





Inter- Ministerial Report on long-term plan for movement of coal through Ports & Waterways.

(Report by IMC Constituted by Ministry of Coal)

June 2023

Foreword

The Ministry of Coal has taken an initiative to integrate Rail-Sea-Rail (RSR) transportation with other modes for the efficient movement of domestic coal. This multimodal transportation system allows for the seamless transportation of coal from mines to ports and then to end-users, reducing transportation costs and improving logistic efficiency. This is essential to meet the growing energy demand of a growing country like India.

The Ministry of Coal's efforts to promote Rail-Sea-Rail are yielding significant results as Rail-Sea-Rail transportation of coal has significant growth of around 50% over the past five years and planned for 125% growth by FY2030. With coal production in India expected to nearly double in the next seven years, the Rail Sea Rail as an alternative mode of transportation, becomes crucial for efficient Coal evacuation to consumption centers in India, ensuring a seamless and uninterrupted power supply.

I Congratulate the Inter-Ministerial Committee and Chairperson for his overall leadership and preparing extensive detail report on long term plan for RSR movement of coal in country.

Amrit Lal Meena

Secretary

Ministry of Coal

Foreword

Coal is the main stay of energy mix in India fulfilling almost 55% of primary energy demand and 75% of electricity generation in the country. The energy demand is driven by a raising economy to meet the aspirations of the country. As per our analysis, coal demand is likely to rise to1.5 BT by 2029-30 and to 2 BT by 2047.

The challenge, therefore, is to transport coal efficiently, competitively and in a faster manner to coal consuming destinations. The report is an attempt to suggest a long-term strategy for coal transportation through Ports and Waterways and to identify infrastructure required. I hope this report will be useful to all the stakeholders to take required long-term actions to ensure energy security to the country.

M. Nagaraju, IAS
Additional Secretary & Nominated Authority,
Chairman, Inter-Ministerial Committee
Ministry of Coal

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List of Abbreviations

Abbreviations	Meaning
ARR	All rail route
BCCL	Bharat Coking Coal Limited
BT	Billion Tonne
CAGR	Compound Annual Growth Rate
CEA	Central Electricity Authority
CCL	Central Coalfield Limited
CHP	Coal Handling Plants
CIL	Coal India Limited
ECL	Eastern Coalfields Limited
ED	Executive Director
FY	Financial Year
GW	Giga Watt
IMC	Inter-Ministerial Committee
IWAI	Inland Waterways Authority of India
KPCL	Karnataka Power Corporation Limited
MCL	Mahanadi Coalfield Limited
MOC	Ministry of Coal
MOP	Ministry of Power
MoPSW	Ministry of Ports, Shipping and Waterways
MMTPA	Million metric tonnes per annum
MMT	Million metric tonne
MT	Million Tonne
MW	Mega Watt
MTPA	Million tonnes per annum
NRS	Non-Regulated Sector
NW	National Waterways
PLF	Plant Load Factor
PPA	Paradeep Port Authority
PRC	Peak Rated Capacity
RS	Rail Sea
RSR	Rail Sea Rail
SECL	South Eastern Coalfield Limited
TLC	Total Landed Cost
TOR	Terms of Reference
TPS	Thermal Power Plants

Chapter1: Introduction

1.1 Constitution of Inter-Ministerial Committee

India produced ~893 MT of coal in FY23, and ~1.55 BT is expected to be produced by FY2030. Currently, ~55% of coal is transported by rail to power plants. Ministry of Coal is making efforts to discourage road transportation of coal and increase current share of rail transportation to 75% by FY 2030, therefore, rail will continue to be the principal coal evacuation method in the future. However, given the present congested rail network in the country and India's plans to double coal production by FY2030, it is expected that all rail route may not be sufficient to cater for smooth coal transportation in India. We need to explore other alternative routes to complement rail network.

1.1.2 During the last three years, on an average,30-40 MT of coal was transported through coastal shipping to southern power houses. This presents a potential alternate transporting route for coal. In this context, on December 7, 2022, a meeting was held under the chairmanship of Secretary for Ports, Shipping, and Waterways with Secretary (Coal), Senior Ministry of Coal officials, Chairman of Coal India, officials of Power, Railway Board, PSW, NTPC, and representatives from other organizations to discuss coal evacuation via coastal shipping.

1.1.3 It was decided in the meeting that Rail Sea Rail (RSR) route be promoted in the country strengthening Ports infrastructures and connecting rail network to Ports at first and last leg to enhance more efficient coal evacuation. It was decided at the meeting to establish an Inter-Ministerial Committee to come up with recommendations to improve coal transportation by coastal shipping in the country.

1.1.4 The Ministry of Coal, Government of India, has constituted an Inter-Ministerial Committee (IMC), headed by M. Nagaraju, Additional Secretary, Ministry of Coal to formulate a long-term perspective plan for movement of coal through Ports and waterways [Annexure 1]. The list of the IMC's members:

Table 1: List of Members of the IMC

Sl.No.	Name	Designation
1	M. Nagaraju, Additional Secretary & NA, Ministry of Coal	Chairman
2	Additional Secretary Ministry of Port, Shipping and Waterways	Co-Chair
3	P.L. Haranadh, Chairman Paradeep Port	Member
4	O.P. Singh, CMD Mahanadi Coalfields Limited	Member
5	Mukesh Chaudhary, Director Marketing, Coal India Limited	Member
6	H Bajwa ED (Coal), Railways	Member
7	Chandra Prakash, Chief Engineer, CEA	Member
8	P V Rao, Director IWAI	Member
9	Dileep Kumar ED, NTPC	Member

1.2 Terms of Reference of the IMC

1.2.1 To create a long-term strategy for coal transportation through ports and waterways.

1.2.2 To propose the need for adequate infrastructure to boost coal transportation by rail, sea, and rail.

1.3 Proceedings

1.3.1 First Meeting of the IMC:

In the first meeting of IMC held on February 3, 2023, MOC provided a concise overview of the current state of the India's RSR coal movement. A detailed discussion was held on the terms of reference and the suggestions were made by the members, which was created to provide recommendations for seamless transportation of coal through sea routes in the shortest time possible.

1.3.2 Second Meeting of the IMC:

The second meeting of the IMC was held on April 06, 2023. The MOC gave a brief presentation on the outline of the draft IMC report. A detailed discussion took place regarding cost analysis comparisons, as well as infrastructure and requirement of loading/unloading ports.

1.3.3 Third Meeting of the IMC:

During the 3rd meeting of the IMC on May 03, 2023, MOC discussed draft recommendations of the report and CEO, Damra Port made a presentation on coastal movement of coal in the meeting. A detailed discussion took place on the recommendations and decided that final views of stakeholders will be obtained on the report before finalization.

Chapter 2: Coal Production

2.1 Overview

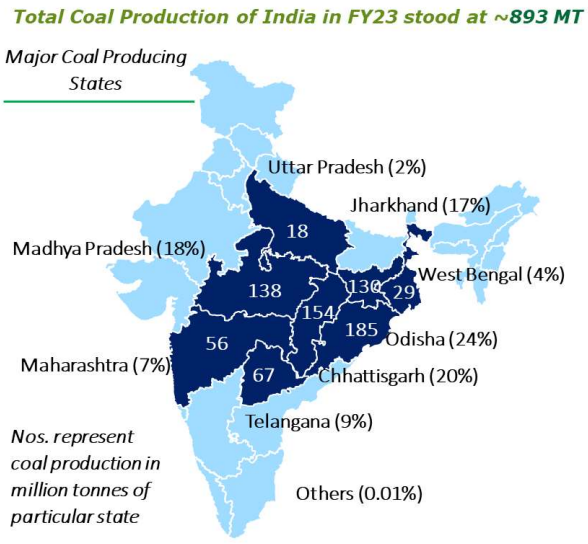
India's energy sector primarily relies on coal, which constitutes 55% of the total energy mix. To achieve the targeted economic growth of the country, it is imperative to build a vibrant coal market. The Ministry of Coal has a vision to build "Modern, sustainable and competitive coal sector enabling accelerated coal production for energy security and economic growth" to ensure coal availability to meet demand from diverse economic sectors in an eco-friendly, sustainable, and cost-effective manner.

2.1.2 Coal reserves are majorly in Eastern and Central part of India and have to be transported to consumers across the country has led to use of multiple transportation modes like rail, sea, road, and conveyors, to transport coal in bulk and dispatch externally from collieries. Creating a transportation infrastructure network and logistics for the efficient transportation of coal from its source to the consumption centers poses significant challenge for sustainable coal market development in India.

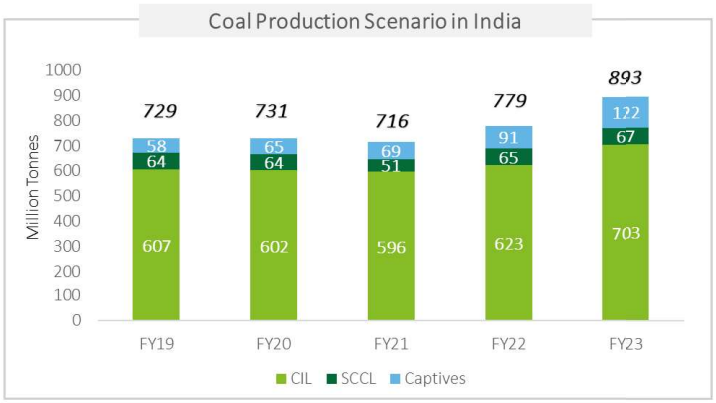
2.2 Coal Production Centers

India has produced around ~893MT in FY23 as shown in Figure 1. Coal India Limited (CIL) and its subsidiaries account for over 80% of domestic coal production. The coal field wise state wise expected coal production in 2030 is given at table 2 shows the growth regions of coal in the coming years. In the past five years, captive coal production in the country has grown significantly, registering a compounded annual growth rate (CAGR) of 20.43% between FY19 and FY23 due to a slew of ease of doing business reforms in the coal sector.

Figure 1 : Coal production in last 5 years



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: Ministry of Coal-Statistic Report

Table 2: Coalfield-wise coal production projection

(All figures in million tonnes)

State	Coalfields	FY23(tentative)	FY30
Odisha	Talcher	112.7	292.50
	Ib-Valley	96.29	221.20
Chhattisgarh	Mand-Raigarh	29.08	160.00
	CIC & Korba	178.37	277.00
Madhya Pradesh	Singrauli	163.69	135.00
Jharkhand	North Karanpura	71.7	122.92
	South Karanpura	6.76	12.50
	East Bokaro	14.46	29.15
	West Bokaro	5.48	12.33
	Ramgarh	1.33	3.00
	Giridih	0.2	0.10
	Jharia	36.0	54.00
Maharashtra	Pench Kanhan & Tawa Velley	2.84	4.59
	Wardha Velley, Umrer, Kamptee & Bander	63.6	65.42
Telangana		69.5	90.00
West Bengal	Deoghar/Saharjuri	1.03	2.50
	Mugma-Salanpur	4.86	11.40
	Rajmahal	5.62	23.50
	Raniganj	29.56	32.50
TOTAL		**893.07**	**1549.61**

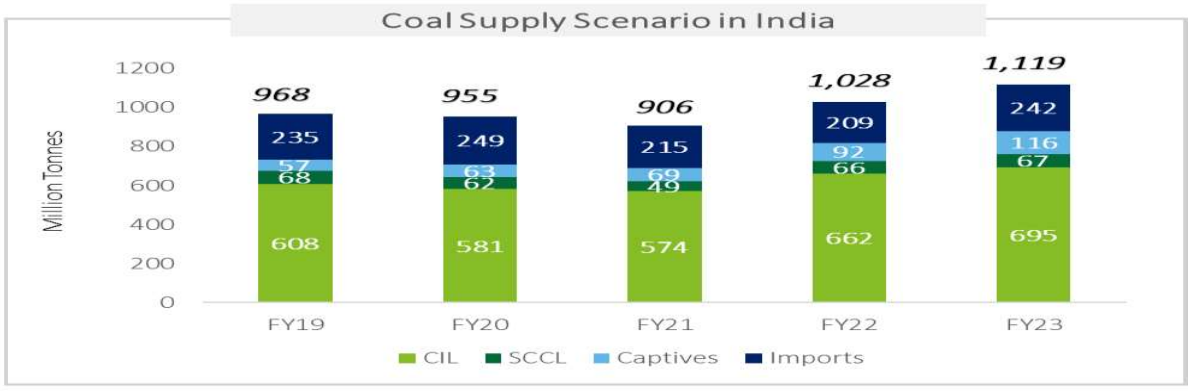
Source: Ministry of Coal

2.2.2 The above data indicates that coal production in India will nearly double in next 7 years and that 90% of coal will be produced from States of Odisha, Chhattisgarh, Madhya Pradesh, Telangana, and Jharkhand.

2.3 Major Coal Despatch Centers

In FY23, the major coal-producing states of Odisha, Chhattisgarh, Jharkhand, along with parts of Madhya Pradesh, are the main clusters for coal production and evacuation, accounting approximately 75% of the total domestic raw coal despatch. The figure 2 provide us the steady increase of coal dispatch in India.

Figure 2: Coal Despatch in last 5 years



- *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: Ministry of Coal- Statistic report

2.4 Coal Production Projection

The Ministry of Coal has set a goal to produce 1.3 billion tonnes of domestic coal by FY2026 and 1.55BT by FY2030 to advance Atma-Nirbhar Bharat and increase India's energy security by substituting imported coal with locally mined coal. In FY2023 India has produced ~893MT. Demand of coal is likely to rise from 1115 MT in FY2023 to 1.55 BT in FY2030 for power generation and Non-Regulated Sector.

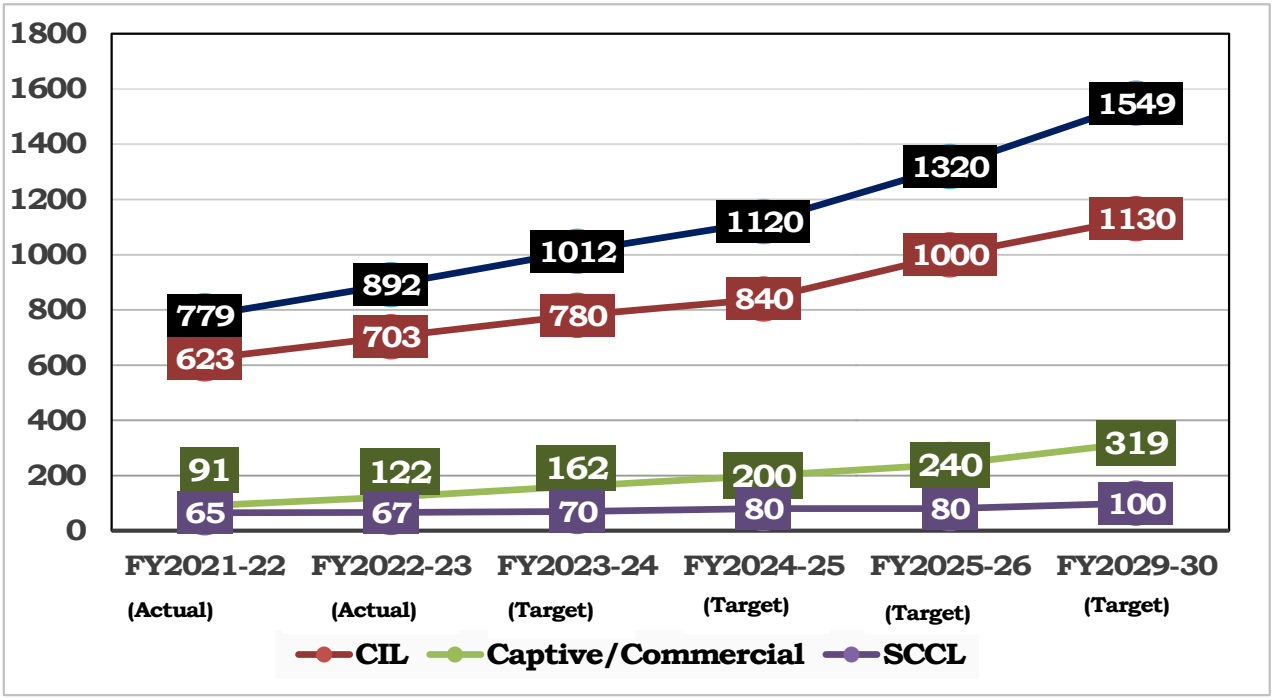
2.4.2 Ministry of Coal successfully auctioned 133 coal mines since 2015 with cumulative

peak rated capacity (PRC) of 515 MT. It is also expected to auction 25 more coal mines during FY2023-24[1]. Most of these will reach production before 2030.

2.4.3 Since Coal production in India will nearly double in next 7 years with a CAGR of ~7.7% by FY2030, India needs to plan more efficient evacuation of produced coal to consumption centers. Year-wise projected coal production in India is shown at Figure-3.

2.4.4 Out of projected production of ~1.55BT, ~500 MT is from two coalfields of Odisha i.e., Ib-Valley & Talcher Coalfields, followed by Mand-Raigarh of Chhattisgarh (160 MT), Singrauli of Madhya Pradesh (135 MT) and North Karanpura of Jharkhand (122 MT). Therefore, India is required to build a seamless network of transportation modes from these places to evacuate coal to the consumption points. This requires close coordination with all the stakeholders in the coal industry like coal companies, Railways, Road network and Ports, logistics companies.

Figure 3: Coal Production Projection



Source: Ministry of Coal: Statistical Report Mar'2023

[1] Action Plan FY2023-24, Ministry of Coal

Chapter 3: Coal Transportation

3.1 Overview

Coal transportation in India is primarily through by rail, with the majority of coal moved through coastal mode being loaded at Paradeep Port. Other load Ports for coal transportation include Damra, Gangavaram, Haldia and Vizag Ports. Coal is unloaded at Krishnapatnam Port, Ennore Port, and Tuticorin Port before being transported to the power plants located in Andhra Pradesh and Tamil Nadu. These states have linkages with MCL mines, situated close to Paradeep Port, providing opportunities for coastal shipment. On the other hand, power plants in Maharashtra and Gujarat primarily have linkages from SECL and WCL mines to optimize rail-based transportation from the mines to these plants. The current mine-power plant linkages have been designed with the objective of optimizing transportation costs using railways. With the development of Port and Waterways infrastructure and cost savings, Ministry of Coal need to rationalize linkages to some of the power plants in the medium term.

3.2 Mode-wise dispatch of Coal

The first mile connectivity involves transportation of coal from the mine pithead to dispatch points, while last-mile connectivity comprises transportation of coal from receiving points to the end-use plant. However, in some cases, there is an overlap of first-mile, trunk, and end-mile connectivity, where coal is transported from end to end using a single mode of transportation. For example, if a mine is in close proximity to an end-use plant, coal can be transported directly from the mine to the end-use plant using a road or conveyor. Similarly, if both the mine and the end-use plant have railway siding connectivity, rail can be used as the sole mode of transportation for coal.

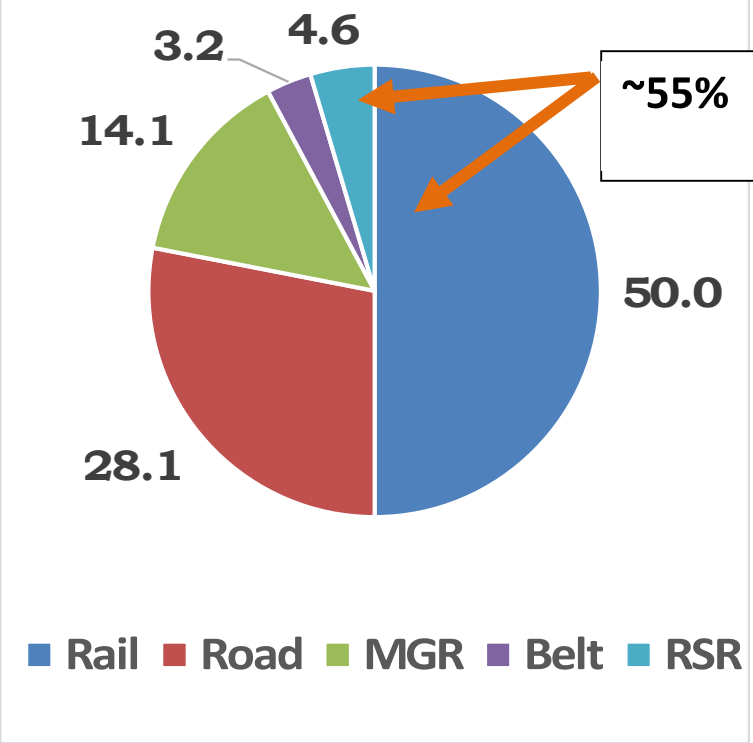
3.2.2 While railways, ports, and inland waterways are important modes of transportation for coal, they may not always be able to reach every region where mines are located, and as a result, road infrastructure needs to be synchronized with the infrastructure of railways, ports, and waterways. In cases where end-use plants are situated near mines, coal can be transported using either roads or conveyor belts as modes of

transportation.

3.2.3 Currently, 28% of coal is transported through roads. To reduce dependence on road transportation, the Ministry of Coal has developed a comprehensive strategy for an integrated approach. As part of the strategy, the ministry is upgrading the mechanized coal transportation and loading system through the "First Mile Connectivity" projects, which involve development of Coal Handling Plants (CHPs) and SILOs with Rapid Loading Systems. This system offers several benefits, including crushing, sizing, and rapid computer-aided loading of coal. A total of 67 FMCs to evacuate more than 900 MT by 2027-28 have been planned.

3.2.4 In FY23 ~55 % of Coal is being evacuated through rail and it is likely to increase to 75% by FY2030.Out of 55% rail transportation of coal in FY23, ~4.6% coal is being evacuated through coastal shipping (RS/RSR route).

Figure 4: Modes of Coal Evacuation in FY2022-23



Source: Ministry of Coal Statistical Report Mar'2023

The primary mode of coal evacuation in the future is expected to remain railways, with a goal to increase its current modal share to 75% by FY 2030.

Therefore, to avoid congestion in the All-Rail Route for coal evacuation, there is a need to enhance alternative routes, such as Rail-Sea/Rail-Sea-Rail by FY 2030.

Chapter 4: Coastal Shipping of Coal

4.1 Overview

The coastal shipping mode of transportation is an economical and eco-friendly system for moving goods and has the potential to revolutionize the logistics industry in India through implementation of Sagarmala program. Over the last five years, coastal traffic has grown at a compounded annual growth rate of 8.4%. In 2019, the Ministry of Ports, Shipping and Waterways (MoPSW) and the Asian Development Bank (ADB) collaborated to create a report on an action plan to promote coastal shipping in India. The report identified a potential to transport 340 million metric tonnes per annum (MMTPA) of cargo via coastal shipping by the fiscal year 2025, which could result in a savings of approximately Rs. 9600 crores.

4.1.2 Paradeep Port serves as the primary load Port for coal traffic traveling down the coast, while Vizag, Damra and Haldia Ports serve as secondary loading Ports for the transportation of coastal cargo of coal. The thermal power plants located in Andhra Pradesh and Tamil Nadu are connected to the MCL mines in Odisha, which are near the Paradeep port, enabling efficient coastal transit.

4.1.3 The Paradeep Port & Dhamra rail network, which is linked to the hinterland through a broad-gauge rail link via Cuttack, is part of the East Coast Railway System. Paradeep is one of the largest Ports in terms of cargo volume, with a capacity of more than 70 MTPA for coal. MCL has a berth capacity of approximately 20 MT at Paradeep Port to handle coal for the power plants of Andhra Pradesh and Tamil Nadu.

4.1.4 Over the past four years, Rail-Sea-Rail transportation of coal has experienced a significant growth of around 125%, with dispatches increasing from approximately 18 million tonnes (MT) in FY20 to approximately 40 MT in FY23. There are ongoing efforts to achieve 100% capacity utilization of Ports located along the Southern and Western coasts to transport more coal to powerhouses in Gujarat, Maharashtra, Karnataka, Goa, Tamil Nadu, Kerala, and Andhra Pradesh.

Table 3: Despatch of Coal through various Ports

(All figures in million tonnes)

PORT	Port Capacity (MTY)	Coal Handling Capacity	Coal Company	2018-19	2019-20	2020-21	2021-22	2022-23
HALDIA	19.00		ECL	1.97	0.32	0.19	0.04	0.00
			CCL	0.07	0.14	0.09	0.00	0.00
			TOTAL	**2.04**	**0.46**	**0.28**	**0.04**	**0.00**
PARADEEP	74.20	55 rakes per day	MCL	20.21	16.39	17.16	23.25	36.70
			ECL	0.40	0.01	0.39	0.76	0.03
			CCL	0.61	0.26	0.43	0.07	0.00
			TOTAL	**21.22**	**16.66**	**17.98**	**24.08**	**36.73**
VIZAG	25.00	2 rakes per day	**MCL**	**1.78**	**0.64**	**0.86**	**2.37**	**1.10**
DHAMRA	7.00	6 rakes per day	MCL	1.02	0.45	0.26	1.30	1.20
			CCL	0.00	0.00	0.10	0.08	0.04
			ECL	0.94	0.36	0.88	0.24	0.12
			TOTAL	**1.96**	**0.81**	**1.24**	**1.62**	**1.26**
GANGAVARAM	3.00	5 rakes per day	**MCL**	**0.00**	**0.00**	**0.00**	**0.00**	**1.60**
GOPALPUR	5.00		**MCL**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Ports	133.2	**CIL TOTAL**		**27.00**	**18.57**	**20.36**	**28.11**	**39.59**

4.1.5 In FY23, approximately 40 MT of coal was transported through the Rail-sea/Rail-Sea-Rail Route, via Paradeep, Haldia, Vizag, and Damra Ports as indicated at table 3. Six ports, namely Dhamra, Mundra, Gangavaram, Paradeep, Krishnapatnam, and Jaigad, handle around 48-50% of imported coal, equivalent to 100 million metric tons. Table 3 highlights East Coast and Western ports and coal despatches in the last 5 years. It is evident that the East Coast ports have a capacity of 133 MT for transporting coal through the RSR route. However, in FY23, only 40 MT of coal was transported, which indicates that the Ports are currently underutilized.

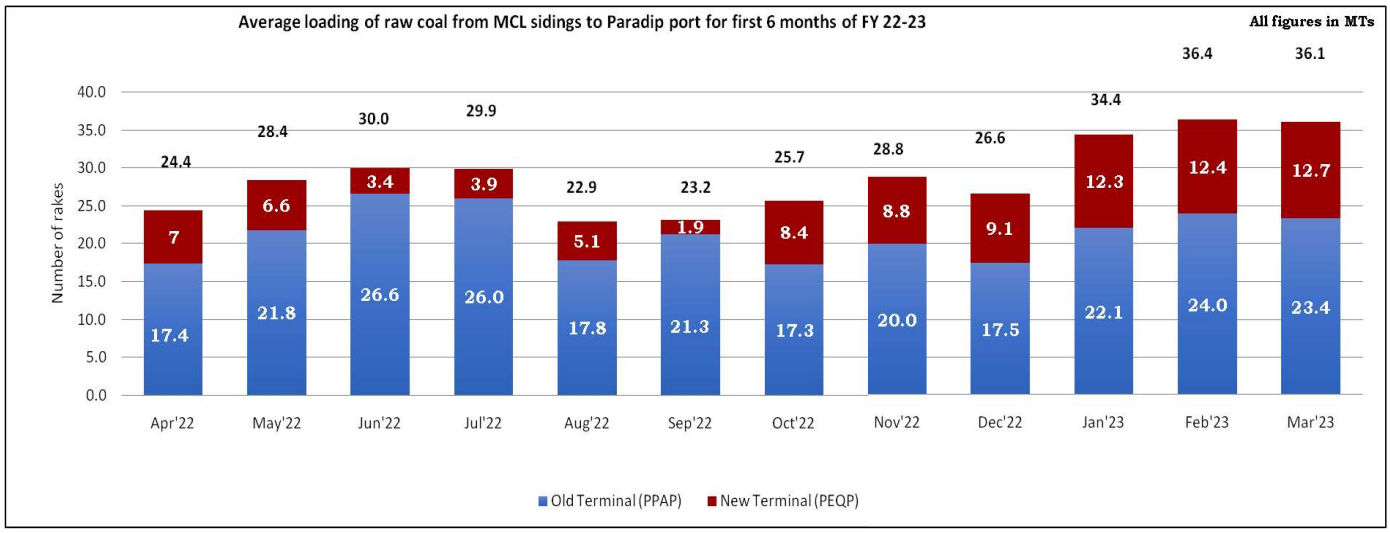
4.1.6 Odisha is in close proximity to several orts like Paradeep, Damra, Gopalpur, Vizag and in a advantageous position for evacuation of coal via coastal shipping. Odisha has produced ~219 MT of coal in FY23 and evacuated 55% through rail. To ensure proper evacuation of more quantity of coal in FY2030, an alternative route of evacuation of coal other than rail is needed from Odisha. Given that it has more coal production capacity and several ports close-by, Rail-Sea/Rail-Sea-Rail route of coal evacuation has great potential in Odisha.

4.2 Seasonal demand of coal in RS/RSR route

It has been noticed that Power demand is very dynamic throughout the year due to several factors such as monsoon, hydro & wind energy for power generation and cost of imported coal.

4.2.2 The average number of coal rakes loaded per day at Paradeep from MCL to southern states power plants is 28.9. It has been noted that the demand for coal by coastal power plants varies throughout the year, with higher demand in the first half of the year (Jan-Jun) and a decline in demand towards the second half (Jul-Dec). The demand typically peaks between February and May.

Figure 5: Average loading of rakes from MCL sidings to Paradeep port for FY23



4.3 Demand Supply Gap Analysis by FY 2030

The demand-supply analysis for FY2030 has been undertaken based on the following scenarios:

i. **Demand:** Estimated demand for coal carried via RS/RSR route is 112 MTPA by FY 2030, considering coal requirement for Southern & Western Power Plants as well as export opportunities to Bangladesh and Sri Lanka & NRS sectors in Southern states.

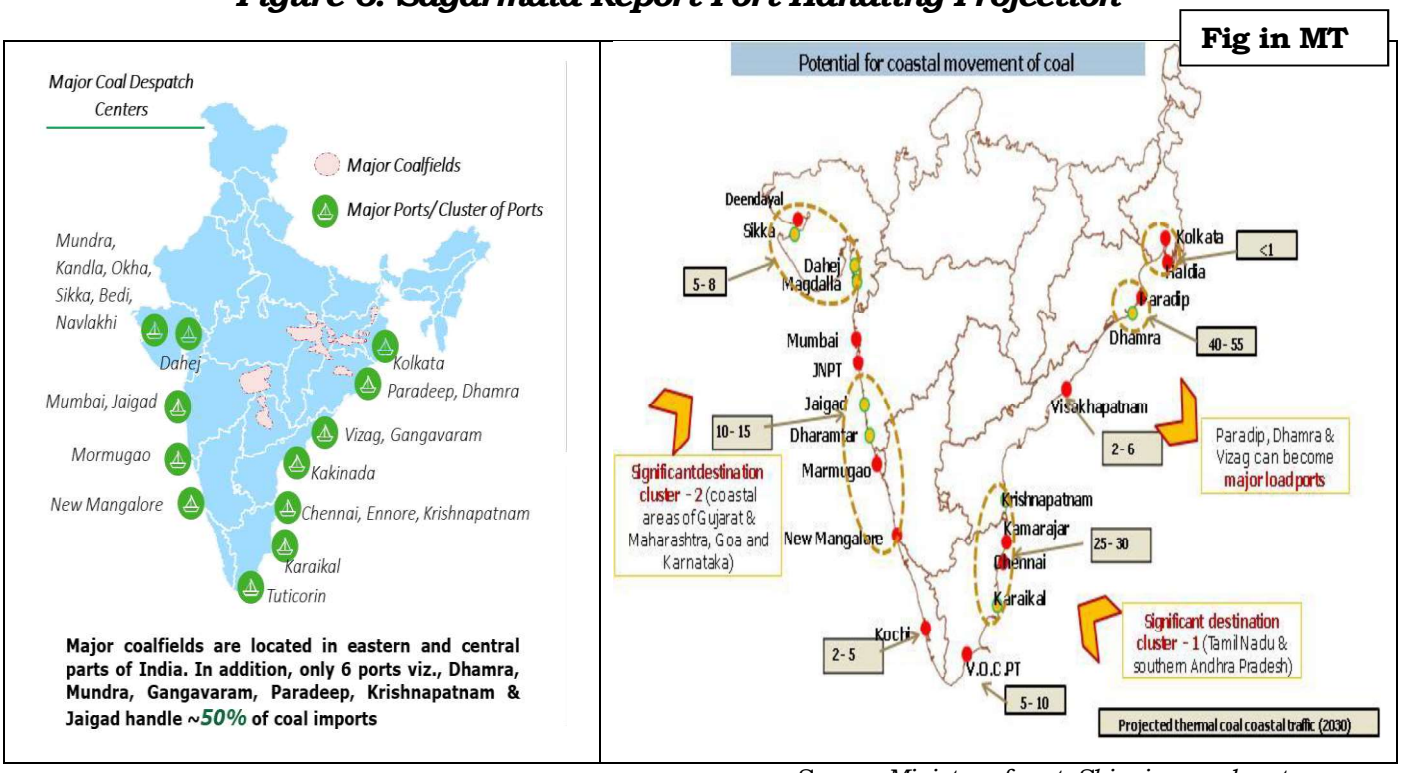
ii. **Supply:** By FY 2030, it is anticipated that the CIL/Non-CIL Blocks will provide ~81 MT of coal to the Southern States power plants via the R-S/ R-S-R route.

4.4 Handling of coal in FY 2030 through RS/RSR route

Although rail is currently the primary mode of long-distance coal transportation, research data and industry experts suggest that transitioning the modal mix to coastal shipping could lead to considerable cost savings for southern part of India. However, it may not have any cost advantage to the western part. Despite that, due to railway congestion, there may still be time rationale for coastal shipment to such plants due to availability of coal to the power plants. Therefore, thermal coal shipments has been identified as a critical component of the Sagarmala Project's overall goal.

4.4.2 The Maritime India Vision 2030, developed by the Ministry of Ports, Shipping and Waterways, suggests that there is a potential for approximately 110-130 million tonnes per annum (MMTPA) of coastal coal movement to Gujarat, Maharashtra, Karnataka, Goa, Tamil Nadu, Kerala, and Andhra Pradesh by 2030.

Figure 6: Sagarmala Report Port Handling Projection



Source: Ministry of port, Shipping, and waterways

4.4.3 Based on the above data, it is projected that the Southern and Western Ports can handle 110-130 MT of coal transportation and supply to powerhouses. However, it is important to note that some Ports have more capacity to handle than the projected amount, such as Paradeep, which presently has a capacity of 74.2 MTPA.

4.5 Location based demand projection of thermal coal via sea route

4.5.1 Requirement for power plants in Southern Region

The power plants in Andhra Pradesh and Tamil Nadu have fuel supply agreements with MCL and transport coal through the Rail-Sea (RS) or Rail-Sea-Rail (RSR) mode. Currently, ten plants, with a capacity of 13.5 GW, transport coal from MCL through RS/RSR mode. At 85% PLF, these plants require approximately 1.79 lakh tonnes/day (~47 rakes/day). However, based on the generation program for the year 2023-24, the daily coal requirement of these plants will be around 39 rakes per day. Furthermore, four power plants are expected to be added to the country by FY25, with a projected requirement of 15 rakes/day at 85% PLF. This combined demand for these projects is 62.5 rakes/day or approximately 80MT at 85% PLF of power plants.

Table 4: Requirement of Coal from Existing Power Plant in Southern State

S. No	Name of Thermal Power Station	GENCO	Capacity (in MW)	based on generation requirement 2023-24		Loading Port	Unloading Port	based on generation requirement FY30	
				Requirement / day ('000 T')	Rakes required / day			Requirement / day ('000 T')	Rakes required / day
1	Damodaram Sanjeevaiah TPS	AP -GENCO	2400	22.9	6.0	Paradeep/ Damra/ Vizag / Gangavaram/ Gopalpur	Krishnapa-tnam	31.3	8.2
2	Rayalaseema TPS*		1650	9.8	2.6			12.7	3.3
3	Painampuram TPS	SEIL	1320	15.6	4.1			16.3	4.3
4	SGPL TPS		1320	12.7	3.4			14.8	3.9
5	Mettur TPS*	TAN-GENCO	840	5.5	1.5		Ennore/ Karaikal	7.0	1.8
6	Mettur TPS – II*		600	3.2	0.9			4.8	1.3
7	North Chennai TPS		1830	30.7	8.1		Ennore	35.7	9.4
8	Tuticorin TPS		1050	14.6	3.8		Tuticorin	19.9	5.2
9	Vallur TPS	NTPC-JV	1500	19.8	5.2		Ennore	23.1	6.1
10	NTPL Tuticorin TPS	NLC-TN-JV	1000	14.7	3.9		Tuticorin	13.7	3.6
	Total - Existing Plants		**13510**	**131.1**	**39.4**			**178.8**	**47.1**

Source: Ministry of Coal: RSR Task Force Report

4.5.1.2 Considering the first mile (i.e. connecting mine to ports) is rail in all the above cases and last mile (i.e. connecting ports to powerhouses) may be rail/road/conveyor, above data indicates that 10 Southern Power plants demand of coal through RS/RSR route as ~65 MT considering 85 % PLF. However, railways confirmed that considering the rail construction in future, the hinterland power plants like Rayalseema plant may get coal from SCCL mines through All Rail route. The total demand of coal for existing Southern Power Plants may be considered as **55-60 MT.**

Table 5: Requirement of Coal from New Power Plant in Southern State

S.No	Name of Thermal Power Station	GENCO	Capacity (in MW)	Expected Schedule commissioning date	Loading Port	Unloading Port	based on generation requirement FY30	
							Requirement / day ('000 T')	Rakes required / day (RPD)
1	North Chennai Stage- III TPS	TANGENCO	800	Sep'23	Paradeep / Damra/ Vizag / Gangavaram/ Gopalpur	Ennore	11.4	3.2
2	Ennore SEZ TPP		1320	Sep'24		Ennore	18.8	5.0
3	EZTP Expansion TPP		660	Mar'25		Ennore	9.4	2.5
4	Udangudi TPP Stage-I		1320	Jun'24		Tuticorin	18.8	5.0
	Total –		**4100**				**58.5**	**15.4**

Source: Ministry of Coal: RSR Task Force Report

4.5.1.3 Above data indicates that 4 new Southern Power plants are having potential demand of coal through RS/RSR route of ~20 MT considering 85 % PLF.

4.5.1.4 It can be projected that potential demand of coal in future for existing & new Southern Power Plants may be considered as 75-80 MT.

4.5.2 Requirement for western/northern state plants:

Due to severe constraints in logistics in the railway system for transporting coal, especially from MCL area to the northern part of the country, the Ministry of Power (MoP) has advised transportation of coal through RSR mode to plants located in the western and northern parts of the country. It is estimated that approximately 6-8 rakes/day, equivalent to 10-12 MT per annum at 85% PLF, may be required to build an adequate coal stock for plants located in the western and northern states

(Maharashtra, Rajasthan, Haryana, Gujarat, and Punjab), in addition to the requirements.

4.5.3 Opportunity for Exports of Indian Coal

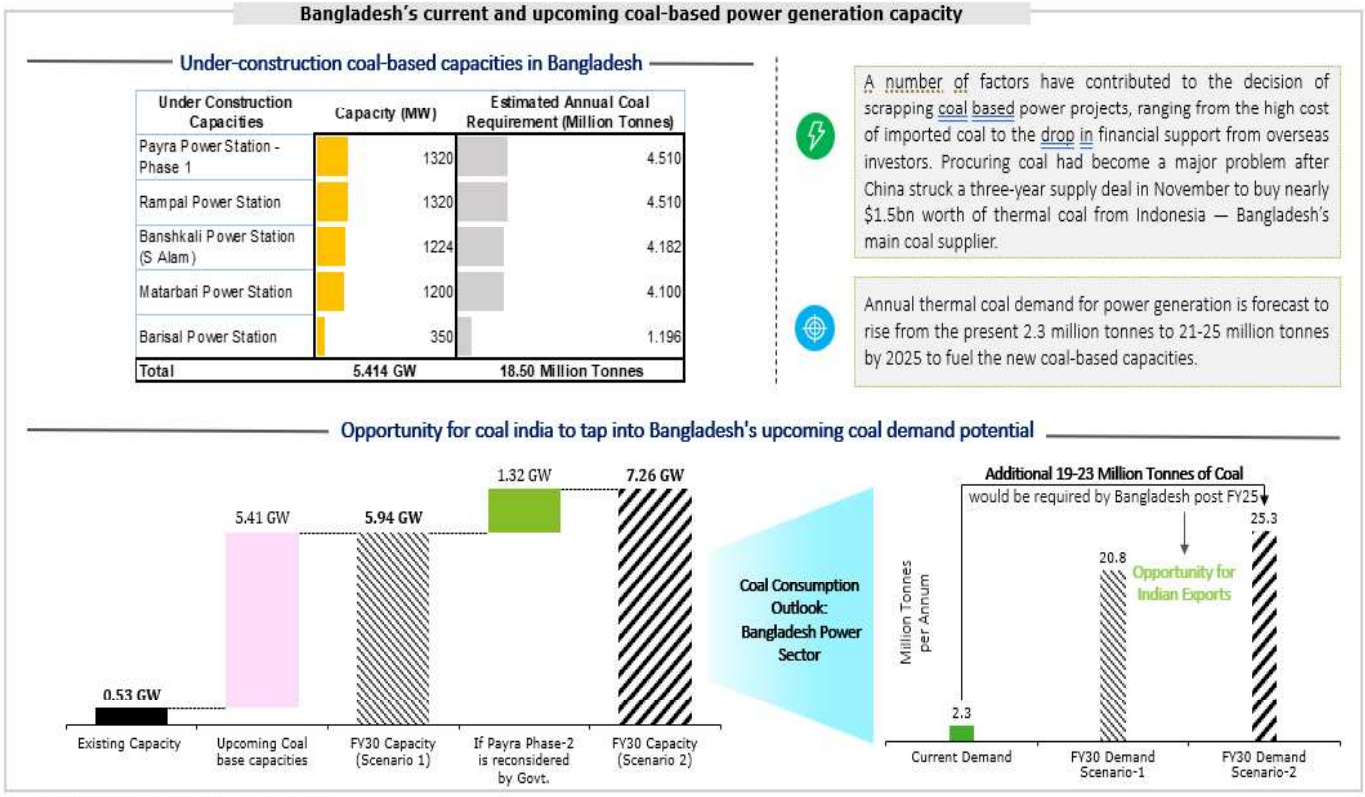
The Integrated Coal Evacuation report for CIL & Non-CIL, prepared by Deloitte, has projected an opportunity for India to export approximately 20 MT of coal to Bangladesh and Sri Lanka via sea route by FY30. The details of the requirement for Bangladesh and Sri Lanka are as follows

i. The following are the projections for the current and future coal-based power production capacity of Bangladesh:

Existing Power Capacity:	~0.525 GW
Under Construction:	~5.414 GW
Planned Capacity:	~17.22 GW

(The likelihood of commissioning these Planned Capacities is low because of recent announcements made by Bangladesh regarding their move away from coal due to issues related to financing and the availability of Indonesian coal.) Estimated coal-based Power capacity in FY2030 - ~6GW

Table 6: Requirement of Coal in Bangladesh



India has an opportunity to export coal to Bangladesh, considering the afore mentioned coal requirement of approximately 15 to 17 MT. Coal can be sourced from Mahanadi Coalfields Limited/Non-CIL Blocks in Talcher coalfields and transported via Indian ports such as Paradeep, Damra or Haldia to Bangladesh ports like Mongla, Khulna, Narayanganj, Pangaon, and Sirajganj. However, the economic viability of this projection needs to be evaluated to establish its feasibility. Coal India need to explore Bangladesh market to meet its demand. Tentative landed cost analysis for Bangladesh ports presented.

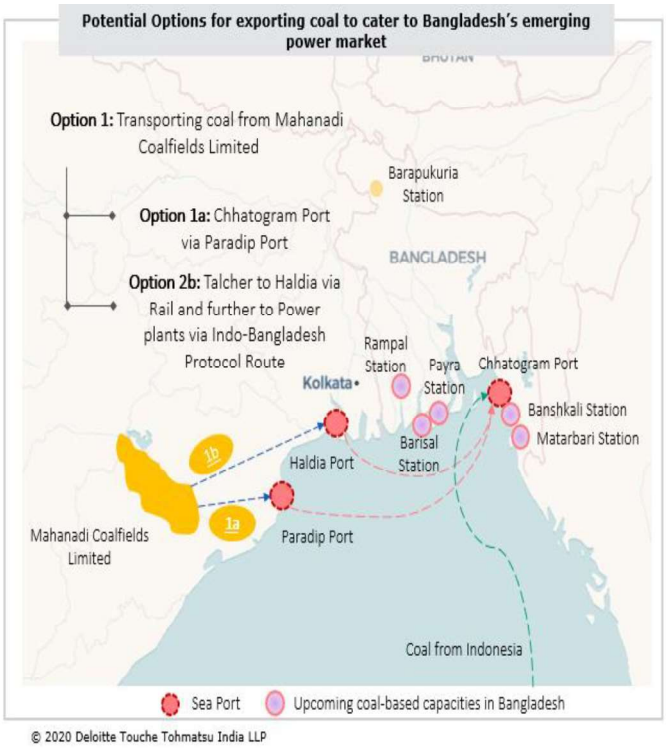


Figure 7: Potential Options for exporting coal to Bangladesh

Table 7: Tentative Landed Cost Analysis for Bangladesh Ports

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**

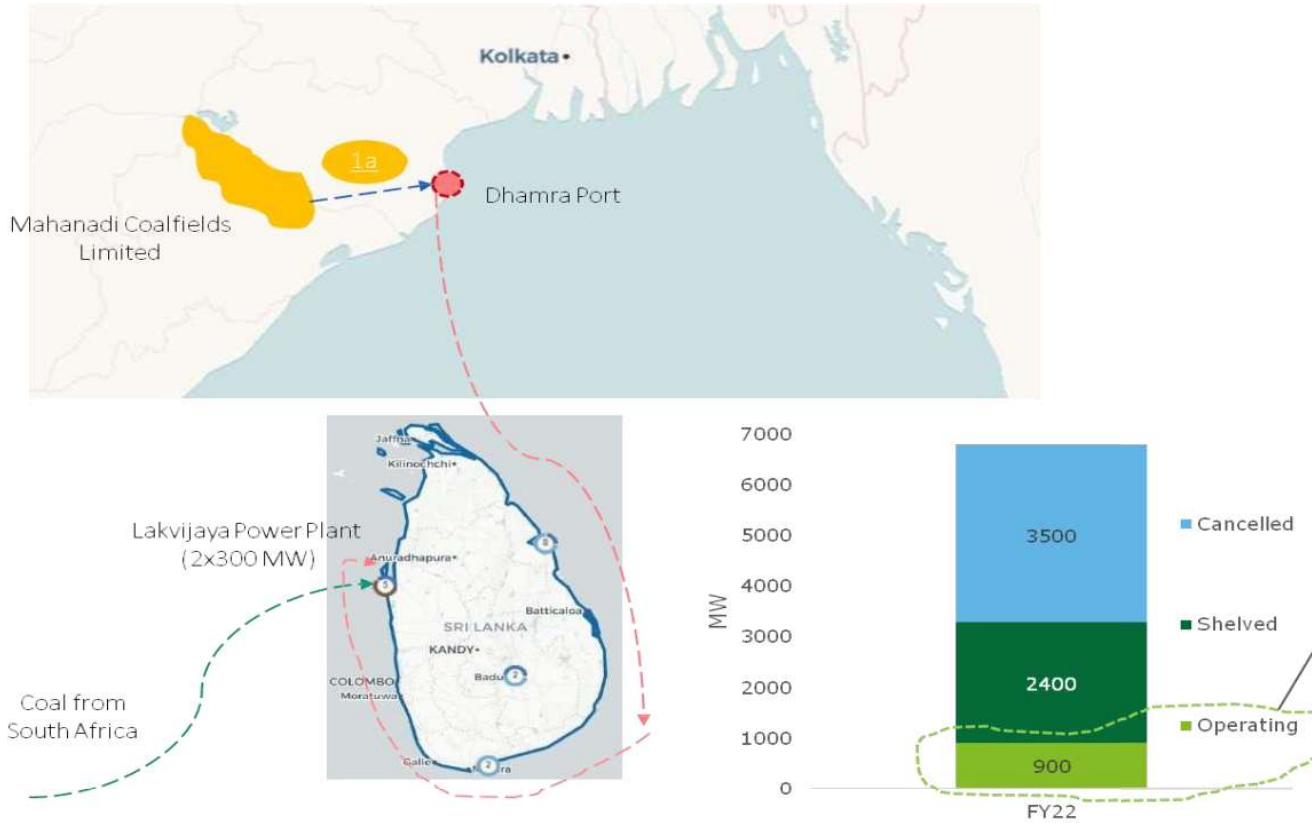
Source: M/s Deloitte

ii. Future Coal requirements of Sri-lanka for power generation

At present 900 MW of coal-based power plants are running in Sri Lanka. As it strives to have a greener energy mix in the future, about 2400 MW of coal-based projects were shelved and about 3500 MW of coal-based projects were recently terminated. Its future requirement may not be large given its pivot to RE

The Talcher coalfields have the potential to export around 4 million tonnes per annum of G-12/13 grade coal, sourced from MCL/Non-CIL Blocks to the Lakvijaya 900 MW project. To facilitate this, the MCL/Non-CIL Blocks may consider entering into a fuel supply agreement for an extended period with the Lanka Coal Company, which is in charge of providing coal to Sri Lanka's coal-fired power plants. Coal may be supplied through Damra Port to Sri-Lanka of ~4MT. Sri-Lanka is importing coal from South Africa.

Figure 8: Potential Options for Exporting Coal to Sri-Lanka

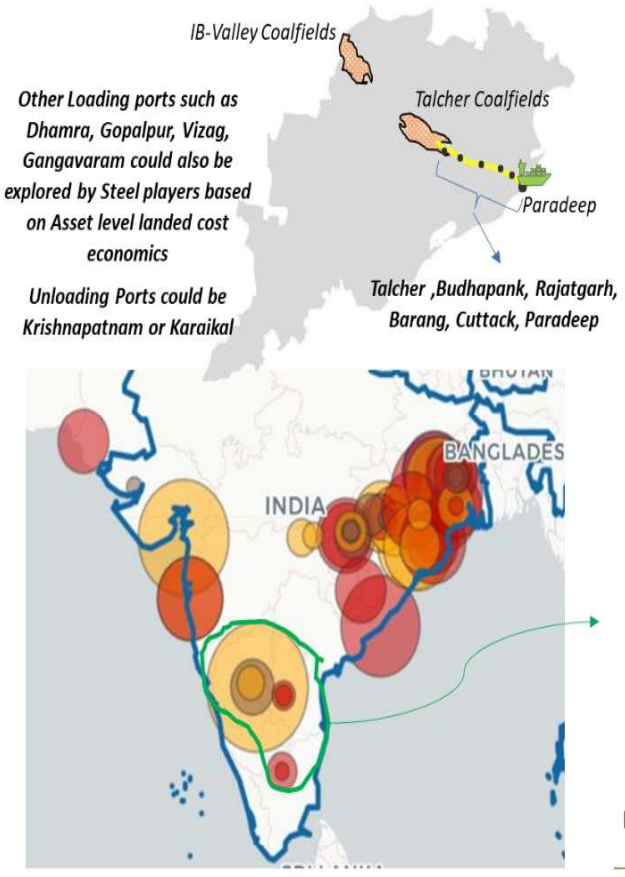


Source: CarbonBrief, Rystad Energy Research and Analysis, Coal Directory FY20, Deloitte Analysis

4.5.4 Coastal Shipping Potential for Non-Regulated Sector (NRS) in India

There is a potential steel capacity of ~24 MT in southern India covering the states of Karnataka and Tamil Nadu which may be served by coastal shipping for their coal sourcing. Estimated coal requirement for 80% capacity utilization of the steel capacities stands at ~22 MT. Considering 10 % domestic coal blending for steel making, ~1-2 MT coking coal may be supplied from BCCL/CCL via Haldia port to southern steel plants. On a similar note, the major cement clusters of Gulbarga (cement plants in Karnataka), Nalgonda (cement plants in Telangana & Andhra Pradesh) and the Tamil Nadu cluster are potential areas where coastal shipping may aid the traffic of coal from India's eastern ports.

Figure 9 Probable Coastal shipping to NRS Assets (Steel)

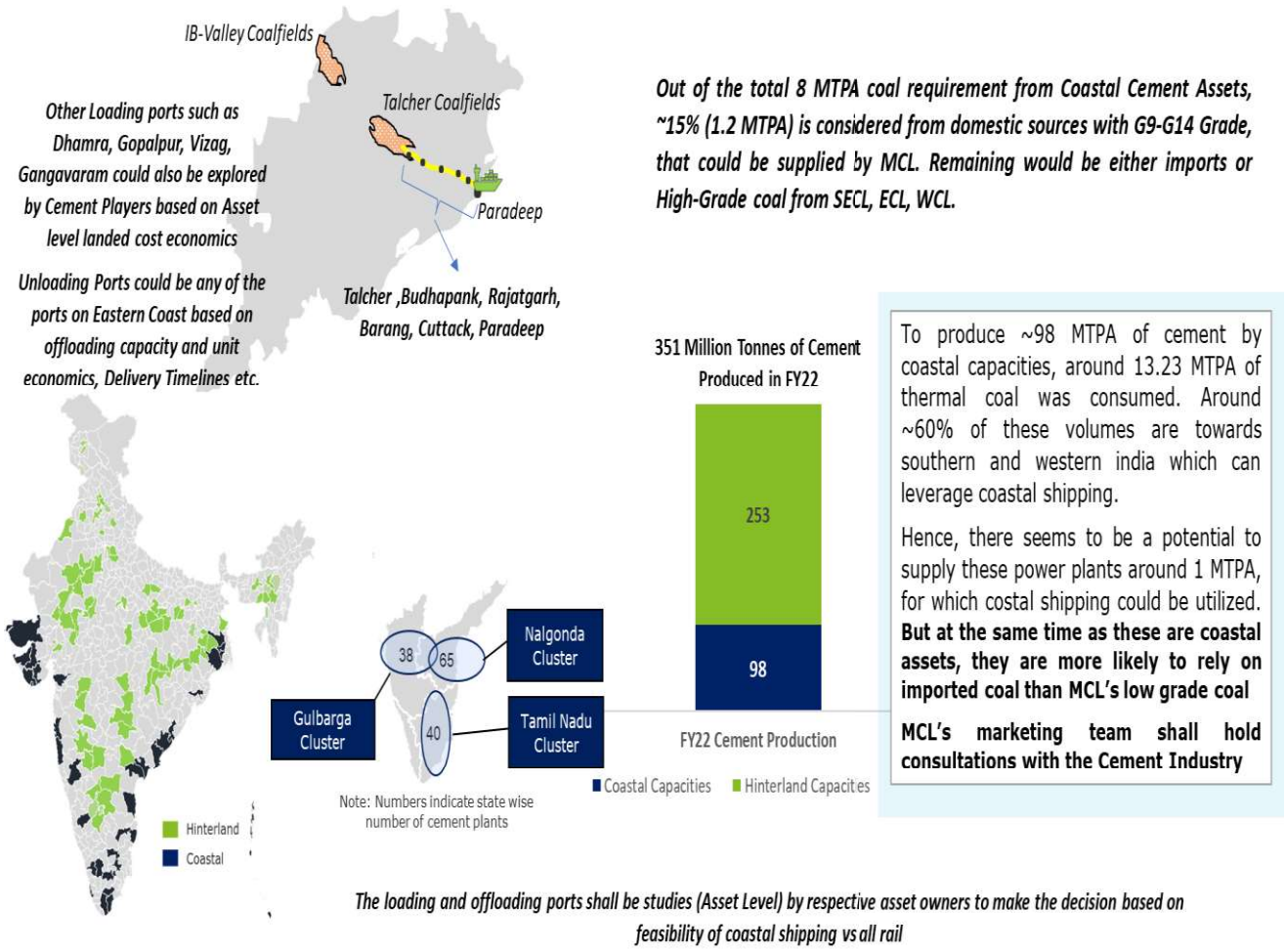


Steel Plant	Capacity (MTPA)
JSW Steel Vijaynagar	12
JSW Steel Vijaynagar BF & BOF Expansion	6.80
BMM Ispat Steel Plant	2.20
Kalyani Steels Hospet Plant	0.86
JSW Steel Salem Plant	1.03
JSW Steel Salem Plant Bf & BOF Expansion	0.23
Arjas Steel Tadipatri Plant	0.33
Arjas Steel Expansion	0.62
Total Capacity (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

Source: M/s Deloitte- Integrated Coal Evacuation Report

Figure 10 Probable Coastal shipping to NRS Assets (Cement)



Source: M/s Deloitte-Integrated Coal Evacuation Report

The projected transportation of coal through R-S-R route in FY30 is 112 MT

i. East Coast/Southern States: ~80 MT
ii. Western/northern States: ~10 MT
iii. Export of Coal to Bangladesh & Sri-Lanka: ~20 MT
iv. NRS sector in Southern India (Cement and Steel Industries): ~2-3MT

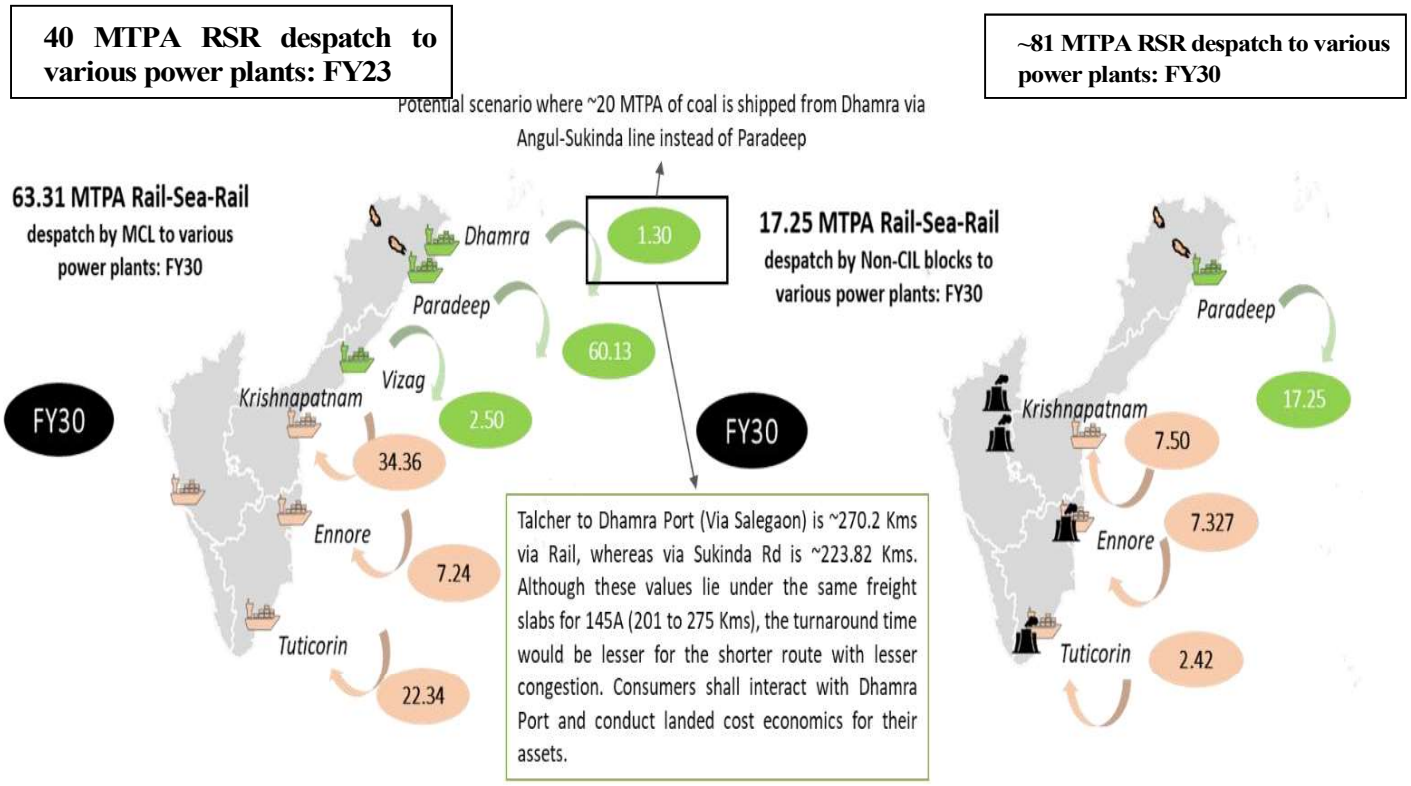
Currently, the ports that are used for coal evacuation, namely Paradeep, Dhamra, Haldia, Vizag, and Gangavaram, have a total capacity of 128.2 MT. For the increased evacuation of coal through RSR, another 5-10MT capacity in east coast ports, like Gopalpur (5 MT capacity), may also be taken into consideration. However, Paradip and Dhamra will likely emerge as important loading ports for coal in India.

4.6 Supply of Coal in FY2030 through RS/RSR route:

At present, there are 149 coal-based power plants in India (including Central/Public/Private/State) (list attached in Annexure-2) and out of them 7 Southern power Plants are taking coal ~30 MT in FY22 through Rail-Sea/Rail-Sea-Rail mode having linkage from MCL majorly and ECL as minor quantity indicated in table 3.

4.6.2 According to a report prepared by M/s Deloitte- Integrated Coal Evacuation Report it is expected to have potential of 81 MT RSR evacuation of coal in FY2030.

Figure 11: Projection of Rail Sea Rail transportation of coal



Source: M/s Deloitte

4.6.3 The estimated figure of 81.18 MT for FY2030 coal transportation via Rail-Sea/Rail-Sea-Rail includes dispatch from MCL (63.93 MT) and Non-CIL blocks (17.25 MT). Presently, only a small amount of coal is being transported from ECL/CCL via coastal routes. It would be advisable for CIL to consider exploring the possibility of transporting

coal from ECL and CCL via the coastal route through Haldia port by FY2030.However, it is noted that hinterland power plants like Rayalseema TPP having last leg transportation through rail may take coal through all rail route from SCCL/ WCL/SECL subject to strengthening of rail capacity in the route.

4.6.4 The projection of coal carried via Rail-Sea/Rail-Sea-Rail route in FY2030 for 10 Southern Power plants (7 existing and 3 New Power Plants) is indicated below in accordance with the projection provided in the Integrated Coal Evacuation plan for CIL & Non-CIL prepared by M/s Deloitte.

Table 8: Despatch projections in FY2030 through Coastal shipping

(All figures in million tonnes)

Consumer	Mode-RS/RSR (*)	Paradeep		Dhamra		Vizag		Total	
		FY22	FY30	FY22	FY30	FY22	FY30	FY22	FY30
APGENCO/ Rayalseema TPP (AP)	RSR (200km)	1.4	7.36	0	0	0	0	1.4	7.36
APGENCO-Dr Narla Tata Rao TPS ST-V	RSR (230km)	0	3.55						3.55
APPDCL-Sri Damodaran SanjeevaihTPS(AP)	RS	2.28	10.67	0	0	0	0	2.28	10.67
NTECL-VALLUR (TN)	RS	4.27	5.94	1.3	1.3	0	0	5.57	7.24
NLC-TPL(TN)	RS	2.40	4.66	0	0	0	0	2.40	4.66
KPCL (Karnataka)	RSR (350 Km)	0.23	9.13	0	0	0	0	0.23	9.13
TANGEDCO(TN)	RS	10.92	24.01	0	0	2.5	2.5	13.42	24.01
SEMB CORP ENERGY INDIA LTD (AP)	RS	4.75	11.14	0	0	0	0	4.75	11.14
Coastal Energen MUTIARA	RS	0	0.50	0	0	0	0	0.50	0.50
IL & FS TAMIL NADU POWER COMPANY	RS	0	0.41	0	0	0	0	0.41	0.41
TOTAL		**26.2**	**60.1**	**1.3**	**1.3**	**2.5**	**2.5**	**30.0**	**81.1**

Source: Deloitte -Integrated coal Evacuation Report'2023

* Distance from nearest port to power house as last mile

4.6.5 The projected demand for coal is 112 MT, with 80 MT intended for Southern Power Plants, about10 MT for Western Power Plants, ~ 20 MT for export to Bangladesh and Sri Lanka and ~2 MT for NRS sector (Cement and Steel industries) in Southern India. As shown in Table-8, the planned supply of coal through RSR is 81 MT, specifically for the Southern Power Plants. It is necessary to confirm the possibility of increasing the supply of coal from CIL/Non-CIL Blocks to meet the demand of the Southern and Western states.

4.6.6 There is a gap in the projected coal transportation through coastal shipping and demand of coal in RSR by FY2030. It is estimated that an additional 30-40 MT of coal can be evacuated via this mode with present port capacity.

4.7 Evacuation cost of transportation

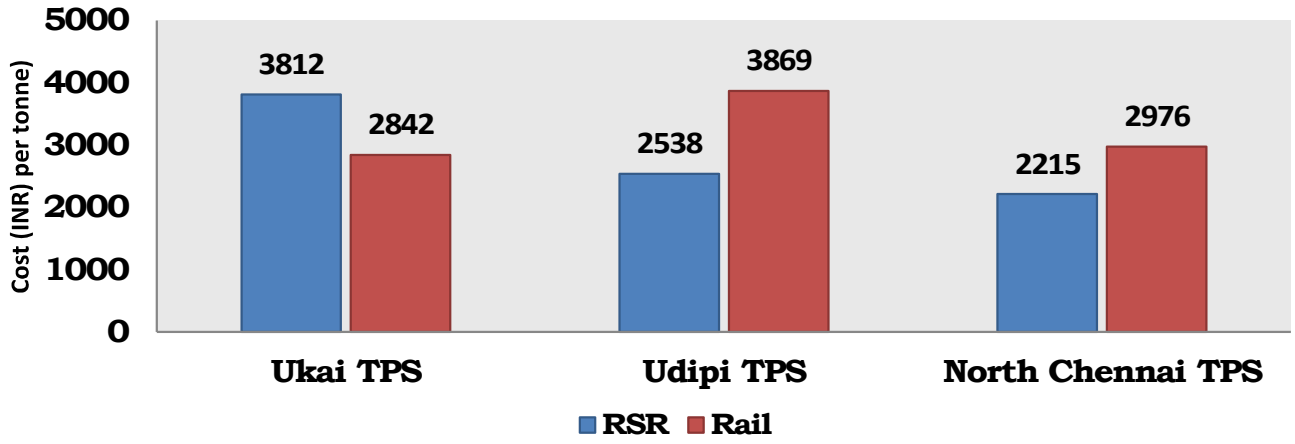
Economics are being developed for several locations to compare the cost of delivering coal in various modes, All rail, Rail-Sea/Rail-Sea-Rail, Rail cum Road.

4.7.2 The cost of transportation via the all-rail route (ARR) from Talcher to Ukai TPS (Western TPS) is approximately Rs 2,842 per ton. However, if the rail-sea-rail (RSR) option is chosen, the cost may increase to around Rs 3,812 per tonne including rail freight cost (37%), coastal shipping charges (37 %) and ports handling charges (26%).

4.7.3 If total logistics cost is considered for the linkage between Talcher (MCL) and North Chennai Thermal Power station, the rail-sea (RS) option shows a cost savings of over Rs 761 per ton compared to the all-rail route (ARR) option. RS transportation included 35% rail freight cost,29% coastal shipping charges and 36% ports handling charges.

4.7.4 The cost of transportation via the all-rail route (ARR) from Talcher to Udupi Thermal Power Plant (Southern coast TPS) is approximately Rs 3,869 per ton. However, if the rail-sea-rail (RSR) option is chosen, the cost may decrease to around Rs 2,538 per ton including rail freight cost (36%), coastal shipping charges (24%) and ports handling charges (40%).

Figure 12: Transportation cost comparisons via RSR & ARR to different TPS

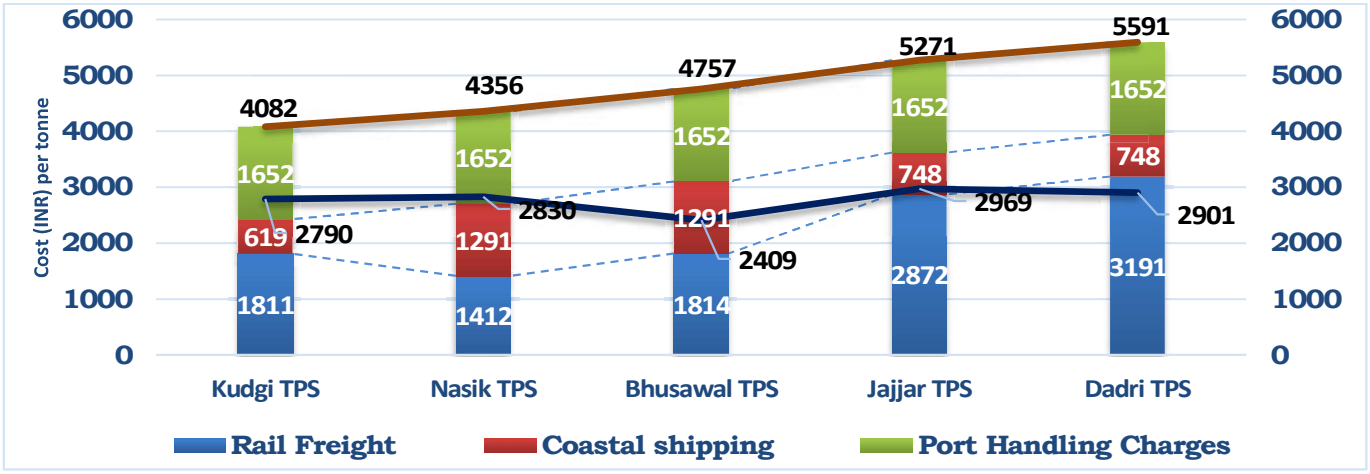


Source: MCL/Paradeep Port

4.7.5 The analysis indicates that transporting coal via RS/RSR option to the Eastern coast power houses from MCL have cost savings, but the cost is significantly higher compared to the ARR when transporting coal to the Western power houses. Annexure-3 provides a detailed breakdown of all the costs involved in the calculations for reference.

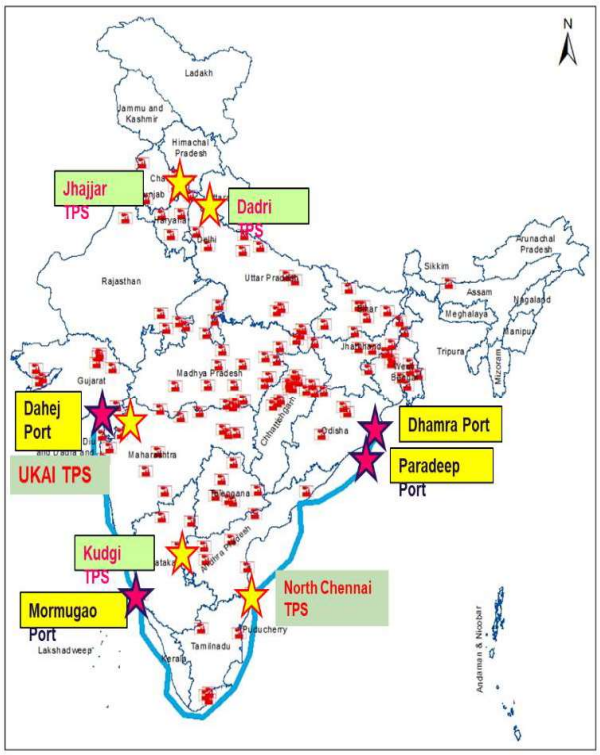
Case1. NTPC Dadri & Jajjar power plants have linkages from NCL (MP) & CCL (Jharkhand). Due to additional requirement of coal for these plants and unavailability of additional coal at CCL & NCL, NTPC has taken coal from MCL (Odisha) via Rail-Sea-Rail route via Paradeep & Dahej Ports. The projected landed cost of RSR route is higher when compared with all-rail route (ARR) option as shown below in Figure 13.

Figure 13: Transportation cost comparisons via RSR & ARR to Western/Northern TPS



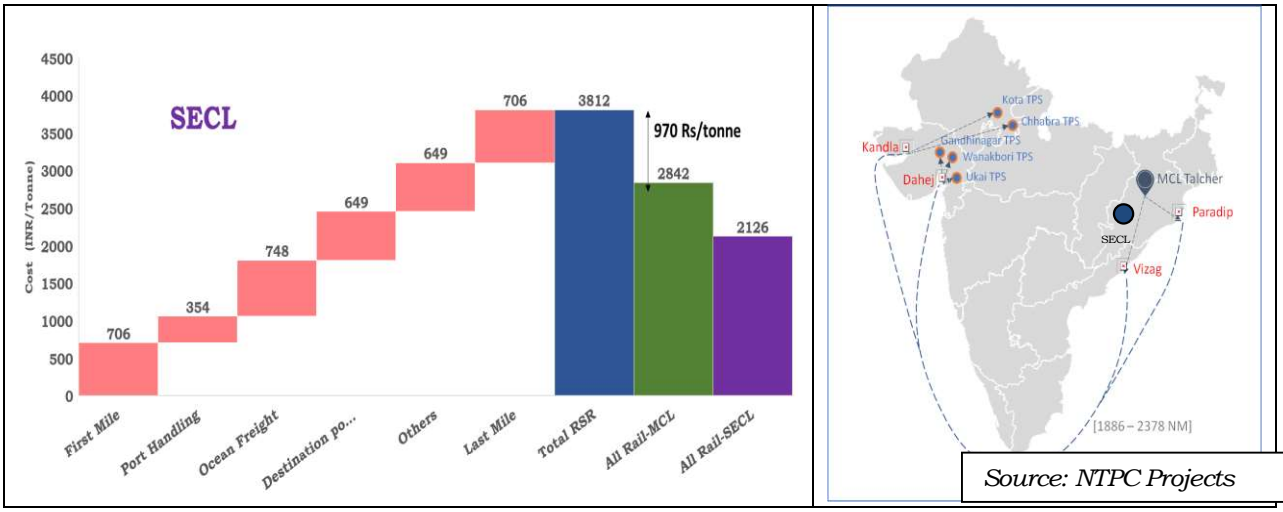
Source: NTPC Projects

4.7.6 The data presented above demonstrates that the transportation expenses associated with delivering coal from MCL to Northern/Western NTPC TPS via the RSR route are significantly higher compared to the ARR route, mainly due to the multiple handling of coal. The percentage of railway freight for transporting coal to Nasik TPS via RSR route is 32 % where as it is 57% for Dadri TPS. Shipping Cost and Port handling charges are 29% & 37 % for Nashik TPS. As a result, it is necessary to reduce shipping costs, port handling fees, and railway freight for ports to make the RSR route economically feasible.



4.7.7 The following is a detailed breakdown of the transportation costs for coal from MCL to Paradeep Port to Dahej Port to Ukai TPS, along with all rail transportation costs for MCL and SECL to Ukai TPS for comparison purposes.

Figure 14: Comparisons in transportation cost for RSR route and ARR

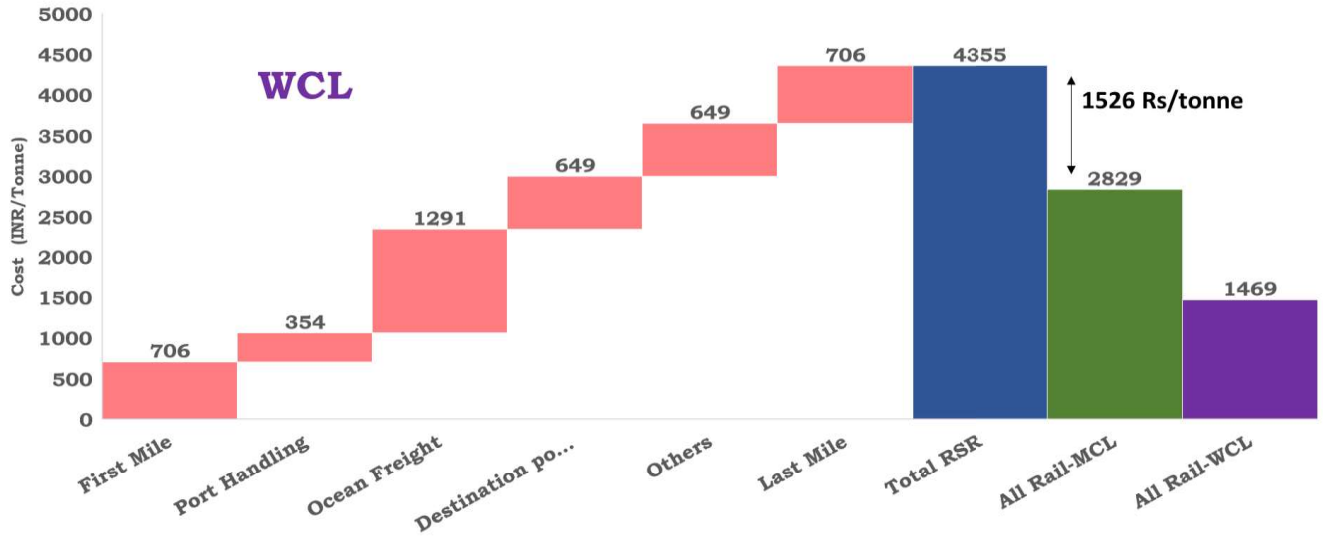


Source: NTPC Projects

Note – First Mile includes-FMC costs, Loading at Siding, other associated costs, Rail transportation from Talcher to Paradeep Port
Last Mile includes Rail Transportation Port to TPS cost.

4.7.8 The above data shows the cost of Railway Freight component as (37%) and shipping charges (37%) and ports handling charges (26%).

4.7.9 Transportation costs for coal from MCL to Paradeep Port to Dharamatar Port to Nashik TPS, along with all rail transportation costs for MCL and WCL to Nashik TPS when compared it was found that coal from WCL through ARR is cheaper and RSR route is very costly.



Source: NTPC Projects

4.7.10 According to the data presented above, the assessment of Total Landed Cost (TLC) for coastal transportation of thermal coal to power plants in Western States such as Gujarat and Maharashtra are considerably higher than the cost of transportation by railways, given the current freight charges and mine linkage situation.

4.7.11 Generally power plants located in Gujarat and Maharashtra have linkages with SECL/WCL mines due to their proximity to the power plants. To transport coal from these mines through RSR mode may not be financially feasible since SECL mines are quite far from the nearest port, which significantly increases the cost of First mile in the coastal transportation of coal to power plants. As a result, coastal movement becomes economically unviable in comparison to rail (ARR) movement. Here are the costs of the First Mile from SECL & MCL to different loading ports:

Table 9: Comparisons of first mile cost for MCL & SECL to different ports

Name of the Port	Distance b/w SECL & Port in KMs	Cost of transportation SECL to the Port in Rs/Te	Distance b/w MCL & Port in KMs	Cost of transportation MCL to the Port in Rs/Te
Paradeep	595	1310	220	655
Vizag	738	1580	577	1289
Haldia	704	1528	560	1228
Dhamra	664	1490	290	837

4.7.12 The above data shows that the transportation cost of coal from SECL to ports, ranging between Rs. 1310-1490 per tonne for 595 km - 664 km, is higher compared to transporting coal from MCL to ports, ranging between Rs. 655-1289 per tonne for 220-290 km. This difference in cost is primarily due to the freight charges. Therefore, to make SECL a viable option for transporting coal in RSR mode, freight charges need to be rationalized or coal prices have to be further reduced. A tentative illustration on cost comparison for KPCL's plants has been provided for coal sourced from Talcher region via all rail route and rail-sea-rail route options is provided below.

Figure 15: Illustrative Cost Comparison for KPCL Plants

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.

Source: M/s Deloitte Integrated coal evacuation report

4.7.13Keeping in view of above, it is felt that southern power plants are viable for RS/RSR coal transportation having first/last leg of rail up to 250 km considering present rail freight charges. Also, to promote RSR coal transportation for western power plants either railway freight is rationalized to ports, coastal shipping & handling charges are reduced. Similarly, RSR transportation of coal may not be considered if first leg/last leg of rail transportation is more than 200 km due to financial viability.

4.8 Last Mile Cost

A study conducted by MOPSW revealed that the last mile cost for the Ukai TPS plant from Dahej and Hazira Port is Rs. 700/tonne and Rs. 300/tonne, respectively. It is expected that the development of railway siding at Adani and Essar berths at Hazira Port will lead to a reduction in the last mile cost for the Ukai Thermal Power Plant by Rs. 280/tonne.

4.9 Recommendations

4.9.1 There is a need to increase coastal evacuation of coal to 112 MT by FY2030:

It makes eminent sense to enhance RSR coal evacuation in India by FY2030. The projected demand for RSR coal is 112 MT, with 80 MT intended for Southern Power Plants, about 10 MT for Western Power Plants, ~ 20 MT for export to Bangladesh and Sri Lanka and ~2 MT for NRS sector (Cement and Steel industries) in Southern India. Therefore, Railways, Ministry of Shipping and Ministry of Coal should work in tandem.

Case-1 NTPC Dadri & Jajjar power plants have linkages from NCL (MP) & CCL (Jharkhand). Due to additional requirement of coal at these plants and unavailability of additional coal at CCL & NCL, NTPC has taken coal from MCL (Odisha) via Rail-Sea-Rail route via Paradeep & Dahej Ports. The projected landed cost of RSR route is higher compared to all-rail route (ARR) option as shown at Figure 13.

Case-2 Due to sudden increase of coal demand at power houses in 2022, even after availability of coal at pit head coal mines, there was delay in supply of coal to power due to railway network congestion. To overcome this situation, railway had to cancel

many passenger trains for enhancing supply of coal. To avoid such situation when coal demand and production will increase, alternative evacuation routes like RSR needs to be planned to increase coal supply.

4.9.2 Rationalize Coal Freight Charges for RSR movement:

The cost comparisons in transportation cost for Rail-Sea/Rail-Sea-Rail route and All Rail Route to different TPSs located in Southern, Western and northern clearly indicates that coal transportation cost as –

(All figures in Rs per tonne)

Destination TPS	**Transportation cost (approx.)**	**Rail freight**	**Shipping Cost**	**Port handling charges**
East Coast TPS	2215	780 (35%)	649 (29%)	780 (35%)
Southern Coast TPS	2538	916 (36%)	619 (24%)	1003 (40%)
Western TPS	3900	1420 (36 %)	1397 (35%)	1083 (29%)
Northern TPS	5590	3190 (57 %)	1397 (25%)	1083 (18%)

The railway freight has 35-57% component in the total transportation cost through RS/RSR route in India from MCL lowest for East coast power houses followed by plants at southern coast and highest for Western and Northern power houses. Therefore, there is a need to take a relook at transportation costs for Rail-Sea-Rail (RSR) movement and make RSR transportation of coal cost viable. It is recommended that Railways may review rail freight charges from mines to ports and ports to Plants to encourage RSR movement of coal. Adopting this approach on rationalizing freight charges for RSR coal evacuation will make RSR coal transportation option viable for power plants located in the Western/northern region.

4.9.3 Rationalization & Standardization of Port Handling & transportation Charges:

As analyzed at para 4.9.2, Rail-Sea-Rail transportation cost includes 40-60% cost for coastal shipping and port handling charges at loading and unloading Ports. Also,

it has been noticed in data shown at para 4.7 that cost of transportation of coal from different ports is different. Therefore, there is a need to rationalize transportation costs for Rail-Sea-Rail (RSR) movement of coal. However, this burden cannot be taken by one agency alone. It should be shared by all agencies responsible for different components. It is recommended that Ministry of Shipping may review current shipping charges and port handling charges to promote coastal shipping. Also, Ministry of Shipping may undertake an exercise to rationalize and standardize port handling charges for all Ports to incentivize RSR movement of coal.

4.9.4 Feasibility of RSR evacuation of coal up to 250 km of first mile and last mile leg:

Given the cost economics of RSR evacuation of coal, it is recommended that southern power plants are most viable for RSR coal transportation having first/last leg of rail up to 250 km. For western power plants, either railway freight be rationalized from/to Ports or coastal shipping & handling charges be reduced otherwise RSR transportation of coal may be costlier to ARR and imported coal. It is also noted financial unviability of RSR if first leg/last leg of rail transportation is more than 200 km.

4.9.5 Multi Modal logistic Ecosystem:

Coal is handled at several points in RSR. Multiple handling of Coal increases its costs and makes it unviable at present. Handling charges of coal at mine, loading Port, unloading Port & power house varies from 10-30 % in total transportation cost. There is a need to develop Multi-Modal logistic Ecosystem options, awarding Single contract from coal mine to power plants in fixed vessels to reduce multiple handling of coal. This will reduce the need for multiple handling of coal and involve fixed vessels. Additional research is necessary to design vessels that meet the required specifications. Gencos may be invited to bid on the selection of a long-term logistics company (Bidding for end-to-end logistic service) for this Multi-Modal Logistics project. Long-term contracts will provide viability and improves investment climate to private sector for the development of integrated logistics ecosystem in India.

4.9.6 Rationalizing linkages (identified mine /area to specific TPPs):

The Ministry of Coal has a policy on rationalization of coal linkages. The linkages are reviewed on regular basis to take stock of any linkage gains. With the aim to reduce logistics cost of transportation in RS/RSR route, multimodal movement involving coastal shipping/inland waterways may be developed with rationalization of linkages from nearby coal mines to reduce distance. In certain instances, the cost of logistics could be reduced by rationalizing coal mine linkages through multimodal transportation, which involves coastal shipping and inland waterway movement.

4.9.7 Viability Gap Funding for Coastal shipping:

Cost economics projected in para 4.7 clearly indicate that while transportation cost from Talcher coalfields though RS/RSR route is cost effective for southern power houses located at coasts and up to a distance of 250 km at hinterland, but cost economics for western/northern power houses is not viable compared with All Rail Routes. However, there may be situations in future where rail may not be able to handle almost double the coal production in India by FY2030, in that case, Gencos will be left with no option but to opt for coastal shipping of coal. To reduce the present transportation cost in RSR movement of coal, Viability Gap funding option may be explored to build and enhance Ports capacity of handing coal. In this line, the Union Budget has emphasized promotion of Coastal Shipping as a cost-effective and energy-efficient mode of transportation for both passengers and freight. This will be achieved through Public-Private Partnership (PPP) with Viability Gap Funding. Budgetary support in the form of viability gap funding /subsidy may be considered for the promotion of Coastal Shipping as a energy efficient and lower cost of mode of transport.

4.9.8 Coal Transportation to NRS Sector:

At present no coal is being transported to the Non-Regulated Sector (NRS) via coastal shipping. As per projections, about 380 MT coal is the likely demand to Non-Regulated Sector by FY 2030**.** Para 4.5.4 noted that there could be possibility of

transportation of 2-3MT coal to NRS sector (Cement and Steel sectors) in Southern States by FY 2030. MCL may explore more NRS customers who are having plants at coastal areas and transport coal via coastal shipping route and de-congest the rail network in country.

4.9.9 Coastal States/ Gencos should prioritize lifting of coal through RSR route:

Coal production in India will almost double by FY2030 i.e.1.55 BT from present level of ~893 MT based on demand as projected in para 2.2. Railways has informed that they have planned rail infrastructure which will be sufficient to cater to the increased production of coal in FY2030, but keeping passenger and freight demand, it is necessary to strengthen RSR as an alternative route in the country for transportation of coal. Keeping in view the cost economics as explained in para 4.7 for RSR transportation of coal, Coastal Gencos/ States should move a certain percentage of coal through RSR/RS route and decongest the rail network in the country.

4.9.10 Concession rates of coal:

CIL may also consider to offer concessional rates to coal shipped through Ports along with MoC and MoPSW reviewing their freight tariffs and Port charges. This approach will see sea route much more attractive to the State Gencos.

Chapter 5: Railway Infrastructure for RSR Transportation

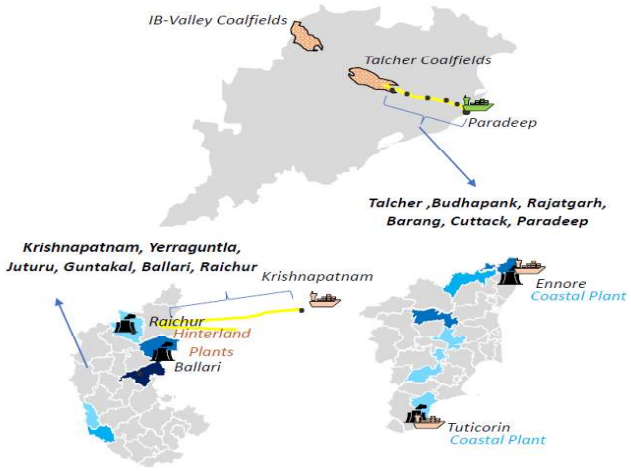
5.1 Overview

Infrastructure connecting Ports to production or consumption centers can be constrained by excessive dependency on a single mode of transportation, resulting in congestion and higher costs for the first or last mile. Development of rail infrastructure, including increase in the availability of rakes, is essential. At present, railways is supplying approximately 38-40 rakes per day to support coastal shipping of coal. However, to achieve an estimated coastal evacuation of domestic coal to the southern/western parts of the country, as well as for export to Bangladesh and Sri Lanka, this requirement is projected to increase to approximately 85-87 rakes per day.

5.2 Coal Traffic on Major Trunklines for Coastal shipping

Considering economic feasibility of coastal evacuation of coal as projected in chapter 4, it is evident that around 112 million tonnes of coal can be transported via coastal evacuation from coalfields in Odisha to the Southern/Western regions of the country, as well as for export to Bangladesh and Sri Lanka. Therefore, it is imperative to decongest the railway lines at the first mile, connecting the mines to Ports such as Paradeep, Dhamra, Gopalpur, etc., and the last mile, connecting the Ports to power plants, by FY2030.

Figure 16: First & Last Mile Rail network along Rake projections

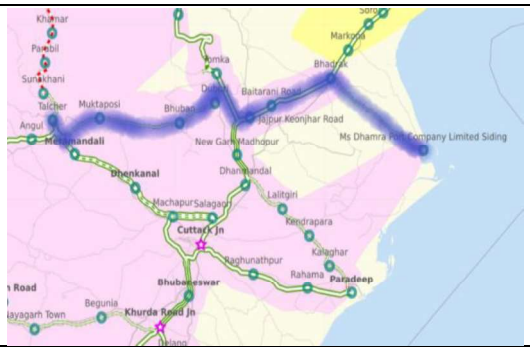


From	To	Traffic (Tonnes) 2022	Rakes / Day 2022	Traffic (Tonnes) 2030	Rakes / Day 2030
Angul	Talcher Rd	1417000	1.01	17247000	12.27
Talcher Rd	Budhapank	1417000	1.01	17247000	12.27
Budhapank	Rajatgarh	1417000	1.01	17247000	12.27
Rajatgarh	Barang	1417000	1.01	17247000	12.27
Barang	Cuttack	1417000	1.01	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

Source: M/s Deloitte -Integrated Coal Evacuation Report

5.2.2 The majority of coal is currently being transported via coastal shipping from nearby loading Ports, namely Paradeep and Dhamra, with linkages from MCL. These Ports are connected to the railways through three lines, these are (1) Cuttack-Paradeep, (2) Haridaspur-Siju line, and (3) Bhadrak-Damra siding. All these lines are linked to the Howrah-Chennai main railway line at Cuttack, Haridaspur, and Bhadrak, respectively.

Table 10: Railway Lines transporting Domestic Coal from Mines to Port

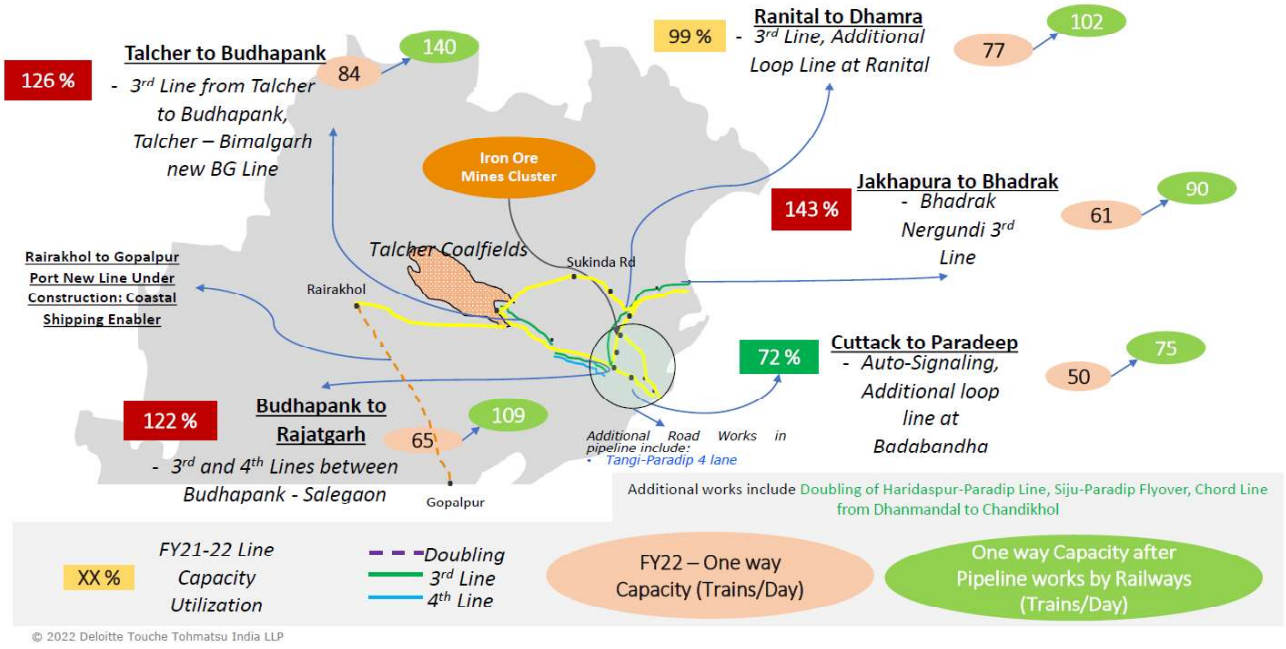
S. No	Section	No of Lines	Line Capacity Existing	% Utilization in FY22	Enroute-Map
MCL (Talcher) to Paradeep Port- 220 km, Rail Freight- Rs. 706 per tonne (BDPK-MRDL-RJGR-RQP-BRAG-CTC)					
1.	Talcher-Budhapank	Double	59	120%	
2.	Budhapank-Rajathgarh	Double	65	122%	
3.	Rajatgarh-Salegaon	Double	65	81%	
4.	Salegaon-Nergundi	Double	82	47%	
5.	Nergundi-Cuttack	Double	50	122%	
6.	Cuttack-Paradeep	Double	50	73%	
MCL (Talcher) to Paradeep Port- 233 km, Rail Freight- Rs. 706 per tonne (BDPK-MRDL-RJGR-KIS-DNM-CIKR)					
1.	Talcher-Budhapank	Double	59	120%	
2.	Budhapank-Rajathgarh	Double	65	122%	
3.	Rajatgarh-Salegaon	Double	65	81%	
4.	Salegaon-Kapilas Rd	Double	72	24%	
5.	Kapilas Road-Dhanmandal	Double	68	126%	
6.	Dhanmandal-Chandikhole Rd	Single			
6.	Chandikhole Rd-Paradeep	ingle	20	64%	
MCL (Talcher) to Damra Port- 233 km, Rail Freight- Rs. 706 per tonne (BDPK-BGPL-SKND-JJKR-BHC)					
1.	Talcher-Budhapank	Double	59	120%	
2.	Budhapank-Baghupal	Single			
3.	Baghupal-Sukinda Rd	Double	54	39	
4.	Sukinda Rd-Jajpur	Single	19	11%	
5.	Jajpur keonjhar Rd (By Pass) -Bhadrak	Double	61	143%	
6.	Bhadrak-Bhatatira	Double	43	17%	
7.	Bhatatira-Dhamra	Single	21	75%	

S. No	Section	No of Lines	Line Capacity Existing	% Utilization in FY22	Enroute-Map
MCL (Talcher) to Damra Port- 290 km, Rail Freight- Rs. 797 per tonne (BDPK-BGPL-SKND-JJKR-BHC)					
1.	Talcher-Budhapank	Double	59	120%	
2.	Budhapank-Rajathgarh	Double	65	122%	
3.	Rajatgarh-Salegaon	Double	65	81%	
4.	Salegaon-Kapilas Road	Double	72	24%	
5.	Kapilas Rd-Haridaspur	Double	68	126%	
6.	Haridaspur-Jakhapura	Triple	99	96%	
7.	Jakhapura-Bhadrak	Double	61	143%	
8.	Bhadrak-Bhatatira	Double	43	17%	
9.	Bhatatira-Damra	Single	21	75%	
MCL (Talcher) to Gopalpur Port- 288 km, Rail Freight- Rs. 797per tonne (BDPK-RJGR-BBR-KHD-GPR)					
1.	Talcher-Budhapank	Double	59	120%	
2.	Budhapank-Rajathgarh	Double	65	122%	
3.	Rajatgarh-Barang	Double	58	48%	
4.	Barang-Mancheswar	Triple	116	83%	
5.	Mancheswar-Bhubaneswar	Double	91	106%	
6.	Bhubaneswar-Khurda	Triple	103	96%	
7.	Khurda Rd-Chatrapur	Double	55	137%	
8.	Chatrapur-Gopalpur	Single			
MCL (IB-Valley) to Gangavaram Port- 595 km, Rail Freight- Rs. 1228 per tonne					
1.	Ib-Jharsuguda Rd Jn	Double	20	104%	
2.	Jharsuguda-Sambalpu	Double	49	134%	
3.	Sambalpur- Deobahal	Double	50	68%	
4.	Deobahal-Barpali	Single	25	135%	
5.	Barpali-Badmal	Double	48	70%	
6.	Badmal-Tilgarh Jn	Single	25	131%	
7.	Titlagarh Jn.-Kesinga	Double	46	118%	
8.	Kesinga-Rupra Road	Triple	60	90	
9.	Rupra-Singapur	Double	46	121%	
10.	Singapur Rd-Vizianagaram	Double	61	74%	
11.	Vizianagram-kottavalasa	Triple	110	90%	
12.	Kottavalasa Jn-Simhachalam	Triple	116	99%	
13.	Simhachalam North-Duvada (By pass)	Double	26	78%	

5.2.3 19 Colored lines indicated above are bottlenecks & congested for transporting coal from mines to Port. Capacity enhancement is required for these lines for handling coal to Ports.

5.2.4 Currently, there are some constraints from the railway side for coal movement from MCL through RSR mode. Rakes transporting coal from MCL to Paradeep Port need to cross the Cuttack rail section, which is heavily congested and can only handle 38-39 rakes a day presently. However, with the completion of Budapank-Rajatgarh 3rd and 4th line, the supply of rakes to Paradeep Port may increase. A flyover at Cuttack is needed to avoid congestion in the supply of rakes to Paradeep Port. While the Talcher -Sukhinda line may not significantly contribute to the evacuation of coal to Paradeep Port, it may facilitate Dhamra Port.

Figure 17: Enhancing Paradeep Port Connectivity from mines



5.2.5 To alleviate congestion in the transportation of coal rakes from MCL, Talcher to Paradeep Port, an alternative railway route is proposed. The existing Hardispur-Paradeep Line is currently underutilized, and the construction of a new DC Chord line, approximately 6 km in length, would provide an alternative route from Salegaon to Paradeep. This bypasses the heavily congested Cuttack station, increases the capacity of the HPRCL line, and ensures that the capacity of the Howrah-Chennai and Cuttack-Paradeep lines is not affected.

Table 11: Under construction/New Railway Lines

S. No	Name of Railway Project	Total Length (kms)	Expected TDC
1	Doubling of Sambalpur Talcher Road Line- **Eco. Railway** Additional traffic of 10 rakes per day in each way	168	Mar 23
2	Auto Signalling between Cuttack &Paradeep (83 km) **Railway Funded**	83	Oct 23
3	3rd & 4th line between Jarapada- Budapank (91 km) with flyover at Talcher**(Eco Railway)**	91	Mar 25
4	3rd & 4th line from Budapank – Salegaon via Rajatgarh (2*86 km) **Eco. Railway**	86	Mar 25
5	Balram – Jarapada – Tentuloi (54 Km) **(IRCON) SPV**	54	Dec 25
6	Talcher- Bimalgarh Line (150 KM) **(Eco. Railway)** additional 10 rakes per day projection	150	New Line
7	Outer Corridor of Talcher Coal Field from Tentuloi to Budapank	106	
8	Flyover between Siju and Paradeep Coaching Yard	7	
9	Visakhapatnam –Gopalapatnam 3rd line	7	
10	Talcher-Gopalpur	220	New Line

5.2.6 Several railway projects are currently underway in the Odisha region with the aim of enhancing coal transportation. These include the following

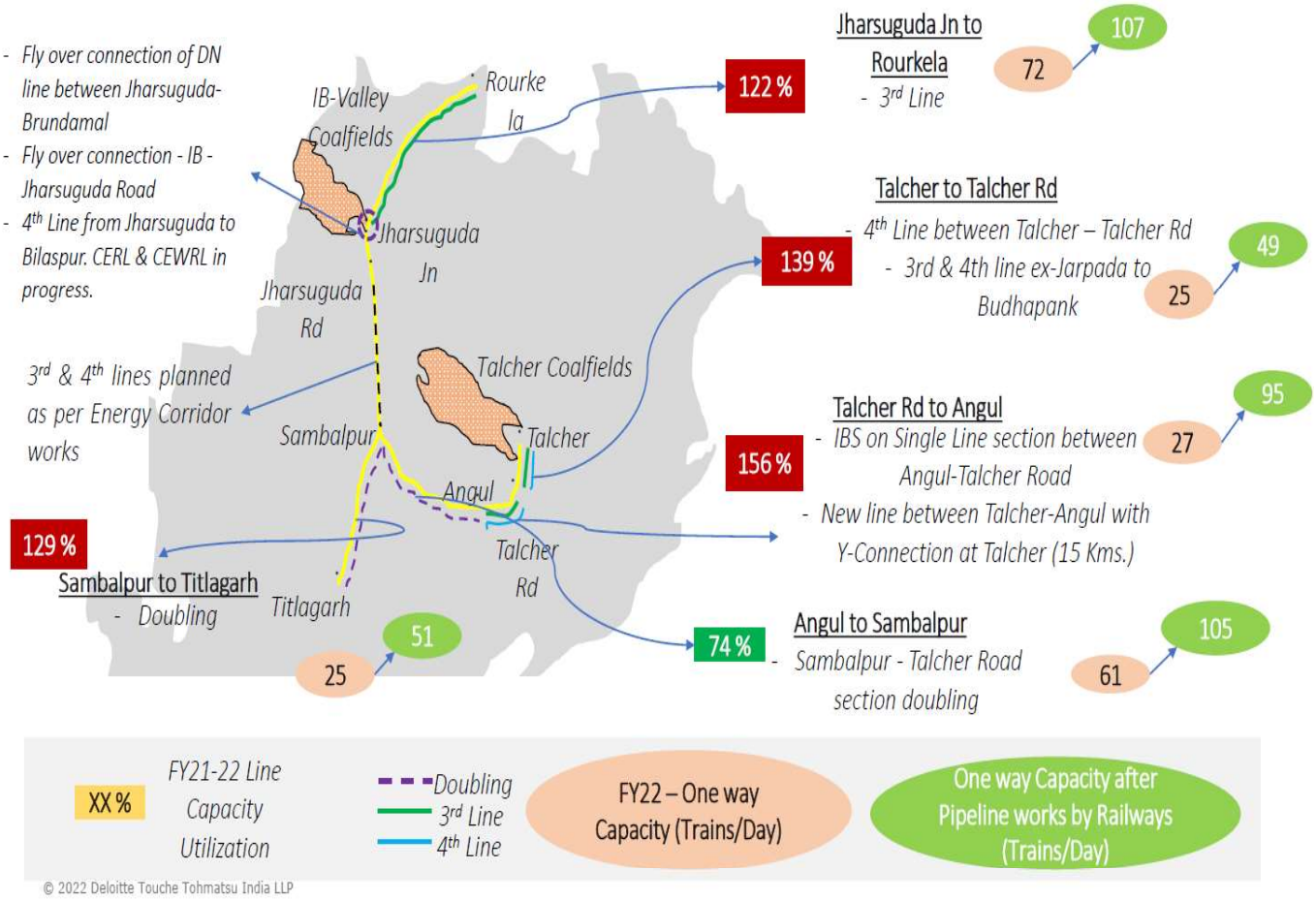
i. Expansion of the Sambalpur Talcher Road Line,
ii. Implementation of automatic signaling between Cuttack and Paradeep,
iii. Construction of 3rd & 4th lines between Jarapada-Budapank-Salegaon
iv. Construction of MCRL Ph-II the Balram-Jarapada-Tentuloi line
v. The Dhanmadal-Chandikhole chord line's construction
vi. Talcher-Gopalpur construction.

It is anticipated that all these projects will be completed by December 2025, and the completion of certain initiatives is expected to occur between March 2023 and October 2023. Completion of these projects could increase rake movement capacity by 10 rakes per day. Additionally, the Dhanmadal-Chandikhole chord line's construction will offer an alternative route for thermal coal rakes to Damra Port and prevent congested areas from being affected, while also safeguarding the capacity of other lines. Furthermore, it is crucial to ensure enough rakes for coal evacuation from MCL to Paradeep, Dhamra & Gopalpur Port.

5.2.7 Once the land acquisition process is completed and three years of work have passed, the ongoing railway projects in the MCL area, specifically the Talcher-Bimalgarh line, are expected to be completed. This 150-km line is anticipated to increase coal evacuation capacity by an additional 10 rakes per day. The ongoing projects to double the Bhadrak and Ranital lines up to Damra Port is expected to increase the capacity for coal transportation through Damra Port.

5.2.8 Railways also designed an energy corridor to expand the capacity of their infrastructure. Additionally, capacity leading to unloading Ports from plants that require a second railway leg in the transportation of coal through RSR must be improved.

Figure 18: Major Railway Works for Capacity Enhancement in the Region



5.3 Demand and Supply of rakes

At present, the railway is supplying approximately 38-40 rakes per day to Ports to support coastal shipping of coal. However, to achieve an estimated coastal evacuation of domestic coal to the southern/western parts of the country, as well as for export to Bangladesh and Sri Lanka, this requirement is projected to increase to 85-87 rakes per day. As a result, it is important for the railways to ensure adequate availability of rakes in the Odisha circuit to support RSR transportation of coal.

Table 12: 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]

5.4 Recommendations

5.4.1 Railway Infrastructure Development:

With the increased projection of coal i.e. ~112 MT to be transported through RS/RSR route in India by FY2030, Table 10 & table 11 clearly indicated the over utilized railway network connecting to mine & Ports or Ports to TPSs**.** Railways may consider investing in new/ capacity enhancement infrastructure connecting Ports to coal mines & TPSs, as indicated in Table 10 & Table 11 for RSR evacuation of coal by FY2030.

5.4.2 Availability of Rakes/Wagon Procurement:

At present, the Railway is supplying approximately 38-40 rakes per day to Ports to support coastal shipping of coal. However, to achieve an estimated coastal evacuation of domestic coal to the southern/western parts of the country, as well as for export to Bangladesh and Sri Lanka, this requirement is projected to increase to 85-87 rakes per day. As a result, it is important for the railways to ensure adequate availability of rakes in the Odisha circuit & unloading ports to TPSs to support RSR transportation of coal.

5.4.3 Telescopic benefit for RSR movement:

Transportation of coal through coastal shipping involves two legs of rail transportation, one leg from mines to loading Port by rail and another leg from unloading port to the thermal power plant. Presently, the tariff is charged by Railways as a spilt fare, which is higher than the telescopic fare for the total distance of both legs of transportation. The telescopic fare would reduce the rail transportation cost ranging from Rs.306/ton to Rs.408/ton depending upon the distance of transportation and which will also reduce the cost of generation by Rs.0.21/kWh to Rs.0.28/kWh. Breakup details given in Annexure-3

Chapter 6: Ports Infrastructure for RSR transportation

6.1 Overview

To meet the demand and to ensure efficient and timely first/last mile movement of coastal cargo in country, it is necessary to have adequate Port handling capacity, appropriate Port or inland waterway infrastructure must be put in place to support this capacity and adequate connectivity infrastructure at existing and upcoming Ports/berths

6.2 Present and Future Loading port handling capacity for coal

6.2.1 Loading Ports:

Presently, Loading Ports are having 133 MT coal handling capacity which is planned to increase to ~168 MT by F 2029-30 sufficient to handle the projected evacuation of domestic coal in India by FY 2029-30 if all the Ports are fully utilized. Many Ports like Gangavaram, Gopalpur are mechanized handling which constraints their capacity utilization. Haldia Port is utilizing capacity to handle imported coal in the country. It is to be noted that Paradeep and Damra needs to be expanded from existing capacity in case other Ports are not utilized for domestic coal handling.

Table 13: Loading Port Capacities in Fy23 & FY30

PORT	In FY2022-23	In FY2029-30
	Port Capacity for coal (MTY)	Port Capacity for coal (MTY)
PARADEEP	74.2	86
DHAMRA	7	20
VIZAG	25	35
GANGAVARAM	3	3
HALDIA	19	19
Gopalpur	5	5
TOTAL	**133.2**	**168**

6.2.2 Unloading Ports

The existing and planned capacity by FY2030 of unloading Ports for coal handling in the country is as follows:

Table 14:Loading Port Capacities in FY23 & FY30

PORT	In FY2022-23	In FY2029-30
	Port Capacity for coal (MTY)	Port Capacity for coal (MTY)
Chennai	Nil	Nil
Krishnapatnam	45.0	45.0
Ennore	26.0	44.0
Tuticorin	45.9	45.9
New Mangalore	20.5	23.3
Dahej	14.0	21.0
Jaigad, Mumbai	28.0	35.0
TOTAL	**179.4**	**214.2**

Above unloading Ports also handles imported coal along with domestic. Table indicates unloading Ports capacity existing and planned for FY30 is sufficient to handle the projected demand of RSR evacuation of coal.

6.3 Paradeep Port

Paradeep Port is one of the major Ports in the state of Odisha and is situated close to the Talcher coalfield, which is the largest coalfield in the area, at approximately 200 km. The Paradeep Port Authority (PPA) currently has a capacity of 279 million metric tonnes per annum (MMTPA), which is slated to be enhanced to 304 MMTPA by the end of FY2025.

Table 15: Average rakes handled by Paradeep Port

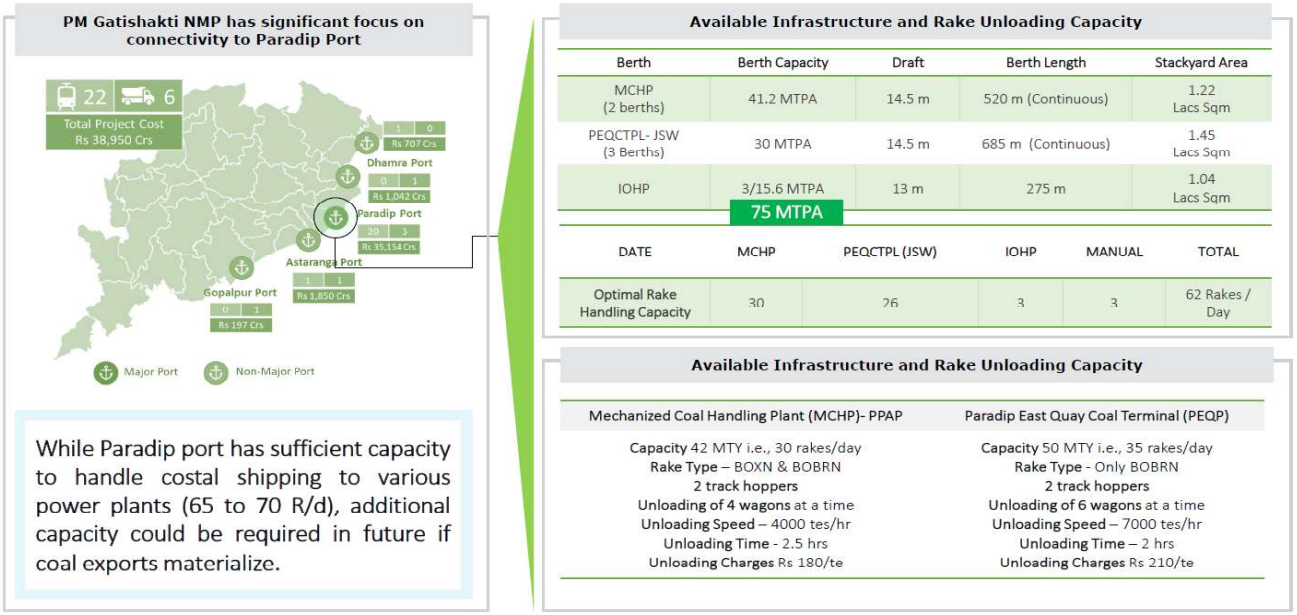
Average rakes per day

THERMAL COAL RAKES HANDLED	2020-21	2021-22	2022-23 (Q1)	2022-23 (Q2)	2022-23 (Q3)	2022-23 (Q4)
BOBRN (MCHP HOPPER + Manual)	14.07	23.19	23.85	21.14	18.43	22.03
BOBRN (PEQP)	-	3.07	6.73	7.96	9.95	12.32
BOXN (MANUAL + TIPPLER)	1.18	2.07	1.36	1.10	0.88	1.16
TOTAL	**15.25**	**28.33**	**31.94**	**30.20**	**29.26**	**35.52**

6.3.2 As mentioned above, the transportation of thermal coal at Paradip mainly involves the use of BOBRN rakes, and the total amount of coal handled has increased steadily from 15.25 rakes per day in 2020-21 to 35.52 rakes per day in 2022-23. However, it is important to note that the current maximum rake handling capacity of the Port

is 57, with MCHP handling 25 rakes per day, PEQP handling 26 rakes per day, and IOHP handling 6 rakes per day. Further information can be found in Annexure-4.

Figure 19: Coastal Coal Handling Capacity of Paradeep Port



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

6.3.3 Further, the details of Gencos wise distribution of coal quantity and rakes handled may be seen in the table given hereunder:

Table 16: GENCOs-wise Distribution for FY 22-23 (till January 2023)

GENCOS	FORECAST FOR FY 23 (MMT)	QUANTITY HANDLED (MMT)			AVERAGE RAKE HANDLED PER DAY		
		PORT	PEQP	Total	PORT	PEQP	Total
TANGEDCO	14.00	8.19	4.26	12.45	7.32	3.92	11.24
SEMBCORP	7.00	2.82	1.84	4.67	2.52	1.73	4.25
NTECL	5.00	3.25	1.21	4.47	2.99	1.21	4.21
NTPC(KUDGI)	-	0.00	0.31	0.31	0.00	0.48	0.48
APPDCL	9.90	2.85	0.53	3.38	2.52	0.41	2.92
NTPL	5.00	2.46	0.85	3.31	2.13	0.82	2.95
APGENCO	2.50	3.34	0.00	3.34	3.23	0.00	3.23
KPCL	1.50	1.83	0.00	1.83	1.53	0.00	1.53
OPG	0.00	0.12	0.00	0.12	0.09	0.00	0.09
COASTAL	0.00	0.00	0.08	0.08	0.00	0.07	0.07
SEPC	0.00	0.03	0.00	0.03	0.01	0.00	0.01
TOTAL	**44.90**	**24.89**	**9.07**	**33.96**	**22.35**	**8.63**	**30.98**

6.3.4 According to the table, there is information on the distribution of coal being handled by different GENCOS at Paradeep Port. In FY23, various GENCOS were handling around 30 rakes per day, and this number is projected to increase due to the current requirements of GENCOS and the potential gap in the demand and supply of domestic coal.

6.3.5 It has been reported that approximately 28 million metric tonnes (MT) of thermal coal was transported via Paradeep Port in FY22, with a projected increase to around 40 MT in FY23. The Paradeep Port Authority has stated that the charges for transporting coal through the port are the lowest, with the Coastal Railways charges at Rs 188 per tonne and the Vessel Related Charges at Rs 13 per tonne.

6.3.6 Paradip Port currently transports an average of 35s rakes per day, carrying coal to powerhouses, while their vessel loading capacity stands at around 2.5 Lakhs ton per day, which is equivalent to handling 62 rakes every day. By FY2030, Paradeep Port's projected requirement is between 68-71 rakes per day. If other ports are not utilized for coal handling, this requirement is likely to increase, indicating the need for Paradeep Port to increase its rakes per day handling capacity.

6.4 Dhamra Port Infrastructure

Dhamra Port, situated in Odisha state, is connected to iron ore and coal mines in Odisha through a rail link. This port is operational with five berths, including two mechanized import coal terminals, one mechanized export coal terminal, and two multi-purpose berths equipped with four harbor mobile cranes (HMCs) that can handle Cape-size and Panamax vessels. The Port has a cargo handling capacity of more than 45 MMT. Out of these five berths, three berths can accommodate and handle domestic thermal coal coastal vessels.

Figure 20: Coastal Coal Handling Capacity of Dhamra Port

S No	Berth	Capacity for Coastal Coal (MMTPA)	Remarks
1	BB3	10	Mechanized Coal Export Berth. Ship Loader Capacity - 5000 TPH

- Currently, up to **10 MMTPA** of coastal coal handling capabilities are present.
- **Complete mechanized** handling facilities for coal exports from receipt from rake till loading to vessel.
- Ample scope to further enhance capacities. EC available to handle up to **314 MMPTA** cargo.
- New export berth BB4 of **30 MMTPA** is proposed.
- No land / space constraints for port expansion as adequate land is available.

6.4.2 Dhamra Port currently operates one mechanized coal terminal equipped with a ship loader that has a capacity of 5000 TPH to handle cargo up to 13 MMTPA. Additionally, the Port has a dedicated rail corridor stretching over 62 Kms from Bhadrak to Dhamra with the capacity to handle 36 rakes per day. With firm commitments and long-term contracts in place, the existing facilities can handle at least 7-8 MMTPA of thermal coal, which is equivalent to 5-6 rakes per day.

6.4.3 Coastal coal is transported to Dhamra from Talcher's MCL mines via Cuttack. The commissioning of the Talcher-Sukinda Rail Link, scheduled to take place in the next month, will aid Dhamra by reducing the existing railway freight, bringing it at par with Paradeep. Additionally, there are plans to double the Bhadrak and Ranital to Damra Port railway links, which will enhance the Port's overall capacity to 70 MMTPA, including 20 MMTPA of coastal coal. With the implementation of these new railway links, Dhamra is expected to become a primary port for MCL Coal in addition to Paradip.

6.5 Haldia Port Infrastructure

Haldia Dock Complex (HDC) under Syama Prasad Mookerjee Port, Kolkata has been the gateway Port for the Thermal Coal cargo for power plants. It has a vast hinterland comprising the entire northeast of India including West Bengal, Bihar, Jharkhand, Uttar Pradesh, Madhya Pradesh, Assam. The Port has a mechanized coal handling plant of 4 MMT annual capacity with allied equipment viz. 2 Wagon

Tipplers, 2 Stacker- Reclaimers and two wagon loaders. A dedicated plot of around 45,000 Sq. mtrs. with storage capacity of 1.8 Lakh Tons is also available for the plant. The berth designated for loading of thermal coal in vessels can accommodate up to Panamax vessels.

6.5.2 It is worth noting that HDC is the nearest Port to the ECL and CCL collieries, resulting in a railway freight charge of approximately Rs. 800/- per MT. Additionally, sea freight from Haldia to Ports located in South India costs around $10 to $12. Thus, with an expenditure of around Rs. 1800 the cargo can be transferred from ECL/CCL to southern states. The economical handling charges at HDC coupled with the low railway freight makes HDC the ideal gateway Port for the shipment of Thermal Coal. Previously, TANGEDCO was the sole user of this facility, moving approximately 2.5 MMT to 3 MMT per annum. However, they stopped transporting their cargo through HDC since October 2020.

6.5.3 Haldia Dock Complex is currently in the process of fully mechanizing three highly productive berths, which will enable the shipment of coal. Once operationalized, it is expected that these berths will be able to handle approximately 10 MTPA of coal, and by 2030, the coal loading capacity at HDC is estimated to reach around 15 MTPA. HDC would be a preferred port for transporting coal from ECL/CCL to the southern and western parts of India.

6.6 Gopalpur Port

The Gopalpur Port, located in Odisha, commenced its operations in FY2013 and handled 8.13 MTPA capacity and planned to increase capacity by 5MTPA in next 5 years. However, the development of NH-5 is required to improve connectivity between the Port and coal mines. Gopalpur Port has 3 Berths of 800 m Quay Length. The port has limited loading rate due to presence of only 3 Mobile Harbour Cranes (3 MHCs). However, only 512 acres of land had been acquired in Phase-I and further Port expansion is also limited as it is bounded by IREL. Full scale mechanization through Material Handling System (MHS) will require minimum area of 250 acres which is not available. Thus, large scale ramp up of coastal coal cannot be envisaged under current situation.

Figure 21:Coastal Coal Handling Capacity of Gopalpur Port

S No	Berth	Capacity for Coastal Coal (MM TPA)	Remarks
1	B1, B2 & B3	5	3 Berths of 800 m Quay Length. Only 3 MHCs. Hence, can load only one coastal coal vessel at a time. Capacity considered accordingly.

- Currently, only **5 MMTPA** of coastal coal handling capacity.
- **No mechanized** handling facilities for coal exports.
- **Only 3 MHCs** – Limited loading rate. All three cannot be deployed if simultaneous gearless vessels are berthed.
- EC available for maximum **20 MMTPA** of cargo handling.

- Only **512 acres** of land acquired in Ph-I. Port expansion is also limited as it is bounded by IREL.
- Full scale mechanization through MHS will require minimum area of 250 acres which is not available. Thus, large scale ramp up of coastal coal cannot be envisaged.

To evacuate coal from Gopalpur Port, it is important for railway to construct Talcher to Gopalpur Rail line on priority as indicated in table-11.

6.7 Gangavaram Port

Gangavaram Port located in Visakhapatnam, Andhra Pradesh has deep sea of up to 15 m draft at Berth no 2/3/8 for coastal coal loading. Port has Manual unloading of rakes at dedicated sidings and it can unload up to **5 rakes/day.** Loading through Mobile Harbour Cranes; can offer **productivity of 20,000 TPD** for loading the vessel. Port is currently serving TANGEDCO coastal coal from IB Valley. Port has peaked at **88 rakes** from TANGEDCO in April 2023.

6.7.2 Additionally, for making evacuation of coal feasible via coastal shipping (Jharsuguda to eastern Ports) from Ib-valley, it is proposed that Indian Railways should evaluate provision of freight concessions for RSR traffic to achieve freight parity. Currently, only less than 5 million tonnes of coal is being transported to Ports other than Paradeep (~30 MT in FY22). As these shipments usually have ~ INR 400 / Tonne more transportation cost as compared to Talcher-Paradeep route, Indian Railways should evaluate freight concessions to those eastern Ports to achieve freight parity.

6.8 Rake handling at unloading Ports

To ensure smooth movement of coal through RSR, it is essential to have adequate unloading capacity at the destination Ports. Unfortunately, some power plants are facing unloading issues at Ports. For instance, Andhra Pradesh has reported a waiting period of 5-6 days for each vessel at Krishnapatnam Port area. Therefore, it is recommended that the unloading infrastructure at various Ports, including Krishnapatnam, Ennore, Kandla, and Goa, be augmented to avoid congestion at the unloading Ports and facilitate handling of more coal.

6.8.2 At present, Paradeep Port has five dedicated mechanized coastal berths that have a combined capacity of 71.2 MTPA for the shipment of coastal coal to Southern and Western Ports. Similarly, it is essential to have an adequate number of dedicated coastal coal berths with a commensurate capacity at the destination Ports to prevent the detention of coastal coal vessels at the destination Ports.

6.8.3 In the fiscal year 2023, Paradeep Port Authority (PPA) has transported approximately 40 million metric tons of thermal coal to Ports in southern India, such as Ennore, Krishnapatnam, and Tuticorin. PPA's current berths are capable of handling Cape size vessels with a draft of 14.50-15 meters. To accommodate larger Cape size vessels at the unloading Port, dredging operations may be conducted at the destination Ports to increase the draft. Dhamra Port has the capability to handle Cape size vessels with a draft of 17.2 meters, but its facilities are currently underutilized as power plants prefer PPA due to lower sea freight charges.

6.9 New Ports Planned

The Indian government aims to revamp the country's Ports and lower logistics expenses for both domestic and import/export shipments by optimizing infrastructure investment through the ambitious Sagar Mala project. Several new Ports have been planned under the Sagarmala initiative. It is important to explore opportunities to transport thermal coal from these new Ports to consumers.

In order to prevent connectivity issues with the new Ports, it is necessary for railways to align their connectivity plans with the development plans of these Ports.

6.10 Ports Issues

6.10.1 High Repositioning Costs of Empty Domestic Containers:

Most coastal shipping routes presently have scarcity of return cargo, which necessitates the repositioning of empty containers back to their point of origin (either the loading Port or, in the worst-case scenario, the cargo's original location) for the subsequent shipment. The expense of relocating empty containers is then included in the overall logistics cost incurred by the cargo owner, increasing the total cost of the movement.

6.10.2 Handling of Cap-sized vessel:

At present, Panamax vessels are being employed to transport coal to the southern Port. To enhance coal transportation, the unloading Port infrastructure needs to be developed to accommodate Cap-size vessels.

6.11 Recommendations

6.11.1 Long term shipping contract to deploy adequate vessels in coastal circuits:

Analyzing Port infrastructure, it has been noted that unloading Ports like Tuticorin, Ennore Ports may not be adequate to handle large no. of vessels at a time due to which vessel turn-around time increases. It is recommended that coastal States/Gencos may engage long term shipping contract of lifting coal to give confidence to shipping industry and Ports to deploy adequate vessels in coastal circuit, thereby reducing vessel turnaround time. This would help to expedite the evacuation of coal from loading Ports. Long-term contract will enable Ports to enhance Port capacity based on the demand.

6.11.2 Dedicated Coal berths at destination Ports:

Most coastal shipping routes presently have scarcity of return cargo, which necessitates repositioning of empty containers back to their point of origin (either the loading Port or, in the worst-case scenario, the cargo's original location) for the

subsequent shipment. The expenses of relocating empty containers is then included in the overall logistics cost incurred by the cargo owner, increasing the total cost of the movement. If dedicated coastal coal berths at destination Ports are created to avoid detention of coastal coal vessels, this will reduce the turn-around time and cost in RSR evacuation of coal.

6.11.3 New Ports for Coal transportation:

The Indian government aims to revamp the country's Ports and lower logistics expenses for both domestic and import/export shipments by optimizing infrastructure investment through the ambitious Sagar Mala project. Several new Ports have been planned under the Sagarmala initiative. It is important to explore opportunities to transport thermal coal from these new Ports to consumers. In order to prevent connectivity issues with the new Ports, it is necessary for railways to align their connectivity plans with the development plans of these Ports. It is recommended that New Ports planned may look for an opportunity to transport thermal coal in the country. Also, connectivity to new Ports from coal mines to Port may be considered by railways.

6.11.4 Mechanized handling at Loading and unloading Ports:

At present, many loading Ports like Gopalpur, Gangavaram and unloading Ports are having manual handling of coal. This will restrict the utilization of port capacity. It is recommended that all the loading and unloading Ports may consider development of mechanized handling of coal for full utilization of port capacity. Ministry of Shipping may monitor the development of mechanized infrastructure for coal at Ports.

6.11.5 Ministry of Shipping may undertake a review of infrastructure available at Ports and required FY30 in all loading and unloading Ports for taking required actions.

6.11.6 Paradip and Damra are well connected with Railway infrastructure, distance, coalfields and ideally located to emerge as the leading coal Ports in the country. They need to create required capacity to handle the projected growth.

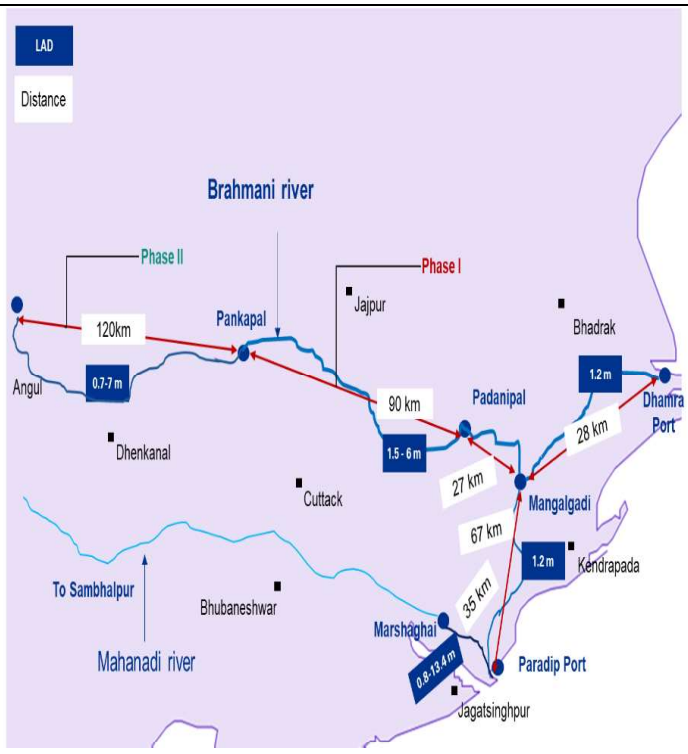
Chapter 7: Inland Waterways

7.1 Inland Waterways handling of Coal

From 2015-16 to 2021-22, the cargo transported by inland waterways has increased from 41 MMTPA to 109 MMTPA, representing a growth of 2.7 times. Water transport is considered to be the most carbon-efficient mode of transportation in the world, with significantly lower carbon footprint compared to road or rail transport. On a per metric ton of cargo basis, a large container vessel emits only half the carbon dioxide of rail transport and just one-sixth of that of road transport, thereby playing a crucial role in reducing carbon emissions and pollution on the mainland. Consequently, a seamless multimodal connectivity with the inland waterways will provide a cost-effective logistics solution.

Coal transportation exists on NW-1, NW-2, NW-97 (IBP route), Gujarat waterways (import), Maharashtra waterways (import) and Goa Waterways (export). There is potential for coal movement in NW-5 (Odisha) apart from above NWs. Current coal movement in Inland Waterways is 35.19 million tons during FY 2022-23. The future coal movement is expected to be 55 million tons by FY 2030.

Figure 22: NW-5 & NW-64 connecting mine and Ports



National Waterways 5 (NW-5) runs through the states of Odisha along Bhramani River. The main rational for NW5 is its proximity to the Talcher-Paradeep region, which is abundant in resources and provides opportunities for evacuation of coal as well as other commodities like Iron ore, limestone and coke.

The waterways has the potential of 16 MTPA using a conventional system, it can be enhanced if barge trains are used.

The estimated cost of the development of NW-5 from Talcher to Paradeep & Damra is nearly Rs 15000 crores including terminal development cost of Rs 900 crores.

Source: Ministry of Port, Shipping and Waterways, IWAI

7.1.2 Based on the single barge configuration of 16 MTPA with a draught of 2.5 meters over 55-60 km with five navigational locks and three barge terminals. The yield is estimated return of 13% to the IWAI as the developer, whereas barge operators would earn 18%

7.1.3 The availability of the National Waterways-5 (which includes the Brahmani delta, Melta river & East Coast Canal (ECC) of 332 km length) connecting the Talcher area with Paradeep Port and Dhamra Port creates the possibility of carrying coal in suitable barges from Talcher and for onward dispatch to the power plants mentioned earlier.

7.1.4 The Brahmani River basin extends across Jharkhand, Odisha, and Madhya Pradesh, providing potential areas for transporting coal. In March 2010, the Inland Waterways Authority of India (IWAI) prepared a Detailed Project Report for the National Waterway-5, which includes the East Coast Canal and Brahmani/Kharsua River system, with a total length of 332 km, divided into two stretches.

Stretch -I: Paradeep/Damra to Pankhapal:	212 km
Stretch II: Pankhapal to Talcher:	120 km
Total:	332 km

7.1.5 The development of the 332 km stretches of National Waterway-5 (NW-5) connecting Paradeep/Dhamra and Talcher was proposed through the DBFOT (Design-Build-Finance-Operate-Transfer) model in two phases. The terminal infrastructure would include berths, cargo handling equipment, storage areas, and terminal buildings. The project for operationalization of NW-5 and NW-64 would also involve the development and maintenance of the fairway, dredging, navigational aids, and related works along the identified stretches.

7.1.6 Development period for NW-5 after formation of SPV will depend on funding agencies, tendering and finalization of bids on PPP mode. The period of development is expected to be about 5 years. NW-5 is expected to be completed by FY2030.

7.1.7 The transportation of coal by barges depends upon the fairway. At present the barge size of 500 ton is suitable and in future it is expected that total capacity may be enhanced to 2000 ton (approx.).

7.1.8 There are four power plants located in Angul, Dhenkanal, and Talcher regions of Odisha, in proximity to the river Brahmani-NW-5. These power plants have a total installed capacity of around 10 GW and consume more than 30 MT of coal. All these power plants have linkages with MCL. The list of power plants is attached in Annexure-5. These power plants may take coal through inland waterways.

7.1.9 Using the convention system of waterways, capacity of NW-5 is limited to ~16 MTPA (including for thermal coal, coking coal & iron ore) until the barge trains being used to transport. The expected quantity of thermal coal to be handle through NW5 by FY2030 can be consider ~8 MT.

7.1.10 The revenue to the developer- would consists of a usage fee, vessel berthing fee and cargo handling fees at each terminal. For barge operators this revenue will be operating cost. The cost for transportation of coal via inland waterways is 1.06 Rs per tonne. However, cost comparison for inland waterways and rail route needs to be done for better decision.

7.2 Recommendations

7.2.1 Development of NW-5 through SPV

Coastal shipping has a great potential and MoPSW has taken the initiative to develop Inland Waterways NW-5 on Brahmani River for cargo transportation. While Transporting Coal through RS/RSR route it involves connectivity from mine to Port as first leg via rail. Inland Waterways through NW-5 on Brahmani River from Talcher coalfield connecting Paradeep & Damra Port is proposed for first leg transportation of cost in cost effective manner. NW-5 is proposed to be developed by FY 2030 through SPV. An SPV has been decided to be formed with the participation of the Ministry of Coal/Coal India Limited, Ministry of Ports, Shipping and Waterways/Inland Waterways Authority of India, Ministry of Power, State Government, and willing Gencos. Attached in Annexure 4 is a concept note for SPV establishment. It is recommended that Ministry of Shipping is requested to operationalize the SPV within 6 months to expedite completion of NW-5 by FY2028. Transportation of coal though Inland waterways will reduce port handing charges.

7.2.2 Ministry of Shipping may also consider to provide financial viability funding upfront to IWAI to take up development of Brahamini river for coal transportation to promote greener transportation of coal and incentivise use of inland waterways in the country.

Chapter 8: Recommendations & Implementation Roadmap

A summary of recommendations of Inter-Ministerial Committee report constituted to prepare long term plan for transportation of coal through coastal shipping are provided below:

1. There is need to increase Rail-sea/Rail-sea-Rail evacuation of coal to 112 MT by FY2030:

It makes eminent sense to enhance RSR coal evacuation in India by FY2030. The projected demand for RSR coal is 112 MT, with 80 MT intended for Southern Power Plants, about 10 MT for Western Power Plants, ~ 20 MT for export to Bangladesh and Sri Lanka and ~2 MT for NRS sector (Cement and Steel industries) in Southern India. Therefore, Railways, Ministry of Shipping and Ministry of Coal should work in tandem.

Case-1 NTPC Dadri & Jajjar power plants have linkages from NCL (MP) & CCL (Jharkhand). Due to additional requirement of coal at these plants and unavailability of additional coal at CCL & NCL, NTPC has taken coal from MCL (Odisha) via Rail-Sea-Rail route via Paradeep &Dahej Ports. The projected landed cost of RSR route is higher compared to all-rail route (ARR) option as shown at Figure 13.

Case-2 Due to sudden increase of coal demand at power houses in 2022, even after availability of coal at pit head coal mines, there was delay in supply of coal to power due to railway network congestion. To overcome this situation, railway had to cancel many passenger trains for enhancing supply of coal. To avoid such situation when coal demand and production will increase, alternative evacuation routes like RSR needs to be planned to increase coal supply.

2. Rationalize Coal Freight Charges for RSR movement:

The cost comparisons in transportation cost for Rail-Sea/Rail-Sea-Rail route and All Rail Route to different TPSs located in Southern, Western and northern clearly indicates that coal transportation cost as –

(All figures in Rs per tonne)

Destination TPS	Transportation cost (approx.)	Rail freight	Shipping Cost	Port handling charges
East Coast TPS	2215	780 (35%)	649 (29%)	780 (35%)
Southern Coast TPS	2538	916 (36%)	619 (24%)	1003 (40%)
Western TPS	3900	1420 (36 %)	1397 (35%)	1083 (29%)
Northern TPS	5590	3190 (57 %)	1397 (25%)	1083 (18%)

The railway freight has 35-57% component in the total transportation cost through RS/RSR route in India from MCL lowest for East coast power houses followed by plants at southern coast and highest for Western and Northern power houses. Therefore, there is a need to take a relook at transportation costs for Rail-Sea-Rail (RSR) movement and make RSR transportation of coal cost viable. It is recommended that Railways may review rail freight charges from mines to ports and ports to Plants to encourage RSR movement of coal. Adopting this approach on rationalizing freight charges for RSR coal evacuation will make RSR coal transportation option viable for power plants located in the Western/northern region.

3. Rationalization & Standardization of Port Handling & transportation Charges:

As analyzed at para 4.9.2, Rail-Sea-Rail transportation cost includes 40-60% cost for coastal shipping and port handling charges at loading and unloading ports. Also, it has been noticed in data shown at para 4.7 that cost of transportation of coal from different ports is different. Therefore, there is a need to rationalize transportation costs for Rail-Sea-Rail (RSR) movement of coal. However, this burden cannot be taken by one agency alone. It should be shared by all agencies responsible for different components. It is recommended that Ministry of Shipping may review current shipping charges and port handling charges to promote coastal shipping. Also, Ministry of Shipping may undertake an exercise to rationalize and standardize port handling charges for all ports to incentivize RSR movement of coal.

4. Feasibility of RSR evacuation of coal up to 250 km of first mile and last mile leg:

Given the cost economics of RSR evacuation of coal, it is recommended that southern power plants are most viable for RSR coal transportation having first/last leg of rail up to 250 km. For western power plants, either railway freight be rationalized from/to Ports or coastal shipping & handling charges be reduced otherwise RSR transportation of coal may be costlier to ARR and imported coal. It is also noted financial unviability of RSR if first leg/last leg of rail transportation is more than 200 km.

5. Multi Modal logistic Ecosystem:

Coal is handled at several points in RSR. Multiple handling of Coal while transporting in RSR mode increases its costs and makes it unviable at present. Handling charges of coal at mine, loading Port, unloading Port & power house varies from 10-30 % in total transportation cost. There is a need to develop Multi-Modal logistic Ecosystem options, awarding Single contract from coal mine to power plants in fixed vessels to reduce multiple handling of coal. This will reduce the need for multiple handling of coal and involve fixed vessels. Additional research is necessary to design vessels that meet the required specifications. Gencos may be invited to bid on the selection of a long-term logistics company (Bidding for end-to-end logistic service) for this Multi-Modal Logistics project. Long-term contracts will provide viability and improves investment climate to private sector for the development of integrated logistics ecosystem in India.

6. Rationalizing linkages (identified mine /area to specific TPPs:

The Ministry of Coal has a policy on rationalization of coal linkages. The linkages are reviewed on regular basis to take stock of any linkage gains. With the aim to reduce logistics cost of transportation in RS/RSR route, multimodal movement involving coastal shipping/inland waterways may be developed with rationalization of linkages from nearby coal mines to reduce distance. In certain instances, the cost of logistics could be reduced by rationalizing coal mine linkages through multimodal transportation, which involves coastal shipping and inland waterway movement.

7. Viability Gap Funding for Coastal shipping:

Cost economics projected in para 4.7 clearly indicate that while transportation cost from Talcher coalfields though RS/RSR route is cost effective for southern power houses located at coasts and up to a distance of 250 km at hinterland, but cost economics for western/northern power houses is not viable compared with All Rail Routes. However, there may be situations in future where rail may not be able to handle almost double the coal production in India by FY2030, in that case, Gencos will be left with no option but to opt for coastal shipping of coal. To reduce the present transportation cost in RSR movement of coal, Viability Gap funding option may be explored to build and enhance Ports capacity of handing coal. In this line, the Union Budget has emphasized promotion of Coastal Shipping as a cost-effective and energy-efficient mode of transportation for both passengers and freight. This will be achieved through Public-Private Partnership (PPP) with Viability Gap Funding. Budgetary support in the form of viability gap funding /subsidy may be considered for the promotion of Coastal Shipping as a energy efficient and lower cost of mode of transport.

8. Coal Transportation to NRS Sector:

At present no coal is being transported to the Non-Regulated Sector (NRS) via coastal shipping. As per projections, about 380 MT coal is the likely demand to Non-Regulated Sector by FY 2030**.** Para 4.5.4 noted that there could be possibility of transportation of 2-3MT coal to NRS sector (Cement and steel sector) in Southern States by FY 2030. MCL may explore more NRS customers who are having plants at coastal areas and transport coal via coastal shipping route and de-congest the rail network in country.

9. Coastal States/ Gencos should prioritize lifting of coal through RSR route:

Coal production in India will almost double by FY2030 i.e.1.55 BT from present level of ~893 MT based on demand as projected in para 2.2. Railways has informed that they have planned rail infrastructure which will be sufficient to cater to the increased production of coal in FY2030, but keeping passenger and freight demand, it is necessary to strengthen RSR as an alternative route in the country for

production of coal in FY2030. Keeping in view the cost economics as explained in para 4.7 for RSR transportation of coal, Coastal Gencos/ States should move a certain percentage of coal through RSR/RS route and decongest the rail network in the country.

10. Concession rates of coal

CIL may also consider to offer concessional rates to coal shipped through Ports along with MoC and MoPSW reviewing their freight tariffs and port charges. This approach will see sea route much more attractive to the State Gencos.

11. Railway Infrastructure Development:

With the increased projection of coal i.e. ~112 MT to be transported through RS/RSR route in India by FY2030, Table 10 & table 11 clearly indicated the over utilized railway network connecting to mine & Ports or Ports to TPSs**.** Railways may consider investing in new/ capacity enhancement infrastructure connecting Ports to coal mines & TPSs, as indicated in Table 10 & Table 11 for RSR evacuation of coal by FY2030.

12. Availability of Rakes/Wagon Procurement:

At present, the Railway is supplying approximately 38-40 rakes per day to support coastal shipping of coal. However, to achieve an estimated coastal evacuation of domestic coal to the southern/western parts of the country, as well as for export to Bangladesh and Sri Lanka, this requirement is projected to increase to 85-87 rakes per day. As a result, it is important for the railways to ensure adequate availability of rakes in the Odisha circuit & unloading Ports to TPSs to support RSR transportation of coal.

13. Telescopic benefit for RSR movement:

Transportation of coal through coastal shipping involves two legs of rail transportation, one leg from mines to loading Port by rail and another leg from unloading port to the thermal power plant. Presently, the tariff is charged by

Railways as a spilt fare, which is higher than the telescopic fare for the total distance of both legs of transportation. The telescopic fare would reduce the rail transportation cost ranging from Rs.306/ton to Rs.408/ton depending upon the distance of transportation and which will also reduce the cost of generation by Rs.0.21/kWh to Rs.0.28/kWh.

14. Long term shipping contract to deploy adequate vessels in coastal circuits:

Analyzing Port infrastructure, it has been noted that unloading Ports like Tuticorin, Ennore Ports may not be adequate to handle large no. of vessels at a time due to which vessel turn-around time increases. It is recommended that coastal States/Gencos may engage long term shipping contract of lifting coal to give confidence to shipping industry and Ports to deploy adequate vessels in coastal circuit, considering vessel turnaround time. This would help to expedite the evacuation of coal from loading Ports. Long-term contract will enable Ports to enhance port capacity based on the demand.

15. Dedicated Coal berths at destination ports:

Most coastal shipping routes presently have scarcity of return cargo, which necessitates repositioning of empty containers back to their point of origin (either the loading Port or, in the worst-case scenario, the cargo's original location) for the subsequent shipment. The expenses of relocating empty containers is then included in the overall logistics cost incurred by the cargo owner, increasing the total cost of the movement. If dedicated coastal coal berths at destination Ports are created to avoid detention of coastal coal vessels, this will reduce the time around time and cost in RSR evacuation of coal.

16. New Ports for Coal transportation:

p to transport thermal coal from these new Ports to consumers. In order to prevent connectivity issues with the new Ports, it is necessary for railways to align their connectivity plans with the development plans of these Ports. It is recommended that New Ports planned may look for an opportunity to transport thermal coal in the country. Also, connectivity to new ports from coal mines to port may be

considered by railways. Breakup details given in Annexure-3

17. Mechanized handling at Loading and unloading ports:

17.1 At present, many loading Ports like Gopalpur, Gangavaram and unloading Ports are having manual handling of coal. This will restrict the utilization of port capacity. It is recommended that all the loading and unloading Ports may consider development of mechanized handling of coal for full utilization of port capacity. Ministry of Shipping may monitor the development of mechanized infrastructure for coal at ports.

17.2 Ministry of Shipping may undertake a review of infrastructure available at Ports and required FY30 in all loading and unloading Ports for taking required actions.

18. Paradip and Damra are well connected with Railway infrastructure, distance, coalfields and ideally located to emerge as the leading coal Ports in the country. They need to create required capacity to handle the projected growth.

19. **Development of NW-5 through SPV:**

19.1 Coastal shipping has a great potential and MoPSW has taken the initiative to develop Inland Waterways NW-5 on Brahmani River for cargo transportation. While Transporting Coal through RS/RSR route it involves connectivity from mine to Port as first leg via rail. Inland Waterways through NW-5 on Brahmani River from Talcher coalfield connecting Paradeep & Damra Port is proposed for first leg transportation of cost in cost effective manner. NW-5 is proposed to be developed by FY 2030 through SPV. An SPV has been decided to be formed with the participation of the Ministry of Coal/Coal India Limited, Ministry of Ports, Shipping and Waterways/Inland Waterways Authority of India, Ministry of Power, State Government, and willing Gencos. Attached in Annexure 4 is a concept note for SPV establishment. It is recommended that Ministry of Shipping is requested to operationalize the SPV within 6 months to expedite completion of NW-5 by FY2028. Transportation of coal though Inland waterways will reduce Port handing charges.

19.2 Ministry of Shipping may also consider to provide financial viability funding upfront to IWAI to take up development of Brahamini river for coal transportation to promote greener transportation of coal and incentivise use of inland waterways in the country.

Chapter 9 : Annexure

Annexure1: Constitution of Committee Order

F. No.- 55020/10/2020-CPIAM-Part(2)
Government of India
Ministry of Coal
*****

Room No. 622-A, Shastri Bhawan,
New Delhi, Date: 19-01-2023

Office Memorandum

Subject:- Constitution of Inter-Ministerial Committee to prepare a long term perspective plan for movement of coal through ports.-reg

The undersigned is directed to convey that as per the decision taken in meeting held on 7.12.2022 on RSR movement of coal, Ministry of Coal has constituted an Inter-Ministerial Committee (IMC) under the Chairmanship of Additional Secretary (Coal) and Co-Chairmanship of Additional Secretary (PSW) to prepare a long term perspective plan for movement of coal through ports. The composition of committee shall be as under:

1	Shri M. Nagaraju, Additional Secretary, Ministry of Coal	**Chairman**
2	Additional Secretary, Ministry of Port, Shipping and Waterways	**Co-Chair**
3	Representative from Ministry of Power	**Member**
4	Representative from Ministry of Railway	**Member**
5	Chairman, Coal India Limited	**Member**
6	Chairman, Paradip Port	**Member**
7	Chairman, Inland Waterways	**Member**
8	Chairman, NTPC	**Member**
9	CMD, MCL	**Member**

2. The Terms of Reference shall be as under:

(i) To prepare a long term perspective plan for movement of coal through ports and waterways.

(ii) To suggest Adequate infrastructure requirement to increase rail-sea-rail movement of coal.

3. The committee shall submit report within two months for consideration to the Ministry.

4. Ministry of Power and Ministry of Railways are requested to nominate officers (JS and above Level) from their Ministries for the said IMC and intimate the same to this Ministry at the earliest.

(Hitlar Singh)
Under Secretary to the Govt. on India

To,
Chairman/Co-chairman/members of the IMC
Copy to:

1. The Secretary, Ministry of Port, Shipping and Waterways, Transport Bhawan, New Delhi
2. The Secretary, Ministry of Power, Shram Shakti Bhawan, New Delhi
3. The Chairman, Railway Board, Ministry of Railway, New Delhi

Annexure 2: Coal Based Power Plants in country

Highlighted power plants are evacuating coal via Rail Sea route.

Sl. No.	Name of Thermal Power Station	Sector (Central-C, State-S, Private-P, Joint Venture-JV)	Installed Capacity	Utility	Mode of Transpor-tation	Coal Company	PLF % (April-Dec. 2022)	Requirement for the day @85% PLF
			MW				%	(In '000 Tonnes')
A	**PLANTS HAVING COAL LINKAGES, NO LINKAGE AND COAL BLOCK**							
	Haryana							
1	Panipat TPS	S	710	HPGCL	Rail	BCCL, CCL, WCL	84.4	10.2
2	Rajiv Gandhi TPS	S	1200	HPGCL	Rail	CCL, ECL, MCL, NCL	63.4	17.1
3	Yamuna Nagar TPS	S	600	HPGCL	Rail	CCL	79.9	8.7
	TOTAL (Haryana)		**2510**					**36.0**
	Punjab							
4	Guru Hargobind TPS (LehraMohabbat)	S	920	PSPCL	Rail-1500	CCL	46.4	12.6
5	Ropar TPS	S	840	PSPCL	Rail	BCCL, CCL, SECL	47.0	11.8
	TOTAL (Punjab)		**1760**					**24.3**
	Rajasthan							
6	Chhabra TPP	S	500	RVUNL	Rail	SECL	73.9	6.6
7	Kota TPS	S	1240	RVUNL	Rail	SECL, NCL	71.6	18.0

Sl. No.	Name of Thermal Power Station	Sector (Central-C, State-S, Private-P, Joint Venture-JV)	Installed Capacity	Utility	Mode of Transpor-tation	Coal Company	PLF % (April-Dec. 2022)	Requirement for the day @85% PLF
			MW				%	(In '000 Tonnes')
8	Suratgarh TPS	S	1500	RVUNL	Rail-1500	SECL, NCL, SECL	49.9	18.6
9	Kalisindh TPS	S	1200	RRVUNL	Rail	NA	54.7	15.0
10	Suratgarh STPS	S	1320	RRVUNL	Rail-1500	NA	0.0	18.0
11	Chhabra-I Ph-2 TPP	S	500	RRVUNL	Rail	NA	48.1	6.3
12	Chhabra-II TPP	S	1320	RRVUNL	Rail	NA	64.8	16.7
	TOTAL (Rajasthan)		**7580**					**99.3**
	Uttar Pradesh							
13	Anpara TPS	S	2630	UPRVUNL	Pit-Head	NCL	84.8	35.1
14	Harduaganj TPS	S	1265	UPRVUNL	Rail	BCCL, CCL	53.7	18.6
15	Obra TPS	S	1000	UPRVUNL	Rail	NCL	59.7	15.2
16	Parichha TPS	S	1140	UPRVUNL	Rail	BCCL, CCL, NCL	54.0	16.4
	TOTAL (Uttar Pradesh)		**6035**					**85.3**
	Chhattisgarh							
17	Dr. Shyama Prasad Mukharjee (DSPM) TPS	S	500	CSPGCL/ CSEB	Rail	SECL	82.3	7.3
18	Korba-West TPS	S	1340	CSPGCL/ CSEB	Pit-Head	SECL	82.0	20.9
19	Marwa TPS	S	1000	CSPGCL	Rail	NA	48.7	15.1
	TOTAL (Chhattisgarh)		**2840**					**43.4**
	Gujarat							
20	Gandhi Nagar TPS	S	630	GSECL	Rail-1500	SECL	67.6	8.6

Sl. No.	Name of Thermal Power Station	Sector (Central-C, State-S, Private-P, Joint Venture-JV)	Installed Capacity	Utility	Mode of Transpor-tation	Coal Company	PLF % (April-Dec. 2022)	Requirement for the day @85% PLF
			MW				%	(In '000 Tonnes')
21	Ukai TPS	S	1110	GSECL	Rail	SECL, WCL, SECL-Washery	56.3	15.5
22	Wanakbori TPS	S	2270	GSECL	Rail-1500	SECL, SECL-Washery	52.8	31.6
	TOTAL (Gujarat)		**4010**					**55.6**
	Madhya Pradesh							
23	Amarkantak Ext TPS	S	210	MPGCL	Pit-Head	SECL	72.0	2.8
24	Sanjay Gandhi TPS	S	1340	MPGCL	Rail	SECL	72.8	21.1
25	Satpura TPS	S	1330	MPGCL	Rail	SECL, WCL	33.1	17.7
26	Shri Singaji TPP	S	2520	MPGCL	Rail	SECL, WCL	57.2	37.6
	TOTAL (M P)		**5400**					**79.2**
	Maharashtra							
27	Bhusawal TPS	S	1210	MAHA GENCO	Rail	WCL, SECL	60.7	19.0
28	Chandrapur (Maharashtra) STPS	S	2920	MAHA GENCO	Rail	SECL, WCL	58.3	46.9
29	Khaparkheda TPS	S	1340	MAHA GENCO	Rail	WCL, SECL, MCL	64.9	23.8
30	Koradi TPS	S	2190	MAHA GENCO (MSPGCL)	Rail	WCL, SECL, MCL	60.7	32.4
31	Nasik TPS	S	630	MAHA GENCO	Rail	WCL, SECL	46.1	10.7

Sl. No.	Name of Thermal Power Station	Sector (Central-C, State-S, Private-P, Joint Venture-JV)	Installed Capacity	Utility	Mode of Transpor-tation	Coal Company	PLF % (April-Dec. 2022)	Requirement for the day @85% PLF
			MW				%	(In '000 Tonnes')
32	Paras TPS	S	500	MAHA GENCO	Rail	WCL	66.3	7.7
33	Parli TPS	S	750	MAHA GENCO	Rail	WCL	61.0	10.2
	TOTAL (Maha)		**9540**					**150.7**
	Andhra Pradesh							
34	DamodaramSanjeevaiah TPS	S	1600	APGENCO	Rail-Sea	MCL	41.9	20.9
35	Dr. N.Tata Rao TPS	S	1760	APGENCO	Rail	MCL	68.3	28.6
36	Rayalaseema TPS	S	1650	APGENCO	Rail	MCL, SCCL	61.6	25.3
	TOTAL (Andhra Pradesh)		**5010**					**74.7**
	Karnataka							
37	Bellary TPS	S	1700	KPCL	Rail	SCCL	43.6	22.9
38	Raichur TPS	S	1720	KPCL	Rail	WCL, MCL	38.8	24.8
39	Yermarus TPP	S	1600	KPCL	Rail	SCCL	28.9	19.9
	TOTAL (Karnataka)		**5020**					**67.7**
	Tamil Nadu							
40	Mettur TPS	S	840	TNEB / TANGEDCO	Rail-Sea-1500	MCL / Talcher & ECL	70.4	13.9
41	Mettur TPS - II	S	600	TNEB / TANGEDCO	Rail-Sea-1500	MCL / Talcher & ECL	55.3	9.6
42	North Chennai TPS	S	1830	TNEB / TANGEDCO	Inter Modal	MCL / Talcher & ECL	49.3	35.7

Sl. No.	Name of Thermal Power Station	Sector (Central-C, State-S, Private-P, Joint Venture-JV)	Installed Capacity	Utility	Mode of Transpor-tation	Coal Company	PLF % (April-Dec. 2022)	Requirement for the day @85% PLF
			MW				%	(In '000 Tonnes')
43	Tuticorin TPS	S	1050	TNEB / TANGEDCO	Rail-Sea-1500	MCL / Talcher, MCL / IB and ECL	56.4	19.9
	TOTAL (Tamil Nadu)		**4320**					**79.0**
	Telangana							
44	Bhadradri TPP	S	1080	TSGENCO	Rail	SCCL	0.0	13.2
45	Kakatiya TPS	S	1100	TSGENCO	Pit-Head	SCCL	74.7	13.0
46	Kothagudem TPS (New)	S	1000	TSGENCO	Rail	SCCL	80.5	13.5
47	Kothagudem TPS (Stage-7)	S	800	TSGENCO	Rail	SCCL	52.7	8.1
48	Ramagundem-B TPS	S	62.5	APGENCO	Pit-Head	SCCL	49.7	1.0
49	Singareni TPP	S	1200	TSGENCO	Rail	SCCL	91.2	14.2
	TOTAL (Telangana)		**5242.5**					**62.9**
	Jharkhand							
50	Tenughat TPS	S	420	TVNL	Rail	CCL	71.4	6.2
	TOTAL (Jharkhand)		**420**					**6.2**
	Odisha							
51	IB Valley TPS	S	1740	OPGC	Pit-Head	MCL	76.0	27.9
	TOTAL (Odisha)		**1740**					**27.9**
	West Bengal							
52	Bakreswar TPS	S	1050	WBPDCL	Rail	ECL, BCCL, MCL, CCL	89.4	13.3

Sl. No.	Name of Thermal Power Station	Sector (Central-C, State-S, Private-P, Joint Venture-JV)	Installed Capacity	Utility	Mode of Transpor-tation	Coal Company	PLF % (April-Dec. 2022)	Requirement for the day @85% PLF
			MW				%	(In '000 Tonnes')
53	Bandel TPS	S	270	WBPDCL	Rail	ECL, BCCL, MCL	75.5	4.4
54	D.P.L. TPS	S	550	WBPDCL	Rail	ECL, BCCL, MCL	53.9	7.8
55	Kolaghat TPS	S	840	WBPDCL	Rail	ECL, BCCL, MCL, CCL	64.6	13.6
56	Sagardighi TPS	S	1600	WBPDCL	Rail	ECL, BCCL	86.3	20.0
57	Santaldih TPS	S	500	WBPDCL	Rail	ECL, BCCL, CCL	88.3	7.3
	TOTAL (West Bengal)		**4810**					**66.3**
	N T P C							
58	Dadri (NCTPP)	C	1820	NTPC	Rail	BCCL, ECL, CCL	66.6	25.0
59	Rihand STPS	C	3000	NTPC	Pit-Head	NCL	89.2	37.0
60	Singrauli STPS	C	2000	NTPC	Pit-Head	NCL	90.5	26.7
61	Tanda TPS	C	1760	NTPC	Rail	CCL	60.5	24.7
62	Unchahar TPS	C	1550	NTPC	Rail	BCCL and CCL	60.5	21.3
63	Korba STPS	C	2600	NTPC	Pit-Head	SECL	90.7	35.3
64	Lara STPP	C	1600	NTPC	Rail	Talaipali Coal Block	82.0	22.8

Sl. No.	Name of Thermal Power Station	Sector (Central-C, State-S, Private-P, Joint Venture-JV)	Installed Capacity	Utility	Mode of Transpor-tation	Coal Company	PLF % (April-Dec. 2022)	Requirement for the day @85% PLF
			MW				%	(In '000 Tonnes')
65	Sipat STPS	C	2980	NTPC	Pit-Head	SECL	79.1	40.8
66	Gadarwara TPP	C	1600	NTPC	Rail	NCL, SECL, WCL	67.2	21.0
67	Khargone STPP	C	1320	NTPC	Rail	-	0.0	16.3
68	Vindhyachal STPS	C	4760	NTPC	Pit-Head	NCL	89.9	65.4
69	Mauda STPS	C	2320	NTPC	Rail	WCL, SECL, MCL	68.7	33.6
70	Solapur STPS	C	1320	NTPC	Rail-1500	MCL	45.9	16.8
71	Simhadri STPP	C	2000	NTPC	Rail	ECL, MCL	69.6	31.5
72	Kudgi STPP	C	2400	NTPC	Rail	SCCL-Bridge Linkage	51.2	29.1
73	Ramagundem STPS	C	2600	NTPC	Pit-Head	SCCL	67.1	32.9
74	Barauni TPS	C	710	NTPC	Rail	Bridge Linkage from CCL & ECL	57.1	9.2
75	Barh I	C	1980	NTPC	Rail	CCL, ECL	75.7	26.5
76	Kahalgaon TPS	C	2340	NTPC	Pit-Head	ECL	76.5	35.7
77	Darlipali STPS	C	1600	NTPC	Pit-Head	Dulanga Coal Block	76.8	22.8
78	Talcher STPS	C	3000	NTPC	Pit-Head	ECL, MCL	87.7	47.2

Sl. No.	Name of Thermal Power Station	Sector (Central-C, State-S, Private-P, Joint Venture-JV)	Installed Capacity	Utility	Mode of Transpor-tation	Coal Company	PLF % (April-Dec. 2022)	Requirement for the day @85% PLF
			MW				%	(In '000 Tonnes')
79	Farakka STPS	C	2100	NTPC	Pit-Head	ECL, BCCL, NEC	63.7	28.0
80	Bongaigaon TPP	C	750	NTPC	Rail	ECL, NEC	77.1	9.1
	TOTAL (N T P C)		**48110**					**658.5**
	N T P C JV							
81	Indira Gandhi STPP	JV	1500	NTPC JV	Rail	CCL, ECL, NCL	63.9	20.3
82	Meja STPP	JV	1320	NTPC-MUNPL JV	Rail	CCL, NCL, SECL	58.2	18.0
83	Bhilai TPS	JV	500	NTPC JV	Rail	SECL	84.4	7.7
84	Seioni TPP	JV	600	NTPC JV	Rail	MCL, SECL	71.8	7.6
85	Vallur TPP	JV	1500	NTPC-NTECL JV	Rail	MCL, ECL, CCL	71.3	23.1
86	Muzaffarpur TPS	JV	390	NTPC-KBUNL Kanti JV	Rail	ECL, CCL	85.1	5.8
87	Nabi Nagar STPP	JV	1980	NTPC-NPGCL JV	Rail	CCL	75.8	24.6
88	Nabi Nagar TPP	JV	1000	NTPC JV	Rail	CCL	80.1	14.2
	TOTAL (N T P C JV)		**8790**					**121.1**
	TOTAL (NTPC& NTPC JV)		**56900**					**779.6**
	D V C							

Sl. No.	Name of Thermal Power Station	Sector (Central-C, State-S, Private-P, Joint Venture-JV)	Installed Capacity	Utility	Mode of Transpor-tation	Coal Company	PLF % (April-Dec. 2022)	Requirement for the day @85% PLF
			MW				%	(In '000 Tonnes')
89	Bokaro TPS 'A' EXP	C	500	DVC	Rail	BCCL, CCL	85.4	5.9
90	Chandrapura (DVC) TPS	C	500	DVC	Rail	BCCL, CCL	83.4	6.3
91	Kodarma TPP	C	1000	DVC	Rail	BCCL, CCL, ECL	80.9	12.7
92	Durgapur Steel TPS	C	1000	DVC	Rail	ECL, BCCL, MCL	77.4	13.7
93	Durgapur TPS	C	210	DVC	Rail	ECL, BCCL, MCL	9.8	5.0
94	Mejia TPS	C	2340	DVC	Rail	ECL, BCCL, MCL	74.9	32.2
95	Raghunathpur TPP	C	1200	DVC	Rail	ECL, BCCL, CCL	50.6	16.0
	TOTAL (D V C)		**6750**					**91.8**
	NLC-TN JV							
96	NTPL Tuticorin TPP	JV	1000	NLC-TNEB JV	Rail-Sea-1500	NA	65.2	13.7
	TOTAL (NLC-TN JV)		**1000**				**65.2**	**13.7**
	I P P							
97	Mahatma Gandhi TPS	P	1320	JhPL(HR) / CLP	Rail	BCCL, CCL, ECL, NCL	71.3	16.4
98	Goindwal Sahib TPP	P	540	GPGSL (GVK) COAL	Rail-1500	CCL	39.7	7.8

Sl. No.	Name of Thermal Power Station	Sector (Central-C, State-S, Private-P, Joint Venture-JV)	Installed Capacity	Utility	Mode of Transpor-tation	Coal Company	PLF % (April-Dec. 2022)	Requirement for the day @85% PLF
			MW				%	(In '000 Tonnes')
99	Rajpura TPP	P	1400	NABHA POWER	Rail	SECL	85.7	16.1
100	Talwandi Sabo TPP	P	1980	TSPL	Rail-1500	MCL	66.5	27.3
101	Kawai TPS	P	1320	ADANI POWER	Rail	SECL, NCL	79.5	15.7
102	Anpara C TPS	P	1200	LANCO	Pit-Head	NCL	74.3	15.6
103	Barkhera TPS	P	90	BEPL COAL	Rail	CCL, NCL, SECL	33.9	1.5
104	Khambarkhera TPS	P	90	BEPL COAL	Rail	CCL, NCL, SECL	32.5	1.5
105	Kundarki TPS	P	90	BEPL COAL	Rail	CCL, NCL, SECL	33.4	1.4
106	Lalitpur TPS	P	1980	LPGCL	Rail	CCL, NCL, SECL	68.0	24.8
107	Maqsoodpur TPS	P	90	BEPL COAL	Rail	CCL, NCL, SECL	33.3	1.5
108	Prayagraj TPP	P	1980	PPGCL -Pvt	Rail	NCL	73.7	24.2
109	Rosa TPP Ph-I	P	1200	RPSCL	Rail	CCL	74.8	15.5
110	Utraula TPS	P	90	BEPL COAL	Rail	CCL, NCL, SECL	34.0	1.4
111	Akaltara TPS	P	1800	WPCL COAL	Rail	MCL, SECL	65.4	23.8
112	Balco TPS	P	600	IPP	Rail	SECL	43.5	9.0

Sl. No.	Name of Thermal Power Station	Sector (Central-C, State-S, Private-P, Joint Venture-JV)	Installed Capacity	Utility	Mode of Transpor-tation	Coal Company	PLF % (April-Dec. 2022)	Requirement for the day @85% PLF
			MW				%	(In '000 Tonnes')
113	Bandakhar TPP	P	300	ACB (India) Ltd.	Road	SECL	53.9	4.3
114	Baradarha TPS	P	1200	DB Power	Rail	SECL	69.9	18.4
115	Binjkote TPP	P	600	SKS Power / Private	Rail	SECL	22.3	9.1
116	Nawapara TPS	P	600	TRN Energy	Rail	SECL	44.5	9.7
117	Pathadi TPP	P	600	LANCO	Rail	SECL	58.1	8.4
118	Tamnar TPP	P	2400	Jindal Pvt Ltd.	Rail	MCL, SECL	52.9	40.1
119	Uchpinda TPP	P	1440	RKM Powergen Pvt Ltd.	Rail	SECL	41.4	22.5
120	Sabarmati (D-F Stations)	P	362	TORRENT POWER	Rail	SECL	87.2	4.2
121	Anuppur TPP	P	1200	MOSER BEAR	Rail	SECL	72.0	17.2
122	Bina TPS	P	500	BPSCL (JP BINA)	Rail	SECL, CCL	63.8	7.4
123	Amaravati TPS	P	1350	IBPL COAL	Rail	SECL	73.8	17.9
124	Butibori TPP	P	600	VIPL COAL	Rail	WCL	0.0	8.2
125	Dahanu TPS	P	500	RIL	Rail	SECL	78.9	6.1
126	Dhariwal TPP	P	600	DIPL-Pvt	Rail	SECL	80.3	8.3
127	Dishergarh TPP	P	12	DPSC Ltd.	Rail	-	0.0	0.2
128	GMR Warora TPS	P	600	GMR EMCO ENERGY	Rail	SECL	79.5	8.2
129	Tirora TPS	P	3300	APML COAL	Rail	WCL, SECL, MCL	76.4	44.1

Sl. No.	Name of Thermal Power Station	Sector (Central-C, State-S, Private-P, Joint Venture-JV)	Installed Capacity	Utility	Mode of Transpor-tation	Coal Company	PLF % (April-Dec. 2022)	Requirement for the day @85% PLF
			MW				%	(In '000 Tonnes')
130	Wardha Warora TPP	P	540	KSK ENERGY VENTURES	Road	WCL	55.9	7.1
131	Painampuram TPP	P	1320	THERMAL POWERTECH	Rail-Sea	MCL	74.6	16.3
132	SGPL TPP	P	1320	SGPL Coal	Rail-Sea	-	68.7	14.8
133	Vizag TPP	P	1040	HNPCL	Rail	MCL	51.8	15.8
134	Jojobera TPS	P	240	TATA Power	Rail	-	83.8	3.3
135	Mahadev Prasad STPP	P	540	ADHUNIK	Rail	CCL	74.1	7.5
136	Maithon RB TPP	P	1050	TATA-MAITHON RB JV	Rail	BCCL, CCL	88.0	13.1
137	Derang TPP	P	1200	Jindal India Pvt. Limited	Rail	MCL	71.7	16.8
138	Kamalanga TPS	P	1050	GMR ENERGY	Rail	MCL	73.1	15.5
139	Vedanta TPP	P	600	Sterlite Energy	Rail	MCL	60.9	8.7
140	Budge Budge TPS	P	750	CESC	Rail	ECL, BCCL	80.4	8.9
141	Haldia TPP	P	600	HEL Coal	Rail	MCL	84.5	8.4
142	Hiranmaye TPP	P	300	Hiranmaye Energy	Rail	-	71.0	4.7
143	Southern Repl. TPS	P	135	CESC	Rail	ECL	64.2	2.2
144	Avantha Bhandar	P	600	KWPCL Coal	Rail	NA	73.2	9.1
145	OP Jindal TPS	P	1000	JPL	Road	NA	61.2	16.2
146	Raikheda TPP	P	1370	GCEL	Rail	NA	55.0	19.6

Sl. No.	Name of Thermal Power Station	Sector (Central-C, State-S, Private-P, Joint Venture-JV)	Installed Capacity	Utility	Mode of Transpor-tation	Coal Company	PLF % (April-Dec. 2022)	Requirement for the day @85% PLF
			MW				%	(In '000 Tonnes')
147	Mahan TPP	P	1200	ESSAR PMPL	Road	NA	32.2	17.0
148	Nigri TPP	P	1320	JPPVL	Rail	NA	76.1	16.0
149	Sasan UMTPP	P	3960	RPL Coal	Pit-Head	NA	87.2	45.3
	TOTAL (I P P)		**52069**					**704.0**
	Total - A		**182957**					**2547**

Annexure 3: Economics calculations of RSR and All Rail Transportation of Coal

a. Estimate for transportation of Coal from Talcher area of MCL to Northern/Western TPS by RAIL-SEA-RAIL mode

Sl. No.	Particular	Nashik TPS	Bhusawal TPS	Kudgi	Dadri	Jajjar
1	MCL to Loading Port (Paradeep) (kms)	201-275				
2	Unloading Port to NTPS (kms)	242 (Dharamatar)	499 (Dharamatar)	280 (Goa)	1180 (Dahej)	1085 (Dahej)
3	Railway Freight from MCL Talcher to Loading Port (Paradeep Port)	706.13	706.13	708.15	708.15	708.15
4	Handling Cost at Loading Port (Intra Port Shifting, Railway related charges, Labor Charges and Loading in to vessel, Berth Hire, Plot rent, Other Port Charges etc.)	354	354	354	354	354
5	Ocean Freight from Load port to Unloading/ Discharge port	1291.5	1291.5	619	748	748
6	Handling Cost Unloading/ Discharge Port (Intra Port Shifting, Railway related charges, Labor Charges and Unloading from vessel, Berth Hire, Plot rent, Other Port Charges etc.)	649	649	649	649	649
7	Other Scope of work including Liaising and Supervision, Other incidental charges, insurance etc.	649	649	649	649	649
8	Railway Freight from Unloading/Discharge Port to TPS	706.13	1107.44	1102.5	2482.7	2164.0
9	Total Rail-Sea-rail (RSR) transportation Cost (3+4+5+6+7+8)	4355.75	4757.06	4081.6	5590.8	5272.1
10	MCL Coal Cost including all taxes (Rs./MT)	1670.32	1670.32	1694.0	1694.0	1694.0
11	**Total Landed Cost through RSR route (9+10) (Rs./MT)**	**6026.07**	**6427.38**	**5775.6**	**7284.8**	**6966.1**
12	Average GCV ARB of MCL Coal (Kcal/Kg)	2986.00	2986.00	3500.0	3500.0	3500.0
13	Rs/GCV value of Coal received through RSR route (11/12)	2.02	2.15	1.85	2.08	1.99
14	Railway Freight to TPS	2829.75	2409.12	2790.0	2900.5	2969.0
15	**Total Landed Cost through ARR cost (Rs/MT)**	**4500.07**	**4079.44**	**5190.0**	**4594.5**	**4663**
16	**Telescopic Fare**			**1481**	**2848**	**2567**
17	**Possible Fare reduction (Rs/ton)**			**411.3**	**342**	**305.8**

Note- Basic Rates of RSR components are taken as per lowest budgetary offer received. Source: NTPC Projects

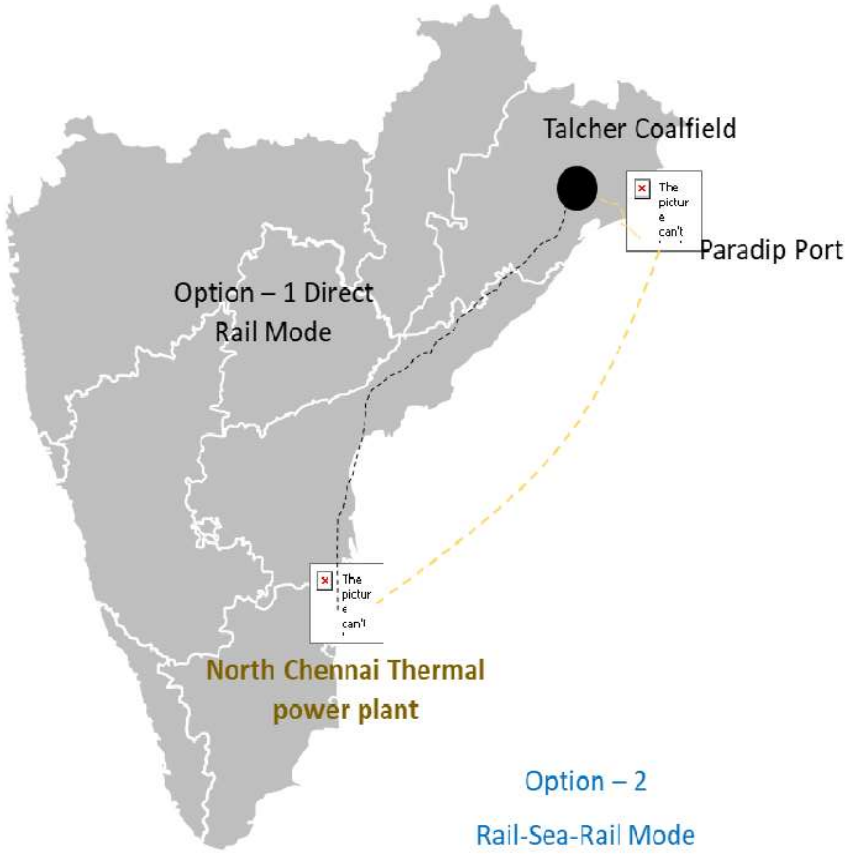
b. MCL Cost for Rail-Sea Rail Route / Direct Rail Mode

Sr. No.	Particulars	Ukai			Wanakbori			Gandhinagar		
		G12	G13	G14	G12	G13	G14	G12	G13	G14
1	Coal Cost	1,836	1,750	1,664	1,836	1,750	1,664	1,836	1,750	1,664
2	Coal Siding to Paradeep Railway frt.(219kms)	706	706	706	706	706	706	706	706	706
3	RSR Transportation & Handling charges*	2,400	2,400	2,400	2,400	2,400	2,400	2,400	2,400	2,400
4	Dahej Port to TPS Railway frt	706	706	706	706	706	706	837	837	837
5	Landed Cost (For RSR Mode)	5,648	5,562	5,476	5,648	5,562	5,476	5,779	5,693	5,607
6	**Landed Cost with Transit Loss (0.8%)**	**5,693**	**5,606**	**5,520**	**5,693**	**5,606**	**5,520**	**5,825**	**5,739**	**5,652**
7	Mid-band GCV	3,850	3,550	3,250	3,850	3,550	3,250	3,850	3,550	3,250
8	**GCV at TPS**	**3,100**	**2,800**	**2,500**	**3,100**	**2,800**	**2,500**	**3,100**	**2,800**	**2,500**
9	**Rs/1000Kcal (For RSR mode)**	**1.83**	**2.00**	**2.20**	**1.83**	**2.00**	**2.20**	**1.87**	**2.04**	**2.26**
10	**ECR(Rs/kWh) (For RSR Mode)**	**5.27**	**5.76**	**6.33**	**5.27**	**5.76**	**6.33**	**5.38**	**5.87**	**6.50**

	Direct Rail mode Transportation (1508-1801KM)	**2,842**	**2,842**	**2,842**	**2,969**	**2,969**	**2,969**	**3,075**	**3,075**	**3,075**
	Landed Cost (For Direct Rail mode)	**4,678**	**4,592**	**4,506**	**4,805**	**4,719**	**4,633**	**4,911**	**4,825**	**4,739**
	Landed Cost with Transit Loss (0.8%)	**4,716**	**4,629**	**4,543**	**4,844**	**4,757**	**4,671**	**4,951**	**4,864**	**4,778**
	Rs/1000Kcal (For Direct Rail mode)	**1.52**	**1.65**	**1.82**	**1.56**	**1.70**	**1.87**	**1.60**	**1.74**	**1.91**
		4.40	**4.79**	**5.26**	**4.52**	**4.92**	**5.41**	**4.62**	**5.03**	**5.53**

Source: NTPC Projects

c. Talcher (MCL), and North Chennai Thermal Power

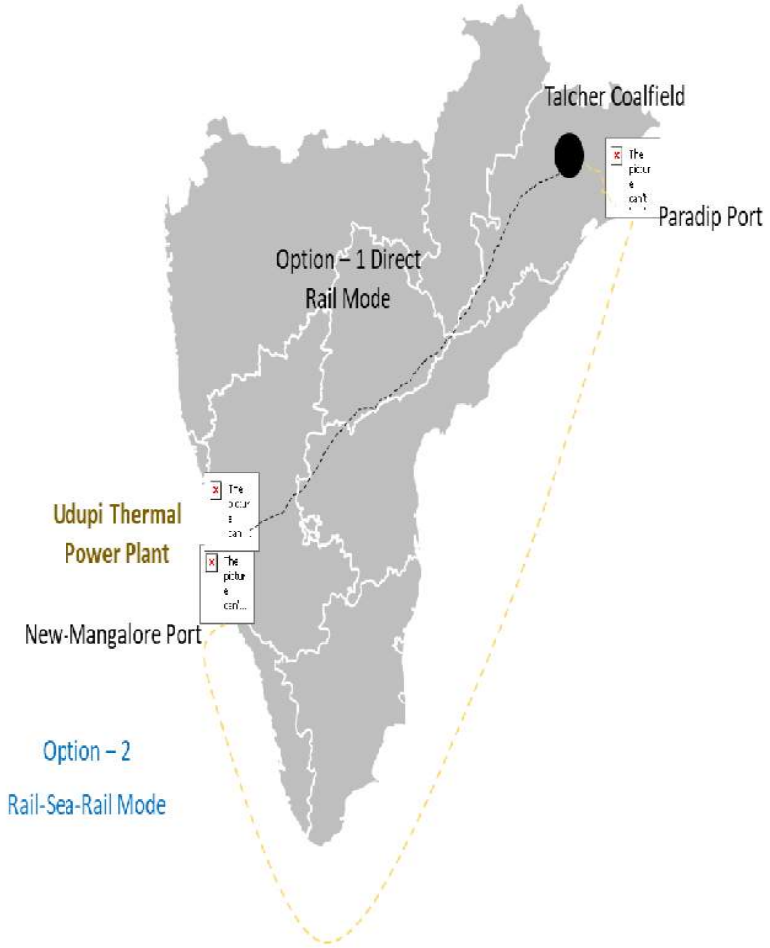


Cost Head	Cost (INR/Tonne)
First Mile Connectivity Costs (FMC costs, Loading at Siding, other associated costs, Rail transportation from Talcher to Paradip Port)	706
Charges at Paradip Port	354
Shipping Costs from Paradeep to Ennore Port	649
Charges at Ennore Port	426
Last Mile Connectivity Charges (Port to TPP)	80
Total Logistics Charges – Option 2 RSR mode	INR 2215/ Ton
Total Logistics Charges – Option 1 Rail mode	**INR 2976 / Ton**

- Potential cost savings of nearly INR 761 per tonne via Rail-Sea-Rail rou over the All-Rail Route

Source: MCL, Paradeep

d. Talcher to Udupi Thermal Power



Cost Head	Cost (INR/Tonne)
First Mile Connectivity Costs (FMC costs, Loading at Siding, other associated costs, Rail transportation from Talcher to Paradip Port)	706
Charges at Paradip Port	354
Shipping Costs from Paradeep to New Mangalore Port	619
Charges at New Mangalore Port	649
Last Mile Connectivity Charges (Port to TPP)	210
Total Logistics Charges – Option 2 RSR mode	**INR 2538 / Ton**
Total Logistics Charges – Option 1 Rail mode	**INR 3869 / Ton**

- Potential cost savings of nearly INR 1331 per tonne via Rail-Sea-Rail route over the All-Rail Route

Source: MCL, Paradeep

Annexure 4: Concept note for formation of SPV

भारतीय अन्तर्देशीय जलमार्ग प्राधिकरण
(पोत परिवहन मंत्रालय, भारत सरकार)
मुख्यालय : ए–13, सैक्टर–1, नौएडा–201 301, (उ० प्र०)
INLAND WATERWAYS AUTHORITY OF INDIA
(Ministry of Shipping, Govt. of India)
Head Office : A-13, Sector-1, Noida-201 301 (U.P.)
Website : www.iwai.gov.in | www.iwai.nic.in
Tel. : +91-120-2544036, 2543972, 2527667, 2448101 Fax : +91-120-2544009, 2544041, 2543973, 2521764

(By Email)

No. IWAI/NW-5/SPV/2022-23 Dated: 02.02.2023

To,
The Secretary,
Ministry of Coal
Shastri Bhawan,
New Delhi- 110 001
Email id: secy.moc@nic.in

Sub: Long term prospective plan to promote Rail-Sea-Rail (RSR) mode Coal movement - Concept Note for formation of the SPV with stakeholders viz., M/o. Power, M/o. Coal, MoPS&W and Govt. of Odisha - reg.

Ref: 1. Minutes of Meeting held on 07.12.2022 under the chairmanship of the Secretary (PS&W) at Transport Bhawan.
2. Your DO letter No. CPAM- 55020/10/ 020- CPIAM- Part (2), dt. 30.12.2022.

Sir,

Please refer to the letter cited above on the subject, vide which you have desired to share a Concept Note for the proposed SPV formation between MoPS&W, Ministry of Coal (MoC) / CIL, M/o Power, State Govt and willing GENCOS for taking further steps on long term perspective planning for transportation of coal through IWT mode in Odisha.

2. In this context, I am directed to forward a Concept Note on the proposed SPV, as attached at **Annex-1** for kind perusal and further action at your end.

This issues with the approval of the Competent Authority.

Yours faithfully,

Agautam 2/2/23

(Ashutosh Gautam)
Member (Technical)
Email : mt@iwai.gov.in

Copy to (By email):

1. The Chairman / Vice Chairman / Member (Finance), IWAI, Noida - for information.
2. The Director, IWAI, Bhubaneshwar - for information.
3. Director (MM.), IWAI Noida - for information.

Annex- 1

Concept Note for formation of Special Purpose Vehicles (SPV)

Background:

1. Govt. of India declared National Waterway-5 (NW-5) in Mahanadi / Brahmani delta, Matai River & East Coast Canal (ECC) in November 2008 for total length of 588 Km. The Brahmani / Mahanadi River basins extending in Madhya Pradesh, Jharkhand & Odisha have rich deposits of minerals, coal, iron ore and large production of various industrial & agricultural products. The likely commodities to be transported through NW-5 could be divided into three groups namely, Minerals (Coal, Iron Ore), Agricultural products (Paddy, Rice, Straw, Animal fodder, fish, Jute) and Finished goods / Manufactured products (from Kalinga Nagar industries, textiles and forest).

2. IWAI awarded the preparation of Detailed Project Report on NW-5 (East Coast Canal & Brahmani / Kharsua River System) to WAPCOS Ltd and DPR submitted to IWAI in March, 2010. The lengthwise distribution of NW-5 in 3 different stretches, as per the DPR is given below:

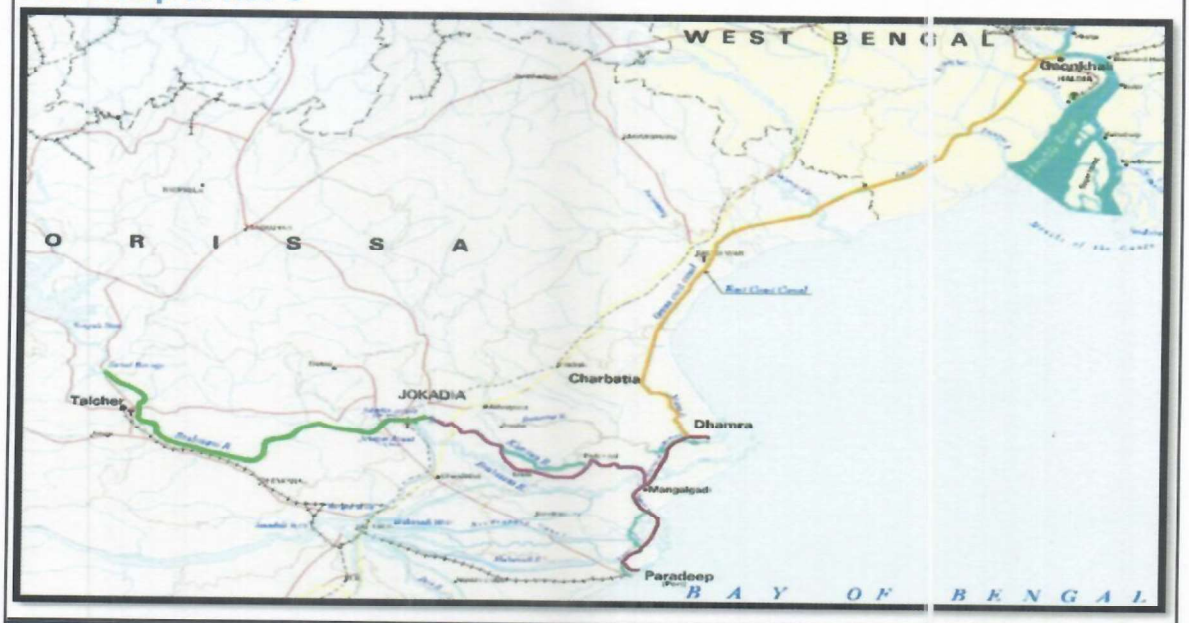
(i)	Stretch I	:	Mangalgadi to Talcher	:	237 Km
(ii)	Stretch II	:	Dhamra to Paradip	:	95 Km
(iii)	Stretch III	:	Dhamra to Geonkhali	:	256 Km
				Total :	588 Km

3. DPR prepared by M/s WAPCOS Ltd have recommended to IWAI for giving priority to development of Phase-I & Phase-II from various considerations keeping in view the potential of cargo movements as emanated through various studies. It was decided to initially develop 332 Km of economically & commercially viable stretches of NW-5 between Paradip / Dhamra and Talcher in following 2 phases and balance length of the waterway from Dhamra to Geonkhali is not considered feasible for the development:

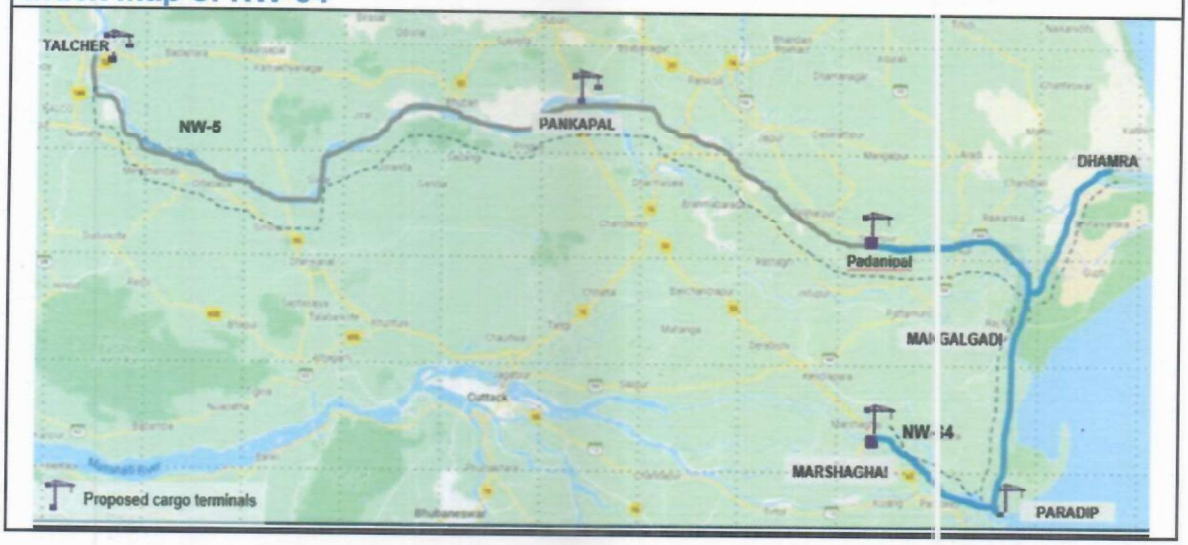
i.	Phase-I : Between Paradip / Dhamra and Pankapal	:	212 Km.
ii.	Phase-II : Pankapal to Talcher	:	120 Km.

4. Phase-I development covering 212 Km between Paradip / Dhamra and Pankapal is taken up initially. The development works such as (i) Monthly Thalweg survey, (ii) Studies on the modification of existing cross structures / bridges – 9 nos (iii) Construction of weirs / barrages / locks and (iv) Hydrographic Survey in Phase-II covering 120 kms from Pankapal to Talcher are taken up initially to firm up the strategy for funding by suitable agency through appropriate model. An index map of NW5 & NW-64 in Odisha is placed below :

Index map of NW-5



Index map of NW-64



5. Details of the tentative project cost estimated for implementation on NW-5 in Odisha is as below:

Sl. No	Project	Estimated cost (Rs. in Cr.)	Status
1	Construction of: i. 4 weirs on River Kharsua ii. 3 Navigation locks at weirs iii. 2 Check Dams to close off channels iv. 1 Rubber Dam with Lock	2,243.00	The draft DPRs submitted to Central Water Commission for vetting of designs of hydraulic structures. Estimate prepared and submitted based on the rates as on 2019, which needs updation.

2	Modification of 9 no. of road bridges	804.11	DPRs accepted by IWAI in Nov., 2021 and the cost which needs updation.
3	Shifting of High-Tension Lines	45.01	Work entrusted to Govt. of Odisha on deposit basis. 90% progress achieved.
4	Construction of Multimodal terminal at Pankapal (Odisha)	85.00	As per DPR (2016), cost of construction projected excluding land cost. Land to be acquired by Govt. of Odisha.

6. Expression of Interest (EoI) for Business proposal for Operationalization of select stretches of NW-5 and NW- 64 in Odisha on Design, Build, Finance, Operate & Transfer (DBFOT) basis" was published for participating of bidders. M/s APSEZ Ltd have participated in EoI process with the conditions (by 3 Business Cases) to invest only in the terminal facilities at Pankapal & Talcher and barge / vessel operations on DBFOT basis, provided that WAI to undertake the development of fairway / barrages / bridges / shore protection / navigation locks / navigational aids etc on Hybrid Annuity Model (HAM) and also protection up to 20% of cargo shift (in 10 years) from road & railways to waterways by IWAI. The proposal submitted to the Competent Authority for appraisal.

7. Transaction advisory services from DEA empanelled agencies for finalizing the concessionaire and suitable model of development of NW-5 and NW-64 has been invited and bid to be opened on 01.02.2023.

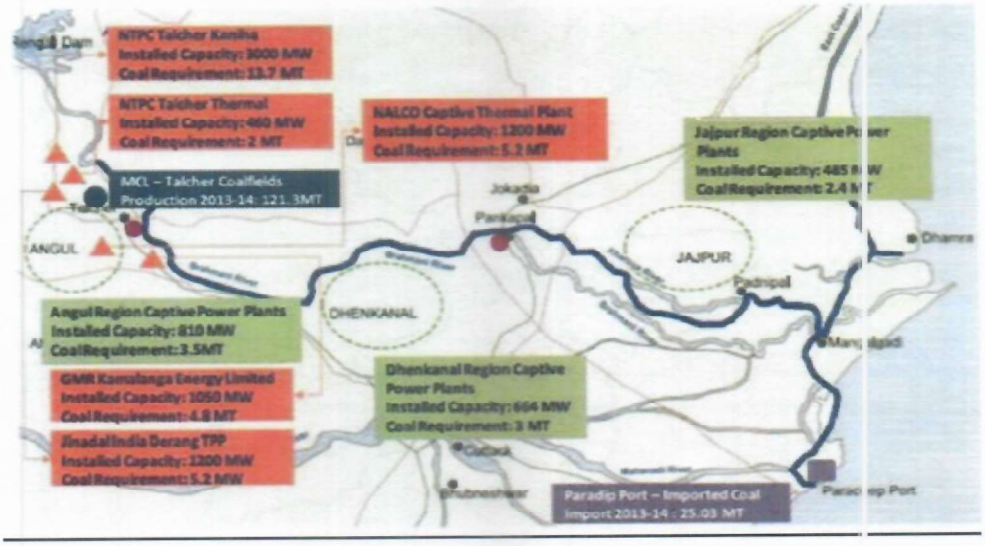
8. Total Cargo / Gypsum moved from IFFCO to Paradip unit is 2,29,338 MT (from Feb., 2022 to December, 2022). On development of various stretches of NW-5 & NW-64 will further enhance the cargo in Odisha including the Coal & Iron ore etc.

9. There are five power plants located in the proximity of the river Brahmani- NW-5 in the Angul, Dhenkanal and Talcher region of Odisha with a total installed capacity of about 10,000 MW and total coal requirement of more than 30 Million MT.

9.1 All the above power plants are having the coal linkages from the Mahanadi Coal and thus have merry go round or conveyor belt system for the transportation of coal from the coal field to the power plants.

9.2 There are only minimal requirement of the imported coal and can be used only in case exigency. Thus possibility of the regular transportation of the coal through NW-5 to these power plants are almost negligible.

The location of power plants with their individual installed capacity and coal requirement along national waterway-5 is presented in the figure below.



9.3 As per the current traffic data, Paradip Port undertakes coastal shipping of thermal coal to Generation Company (GENCO) in Tamil Nadu, Andhra Pradesh and Karnataka. The coal from MCL (Talcher) first arrives at Paradip Port and thereafter shipped to these power plant through coastal shipping. Coastal shipping of thermal coal to the power plants located in Tamil Nadu, Andhra Pradesh and Karnataka is up by 60% so far this year through Rail/Coastal shipping/Road (RCR) mode and it is expected to cross 40 Million MT as against 28 Million MT during last year.

9.4 Paradip port is emerging as a coastal shipping hub of the country and has plans even to coastal ship thermal coal to power houses, located in Rajasthan, UP and Haryana.

9.5 With the development and mechanization of the EQ1, EQ2 and EQ3 by JSW at the cost of Rs. 1440 crore under Build, Operate & Transport (BOT) increases the handling capacity of coal by 30 Million MT, in addition to above Paradip Port has already developed the mechanized berth for the handling of domestic coal with a capacity to handle around 21 Million MT. Thus, in total Paradip Port has a capacity to handle 51 Million MT of thermal coal to meet the entire demand of thermal coal coastal shipping from the southern India region

9.6 Taking an average of carrying capacity of 3600 MT per rake, the total number of rakes required on par day basis are around 35 rakes from Talcher to Paradip Port.

9.7 Paradip Port has a capacity to handle around 46 rakes per day, the infrastructure at both the loading and unloading point has been augmented to handle the envisaged coal traffic, however, there are issues with respect to the availability of railway wagon due to which the regular supply to the Gencos located in the state of Andhra Pradesh, Karnataka and Tamil Nadu has been hampered.

9.8 This creates a possibility for utilization of National Waterway -5, which connects Talcher area with Paradip Port and Dhamra Port for carrying coal in suitable barges from Talcher area and directly bring in to Paradip Port for onward dispatch to above stated power plants.

10. SPV framework

As decided during the meeting held on 7th Dec 2022, wherein it was decided to form a SPV with the participation of Ministry of Coal/Coal India Ltd, Ministry of Ports, Shipping and Waterways/Inland Waterways Authority of India, Ministry of Power, State Government and willing GENCOS to develop the Brahmani and Mahanadi River system to facilitate the movement of coal through waterways from Talcher coal mines to Dhamra and Paradip Port.

10.1 Role of SPV

i. Role of SPV shall include but not limited to the following
ii. SPV to review all the earlier studies undertaken by IWAI
iii. Decide on requirement of the updation of the studies or for undertaking additional studies for operationalization of waterways.
iv. Appoint the consultant for
   A. undertaking the identified studies
   B. detailed assessment with respect to the cost and doability with respect to various identified infrastructure intervention envisaged to be carried out for the operationalization of the waterways.
v. Review the reports and suggest in case any modification s required to be carried out
vi. Identify the project components that are to be developed on Engineering, Procurement and Construction (EPC) mode and the components which can be developed on PPP mode

vii. Obtain the various approvals and permissions from the relevant Authorities for carrying out the construction and operation of the various identified project components

viii. Appoint the EPC contractor for the construction of various structures that are required to be built inorder to ensure the navigability of the river.

ix. Appoint Transaction Advisors for the selection of the PPP operators for the project components that are identified to be developed on PPP mode.

x. Monitoring of the project execution either by itself or by appointing specialized consultant to ensure timely completion of the each of the project components

xi. Appoint officials for smooth functioning of the SPV

xii. Coordinate with each of the shareholders for timely equity investment as per Shareholder Agreement (SHA).

xiii. Collect the usage charges as per the agreed terms

xiv. Making payment to EPC contractors

xv. Contract management

xvi. Any such other activities as required for the smooth functioning of the project

10.2 Role of IWAI

i. Act as a nodal agency to initiate the process of the formation of the SPV and finalize the terms with the various proposed shareholders of the SPV.

ii. Try to the obtain the commitment of cargo to be moved on the waterways through GENCOs. GENCO may come with nominal equity investment in the proposed SPV, in case GENCOS are willing to commit the cargo to be moved on national waterways on take and pay basis.

iii. Finalize the terms of SHA and arrange for the signing of SHA for the formation of SPV

iv. Depute the officials on deputation to SPV for carrying out the initial activities

v. Provide all the earlier studies carried out by IWAI to SPV

vi. Provide technical inputs for finalization of infrastructure intervention requirement to ensure the navigability of the river

vii. Assist SPV in obtaining all the approvals and permissions for the project

viii. Assist SPV in obtaining the cargo commitment from the GENCOs

10.3 MoPSW

i. Assist SPV in acquiring/obtaining land at Paradip and Dhamra port for the construction of IWT terminal

ii. Assist SPV in obtaining approvals and permission for the project

iii. Facilitate the process of approval of SFC/EFC

iv. Coordination with other Central line ministries as per requirement

v. Coordination with State Government for land acquisition for terminal infrastructure and development other river structures such as barrages with navigational locks, redevelopment of Anicut etc. for ensuring the navigability of river.

10.4 Ministry of coal

i. Assist in allocation of coal from MCL to power plants wh ch are located on NW-5, NW-1, NW-2 and coastal areas of India to ensure the cargo availability/visibility for these waterways.
ii. Assist SPV in obtaining cargo commitment from GENCOs for transportation of Coal through waterways
iii. Assist SPV in obtaining all the approvals and permission for the project
iv. Coordination with other Central Line Ministries

10.5 Coal India Limited (CIL)

i. Allocate the coal from Talcher Coal mines to power plants located on NW-1, NW-2, NW-5 and coastal areas of India
ii. Assist SPV in provide land/RoW for first mile connectivity from coal mines upto water head on NW5
iii. Assist SPV in obtaining required approvals and permission for the project
iv. Depute officials in SPV for undertaking the initial activities
v. Provide Equity contribution as per agreed terms

10.6 GENCOs

i. Provide cargo commitment to SPV
ii. Depute officials in SPVs for undertaking the activities
iii. Provide Equity contribution as per agreed terms
iv. Assist SPV in obtaining required approvals and permission for the project.

****

Annexure 5: List of Power Houses in the proximity of Brahmani River

Power House	Capacity (MW)
Kamalanga TPP	1050
Talcher TPS	1000
Derang TPP	1200
NTPC-SAIL Power Company Ltd	120 MW, 250 MW under construction

Annexure 6: Paradeep Port Details

The details of available infrastructure at PPA are given hereunder:

9.1 Available Infrastructure

Berth	Berth Capacity
MCHP (2 berths)	41.2 MTPA
PEQCTPL- JSW (3 Berths)	30 MTPA
IOHP	3/15.6 MTPA

*MCHP-Mechanized Coal Handling Plant, IOHP- Iron ore handling Plant

*PEQCTPL stands for "Paradeep East Quay Coal Terminal Private Limited". It is a joint venture between Paradeep Port Trust and JSW Infrastructure for a mechanized coal-handling facility.

9.2 Vessel Handling Capacity at Paradeep Port

Berth	Vessel Loading Capacity (Lakh/day)
MCHP (2 berths)	0.90 Lakh
PEQCTPL- JSW (3 Berths)	1.40 Lakh
IOHP	0.20 Lakh

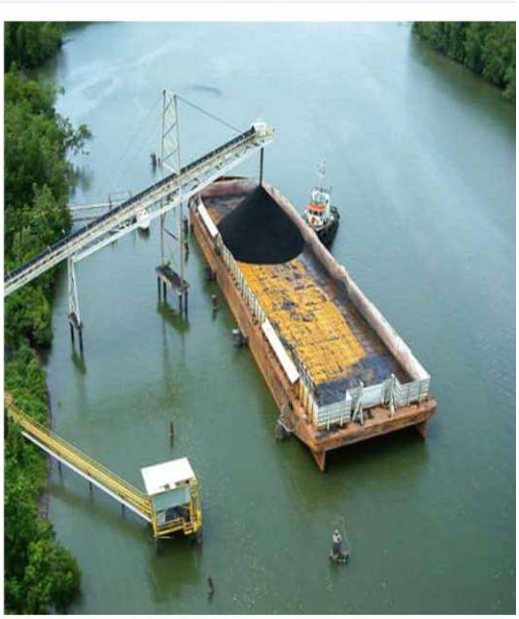
The total vessel handling capacity of Paradeep Port is 2.5 Lakh. Out of which 0.20 Lakh is for iron ore handling.

9.3 Rake Handling Capacity (Rakes/day)

DATE	MCHP	PEQCTPL (JSW)	OHP	MANUAL	TOTAL
On date	25	26	3	3	**57**
March 2023	30	26	3	3	**62**

9.4 Unloading time at Paradeep Port

Month:	Nov-22			Dec-22			2022-23
	MCHP	JSW	Total	MCHP	JSW	Total	
Total rakes unloaded at PRDP(No)	470	340	810	554	250	804	**6953**
Oversized cases (%)	2%	1%	2%	4%	1%	3%	**2.03%**
Average unloading Time	01:37	01:38	01:37	01:45	01:54	01:48	**01:49**



End of Report