.500	5.000	5.000	5.000	5.000
ECL	Rajmahal	Rajmahal OC	16.000	16.000	17.000	20.000	20.000	20.000	20.000	20.000
ECL	Rajmahal	Hura-C OCP	0.500	0.500	0.500	1.250	1.500	1.500	1.500	1.500
ECL	Rajmahal	Chupervita					1.000	1.000	1.000	1.000
ECL	Rajmahal	Lalmatia Dip							1.000	1.000
ECL	S P Mines	Chitra East OCP	1.500	1.600	2.000	2.500	2.700	2.500	2.500	2.500
ECL	Sonepur	Sonepur Bazari OCP	11.000	11.000	12.000	12.000	12.000	12.000	12.000	12.000

ECL's production capacity expansion plans (2/7)

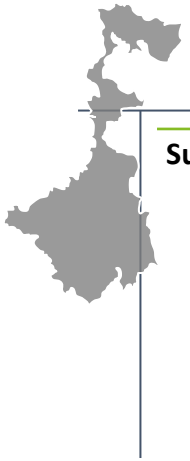


West Bengal

All figures in million tonnes

Subsidiary	Area	Mine	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30
ECL	Kajora	Jambad	0.140	0.150						
ECL	Kajora	Khas Kajora	0.170	0.180	0.170	0.170	0.170	0.170	0.170	0.170
ECL	Kajora	Madhabpur	0.040	0.045	0.040	0.040	0.050	0.050	0.050	0.050
ECL	Kajora	Naba Kajora UG	0.045	0.000	0.000	0.000	0.040	0.040	0.040	0.040
ECL	Kajora	Parascole East	0.070	0.080	0.070	0.070	0.070	0.070	0.070	0.070
ECL	Kajora	Parascole West	0.075	0.075						
ECL	Kajora	Madhabpur OC								
ECL	Kajora	Parascole East OC			0.000	0.000	0.100	0.100	0.100	0.100
ECL	Kajora	Central Kajora	0.075	0.085	0.070	0.070	0.060	0.060	0.060	0.060
ECL	Kajora	Madhusudanpur	0.025							
ECL	Kajora	Jambad OC	0.550	0.550						
ECL	Kajora	Parascole-Jambad (UG+OC)			0.200	0.440	0.230	0.480	0.480	0.480
ECL	Kajora	Parascole-Jambad			0.500	0.500	0.600	0.600	0.600	0.500
ECL	Kajora	Nabakajora Madhabpur					0.100	0.100	0.100	0.100

ECL's production capacity expansion plans (3/7)



West Bengal

All figures in million tonnes

Subsidiary	Area	Mine	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30
ECL	Kenda	CL Jambad UG	Convertion to OC	Convertion to OC						
ECL	Kenda	Chora 7 & 9 Pit	0.100	0.090	Amalgamation with Sonepur Bazari Expansion OC					
ECL	Kenda	New Kenda								
ECL	Kenda	Bonbahal OC	0.300	0.200	0.000	0.000				
ECL	Kenda	CL Jambad OC	0.100	0.300	0.300	0.400	0.300	0.400	0.400	0.400
ECL	Kenda	Bahula	0.150	0.100	0.120	0.120	0.140	0.140	0.140	0.140
ECL	Kenda	Lower Kenda	0.065	0.070	0.060	0.060	0.060	0.060	0.060	0.060
ECL	Kenda	Chora 10	0.045	0.035	0.000	0.000				
ECL	Kenda	Chora Block Incline	0.055	0.045	0.000	0.000				
ECL	Kenda	Shankarpur OC	0.100	0.100	0.000	0.000				
ECL	Kenda	Siduli	0.085	0.085	0.080	0.080	0.160	0.160	0.160	0.160
ECL	Kenda	New Kenda OCP	0.550	0.400	0.500	1.000	1.000	1.000	1.000	1.000
ECL	Kenda	Siduli OCP	0.100	0.100	0.500	0.750	1.000	1.000	1.000	1.000

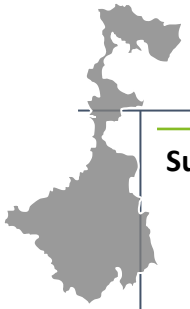
ECL's production capacity expansion plans (4/7)

West Bengal

All figures in million tonnes

Subsidiary	Area	Mine	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30
ECL	Kunustoria	North Searsole OC	0.100	0.200	0.000	0.000				
ECL	Kunustoria	Bansra OC	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
ECL	Kunustoria	N Searsole OC	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500
ECL	Kunustoria	Amritnagar	0.110	0.100	0.100	0.100	0.100	0.100	0.100	0.100
ECL	Kunustoria	Bansra	0.350	0.100	0.200	0.200	0.150	0.150	0.150	0.150
ECL	Kunustoria	Kunustoria	0.115	0.100	0.100	0.100	0.110	0.110	0.110	0.110
ECL	Kunustoria	Parasea-Belbaid Reorganisation	0.215	0.175	0.360	0.360	0.360	0.360	0.360	0.360
ECL	Kunustoria	Narainkuri HW	0.300	0.450	0.500	0.500	0.400	0.400	0.400	0.400
ECL	Mugma	Badjna UG	0.060	0.060	0.060	0.060	0.060	0.060	0.060	0.060
ECL	Mugma	Kumardhubi	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030
ECL	Mugma	Lakhimata	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050
ECL	Mugma	Shyampur-B UG	0.060	0.060	0.060	0.060	0.060	0.060	0.060	0.060
ECL	Mugma	Shampur A OC	0.050	0.050	Patch reserve exhaustion					
ECL	Mugma	Gopinathpur OC	0.050		0.000	0.000				
ECL	Mugma	Badjna OC		0.070	0.000	0.000				
ECL	Mugma	Chapapur OC	0.300	0.400	0.400	0.400	0.400	0.500	0.500	0.500
ECL	Mugma	Kapasara OC	0.500	0.400	0.400	0.200	0.500	0.500	0.500	0.500
ECL	Mugma	Nirsha OC	0.350	0.400	0.400	0.400	0.400	0.400	0.400	0.400
ECL	Mugma	Chapapur-II	0.030	0.025	0.030	0.030	0.040	0.040	0.040	0.040
ECL	Mugma	Hariajam	0.040	0.040	0.040	0.040	0.040	0.040	0.040	0.040
ECL	Mugma	Khoodia	0.010	0.010	0.010	0.010	0.030	0.030	0.030	0.030
ECL	Mugma	Barmuri OC	0.400	0.500	0.300		0.300	0.300	0.300	0.300
ECL	Mugma	Rajpura OC	0.200	0.100	0.000	0.000				

ECL's production capacity expansion plans (5/7)



West Bengal

All figures in million tonnes

Subsidiary	Area	Mine	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30
ECL	Pandaveshwar	Madhaipur UG	0.055	0.050	0.050	0.050	0.060	0.060	0.060	0.060
ECL	Pandaveshwar	Manderboni South Samala	0.075	0.080	0.080	0.080	0.080	0.080	0.080	0.080
ECL	Pandaveshwar	Pandaveshwar	0.100	0.100	0.000	0.000				
ECL	Pandaveshwar	Madhaipur OC	0.300	0.300	Patch reserve exhaustion					
ECL	Pandaveshwar	Dalurband OC	0.500	0.500	New PR Pandaveswar - Dalurband (UG+OC)					
ECL	Pandaveshwar	Khottadih	0.890	0.600	0.800	0.800	1.000	1.000	1.000	1.000
ECL	Pandaveshwar	Khottadih OCP	1.000		0.000		Reserve exhaustion	Reserve exhaustion	Reserve exhaustion	Reserve exhaustion
ECL	Pandaveshwar	Pandaveshwar Dalurbandh			0.100	0.100	0.095	0.095	0.095	0.095
ECL	Pandaveshwar	Pandaveshwar Dalurbandh			0.300	0.750	0.750	0.750	0.750	0.750
ECL	Salanpur	Gaurangdih OC	0.500		0.000	0.000	0.500	0.500	0.500	0.500
ECL	Salanpur	Dabor OC		0.500	0.500	0.500	0.500	0.750	0.750	0.750
ECL	Salanpur	Gaurangdih-Begunia OC	1.300	1.300	1.300	1.300	1.300	1.300	1.300	1.300
ECL	Salanpur	Itapara	0.000	0.000	Future as MDO mode					
ECL	Salanpur	Shampur B / Sangmahal OC			0.250	0.500	0.500	0.500	0.500	0.500
ECL	Salanpur	Bonjemehari OC								
ECL	Salanpur	Mohanpur OCP	1.100	2.000	2.000	2.250	2.250	2.250	2.250	2.250
ECL	Salanpur	Bonjemehari OCP	0.500	0.450	0.750	1.000	0.750	1.000	1.000	1.000
ECL	Salanpur	Itapara (in MDO Mode)			0.500	1.500	1.800	2.000	2.000	3.100

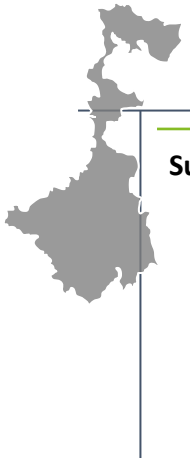
ECL's production capacity expansion plans (6/7)

West Bengal

All figures in million tonnes

Subsidiary	Area	Mine	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30
ECL	Satgram	Chapui Khas	0.025	0.025	0.020	0.020	0.020	0.020	0.020	0.020
ECL	Satgram	Nimcha UG	0.170	0.170	0.170	0.170	0.180	0.180	0.180	0.180
ECL	Satgram	Pure Searsole	0.030	0.035	0.030	0.030	0.040	0.040	0.040	0.040
ECL	Satgram	Kalidaspur OC					0.100	0.100	0.100	0.100
ECL	Satgram	Nimcha OCP	0.300	0.300	0.300	0.200	0.200	0.200	0.200	0.200
ECL	Satgram	JK Nagar	0.150	0.150	0.140	0.140	0.130	0.130	0.130	0.130
ECL	Satgram	Kalidaspur	0.070	0.070	0.070	0.070	0.080	0.080	0.080	0.080
ECL	Satgram	Satgram Pit (Project)	0.055	0.055	0.050	0.050	0.050	0.050	0.050	0.050
ECL	Satgram	Satgram Incline	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030
ECL	Satgram	Nimcha HW	0.080	0.100	0.500	0.500	0.500	0.500	0.500	0.500
ECL	Sodepur	Bejdih	0.025	0.036	0.030	0.030	0.025	0.025	0.025	0.025
ECL	Sodepur	Mithani	0.050	0.051	0.050	0.050	0.050	0.050	0.050	0.050
ECL	Sodepur	Parbelia	0.050	0.035	0.030	0.030	0.050	0.050	0.050	0.050
ECL	Sodepur	Chinakuri-III	0.040	0.055	0.040	0.040	0.040	0.040	0.040	0.040
ECL	Sodepur	Dhemomain Pit	0.015	0.020	0.015	0.015	0.015	0.015	0.015	0.015
ECL	Sodepur	Dhemomain Incline	0.025	0.025	0.025	0.025	0.030	0.030	0.030	0.030
ECL	Sodepur	Dubeswary	0.085	0.043	0.050	0.050	0.060	0.060	0.060	0.060
ECL	Sodepur	Narsamunda	0.025	0.050	0.040	0.040	0.040	0.040	0.040	0.040
ECL	Sodepur	Patmohna	0.040	0.045	0.030	0.030	0.030	0.030	0.030	0.030

ECL's production capacity expansion plans (7/7)



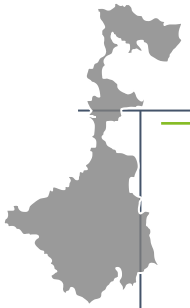
West Bengal

All figures in million tonnes

Subsidiary	Area	Mine	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30
ECL	Sripur	Nigha	0.000	0.000	0.000	0.010	0.010	0.010	0.020	0.020
ECL	Sripur	Bhanora OC	0.300	0.300	0.350	0.215	0.400	0.400	0.400	0.400
ECL	Sripur	Kalipahari OC	Patch reserve exhaustion	Patch reserve exhaustion			0.000	0.000		
ECL	Sripur	Bhanora West OC	0.050	0.050	0.050		0.000		Exhaustion of Patch Reserve, New PR on Bhanora west UG	Exhaustion of Patch Reserve, New PR on Bhanora west UG
ECL	Sripur	Ningha	0.050	0.050	0.100	0.200	Patch reserve exhaustion	Patch reserve exhaustion	Patch reserve exhaustion	Patch reserve exhaustion
ECL	Sripur	Bhanora West Block	0.030	0.030	0.030	New PR on Bhanora west UG				
ECL	Sripur	Rajpura HW	0.030	0.030	0.200	0.350	Reserve exhaustion	Reserve exhaustion	Reserve exhaustion	Reserve exhaustion
ECL	Sripur	Bhanora-West UG				0.030	0.030	0.030	0.030	0.030

- For ECL's planned growth of ~33 MT dispatch in FY22 to ~70 MT production & dispatch in FY30, the major contributor is the Rajmahal coalfields which will drive almost ~50% of the production ramp-up

Non-CIL blocks Pipeline in West Bengal – Raniganj CF (1/2)



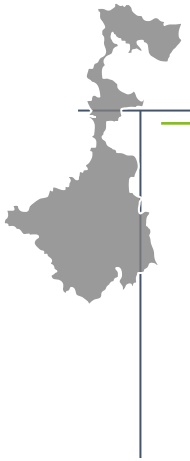
West Bengal

All figures in million tonnes

Details of Non-CIL blocks in Raniganj CF

#	Name of the Block	Block Owner	PRC	Operational Status	Proposed Loading Point	EUP and other remarks	Actual FY22 Prodn.	Actual FY21 Prodn.
1	Ardhagram	OCL Iron & Steel Ltd.	0.4	Operational	The coal is transported to the plant on road via tarpaulin covered trucks	OCL Iron & steel, Rajganjpur, Odisha: 407 kms from mine site	0.4	0.4
2	Bajora	WBPDCL	0.5	Operational	Hazratpur Railway Siding (Mine to Siding via road – 7.5 Kms)	Sagardigih TPP, WB: 176 kms from the mine; Bakreshwar TPP, WB: 44 kms from the mine Bandel TPP, WB: 178 kms from the mine Santhaldih TPP, WB: 123 kms from the mine Kolaghat TPP, WB: 254 kms from the mine	0.22	0.22
3	Bajora North	WBPDCL	3	Operational	Durgapur Railway Siding (Mine to Siding via road – 16.5 Kms)	Sagardigih TPP, WB: 209 kms from the mine; Bakreshwar TPP, WB: 232 kms from the mine Bandel TPP, WB: 145 kms from the mine Santhaldih TPP, WB: 123 kms from the mine Kolaghat TPP, WB: 221 kms from the mine .	2.2	1.5
4	Gangramchak and Gangaramchak Bhadulia	WBPDCL	1	Operational	Hazratpur Railway Siding (Mine to Siding via road – 15 Kms)	Sagardigih TPP, WB: 176 kms from the mine; Bakreshwar TPP, WB: 44 kms from the mine Bandel TPP, WB: 178 kms from the mine Santhaldih TPP, WB: 123 kms from the mine Kolaghat TPP, WB: 254 kms from the mine	0.5	-
Total PRC			4.9				3.32	2.12

Non-CIL blocks Pipeline in West Bengal – Raniganj CF (2/2)



West Bengal

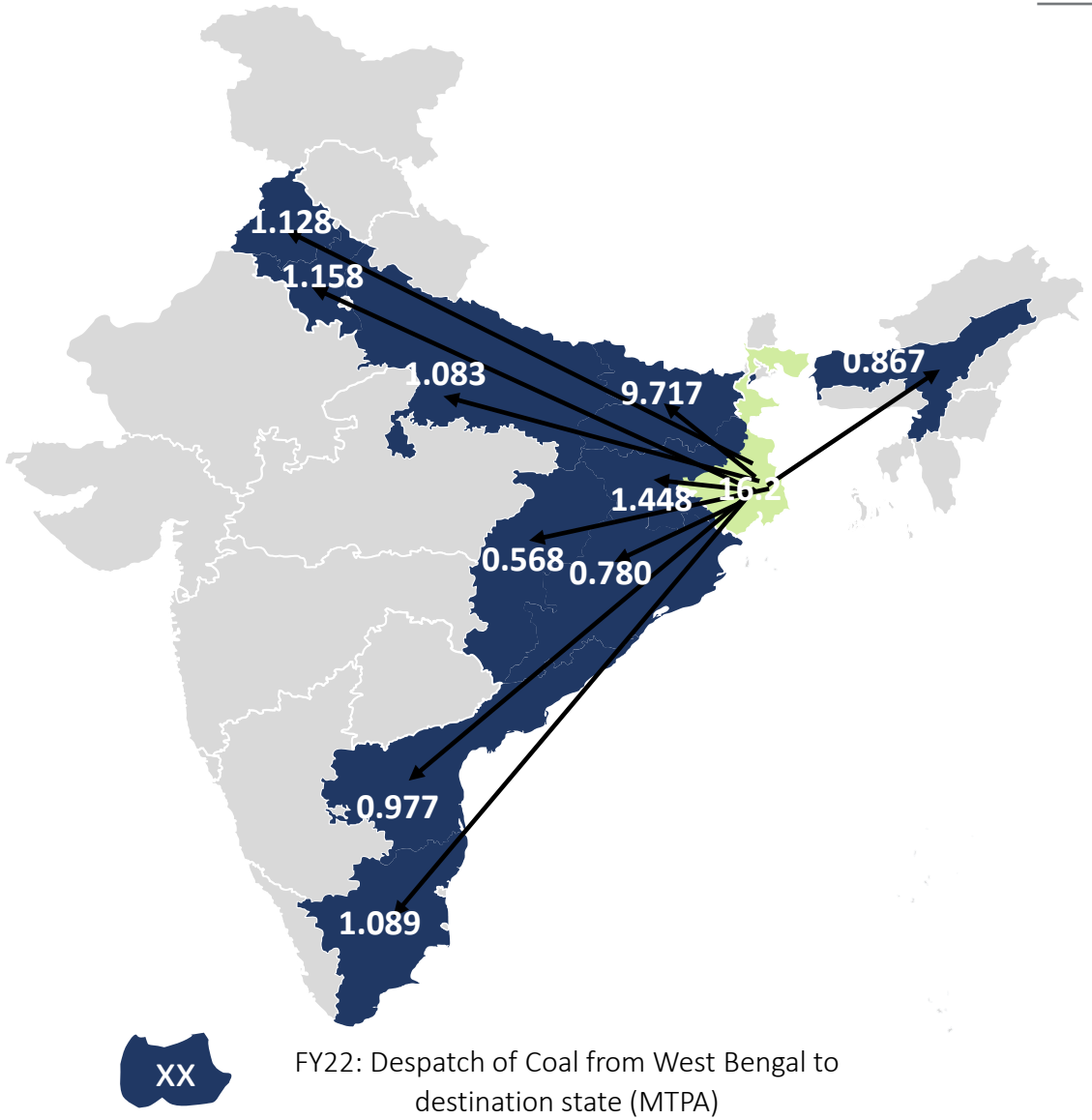
All figures in million tonnes

Details of Non-CIL blocks in Raniganj CF

#	Name of the Block	Block Owner	PRC	Operational Status	Proposed Loading Point	EUP and other remarks	Actual FY22 Prodn.	Actual FY21 Prodn.
5	Khagra Joydev	DVC	3	Operational	Panchra Railway Siding (Mine to Siding via road – 20 Kms)	Mejia, TPP, WB: 591 kms from mine	1	-
6	Sarisatoli	CESC	3.5	Operational	Asansol Railway Siding. (Mine to Siding via road – 25 Kms)	CESC Budge Budge, WB- 257 kms from mine	1	0
7	Tara E&W	WBPDCL	4	Non-Operational	Bara Bani Railway Siding (Mine to Siding via road – 14 Kms)	Sagardigih TPP, WB: 239 kms from the mine; Bakreshwar TPP, WB: 107 kms from the mine Bandel TPP, WB: 207 kms from the mine Santhaldih TPP, WB: 123 kms from the mine Kolaghat TPP, WB: 294 kms from the mine .	0.5	-
8	Jagannathpur B	Powerplus Traders	1.5	Non Operational	Ukhra Railway Station (Mine to station via road-19 kms). Coal is transported to Shyam steel by road.	Orissa Metalliks, WB: 285 kms from mine Rashmi Cement, WB: 331 kms from mine Shyam Steel, WB: 27 kms from mine	0.5	-
9	Jaganathpur A	-	0.6	Non-Operational	Nearest railhead is Ukhra (19 km by road)	Coal block expected to be auctioned in 7th Tranche of coal block auctions	-	-
10	Kabirtirtha	-	1.0	Non-Operational	20 km away from Asansol and 18 km from Raniganj by road	Coal block expected to be auctioned in 7th Tranche of coal block auctions	-	-
Total PRC			**13.6**				**3.0**	**0**

Origin – Destination Cluster Mapping for West Bengal

O-D Source cluster Mapping – Despatch of Coal from ECL, West Bengal: FY22 snapshot

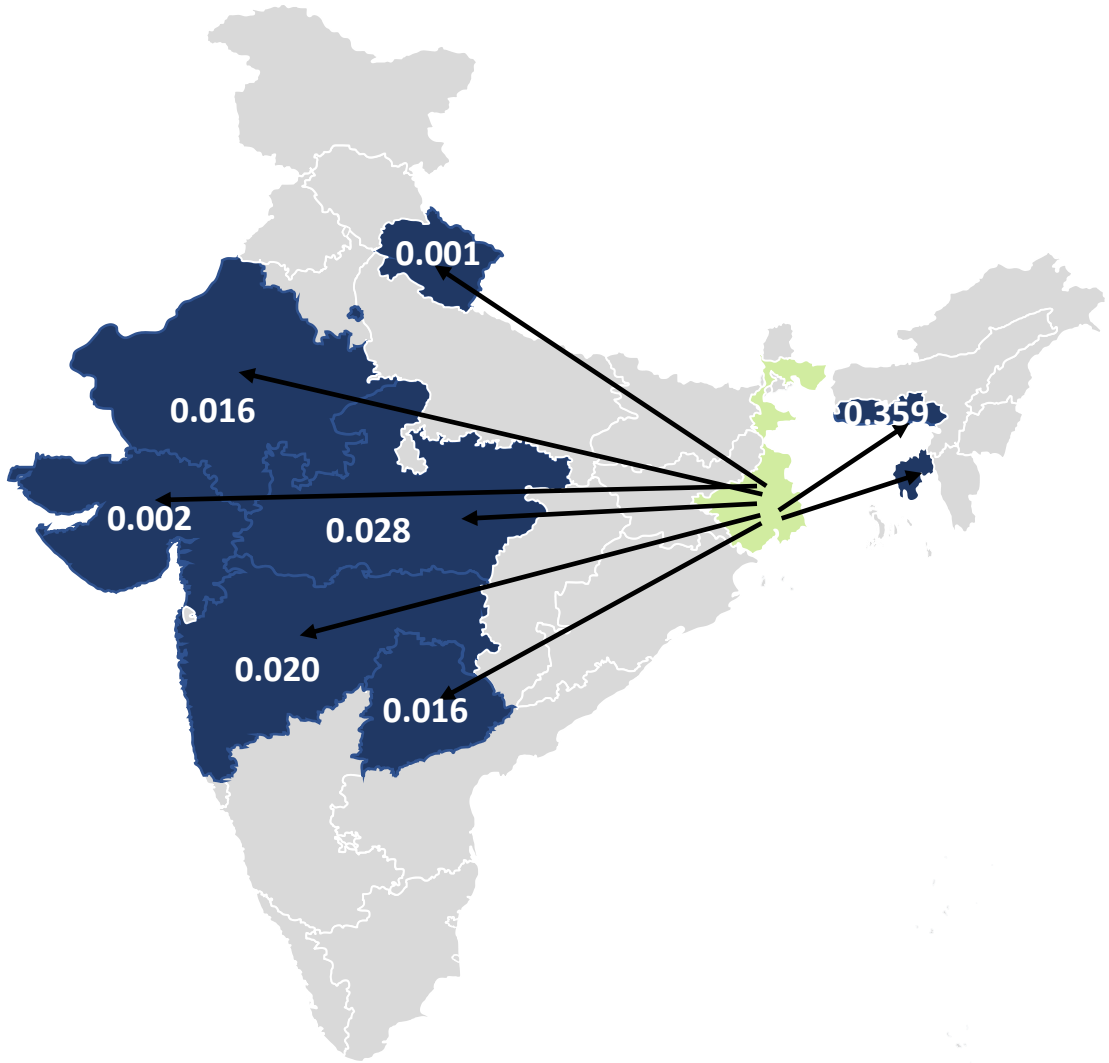


FY22: Despatch of Coal from West Bengal to destination state (MTPA)

All figures in million tonnes

Consuming State	Rail	Pure Road & RCR	MGR & Others	Total
WEST BENGAL	12.911	1.872	1.397	16.179
BIHAR	2.760	0.150	6.807	9.717
HARYANA	1.585	0.000	0.000	1.586
JHARKHAND	0.382	1.067	0.000	1.448
UTTAR PRADESH	1.005	0.178	0.000	1.183
PUNJAB	1.122	0.007	0.000	1.128
TAMIL NADU	1.089	0.000	0.000	1.089
ANDHRA PRADESH	0.977	0.000	0.000	0.977
ASSAM	0.860	0.006	0.000	0.867
ODISHA	0.767	0.013	0.000	0.780
CHATTISGARH	0.568	0.000	0.000	0.568

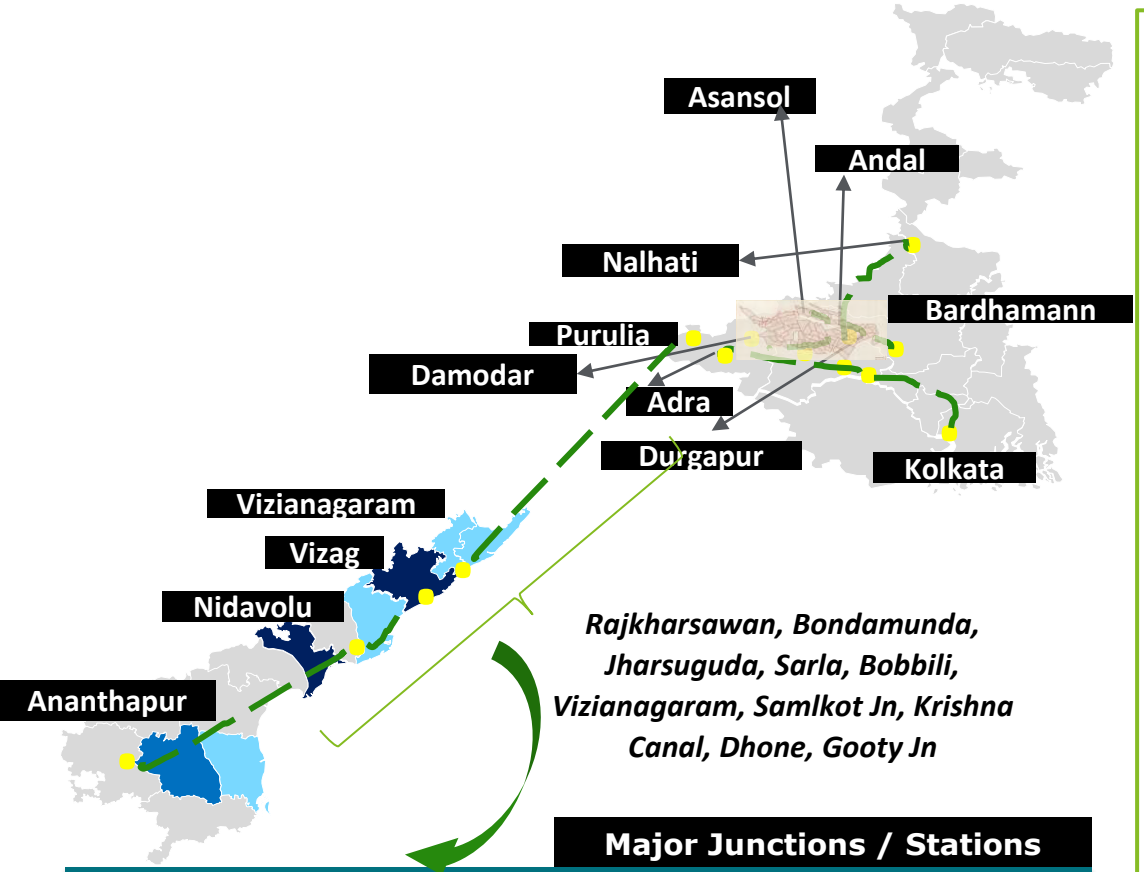
O-D Source cluster Mapping – Despatch of Coal from ECL, West Bengal: FY22 snapshot



FY22: Despatch of Coal from West Bengal to destination state (MTPA)

Consuming State	Rail	Pure Road & RCR	MGR & Others	Total
MEGHALAYA	0.359	0.000	0.000	0.359
HIMACHAL PRADESH	0.155	0.000	0.000	0.155
TRIPURA	0.032	0.000	0.000	0.032
MADHYA PRADESH	0.027	0.001	0.000	0.028
MAHARASHTRA	0.020	0.000	0.000	0.020
TELANGANA	0.008	0.008	0.000	0.016
RAJASTHAN	0.016	0.000	0.000	0.016
NAGALAND	0.004	0.000	0.000	0.004
GUJARAT	0.000	0.002	0.000	0.002
UTTARAKHAND	0.000	0.001	0.000	0.001
DELHI	0.000	0.000	0.000	0.000
Total Despatch from West Bengal	**24.65 (68.2%)**	**3.30 (9.14%)**	**8.20 (22.69%)**	**36.20**

O-D Source cluster Mapping – West Bengal to Andhra Pradesh



Rajkharsawan, Bondamunda, Jharsuguda, Sarla, Bobbili, Vizianagaram, Samlkot Jn, Krishna Canal, Dhone, Gooty Jn

Major Junctions / Stations

Major Coal Consuming Districts of AP: 2030 (Estimated)

>15 MTPA Coal Consumption	*Krishna, Visakhapatnam*
10-15 MTPA Coal Consumption	*Kadapa*
5-10 MTPA Coal Consumption	*NA*
1-5 MTPA Coal Consumption	*Anantpur, Nellore, East Godavari, Vizianagaram, Srikakulam*

Expected Load from West Bengal to Andhra Pradesh main trunk lines (Excluding load from other states on this line)

FY22

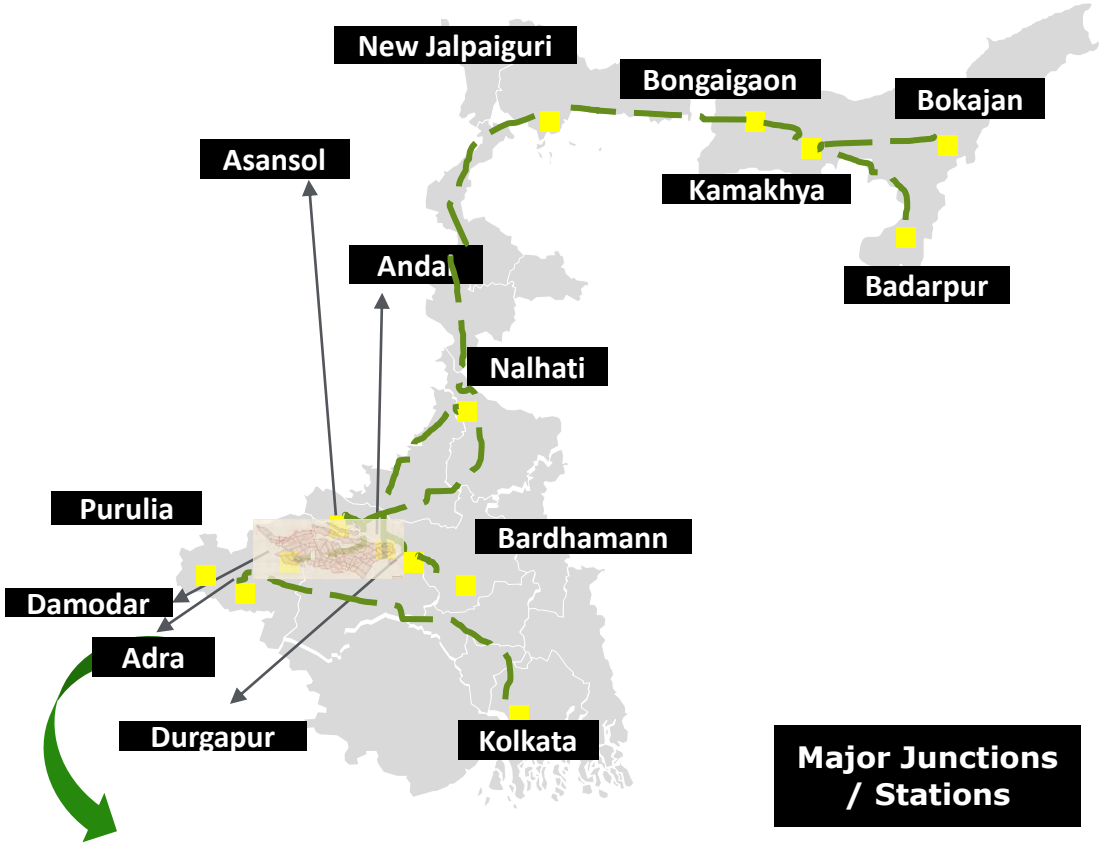
From	To	Traffic (Tonnes)	Rakes / Day
Andal	Damodar	623357	0.444
Damodar	Ramkanali	804894	0.573
Ramkanali	Purulia	869482	0.619
Purulia	Samalkot	887782	0.632
Samalkot	Dharmavaram	29073	0.021
Bhojudih	Purulia	18300	0.013
Asansol	Damodar	125452	0.089

FY30

From	To	Traffic (Tonnes)	Rakes / Day
Andal	Damodar	1032428	0.73
Damodar	Ramkanali	1333097	0.95
Ramkanali	Purulia	1440070	1.02
Purulia	Samalkot	1470379	1.05
Samalkot	Dharmavaram	48152	0.03
Bhojudih	Purulia	30309	0.02
Asansol	Damodar	207779	0.15

- Major Power consumers in Andhra Pradesh currently taking coal from ECL include NTPC Simhadri and APPCDL.
- The major end use customers are primarily located in Vishakhapatanam district.

O-D Source cluster Mapping – West Bengal to Assam



Major Coal Consuming Districts of Assam: 2030 (Estimated)

>15 MTPA Coal Consumption	*NA*
10-15 MTPA Coal Consumption	*NA*
5-10 MTPA Coal Consumption	*NA*
1-5 MTPA Coal Consumption	*NA*

Expected Load from West Bengal to Assam main trunk lines (Excluding load from other states on this line)

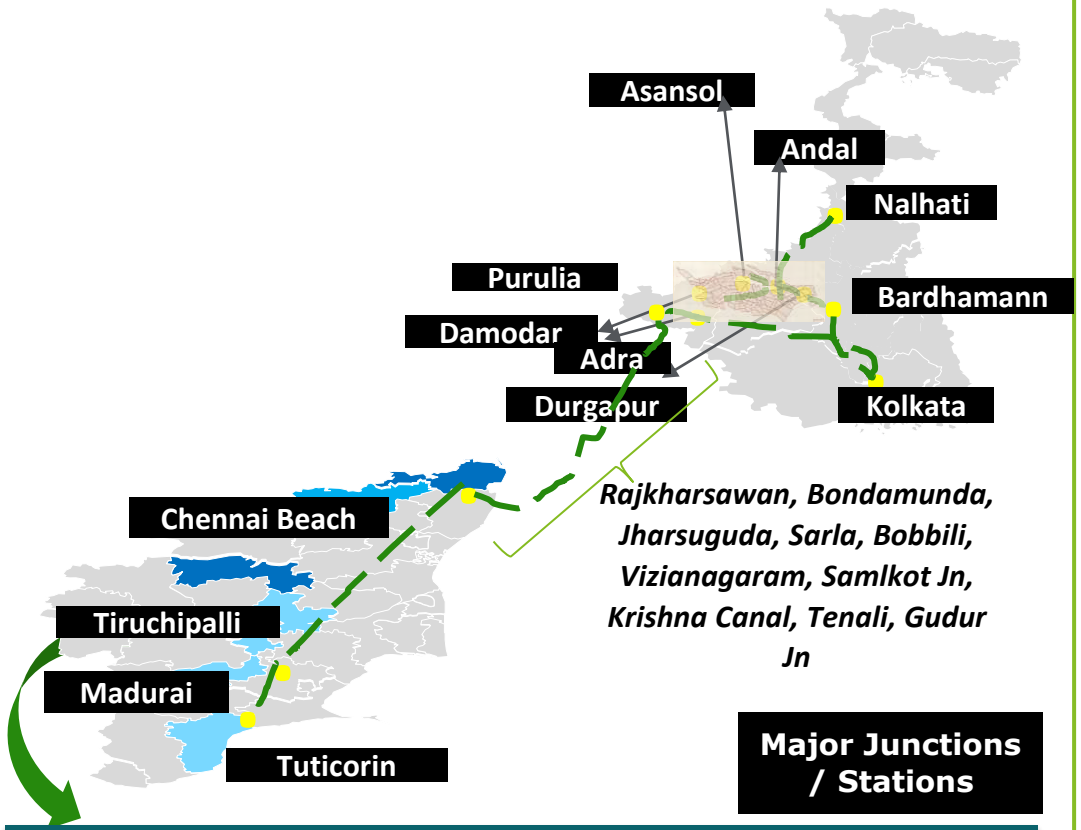
FY22

From	To	Traffic (Tonnes)	Rakes / Day
Asansol	Andal	72759	0.05
Andal	Bhimgara	157334	0.11
Bhimgara	Sainthia	860150	0.61
Sainthia	Nalhati	860150	0.61
Nalhati	Barsoi	860150	0.61
Barsoi	New Jalpaiguri	860150	0.61
New Jalpaiguri	Fakiragram	860150	0.61
Fakiragram	New Bongaigaon	860150	0.61
New Bongaigaon	Rangya	57830	0.04
Rangya	Kamakhya	57830	0.04
Kamakhya	Chaparmukh	50151	0.04
Chaparmukh	Lumding	30697	0.02
Lumding	Bokajan	30697	0.02
Chaparmukh	Badarpur	19454	0.01

FY30

From	To	Traffic (Tonnes)	Rakes / Day
Asansol	Andal	120506	0.09
Andal	Bhimgara	260583	0.19
Bhimgara	Sainthia	1424614	1.01
Sainthia	Nalhati	1424614	1.01
Nalhati	Barsoi	1424614	1.01
Barsoi	New Jalpaiguri	1424614	1.01
New Jalpaiguri	Fakiragram	1424614	1.01
Fakiragram	New Bongaigaon	1424614	1.01
New Bongaigaon	Rangya	95780	0.07
Rangya	Kamakhya	95780	0.07
Kamakhya	Chaparmukh	83062	0.06
Chaparmukh	Lumding	50842	0.04
Lumding	Bokajan	50842	0.04
Chaparmukh	Badarpur	32220	0.02

O-D Source cluster Mapping – West Bengal to Tamil Nadu



Major Coal Consuming Districts of TN: 2030 (Estimated)

>15 MTPA Coal Consumption	*NA*
10-15 MTPA Coal Consumption	*Salem, Thiruvallur*
5-10 MTPA Coal Consumption	*Vellore*
1-5 MTPA Coal Consumption	*Tuticorin, Madurai, Tiruchirapalli*

Expected Load from West Bengal to Tamil Nadu main trunk lines (Excluding load from other states on this line)

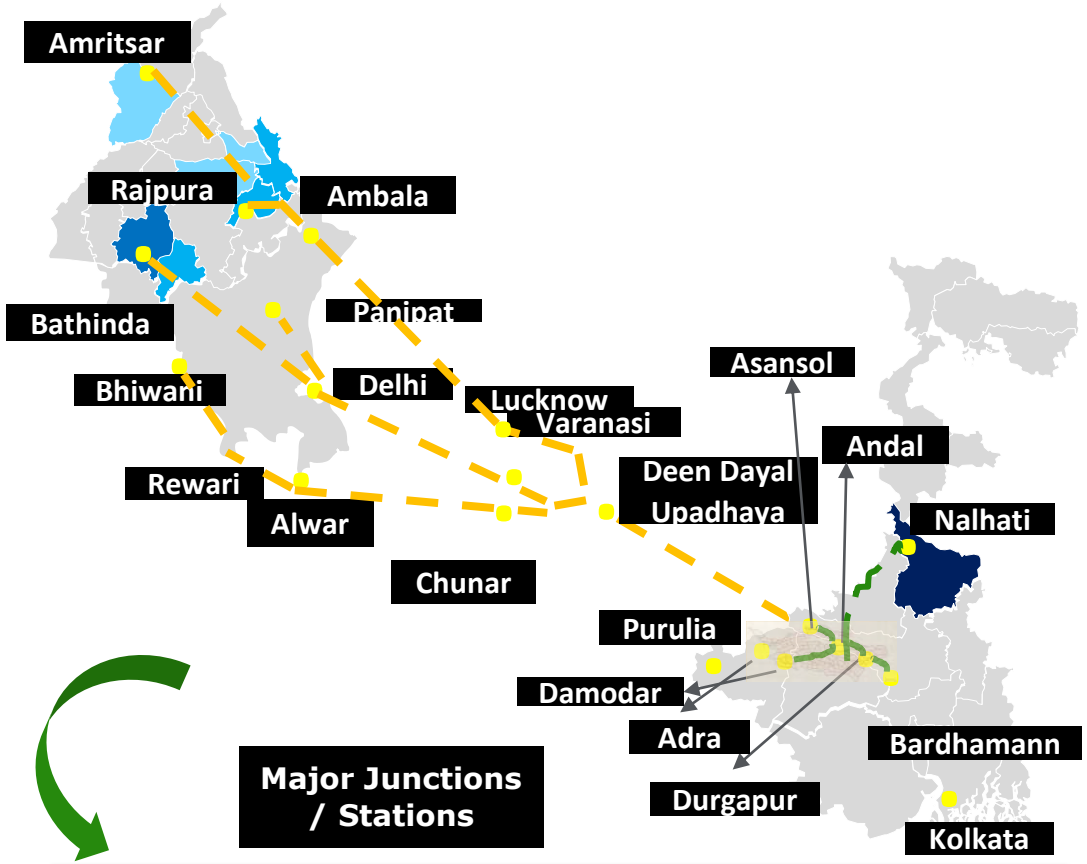
FY22

From	To	Traffic (Tonnes)	Rakes / Day
Andal	Damodar	1088751	0.77
Damodar	Ramkanali	1088751	0.77
Ramkanali	Purulia	1088751	0.77
Purulia	Chandil	1088751	0.77
Chandil	Sini	1088751	0.77
Sini	Rajkharsawan	1088751	0.77
Rajkharsawan	Bondamunda	1088751	0.77
Bondamunda	Jharsuguda	1088751	0.77
Jharsuguda	Sarla	1088751	0.77
Sarla	Bobbili	1088751	0.77
Bobbili	Vizianagaram	1088751	0.77
Vizianagaram	Samalkot	1088751	0.77
Samalkot	Nidadavolu	1088751	0.77
Nidadavolu	Krishna Canal	1088751	0.77
Krishna Canal	Tenali	1088751	0.77
Tenali	Gudur	1088751	0.77
Gudur	Chennai Beach	1088751	0.77
Chennai Beach	Chengalpattu	432295	0.31
Chengalpattu	Villupuram	432295	0.31
Villupuram	Vriddhachallam	432295	0.31
Vriddhachallam	Trichy	432295	0.31
Trichy	Dindigul	432295	0.31
Dindigul	Madurai	432295	0.31
Madurai	Virudunagar	432295	0.31
Virudunagar	Vanchimaniyachi	432295	0.31
Vanchimaniyachi	Tuticorin	432295	0.31

FY30

From	To	Traffic (Tonnes)	Rakes / Day
Andal	Damodar	1803232	1.28
Damodar	Ramkanali	1803232	1.28
Ramkanali	Purulia	1803232	1.28
Purulia	Chandil	1803232	1.28
Chandil	Sini	1803232	1.28
Sini	Rajkharsawan	1803232	1.28
Rajkharsawan	Bondamunda	1803232	1.28
Bondamunda	Jharsuguda	1803232	1.28
Jharsuguda	Sarla	1803232	1.28
Sarla	Bobbili	1803232	1.28
Bobbili	Vizianagaram	1803232	1.28
Vizianagaram	Samalkot	1803232	1.28
Samalkot	Nidadavolu	1803232	1.28
Nidadavolu	Krishna Canal	1803232	1.28
Krishna Canal	Tenali	1803232	1.28
Tenali	Gudur	1803232	1.28
Gudur	Chennai Beach	1803232	1.28
Chennai Beach	Chengalpattu	715984	0.51
Chengalpattu	Villupuram	715984	0.51
Villupuram	Vriddhachallam	715984	0.51
Vriddhachallam	Trichy	715984	0.51
Trichy	Dindigul	715984	0.51
Dindigul	Madurai	715984	0.51
Madurai	Virudunagar	715984	0.51
Virudunagar	Vanchimaniyachi	715984	0.51
Vanchimaniyachi	Tuticorin	715984	0.51

O-D Source cluster Mapping – West Bengal to Punjab & Haryana



Major Coal Consuming Districts of Punjab: 2030 (Estimated)

10-15 MTPA Coal Consumption	*Bhatinda*
5-10 MTPA Coal Consumption	*Mansa, Fatehgarh Sahib, Rupnagar*
1-5 MTPA Coal Consumption	*Amritsar, Tarn Taran, Ludhiana, Nawashahr*

Expected Load from West Bengal to Punjab & Haryana main trunk lines (Excluding load from other states on this line)

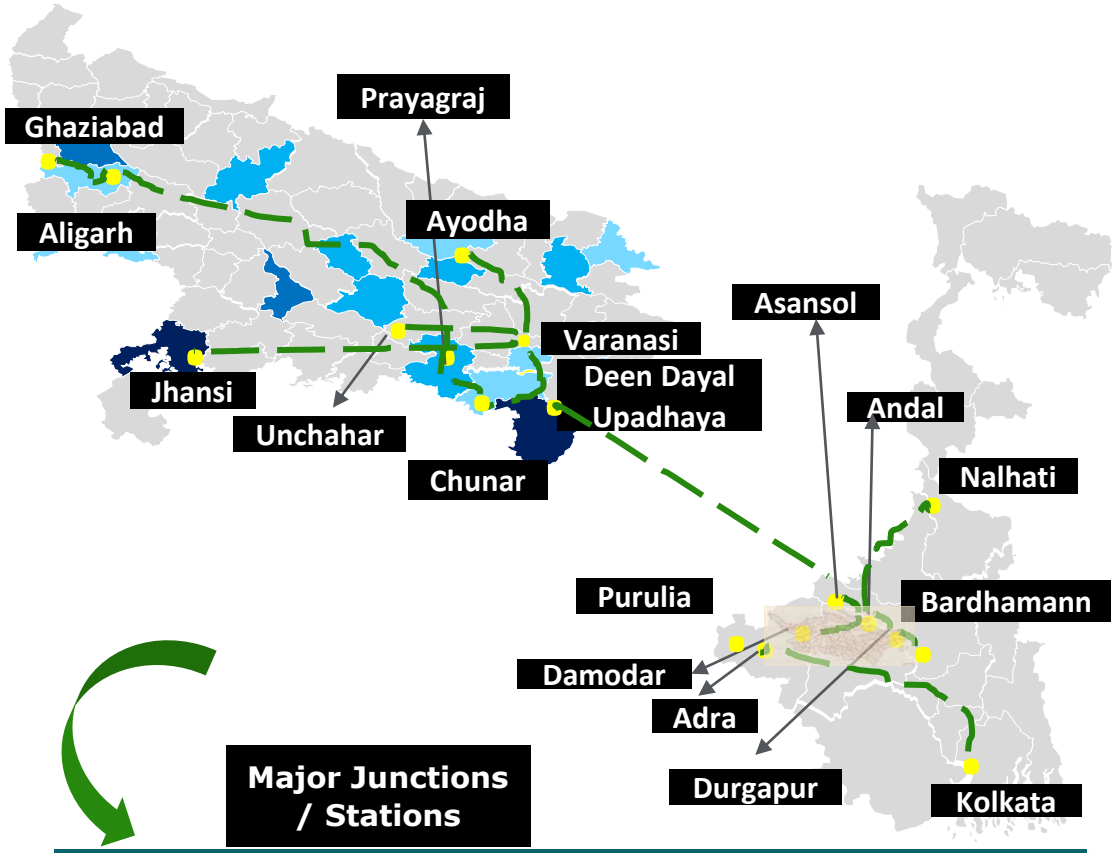
FY22

From	To	Traffic (Tonnes)	Rakes / Day
Andal	Deen Dayal Upadhaya	2705730	1.93
Deen Dayal Upadhaya	Varanasi	1472993	1.05
Varanasi	Ambala	1472993	1.05
Ambala	Sirhind	686625	0.49
Sirhind	Amritsar	52571	0.04
Deen Dayal Upadhaya	Prayagraj	1919362	1.37
Prayagraj	Tundla	1919362	1.37
Tundla	Bhiwani	1250626	0.89
Tundla	Ghaziabad	668736	0.48
Ghaziabad	Hazrat Nizamuddin	233629	0.17
Hazrat Nizamuddin	Panipat	46071	0.03
Hazrat Nizamuddin	Jakhal	187558	0.13
Ghaziabad	Bhatinda	435107	0.31

FY30

From	To	Traffic (Tonnes)	Rakes / Day
Andal	Deen Dayal Upadhaya	4481336	3.19
Deen Dayal Upadhaya	Varanasi	2439629	1.74
Varanasi	Ambala	2439629	1.74
Ambala	Sirhind	1137215	0.81
Sirhind	Amritsar	87070	0.06
Deen Dayal Upadhaya	Prayagraj	3178923	2.26
Prayagraj	Tundla	3178923	2.26
Tundla	Bhiwani	2071336	1.47
Tundla	Ghaziabad	1107587	0.79
Ghaziabad	Hazrat Nizamuddin	386946	0.28
Hazrat Nizamuddin	Panipat	76305	0.05
Hazrat Nizamuddin	Jakhal	310641	0.22
Ghaziabad	Bhatinda	720641	0.51

O-D Source cluster Mapping – West Bengal to Uttar Pradesh



Major Coal Consuming Districts of UP: 2030 (Estimated)

>15 MTPA Coal Consumption	*Jhansi, Sonbhadra*
10-15 MTPA Coal Consumption	*Bulandsahar, Kanpur*
5-10 MTPA Coal Consumption	*Prayagraj, Rae Bareli, Lucknow, Shahjahanpur, Ambedkar Nagar, Gorakhpur*
1-5 MTPA Coal Consumption	*Ghaziabad, Hapur, Gautam Buddha Nagar, Aligarh, Agra, Kushinagar, Gonda*

Expected Load from West Bengal to Uttar Pradesh main trunk lines (Excluding load from other states on this line)

FY22

From	To	Traffic (Tonnes)	Rakes / Day
Andal	Asansol	1005036	0.72
Asansol	Deen Dayal Upadhaya	948278	0.67
Deen Dayal Upadhaya	Varanasi	203980	0.15
Varanasi	Ayodha	110366	0.08
Deen Dayal Upadhaya	Chunar	143798	0.10
Chunar	Ghaziabad	136111	0.10
Asansol	Gorakhpur	56778	0.04
Chunar	Bina Etawa	7687	0.01
Varanasi	Unchahar	93614	0.07

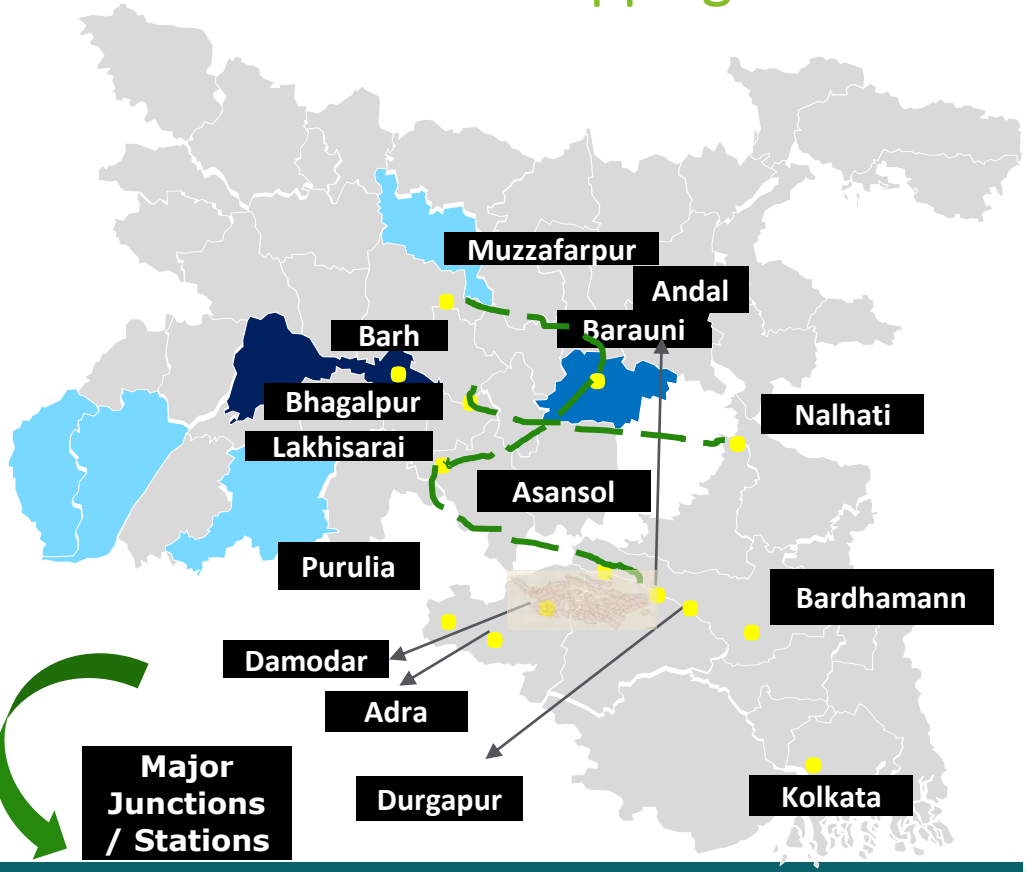
FY30

From	To	Traffic (Tonnes)	Rakes / Day
Andal	Asansol	1664580	1.18
Asansol	Deen Dayal Upadhaya	1570542	1.12
Deen Dayal Upadhaya	Varanasi	337840	0.24
Varanasi	Ayodha	182793	0.13
Deen Dayal Upadhaya	Chunar	238164	0.17
Chunar	Ghaziabad	225432	0.16
Asansol	Gorakhpur	94038	0.07
Chunar	Bina Etawa	12732	0.01
Varanasi	Unchahar	155047	0.11

- Major Power consumers in Uttar Pradesh procuring coal from ECL include NTPC Tanda and Unchahar.
- The major coal consuming districts of Uttar Pradesh procure coal through the coal trunk line via Deen Dayal Upadhaya.

Note: Coal Dispatch from ECL by railway mode to numerous local, small and micro scale coal traders totaling to 0.6 MT have been distributed evenly across major railway nodes and important routes/junctions.

O-D Source cluster Mapping – West Bengal to Bihar



Major Coal Consuming Districts of Bihar: 2030 (Estimated)

>15 MTPA Coal Consumption	*Patna*
5-10 MTPA Coal Consumption	*Bhagalpur, Aurangabad*
1-5 MTPA Coal Consumption	*Bhabua, Gaya, Rohtas, Darbhanga*

Expected Load from West Bengal to Bihar main trunk lines (Excluding load from other states on this line)

FY22

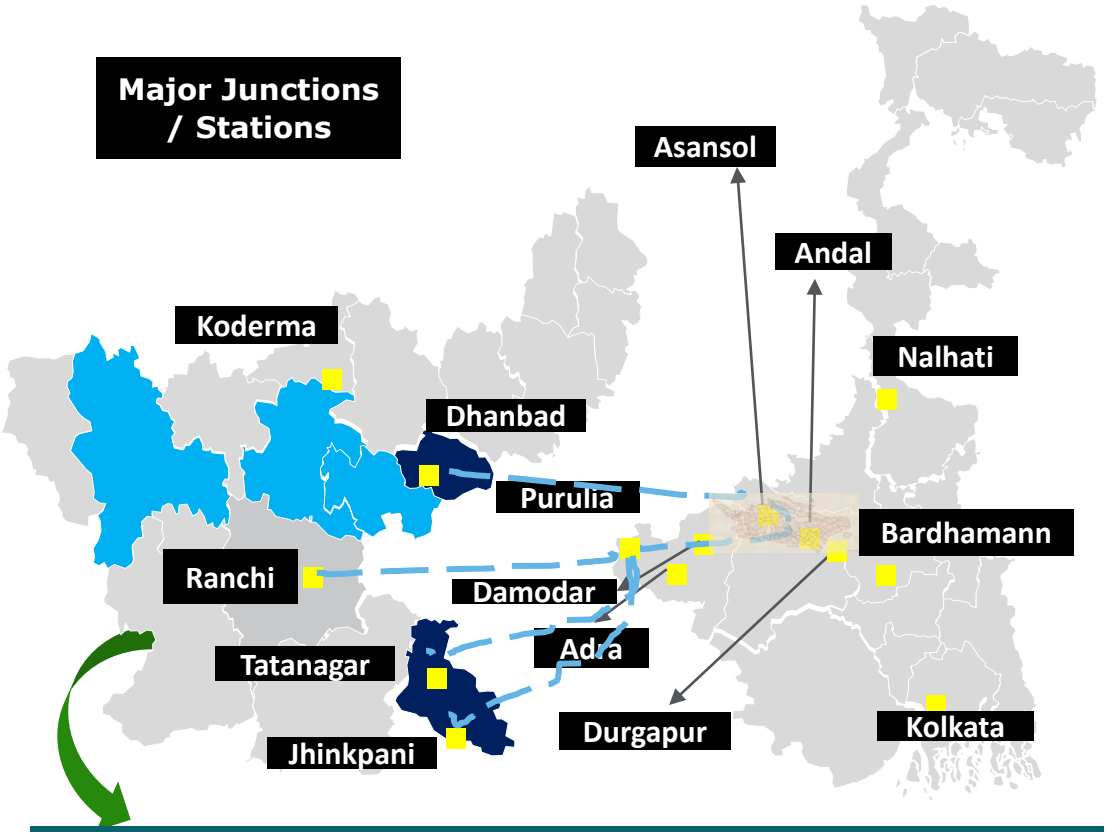
From	To	Traffic (Tonnes)	Rakes / Day
Andal	Asansol	52468	0.04
Asansol	Madhupur	56432	0.04
Madhupur	Jasidih	399655	0.28
Jasidih	Kiul	351366	0.25
Kiul	Luckeesarai	351366	0.25
Luckeesarai	Hathidah	351366	0.25
Hathidah	Barauni	351366	0.25
Barauni	Bachwara	3964	0.00
Bachwara	Samastipur	3964	0.00
Samastipur	Muzaffarpur	3964	0.00
Bhimgara	Sainthia	2360640	1.68
Sainthia	Nalhati	2360640	1.68
Nalhati	Barharwa	2360640	1.68
Barharwa	Tinpahar	2360640	1.68
Tinpahar	Bhagalpur	2360640	1.68
Jasidih	Bhagalpur	48289	0.03
Bhagalpur	Barharwa	48289	0.03

FY30

From	To	Traffic (Tonnes)	Rakes / Day
Andal	Asansol	86900	0.06
Asansol	Madhupur	93465	0.07
Madhupur	Jasidih	661924	0.47
Jasidih	Kiul	581946	0.41
Kiul	Luckeesarai	581946	0.41
Luckeesarai	Hathidah	581946	0.41
Hathidah	Barauni	581946	0.41
Barauni	Bachwara	6565	0.00
Bachwara	Samastipur	6565	0.00
Samastipur	Muzaffarpur	6565	0.00
Bhimgara	Sainthia	3909785	2.78
Sainthia	Nalhati	3909785	2.78
Nalhati	Barharwa	3909785	2.78
Barharwa	Tinpahar	3909785	2.78
Tinpahar	Bhagalpur	3909785	2.78
Jasidih	Bhagalpur	79978	0.06
Bhagalpur	Barharwa	79978	0.06

- **Major Power consumers in Bihar procuring coal from ECL** include NTPC Kahalgaon and Baruni Thermal Power.

O-D Source cluster Mapping – West Bengal to Jharkhand



Major Coal Consuming Districts of Jharkhand: 2030 (Estimated)

- *>15 MTPA Coal Consumption* — *Dhanbad, Purba Singhbhum*
- *5-10 MTPA Coal Consumption* — *Bokaro, Ramgarh, Hazaribagh, Palamu, Latehar*
- *1-5 MTPA Coal Consumption* — *Ranchi*

Expected Load from West Bengal to Jharkhand main trunk lines (Excluding load from other states on this line)

FY22

From	To	Traffic (Tonnes)	Rakes / Day
Andal	Damodar	341394	0.24
Damodar	Ramkanali	341394	0.24
Ramkanali	Purulia	341394	0.24
Purulia	Chandil	289742	0.21
Chandil	Sini	98257	0.07
Sini	Rajkharsawan	98257	0.07
Rajkharsawan	Jhinkpani	98257	0.07
Chandil	Tatanagar	191486	0.14
Purulia	Ranchi	51652	0.04
Andal	Asansol	40330	0.03
Asansol	Dhanbad	40330	0.03

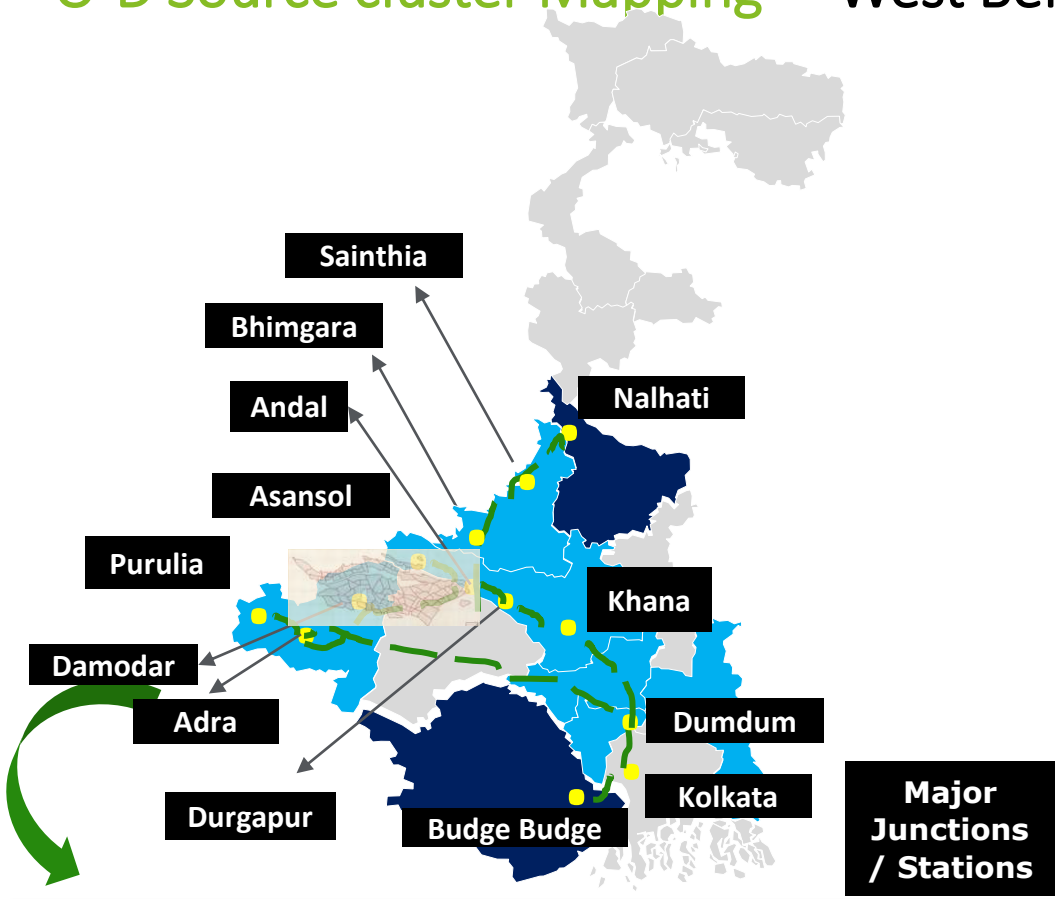
FY30

From	To	Traffic (Tonnes)	Rakes / Day
Andal	Damodar	565431	0.40
Damodar	Ramkanali	565431	0.40
Ramkanali	Purulia	565431	0.40
Purulia	Chandil	479883	0.34
Chandil	Sini	162737	0.12
Sini	Rajkharsawan	162737	0.12
Rajkharsawan	Jhinkpani	162737	0.12
Chandil	Tatanagar	317146	0.23
Purulia	Ranchi	85548	0.06
Andal	Asansol	66796	0.05
Asansol	Dhanbad	66796	0.05

- Major End-Use consumers in Jharkhand currently procuring coal from ECL include Tata Power, ACC Cement.

Note: Coal Dispatch from ECL by railway mode to numerous local, small and micro scale coal traders totaling to 0.06 MT have been distributed evenly across major railway nodes and important routes/junctions.

O-D Source cluster Mapping – West Bengal's Internal Consumption (Incl. Non CIL Blocks)



Major Coal Consuming Districts of West Bengal: 2030 (Estimated)

>15 MTPA Coal Consumption	*Murshidabad, Purba Mednipur, Paschim Mednipur*
5-10 MTPA Coal Consumption	*Purulia, Paschim Bardhamann, Purba Bardhamann, North 24 Parganas, Howrah, Hugli, Birbhum*

Expected Load in West Bengal' main trunk lines (Excluding load from other states on this line)

FY22

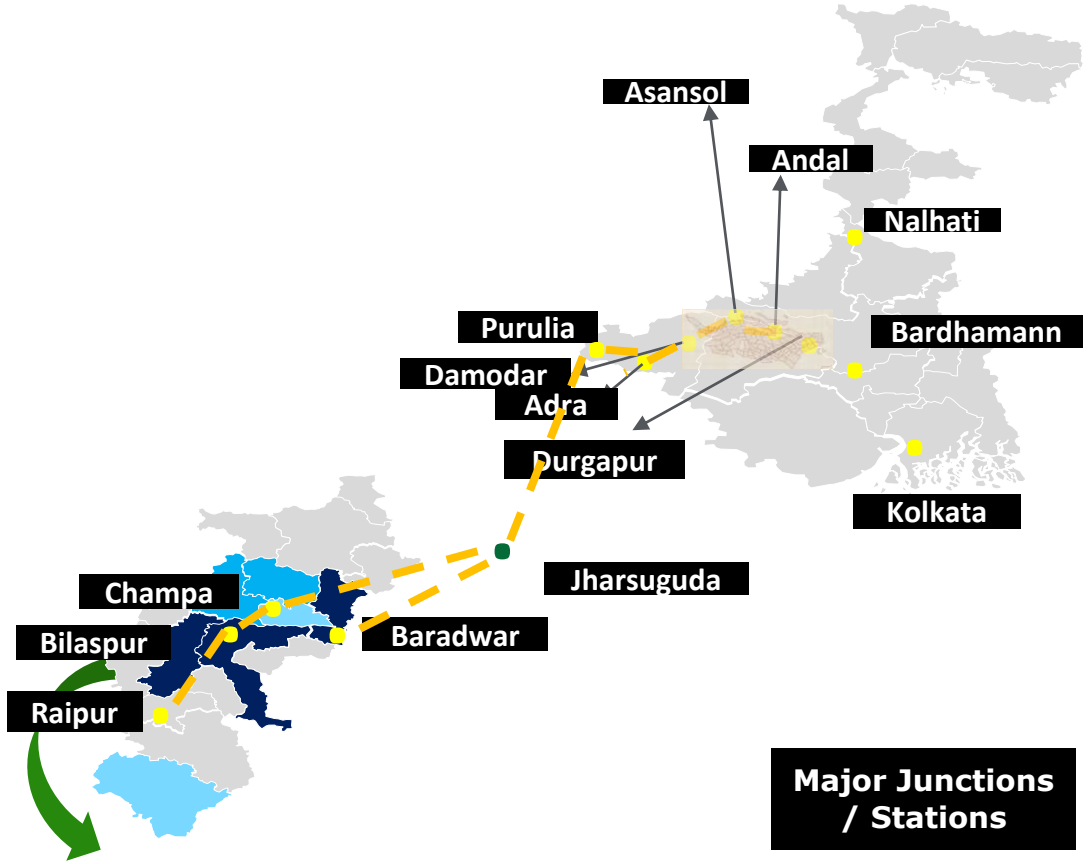
From	To	Traffic (Tonnes)	Rakes / Day
Andal	Khana	4198205	2.99
Khana	Dum Dum	2360220	1.68
Dum Dum	Ballygunge	2052258	1.46
Ballygunge	Budge Budge	2052258	1.46
Andal	Damodar	1515907	1.08
Andal	Bankura	2586134	1.84
Bhimgara	Sainthia	7258771	5.17
Khana	Naldanga	1014243	0.72
Asansol	Andal	2813696	2.00
Andal	Bhimgara	6437522	4.58
Sainthia	Nalhati	5407522	3.85
Nalhati	Barharwa	5407522	3.85
Asansol	Damodar	225568	0.16
Damodar	Ramkanali	1505568	1.07
Ramkanali	Adra	905568	0.64
Khana	Kolkata	978246	0.70
Andal	Bardhamann	2740903	1.95
Andal	Sainthia	207721	0.15

FY30

From	To	Traffic (Tonnes)	Rakes / Day
Andal	Khana	7361695	5.24
Khana	Dum Dum	3252849	2.31
Dum Dum	Ballygunge	2742791	1.95
Ballygunge	Budge Budge	2742791	1.95
Andal	Damodar	3090718	2.20
Andal	Bankura	5627017	4.00
Bhimgara	Sainthia	13219463	9.41
Khana	Naldanga	2170774	1.54
Asansol	Andal	4003914	2.85
Andal	Bhimgara	12579594	8.95
Sainthia	Nalhati	9579594	6.82
Nalhati	Barharwa	9579594	6.82
Asansol	Damodar	373595	0.27
Damodar	Ramkanali	3073595	2.19
Ramkanali	Adra	2073595	1.48
Khana	Kolkata	2193967	1.56
Andal	Bardhamann	4539591	3.23
Andal	Sainthia	344036	0.24

Note: Coal Dispatch from ECL by railway mode to numerous local, small and micro scale coal traders totaling to 0.5 MT have been distributed evenly across major railway nodes and important routes/junctions.

O-D Source cluster Mapping – West Bengal to Chattisgarh



Major Coal Consuming Districts of Chattisgarh: 2030 (Estimated)

- *>15 MTPA Coal Consumption* — *Raipur, Raigarh, Durg*
- *5-10 MTPA Coal Consumption* — *Korba, Bilaspur*
- *1-5 MTPA Coal Consumption* — *Janjgir-Champa, Bijapur-Dantewada-Sukma cluster*

Expected Load from West Bengal to Jharkhand main trunk lines (Excluding load from other states on this line)

FY22

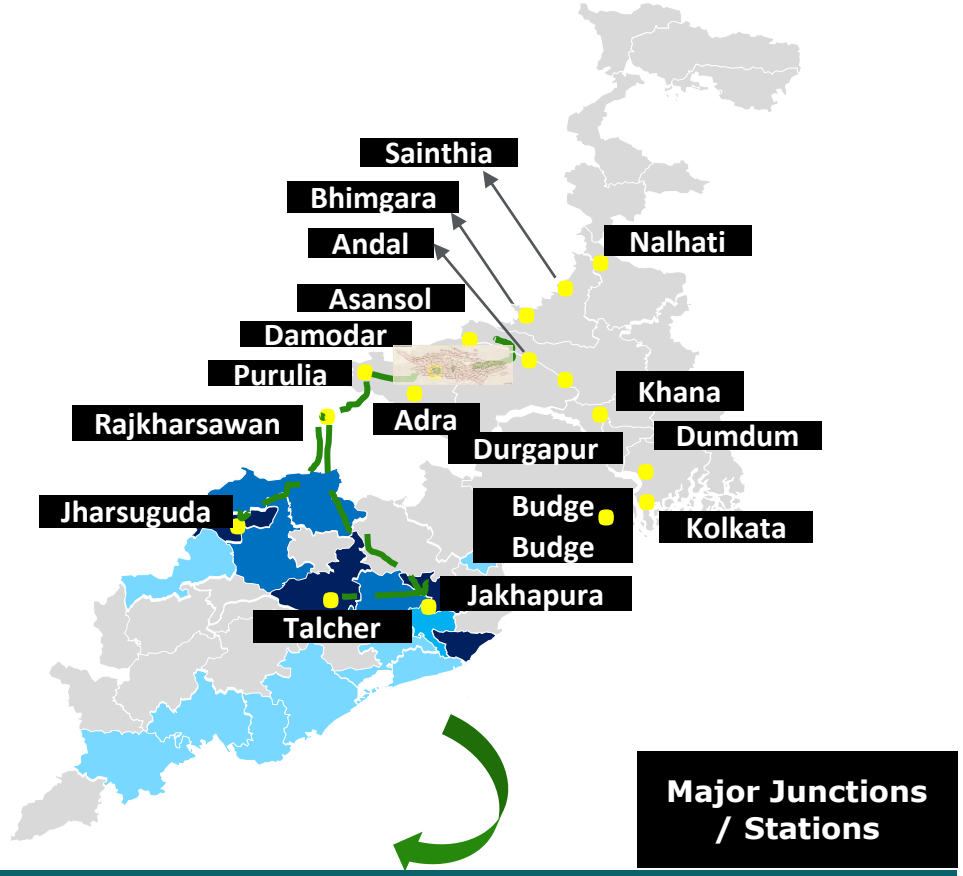
From	To	Traffic (Tonnes)	Rakes / Day
Andal	Damodar	500138	0.36
Damodar	Ramkanali	500138	0.36
Ramkanali	Purulia	500138	0.36
Purulia	Chandil	500138	0.36
Chandil	Sini	500138	0.36
Sini	Rajkharsawan	500138	0.36
Rajkharsawan	Bondamunda	500138	0.36
Bondamunda	Jharsuguda	500138	0.36
Jharsuguda	Champa	106865	0.08
Champa	Bilaspur	106865	0.08
Bilaspur	Raipur	106865	0.08
Jharsuguda	Naya Baradwar	461445	0.33
Asansol	Damodar	68172	0.05

FY30

From	To	Traffic (Tonnes)	Rakes / Day
Andal	Damodar	653513	0.47
Damodar	Ramkanali	653513	0.47
Ramkanali	Purulia	653513	0.47
Purulia	Chandil	653513	0.47
Chandil	Sini	653513	0.47
Sini	Rajkharsawan	653513	0.47
Rajkharsawan	Bondamunda	653513	0.47
Bondamunda	Jharsuguda	653513	0.47
Jharsuguda	Champa	139637	0.10
Champa	Bilaspur	139637	0.10
Bilaspur	Raipur	139637	0.10
Jharsuguda	Naya Baradwar	602954	0.43
Asansol	Damodar	89078	0.06

- Major End-Use consumers in Chattisgarh currently procuring coal from ECL include NTPC Lara and Bhilai Steel Plant.

O-D Source cluster Mapping – West Bengal to Odisha (Incl. Non CIL Blocks)



Major Coal Consuming Districts of Odisha: 2030 (Estimated)

>15 MTPA Coal Consumption	*Jharsuguda, Angul, Jajpur, Jagatsinghpur*
10-15 MTPA Coal Consumption	*Sundergarh, Sambalpur, Dhenkanal*
5-10 MTPA Coal Consumption	*Cuttack*
1-5 MTPA Coal Consumption	*Koraput, Rayagada, Gagapati, Ganjam, Khordha, Puri, Bargarh, Balasore*

Expected Load from West Bengal to Jharkhand main trunk lines (Excluding load from other states on this line)

FY22

From	To	Traffic (Tonnes)	Rakes / Day
Andal	Damodar	767100	0.55
Damodar	Ramkanali	1167100	0.83
Ramkanali	Purulia	435438	0.31
Purulia	Chandil	435438	0.31
Chandil	Sini	435438	0.31
Sini	Rajkharsawan	435438	0.31
Rajkharsawan	Bondamunda	423448	0.30
Bondamunda	Jharsuguda	423448	0.30
Ramkanali	Rupsa	731662	0.52
Rupsa	Jakhapura	731662	0.52
Jakhapura	Sambalpur	731662	0.52
Rajkharsawan	Jakhapura	11990	0.01

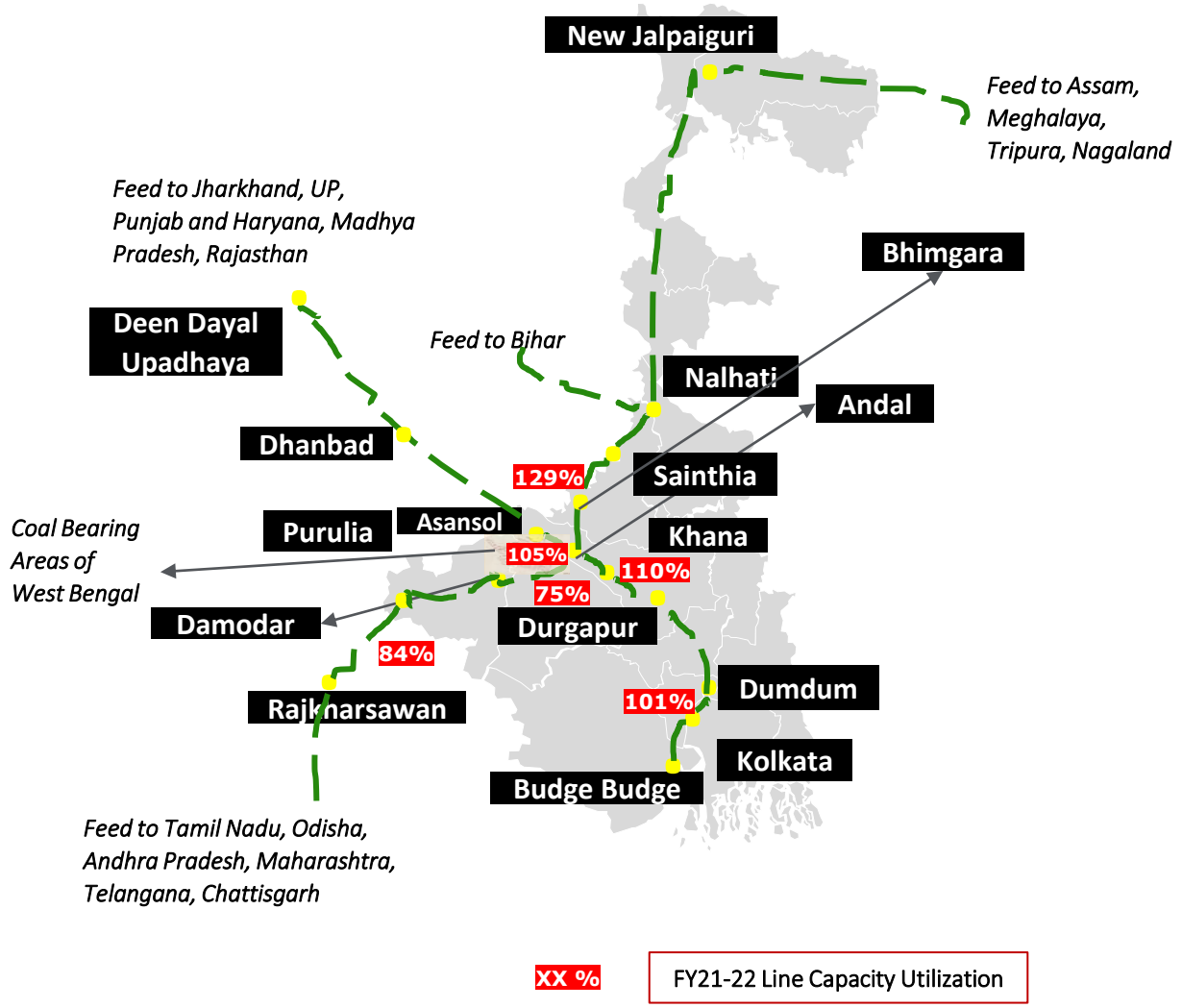
FY30

From	To	Traffic (Tonnes)	Rakes / Day
Andal	Damodar	1270501	0.90
Damodar	Ramkanali	1670501	1.19
Ramkanali	Purulia	458694	0.33
Purulia	Chandil	458694	0.33
Chandil	Sini	458694	0.33
Sini	Rajkharsawan	458694	0.33
Rajkharsawan	Bondamunda	438835	0.31
Bondamunda	Jharsuguda	438835	0.31
Ramkanali	Rupsa	1211807	0.86
Rupsa	Jakhapura	1211807	0.86
Jakhapura	Sambalpur	1211807	0.86
Rajkharsawan	Jakhapura	19858	0.01

- Major End-Use consumers in Odisha currently procuring coal from ECL include NTPC Talcher and Rourkela Steel Plant.

O-D Source cluster Mapping – Consolidated Coal Traffic from West Bengal to all states

FY22 Actual and FY30 (Estimated) coal traffic in major sections for Despatch of coal from West Bengal to various destinations						
From	To	Traffic (MT): 2022	Rakes / Day: 2022	Traffic (MT): 2030	Rakes / Day: 2030	Increase in Coal Traffic (Rakes / Day)
Andal	Damodar	4.84	3.44	8.59	6.11	2.67
Damodar	Ramkanali	5.41	3.85	9.27	6.60	2.75
Ramkanali	Purulia	3.24	2.30	5.10	3.63	1.32
Purulia	Chandil	3.20	2.28	5.04	3.59	1.31
Chandil	Sini	3.01	2.14	4.72	3.36	1.22
Sini	Rajkharsawan	3.01	2.14	4.72	3.36	1.22
Andal	Khana	4.20	2.99	7.36	5.24	2.25
Bhimgara	Sainthia	10.48	7.46	18.55	13.20	5.75
Asansol	Andal	6.69	4.76	10.42	7.42	2.66
Andal	Bhimgara	6.59	4.69	12.84	9.14	4.44
Sainthia	Nalhati	8.63	6.14	14.91	10.61	4.47
Nalhati	Barharwa	7.77	5.53	13.49	9.60	4.07
Andal	Bardhamann	2.74	1.95	4.54	3.23	1.28
Asansol	Deen Dayal Upadhaya	3.65	2.60	6.05	4.31	1.71



Significant railway connectivity projects in Jharkhand, West Bengal and adjoining areas (1/2)

Zone	Activity	Description of Proposed / Ongoing Works
Eastern Railway	New Lines	Lakshmikantapur-Namkhana-Chandanagar with new material modification for Kakadwip-Budakhali (5 km) & Chandanagar-Bakhali (17.2 km)
Eastern Railway	New Lines	Tarakeswar-Bishnupur with extension upto Dhaniakhali, Arambagh-Irphala, Irphala-Ghatal (11.2 km), Arambagh-Champadanga (23.3 km) & Bishnupur-Uparsol (31.8 km) and new material modification for Mynapur-Kamarpukur via Birsha (19 km)
Eastern Railway	Guage Conversion	Bardhaman-Katwa (51.52 km) with new material modification for Katwa-Bazarsau (30.59 km) - doubling, Katwa (Dainhat)-Mateswar (34.4 km), Negun - Mangalkot (8.60 km) & Mateswar - Memari (35.6 km) – NL
Eastern Railway	Doubling	New Alipore-Akra & Budge Budge-Pujali with new material modification for Pujali-Uluberia (Birshivpur)(10.25 km) & Pujali-Bahrahat(9.75 km)- new lines
Eastern Railway	Doubling	Pandabeswar-Chinpai (21.41 km) with new material modification between Barbani-Churulia (9 km) - new line
Eastern Railway	Track Renewals	Andal-Sainthia: TFR - 43.09 Km (DN Line)
Eastern Railway	Doubling	Andal-Sainthia - Broad gauge bypass line with direct connection from quadruple line to branch line (2.565 km)
Eastern Railway	Track Renewals	Andal-Sainthia - CTR - 2.38 km & TRR - 2.53 km (P)
South Eastern Railway	New Lines	Bankura - Damodar Valley (96 Km) GC with Bowai Chandi - Khana (22 km) NL, Rainagar-Masagram (20.9 km) NL, Bankura - Mukut Monipur (57 km) NL & Mukut Monipur-Uparsol (26.7 km) NL , Bankura (Kalabati)-Purulia via Hura - (65 km) NL & Mukut Monipur-Jhilim
South Eastern Railway	Doubling	Rajkharswan-Chakradharpur - 3rd line (20 km)
South Eastern Railway	Doubling	Rourkela-Jharsuguda - 3rd line (101 km)

Significant railway connectivity projects in West Bengal and adjoining areas (2/2)

Zone	Activity	Description of Proposed / Ongoing Works
South Eastern Railway	Track Renewables	Rourkela - Jharsuguda - CTR(S) - 8.28 km
South Eastern Railway	Track Renewables	Howrah-Kharagpur & Kharagpur-Tatanagar - CTR(S) -19.573 km
Northeast Frontier Railway	Gauge Conversion	New Jalpaiguri-Siliguri-New Bongaigaon line alongwith branch lines, material modification for Chalsa-Naxalbari (16 km) - new line & Rajabhatkhowa - Jainti (15.13 km) - new line
Northeast Frontier Railway	Track Renewals	Alipurduar jn. - Fakiragram - New Bongaigaon - TRR(P) - 18.449 km
Northeast Frontier Railway	Track Renewals	New Bongaigaon - Kamakhya - TSR(P) - 8.700 km
Northeast Frontier Railway	Track Renewals	New Jalpaiguri - Malda Town & New Jalpaiguri - Raninagar Jalpaiguri -CTR(P) - 13.120 km
East Central Railway	Track Renewal	Dhanbad-Chandrapura - Alternative route via Tundu-Nichitpur (25.81 km) (umbrella work
East Central Railway	Track Renewal	Dhanbad - Chandrapura - CTR(P) -1.576 km, TSR(P) - 3.70 km, CTR(S) (TSR(P) & TRR(S) -2.618 km
East Central Railway	Track Renewal	Dhanbad Div.- N.S.C.B.Gomoh - Barkakana - CTR(S/P) - 5.345 km & Danapur Div.- Jhajha - Patna - TRR(S) - 2.88 km & TSR(S) - 1.50 km
East Central Railway	Track Renewal	N.S.C.B.Gomoh - Patratu - TBR - 4.01 km, TFR - 1.011 km and Dhanbad - Chandrapura - TBR 5.916 Km
East Central Railway	Track Renewal	Garwa Road Jn. - Son Nagar jn. & Manpur - Pt. Deen Dayal Upadhyay Jn. - TRR(P) - 3.741 km
East Central Railway	Track Renewal	Manpur - Pt. Deen Dayal Upadhyay Jn. - CTR(P) - 33.187 km Manpur - Pd. Deen Dayal Upadhyay Jn. - TRR(P) - 13.33 Km & TSR(P) - 31.90 Km Manpur - Pd. Deen Dayal Upadhyay Jn.- TBR - 73.14 km & TFR - 72.37 km
East Central Railway	Track Renewal	Patratu - Garhwaroad - CTR(P) - 19.95 km, TRR(P) - 29.775 km, CTR(S), TSR(P) & TRR(S)) - 7.464 km, TRR(S) - 2.25 km

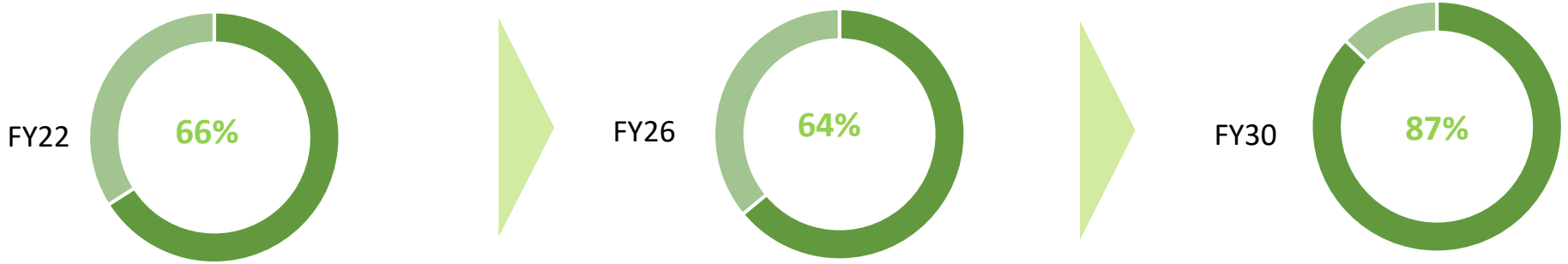
First Mile Connectivity Analysis of ECL

Logistical Outlook – Eastern Coalfields Limited (ECL)

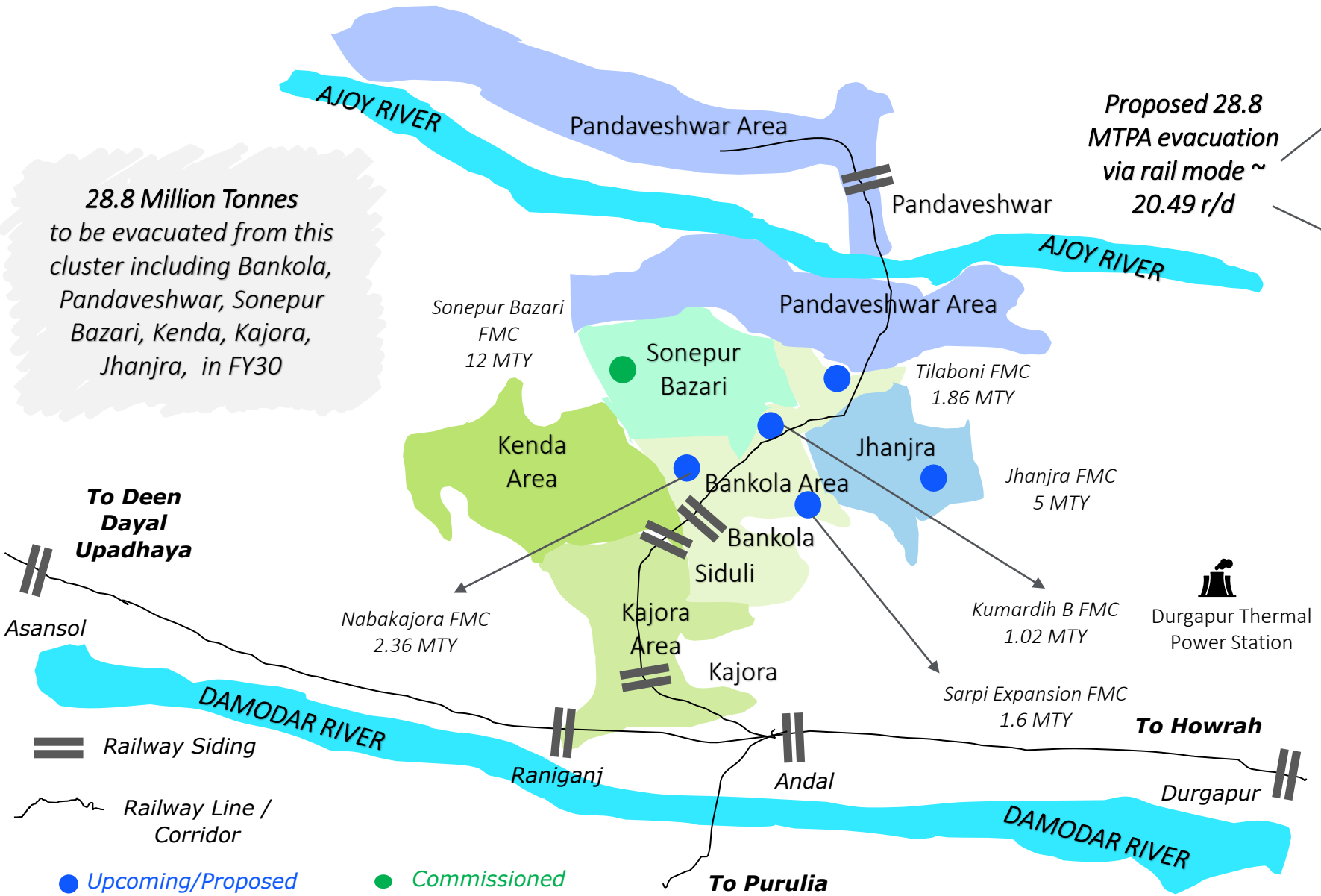
ECL's despatch is progressing towards higher share of rail from current 67% to close to 88 % by FY30. Ensuring that the evacuation capacity exists is a crucial aspect of the holistic logistics policy

AREAS	FY 22 ACTUAL DISPATCH (MT)					FY 26 DISPATCH 1 BT PLAN (MT)					FY 30 ANTICIPATED DISPATCH (MT)				
	RAIL	ROAD	MGR	OTHERS	TOTAL	RAIL	ROAD	MGR	OTHERS	TOTAL	RAIL	ROAD	MGR	OTHERS	TOTAL
BANKOLA	1.9	0.18	0	0	2.08	2.14	0	0	0	2.14	5.4	0	0	0	5.4
JHANJRA	3.59	0.05	0	0	3.64	3.5	0	0	0	3.5	5	0	0	0	5
KAJORA	0.72	0.72	0	0	1.44	1.83	0	0	0	1.83	1.6	0	0	0	1.6
KENDA	0.84	0.17	0	0	1.01	3.46	0	0	0	3.46	2.8	0	0	0	2.8
SATGRAM	0.58	0.12	0	0	0.7	0.97	0	0	0	0.97	1.3	0	0	0	1.3
SRIPUR	0.17	0.02	0	0	0.19	0.75	0	0	0	0.75	0.5	0	0	0	0.5
KUNUSTORIA	0.74	0.1	0	0	0.84	1.81	0	0	0	1.81	1.8	0	0	0	1.8
SALANPUR	2.28	0.94	0	0	3.22	5.2	0	0	0	5.2	9.4	0	0	0	9.4
MUGMA	1.54	0.29	0	0	1.83	2.11	0	0	0	2.11	2	0	0	0	2
SP MINES	0.88	0.23	0	0	1.11	2.5	0	0	0	2.5	2.5	0	0	0	2.5
SONEPUR BAZARI	9.75	0.48	0	0	10.23	12	0	0	0	12	12	0	0	0	12
PANDAVESHWAR	1.35	0.23	0	0	1.58	2.82	0	0	0	2.82	2	0	0	0	2
RAJMAHAL	0	0.08	8.21	0	8.29	-	0	22.5	0	22.5	14.4	0.1	9	0	23.5
SODEPUR	0.31	0.1	0	0	0.41	0.31	0	0	0	0.31	0.3	0	0	0	0.3
TOTALS	24.65	3.71	8.21	0	36.57	39.4	0	22.5	0	61.9	61	0.1	9	0	70.1

Rail's share progression for ECL



Proposed evacuation plan for East Raniganj CF Areas cluster achievable



28.8 Million Tonnes *to be evacuated from this cluster including Bankola, Pandaveshwar, Sonepur Bazari, Kenda, Kajora, Jhanjra, in FY30*

Proposed 28.8 MTPA evacuation via rail mode ~ 20.49 r/d

A combination of FMC projects coming up at the cluster along with existing wharf wall/railway siding capacity would be sufficient to evacuate the coal produced by the cluster in FY 2030.

FMC Projects: 23.84 MTPA (~17 rakes per day)

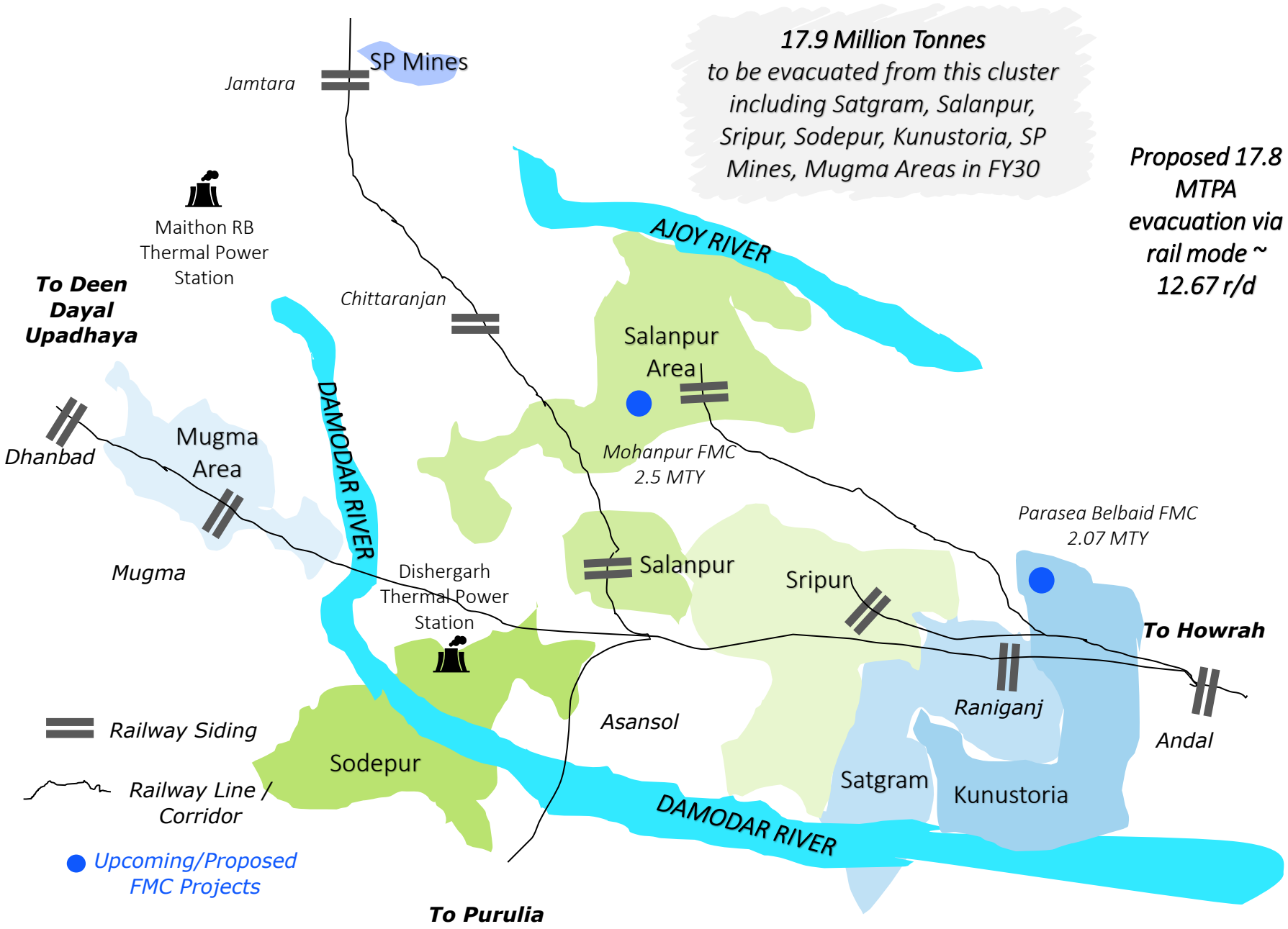
Evacuation via Wharf Wall/Railway Siding: 5-6 MTPA (~ 4 rakes per day)

✓ *Achievable*

Total Evacuation of 28.8 MTPA from this cluster is achievable

- *Given completion of Upcoming FMC projects at Bankola Area. FMC projects in Bankola Area have excess capacity of 1.44 MTPA and can be used to evacuate coal from adjacent Kenda area.*
- *FMC Project at Jhanjhra is expected to be commissioned in FY 2023. FMC project at Sonepur Bazari has been commisssioned already*
- *If there is delay in completion of FMC projects, then existing wharf wall/railway siding capacity should be sufficient to cater to additional evacuation load. Existing road infrastructure is also present to cater to requirement*

Proposed evacuation plan for West Raniganj CF Areas cluster achievable



A combination of FMC projects coming up at the cluster along with existing wharf wall/railway siding capacity would be sufficient to evacuate the coal produced by the cluster in FY 2030.

FMC Projects: 4.6 MTPA (~3.3 rakes per day)

Evacuation via Wharf Wall/Railway Siding: 13-14 MTPA (~ 10 rakes per day)

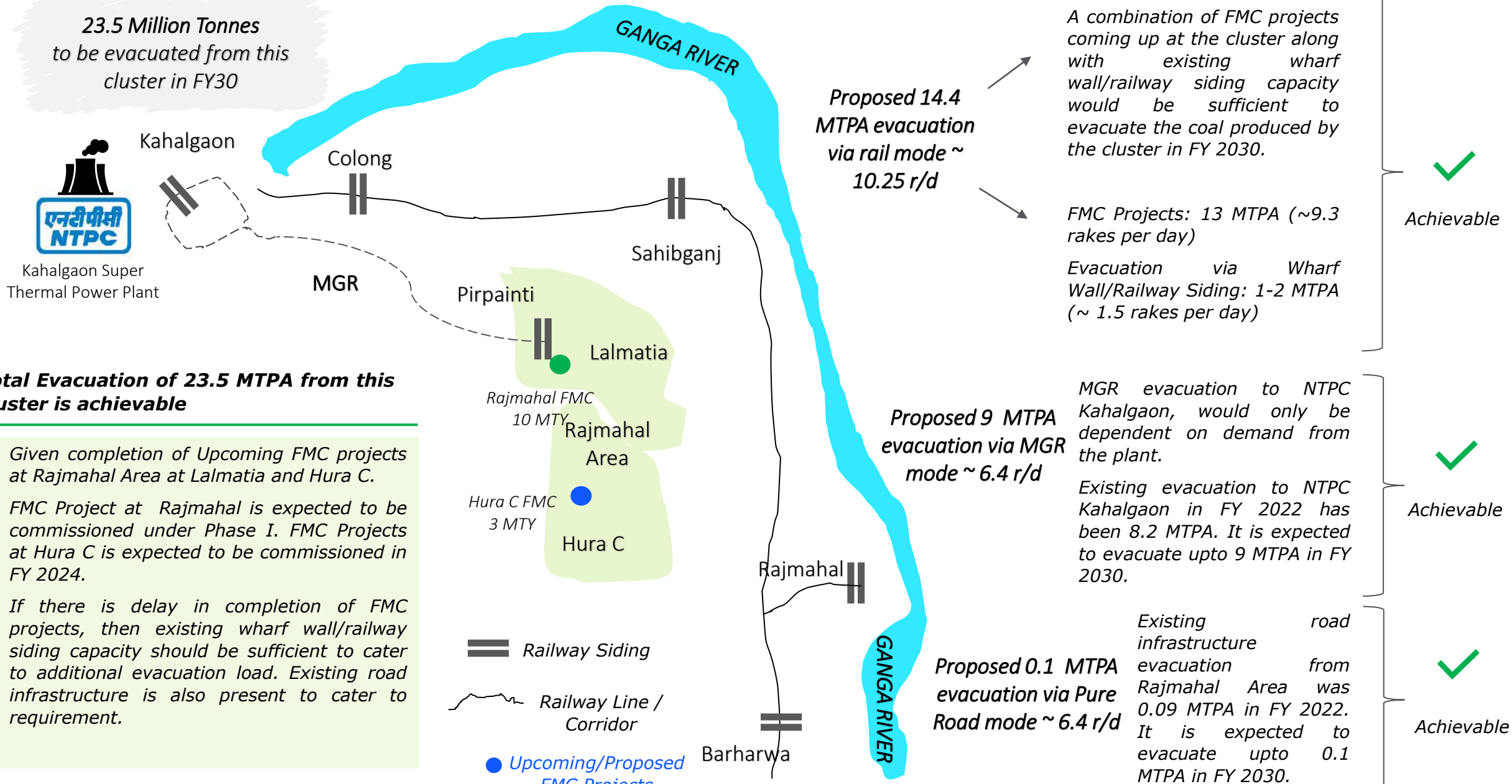
✓ *Achievable*

Total Evacuation of 17.8 MTPA from this cluster is achievable

- *Given completion of Upcoming FMC projects at Salanpur Area and Kunustoria Area. FMC projects in Kunustoria Area have excess capacity of 0.3 MTPA and can be used to evacuate coal from adjacent Satgram area.*
- *FMC Projects at Mohanpur is expected to be commissioned in FY 2024. FMC Projects at Parasea Belbaid is expected to be commissioned in FY 2024.*
- *If there is delay in completion of FMC projects, then existing wharf wall/railway siding capacity should be sufficient to cater to additional evacuation load. Existing road infrastructure is also present to cater to requirement*

Proposed evacuation plan for Rajmahal CF areas cluster achievable

23.5 Million Tonnes to be evacuated from this cluster in FY30



Kahalgaon Super Thermal Power Plant

Total Evacuation of 23.5 MTPA from this cluster is achievable

- *Given completion of Upcoming FMC projects at Rajmahal Area at Lalmatia and Hura C.*
- *FMC Project at Rajmahal is expected to be commissioned under Phase I. FMC Projects at Hura C is expected to be commissioned in FY 2024.*
- *If there is delay in completion of FMC projects, then existing wharf wall/railway siding capacity should be sufficient to cater to additional evacuation load. Existing road infrastructure is also present to cater to requirement.*

Proposed 14.4 MTPA evacuation via rail mode ~ 10.25 r/d

A combination of FMC projects coming up at the cluster along with existing wharf wall/railway siding capacity would be sufficient to evacuate the coal produced by the cluster in FY 2030.

FMC Projects: 13 MTPA (~9.3 rakes per day)

Evacuation via Wharf Wall/Railway Siding: 1-2 MTPA (~ 1.5 rakes per day)

✓ *Achievable*

Proposed 9 MTPA evacuation via MGR mode ~ 6.4 r/d

MGR evacuation to NTPC Kahalgaon, would only be dependent on demand from the plant.

Existing evacuation to NTPC Kahalgaon in FY 2022 has been 8.2 MTPA. It is expected to evacuate upto 9 MTPA in FY 2030.

✓ *Achievable*

Proposed 0.1 MTPA evacuation via Pure Road mode ~ 6.4 r/d

Existing road infrastructure evacuation from Rajmahal Area was 0.09 MTPA in FY 2022. It is expected to evacuate upto 0.1 MTPA in FY 2030.

✓ *Achievable*

Evacuation Capacity Augmentation for coal transportation roads at ECL

		Length (Km)	Carriage Width (m)
	Road Projects already taken up		
ECL	Raod from I-land to East-North corner of CHP sub-station (Marked as CF in Plan)	0.35	7.5
	Road from ramp end slope portion of crusher to North of maintenace zone tail end (Marked as C2 -C3 in Plan)	0.27	15
	Road from near reclaim section to near RCC drain (Marked as IJ in Plan)	0.12	7.5
	Road from near Silo weigh bridge to Pillar no 10 maintenace zone (Marked as BI in Plan)	0.51	7.5
	Road from BTL crusher to slope ramp end portion (Marked as C1-C2 in Plan)	0.112	9
	Proposed Road Projects		
	Construction of concrete road for coal transportation from ICL Crusher Point to New CHP at Sonepur Bazari, ECL	2.3	7.0 metre + Divider +7.0 Metre
	Construction of concrete road fro coal transportation road in CHP at Rajmahal Area of ECL	2.71	7.5 to 15

CIL(ECL) blocks in Jharkhand – Rajmahal CF

#	Name of the Block	Exploration Status	Evacuation Route	Distance from Nearest major Rail Line
1	Amarkonda Murdangal	Regional Explored	Existing railway main line from Rampurhat to Dumka with proposed railway line from Amarkonda to meet main line at Harinsingh. From Harinsingh, traffic bound from Jharkhand, Uttar Pradesh and west of Rajmahal CF to move towards Dumka and onwards towards Jasidih or towards Hansdiha and onwards to Bhagalpur as per destination. Traffic bound for West Bengal to move towards Rampurhat from Harinsingh. Local roads may be used to transport coal from these blocks to Harinsingh till new proposed railway line is commissioned.	~13 Kms from Harinsingh
2	Brahmini (Including Chichro Patsimal)	Regional Explored		
3	Haripur Chaparia	Regional Explored		
4	Kulkuli Dangal	Regional Explored		
5	Kayada-Choudhar-Gariapani	Explored		
6	Salaipahar	Regional Explored		
7	Chuperbhita	Explored	Pakur to Godda Proposed new BG Rail line will pas through these blocks. After development of Sidings at these projects, it will directly feed the new line with three possible evacuation routes. If coal has to move to South-east, it will move towards Godda to Hansdiha to Dumka to various destinations. For supply to WB, it will move to Pakur to Rampurhat to various WB destinations, for movement to Northern States, it will move via new proposed Rail Line (Godda-Pirpainti new BG Line) to Pirpainti via Godda and further to Bhagalpur to various destinations.	~22 Kms from Godda
8	Simlong	Explored		
9	Bhalukasba Surni (Including Ph-I,II,III)	Explored	This block is very near to Pirpainti. This will leverage proposed New Godda-Pirpainti line. For movement towards Northern states, coal will move towards Pirpainti to Bhagalpur to destinations. For movement towards Eastern states, coal will move towards Godda to Hansdiha to Dumka to various destinations. For movement to WB destinations, it will move to Godda to Pakur to Rampurhat to destinations or to Pirpainti to Sahibganj to Pakur to Rampurhat to destinations.	~15 Kms from Pirpainti
10	Hura C' (Deoghar)	Explored	Feed Via MGR to NTPC Kahalgaon and Farakka. If coal has to be evacuated via Rail, FMC projects would be used for evacuation. Coal would be evacuated via the new proposed Rail Line (Godda-Pirpainti new BG Line) and further move towards Bhagalpur if supply is to Northern States. For Movement to Western States, it would move from Godda to Hansdiha to Dumka and further from Dumka to various destinations. For movement towards west Bengal, coal will move from Godda to Pakur to Rampurhat and from Pakur to WB destinations.	~ 30 Kms, equidistant from Godda and Pirpainti
11	Lalmatia A&B	Partly Explored		

Non-CIL blocks in Pipeline in Rajmahal CF

Details of Non-CIL blocks in Rajmahal CF					
#	Name of the Block	Exploration Status	Operational Status	Evacuation Route	Distance from Nearest major Rail Line (in km)
1	Jitpur	Explored	Non-Operational	Godda Railway Station (Mine to Station via local roads- km)	21 km to Godda
2	Mahuagarhi	Partially explored	Non-Operational	Block lies beside proposed railway line, Litipara-Amrakonda	-
3	Singdhri-Cholpathar	Under exploration	Non-Operational	The coal will be transported by road NH-114A, from the mine to the railhead at Murari, which is 37 km away	37 km
4	Urma Paharitola	Regionally explored	Non-Operational	Urma Paharitola allotted to Aurobindo Reality and Infra Pvt. Ltd. (PRC: 15 MTPA)	
5	Saharpur-Jamarpani	Regionally explored	Non-Operational	Existing railway main line from Rampurhat to Dumka with proposed railway line from Amrakonda to meet main line at Harinsingh.	NA (Block beside Rampurhat-Dumka line, distance from Rampurhat-55 km)
6	Pokharia Paharpur	Under exploration	Non-Operational	From Harinsingh, traffic bound from Jharkhand, Uttar Pradesh and west of Rajmahal CF to move towards Dumka and onwards towards Jasidih or towards Hansdiha and onwards to Bhagalpur as per destination.	13 km to Harinsingh
7	Kalyanpur Badalpara	Regionally explored	Non-Operational	Traffic bound for West Bengal to move towards Rampurhat from Harinsingh. Local roads may be used to transport coal from these blocks to Harinsingh till new proposed railway line is commissioned.	12 km to Harinsingh
8	Gomarpahari-Siulibana	Regionally explored	Non-Operational	Saharpur-Jamarpani allotted to UP Rajya Vidyut Utpadan Nigam Ltd. (PRC: 1 MTPA)	15 km to Harinsingh
9	Salbhadra-Gomarpahari	Explored	Non-Operational		20 Km to Harinsingh

Non-CIL blocks in Pipeline in Rajmahal CF

Details of Non-CIL blocks in Rajmahal CF

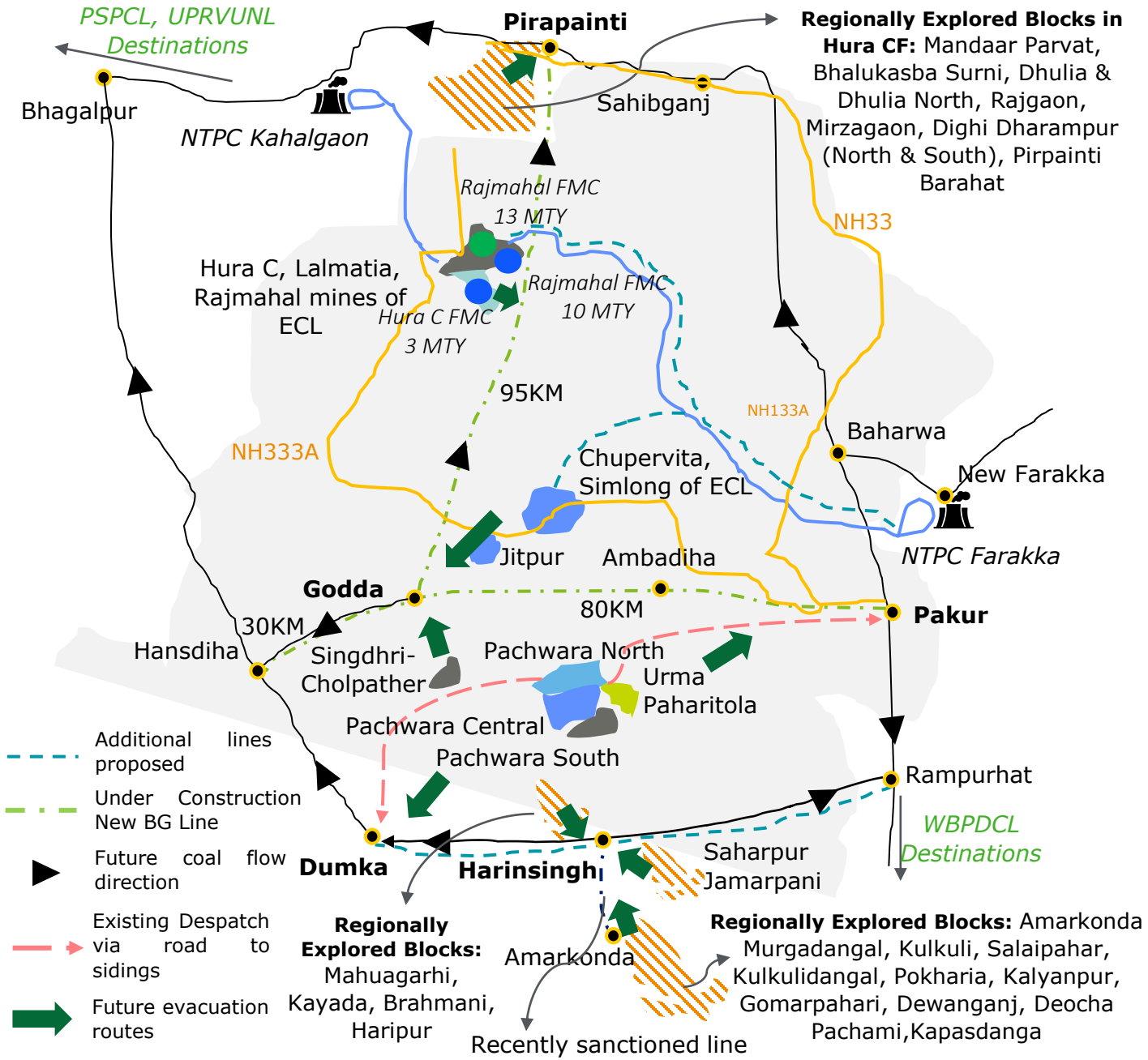
#	Name of the Block	Exploration Status	Operational Status	Evacuation Route	Distance from Nearest major Rail Line (in km)
10	Mandar Parvat	Explored	Non-Operational		~17 Kms from Pirpainti
11	Mirzagaon	Under exploration	Non-Operational		~6 Kms from Pirpainti
12	Dhulia & Dhulia North	Explored	Non-Operational	These blocks are very near to Pirpainti. This will leverage proposed New Godda-Pirpainti line. For movement towards Northern states, coal will move towards Pirpainti to Bhagalpur to destinations. For movement towards Eastern states, coal will move towards Godda to Hansdiha to Dumka to various destinations. For movement to WB destinations, it will move to Godda to Pakur to Rampurhat to destinations or to Pirpainti to Sahibganj to Pakur to Rampurhat to destinations.	~14 Kms from Pirpainti
13	Pirpainti Barahat	Explored	Non-Operational		~18 Kms from Pirpainti
14	Rajgaon	Under Exploration	Non-Operational		~8 Kms from Pirpainti
15	Dighi Dharampur North & South	Regionally Explored	Non-Operational		~16 Kms from Pirpainti

Non-CIL blocks in Pipeline in Rajmahal CF

Details of Non-CIL blocks in Rajmahal CF

#	Name of the Block	Exploration Status	Operational Status	Evacuation Route	Distance from Nearest major Rail Line (in km)
16	Dewanganj-Harisingha	Regionally Explored	Non-Operational	Existing railway main line from Rampurhat to Dumka with proposed railway line from Amarkonda to meet main line at Harinsingh. From Harinsingh, traffic bound from Jharkhand, Uttar Pradesh and west of Rajmahal CF to move towards Dumka and onwards towards Jasidih or towards Hansdiha and onwards to Bhagalpur as per destination. Traffic bound for West Bengal to move towards Rampurhat from Harinsingh. Local roads may be used to transport coal from these blocks to Harinsingh till new proposed railway line is commissioned. Alternatively, it can also leverage Mallarpur Bazar Station for evacuation towards West Bengal.	25 km from Harinsingh And 15 Km from Mallarpur Bazar
17	Deocha-Pachami	Regionally Explored	Non-Operational		
18	Kapasdanga-Bharkata	Regionally Explored	Non-Operational		
19	Pachwara Central	Explored	Operational	The coal is currently being transported by road to Pakur & Dumka. For movement towards northern states, coal will move from Dumka to Bhagalpur and onwards. For movement towards eastern states, coal will move towards Pakur to Rampurhat. Pachwara Central allotted to Punjab State Power Corp Ltd. (PRC of 5.6 MTPA) Pachwara North allotted to WBPDCL (PRC of 15 MTPA) Pachwara South allotted to Neyveli UP Power Ltd. (PRC of 9 MTPA)	55 km from Pakur 35 km from Dumka
20	Pachwara North	Explored	Operational		
21	Pachwara South	Regionally explored	Non-Operational		

Proposed evacuation plan for Rajmahal CF areas cluster achievable



Total Evacuation of 23.5 MTPA from 4 mines of ECL by FY30

Proposed 14.4 MTPA evacuation via rail mode ~ 10.25 r/d	FMC Projects: 23 MTPA (~16.27 rakes per day) capacity will exist by FY30 Evacuation via Wharf Wall/Railway Sidings would not be required
Proposed 9 MTPA evacuation via MGR mode ~ 6.4 r/d	Existing evacuation to NTPC Kahalgaon and Farakka in FY 2022 has been 8.2 MTPA. It is expected to evacuate upto 9 MTPA in FY 2030.

Remaining Smaller Quantities by Road

Evacuation of 36.5 MTPA from Non-CIL Mines by FY30

For Saharpur Jamarpani (UPRVUNL) , the evacuation would be from Rampurhat and would move towards dumka – Bhagalpur to power plants in Uttar Pradesh.

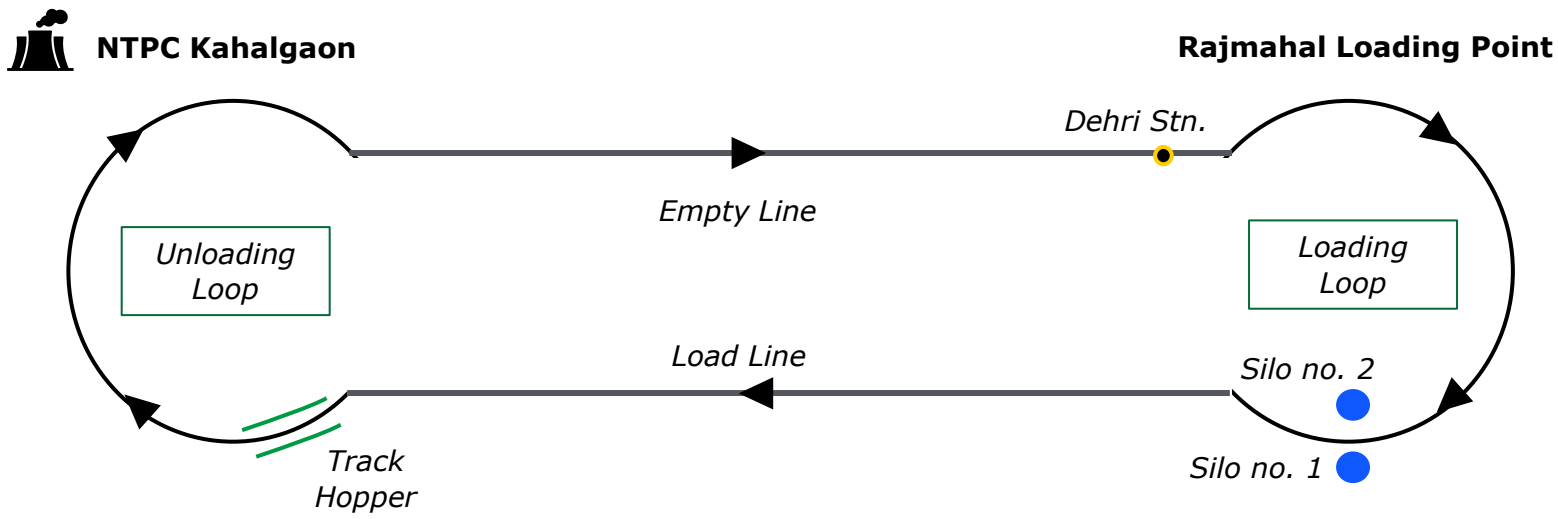
For Pachwara Central (PSPCL), Pachwara North (WBPDCL), and Pachwara South (NUPL) will leverage Pakur Railway Station for loading. Godda – Pirapainti can also be leveraged for north movements by PSPCL and NUPL. These coal block owners have formed a SPV with equity participation for development of coal siding at Pakur for shared use.

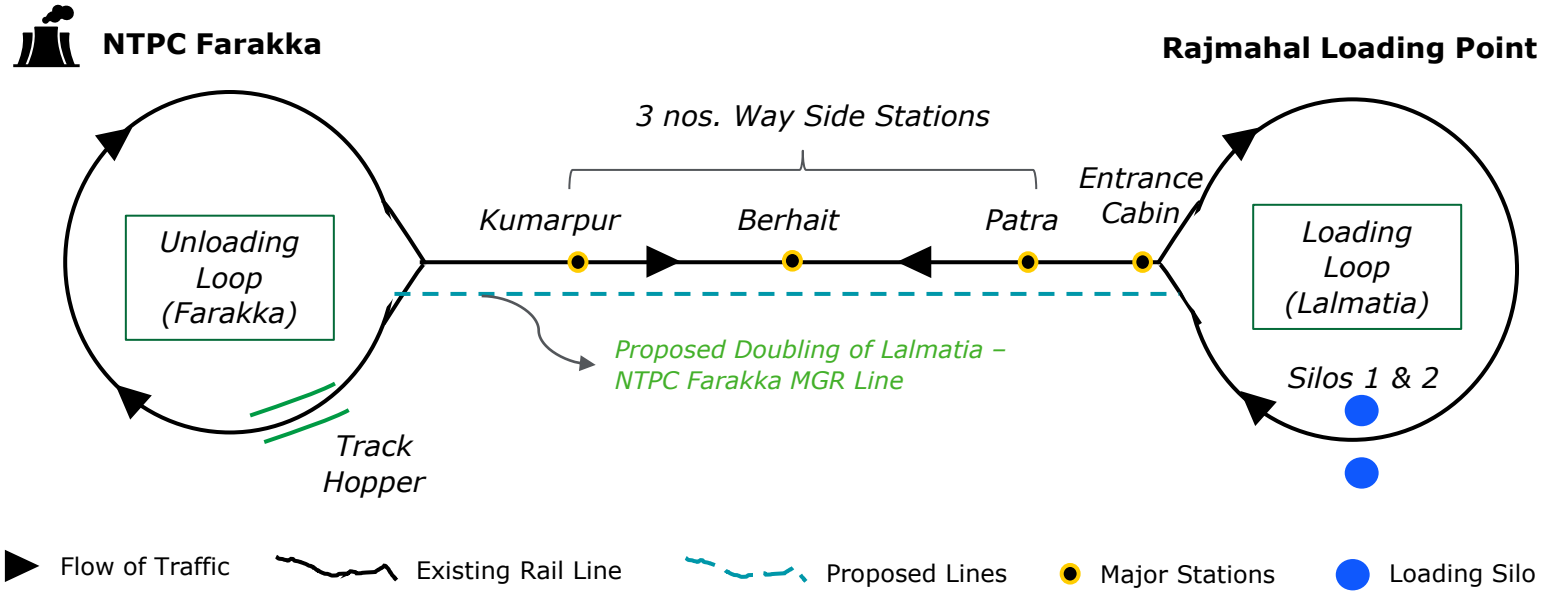
WBPDCL currently taking coal via road to both Dumka and Pakur stations for despatch to its power plants

Detailed evacuation routes for under exploration blocks have been mapped in the list attached

Expected commissioning of railway works: Godda-Pirpainti Line TDC by FY28-FY29 | Godda-Pakur Line TDC by FY28-FY29

Proposed Doubling of Rajmahal – NTPC Farakka MGR Line





Flow of Traffic | Existing Rail Line | Proposed Lines | Major Stations | Loading Silo

Details of Existing MGR Lines

MGR Line for NTPC Kahalgaon	Double rail line already exists between two bulb points for coal evacuation to NTPC Kahalgaon
MGR Line for NTPC Farakka	For NTPC Farakka, there is only single rail line between two bulb points

Details of Enhanced Loading Capacity

- 10 MTPA SILO is being commissioned at Rajmahal for transport of coal to plants of NTPC under CIL's FMC projects, in addition to existing silo
- Further, another 3 MTPA SILO is being commissioned at Hura-C coal mine for transport of coal to plants of NTPC under CIL's FMC projects.
- For smooth transport of coal from augmented silo capacity i.e., on FMC project completion, it is proposed that doubling of rail line from Rajmahal to NTPC Farakka may be evaluated

Key Insights and Recommendations

#	Recommendation	Way Forward
1	New BG line between Godda and Pakur should be expedited to reduce reliance on road transport from the Pachwara blocks to Pakur and Dumka.	Expediting of new line Godda-Pakur
2	At the same time, FMC projects with requisite capacities may be planned by block owners for the Pachwara blocks for efficient loading of coal	FMC projects to be taken up/expedited
3	Proposed projects of Murari-Pakur 3rd and 4th line to be expedited due to increased coal traffic from Pakur along with Bardhman-Shaktigarh 5th line	Proposed 3rd & 4th line to be expedited
4	Double line from Ambadhia station (Pakur-Godda line) to Pachwara coal mines (Pachwara North, Pachwara central and Pachwara South) may taken up post discussion by stakeholders with Indian Railways	Double line from Ambadhia station (Pakur-Godda line) to Pachwara coal blocks
5	New BG line from Saharpur-Jamarpani block to Harisingh station to be taken up. This may be extended in future to cater to coal traffic from Deocha-Pachami and other non-operational blocks	New line to Harisinghpur from southern blocks
6	MGR line from Rajmahal to NTPC Farakka may be extended to cover coal evacuation from Chupervita of ECL along with doubling of the NTPC Farakka MGR line. Hura C to Rajmahal MGR (~12 Kms) is being constructed by NTPC for taking coal to either Kahalgaon and Farakka Plants	Doubling of MGR Line and expedition of connectivity from Hura C to Rajmahal. NTPC
7	Expediting of Chitra-Basukinath line works along with doubling of Rampurhat-Dumka line to facilitate coal traffic in the Rajmahal CF	Doubling of Rampurhat-Dumka line
8	Options for commissioning of Public Freight Terminals with facilities of mechanized loading of coal may be evaluated for providing rake loading services to non-CIL blocks to reduce road movement of coal from these regions	Exploration of Public Freight Terminals for mechanized coal loading and coal transport through rail for non-CIL blocks
9	Automatic Signaling may be proposed across all major rail sections in the vicinity of Rajmahal CF	Indian Railways

Estimated Wagon Procurement requirement by Indian Railways (ECR, SER, ER – Jharkhand & West Bengal)

Destination State	Million Tonne - Kms	Volume (Million Tonnes)	Weighted Avg Distance of Despatch (KMs)
Jharkhand	3075.80	19.04	161.54
West Bengal	8097.04	38.18	212.07
Uttar Pradesh	25024.23	30.60	817.92
Bihar	7128.65	19.73	361.31
Punjab & Haryana	17924.77	13.03	1375.97
Others	7181.25	9.58	750
Total	68431.74	130.15 Million Tonnes	

FY22 - Rail

Average Lead for Coal Supply in FY22 for supplies by Jharkhand & West Bengal

525.80 KMs

Destination State	Million Tonne - Kms	Volume (Million Tonnes)	Weighted Avg Distance of Despatch (KMs)
Jharkhand	6671.76	41.30	161.54
West Bengal	12490.92	58.90	212.07
Uttar Pradesh	45803.46	56.00	817.92
Bihar	13982.70	38.70	361.31
Punjab & Haryana	45407.04	33.00	1375.97
Additional Push Volumes + Commercial Despatches to be taken as per FY22 avg Leads	22726.64	57.22	397.18
Total	147082.53	285.12 Million Tonnes	

FY30 - Rail

Average Lead for Coal Supply in FY30 for supplies by Jharkhand & West Bengal

515.86 KMs

	FY22	FY30
Average Lead of coal Despatch from JH + WB (KMs)	525.80	515.86
Estimated Average Turnaround time of Rakes (Days)	3.92	3.85
Rakes / Day Despatch by Rail + RCR + RSR Mode	90.38	198

Additional Rakes/Day Despatch Envisaged	107.62
Estimated Improved TAT (Days)	3.85
Total Number of Rakes Required	414.34
Estimated Wagons to be Procured for Coal till FY30	**24,032**

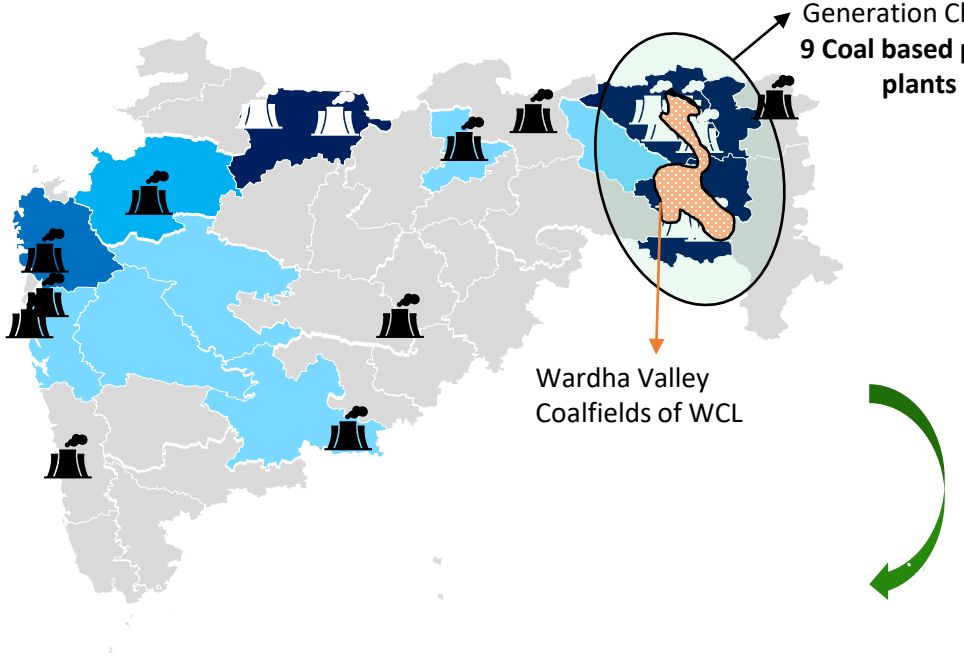
Additional ~1,803 Wagons would be required for despatches during peak demand period from November to March

Source: Sagarmala Report, Ministry of Ports, Shipping & Waterways, Comprehensive Action Plan for Port Connectivity on Gatishakti NMP 2022, DPIIT]

Detailed analysis
for
Maharashtra

Maharashtra's coal-based power generation clusters

Maharashtra's Total Coal Demand from Power Sector in FY22: 82 Million Tonnes



Major Coal Consuming Districts of Maharashtra: 2030 (Estimated)

>15 MTPA Coal Consumption	*Nagpur, Chandrapur, Bhandara, Jalgaon*
10-15 MTPA Coal Consumption	*Palghar/Thane*
5-10 MTPA Coal Consumption	*Nashik*
1-5 MTPA Coal Consumption	*Solapur, Pune, Raigad, Ahmednagar, Wardha & Akola*

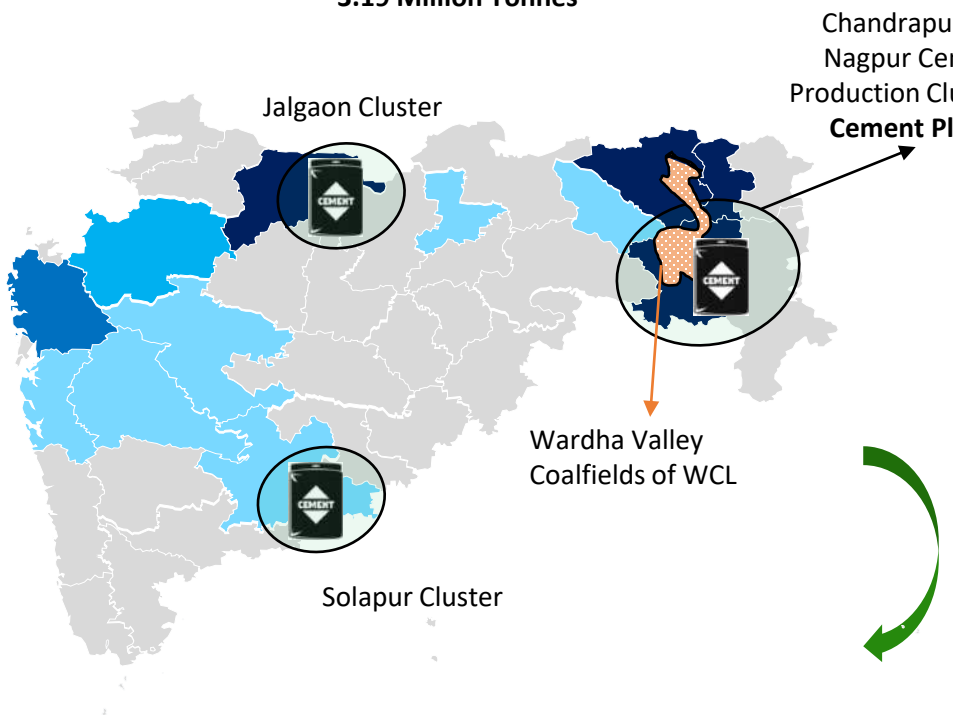
Major Coal Based Power Plants in Maharashtra

Name of TPS	Power Utility	Installed Capacity (MW)	Coal Consumed in FY22 (MMT)
Tiroda	Adani Power Maharashtra Lttd	3300	14.1826
Adani Dahanu	Adani Electricity Mumbai Ltd	500	1.989
Dhariwal	Dhariwal Infrastructure Ltd	600	2.721
GMR Warora	GMR Warora Energy Ltd	600	2.3192
Ratnagiri	JSW Energy Ltd	1200	2.7286
Bhusawal	MAHAGENCO	1210	4.7446
Chandrapur	MAHAGENCO	2920	11.5712
Khaparkheda	MAHAGENCO	1340	6.2042
Koradi	MAHAGENCO	2190	8.1874
Nashik	MAHAGENCO	630	1.6781
Parli	MAHAGENCO	750	1.9664
Paras	MAHAGENCO	500	1.9981
Mouda Super TPS	NTPC Ltd	2320	8.6862
Solapur Super TPS	NTPC Ltd	1320	3.2532
Amravati TPS	RattanIndia Power Ltd.	1350	5.9049
Trombay	The TATA Power Company Ltd	750	2.31
Sai Wardha Power Ltd, Warora	Sai Wardha Power Generation Pvt Ltd	540	1.4753
	Total	**22020**	**81.92**

+ Under Construction 660 MW Bhusawal STPP Unit 1 being developed by MAHAGENCO

Maharashtra's Cement production clusters

Maharashtra's Total Coal Demand from Cement Sector in FY22: 3.19 Million Tonnes



Major Coal Consuming Districts of Maharashtra: 2030 (Estimated)

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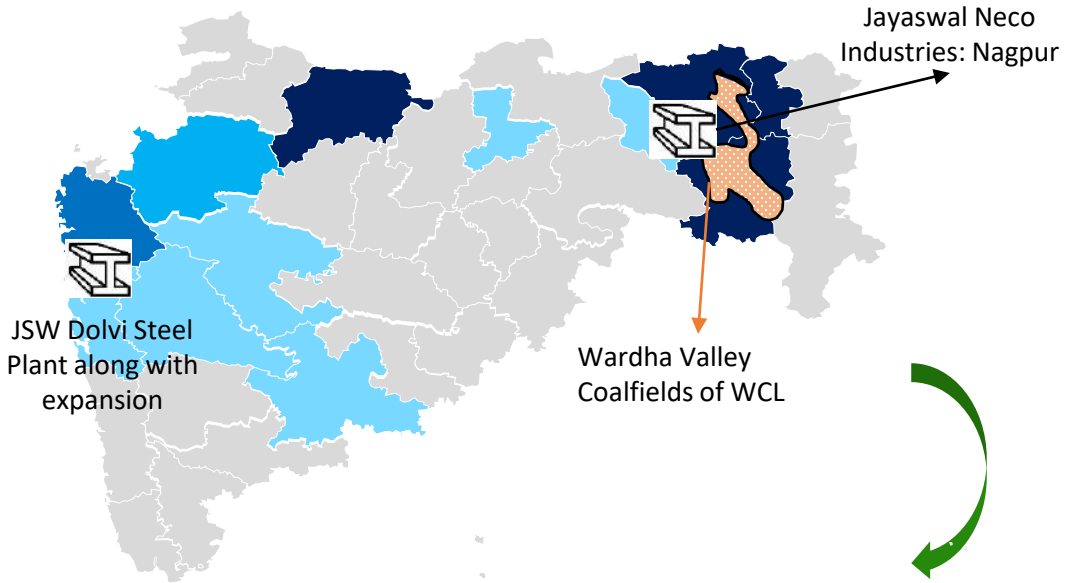
5-10 MTPA Coal Consumption	*Nashik*
1-5 MTPA Coal Consumption	*Solapur, Pune, Raigad, Ahmednagar, Wardha & Akola*

Major Cement Production Plants in Maharashtra

Name of Cement Plant	Cement Production: FY22 (MTPA)	Estimated Coal Consumption(MTPA)
ACC Ltd Chanda, Chandrapur	2.63	0.36
Ambuja Cement, Maratha Cement, Chandrapur	3.60	0.49
Century Textiles, Manikgarh Cement I & II, Chandrapur	3.00	0.41
Ultratech Cement, Awarpur, Chandrapur	2.73	0.37
Ultratech Cement, Hotgi, Solapur	2.40	0.32
Ultratech Cement, Nagpur	1.40	0.19
Ultratech Cement, Ratnagiri	0.34	0.05
Zuari Cement, Solapur	0.84	0.11
Orion Cement, Jalgaon	1.40	0.19
Murli Industries, Chandrapur	2.10	0.28
Mancherial Cement, Jalgaon	1.40	0.19
JSW Dolvi, Raigad	0.70	0.09
India Cements, Parli, Beed	0.77	0.10
Birla Corporation, Butibori, Nagpur	0.35	0.05
Total Maharashtra Cement Production	**23.66**	**3.19**

Maharashtra's Iron & Steel production clusters

Maharashtra's Total Coal Demand from Iron & Steel Sector in FY22: 3.38 Million Tonnes



Major Coal Consuming Districts of Maharashtra: 2030 (Estimated)

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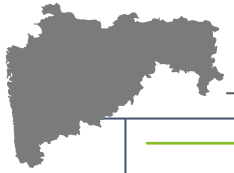
10-15 MTPA Coal Consumption	*Palghar/Thane*
5-10 MTPA Coal Consumption	*Nashik*
1-5 MTPA Coal Consumption	*Solapur, Pune, Raigad, Ahmednagar, Wardha & Akola*

Major Crude Steel and Sponge Iron Plants in Maharashtra

	No of Units				Production ('000 Tonnes)				Estimated Coal Consumption (MTPA)
Crude Steel	BOF	EAF	IF	Total	BOF	EAF	IF	Total	**Total**
	0	9	46	55	0	5105	3155	8260	**0.061**

	No of units	Production ('000 Tonnes)	Estimated Coal Consumption (MTPA)
Sponge Iron	7	2371.95	**3.32**

WCL has ambitious production capacity expansion plans



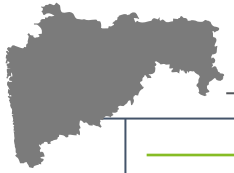
Maharashtra (WCL)

All figures in million tonnes

Coal Supply from WCL	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Pench Kanhan & Tawa Valley CF	2.97	2.84	3.3	3.71	4.59	4.59	4.59	4.59	4.59
Wardha Valley, Umrer, Kamptee & Bander CF	54.74	61.426	63.7	64.30	65.42	65.42	65.42	65.42	65.42
Total WCL (CIL)	58	64	67	68	70	70	70	70	70

- Wardha Valley, Umrer, Kamptee and Bander coalfields are the major coalfields contributing to current production of WCL.
- Till FY30, WCL is expected to grow from current ~64 MT (FY23) to ~70 MT (FY30), with a CAGR growth of ~1.3%
- WCL's major coal producing area of Wardha Valley has produced ~40 MT in FY23 with plans to produce ~40 MT in FY30. Hence, this area has already reached its target of FY30 with existing evacuation infrastructure.

WCL has ambitious production capacity expansion plans (1/5)



Maharashtra

All figures in million tonnes

Coalfield			AREA	Name of Mine / Project	Type (UG / OC)	PR Capacity (MTY)	Actual 21-22	Act 2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30
Wardha Valley	Chandrapur	Mahakali	Chandrapur	UG		0.029									
Wardha Valley	Ballarpur	Ballarpur RO	Chandrapur	UG	0.600	0.088	0.110	0.120	0.120	0.120	0.120	0.120	0.120	0.120	0.120
Wardha Valley	Ballarpur	Sasti RO	Chandrapur	UG	0.360	0.042	0.000								
Wardha Valley	Chandrapur	Durgapur Rayatwari RPR	Chandrapur	UG	0.600	0.108	0.100	0.150	0.150	0.150	0.140	0.140	0.140	0.140	0.140
Wardha Valley	Chandrapur	Hindusthan Lalpeth (Mana & Nandgaon)	Chandrapur	UG	0.600	0.150	0.063	0.090	0.080	0.080	0.080	0.080	0.080	0.080	0.080
Wardha Valley	Wani North	Rajur (Incl. RO)	Yeovatmal	UG	0.300	0.052	0.053	0.065	0.080	0.080	0.070	0.070	0.070	0.070	0.070
Kamptee	Nagpur	Patansaongi RPR (Patansongi Scheme)	Nagpur	UG	0.370	0.054	0.037	0.070	0.070	0.070	0.070	0.070	0.070	0.070	0.070
Kamptee	Nagpur	Saoner RPR (II &III)	Nagpur	UG	0.960	0.249	0.282	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.500
Kamptee	Nagpur	Silewara Ph-II	Nagpur	UG	0.800	0.078	0.052	0.085	0.090	0.090	0.100	0.100	0.100	0.100	0.100
Bander	Umrer	Morpar	Chandrapur	UG	0.090	0.072	0.024								
Pench Kanhan	Pench	Mahadeopuri	Chindhwara	UG	0.150	0.082	0.073	0.125	0.100	0.100	0.120	0.120	0.120	0.120	0.120
Pench Kanhan	Pench	Mathani	Chindhwara	UG	0.270	0.073	0.092	0.060							
Pench Kanhan	Pench	Naharia	Chindhwara	UG	0.360	0.252	0.283	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300
Pench Kanhan	Pench	Vishnupuri II	Chindhwara	UG	0.260	0.074	0.095	0.125	0.090						
Pench Kanhan	Kanhan	Jharna	Chindhwara	UG	0.090										

WCL has ambitious production capacity expansion plans (2/5)

Maharashtra

All figures in million tonnes

Coalfield			AREA	Name of Mine / Project	Type (UG / OC)	PR Capacity (MTY)	Actual 21-22	Act 2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30
Pench Kanhan	Kanhan	Mauri Scheme RCE	Chindhwara	UG	0.180	0.171		0.190	0.190	0.190					
Pench Kanhan	Kanhan	Tandsi Expan. (Incl. Tandsi RPR)	Chindhwara	UG	0.590	0.158	0.094	0.060	0.160	0.160	0.300	0.300	0.300	0.300	0.300
Tawa Valley	PATAHKHERA	Chatarpur II	Betul	UG	0.200	0.071	0.060	0.060							
Tawa Valley	PATAHKHERA	Sarni (including D2 Dyke)	Betul	UG	0.420										
Tawa Valley	PATAHKHERA	Shobhapur	Betul	UG	0.600	0.019									
Tawa Valley	PATAHKHERA	Tawa Phase-I	Betul	UG	0.210	0.328	0.270	0.370	0.360	0.360	0.360	0.360	0.360	0.360	0.360
Tawa Valley	PATAHKHERA	Chattarpur I (including Umri)	Betul	UG	0.210	0.334	0.407	0.610	0.600	0.600	0.360	0.360	0.360	0.360	0.360
Tawa Valley	PATAHKHERA	Tawa - II Expansion	Betul	UG	0.390	0.353	0.464	0.600	0.660	0.660	0.650	0.360	0.360	0.360	0.360
Kamptee	Nagpur	Saoner UG-1 Expansion	Nagpur	UG	1.200	0.205	0.163	0.160	0.445	0.900	1.200	1.200	1.200	1.200	1.200
Kamptee	Nagpur	Waghoda	Nagpur	UG	0.390						0.200	0.300	0.350	0.350	0.350
Pench Kanhan	Pench	Jamuniya	Chindhwara	UG	0.900										
Pench Kanhan	Pench	Dhankasa	Chindhwara	UG	1.000					0.300	0.700	1.400	1.800	1.800	1.800
Tawa Valley	PATAHKHERA	Tawa -III	Betul	UG	0.840					0.145	0.420	0.420	0.720	0.720	0.720
Pench Kanhan	Kanhan	Sharda	Chindhwara	UG	0.378				0.045	0.080	0.150	0.250	0.350	0.350	0.350
Tawa Valley	PATAHKHERA	Gandhigram	Betul	UG	1.260						0.100	0.400	0.800	1.200	1.200
Wardha Valley	Ballarpur	Gauri I & II Expn. Scheme	Chandrapur	OC	1.800	0.944	0.866	1.000	1.000						
Wardha Valley	Ballarpur	Pauni(OC SCHEME)	Chandrapur	OC	0.600										
Wardha Valley	Wani	Kolgaon RPR	Chandrapur	OC	0.500	0.600	0.600	0.600	0.320						
Pench Kanhan	Pench	Explo.of Patch Pench (Sethia, Barkui, Chinda)	Chindhwara	OC	0.100	0.180	0.015	0.200	0.500	0.500					

WCL has ambitious production capacity expansion plans (3/5)

Maharashtra

All figures in million tonnes

Coalfield			AREA	Name of Mine / Project	Type (UG / OC)	PR Capacity (MTY)	Actual 21-22	Act 2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30
Wardha Valley	Ballarpur	Scheme for Ballarpur OC	Chandrapur	OC	0.540	0.265	0.101	0.625	0.625	0.625					
Pench Kanhan	Kanhan	Ambara & other Quarry Patches (Mohan)	Chindhwara	OC	0.120	0.373	0.291								
Bander	Umrer	Gokul	Nagpur	OC	1.875	1.875	1.875	1.875	1.000						
Wardha Valley	Ballarpur	Gauri Deep	Chandrapur	OC	0.400	0.600	0.563	0.600	0.600	0.600	0.600				
Wardha Valley	Ballarpur	Sasti Expn. (SCHEME)	Chandrapur	OC	1.400	1.463									
Wardha Valley	Ballarpur	Pauni-II Expansion OC	Chandrapur	OC	3.250	3.250	3.250	3.250	3.900	3.900	3.250	3.000	1.850		
Wardha Valley	Chandrapur	Durgapur Expn. Deep	Chandrapur	OC	3.000	1.836	1.725	1.795	2.400	2.400	3.000	3.000	3.000	3.000	3.000
Wardha Valley	Chandrapur	Padmapur Deep Extention	Chandrapur	OC	2.500	0.190	0.011								
Wardha Valley	Majri	New Majri Sector IA & II A Extn.	Chandrapur	OC	2.000	1.667	2.402	2.000	1.000						
Wardha Valley	Wani	Mungoli Nirguda Deep Extn. OC	Chandrapur	OC	3.500	4.167	4.308	5.200	5.250	5.250	5.250	5.250	5.250	3.000	
Wardha Valley	Wani	Bellora/ Naigaon Deep	Yeovatmal	OC	1.000	0.942	1.250	1.250	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Wardha Valley	Wani	Niljai Expansion (Deep)	Yeovatmal	OC	3.500	3.752	4.451	4.500	4.500	4.500	4.500	4.500	4.500	4.200	
Wardha Valley	Wani North	Ghonsa RPR	Yeovatmal	OC	0.600	0.426	0.460	0.600							
Wardha Valley	Wani North	Junad Extn.	Yeovatmal	OC	0.600	0.739	0.631	0.600	0.600						
Wardha Valley	Wani North	Kolar pimpri Extn.	Yeovatmal	OC	1.500	0.511	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500
Wardha Valley	Wani North	Ukni Deep	Yeovatmal	OC	2.000	1.500	1.756	1.700	2.000	2.000	2.000	2.000	2.000	2.000	2.000

WCL has ambitious production capacity expansion plans (4/5)

Maharashtra

All figures in million tonnes

Coalfield			AREA	Name of Mine / Project	Type (UG / OC)	PR Capacity (MTY)	Actual 21-22	Act 2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30
Wardha Valley	Wani North	Junad Extn.	Yeovatmal	OC	0.600	0.739	0.631	0.600	0.600						
Wardha Valley	Wani North	Kolar pimpri Extn.	Yeovatmal	OC	1.500	0.511	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500
Wardha Valley	Wani North	Ukni Deep	Yeovatmal	OC	2.000	1.500	1.756	1.700	2.000	2.000	2.000	2.000	2.000	2.000	2.000
Kamptee	Nagpur	Bhanegaon	Nagpur	OC	1.000	0.633	0.403	0.625	0.625	1.150	1.000	1.000	1.000	1.000	1.000
Kamptee	Nagpur	Amalgamated Gondegaon - Ghatrohan	Nagpur	OC	3.500	3.500	3.500	3.500	3.500	1.500					
Wardha Valley	Chandrapur	Hindustan Lalpeth Expn	Chandrapur	OC	1.000	0.457	1.000	1.000		1.000	0.600	0.600			
Pench Kanhan	Pench	Urdhan	Chindhwara	OC	0.600	0.501	0.700	0.600	0.700	0.700	0.700	0.700	0.700	0.700	0.400
Umrer	Umrer	Umrer Expansion (Amb River Phase - IV)	Nagpur	OC	2.000	3.552	3.808	1.500							
Wardha Valley	Wani	Penganga	Chandrapur	OC	4.500	6.300	5.706	5.400	2.100						
Kamptee	Nagpur	Singori	Nagpur	OC	0.800	1.120	1.200	1.200	1.200						
Kamptee	Nagpur	Amalgamated Inder-Kamptee OC	Nagpur	OC	3.200	2.221	2.506	2.650	3.200	3.200	3.200	3.200	3.200	3.200	3.200
Wardha Valley	Majri	Amalgamated Yekona I & II OC	Chandrapur	OC	2.750	2.417	2.750	2.750	2.750	2.750	2.750	2.750	2.750	2.750	2.750
Wardha Valley	Wani North	Pimpalgaon OC Scheme	Yeovatmal	OC	1.500			0.400	1.000	1.500					
Wardha Valley	Chandrapur	Bhatadih Expn	Chandrapur	OC	2.000	1.302	1.465	1.465	1.465	2.000	2.000	2.000	2.000	2.000	2.000
Umrer	Umrer	Dinesh OC Expn	Nagpur	OC	8.000	1.131	3.003	4.200	4.200	6.000	6.000	6.000	6.000	6.000	8.000
Wardha Valley	Majri	New Majri Expn UG to OC	Chandrapur	OC	3.000	1.925	1.864	2.250	3.000	3.000	3.000	3.000	3.000	3.000	3.000
Umrer	Umrer	Makardhokra I	Nagpur	OC	2.000	3.720	4.200	4.100	4.200	4.200	4.200				

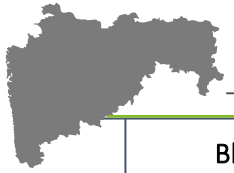
WCL has ambitious production capacity expansion plans (5/5)

Maharashtra

All figures in million tonnes

Coalfield			AREA	Name of Mine / Project	Type (UG / OC)	PR Capacity (MTY)	Actual 21-22	Act 2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30
Kamptee	Nagpur	Adasa UG to OC	Nagpur	OC	1.500	0.607	0.237	1.025	1.500	1.850	1.850	1.850	1.850	1.850	1.850
Pench Kanhan	Pench	Vishnupuri UG to OC	Chindhwara	OC	2.000					0.490	1.160	1.500	1.500	1.500	1.500
Wardha Valley	Ballarpur	Gauri-Pauni Expn	Chandrapur	OC	3.500				2.500	3.500	3.500	3.500	3.500	3.500	3.500
Wardha Valley	Ballarpur	Sasti Expn	Chandrapur	OC	2.500		2.450	2.200	1.725	2.500	2.500	2.500	2.500	2.500	2.500
Wardha Valley	Wani North	Ghonsa Expn OC (Kumbharkhani UG to OC)	Yeovatmal	OC	1.500				0.600	1.200	1.500	1.500	1.500	1.500	1.000
Wardha Valley	Ballarpur	Dhuptala Sasti UG to OCP	Chandrapur	OC	2.500		0.701	1.300	1.700	2.500	2.500	2.500	2.500	2.500	2.500
Wardha Valley	Ballarpur	Ballarpur N/W	Chandrapur	OC	1.500					0.500	1.200	1.200	1.200	1.200	1.500
UMRER SIDING	Umrer	Gokul Extn OC	Nagpur	OC	2.000				1.000	2.000	2.000	2.000	2.000	2.000	2.000
Kamptee	Nagpur	Singhori Deep	Nagpur	OC	2.000				1.000	1.500	1.500	1.500	1.500	1.500	2.000
Umrer	Umrer	MKD-I Expn	Nagpur	OC								4.200	4.200	4.200	4.200
Wardha Valley	Ballarpur	Gauri Central/Gauri Deep Expn	Chandrapur	OC							0.500	0.500	0.500	0.600	1.000
Wardha Valley	Majri	Konda Hardola	Chandrapur	OC							0.500	0.500	0.600	1.600	2.500
Wardha Valley	Wani North	Chinchala-Pisgaon	Yeovatmal	OC										0.500	1.000
Kamptee	Nagpur	Silori OC	Nagpur	OC										0.500	1.000
Wardha Valley	Wani	Penganga Deep	Chandrapur	OC							0.500	0.500	0.500	1.000	2.000
Wardha Valley	Wani North	Borda	Yeovatmal	OC										0.500	1.000
Wardha Valley	Wani North	Shivani	Yeovatmal	OC										0.500	0.700
Wardha Valley	Wani North	Parsoda	Yeovatmal	OC										0.300	0.800
Pench Kanhan	Pench	Thesgora UG to OC	Chindhwara	OC											0.300
Wardha Valley	Wani	Kolgaon Deep	Chandrapur	OC							0.500	0.500	0.500	0.600	0.800

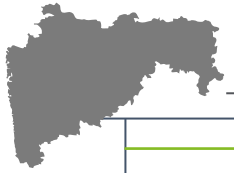
Non-CIL blocks in Wardha Valley CF



Maharashtra

Block Name	Allocated to	PRC (MT)	Operational Status	Proposed Loading point	EUP and other remarks	FY23 Production (MT)	FY22 Production (MT)
Baranj I, Baranj II, Baranj III, Baranj IV, Manora Deep & Kiloni	Karnataka Power Corporation Ltd	2.5	Operational	Roadways will be used to deliver coal to Majri Junction by haul trucks (distance from mine is approx.- 7Kms)	Bellary Thermal Power Station Unit 1 and 2 Karnataka	1.59	0.96
Belgaon	Sunflag Iron & Steel Company Ltd	0.27	Operational	Roadways will be used to deliver coal to Chikni Road station (distance from mine is approx.- 4.5 Kms)	500 TPD KILN DRI/ 10MW Combustor, 350 TPD KILN DRI & 15 MW Captive Power Plant at Bhandara Maharastra	~0.19	0.18
Marki Mangli - III	B.S. Ispat Ltd	0.3	Operational	Roadways will be used to deliver coal to Kayar station	B.S. ISPAT LTD Nagpur	~0.14	0.13
Marki Mangli - I	Topworth Urja and Metals Ltd	0.38	Operational	Roadways will be used to deliver coal to Kayar station (distance from mine is approx.- 24 Kms)	2 X 100 TPD Sponge iron Plant & 2 X 13 MW Captive power plant at Nagpur	~0.14	0.24
Marki Mangli - II	Yazdani International Pvt Ltd	0.3	Non-Operational	Roadways will be used to deliver coal to Wani station (distance from mine is approx.- 37 Kms)	Sponge Iron Plant of Yazdani Steel and Power, Jajpur Odisha	0	0
Takli-Jena-Bellora (North & South)	Aurobindo Reality & Infrastructure Pvt Ltd	1.5	Non-Operational	Roadways will be used to deliver coal to Bhandak Station (distance from mine is approx.- 7Kms)	Commercial use	0	0
Nerad Malegaon	Indrajit Power Pvt Ltd	0.36	Non-Operational	Roadways will be used to deliver coal to Kayar station (distance from mine is approx.-5 Kms)	Indrajit Power Private Limited (IPPL) Wardha Maharastra	0	0
Bhivkund	Sunflag Iron & Steel Company Ltd	0.72	Non-Operational	Roadways will be used to deliver coal to Chikni Road station	Commercial Mining	0	0
North West of Madheri	MH Natural Resources Pvt. Ltd.	NA	Non-Operational	Partially explored block	-	0	0
		6.33				2.06	1.5

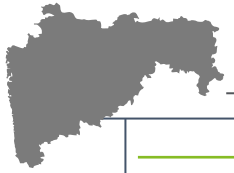
Non-CIL blocks in Pench Kanhan, Kamptee, Katol & Mohpani CF



Maharashtra

Block Name	Allocated to	PRC (MT)	Operational Status	Proposed Loading point	EUP and other remarks	FY23 Production (MT)	FY22 Production (MT)
Sial Ghogri	Reliance Cement Company Pvt. Ltd.	0.3	Operational	Coal is transported on trucks/dumpers via road.	Maihar Cement Plant Madhya Pradesh	~0.36	0.20
Brahmpuri	Birla Corporation Ltd	0.36	Non-Operational	Coal is transported on trucks/dumpers via road.	Birla Vikas Satna MP & Madhav Nagar Rajasthan Plant at Bhandara Maharastra	0	0
Mandla North	Dalmia Cement (Bharat) Ltd.	1.5	Non-Operational	Coal is likely to be transported via roadways to nearest railhead	Dalmia Cement works; block allotted in 6th Tranche auctions	0	0
Dahegaon Gowari	Ambuja Cements	0.50	Non-Operational	Coal is likely to be transported via roadways to nearest railhead	Various cement works of Ambuja such as Darlaghat, Bhatapara, Rabriyawas, Bargarh, Rauri, Ropar, and Gajambuja	0	0
Kalambi Kamleshwar (Western part)	Samlok Industries Pvt. Ltd.	Partially explored	Non-Operational	-	-	0	0
Total		**17.5**				**0.36**	**0.2**

Coal Blocks to be Auctioned in 7th Tranche

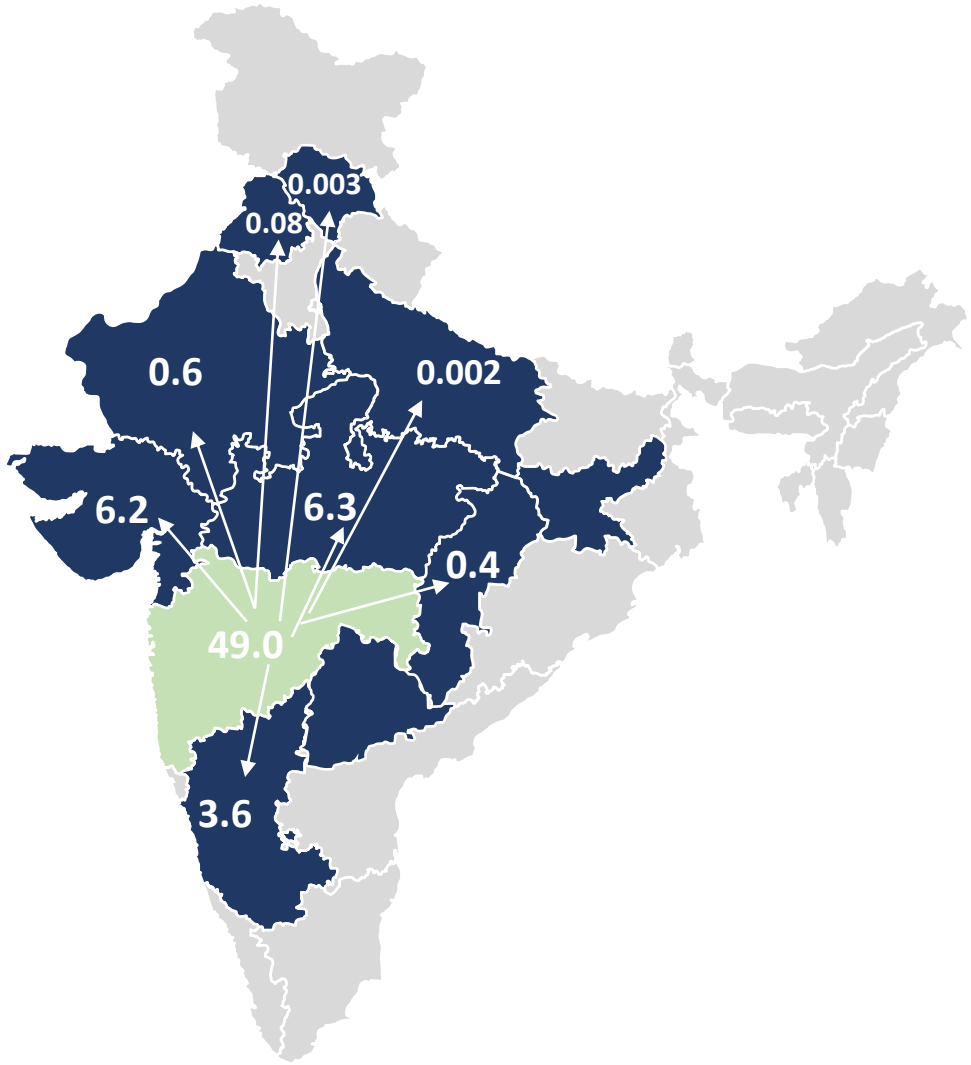


Maharashtra (including blocks in Pench Kanhan-Tawa Valley, Madhya Pradesh)

Block Name	Coalfield	State	PRC (MT)
Dahegaon Jhunki	Kamptee	Maharashtra	0.5
Dahegaon Saptadhara	Kamptee	Maharashtra	0.5
Kosar Dongargaon	Wardha Valley	Maharashtra	0.3
Mandla South	Pench Kanhan	Madhya Pradesh	0.3
Pathakhuri-Piparia (Northern Part)	Pench Kanhan Tawa	Madhya Pradesh	0.36
Pathakhuri-Piparia (Southern Part)	Pench Kanhan Tawa	Madhya Pradesh	0.36
Rawanwara North (Eastern Part)	Pench-Kanhan	Madhya Pradesh	0.5
Rawanwara North (Western Part)	Pench-Kanhan	Madhya Pradesh	0.5
Tandsi-III & Tandsi-III Extn (Revised)	Pench Kanhan	Madhya Pradesh	0.6
Thesgora-B/ Rudrapuri	Pench Kanhan Tawa	Madhya Pradesh	1
West of Kiloni	Wardha Valley	Maharashtra	0.25
Total			**5.17**

Origin – Destination Cluster Mapping for Maharashtra

O-D Source cluster Mapping – Despatch of Coal from Maharashtra: FY22 snapshot



XX FY22: Despatch of Coal from Maharashtra to destination state (MTPA)

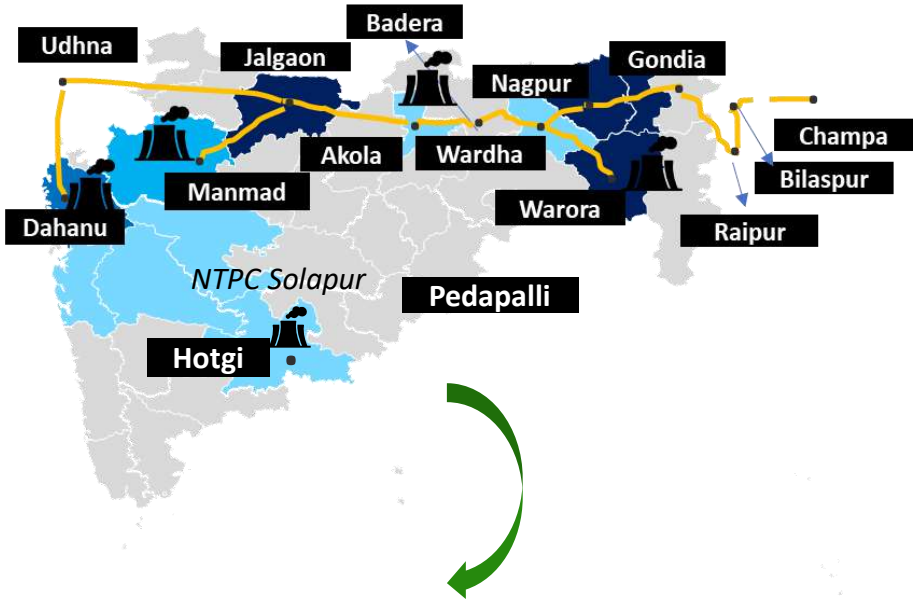
All figures in million tonnes

Consuming State	Rail + RCR	Rail-Sea-Rail	Pure Road	MGR & Others	Total
Maharashtra	31.42	0.00	15.12	2.06	48.60
Gujrat	5.76	0.00	0.47	0.00	6.24
Karnataka	3.57	0.00	0.06	0.00	3.63
Chhattisgarh	0.30	0.00	0.11	0.00	0.41
Madhya Pradesh	5.16	0.00	1.16	0.02	6.34
Rajasthan	0.55	0.00	0.005	0.00	0.55
Punjab & Haryana	0.08	0.00	0.00	0.00	0.08
Other States (UP, Jharkhand & Telengana)	0.001	0.00	0.05	0.015	0.016
Total Despatch from Maharashtra	**46.85 (71.12%)**	**0.00 (0.00%)**	**16.95 (25.73%)**	**2.07 (3.15%)**	**65.87**

Origin – Destination Mapping and the coal flow analysis of rail trunk lines for ~47 MTPA is conducted and presented in the next sections

O-D Source cluster Mapping – Maharashtra's internal consumption (1/2)

Maharashtra's Internal total Rail Despatch in FY22 = 31.42 Million Tonnes



Major Coal Consuming Districts of Maharashtra: 2030 (Estimated)

>15 MTPA Coal Consumption	*Nagpur, Chandrapur, Bhandara, Jalgaon*
10-15 MTPA Coal Consumption	*Palghar/Thane*
5-10 MTPA Coal Consumption	*Nashik*
1-5 MTPA Coal Consumption	*Solapur, Pune, Raigad, Ahmednagar, Wardha & Akola*

Expected Load from Maharashtra-to-Maharashtra main trunk lines (Excluding load from other states on this line)

*Maharashtra's Coal **Demand 2022 ~ 85 MTPA***
*Rail Supply by Maharashtra **2022 ~ 31.42 MTPA***

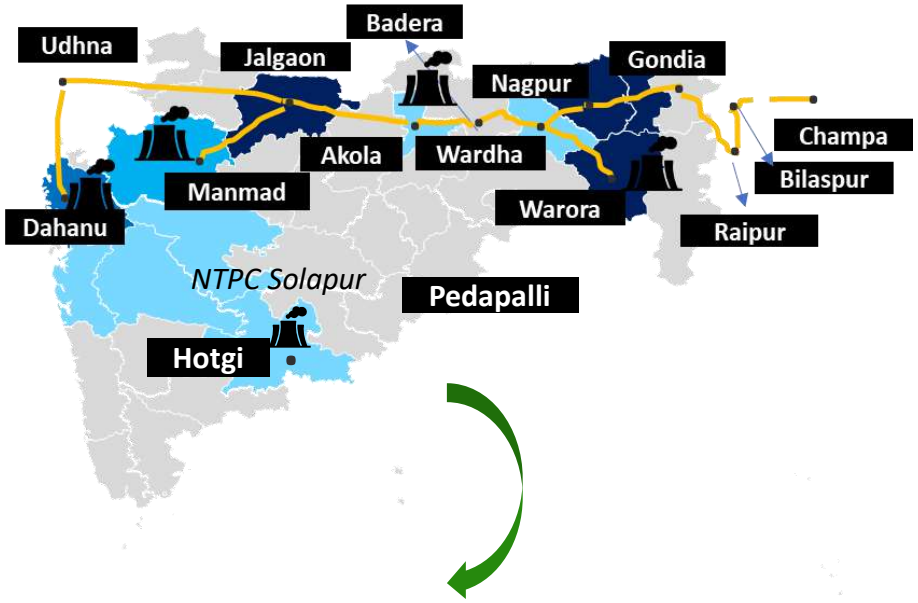
*Maharashtra's Coal **Demand 2030 ~ 111 MTPA***
*Rail Supply by Maharashtra **2030 ~ 41.06 MTPA***

		FY22		FY30	
From	To	Traffic (Tonnes) 2022	Rakes / Day 2022	Traffic (Tonnes) 2030	Rakes / Day 2030
Chandrapur	Majri	8758309.2	6.23	10537975.6	7.50
Chandrapur	Tadali	494332.4	0.35	989011.9	0.70
Chandrapur	Kazipet	173927.1	0.12	347976.4	0.25
Majri	Wardha	9179115.9	6.53	10609223.6	7.55
Majri	Mudkhed	45438.4	0.03	90908.8	0.06
Majri	Warora	1194776.0	0.85	2390391.0	1.70
Wardha	Akola	4338955.5	3.09	5139226.8	3.66
Mudkhed	Parli	45438.4	0.03	90908.8	0.06
Tadali	MDIT	167237.8	0.12	334593.0	0.24
Akola	Bhusaval	4994528.3	3.55	5638683.4	4.01
Bhusaval	Jalgaon	4928218.1	3.51	5575786.2	3.97
Jalgaon	Manmad	59739.0	0.04	119520.0	0.09
Manmad	Nasik Rd	1501461.3	1.07	1509348.9	1.07
Kazipet	Secunderabad	379368.6	0.27	582359.1	0.41
Secunderabad	Chittapur	379368.6	0.27	582359.1	0.41
Chittapur	Tilati	379368.6	0.27	582359.1	0.41
Tilati	Solapur	379368.6	0.27	582359.1	0.41
Wardha	Nagpur	11647338.7	8.29	11594287.6	8.25
Chhindwara	Nagpur	37196.4	0.03	35281.9	0.03
Akola	Pune	372704.9	0.27	368393.6	0.26
Nagpur	Kanhan	1052190.9	0.75	903307.6	0.64
Kanhan	Gondia	2572928.0	1.83	2565807.4	1.83

- Major consumers include Adani Electricity, NTPC Mouda & Solapur plants, Mahagenco's Koradi, Chandrapur & Khaperkheda plants, Adani Power's Gondia Power Plant

O-D Source cluster Mapping – Maharashtra's internal consumption (1/2)

Maharashtra's Internal total Rail Despatch in FY22 = 7.86 Million Tonnes



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5-10 MTPA Coal Consumption	*Nashik*
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Expected Load from Maharashtra-to-Maharashtra main trunk lines (Excluding load from other states on this line)

*Maharashtra's Coal **Demand 2022 ~ 85 MTPA***
*Rail Supply by Maharashtra **2022 ~ 31.42 MTPA***

*Maharashtra's Coal **Demand 2030 ~ 111 MTPA***
*Rail Supply by Maharashtra **2030 ~ 41.06 MTPA***

		FY22		FY30	
From	**To**	**Traffic (Tonnes) 2022**	**Rakes / Day 2022**	**Traffic (Tonnes) 2030**	**Rakes / Day 2030**
Akola	Latur	1075943.6	0.77	1043834.8	0.74
Latur	Solapur	1075943.6	0.77	1043834.8	0.74
Maksi	Bhopal	605673.2	0.43	904724.4	0.64
Bhopal	Itarsi	605673.2	0.43	904724.4	0.64
Itarsi	Akola	38578.4	0.03	57626.5	0.04
Itarsi	Nagpur	44238.8	0.03	66081.8	0.05
Itarsi	Kahndwa	522856.0	0.37	781016.2	0.56
Kahndwa	Jalgaon	522856.0	0.37	781016.2	0.56
Umred	Buti Bori	4933293.2	3.51	5206416.7	3.70
Nagpur	Akola	6537429.9	4.65	6166345.0	4.39
Akola	Parli	37288.2	0.03	24323.3	0.02
Nagpur	Gondia	1806401.7	1.29	1848840.5	1.32
Wardha	Amravati	161561.4	0.11	105387.5	0.07
Manmad	Ankai	24532.9	0.02	37516.1	0.03
Ankai	Pune	24532.9	0.02	37516.1	0.03

- Major consumers include Adani Electricity, NTPC Mouda & Solapur plants, Mahagenco's Koradi, Chandrapur & Khaperkheda plants, Adani Power's Gondia Power Plant

O-D Source cluster Mapping – Slight increase in supply to Maharashtra (1/2)

All figures in million tonnes

Name of TPS	Utility	Wardha CF	Pench Kanhan & Tawa	Umrer, Bander, Kamptee	Captive	Total Maharashtra	Others	Total Coal Consumption (FY22)	Estimated Coal Consumption (FY30)	Wardha CF	Pench Kanhan & Tawa CFs	Umrer, Bander, Kamptee CFs	Captive	Total Maharashtra	Others
TIRODA	ADANI POWER MAHARASHTRA LTD.	0.1	0.0	3.4	0.0	3.5	10.7	14.2	15.2	0.0	0.0	2.7	0.0	2.7	12.4
ADANI DAHANU	ADANI ELECTRICITY MUMBAI LIMITED	0.0	0.0	0.0	0.0	0.0	2.0	2.0	2.1	0.0	0.0	0.0	0.0	0.0	2.1
DHARIWAL INFRASTRUCTURE Ltd.	DHARIWAL INFRASTRUCTURE LIMITED	0.8	0.0	0.0	0.0	0.8	2.0	2.7	2.9	0.0	0.0	0.7	0.0	0.7	2.2
GMR WARORA ENERGY LTD.	GMR WARORA ENERGY LTD.	1.4	0.0	0.0	0.0	1.4	0.9	2.3	2.8	2.4	0.0	0.0	0.0	2.4	0.4
RATNAGIRI	JSW ENERGY LIMITED	0.0	0.0	0.0	0.0	0.0	2.7	2.7	4.6	0.0	0.0	0.0	0.0	0.0	4.6
BHUSAWAL	MSPGCL	2.6	0.7	1.4	0.0	4.8	0.0	4.7	6.6	1.8	0.5	1.0	0.0	3.2	3.3
CHANDRAPUR	MSPGCL	6.8	0.0	0.1	0.0	6.9	4.7	11.6	15.8	6.0	0.0	0.0	0.0	6.0	9.9
KHAPARKHEDA	MSPGCL	0.2	0.1	2.7	0.0	3.0	3.2	6.2	8.2	0.0	0.0	1.4	0.0	1.4	6.8
KORADI	MSPGCL	4.0	0.0	2.7	0.0	6.7	1.5	8.2	11.2	0.0	0.0	0.0	0.0	0.0	11.2
NASHIK	MSPGCL	0.9	0.0	0.7	0.0	1.6	0.1	1.7	3.7	0.5	0.0	1.9	0.0	2.4	1.3
PARLI	MSPGCL	0.1	0.0	0.0	0.0	0.1	1.8	2.0	3.5	1.0	0.0	0.0	0.0	1.0	2.5
PARAS	MSPGCL	1.3	0.0	0.5	0.0	1.9	0.1	2.0	2.7	1.8	0.1	0.7	0.0	2.7	0.0
MOUDA SUPER TPS	NTPC LTD.	2.5	0.0	1.5	0.0	4.0	4.7	8.7	11.6	5.7	0.0	3.8	0.0	9.5	2.1

O-D Source cluster Mapping – Slight increase in supply to Maharashtra (2/2)

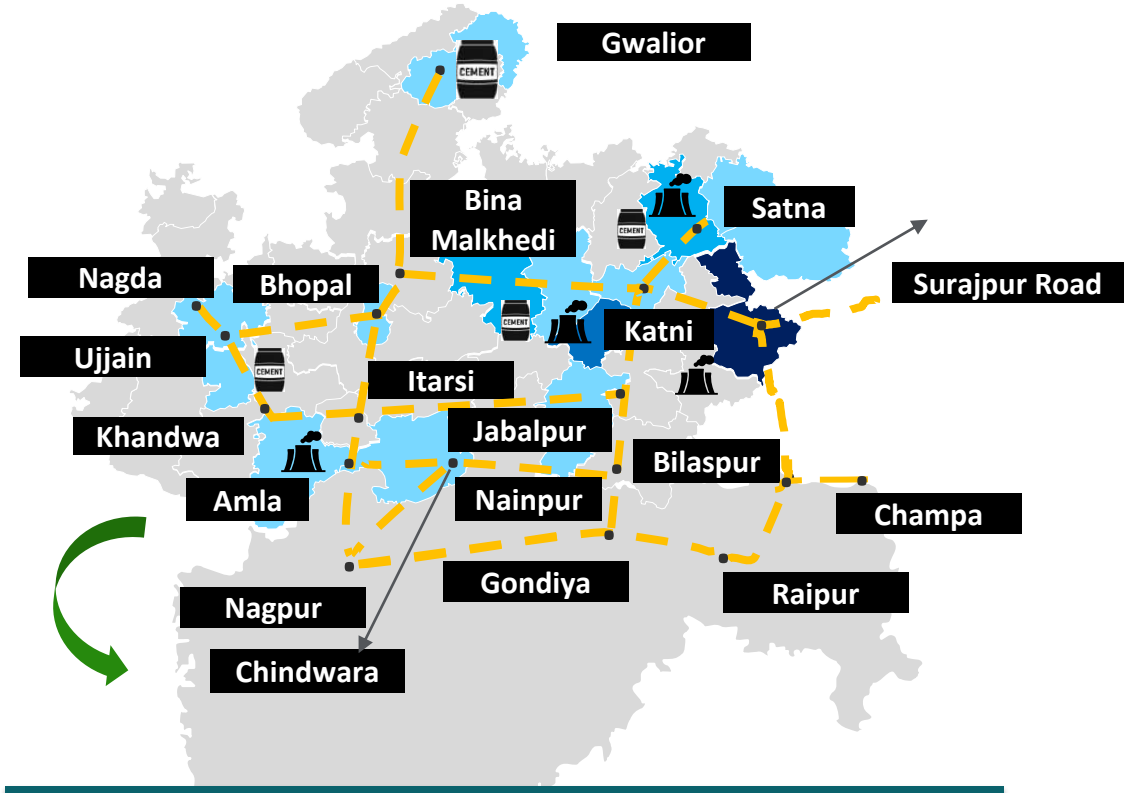
All figures in million tonnes

Name of TPS	Utility	Wardha CF	Pench Kanhan & Tawa	Umrer, Bander, Kamptee	Captive	Total Maharashtra	Others	Total Coal Consumption (FY22)	Estimated Coal Consumption (FY30)	Wardha CF	Pench Kanhan & Tawa CFs	Umrer, Bander, Kamptee CFs	Captive	Total Maharashtra	Others
SOLAPUR SUPER TPS	NTPC LTD.	0.9	0.0	0.3	0.0	1.3	2.0	3.3	5.9	2.3	0.0	0.8	0.0	3.1	2.8
AMARAVATI TPS	RATTANINDIA POWER LTD.	0.2	0.0	0.0	0.0	0.2	5.7	5.9	6.3	0.0	0.0	0.0	0.0	0.0	0.0
TROMBAY	THE TATA POWER COMPANY LIMITED	0.0	0.0	0.0	0.0	0.0	2.3	2.3	2.7	0.0	0.0	0.0	0.0	0.0	9.0
SAI WARDHA POWER Ltd., WARORA	SAI WARDHA POWER GENERATION PVT LTD.	1.6	0.0	0.0	0.0	1.6	0.0	1.5	2.5	2.5	0.0	0.0	0.0	2.5	0.0
Bhusawal TPS	MSPGCL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.2	0.6	0.0	2.5	0.0	3.2	0.0
Total		**23.4**	**0.9**	**13.4**	**0.0**	**37.7**	**44.4**	**81.9**	**111.5**	**24.5**	**0.6**	**15.6**	**0.0**	**40.7**	**70.8**

- Major growth in coal consumption of power houses in Maharashtra shall be catered to by WCL. However, due to existing FSAs of plants in Maharashtra with other subsidieries along with major import-based power plants such as Trombay plant of Tata Power present, coal shall also be sourced from outside Maharashtra for the power sector.
- For upcoming power plant, Bhusawal TPS, coal has been allocated from WCL; allocated Mine - WCL, Umred/Ghugus; Distance from mine – 403/430km; Allocation Date: 11-09-2020, Source: WCL mines ,Grade: G9/G10, Quantity : 3.18 million tonne.

O-D Source cluster Mapping – Maharashtra to Madhya Pradesh (1/2)

Maharashtra (including Pench in MP) to Madhya Pradesh total Rail Despatch in FY22 = 5.160 MT



Major Coal Consuming Districts of MP: 2030 (Estimated)

>15 MTPA Coal Consumption	*Shahdol*
10-15 MTPA Coal Consumption	*Jabalpur*
5-10 MTPA Coal Consumption	*Satna, Sagar*
1-5 MTPA Coal Consumption	*Sidhi, Singrauli, Rewa, Katni, Damoh, Betul, Khandwa, Ujjain, Indore, Bhind, Gwalior, Bhopal, Seoni*

Expected Load from Maharastra to MP main trunk lines (Excluding load from other states on this line)

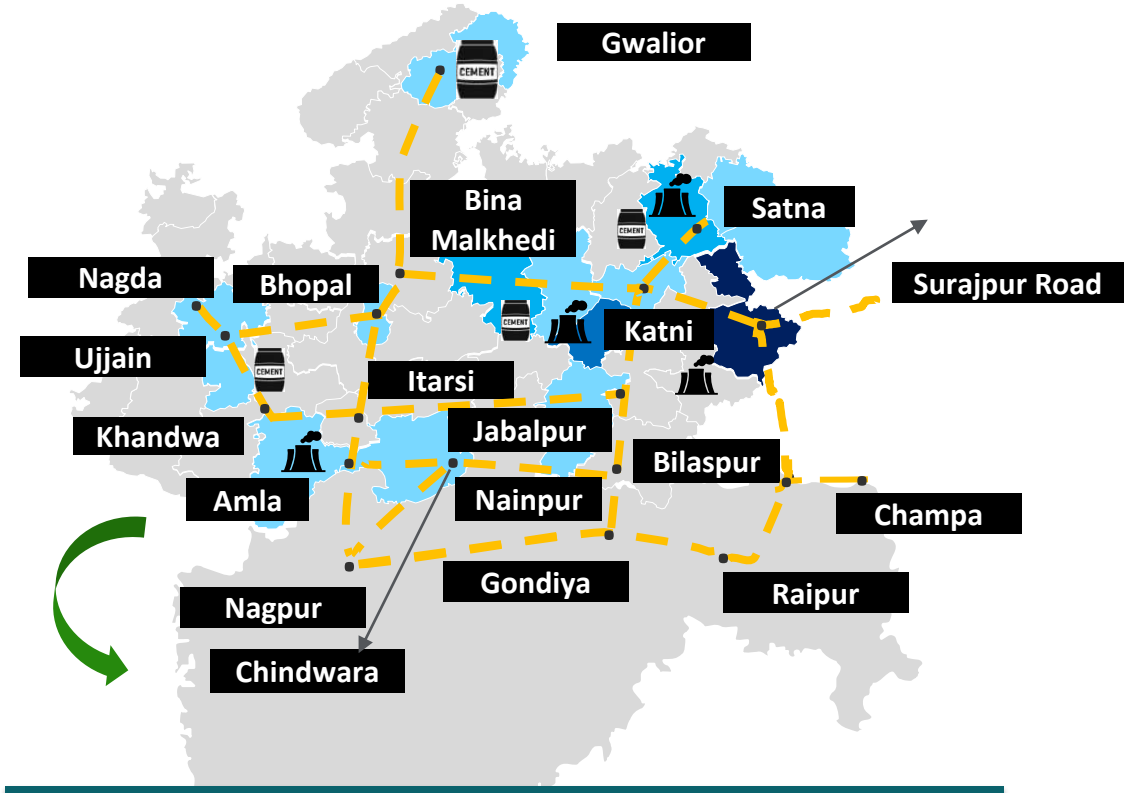
MP's Coal ***Demand 2022 ~ 84.33 MTPA***
Rail Supply by Maharashtra ***2022 ~ 5.16 MTPA***

MP's Coal ***Demand 2030 ~ 110.20 MTPA***
Rail Supply by Maharashtra ***2030 ~ 6.74 MTPA***

		FY22		FY30	
From	To	Traffic (Tonnes) 2022	Rakes / Day 2022	Traffic (Tonnes) 2030	Rakes / Day 2030
Chandrapur	Nagbhir	118875.0	0.08	237833.5	0.17
Nagbhir	Gondia	118875.0	0.08	237833.5	0.17
Gondia	Balaghat	118875.0	0.08	237833.5	0.17
Balaghat	Nainpur	161984.4	0.12	276239.2	0.20
Nainpur	Kachhpura	161984.4	0.12	276239.2	0.20
Kachhpura	Narsinghpur	161984.4	0.12	276239.2	0.20
Umred	Buti Bori	537105.1	0.38	566841.0	0.40
Buti Bori	Nagpur	228025.5	0.16	213760.5	0.15
Nagpur	Amla	1192628.9	0.85	1184975.8	0.84
Amla	Betul	1192628.9	0.85	1184975.8	0.84
Betul	Itarsi	1684235.6	1.20	1897780.4	1.35
Itarsi	Narsinghpur	830959.5	0.59	884592.9	0.63
Wardha	Akola	2746965.0	1.95	3334674.0	2.37
Akola	Bhusaval	2746965.0	1.95	3334674.0	2.37
Bhusaval	Khandwa	2746965.0	1.95	3334674.0	2.37
Khandwa	Indore	23618.3	0.02	32873.4	0.02
Chandrapur	Majri	880313.5	0.63	1761245.2	1.25
Majri	Wardha	2995035.0	2.13	3588037.5	2.55
Buti Bori	Wardha	639956.4	0.46	648497.2	0.46
Wardha	Nagpur	888026.3	0.63	901860.7	0.64
Maksi	Bhopal	559666.9	0.40	826603.0	0.59
Bhopal	Itarsi	1224066.6	0.87	1525048.9	1.09
Itarsi	Khandwa	85947.0	0.06	127745.9	0.09
Maksi	Ujjain	7761.5	0.01	8191.2	0.01
Ujjain	Nagda	7761.5	0.01	8191.2	0.01

O-D Source cluster Mapping – Maharashtra to Madhya Pradesh (2/2)

Maharashtra (including Pench in MP) to Madhya Pradesh total Rail Despatch in FY22 = 5.160 MT



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MP's Coal ***Demand 2030 ~ 110.20 MTPA***

Rail Supply by Maharashtra ***2030 ~ 6.74 MTPA***

		FY22		FY30	
From	To	Traffic (Tonnes) 2022	Rakes / Day 2022	Traffic (Tonnes) 2030	Rakes / Day 2030
Nagpur	Gondia	865.9	0.00	771.4	0.00
Gondia	Durg	865.9	0.00	771.4	0.00
Durg	Ghutku	865.9	0.00	771.4	0.00
Ghutku	Anuppur	865.9	0.00	771.4	0.00
Maksi	Ratlam	1341.7	0.00	1614.6	0.00
Maksi	Gwalior	957.5	0.00	1326.5	0.00
Gwalior	Bhind	4865.7	0.00	7164.3	0.01
Nagpur	Chhindwara	30458.3	0.02	27135.0	0.02
Betul	Chhindwara	2160.3	0.00	2599.7	0.00
Itarsi	Chhindwara	12217.8	0.01	18250.3	0.01
Maksi	Dewas	9609.1	0.01	8689.6	0.01
Majri	Nagpur	454.6	0.00	518.7	0.00
Bhopal	Maksi	137099.2	0.10	142781.6	0.10
Maksi	Indore	120655.0	0.09	149985.5	0.11
Betul	Akola	174.9	0.00	210.5	0.00
Akola	Gangapur	174.9	0.00	210.5	0.00
Itarsi	Jalgaon	274.9	0.00	410.7	0.00
Jalgaon	Gangapur	274.9	0.00	410.7	0.00
Bhopal	Bina	650946.6	0.46	821411.8	0.58
Bina	Gwalior	2883.1	0.00	3231.6	0.00
Nagpur	Betul	761.1	0.00	678.0	0.00
Nagpur	Itarsi	72913.5	0.05	64957.8	0.05
Nagpur	Balaghat	44109.4	0.03	39296.5	0.03
Balaghat	Jabbalpur	1000.0	0.00	890.9	0.00
Itarsi	Jabbalpur	8022.7	0.01	10236.2	0.01
Bina	Katni	648063.5	0.46	818180.2	0.58
Maksi	Nagda	55037.4	0.04	50605.1	0.04

O-D Source cluster Mapping – Slight increase in supply to Madhya Pradesh

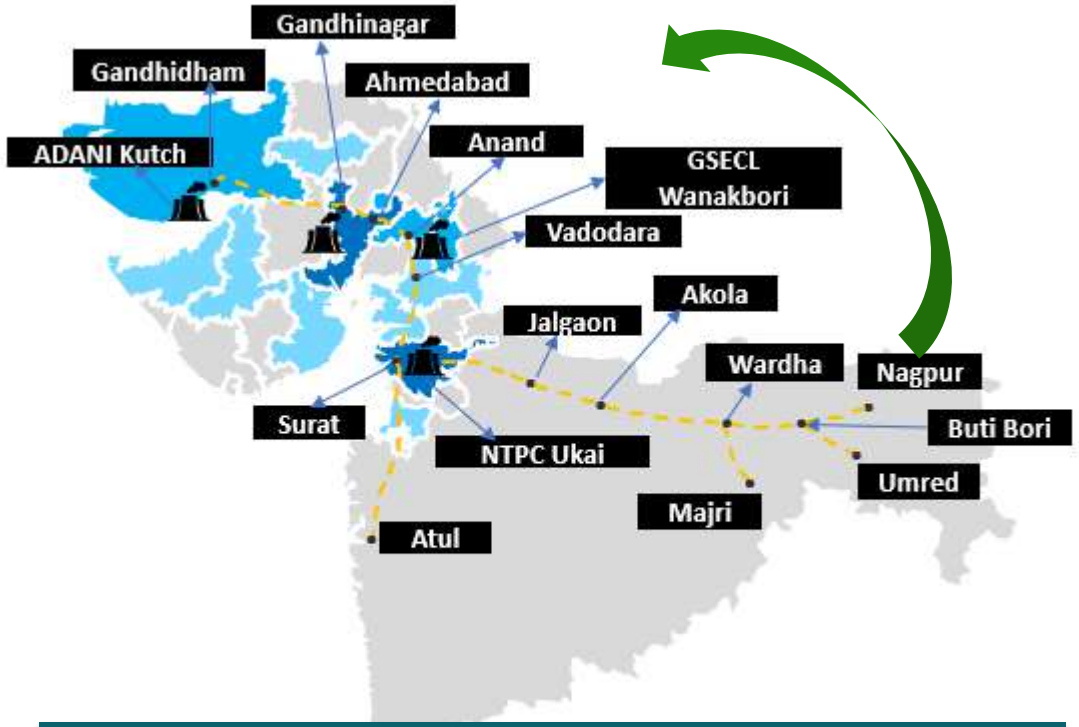
All figures in million tonnes

Name of TPS	Utility	Wardha CF	Pench Kanhan & Tawa	Umrer, Bander, Kamptee	Captive	Total Maharashtra	Others	Total Coal Consumption (FY22)	Estimated Coal Consumption (FY30)	Wardha CF	Pench Kanhan & Tawa CFs	Umrer, Bander, Kamptee CFs	Captive	Total Maharashtra	Others
MAHAN	MAHAN ENERGEN	0.0	0.0	0.0	0.0	0.0	2.4	2.4	5.5	0.0	0.0	0.0	0.0	0.0	5.5
JAYPEE BINA TPP	JVPL	0.0	0.0	0.0	0.0	0.0	1.8	1.8	2.4	0.2	0.0	0.0	0.0	0.2	2.1
JAYPEE NIGRIE SUPER TPP	JVPL	0.0	0.0	0.0	0.0	0.0	5.0	5.0	5.2	0.0	0.0	0.0	0.0	0.0	5.2
SANJAY GANDHI	MPPGCL	0.0	0.0	0.0	0.0	0.0	4.9	4.9	6.6	0.0	0.0	0.0	0.0	0.0	6.6
SATPURA	MPPGCL	0.0	0.6	0.1	0.0	0.7	1.5	2.2	5.7	0.0	1.1	0.0	0.0	1.1	4.5
AMARKANTAK	MPPGCL	0.0	0.0	0.0	0.0	0.0	1.0	1.0	1.1	0.0	0.0	0.0	0.0	0.0	1.1
SHREE SINGAJI TPS	MPPGCL	1.0	0.1	0.3	0.0	1.4	5.5	6.9	12.2	2.2	0.3	0.4	0.0	2.9	9.3
JHABUA POWER LIMITED	JHABUA POWER	0.0	0.0	0.0	0.0	0.0	2.6	2.6	2.7	0.0	0.0	0.0	0.0	0.0	2.7
ANUPPUR TPS	MB POWER	0.0	0.0	0.0	0.0	0.0	5.4	5.4	5.6	0.0	0.0	0.0	0.0	0.0	5.6
VINDHYACHAL	NTPC	0.0	0.0	0.0	0.0	0.0	24.3	24.3	26.9	0.0	0.0	0.0	0.0	0.0	26.9
GADARWARA SUPER	NTPC	0.9	0.0	0.0	0.0	0.9	4.2	5.1	6.8	0.5	0.0	0.0	0.0	0.5	6.3
SASAN UMPP TPP	REILIANCE POWER	0.0	0.0	0.0	0.0	0.0	18.3	18.3	18.3	0.0	0.0	0.0	0.0	0.0	18.3
KHARGONE SUPER THERMAL POWER STATION	NTPC LTD.	0.0	0.0	0.0	0.0	0.0	3.8	3.8	5.3	0.0	0.0	0.0	0.0	0.0	5.3
Total		2.0	0.7	0.5	0.0	3.1	80.6	83.7	104.3	3.0	1.4	0.4	0.0	4.8	99.5

- Slight increase in supplies to power houses in Madhya Pradesh due to improved PLFs of plants like Satpura TPS and Shree Singaji. However, due to relatively smaller size of TPS such as Satpura TPS, no major increase in coal demand expected.

O-D Source cluster Mapping – Maharashtra to Gujarat

Maharashtra (including Pench in MP) to Gujarat total Rail Despatch in FY22 = ~5.76 MT



Major Coal Consuming Districts of Gujarat: 2030 (Estimated)

>15 MTPA Coal Consumption	*NA*
10-15 MTPA Coal Consumption	*Ahmedabad, Surat, Tapi*
5-10 MTPA Coal Consumption	*Kutch, Gandhinagar, Kheda*
1-5 MTPA Coal Consumption	*Valsad, Bharuch, Vadodara, Chhotaudepur, Patan, Jamnagar, Dwarka, Bhavnagar*

Expected Load from Maharashtra to Gujarat main trunk lines (Excluding load from other states on this line)

*Gujarat's Coal **Demand 2022 ~ 30 MTPA***
*Rail Supply by Maharashtra **2022 ~ 5.76 MTPA***

*Gujarat's Coal **Demand 2030 ~ 39 MTPA***
*Rail Supply by Maharashtra **2030 ~ 7.53MTPA***

		FY22		FY30	
From	**To**	**Traffic (Tonnes) 2022**	**Rakes / Day 2022**	**Traffic (Tonnes) 2030**	**Rakes / Day 2030**
Wardha	Akola	6405798.9	4.56	6263545.2	4.46
Akola	Bhusaval	6405798.9	4.56	6263545.2	4.46
Bhusaval	Jalgaon	6405798.9	4.56	6263545.2	4.46
Jalgaon	Surat	6382167.5	4.54	6242492.2	4.44
Surat	Vadodara	5104886.7	3.63	4965211.4	3.53
Vadodara	Anand	5104886.7	3.63	4965211.4	3.53
Anand	Ahmedabad	2779875.6	1.98	2666641.8	1.90
Ahmedabad	Gandhinagar	487156.0	0.35	416395.8	0.30
Ahmedabad	Viramgam	2092742.3	1.49	2062159.9	1.47
Viramgam	Gandhidham	2357403.4	1.68	2357403.4	1.68
Surat	Atul	101644.3	0.07	101644.3	0.07
Chandrapur	Majri	351341.3	0.25	658890.3	0.47
Majri	Wardha	2435718.5	1.73	2387465.2	1.70
Umred	Buti Bori	2579895.2	1.84	2631351.5	1.87
Buti Bori	Wardha	4136864.0	2.94	4131128.8	2.94
Nagpur	Buti Bori	1473577.0	1.05	1372252.9	0.98
Anand	Bharuch	451851.3	0.32	402624.2	0.29
Bharuch	Dahej	3246.8	0.00	2892.5	0.00
Jalgaon	Kosamba	13591.8	0.01	12108.8	0.01
Jalgaon	Vapi	1500.0	0.00	1336.3	0.00
Jalgaon	Navapur	8539.6	0.01	7607.8	0.01
Nagpur	Kheda	83391.8	0.06	127524.4	0.09
Betul	Itarsi	44750.2	0.03	53852.8	0.04
Itarsi	Bhopal	44750.2	0.03	53852.8	0.04
Bhopal	Maksi	37386.6	0.03	44991.4	0.03
Maksi	Ratlam	30838.4	0.02	37402.1	0.03
Ratlam	Anand	30838.4	0.02	37402.1	0.03
Maksi	Dewas	7800.0	0.01	9459.2	0.01
Jalgaon	Valsad	7363.6	0.01	8861.4	0.01
Anand	Bharuch	300.0	0.00	342.3	0.00
Majri	Wardha	300.0	0.00	342.3	0.00

O-D Source cluster Mapping – Similar supply from Maharashtra to Gujarat

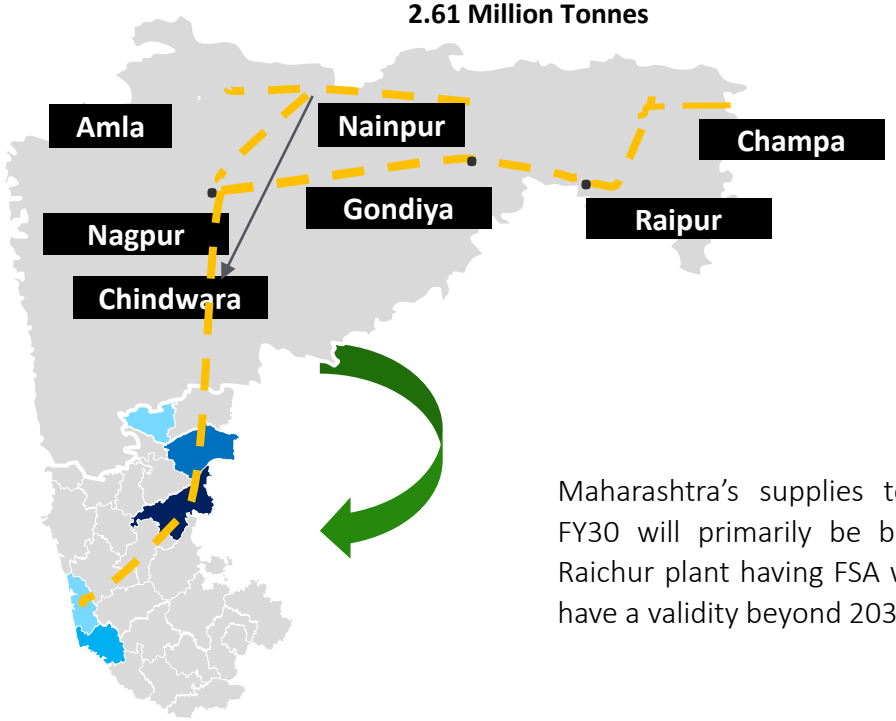
All figures in million tonnes

Name of TPS	Utility	Wardha CF	Pench Kanhan & Tawa	Umrer, Bander, Kamptee	Captive	Total Maharashtra	Others	Total Coal Consumption (FY22)	Estimated Coal Consumption (FY30)	Wardha CF	Pench Kanhan & Tawa CFs	Umrer, Bander, Kamptee CFs	Captive	Total Maharashtra	Others
MUNDRA TPS	ADANI POWER	0.0	0.0	1.9	0.0	1.9	4.7	6.6	15.7	0.0	0.0	4.1	0.0	4.1	11.6
MUNDRA UMPP	Coastal Gujarat Power	0.0	0.0	0.0	0.0	0.0	0.4	0.4	1.0	0.0	0.0	0.0	0.0	0.0	1.0
GANDHINAGAR	GSECL	0.4	0.0	0.2	0.0	0.6	1.7	2.2	2.6	0.0	0.0	0.0	0.0	0.0	2.6
SIKKA	GSECL	0.0	0.0	0.0	0.0	0.0	0.5	0.5	1.5	0.0	0.0	0.0	0.0	0.0	1.5
UKAI	GSECL	0.8	0.0	0.4	0.0	1.2	2.3	3.4	4.7	0.0	0.0	0.5	0.0	0.5	4.2
WANAKBORI	GSECL	1.2	0.0	0.7	0.0	1.9	5.7	7.6	9.6	0.4	0.0	0.3	0.0	0.7	8.9
SABARMATI TPS	TORRENT POWER LTD.	0.0	0.0	0.0	0.0	0.0	1.4	1.4	1.4	0.0	0.0	0.0	0.0	0.0	1.4
Total		2.3	0.0	3.2	0.0	5.5	16.5	22.0	36.5	0.4	0.0	4.8	0.0	5.2	31.3

- Supplies are expected to remain stagnant and may decrease slightly due to increased availability of coal from SECL and MCL with some consumers such as GSECL Ukai recently signing FSA to offtake coal from MCL via coastal shipping

O-D Source cluster Mapping – Maharashtra to Karnataka

Maharashtra to Karnataka total Rail Despatch in FY22 = 2.61 Million Tonnes



Maharashtra's supplies to Karnataka in FY30 will primarily be based on KPCL's Raichur plant having FSA with WCL which have a validity beyond 2030.

Major Coal Consuming Districts of Karnataka: 2030 (Estimated)

>15 MTPA Coal Consumption	*Ballari*
10-15 MTPA Coal Consumption	*Raichur*
5-10 MTPA Coal Consumption	*Dakshina Kanadda*
1-5 MTPA Coal Consumption	*Bijapur, Udupi*

Expected Load from Maharashtra to Karnataka main trunk lines (Excluding load from other states on this line)

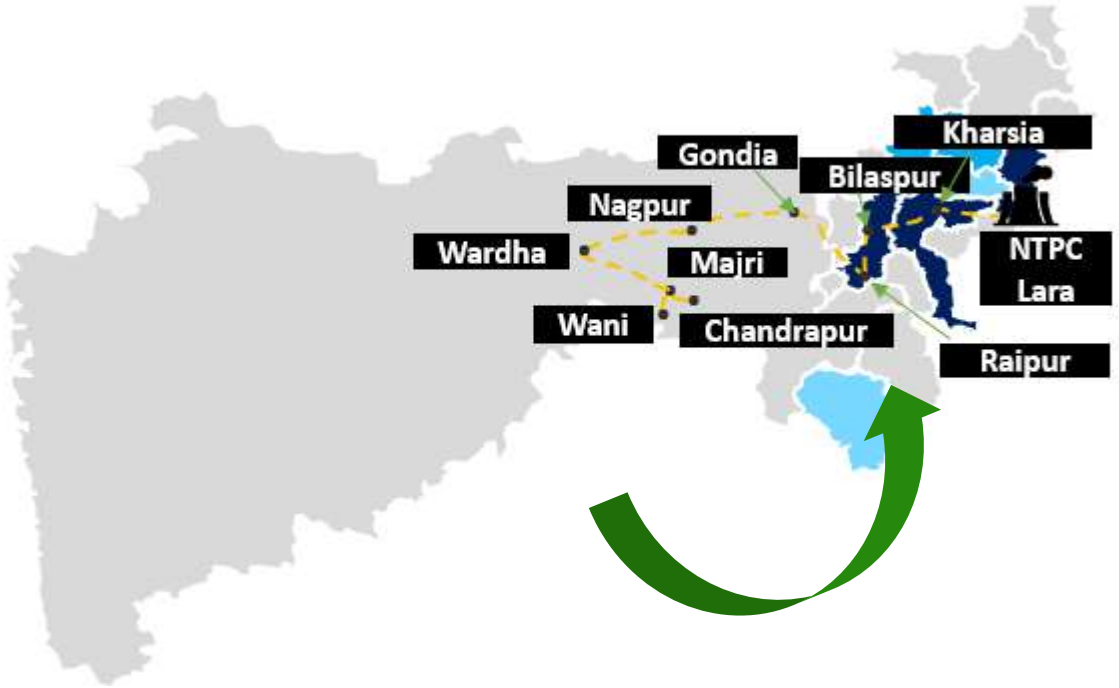
*Karnataka Coal **Demand 2022 ~ 18.51 MTPA***
*Rail Supply by Maharashtra **2022 ~ 2.61 MTPA***

*Karnataka Coal **Demand 2030 ~ 24.19 MTPA***
*Rail Supply by Maharashtra **2030 ~ 4.75 MTPA***

		FY22		FY30	
From	**To**	**Traffic (Tonnes) 2022**	**Rakes / Day 2022**	**Traffic (Tonnes) 2030**	**Rakes / Day 2030**
Chandrapur	Kazipet	1272621.2	0.91	4815387.6	3.43
Kazipet	Bibinagar	1272621.2	0.91	4815387.6	3.43
Bibinagar	Secunderabad	1272621.2	0.91	4815387.6	3.43
Secunderabad	Vikarabad	1233781.0	0.88	4752051.3	3.38
Vikarabad	Wadi	1233781.0	0.88	4752051.3	3.38
Wadi	Raichur	1108317.4	0.79	4752051.3	3.38
Majri	Chandrapur	637186.3	0.45	2376025.6	1.69
Wadi	Hotagi	125463.6	0.09	0.0	0.00
Hotagi	vijayapura	125463.6	0.09	0.0	0.00
Umred	Buti Bori	89211.3	0.06	89211.3	0.06
Buti Bori	Wardha	89211.3	0.06	89211.3	0.06
Wardha	Majri	89211.3	0.06	89211.3	0.06
Secunderabad	Dhone	38840.1	0.03	38840.1	0.03
Dhone	Ballari	38840.1	0.03	38840.1	0.03
Ballari	Hosapete	38840.1	0.03	38840.1	0.03
Hosapete	Gadgag	38840.1	0.03	38840.1	0.03
Gadgag	Hubballi	38840.1	0.03	38840.1	0.03
Hubballi	Alnavar	38840.1	0.03	38840.1	0.03

O-D Source cluster Mapping – Maharashtra to Chhattisgarh

Maharashtra (including Pench in MP) to Chhattisgarh total Rail Despatch in FY22 = ~0.30 MT



Major Coal Consuming Districts of Chhattisgarh: 2030 (Estimated)

	>15 MTPA Coal Consumption	*Raipur, Raigarh, Durg*
	5-10 MTPA Coal Consumption	*Korba, Bilaspur*
	1-5 MTPA Coal Consumption	*Janjgir-Champa, Bijapur-Dantewada-Sukma cluster*

Expected Load from Maharashtra to Chhattisgarh main trunk lines (Excluding load from other states on this line)

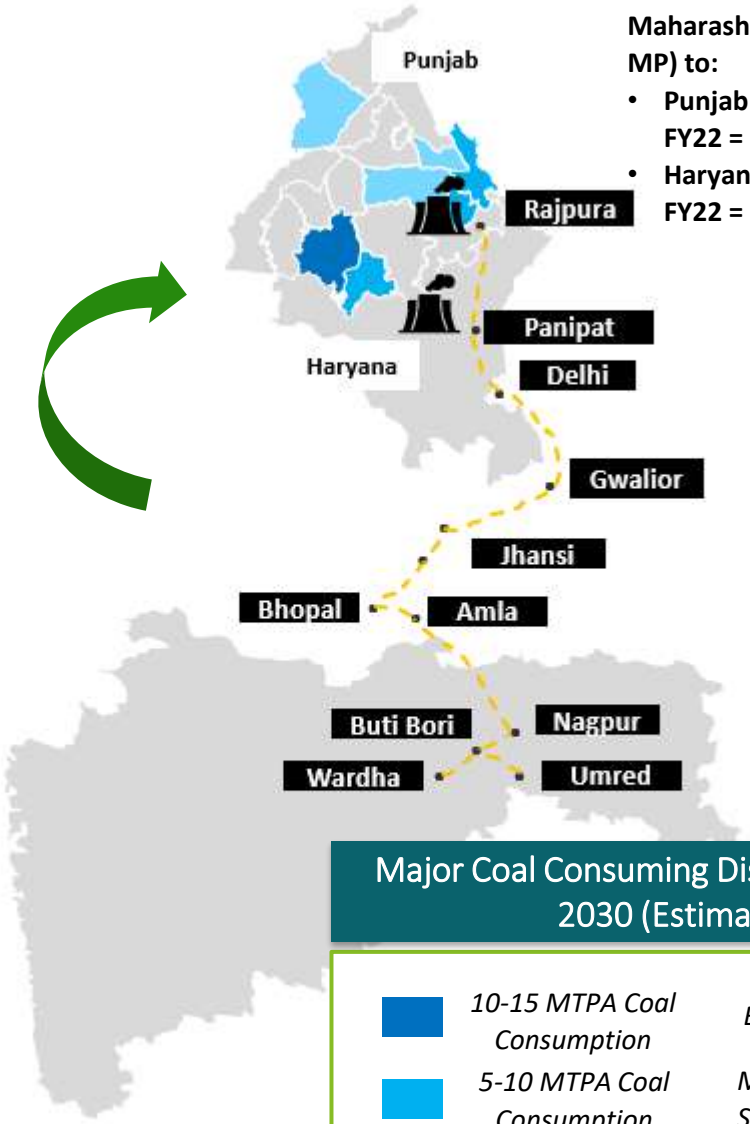
Chhattisgarh's Coal ***Demand 2022 ~ 124.47 MTPA*** *Chhattisgarh's Coal* ***Demand 2030 ~ 162.64 MTPA***

Rail Supply by Maharashtra ***2022 ~ 0.30 MTPA*** *Rail Supply by Maharashtra* ***2030 ~ 0.0 MTPA***

		FY22		FY30	
From	**To**	**Traffic (Tonnes) 2022**	**Rakes / Day 2022**	**Traffic (Tonnes) 2030**	**Rakes / Day 2030**
Chandrapur	Majri	73251.6	0.05	NTPC's Lara shall source its coal from its captive block, Tallaipali and hence no rail movement of coal from Maharashtra to Chhattisgarh is expected.	
Majri	Wardha	275702.7	0.20		
Wardha	Nagpur	275702.7	0.20		
Nagpur	Gondia	323713.8	0.23		
Gondia	Durg	323713.8	0.23		
Durg	Bhilai	323713.8	0.23		
Bhilai	Raipur	323713.8	0.23		
Raipur	Bilaspur	275702.7	0.20		
Bilaspur	Baradwar	275702.7	0.20		
Baradwar	Kharsia	275702.7	0.20		
Betul	Nagpur	745.6	0.00		
Maksi	Bhopal	1000.0	0.00		
Bhopal	Itarsi	1000.0	0.00		

- **Major Power consumers in Chhattisgarh** currently taking coal from WCL is **NTPC Lara** in Raigarh district for which coal is sent from 2 siding – Wani North and Ballarpur.
- The main common trunk line is Majri–Wardha–Nagpur–Gondia-Raipur-Bilaspur.

O-D Source cluster Mapping – Maharashtra to Punjab & Haryana



Maharashtra (including Pench in MP) to:

- **Punjab total Rail Despatch in FY22 = ~0.079 MT**
- **Haryana total Rail Despatch in FY22 = ~0.004 MT**

Major Coal Consuming Districts of Punjab: 2030 (Estimated)

10-15 MTPA Coal Consumption	*Bhatinda*
5-10 MTPA Coal Consumption	*Mansa, Fatehgarh Sahib, Rupnagar*
1-5 MTPA Coal Consumption	*Amritsar, Tarn Taran, Ludhiana, Nawashahr*

Expected Load from Maharashtra to Punjab & Haryana main trunk lines (Excluding load from other states on this line)

Punjab's Coal ***Demand 2022 ~ 18.03 MTPA***

Rail Supply by Maharashtra ***2022 ~ 0.083 MTPA***

Punjab's Coal ***Demand 2030 ~ 23.56 MTPA***

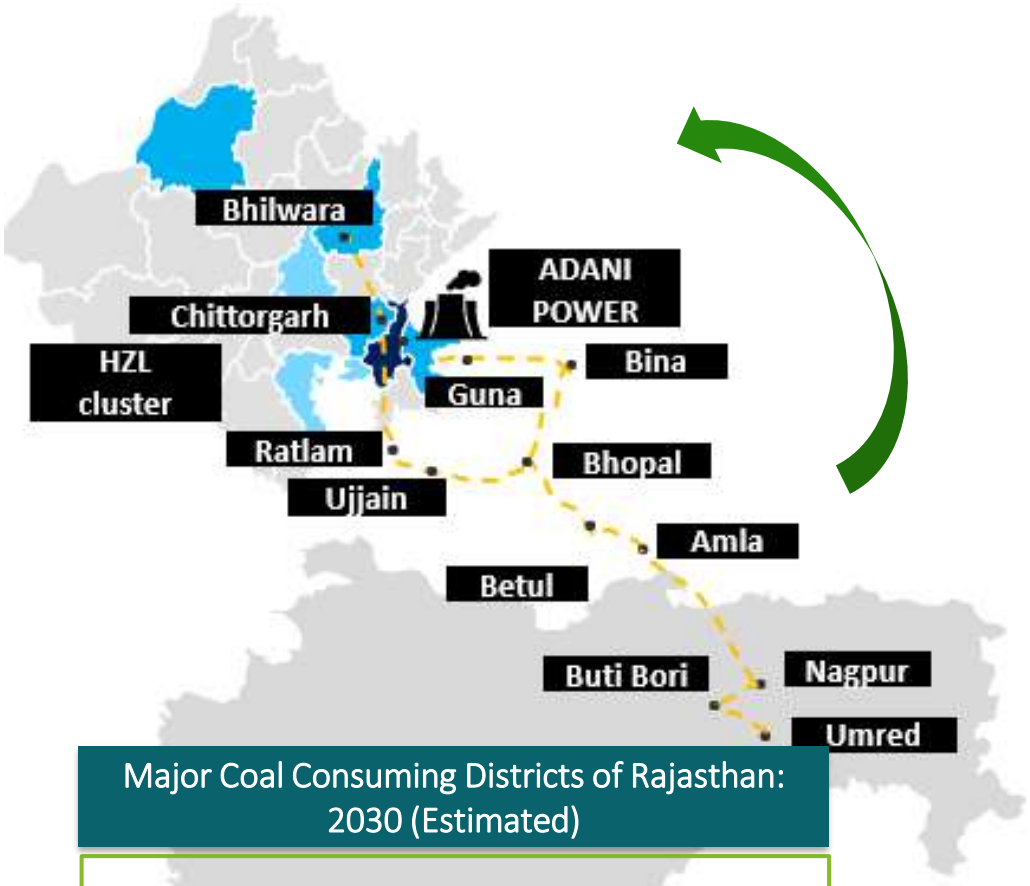
Rail Supply by Maharashtra ***2030 ~ 0.0 MTPA***

		FY22		FY30	
From	To	Traffic (Tonnes) 2022	Rakes / Day 2022	Traffic (Tonnes) 2030	Rakes / Day 2030
Umred	Buti Bori	3917.39	0.003	Minute quantities from Maharashtra to Punjab & Haryana shall be replaced by coal from CCL, NCL and SECL	
Majri	Wardha	79118.01	0.056		
Wardha	Buti Bori	79118.01	0.056		
Buti Bori	Nagpur	83035.40	0.059		
Nagpur	Amla	83035.40	0.059		
Amla	Betul	83035.40	0.059		
Betul	Itarsi	83035.40	0.059		
Itarsi	Bhopal	83035.40	0.059		
Bhopal	Bina	83035.40	0.059		
Bina	Jhansi	83035.40	0.059		
Jhansi	Gwalior	83035.40	0.059		
Gwalior	Dhaulpur	83035.40	0.059		
Dhaulpur	Agra Cantt	83035.40	0.059		
Agra Cantt	Mathura	83035.40	0.059		
Mathura	Delhi Safdarjung	83035.40	0.059		
Delhi Safdarjung	Sonipat	83035.40	0.059		
Sonipat	Panipat	83035.40	0.059		
Panipat	Kurukshetra	79118.01	0.056		
Kurukshetra	Ambala Cantt	79118.01	0.056		
Ambala Cantt	Rajpura	79118.01	0.056		

- **Major Power consumers in Punjab & Haryana** currently taking coal from WCL is **Nabha Power** in Rajpura district (Haryana) and HESB in Panipat (Haryana).
- The common trunk line for supply to Haryana & Punjab is from Buti Bori to Panipat.

O-D Source cluster Mapping – Maharashtra to Rajasthan

Maharashtra (including Pench in MP) to Rajasthan total Rail Despatch in FY22 = ~0.41 MT



Major Coal Consuming Districts of Rajasthan: 2030 (Estimated)

>15 MTPA Coal Consumption	*Kota*
5-10 MTPA Coal Consumption	*Bundi, Baran, Jaipur, Bikaner*
1-5 MTPA Coal Consumption	*Ajmer, Nimach, Chittorgarh, Pratapgarh, Jalor*

Expected Load from Maharashtra to Rajasthan main trunk lines (Excluding load from other states on this line)

Rajasthan's Coal ***Demand 2022 ~ 28.86 MTPA*** *Rajasthan's Coal* ***Demand 2030 ~ 37.71 MTPA***

Total Rail Supply by Maharashtra ***2022 ~ 0.41 MTPA*** *Total Rail Supply by Maharashtra* ***2030 ~ 0.53 MTPA***

FY22				FY30	
From	To	Traffic (Tonnes) 2022	Rakes / Day 2022	Traffic (Tonnes) 2030	Rakes / Day 2030
Umred	Buti Bori	409409.49	0.29	Traffic to remain like FY22.	
Buti Bori	Nagpur	409409.49	0.29		
Nagpur	Amla	409409.49	0.29		
Amla	Betul	409409.49	0.29		
Betul	Itarsi	409409.49	0.29		
Itarsi	Bhopal	409409.49	0.29		
Bhopal	Maksi	39094.49	0.03		
Maksi	Ujjain	39094.49	0.03		
Ujjain	Nagda	39094.49	0.03		
Nagda	Ratlam	39094.49	0.03		
Ratlam	Chittaurgarh	39094.49	0.03		
Chittaurgarh	Bhilwara	15744.99	0.01		

- **Major Power consumers in Rajasthan** taking coal from WCL is Adani Power in Baran district in Rajasthan.
- **Major non power consumer in Rajasthan** taking coal from WCL is HZL in Chittorgarh area (Chanderiya & Dariba).
- The main common trunk line is Nagpur–Amla-Betul-Bhopal. From Bhopal the line is divided towards Chittorgarh and Baran district in Rajasthan

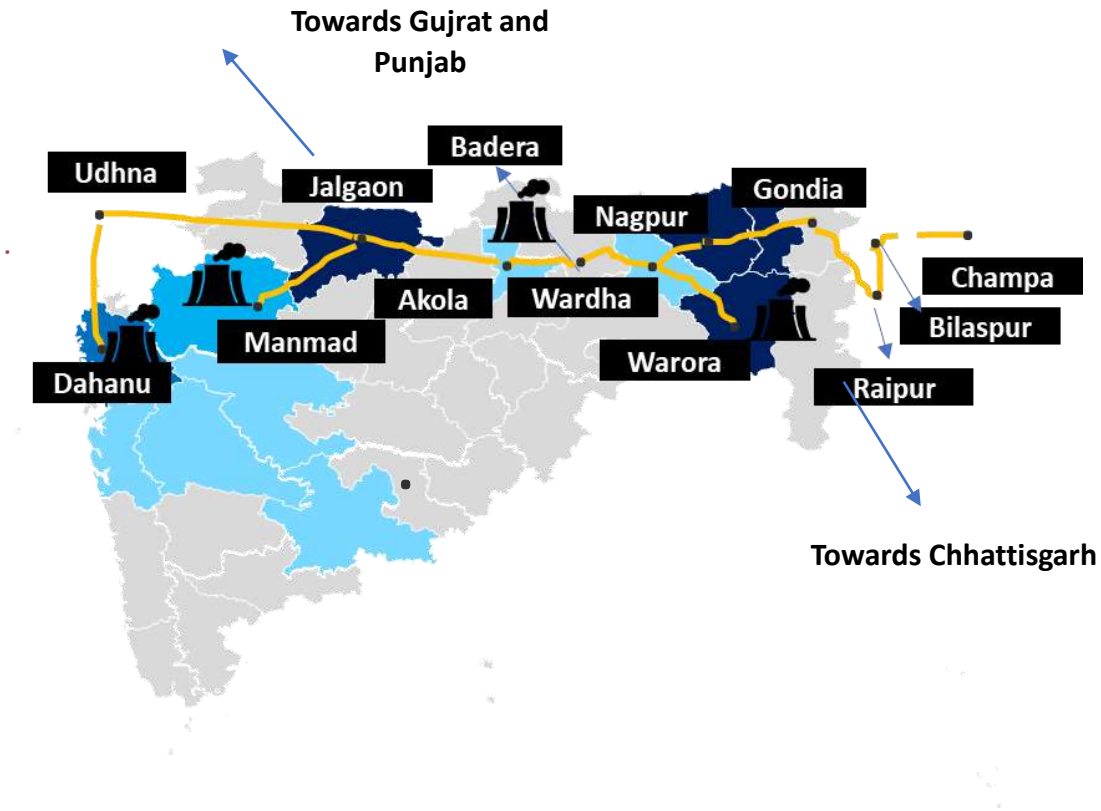
O-D Source cluster Mapping – Consolidated Coal Traffic from Maharashtra to all states

FY22 Actual and FY30 (Estimated) coal traffic in major sections for Despatch of coal from Maharashtra to various destinations

From	To	Traffic (MT): 2022	Rakes / Day: 2022	Traffic (MT): 2030	Rakes / Day: 2030	Increase in Coal Traffic (Rakes / Day)
Wardha	Nagpur	12.81	9.12	16.74	11.91	+2.80
Chandrapur	Majri	10.70	7.61	13.98	9.95	+2.34
Wardha	Akola	13.49	9.60	17.63	12.55	+2.94
Nagpur	Akola	6.54	4.65	8.54	6.08	+1.43
Akola	Bhusaval	14.15	10.07	18.49	13.15	+3.09

Major sections are already witnessing significant coal traffic and is estimated to further increase in the coming decade.

Currently. Almost all of these sections are operating at >100% capacity utilization levels and hence solutions shall be in place to ensure seamless coal flow in future\.

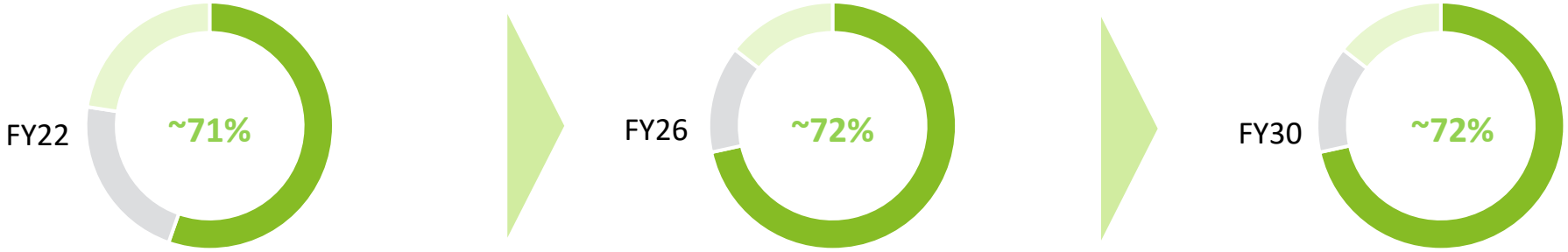


Logistical Outlook – Western Coalfields Limited (WCL)

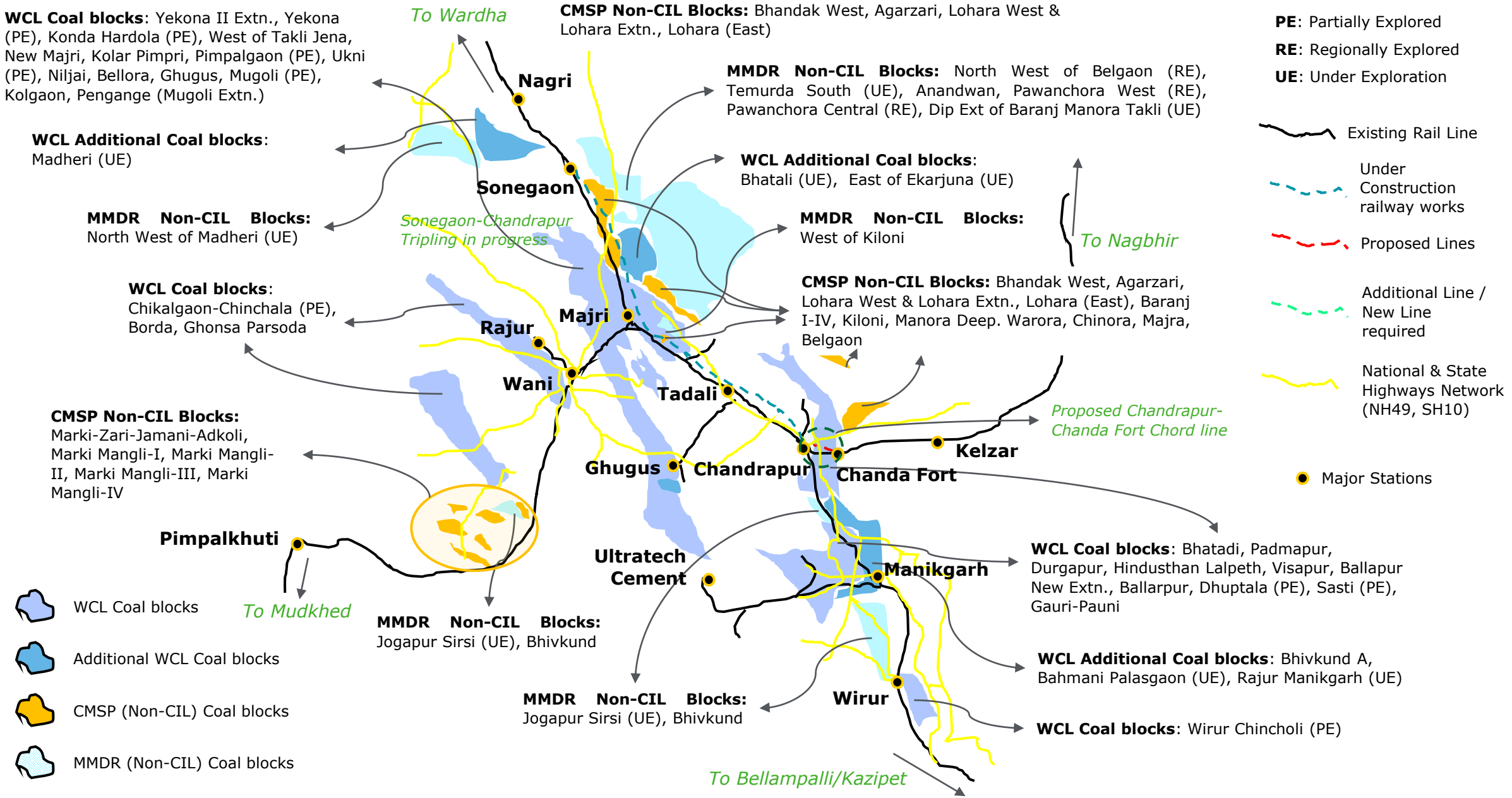
WCL's despatch is expected to continue its share of rail from current ~71% to ~71%-72% by FY30 with sufficient existing evacuation capacity

Area	FY22 Actual Despatch (MTPA)					FY25-26 1 BT Plan (MTPA)					FY29-30 Anticipated Dispatch (MTPA)				
	Rail	RCR	Pure Road	MGR & Others	Total	Rail	RCR	Pure Road	MGR & Others	Total	Rail	RCR	Pure Road	MGR & Others	Total
Ballarpur	4.68	0.66	2.16	0.00	**7.50**	10.26	0.70	3.29	0.00	**14.25**	10.26	0.70	3.29	0.00	**14.25**
Chandrapur	1.13	0.00	1.34	1.99	**4.47**	2.13	0.00	1.00	2.50	**5.63**	2.13	0.00	1.00	2.50	**5.63**
Kanhan	0.34	0.00	0.36	0.00	**0.70**	0.22	0.00	0.21	0.00	**0.43**	0.22	0.00	0.21	0.00	**0.43**
Pench	0.65	0.55	0.07	0.00	**1.27**	1.98	0.00	0.41	0.00	**2.39**	1.98	0.00	0.41	0.00	**2.39**
Majri	3.67	0.11	1.96	0.00	**5.74**	4.14	0.15	1.46	0.00	**5.75**	4.14	0.15	1.46	0.00	**5.75**
Nagpur	4.09	4.80	0.00	0.06	**8.95**	6.78	0.00	1.28	2.50	**10.56**	6.78	0.00	1.28	2.50	**10.56**
Patherkhera	0.00	1.10	0.00	0.02	**1.12**	0.00	0.00	1.77	0.00	**1.77**	0.00	0.00	1.77	0.00	**1.77**
Umrer	8.67	0.00	3.45	0.00	**12.12**	9.95	0.00	2.25	0.00	**12.20**	9.95	0.00	2.25	0.00	**12.20**
Wani	11.76	0.60	5.83	0.00	**18.19**	7.74	1.50	1.51	0.00	**10.75**	7.74	1.50	1.51	0.00	**10.75**
Wani North	2.99	0.09	1.02	0.00	**4.10**	4.52	0.10	1.66	0.00	**6.28**	4.52	0.10	1.66	0.00	**6.28**
Total	**37.99**	**7.90**	**16.20**	**2.07**	**64.16**	**47.72**	**2.45**	**14.84**	**5.00**	**70.00**	**47.72**	**2.45**	**14.84**	**5.00**	**70.00**

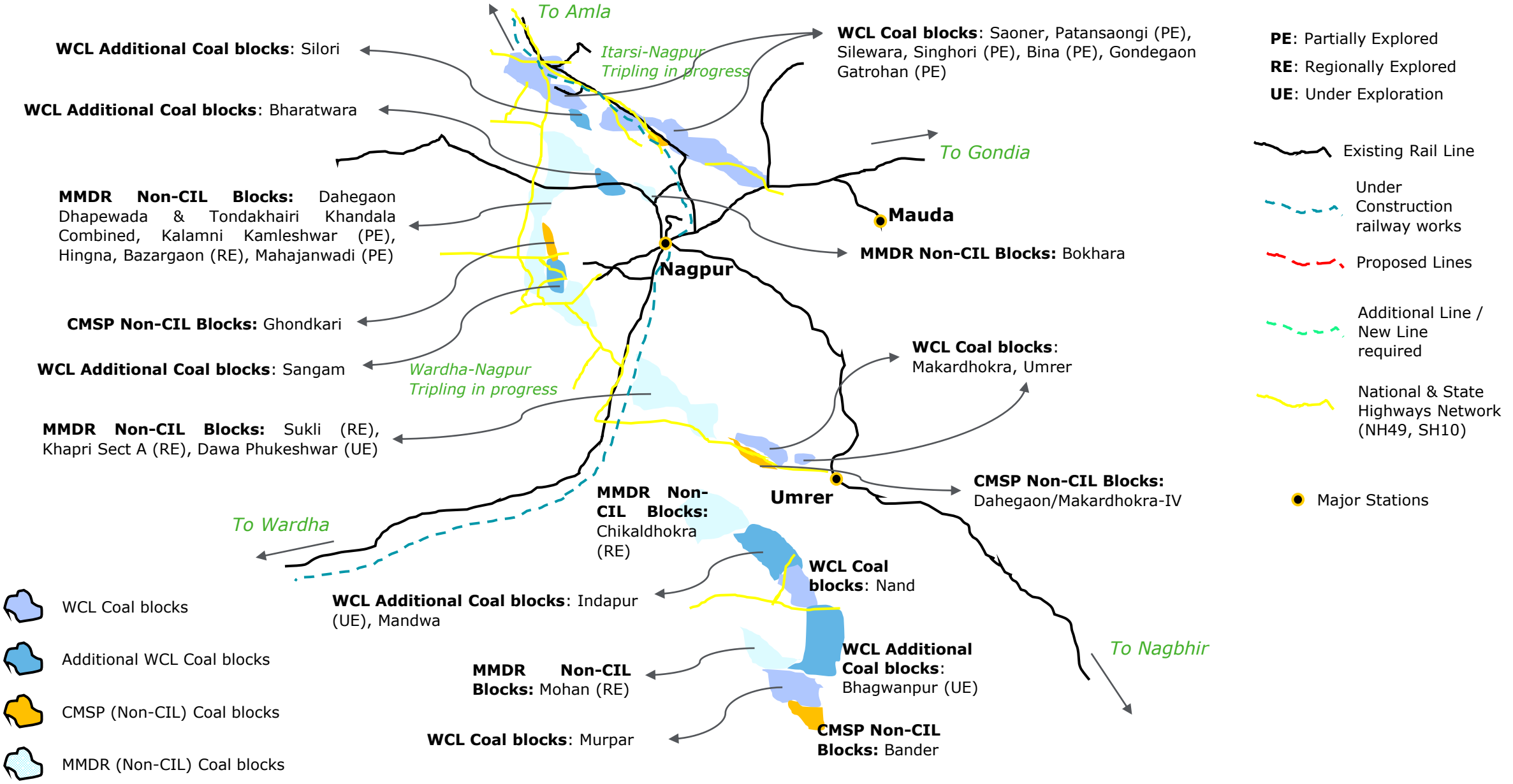
Rail's share progression for WCL



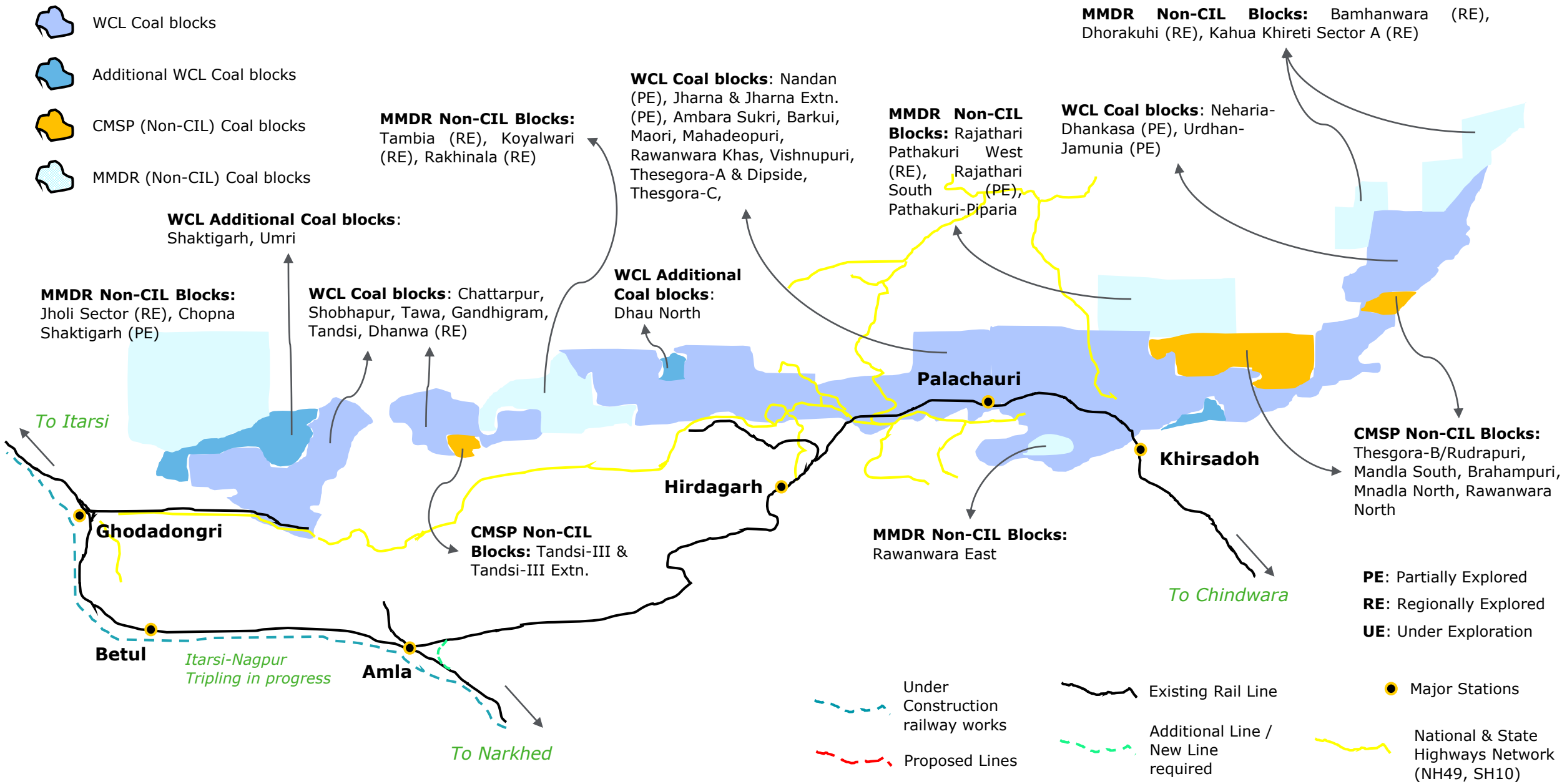
Proposed evacuation plan for Wardha Valley CF



Proposed evacuation plan for Bander, Kamptee, Katol & Umrer CF



Proposed evacuation plan for Pench-Kanhan CF



Key Insights and Recommendations

#	Recommendation	Way Forward
1	Nagpur-Wardha line is currently running at 158%. Due to increased supplies from Chhattisgarh to Maharashtra along with traffic from Odisha and WCL's own traffic, tripling of this line to be expedited.	Tripling of Nagpur-Wardha to be expedited, Indian Railways
2	Tripling of Itarsi-Nagpur (both Itarsi-Amla & Amla-Nagpur currently at >100%) and Chandrapur-Majri (current utilization ~140%) should be expedited to enable future coal evacuation from these areas	Tripling of Chandrapur-Majri-Sonegaon line to be expedited, Indian Railways
3	Proposed chord line from Chandrapur to Chanda Fort station in the Wardha Valley region to be expedited for traffic moving from Wardha Valley CF to Nagbhir	Chandrapur-Chanda Fort Chord line to be expedited
4	Options for commissioning of Public Freight Terminals with facilities of mechanized loading of coal may be evaluated for providing rake loading services to non-CIL blocks to reduce road movement of coal from these regions	Exploration of Public Freight Terminals for mechanized coal loading and coal transport through rail for non-CIL blocks
5	Automatic Signaling may be proposed across all major rail sections in the vicinity of coal blocks in Maharashtra	Indian Railways (CR)

Detailed analysis
for
Telangana

Telangana (SCCL and Non-SCCL) - Production Capacity Expansion Plans

SCCL

All figures in million tonnes

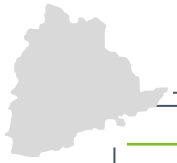
Coal Supply from SCCL	FY22 Actual	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Ramp-up from Existing Mines	~65	~67	70	72	74	81	82	82	80
Mahaveer Khani OC (Telangana)	0	0	0	0.2	0.8	1.5	1.8	2	2
Naini (Odisha)	0	0	5	7.5	10	10	10	10	10
Other New Mine(s)	0	0	0	0	0	2	3	4	6
Total SCCL	**65**	**67**	**75**	**80**	**85**	**94**	**97**	**98**	**100**

Note: New Patrapara coal block in Odisha has been surrendered by SCCL. The block has a PRC of 15 MTPA and SCCL had ramp-up plans up to 8 MTPA within the period FY27 to FY30. However, due to the surrender, a gap of 8 MT for SCCL's growth vision is existing, which can be fulfilled by either ramp-up from existing blocks & participation in new coal block auctions.

Non-SCCL blocks in Telangana

#	Name of the Block	Block Owner	PRC	Operational Status	Proposed Loading Point	EUP and other remarks	Actual FY23 Production	Actual FY22 Production
1	Tadicherla-I	Telangana State Power Generation Corporation Limited. (TSGENCO)	2.5	Operational	Conveyor belt of 17.2 km in length has been proposed as an evacuation method Currently coal is being evacuated through road mode	Kakatiya Thermal Power Project (1 X 600 MW) EUP is 54 km from mine by road	2.48 MT	2.21 MT
	Total PRC		**2.5**					

Coal Blocks to be Auctioned in 7th Tranche



Telangana (including blocks in Pranhita Godavari CF, Andhra Pradesh)

All figures in million tonnes

Block Name	Coalfield	State	PRC (MT)
Chintalpudi Sector A1 (NW Part)	Pranhita Godavari Valley	Andhra Pradesh	0.3
Chintalpudi Sector A1 (SE Part)	Pranhita Godavari Valley	Andhra Pradesh	0.5
Penagaddppa	Godavari Valley	Telangana	1.5
Somavaram East	Godavari Valley	Andhra Pradesh	0.12
Somavaram West (Northern Part)	Pranhita Godavari Valley	Andhra Pradesh	0.5
Somavaram West (Southern Part)	Pranhita Godavari Valley	Andhra Pradesh	0.5
Sravanapalli (Revised)	Godavari Valley	Telangana	2.3
Total			**5.72**

Due to smaller PRC of mines to be auctioned in Telangana (including blocks in Pranhita Godavari CF, Andhra Pradesh), coal from these blocks are expected to be commercial sales in nature and hence road transport is envisioned for blocks except Penagaddppa and Sravanapalli (Revised). For these two blocks, rail traffic is expected to increase by ~3.8 MTPA

Evacuation Capacity from SCCL's mines in Telangana

SCCL

SCCL has ***10 nos. CHPs*** in place to evacuate its coal from its mines in Telangana in addition to MGR and Belt for supply to pithead plants in Telangana

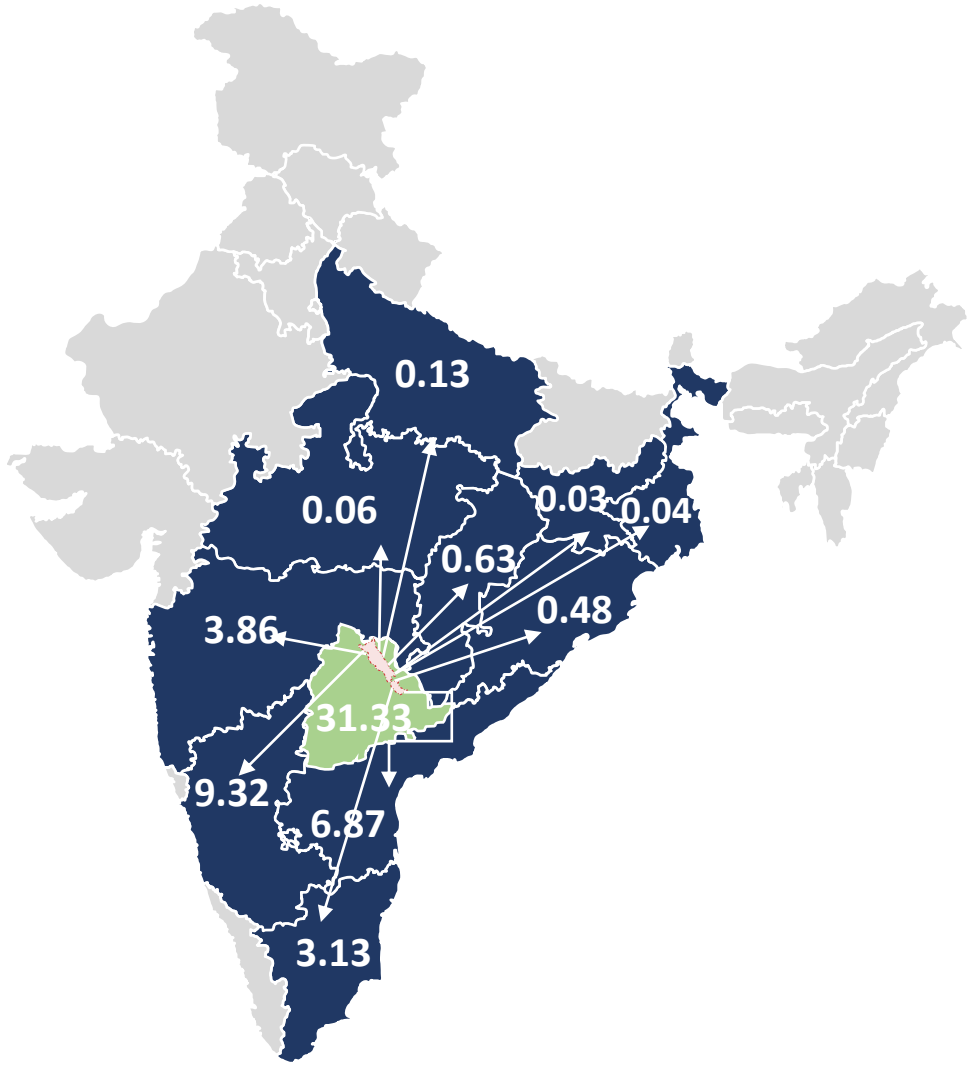
All figures in million tonnes

#	Region	Name of Mines	Dispatch to Power in FY22	Dispatch to Non-Power in FY22	Total Dispatch in FY22	Name of Dispatch Point for Rail
1	Kothagudem	PVK-5 Incline, JVR OC (I&II), Kistaram OC, Penagadapa Coal Block, VK Coal Mine	8.85	3.97	12.82	Rudrampur CHP
2	Kothagudem	KOC-II, JK OC	5.29	0.93	6.22	Yellandu CHP
3	Ramagundam	GDK 11 Incline, GDK 1 & 3 Incline, GDK 2 & 2A Incline, GDK 5 OC	1.22	1.30	2.51	GDK-1 CSP
4	Kothagudem	Kondapuram, PK OC, Manuguru	10.40	2.01	12.40	Kondapuram CHP
5	Ramagundam	RG OC III Exp, Vakilpalli Mine	6.77	1.82	8.59	OC3 CHP
6	Ramagundam	RG OC I Exp, RG OC II Ext, Adriyala LWP, Ramagundam Coal Mine	7.23	0.18	7.41	RG OC-1
7	Ramagundam	KTK-1&1A Inc, KTK-5 Inc, KTK-6 Inc, KTK- OC II, Kakatiya Longwall Project, KTK OC III, PVNR OC (Venkatapur OC)	1.57	0.60	2.16	KTK OC-II CHP
8	Bellampali	Khairagura OC, BPA OC II, Goleti OC	2.16	0.19	2.36	Goleti CHP
9	Bellampali	KK 1 Incline, Kasipet 1 & 2, RKP OC, KK OCP, SK	3.69	0.19	3.88	Ravindrakhani CHP
10	Bellampali	RK-5 Inc, RK-6 Inc, RK-7 Inc, SRP OC II, IK OC, IK 1A	6.46	0.70	7.16	Srirampur CHP
	Total		65.53	53.65	11.88	

Note: ***Naini coal block's evacuation load on railways has been captured in Odisha section as it is located in Odisha.***

Origin – Destination Cluster Mapping for Telangana

O-D Source cluster Mapping – Despatch of Coal from Telangana: FY22 snapshot



FY22: Despatch of Coal from Telangana to destination state (MTPA)

Quantity in million tonnes

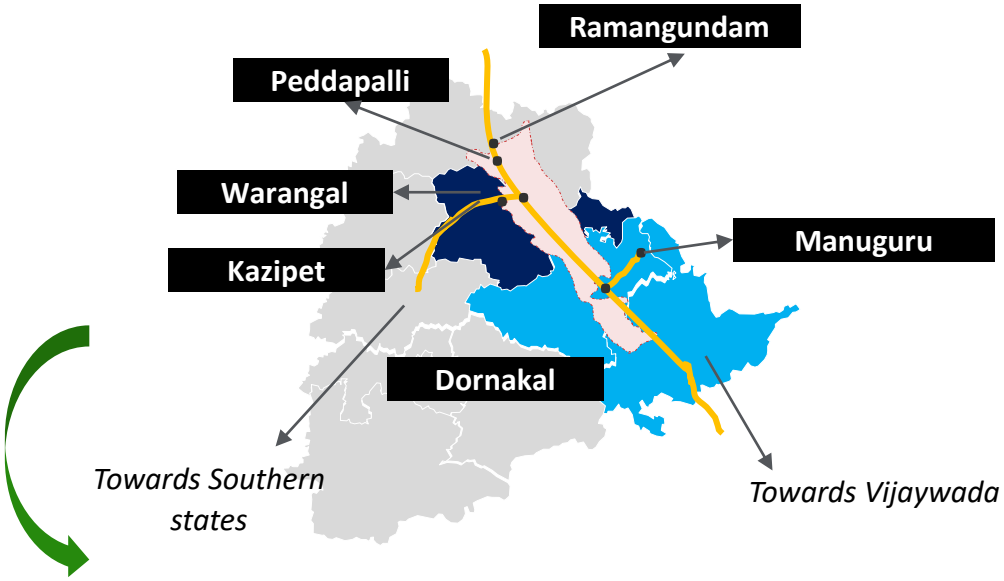
Consuming State	Rail + RCR	Pure Road	MGR & Others	Total
Telangana	16.02	8.08	7.23	31.33
Karnataka	9.32	0	0	9.32
Andhra Pradesh	6.87	0	0	6.87
Maharashtra	3.86	0	0	3.86
Tamil Nadu	3.13	0	0	3.13
Chhattisgarh	0.63	0	0	0.63
Odisha	0.48	0	0	0.48
Other States (UP, Madhya Pradesh, West Bengal, Jharkhand)	0.25	0	0	0.25
Non-Power Consumers	4.81	6.51	0.56	11.88
Total Dispatch from Telangana	**45.36 (66.97%)**	**14.59 (21.54%)**	**7.79 (11.50%)**	**67.74**

Origin – Destination Mapping and the coal flow analysis of rail trunk lines for ~40 MTPA is conducted and presented in the next sections

O-D Source cluster Mapping – Telangana's internal consumption

Telangana (including non-SCCL blocks) to Telangana total Rail Despatch in FY22 = 16.02 Million Tonnes

Nodes named are representative in nature for the illustration. All nodes mapped in table



Load from Telangana-to-Telangana main trunk lines (Excluding load from other states on this line)

Telangana's Coal ***Demand 2022 ~ 31.33 MTPA***

Rail Supply by Telangana ***2022 ~ 16.02 MTPA***

Telanagana's Coal ***Demand 2030 ~ 40.93 MTPA***

Rail Supply by Telangana ***2030 ~ 33.68 MTPA***

		FY22		FY30	
From	To	Traffic (Tonnes) 2022	Rakes / Day 2022	Traffic (Tonnes) 2030	Rakes / Day 2030
Manuguru	Bhadrachalam Road	1821261	1.30	2161645	1.54
Bhadrachalam Road	Karepalli	5986229	4.26	7131829	5.08
Karepalli	Dornakal	1813665	1.29	2211604	1.57
Dornakal	Warangal	1813665	1.29	2211604	1.57
Warangal	Peddapalli	1813665	1.29	2211604	1.57
Peddapalli	Ramagundam	4728939	3.37	20079357	14.29
Ramagundam	Manchiryal	1156842	0.82	15362479	10.93
Manchiryal	Mandamari	5522164	3.93	19980707	14.22
Mandamari	Bellampalli	110810	0.08	132018	0.09
Bellampalli	Asifabad Road	110810	0.08	132018	0.09

Major Coal Consuming Districts of Telangana: 2030 (Estimated)

>15 MTPA Coal Consumption	*Peddapalli/Mancheriyal*
10-15 MTPA Coal Consumption	*NA*
5-10 MTPA Coal Consumption	*Warangal Rural, Bhadradri Kothagudem*

- Major Consumers in Telangana sourcing coal from SCCL include NTPC Ramagundam, Singareni Thermal Power Project and Kothagudem Thermal Power Station (TSGENCO)
- Yadadri TPS has been allocated coal from SCCL to the tune of 14 MTPA and is expected to be commissioned by 2024, as per CEA. Telangana STPS has been allocated coal from SCCL (supply of 6.846 MTPA) to be commissioned by 2023 as per CEA
- From a O-D cluster perspective, the major load on trunk lines are localized in the regions of Ramagundam & Kothagudem with the other load center being Bellampalli to Singareni Thermal Power Project
- TSGENCO's coal from Tadicherla-I is currently being planned to move via conveyor system to its Kakatiya Thermal Power Project

O-D Source cluster Mapping – Significant increase in supply to Telangana

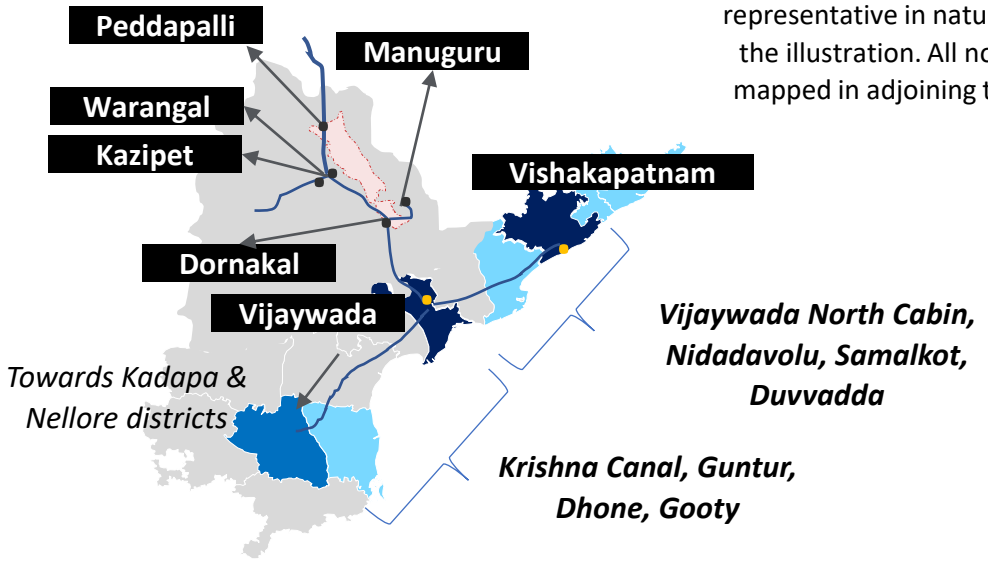
All figures in million tonnes

Name of TPS	Utility	KGM Region	RGM Region	BPA Region	Total SCCL	Captives	Total Telangana	Others (Incl Imports)	Total Coal Consumed (FY22)	Estimated Coal Consumption (FY30)	Supply from SCCL 2030	Supply from Captive 2030	Telangana's Supply in FY30	Sourced from Others & Imports
RAMAGUNDAM SUPER	NTPC LTD.	0.6	10.1	0.1	10.8	0.0	10.8	0.0	10.8	12.7	12.7	0.0	12.7	0.0
SINGARENI TPP	SCCL	0.1	0.6	4.7	5.4	0.0	5.4	0.0	5.4	5.7	5.7	0.0	5.7	0.0
RAMAGUNDAM 'B'	TSPGCL	0.0	0.2	0.0	0.2	0.0	0.2	0.0	0.2	0.4	0.4	0.0	0.4	0.0
KOTHAGUDEM	TSPGCL	6.0	0.1	1.0	7.1	0.0	7.1	0.0	7.1	8.4	8.4	0.0	8.4	0.0
KAKATIYA (Stage-I&II)	TSPGCL	0.0	1.9	0.0	1.9	0.0	1.9	2.2	4.1	5.0	2.5	2.5	5.0	0.0
Bhadradri TPP	TSPGCL	3.6	0.0	0.0	3.6	0.0	3.6	0.0	2.9	4.9	4.9	0.0	4.9	0.0
Sub-Total		**10.3**	**12.9**	**5.7**	**29.0**	**0.0**	**29.0**	**2.3**	**30.6**	**37.1**	**34.6**	**2.5**	**37.1**	**0.0**
Yadadri TPP	TSGENCO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	14.85	14.85	0.00	14.85	0.0
Telangana STPP St-I	NTPC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.85	6.85	0.00	6.85	0.0
Total										**58.8**	**56.3**	**2.5**	**58.8**	**0.0**

- For upcoming power plant, Yadadri, coal has been allocated from SCCL; Distance from mine - 270 km (non pithead); Ministry of Coal vide File No.23014/1/2018-CLD, Dt:15-02-2018 has granted coal linkage from SCCL for supply of 14 MTPA of coal (grade-G9).
- For upcoming power plant, NTPC's Telangana STPP St-I, the plant had been linked with Mandakini-B captive coal mine (PRC-20 MTPA). However, NTPC has approached MoC on 26.12.2020 for surrendering the coal mine. Tapering linkage against the linked coal mine was initially allocated from WCL cost-plus. In July'2020, the linkage has been shifted to SCCL. Coal quantity quantified by the Coal Controller is 6.846 MTPA. Telangana STPP is expected to move coal from SCCL via conveyor or MGR system due to proximity

O-D Source cluster Mapping – Telangana to Andhra Pradesh

Telangana to Andhra Pradesh total Rail Despatch in FY22 = 6.87 Million Tonnes



Nodes named are representative in nature for the illustration. All nodes mapped in adjoining table

Major Coal Consuming Districts of AP: 2030 (Estimated)

>15 MTPA Coal Consumption	*Krishna, Visakhapatnam*
10-15 MTPA Coal Consumption	*Kadapa*
5-10 MTPA Coal Consumption	*NA*
1-5 MTPA Coal Consumption	*Nellore, East Godavari, Vizianagaram, Srikakulam*

Load from Telangana-to-Andhra Pradesh main trunk lines (Excluding load from other states on this line)

Andhra Pradesh's Coal ***Demand 2022 ~ 40.16 MTPA***
Rail Supply by Telangana ***2022 ~ 6.87 MTPA***

AP Coal ***Demand 2030 ~ 64.10 MTPA***
Rail Supply by Telangana ***2022 ~ 8.7 MTPA***

		FY22		FY30	
From	**To**	**Traffic (Tonnes) 2022**	**Rakes / Day 2022**	**Traffic (Tonnes) 2030**	**Rakes / Day 2030**
Manuguru	Bhadrachalam Road	1727423	1.23	1731755	1.23
Bhadrachalam Road	Karepalli	2742782	1.95	2722129	1.94
Mandamari	Manchiryal	201793	0.14	327078	0.23
Manchiryal	Ramagundam	667235	0.47	666493	0.47
Ramagundam	Peddapalli	912334	0.65	842184	0.60
Peddapalli	Kazipet	506801	0.36	299927	0.21
Kazipet	Bibinagar	506801	0.36	299927	0.21
Bibinagar	Makajgiri (Secun. bypass)	506801	0.36	299927	0.21
Makajgiri (Secun. bypass)	Dhone	912334	0.65	842184	0.60
Warangal	Dornakal	405533	0.29	542256	0.39
Karepalli	Dornakal	5961865	4.24	7856029	5.59
Dornakal	Motumari	6367398	4.53	8398285	5.98
Motumari	Vijaywada	6367398	4.53	8398285	5.98
Vijaywada	Nidadavolu	190222	0.14	0	0.00
Nidadavolu	Samalkot	190222	0.14	0	0.00
Samalkot	Duvvada (Gopalapatnam section)	190222	0.14	0	0.00
Vijaywada	Krishna Canal	44779	0.03	0	0.00
Krishna Canal	Tenali	44779	0.03	0	0.00
Tenali	Venkatachalam Road	44779	0.03	0	0.00
Krishna Canal	Guntur	1642528	1.17	972056	0.69
Guntur	Dhone	1642528	1.17	972056	0.69
Dhone	Gooty	2149329	1.53	1271983	0.91
Gooty	Muddanur (Renigunta section)	2149329	1.53	1271983	0.91

O-D Source cluster Mapping – No significant change in supply to Andhra Pradesh

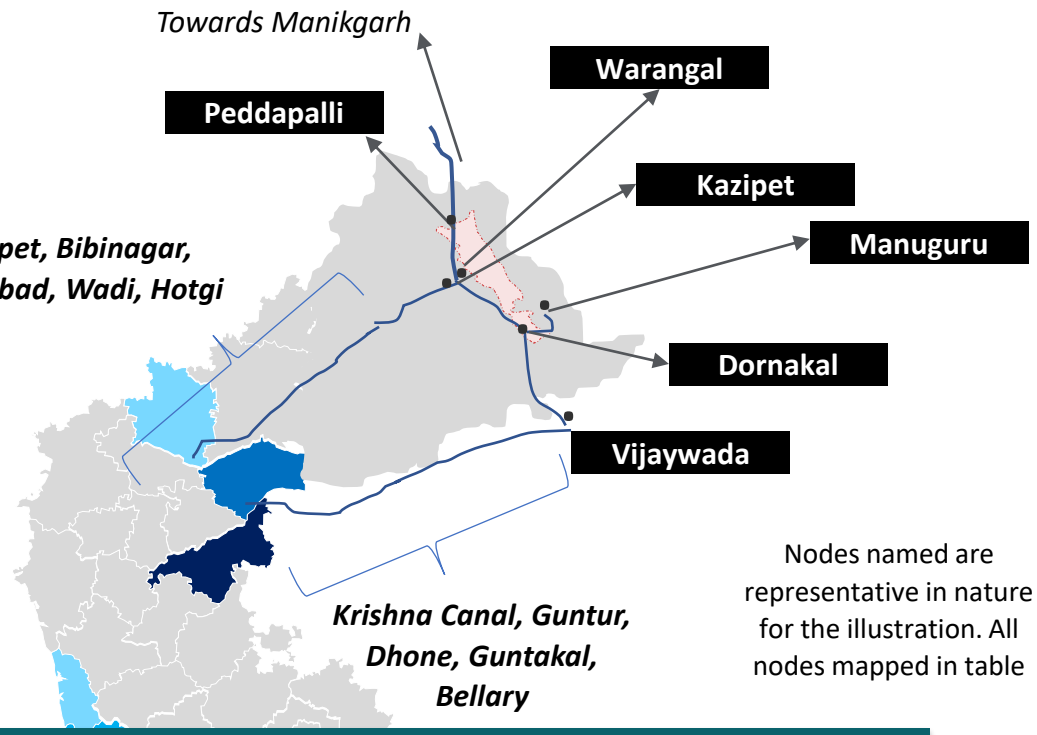
All figures in million tonnes

Name of TPS	Utility	KGM Region	RGM Region	BPA Region	Total SCCL	Captives	Total Telangana	Others (Incl Imports)	Total Coal Consumed (FY22)	Estimated Coal Consumption (FY30)	Supply from SCCL 2030	Supply from Captive 2030	Telangana's Supply in FY30	Sourced from Others & Imports
Dr. N.T.R TPS	APGENCO	4.2	0.0	0.3	4.5	0.0	4.5	4.7	9.2	9.7	7.4	0.0	7.4	2.3
RAYALSEEMA	APGENCO	1.6	0.2	0.3	2.1	0.0	2.1	3.0	5.1	8.6	1.3	0.0	1.3	7.4
SRI DAMODARAM SANJEEVAIAH	APPDCL	0.0	0.0	0.0	0.0	0.0	0.0	3.6	3.6	7.1	0.0	0.0	0.0	7.1
Vizag TPP	HINDUJA NATIONAL POWER CORPORATION LIMITED	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	5.4	0.0	0.0	0.0	5.4
SIMHADRI SUPER	NTPC LTD.	0.1	0.0	0.1	0.2	0.0	0.2	8.8	8.9	10.8	0.0	0.0	0.0	10.8
PAINAMPURAM TPP	SEMBCORP ENERGY INDIA LTD.	0.0	0.0	0.0	0.0	0.0	0.0	5.7	5.7	5.6	0.0	0.0	0.0	5.6
SGPL TPP	SEMBCORP ENERGY INDIA LTD.	0.0	0.0	0.0	0.0	0.0	0.0	4.6	4.6	5.6	0.0	0.0	0.0	5.6
Sub-Total		**6.0**	**0.2**	**0.7**	**6.9**	**0.0**	**6.9**	**26.2**	**33.0**	**48.8**	**8.7**	**0.0**	**8.7**	**40.1**
Dr Narla Tata Rao TPS St-V	APGENCO	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.55	0.00	0.00	0.00	3.55
Sri Damodaram Sanjeevaiah TPP St-II	APPDCL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.55	0.00	0.00	0.00	3.55
Total										**55.9**	**7.86**	**0.00**	**8.7**	**47.2**

- 2 Under-Construction power plants namely APGENCO's Dr NTR TPS Unit-V and Sri Damodaram Sanjeevaiah TPP St-II to consume ~7.10 Million Tonnes of Coal for which FSA's are in place with MCL. Coastal Shipping will be more cost effective than transporting directly via rail to these power plants.
- From the overall increase in demand from power sector in Andhra Pradesh, majority will be catered by mines of MCL (either via coastal shipping or complete Rail mode) and the remaining to be catered by SCCL. Some quantities being sourced by ECL and SCCL by NTPC Simhadri could also be substituted with MCL's coal. This substitution has been assumed under the analysis. 1 – 2 Million Tonnes of Imported coal for blending would happen for these power plants.

O-D Source cluster Mapping – Telangana to Karnataka

Telangana to Karnataka total Rail Despatch in FY22 = 9.31 Million Tonnes



Nodes named are representative in nature for the illustration. All nodes mapped in table

Major Coal Consuming Districts of Karnataka: 2030 (Estimated)

>15 MTPA Coal Consumption	*Ballari*
10-15 MTPA Coal Consumption	*Raichur*
5-10 MTPA Coal Consumption	*Dakshina Kanadda*
1-5 MTPA Coal Consumption	*Bijapur, Udupi*

Load from Telangana-to-Karnataka main trunk lines (Excluding load from other states on this line)

Karnataka's Coal ***Demand 2022 ~ 18.43 MTPA***
Rail Supply by Telangana ***2022 ~ 9.3 MTPA***

Karnataka Coal ***Demand 2030 ~ 21.84 MTPA***
Rail Supply by Telangana ***2030 ~ 9.4 MTPA***

		FY22		FY30	
From	To	Traffic (Tonnes) 2022	Rakes / Day 2022	Traffic (Tonnes) 2030	Rakes / Day 2030
Asifabad Road	Bellampalli	557821	0.40	227544	0.16
Bellampalli	Mandamari	557821	0.40	227544	0.16
Mandamari	Manchiryal	1638230	1.17	1349459	0.96
Manchiryal	Ramagundam	2322848	1.65	1846074	1.31
Manuguru	Bhadrachalam Road	1640400	1.17	1471283	1.05
Ramagundam	Peddapalli	5172714	3.68	5229672	3.72
Peddapalli	Kazipet	5172714	3.68	5229672	3.72
Bhadrachalam Road	Karepalli	4146132	2.95	4143279	2.95
Karepalli	Dornakal	4146132	2.95	4143279	2.95
Dornakal	Motumari	1636866	1.16	0	0.00
Dornakal	Warangal	2509266	1.79	4143279	2.95
Kazipet	Bibinagar	7681980	5.47	9372951	6.67
Bibinagar	Vikarabad	6486087	4.62	9372951	6.67
Vikarabad	Wadi	6486087	4.62	9372951	6.67
Motumari	Vijaywada	1636866	1.16	0	0.00
Vijaywada	Krishna Canal	1636866	1.16	0	0.00
Krishna Canal	Guntur	1636866	1.16	0	0.00
Guntur	Dhone	1636866	1.16	0	0.00
Bibinagar	Makajgiri	1195893	0.85	0	0.00
Makajgiri	Dhone	1195893	0.85	0	0.00
Dhone	Guntakal	2832759	2.02	0	0.00
Wadi	Hotgi	1685841	1.20	5553546	3.95
Hotgi	Vijayapura	1685841	1.20	5553546	3.95
Vijayapura	Kudgi (Gadag section)	1685841	1.20	5553546	3.95
Wadi	Guntakal	4800246	3.42	3819405	2.72
Guntakal	Bellary	2832759	2.02	0	0.00
Bellary	Hospete Section	2832759	2.02	0	0.00

O-D Source cluster Mapping – No significant change in supply to Karnataka

All figures in million tonnes

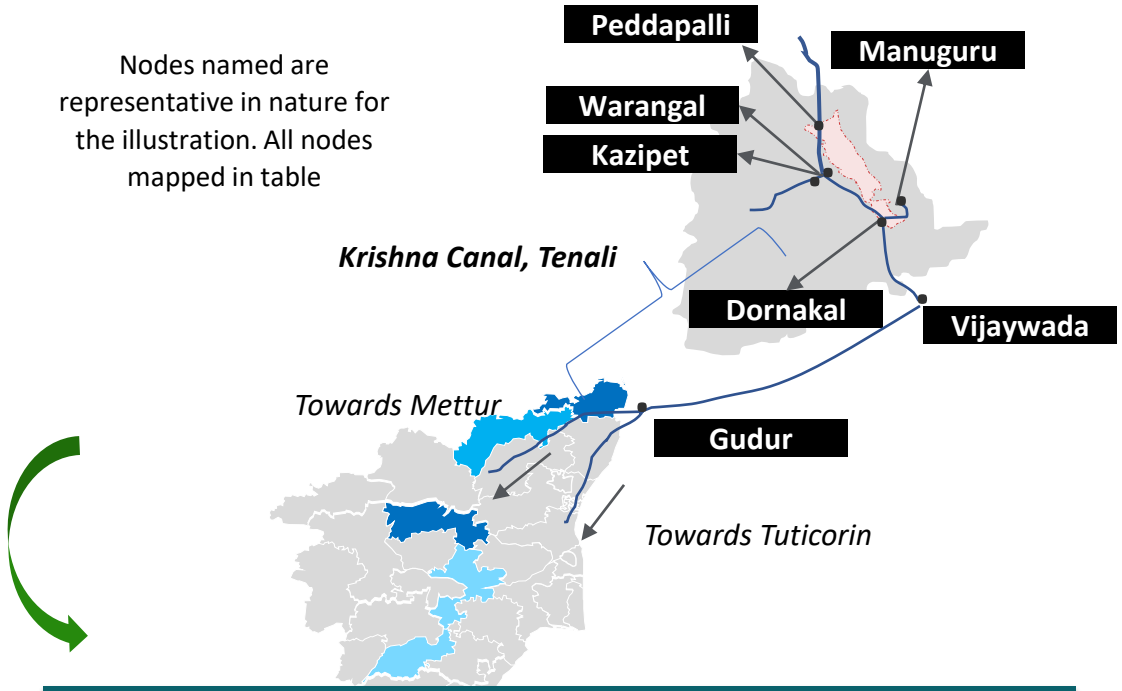
Name of TPS	Utility	KGM Region	RGM Region	BPA Region	Total SCCL	Captives	Total Telangana	Others (Incl Imports)	Total Coal Consumed (FY22)	Estimated Coal Consumption (FY30)	Supply from SCCL 2030	Supply from Captive 2030	Telangana's Supply in FY30	Sourced from Others & Imports
VIJAYANAGAR	JSW ENERGY LIMITED	0.0	0.0	0.0	0.0	0.0	0.0	1.3	1.3	1.3	0.0	0.0	0.0	1.3
RAICHUR POWER PLANT	KPCL	0.7	0.6	0.3	1.5	0.0	1.5	3.2	4.7	4.8	0.0	0.0	0.0	4.8
BALLARI	KPCL	1.6	0.6	0.6	2.8	0.0	2.8	1.5	4.4	4.4	0.0	0.0	0.0	4.4
KUDGI	NTPC LTD.	0.9	0.6	0.1	1.6	0.0	1.6	2.3	4.0	5.6	5.6	0.0	5.6	0.0
YERAMARUS TPS	RPCL	0.9	1.0	1.3	3.3	0.0	3.3	0.0	3.3	3.8	3.8	0.0	3.8	0.0
UDUPI	UDUPI POWER CORPORATION LIMITED	0.0	0.0	0.0	0.0	0.0	0.0	0.7	0.7	2.0	0.0	0.0	0.0	2.0
Sub-Total		**4.1**	**2.8**	**2.3**	**9.3**	**0.0**	**9.3**	**9.2**	**18.4**	**21.8**	**9.4**	**0.0**	**9.4**	**12.5**
Yelanhaka CCPP	KPCL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.60	0.00	0.00	0.00	1.60
Total										**23.4**	**9.4**	**0.00**	**9.4**	**14.1**

- 1 Under-Construction power plant namely KPCL's Yelahanka CCPP to consume ~1.6 Million Tonnes of Coal from its captive blocks Baranj in Maharashtra.
- JSW's plant in Vijaynagar likely to consume its total coal requirement based on imports as per current scenario. Udupi plant is likely to source majorly imported coal

O-D Source cluster Mapping – Telangana to Tamil Nadu

Telangana to Tamil Nadu total Rail Despatch in FY22 = 3.12 Million Tonnes

Nodes named are representative in nature for the illustration. All nodes mapped in table



Major Coal Consuming Districts of TN: 2030 (Estimated)

>15 MTPA Coal Consumption	*NA*
10-15 MTPA Coal Consumption	*Salem, Thiruvallur*
5-10 MTPA Coal Consumption	*Vellore*
1-5 MTPA Coal Consumption	*Tuticorin, Madurai, Tiruchirapalli*

Expected Load from Telangana to Tamil Nadu main trunk lines (Excluding load from other states on this line)

*TN Coal **Demand 2022 ~ 27.95 MTPA***

*Rail Supply by Telangana **2022 ~ 1.97 MTPA***

*TN Coal **Demand 2030 ~ 56.56 MTPA***

*Rail Supply by Telangana **2030 ~ 3.94 MTPA***

		FY22		FY30	
From	To	Traffic (Tonnes) 2022	Rakes / Day 2022	Traffic (Tonnes) 2030	Rakes / Day 2030
Manuguru	Bhadrachalam Road	1026137	0.73	788742	0.56
Bhadrachalam Road	Karepalli	3095360	2.20	1947878	1.39
Karepalli	Dornakal	3095360	2.20	1947878	1.39
Ramagundam	Peddapalli	32480	0.02	1995966	1.42
Peddapalli	Warangal	32480	0.02	1995966	1.42
Warangal	Dornakal	32480	0.02	1995966	1.42
Dornakal	Motumari	3127841	2.23	3943844	2.81
Motumari	Vijaywada	3127841	2.23	3943844	2.81
Vijaywada	Krishna Canal	3127841	2.23	3943844	2.81
Krishna Canal	Tenali	3127841	2.23	3943844	2.81
Tenali	Gudur	3127841	2.23	3943844	2.81
Gudur	Renigunta	2566631	1.83	1972844	1.40
Renigunta	Katpadi	2566631	1.83	1972844	1.40
Katpadi	Jolarpettai	2566631	1.83	1972844	1.40
Gudur	Ennore	561209	0.40		
Ennore	Chennai Beach	561209	0.40		
Chennai Beach	Chengalpattu	561209	0.40		
Chengalpattu	Villupuram	561209	0.40		
Villupuram	Vriddhachalam	561209	0.40		
Vriddhachalam	Tiruchchirappalli	561209	0.40		
Tiruchchirappalli	Dindigul	561209	0.40		
Dindigul	Madurai	561209	0.40		
Madurai	Virudunagar	561209	0.40		
Virudunagar	Vanchi Maniyachchi	561209	0.40		
Vanchi Maniyachchi	Tuticorin	561209	0.40		

For Ennore & Tuticorin plants, coastal shipping via MCL is expected and rail load from Telangana to these plants are expected to be nil

O-D Source cluster Mapping – No significant change in supply to Tamil Nadu

All figures in million tonnes

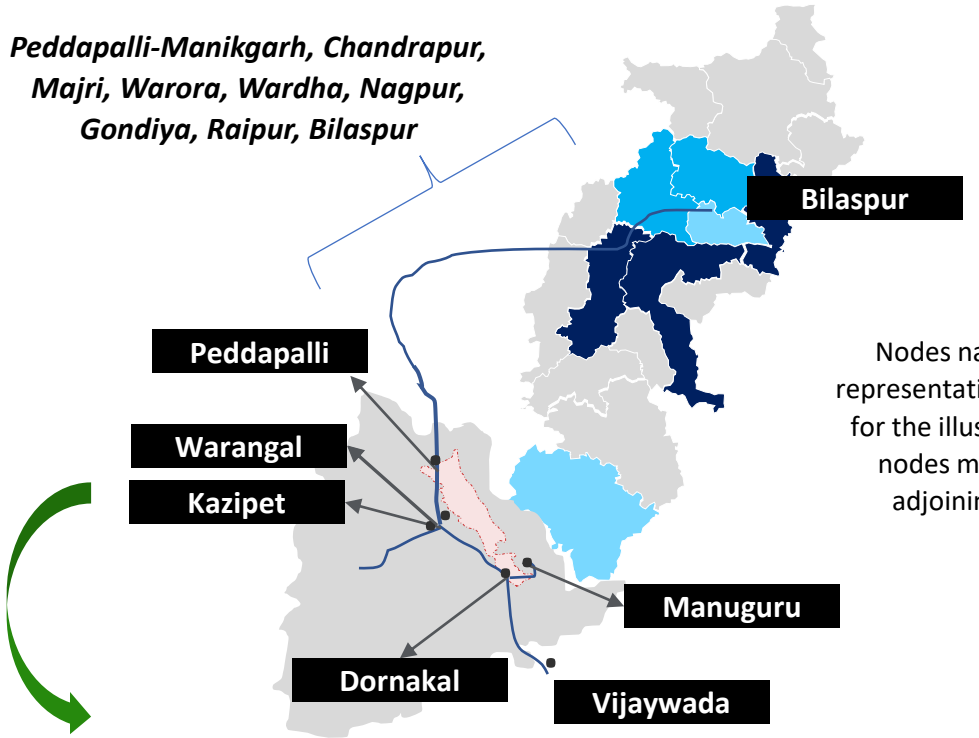
Name of TPS	Utility	KGM Region	RGM Region	BPA Region	Total SCCL	Captives	Total Telangana	Others (Incl Imports)	Total Coal Consumed (FY22)	Estimated Coal Consumption (FY30)	Supply from SCCL 2030	Supply from Captive 2030	Telangana's Supply in FY30	Sourced from Others & Imports
MUTIARA	COASTAL ENERGEN PVT. LTD	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.80	5.04	0.0	0.0	0.0	5.0
IL & FS TAMIL NADU POWER COMPANY LTD.	IL & FS TAMIL NADU POWER COMPANY LIMITED	0.0	0.0	0.0	0.0	0.0	0.0	1.7	1.67	4.14	0.0	0.0	0.0	4.1
NLC TAMILNADU POWER Ltd	NLC TAMIL NADU POWER LIMITED	0.0	0.0	0.0	0.0	0.0	0.0	3.0	3.04	4.66	0.0	0.0	0.0	4.7
VALLUR	NTPC TAMILNADU ENERGY COMPANY LTD (NTECL) (NTPC- JV)	0.6	0.0	0.0	0.6	0.0	0.6	5.4	5.96	7.24	0.0	0.0	0.0	7.2
TUTICORIN	TANGEDCO	0.0	0.0	0.0	0.0	0.0	0.0	4.3	4.28	5.80	0.0	0.0	0.0	4.6
METTUR-I & II	TANGEDCO	2.5	0.0	0.0	2.6	0.0	2.6	3.5	3.86	4.33	1.97	0.0	2.0	5.4
NORTH CHENNAI-I & II	TANGEDCO	0.0	0.0	0.0	0.0	0.0	0.0	6.2	6.18	9.20	0.0	0.0	0.0	9.2
Sub-total		**3.1**	**0.1**	**0.0**	**3.2**	**0.0**	**3.2**	**24.8**	**27.95**	**43.43**	**1.97**	**0.0**	**1.97**	**40.3**
Ennore SCTPP	TANGEDCO									5.12	0.0	0.0	0.0	5.12
Udangudi STPP St-I	TANGEDCO									5.07	0.0	0.0	0.0	5.07
North Chennai TPP St-III	TANGEDCO									2.94	1.97	0.0	1.97	0.97
Total										**56.56**	**3.94**	**0.0**	**3.94**	**52.62**

- For North Chennai TPP St-III, allocated coal source is SCCL; Distance from mine - 606 km (non pithead);. Ministry of Coal recommended for long-term coal linkage for 1.971 MTPA Indigenous coal to SCCL. FSA Executed between TANGEDCO and SCCL for indigenous coal. MoU has been entered with M/s. MMTC for supply of Imported coal of 1.450 MTPA on 25.05.2015.
- For Ennore SCTPP & Udangudi STPP, allocated mine is Chandrabila Coal Block in Odisha; Distance from mine - 1300 km (non pithead)

O-D Source cluster Mapping – Telangana to Chhattisgarh

Telangana to Chhattisgarh total Rail Despatch in FY22 = 0.6 Million Tonnes

Peddapalli-Manikgarh, Chandrapur, Majri, Warora, Wardha, Nagpur, Gondiya, Raipur, Bilaspur



Nodes named are representative in nature for the illustration. All nodes mapped in adjoining table

Major Coal Consuming Districts of Chhattisgarh: 2030 (Estimated)

>15 MTPA Coal Consumption	*Raipur, Raigarh, Durg*
5-10 MTPA Coal Consumption	*Korba, Bilaspur*
1-5 MTPA Coal Consumption	*Janjgir-Champa, Bijapur-Dantewada-Sukma cluster*

Load from Telangana-to-Chhattisgarh main trunk lines (Excluding load from other states on this line)

*Chhattisgarh's Coal **Demand 2022 ~ 134.2 MTPA***
*Rail Supply by Telangana **2022 ~ 0.6 MTPA***

*Chhattisgarh's Coal **Demand 2030 ~ 179.3 MTPA***
*Rail Supply by Telangana **2030 ~0 MTPA***

FY22			FY30
From	**To**	**Traffic (Tonnes) 2022**	**Rakes / Day 2022**
Manuguru	Bhadrachalam Road	41537	0.03
Bhadrachalam Road	Karepalli	41537	0.03
Karepalli	Dornakal	41537	0.03
Dornakal	Warangal	41537	0.03
Warangal	Peddapalli	41537	0.03
Peddapalli	Manchiryal	351438	0.25
Manchiryal	Mandamari	617998	0.44
Mandamari	Manikgarh	625564	0.45
Manikgarh	Chandrapur	625564	0.45
Manikgarh	Chandrapur	625564	0.45
Chandrapur	Majri	625564	0.45
Majri	Warora	625564	0.45
Warora	Wardha	625564	0.45
Wardha	Nagpur	625564	0.45
Nagpur	Kanhan	625564	0.45
Kanhan	Gondiya	625564	0.45
Gondiya	Raipur	625564	0.45
Raipur	Bilaspur	625564	0.45
Bilaspur	Champa section	625564	0.45

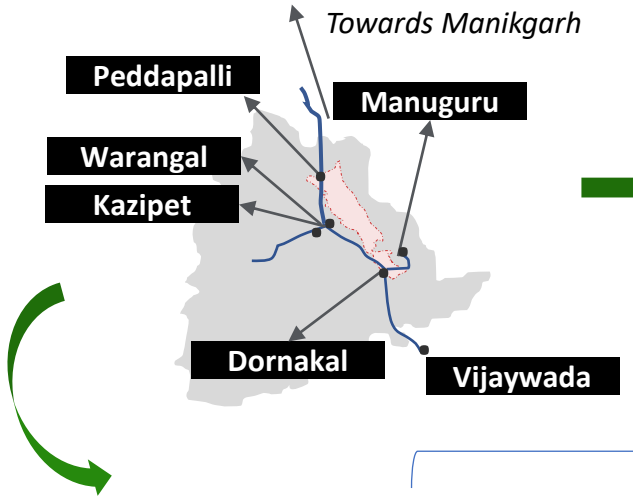
No volume is expected to flow from Telangana to Chhattisgarh in future.

SECL and Captive blocks in Chhattisgarh would be sufficient to cater to demand of Chhattisgarh

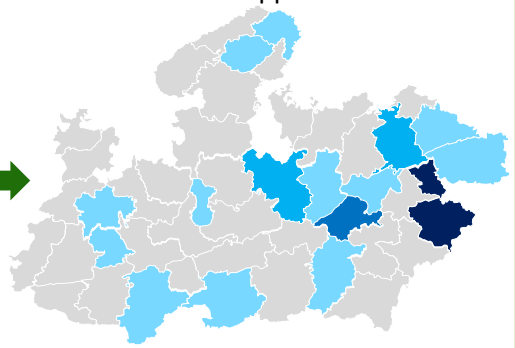
- Owing to growth of SECL & Non-CIL coal supply in Chhattisgarh, SCCL is not expected to supply to Chhattisgarh

O-D Source cluster Mapping – Telangana to Madhya Pradesh

Telangana to Madhya Pradesh total Rail Despatch in FY22 = 0.06 Million Tonnes



Nodes named are representative in nature for the illustration. All nodes mapped in table



MP is not expected to source coal from SCCL in FY30

Route 1: Peddapalli-Manikgarh, Warora, Wardha, Pulgaon, Badnera, Akola, Jalamb, Bhusawal

Route 2: Peddapalli-Manikgarh, Nagbhir, Gondiya, Balaghat, Nainpur

Major Coal Consuming Districts of MP: 2030 (Estimated)

>15 MTPA Coal Consumption	*Shahdol*
10-15 MTPA Coal Consumption	*Jabalpur*
5-10 MTPA Coal Consumption	*Satna, Sagar*
1-5 MTPA Coal Consumption	*Sidhi, Singrauli, Rewa, Katni, Damoh, Betul, Khandwa, Ujjain, Indore, Bhind, Gwalior, Bhopal, Seoni*

Load from Telangana-to-Madhya Pradesh main trunk lines (Excluding load from other states on this line)

MP's Coal ***Demand 2022 ~ 84.33 MTPA***

Rail Supply by Telangana ***2022 ~ 0.06 MTPA***

MP's Coal ***Demand 2030 ~ 110.20 MTPA***

Rail Supply by Telangana ***2030 ~ 0.00 MTPA***

FY22 **FY30**

From	To	Traffic (Tonnes) 2022	Rakes / Day 2022
Bhadrachalam Road	Karepalli	20217	0.01
Karepalli	Dornakal	20217	0.01
Dornakal	Warangal	20217	0.01
Warangal	Peddapalli	20217	0.01
Peddapalli	Manchiryal	52344	0.04
Manchiryal	Mandamari	52344	0.04
Mandamari	Manikgarh	56383	0.04
Manikgarh	Chandrapur	20230	0.01
Chandrapur	Majri	20230	0.01
Majri	Warora	20230	0.01
Warora	Wardha	20230	0.01
Wardha	Pulgaon	20230	0.01
Pulgaon	Badnera	20230	0.01
Badnera	Akola	20230	0.01
Akola	Jalamb	20230	0.01
Jalamb	Bhusawal	20230	0.01
Bhusawal	Khandwa	20230	0.01
Manikgarh	Nagbhir	36153	0.03
Nagbhir	Gondiya	36153	0.03
Gondiya	Balaghat	36153	0.03
Balaghat	Nainpur	36153	0.03
Nainpur	Kachhpura	36153	0.03

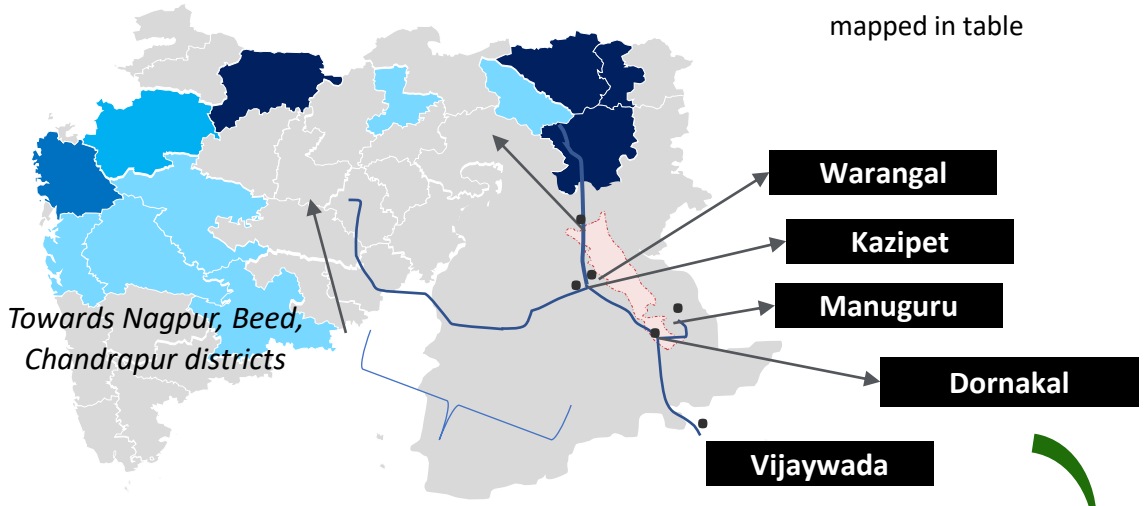
No volume is expected to flow from Telangana to Madhya Pradesh in future.

SECL, NCL and Captive blocks in Madhya Pradesh would be sufficient to cater to demand of Madhya Pradesh

O-D Source cluster Mapping – Telangana to Maharashtra

Telangana to Maharashtra total Rail Despatch in FY22 = 3.85 Million Tonnes

Nodes named are representative in nature for the illustration. All nodes mapped in table



Bibinagar, Vikarabad, Nizamabad, Jankampet, Mukhed, Purna

Major Coal Consuming Districts of Maharashtra: 2030 (Estimated)

>15 MTPA Coal Consumption	*Nagpur, Chandrapur, Bhandara, Jalgaon*
10-15 MTPA Coal Consumption	*Palghar/Thane*
5-10 MTPA Coal Consumption	*Nashik*
1-5 MTPA Coal Consumption	*Solapur, Pune, Raigad, Ahmednagar, Wardha & Akola*

Load from Telangana-to-Maharashtra main trunk lines (Excluding load from other states on this line)

Maharashtra's Coal ***Demand 2022 ~ 84 MTPA***
Rail Supply by Telangana ***2022 ~ 3.85 MTPA***

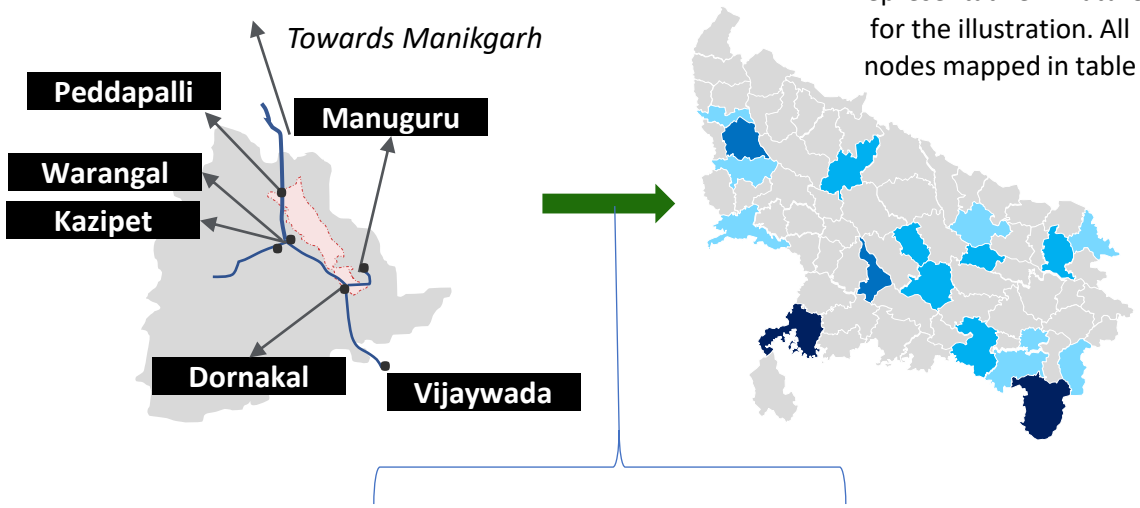
Maharashtra's Coal ***Demand 2030 ~ 111 MTPA***
Rail Supply by Telangana ***2030 ~ 0.0 MTPA***

FY22				FY30
From	**To**	**Traffic (Tonnes) 2022**	**Rakes / Day 2022**	
Manuguru	Bhadrachalam Road	162747	0.12	No volume is expected to flow from Telangana to Maharashtra in future. WCL, SECL, NCL and Captive blocks would be sufficient to cater to demand of Maharashtra
Bhadrachalam Road	Karepalli	235665	0.17	
Karepalli	Dornakal	235665	0.17	
Dornakal	Warangal	235665	0.17	
Warangal	Kazipet	235665	0.17	
Kazipet	Bibinagar	235665	0.17	
Bibinagar	Vikarabad	235665	0.17	
Vikarabad	Latur Road	235665	0.17	
Latur Road	Parbhani (section towards Parli)	1707422	1.22	
Manikgarh	Mandamari	1013298	0.72	
Mandamari	Manchiryal	1220064	0.87	
Manchiryal	Ramagundam	1260551	0.90	
Ramagundam	Peddapalli	1471757	1.05	
Peddapalli	Nizamabad	1471757	1.05	
Nizamabad	Jankampet	1471757	1.05	
Jankampet	Mukhed	1471757	1.05	
Mukhed	Purna	1471757	1.05	
Purna	Parbhani	1471757	1.05	

- Maharashtra is not expected to source coal from SCCL due to increase in volume of CIL's & Mahagenco's captive blocks in Chhattisgarh

O-D Source cluster Mapping – Telangana to Uttar Pradesh

Telangana to Uttar Pradesh total Rail Despatch in FY22 = 0.13 Million Tonnes



Route: Peddapalli-Manikgarh, Nagbhir, Gondiya, Balaghat, Nainpur, Jabalpur, Katni, Prayagraj, Jaunpur

Load from Telangana-to-Uttar Pradesh main trunk lines (Excluding load from other states on this line)

UP's Coal ***Demand 2022 ~ 87 MTPA***
Rail Supply by Telangana ***2022 ~ 0.13 MTPA***

UP's Coal ***Demand 2030 ~ 114 MTPA***
Rail Supply by Telangana ***2030 ~ 0.0 MTPA***

FY22			
From	To	Traffic (Tonnes) 2022	Rakes / Day 2022
Manuguru	Bhadrachalam Road	7801	0.01
Bhadrachalam Road	Karepalli	67233	0.05
Karepalli	Dornakal	67233	0.05
Dornakal	Warangal	67233	0.05
Warangal	Peddapalli	67233	0.05
Peddapalli	Manchiryal	118017	0.08
Manchiryal	Mandamari	125972	0.09
Mandamari	Manikgarh	125972	0.09
Manikgarh	Nagbhir	125972	0.09
Nagbhir	Gondiya	125972	0.09
Gondiya	Balaghat	125972	0.09
Balaghat	Nainpur	125972	0.09
Nainpur	Jabalpur	125972	0.09
Jabalpur	Katni	125972	0.09
Katni	Manikpur	125972	0.09
Manikpur	Prayagraj	125972	0.09
Prayagraj	Jaunpur	125972	0.09
Jaunpur	Akbarpur	54283	0.04
Prayagraj	Unchahar	71689	0.05

FY30

No volume is expected to flow from Telangana to Uttar Pradesh in future.

NCL, CCL, captive blocks and other CIL sources would be sufficient to cater to demand of Uttar Pradesh

Major Coal Consuming Districts of UP: 2030 (Estimated)

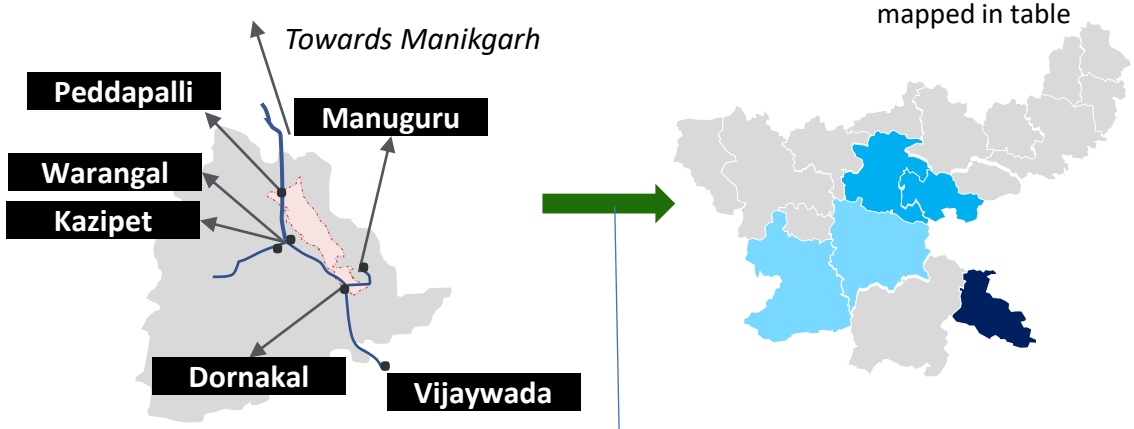
>15 MTPA Coal Consumption	*Jhansi, Sonbhadra*
10-15 MTPA Coal Consumption	*Bulandsahar, Kanpur*
5-10 MTPA Coal Consumption	*Prayagraj, Rae Bareli, Lucknow, Shahjahanpur, Ambedkar Nagar, Gorakhpur*
1-5 MTPA Coal Consumption	*Ghaziabad, Hapur, Gautam Buddha Nagar, Aligarh, Agra, Kushinagar, Gonda*

- Major consumers of coal in UP in FY22 to source coal from Telangana are NTPC Tanda & NTPC Unchahar. However, these plants are not expected to source coal from SCCL in 2030

O-D Source cluster Mapping – Telangana to Jharkhand

Telangana to Jharkhand total Rail Despatch in FY22 = 0.03 Million Tonnes

Nodes named are representative in nature for the illustration. All nodes mapped in table



Route: Peddapalli-Manikgarh, Chandrapur, Majri, Warora, Wardha, Nagpur, Gondiya, Raipur, Bilaspur, Jharsuguda Jn, Bondamunda

Major Coal Consuming Districts of Jharkhand: 2030 (Estimated)

>15 MTPA Coal Consumption	*East Singhbhum*
10-15 MTPA Coal Consumption	-
5-10 MTPA Coal Consumption	*Bokaro, Hazaribagh*
1-5 MTPA Coal Consumption	*Simdega, Gumla, Khunti, Ranchi, Saraikela-Kharsawan*

Load from Telangana-to-Jharkhand main trunk lines (Excluding load from other states on this line)

*Jharkhand's Coal **Demand 2022 ~ 87 MTPA***
*Rail Supply by Telangana **2022 ~ 0.03 MTPA***

*Jharkhand's Coal **Demand 2030 ~ 68.35 MTPA***
*Rail Supply by Telangana **2022 ~ 0.00 MTPA***

FY22			FY22
From	**To**	**Traffic (Tonnes) 2022**	**Rakes / Day 2022**
Ramagundam	Manchiryal	28478	0.02
Manchiryal	Mandamari	28478	0.02
Mandamari	Manikgarh	28478	0.02
Manikgarh	Chandrapur	28478	0.02
Manikgarh	Chandrapur	28478	0.02
Chandrapur	Majri	28478	0.02
Majri	Warora	28478	0.02
Warora	Wardha	28478	0.02
Wardha	Nagpur	28478	0.02
Nagpur	Kanhan	28478	0.02
Kanhan	Gondiya	28478	0.02
Gondiya	Raipur	28478	0.02
Raipur	Bilaspur	28478	0.02
Bilaspur	Champa	28478	0.02
Champa	Kharsia	28478	0.02
Kharsia	Jharsuguda Jn	28478	0.02
Jharsuguda Jn	Bondamunda	28478	0.02
Bondamunda	Rajkharsawan	12200	0.01
Rajkharsawan	Sini	12200	0.01
Sini	Chandil	12200	0.01
Chandil	Purulia	12200	0.01
Purulia	Bokaro Steel City	12200	0.01
Bokaro Steel City	Chandrapura	12200	0.01
Bondamunda	Ranchi	16278	0.01
Ranchi	Tatisilwai	16278	0.01
Tatisilwai	Barkakhana	16278	0.01
Barkakhana	Kuju	16278	0.01
Kuju	Koderma	16278	0.01

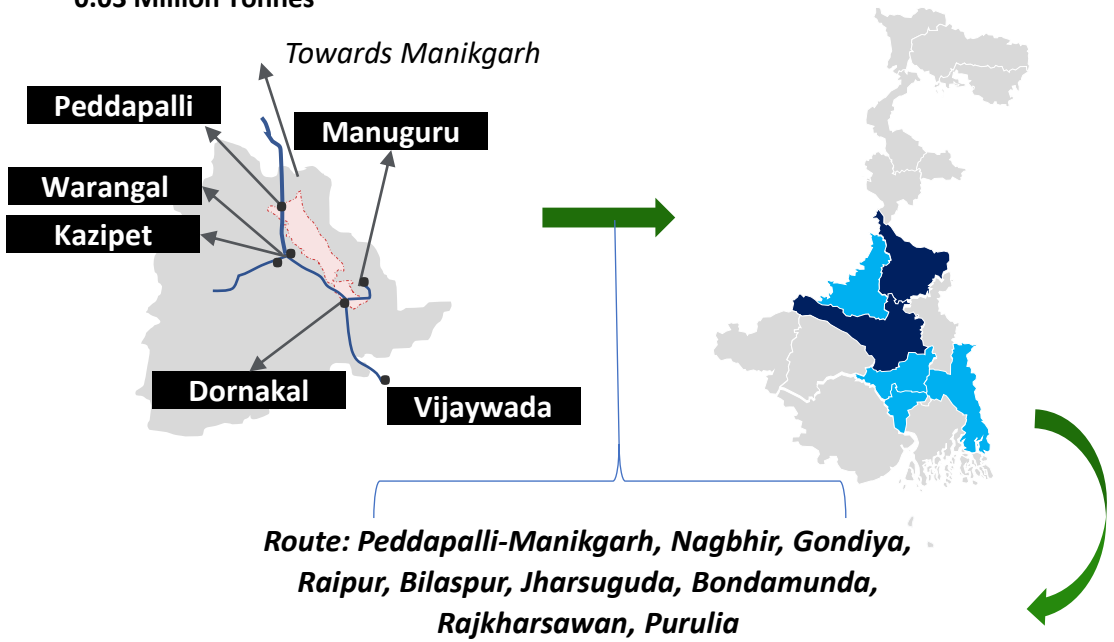
No volume is expected to flow from Telangana to Jharkhand in future.

CCL, BCCL, ECL and captive blocks would be sufficient to cater to demand of Jharkhand

O-D Source cluster Mapping – Telangana to West Bengal

Telangana to West Bengal total Rail Despatch in FY22 = 0.03 Million Tonnes

Nodes named are representative in nature for the illustration. All nodes mapped in table



Route: Peddapalli-Manikgarh, Nagbhir, Gondiya, Raipur, Bilaspur, Jharsuguda, Bondamunda, Rajkharsawan, Purulia

Load from Telangana-to-West Bengal main trunk lines (Excluding load from other states on this line)

West Bengal's Coal ***Demand 2022 ~ 54.96 MTPA***
Rail Supply by Telangana ***2022 ~ 0.03 MTPA***

West Bengal Coal ***Demand 2030 ~ 71.81 MTPA***
Rail Supply by Telangana ***2030 ~ 0.00 MTPA***

FY22 | **FY30**

From	To	Traffic (Tonnes) 2022	Rakes / Day 2022
Peddapalli	Manchiryal	8065	0.01
Manchiryal	Mandamari	39084	0.03
Mandamari	Manikgarh	39084	0.03
Manikgarh	Nagbhir	39084	0.03
Nagbhir	Gondiya	39084	0.03
Gondiya	Raipur	39084	0.03
Raipur	Bilaspur	39084	0.03
Bilaspur	Champa	39084	0.03
Champa	Kharsia	39084	0.03
Kharsia	Jharsuguda Jn	39084	0.03
Jharsuguda Jn	Bondamunda	39084	0.03
Bondamunda	Rajkharsawan	39084	0.03
Rajkharsawan	Sini	39084	0.03
Sini	Purulia	39084	0.03
Purulia	Andal	39084	0.03

No volume is expected to flow from Telangana to West Bengal in future.

ECL, BCCL, CCL and captive blocks would be sufficient to cater to demand of West Bengal

Major Coal Consuming Districts of WB: 2030 (Estimated)

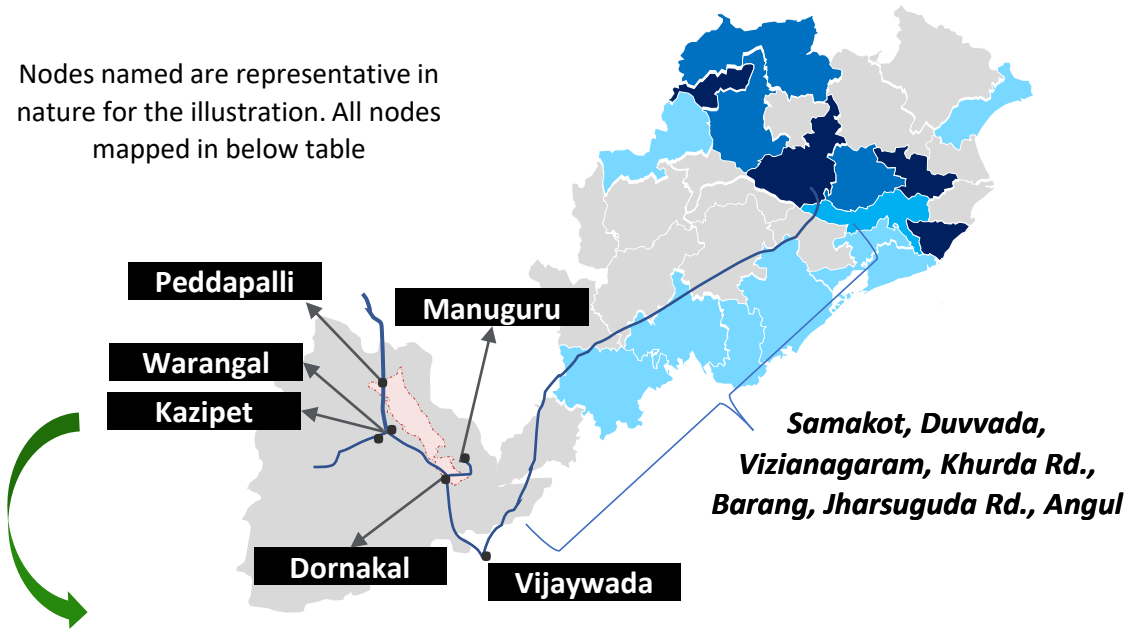
>15 MTPA Coal Consumption	*Murshidabad, Paschim Bardaman, Purba Bardaman*
10-15 MTPA Coal Consumption	-
5-10 MTPA Coal Consumption	*Hooghly, Howrah, North 24 Parganas*
1-5 MTPA Coal Consumption	-

- Only 1 plant in West Bengal sourced coal from Telangana in FY22 – Durgapur Steel TPS, DVC.
- However, going forward, no traffic is expected to flow from Telangana to West Bengal due to growth in ECL, BCCL, CCL and captive blocks of DVC, WBPDCL etc.
- Further, DVC has plans to participate in coal block auctions for its plants

O-D Source cluster Mapping – Telangana to Odisha

Telangana to Odisha total Rail Despatch in FY22 = 0.47 Million Tonnes

Nodes named are representative in nature for the illustration. All nodes mapped in below table



Major Coal Consuming Districts of Odisha: 2030 (Estimated)

>15 MTPA Coal Consumption	*Jharsuguda, Angul, Jajpur, Jagatsinghpur*
10-15 MTPA Coal Consumption	*Sundergarh, Sambalpur, Dhenkanal*
5-10 MTPA Coal Consumption	*Cuttack*
1-5 MTPA Coal Consumption	*Koraput, Rayagada, Gagapati, Ganjam, Khordha, Puri, Bargarh, Balasore*

Load from Telangana-to-Odisha main trunk lines (Excluding load from other states on this line)

*Odisha's Coal **Demand 2022 ~ 99 MTPA***

*Rail Supply by Telangana **2022 ~ 0.47 MTPA***

*Odisha's Coal **Demand 2030 ~ 147 MTPA***

*Rail Supply by Telangana **2030 ~ 0.00 MTPA***

FY22

From	To	Traffic (Tonnes) 2022	Rakes / Day 2022
Manuguru	Bhadrachalam Road	23107	0.02
Bhadrachalam Road	Karepalli	23107	0.02
Karepalli	Dornakal	23107	0.02
Dornakal	Motumari	23107	0.02
Motumari	Vijayawada North (Vijaywara bypass)	23107	0.02
Vijayawada North (Vijaywara bypass)	Nidadavolu	23107	0.02
Nidadavolu	Samalkot	23107	0.02
Samalkot	Duvvada	23107	0.02
Duvvada	Vizianagaram	23107	0.02
Vizianagaram	Naupada	23107	0.02
Naupada	Khurda Road	23107	0.02
Khurda Road	Barang	23107	0.02
Barang	Sambalpur	23107	0.02
Manchiryal	Mandamari	454987	0.32
Mandamari	Manikgarh	454987	0.32
Manikgarh	Nagbhir	454987	0.32
Nagbhir	Gondiya	454987	0.32
Gondiya	Raipur	454987	0.32
Raipur	Bilaspur	454987	0.32
Bilaspur	Champa	454987	0.32
Champa	Kharsia	454987	0.32
Kharsia	Jharsuguda Rd	454987	0.32
Jharsuguda Rd	Sambalpur City	454987	0.32
Sambalpur City	Angul	454987	0.32
Angul	Talcher Rd	454987	0.32

FY30

No volume is expected to flow from Telangana to Odisha in future.

MCL and captive blocks would be sufficient to cater to demand of Odisha

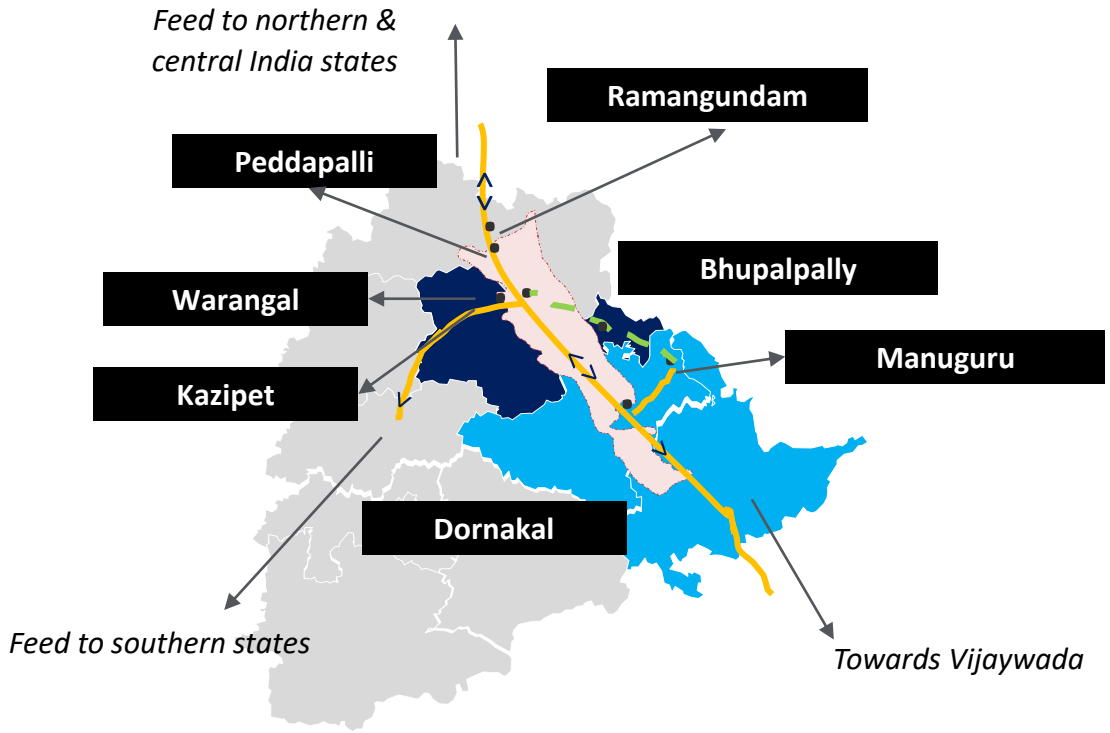
O-D Source cluster Mapping – Consolidated Coal Traffic from Telangana to all states

FY22 Actual and FY30 (Estimated) coal traffic in major sections for despatch of coal from Telangana to various destinations

From	To	Traffic (MT): 2022	Rakes / Day: 2022	Traffic (MT): 2030	Rakes / Day: 2030	Increase in Coal Traffic (Rakes / Day)
Manuguru	Bhadrachalam Road	6.76	**4.81**	7.65	5.45	**+0.63**
Bhadrachalam Road	Karepalli	12.71	**9.04**	13.30	9.47	**+0.42**
Karepalli	Dornakal	15.90	**11.32**	17.66	12.57	**+1.25**
Dornakal	Warangal	5.62	**4.00**	10.22	7.27	**+3.27**
Dornakal	Motumari	11.16	**7.94**	13.67	9.73	**+1.79**
Warangal	Peddapalli	2.16	**1.54**	5.53	3.94	**+2.40**
Peddapalli	Kazipet	5.68	**4.04**	21.70	15.45	**+11.40**
Peddapalli	Manchiryal	8.62	**6.14**	25.15	17.89	**+11.76**
Manchiryal	Mandamari	10.43	**7.42**	23.66	16.83	**+9.41**
Kazipet	Bibinagar	8.83	**6.28**	25.85	18.39	**+12.11**
Motumari	Vijaywada	11.16	**7.94**	13.38	9.52	**+1.58**

Major sections are already witnessing significant coal traffic and is estimated to further increase in the coming decade.

Increase in traffic majorly expected in sections serving the state of Telangana for which coal supply has been allocated to SCCL for upcoming power plants



<> Multi-Directional Coal Flow from SCCL

> Uni-Directional Coal Flow from SCCL

In addition, the **line connecting Manuguru with Ramagundam via Jayashankar Bhupalpally** shall further ease coal evacuation from this area. The construction of this **new BG line is to be expedited**

Key Insights and Recommendations

#	Recommendation	Way Forward
1	Due to increased coal production from SCCL's Bhupalpally region, the line connecting Ramagundam to Manuguru via Jayashankar Bhupalpally region which is under contruction to be expedited on priority. Joining of this line will ease traffic on Kazipet-Peddapalli section	Manuguru-Ramagundam (via Bhupalpally) line may be expedited
2	Ongoing tripling works on sections Vijaywada-Motumari-Dornakal-Kazipet-Odella (near Peddapalli) and section Mandamarri-Manikgarh shall further ease evacuation for congested sections in this region.	Tripling work in the region to be expedited. Additional lines may be evaluated for Peddapalli-Manchiryal section (4th line)
3	Doubling of Dornkal- Bhadrachalam Road section & Doubling of Motumari-Vishnupuram section	Doubling of Dornakal-Bhadrachalam Road & Motumari-Vishnupuram sections
4	Tripling of Kazipet-Bibinagar should be evaluated for easing traffic flowing from SCCL's blocks to southern states along with re-modeling of Kazipet yard for free flow of goods trains	Tripling work for Kazipet-Bibinagar along with rem-modeling of Kazipet yard should be evaluated
5	Automatic Signaling may be proposed across all major rail sections in the vicinity of coal blocks in Telangana	Indian Railways (SCR)

Estimated Wagon Procurement requirement by Indian Railways (SCR - Telangana)

Destination State	Million Tonne - Kms	Volume (Million Tonnes)	Weighted Avg Distance of Despatch (KMs)
Telangana	2198.58	16.02	137.24
Karnataka	5766.82	9.32	618.76
Andhra Pradesh	1699.57	6.87	247.39
Maharashtra	1301.05	3.86	337.06
Tamil Nadu	3055.77	3.13	976.28
Others	2858.85	6.17	463.35
Total	16880.64	**45.37 Million Tonnes**	

FY22 - Rail

Average Lead for Coal Supply in FY22 (SCR) by Telangana
372.07 KMs

Destination State	Million Tonne - Kms	Volume (Million Tonnes)	Weighted Avg Distance of Despatch (KMs)
Telangana	5386.67	39.25	137.24
Karnataka	5816.32	9.4	618.76
Andhra Pradesh	2152.29	8.7	247.39
Maharashtra	0.00	0	337.06
Tamil Nadu	3846.56	3.94	976.28
Additional Push Volumes + Commercial Despatches to be taken as per FY22 avg Leads	4633.46	10	463.35
Total	21835.30	**71.29 Million Tonnes**	

FY30 - Rail

Average Lead for Coal Supply in FY30 (SCR) by Telangana
306.29 KMs

	FY22	FY30
Average Lead of coal Despatch from SCCL (KMs)	372.07	306.29
Estimated Average Turnaround time of Rakes (Days)	2.77	2.28
Rakes / Day Despatch by Rail + RCR + RSR Mode	31.51	49.51

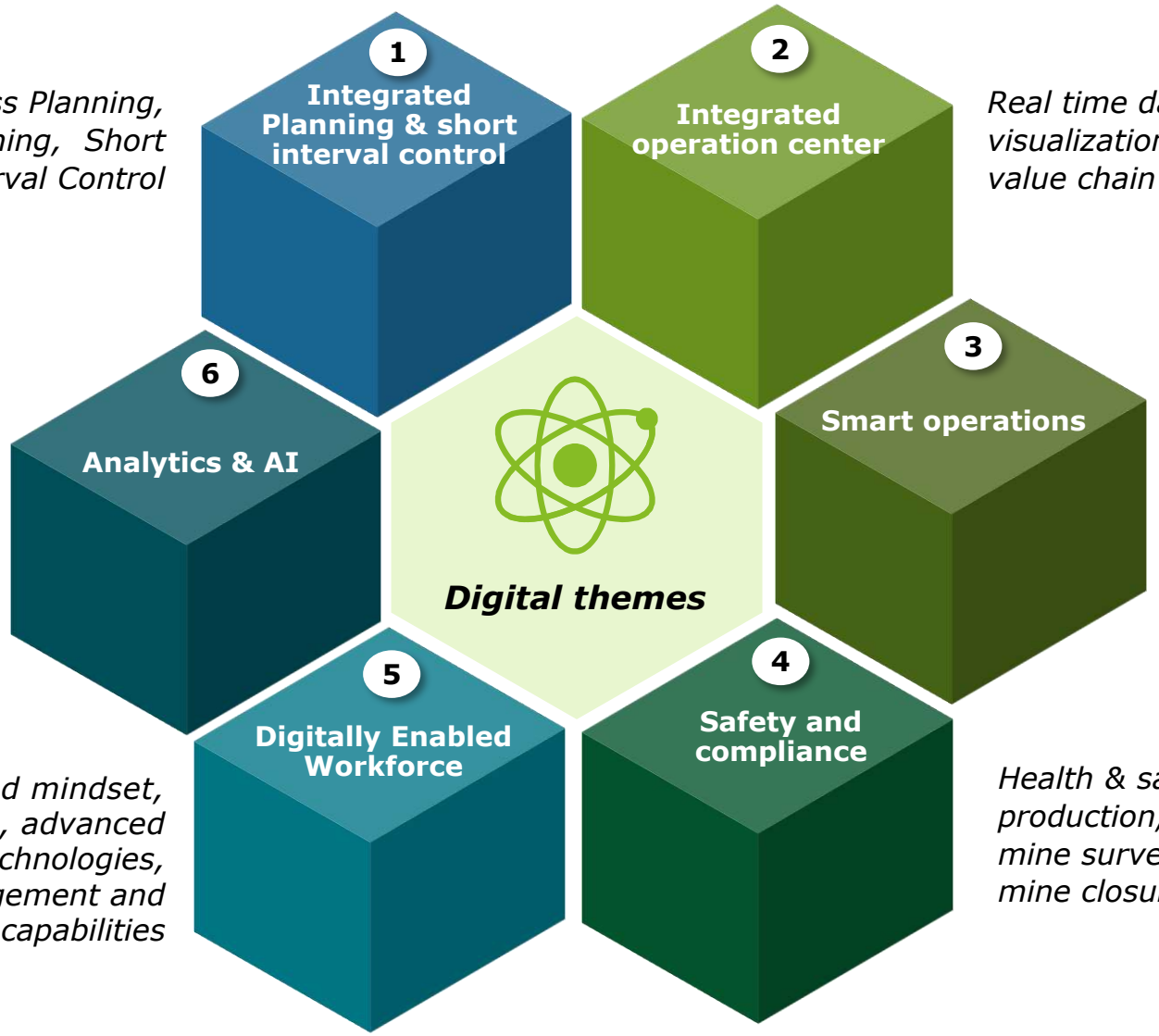
Additional Rakes/Day Despatch Envisaged	18
Estimated Improved TAT (Days)	2.28
Total Number of Rakes Required	41
Estimated Wagons to be Procured for Coal till FY30	**2,384**

Additional ~179 Wagons would be required for despatches during peak demand period from November to March

Source: Sagarmala Report, Ministry of Ports, Shipping & Waterways, Comprehensive Action Plan for Port Connectivity on Gatishakti NMP 2022, DPIIT]

Smart Coal Logistics

Digital backbone is a key theme for Smart operation



Integrated Business Planning, Execution planning, Short Interval Control

Real time data collection and visualization, optimization across the value chain from mine-to-market

Improvement in operational efficiency, Gamified platforms, fuel management system, productivity, Autonomous and tele-operation systems for mining machineries, Fleet Management System

Health & safety integrated to production, Fatigue management, mine surveillance, monitoring of mine closure etc.

Capability and mindset, Connected workforce, advanced track-and-trace technologies, drive change management and building capabilities

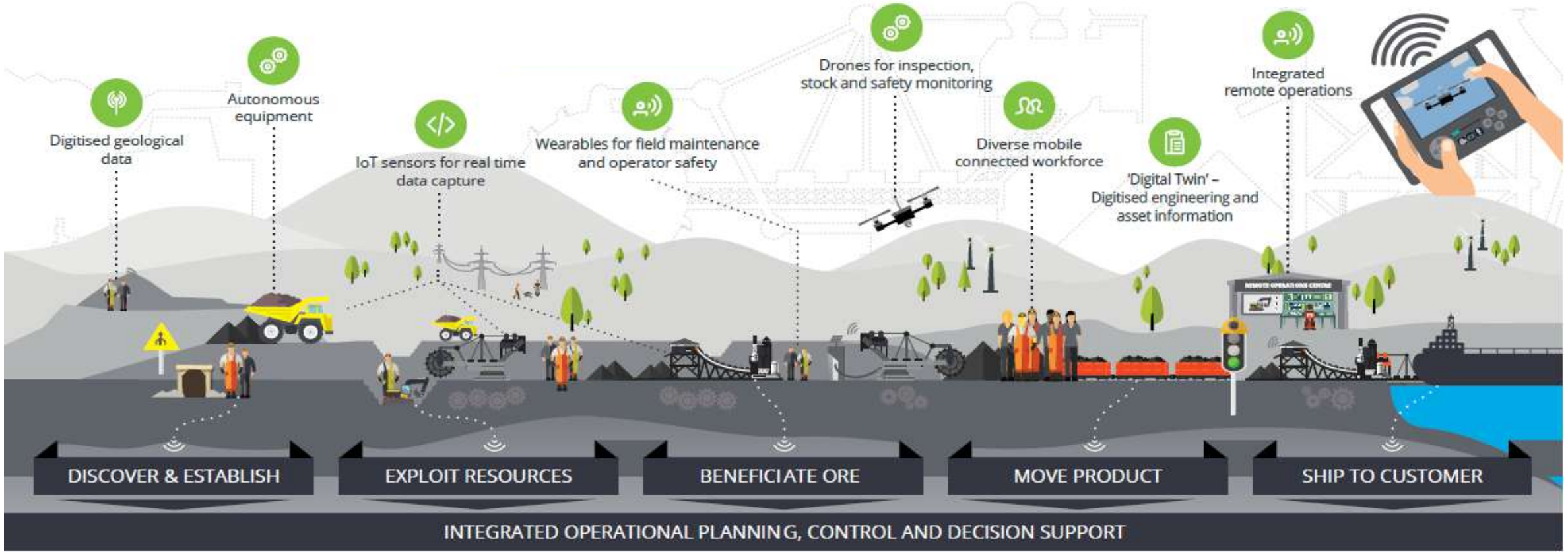
Drilling and blasting, HEMM & plants efficiency, manpower productivity

Opportunities in mining sector

The core operational processes in the future mining value chain will be a highly automated, with a wide range of digital capabilities

Globally, 69% of mining companies are looking at remote operation and monitoring centres, 29% at robotics and 27% at unmanned drones.

While in India, only ~25% of the mining companies are looking for remote operation & monitoring centers.



Technology innovation in mining sector

The technological innovations including the digital solutions have the capacity to add a considerable value to the metals and mining industry. The below data shows the cumulative value addition under various technology innovation portfolio in metal and mining sector with the expected rate of adoption in the mining industry:

Technology Innovation Portfolio	Cumulative Value Addition (Till FY25		Rate of Adoption (Mining Industry)	
	Mining	Metals	FY18	FY25
Smart Sensors	Usd 9 Billion	Usd 25 Billion	20%	50%
Autonomous Operations	Usd 47 Billion	Usd 8 Billion	25%	40%
Connected Worker	Usd 59 Billion	Usd 26 Billion	50%	65%
Remote Operations Center	Usd 65 Billion	Usd 12 Billion	30%	60%
Asset Cyber security	Usd 5 Billion	Usd 16 Billion	75%	80%
Integrated Platforms	Usd 2 Billion	Usd 35 Billion	15%	25%
Advanced Analytics	Usd 2 Billion	Usd 8 Billion	25%	50%

Source: World Economic Forum, IBEF Analysis, News Articles

Technology and Digital Trends in Mining

Sample use cases of technology and digital opportunities trending in the mining industry

Asset Management

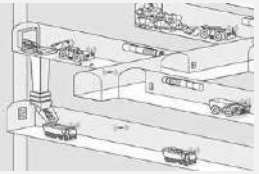
Use Cases

Integrated Operations

Integrated operations is enabled by global access to real time information, collaborative technology and integration of multiple expertise across disciplines, organizations and geographical locations

Traffic Management

Haul trucks, jumbos, scoops and other vehicles can cause traffic jams and result in lost time and productivity. Traffic management solutions can be used to prioritized and sequence traffic



Location Detection

Underground location detection is a support system that provides real-time positioning of vehicles, equipment and personnel in underground mines to maximize safety and productivity

Analytics and AI

Use Cases

Analytical Optimization

Faster distribution of intelligence on asset condition and operations data can be triggered by analyzing data from sensors.

Digital Drawings

Digital twins and digital drawings are created from physical drawings of assets for predictive modelling scenarios

Blast Optimization

The use of advanced analytics, data, and models can enhance the blast to achieve the desired degree of fragmentation, minimize costs, and improve safety.

Predictive Maintenance

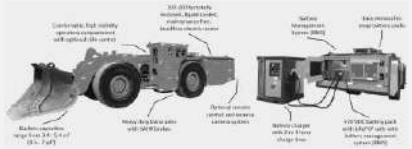
Predictive maintenance include asset data monitoring, intelligent, parameter optimization, analytically modeling, and using data to inform maintenance planning

Energy Management

Use Cases

Natural Gas Trucks

The conversion of traditional haul trucks to supplement their use of diesel can increase safety, decrease emissions, and decrease operating costs.



Asset Electrification

Battery-powered vehicles can be more efficient than diesel-based counterparts and can reduce ventilation and cooling requirements in underground mines

Smart Grid

Smart grid is the digitization of the traditional distribution grid through sensors to collect information on the grid operating conditions,, information storage and analysis

Demand Management

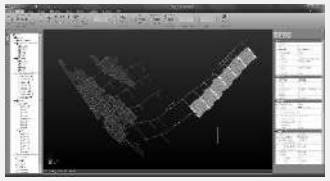
Demand Management refers to the opportunity to optimizing power use when local renewable energy is abundant & grid electricity is economical

Technology and Digital Trends in Mining

Sample use cases of technology and digital opportunities trending in the mining industry

Short Interval control

Use Cases

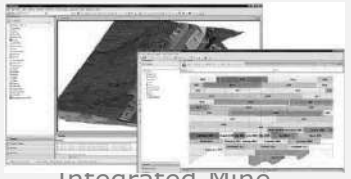


Planning Software

Planning software maximizes use of automated processes to eliminate repetitive tasks to improve speed and accuracy in operations across multiple scenarios

Digital Short Interval Control

Use of sensors on personnel and equipment can result in better view of underground operations and result in continuous improvement to mining operations



Integrated Mine Planning

Integrated Mine Planning is provided through mining software for geological data discovery, reserves definition, mine engineering and scheduling of mining activities

Automation

Use Cases

Fleet Automation

Fleet including robo fuel arm, haul trucks and drills can be automated to achieve autonomous operations without human intervention

Collision Warning System

CWS can detect obstacles in the equipment's path and alert operators and CAS can make adjustments to the movement of the equipment to avoid the collision

Tele-remote Operation

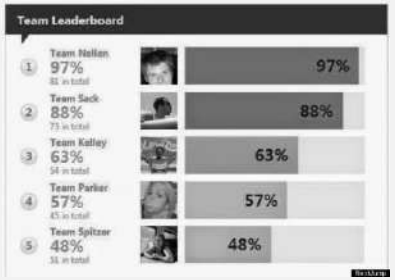
Tele-remote Operation of an asset can be initiated via the use of joysticks, and camera feeds, and can remove worker from hazardous working conditions

Autonomous Drill

GPS technology enables autonomous rigs to position themselves extremely accurately hole after hole in daylight or at night.

Gamified Performance Control

Use Cases



Digital Gamified Performance Management (GPM)

At its core, Gamified performance management is initiated to engage operational teams on a behavioral level and motivate teams or individuals to achieve their daily targets

SAFETY AND COMPLIANCE

The benefits from incorporating new innovations and best practices can be meaningful

Preventive	**Virtual/Augmented Reality Training**	Realistic and engaging training through VR glasses and 360° videos
Preventive	**Remote Inspection / Adv. Surveillance**	The use of drones and smart cameras offer an advanced level of inspections, monitoring and tracking being out of harms way
Monitor	**People Tracking**	Wearables, such as smart watches and glasses, can track attributes including a worker's environments, biometrics, and location
Monitor	**Smart Sensors/ Warning Sensors**	Creating an Industrial Internet of Things and alerting personnel of any dangers that may arise in risky environments
Monitor	**Fatigue Detection**	Tracking behavioral indications of fatigue and drowsiness with cameras and wearables to reduce the chance of a fatigue-related accident
Monitor	**Predictive Maintenance**	Testing and analyzing mechanical attributes in vehicles and equipment to accurately predict maintenance requirements
Control	**Virtual Simulation / Digital Twin**	Creating a virtually identical scenario to the real-world to alter variables and interpret how processes will be affected
Eliminate	**Fully Autonomous**	Reducing the need for personnel to be put in dangerous environments and eliminating the risk of incidents

Sample benefits

- Reduction in number of fatalities
- Improvement in lost time injuries (absolute)
- Better Technical Safety Reviews score (TSR)
- Reduction in Lost Time Injury Frequency Rate (LTIFR)
- Increasing Safety Culture Performance (Bradley Index Score)
- More accurate assessment of employees potential for risk behaviours
- Reduction in number of Work Stoppages

Preventive | Monitoring/Tracking | Controlling the Risk | Eliminating the Risk

Application of Smart Technology (1/2)

With the adoption of various digital solutions across the mining value chain, miners are extracting business benefits.

Underground Monitoring System

An underground network of sensors powered by IOT helps keep workers constantly up to date on the state of underground environment and mining operations. These sensors connect to each other and the internet share data between different devices. Companies that use IOT usually choose to store their data on the cloud because IOT devices to collect large quantities of data and facilitate collaboration across operations. Sensors enable the mass collection of data that help make smart mining so much more efficient than traditional mining practices. More data leads to a better understanding of mining operations, which allows for better planning and site wide improvements.

Moreover, IOT sensors allow a mine to know the exact second something goes abnormal instead of discovering anomalies after the situation has time to aggravate. Miners working above and below ground can be informed of issues real time and can deal with them more concisely.

Autonomous smart mining vehicle

We have been looking forward to self-driving cars for decades but while we wait for them to hit our highways, automated fleet vehicles are already impacting the mining industry. These vehicles position themselves with their environment, load, and unload materials, perform route tracking, and park by themselves. Route tracking is when machines use AI to identify the optimal route to travel. By pinpointing the best possible trajectory, autonomous vehicles reduce furl consumption. Each autonomous vehicles communicates with the rest of the fleet and build in collision awareness increases efficiency and decreases accident.

Mining vehicles often access hazardous areas, putting drivers in danger. Automated vehicles reduce the risk of accidents and keep people safe.

Remote controlling devices

Remote-controlled drills are operated from console at a remote location. This means workers aren't exposed to the typical dangers associated with drilling. Additionally, operators can use multiple drills simultaneously, increasing efficiency.

Autonomous drills also offer more precise drilling. Unevenly blasted material is more challenging to handle and leads to more costly operations. With advanced technology, drilling is more precise, setting a better foundation for the entire operation.

Unmanned aerial vehicle

Unmanned aerial vehicles are generally known as drones, are used for prospecting possible new mines, and providing visualizations of geographical areas. Instead of sending a team of people to stake out the land, drone imaging provides an accurate, detailed view of the terrain that wouldn't be possible without technology.

Drone mapping is a lot faster than in person mapping. It also makes possible to map out previously inaccessible areas, with accuracy down to 1 cm.

Aside from mapping mines, automated drones survey hazardous areas to ensure worker safety. Workers also use them to measure and manage inventory and perform inspections.

Application of Smart Technology (2/2)

With the adoption of various digital solutions across the mining value chain, miners are extracting business benefits.

3D laser mapping in smart mining

Three-dimensional laser scanning has been used or years in civil engineering and architecture, but it's application in mining sector is relatively new. This technology uses laser light to analyze the environment's geography and create 3d map. Analyzing the resulting geographical data helps workers with mine exploration, the planning of drill holes and project management.

Geographic information system

Geographical information systems offer mineworkers a more in depth look at an area's geography, especially when the terrain is in accessible. This technology provides a 3D visualization of a mine, including the location, size, and shape of various geographical features.

Geographical Information systems generates a digital map with various layers superimposed on a base map. Different version of this map can be toggled to showcase additional landscape features depending on the purpose. GIS apps then allow workers to view detailed maps on various devices from any number of locations and access a database of geographical data.

Image recognition technology

Smart mines use image recognition technology to detect ores and differentiate them from the surrounding environment. This increased accuracy mitigates human error and streamlines the mining process.

For example, image recognition can differentiate between copper grades, some of which are suitable to differentiate commercialization ends.

Smart PPE (Personal Protective Equipment)

Many types of PPE have smart equipment or equivalents whether its hardhats, vests, safety googles, or boots. These safety wear items contain variety of sensors and communication devices that connect workers- especially lone workers- and providing them with real-time biometric data to ensure their safety in dangerous environments.

By measuring physiological indicators like body temperature, breath frequency, and heart rate, mineworkers and managers can be infirmed of an incident as soon as it happens and can deploy emergency health faster. Mineworkers follow strict work/rest regimes to stay safe in a difficult work environment. Keeping track of biometrics through PPE helps to keep everyone informed on the state of each worker so they can rest when required and prevent overexertion.

Benefits of implementing Smart Mining (1/2)

While embarking on their digitalization journey, digital solutions across the mining value chain is helping the miners to achieve the real benefits across safety & sustainability, total cost control, transparency, and mobility.

Reduced Operational Cost

The implementation of the smart mining technologies is high, but they help to reduce the mining operational cost in the long run. As the long-time taking tasks that are usually done by people are automated for ultimate productivity, leading to increased profits, also the usage of automated machines to perform various tasks leads to the requirement of fewer people on the field at a time. It also reduces the cost of labor for making manual data collection and maintenance.

The three main cost area of a mine are equipment, energy, and safety. Investing in equipment leads to fewer costs in energy and safety. Collecting data through smart sensors helps mines use energy more efficiently and prevents expensive safety incidents, leading to safer working environment.

Optimized Workflow and Decision making

The use of big data automation makes it easier to optimize every stage of the mining process. Large-scale data gathering leads to less downtime because the errors or inconsistencies are immediately identified and addressed sooner than they would have been otherwise. It also simplifies tracking materials across the value chain, so that less time is wasted on figuring out logistics.

Regularly reviewing the data allows organizations to continuously adapt and find room for improvement, producing a lean and effective organization. Smart technologies can automatically provide valuable insights, leading to better decision-making and leaving more time for implementing beneficial changes. Additionally, interconnected device networks make it possible to increase collaboration across all the level of mines, leading to a better decision making.

Increased accuracy

As the key to the profit in mining industry is primarily the number of natural resources that are excavated, so making sure that the machinery is used as efficiently as possible is crucial to meet the performance goals. Usage of AI and data analytics decreases manual searching for ores and minimizes the possibility of human error. The same mining site becomes more productive and yields more profit when smart technologies are leveraged.

The use of high-tech equipment always has an edge when it comes to understanding of a mine’s geography and weak points. The use of drone mapping and image recognition technology allow workers to gain a better understanding of mine’s terrain. The detailed analysis of the terrain increases the accuracy of the explosive deployment, optimizing various resources like the required number of explosive and hours of labor.

Improved asset health with predictive maintenance

Smart mining technologies equipped with sensors can generate constant stream of data on equipment “wear and tear”, allowing the predictive maintenance of equipment. The analytics allows mining operation to know when and where there will be equipment issues based on all the involved variables like temperature, pressure, and their usage, which allows the maintenance checks and replacement at the exact location when there is a true need for the same. This leads to an efficient and budget-oriented maintenance as compared to constant routine maintenance upkeep.

Benefits of implementing Smart Mining (2/2)

While embarking on their digitalization journey, digital solutions across the mining value chain is helping the miners to achieve the real benefits across safety & sustainability, total cost control, transparency, and mobility.

Better worker safety

Mine workers face physical dangers like cave-ins, explosives, and extreme temperatures, they are also exposed to many medical risks from physical injuries due to heavy lifting to respiratory diseases like lung cancer and black lung disease. There is also risk of hearing loss due to loud repetitive noises.

Equipping amine and workers with connective technologies and providing the appropriate training improves the safety in the workplace. AI helps to generate detailed actionable reports, facilitating safety accountability, planning, training, monitoring and improvements.

With AI and machine learning constant analysis of data can be done, negative behavioral trends can be quickly spotted, and corrective training can be automatically recommended.

Prevention of Environment Incident

In the mining industry, any errors can lead to injuries and fatalities, as well as have direct consequences on the local environment. The best solution is to take advantage of the latest technology to automate equipment, monitor processes and use data to proactively predict outcomes and make efficient decisions.

The way out for operation to avoid unexpected consequences on the environment is the large-scale collection of real time data. Using historical data, Ai technology can use algorithms to predict environment risks and generate actionable insights, AI can also be used to predict energy peaks, allowing operations to control their energy usage, reduce overall energy demand, save cost, and reduce greenhouse gas emissions.

Improved Recruiting and Employee Retention

Maintaining a skilled workforce is a continuous challenge in the industry. Increasing demand for resources, a retiring workforce, and a lack of emphasis on skilled trades in younger generations have created a mining labor shortage in the industry.

This lack of interest in the sector is caused by a combination of factors, including the physical and mental toll, possible dangers, and the remoteness of many mining communities. Smart mining makes mining sector more attractive to new workers by making it possible to work form a safe, remote location while using cutting-edge technology.

With this new technology, smart mining is introducing more jobs to people from broader set of educational backgrounds. The new mining workforce includes engineers, computer scientists, programmers, and data analysts.

Remote operation

Smart mining and automated equipment allow many workers to do their jobs remotely, away from the dangers of unstable areas within the mine. Thus, in many cases, new technologies have removed a lot of the labor-intensive work and improved the overall safety. As the inclusion of automated vehicles keep people out of dangerous areas while transporting materials to where they need to go. Inclusion of smart PPE and wearables can alert the workers about abnormalities in their environment or their individual biometrics, prompting them to follow emergency procedures when needed.

Illustrative case study in Smart Mining

Illustrative use case 1: IOT enabled Asset health monitoring and predictive maintenance to enhance reliability of mining operations and predict failure

Use case detail

Mines are struggling with unplanned downtime and lack of Asset health monitoring capabilities. Interconnected asset data can be extensively used to analyze trend, predict failure and optimize maintenance schedule. By leveraging IOT technology, large pool of data can be captured, processed and analyzed.

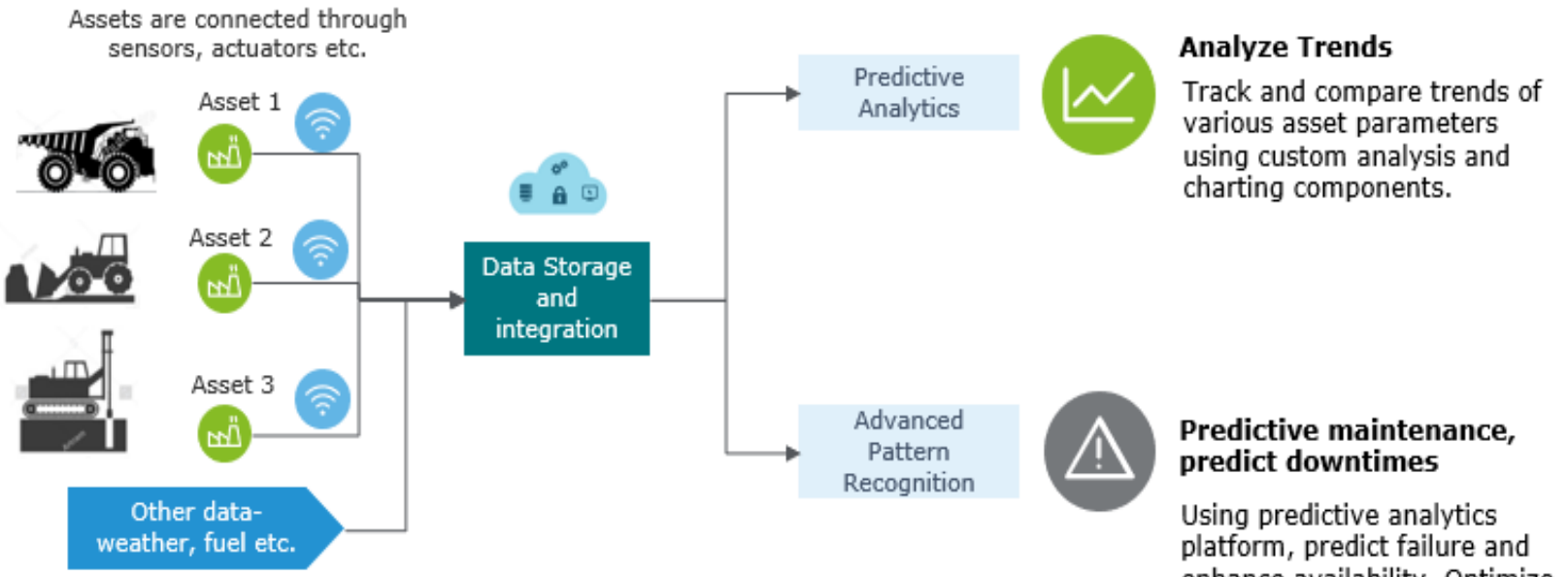
Potential benefit

- Early prediction of failure for HEMMs including drilling machines
- Improvement in Equipment life and performance
- Data driven decision making- optimized maintenance schedule, reduction in spare cost

Digital enablers :

Internet of Things, Big Data Analytics, Machine Learning

Illustration



Analyze Trends

Track and compare trends of various asset parameters using custom analysis and charting components.

Predictive maintenance, predict downtimes

Using predictive analytics platform, predict failure and enhance availability. Optimize maintenance schedule

Example 1: Australian coal mining company

A Major Australian coal miner realized operational cost reductions of **over USD 55 Million in the first year**, with the payback being 3 months and a 3:1 ROI achieved in the first year of operations after implementation of smart IOT enabled Asset monitoring and predictive analytics solution. Similar realizations have been made by other mining companies all over the world

Deloitte has helped multiple Mining and Oil & Gas companies to deploy sensor enabled predictive analytics to predict health of crucial assets on site in order to improve asset performance and reduce costs

Illustrative case study in Smart Mining

Illustrative use case 2: Deployment of drones for smart production scheduling in variety of applications in the mining industry ranging from haul mine planning to production scheduling and monitoring

Use case detail

Mines face a problem of seamless mine plan monitoring and time intensive surveys for volumetric calculations.
Drone technology with smart sensors has helped mining clients along the globe save time and cost of operations while maintaining desired accuracy levels.

Potential benefit

- Better accuracy in excavated volume calculations
- Reduction in time and cost for production monitoring and scheduling
- Faster and easily repeatable surveys at low cost

Digital enablers :

Drone Technology, Smart sensors (payloads)

Illustration

Current Drone applications in the Mining Industry

- Holistic Mine planning
- Pit excavated volumetric calculations
- Face advancement and bench stability monitoring
- Haul road width and gradient monitoring
- Tracking and flagging of mine plan deviations
- Assisting fleet management systems by vehicle and asset monitoring in remote mining locations
- Stockpiles volumetric assessment (in mines, ports and washeries)
- Monitoring mine boundary compliance
- Providing visual information about inaccessible areas
- Enabling and reinforcing Mine Security

Example 1: APAC- American aggregate mining company
APAC has successfully deployed drone technology to improve the accuracy of their mine plan and schedule monitoring, boundary demarcations, pit road optimization and mine security.

Example 2: Complete Mapping of the RTB Copper mines, Serbia in 10 days
APAC has successfully deployed drone technology to improve the accuracy of their mine plan and schedule monitoring, boundary demarcations, pit road optimization and mine security.

Illustrative case study in Smart Mining

Illustrative use case 3: Smart machine learning enabled analytics for optimized blasting parameters using previous blasting data to provide smart solutions for fragmentation monitoring and optimization

Use case detail

Mining companies facing challenges pertaining to blast performance. Strong machine learning enabled analytics platforms are being used by mining companies globally to ensure optimized fragmentation to reduce crushing and beneficiation costs while reducing ground vibrations, back breaks and fly-rocks

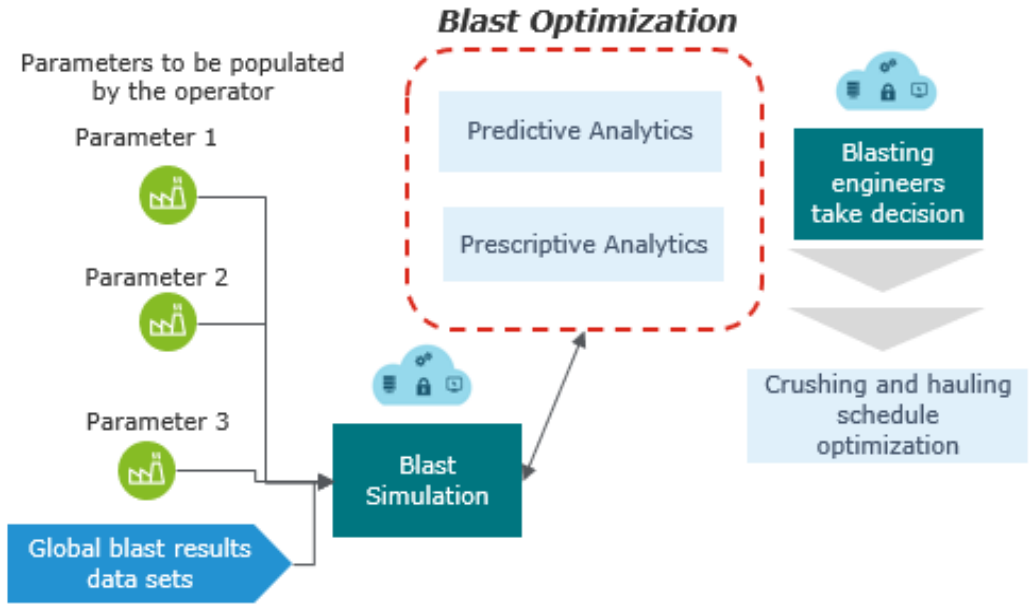
Potential benefit

- Improved crushing, loading and hauling productivity
- Reduction in blasting costs due to reduced consumption of explosives
- Reduced environmental impacts
- Control over bench integrity and phasing

Digital enablers :

Machine learning, future simulation platforms, big data analytics

Illustration



Parameters include geological strata characteristics, desired fragmentation (gradation), explosive used etc. IOT sensors are also leveraged by some players to get real time data for from blast hole drills

ANGLO AMERICAN Teck ORICA

Example 1: Anglo American and Teck Resources

Global mining giants like Anglo America and Teck Resources have used Orica's smart blasting solutions to reduce overall operational costs and realize better control over downstream scheduling, quality compliance and reduced environmental impacts

Illustrative case study in Smart Mining

Illustrative use case 4 : Safety management through wearable technology have led to improved worker connectivity, safety and productivity for various mining and metals companies globally

Use case detail

Advanced wearable technologies can be effective to enhance safety of workforce in the field and hazardous areas along with increasing operational productivity

Potential benefit

- Enhance safety of workforce
- Improved health monitoring of workforce
- Improved productivity
- Generation of Management insights for better operational planning and design

Digital enablers:
Wearable technology, Cognitive computing, Cloud, Mobile Application

Illustration 1:
Wearable technology allows real time monitoring of the environment as well as interfaces with which to communicate with field workers. Google glass and other optical sensors allow engineers to access information whilst keeping their hands free.

Illustration 2: Example of Vital parameters monitoring

Health sensors are becoming more effective and can interface into apps to improve health and safety and monitor the health of workers in the field

RioTinto ANGLO AMERICAN NEWCREST MINING LIMITED

Example 1: Rio Tinto, Anglo American, New Crest Mining

- Mining companies in Australia are providing workers with smart caps that monitor their brain waves to measure fatigue. The smart cap provides early warnings when the worker is approaching microsleep.

JANNATEC Technologies

Example 1: Companies like Janantec technologies, K4 Integration and M3sh technologies have penetrated global mining and metals market with a range of smart wearables that have helped clients improve worker safety and productivity, along with getting management insights on operational planning and design to mitigate the core issues identified.

Illustrative case study in Smart Mining

Illustrative use case 5 : Remote operations center provide real time control over operations to off-site employees leveraging connectivity and analytics platforms

Use case detail

Mining companies face challenges pertaining to skill retention and labor productivity at extremely remote mining sites. Remote operations center has provided an alternate option to mining operations, leveraging IOT, smart backend analytics platforms and front end data visualization and control software systems

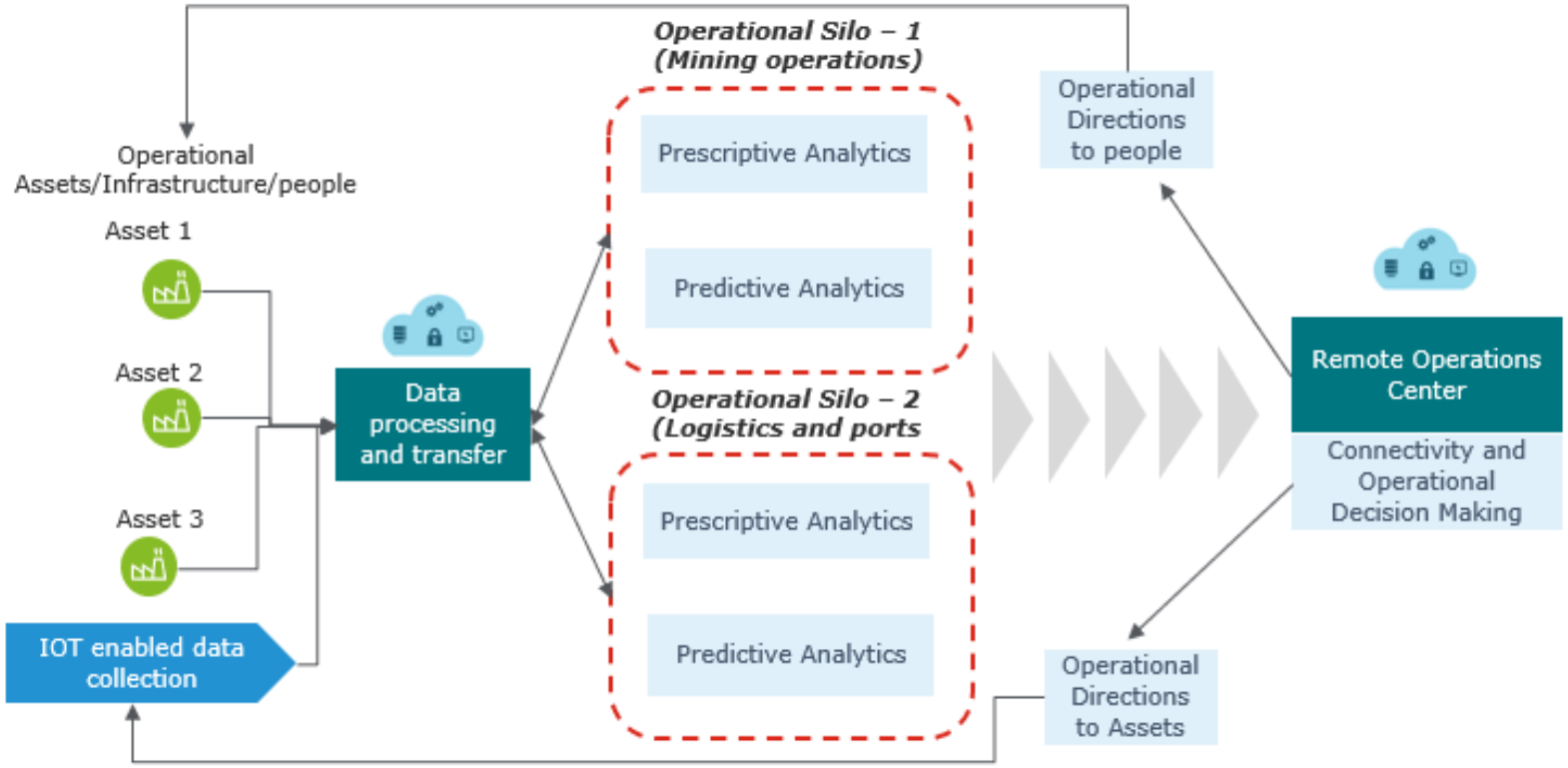
Potential benefit

- Decrease reliance on on-site Human interventions
- Leads to better productivity and engagement between the operating, monitoring and planning teams

Digital enablers :

IOT, Machine learning, Data visualization software systems

Illustration



bhpbilliton

Example 1: ROC for BHP's Pilbara mine
The Integrated Remote Operations Center allows BHP to monitor, analyze and control its entire west Australian iron ore supply chain including operational controls over Pilbara Mine, fixed plant, train & port operations from one central location.

IROC uses a mine fleet-management system, train control and fixed-plant control systems for mine and port operations as well as CCTV/radio communications for personnel communications.

Other Examples

Roy Hill vedanta

Need for Digitalization in Logistics

The digital intervention in mining logistics creates the must needed “Digital Supply Chain”. Every industry at present is experiencing a supply chain disruption and the story remains same for the mining sector too. The key to resolve this turbulence in supply chain is the adaptation of digital technology. The adoption of digital supply chain in the mining sector is an uphill task than compared to other industries as this sector requires and inside-out transformation with cultural changes, workforce reskilling, and strong data management practices.

Post Covid period the change in the demand dynamics is disrupting the traditional supply chains and as the demand and price are in fluctuation, there will always be fluctuation in the production plan. The traditional mining supply chain are not elastic enough to swiftly align supply pipelines with demand fluctuations. The mining logistics has always been complex and challenging to manage, with demand changes the complexities in the domain increases further. The predicted future supply chain requirements were pushed to forefront as the pandemic led to the complete disruption of the supply chain. The pandemic brought the economic activities to screeching halt and the traditional supply chain was disrupted completely. Studies suggest that the supply chain disruption across industries were up by 67% in 2020 than compared to previous year.

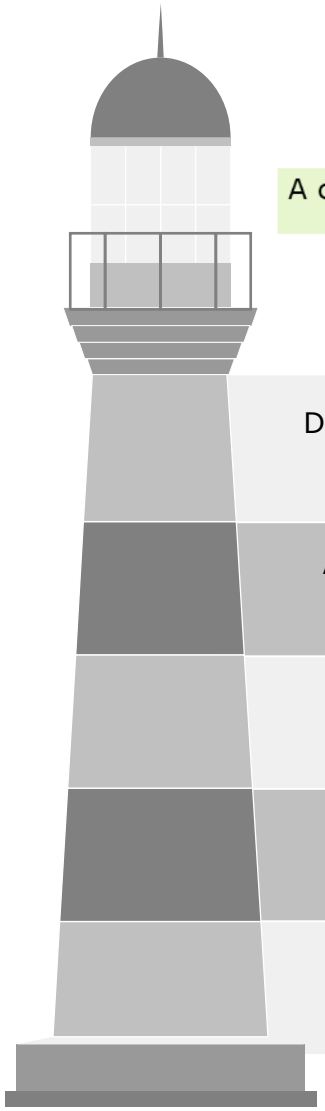
The idea of digital supply chain gained popularity as people started to reconsider their supply chain strategies post pandemic. Moreover, the Suez Canal blockage in March 2021 hurt the global economy by approximately $ 9 Billion per day, while the ongoing Russia-Ukraine conflict is fluctuating the values of all commodities.

The Leading miner BHP is targeting to use predictive analytics to streamline operations, enabling better identification of asset condition and efficiency. Various companies are deploying block chain solutions for enhanced supply chain traceability, allowing end to end digital transactions.

The technology uses augmented reality and virtual reality technology for modeling, simulation, and cause-and-effect analysis to predict and solve the challenges. It helps miners to visualize end-to-end supply chain and site operations. The use of digital twin technology for miners is not only limited to enhancement of operational visibility but also to boost the real time management of production, inventory, product pipeline, and deliveries.

Digitalization in Logistics - Logistics control tower

Solution features and benefits



A centralised integrated platform for logistics planning, scheduling, reporting and monitoring logistics parameters in real-time

Dynamic Planning tool with GPS enabled real-time tracking of major logistics assets and reporting of any abnormal behaviour for proactive behaviour

Advanced analytics on large volumes of data to understand the interactions between assets, network and customers, to identify patterns, predictions and recommendations

Real-time visibility of autonomous loading of rakes and other types of maintenance work for Weighbridge and Rail track

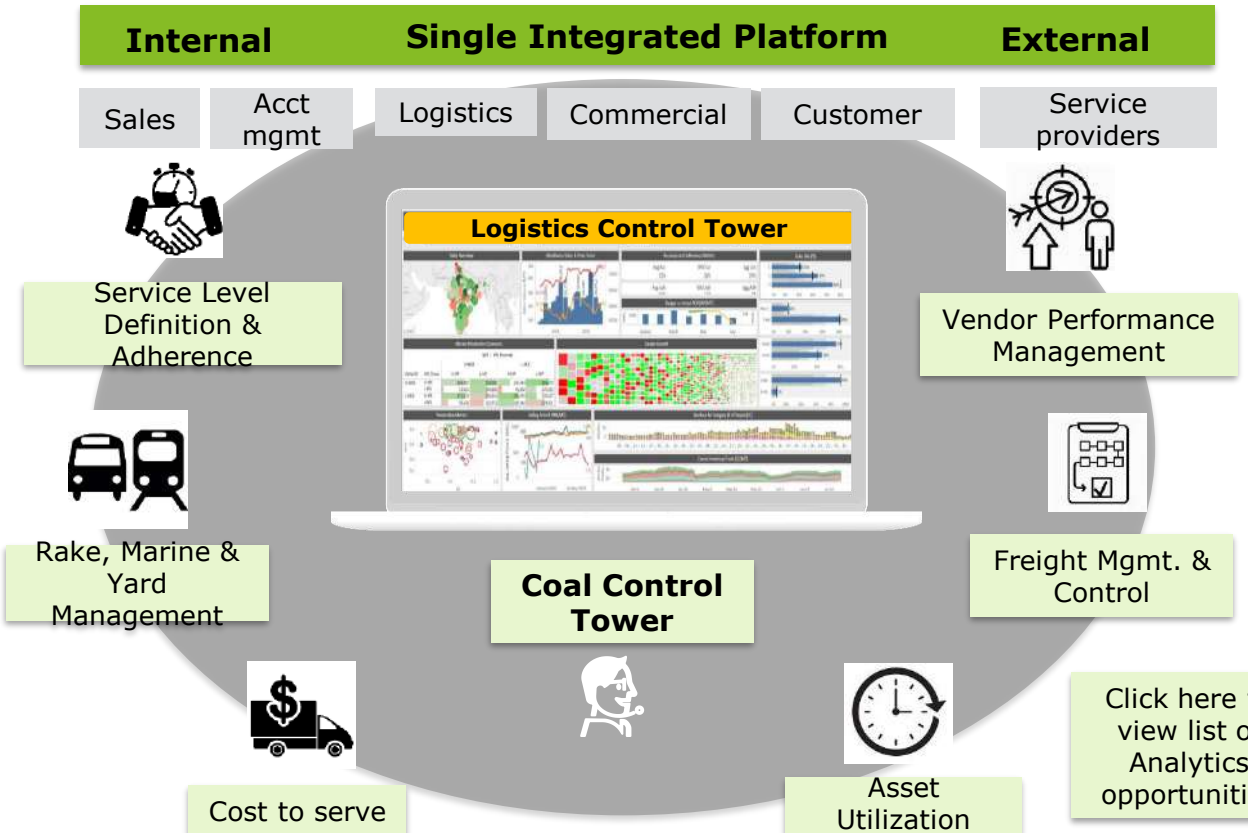
Integration with Rapid loader system, Weighbridge and ERP for automatic reconciliation of dispatch quantity and generation of dispatch goods note

Interaction through IoT cloud platform with Drones and Rail inspection trolleys for rail track monitoring and surveillance

Benefits- Tangible / Intangible

- Reduction in overall logistics cost by reducing TAT
- Increased transparency and efficiency in rake planning
- Optimization of rake loading efficiency
- Higher customer delight due to better On-time In-full (OTIF) compliance
- Seamless collaboration between stakeholders for proactive decision
- Improved SLA adherence and ground-level end-to-end visibility

Illustrative Platform Architecture for visibility and driving actions on various KPIs



Service Level

- OTIF
- Turn Around Time
- Adherence to dispatch plan
- Average Lead
- Order to Dispatch Time
- Inventory Levels
- Pending Orders

Cost to Serve

- S&OP Adherence
- Direct Dispatch
- Diversions
- Mode Mix
- Asset Utilization
- Freight PTPK
- Inventory Loss

Improve Logistics Efficiency

Enhance customer Experience

Increased Cost Efficiency

Increased Visibility over operations

Track & Trace of Deliveries

Real time Exception Management

IT-OT integration

Focus on enabling seamless & secure collaboration between IT and OT assets and teams

Secured and Seamless flow of data from OT to IT systems

Field level Control

OT system helps in operation of physical processes and the machinery used. ***High in Instrumentation capabilities, low in compute & analytical capabilities***

FMS & Asset health management system

- Sensorization of fleet assets
- In-line sampling system for of real-time data on Quality
- Alarms & Alerts from SCADA & PLC systems

Integrated EHS

- Environmental sensors for continuous monitoring of air quality levels

IT – OT Integration

IT Systems

IT system involves network & applications with ***high in compute & analytical capabilities***

Operation Management Level Controls and Planning

- Condition-based analytics: Asset class defined rule/logic
- Automated quality & Quantity reconciliation for error free invoicing

Production Process Operating Controls

- Improved drilling effiiency by better planning
- Integration Mine Planning application with on field devices for real time actions

Recording and Analysis Level Control

- Monitoring of scheduled activities for Mining operation, Processing & Logistics from start to completion, according to the time frame set and/or the operational targets

Business Benefits

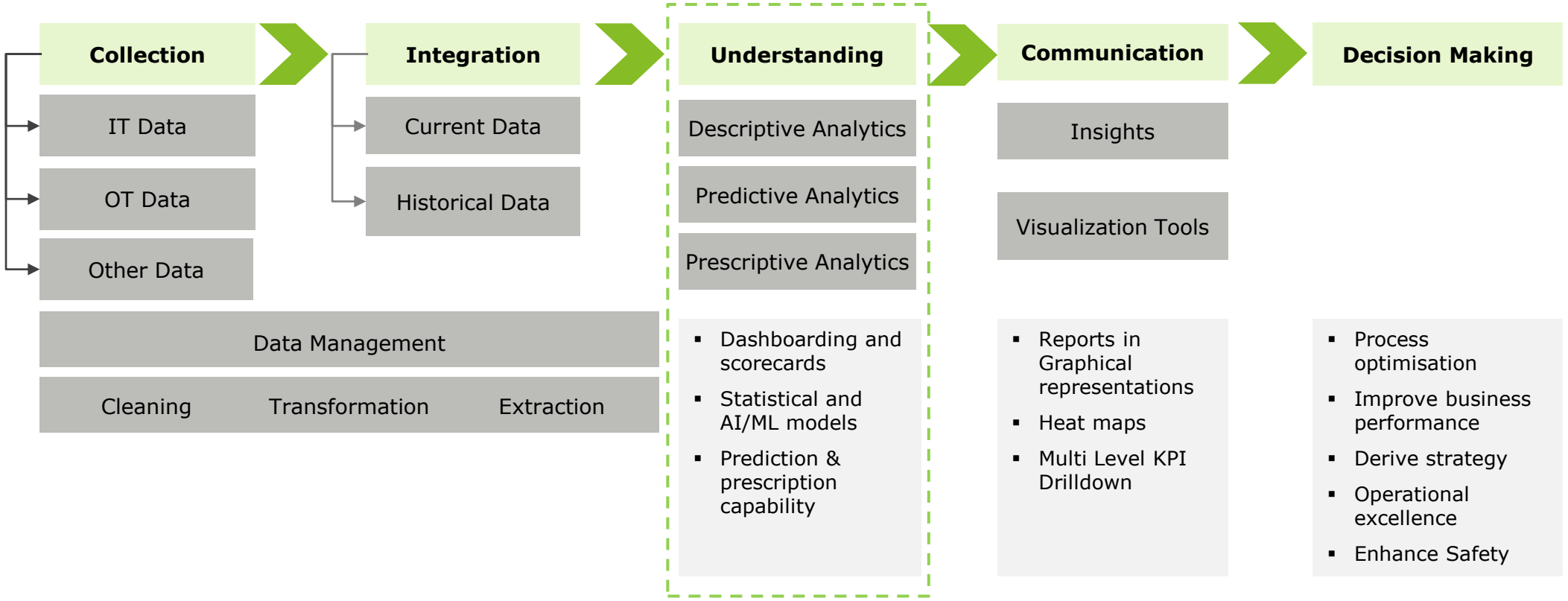
- Improved IT and OT security by reduction enabling a secure architecture
- Common language and processes for IT-OT risk management
- Detection and prevention from detected anomalies and cyber attacks
- Improvement in availability of OT/OT systems

Integrated data platform (IDP)

Encompasses complete data life-cycle and host use-case interventions to address technological challenges

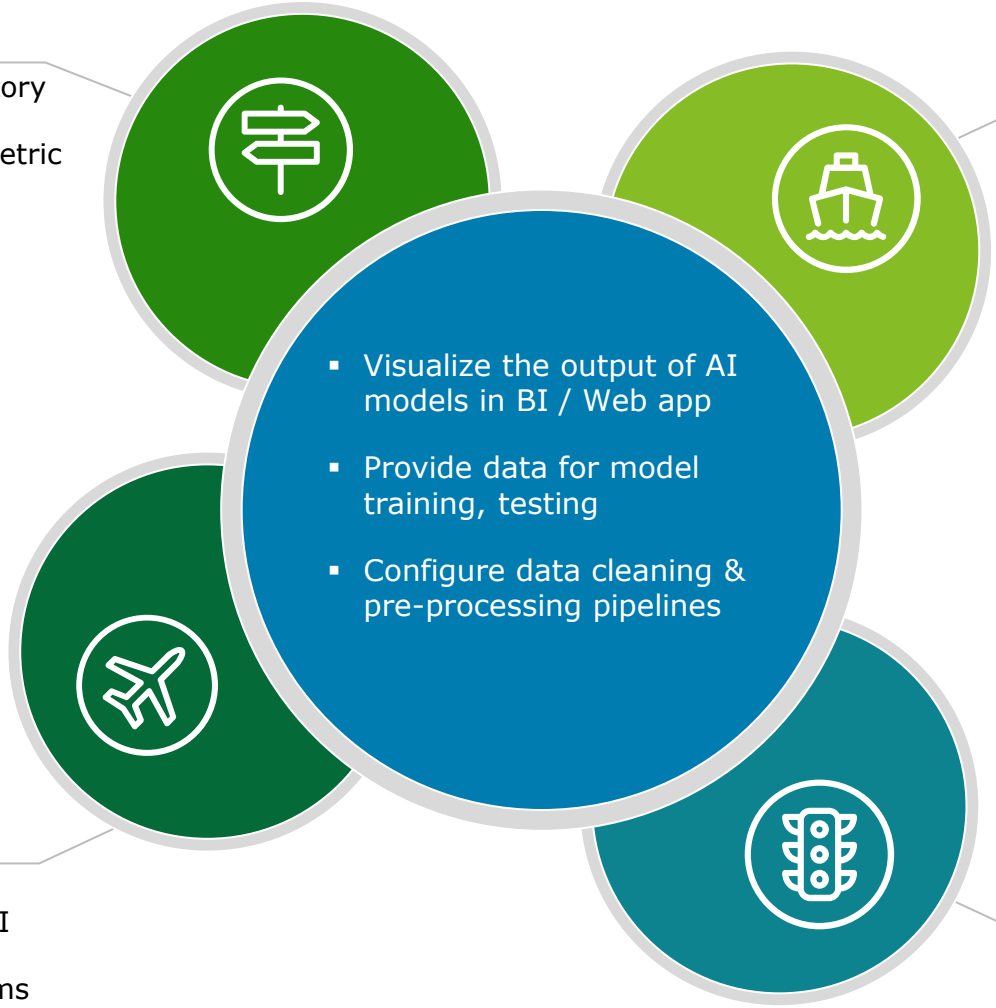
- Maximize value of data across the organization leveraging digital platform
- Provide base for advanced analytics and business intelligence initiatives
- Real time tracking of success indicators and KPIs

Data Journey to reach the Analytics future state and accelerate decision making process



Advanced analytics platform

Empowering enterprises to rapidly adopt AI, resulting in faster, smarter and future ready businesses



Self Service Analytics

- Data Discovery and exploratory data analysis
- Calculated fields for quick metric and insight calculation & algorithms

Automated AI Lifecycle Management

- Powerful AI studio tools to build, train & deploy complex AI at scale
- Instantly scale AI solutions across the enterprise from proof of concept to production

Private AI

- Create custom AI solutions without using cloud-based AI models
- Brings AI models & algorithms near to data source (Edge deployment)

Infuse Intelligence

- Embed intelligence in legacy Applications
- End to end automation of business Processes

Illustrative case study in Smart Logistics

Illustrative use case 1 : IOT enabled value chain visualization and analysis provide companies a holistic view of the entire supply chain and helps in improving analytics and modelling capabilities to drive value

Use case detail

Mining companies face decision making challenges due to siloed operational and supply chain data and lack of capabilities to conduct real time assessment of operations and make decisions based on KPIs

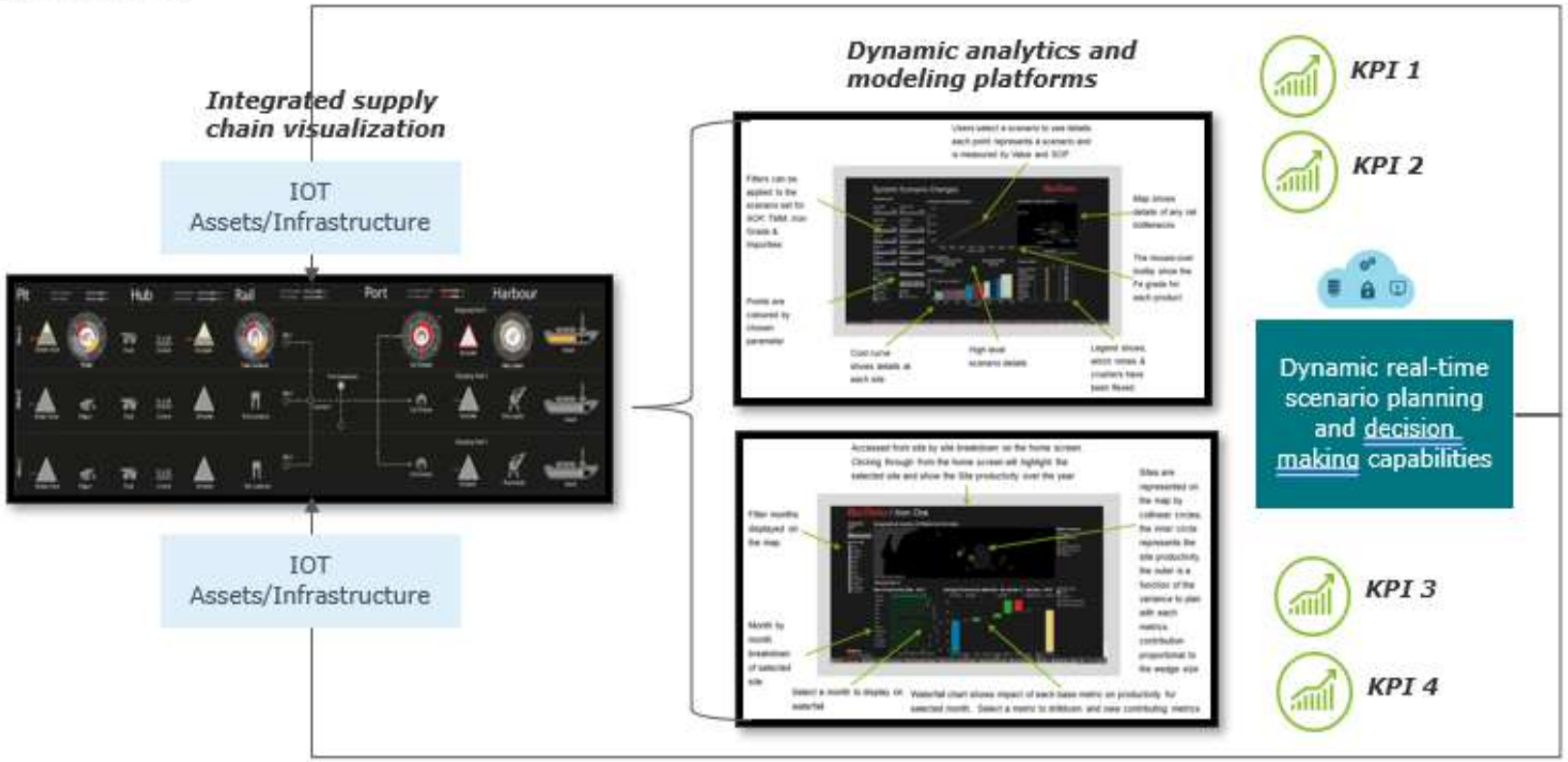
Potential benefit

- Improved decision making capabilitiess
- Comprehensive managerial transparency over the integrated value chain
- Enhanced governance and risk mitigation capabilities

Digital enablers :

IOT, Machine learning, Big Data Analytics, Scenario planning and modelling software solutions, Data Visualization

Illustration



bhpbilliton

Example 1: Supply chain visualization for BHP's Iron ore Operations
The Integrated Remote Operations Center allows BHP to monitor, analyze and control its entire west Australian iron ore supply chain including operational controls over Pilbara Mine, fixed plant, train & port operations from one central location.

Example 1: Leading metals and mining company in Australia adopted supply chain visualization and real-time state-of-art scenario modelling tool to optimize their decision making processes while complementing established intelligent mining ecosystem

Existing Initiatives in India for Smart logistics

The key technology behind Smart mining is the Internet of Things (IoT), which is defined by the use of a network of sensors and devices connected through the Internet. When used in industries like mining, IoT is referred to as IIoT, which stands for “Industrial Internet of Things.” The goal of IIoT is to improve industry efficiency by connecting devices and eliminating the need for human involvement in data collection.

If we closely look at the mining value chain, we can broadly classify it into Production & Transportation. Major capital expenditure takes place in production and secondary expenditure is in transportation and logistics. At any mines surveillance and safety is the utmost area of concern. CSIR-CIMFR had developed and filed patent application entitled “Mine Transport Surveillance System (MTSS)” under a R&D project sponsored by Ministry of Electronics and Information Technology (MeitY), Government of India. This is the proprietary and indigenous product of CSIR-CIMFR, which has been recommended by MeitY to NMDC, CIL, Ministry of Coal, Ministry of Mines and others for its implementation in mines under “Digital India” and “Make in India” programs. NMDC Ltd. had sponsored the project for installing MTSS in Kumaraswamy Iron Ore Mine (KIOM), Donimalai Iron Ore Mine (DIOM) and Pellet Plant at Donimalai Complex of NMDC Ltd. The different modules under MTSS are:

• Weighbridge automation module for fast, accurate and automated weighing process; Centralized billing, monitoring and software solution for secure and transparent on-line

• Dispatch and Production monitoring with independent website of each mining company.

• Long range proximity warning device for safety of Heavy Earth Moving Machinery.

• GPS and RFID-based vehicle tracking and production monitoring module for keeping continuous watch on the vehicles on geo-fenced transportation routes

• Periphery surveillance using virtual fencing for detecting intrusion of vehicles with the intention of illegal transportation of mineral through unauthorized routes as well as identifying human intrusion into an industrial area.

• Close circuit television cameras and thermal imaging cameras for keeping different mining activities under day-and-night sharp surveillance, particularly to watch vehicles carrying mineral.

• In-motion weighbridge for weighing of mineral produces from mine, and Wireless networking for effective deployment of the system and centralized monitoring for overseeing all mining activities as well as transport surveillance from a central location.

Existing Initiatives in CIL for Smart logistics (1/2)

BHARAT COKING COAL LIMITED (BCCL)

CCTV Surveillance System: CCTV surveillance System have been commissioned and made operational at 136 vulnerable points of BCCL like Area Offices, Stores, Magazines, Major Coal Dumps, Hospitals etc. CCTV surveillance system have been installed & commissioned at 23 nos. of railway sidings of BCCL.

Presently, RFID based boom barrier system is installed and commissioned at 48 nos. of Road Weighbridges at BCCL for weighbridge automation & surveillance purposes. Also 15 nos. more RFID surveillance system is under implementation in upcoming road weighbridges of BCCL.

Work order for supply, installation, commissioning, implementation, training & maintenance of GPS based Vehicle Tracking System has been issued in Jan2020 and is under trial run now.

CENTRAL COALFIELDS LIMITED (CCL)

GPS/GPRS based Vehicle Tracking System and RFID with CCTV based Weighing Control and Monitoring System across CCL Command areas.

CCTV surveillance at Vulnerable points of CCL Command Area.

EASTERN COALFIELDS LIMITED (ECL)

CCTV Surveillance System: CCTV system has been established at mine viewpoint in Sonepur Bazari Area and is in operation. Seventy-two (72) nos. of CCTVs are installed in Pandaveswar Area. Eighteen (18) nos. of CCTVS are online i.e., can be access from anywhere through internet.

"Weighbridge Automation System" for all the 105 road weighbridges of ECL with RFID based boom barrier access control system.

GPS based vehicle monitoring system has been introduced at all the Areas to curb coal pilferage.GPS enabled VTMS system is fitted in Coal transportation vehicle for live tracking of vehicle.

CCTV cameras are installed at each railway siding and other sensitive locations.

WESTERN COALFIELDS LIMITED

GPS/ GPRS based Vehicle Tracking System (VTS) with 1370 nos. of GPS sets and Geofencing of Mine Areas.

Increased electronic surveillance with Centralized CCTV surveillance system at all vulnerable points like Weighbridges, entry/ exit points, stock yards, magazines, stores etc.

Implemented RFID based weighment integration of all the Road weighbridges.

RFID based Boom barrier access control system is implemented at Check posts to prevent entry of unauthorized vehicles in mines.

IP Radio Network with the state-of-the-art technology established for integration of all above systems from remote units to the Area HQ Servers.

Existing Initiatives in CIL for Smart logistics (2/2)

MAHANADI COALFIELDS LIMITED (MCL)

GPS/GPRS based Vehicle Tracking System: GPS based VTS (Vehicle Tracking System) units have been installed in 2970 private trucks/ tippers, HEMM's, and other vehicles engaged in production and internal transportation of coal and OB, as well as vehicles used by Security Department for patrolling. Live tracking of these vehicles along with viewing of various reports related to violation of geo fences, trip, long stoppages, distance traveled etc. are available through web.

Geo-fencing of the mine boundary along with the routes have been done.

Operator Independent Truck Dispatch System (OITDS): OITDS is running successfully in three open cast projects of MCL i.e., Balram, Lingaraj and Bharatpur OCP. A total of 137 HEMMs have been installed with the equipment for OITDS.

Installed still-shot IP cameras at 90 in-motion and static road weighbridges.

VHF communication: Installed VHF communication network in different mines for communication at the Projects up to the Coal Faces. The same is being enhanced every year for increased operational efficiency.

Underground Communications System has been installed in all underground projects for fast and safe communication.

South Eastern COALFIELDS LIMITED (SECL)

CCTV Camera Surveillance System: SECL has procured 596 numbers of CCTV cameras centrally in August 2020 and installed them at different vulnerable points of Areas like Coal Stocks, Weighbridges, Mines Entry-Exit gates. "CIL Eye" app has been installed for real time monitoring of mine activities

GPS-GPRS based Vehicle Tracking System: In this system, the GPS/GPRS devices are installed in all internal coal transportation vehicles and the same are tracked on real-time by 24x7 basis.

Geo Fencing: All mine boundaries, coal patches, unloading points like sidings, stocks, feeder breakers, crusher and bunker, internal coal transportation routes are geo-fenced.

RFID based Automatic Boom Barriers: RFID based Automatic boom barriers are installed at all the entry and exit points of Mines and Railway Sidings so that only authorized vehicles/tippers can enter/exit into the mine premises which eliminate the possibility of any coal pilferage and helps to regulate vehicle traffic.

Electronic In-motion Rail weighbridges and Road weighbridges has been installed for weighment of input as well as output coal of SECL mines. Five numbers of new In-motion Rail weighbridges have been installed at different sidings in place of old static Rail weighbridges. All the In-motion Rail WBs have been upgraded for integration with Freight Operation Information System (FOIS) of Railways.

All the road weighbridges are equipped with Weighbridge Centering System (WBC). This system would allow the weighment of trucks only if the vehicle is properly placed within the weigh platform otherwise would not allow.

Initiatives in Railway Sector

- Railway, said to be the lifeline of India, transports ~1200 million Tons of goods annually through ~5000 goods train every day earning 66% of revenue. The major commodities carried by Indian Railways are Coal, Iron Ore, Food grains, Iron & Steel, Cement, Petroleum products, Fertilizer and Containerized Traffic. Wagons are standardized as per the material they transport. Unlike passenger carrying trains, freight trains do not run to a fixed schedule. Thus, it is even more imperative to have real-time data on freight train. These data drives decision on optimum utilization of resources like wagons, locomotives, crew and routes ensuring high mobility in the system.

- To manage such a complex system Indian Railways has introduced Freight Operations Information System (FOIS). Apart from monitoring the movement of freight trains, the system calculates freight and other charges based on complex rules of business and generates the Railway Receipt, the bill payable by the shipper. The system is used to track and trace consignments for end users and system administrators. Electronic Registration of Demand is also now a part of FOIS which brings convenience, speed, and ease to customers through online registering of indents for Rakes and Wagons.

- Centre for Railway Information Systems (CRIS) undertakes design, development, Implementation and O&M for various IT projects awarded by Railway Board. Further, CRIS also undertakes Freight Business Data Integration (FBDI), for FOIS, to develop APIs for customers to integrate with their internal MIS networks.

- For faster and customized automated access to data through Freight Operations Information System (FOIS) of Indian Railways, which would help Coal India Limited (CIL) monitor movement of coal laden rakes and coal dispatch activity, CIL has entered a Memorandum of Understanding (MoU) with the Centre for Railway Information Systems (CRIS). The first-of-its-kind data sharing offers CIL a bouquet of benefits which will help it in rationalizing the entire coal supply matrix via rail mode. It provides precise details of loading, weighment and unloading details along with turnaround time of rakes. The MoU is a collaboration on freight operation information between the networks of CIL and CRIS regarding CIL’s rail movement of coal.. The data on coal transport and events enroute on consignments can be ported into Coal Sector Smart Logistics systems for real time information and decision making.

Initiatives in Port Sector

- Centralized Port Community System (PCS) is an initiative by Indian Ports Association (IPA) intended to provide a single window system for the Port communities in India to securely exchange the documents and information electronically with their stakeholders involved in the maritime transport and logistics chain including the trading partners and government agencies. It is also expected to provide global visibility and access to the central database to all its stakeholders through internet-based interfaces.

- PCSIx, a cloud-based new generation system, brings together the different stakeholders of the maritime sector on a single platform, facilitating government-to-business, business-to-government, and business-to-business transactions even as it ensures extreme levels of cyber security. As PCS architecture is built on an open platform, the technology can integrate any new concept or module available in the industry without disturbing the existing ecosystem. Various ports are in the process of adopting PCS1x including minor ports. Indian Ports Association (IPA) and PCS have published an API specifications sheet and assist users in API integrations to avail of services and information.

Benefits from digital makeover of logistics

Digitalizing the multi-modal logistics offers various benefits:

Prediction of operational risks

Digital supply chain can self-organize and self-optimize with the real time data from connected sensors combined with the individual preferences, this will provide us the accurate forecasts of demand. Furthermore, by providing an operational bottleneck from a rising at an event, a smart logistic system can analyze the situation, streamline the system. Thus, it will result improved operational efficiency and leaner manufacturing.

Smart trend analysis

Using smart technologies, an effective predictive analytics solution can be very useful in monitoring the conditions of the vehicles. It will assist the team with predictive analysis to identify the parts that are not working properly and to arrange replacement of the parts quickly. It is also a simple way to achieve greater efficiency by incorporating the smart chain into this process. Detecting and monitoring operational issues with a system and adjusting based on the findings might increase the system's overall span.

With the market's growing demands and customer expectations, manufacturers are becoming more concerned with supply chain transparency. Therefore, it is vital to maintain a transparent supply chain through IoT to effectively cater to eco-conscious customers and prevent disruptions that could place supply chain operation at risk.

Proactive maintenance to avoid downtime

Using smart logistics predetermined maintenance schedule can be made, this schedule helps to ensure that they are repaired and checked to prevent them from malfunctioning when needed the most. It may not be the best maintenance strategy, but it is the most used. In a connected world, companies are no longer in need to perform the preventive maintenance; instead, the analytics inform the date of maintenance.

AI and machine learning integrated together can create the maintenance management software which will monitor and feed real time data into equipment and the health of the system can be monitored. This makes it possible to take appropriate action to prevent equipment failure and costly downtime.

Improved and efficiency planning

The use of real-time data so gathered from the connected devices to understand the current demand of commodities in the market. The analytics so generated can be used to plan the sales and operations by making sure the current plans are viable and providing accurate information about the changing conditions, such as logistic planning. Several companies have already incorporated the use of supply chain 4.0 based on AI and Machine learning, no matter how small but the gains in efficiency are worth the effort and expense, as the return to the investment is massive in long run.

Smart supply will not only help to track the movement of commodities but will also provide more visibility into the demand and supply patterns so the cost can be controlled, and profitability can be increased. As smart logistics will provide maximum efficiency only when there will be the right set of data to analyze, rather than collecting all the data at one place.

Thank You

Annexure - Outcomes from Stakeholder Consultations

Key Outcomes from Stakeholder Consultation held at Ranchi

Participants of Stakeholder Consultation – Ranchi

#	Name of Organization
1	Ministry of Coal (MoC)
2	Coal India Limited (CIL)
3	Central Coalfields Limited (CCL)
4	Eastern Coalfields Limited (ECL)
5	Bharat Coking Coal Limited (BCCL)
6	Northern Coalfields Limited (NCL)
7	Hindalco
8	JSW Steel Ltd.
9	Indian Port Rail Corporation Ltd. (IPRCL)
10	Central Mine Planning and Design Institute (CMPDI)
11	Jharkhand Central Railway Ltd. (JCRL)
12	Tenughat Vidyut Nigam Limited (TVNL)

#	Name of Organization
13	Ministry of Mines (MoM)
14	Ministry of Road Transport and Highways (MoRTH)
15	Department of Mines and Geology, Govt. of Jharkhand
16	Inland Waterways Authority of India (IWAI)
17	Indian Railways (IR)
18	NTPC Limited
19	Ircon International Ltd.
20	Trimula Industries
21	Tata Steel
22	Emveess Infraventures Private Limited
23	NITI Aayog
24	Deloitte

Key Observations and Recommendations from Stakeholder Consultation – Ranchi (1/3)

#	Recommendations	Action Taken (Yes/No)	Details of Action Taken
1	Recommendations regarding CCL's evacuation plan: Gomia-Bokaro Thermal line doubling has been completed. The same may be updated in the report.	Yes ✓	Gomia-Bokaro Thermal line updated to reflect completion of the line works
2	It was also recommended to plan for doubling of the Shivpur-Kathautia single line which is under construction.	Yes ✓	Recommendation analyzed, discussed with stakeholders and added as part of key findings of report
3	It was pointed out that current lines from CCL's Magadh-Amrapali-Sanghamitra areas have Y-curves for coal traffic towards Tori. In future when Shivpur-Kathautia line shall be commissioned, requisite Y-curves shall be required for coal traffic towards Kathautia/Koderma.	Yes ✓	3 nos. Y-curves in the North Karanpura area recommended to ease coal evacuation from the area towards Kathautia.
4	Recommendations regarding BCCL's evacuation plan: Doubling of Bhojudih-Pradhan Khunta line to facilitate coal evacuation from this area.	Yes ✓	Recommendation of doubling the Bhojudih-Pradhan Khunta line to facilitate BCCL's evacuation plan

Key Observations and Recommendations from Stakeholder Consultation – Ranchi (2/3)

#	Recommendations	Action Taken (Yes/No)	Details of Action Taken
5	Recommendations regarding ECL's evacuation plan: Expediting of Chitra-Basukinath line works along with doubling of Rampurhat-Dumka line	Yes ✓	Doubling of Rampurhat-Dumka line critical for evacuation of Pachwara blocks.
6	Point of View on congestion on Major junctions such as Garwa Rd, Tori Jn, Katni Jn etc shall also be incorporated	Yes ✓	Major junctions identified and suitable enhancement works recommended as applicable. At junctions where projects are ongoing, such have been recommended to be fast tracked based on requirement, e.g., Katni Grade separator
7	Number of Rakes and wagon procurement to be done by Indian Railways for Coal despatch in Jharkhand, West Bengal, Uttar Pradesh and Madhya Pradesh shall be taken into account	Yes ✓	Number of rakes required for ECR projected and suggestions on wagon procurement provided in the report. Expanding the analysis for pan-India network led to estimated ~95,000 – 1,00,000 additional wagon procurement by Indian Railways.

Key Observations and Recommendations from Stakeholder Consultation – Ranchi (3/3)

#	Recommendations	Action Taken (Yes/No)	Details of Action Taken
8	Recommendations regarding ECL's MGR line to NTPC Farakka: A 13.00 MTY SILO is presently running at Rajmahal coal mines of ECL wherein a double rail line already exists between two bulb points for coal evacuation to NTPC Kahalgaon. For NTPC Farakka, there is only single rail line between two bulb points. Another 10.00 MTY SILO is being prepared at Rajmahal coal mines for transport of coal to plants of NTPC under FMC project. Another 3.00 MTY SILO is being prepared at Hura-C coal mine for transport of coal to plants of NTPC under FMC project. Hura C to Rajmahal MGR (~12 Kms) is being constructed by NTPC for taking coal to either Kahalgaon and Farakka Plants For smooth transport of coal on augmented silo completion i.e., FMC project completion, it is apprehended that double rail line from Rajmahal to NTPC Farakka is required	Yes ✓	Detailed evacuation plan for Rajmahal coalfield covered as part of report with focus on ECL's projected growth. Non-CIL blocks in the region (Pachwara blocks, etc.) have also been considered while planning for infrastructure requirement. For the MGR line between ECL and NTPC Farakka, a detailed schematic has been included in the report showing the current single line status and recommendations for doubling of the said line.

Key Outcomes from Stakeholder Consultation held at Bhubaneswar

Participants of Stakeholder Consultation – Bhubaneswar

#	Name of Organization
1	Ministry of Coal (MoC)
2	Coal India Limited (CIL)
3	Mahanadi Coalfields Limited (MCL)
4	EMIL Mines & Mineral Resources Limited (EMMRL)
5	Steel Authority of Indian Ltd (SAIL)
6	Jindal Stainless
7	Mahanadi Coal Railway Limited (MCRL)
8	Central Mine Planning and Design Institute (CMPDI)
9	Adani - Dhamra Port Company Limited (DPCL)
10	Neyveli Lignite Corporation of India Limited (NLCIL)
11	National Aluminum Company (NALCO)
12	Ministry of Road Transport and Highways (MoRT&H)
13	Bhushan Power & Steel Limited (BPSL)

#	Name of Organization
14	Inland Waterways Authority of India (IWAI)
15	Indian Railways (IR)
16	NTPC Limited
17	Ircon International Ltd.
18	Bhubaneswar Power Private Limited (BPPL)
19	Tata Steel
20	Government of Odisha (Department of Steel & Mines)
21	Jindal Steel & Power Limited (JSPL)
22	Rashtriya Ispat Nigam Limited (RINL)
23	Rail India Technical & Economic Services (RITES)
24	Vedanta Limited
25	NITI Aayog
26	Deloitte

Key Observations and Recommendations from Stakeholder Consultation – Bhubaneswar (1/2)

#	Recommendations	Action Taken (Yes/No)	Details of Action Taken
1	Demand for Coking coal by FY30 shall be taken as 140 MTPA, as recommended by Ministry of Coal representative	Yes ✓	Coking coal projections taken on basis of MECON report modified to as per recommendation from Ministry of Coal representative
2	Additional lines such as recently commissioned Angul – Sukinda Rd BG line and proposed lines such as Rairakhol to Gopalpur shall also be taken into consideration	Yes ✓	Additional lines which have been recently commissioned have been considered in the report. However, lines specific to coal traffic considered.
3	Ports apart from Paradeep such as Dhamra, Gopalpur, Vizag and Gangavaram shall also be mentioned under recommendations section for future possibilities of coastal shipping through these ports	Yes ✓	Coastal shipping possibilities to Dhamra, Vishakahpatnam considered in section covering coastal shipping and export of coal
4	Estimated number of Wagons to be procured by Indian Railways for movement of coal from Odisha state shall also be worked out and included	Yes ✓	Number of rakes required for ECoR projected and suggestions on wagon procurement provided in the report. Expanding the analysis for pan-India network led to estimated ~95,000 – 1,00,000 additional wagon procurement by Indian Railways

Key Observations and Recommendations from Stakeholder Consultation – Bhubaneswar (2/2)

#	Recommendations	Action Taken (Yes/No)	Details of Action Taken
5	A point of view on coastal shipping capacities for Non-Regulated Sector shall also be included	Yes ✓	Coastal shipping potential mapped for Non-Regulated Sectors such as steel and cement with coastal and hinterland capacities analyzed
6	Inclusion and addition of Explored Coal Blocks in pipeline for 7th / 17th Tranches coal block Auctions	Yes ✓	Coal blocks at various stages of exploration such as explored, partially explored, regionally explored have been included along with list of blocks in pipeline for auctions.
7	Sambalpur to Titlagarh traffic shall also be taken into consideration, which can be further used for coal transport to Vizag & Gangavaram	Yes ✓	Sambalpur-Titlagarh line has been covered as part of detailed analysis focused on the state of Odisha

Key Outcomes from Stakeholder Consultation held at Bilaspur

Participants of Stakeholder Consultation – Bilaspur

#	Name of Organization
1	Ministry of Coal (MoC)
2	Coal India Limited (CIL)
3	Southeastern Coalfields Limited (SECL)
4	Western Coalfields Limited (WCL)
5	Sarda Energy
6	Chhattisgarh State Power Generation Corporation Limited (CSPGCL)
7	Government of Chhattisgarh
8	Rajasthan Rajya Vidyut Utpadan Nigam Limited (RRVUNL)
9	Central Mine Planning and Design Institute (CMPDI)
10	Maharashtra State Power Generation Company (MAHAGENCO)
11	M/s Prakash Industries Limited

#	Name of Organization
12	Hindustan Aluminum Company (HINDALCO)
13	Ministry of Road Transport and Highways (MoRTH)
14	Indian Railways (IR)
15	NTPC Limited
16	Ircon International Ltd.
17	NITI Aayog
18	Jindal Steel & Power Limited (JSPL)
19	JSW Steel
20	Rail India Technical & Economic Services (RITES)
21	Vedanta Limited
22	Deloitte

Key Observations and Recommendations from Stakeholder Consultation – Bilaspur (1/2)

#	Recommendations	Action Taken (Yes/No)	Details of Action Taken
1	Inclusion and addition of Explored Coal Blocks in pipeline for 7th / 17th Tranches coal block Auctions	Yes ✓	Coal blocks at various stages of exploration such as explored, partially explored, regionally explored have been included along with list of blocks in pipeline for auctions
2	Estimated number of Wagons to be procured by Indian Railways for movement of coal from Chhattisgarh state shall also be worked out and included	Yes ✓	Number of rakes required for SECR projected and suggestions on wagon procurement provided in the report. Expanding the analysis for pan-India network led to estimated ~95,000 – 1,00,000 additional wagon procurement by Indian Railways
3	Impact of Non-Operationalization of coal blocks falling under Lemru Reserve (Gidmuhi & Paturia of CSPGCL, and Madanpur South of APMDCL, along with other blocks in future pipeline) shall be highlighted in Hasdeo-Arand CF	Yes ✓	Relevant blocks affected in the vicinity of Lemru Reserve region have been highlighted for risks of non-operationalization

Key Observations and Recommendations from Stakeholder Consultation – Bilaspur (1/2)

#	Recommendations	Action Taken (Yes/No)	Details of Action Taken
4	Quantification of Non-CIL coal which can move through CERL and CEWRL shall be incorporated	Yes ✓	Scenario created for CERL & CEWRL lines to cater to non-CIL traffic. However, additional capacities may be required to handle coal beyond CIL's evacuation requirement.
5	For road despatches in Chhattisgarh, NGT guidelines shall be adhered to and considered while estimating road movement in the area	Yes ✓	National Green Tribunal (NGT) restrictions on road movement of coal in the Raigarh region has been considered along with coal evacuation plans of block owners in the region.
6	Impact of CRCL and CEWRL lines on reduction of traffic congestion shall be considered	Yes ✓	Impact of capacity and utilization of railway lines due to commissioning of CRCL and CEWRL lines have been mapped in the report

Other Comments & Recommendations Received

Other Comments & Recommendations Received *(pre & post publication of draft report on MoC website)* (1/3)

#	Recommendations	Action Taken (Yes/No)	Details of Action Taken
1	SAIL: Issues regarding congestion on lines highlighted along with issues in rake availability.	Yes ✓	Recommended to plan for connecting major plants such as SAIL plants to DFC network for ease of traffic movement based on SAIL's rake projections. Issues in rake availability addressed through wagon procurement recommendation in the report.
2	NALCO: Welcomed the railway works planned for MCRL Inner Corridor and Angul-Balaram doubling. Revised projections of NALCO's coal requirement provided.	Yes ✓	Revised projections considered for railway line traffic analysis along with detailed evacuation plan for NALCO's captive mines provided in report.
3	NLCIL: Requested to incorporate recommendation on connectivity from Ambadhia station (Pakur-Godda line) to Pachwara coal mines	Yes ✓	Recommendation of "Double line from Ambadhia station (Pakur-Godda line) to Pachwara coal mines (Pachwara North, Pachwara central and Pachwara South)" included in Rajmahal Coalfield area in the report
4	21st Century Mining: Recommended connectivity improvement for non-CIL blocks in terms of sidings being made available for public use. Pointed out typographical error for Tokisud block	Yes ✓	Recommendations regarding planning for Public Freight Terminals have been included as part of key recommendations in the report. Typographical error rectified.

Other Comments & Recommendations Received *(pre & post publication of draft report on MoC website)* (2/3)

#	Recommendations	Action Taken (Yes/No)	Details of Action Taken
5	MoRTH: Requirement of connectivity of coal bearing areas to national highways for coal evacuation may be highlighted	Yes ✓	Since coal traffic on road is projected to be tapered down with bulk of traffic shifting to railways and waterways (including coastal), dedicated road projects for coal only required for mine to concerned siding. Such projects which are ongoing and planned have been highlighted in the report.
6	Director, CPIAM, MoC: Illustrative calculation for analysis of future line capacity utilization to be added for clarity with source added for current utilization levels	Yes ✓	Approach for analyzing future line capacity utilizations using an example has been illustrated in the report with source of data mentioned.
7	Director, CPIAM, MoC: Impact of network optimization for coal logistics on to be illustrated with focus on cost & reduction in emissions	Yes ✓	Impact illustrated in report in terms of reduction in average transportation leads and costs along with projected savings and lower emissions

Other Comments & Recommendations Received *(pre & post publication of draft report on MoC website)* (3/3)

#	Recommendations	Action Taken (Yes/No)	Details of Action Taken
8	Ministry of Mines: The Ministry of Mines examined the draft report in consultations with Indian Bureau of Mines (IBM), Hindustan Copper Ltd. (HCL), Steel Authority of India Ltd. (SAIL) & NALCO	Not Applicable	The Ministry of Mines informed that the said plan in consonance of NMP, 2019 and hence lent its support to the proposal.
9	IWAI: Execution of National Waterway 5 to execute coastal shipping via inland waterways (Mahanadi River)	Not Applicable	IWAI appraised that transaction advisor has been appointed to take up the project in PPP mode
10	IWAI: Talcher to Haldia and Further utilizing Haldia to Indo-Bangladesh Protocol Route for delivery of coal to power plants in Bangladesh	Not Applicable	IWAI confirmed and welcomed the recommendation made in the report adding that it is efficient considering the congestion at land border

Thank You