



# Final Report for Sagarmala (Vol. III)

Ministry of Shipping, Indian Ports Association  
November 2016

- National Perspective Plan
- Report on government imperatives including financing plan
- Report on Project Management Office Structure



# Final Report for Sagarmala (Vol. III)

Prepared for



## Ministry of Shipping / Indian Ports Association

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<b>Name</b>	<b>Date of submission</b>	<b>Approved by</b>
Draft final report for Sagarmala	18 <sup>th</sup> August, 2016	Suvojoy Sengupta
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“In 2015 the Ministry of Shipping instructed McKinsey & Company and AECOM to provide fact-based analysis and insights from best practice around the world into [potential future trends in container shipping, options for infrastructure and potential approaches to financing ports development].

The Ministry will evaluate this advice, along with inputs and advice from a variety of internal and external experts, and determine the most appropriate strategy to give effect to the Cabinet’s decision of 25 March, 2015. McKinsey’s advice, in the form of the following confidential report, was provided in November, 2016.

McKinsey & Company, in consortium with AECOM, was selected following a competitive public tender, based on its extensive global experience advising on infrastructure, shipping and logistics, and its deep local knowledge and experience.

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*The analyses and conclusions contained in this report are based on various assumptions have been developed with the Ministry of Shipping, which are subject to uncertainty. Nothing contained herein is or shall be relied upon as a promise or a representation. Neither McKinsey nor AECOM are investment advisors, and thus does not provide investment advice. This is not intended to serve as investment advice, and parties should conduct their own due diligence prior to making investment decisions.*

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- Capacity enhancement/shelf of projects (including report on National Multi-Modal Transportation Grid) with high level cost estimates for major ports
- Report on identification of sites for new port development
- Annexure: Origin destination analysis report
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- Coastal Economic Zones perspective plan
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## **VOLUME 3**

- National Perspective Plan
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- Master Plan for Chennai Port
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- Master Plan for Mormugao Port
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1. National perspective plan for Sagarmala
2. Report on government imperatives including financing plan
3. Report on Project Management Office Structure



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November 2016









सत्यमेव जयते

**MINISTRY OF SHIPPING**  
Government of India

पोत परिवहन मंत्रालय  
भारत सरकार

# SAGARMALA

National Perspective Plan

| April 2016



Port Modernisation



Port Connectivity



Port Led Industrialisation



Coastal Community Development



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# Executive summary

## Potential for coastline development in India

India is richly endowed with natural maritime advantages, with a 7,500-km coastline covering 13 states and union territories, a strategic location on key international trade routes and 14,500 km of navigable and potentially navigable waterways. Maritime logistics has been an important component of the Indian economy, accounting for 90 per cent of EXIM trade by volume and 72 per cent by value. More than 1 bn tonnes of cargo was handled across over 200 ports in FY 2015.

A robust maritime logistics sector with modern and efficient port infrastructure can be a strong catalyst of economic growth. EXIM trade can become competitive through cost-efficient and timely logistics. Coastal and inland waterway transportation is energy efficient, eco-friendly and reduces logistics costs for domestic freight. However, the Indian coastline and river network has historically remained under-leveraged. Despite significantly lower costs, water transport accounts for only 6 per cent of total freight movement in India in tonne km terms. Industrial development has not fully utilised the structural advantages of efficient supply chains leveraging proximity to coast.

Logistics costs account for a large part of the Indian non services GDP compared to developed nations. EXIM containers in India travel a distance of 700 to 1,000 km between production centres and ports, compared to 150 to 300 km in China. Lack of seamless connectivity across various logistics modes and complexity in procedures contribute to high variability in transit times. As a result, container exports take 7 to 17 days from the hinterland to vessel, compared to 6 days in China.

The high variability of transit time impacts the trade since exporters are not able to commit to tight delivery schedules and have to finance higher working capital.

Adequate road and rail connectivity linkages to ports have not been developed in tandem with port development, resulting in instances of new ports with modern facilities being underutilised due to connectivity bottlenecks. For example, one of the factors impeding the utilisation of non-major ports of southern Maharashtra is poor connectivity between industrial centres and ports. Inadequate road and rail linkages through the Western Ghats constrain North Karnataka's development. Inadequate focus on developing coastal shipping and inland waterways for domestic (non-EXIM) logistics has skewed the modal mix of transport in India with a disproportionately high share of roadways.

The siting and master planning of industrial clusters and zones (often with high EXIM traffic) does not adequately take into account proximity to ports. The port land itself is inadequately utilised for setting up industries and manufacturing. Major ports have 2.71 lakh acre of land, of which 2.35 lakh acre is underutilised. Raw material often travels a large distance from coastal areas to the hinterland and then finished products travel back from the hinterland to the coast for exports. This reduces the competitiveness of Indian exports compared to other exporting countries.

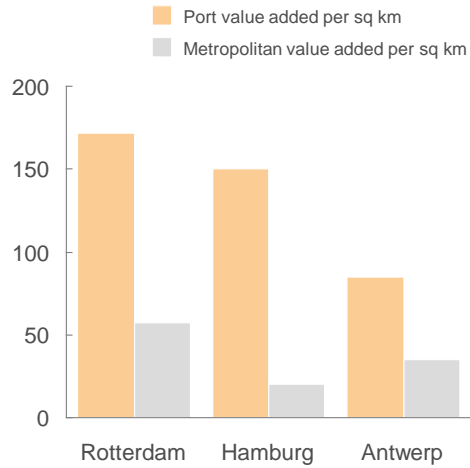
Internationally, several ports have been successful in generating higher value-add and jobs inside the port area compared to the metropolitan area (Exhibit 1). Existing policies in India for usage of port land are focused on maximising rental yields, rather than the maximisation of overall economic value-add and job creation.

## EXHIBIT 1

### Value-addition and job density inside the port area

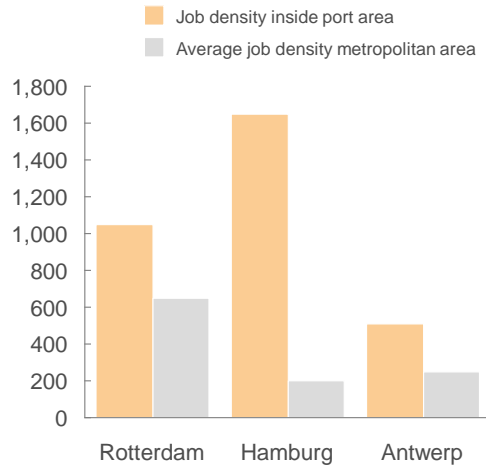
#### Port and metropolitan value added per sq km

2009, EUR mn



#### Job density

2009, Number of jobs






SOURCE: "The Competitiveness of Global Port-Cities" by OECD

Indian ports are often small, inefficient and lack the draft to accept larger sized vessels. As a result, no Indian port ranks among the

global top 20 (Exhibit 2). In addition, some ports like JNPT are congested while others do not have sufficient cargo.

## EXHIBIT 2

### Comparison of India, China, US on a few port-related KPIs

	India 	China 	US 
<b>Port capacity stock</b> (% of GDP)	1	3	10
<b>Number of shipyards<sup>2</sup></b>	7	70	45
<b>Number of ports in global top 20</b>	0	9	2
<b>Container traffic</b> (mn TEU)	11	185	44
<b>Average annual growth in container traffic<sup>1</sup></b> (mn TEU)	0.5	10	0.4
<b>Contribution of waterways in domestic transportation<sup>3</sup></b>	~6%	24%	6%
<b>Average turn-around time</b> (Days)	4.5	1	1.2

<sup>1</sup> Over 2008–2012

<sup>2</sup> That can make more than 120 mts long ships

<sup>3</sup> Includes both Coastal Shipping and Inland Waterways

SOURCE: Expert discussion; World Bank; Lloyd's list; OECD; Port technology; Clarksons



## Port-led development opportunity for India

Industrialisation positively impacts per capita income and hence the prosperity of the region. However, for industrialisation to be competitive, it needs to have effective and efficient logistics. Proximity and/or

adequate linkages to ports are important factors industry to be competitive. The opportunity from pursuing port-led development is immense in India, as evident from a comparative analysis with China (Exhibit 3). China leads India by a factor of seven times to 16 times on the measured parameters.

### EXHIBIT 3

#### Comparative impact of port-led development on economies of India and China

		India 	China 	China/India	
Size	Land mass (mn sq km)	3.3	9.6	3X	
	GDP (USD trillion)	1.9	9.2	5X	
Port-led development	Energy	Cost of energy (cents/kWh)	19	11	-42%
		Electricity production (bn kWh)	1,000	5,000	5X
		Petchem crackers (number)	07	46	7X
	Materials	Steel production (mn tonne)	87	823	10X
		Cement production (mn tonne)	280	2,480	9X
	Discrete Mfg	Container traffic (mn TEUs)	11	174	16X
Merchandise export (USD bn)		317	2,343	7X	
Services	Mobile subscribers (mn)	1,000	1,290	1X	
	Internet subscribers (mn)	354	659	2X	

The Sagarmala initiative was conceived by the Government of India to address the challenges and capture the opportunity of port-led development comprehensively and holistically. Sagarmala is a national programme aimed at accelerating economic development in the country by harnessing

the potential of India's coastline and river network. Sagarmala was articulated by the then Prime Minister Shri Atal Bihari Vajpayee in 2003 and announced by the Prime Minister Shri Narendra Modi in 2014. It was approved by the Union Cabinet in March 2015.

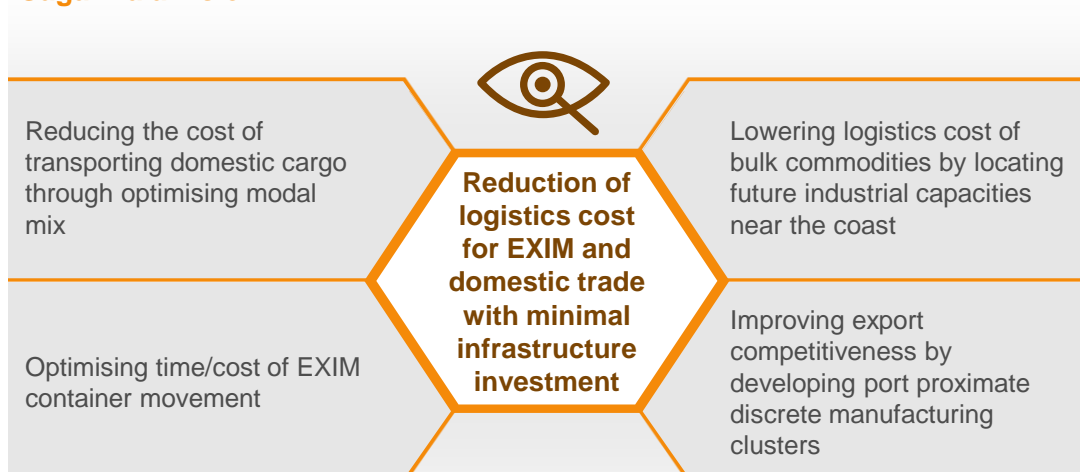
## Sagarmala vision

“The vision of Sagarmala is to reduce logistics cost for both domestic and EXIM cargo with minimal infrastructure investment.” Studies under Sagarmala have identified opportunities for reducing overall logistics costs, thereby improving the overall efficiency of the economy and increasing competitiveness of exports. A multi-modal logistics optimisation model has been developed to identify the most optimal mode of evacuation to/from ports for both EXIM and domestic cargo. The model suggests substantial opportunities for logistics optimisation.

Based on these studies, Sagarmala can aspire to reduce logistics costs for EXIM and domestic cargo leading to overall cost savings of INR 35,000 to 40,000 cr. Some of this will be direct cost savings, while others are savings from inventory-handling costs resulting from time (and reduced variability) in transportation of goods, particularly containers. These cost savings apply to current industrial capacities as well as future coast proximate capacities for energy, material, marine and discrete industries that could come up through port-linked industrialisation. Four main strategies have been identified for achieving the overall vision of logistics cost-reduction (Exhibit 4), and their impact is depicted in Exhibit 5.

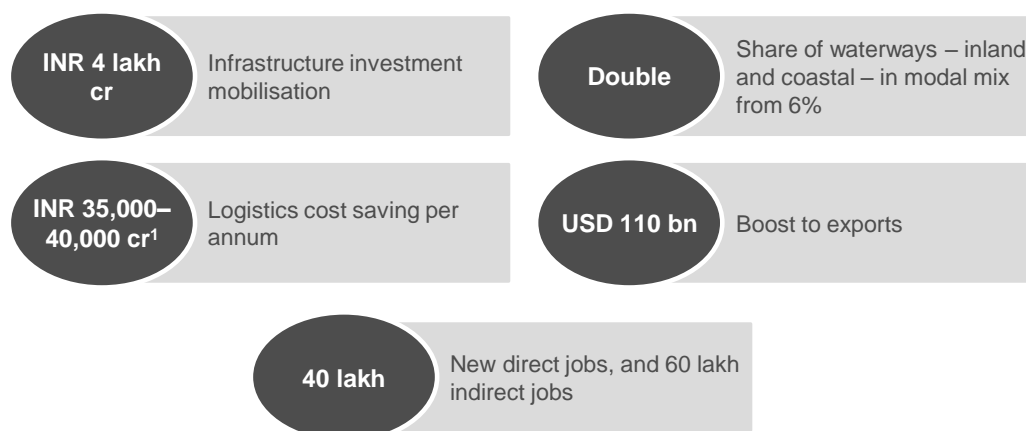
### EXHIBIT 4

#### Sagarmala vision



## EXHIBIT 5

### Impact from Sagarmala – 2025



<sup>1</sup> Savings from coastal shipping of coal – 17,000 to 18,000 Cr  
Savings from coastal shipping of steel, cement, food grains and fertilisers - 11,500 to 13,500 Cr  
Savings from modal shift and time and variability reduction of containers - 7,000 to 9,000 Cr

#### 1. Reducing the cost of transporting domestic cargo through optimising modal mix<sup>1</sup>

The cost per tonne kilometre of moving cargo by sea or inland waterway routes can be 60 to 80 per cent lower than by road or rail. However the modal share of coastal shipping and inland waterways remains low. Several production and demand centres in India lie close to the coastline and rivers, yet the waterways are underutilised. The study found significant potential for moving raw materials and finished products between these centres using coastal shipping and inland waterways instead of rail or road.

For example, coastal shipping can play a significant role in lowering the delivered cost of domestic thermal coal. It is estimated that for power plants located 800 to 1,000 km away from coal mines, the cost of coal logistics can contribute up to 35 per cent of the cost of power at the bus bar. Coastal power plants in Andhra Pradesh and Karnataka are currently receiving coal from Mahanadi Coalfields by railways, but could

save significantly by taking coal on the rail-sea-rail (RSR) route. It is estimated that 100 to 130 mn tonnes of coal could move through the RSR route to these plants by 2020, resulting in annual savings of over INR 10,000 cr to the power sector. In addition, up to 50 mn tonnes could be moved coastally for non-power thermal coal users (for example, cement, steel, aluminium plants). This increases further in 2025 (Exhibit 6). Other commodities such as steel, cement, fertilisers and food grains could also be moved coastally to the extent of about 60 mn tonnes by 2025. Further, about 20 mn tonnes of petroleum products could be moved coastally from refineries in Gujarat and Odisha to demand centres in Tamil Nadu and Andhra Pradesh.

In addition, an estimated 60 to 70 mn tonnes of cargo can also be moved over inland waterways (with focus on NW1, NW2, NW4 and NW5) by 2025.

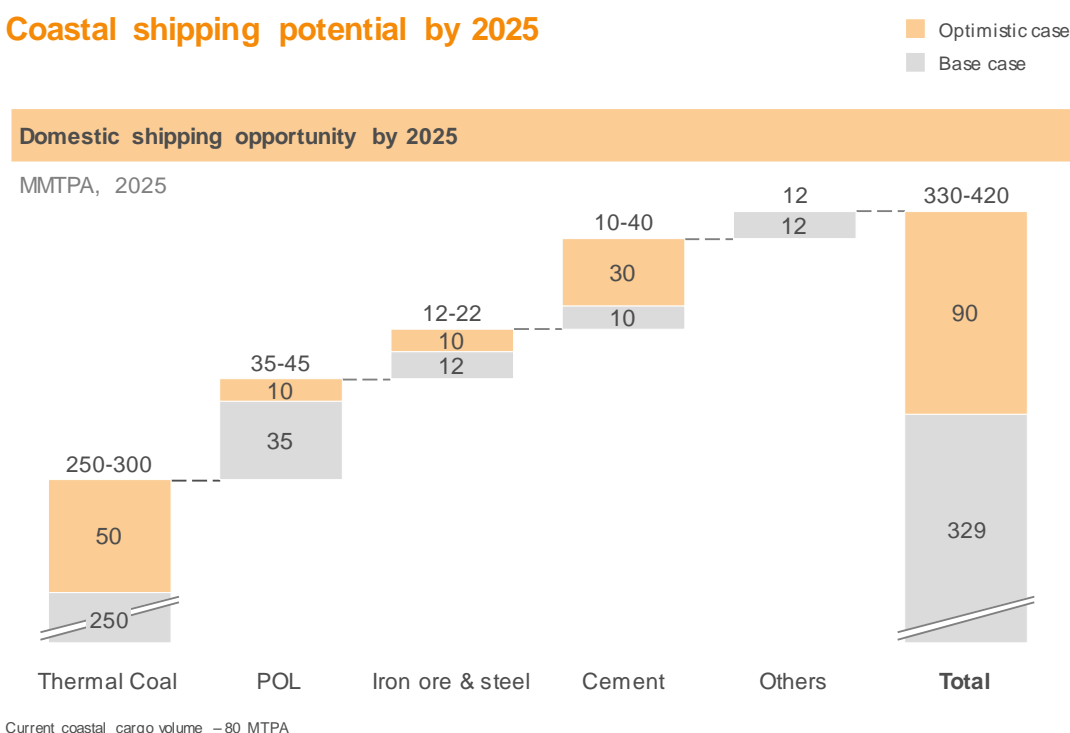
The change in modal mix could also lead of emission savings of about 3.5 per cent of total freight sector emissions.

<sup>1</sup> Detailed methodology and sources in the subsequent chapters



## EXHIBIT 6

### Coastal shipping potential by 2025



## 2. Lowering logistics costs of bulk commodities by locating future industrial capacities near the coast

For industries in which logistics costs of bulk raw materials, intermediates or finished goods form a significant component of the cost of goods sold, locating future capacities at or near coastal locations could be a lever for designing efficient supply chains. Some examples of such industries include oil refining (especially in India where 75 to 80 per cent of crude oil is imported), power, cement/clinker, steel (and raw materials like pellets). Future capacities could be developed in competitive coastal locations either close to end markets or close to raw material sources. This could reduce the overall logistics costs and eventually the cost of the end product.

As a result of this, coastal shipping volumes could grow to 5 times of current levels to about 330 to 420 mn tonnes by 2025. This would save logistics costs of about INR 23,000 to 25,000 cr per annum and free up over 2 to 2.5 lakh rail-rake days.

Unlocking the full potential of coastal shipping in India would require the execution of a set of coordinated projects across multiple stakeholders. For example, for realising the potential of coastal shipping of coal, required projects include expansion of port capacity in Paradip/Dhamra, expansion of railway capacity connecting Talcher/Ib Valley to Odisha ports and creation of end-to-end logistics service providers.

## 3. Optimising time/cost of EXIM container movement

The total cost of EXIM container movement in India is significantly higher compared to other countries (Exhibit 7). The transit time is highly variable (seven to 17 days), making it difficult for exporters to plan container logistics and to commit to tight deadlines to their customers. The high transit time results in higher levels of inventory along the supply chain. Some of the root causes of sub-optimal container movement include:

- Skewed modal mix: Container movement of above 500 km by road

instead of railways. Road has more than 80 per cent share of traffic while railways has less than 20 per cent share

- Complicated and time consuming procedures for customs and interstate border formalities

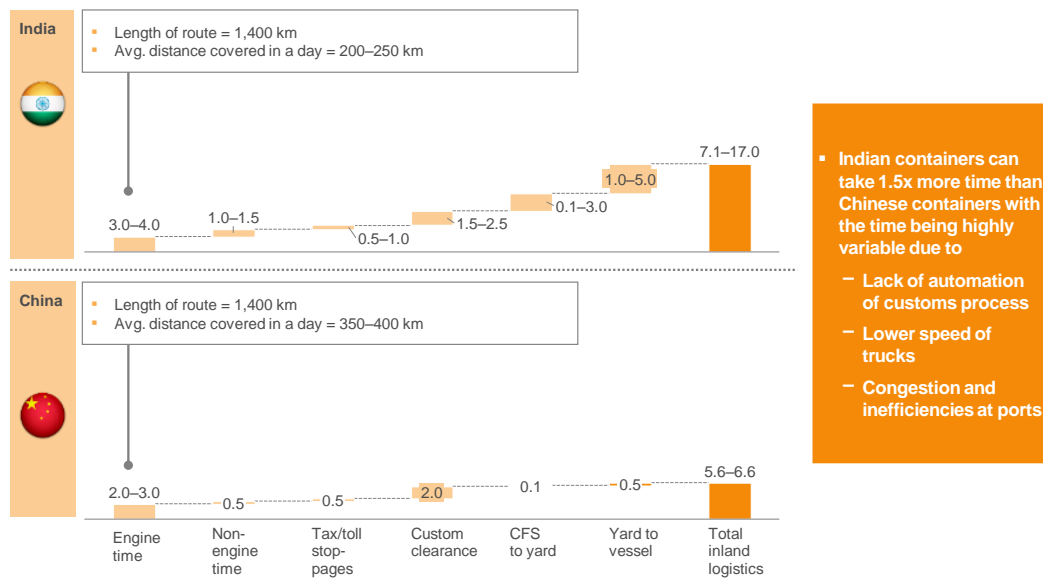
- Infrastructure bottlenecks at ports, roads and Inland Container Depots (ICDs) resulting in overall lower speed of transit

### EXHIBIT 7

#### Comparison of end-to-end time of transporting a container in India and China by road on similar routes

BOTTOM UP ANALYSIS FOR ROAD TIME

Days/TEU



1 Ocean distance = 6,658 NM

SOURCE: Expert discussions

Optimising time and cost for transporting export containers would improve the competitiveness of exports. A total of five days of export time and an average cost of INR 1,000 to 1,500 per container can be saved on container exports. The range of actions to realise this opportunity include:

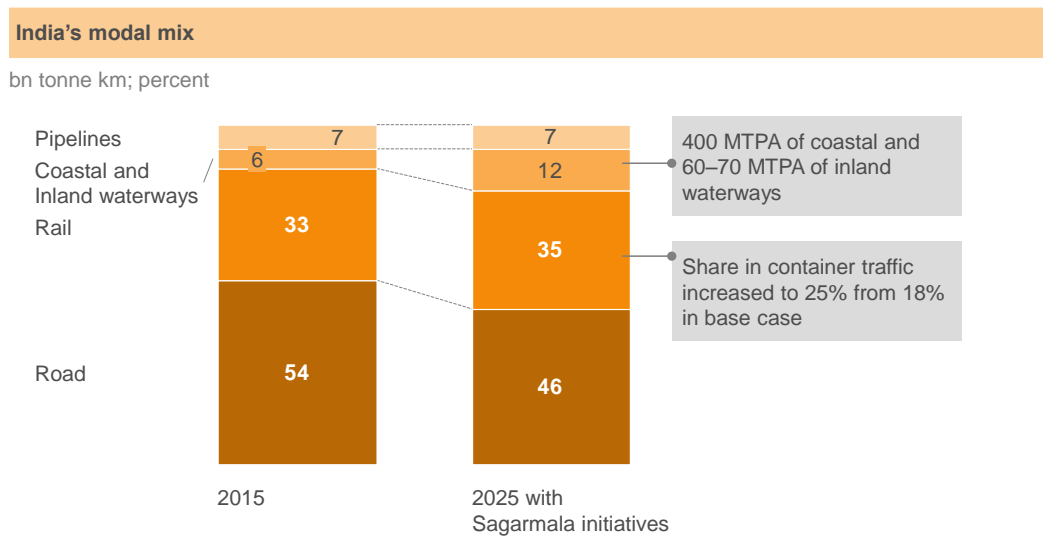
- Increasing modal share of railways from current 18 per cent to at least 25 per cent through rationalisation of railway freight rates (Exhibit 8), to make rail movement economical relative to road movement for longer lead distances
- Extending the reach of Western Dedicated Freight Corridor (DFC)

connectivity through building spur lines connecting additional ports in Gujarat and Maharashtra

- Expressways in select high volume road corridors
- Greater automation and streamlining of clearance procedures
- Creation of additional multimodal logistics hubs and ICDs
- Milk run railway services of container trains between ICDs.

### EXHIBIT 8

#### Sagarmala could help in optimising India's modal mix



#### 4. Improving export competitiveness by developing port proximate discrete manufacturing clusters

The weighted average of distance between the manufacturing hinterlands and the port for India is 700 to 800 km compared to 150 to 300 km in China. Even though India fares better than China in transportation cost for a comparable distance, the longer hinterland to port distance leads to higher costs for exporting/importing a container in India.

International experience suggests that India can leverage export-oriented/import-substituting discrete manufacturing for creating economic activity in coastal areas. Port-based or port-proximate manufacturing can play a pivotal role in supporting this initiative. This study identified focus sectors for port-based or port-proximate manufacturing. Six sectors—electronics, furniture, automotive, apparel, leather and footwear and food processing—offer high potential. These sectors can have strong port linkages in terms of value-to-weight ratio and time sensitivity.

## Projects identified under Sagarmala

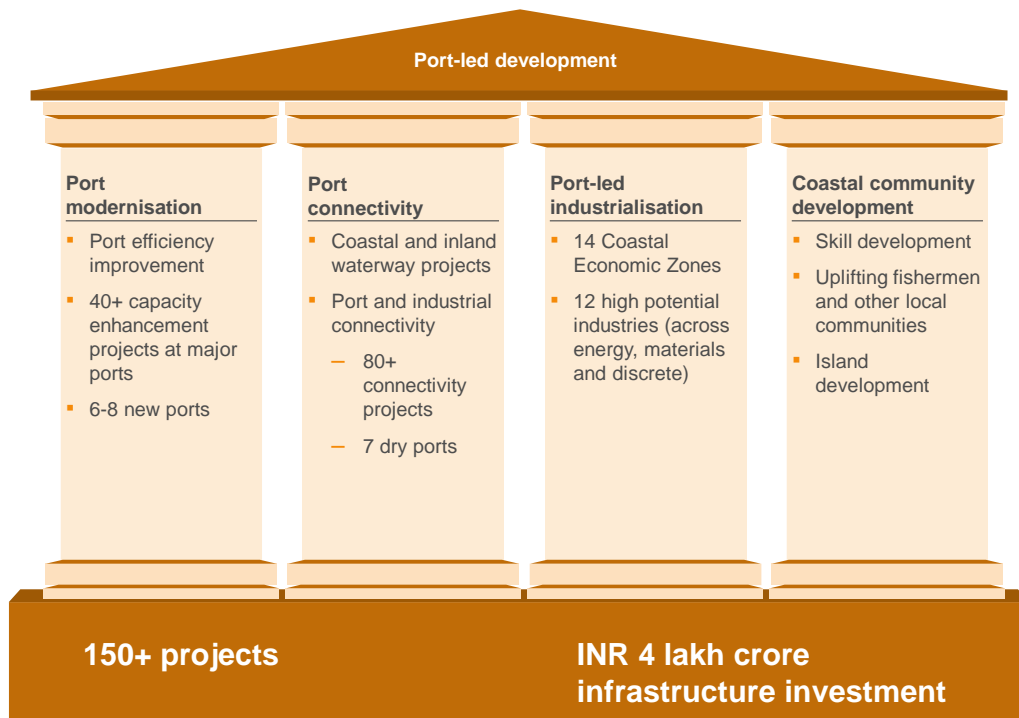
The concept of “port-led development” is central to the Sagarmala vision. Port-led development focuses on logistics-intensive industries (where transportation either represents a high proportion of costs, or timely logistics is a critical success factor). These industries can be structurally competitive if developed proximate to coast/waterways. They would be supported by efficient and modern port infrastructure and seamless multi-modal connectivity. The population in adjoining areas would be sufficiently skilled to participate in the economic opportunities on offer. The synergistic and coordinated development of

the above four components—logistics intensive industries, efficient ports, seamless connectivity and requisite skill base—leads to unlocking economic value.

The Sagarmala National Perspective Plan (NPP) has identified a range of projects and enablers under these four pillars, which can unlock the opportunities for port-led development (Exhibit 9). The rest of this section summarises the key findings and projects associated with each pillar. Over 150 projects have been identified across these four pillars. Executing these projects could mobilise an investment of INR 4 lakh cr in the infrastructure sector. An additional investment of INR 7 to 8 lakh cr could be in the industrial and manufacturing sectors.

### EXHIBIT 9

#### Sagarmala: Port-led development



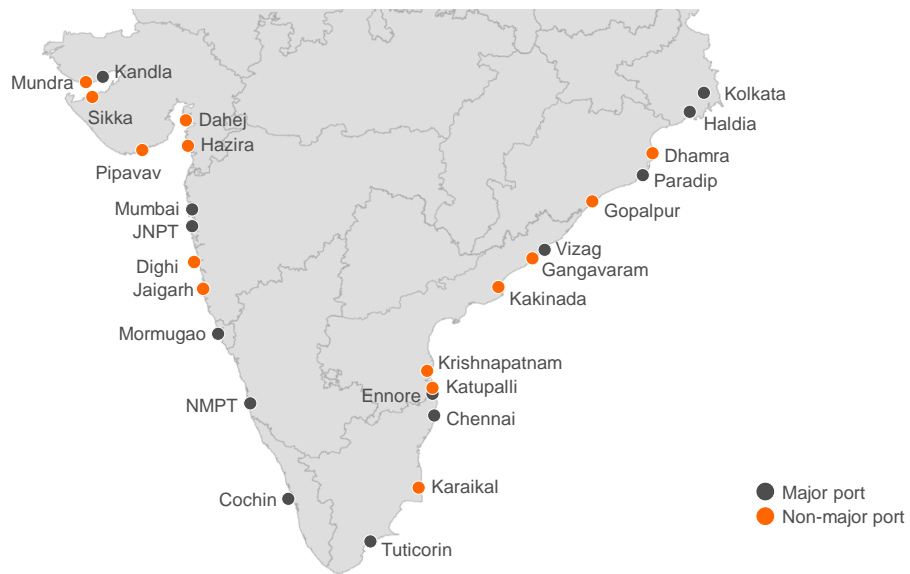
5. **Port modernisation: Build port capacity with world-class quality and right quantity**

Increasing port efficiency facilitates trade. India has a coastline of around 7,517 km

with 12 major ports and around 200 notified non-major ports (Exhibit 10). The ports are important intermodal units, acting as the interchange point for two modes — sea and land (Exhibit 11).

**EXHIBIT 10**

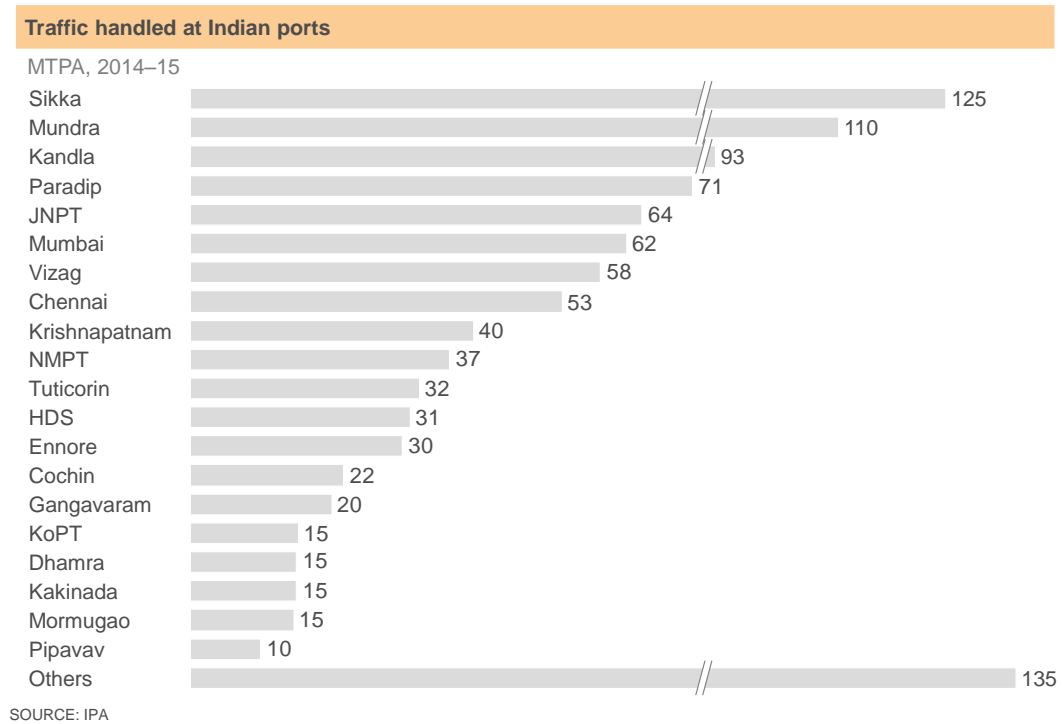
**Prominent ports of India**



SOURCE: IPA

## EXHIBIT 11

### Traffic handled at Indian ports



Indian ports are generally small—most lack the necessary draft to handle the largest (cape sized) vessels. The average size of a container vessel calling at Indian ports is around 5,000 TEUs<sup>2</sup> while for China it is around 12,000 TEUs. At JNPT—India’s biggest container port—draft is 14 m while a cape size vessel requires upwards of 16 m. Around 25 per cent of India’s container cargo is transhipped through international transshipment ports.

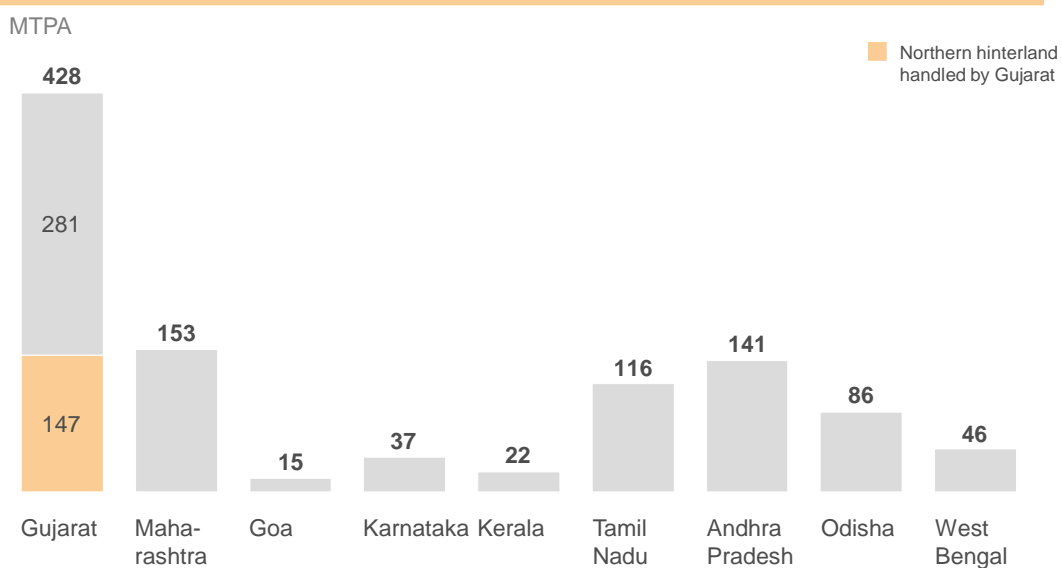
In 2014–15, Indian ports handled ~1,050 MTPA of cargo, growing at a rate of 4.5 per cent per annum. Western coast ports handle more than 60 per cent of the total cargo owing to the large northwest hinterland (Exhibit 12).

<sup>2</sup> Ports data

## EXHIBIT 12

### State-wise cargo traffic in 2015

#### Traffic at major and non-major ports



SOURCE: Updated basic port statistics

Projected cargo volume at Indian ports by 2025 is estimated at 2,500 mn MTPA (Exhibit 13). The detailed methodology for

the cargo and port capacity projections is in the details of the NPP.

## EXHIBIT 13

### Cargo volume growth at Indian ports by commodities

MTPA

Commodity	2014	2025		
		Base	Optimistic	Total
POL	351	460	80	540
Coal	231	850	128	978
Containers	115	323	53	375
Others	275	527	80	607
<b>Total<sup>1</sup></b>	<b>972</b>	<b>2,160</b>	<b>341</b>	<b>2,500</b>

<sup>1</sup> Numbers may not add up due to rounding

Much of the growth may come from coastal shipping of bulk commodities. While EXIM cargo will double over the next decade to

~1,671 MTPA, the share of coastal shipping can increase five times, taking its share in port traffic from the current 15 per cent to over 33 per cent (Exhibit 14).

**EXHIBIT 14**

**EXIM and domestic shipping cargo growth**

MTPA

Commodity	2014	2025		
		Base	Optimistic	Total
EXIM	820	1,511	161	1,671
Domestic shipping	150	649	180	829
<b>Total</b>	<b>970</b>	<b>2,160</b>	<b>341</b>	<b>2,500</b>

Catering to the increasing traffic over the next 10 years will require augmenting capacity. Cargo traffic at the ports is expected to be 1,650 MTPA in 2020 and reach 2,500 MTPA by 2025.

To cater to this demand, the ports will need to create additional capacity (Exhibit 15) by:

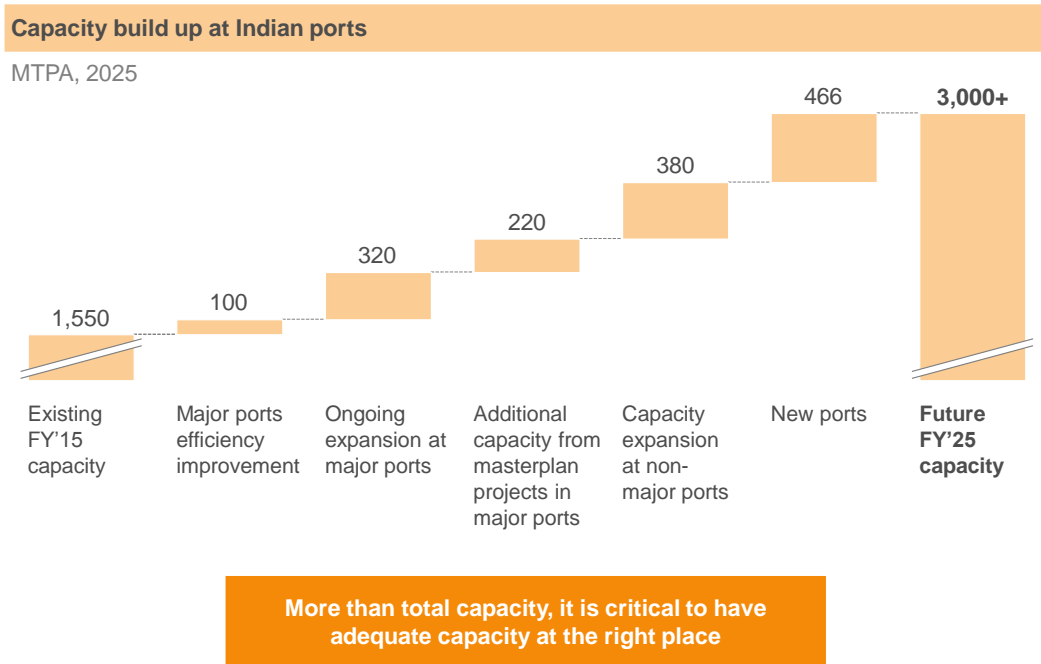
- Unlocking 100 MTPA capacity at existing terminals of major ports through improved efficiency

- Increasing capacity at existing major ports through mechanisation and building new terminals
- Increasing capacity at existing non-major ports through mechanisation and building new terminals
- Building six to eight greenfield ports.



**EXHIBIT 15**

**Capacity build up at the ports to meet the 2025 demand**

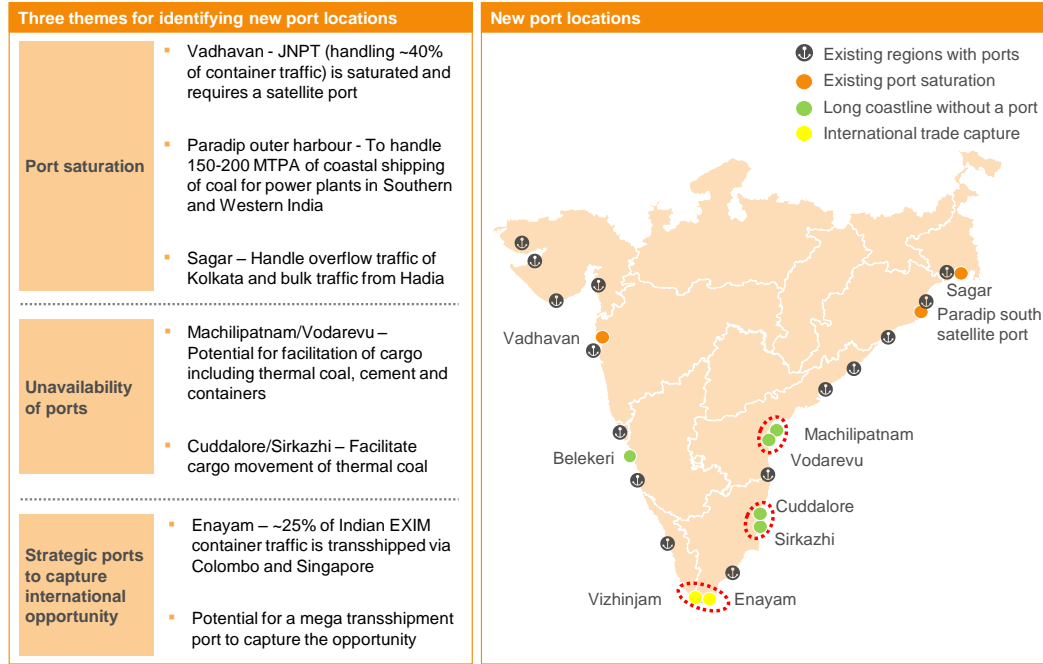


New ports could potentially be created at Sagar in West Bengal, Paradip Outer Harbour in Odisha, Enayam in Tamil Nadu and Vadhavan in Maharashtra. In addition,

potential has been identified for new ports to come up in central Andhra Pradesh, south-eastern Tamil Nadu, and possibly northern Karnataka (Exhibit 16).

**EXHIBIT 16**

**6-8 potential new ports based on three themes have been identified that could add upto 400 MTPA**



As part of Sagarmala, detailed masterplans have been developed for all major ports and

capacity expansion projects have been identified (Exhibit 17).

**EXHIBIT 17**

**Capacity expansion plan at major ports**

Capacity expansion at major ports					
S. No.	Name	Existing Capacity (MTPA)	Ongoing expansion	Additional capacity from Master Plan projects	Capacity (MTPA)
1.	Kandla	121.4	24.5	55.0	185.9
2.	Mumbai	44.5	29.5	4.0	48.5
3.	JNPT	79.4	60.0	45.0	124.4
4.	Mormugao	43.8	0.0	35.0	78.8
5.	Kamarajar(Ennore)	37.0	42.0	3.0	82.0
6.	Chennai	86.0	0.0	12.0	98.0
7.	V.O. Chidambaranar	44.6	38.9	30.6	75.2
8.	New Mangalore	77.8	6.7	5.5	90.0
9.	Cochin	49.7	4.1	2.0	51.7
10.	Visakhapatnam	96.8	38.8	8.0	143.5
11.	Paradip	119.8	65.6	10.0	195.4
12.	Kolkata Port Trust	70.9	10.8	12.0	82.9
<b>Total capacity (MTPA)</b>		<b>871.5</b>	<b>320.9</b>	<b>222.1</b>	<b>1,414.5</b>

## 6. Connectivity across pipeline, water, rail and road

Port connectivity is the second pillar of the port-led development model under Sagarmala. It aspires to provide the most optimal mode of evacuation to/from ports for both EXIM and domestic cargo. For example, the intermodal transportation network of rail, inland shipping, road, short sea and pipelines gives the Port of Rotterdam the best possible connections to the rest of Europe—transit times to most destinations is less than 24 hours. Superior connectivity has helped the Port of Rotterdam to become the largest sea port in Europe handling more than 450 MTPA of cargo.

Providing adequate connectivity to ports is a challenge in India. Even modern ports that have world-class equipment can have their turnaround times hamstrung because of poor connectivity. The main challenges to port connectivity are underleveraging of domestic waterways, severely constrained rail infrastructure along key routes, sub-optimal modal mix for container freight, poor connectivity to west coast ports through the Western Ghats, lack of coordinated end to end planning for bulk logistics and constrained last-mile connectivity between ports and key industrial hinterlands.

India's hinterland connectivity is mainly based on road and rail networks with domestic waterways, both coastal shipping and inland routes, playing a limited role. Pipelines are predominantly used for transporting crude oil, refined petroleum products and natural gas. Chapter 3 of the detailed National Perspective Plan talks about reinventing the modal mix through pipelines, waterways, roads and railways.

Pipelines are an effective means of transporting liquid cargo to and from ports; the cost of transporting the product by pipeline could be about 10 to 15 per cent of that by rail. Currently most of the pipelines

are operating at utilisation levels of more than 90 per cent; therefore, any increase in refineries capacity has to be matched by pipeline expansion. With this in mind, potential pipelines projects have been outlined for capacity enhancement and expansion—expansion of Salaya–Mathura pipeline, new pipeline from Paradip to Hyderabad, etc.

Freight transportation by waterways is highly underutilised in the country as compared to the US, China and the EU. For example the Yangtze River system is one of the most developed inland waterways navigation systems with 13 waterways and 92 ports, and generates as much as 20 per cent of China's GDP. The Port of Shanghai is located in the vicinity of Shanghai, at the confluence of Yangtze, Huangpu and Qiantang rivers and handled 35 mn TEUs in 2014<sup>3</sup>, most of which originates in the industrial clusters located in the Yangtze valley. Similarly in India, NW1, NW2, NW4 and NW5 can be developed to play an important role in cargo movement.

Railways is the mainstay for carrying long lead distance and bulk cargo. Expansion of the rail network has not been able to keep up with the growing demand. In the last five years, the rail network has grown at ~0.7 per cent. Most of the routes carrying bulk cargo (like thermal coal) are constrained and running at high utilisation. The evacuation network in Odisha and Chhattisgarh is much lower than projected requirement, while the Western Ghats hamper connectivity of the ports to the main rail line. To transport the large volumes of thermal coal from MCL via coastal shipping to coastal power plants in southern India, a heavy haul rail line from Ib Valley/Talcher to Paradip/Dhamra port could be developed. Connectivity of Mormugao port to Hospet/Bellary could also be taken up on priority. Several specific last-mile connectivity projects like spur lines to

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<sup>3</sup> Shanghai port

connect the ports to DFC, connectivity to Dhamra, Gopalpur, Krishnapatnam, Tuticorin ports are needed.

By investing in the short first- and last-mile rail connectivity projects, a sizeable investment in point to point rail network can be avoided. This will also unlock coastal shipping potential of bulk commodities like thermal coal. High freight rates due to cross-subsidisation and low priority for goods trains have made the railways uneconomical for container movement—shippers prefer moving long distance containers also on road. Right pricing of railways, last mile connectivity to DFC, additional inland container depots, and the prioritisation of container rakes could increase the share of rail in the modal mix of containers and also reduce the transit time by five to six days, making Indian trade more competitive.

Road is economical compared to rail for covering distances up to 1,000 km from the port, but the current condition of highway stretches is inconsistent. Moreover, the Indian coastline does not have a coastal road network. To make roads more effective as a mode of cargo movement, 10 potential highway stretches have been identified as freight friendly expressways. In addition to this, the Government of India has undertaken the Bharatmala programme which will also help in joining coastal regions through road links. Close to 70 road projects

have been identified to improve connectivity to the ports. These include road connectivity of JNPT to industrial hinterland, last-mile connectivity to ports on the Western Ghats, connectivity to new potential port locations like Enayam, Vadhavan, Sagar, Central Andhra and Central Tamil Nadu ports (Exhibit 18).

Additionally, as part of a logistics efficiency enhancement programme, multiple initiatives could be explored to improve India's logistics performance—logistics park development, corridor upgradation, procedural complexity reduction, 3PL service to provide ecosystem development, etc.

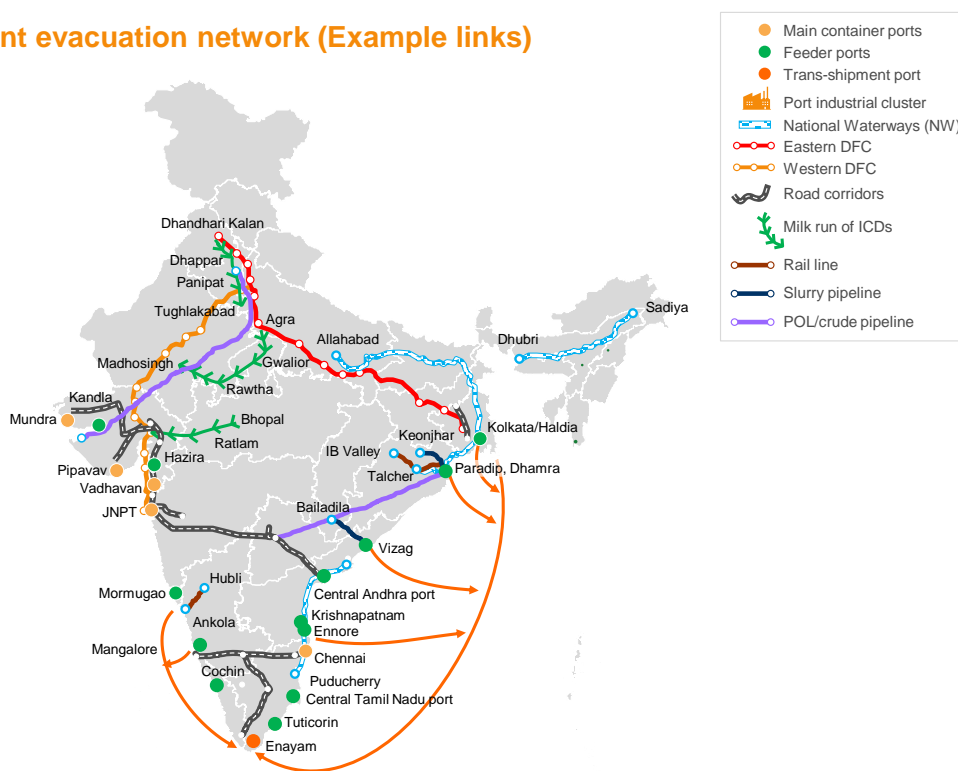
Customs procedures at ports could also be made more efficient by facilitating online submission of documents and forms; simplifying the process to become an accredited importer/exporter; a specialised clearance system for accredited importers/exporters; obtaining more scanning equipment and different treatment of coastal and EXIM cargo.

With the proposed connectivity projects and initiatives, there can be a significant change in the modal mix of cargo with minimal investment. These connectivity projects will require an approximate investment outlay of INR 2 lakh cr.

## EXHIBIT 18

### Efficient evacuation network (Example links)

FY 25



## 7. Port-led industrialisation to support Make in India

Port-led industrialisation is the third pillar of the port-led development model. Ports play a crucial role in reducing logistics costs and facilitate export-oriented manufacturing by reducing export time and variability. Several countries with large coastlines have leveraged ports for aiding industrialisation.

A comprehensive plan for port-led industrialisation has been proposed as part of Sagarmala which combines the growth potential of specific industries that have port linkages with the competitive location for each industry. These locations have also been mapped to the relevant major and non-major ports in the region that can most optimally facilitate the movement of cargo from the industrial locations.

Twelve major industries covering energy, material and discrete manufacturing have been identified on the basis of suitability of ocean mode of transportation for imports of raw materials or exports of finished products. Competitive locations for each of

these industries have also been shortlisted with the aim to reduce the overall logistics costs. Other factors of production that impact competitiveness like availability of raw material and skills, supporting infrastructure and existing industrial agglomeration have also influenced the selection of locations. This has been aligned with state industrial plans. Similarly, existing and proposed ports have been mapped which can most optimally serve the proposed industrial locations. Major and non-major ports, industrial units and evacuation infrastructure have hence been linked into a single system at a regional level through the concept of Coastal Economic Zones (CEZs).

The port-led industrialisation programme will be delivered through the CEZs, which will be the focal point for development along India's coastline. 14 CEZs (Exhibit 19) have been identified along the coastline of the country, with each coastal state having one or more CEZs. These CEZs have been geographically mapped covering one or more districts, and specific industrial

clusters relevant for each CEZs have been proposed.

The industrial clusters within the CEZ fall into one of three archetypes of energy, materials and discrete manufacturing. In each archetype the underlying logic is that lower cost of movement by waterways can increase the competitiveness of manufacturing if located proximate to ports.

**Energy clusters:** To meet India's projected long-term energy needs, three coastal power clusters and one to two coastal refinery clusters could be developed by 2025. In addition, there is potential for 3 to 4 new petrochemical clusters with the target of reducing import dependence through domestic petrochemical production.

**Bulk clusters:** Similarly in bulk materials such as steel and cement, Sagarmala has identified the potential for setting up medium to long term incremental capacity in coastal regions. An estimated 40 MTPA of

steel and 40 MTPA of new cement capacity can be coastally located by 2025. This will help to save logistics costs by up to INR 1,000 per tonne and make domestic manufacturing more competitive.

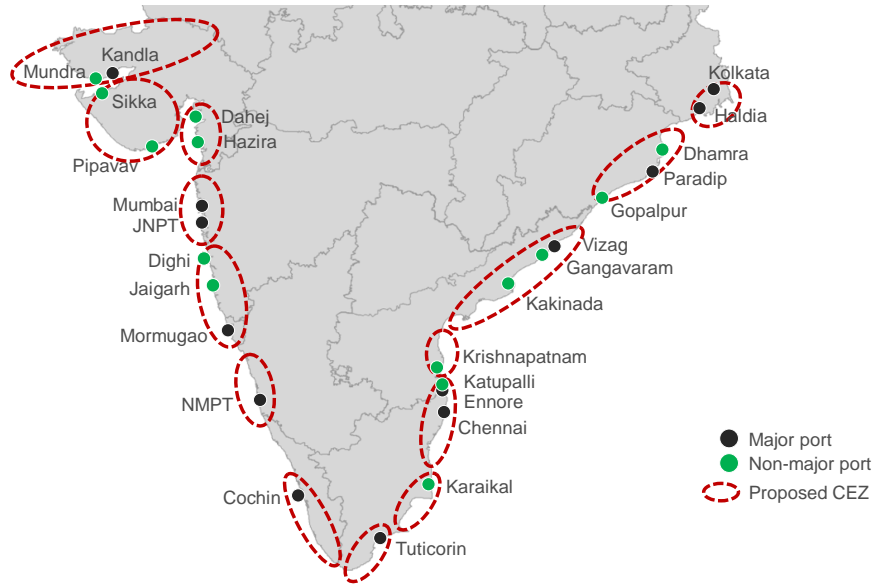
**Discrete manufacturing:** India has set itself a target of boosting exports from USD 465 bn in 2014–15 to USD 900 bn by 2020. Merchandise exports would continue to form a significant share of total exports. Discrete manufacturing clusters aim to support this aspiration with strong linkages between existing and announced clusters and corridors, e.g., Vizag–Chennai Industrial Corridor being developed by DIPP. Based on an analysis of global and domestic trade flows, India's competitiveness and linkages with ports, six discrete manufacturing sectors (including automotive) can promote port-based/port-proximate manufacturing. These are food processing, automotive, electronics, apparel, leather products and footwear, and furniture.

### List of high potential industrial clusters

S No	Proposal	Investment in land (INR cr)	Investment in basic infrastructure (INR cr)	Potential industrial investment (INR cr)	Employment potential (lakh)	Incremental GDP (INR cr)
1	2 refinery and petrochemical clusters	7,200	1,200	45,000	0.1	20,000
2	4 gas-based petrochemicals clusters	1,500	250	16,000	0.3	5,500
3	3 coastal power clusters	20,000	3,500	75,000	0.2	15,000
4	2 steel clusters	18,000	3,000	1,35,000	2.5	80,000
5	2 marine clusters	6,000	1,000	40,000	2.5	10,000
6	2 cement clusters	1,300	200	50,000	0.1	9,000
7	2 food processing clusters	4,300	700	50,000	3	9,000
8	2 science and technology clusters (electronics, instruments)	6,000	1,000	1,40,000	7	60,000
9	3 apparel clusters	8,500	1,500	50,000	10	20,000
10	1 automotive cluster	4,000	700	55,000	2.5	25,000
11	3 leather and footwear clusters	5,000	1,000	25,000	6	13,000
12	3 furniture clusters	6,000	1,000	60,000	4.5	20,000
	<b>Total</b>	<b>~85,000–90,000</b>	<b>~12,000–15,000</b>	<b>~7,00,000–8,00,000</b>	<b>~40</b>	<b>~3,00,000</b>

**EXHIBIT 19**

**Proposed coastal economic zones**





Each of these CEZs is also mapped to the nearby ports. The table below gives details of the geographical coverage, port linkages,

potential industries as well as sample projects in the CEZ.

### List of Coastal Economic Zones

	CEZ	Potential districts	Port	Possible industries	Sample projects
1	Kachchh – Gujarat	Kachchh	Kandla, Mundra	Petrochemicals, cement, furniture	LPG import terminals, container and bulk terminals at Kandla port
2	Saurashtra – Gujarat	Junagarh, Amreli, Bhavnagar, Ahmedabad	Pipavav, Sikka	Apparel, automotive	Connection of western DFC to Pipavav, expressway from Sarkhej to Pipavav
3	Suryapur – Gujarat	Bharuch, Surat, Navsari, Valsad	Dahej, Hazira	Marine clusters	Connection of western DFC to Hazira, Ro – Pax Ferry Services between Gogha and Dahej
4	North Konkan – Maharashtra	Nashik, Thane, Mumbai, Pune, Raigarh	JNPT, Mumbai	Power, electronics, apparel	Vadhavan port, Expressway from Ahmedabad and Dighi to JNPT, terminals in Nhava Creek
5	South Konkan – Maharashtra	Ratnagiri, Sindhudurg, North Goa, South Goa	Dighi, Jaigarh, Mormugao	Refining, steel, food processing	Upgradation of SH164 to connect Jaigad port to NH17, Connectivity of NH17 to north and south banks of Dighi port
6	Dakshin Kanara – Karnataka	Udupi, Dakshin Kannada, Kodagu, Mysore	Mangalore	Petrochemical	Railway line from Belekeri port to Ankola, food grain and fertiliser handling facility in NMPT
7	Malabar – Kerala	Ernakulam, Alappuzha Kollam, Thiruvananthapuram	Kochi	Furniture	Food grain import terminal, fertiliser bagging facility
8	Mannar – Tamil Nadu	Kanyakumari, Tirunelveli, Thoothukudi	Tuticorin	Apparel, refining	Enayam port, Expressway to Enayam, road to Hare island, container berth at Tuticorin

	CEZ	Potential districts	Port	Possible industries	Sample projects
9	Poompuhar – Tamil Nadu	Cuddalore, Perambalur, Ariyalur, Tiruchirappallu, Thanjavur, Thiruvavur, Nagapattinam	Cuddalore	Leather processing, power, refining	Sirkazhi/Cuddalore port, road connectivity to Cuddalore port
10	VCIC South – Tamil Nadu	Thiruvallur, Chennai, Kancheepuram	Chennai, Ennore and Katupalli	Petrochemicals, electronics, steel, shipbuilding	LNG import terminal, rail link to KPL, MLT-2 at Ennore
11	VCIC Central – Andhra Pradesh	Chittoor, Nellore	Krishnapatnam	Electronics	Upgradation of road connecting Krishnapatnam port to Nellore city, road to Krishnapatnam Port from Naidupeta
12	VCIC North – Andhra Pradesh	Guntur, Krishna, West Godavari, East Godavari, Visakhapatnam, Vizianagaram, Srikakulam	Vizag, Kakinada	Petrochemicals, cement, apparel, food processing	Machilipatnam/Vodarevu port, Oil jetty at Vizag, road from Machilipatnam to NH-SH-46
13	Kalinga – Odisha	Puri, Jagatsinghapur, Cuttack, Kendrapara, Jajapur, Bhadrak	Paradip, Dhamra	Petrochemicals, marine processing	Paradip outer harbour, IWT terminal, heavy haul, LPG import terminal
14	Gaud – West Bengal	Purba Medinipur, South twenty Parganas	Kolkata, Haldia	Leather processing	Sagar port, ICD, LPG import terminal, expressway from Durgapur to Haldia

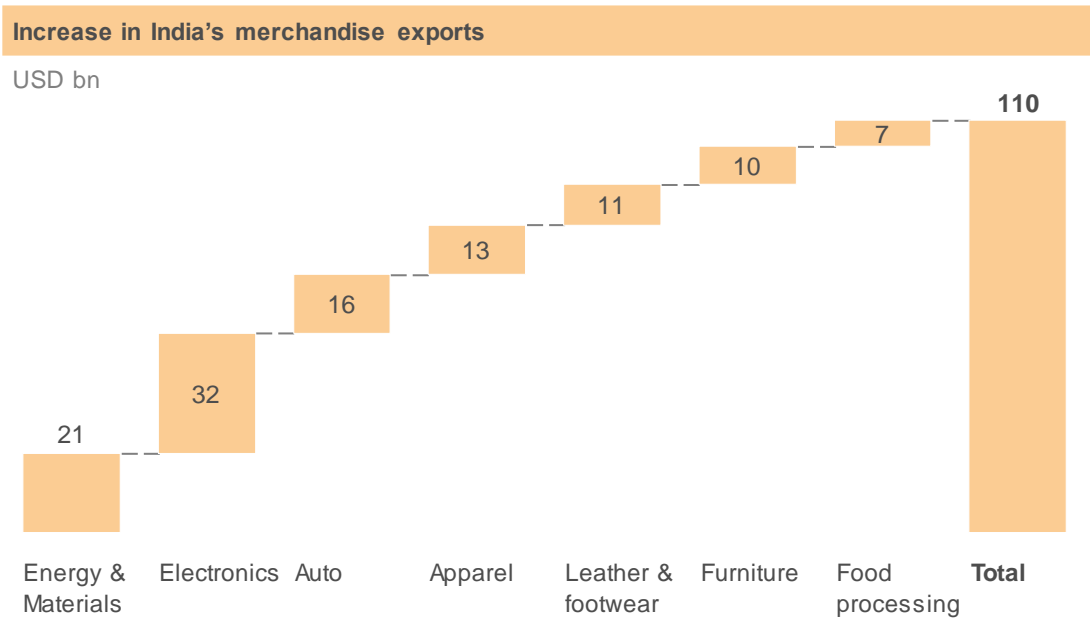
All 14 CEZs come under the influence area of one or more major or non-major ports. The influence area is considered flexible and districts covered under the CEZ could change.

These CEZs are also demarcated to align with the planned industrial corridors (e.g., DMIC, VCIC, CBIC, BMEC, AKIC). CEZs can add over USD 110 bn to Indian merchandise exports only through the identified high potential industries (Exhibit

20). It is envisaged that of the 14 CEZs, a few could be taken up as early pilots with learnings from these replicated across other CEZs. These early pilot CEZs should be shortlisted on the basis of availability of large contiguous land parcels, existing industrial base, access to urbanisation and supporting infrastructure, strong industrial potential for high-potential industries, availability of deep draft container terminals and strong state support and participation.

**EXHIBIT 20**

**Sagarmala projects could add USD 110 bn to India’s merchandise exports**



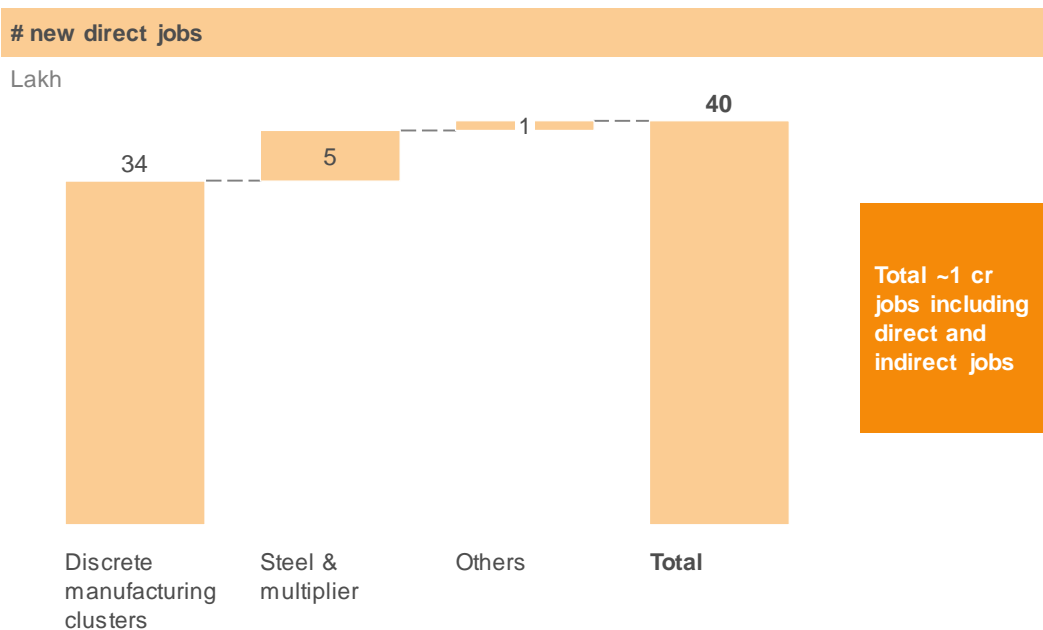
SOURCE: ITC trade map – 2015 base data used for projections

These clusters, put together, could generate 40 lakh direct jobs and about 60 lakh indirect jobs (Exhibit 21). Setting up the manufacturing clusters would require an infrastructure investment of about INR 1

lakh cr to develop the basic infrastructure in the CEZs. The proposed industries would require an additional industrial investment of about INR 7 to 8 lakh cr.

**EXHIBIT 21**

**40 lakh potential new direct jobs through Sagarmala**



SOURCE: ASI data used for projections

## 8. Development of coastal communities and matching skills with opportunities

Approximately 18 per cent of India's population<sup>4</sup> lives in the 72 coastal districts<sup>5</sup> that comprise 12 per cent of India's mainland. Since these people are critical stakeholders in the Sagarmala Programme's "port-led development" agenda, ensuring their socio-economic well-being is one of the programme's key objectives. However, the pace of socio-economic development among the maritime states has not been uniform in terms of per capita income, poverty, and infrastructure. Hence, there is a need for holistic and sustainable development of coastal communities.

Port-led industrialisation can be the engine of sustainable development of coastal communities and provide direct and indirect benefits to the coastal region. An OECD report<sup>6</sup> estimates that one tonne of port throughput is on an average associated with USD 100 of economic value addition, and an increase of one million tonnes of port throughput is associated with the generation of 300 new jobs in the port region in the short-term.

A "Community Development Fund" (CDF) is being created to fund projects and activities related to coastal community development under Sagarmala. The CDF will fund projects related to value addition in fisheries, aquaculture, cold chain development, skill development, local tourism and recreational facilities, etc. which would be beneficial to the livelihoods of the coastal communities. The projects considered would be specific time-bound local interventions not covered under existing central/state government schemes. To ensure sustainable development of coastal communities, the environmental and social impact of the projects, considered

under Sagarmala, will be analysed and the requisite clearances will be obtained before the commencement of the projects.

**Skill development for coastal communities:** In addition to the new jobs expected to be generated from port-led industrialisation, substantial manpower will be required for constructing infrastructure.

Challenges still exist in closing the skill demand–supply gap in India. The need is not only for fresh skilling but also for up-skilling/re-skilling the existing labour force to make it compatible with the changing industry needs.

Considering the above factors, a three-pronged approach for skill development in coastal regions is proposed to be adopted under the Sagarmala Programme. The first area of focus will be to promote skill training programmes for job roles related to the ports and maritime sector. The second focus area will be to promote skill training and livelihood generation programmes (not related to the maritime sector) in the coastal districts to expand employment and livelihood generation opportunities for the coastal communities and to support development of human capital for the proposed industrial clusters. The third focus area will involve providing access to the training facilities of major ports for third-party skill training programmes in the coastal districts, which will reduce the need to develop new training infrastructure in the coastal areas. The Ministry of Shipping, as part of the Sagarmala Programme, is already undertaking multiple activities/projects across the above mentioned focus areas.

<sup>4</sup> Census 2011

<sup>5</sup> Districts covering all maritime states and union territories; Mumbai City and Mumbai Suburb considered as separate districts

<sup>6</sup> The Competitiveness of Global Port-Cities: Synthesis Report, OECD

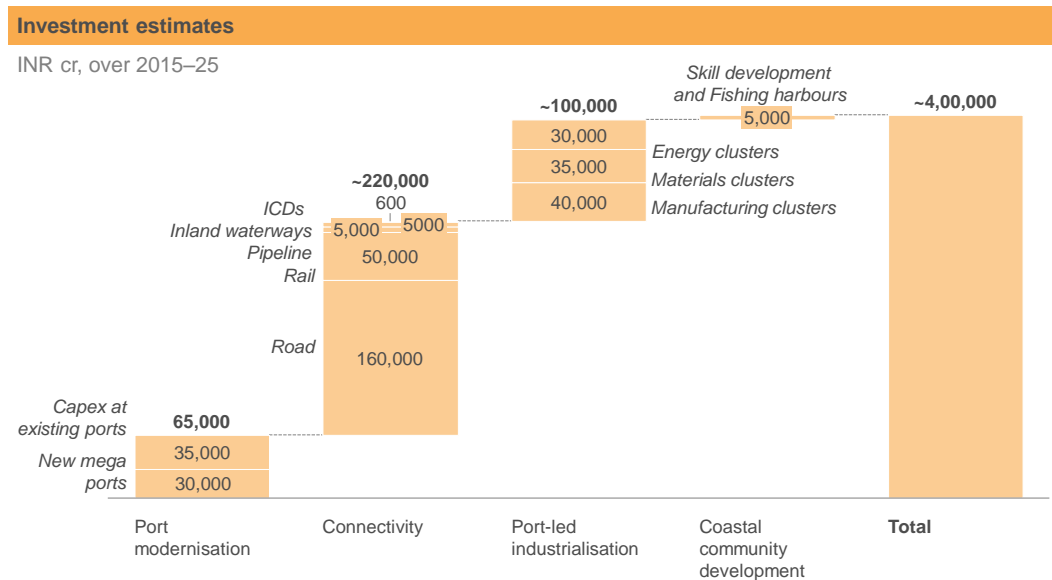
**Marine fishermen community development:** The marine fisheries sub-sector, impacting the nutrition availability in the country and accounting for approximately 0.5 per cent of India's total GDP<sup>7</sup>, is vital for the coastal districts. And the 3.9 mn fisherfolk<sup>8</sup> (as of 2010), living in 3,288 marine fishing villages spread across the Indian coastline, form a critical component of the coastal communities.

A concerted effort is required to help improve the status of the marine fishermen community on human development indices, ensuring uniform access to basic infrastructure such as housing, electricity, transport accessibility and healthcare and for promoting sustainable fishery management. As part of the Sagarmala Programme, the CDF and the Sagarmala Development Company (SDC) will provide funding grants for marine fishermen—Exhibit 22 shows the total investment requirement for Sagarmala.

related social welfare projects, projects for generating livelihood opportunities within the fisheries sector (e.g., new fish processing and value-added product development, etc.) or outside the fisheries sector (e.g., training in new skills and trades in small business development, agriculture, or handicrafts, etc.) and projects related to the promotion of sustainable marine fisheries management (e.g., sustainable fishery practices, promoting aquaculture, spreading fish quality literacy among fishermen, as well as developing facilities for fish landing and handling).

**EXHIBIT 22**

**Sagarmala could mobilise investment<sup>1</sup> of about INR 4 lakh cr in Indian infrastructure sector over next ten years**



**Additional investment of INR 7–8 lakh cr in industrial and manufacturing clusters**

<sup>1</sup> From currently envisaged projects  
SOURCE: Port masterplanning, Maritime boards and port department of respective states

<sup>7</sup> “Indian Marine Fisheries – Issues, Opportunities and Transitions for Sustainable Development”, World Bank Report, 2010

<sup>8</sup> Marine Fisheries Census 2010, India, Central Marine Fisheries Research Institute

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Sagarmala is an ambitious programme, geared towards making domestic manufacturing and EXIM more competitive and uplifting coastal communities. The programme will have a profound impact and could act as a model for India's development.

# A perspective on port-led development

## India's maritime heritage

India has a rich maritime history of trade and cultural contacts with multiple countries and cultures around the globe. Inhabitants of the Indus Valley Civilisation are known to have established trade links with Mesopotamia as early as the third millennium BC. Rivers were the lifelines of the ancient Indian economy. The town of Lothal in modern day Gujarat had the earliest known dock, and was part of a river transportation system. Ports such as Tamralipta, Dwarka, Muziris and Calicut served as gateways to international trade. There is evidence of extensive trade and cultural ties by maritime route to civilisations in Africa, South East Asia and the Mediterranean.

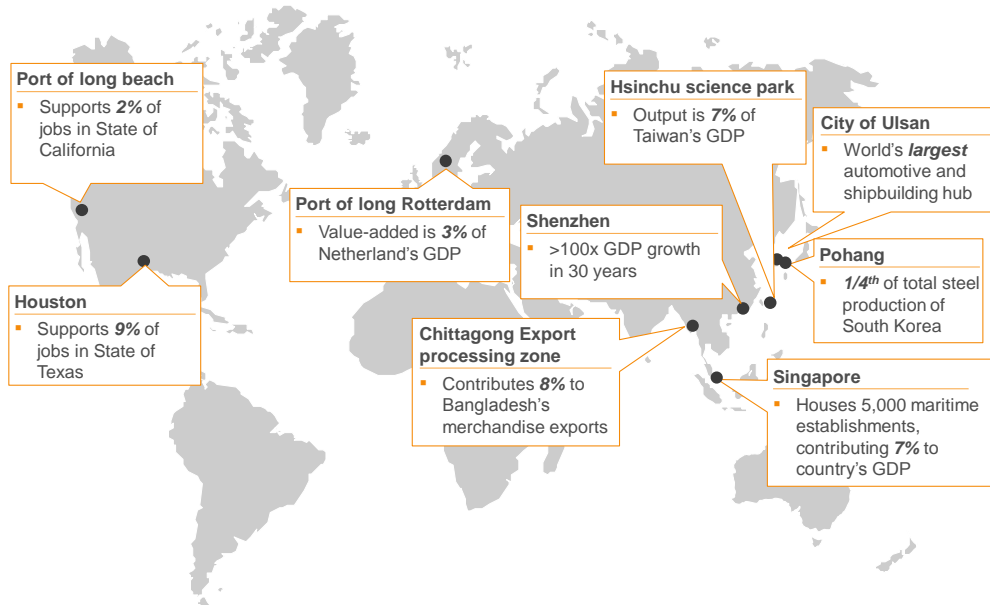
## Global examples of coastline development

Ports create significant economic payoffs for their city and state – they help generate jobs, add value, mobilise new investment, bring in tax revenues and support trade through reducing logistics costs (Exhibit 22). One tonne of port throughput is associated with a value addition of USD 100, and a 1 mn tonne increase in port throughput is associated with 300 new jobs being created in the port region in the short-term<sup>1</sup>.

<sup>1</sup> Based on *The Competitiveness of Global Port Cities: Synthesis Report* by OECD

## EXHIBIT 23

### Globally, ports have had a significant economic impact

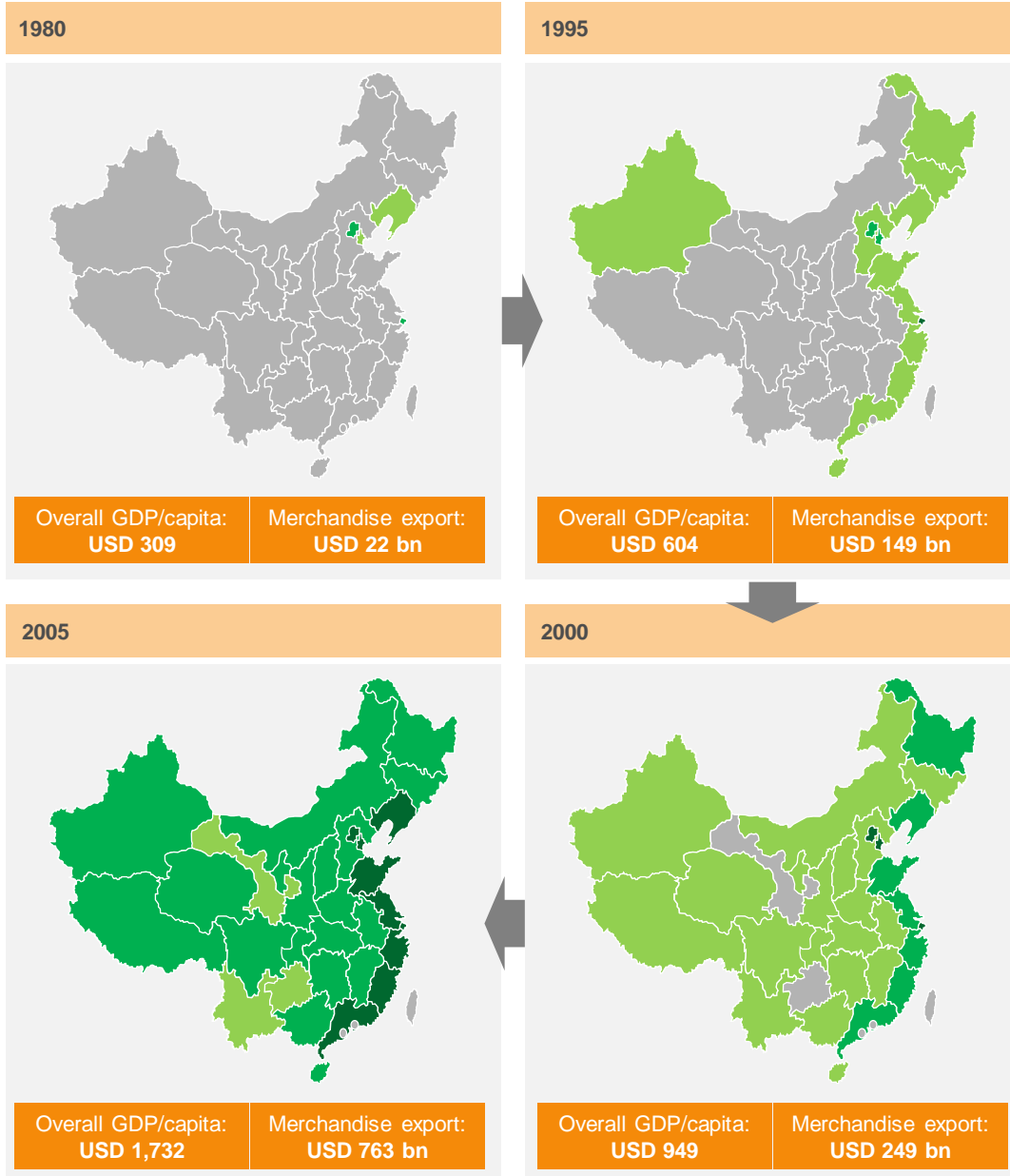


SOURCE: Individual ports' data



**EXHIBIT 24**

**Port-led development of China**



SOURCE: Moodys' Analytics

## Port-led development archetypes and relevant industries

Many countries with long coastlines have leveraged ports for supporting industrial growth. Some examples of success stories include the refinery and petrochemical complex in Rotterdam, the steel cluster in Pohang, and the electronics manufacturing cluster in Shenzhen.

Port-led industrialisation models can be classified as (Exhibit 23):




- Energy-focused
- Materials-focused
- Discrete-manufacturing focused

Energy and materials focused industries have strong port linkages due to the volume of cargo handled. Logistics contributes a significant proportion of the total costs in these industries. For discrete-manufacturing, time to export is critical and adequate port-linkages can significantly improve the competitiveness of the industries.

Globally, cargo of the three archetypes of the industries mentioned above also form the majority of the cargo handled at ports. These industries thus justify consideration under port-led development.

### EXHIBIT 25

#### Port led development: 3 archetypes

Archetype	Commodities	Port linkage
<b>Energy</b> 	Thermal Coal (Power)	<ul style="list-style-type: none"> <li>■ Strong port linkage</li> <li>■ Contributes to port volumes to justify the port</li> <li>■ Highly concentrated – 2–3 plants</li> <li>■ Potential for state intervention</li> <li>■ Can be planned centrally/by state</li> <li>■ Built for specific need (cost efficiency)</li> </ul>
	Petroleum, Oil and Lubricants (POL)	
<b>Materials</b> 	Steel & allied industries	<ul style="list-style-type: none"> <li>■ Ports enable industrialisation of downstream material processing sectors (e.g., shipbuilding)</li> <li>■ Ports provide global market linkage for sourcing raw material and exporting</li> <li>■ State could play a role typically through state owned enterprises</li> </ul>
	Cement	
	Food grain & fertilisers	
<b>Discrete manufacturing</b> 	Labour intensive (Apparel, footwear)	<ul style="list-style-type: none"> <li>■ Time to export is a critical competitiveness factor, hence enabled by ports</li> <li>■ Highly disaggregated</li> <li>■ Private with little state intervention</li> <li>■ Cannot be micro planned</li> </ul>
	Skill intensive (Electronics, Automotive)	

## Energy-focused model

Globally, ports have played a crucial role in reducing logistics cost for energy, which forms a significant proportion of the delivered cost of energy. The lower cost of energy is eventually passed on to the end consumer (both retail and industries), further boosting industrial development and private consumption. Ports provide access to internationally traded fuel commodities (e.g., crude oil, coal or gas), reduce the

logistics cost for serving local demand and provide access to markets for finished goods (e.g., petrochemicals).

Several major refinery and petrochemical clusters across the world are port-based – Jurong (Singapore), Antwerp (Belgium), Rotterdam (Netherlands) and Fujian (China) (Exhibit 24). Port location is critical for importing feedstock for the petrochemical sector and for the efficient evacuation of products for export.

## EXHIBIT 26

### Petrochemical clusters globally are coast based to facilitate feed-stock access and trading

#### Jurong, Singapore

- World-class infrastructure providing a cost advantage
- Demarcated masterplan with match-making for feedstock supply agreements
- Advantageous economic environment



#### Antwerp, Belgium

- Establishment of a pipeline corridor by the local government
  - 57 different products
  - More than 1,000 km
- A professional agency that promotes various European clusters including Antwerp's among potential investors



#### Fujian, China

- JV in petrochemicals with international majors
- The focused petrochemicals player reserving feedstock for downstream cluster
- Local government support preferential tax regimes and simplified administrative formalities



SOURCE: Expert interviews; press search

## Energy archetype case studies

The Hamburg–Le Havre (HLH) range covers 11 European ports that include the major competing North Range ports of Rotterdam, Hamburg, Antwerp, Bremerhaven, Amsterdam and Le Havre. All major global sea routes have at least one stop in the range, which serves 32 per cent of the EU27 population found within a 500 km radius of the hinterland (Exhibit 25).

As an example, Europe's biggest port (by container and liquid bulk), the Rotterdam port in the HLH range, is centrally located, on Europe's north shore at the mouth of the Rhine river. Multiple oil refineries, chemical companies and power plants dot the Rotterdam port cluster. Parts of the port are situated close to the city centre. Supporting infrastructure in terms of tank storage and pipeline connectivity enables companies to take advantage of the location of the port.

The economic impact of these ports has been substantial. Rotterdam's port directly employs about 87,000 people and generates indirect employment for another 50,000. The value added at the Port of Rotterdam is estimated at EUR 19 bn<sup>2</sup> (3 per cent of the GDP of the Netherlands). (Exhibit 26)

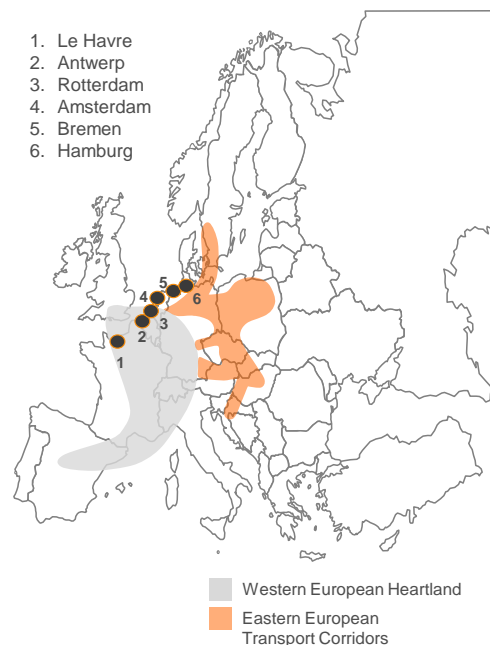
In the power generation sector, too, fuel logistics contributes a significant proportion of the cost of the end product.

Major power plant clusters in China are located in coastal regions near demand centers. Around 600 MT of China's domestic thermal coal travels on coastal routes, feeding to power plants on the coast (Exhibit 27).

### EXHIBIT 27

#### Hamburg – Le Havre (HLH) range is key to Europe's economy

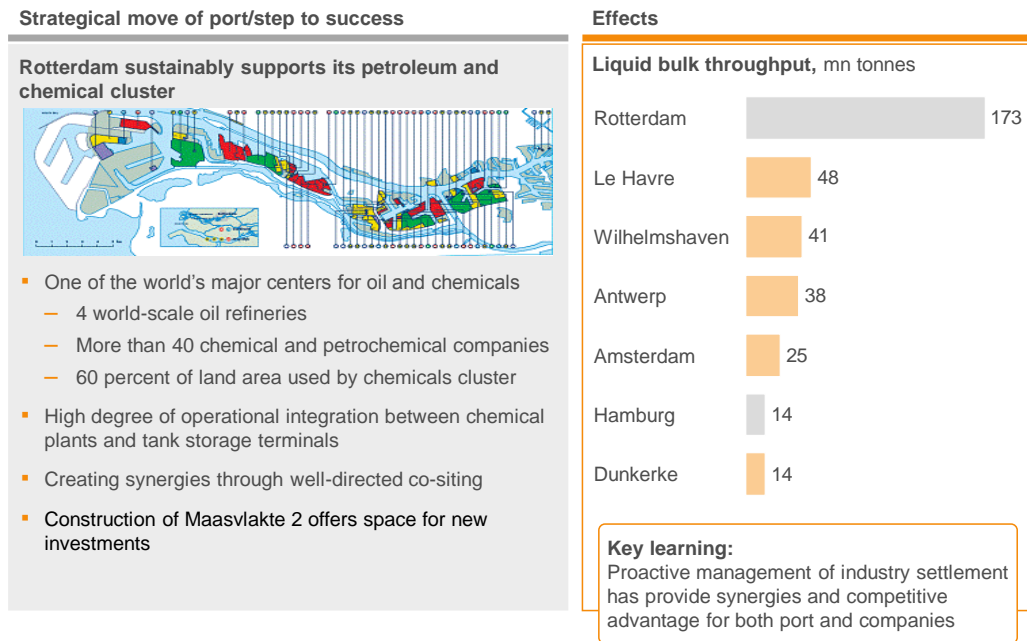
- The HLH range covers 11 European ports that include the major competing **North Range ports** of **Rotterdam, Hamburg, Antwerp, Bremerhaven, Amsterdam and Le Havre**
- All major global sea routes have at least one stop in the range
- The range **serves 32% of the EU27 population** found within 500 km radius of the hinterland
- The range is located at the core of the **blue banana corridor** of Europe that covers nearly 111 mn population
- Enlargement of EU and economic development are **further expanding the blue banana with emerging logistical nodes and activities** from the Baltic area, Central Europe and the Latin arc



SOURCE: OECD – The competitiveness of global port-cities; OECD – trans-continental infrastructure needs; ITF; press

## EXHIBIT 28

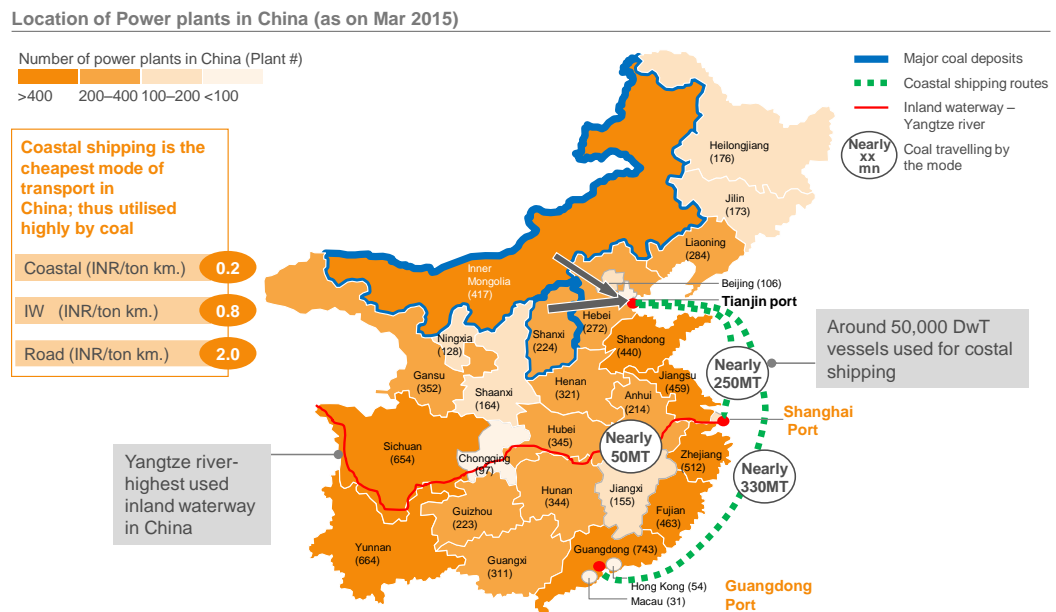
### Rotterdam actively supports its chemical/petroleum industry cluster in port to foster synergies



SOURCE: Rotterdam Port Authority

## EXHIBIT 29

### Major power plant clusters in China are located in coastal regions; nearly 600 MT of thermal coal travels on coastal routes feeding into these plants



SOURCE: Expert interviews

## Materials-focused model

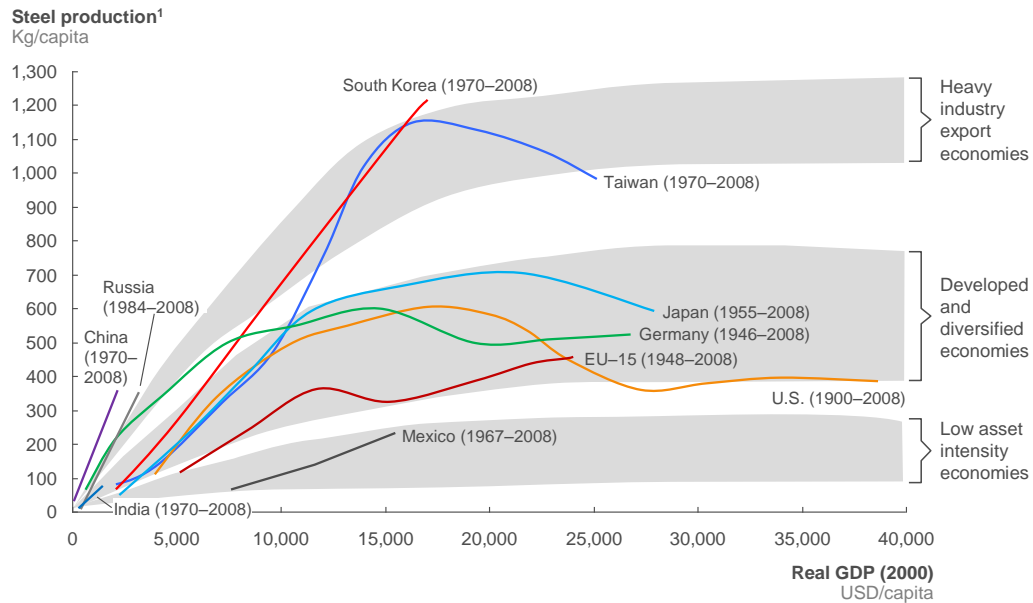
Materials-focused models of port-led development are based on the rationale that seaborne transport and efficient ports can help reduce the logistics cost of bulk raw materials, and promote the development of downstream end-use industries in the hinterland. Ports can act as catalysts for bringing complementary industries to adjacent locations by lowering overall logistics costs (Exhibit 28).

Steel is a key material with port linkages. Coastal steel production centres located closer to demand centres have lower delivered costs of steel than those located proximate to raw-material sources.

Steel output is used in downstream sectors such as shipbuilding, automotive industry and heavy machinery. The “steel–shipbuilding–automotive” cluster of South Korea was a key thrust factor in the country’s industrialisation.

## EXHIBIT 30

### Steel production follows an inverted U-shaped curve during a country's economic development



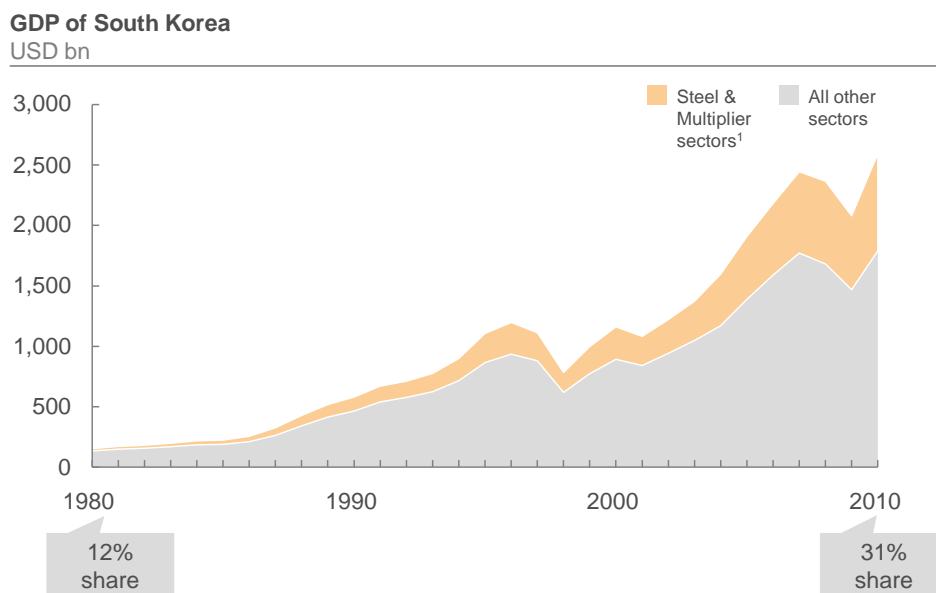
**Materials archetype case study:  
South Korea's steel and multiplier  
industries**

Steel has played an important role in the development of economies like Japan, South Korea and Taiwan. Approximately 30 per cent<sup>3</sup> of steel production is exported from South Korea.

The South Korean economy used ports to boost steel and downstream “multiplier industries”, such as automotive, and shipbuilding, through port-based steel, automotive and shipbuilding facilities (Exhibit 29).

**EXHIBIT 31**

**Steel and “Multiplier sectors” played a pivotal role in growth of South Korean economy**



<sup>1</sup> Iron & Steel; fabricated metal products; machinery, equipment, appliances; automotive; shipbuilding; electrical machinery, communication equipment

SOURCE: Yearbook of Iron and Steel (Korean Iron and Steel Association)

One-third of the economic growth of South Korea between 1980 and 2010 was due to the direct contribution of steel and multiplier sectors<sup>4</sup>.

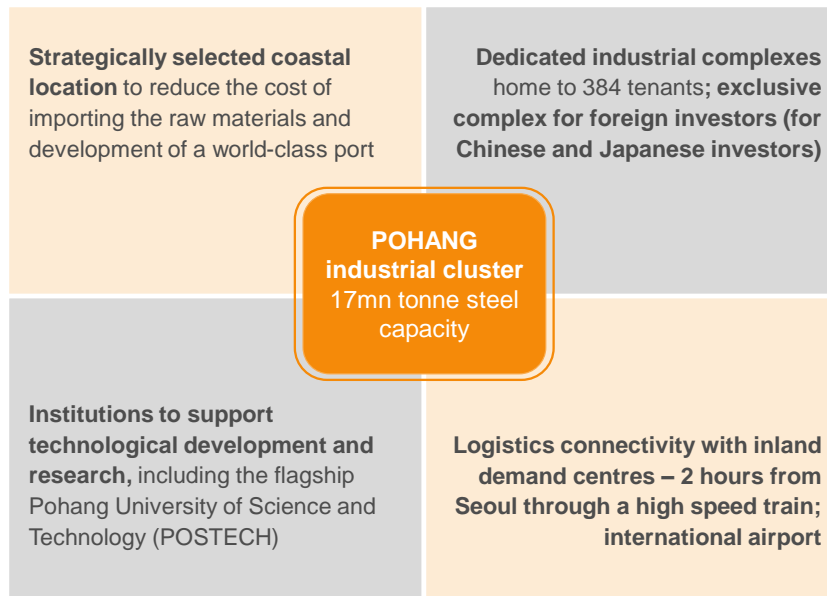
To illustrate, South Korea set up a coastal steel cluster at Pohang to ensure low-cost access to imported iron ore, coking coal and to facilitate access to global markets (Exhibit 30 and 31).

<sup>3</sup> Yearbook of Iron and Steel (Korean Iron and Steel Association)

<sup>4</sup> The Steel and Shipbuilding Industries of South Korea: Rising East Asia and Globalisation, Working party on Shipbuilding- Peer review of the Korean shipbuilding industry and related government policies

**EXHIBIT 32**

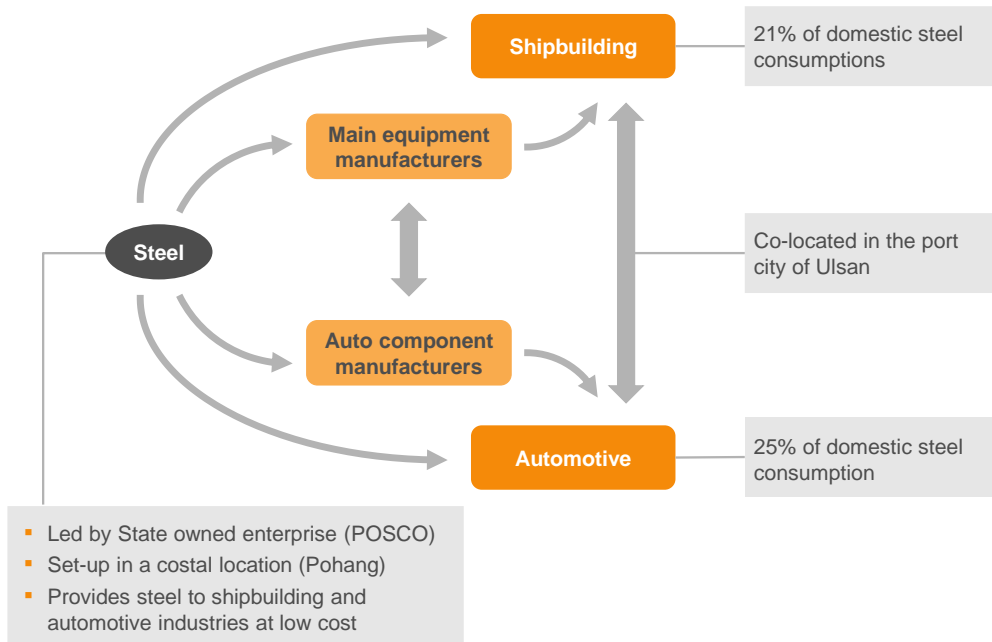
**Port enabled eco-system of Steel cluster at Pohang**



SOURCE: <http://eng.ipohang.org>

**EXHIBIT 33**

**South Korean marine cluster concept : Steel – Shipbuilding – Automotive**



SOURCE: The Steel and Shipbuilding Industries of South Korea: Rising East Asia and Globalization, Working party on Shipbuilding – Peer review of the Korean shipbuilding industry and related government policies



## Discrete-manufacturing model

These clusters are the key to reducing the trade deficit through import substitution and exports. Asian countries like China, South Korea and Taiwan have successfully used export-oriented discrete manufacturing to increase GDP. Other emerging Asian economies like Thailand, Vietnam and Bangladesh have also managed to be a part of the port-led development model. Ports facilitate export-oriented manufacturing by reducing logistics cost, export time and variability. Time is of the essence for the export competitiveness of manufactured goods. Studies claim that even one day of delay adds on average 0.8 per cent to the cost of manufactured goods<sup>5</sup>. A week's delay could add 5 to 6 per cent to the cost of goods, often equivalent to the total profit

margin available to some manufacturers of mass-produced goods. Uncertain export time also has a bigger impact than longer (but certain) export time, which is why several export-oriented discrete manufacturing clusters have come up either at ports or close to ports to provide a low-cost, faster mode of exporting products. Of the top 20 global free trade zones, 14 are either port-based or port-proximate (Exhibit 32).

Export-oriented discrete manufacturing also helps the productivity of domestic manufacturing by incorporating learnings and best practices from competing in international markets and gaining from their sheer scale (Exhibit 33).

## EXHIBIT 34

**Of the global top 20 free trade zones 14 are either port-based or port proximate**

✓ Port-based  
✓ Port-proximate  
— Inland

Top-20 free trade zones of the future (2012-13)	Country	Port linkage
1 Dubai Airport Free Zone	UAE	—
2 Dubai International Financial Centre	UAE	—
3 Shanghai Waigaoqiao Free Trade Zone	China	✓
4 Iskandar	Malaysia	✓
5 DuBiotech	UAE	—
6 Tanger Free Zone	Morocco	✓
7 Freeport of Ventspils	Latvia	✓
8 The Clark Freeport Zone	Phillippines	✓
9 Chittagong Export Processing Zone	Bangladesh	✓
10 Dubai Media City	UAE	—
11 JLT Freezone	UAE	✓
12 Katowice Special Economic Zone	Poland	—
13 Dubai Silicon Oasis	UAE	✓
14 Mauritius Freeport	Mauritius	✓
15 Bahrain International Investment Park	Bahrain	✓
16 Khalifa Bin Salman Port	Bahrain	✓
17 Salalah Free Zone	Oman	✓
18 Lodz Special Economic Zone	Poland	—
19 Bahrain International Airport	Bahrain	✓
20 Aqaba Special Economic Zone	Jordan	✓

SOURCE: Global Free Zones of the future 2012/13, published by FDI magazine

5 *Trading on Time*, by S. Djankov, C. Freund and C. Pham (2006), World Bank Policy Research Working Paper no. 3909, World Bank, Washington DC

### EXHIBIT 35

#### Export-driven production is two times more productive than players with domestic focus

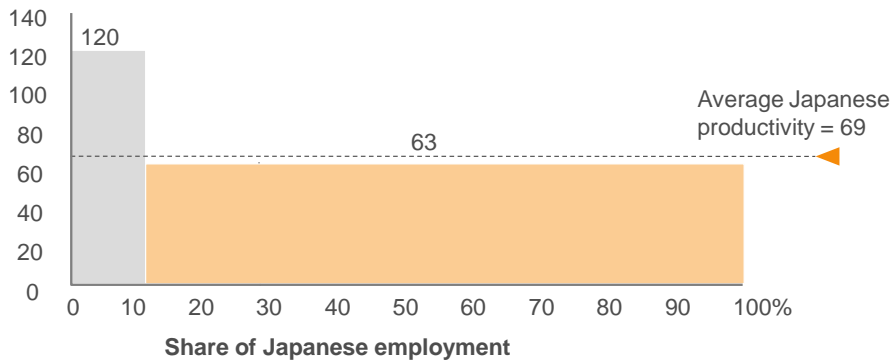
JAPAN EXAMPLE

Indexed, U.S. = 100

Effect of manufacturing<sup>1</sup> services to productivity (Japan)

$$\text{Productivity} = \frac{\text{GDP sector}}{\text{Labor force in sector}}$$

- Domestic manufacturing and services
- Export driven manufacturing



<sup>1</sup> Manufacturing excluding oil, utilities

SOURCE: MGI

#### Discrete manufacturing case study: China

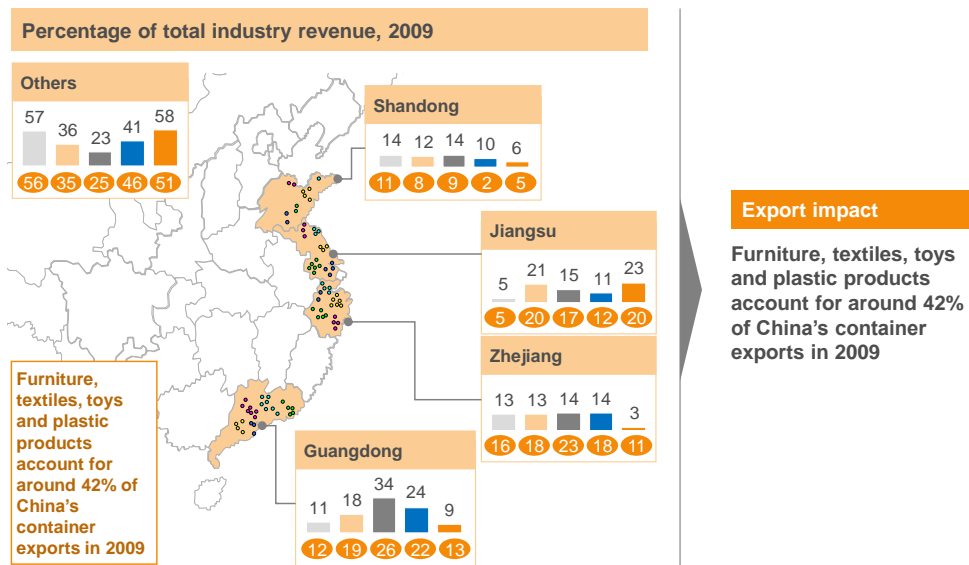
Merchandise exports from China stood at USD 250 bn in 1999 but have grown almost 10 times over the last 15 years to USD 2.3

trillion in 2014<sup>6</sup>. Port-based manufacturing hubs such as Shenzhen have emerged as centres of global manufacturing and transformed their local economies, thereby significantly improving incomes (Exhibit 34).

### EXHIBIT 36

#### Light manufacturing clusters in China are concentrated in coastal clusters

- Furniture
- Toys
- Electronic goods
- Textile
- Plastic products
- % of number of companies



SOURCE: Global Insight; province year books

The Shenzhen cluster played a crucial role in the export-led development of China. Located in the Guangdong province of China, Shenzhen has a land area of 2,000 sq km and shares a border with Hong Kong on the south (Exhibit 35). The explosive growth of Shenzhen was made possible by huge foreign and

domestic investment after Shenzhen was designated as the country's first special economic zone (SEZ) in 1980. The port of Shenzhen played a critical role in supporting this growth as it has grown to be a 23 mn TEU (twenty-foot equivalent) traffic port (third-highest in the world after Shanghai and Singapore)<sup>7</sup>.

## EXHIBIT 37

**Shenzhen city is located in the Guangdong province of China and shares a border with Hong Kong on the south**



In the 1980s, the central government reserved land banks and classified four districts in Shenzhen as an SEZ, and provided taxation, labour and administrative incentives. The state government was responsible for zone infrastructure development and operations<sup>6</sup>. By the 1990s, labour-intensive industries moved away from Hong Kong and Taiwan to set up factories in China, leveraging the nation's resources in the form of cheap labour. Soft toys, plastic toys and apparel were among the first industries to relocate to China. With the development of an integrated infrastructure network, such as utilities,

highways, logistics parks and ports, Shenzhen became less reliant on Hong Kong, stimulating manufacturing growth. In the early years of the new millennium (2000), low-end electronics manufacturers also set up their units in China. And, as manufacturing activity started picking up in the region, local Chinese entrepreneurs began to work as contract manufacturers in Shenzhen. Post 2010, the benefits that were restricted to a few districts were extended to the whole city of Shenzhen.

Currently the SEZ has about 6,500 large-scale enterprises and 59,000 small and

6 ITC Trade map

7 Shenzhen Statistical Yearbook 2011, Shenzhen Special Zone Daily, SBSZ

8 Shenzhen Government Online




micro entities (Exhibit 36). Most of these enterprises focus on production of microelectronics and components, high tech and medical instruments. There are many industrial zones within Shenzhen (e.g., Shenzhen-Hong Kong Modern Service Cooperation Zone, Shenzhen Hi-tech Industrial Park (SHIP),

Shekou Industrial Zone, etc.) each dedicated to an industry.

Shenzhen SEZ provided numerous incentives—economic or tax, labour, administrative, market—to attract FDI in labour-intensive manufacturing (Exhibit 37).

## EXHIBIT 38

### Overview of Shenzhen

Key facts and figures	Competitiveness of Shenzhen
<ul style="list-style-type: none"> <li>▪ <b>Location:</b> Shenzhen, China</li> <li>▪ <b>Established:</b> 1980</li> <li>▪ <b>Land area:</b> 2,000 sq.km</li> <li>▪ <b>Population:</b> 10.6 mn (2013)</li> <li>▪ <b>SEZ area:</b> 400 sq.km (benefits extended to whole city post 2010)</li> <li>▪ <b># of units:</b> 6,500 large scale enterprises(&gt;20 mn revenue), 59,000 small &amp; micro entities</li> <li>▪ <b># of workers in manufacturing:</b> 4 mn</li> <li>▪ <b>Sector focus:</b> Computer software, IT, Microelectronics and components, High Tech and medical instruments, etc.</li> <li>▪ <b>Industrial Zones:</b> Many industrial zones (1 to 5 sq km) within Shenzhen, each dedicated to an industry</li> </ul>	<p><b>Geography</b></p>  <p><b>Shares a common border with Hong Kong</b> – serves as a cost efficient alternative for manufacturers</p> <hr/> <p><b>Infrastructure</b></p>  <p><b>Seaports, airport and land ports</b></p> <ul style="list-style-type: none"> <li>▪ Expressways link Hong Kong, Shenzhen and inland cities</li> <li>▪ Connected via inland waterways <ul style="list-style-type: none"> <li>– Seaports – 9</li> <li>– Airports – 1</li> <li>– Railway – 3,200 km</li> <li>– Metro – 2 lines</li> <li>– Road – 1,600 km</li> </ul> </li> </ul> <hr/> <p><b>Talent</b></p>  <p><b>Strong coverage and supply of talent</b></p> <ul style="list-style-type: none"> <li>3,800 State-level high-tech enterprises</li> <li>1,313 preschool institutions</li> <li>335 primary schools</li> <li>10 full-time and one part-time institute for higher education</li> </ul>

SOURCE: Shenzhen Government Online, Shenzhen Statistical Yearbook

## EXHIBIT 39

### Shenzhen – Levers to attract investors

Economic/ tax incentives	Labour incentives	Administrative incentives	Market incentives
<ul style="list-style-type: none"><li>▪ Access to tax breaks</li><li>▪ Free or low duties on imported equipment and production materials</li><li>▪ Free or low-rent business accommodation</li><li>▪ Depreciation allowances</li></ul>	<ul style="list-style-type: none"><li>▪ Flexibility in hiring and firing workers</li><li>▪ Residence and work permits and income tax exemptions for foreigners working within the SEZ</li><li>▪ Provided manufacturers with candidate employees through a labor services company</li></ul>	<ul style="list-style-type: none"><li>▪ Streamlined administrative process for business registration</li><li>▪ Investment and financial consultation</li></ul>	<ul style="list-style-type: none"><li>▪ Negotiated limited access to the domestic Chinese market for goods produced within SEZs</li></ul>

SOURCE: Shenzhen government online

The governance model of Shenzhen was aimed at providing independence to local bodies to operate the zone. At the provincial level, the Guangdong Provincial Administration of Special Economic Zones (GPASEZ) looked after the administration and coordination of Shenzhen SEZ. Assisted by the Guangdong Provincial Special Economic Zone Development Company, the GPASEZ dealt directly with the SEZ, independently of the pre-existing Guangdong administration, and was responsible for:

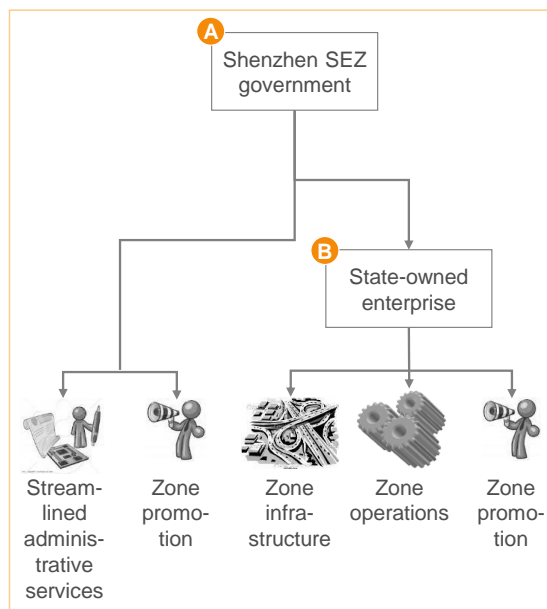
- Drawing up development plans and organising their implementation
- Examining and approving investment projects of investors
- Handling registration of industrial and commercial enterprises and land allotment

- Coordinating working relations among banking, insurance, taxation and customs departments; providing staff members and workers, needed by enterprises, and protecting their legitimate rights and interests
- Establishing educational, cultural, health and various public welfare institutions
- Maintaining law and order

To manage the FDI in the SEZ, the Shenzhen SEZ Development Company was set up and made responsible for locating appropriate Chinese partners for joint ventures (JVs) and seeking Chinese capital for investment. The company worked together with the municipality, which looked after the legal aspects of development and oversaw the general planning of the zone (Exhibits 38 and 39).

#### EXHIBIT 40

### In Shenzhen, a professionalised state-owned enterprise was responsible for developing, operating, and promoting the zone



#### A Governance structure

- A municipal government was established with relative independence for local planning
- The local government had direct access to provincial and central level planning units
- A one-stop shop provided a single interface to investors; key transfers (e.g., land) approved at central/provincial government level
- Shenzhen investment promotion bureau set up at the SEZ government for high-level promotional activities

#### B Zone services and fees

- A state-owned enterprise was responsible for zone infrastructure development and operations
- The type of services offered by zone operator were determined by Shenzhen SEZ industrial strategy
- Coordinated promotion at central and local government level and zone level

SOURCE: Expert interviews

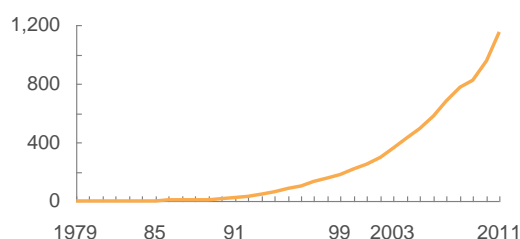
## EXHIBIT 41

### Shenzhen had a substantial impact on China's national economy

Production of Shenzhen SEZ

RMB bn

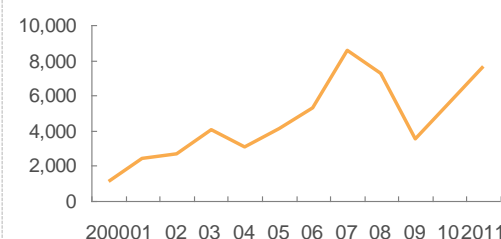
#### Shenzhen GDP



Foreign and domestic investment

USD mn

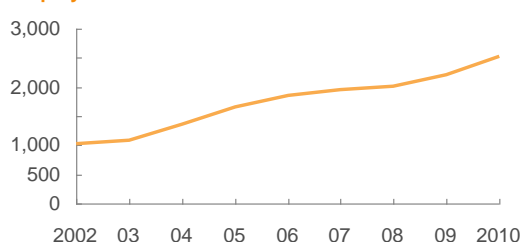
#### FDI



Employment in Shenzhen SEZ

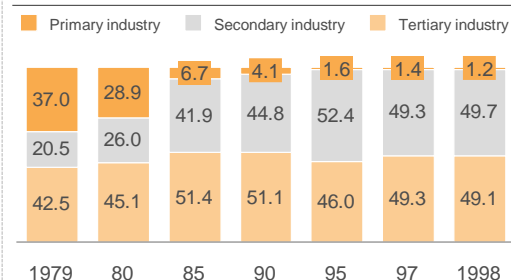
People, thousands

#### Employment



Structure of GDP in Shenzhen SEZ

Percent



SOURCE: Shenzhen statistical yearbook 2011; Shenzhen special zone daily (April 7, 1999) and SBSZ (various years)

### Development of infrastructure for port linked industries

Bulk industries and discrete manufacturing industries differ in the way planning is required for infrastructure development. For bulk industries, including steel, cement, power, refining, etc., infrastructure can be centrally predicted and “micro-planned” with capacity “on demand”. The state could play a more directive role in identifying locations and attracting investments for this archetype. Volumes from energy materials (e.g., coal, POL) are often significant enough to justify a port location by themselves. Production is concentrated across a few locations and reducing logistics cost is a key criterion for developing a supply chain around these. Hence, dedicated infrastructure could be developed for bulk industries by micro-planning.

Production and consumption centres for discrete manufacturing tend to be distributed and investment is driven by private entrepreneurs. While port connectivity is a critical enabling factor (for

raw material imports, exports of finished goods), discrete manufacturing does not by itself contribute large traffic volumes to the port. Unlike bulk, discrete industries may need shared infrastructure. For these reasons, only macro-planning for these sectors is possible (and useful). Competition among local authorities to attract private capital in this sector may be necessary. Micro-planning could therefore be delegated to states. Under this macro-planning regime, the port capacity for containers could be planned ahead of demand in the context of long-term economic expansion like in China.

The state could also play a “facilitative and administrative role” in developing discrete manufacturing-based archetypes and could let private enterprises come up and develop the clusters. For example, Hsinchu Science Park in Taiwan was conceptualised by the Government of Taiwan in 1980 as a policy initiative to promote high-tech manufacturing in the country, with a special focus on electronics. In the first decade of operations, the

government played an “incubator” role by acting as a guide for private industries, setting the rules of the game at the Science Park to ensure a level playing field, providing incentives like tax breaks to entrepreneurs and aid financing for local entrepreneurs from international financing groups. The government also created an environment to attract expert Taiwanese with high-tech knowledge back to the country. After the initial decade, the government has played only an administrator role for the Science Park and nearly all business activity is conducted by private enterprises<sup>9</sup>.

Finally, the government provides the land for many of these clusters. Globally,

71 per cent of science and technology parks are located on government-owned or university-owned land<sup>10</sup>. The full cost (of infrastructure and land) cannot be passed on to users, but return on public investment should come through tax revenues and employment, not primarily through concessions, fees or land rent. In European ports like Rotterdam, the main criteria for choosing a commercial location in the port are improvement in land-use productivity and economic value addition. Aspects such as strategic value for the port complex, accessibility, environmental space and employment are also considered while deciding location for new business.

9 Taiwan’s Hsinchu Region: Imitator and Partner for Silicon Valley

10 IASP (<http://www.iasp.ws/statistics>)



# 1. Supply chain study for key commodities

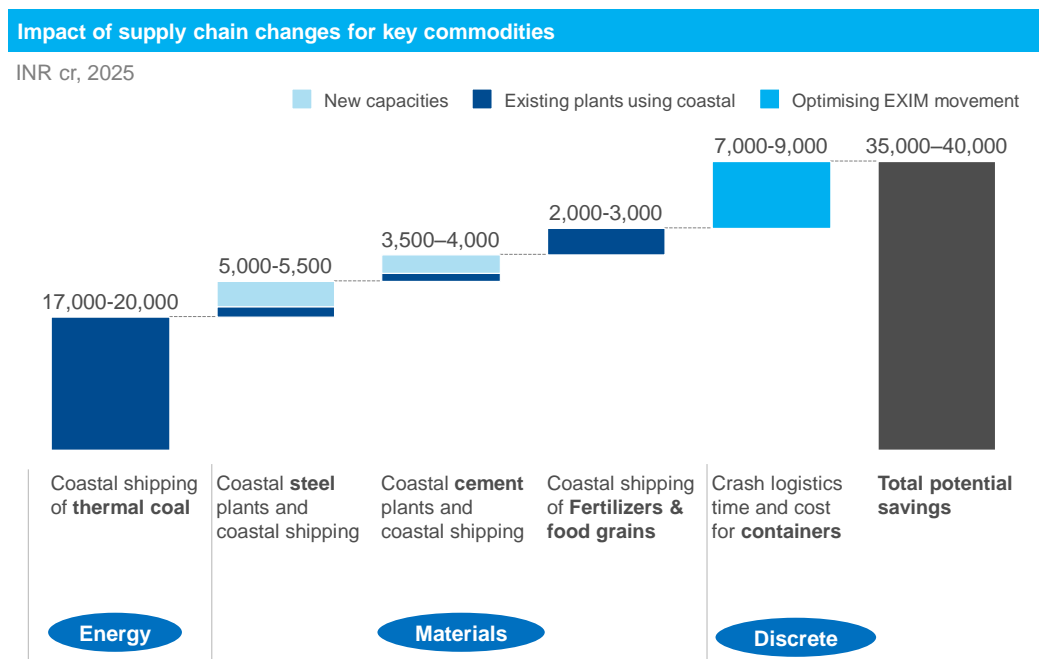
Logistics account for a major portion of India's industrial GDP, among the highest for any country. Inefficiency in logistics, thus, increases the cost of end products, requires higher amount of working capital and reduces competitiveness of exports. As part of the Sagarmala Programme, several opportunities have been identified to reduce logistics costs of bulk commodities and containers, totalling around INR 35,000 to 40,000 cr per annum (Exhibit 1.40). Main enablers for unlocking this opportunity include greater use of coastal shipping and inland waterways, addressing existing gaps

and bottlenecks in road and rail connectivity, creation of multimodal logistics hubs and streamlining procedures. The following exhibit summarises these opportunities by commodity.

Savings opportunity has been estimated based on a comprehensive origin-destination study of logistics movement of key commodities. The main findings for each commodity are summarised in subsequent sections.

## EXHIBIT 1.1

### Potential savings of INR 35–40 thousand cr across six levers



SOURCE: Industry discussions

## 1.1 Petroleum, oil and lubricants



In any modern economy, efficient, reliable and competitively priced energy supplies are prerequisites for accelerating economic growth. Logistics costs for energy commodities (fuel and end products) form a significant portion of the delivered cost of energy. This is especially true for India where import dependence for crude is 75 to 80 per cent and the lead distances from refinery location to consumption centres is significant<sup>9</sup>.

After coal, oil is the largest energy source for India, with a share of about 30.5 per cent in the primary energy consumption basket<sup>10</sup>. The high rate of India's economic growth has been accompanied by an increasing demand for oil. India's fuel consumption has risen at an average of 6 per cent<sup>2</sup> in the last five years, primarily driven by a surge in passenger vehicles sales. Since petrol and diesel account for around 60 per cent of sales of all petroleum products, these have been considered for the origin–destination analysis. Crude and petroleum, oil and lubricant (POL) products also contribute 36 per cent of the traffic at Indian ports, higher than any other commodity.

India's refining capacity is higher than its domestic demand making India a net exporter of petroleum products. However, domestic demand for petroleum products is projected to grow steeply over the next 10 years<sup>1</sup>, and is expected to push further investments into the refining sector.

De-regulation of diesel prices could encourage existing export-focused refineries in the private sector to divert a significant proportion of their products into

the domestic market. An analysis of industry trends, plans and projections suggests a potential of increased coastal shipping of around 8 to 10 MTPA of products from Gujarat.

### 1.1.1 Petroleum and lubricants

Currently, domestic demand for petroleum products is around 158 MTPA, with petrol (MS) and diesel (HSD) forming around 60 per cent of total demand. Over the next decade, this is expected to grow to around 275 to 290 MTPA. A “gradual recovery” scenario envisages GDP growth at 6.1 per cent per annum, which may result in a growth of over 4.7 per cent per annum in demand for petroleum products, to reach around 275 MTPA by 2025 (Exhibit 1.41). Conversely, in the “growth renewal” scenario with a 7.2 per cent per annum expected growth in GDP, domestic demand for petroleum products is expected to grow at 5.3 per cent per annum, to reach around 290 MTPA in 2025.

India's refineries, including private refiners, have a total output of around 220 MTPA of product. Taking into account the planned capacity expansions by existing refineries, the refining capacity in India could increase to about 282 MTPA by 2025 (Exhibit 1.42). The Indian Oil Corporation (IOC) refinery at Paradip is expected to start production by 2025, and major capacity expansions have been proposed at Bharat Petroleum Corporation Ltd (BPCL), Kochi, Hindustan Petroleum Corporation Ltd (HPCL), Visakhapatnam, and Bharat Oman Refineries Limited (BORL), Bina<sup>11</sup>.

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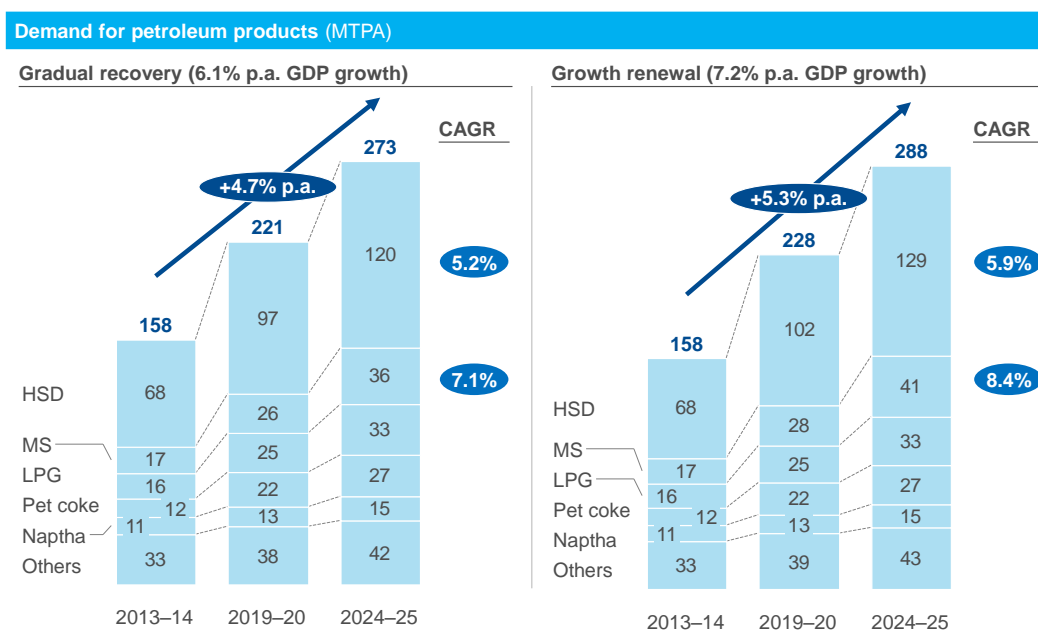
<sup>9</sup> PPAC, MoP&NG

<sup>10</sup> iea, esi

<sup>11</sup> Inputs given by OMCs

## EXHIBIT 1.2

### Demand for petroleum products in India may reach 275–290 MTPA in the next 10 years



SOURCE: PPAC, MoP&NG base date used for projections

## EXHIBIT 1.3

### While total capacity may increase to 282 MTPA in the base case by 2025

MTPA

Refinery <sup>1</sup>	Installed capacity 2014–15	Base case capacity 2024–25
IOC Panipat	15	20
MRPL Mangalore	15	18
IOC Koyali	14	18
BPCL Mumbai	12	12
BPCL Kochi	10	16
CPCL Manali	11	11
HPCL Visakhapatnam	8	15
IOC Mathura	8	9
HPCL Mumbai	7	7
IOC Haldia	8	8
HMEL, Bathinda	9	11
BORL Bina	6	15
IOC Barauni	6	9
NRL Numaligarh	3	9
Private Refineries	80	80
IOC Paradip	0	15
<b>Total production</b>	<b>219</b>	<b>282</b>

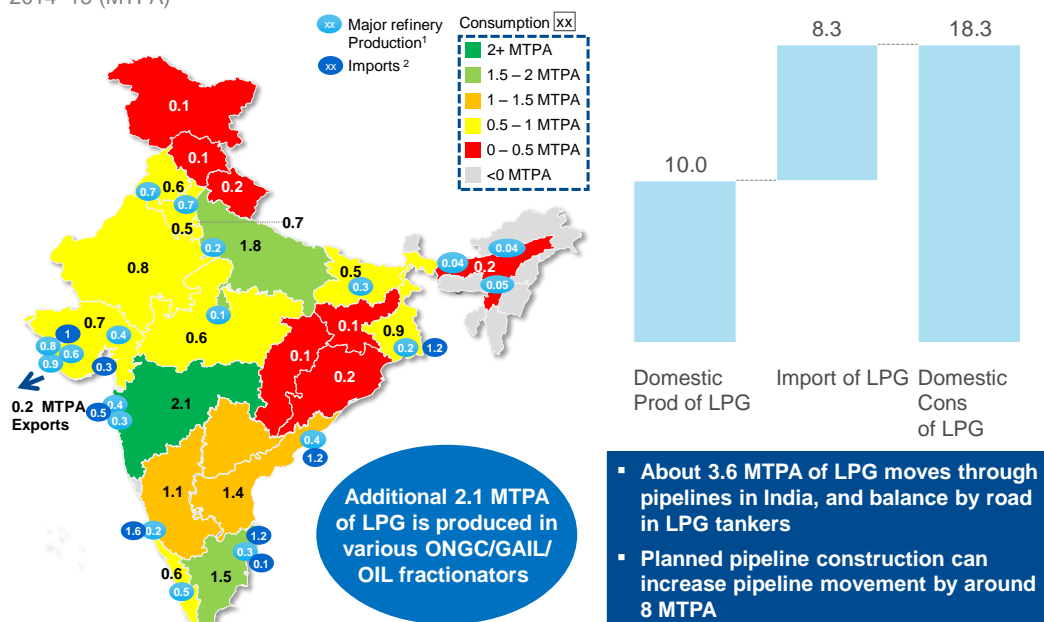
<sup>1</sup> Includes refineries – IOC Bongaigaon, IOC Guwahati, IOC Digboi, CPC Narimanam, ONGC Tatipaka, besides fractionators

SOURCE: PPAC; annual search

## EXHIBIT 1.4

### Demand centres, production and distribution of LPG in 2014–2015

2014–15 (MTPA)



SOURCE: Indian Petroleum and Natural Gas Statistics 2013–14; IOCL "Indian LPG Market" report

For liquefied petroleum gas (LPG), the current domestic consumption is around 18 MTPA, of which 10 MTPA is supplied by domestic production while the rest is imported.

Around 3.6 MTPA is transported through pipelines and the rest by road in tankers. The accompanying map depicts the consumption pattern for LPG in various states as well as the major locations of refinery production and import of LPG. Apart from these an additional 2.1 MTPA is produced in various fractionators belonging to Oil and Natural Gas Corporation Limited (ONGC) or Gas Authority of India Limited (GAIL) or Oil India Limited (OIL) (Exhibit 1.43).

#### 1.1.1.1 Current and future supply chain

The Indian economy currently consumes around 227 MTPA of crude oil, of which 189 MTPA is sourced through imports and 38 MTPA through domestic production (Exhibit 1.44). Imported crude is received at seven

port clusters—the Gujarat cluster (Vadinar, Mundra, Sikka), Paradip, New Mangalore, Mumbai, Chennai, Kochi and Visakhapatnam. The Gujarat cluster handles around 65 per cent of the total crude imports. Mumbai, New Mangalore and Paradip account for 7 to 8 per cent each, while the rest handle 4 to 5 per cent each of the total import.

Imported crude is either processed at coastal refineries or moved to inland refineries by pipelines. For example, around 34 per cent of the crude landed at the Gujarat cluster is transported inland through pipelines to refineries at Bathinda, Panipat, Mathura and Bina. A majority of the refineries are coastal largely optimising the movement of crude. However, most crude pipelines to inland refineries are operating at over 90 per cent utilisation and any plans to expand existing refineries may also need to factor in a capacity increase for the relevant pipeline.

An extensive inter-regional and intra-regional pipeline network transports the bulk of liquid products from refineries to

terminals/depots. Around 80 per cent of evacuation from the refineries to the hinterland travels through the pipeline network, with the balance moving by road/rail. Private refineries sell products at the refinery gate and coastally ship products to demand centres along the coast.

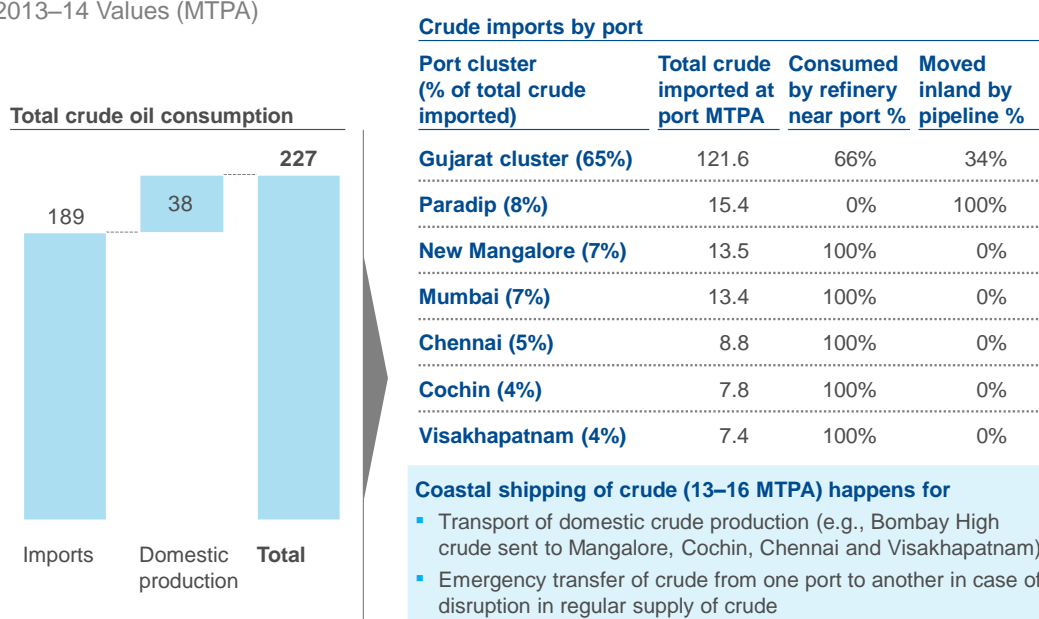
An analysis of supply and demand for petroleum products by state reveals that

eastern hinterland states face a deficit of around 2.8 MTPA between product demand and capacity of refineries in the hinterland. Similarly southern states (mainly Tamil Nadu and Andhra Pradesh) face a deficit of around 2.3 MTPA. This could be served by either inter-state dispatches from the Northeast or by coastal shipping from the west.

### EXHIBIT 1.5

#### Nearly 227 MTPA of crude is consumed in the country today, >80% of which is accounted by crude imports to 7 port clusters in the country

2013–14 Values (MTPA)



SOURCE: Indian Petroleum and Natural Gas Statistics 2013–14; Basic Port Statistics of India 2013–14

Refineries will continue to rely on the pipeline network for domestic evacuation of products, since the cost of transporting comes to around INR 0.14 to 0.18 per tonne km compared to INR 1.2 to 1.5 per tonne km by rail.

LPG is primarily moved via road from importing terminals or refineries. There are

four main pipelines in the country to transport LPG—Jamnagar–Loni, Vizag–Secunderabad, Panipat–Jalandhar and Mumbai–Uran. Jamnagar–Loni and Vizag–Secunderabad pipelines are operating at around 90 per cent utilisation and transporting additional LPG through these pipelines will require pipeline augmentation.

### 1.1.1.2 Key concerns and opportunities

The market scenario in the country is changing following the price de-regulation of diesel. Private refiners are expected to re-enter the domestic retail market. Since private sector refineries are based in Gujarat and these companies do not have a well-developed network of pipelines for moving products to other regions, it is expected that they will use coastal shipping for this purpose.

It is estimated that total scope for coastal shipping of MS/HSD would be around 15–20 MTPA by 2025<sup>12</sup>. In the case of Reliance SEZ being allowed to sell in the domestic market, the volume of coastal shipping could go up by another 20 MTPA.

The industry expects 150 MTPA MS/HSD being made available to the domestic market by private refineries by 2025. However, the projected domestic demand of MS/HSD by 2025 is estimated between 156

and 172 MTPA, which translates to an expected deficit of 12 to 13 MTPA of MS/HSD<sup>13</sup> (Exhibit 1.45). Furthermore, this deficit is likely to be unevenly distributed with Gujarat and the eastern regions expected to have surplus product while other regions in the country would be in deficit.

For LPG, given that the current penetration of piped gas is 3 per cent of urban Indian households and the current rate of urbanisation in the country is 33 per cent, projections of LPG demand in 2025 have been carried out in scenarios of high (30 per cent) and low (10 per cent) penetration of piped gas, with rapid (40 per cent) as well as slow (35 per cent) urbanisation. Demand for LPG is projected between 29 and 35 MTPA in 2025 (Exhibit 1.46). This corresponds to a compounded annual growth rate (CAGR) of 5 to 6 per cent which is in line with historical trends.

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<sup>12</sup> Discussions with OMCs, PPAC


<sup>13</sup> PPAC, MoP&NG

## EXHIBIT 1.6

### Export decision of private players and MS/HSD production capacity of refineries may determine its availability for domestic consumption

#### Scenario analysis of amount of MS/HSD available for domestic consumption

MTPA

 Considered base case for 2025

#### % MS/HSD production by refineries

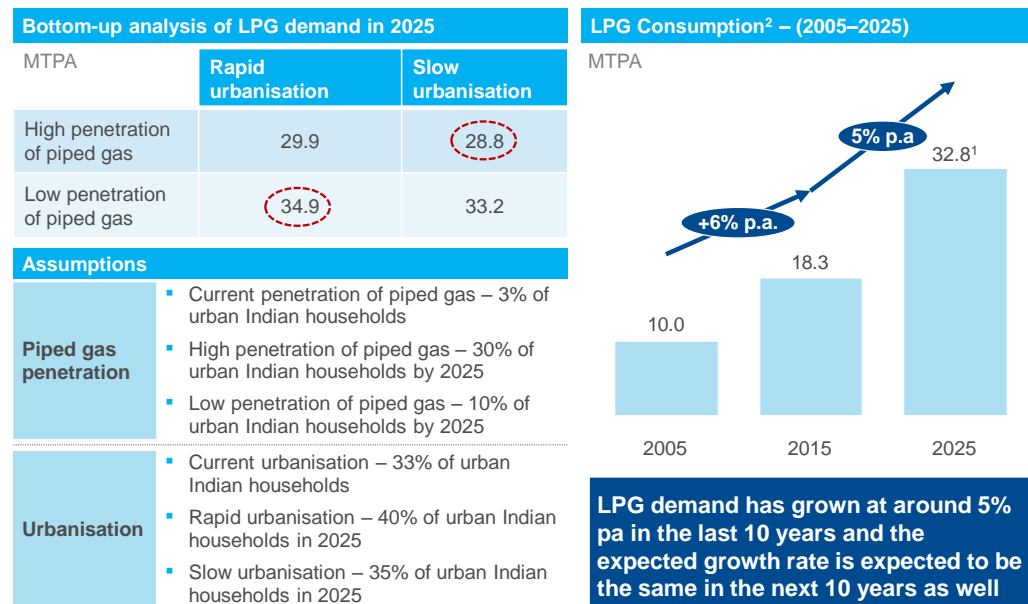
		56%	60%	65%
<b>Export plans of private players</b>	<ul style="list-style-type: none"> <li>Reliance SEZ exports 100% product</li> <li>RIL Jamnagar and Essar Oil export 50% product</li> </ul>	126	135	146
	<ul style="list-style-type: none"> <li>Reliance SEZ exports 100% product</li> <li>RIL Jamnagar and Essar Oil export nothing</li> </ul>	140		163
	<ul style="list-style-type: none"> <li>Reliance SEZ, RIL Jamnagar and Essar Oil export nothing</li> </ul>	162	174	188

- Essar and Reliance currently export 50% of their product due to subsidized domestic market
- They plan to sell 100% of the product to domestic market if market remains unregulated
- SEZ rules enforce Reliance SEZ to export all of their product
- Govt might relax the rules for Reliance SEZ if there is a shortage of product in India
- All refineries are trying to install units that will produce more MS in place of residual fuels as the demand has gone up

SOURCE: Private sector interviews; PPAC

## EXHIBIT 1.7

### LPG demand in 2025 could range from nearly 29 MTPA to nearly 35 MTPA depending upon level of urbanisation and piped gas penetration



<sup>1</sup> Under base case LPG production – Urbanisation – 37% and Piped gas penetration – 15% of urban Indian households

<sup>2</sup> Total LPG penetration in 2025 assumed to be 85%

SOURCE: IOCL "Indian LPG Market" report

With LPG demand poised to outpace domestic production in the next decade, increase in import capacity is required.

Currently, India has an import capacity of 7 MTPA, and plans for another 3 MTPA, taking the total projected import capacity for

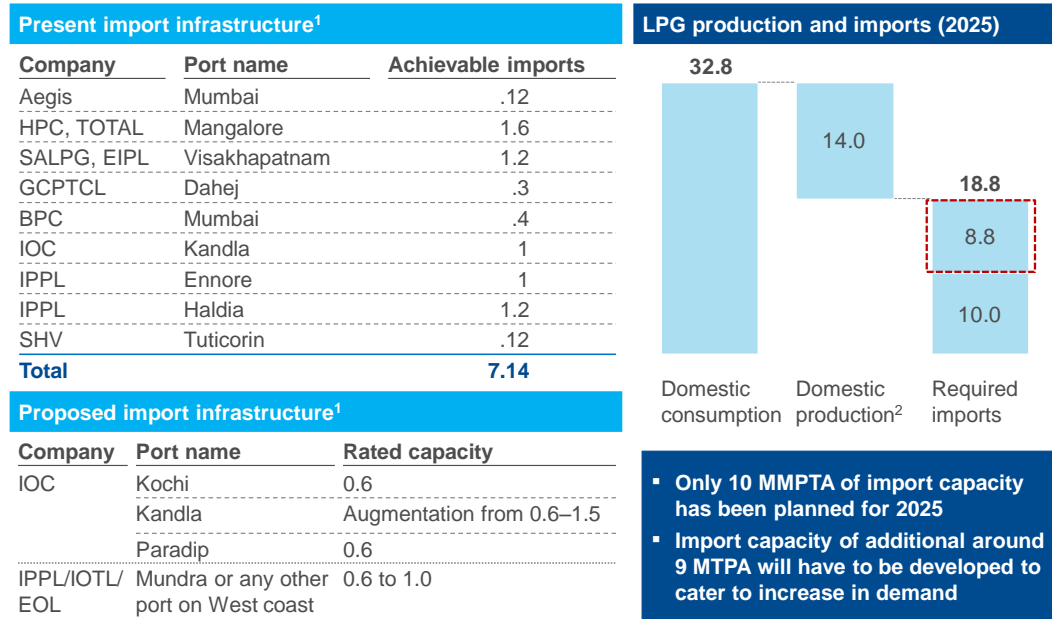
LPG to 10 MTPA in 2025. However, consumption demand in 2025 could reach 33 MTPA. Of this, 14 MTPA is expected to be produced domestically while planned

imports amount to around 10 MTPA, implying that additional LPG import capacity of around 9 MTPA would be needed by 2025 (Exhibit 1.47).

### EXHIBIT 1.8

#### LPG demand to outpace domestic production in the next 10 years, requiring increased import capacity

MTPA



<sup>1</sup> IOCL "Indian LPG Market" Report

<sup>2</sup> Estimate 2024–25 optimistic production taking into account realisation of certain speculated greenfield and brownfield projects

## 1.1.2 Liquefied natural gas

Natural gas in India is either produced domestically (in gaseous form) or imported in liquefied form (liquefied natural gas or LNG). Gas imported in liquid form is gassified at the import terminals and then moved internally through pipelines. Currently 57 mn metric tonnes per annum (MTPA) (around 205 mn metric standard cubic metre per day [mmscmd]) of gas is consumed in the country annually.

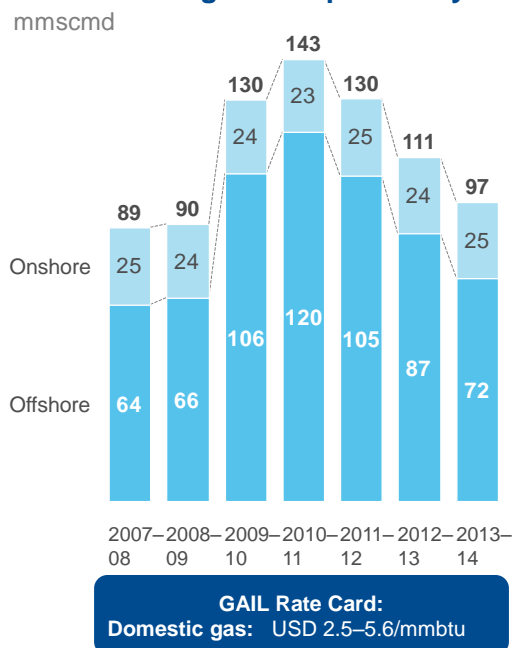
### 1.1.2.1 Current and future supply chain

Domestic gas production has been declining consistently over the last few years. It has dropped from a peak of 143 mmscmd in 2010–11 to 97 mmscmd in 2013–14 and a large jump is not anticipated (Exhibit 1.48). Thus, India is expected to largely depend on imported LNG to meet the demand.



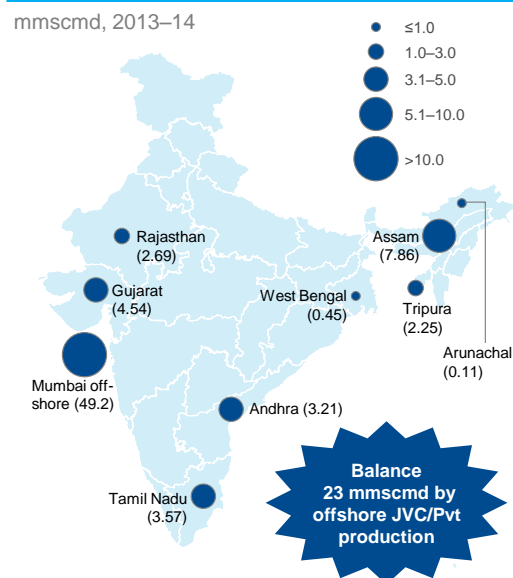
## EXHIBIT 1.9

### Domestic gas supply, which is cheaper, is currently 97 mmscmd and has been declining for the past few years



SOURCE: PPAC, GAIL

### Gross gas production by states



Demand for LNG is highly price sensitive, with different end-users having different price thresholds for substituting gas with alternate fuels. As a result, the realised demand of LNG is heavily dependent on the landed price into India. In the past two to three years, the landed price for LNG has averaged USD 12 to 14 per mmbtu<sup>14</sup>. Going forward, landed cost of imported LNG is not expected to be less than USD 9 to 10 per mmbtu. Natural gas spot prices in North America (Henry Hub) have averaged USD 2.88 per mmbtu in the last five years with a historic low of USD 1.87 in April 2012 and

high of USD 5.21 in February 2014. Crude linked LNG contracts (estimated at USD 55 per barrel as crude price and 12 per cent slope) could be around USD 6.6 per mmbtu. The total landed cost of LNG, including procurement and end-to-end transportation is likely to vary in the range of USD 9 to 10 per mmbtu (Exhibit 1.49).

Therefore, in this scenario, assuming LNG import price to be around USD 10 per mmbtu, the estimated gas demand in 2020 would increase to 283 mmscmd and 350 mmscmd in 2025<sup>15</sup> (Exhibit 1.50).

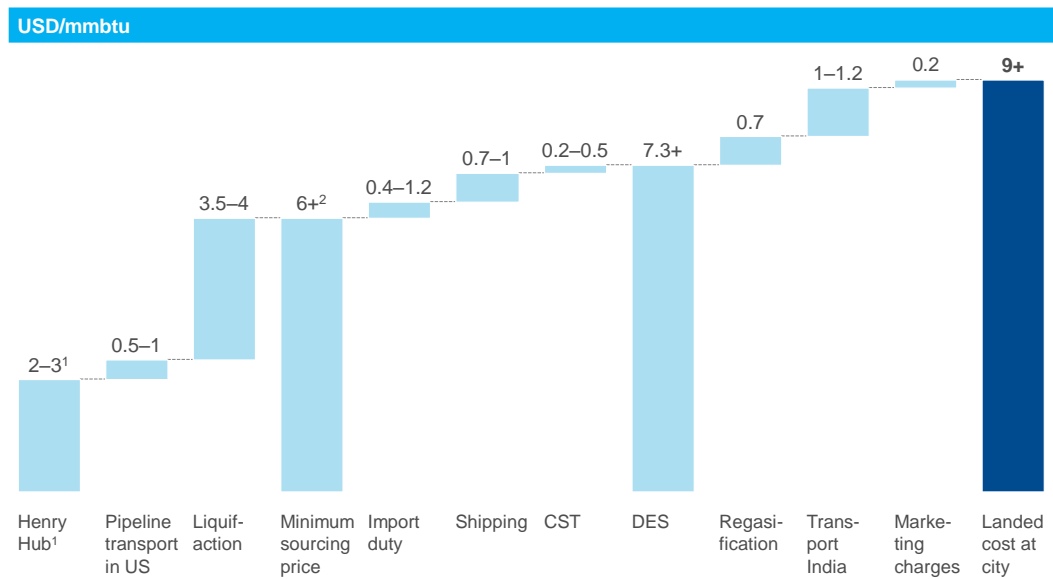
<sup>14</sup> One mmbtu is equal to 1 mn BTU (British Thermal Unit) = 25.2 standard cubic m (to be seen in the context of current demand in India of 205 mn metric standard cubic m per day)

<sup>15</sup> The demand curve for 2025 also depicts the switching cost of each segment (the price at which

the segment will switch to an alternative fuel). For instance, if the LNG import price is at USD 13–15 per mmbtu, segments 1–3 would demand gas but segments 4, 5 and 6 would not.

### EXHIBIT 1.10

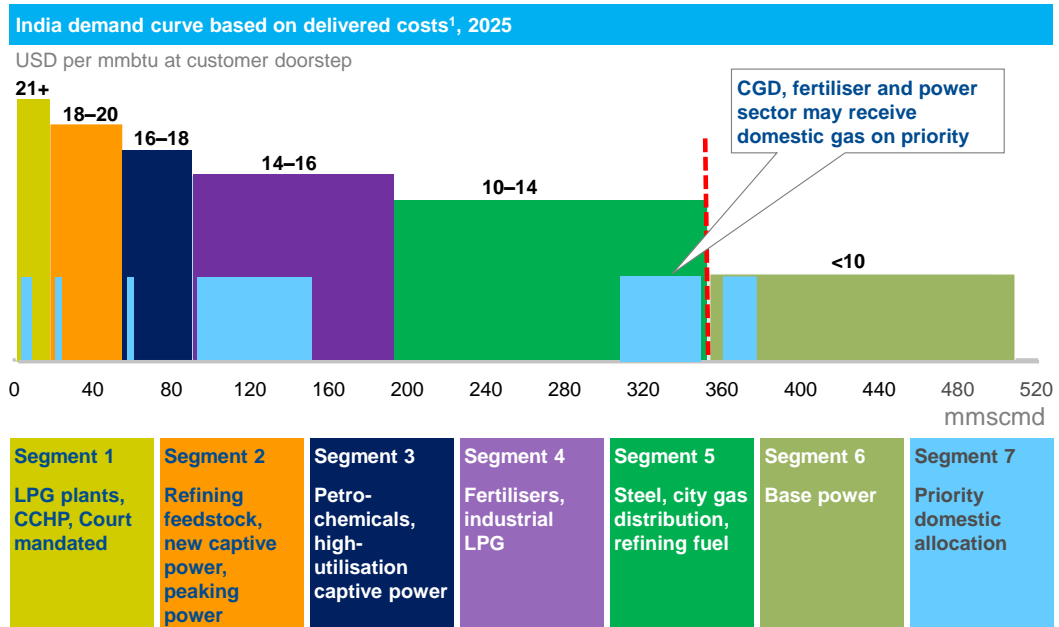
**Even in the best case scenario, DES price of imported LNG may remain above USD 7.3/mmbtu and landed cost above USD 9–10/mmbtu**



<sup>1</sup> Henry Hub prices have averaged USD 2.88 mmbtu in the last 5 years with a historic low of USD 1.87 in April '12 and high of USD 5.21 in Feb '14  
<sup>2</sup> Sourcing price of crude is unlikely to be less than USD 6.6/mmbtu. Estimating crude linked price as an alternative to Henry Hub built up price, conservative crude price of USD 55/barrel with LNG sourcing price at 12% of crude price would still yield a minimum sourcing price will be USD 6.6/mmbtu

### EXHIBIT 1.11

**At this price, demand for gas could be 350 mmscmd in 2025, part of which may be served by priority domestic gas allocation**



<sup>1</sup> Alternate switching cost at USD 90 per barrel, World Bank crude price forecast for 2025

SOURCE: CERC, Indian Petro, PCRA, UDI world electric power plant data base, OMCs, Petronetlng.com

### 1.1.2.2 Key concerns and opportunities

Assuming that domestic supply would range between 125–138 mmscmd (say, 130 mmscmd) in 2025, the supply shortfall would be around 220 mmscmd. Given that about 20 mmscmd of domestic gas is likely

to be reinjected for internal use and another 10 mmscmd may be allocated to Segment 6 as per expected government allocation, therefore a total import requirement of 25 mmscmd in 2025 at an import price of USD10 per mmbtu could be considered (Exhibit 1.51).

#### EXHIBIT 1.12

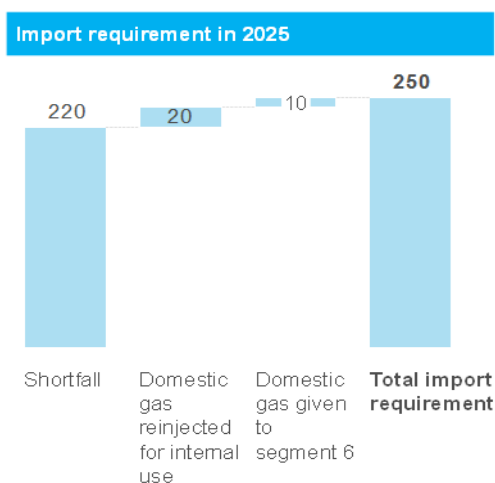
#### Taking domestic gas production at 123–138 mmscmd; maximum import demand may be 250 mmscmd (nearly 70 MTPA)<sup>1</sup>

mmscmd

Gross gas demand & supply estimates			
Gas Supply	2015	2020	2025
Low domestic production	101	112	125
High Domestic Production	103	119	138

At USD 10 per mmbtu price, LNG demand in India would be around 350 mmscmd by 2025 leading to a LNG shortfall of around 220 mmscmd

<sup>1</sup> 350 mmscmd is equal to 97 MTPA  
SOURCE: PNGRB base data used projections



A sensitivity analysis suggests that, everything else being the same, if domestic supply were to increase to 204 mmscmd<sup>16</sup> and total gas demand increased to 370 mmscmd<sup>17</sup>, import demand may reduce to 205 mmscmd (57 MTPA). Alternatively, if import price of LNG were to be at USD 12 per mmbtu instead of USD 10 per mmbtu, the total gas demand may reduce to 327 mmscmd and, at a domestic production level of about 138 mmscmd, import demand may be in the range of 223 to 241 mmscmd (62 to 67 MTPA).

Demand could be strongest from Maharashtra, Gujarat, Uttar Pradesh, Andhra Pradesh and Tamil Nadu (Exhibit 1.52). Power, fertiliser, industrial and city gas distribution (CGD) segments are expected to contribute to the bulk of future growth of natural gas demand in India. Fertiliser industry is the only industry that uses chemical and thermal heat of gas for its production and remains a major contributor to the natural gas demand in the country<sup>18</sup>.

<sup>16</sup> Forecast by Industry Group for Petroleum and Natural Gas Regulatory Board in “Vision 2030”, based on MoPNG projections in 12th Plan document

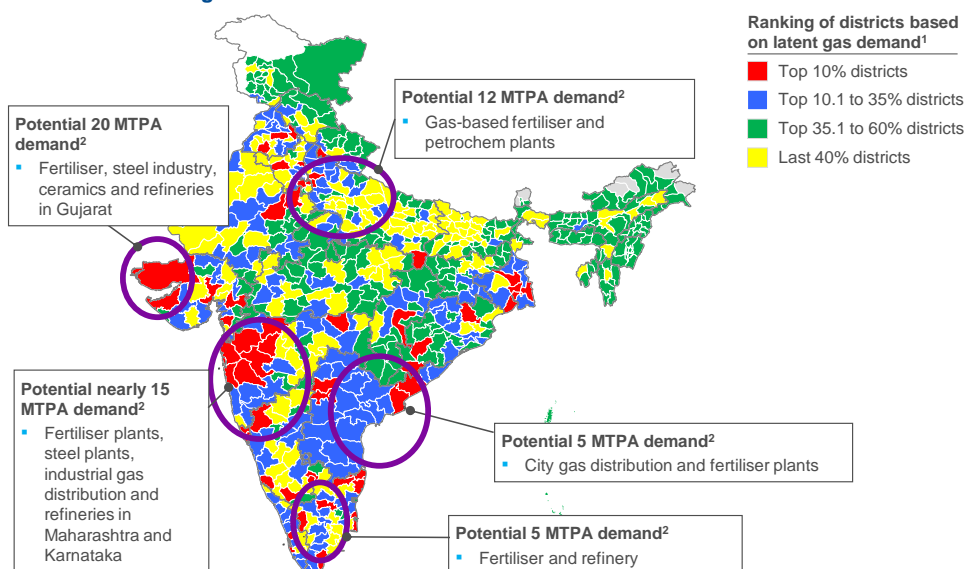
<sup>17</sup> An increase in domestic gas production would also increase demand for certain sectors that were previously unviable

<sup>18</sup> “Vision 2030” Natural Gas Infrastructure in India Report by Industry Group For Petroleum & Natural Gas Regulatory Board; <http://www.pngrb.gov.in/Hindi-Website/pdf/vision-NGPV-2030-06092013.pdf>

## EXHIBIT 1.13

### Gas demand may be concentrated in selected industrial clusters in Maharashtra, Andhra Pradesh and Uttar Pradesh

#### Latent incremental gas demand at district level<sup>1</sup>



<sup>1</sup> Based on existing consumption of LPG- Bulk, Naphtha and Furnace Oil and 40% of domestic gas

<sup>2</sup> Demand in FY25

SOURCE: CERC, Indian Petro, PCRA, UDI world electric power plant data base, OMCs, petronetng.com

#### 1.1.2.1 Possible outcomes and recommendations

- Out of a surplus of about 20 MTPA in the Gujarat cluster, 15 MTPA could be moved to the deficit areas in the North and 5 MTPA to Maharashtra through coastal shipping. Of the 6.3 MTPA surplus in the eastern region, 4 MTPA could be shipped to Hyderabad and the remaining moved to the North and central regions via pipeline. This would leave residual deficits of 6.3 MTPA in the South, 3 MTPA in the Maharashtra region and 2 MTPA in the Hyderabad region.

Of the 15 MTPA being moved north from the Gujarat cluster, 10 MTPA could be coastally shipped within Gujarat, from RIL Jamnagar to Mundra, and thereafter through pipeline to the North in the short run. There is also scope for coastal shipping of 4 MTPA from Odisha to Andhra Pradesh (AP), thus amounting to a nearly 15 MTPA of coastal

shipping of petroleum products by 2025. To facilitate coastal shipping, supporting infrastructure shall be required at ports in Vizag, Paradip, Kandla, Jamnagar and JNPT/Mumbai.

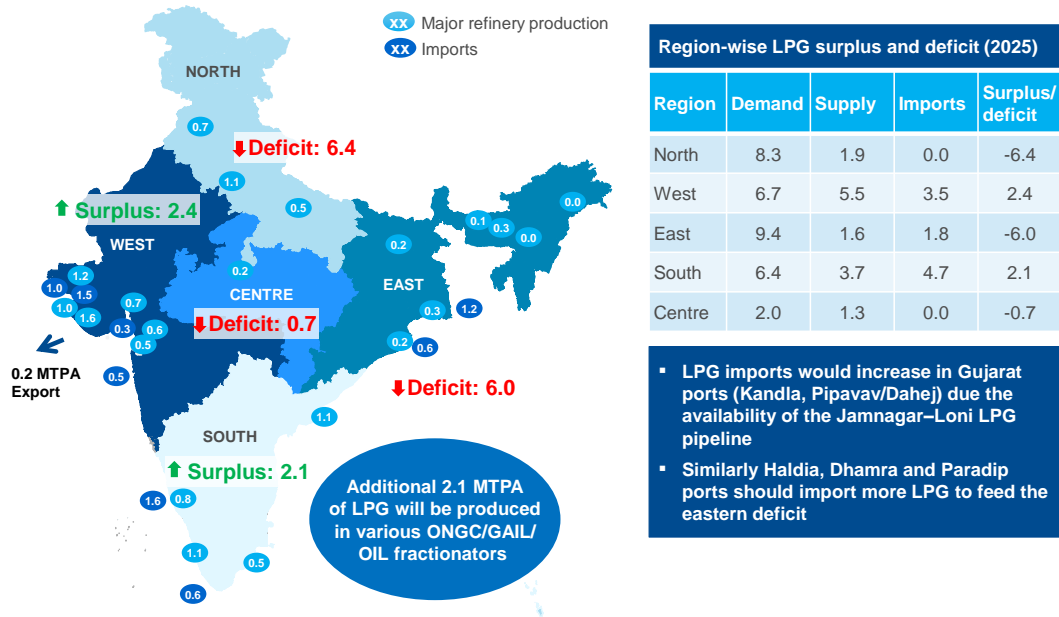
It is expected that greenfield refining capacity will be required in the country (details in chapter 4). Before the capacity comes up, it is proposed that import facilities are built at ports of Jaigarh, Mormugao, Tuticorin and Cuddalore.

The northern and eastern states of the country are expected to experience LPG supply deficit to the extent of 8.8 to 9 MTPA over the next decade. To plug this deficit, LPG imports could be increased in ports of Gujarat (Kandla, Pipavav/Dahej), where the Jamnagar–Loni LPG pipeline to the north is available, and at Haldia, Paradip and Dhamra to feed the eastern deficit as a LPG pipeline connecting Paradip–Haldia–Durgapur is being built by IOCL (Exhibit 1.53).

**EXHIBIT 1.14**

**LPG import capacity may have to be built at ports in Gujarat, Orissa and West Bengal that could help the LPG-deficient northern and southern states**

2025 (MTPA)



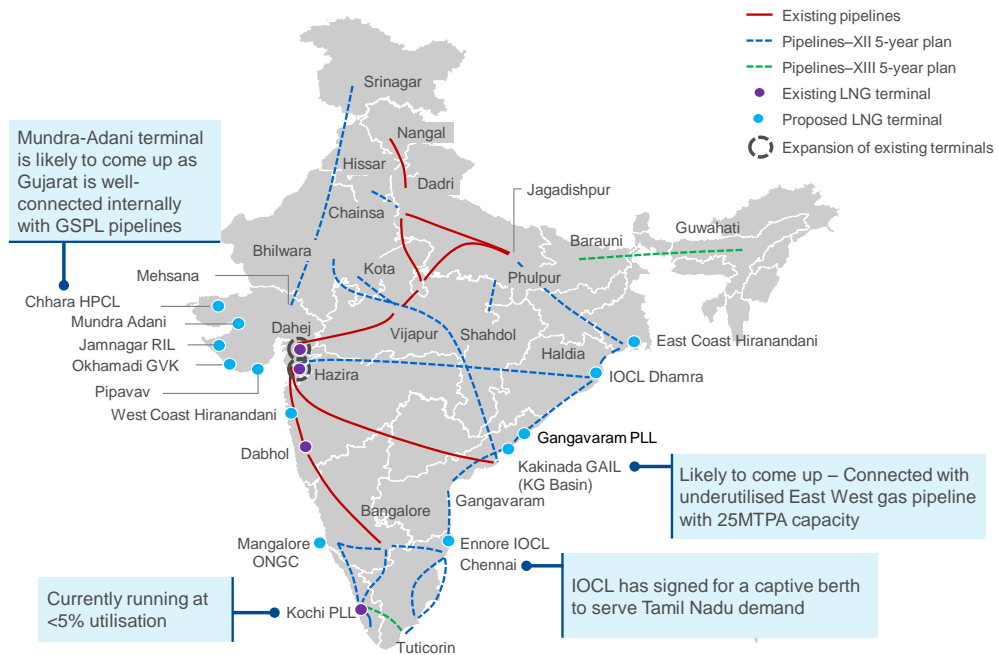
SOURCE: Indian Petroleum and Natural Gas Statistics 2014–15; IOCL "Indian LPG Market" report

Similarly in the gas sector, regasification terminals could be developed in Kachchh, Central AP, and Northern Tamil Nadu to serve the demand in these pockets. These

terminals will serve the demand for Gujarat, Tamil Nadu and Andhra Pradesh (Exhibit 1.54).

**EXHIBIT 1.15**

**Terminals connected with pipelines and FSRUs are more likely to come up**



SOURCE: MoPNG; press research

## 1.2 Thermal coal



In response to the projected coal demand in excess of 1.2 bn tonnes (BT) by 2020, Coal India Limited (CIL) is targeting to reach a production of 1 bn tonnes per annum by 2020<sup>19</sup>. This rapid increase in production, expected over the next five years will prompt all stakeholders in the coal, mining and logistics industry, along with end-users such as thermal power plants, steel, cement and fertiliser plants, to re-assess two key aspects: coal linkage rationalisation and coal evacuation.

As of 2013–14, approximately 740 MTPA of coal moved through the country, including domestic production and imports. The majority of coal produced and imported in India is thermal coal, while coking coal contributes a much smaller share of 60 MTPA. Power and steel plants use about 80 per cent of the total domestic and imported coal. While coal production is concentrated mostly in eastern and central India, it is transported primarily by rail to other parts of the country. Coastal shipping, at INR 0.20 per tonne-km after taking into account the cost of double handling<sup>20</sup>, has a negligible share in the volume of coal movement even though cost per tonne by coastal shipping is 80 per cent lower than by rail, which is INR 1.2 to 1.5 per tonne-km for coal movement<sup>21</sup>.

The cost of coal logistics can contribute up to 30 to 40 per cent to the per unit cost of power generated, especially when the distances from mine to power plant are over 500 km<sup>22</sup>. As a result, shifting coal movement from rail to coastal shipping, via

ports for the relevant coastal thermal and steel plants, could significantly lower the per unit cost of power generation in India. Further, major railway lines for coal movement are running at a capacity utilisation of 100 per cent and above, causing delays and higher costs. With the government investing in key manufacturing and infrastructure development programmes, industry experts analyse that the current network may not be sufficient to meet the coal movement volumes in the next 10 to 15 years.

### 1.2.1 Current and future supply chain

Thermal coal accounts for 60 per cent of installed power generation capacity, contributes to over half the railway traffic and represents 24 per cent of port volumes (Exhibit 1.55).

Coal production in India during 2013–14 was 565 MMT. In addition, 168 MMT of coal was imported mainly from Indonesia, Australia and South Africa. After accounting for the changes in stock and the small quantity of coal exported, data indicates that around 740 MMT of coal moved around the country.

Existing thermal power plants require about 525 MTPA of thermal coal. Of this, nearly 80 per cent, i.e., 445 MTPA, is produced domestically while another 80 MTPA is imported (Exhibit 1.56).

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<sup>19</sup> CIL

<sup>20</sup> Two additional handlings are caused during coastal shipping in most cases

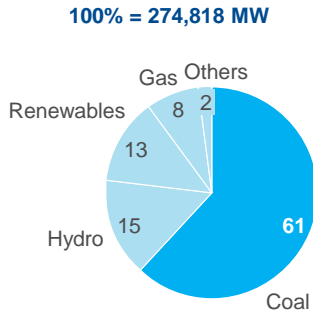
<sup>21</sup> Source: Actual prices and clean sheet analysis

<sup>22</sup> Sigma insights

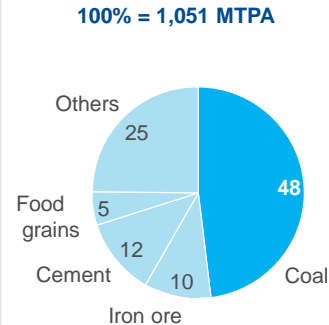
## EXHIBIT 1.16

### Coal volumes as percent of total movement for power, rail and port

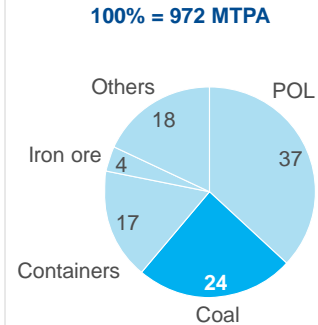
61% of installed power capacity<sup>1</sup>  
'000 MW, FY14



Nearly 50% of railway traffic<sup>2</sup>  
MTPA, FY 14



24% of port volume<sup>3</sup>  
MTPA, FY 14



1 Total Installed Capacity as on 30.06.2015  
2 2013-14 Loading of revenue earning traffic  
3 2013-14 Traffic Handled at All Ports

SOURCE: Basic Port Statistics of India, Transport Research Wing, Government of India, 2013-14; Indian railways annual reports and accounts 2013-14; Ministry of Power

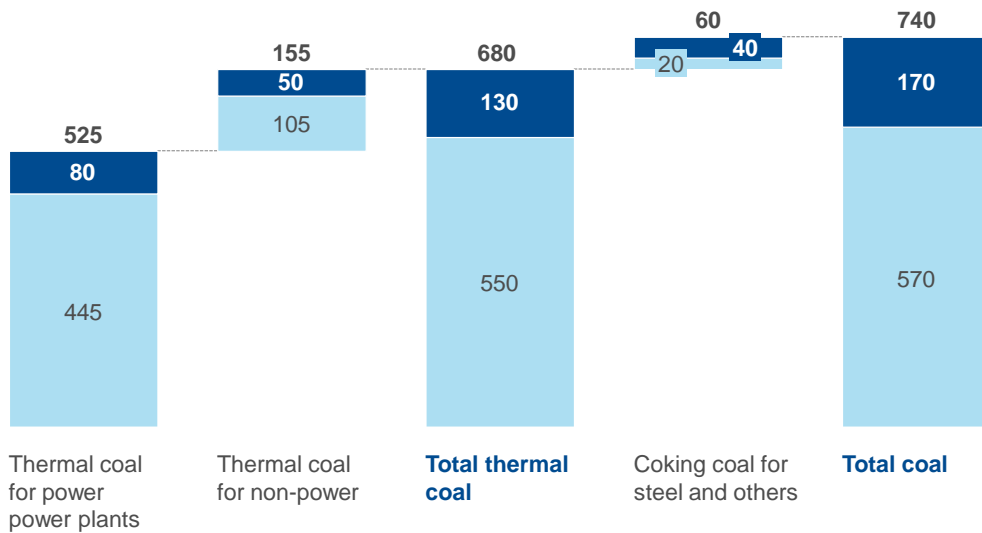
## EXHIBIT 1.17

### Coal demand and supply in India

■ Import  
■ Domestic

#### Demand for coal by end use

MTPA, 2014



SOURCE: Sigma Insights; India coal market watch

Coal deposits are confined to the eastern and southern and central parts of the country. Jharkhand, Odisha, Chhattisgarh, 23. The Sagarmala Programme has primarily focused on thermal coal mainly produced by Chhattisgarh and Odisha.

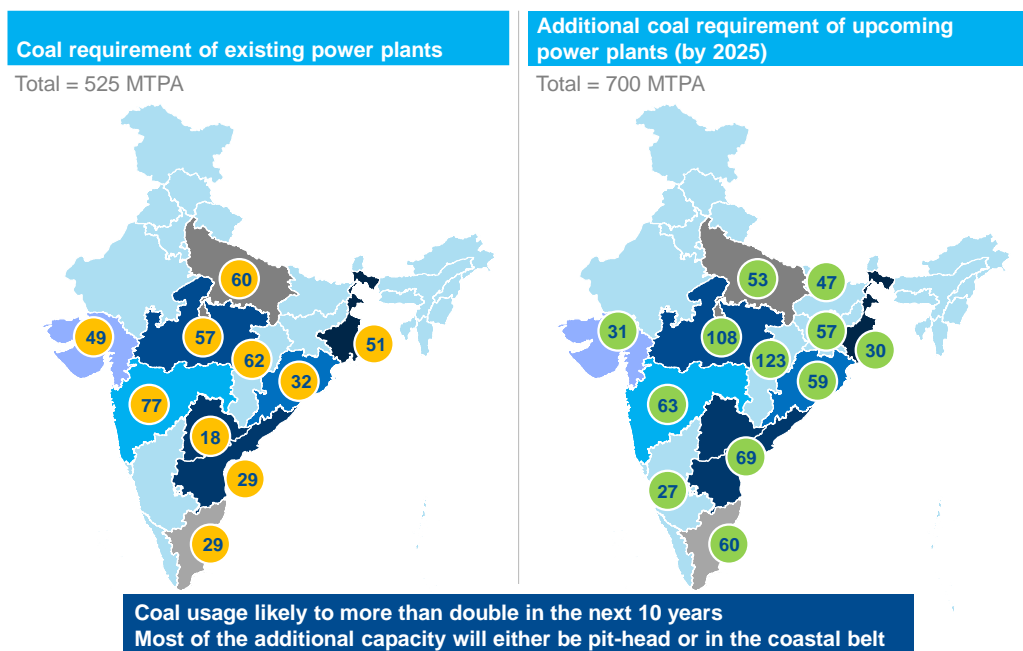
Power plants in Maharashtra consume the highest quantity of coal, about 77 MTPA,

West Bengal, Madhya Pradesh, Andhra Pradesh and Maharashtra account for nearly all the coal reserves in India followed by power plants in Chhattisgarh and Uttar Pradesh at 62 MTPA and 60 MTPA respectively. Overall, 10 states account for more than 80 per cent of the current thermal coal requirement for power generation in India (Exhibit 1.57).

**EXHIBIT 1.18**

**10 states account for 80% of current thermal coal requirement for power**

MTPA ● Current requirement ● Requirement of upcoming projects



SOURCE: CEA; Sigma insights

While coal production is concentrated in the eastern and central zones of India, it is transported for power generation to nearly all parts of the country, e.g., 26 MTPA of coal travels from Odisha to Tamil Nadu.

Similarly, 19 MTPA of coal also moves from Chhattisgarh to Maharashtra and 14 MTPA to Gujarat (Exhibit 1.58). Coal imported from Indonesia and South Africa arrives at various ports and then moves inland.

23 CIL

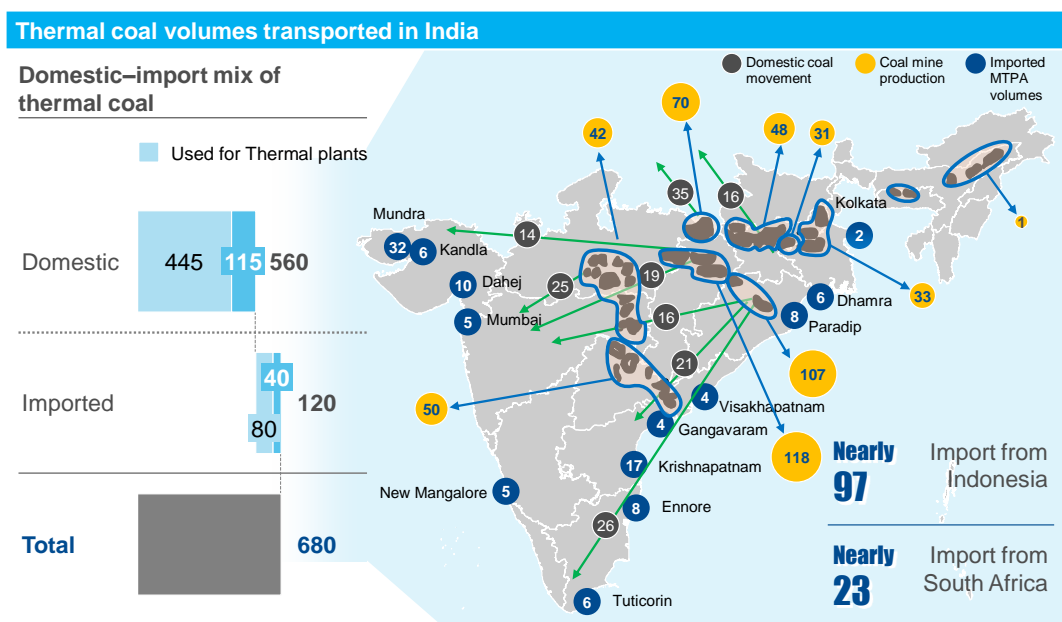


## EXHIBIT 1.19

### Current thermal coal origin-destination

MTPA; 2014

XX Imported MTPA volumes



SOURCE: CIL; Sigma insights; Reuters

Coal-based power generation capacity in the country is expected to reach 280 GW by 2020, which may push up the demand for thermal coal, projected to rise up to 1,250 MTPA by 2020 at a CAGR of almost 11 per cent (Exhibit 1.59). Evacuation of this coal may put further pressure on the already constrained rail network.

Indian Railways plans to construct 60 new railway lines and make 200 new rakes available over and above the current 200 rakes deployed for coal by the railways<sup>24</sup>. The growth projection of railway tracks as per the Indian Railways' Vision 2020, however, shows only 25,000 tracks/route km being added to the 2013–14 level of 65,808 at a CAGR of approximately

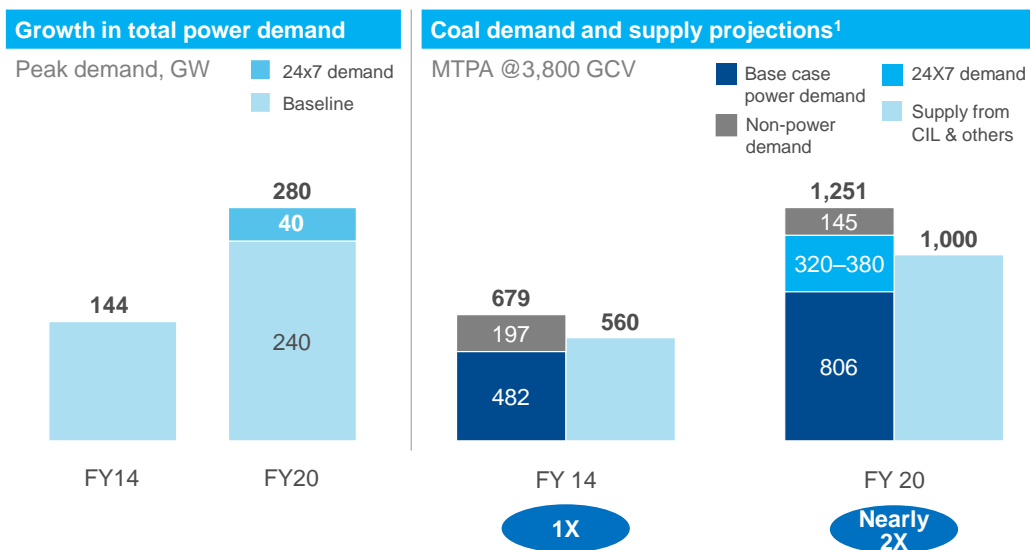
5.5 per cent, which is much slower than the growth in coal demand. The Coal India Board has also approved an INR 515 cr plan to procure high-capacity box wagons of 80.5 tonnes each<sup>25</sup>. And the Ministry of Coal has set up two joint ventures (JVs) in Odisha and Jharkhand where state governments are participating with the objective of investing in coal evacuation mainly through railway projects.

<sup>24</sup> Source : Press research

<sup>25</sup> Source: Press research

## EXHIBIT 1.20

### Demand growth for thermal coal



<sup>1</sup> 10% annual growth till FY 2020  
 Adding latent demand can add 20% more to power demand  
 25% of coal requirement is for non-power usage  
 CIL production assumed to be around 800 MTPA, 200 from other coal fields  
 SOURCE: Coal optimisation model; Sigma insights

### 1.2.2 Key concerns and opportunities

While these are laudable initiatives, issues such as land acquisition, project completion delays and cost overruns imply that rail infrastructure may not suffice to handle 1 bn tonnes of coal evacuation by 2020 through railways. The rail network is not expanding at the pace necessary to keep up with the required coal capacity, having grown at only 0.7 per cent year-on-year historically.

Furthermore, rail transport significantly adds to the overall cost of power generation which passes on to end-use customers. Industry experts indicate that about 30 to 35 per cent of the cost of power is contributed by coal logistics costs especially for power plants located

over 500 km away from coal mines (Exhibit 1.60). Thus, shifting coal movement from rail to sea wherever possible could help reduce the cost of power in the country supporting 'Make in India' and '24x7 power to all'.

Coastal shipment only has a 4 per cent share (23 MTPA) in the total domestic coal movement, which is much lower than countries like China, where around 600 MTPA<sup>26</sup> of domestic coal is moved through coastal shipping (Exhibit 1.61).

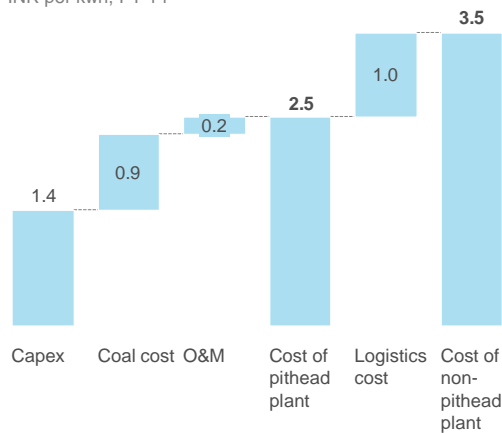
<sup>26</sup> Expert interviews

## EXHIBIT 1.21

### Logistics cost as a proportion of cost of power

#### Break up of power cost at busbar<sup>1</sup>

INR per kwh, FY 14

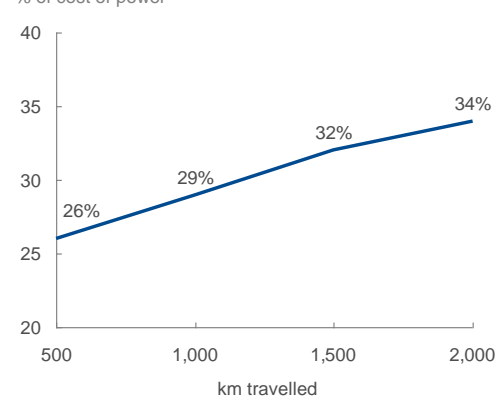


<sup>1</sup> Does not include transmission cost  
 Supercritical power plant of 660 MW with economic life of 25 years  
 Plant runs on 100% domestic coal  
 Average mine to plant distance of 1,000 km  
 Transportation of coal by rail  
 Capex of INR 6,000 Cr for 1 GW capacity plant  
 Average PLF of 80%

SOURCE: Expert discussions

#### Share of logistics cost

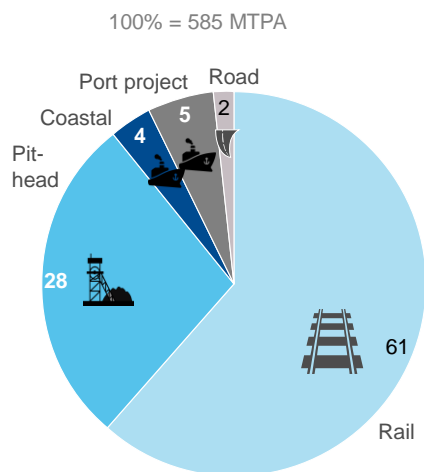
% of cost of power



## EXHIBIT 1.22

### Share of coastal shipping in freight mix

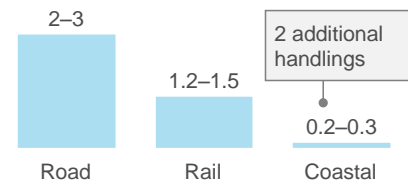
#### Nearly 61% coal is transported on rail



SOURCE: Sigma insights

#### Coastal is significantly cheaper than rail

INR per tonne km (operating cost)



- 28% of movement is pithead and port projects which are already optimised
- Around 63% of movement is via road/rail, opportunity to optimise the movement by
  - Debottlenecking the rail/road routes
  - Alternative modal mix using coastal shipping and inland waterways wherever feasible

An analysis of current and projected coal movement indicates significant potential to cut costs through a modal-mix shift towards coastal shipping. An in-depth study was conducted across 400 thermal power plants in the country to examine the currently used

origin, destination and mode of coal movement (Exhibit 1.62). A cost comparison of all possible combinations of the modal mix under different scenarios of vessel capacity was also done.

**EXHIBIT 1.23**

**Example of optimisation model: Nearly 400 plants were studied to optimise their coal demand routes and cost economics**

**The OD of coal for each operating/power plant was tracked**

Project Name	Capacity MW	Project Status	Expected Year	Location	District	State
Mundra	4620	Commissioned	Existing	Mundra	Kutch	Gujarat
Mundra	4620	Commissioned	Existing	Mundra	Kutch	Gujarat
Mundra	4620	Commissioned	Existing	Mundra	Kutch	Gujarat
Mundra	4620	Commissioned	Existing	Mundra	Kutch	Gujarat
Tiroda I	3300	Commissioned	Existing	Tiroda	Gondia	Maharashtra
Tiroda I	3300	Commissioned	Existing	Tiroda	Gondia	Maharashtra
Tiroda I	3300	Commissioned	Existing	Tiroda	Gondia	Maharashtra
Tiroda I	3300	Commissioned	Existing	Tiroda	Gondia	Maharashtra
Tiroda I	3300	Commissioned	Existing	Tiroda	Gondia	Maharashtra
Tiroda I	3300	Commissioned	Existing	Tiroda	Gondia	Maharashtra

**Nearly 400**

**5 specific possible modal mix scenarios for each plant was developed**

Source	Destination	Project Status	Coal Movem	Coal Mover	Coal M	Sequence
Dahej	Kawai	Commissioned	3,614	4,447	3,782	Road-Rail
Dahej	Kawai	Commissioned	3,614	4,447	3,782	Road
Hazira	Sabarmati II	Commissioned	0.301	0.371	0.409	Road-Rail
Hazira	Sabarmati II	Commissioned	0.301	0.371	0.409	Road
Jajgad	Jsw Ratnagiri	Commissioned	3,285	4,043	3,673	Road
Jajgad	Jsw Ratnagiri	Commissioned	3,285	4,043	3,673	Road-Rail-Road
Krishnapatnan Meenakshi Thamm		Commissioned	0.821	1,011	0,746	Road
Krishnapatnan Meenakshi Thamm		Commissioned	0.821	1,011	0,746	Rail-Road
Krishnapatnan Simhapuri TPS I		Commissioned	1,643	2,022	2,054	Road
Krishnapatnan Simhapuri TPS I		Commissioned	1,643	2,022	2,054	Rail-Road
Krishnapatnan Sri Damodaram		Commissioned	1,643	2,022	0,143	Road
Krishnapatnan Sri Damodaram		Commissioned	1,643	2,022	0,143	Rail-Road

**Nearly 5**

**The nearest (rail distance) mine coal for each plant was tracked**

S. No.	Project Name	Capacity MW	Coal Source	Origin Point (Mine/Port)	Mine Rail Head
1	Mundra	4620	Mundra Term	Mundra Termin	MUNDRA PORTCONTAINER TERI
2	Mundra	4620	MCL	Lingaraj	Private Skidng, Lingaraj MGR of U
3	Mundra	4620	MCL	Lalthanpur	BELPAHAR OPEN CAST MAINES
4	Mundra	4620	Mundra Term	Mundra Termin	MUNDRA PORTCONTAINER TERI
5	Tiroda I	3300	SECL	Kusmundha BI	PRIVATE SDG OF NTPC GEVRA
6	Tiroda I	3300	WCL	Ghugus OCP	GHUGUS COLLIERY SDG.
7	Tiroda I	3300	SECL	Kusmundha BI	PRIVATE SDG OF NTPC GEVRA
8	Tiroda I	3300	SECL	Kusmundha BI	PRIVATE SDG OF NTPC GEVRA
9	Tiroda I	3300	Visakhapatn	Visakhapatnar	Visakhapatnam Port
10	Kawai	1320	Dahej	Dahej	Dahej
11	Kothagudem	720	SCCL	GK OCP	Bhadrachalam Road

**Nearly 10**

**The most logical (nearest distance) port for import/coastal shipping was mapped**

Source	Destination	Project Status	Earlier Used Port
Tadri	Torangallu Ext	Commissioned	Goa Terminal
Tadri	Torangallu Ext	Commissioned	Goa Terminal
Tadri	Torangallu Imp	Commissioned	Goa Terminal
Tadri	Torangallu Imp	Commissioned	Goa Terminal
Vadinar Termi Salaya I		Commissioned	Vadinar Terminal
Vadinar Termi Salaya I		Commissioned	Vadinar Terminal
Vadinar Termi Vadinar II		Commissioned	Vadinar Terminal
Vadinar Termi Vadinar II		Commissioned	Vadinar Terminal

**Nearly 30**

SOURCE: Coal optimisation model

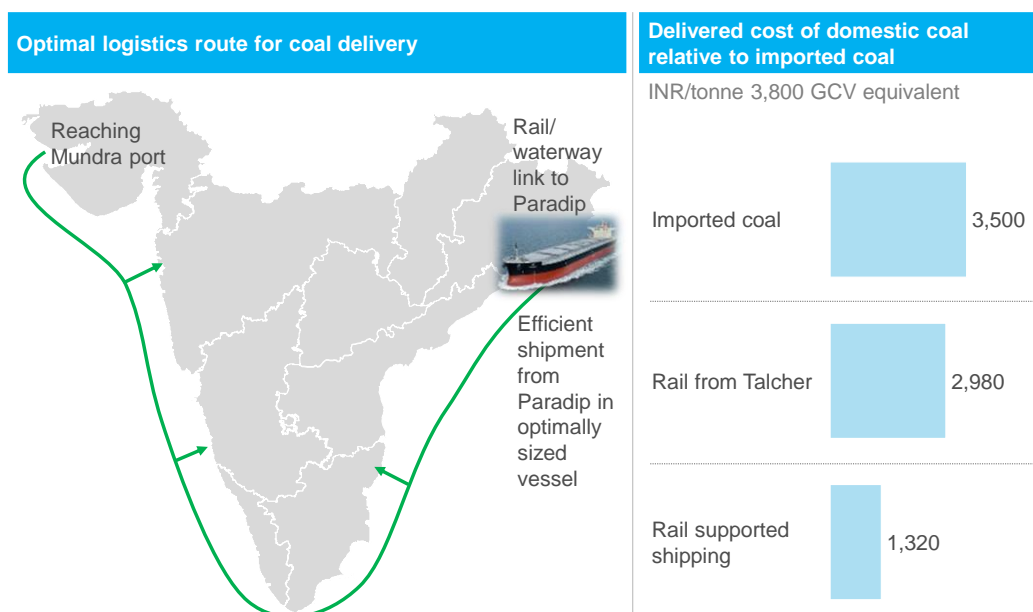
For instance, from Talcher in Odisha to a power plant at Mundra port in Gujarat, the cost for movement through rail is INR 2,980 per tonne while moving the same volume through rail-supported coastal shipping

would save nearly 56 per cent of the cost at INR 1,320 per tonne. Key assumptions used for this example have been shown as a sample in the Exhibit 1.63 and 1.64.

## EXHIBIT 1.24

**Output of OD study: All possible modal mix for each OD have been considered to come up with the most effective alternative**

ILLUSTRATIVE



SOURCE: Sigma insights – Coal optimisation model

## EXHIBIT 1.25

**Estimated coal transportation cost from Lingaraj mines (MCL) via Paradip port to Mundra Power Plant**

Cost head	Distance km	Rate INR per tonne per km	Total INR per tonne
Road freight from mine	-	5	0
Rail freight (mine to Paradip)	193	-	315
Ocean freight (Paradip to Mundra)	3,699	0.15	555
Road handling	-	-	-
Rail handling	-	-	150
Port handling at Paradip	-	-	150
Port handling at Mundra	-	-	150
<b>Total transportation cost</b>			<b>1,320</b>

Source: Sigma Insights- Coal optimisation model

### 1.2.3 Possible outcomes and recommendations

The study identified 12 coalfields and 37 power plant linkages (both existing and under-construction plants) as having considerable cost-saving potential through increased movement via coastal shipping.

Although the cost economics offer only a marginal advantage in coastal shipping in some cases, overall railway congestion still makes a strong case for a shift to coastal shipment in these plants.

While each plant may need to consider a unique set of factors before shifting entirely

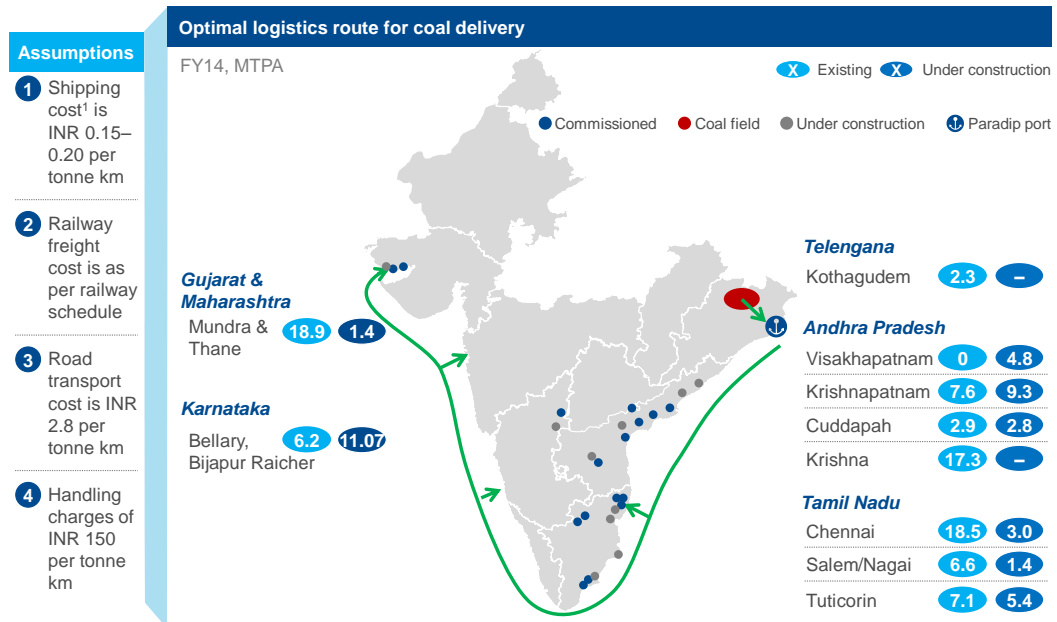
to coastal shipping, some have already adopted coastal shipping to a certain extent. It is possible to combine these plants

location-wise for a cluster-based view of the coal movement potential (Exhibit 1.65 and 1.66).

### EXHIBIT 1.26

#### Key clusters for coastal movement of domestic thermal coal

2020 potential



<sup>1</sup> Excluding handling cost which is considered separately  
SOURCE: Sigma insights; Coal optimisation model

### EXHIBIT 1.27

#### Coastal shipping opportunity by cluster

MTPA; FY 2020; assumed at 80% PLF

Clusters	Existing coastal shipping (MTPA)	Additional coastal shipping opportunity for existing plants (MMPTA)	Coastal shipping opportunity for upcoming plants (MTPA)
Tuticorin	6.4	0.8	5.4
Chennai	5.3	13.3	3.0
Salem	4.5	2.1	1.4
Raichur/Bellary	2.3	3.9	11.1
Krishnapatnam	0.1	7.5	9.3
Cuddapah	0.8	2.1	2.8
Krishna	2.4	14.9	–
Visakhapatnam	–	–	4.8
Gujarat	1.8	17.1	1.4
Kothagudem	–	2.3	–
<b>Total</b>	<b>23.5</b>	<b>63.9</b>	<b>39.2</b>

SOURCE: Sigma insights; Coal optimisation model

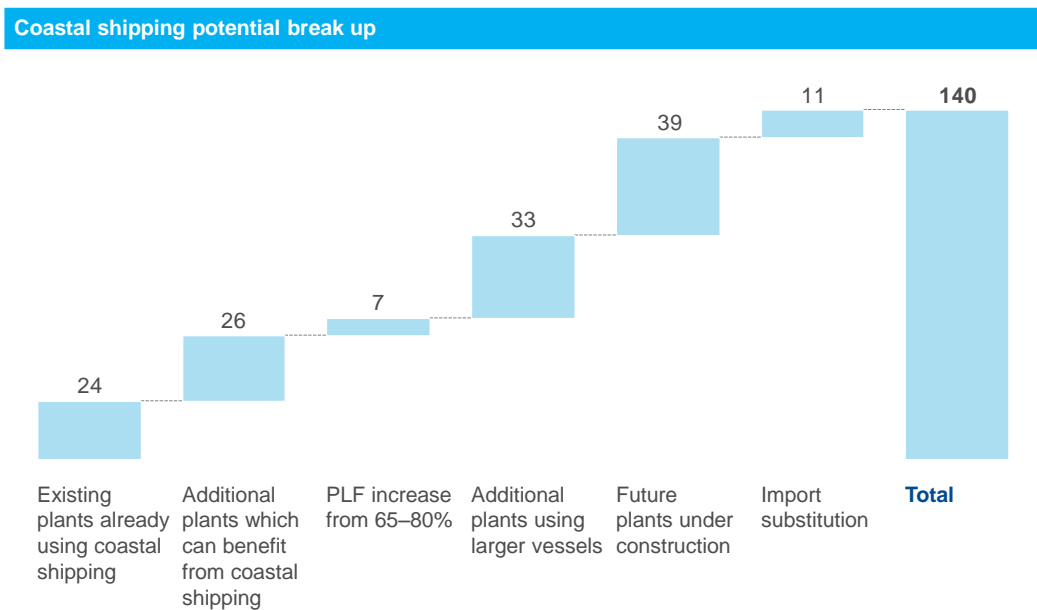
The cost of coastal shipping could be further reduced by deploying vessels of a larger capacity. Data suggests that with the right infrastructure and institutional support, movement of coal via coastal shipping could increase nearly six-fold from the current 23 MTPA to almost 140 MTPA by 2020 (Exhibit 1.67).

Three coalfields are likely to service the entire opportunity of 140 MTPA with more than two-thirds of the opportunity arising from MCL's coal-mine fields at Talcher and Ib Valley in Odisha, around 200 to 400 km from Paradip port. Due to capacity limitations at ports, Dhamra port could be considered to play an important role in coastal movement of coal along with Paradip port.

**EXHIBIT 1.28**

**140 MTPA of coal could be moved via coastal shipping**

MTPA; FY 2020



SOURCE: Sigma insights; Coal optimisation model

Of this potential, 80–85 MTPA of opportunity has been confirmed and syndicated by the Coal Working group formed under Sagarmala, comprising representatives from Railway Board, IPA, CIL, power gencos, ports as well as shipping associations

Power plant clusters, e.g., districts like Thiruvallur, Krishna and Krishnapatnam, could be prioritised for execution on the basis of cumulative savings<sup>27</sup>. Overall savings would be around INR 10,000 cr by 2020 with AP contributing roughly 25 per cent of the overall savings.

<sup>27</sup> Sigma insights – Coal optimisation model

### 1.3 Steel and raw materials



Logistics cost contributes to around 15 per cent of the total landed cost of steel. Underutilisation of our waterways is one of the reasons of high logistics cost, both ocean and inland waterways. The water mode contributes only 6 per cent<sup>28</sup> of logistics in India, compared to the 24 per cent in China<sup>29</sup>, even though it offers environmental benefits and savings in fuel costs.

Logistics efficiency is especially critical for India's steel industry, which has grown from 48 MTPA capacity in 2004 to 106 MTPA in 2014. India is now the third largest producer of crude steel in 2015 and remains the largest producer of sponge iron, also known as direct reduced iron (DRI), in the world. While the global steel market is in a downturn, steel demand in India is projected to be over 200 MTPA by 2025 under the base case scenario of GDP growing at 7 to 8 per cent per annum<sup>30</sup>. One tonne of steel requires three tonnes of raw materials. The volume of material to be transported for the

steel industry will reach 800 mn tonnes by 2025. Logistics efficiency will be critical for making the existing capacity more competitive. The global steel market is in a downturn with steel production and demand in China slowing down, but steel demand in India will grow.

#### 1.3.1 Coking coal

##### 1.3.1.1 Current and future supply chain

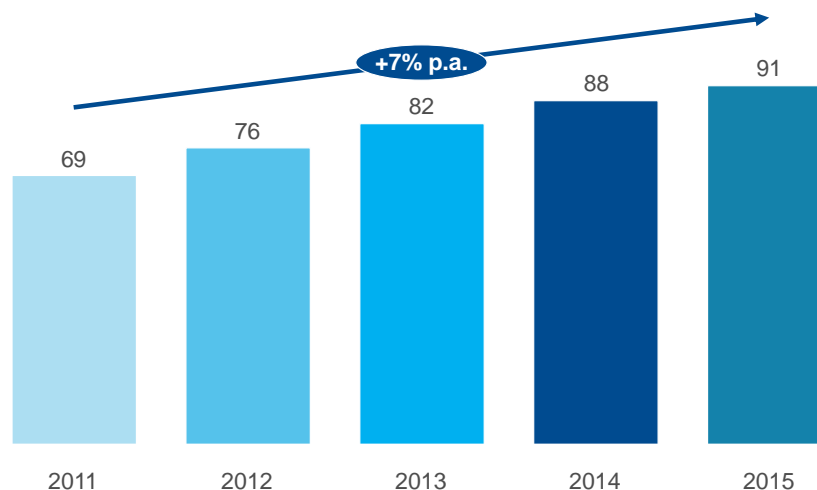
In 2014–15, the production of total finished steel for sale was ~91 MTPA, against an installed capacity of around 103 MTPA, with a growth of 4.3 per cent over 2013 and 2014 (Exhibit 1.68).

India has a low per capita consumption of steel and a high growth in GDP. This will result in an increase in steel demand, projected to be 200–250 MTPA by 2025 (Exhibit 1.30).

#### EXHIBIT 1.29

##### Steel production in India

MTPA



SOURCE: Ministry of Steel

<sup>28</sup> Total Transportation Study by RITES

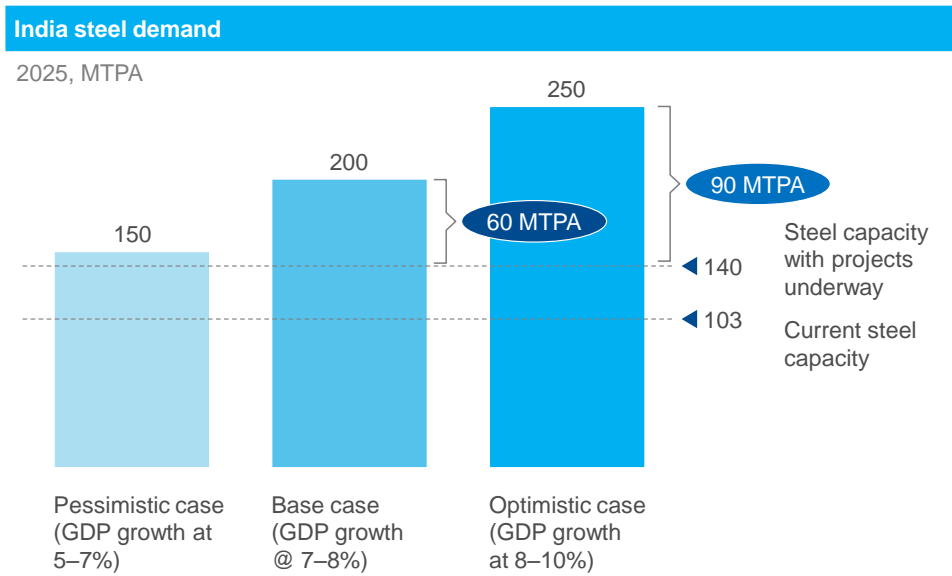
<sup>29</sup> China Statistical Yearbook 2012

<sup>30</sup> Ministry of Steel



**EXHIBIT 1.30**

**Future steel demand in India**



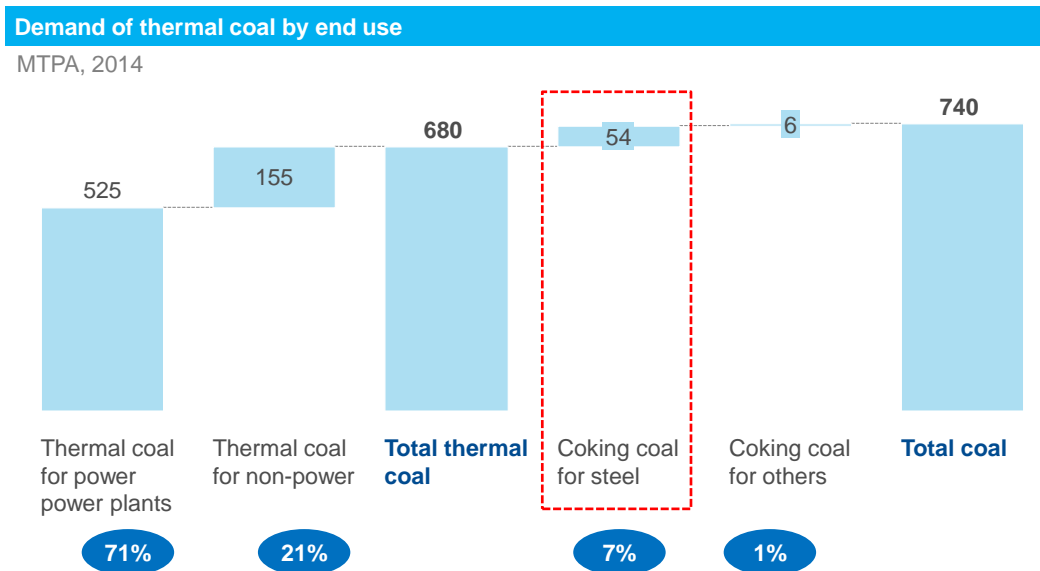
SOURCE: Ministry of Steel

Around 60 MTPA of coking coal is transported in the country of which around 54 MTPA is consumed for the production of

steel (Exhibit 1.69). About 80 per cent of the coking coal consumed is imported due to insufficient coking coal reserves in India.

**EXHIBIT 1.31**

**Coal consumption by steel and power sectors**



SOURCE: Sigma insights;

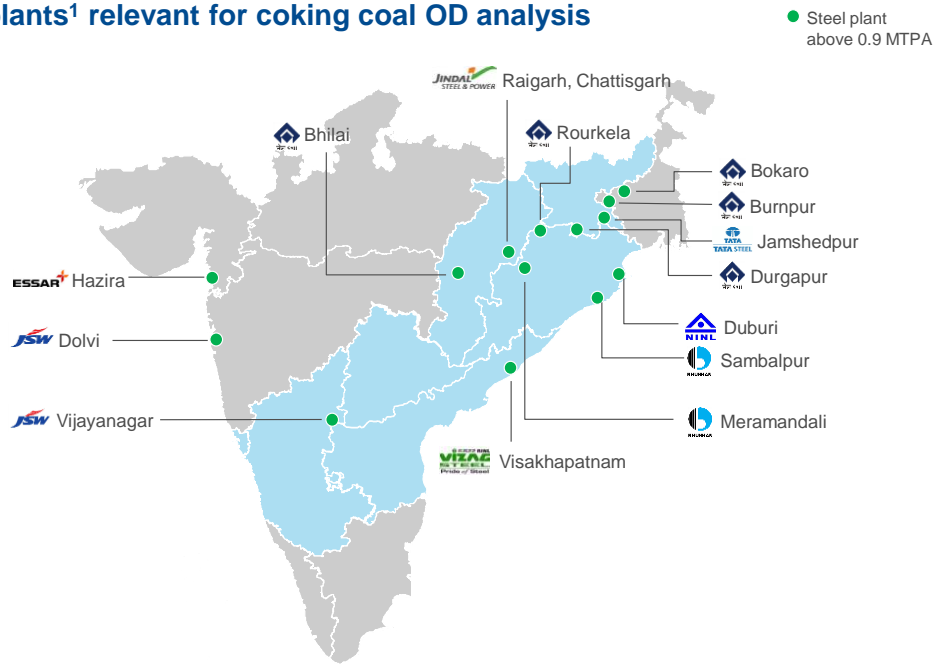
Eastern India, i.e., West Bengal, Jharkhand, Odisha and Chhattisgarh, is the biggest cluster of steel production in the country with 45 MTPA<sup>31</sup> (around 40 per cent) of total installed steel capacity. For the OD analysis, 14 steel plants have been considered as most relevant since they are the major producers of steel at around 60 per cent of the total and consume around 80 per cent of the total imported coking coal (Exhibit 1.70). These 14 plants may need around 45 MTPA

of coking coal of which imported coking coal fulfils 37 MTPA.

Each steel plant is aligned with one or more ports for sourcing imported coal with the entire evacuation done by rail. A total of 12 Indian ports handle around 37 MTPA of the imported coking coal used at 15 steel plants (Exhibit 1.71 and 1.72).

**EXHIBIT 1.32**

**Steel plants<sup>1</sup> relevant for coking coal OD analysis**



<sup>1</sup> Blast furnace based  
 SOURCE: World Steel Association; Steel Authority of India Limited; expert interviews

<sup>31</sup> Ministry of Steel

## EXHIBIT 1.33

### Origin-destination matrix for coking coal: Port to plant (Current)



Imported coking coal and plant origin destination, MTPA, 2014													
Steel plants/ Import port	Dhamra	Dharamtar ISPAT	Ganga- varam	Haldia	Hazira	Karaikal	Krishna- patnam	Mangalore	Mor- mugao	Mumbai	Paradip	Vizag	Grand total
JSW, Vijayanagar						0.1	0.6		5.0				5.68
TISCO	4.1		0.1	1.2							0.9		6.20
SAIL, Bokaro				1.6									1.60
SAIL, Bhilai												4.0	4.00
RINL, Vizag			3.5										3.54
JSW, Dolvi		0.5						0.6	1.9	0.1			3.05
SAIL, IISCO				1.6								0.5	2.10
Essar – Hazira					0.8								0.81
SAIL, Rourkela			0.5								2.8		3.32
SAIL, Durgapur	1.6												1.60
Bhushan steel, Sambalpur	0.1										1.4		1.51
JSPL, Raipur			0.9								0.4		1.33
Bhushan steel, Meramandali			0.2									0.4	0.60
Neelachal Ispat Nigam, Odisha											0.6		0.60
JSW, Salem		0.2						0.6					0.83
<b>Total</b>	<b>5.83</b>	<b>0.66</b>	<b>5.20</b>	<b>4.35</b>	<b>0.81</b>	<b>0.11</b>	<b>0.57</b>	<b>1.24</b>	<b>6.90</b>	<b>0.08</b>	<b>6.09</b>	<b>4.92</b>	<b>36.76</b>

SOURCE: SteelMint; annual report and steel expert interview

Australia accounts for over 82 per cent (37 MTPA) of coking coal imports (Exhibit 1.73). Import volumes on the eastern seaboard are much higher than on the western seaboard. Rail, by far, is the largest contributor to the current coking coal inland movement since only around 10 per cent of India's steel capacity is coastal. Most steel plants are

around 300 km inland from the coast, positioned to leverage iron ore reserves.

According to estimates, coking coal demand for steel would reach around 130 to 140 MTPA in 2035 based on increased steel demand in the country which faster than GDP (multiplier vs. GDP of 1.14) (Exhibit 1.74).

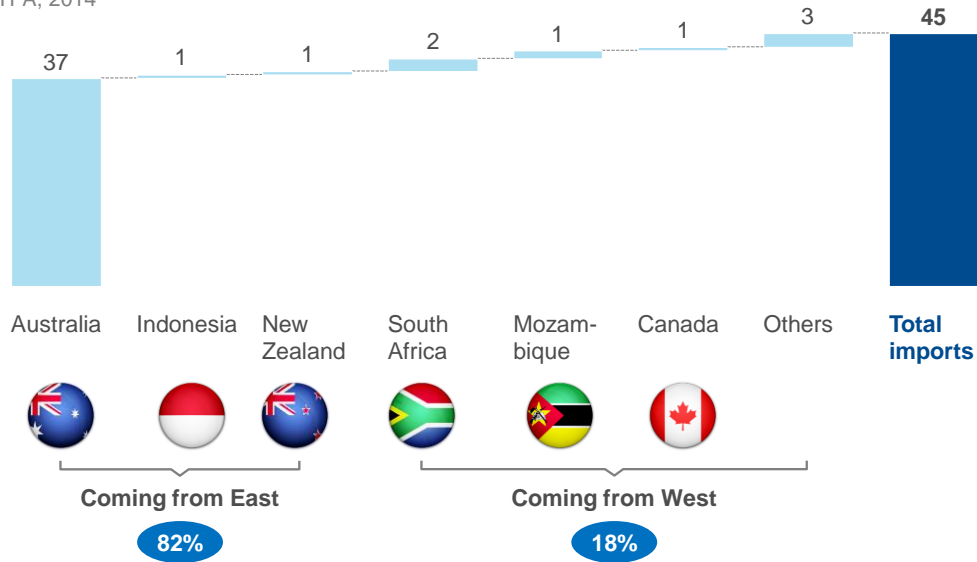
**EXHIBIT 1.34**

**Imported coking coal origin by country**

xx % contribution to total imports

**Nearly 87% of coking coal comes from East , with Australia contributing nearly 82% to it**

MTPA, 2014



SOURCE: SteelMint

**1.3.1.2 Key concerns and opportunities**

Current coking coal evacuation is facing challenges due to limited availability of rakes at unloading ports and rail line capacity at key railway routes. Around 21 MTPA of new steel capacity at key steel plants (1 MTPA and above blast furnace based) is under construction and would further need 18 to 20 MTPA of coking coal evacuation on the same routes, which are currently running at above 100 per cent utilisation.

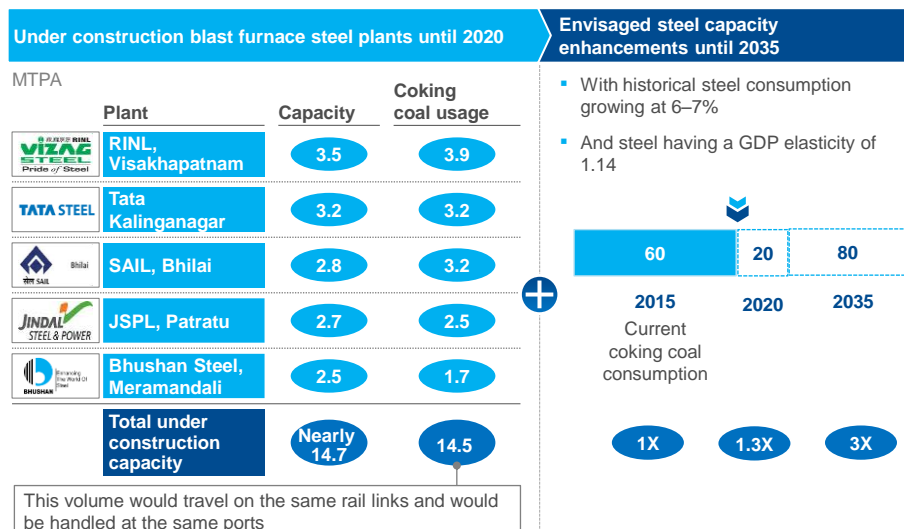
Thus, evacuation capability at the relevant unloading ports and railway routes may need to be improved for optimal evacuation of coking coal.

**1.3.1.3 Possible outcomes and recommendations**

For seamless movement of coking coal, key issues pertaining to expansion and modernisation of railway routes connecting ports to steel plants have been discussed in the report.

## EXHIBIT 1.35

### Future coking coal volumes



SOURCE: World Steel Association

## 1.3.2 Iron ore

### 1.3.2.1 Current and future supply chain

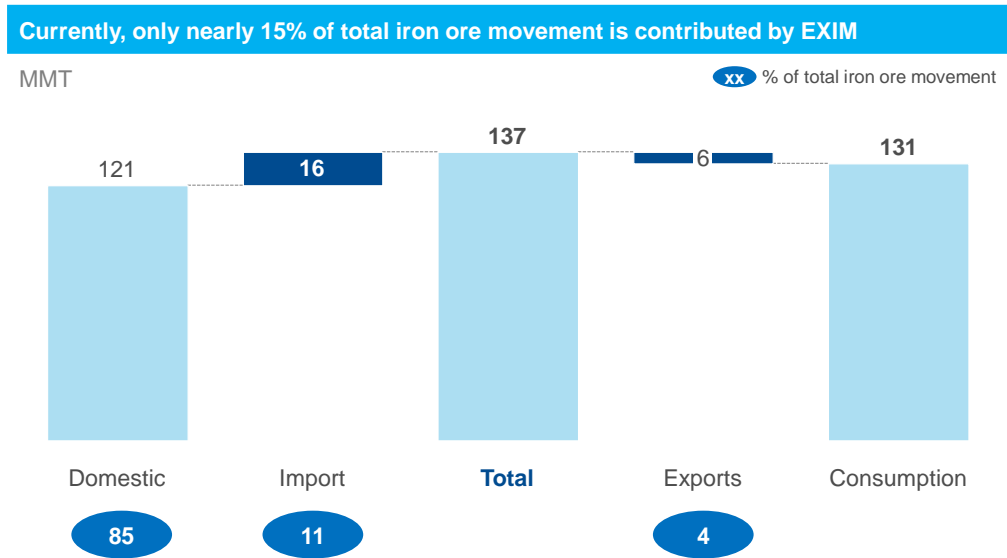
Over the last five to six years, India has turned from a net exporting country to a net importing country for iron ore. In 2008–09, before the iron ore mining ban, India produced around 220 MTPA and exported 102 MTPA (around 32 per cent) of iron ore. Today, India consumes around 131 MTPA of iron ore (as of FY 2014–15). Of this, 121 MTPA is produced domestically, 15.6 MTPA

is imported, 5.4 MTPA is still exported. Total EXIM traffic at around 21 MTPA, contributes only about 15 per cent of the total iron ore movement in India (Exhibit 1.75).

Currently, India exports around 68 per cent of its outgoing iron ore to the Far East, while around 63 per cent of all imports come from South Africa and Brazil (Exhibit 1.76).

**EXHIBIT 1.36**

**Iron ore movement in India, FY 14–15**

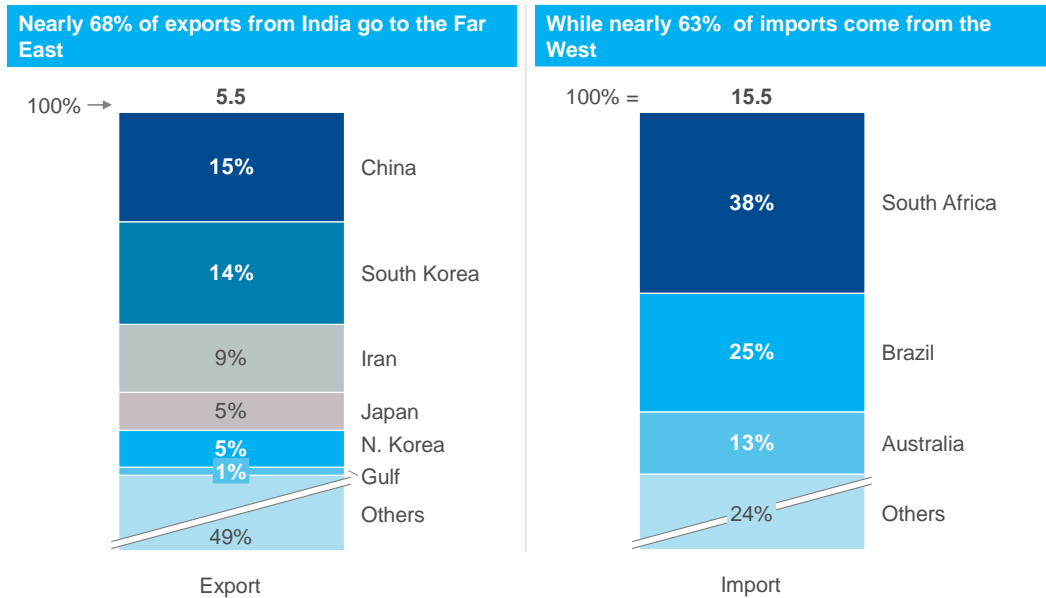


SOURCE: SteelMint

**EXHIBIT 1.37**

**Iron ore origin and destination by country**

MTPA, Percent, FY14–15



SOURCE: SteelMint

The EXIM of iron ore has declined for three reasons<sup>32</sup>:

<sup>32</sup> Source: Ministry of Steel, Indian Ports Association

- **Mining ban in key iron ore states:** The government banned the mining of iron ore in Karnataka and Goa in 2009–10. This had a significant impact on India’s iron ore figures, taking out 45 per cent of overall production and 85 per cent of exports
- **Additional levies on iron ore exports:** To discourage exports, the government introduced an export duty which has been rising continuously, from around 10 per cent in 2010 to 30 per cent in 2012. The new mining law (MMRDA Act) proposes profit sharing with the community, which will impact profits and make small mines unviable
- **Fall in global spot prices:** International spot prices have been falling for the past four years due to oversupply. Current spot prices are around USD 60 per tonne and are estimated to remain around USD 60 to 80 per tonne for the next five to seven years. This makes it an unviable scenario to export iron ore

Visakhapatnam and Paradip are currently the most extensively used ports for exports. Around 3.1 MTPA of iron ore passes through Visakhapatnam. Across all ports, the maximum total export of around 0.84 MTPA goes to China while South Korea is a close second with 0.79 MTPA.

Around 80 per cent of all iron ore exports pass nine Indian ports<sup>33</sup>, where they arrive from eight mining districts across Jharkhand, Odisha, Chhattisgarh, Goa and Karnataka (Exhibit 1.77). The mined commodity is mostly evacuated to the nearest port by rail, except from Goa, where evacuation happens through barges plying on inland waterways.

The highest volume of imports comes in through the Krishnapatnam port, which handled around 8.5 MTPA of iron ore in 2014–15, mainly from South Africa, followed by Brazil, Australia and Oman (Exhibit 1.78).

Three steel plants—Tata Steel Jamshedpur, JSW Vijaynagar and JSW Dolvi—accounted for around 80 per cent of all imports (Exhibit 1.79).

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<sup>33</sup> Visakhapatnam, Paradip, Panaji, Redi, Mormugao, Mangalore, Dhamra, Haldia, in that order of decreasing volumes

**EXHIBIT 1.38**

**Iron ore export: Port to destination country**

MTPA, 2014–15

Exported to	Dhamra	Gangavaram	Haldia	Kandla	Mangalore	Mormugao	Panaji	Paradip	Redi	Visakhapatnam	Grand total
China	-	0.00	0.05	0.02	0.06	0.03	0.20	0.09	0.38	0.02	0.84
South Korea	-	-	-	-	-	-	-	-	-	0.79	0.79
Iran	-	-	-	-	0.06	-	-	-	-	0.46	0.52
Japan	-	-	-	-	-	-	-	-	-	0.29	0.29
Gulf	-	-	-	-	-	-	-	-	-	0.05	0.05
Others <sup>1</sup>	0.10	0.02	0.23	-	-	0.19	0.19	0.85	-	1.20	2.77
<b>Grand total</b>	<b>0.10</b>	<b>0.02</b>	<b>0.27</b>	<b>0.02</b>	<b>0.11</b>	<b>0.21</b>	<b>0.39</b>	<b>0.99</b>	<b>0.38</b>	<b>3.10</b>	<b>Nearly 5.47</b>

<sup>1</sup> Includes the US as well as African and European countries in very small quantities

SOURCE: SteelMint

**EXHIBIT 1.39**

**Iron ore import: Source country to port**

MTPA, 2014–15

Imported from	Dhamra	Gangavaram	Haldia	Hazira	Jaigarh	Kandla	Karaikal	Krishnapatnam	Mangalore	Mormugao	Mumbai	Mundra	Paradip	Revdanda	Tuticorin	Visakhapatnam	Grand total
South Africa	-	0.08	0.11	0.34	0.65	0.80	-	3.05	0.08	0.05	-	0.22	0.35	-	0.05	0.05	5.84
Brazil	-	-	-	0.29	0.24	-	-	3.36	-	-	-	-	-	-	-	-	3.89
Australia	0.02	0.36	0.25	-	-	-	0.07	0.83	-	-	0.06	-	0.36	-	-	0.02	1.96
Oman	-	-	-	-	-	-	-	-	-	-	1.29	-	-	0.10	-	-	1.39
Canada	-	-	-	-	-	-	-	0.70	-	-	-	-	-	-	-	-	0.70
Malaysia	-	-	0.02	-	-	-	-	0.30	-	-	-	-	-	-	-	-	0.33
Marutania	-	-	-	-	-	-	-	0.30	-	-	-	-	-	-	-	-	0.30
Venezuela	-	-	-	-	0.14	-	-	-	-	-	-	-	-	-	-	-	0.14
Finland	-	-	-	-	-	0.05	-	-	-	-	-	-	-	-	-	-	0.05
Ukraine	-	-	-	-	-	0.05	-	-	-	-	-	-	-	-	-	-	0.05
Mozambique	-	-	-	0.05	-	-	-	-	-	-	-	-	-	-	-	-	0.05
Others	-	-	0.07	-	-	0.08	-	-	0.16	-	-	0.11	0.42	-	-	-	0.84
<b>Grand total</b>	<b>0.02</b>	<b>0.44</b>	<b>0.45</b>	<b>0.68</b>	<b>1.04</b>	<b>0.98</b>	<b>0.07</b>	<b>8.54</b>	<b>0.24</b>	<b>0.05</b>	<b>1.35</b>	<b>0.33</b>	<b>1.13</b>	<b>0.10</b>	<b>0.05</b>	<b>0.07</b>	<b>15.54</b>

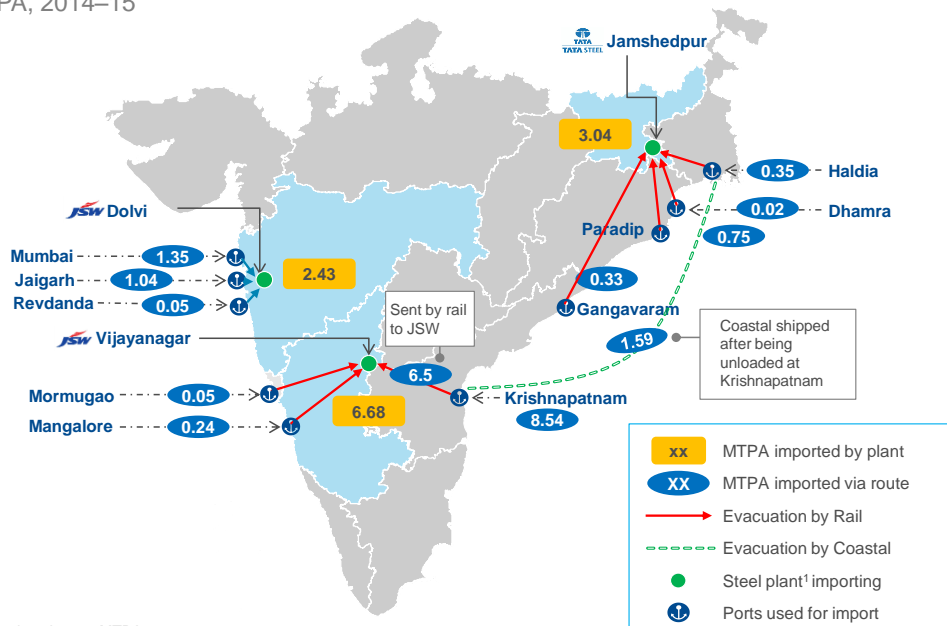
SOURCE: SteelMint



**EXHIBIT 1.40**

**Steel plants relevant for iron ore imports currently**

MTPA, 2014–15



1 Importing above 1 MTPA

SOURCE: SteelMint

The future EXIM movement of iron ore depends on three factors:

- **Global iron ore spot prices:** Oversupply in the global seaborne market has affected global spot prices of iron ore. High logistics costs make Indian iron ore uncompetitive, e.g.,

exporting from India's Bailadila to the China CFR through Visakhapatnam port would run up a cost of USD 115 compared to global prices of USD 67 to 70 (with the most recent numbers further declining to USD 50) (Exhibit 1.80)<sup>34</sup>.

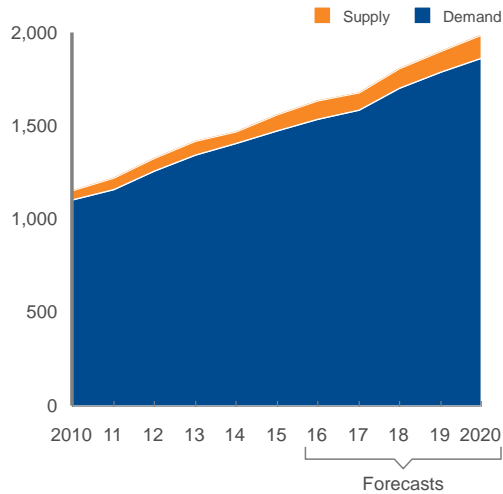
<sup>34</sup> World Steel Association, Bloomberg

## EXHIBIT 1.41

**Due to oversupply, global iron ore prices have dropped steeply and may remain between USD 65 and 80 for the 3 to 5 years**

### Oversupply in global Iron ore markets...

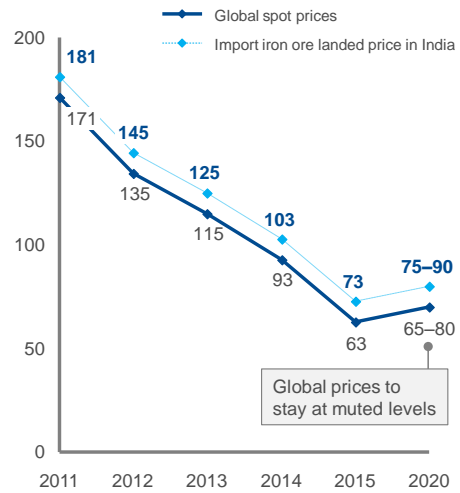
Sea-borne iron ore supply and demand  
mn metric tonne rich ore equivalent



SOURCE: World Steel Association; expert interviews; Bloomberg

### ...has caused Iron ore spot prices to fall steeply

Iron ore spot prices; 2011–2015  
per metric tonne, as on 30th June of each year



- Duties imposed and high railways freight:** Current export duties are driving up export prices and limiting India's export potential. Unless these duties are removed, the export of iron ore will be unviable (Exhibit 1.81). Also, the per tonne per km average rail freight for iron ore is around INR 1.9 to 2.1

compared to around INR 1.3 to 1.5, which is around 40 per cent of the total cost. Although railway rates have been reduced in the past few months, the effect on the final landed price is still not big enough to make exports competitive.

## EXHIBIT 1.42

### Prevalent market conditions make exports of Iron ore unviable; Imports of 7–10 MTPA anticipated until 2020 due to low global prices

High logistics costs, makes Indian Iron Ore non-competitive at global prices ...

#### Iron ore from India – China CFR price

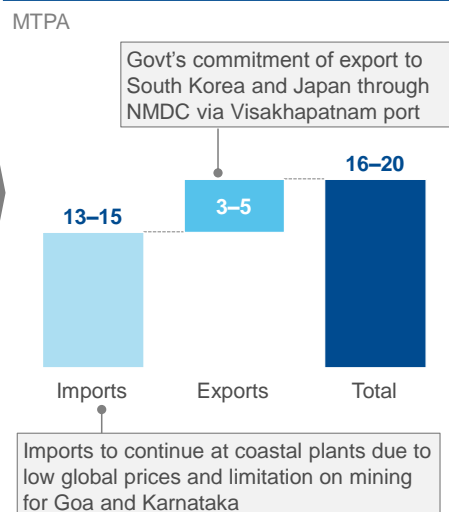
Baila-Dila to China example through Visakhapatnam port

Cost heads	INR/tonne
Mining and state fund	550
Production cost	1,000
Royalty	490
Export duty	1,100
Handling cost	300
Rail freight	2,900
Sea freight	600
<b>Total</b>	<b>6,940</b>

Domestic Iron ore at cost nearly 115 China CFR; compared to global prices of nearly 60 USD China CFR

SOURCE: Expert interviews

... thus nearly 10–13 MTPA of EXIM Iron ore traffic anticipated until 2020



- **Declining steel demand from China:** The mining ban in India affected production volumes as well as Indian exports to China.

In the near future (2020) therefore, iron ore volumes on ports will remain muted unless the global market recovers and iron ore production ramps up in the country. For iron ore volumes to recover, the following are required:

- **Restoration of mining production:** Current restrictions of a mining limit of 20 MTPA in Goa and 35 MT in Karnataka need to be waived. Furthermore, new captive mine allocations (no allocation after 2011) need to kick-start.
- **Reduction of export duty** that discourages exports and increases export prices compared to global spot prices.

- **Exploration of new markets:** Since India lost the China market to Brazil, it will need to identify new growth markets to restore exports.

#### 1.3.2.2 Key concerns and opportunities

Given that the volumes have dropped significantly in the past few years and the trend is expected to continue, the current infrastructure will be more than enough on the key routes if expansions for all the other commodities are done in order.

#### 1.3.2.3 Possible outcomes and recommendations

Key infrastructure projects concerning ports of NMPT and Mormugao that need to be undertaken have been discussed in detail in Chapter 2.

### 1.3.3 Steel

#### 1.3.3.1 Current and future supply chain

Approximately 50 per cent of the total production, i.e., around 30 MTPA of

domestic steel moves via rail while around 15 to 20 MTPA moves by road. In fact, most of the material for large steel plants moves by rail while small and medium units prefer road transport for their material (Exhibit 1.82).

**EXHIBIT 1.43**

	Rail		Road	
	Raw materials	Finished steel	Raw materials	Finished steel
<b>Mega/large projects</b>	90 %	70 %	10 %	30 %
<b>Small &amp; medium units</b>	30 %	30 %	70 %	70 %

Source: Expert interviews

Most steel plants are situated near iron ore mines, reducing the lead distances for iron ore but increasing the lead distances for finished steel by nearly 1,000 km. Transport requirements for finished steel in tonne km are therefore much higher than for raw materials. While production clusters are centred on iron ore mines in eastern India

and North Karnataka–South Goa, consumption clusters are spread across the country depending on urbanisation and industrialisation. Uttar Pradesh, Maharashtra and Tamil Nadu account for the highest receivers of steel largely produced by plants in the eastern hinterland and North Karnataka (Exhibit 1.83).

**EXHIBIT 1.44**

State	Volume moved to state (MTPA)
Uttar Pradesh	3.99
Maharashtra – other than coastal districts	3.94
Tamil Nadu – other than coastal districts	3.21
Andhra Pradesh – other than coastal districts	2.88
Haryana	2.51
West Bengal – other than coastal districts	2.06
Punjab	1.37
Goa	1.27
Jharkhand	1.27
Bihar	1.16
Odisha	1.04
Gujarat (excluding ports)	0.95
Other ports of West Bengal	0.83
Chhattisgarh	0.67
Madhya Pradesh	0.59
Delhi	0.58
Karnataka (excluding ports)	0.56
Rajasthan	0.53
Chandigarh	0.38
Assam	0.34
Other ports of Tamil Nadu	0.20
Kerala (excluding ports)	0.13
Other ports of Andhra Pradesh	0.10
Jammu and Kashmir	0.09
Uttarakhand	0.09
Himachal Pradesh	0.07
Other ports of Maharashtra	0.02
<b>Grand total</b>	<b>30.82</b>

Source: Railways data

### 1.3.3.2 Key concerns and opportunities

Production clusters of steel are centred on iron ore mines in eastern India and the North Karnataka–South Goa region, but consumption clusters are spread across the country depending on urbanisation and industrialisation. Uttar Pradesh, Maharashtra and Tamil Nadu account for the highest receivers of steel, mostly

produced by plants in the eastern hinterland and North Karnataka.

Approximately 50 per cent of the total production—around 30 MTPA of domestic steel—moves via rail, while around 15 to 20 MTPA moves by road. Most of the material for large steel plants moves by rail, while small and medium units prefer road transport for their material. Analysis of research data and expert opinions indicate

that a modal-mix shift towards coastal shipping could significantly reduce costs.

An analysis of key inter-state rail movements across the country was conducted to examine the origination–

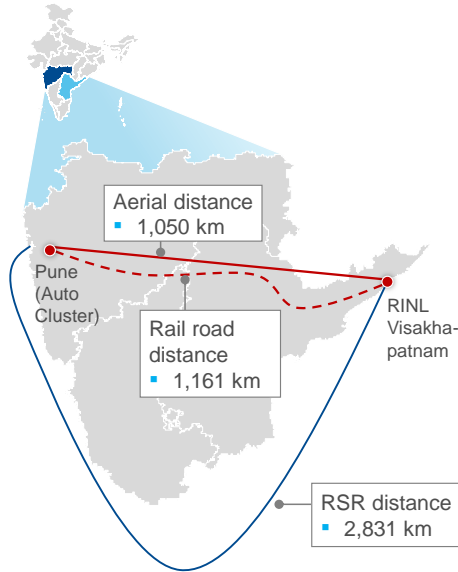
destination movement of steel. At the same time, a cost comparison was also done of all possible combinations of the modal mix under different scenarios of vessel capacity (Exhibit 1.84).

**EXHIBIT 1.45**

ILLUSTRATIVE

**Methodology snapshot: For each OD; 5 to 8 modal combination routes were identified and analysed for arriving at “optimal” route and mode**

Optimised route (green dashed box) Currently used (red dashed box)



**6 modal combinations studied**

**RINL Visakhapatnam to Pune (Auto cluster)**

Rank	Mode combinations	Distance km	Cost INR/tonne
1	Road–Port–Port–Rail	2,831	1,415
2	Rail–Port–Port–Rail	2,831	1,605
3	Road–Port–Port–Road	2,831	1,695
4	Rail	1,311	1,928
5	Road	1,161	2,090

**Each route also has inbuilt costs of handling to arrive at fully landed cost**

SOURCE: DGCIS data 2013–14

For instance, the movement between RINL Vizag (coastal Andhra Pradesh) and the auto cluster in Pune (Maharashtra) costs INR 1,930 per tonne via rail, while the same movement via road and rail-supported

coastal shipping could be as low as INR 1,415 per tonne, which would be a cost saving of nearly 25 to 30 per cent (Exhibit 1.85).

**EXHIBIT 1.46**

Estimated transportation cost from RINL Vizag to Pune via Vizag and Mumbai port			
Cost head	Distance (km)	Rate (INR per tonne per km)	Total (INR per tonne)
Road freight from mine to port	11	5	55
Ocean freight (Visakhapatnam to Mumbai)	2,670	0.25	668
Port handling at Visakhapatnam			150
Port handling at Mumbai			150
Rail handling			150
Rail freight from Mumbai to Pune	148	1.7	243
<b>Total cost</b>			<b>1,415</b>

Source: Multimodal optimisation model

### 1.3.3.3 Possible outcomes and recommendations

Eventually, 13 major steel plants have the potential to shift to coastal shipping. The

cost advantage is marginal in some cases, but overall railway congestion still makes the case for a shift to coastal shipping for these plants (Exhibit 1.86).

#### EXHIBIT 1.47

### Almost every major plant has the potential to shift nearly 30–40% of their inter-state rail movements to coastal shipping

Plant	Location	Volume Potential to shift to coastal MTPA
Tata Steel	Jamshedpur	0.8–1.0
JSW Steel	Torangallu	0.5–0.6
RINL Steel	Visakhapatnam	1.0–1.3
JSW	Dolvi	0.3–0.4
SAIL	Durgapur	0.2–0.3
SAIL	Rourkela	0.9–1.2
SAIL	Bokaro	0.5–0.6
BPSL	Sambalpur	0.4–0.5
BSL	Meramandali	0.7–0.9
JSPL	Angul	0.6–0.8
SAIL ISSCO	Burnpur	0.3–0.4
Tata Steel	Kalinganagar	0.3–0.4
NINL	Duburi	0.3–0.4

SOURCE: DGCIS data 2013–14

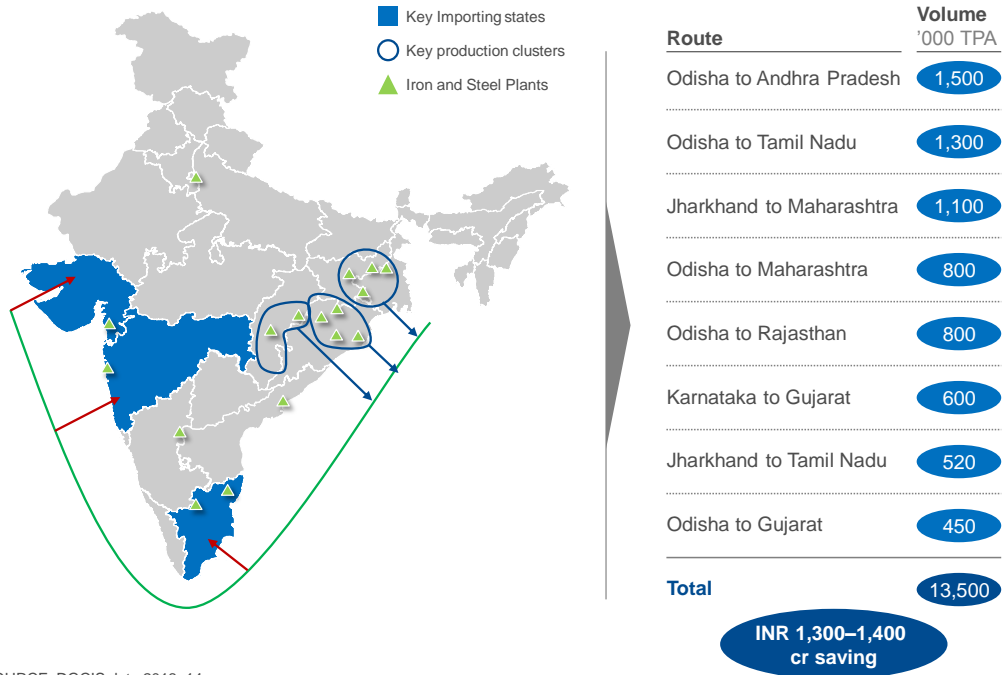
While each plant may have a unique set of factors to consider before shifting completely to coastal shipping, some of these plants can also be combined based on location for a cluster-based view on the potential for steel movement.

With the right infrastructure and institutional support, 7 to 8 MTPA of steel could be

moved via coastal shipping, offering a savings potential of nearly INR 900 cr to 1,000 cr per annum. Furthermore, based on a business-as-usual (BAU) growth rate of around 6 per cent, the potential may rise up to 13 to 14 MTPA in the future, saving around INR 1,300 cr to 1,400 cr per annum by 2025 (Exhibit 1.87 and 1.88).

**EXHIBIT 1.48**

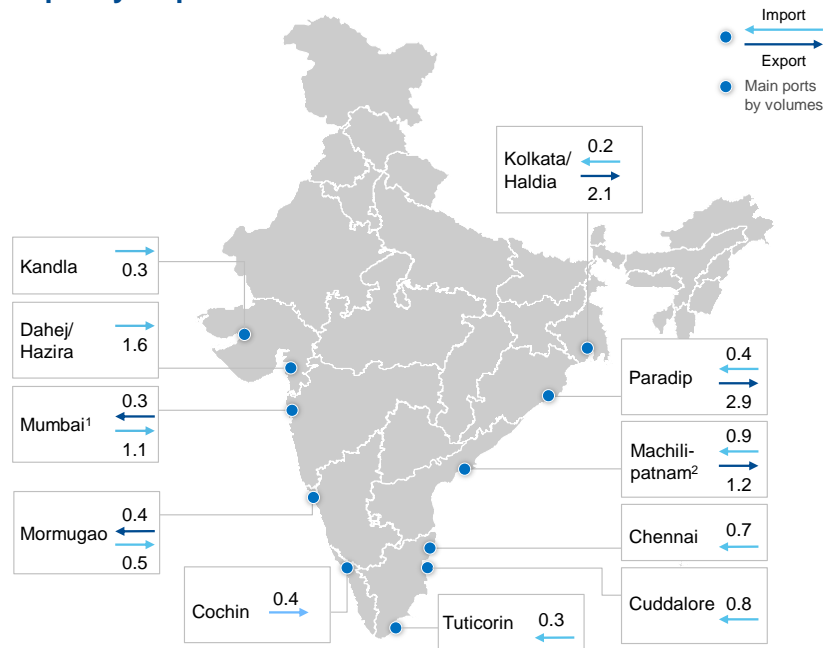
**13–14 MTPA steel coastal shipping opportunity by 2025**



SOURCE: DGCIS data 2013–14

**EXHIBIT 1.49**

**Port-wise capacity requirement**



<sup>1</sup> Includes 0.2 MTPA imports at Dahanu

<sup>2</sup> Includes 0.8 MTPA exports at Visakhapatnam

SOURCE: Multimodal optimisation model



## 1.4 Cement



The Indian cement industry is the second largest in the world and is expected to grow in line with GDP growth in the future. Cement is a high-volume, low-value product, which becomes unprofitable when transported over long distances using road or rail transport. Low-cost sea transport routes could therefore be very important for cement.

Cement demand in India is projected to grow to 700 to 800 mn tonnes by 2025 under base case scenario of GDP growing at 7 to 8 per cent per annum. One tonne of cement requires 2 tonnes of raw materials. The volume of material to be transported for the cement industry will reach 1.6 bn tonnes by 2025. Logistics contribute about 25 per cent of the cost of cement. Logistics efficiency will be critical for making existing capacity more competitive.

### 1.4.1 Current and future supply chains

In the past five years, the capacity of the cement industry has increased by around 75 per cent (Exhibit 1.89). Demand has been growing at a rate of 6 to 8 per cent Y-o-Y, mostly moving with GDP. Capacity is expected to bottom out in FY 2015 as the economy picks up with increasing investments in infrastructure and housing schemes.

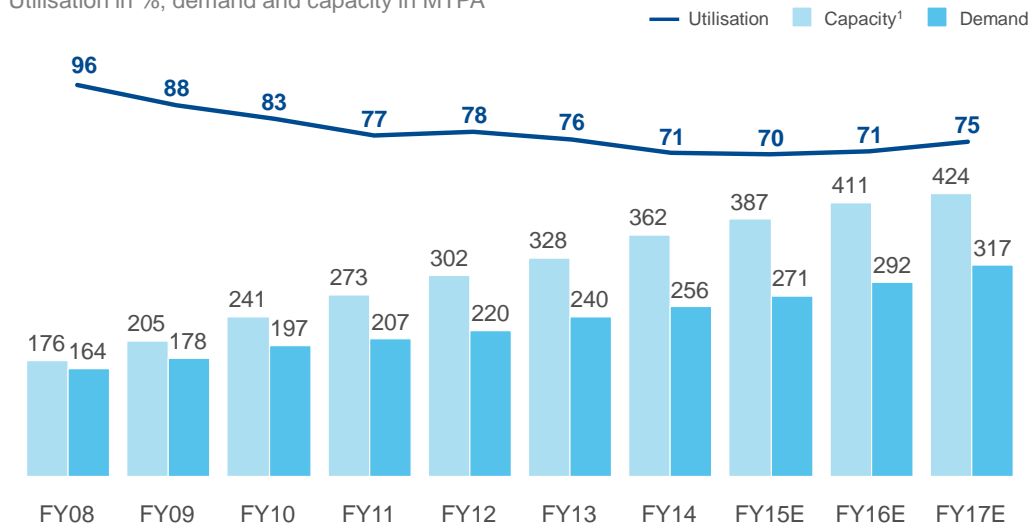
Inter-regional cement dispatches in India occur mostly through road or rail transport. Major dispatch routes are from southern to western India and from central to eastern India (Exhibit 1.90).

#### EXHIBIT 1.50

##### Demand and supply of cement

###### A decade of Indian cement industry's demand-supply

Utilisation in %; demand and capacity in MTPA



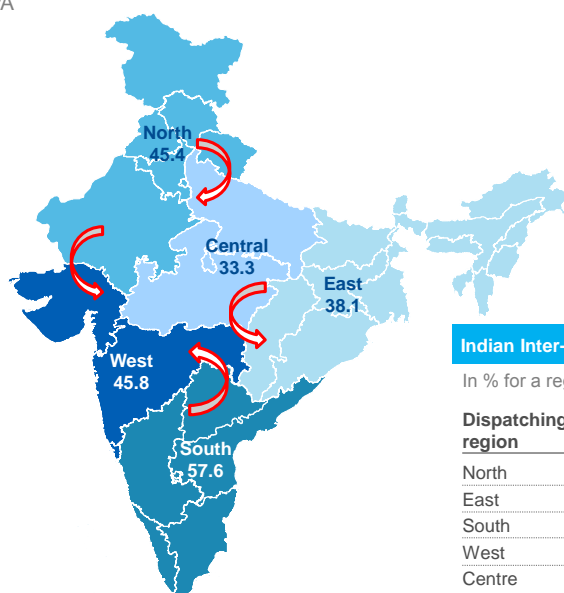
SOURCE: Analyst reports

## EXHIBIT 1.51

### There is a moderate amount of inter-regional cement dispatches in India

#### Indian regional demand FY12

MTPA



Denotes inter-regional dispatches of more than 10 MTPA

#### Indian Inter-regional Dispatches, FY12

In % for a region's overall demand

Dispatching region	Receiving region				
	North	East	South	West	Centre
North	69	1	0	10	20
East	0	99	0	0	1
South	0	2	84	13	0
West	1	2	2	93	2
Centre	6	17	0	2	75

SOURCE: Analyst reports (IDBI and TATA Securities); press releases; company websites

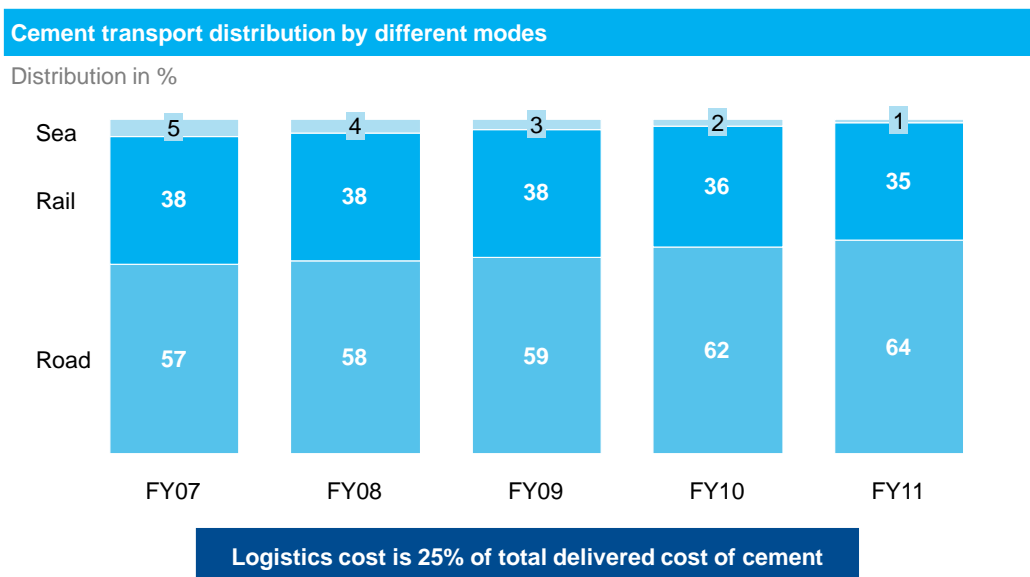
Logistics costs are around INR 1,500 per tonne of cement in the retail price (around INR 6,000). The sea route forms only a minuscule part of the modal mix for cement transport (Exhibit 1.91). This is primarily due to inefficiencies in coastal shipping, unavailability of port infrastructure and greater expansion in hinterland plants as compared to coastal plants. Road and rail are still the most preferred modes. It is also the most expensive, costing INR 3 per tonne km, approximately twice as expensive as

rail, which is INR 1.5 per tonne km, and 20 times as expensive as sea transport, which is INR 0.15 per tonne km.

Rail is the preferred mode of movement for the long-distance transit of cement in the country, whereas shorter intra-state movements are primarily through road. Coastal movement is currently dominated by large players that have dedicated jetties or coastal berths at ports.

## EXHIBIT 1.52

### Modes used for cement transportation



SOURCE: Multiple analyst reports; press releases; company websites

#### 1.4.2 Key concerns and opportunities

Large players dominate the coastal shipping mode for moving cement across India, and have dedicated jetties or coastal berths at ports. Major ones include:

- Multipurpose cement berth at New Mangalore port
- Ultratech cement berth at Pipavav port
- Shree Digvijay cement berth at Sikka port
- Ambuja cement berth at Muldwarka port<sup>35</sup>

Even though there is a considerable number of dedicated jetties operated by private players in this market, volumes have not increased in a large way. In addition to the coastal traffic for large cement players, coastal shipping could also accommodate a sizeable chunk of the volumes currently moving by rail, concentrated in the southern peninsular region of the country. Large city

ports like Mumbai are the key importers of cement due to the infrastructure-related requirements in the hinterlands of these ports. Existing movements of cement testify to the economics of coastal shipping. Even the relatively short Gujarat–Maharashtra movement proves economical for players.

An analysis of the key inter-state rail movements was conducted across the country to examine the origination–destination movement of cement. At the same time, a cost comparison was also done of all possible combinations of the modal mix under different scenarios of vessel capacity.

Moving cement between Andhra Pradesh and West Bengal via rail costs INR 2,200 per tonne, but could cost as little as INR 1,250 per tonne via road and rail-supported coastal shipping, which would mean a cost saving of nearly 40 per cent for this particular route (Exhibit 1.92). Savings across the routes where coastal shipping was found to be more

<sup>35</sup> Source: Basic port statistics

efficient could range from INR 800 to 1,200 per tonne.

**EXHIBIT 1.53**

<b>Estimated transportation cost from Mellacheruvu to Birbhum</b>			
<b>Cost head</b>	<b>Distance (km)</b>	<b>Rate (INR per tonne per km)</b>	<b>Total (INR per tonne)</b>
Rail freight from mine to port	191	1.7	325
Ocean freight (Machilipatnam to Kolkata)	968	0.2	194
Port handling at Machilipatnam			150
Port handling at Kolkata			150
Rail freight from Kolkata to Birbhum	267	1.6	425
<b>Total cost</b>			<b>1,250</b>

Source: Multimodal optimisation model

**1.4.3 Potential outcomes and recommendations**

Nine plants in the Andhra Pradesh/Telangana area have the potential to move to coastal shipping while transporting to states like Tamil Nadu, Maharashtra and West Bengal. Smaller players do not have sufficient volumes to sustain the year-round movement of large and economical ships along the coast. Putting an efficient, large-scale aggregation system into place will enable players to consolidate their parcel size across geographies. In addition to making economic sense, coastal shipping is also much more environmentally friendly and eases the load on India’s already congested railway network.

If the key long-distance rail routes along coastal states are considered to extend from major cement plants to the top-200 construction- and infrastructure-related districts in India – representing 70 per cent of cement consumption in the country – around nine plants have the potential to shift to coastal shipping (Exhibit 1.93). Located close to each other, these plants offer the possibility to consolidate their movements and use larger ships for economies of scale.

Large cement players with multiple plant locations across the country have the most

to gain from coastal shipping. Commodities like steel and iron, too, have potential on similar routes, offering immense scope for consolidation and using large vessels for economies of scale. Coastal plants in Andhra Pradesh are unique because they offer a coastal location, have large plants and are at a distance from the primary consumption hinterlands of cement. Some of these plants can also be combined based on location for a cluster-based view of the potential for cement movement.

With the right infrastructure and institutional support, it could be possible to move around 9 to 10 MTPA of cement via coastal shipping by 2025, saving nearly INR 900 to 1,000 cr (Exhibit 1.94).

It was estimated that another 5 to 6 MTPA of cement could be shipped via coastal route from the Kutch region (Sewagram) in Gujarat if dredging was done for the 5 km channel approaching the Sanghi Jetty. Plants owned by ABG, Sanghi Cements and Ultratech could use the coastal route for transportation to Maharashtra and Tamil Nadu from this region.

**EXHIBIT 1.54**

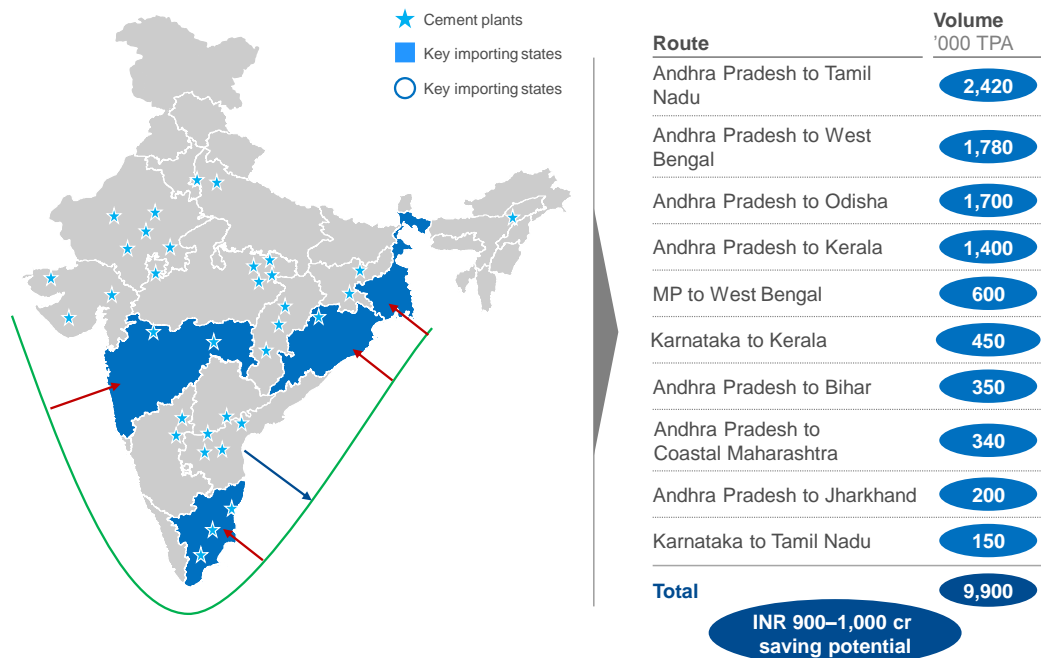
**Plant-wise potential to shift to coastal**

Plant	Location	Volume potential to shift to coastal MTPA
Maha Cement	Mellachevuru	1.2–1.4
India Cements/Raasi	Wadapally	1.0–1.2
Ultratech	Tadipatri	0.9–1.1
Zuari Cements	Jaggayyapeta	0.7–0.9
Zuari Cements	Kadapa	0.7–0.9
Ultratech-Vikram	Jawad Road/Neemuch	0.3–0.4
Birla/Vasvdatta	Sedam	0.1–0.2
J.K. Cement	Mudhol	0.1–0.2
Ultratech	Malkhed	0.1–0.2

SOURCE: DGCIS data 2013–14

**EXHIBIT 1.55**

**9–10 MTPA cement coastal opportunity by 2025**



SOURCE: DGCIS data 2013–14

## 1.5 Fertilisers



Fertiliser is the backbone of agricultural productivity. This commodity contributes 2 per cent of the total cargo handled at ports in India.

Fertiliser production is very energy-intensive with feedstock and fuel alone accounting for 55 to 80 per cent of production cost. From the logistics perspective, therefore, production cost is of particular interest. There could be a potential savings opportunity of around INR 900 to 1,000 cr per annum by executing coastal shipping of around 9 to 10 MTPA of fertilisers by 2025<sup>36</sup>.

### 1.5.1 Current and future supply chains

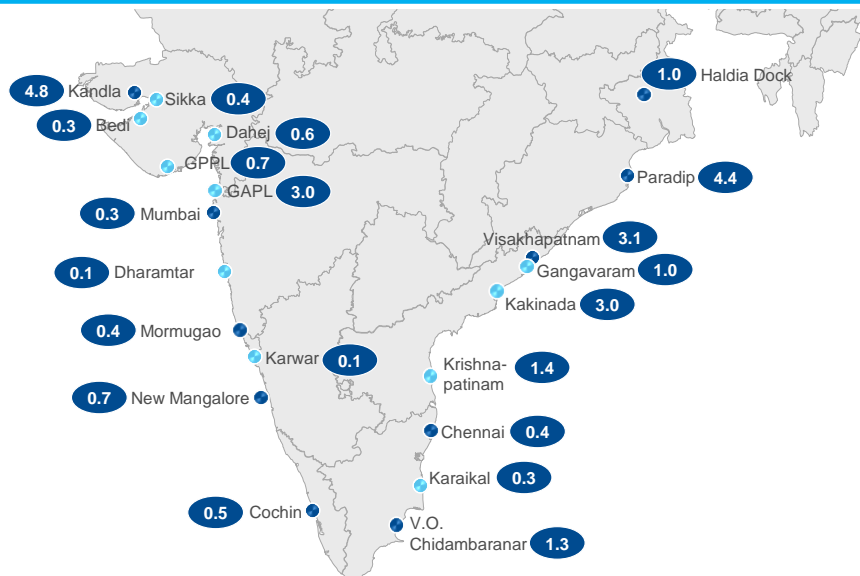
India imports 28 MMT of finished fertilisers and raw materials with Andhra Pradesh, Gujarat and Odisha being the biggest clusters. Kandla, Krishnapatnam, Paradip, Visakhapatnam and Kakinada are the ports with the highest import figures (Exhibit 1.95).

#### EXHIBIT 1.56

#### Fertilisers and raw materials handled by port

xx MTPA handled

Nearly 28 MMT of finished fertilisers and raw materials are imported in India currently



SOURCE: Ministry of Chemicals and Fertilisers

Finished products constitute half of the 28 MTPA of imports while raw materials for fertilisers make up the other half. Imported finished fertilisers travel to six significant agri-clusters, with the largest consumption centres in Andhra Pradesh (Exhibit 1.96). The Ministry of Chemicals and Fertilisers

optimises the majority of port and agri-region combinations, spreading imports across multiple ports.

Long-haul traffic from Haldia and Paradip to northern India and from the Gujarat cluster to Madhya Pradesh and northern India is transported by rail.

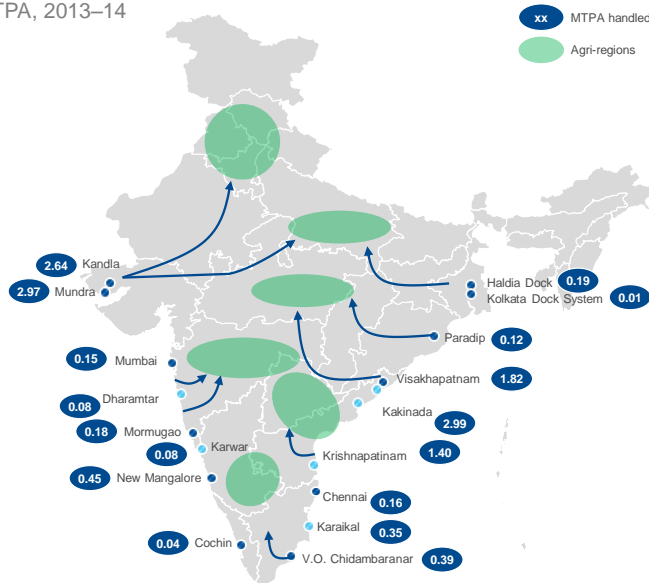
<sup>36</sup> Source: Multimodal optimisation model

**EXHIBIT 1.57**

**Imported finished fertilisers: Origin and destination**

**Agri-regions of fertiliser consumption in India**

MTPA, 2013–14



- Majority of port and agri-region combinations are optimised by Ministry of Fertilisers
- Long-haul traffic from Haldia-Paradip, etc. is done by rail

SOURCE: Ministry of Chemicals and Fertilisers

Urea, which is largely imported from China and Oman, is the biggest imported finished

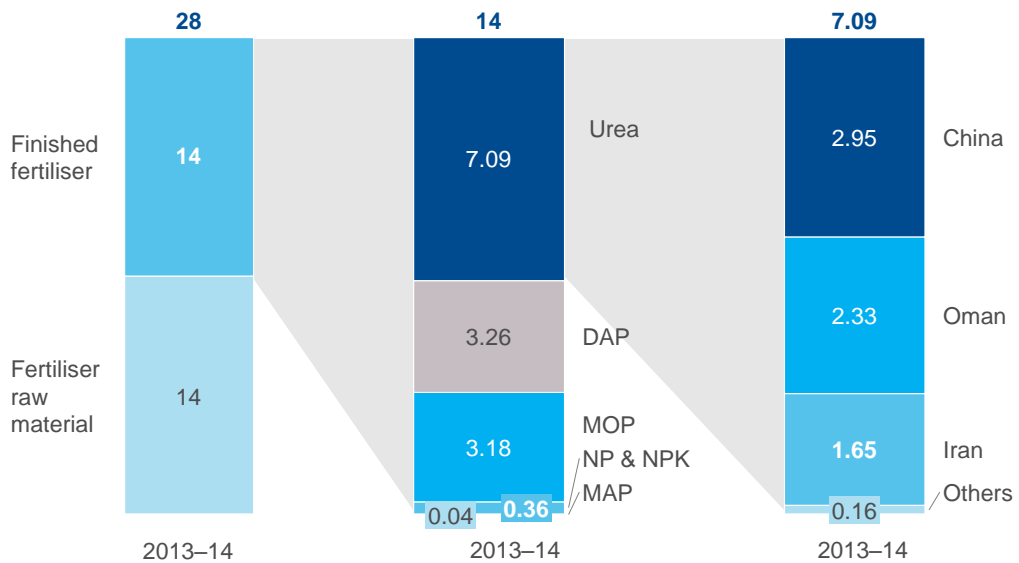
fertiliser, followed by DAP and MOP (Exhibit 1.97).

**EXHIBIT 1.58**

**Finished fertilisers import split and origin country**

**Type of finished products imported**

MTPA, 2013–14



SOURCE: Ministry of Chemicals and Fertilisers

The imported fertiliser raw material travels to five significant clusters for processing. Plant locations of fertilisers are mostly on the coast because they use naphtha as a raw material and are situated next to oil refineries.

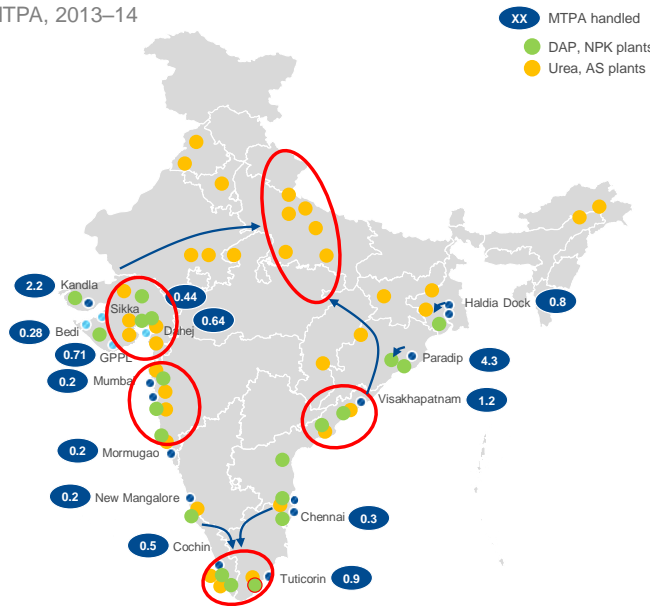
Due to different plant locations, imported fertiliser raw materials are handled in small parcel sizes at various ports, with Kandla and Paradip being the largest clusters. The western seaboard across Gujarat and Maharashtra has aggregated fertiliser-production clusters (Exhibit 1.98).

**EXHIBIT 1.59**

**Fertiliser raw material: Origin and destination**

Location of fertiliser plants and movement from port

MTPA, 2013–14



- Fertiliser raw material imports are spread across ports due to plant locations
- Kandla, Paradip are the largest clusters

SOURCE: Basic Port Statistics 2013-14

**Future movement and usage**

During 2010 to 2015, consumption of fertilisers increased by around 2.5 per cent and is expected to rise at approximately 4 per cent in the future. Growing agri-produce and an increase in the overall sown area will prompt greater demand for fertiliser end products, i.e., around 70 MTPA by 2020 and around 120 MTPA by 2035.

Urea consumption in India is around 29 MTPA, of which around 22.5 MTPA is produced domestically while the remaining 7 MTPA is imported. While domestic plants are increasing capacity by around

5 MTPA<sup>37</sup> by 2020, the rising demand for urea, expected to be 35 MTPA in 2020, will ensure that India continues to import around 7 MTPA of urea.

The volume of imports of fertiliser raw materials and finished products will grow at around 4 per cent, keeping the volumes handled at Indian ports fairly stable by 2020.

Kakinada, Mundra and Kandla will continue to be the largest finished fertiliser-importing ports while Paradip, Kandla and Visakhapatnam will be the largest fertiliser raw material-importing ports.

<sup>37</sup> Ministry of Chemicals and Fertilisers



### 1.5.2 Key concerns and opportunities

While rail is currently the primary mode of transport for long-distance fertiliser movement, an analysis of research data and expert opinions indicates that a modal-mix shift towards coastal shipping could significantly reduce costs.

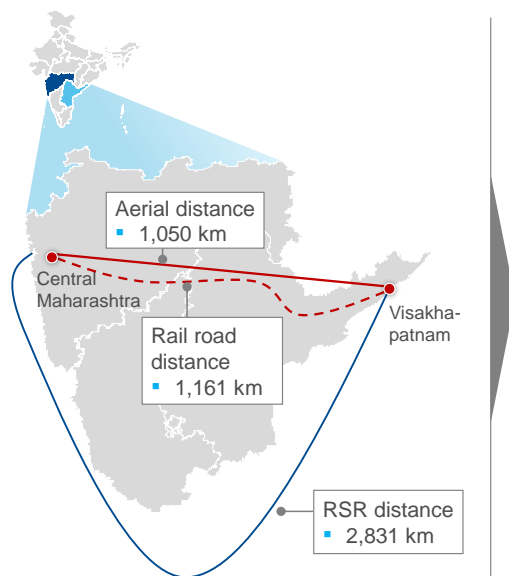
An analysis of the key inter-state rail movements was conducted across the country to examine the origination–destination movement of fertiliser. At the same time, a cost comparison of all possible combinations of the modal mix was also done under different scenarios of vessel capacity (Exhibit 1.99).

#### EXHIBIT 1.60

ILLUSTRATIVE

**Methodology snapshot: For each OD; 5 to 8 modal combination routes were identified and analysed for arriving at “optimal” route and mode**

Optimised route (green dashed box) Currently used (red dashed box)



**6 modal combinations studied**

**Visakhapatnam to Maharashtra**

Rank	Mode combinations	Distance km	Cost INR/tonne
1	Road–Port–Port–Rail	2,831	1,415
2	Rail–Port–Port–Rail	2,831	1,605
3	Road–Port–Port–Road	2,831	1,695
4	Rail	1,311	1,928
5	Road	1,161	2,090

**Each route also has inbuilt costs of handling to arrive at fully landed cost**

SOURCE: DGCIS data 2013–14

### 1.5.3 Possible outcomes and recommendations

Coastal plants in Andhra Pradesh and Gujarat have the potential to coastally ship their products to the peninsular states. If an efficient aggregation system is put in place, the parcel size of individual plants, which is currently not enough to sustain the year around movement of large ships along the coast, can be collaborated based on homogeneity and movement can be made feasible.

fertiliser-consuming districts in the country, around 10 plants could potentially shift to coastal shipping (Exhibit 1.100).

If key rail movements are considered from the major fertiliser plants to the top-200

Fertiliser corporations with multiple plant locations across the country seem to have the highest potential to leverage coastal shipping (e.g., IFFCO and RINL). Urea and complex fertilisers are homogenous goods and cumulative capacity provides a unique combination of movements, which enables backhaul and further reduces coastal shipping costs.

## EXHIBIT 1.61

### Plant-wise potential to shift to coastal

Plant	Location	Volume potential to shift to coastal MTPA
Coromandel	Visakhapatnam	1.0–1.2
RCFL	Visakhapatnam	1.0–1.2
GSFCL	Sikka	0.4–0.5
IFFCO	Kandla	0.4–0.5
IFFCO	Kalol	0.2–0.3
IFFCO	Paradeep	0.3–0.4
GSFCL	Rourkela	0.2–0.3
SPIC	Tuticorin	0.4–0.5
RCFL	Mumbai	0.2–0.3

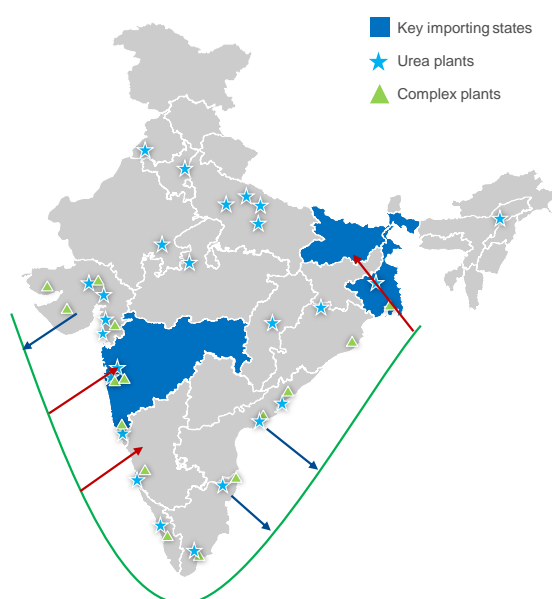
Coastal plants in Gujarat and Andhra Pradesh provide a unique set of circumstances—they are located along the coast, have large plants and are at a distance from the primary consumption hinterlands of fertilisers. Some of these plants could also be combined based on location for a cluster-based view on the potential for fertiliser movement. It is possible to consolidate the movements for a

cluster and use larger ships for economies of scale on these routes.

Even if the price differential between individual ODs is minimal, a shift to coastal shipping will at least ease the pressure on an already congested rail network. With the right infrastructure and institutional support, it could be possible to move around 6 to 7 MTPA of fertilisers via coastal shipping currently, saving nearly INR 500 to 1000 cr per annum (Exhibit 1.101).

## EXHIBIT 1.62

### Total opportunity for coastal movement of fertilisers is 6–7 MTPA



SOURCE: Railways data used for projections

Route	Volume '000 TPA
Coastal Gujarat to Coastal Maharashtra	720
Coastal Andhra Pradesh to Bihar	430
Coastal Andhra Pradesh to Maharashtra	410
Coastal Andhra to West Bengal	620
Odisha to Andhra Pradesh	326
Coastal TN to Coastal Karnataka	298
Coastal Andhra Pradesh to Tamil Nadu	271
Coastal Andhra Pradesh to Odisha	265
Gujarat to Andhra Pradesh	234
Coastal TN to Coastal Karnataka	187
<b>Total savings potential (around 6 MTPA)</b>	<b>500–1,000 cr</b>

## 1.6 Containers



Container traffic at Indian ports has grown at an average CAGR of 8 per cent in the past decade. The non-major ports, private or state-owned, continued to fare better than the major government-owned ports, with a growth of over 24 per cent in 2014–15. These non-major ports have registered higher growth rates in the past five years due to their adequate container-handling capacity, improved road and rail connectivity, better draft levels, and modern equipment and technology for faster cargo evacuation.

Sagarmala studies reveal that two optimisation levers may lead to potential savings of around INR 7,000 to 9,000 cr per annum<sup>38</sup>:

- Reduced transit time could save inventory handling cost of around INR 5,000 to 6,000 cr per annum
- Modal shift from road to rail could save around INR 2,000 to 3,000 cr per annum in terms of fuel import bill

### 1.6.1 Current and future supply chain

EXIM container movement in the country, including empties, was 10.7 MTEUs during FY 2014. Of the 9.3 MTEUs laden container volume, 60 per cent was west-bound, and the remaining 40 per cent was east-bound. China and the US accounted for approximately 14 per cent and 10 per cent respectively of the EXIM container volumes to/from India, while the remaining was split between several countries including the UAE, the UK, Germany, Saudi Arabia, Korea, Vietnam and others. With respect to the overall balance of trade in containers, India exported 5.1 MTEUs while it imported 4.2 MTEUs during FY 2014 (Exhibit 1.102).

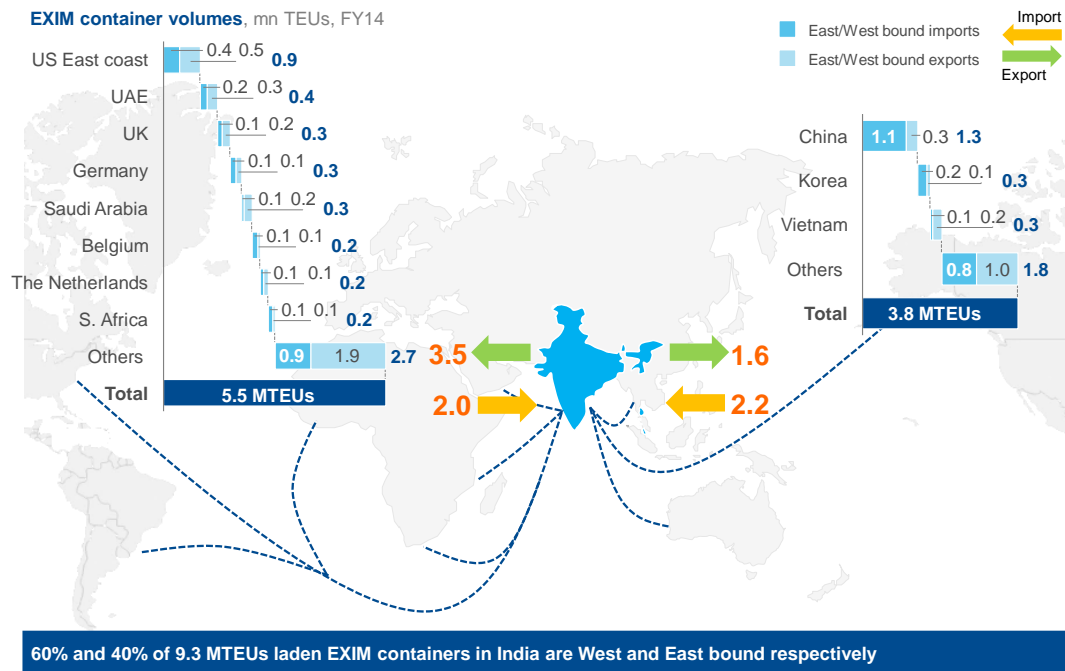
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<sup>38</sup> Calculated assuming ~80 per cent of containers to/from northern hinterland move through rail from

the existing ~40 per cent and ~5 days reduction in transit time of containers enabled by multiple levers

## EXHIBIT 1.63

### Overview of EXIM container movement in India



SOURCE: Khambadkones; APMT; IPA statistics; stakeholder interviews

Out of the 10.7 MTEUs of total container volume, 0.6 MTEUs is coastally shipped traffic, 7.4 MTEUs is gateway traffic and 2.7 MTEUs is transshipped. Colombo, Singapore and Klang account for approximately 75 per cent of transshipped cargo from India.

Three major hinterlands in India, i.e., the northwest, west and southern clusters, account for roughly 90 per cent of container volumes. The northwest cluster is farthest from the coastline and is the largest cluster, generating 3.7 MTEUs of container volumes in FY 2014. It, therefore, has the greatest impact on the overall logistics cost of container movement. It lies at a weighted average distance of 1,087 km from the

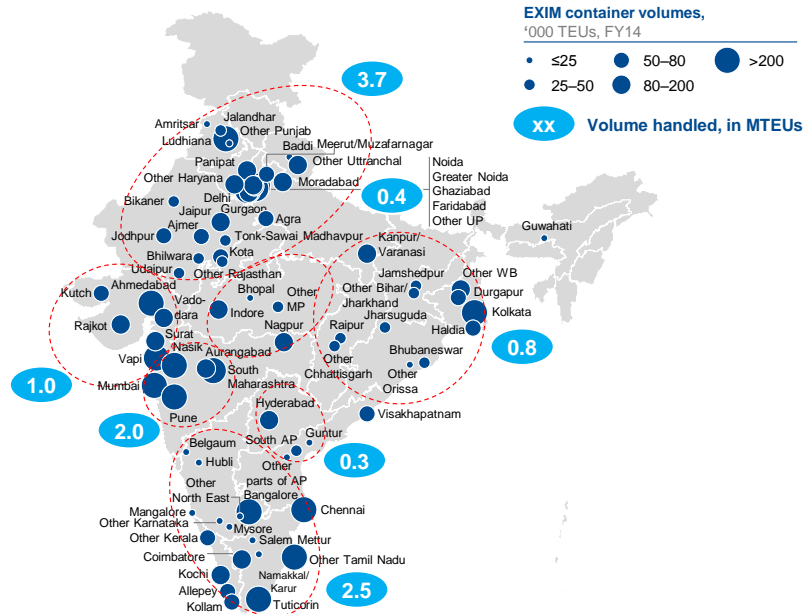
Gujarat/JNPT port cluster. The container-handling hinterlands in the country are mapped in the Exhibit 1.103 along with the individual volumes handled.

The Gujarat–Maharashtra port cluster comprising the Mundra, Kandla, Pipavav and JNPT ports handles 70 per cent of India's EXIM traffic, while Chennai handles another 14 per cent. Other ports on the east coast, Haldia, Vizag and Tuticorin, account for the remaining traffic (Exhibit 1.104). Around 78 per cent of the traffic from east coast ports is transshipped in the absence of sufficient traffic to attract a gateway movement.

**EXHIBIT 1.64**

**EXIM container volumes split for different hinterlands in India**

mn TEUs, FY14

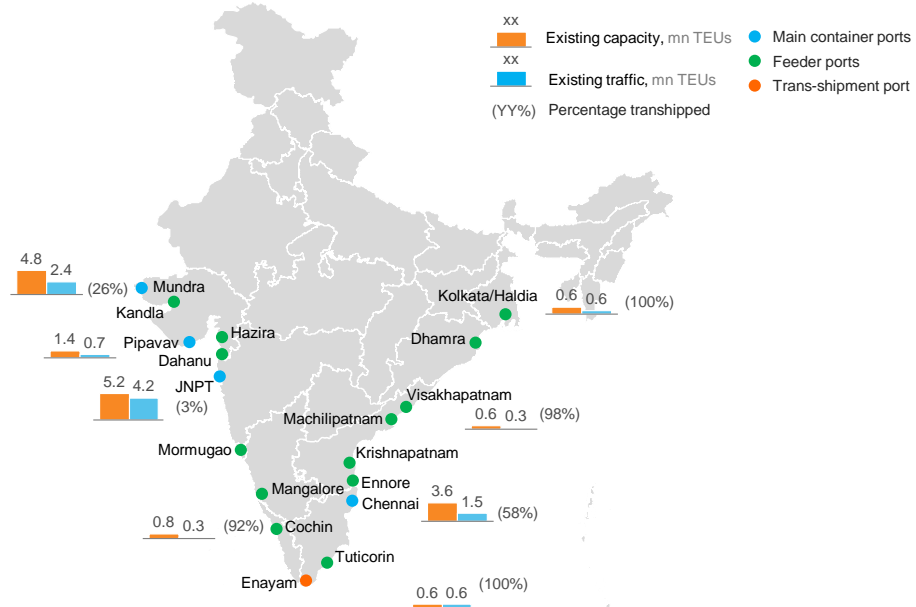


SOURCE: APMT; IPA statistics; stakeholder interviews

**EXHIBIT 1.65**

**Port-wise EXIM container movement in India**

mn TEUs, FY14



SOURCE: APMT; expert interviews

Exhibit 1.105 details the current split of container traffic at ports originating from the different hinterland clusters for FY 2014. Mundra and Pipavav are the only ports whose primary hinterland lies outside the

port state. Also, a significant portion of the total traffic from the hinterlands of NCR and Punjab is handled at JNPT even though they are closer to the Gujarat port cluster.

**EXHIBIT 1.66**

**Hinterland to port mapping of EXIM container movement**

■ Primary hinterland of port

EXIM container volumes, '000 TEUs, FY14	JNPT	Mundra	Chennai	Pipavav	Tuticorin	Haldia	Vallarpadam	Visakhapatnam	Mangalore	Hinterland total
NCR+Punjab	936	1,264	0	329	0	0	0	0	0	2,540
Maharashtra	2,121	54	0	0	0	0	0	0	0	2,177
Tamil Nadu	0	0	1,240	0	484	0	0	0	0	1,724
Gujarat	552	262	0	169	0	0	0	0	0	984
Uttar Pradesh	228	274	0	107	0	0	0	0	0	613
West Bengal	0	0	0	0	0	458	0	0	0	458
Rajasthan	43	448	0	60	0	0	0	0	0	560
Karnataka	94	0	163	0	66	0	0	0	50	406
Kerala	0	0	0	0	0	0	351	0	0	351
Andhra Pradesh	75	0	65	0	0	0	0	110	0	250
Madhya Pradesh	43	70	0	14	0	0	0	29	0	156
Bihar/Jharkhand	0	0	0	0	0	85	0	8	0	93
Uttarakhand	95	0	0	0	0	0	0	0	0	95
Odisha	0	0	0	0	0	12	0	69	0	81
Chhattisgarh	15	18	0	14	0	0	0	15	0	64
Northeast	0	0	0	0	0	7	0	0	0	7
<b>Port total</b>	<b>4,202</b>	<b>2,390</b>	<b>1,468</b>	<b>693</b>	<b>551</b>	<b>562</b>	<b>351</b>	<b>263</b>	<b>50</b>	<b>10,711</b>

SOURCE: APMT; expert interviews

With respect to the modal mix for container movement from the hinterland to ports, road has an 82 per cent share overall while rail accounts for just 18 per cent. The rail coefficient for five out of the eight major container-handling ports is less than 10 per cent<sup>39</sup>. The next section describes the reasons for the existing modal mix and the time and cost challenges in inland logistics.

Two scenarios for growth projections of containers are (Exhibit 1.106):

- Business-as-usual scenario: With the sustenance of past growth rate, FY 2014 traffic of 10.7 MTEUs is expected to be 21.5 MTEUs in FY 2025<sup>40</sup>

- Optimistic scenario: With a boost from “Make in India” and upcoming industrial corridors, e.g., DMIC, VCIC and CBIC, the container traffic is expected to grow to 24.8 MTEUs in FY 2025 registering a CAGR of around 8 per cent<sup>32</sup>.

There is also a possibility to coastally ship automobiles and other commodities, such as cement, steel and food grains, in containerised form which has not been considered in current projections. Detailed port-wise projections are discussed in Chapter 2.

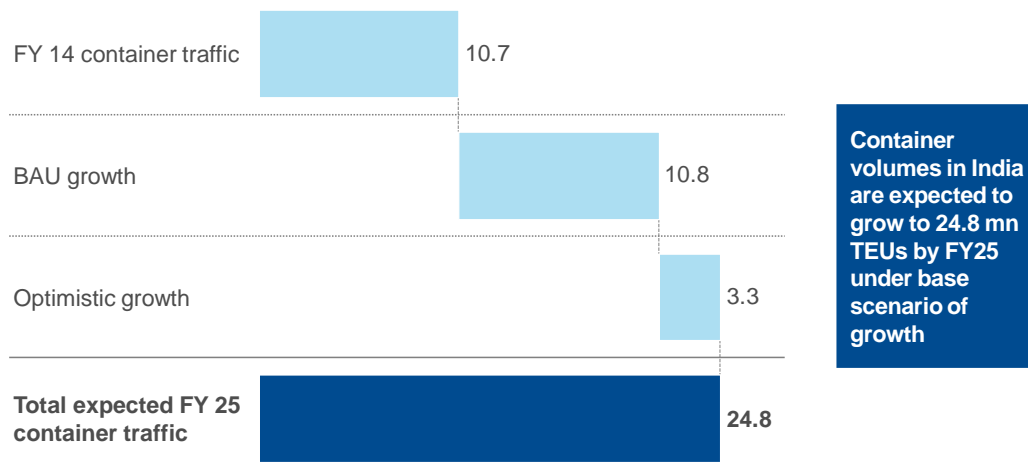
<sup>39</sup> Khambadkones

<sup>40</sup> Khambadkones, APMT

## EXHIBIT 1.67

### Overview of expected container traffic in India by FY25

mn TEUs, FY25



SOURCE: APMT

### 1.6.2 Key concerns and opportunities

Major challenges for each mode in the inland transportation of containers are:

#### Rail

- Congestion and priority to passenger trains adds to delays in freight transportation
- Cross-subsidisation between passenger and freight yields have made the railways unviable for many transportation routes. This results in a greater preference for road, which is not the ideal mode of transportation for the long haul
- Overcrowded inland container depots (ICDs) in the northern cluster cannot get enough traffic to ensure even two rakes per day, adding to the waiting time for cargo at ICDs

**Road:** High congestion, specifically in the stretch from container freight stations to the port gate, leads to huge delays. This issue is more prominent in public ports like JNPT and Chennai.

**Others:** Due to issues pertaining to the unreliability of schedules, the time for customs clearance at ICD/CFS and the congestion on roads and rail, shippers build a lot of buffer into the transportation schedule, leading to idle waiting time for export cargo at ports.

A benchmarking of cost and time required for the end-to-end transportation of a container in India vis-à-vis in China reveals specific actionable insights.

#### Cost

- **Road:** The weighted average of distance between the manufacturing hinterlands and the port for India is 700 to 800 km compared to 150 to 300 km in China. Even though India fares better than China in transportation cost for a comparable distance, longer hinterland to port distance leads to higher costs for exporting/importing a container in India (Exhibit 1.107 and 1.108)
- The average distance covered by a truck in India, per day (250–300 km) is ~30 per cent lower than the same in China and is less than half of the daily distance covered by the trucks in the US

- Moreover, in India, only 50 per cent of the total trip time is the actual vehicle run time, with ~25 per cent of the total

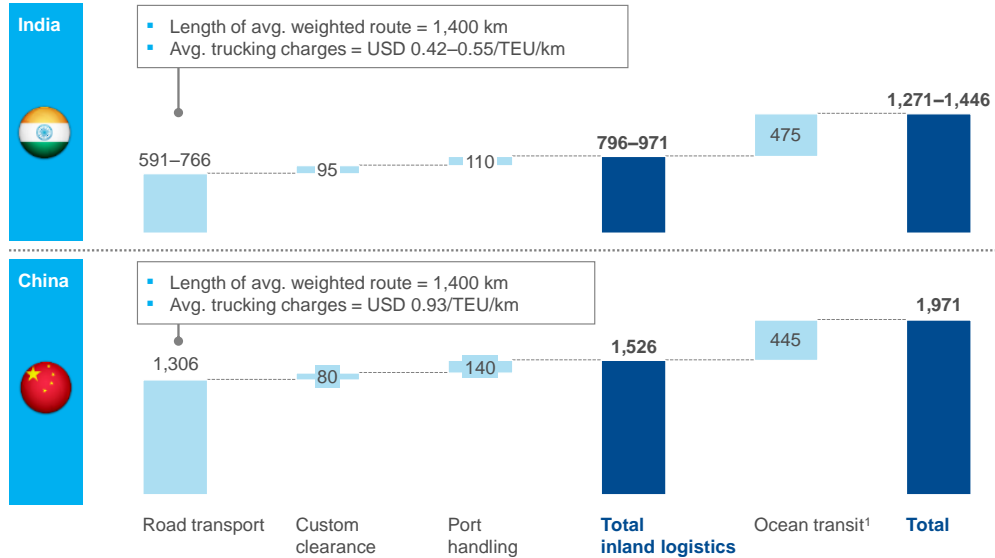
trip time lost due to various forms of congestion and stoppages.

### EXHIBIT 1.68

#### Comparison of end-to-end cost of transporting a container in India and China by road on similar routes

BOTTOM-UP ANALYSIS FOR ROAD COST

USD<sup>2</sup>/TEU



<sup>1</sup> Ocean distance = 6,658 NM

<sup>2</sup> USD to INR exchange rate = 64; USD to RMB exchange rate = 6.4

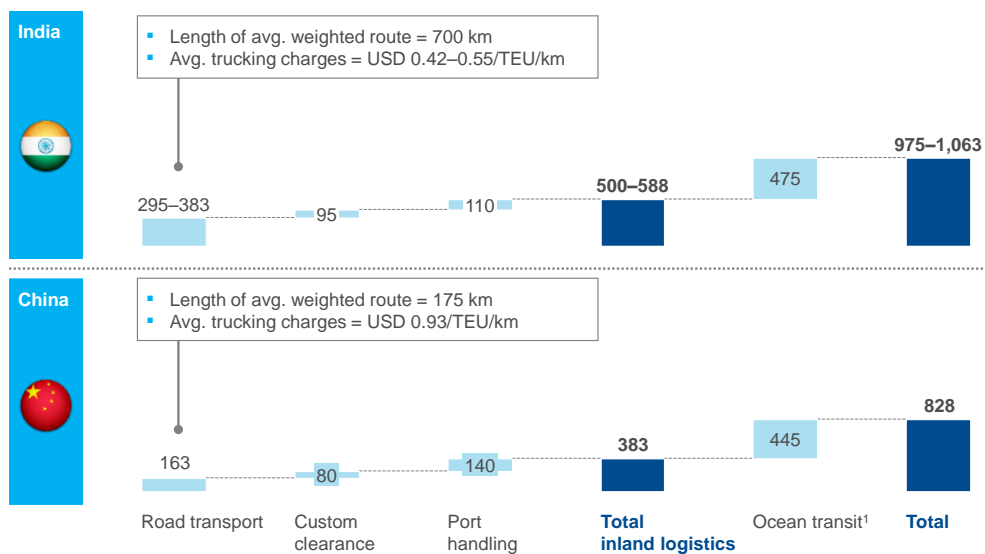
SOURCE: Interviews with truck companies, CTOs, freight forwarders, importers, exporters, port management; World Bank

### EXHIBIT 1.69

#### Comparison of end-to-end cost of transporting a container in India and China by road on a typical route

BOTTOM-UP ANALYSIS FOR ROAD COST

USD<sup>2</sup>/TEU



<sup>1</sup> Ocean distance = 6,658 NM

<sup>2</sup> USD to INR exchange rate = 64; USD to RMB exchange rate = 6.4

SOURCE: Interviews with truck companies, CTOs, freight forwarders, importers, exporters, port management; World Bank



**Rail:** Higher haulage charges due to cross-subsidisation, unlike China, make exports/imports expensive in India. The recent increase in freight charges has further aggravated the issue.

**Implications for modal mix:** Due to the freight charges on road and rail and handling cost involved, rail in India is currently viable for shippers only for a transportation distance beyond 1,000 to 1,300 km. This makes the northwest cluster the primary hinterland where rail becomes viable for inland container transportation. It is also noteworthy that the differential cost between road and rail remains minimal even beyond a distance of 1,000 to 1,300 km. Due to this only 38 per cent of the total volume from this cluster moves by rail.

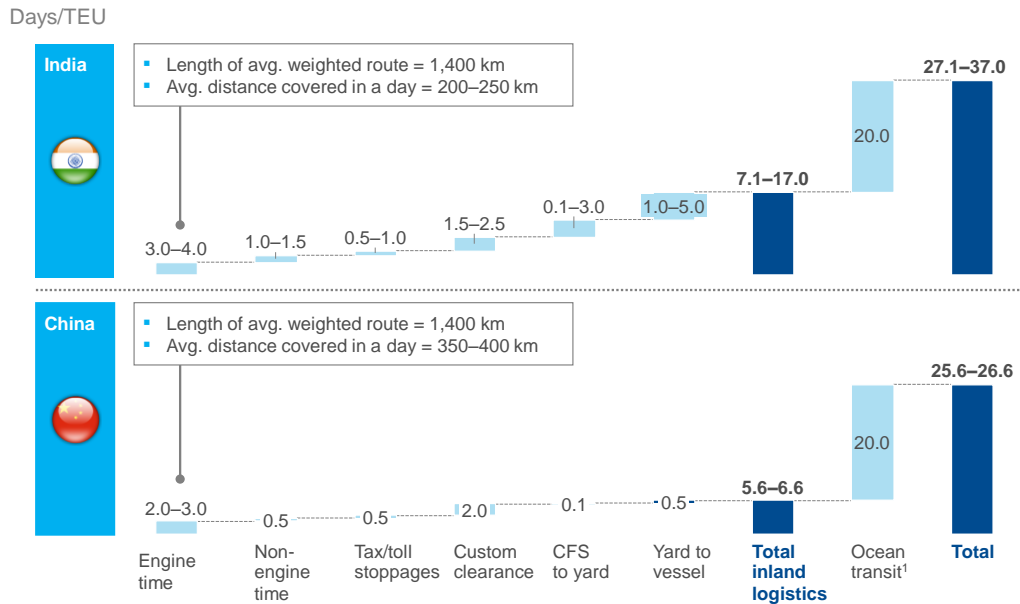
**Time:** Indian containers could take around 50 per cent longer than Chinese containers for a similar inland distance. The duration is highly variable due to the lack of automation in customs processes, lower speed of trucks and trains and congestion and inefficiency at ports, especially major ports. This unreliability of transport schedules forces shippers to incorporate buffers into timelines, increasing variability of idle time at the yard.

Exhibit 1.109 and 1.110 compares the time taken by an Indian export container vis-à-vis a Chinese export container for both road and rail as a mode of inland transportation for a specific route. The major difference is the variability of time taken for inland transportation, primarily due to the yard-to-vessel stage.

**EXHIBIT 1.70**

**Comparison of end-to-end time of transporting a container in India and China by road on similar routes**

BOTTOM-UP ANALYSIS FOR ROAD TIME



<sup>1</sup> Ocean distance = 6,658 NM

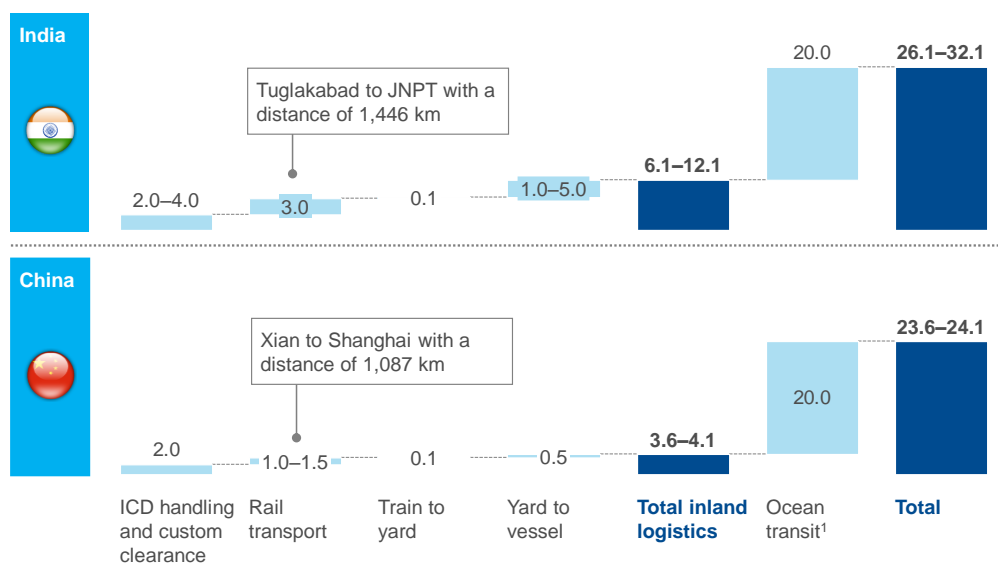
SOURCE: Interviews with truck companies; CTOs; freight forwarders; importers; exporters; port management; World Bank

## EXHIBIT 1.71

### Comparison of end-to-end time of transporting a container in India and China by rail on a specific route

BOTTOM-UP ANALYSIS  
FOR RAIL TIME

Days/TEU



<sup>1</sup> Ocean distance = 6,658 NM

SOURCE: Interviews with truck companies; CTOs; freight forwarders; importers; exporters; port management; World Bank

### 1.6.3 Possible outcomes and recommendations

Considering the projected OD mapping for containers by FY 2025, the recommended port and hinterland network could include:

- Enayam as a transshipment port on the southern tip (discussed in Chapter 2)
- Vodarevu/Machilipatnam to serve the growing hinterland of Andhra Pradesh (discussed in Chapter 2)
- Mundra, Pipavav, JNPT and Chennai to serve as main container ports with all other ports feeding into these ports or Enayam for transshipment
- Ten high-density road routes connecting specific hinterlands to ports (discussed in Chapter 3)
- Western DFC and appropriate connectivity of the ICD network to DFC through three milk runs (discussed in Chapter 3)

# 2. Port modernisation

## 2.1 Challenges in port capacity planning

Overall supply and demand scenario today and port-wise cargo

India has a coastline of around 7,500 km with 12 major ports (Exhibit 2.111) and around 200 notified non-major ports along

the coastline and sea-islands. The ports are important economic and service provision units since they are intermodal, acting as the interchange point for two transport modes, maritime and land.

### EXHIBIT 2.1

#### Prominent ports of India



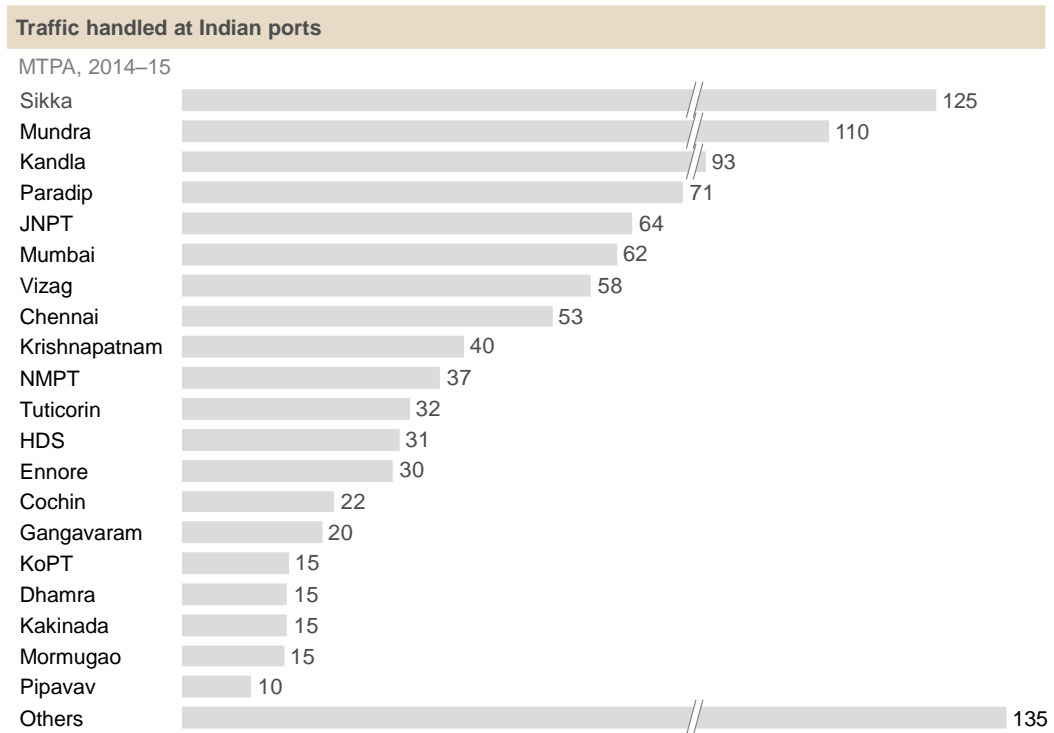
The total traffic handled at Indian ports rose from 934 MTPA in 2012–13 to 1050 MTPA in 2014–15 (Exhibit 2.112). Major ports handled 55 per cent of the total cargo at Indian ports. The capacity of major ports stands at 871 MTPA, while they handled cargo of 581 MTPA. The capacity of non-

major ports stands at 660 MTPA while they handled 471 MTPA of cargo<sup>1</sup>. The capacity utilisation of major ports has been decreasing and stands at 70 per cent; in non-major ports it is at more than 80 per cent. Nineteen ports account for around 80 per cent of the cargo handled.

<sup>1</sup> IPA

## EXHIBIT 2.2

### Traffic handled at Indian ports






Indian ports came short on many performance parameters against international ports

Benchmarking Indian ports against Chinese and US ports shows that India lags behind significantly in port infrastructure (Exhibit 2.113). Seven of the top 10 ports in the world today (by throughput) are Chinese, while no Indian ports figure in the top 30. Most Indian ports don't have the draft to handle cape sized vessels. The average size of a container vessel calling at Indian

ports is around 5,000 TEUs while for China it is around 12,000. At JNPT—India's biggest container port—draft by volume is 14 m while a cape size vessel requires upwards of 18 m (Exhibit 2.114). Around 25 per cent of India's container cargo is transshipped through international transshipment ports due to the lack of infrastructure to handle larger vessels at Indian ports. Average turnaround time (Exhibit 2.115) at Indian ports is much higher—4.5 days as compared to just one day in China.

## EXHIBIT 2.3

### Comparison of port-related KPIs – India, China and US

	India 	China 	US 
Port capacity stock (% of GDP)	1	3	10
Number of shipyards <sup>2</sup>	7	70	45
Number of ports in global top 20	0	9	2
Container traffic (mn TEU)	11	185	44
Average annual growth in container traffic <sup>1</sup> (mn TEU)	0.5	10	0.4
Contribution of waterways in domestic transportation <sup>3</sup>	<1%	24%	6%
Average turn-around time (Days)	4.5	1	1.2

1 Over 2008–2012

2 That can make more than 120 mts long ships

3 Includes both Coastal Shipping and Inland Waterways

SOURCE: Expert discussion; World Bank; Lloyd's list; OECD; Port technology; Clarksons

The low productivity and high vessel turnaround time at Indian ports are due to:

- Low level of mechanisation and insufficient draft
- Skewed handling capacity for different types of cargo
- Infrastructure constraints in hinterland connectivity

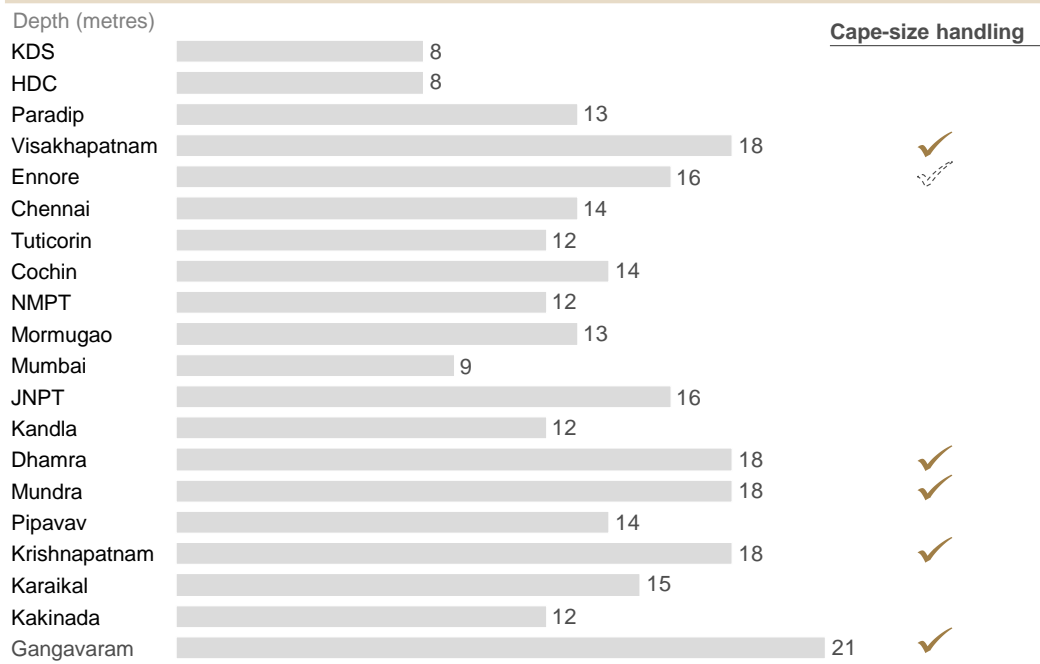
Lagging behind other countries on performance parameters pushes up the cost of trade and renders Indian ports less competitive. Non-major ports have fared

well—ensuring quicker turnaround by investing in the infrastructure to handle larger vessels. Considering the strategic location of India's major ports and their importance to trade, there is an opportunity to improve their performance to meet global benchmarks. Most of the major ports have high turnaround times even while the utilisation level is low and only a few have the ability to handle bigger cape-size vessels. The shipping industry is moving towards cape-size vessels, so it is important that India develops cape handling capability at its key ports to ensure economies of scale for the trade.

## EXHIBIT 2.4

### Vessel-handling capability at Indian ports

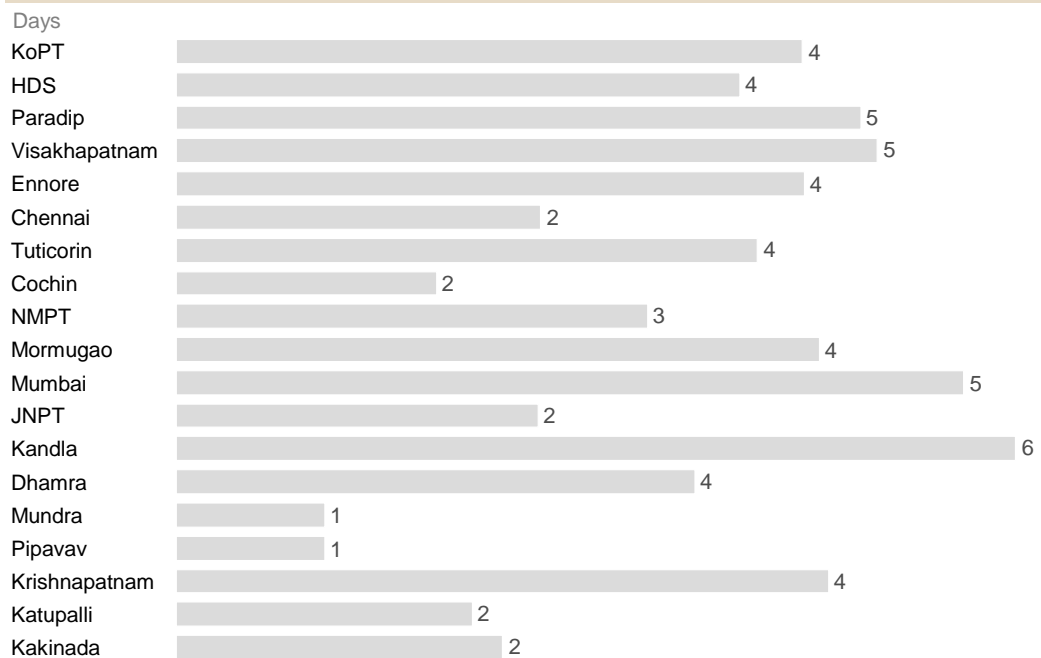
Few ports have cape-size handling capacity



## EXHIBIT 2.5

### Port-wise average turnaround time

Most of the ports' turnaround time is much higher than international benchmarks



### Coordinated approach to capacity addition needed

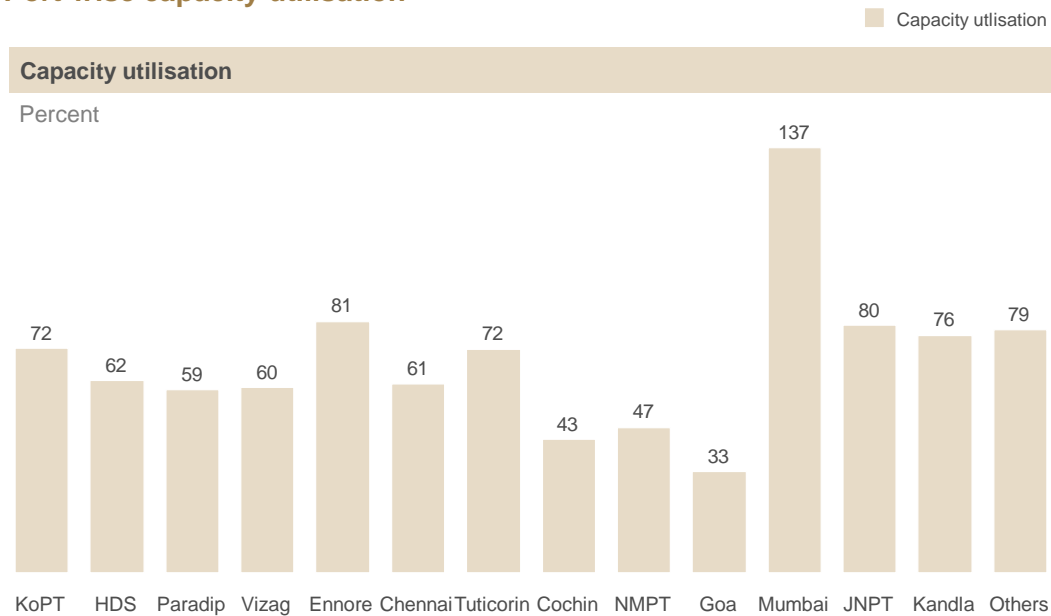
The Indian port sector has a dual structure, with the central government controlling major ports and respective maritime states controlling the non-major ports. The lack of a coordinated strategy for capacity building along the coastline has led to a geographical skew of capacity and skewed commodity-handling capacity inside the ports – some regions have significant overcapacity while others have low capacity (Exhibit 2.116). Northern Tamil Nadu and southern Andhra Pradesh (AP) have built up

significant extra container-handling capacity – Chennai and Ennore are the major ports while Krishnapatnam and Kattupalli are the non-major ports catering to the same hinterland. On the other hand, Maharashtra lacks container-handling capacity – JNPT is running full, resulting in traffic spilling over to Mundra and Pipavav.

Limited commodity-wise capacity creates high variance in berth occupancy rates within ports. At Tuticorin port, berth occupancy of terminals ranges from 9–120 per cent (Exhibit 2.117).

### EXHIBIT 2.6

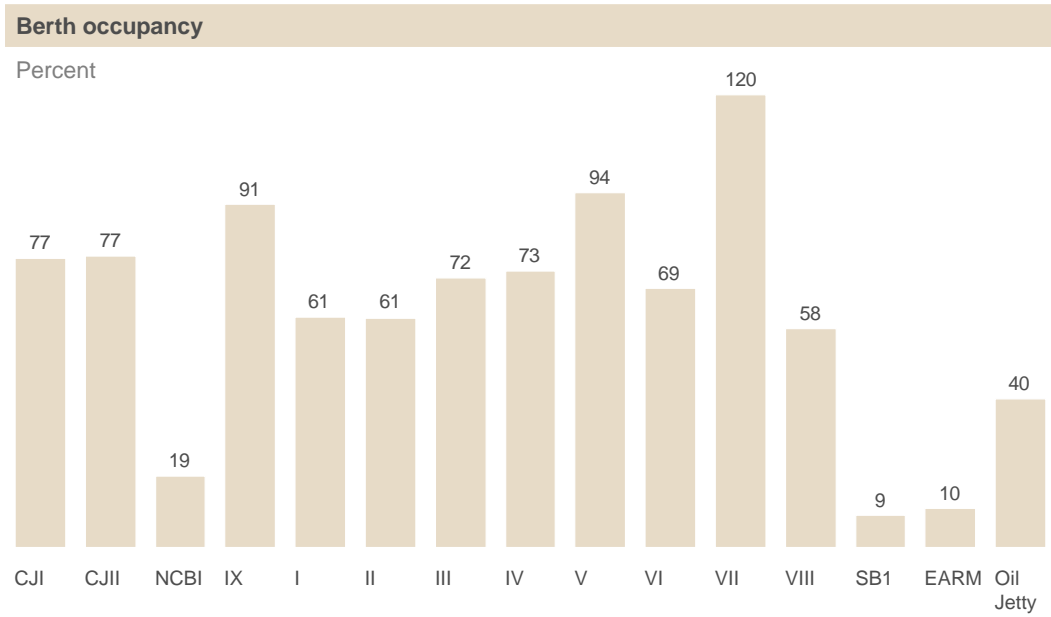
#### Port-wise capacity utilisation



SOURCE: Basic port Statistics, IPA

**EXHIBIT 2.7**

**Higher pressure on coal berths through increased traffic – Tuticorin**



SOURCE: VOC port vessel log 2014–15



## 2.2 Implications and opportunities for port capacity

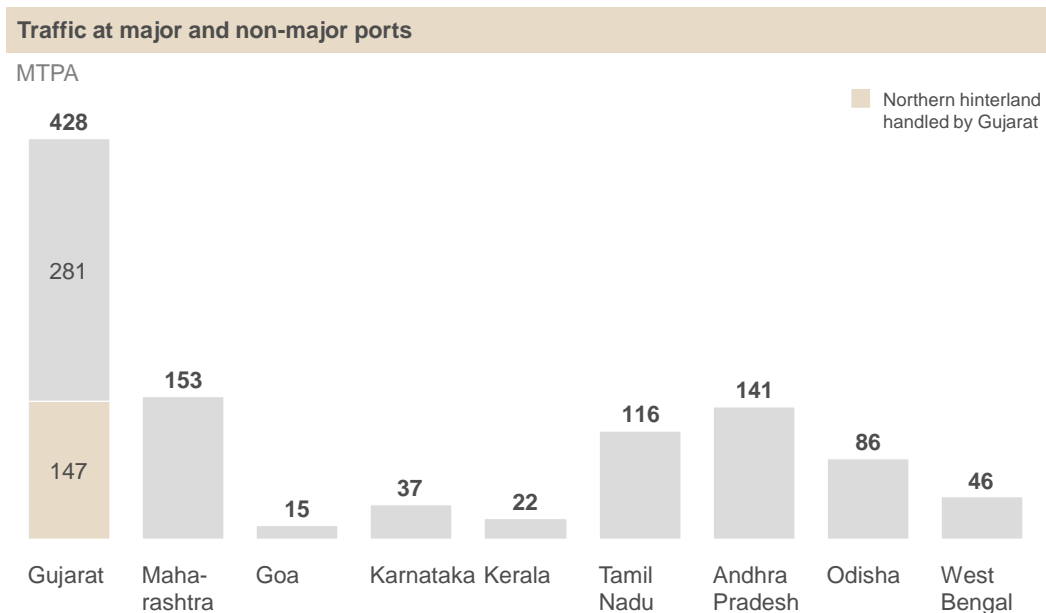
### 2.2.1 Port capacity needs

In 2014–15, Indian ports handled ~1050 MTPA of cargo, growing at a rate of 4.5 per

cent per annum. Western coast ports handle more than 60 per cent of the total cargo owing to the large North West hinterland that the west coast caters to (Exhibit 2.118).

#### EXHIBIT 2.8

#### State-wise cargo traffic in 2015



SOURCE: Updated basic port statistics

Over the next decade, the following commodity wise factors could drive traffic at the ports:

#### ■ Petroleum, oil and lubricant

- Continual increase in the import of petroleum, oil and lubricant (POL) products
- Coastal shipping of POL products from surplus to deficit centres
- Setting up of new refining capacity near increasing demand centres
- Rising demand of LPG due to increased penetration
- Increased demand of LNG

#### ■ Coal

- High growth rate of the power sector and continued reliance on demand centre coal-based power plants
- High growth in CIL's production, enabling coastal shipping of thermal coal to serve power plants in the coastal states

#### ■ Materials

- Coastal shipping of bulk commodities like steel from production to consumption centres
- Setting up of new coastal capacities for bulk commodities, such as steel and cement
- Capacity expansion of steel plants boosting demand for imported coking coal

- **Discrete manufacturing**
  - Increase in container volumes due to growth in the manufacturing sector
  - Boost in EXIM trade from improved logistics due to infrastructure upgradation
- **Development of Coastal Economic zones**

With all the above factors cargo volumes at the ports can potentially increase to 2500 MTPA by 2025 (Exhibit 2.119). While POL, coal and containers will continue to account for majority of the volume, share of coal can grow from 24 per cent to ~40 per cent. Development of Coastal Economic Zones can contribute ~341 MTPA of cargo to ports – both bulk and discrete.

## EXHIBIT 2.9

### Cargo volume growth at Indian ports by commodities

MTPA

Commodity	2014	2025		
		Base	Optimistic	Total
POL	351	460	80	540
Coal	231	850	128	978
Containers	115	323	53	375
Others	275	527	80	607
<b>Total<sup>1</sup></b>	<b>972</b>	<b>2,160</b>	<b>341</b>	<b>2,500</b>

<sup>1</sup> Numbers may not add up due to rounding error

Much of the growth will likely come from coastal shipping of bulk commodities. While the EXIM cargo will double over the next decade to ~1,670 MTPA, share of coastal

shipping can increase 5 times taking its share in port traffic from current 15 per cent to over 33 per cent (Exhibit 2.120).

**EXHIBIT 2.10**

**EXIM and domestic shipping cargo growth**

MTPA

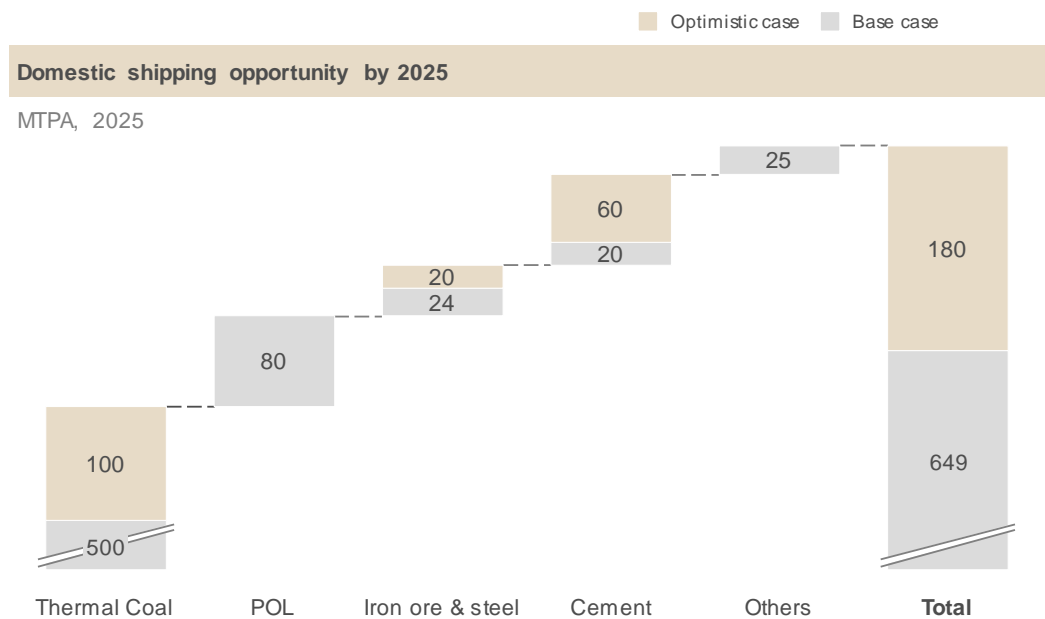
Commodity	2014	2025		
		Base	Optimistic	Total
EXIM	820	1,511	161	1,671
Domestic shipping	150	649	180	829
<b>Total</b>	<b>970</b>	<b>2,160</b>	<b>341</b>	<b>2,500</b>

Thermal coal would grow from 50 MTPA to 600 MTPA by 2025 driving volumes of coastal shipping (optimistic case). Most of this thermal coal will be evacuated from MCL mines through Paradip port to serve the requirement of the thermal power plants

in the coastal states. Other bulk commodities like cement, steel can also leverage coastal shipping to reduce the overall logistics cost. Setting up of bulk clusters in Coastal Economic Zones will also add to the overall potential (Exhibit 2.121).

**EXHIBIT 2.11**

**Thermal coal will drive the domestic shipping volumes**



## 2.2.2 Potential opportunities for port modernisation

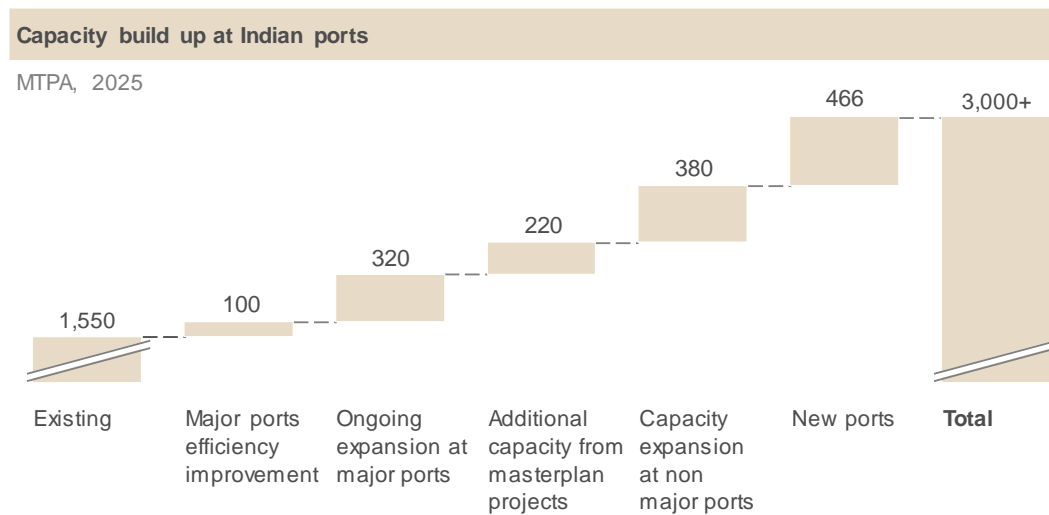
Catering to the increasing traffic over the next 10 years will require augmenting capacity. Cargo traffic at the ports is expected to be 1,650 MTPA in 2020 and reach 2,500 MTPA by 2025.

To cater to this demand, the ports will need to create additional capacity (Exhibit 2.122) by:

- Unlocking 100 MTPA capacity at existing terminals through improved efficiency
- Increasing capacity at existing ports through mechanisation and building new terminals
- Building new greenfield ports

### EXHIBIT 2.12

#### Capacity build up at the ports to meet the 2025 demand



- With the planned projects, there will be sufficient capacity at port to handle projected volumes
- More than total capacity, it is critical to have adequate capacity at the right place

As part of Sagarmala, detailed master plans have been developed for the 12 major ports. For non-major ports, existing capacities and expansion announcements have been

accounted for in arriving at traffic potential. Competitive dynamics between ports located within the same cluster have been taken into account.

## 2.3 Improving port efficiency

### 2.3.1 Introduction

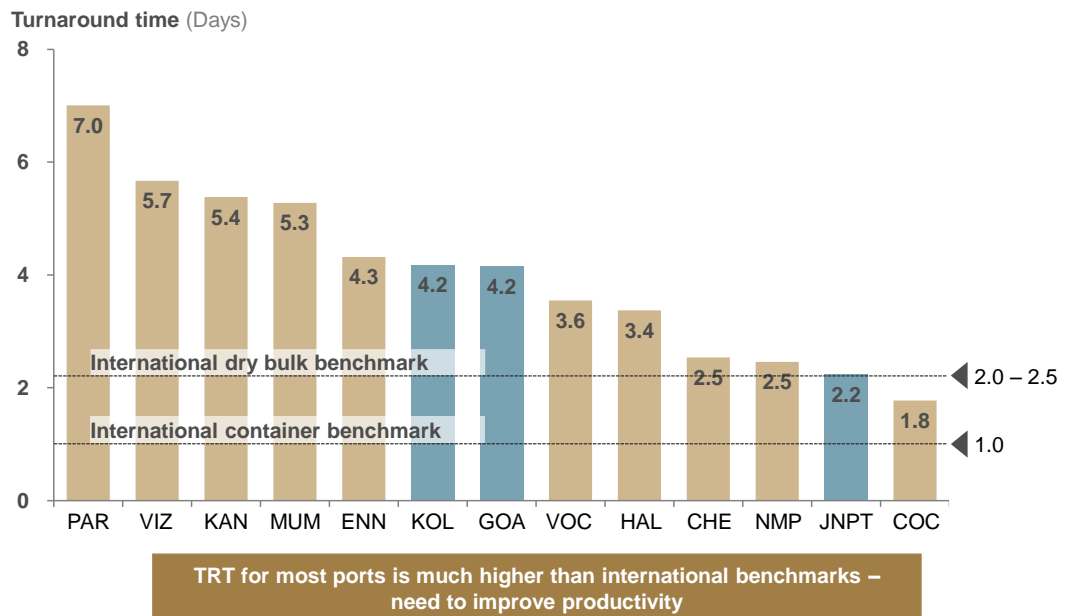
Trade has suffered historically because of inefficiencies in the logistics chain including at the ports, owing to poor turnaround times and low levels of mechanisation. Major ports in particular have high inefficiencies in the form of longer ship turnaround time or higher cargo dwell time/difficulty in evacuation, which affect the overall logistics

cost to the customer. The turnaround times for several major ports are as high as 2 to 2.5 times the global best-in-class benchmark (Exhibit 2.123). Under the current circumstances, when volumes expected to increase, especially driven by a rise in coastal shipping, it is essential that major ports focus on improving service metrics to benefit the trade.

#### EXHIBIT 2.13

##### Most ports in India characterised by high turnaround time

FY 15 performance



Note: Standard container TRT across Singapore (OECD – ITF Reports)

### 2.3.2 Possible initiatives for operational improvement and cost reduction

After an operational benchmarking effort, a deep dive was conducted for all ports to understand the reasons for low productivity. This helped to identify 104 initiatives that could lead 100 MTPA of increased capacity over the next three years, and thereby to savings of INR 1,000 cr in new capacity

building. The operational and cost improvement initiatives identified fall under three themes (Exhibit 2.124):

- Improving productivity with existing infrastructure
- Upgrading berth equipment
- Enabling ports to handle bigger vessels

#### EXHIBIT 2.14

##### Three themes for improving efficiency

###### 1 Improving productivity with existing infrastructure



Increase productivity/reduce costs

###### 2 Upgrading berth equipment



Drive higher berth & evacuation productivity

###### 3 Enabling ports to handle bigger vessels



Enabling ports to handle bigger vessels

Several initiatives have already been implemented and have started showing

results in the performance metrics of the ports (Exhibit 2.125).

**EXHIBIT 2.15**

**Substantial performance change target**

	FY15	FY18
Average turnaround time	4 days	<2 days
Number of ports with cape handling capability	1 port	5 ports
Percentage of mechanised coal handling	nearly 60%	>80%

**2.3.2.1 Improving productivity with existing infrastructure**

Most of the berths across major ports function at very low productivity levels

compared to the best-in-class benchmarks. Establishing productivity-related policies and initiatives will enable the improvements required in the existing infrastructure (Exhibit 2.126).

**EXHIBIT 2.16**

**Paradip pilot: Best-in-class productivity norms rollout**

**New productivity norms in Paradip increase gross productivity by 12%**

	FY15	Aug-Sep
<ul style="list-style-type: none"> <li>Best-in-class productivity norms rolled out in Paradip</li> <li>Norms for individual vessels to demonstrate higher productivity</li> <li>Norms for non-working time and vessel turnaround time defined</li> <li>Penalties could be imposed on vessels unable to match the set norms</li> </ul>	<b>Gross productivity (MT/hr)</b> 1,370	1,541
	<b>Pre-berthing delay (hrs)</b> 55	51
	<b>Turnaround Time (hrs)</b> 97	90

SOURCE: Paradip Port Trust

### 2.3.2.2 Upgradation of equipment

A detailed study of port equipment, such as mobile harbour cranes, quay cranes, dumpers, etc., was undertaken. The equipment at several berths is old and severely constrains capacity. It was set up long ago to achieve the target productivity levels at the time of purchase. Much of this equipment is heavily derated due to improper maintenance. Several ports critically need higher capacity equipment to replace existing old equipment.

The equipment upgrade program would require:

- Installation of 20 new MHCs across bulk handling terminals

- Installation of 14 RTGCs in container-handling terminals
- Automation of gates in container ports to reduce process time ((Exhibit 2.127)
- Addition of over 200 dumpers in conventional handling terminals
- Increase in pipelines and pipeline capacity for efficient use of liquid berths
- Cost reduction through efficient procurement to release capital for new projects
- Barge loading can be used to improve dredger utilisation

#### EXHIBIT 2.17

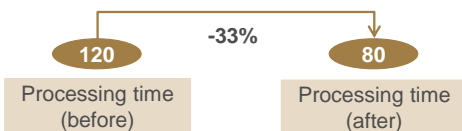
### Automation at terminal gate and frontloading of processes could reduce surveyor processing time by nearly 60%

1 Container damage detection using cameras can reduce processing time by nearly 33%



Can be adopted at all the major ports for container damage identification

- Provides opportunity for joint-procurement across ports



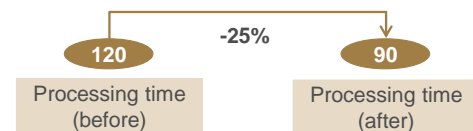
2 Eliminating manual data entry at the surveyor can save another 25%

Vehicle number and seal number are being entered manually by the surveyor

Vehicle Number	TH04 DH 0130	Drivers Name	-
Gross Weight (in KG)	5250	Haailer	-
Category	GENERAL	Remarks	-
IMO Code		UN Code	-
General OOG-BACK-ID / OOG-FRONT-ID / OOG-LEFT-ID / OOG-RIGHT-ID / OOG-TOP-ID			
SpecialStow			
Shipping BillNo	1676407	Shipping BillDate	09/07/2015
Seal No 1 - Shipper Seal		Commodity Code	07089900
Seal No 2 - Customs Seal	CMSN 11136	CFS Exit Time	-
Seal No 3 - Line Seal	EMC BD25204	Exit location	-

The same should be frontloaded to CFS

- Can be enforced by implementing fines on trucks that don't comply
- The checks can be done at the zero gate itself



Note: Results based on around 12 hours of time study. No. of trucks observed: 21 at CCTPL and 23 at CITPL  
SOURCE: BCG analysis; Client data



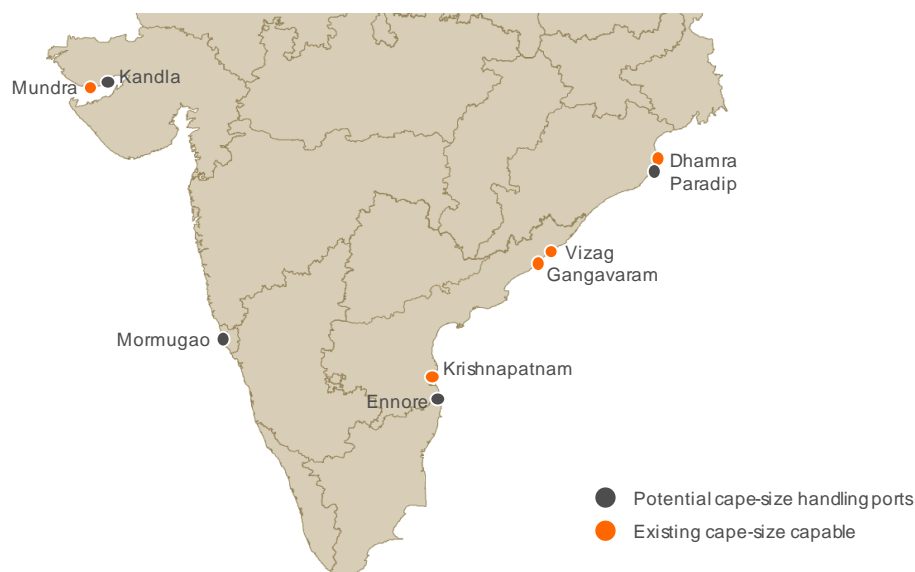
### 2.3.2.3 Enabling ports to handle bigger vessels

A port's attractiveness is determined by its capability to handle large vessels like cape, VLCCs, etc. The cost benefit analysis for deeper draft conducted at several ports justified deepening of draft in two more ports to handle cape-size vessels in the next 18 months (Exhibit 2.128).

- Increase the draft at Ennore from 16 m to 18 m
- Increase the draft at Paradip from 16 m to 18 m

#### EXHIBIT 2.18

##### Ports with cape-size handling capability



### 2.3.1 Unlocking the potential of city ports

Ports have often led to the growth and prosperity of great cities, e.g., London, New York and Singapore. In India, too, port facilities helped in the rise of Mumbai, Kolkata and Chennai as commercial and industrial centres.

Industrialisation and development of port cities leads to urbanisation as well as congestion, which affects access to these ports. Old ports are sometimes also unable to handle the increasing traffic and changing cargo mix, creating the need for port modernisation and expansion. Furthermore, urbanisation increases land values and non-port usage often yields better economic value than maritime activities. Most large

cities have experienced this phenomenon, e.g., ports in Singapore, London and Tel Aviv, discussed subsequently, have redeveloped old ports for non-maritime use while developing new ones farther away from urbanised areas.

Similarly, ports in Mumbai, Chennai and Kolkata have large land parcels that could be leveraged for redevelopment. These ports have generally shown relatively lower growth and have been losing traffic to the ports located in the proximity. These ports also have severe connectivity related challenges that are becoming progressively difficult to address.

#### Canary Wharf, London

The Canary Wharf area was one of the busiest ports in the world until the Second World War, when the industries supporting

the port began to decline and docks started to close. In the 1980s, the British Government closed Canary Wharf as a terminal because it could not compete with coastal terminals, such as Tilbury, Felixstowe and Thames port, as ships became larger requiring deeper water and taller cranes. This period also saw the rise of containerisation, which required a different type of crane for cargo handling. After Canary Wharf in the London Docklands closed down, the London Docklands Development Corporation, a government organisation, overtook the area and began offering incentives to attract businesses and developers. Since then, developers have taken over most of the real estate, building both residential and commercial developments and transforming Canary Wharf into a successful business district.

#### Clarke Quay and Boat Quay, Singapore

During the colonial period, Boat Quay and Clarke Quay on Singapore River were commercial centres until the government decided to relocate cargo services to Pasir Panjang because of environmental concerns as well as attractive modern facilities. The government then cleaned up the area around the Singapore River and decided to promote it as a commercial, residential and entertainment zone.

#### Tel Aviv Port

Tel Aviv port was founded in 1938 and closed down in 1965 for various reasons, including congestion. More economical alternative uses were also proposed. A new port opened at Ashdod. More recently, the port underwent a redevelopment programme and is now a popular local attraction with an estimated 4.3 mn annual visitors.

#### Redevelopment of city ports in India

By 1900, Mumbai was the largest commercial and industrial city in India as a result of its large cotton mill industry. The textile industry began to decline in the 1970s, affecting port activities as well. Currently, due to growing urbanisation

leading to evacuation issues, traffic at Mumbai port is limited to serving only local hinterland needs, leading to the loss of traffic to the nearby ports like JNPT.

Congestion in Kolkata has affected business operations at the Kolkata port. Even though Kolkata and Haldia are natural owners of various kinds of cargo, especially coking coal for steel plants in the primary hinterland, most of the volume has been diverted to deeper drafts non-city ports, e.g., Dhamra and Paradip. Similarly, in Chennai, congestion due to city traffic and restrictions on dirty cargo has diverted container and coal traffic respectively to Ennore.

Redevelopment of Indian city ports could follow a two-pronged strategy:

#### ■ Construction-related infrastructure:

The economic profile of many city ports has changed from a primarily industrial/bulk profile to broader economic activities. All urban ports have significant uptick in construction-related activities, which drive the demand for materials, such as cement and steel. City ports can leverage this demand to repurpose existing terminals to develop dedicated infrastructure

#### ■ Redevelopment for non-maritime use:

Given the location of these city ports and the land area available, these ports may also benefit from redevelopment of land for non-maritime activities and alternative economic uses, such as industrial, tourism and retail as well as commercial and residential complexes

#### Case study: London Docklands Development Corporation

In 1981, the British government established the London Docklands Development Corporation (LDDC) as an urban development corporation to revive the dock area. LDDC had key powers of land acquisition and planning, and the resources to provide new or develop existing

infrastructure. Grants from the Secretary of State for the Environment with the consent of the Treasury fund these operations or by loans from the National Loans Fund. Similar to other public bodies, its activities are subject to economic and financial reviews.

Activities of the LDDC are divided into two categories, commercial and non-commercial. Commercial projects include preparing the land for development activities in the private sector. Proceeds from sale of land is mostly used to pay back the grant funds. Moreover, any excess cash is given to the Department of the Environment. The public sector carried out non-commercial activities, such as providing of transport services and infrastructure, and community projects.

Ownership of development land was very important to the operations of LDDC. Publicly owned land with development potential was required. Non-operational

surplus land by agreement was acquired from various undertakers, such as British Rail, British Gas, Thames Water Authority

and the Central Electricity Generating Board.

LDDC remained operational for 17 years, from 1981 to 1998, and published its achievements in the 1998 Annual Report as

- GBP 1.86 bn in public sector investment
- GBP 7.7 bn in private sector investment
- 1,066 acre of land sold for redevelopment
- 144 km of new and improved roads
- Construction of the Docklands Light Railway
- 25 mn sq feet of commercial /industrial floorspace built
- 1,884 acre of derelict land reclaimed
- 24,046 new homes built
- 2,700 businesses trading
- Strong workforce of 85,000 people at the London Docklands

## 2.4 Capacity expansion at existing ports

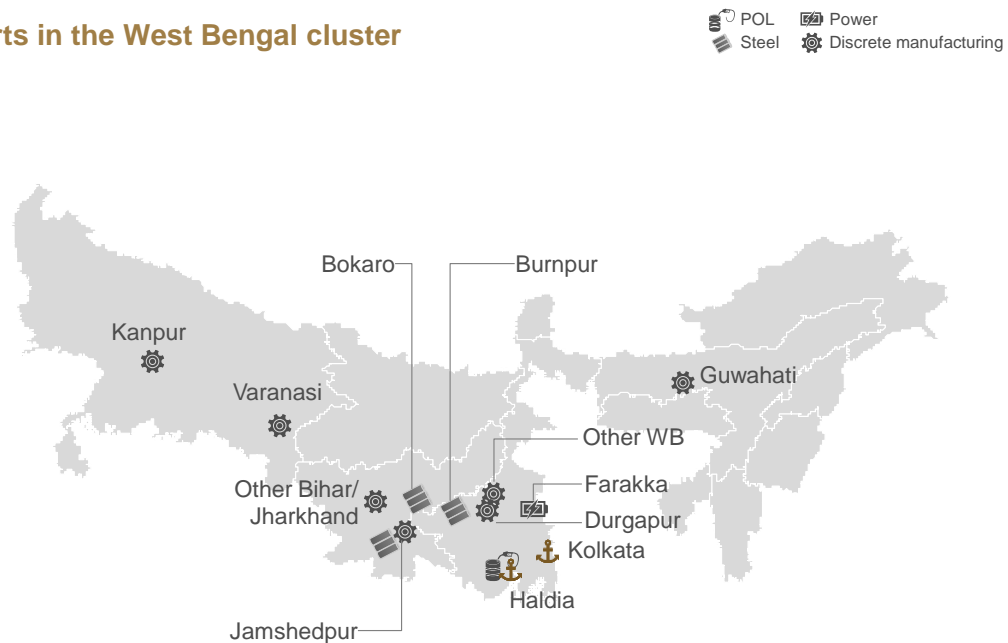
### 2.4.1 West Bengal cluster

West Bengal has two dock complexes, Kolkata and Haldia (Exhibit 2.129). Kolkata is a riverine port handling predominantly containers, while Haldia handles containers, coking coal, iron ore and fertilisers in dry and break bulk cargo and POL in liquid bulk. Out

of these commodities, liquid bulk and coking coal constitute around 50 per cent of the cargo. The primary hinterland for this cluster includes West Bengal, Bihar, Jharkhand, the Northeast and Odisha.

#### EXHIBIT 2.19

##### Ports in the West Bengal cluster



Key growth themes for the West Bengal cluster are:

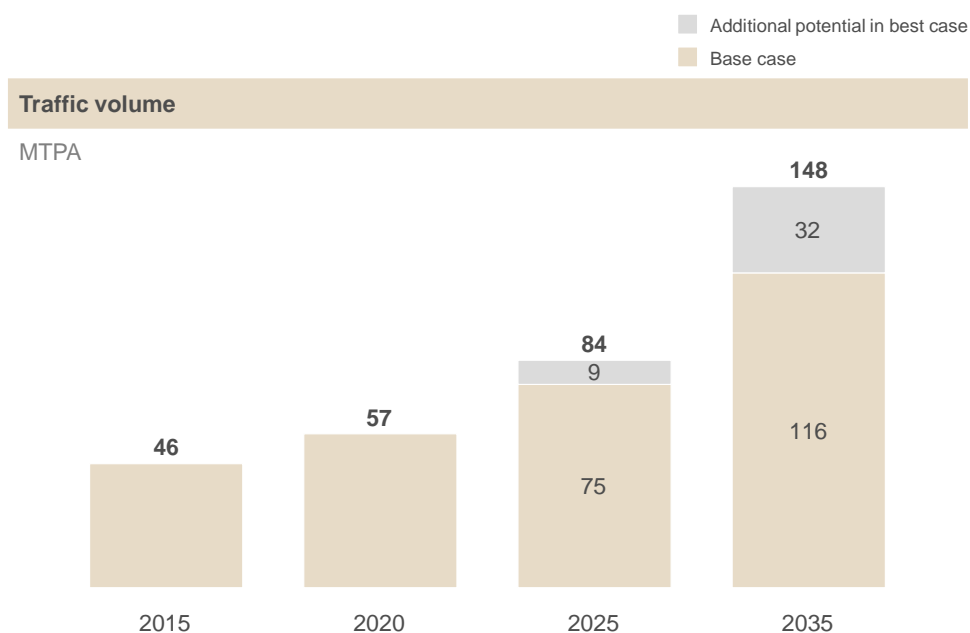
- Import crude oil to feed IOCL facility at Haldia
- Import coking coal to meet the requirement of steel plants

- Cater to the container traffic of West Bengal, Bihar, eastern UP and the North Eastern states

Exhibit 2.130 shows traffic forecast for west Bengal cluster upto 2035.

## EXHIBIT 2.20

### Traffic forecast for West Bengal cluster



### Major commodities and their projections

#### 2.4.1.1 POL

POL crude and product is primarily handled at Haldia and constitutes 18 per cent of Haldia's traffic handled. IOCL Haldia is the key player for the crude oil imports. With no significant capacity expansion expected at Haldia and no new facility planned, POL traffic is expected to grow to 5.8 MTPA by 2020 and 7.7 MTPA by 2025<sup>2</sup>

#### 2.4.1.2 Thermal coal

Currently Haldia imports 3.5 MTPA of thermal coal to meet the blending requirement of the power plants in the hinterland (NTPC Farakka). It also exports 1.2 MTPA of thermal coal, which is coastally shipped to TANGENCO power plants. Going forward, with the output of ECL

increasing, overseas coal imports are unlikely to increase. By 2025, thermal coal imports are likely to range around 3.3 MTPA while the coastal coal will be around 1.6 MTPA<sup>2</sup>.


#### 2.4.1.3 Coking coal

Haldia imports 6 MTPA of coking coal primarily to meet the requirement of steel plants in the hinterland. Haldia is the nearest port for four major steel plants—Durgapur, IISCO, Bokaro and Rourkela (Exhibit 2.131). But due to its low draft, it can only meet a part of these plants' requirement, while Dhamra and Paradip cover the rest. Coking coal import is expected to increase and touch 8 MTPA by 2020 and 11.2 MTPA by 2025.

<sup>2</sup> Source: Master plan

## EXHIBIT 2.21

**Haldia is the nearest port (in rail km) for four SAIL plants which contribute nearly 30% of total imports**

 Short distance

Shortest distance rail route (siding to siding) km					
	Durgapur	IISCO	Bokaro	Rourkela	Bhilai
Vizag	984	656	940	665	550
Dhamra	485	453	499	531	808
Paradip	617	585	630	504	735
Haldia	308	308	366	401	852

SOURCE: Indian Railways and SAIL interviews

### 2.4.1.4 Containers

Container volume in the state is 0.63 mn TEUs, catering primarily to the West Bengal hinterland. With the capacity at KoPT getting saturated, spillover traffic is expected to reach Haldia. Container volumes are expected to touch 0.85 mn TEUs by 2020 and around 1.1 mn TEUs by 2025, provided the port has sufficient capacity to handle containers.

### 2.4.1.5 Other localised commodities

Other commodities include iron ore, manganese, vegetable oil, chemicals, limestone, etc. With the mining ban on iron ore, exports are expected to remain low,

while chemicals and vegetable oil will grow at a healthy rate.

### 2.4.1.6 Other coastal shipping potential

Besides the above mentioned traffic, there is an additional opportunity for coastal shipping that can potentially be tapped. Around 12.4 MTPA of thermal coal can be coastally shipped to NTPC Kudgi (Karnataka) and NTPC Simhadri from Pakri Barwadih and Khottadih OC mines respectively.

Exhibit 2.132 summarises new opportunities possible via coastal shipping for West Bengal cluster.

## EXHIBIT 2.22

### West Bengal cluster: New opportunities possible via coastal shipping

MTPA (except containers)

Commodity	2020		2025	
	Loading	Unloading	Loading	Unloading
Thermal coal	12.4	–	12.4	–
Steel	2.74	0.39	3.66	0.52
Cement	–	1.88	–	7.5
Fertiliser	–	1.92	–	2.34
Food grains	0.11	–	0.13	0.01

Additional Coastal shipping from Pakri Barwadih in Jharkhand to Kudgi in Bijapur; and Khottadih OC to NTPC Simhadri

5 MTPA can be shipped from Central AP cement cluster (if Central AP port comes up)

SOURCE: Master plan

### 2.4.1.7 Projects to be undertaken at Haldia



Project name	Agency	Concerned state	Investment required (INR cr)	Timeframe
Mechanisation of Berth 3 at Haldia Dock Complex	HDC	West Bengal	150	18 months
New exclusive berth outside dock for edible oil and chemicals	HDC	West Bengal	100	15 months
Development of multipurpose berth outside the dock basin	HDC	West Bengal	200	12 months
Building barge jetties to support the anchorage operations	HDC	West Bengal	120	12 months

Source: Master plan

## 2.4.2 Odisha cluster

Odisha has three operational ports—Dhamra, Paradip (major) and Gopalpur (Exhibit 2.133). The cluster handles a total cargo of around 85 MTPA. Paradip is one of the largest major ports in the country by volume, and it alone handles more than 70 MTPA of cargo. This cluster is located in a mineral-rich state with significant bulk industries that are relevant to the ports.

The port primarily handles coal and POL. Roughly 23 MTPA of coal is coastally shipped to the South and the western states of India, and more than 20 MTPA is imported (primarily coking coal). The cluster imports around 18 MTPA of POL, primarily

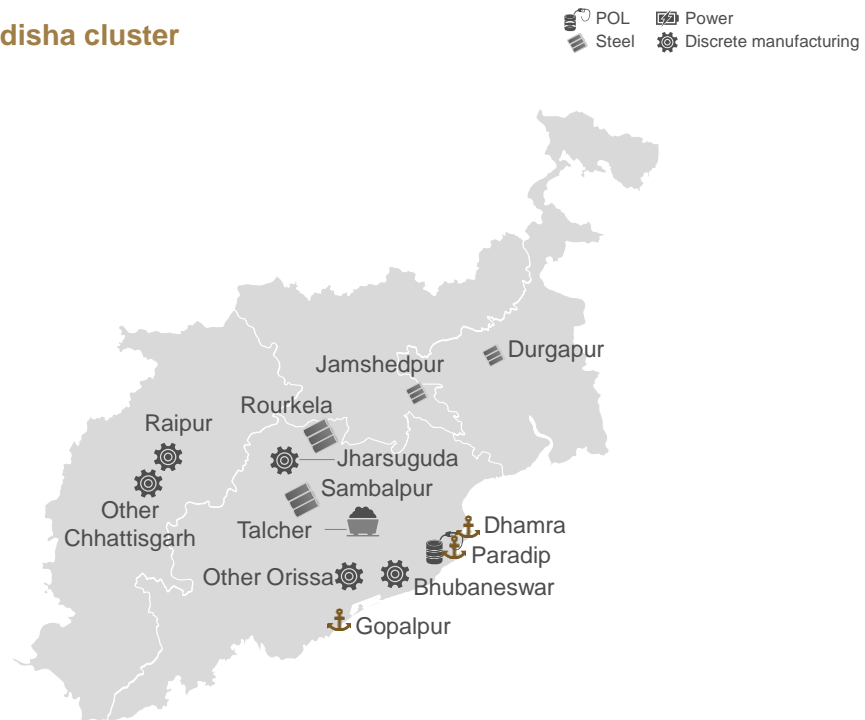
to serve the IOCL Paradip and Haldia refineries.

Key growth themes for the Odisha cluster are:

- Import of crude oil to support the refineries in Paradip and Haldia
- Coastal shipping of thermal coal to power plants in the coastal states
- Meet the requirement of steel cluster in the hinterland for coking coal import and coastal shipping of steel

### EXHIBIT 2.23

#### Ports in the Odisha cluster





## Major commodities and their projections

### 2.4.2.1 Coal

The Odisha cluster is close to coal reserves in the hinterland, primarily MCL. Most power plants in the coastal states have linkages with MCL. Already, around 23 MTPA of thermal coal is coastally shipped to meet the requirements of TANGENCO, APGENCO and NTPC. As MCL production picks up and the power sector grows with new power plants being commissioned, the coastal shipping of thermal coal to power plants can reach 100-130 MTPA by 2020. Thermal coal for non-power uses can also be linked to MCL and be coastally shipped, giving an additional upside of around 50 MTPA.

The cluster handles around 20 MTPA of coking coal imports to meet the requirement of the steel plants in the hinterland, including Odisha, Chhattisgarh and West Bengal. With the planned capacity addition and new plants coming up in the hinterland, the total demand can reach around 30 MTPA. The cluster will need additional capacity for coking coal imports, and the ability to handle cape-size vessels.

### 2.4.2.2 Other commodities

In addition to coal and coking coal, POL is pegged to grow to roughly 33 MTPA by 2020, owing to capacity expansion. In the base case scenario, iron ore exports are expected to be depressed due to the crashing of global prices and the non-competitiveness of Indian ore.

Fertiliser traffic is also projected to grow to roughly 10 to 11 MTPA by 2035 due to the presence of IFFCO and good connectivity with agricultural areas in Bihar and UP.

### 2.4.2.3 Other coastal shipping potential

The Odisha cluster is strategically positioned to serve large areas in the hinterland through coastal shipping, with steel becoming a major commodity. Key plants which can prompt the coastal shipping of steel from Odisha are Tata Steel Jamshedpur, SAIL Rourkela, Bokaro, BSL Meramandali, BSPL Sambalpur and Tata Steel Kalinganagar.

Exhibit 2.134 summarises new opportunities possible via coastal shipping for Odisha cluster.

## EXHIBIT 2.24

### Odisha cluster: New opportunities possible via coastal shipping

MTPA (except containers)

Commodity	2020		2025	
	Loading	Unloading	Loading	Unloading
Steel	3.91	0.50	5.23	0.67
Cement	0.01	1.27	0.01	3.30
Fertiliser	0.87	0.39	1.06	0.47
Food grains	0.40	–	0.49	–

2.5 MTPA can be shipped from Central AP cement cluster (If Central AP port comes up)

#### 2.4.2.4 Projects to be undertaken at Paradip



Project name	Agency	Concerned state	Investment required (INR cr)	Timeframe
Development of IWT Terminal at Paradip Port	PPT	Odisha	300	18 months
Conversion of IOB berth into coal exporting berth	PPT	Odisha	50	18 months

Source: Master plan

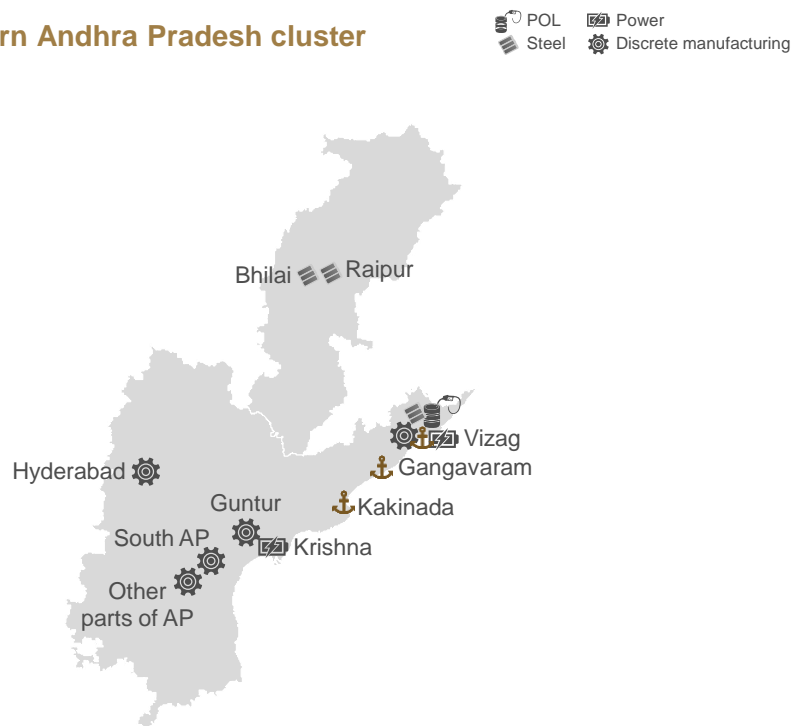
### 2.4.3 Northern AP cluster

Visakhapatnam is the major port in the northern AP cluster, and Kakinada and Gangavaram are the operational non-major ports (Exhibit 2.135). The primary hinterland of these ports includes Andhra Pradesh, Telangana, Chhattisgarh, Madhya Pradesh and southern Odisha.

The cluster predominantly focuses on the bulk industry with a small role for discrete manufacturing. The primary commodities are therefore thermal coal, coking coal, POL and other bulk commodities.

#### EXHIBIT 2.25

##### Ports in the northern Andhra Pradesh cluster



##### Key growth themes for Northern AP cluster

- Crude oil import for HPCL Visakhapatnam refinery
- Receiving cluster for coal to meet the requirements of power and steel plants in the hinterland
- Fertiliser imports to mainly serve the agricultural belt in AP and Telangana
- Export of iron ore

## Major commodities and their projections

### 2.4.3.1 POL

The HPCL refinery located in Visakhapatnam is the anchor customer for POL. The Visakhapatnam port handles roughly 15 MTPA of POL, which comprises approximately 8 MTPA of crude import and balance exports of products from the HPCL refinery. Expansion of HPCL in the future will lead to a traffic of roughly 21 MTPA by 2020, and 28-29 MTPA by 2025. An LNG terminal is expected to come up in Kakinada.

### 2.4.3.2 Coal

The ports of this bulk-oriented cluster service multiple power plants and steel plants in the hinterland requiring thermal and coking coal. A total of around 42 MTPA of coal was handled in 2014–15 by the three ports, including around 2 MTPA of coastal coal export from Visakhapatnam for TANGENCO plants in Tamil Nadu. Coking coal customers include Rashtriya Ispat Nigam Limited (RINL), SAIL Bhilai, Tata Steel and JSPL. Other consumers of coking coal include Uttam Galva Metallics, Jayswal Neco and Bhushan Power and Steel Limited.

Thermal coal customers include NTPC Simhadri, APGENCO and other captive power units of steel and power plants. The total coal requirement is expected to touch around 50 MTPA by 2020, based on the expansion plans of the power and steel plants in the hinterland<sup>3</sup>.

### 2.4.3.3 Iron ore

The cluster handles 3 MTPA of iron ore exports, which is expected to increase to 4 MTPA by 2020. Depending on how export volumes pick up in the future, the volume handled by the port can increase to 6-13 MTPA by 2025 and 10-25 MTPA by 2035.

### 2.4.3.4 Fertilisers

The port imported 5.6 MTPA of fertilisers and raw materials for fertilisers in FY 2015. This comprises approximately 4-4.3 MTPA of finished fertiliser and 1.3-1.6 MTPA of fertiliser raw material. The finished fertiliser serves demand in the hinterlands of Andhra Pradesh, Telangana, Madhya Pradesh and Chhattisgarh. Part of the raw material for fertilisers is used in the DAP, NPK, urea and AS fertiliser plants in Andhra Pradesh itself and the rest is sent to plants in Uttar Pradesh. The overall volume of fertiliser and fertiliser raw material is expected to increase to 8 MTPA by 2020 and 11 MTPA by 2025.

### 2.4.3.5 Containers

Visakhapatnam, the only port for containers in this cluster, handles 0.25 mn TEUs through the Visakha Container Terminal. Most of this traffic comes from Hyderabad, Bangalore, Indore and Visakhapatnam. Other container-producing hinterlands include Bhubaneswar, Jamshedpur and other clusters in Chhattisgarh, Jharkhand and Odisha. The container volume is expected to grow to 0.4-0.5 mn TEUs by 2025 and 0.7-0.9 mn TEUs by 2035, if a central Andhra port does not come up.

### 2.4.3.6 Coastal shipping potential

Visakhapatnam is strategically positioned to serve large areas in the hinterland of the country through coastal shipping. Cement, coal, steel and fertiliser can be major commodities.

### 2.4.3.7 Coal

The northern Andhra cluster can have an additional potential of handling 10 MTPA of coal imports for NTPC Simhadri and upcoming Hinduja<sup>3</sup>.

### 2.4.3.8 Fertilisers

There is potential for coastal shipping of 2-2.5 MTPA of fertiliser from the plants of Coromandel and RCFL in Andhra Pradesh to Odisha, Maharashtra, Tamil Nadu and West Bengal. The volume of coastal shipped fertiliser from North Andhra ports is expected to grow to 3.5 MTPA by 2020, 4.3 MTPA by 2025 and 6.3 MTPA by 2035.

### 2.4.3.9 Steel

North Andhra ports can also facilitate the coastal movement of 1-1.3 MTPA of steel from the RINL plant. This volume is expected to grow approximately three times by 2035.

### 2.4.3.10 Projects to be undertaken at Visakhapatnam port



Project name	Agency	Concerned state	Investment required (INR cr)	Timeframe
Additional stackyard for GCB	Visakhapatnam Port	Andhra Pradesh	150	18 months
Additional oil jetty	Visakhapatnam Port	Andhra Pradesh	100	18 months
Phase III connectivity from Sheelanagar to Anakapalli/Anandapuram bypass	Visakhapatnam Port	Andhra Pradesh	600	15 months

Source: Master plan

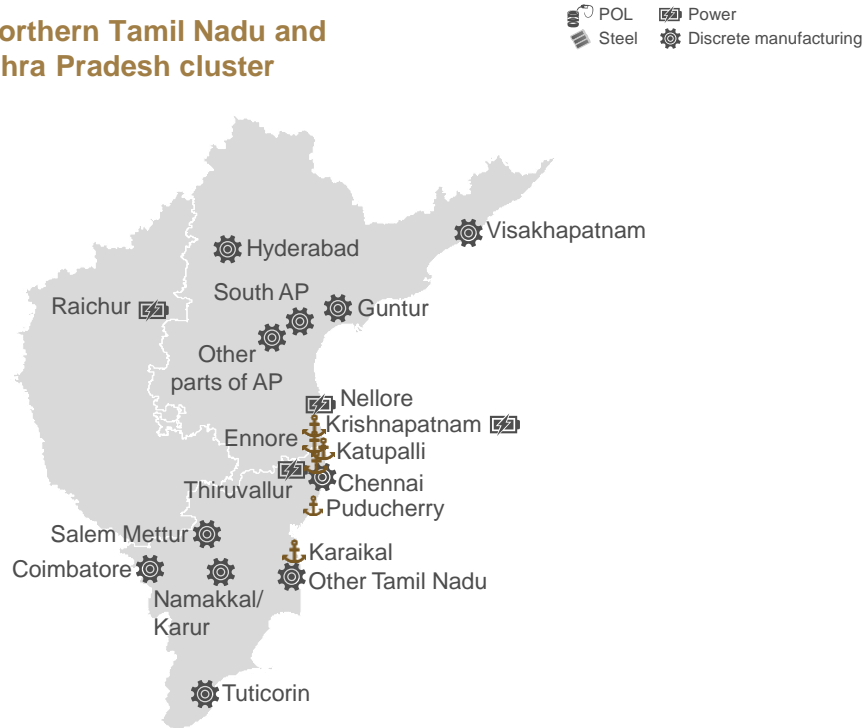
## 2.4.4 Northern Tamil Nadu and southern Andhra Pradesh

This cluster has multiple major and non-major ports – major ports being Ennore and Chennai and non-major ports being Karaikal, Katupalli, Krishnapatnam (Exhibit 2.136). Chennai is a city port handling

containers, while Ennore and Krishnapatnam ports predominantly handle bulk cargo. Primary hinterland for this cluster is Tamil Nadu, Karnataka and southern Andhra Pradesh as well parts of Telangana.

### EXHIBIT 2.26

#### Ports in the northern Tamil Nadu and southern Andhra Pradesh cluster



Key growth themes for this cluster include:

- Import of crude oil, products, LNG and LPG for meeting the POL requirement of Tamil Nadu, Kerala and Andhra Pradesh
- Receiving cluster for coastally shipped thermal coal for power plants cluster around the ports
- Gateway for the container volumes generated in Tamil Nadu (second highest container volumes by state), southern Andhra Pradesh and Karnataka

## Major commodities and their projections

### 2.4.4.1 POL

The 3.3 MPTA of liquid bulk handled at Ennore port comprise POL (1.90 MTPA), LPG (1.30 MTPA) and chemicals (0.10 MTPA).

It is understood that IOC is planning to shift the POL products arriving at Chennai Port for marketing purposes to Ennore, for which they have been given a captive berth<sup>4</sup>. This volume will be about 2.0 MTPA. They also propose to handle about 7 MTPA of lubricants and to bring in excess POL from Paradip for marketing purposes and move it through existing pipelines to Bangalore and Tiruchi/Madurai/Sankari. The volumes are not yet final, but they have provisionally informed the port that their volume could be 3.5 MTPA.

BPCL has acquired land near Ennore Port for shifting their existing marketing terminals from Chennai. They have already started getting POL products at Ennore in small quantities through MLT 1. Once their new terminal is fully commissioned, the volume could be 1 MT.

Hence by 2020, the total POL traffic could reach 7.8 MT, without taking into account the incremental imports by Shell/Reliance/Essar for marketing purposes and also the normal growth. For example, LPG traffic grew from 0.6 MT in 2012–13 to 1 MT in 2013–14 and to 1.3 MT in 2014–15.

Chennai Port currently handles 12.7 MTPA of POL, the majority of which is crude import for the CPCL Manali refinery. The port also exports roughly 1 MTPA of products from the same refinery and receives roughly 1.5 MTPA of products to cater to the specific demands of the Chennai cluster.

Going into 2020, an increase in crude import is expected due to expansions planned in CPCL. The port is pegged to import 9.5 MTPA of crude from outside India and 1.3 MTPA through coastal shipping. The port

will also have the potential to export 1 MTPA of products and import 1.6 MTPA of products through the coastal route.

The overall traffic at the port is pegged to increase to 14 MTPA by 2020. By 2025 the natural growth of this traffic will take the volumes to 18-19 MTPA and by 2035 the range of traffic will be 30-35 MTPA.

### 2.4.4.2 LNG

Gas demand in the region is around 5 MTPA, primarily from fertiliser plants and refineries in the region. To cater to this demand, IOC has initiated action to construct and commission an LNG terminal at Ennore. The capacity of the terminal will be 5 MTPA. This terminal is likely to be commissioned by 2018.

### 2.4.4.3 Coal

Bulk ports in the cluster currently handle 50 MTPA of coal which includes imported coal as well as domestic coastal coal. Most of this is for thermal power plants in the cluster. A breakup of the present traffic and projection of 2020 figures is as follows:

- Ennore Port: 23.1-37.1 MTPA
- Krishnapatnam Port: 10.7-29.2 MTPA
- Karaikal Port: 13.2 - 25.2 MTPA

### 2.4.4.4 Containers

Total container volume in the cluster is around 1.7 mn TEUs, of which Chennai Port handles more than 95 per cent, with Krishnapatnam handling around 80,000 TEUs. The main hinterlands that the port serves for containers are Chennai and nearby SEZs (around 1 mn TEUs), Bangalore (around 150,000 TEUs), southern AP and Hyderabad (around 100,000 TEUs) and part of southern Tamil Nadu (around 200,000 TEUs). A large portion of the traffic (around 60 per cent) is transshipped from the port to other ports in

Southeast Asia, like Colombo and Singapore.

By 2020, container volume is expected to reach 2.32 mn TEUs and 3 mn TEUs by 2025. The cluster has sufficient capacity for container handling, with Krishnapatnam and Ennore also adding capacity. In the first phase, Adani Ennore Container Terminal Private Ltd. (AECTPL) will construct a 400 m long berth with the capacity to handle 0.8 mn TEU. In the second phase, another 330 m long extension of the berth will be carried out with the capacity to handle another 0.6 mn TEU.

In case a new transshipment hub comes up on the southern tip of the country, most of the south Tamil Nadu containers will go directly there, causing a 0.7 mn TEUs drop in potential traffic by 2025.

#### **2.4.4.5 Automobiles**

Currently 2.15 lakh car units have been handled (~0.22 MT). According to a JICA report, by 2020 the likely exports from Chennai and Ennore will be around 1.5 mn car units. The report accordingly recommends additional berths at Ennore Port as Chennai Port may not be able to add any more Ro-Ro berths due to the lack of parking space and the timing restrictions on cars arriving into the port. A conservative look at the growth of the industry indicates that KPL will be required to handle at least 900,000 car units by 2025.

#### **2.4.4.6 Steel and iron ore**

The cluster handles 1.5 MTPA of steel, of which equal volumes are exports and imports. The imports cater to the vibrant auto industry in the vicinity of the port. The overall volume of steel handled is expected to grow to 2 MTPA by 2020, 3 MTPA by 2025 and 5 to 6 MTPA by 2035. The cluster also handles around 8.5 MTPA of iron ore imports and 1.5 MTPA of coastal exports. Most iron ore meets the requirement of JSW Vijayanagar, while 1.5 MTPA is coastally shipped to West Bengal.

#### **2.4.4.7 Limestone**

The cluster imports large amounts of limestone to cater to the cement industry in the Chennai area. It handles roughly 2.5 MTPA at present, and the volume is expected to grow to 3.5 MTPA by 2020 and 5 MTPA by 2025.

#### **2.4.4.8 Other coastal shipping potential**

The cluster is strategically positioned to serve the large demand hinterland of Chennai and adjoining areas through coastal shipping. Steel and cement can be major commodities for Chennai. In case a central AP port comes up in the near future, roughly 10 MTPA can be brought in the area to support construction and the diminishing reserves of limestone in the state.

Exhibit 2.137 summarises new opportunities possible via coastal shipping for Northern Tamil Nadu cluster.



## EXHIBIT 2.27

### Northern TN cluster: New opportunities possible via coastal shipping

MTPA (except containers)

Commodity	2020		2025	
	Loading	Unloading	Loading	Unloading
Steel	0.05	0.86	0.07	1.15
Cement	0.00	0.11	0.00	5.15
Fertiliser	0.04	0.34	0.04	0.40
Food grains	0.02	0.35	0.02	0.42

5 MTPA can be shipped to the cluster from proposed Central AP cement cluster (If Central AP port comes up)

#### 2.4.4.9 Projects to be undertaken at major port in the cluster



Project name	Agency	Concerned state	Investment required (INR cr)	Timeframe
Multi-user liquid terminal-II	Ennore Port	Tamil Nadu	320	24 months
SBM terminal at Chennai	Chennai Port	Tamil Nadu	600	24 months
Development of dry dock at timber pond/boat basin	Chennai Port	Tamil Nadu	500	18 months
LNG terminal at Ennore	Ennore Port	Tamil Nadu	3000	60 months

Source: Master plan

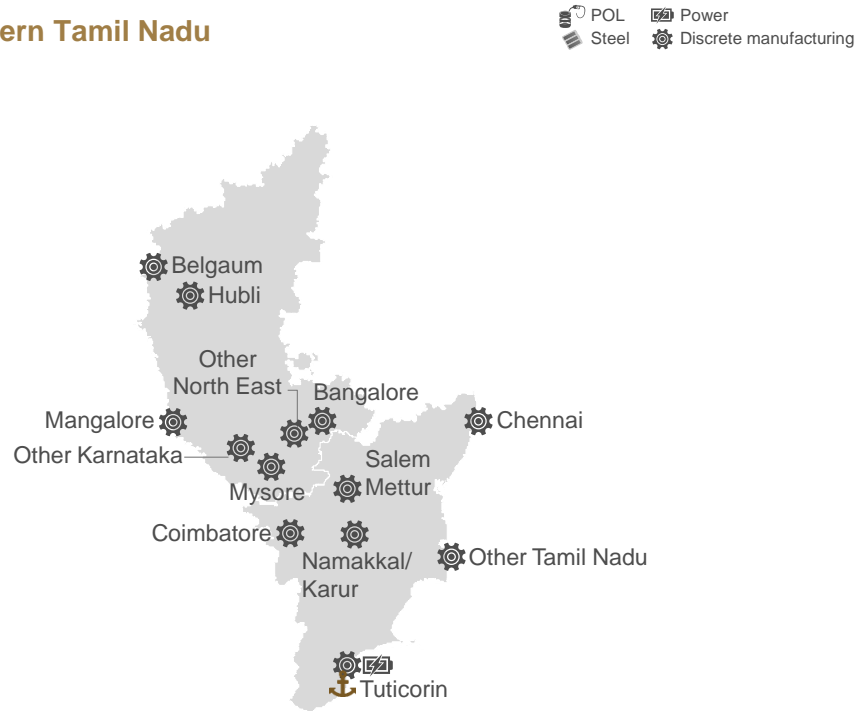
## 2.4.5 Southern Tamil Nadu

The southern Tamil Nadu cluster has Tuticorin port located in the southern part of Tamil Nadu (Exhibit 2.138). This is the second biggest port in the state after

Chennai, and mainly handles containers, catering to the industrial regions in central and southern Tamil Nadu and thermal coal for the power plants in the hinterland.

### EXHIBIT 2.28

#### Ports in southern Tamil Nadu



Around 50 per cent of the current 33 MTPA of cargo consists of thermal coal and containers. The cargo is expected to increase to 50 MTPA by 2020 and 70 MTPA by 2025.

Key growth themes in this cluster are:

- Receiving cluster for coastal thermal coal to serve the power complex in the hinterland
- Continue to cater to the container traffic of southern Tamil Nadu and Karnataka

## Major commodities and their projections

### 2.4.5.1 Thermal coal

Tuticorin port imports 13.8 MTPA of thermal coal, primarily for the consumption of power plants. Of this, 4.4 MTPA is coastally shipped while 9.3 MTPA is imported coal catering to Tuticorin thermal power plant, Coastal Energen, Ind Bharath power plant, DCW, Sterlite, NTPL and other non-power customers. With the power sector growth resulting in higher PLFs and the new capacity expected to come up around Tuticorin, along with import substitution on the back of rising domestic coal production, thermal coal imports can reach 27 MTPA by 2020 and 38 MTPA by 2025.

### 2.4.5.2 Containers

The port primarily caters to the industrial districts of southern and central Tamil Nadu—Salem, Mettur, Namakkal, Karur, Coimbatore, Tuticorin and also some parts of Karnataka. The port now handles 0.56 mn TEUs of containers. Industrial activity is expected to increase at a healthy rate in Tamil Nadu and the container volumes is expected to touch 0.9 mn TEUs by 2020 and 1.18 mn TEUs by 2025. Tuticorin port is a feeder port and the containers are transshipped at international locations like Colombo and Singapore. If a transshipment port comes up at the southern tip of India, it can severely impact the container volumes at Tuticorin as the cargo would directly go to the transshipment port.

### 2.4.5.3 Projects to be undertaken at Tuticorin port



Project name	Agency	Concerned state	Investment required (INR cr)	Timeframe
Upgradation of the existing coal jetty (CJ1, CJ2)	Tuticorin port	Tamil Nadu	250	8 months
Upgradation of inner harbour	Tuticorin port	Tamil Nadu	2,200	36 months
Development of outer harbour	Tuticorin port	Tamil Nadu	4,600	48 months

Source: Master plan

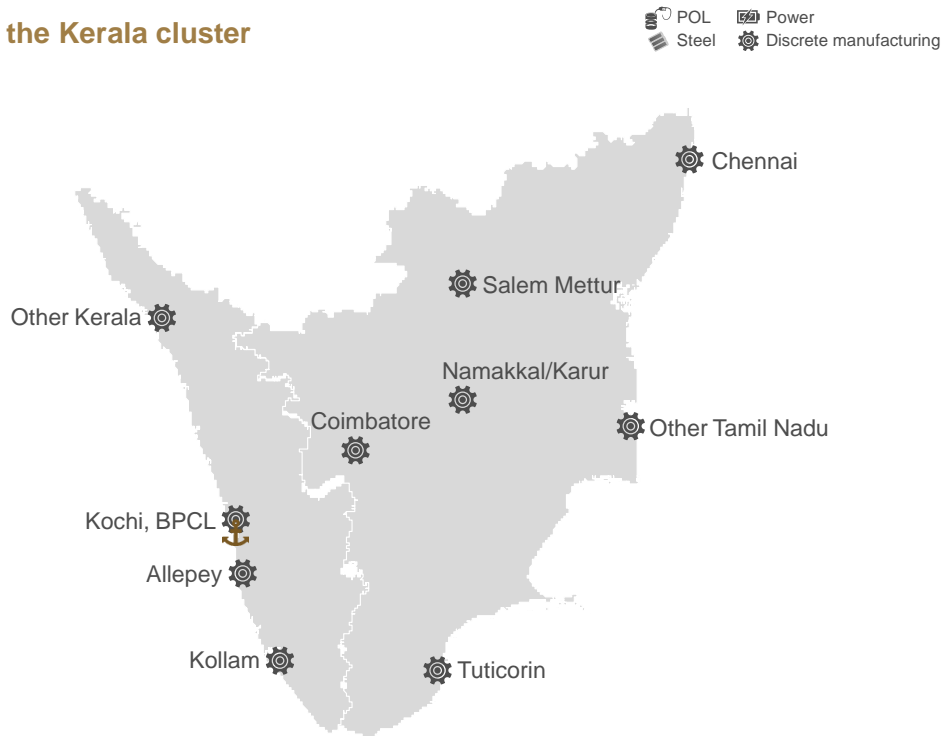
## 2.4.6 Kerala cluster

Cochin port is the only prominent port in Kerala (Exhibit 2.139). It currently handles 22 MTPA of cargo of which POL forms the major chunk at 14 MTPA while the balance is made up of other commodities including

containers (0.37 mn TEUs), fertilisers and coking coal. The total traffic handled at this port could go up to 48-51 MTPA by 2025 driven primarily by the expansion of the BPCL refinery.

### EXHIBIT 2.29

#### Ports in the Kerala cluster



Key growth themes at Kochi include:

- POL to meet the requirement of southern India
- Cater to container cargo of Kerala

## Major commodities and their projections

### 2.4.6.1 POL

POL crude and product constitute the biggest portion of traffic handled at the port. Kochi handles approximately 10 MTPA of crude for the BPCL refinery, of which approximately 8 MTPA is imported. POL products form the majority of the remaining share. Expansion of BPCL in the future will lead to a POL traffic of roughly 24 MTPA by 2020 and 32-34 MTPA by 2025.

### 2.4.6.2 Containers

The port currently handles 0.37 mn TEUs of containers serving the primary hinterland of Kerala, with Kochi, Alleppey and Kollam contributing a major chunk. This traffic is expected to grow to 0.7-0.8 mn TEUs by 2025, but could also reduce substantially by 2025 if a transshipment port is developed.

### 2.4.6.3 Cement

Kochi will be the destination port for cement coastally shipped from Andhra Pradesh and Karnataka. Current potential for this movement is approximately 2 MTPA and could grow to 9 MTPA by 2020 and 12 MTPA by 2025.

### 2.4.6.4 Food grains

Kochi port has a potential to handle approximately 2 MTPA of coastal shipped food grains by 2020. This traffic will mainly come from Andhra Pradesh and Odisha to serve the demand of Kerala.

### 2.4.6.5 Coastal shipping potential

For the hinterland of Kerala, Kochi can facilitate the movement of coastal-shipped cargo from other states. Cement and food grains could be major commodities unloaded at the port.

Exhibit 2.140 summarises new opportunities possible via coastal shipping for Kerala cluster.

## EXHIBIT 2.30

### Kerala cluster: New opportunities possible via coastal shipping

MTPA (except containers)

Commodity	2020		2025	
	Loading	Unloading	Loading	Unloading
Steel	0.06	0.48	0.08	0.64
Cement	0.01	2.85	0.01	6.32
Fertiliser	0.24	0.04	0.30	0.05
Food grains	–	1.64	–	2.00

2.5 MTPA can be shipped from Central AP cement cluster (if Central AP port comes up)

#### 2.4.6.6 Projects to be undertaken at Cochin port



Project name	Agency	Concerned state	Investment required (INR cr)	Timeframe
Setting up the food grain import terminal	Cochin port	Kerala	120	18 months
Setting up the fertiliser bagging facility	Cochin port	Kerala	155	18 months

Source: Master plan

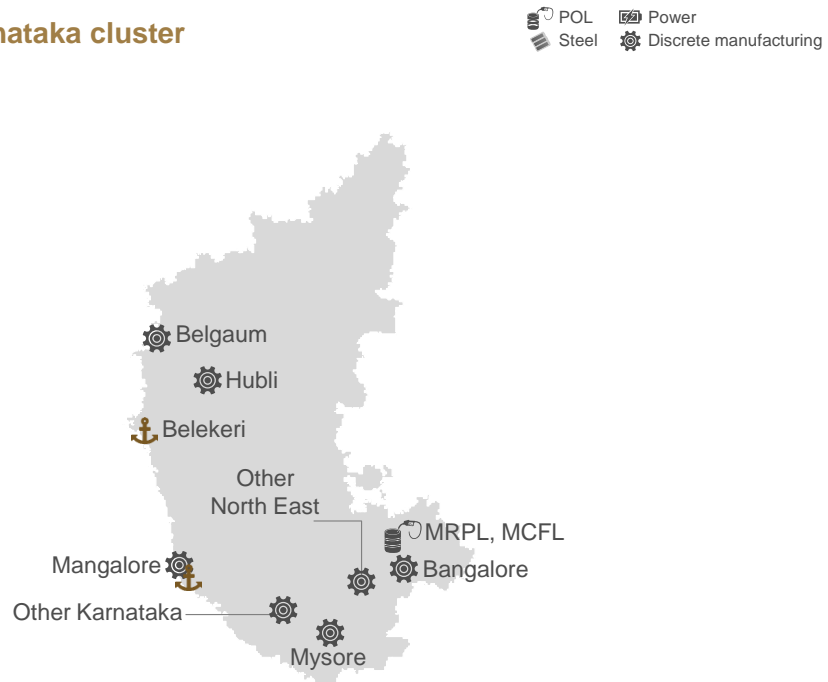
## 2.4.7 Karnataka cluster

NMPT is the only major port (Exhibit 2.141) located in central Karnataka with 15 berths—eight for general cargo, five for POL and one each for coal and iron ore. Total traffic handled by the port in 2014–15 was

37 MTPA, with POL accounting for 65 per cent of total traffic. Cargo traffic is expected to increase to 48 MTPA by 2020 and 62 MTPA by 2025.

### EXHIBIT 2.31

#### Ports in the Karnataka cluster



Key growth themes for Mangalore port are:

- ONGC's captive cargo of crude oil imports and export of refined product exports
- Captive thermal coal cargo of Udupi power plant
- Low potential for containers due to connectivity issues
- Iron ore due to market conditions

## Major commodities and their projections

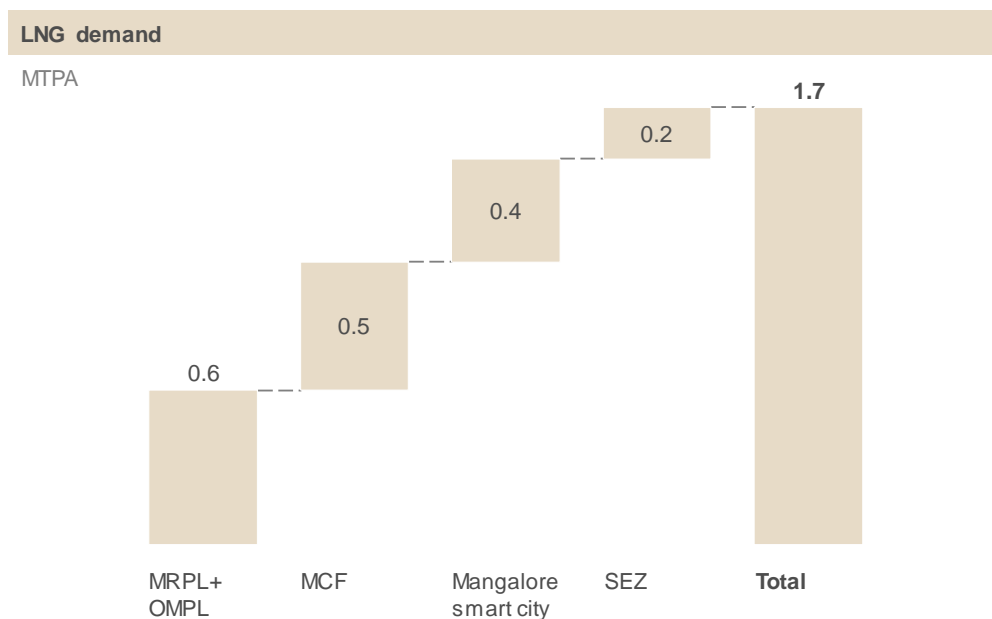
### 2.4.7.1 POL

NMPT currently handles 23 MTPA of POL, through ONGC, with 15 MTPA of crude imports and 8 MTPA of refined products exports. Among Indian ports, NMPT has the highest productivity in POL. Over the last few years, POL volumes has reduced by 1

MTPA due to the decrease in MRPL's refined product exports. Going forward, POL volume is expected to reach 26 MTPA by 2020 and 34 MTPA by 2025. NMPT also has the potential to capture the LNG demand in the hinterland, which can give an additional volume of ~ 2 MTPA (Exhibit 2.142).

### EXHIBIT 2.32

#### Captive LNG demand in NMPT hinterland



### 2.4.7.2 Coal

NMPT handles 8.2 MTPA of coal with the Udupi power plant as the primary customer on imported thermal coal. The shutdown of coal handling at the Chennai port has also provided some spillover traffic to NMPT. There is limited scope for additional traffic of coal volumes at NMPT, mainly because of connectivity issues to Bellary and Hospet (Shiradi Ghat). Going forward, coal volume is expected to reach 9 MTPA by 2020 owing to the Udupi power plant and 12.9 MTPA by 2025.

### 2.4.7.3 Other cargo

NMPT has 1.5 MTPA of KIOCL's captive cargo which includes 0.8 MTPA of iron ore fines imports and 0.75 MTPA of iron ore pellets exports. There is limited scope for expansion due to the mining ban and fall in the iron ore prices globally.

NMPT also handled 0.65 MTPA of fertilisers in 2015. There has been a decrease in volume by around 30 per cent since 2008 as it has moved to other ports like Krishnapatnam. However, it is possible to



increase the volume by reducing handling costs through mechanisation.

NMPT handled 65,000 TEUs of containers in 2015, mainly through coffee exports from the hinterland and cashew imports. Container volumes could be increased from Mysore, Bangalore, Hassan and Bellary, by improving port connectivity and by

mechanising facilities. Due to poor connectivity, most of the container traffic moved to Chennai port.

Exhibit 2.143 summarises new opportunities possible via coastal shipping for Karnataka cluster.

### EXHIBIT 2.33

#### Mangalore Port: New opportunities possible via coastal shipping

MTPA (except containers)

Commodity	2020		2025	
	Loading	Unloading	Loading	Unloading
Steel	0.11	0.07	0.15	0.10
Cement	0.03	–	0.04	2.5
Fertiliser	0.02	1.32	0.03	1.60
Food grains	–	4.85	–	5.90

2.5 MTPA can be shipped from Central AP cement cluster (if Central AP port comes up)

#### 2.4.7.4 Projects to be undertaken at Mangalore port



Project name	Agency	Concerned state	Investment required (INR cr)	Timeframe
Mechanised fertiliser handling facility	NMPT	Karnataka	155	18 months
Mechanised food grain handling facility	NMPT	Karnataka	120	18 months

Source: Master plan

## 2.4.8 Southern Maharashtra and Goa cluster

The cluster has one major port –Mormugao, and 2 non major ports – Jaigad and Vijaydurg (Exhibit 2.144). Mormugao currently handles roughly 14.7 MTPA of cargo catering primarily to the hinterlands of South Maharashtra, northern Karnataka and Goa. Jaigad port handles ~1 MTPA of thermal coal imports. One of the major bottlenecks hindering growth here is the lack of proper connectivity due to the Western Ghats. The port used to be the largest gateway of iron ore export from the country but with the mining ban and Brazil

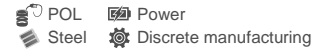
taking over the China market for the supply of ore, the volumes have decreased drastically.

Key growth themes for the cluster are:

- Coking coal cargo to serve steel plants in Bellary
- Receiving cluster for coastal thermal local to serve power plants in the hinterland

### EXHIBIT 2.34

#### Ports in the southern Maharashtra cluster



### Major commodities and their projections

#### 2.4.8.1 Coking coal

Mormugao currently imports 6.6 MTPA of coking coal from Australia and South Africa. This coking coal is primarily used by steel plants in the vicinity of the port, with JSW Vijayanagar consuming nearly 5 MTPA and JSW Dolvi the remaining 1.6 MTPA. The

volume of coking coal handled at the port is expected to grow with the steel multiplier relative to the GDP, to around 9.2 MTPA by 2020, 12 to 14 MTPA by 2025 and 23 to 26 MTPA by 2035.

#### **2.4.8.2 Thermal coal**

The port currently imports 1.9 MTPA of coal primarily for non-thermal power plant purposes. Going forward, the demand is expected to grow to around 2.6 MTPA by 2020 and 3.5 MTPA by 2025.

#### **2.4.8.3 Steel**

Being close to the Bellary belt, Mormugao is an ideal location to export finished steel products from these plants to coastal locations as well as to places outside India. The port exports 1 MTPA hot rolled (HR) steel coils from nearby plants. With natural steel multiplier growth, the volume of exports is expected to grow up to 1.3 MTPA by 2020 and to 2 MTPA by 2025.

#### **2.4.8.4 Iron ore**

During the peak of iron ore exports from the country, prior to the ban on mining in Goa, Mormugao port used to export around 41 MTPA of iron ore (2010–11). In the last few years, the volume has gone down significantly to only around 0.8 MTPA.

Even after the ban was lifted, high cost of iron ore from India makes it uncompetitive against Brazilian ore leading to sluggish growth.

The volume of the ore exported from the port could be muted at below 1 MTPA for the next decade (Exhibit 2.145). A traffic of 60 to 70 MTPA by 2025 would be possible only if prices pick up, and India becomes a major exporter.

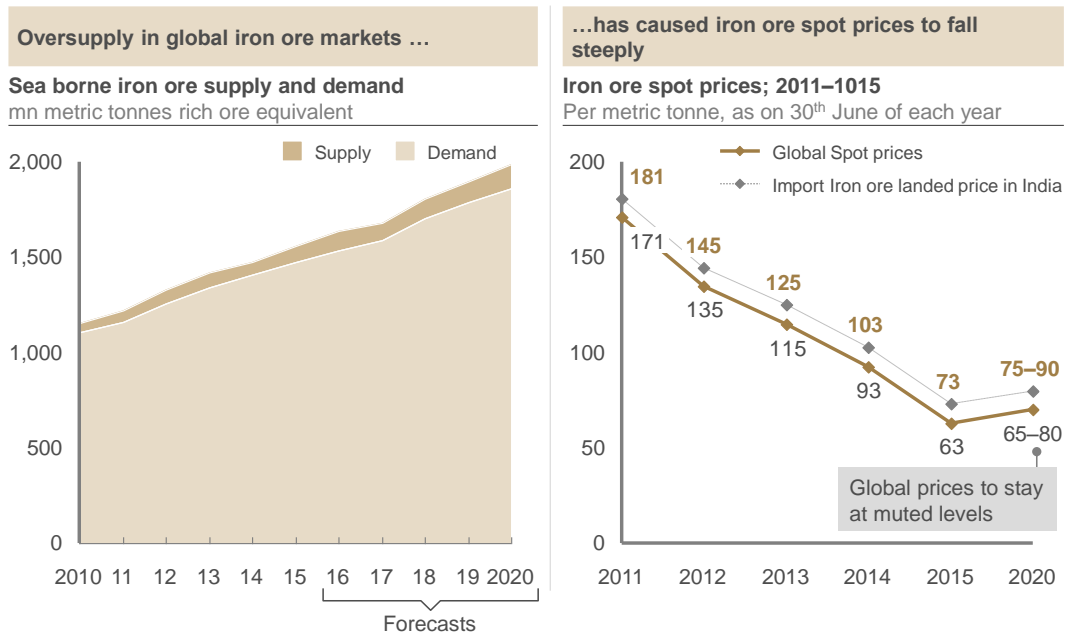
#### **2.4.8.5 Other coastal shipping potential**

Coal could be a major commodity which can be coastally shipped to the Mormugao port. The plants of NTPC Kudgi and KPCL Bellary can shift to coastal shipping and receive their coal from the port. It could also handle around 1 MTPA of coastal steel.

Exhibit 2.146 summarises new opportunities possible via coastal shipping for Southern Maharashtra cluster.

## EXHIBIT 2.35

**Due to over-supply, global iron ore prices have dropped steeply and will remain between USD 65–80 for next 3–5 years**



SOURCE: World steel association; expert interviews; Bloomberg

## EXHIBIT 2.36

**Southern Maharashtra: New opportunities possible via coastal shipping**

MTPA (except containers)

Commodity	2020		2025	
	Loading	Unloading	Loading	Unloading
Thermal Coal	13.37	–	13.37	–
Steel	0.49	0.67	0.65	0.89
Cement	0.39	0.01	0.52	0.02
Fertiliser	0.03	0.06	0.04	0.07
Food grains	–	0.14	–	0.18

Additional Coastal shipping Potential if Belekeri is not built and NTPC Kudgi in Bijapur and KPCL Bellary adopt coastal shipping

### 2.4.8.6 Projects to be undertaken at Mormugao port



Project name	Agency	Concerned state	Investment required (INR cr)	Timeframe
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Road circulation plan for ease of movement of break bulk cargo	Mormugao port	Goa	50	12 months
Redevelopment of berths 8 and 9 into multipurpose terminals	Mormugao port	Goa	1,085	24 months
Finger jetty at Vaso Bay for liquid cargo, passenger and fishing	Mormugao port	Goa	80	18 months

Source: Master plan

## 2.4.9 Northern Maharashtra

Northern Maharashtra has three ports—Mumbai and JNPT are the major ones while Dighi is a non-major port (Exhibit 2.147). JNPT handles containers, liquid cargo including POL, vegetable oil and chemicals and cement in dry and break bulk cargo. Out of these, containers constitute around 90 per cent of the cargo. JNPT currently has Maharashtra as its primary hinterland for containers with NCR, Punjab and Rajasthan along with UP and Madhya Pradesh as the secondary hinterland. Mumbai is the fourth largest major port in the country by volume

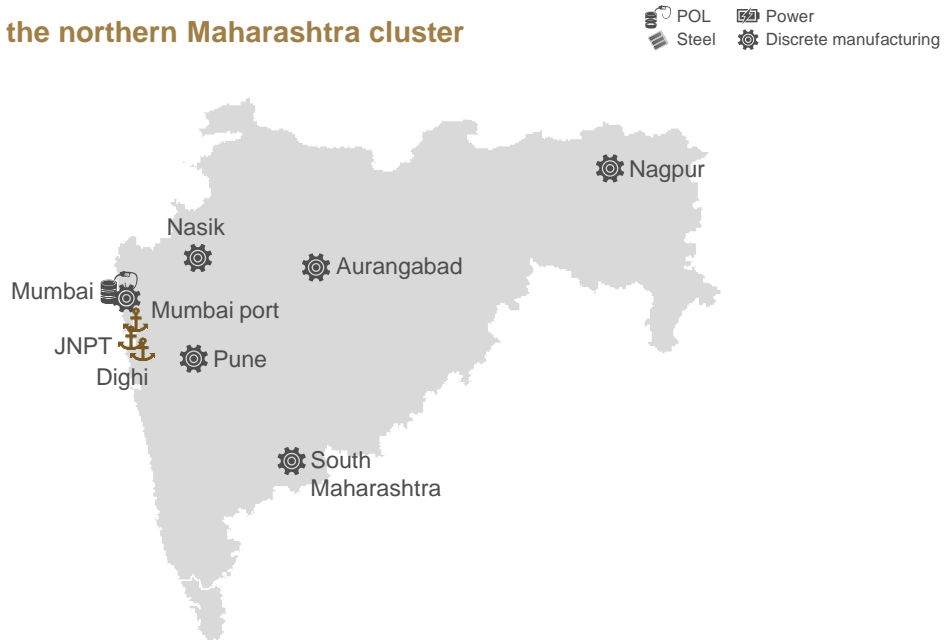
handling more than 60 MTPA of cargo, POL constituting the bulk of it.

Key themes for this cluster includes:

- Import of crude oil and products for refineries in Mumbai region
- Gateway port for largest hinterland of containers volumes—Maharashtra, southern Gujarat and the North–West hinterland

### EXHIBIT 2.37

#### Ports in the northern Maharashtra cluster



### Major commodities and their projections

#### 2.4.9.1 POL

The cluster currently imports 13.5 MTPA of crude for BPCL and HPCL refineries in Mumbai. In the base case, crude imports at the Mumbai port will remain stagnant as there are no plans for further expansions in these two units. The port also exports roughly 0.7 MTPA of POL crude. Coastally exports of crude also play a big role in the traffic, the cluster imports 9.2 MTPA of crude coastally and exports 2.8 MTPA of crude.

The port also imports 1.8 MTPA and exports 3.1 MTPA of products. Through the coastal route, Mumbai imports 4.3 MTPA of products while exporting a minuscule 0.5 MTPA. EXIM movement of cargo is expected to stay the same too at 4.9 MTPA. There will be an uptick in the port in coastal imports to roughly 6.5 MTPA to cater to the growing demands of the clusters around the Mumbai metropolitan region.

The overall traffic of POL in the cluster is expected to reach 38 MTPA by 2020 and 51-53 MTPA by 2025.

#### **2.4.9.2 Thermal coal**

Mumbai port currently imports 4.8 MTPA of thermal coal for the Trombay plant. By 2020, if coastal shipping of coal picks up there is a possibility to serve the Nasik 1 power plant (Indiabulls Power, 270 MW) which currently gets coal from Lakhanpur, mines in MCL, causing an increase of around 1.2 MTPA.

Hence, by 2020, the overall traffic at the port is expected to increase to 6 MTPA. By 2025, the natural growth of this traffic will be up to 7 MTPA and by 2035 the range of traffic will be 10–12 MTPA.

#### **2.4.9.3 Cement**

Mumbai's real estate hub is catered to by the cluster that currently imports 1.4 MTPA of cement from surplus areas like Gujarat. Volumes are expected to grow to 2 MTPA by 2020, 2.5–3 MTPA by 2025 and 4–5 MTPA by 2035.

#### **2.4.9.4 Steel**

The cluster current handles 3.9 MTPA of steel primarily in imports for steel multiplier industries present in the Mumbai hinterland. The port also exports roughly 1 MTPA of steel from the JSW Dolvi plant. Volume of steel handled at the port is expected to grow with the steel multiplier relative to the GDP. The overall volume of steel handled at the port is expected to grow to 5.4 MTPA by 2020 and 7 to 8 MTPA by 2025.

#### **2.4.9.5 Iron ore**

The port currently caters to the demand of iron ore for JSW Dolvi plant, importing 1.35 MTPA. The natural growth of demand for steel is expected to increase this volume to 1.7 MTPA by 2020, 2.5 MTPA by 2025 and 4 to 5 MTPA by 2035.

#### **2.4.9.6 Containers**

The cluster's hinterland includes Maharashtra, NCR, Punjab, Uttar Pradesh, Uttarakhand, Rajasthan and Gujarat. Except for Maharashtra, which is almost solely served by JNPT, the hinterland is also served by the Gujarat ports, especially Mundra and Pipavav.

Container traffic from the North and north-western parts of India, including NCR, Uttar Pradesh, Haryana, Punjab and Rajasthan, has shifted to Mundra and Pipavav in recent years. This trend is expected to continue mainly because of the shorter distance by road and rail from this hinterland to Gujarat ports as compared to JNPT—average rail distance of NCR from Mundra and Pipavav is around 350 and 250 km less than JNPT.

Part of the reason for the shift is due to increasing congestion at JNPT. While the completion of the fourth container terminal and other expansions will ease this situation, the rail distance advantage of Gujarat ports will still make them more competitive for the North and north-western parts of India.

JNPT handled 4.2 mn TEUs in FY14 (Exhibit 2.148). This is the base traffic taken for JNPT. Traffic projections for the cluster have been done (Exhibit 2.149) considering:

- Historical growth in container traffic at JNPT and other ports
- Historical trends in level of containerisation in India
- Forecast for manufacturing GDP of different districts including increase in demand and manufacturing from initiatives such as the "Make in India" campaign as well as the construction of the Delhi-Mumbai Industrial Corridor (DMIC), Visakhapatnam-Chennai Industrial Corridor (VCIC), Chennai-Bangalore Industrial Corridor (CBIC) and Mumbai-Bangalore Economic Corridor (MBEC)
- Proposed dedicated freight corridor from Dadri to JNPT

## EXHIBIT 2.38

### Hinterland to port mapping of EXIM container movement

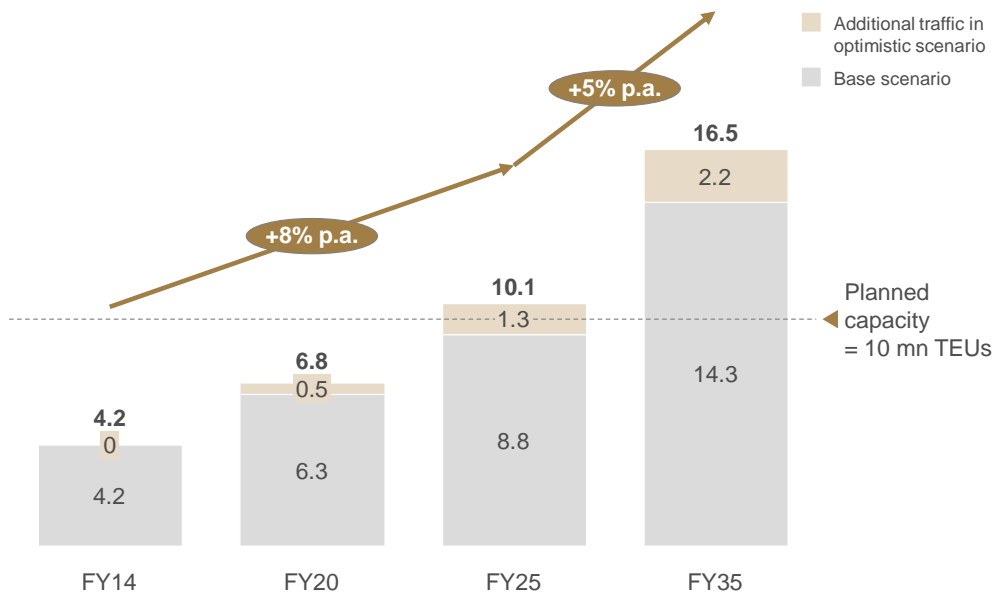
■ Primary hinterland of port

EXIM container volumes '000 TEUs, FY14	JNPT	Mundra	Chennai	Pipavav	Tuticorin	Haldia	Vallarpadam	Visakhapatnam	Mangalore	Hinterland total
NCR+Punjab	936	1,264	0	329	0	0	0	0	0	2,540
Maharashtra	2,121	54	0	0	0	0	0	0	0	2,177
Tamil Nadu	0	0	1,240	0	484	0	0	0	0	1,724
Gujarat	552	262	0	169	0	0	0	0	0	984
Uttar Pradesh	228	274	0	107	0	0	0	0	0	613
West Bengal	0	0	0	0	0	458	0	0	0	458
Rajasthan	43	448	0	60	0	0	0	0	0	560
Karnataka	94	0	163	0	66	0	0	0	50	406
Kerala	0	0	0	0	0	0	351	0	0	351
Andhra Pradesh	75	0	65	0	0	0	0	110	0	250
Madhya Pradesh	43	70	0	14	0	0	0	29	0	156
Bihar/Jharkhand	0	0	0	0	0	85	0	8	0	93
Uttaranchal	95	0	0	0	0	0	0	0	0	95
Odisha	0	0	0	0	0	12	0	69	0	81
Chhattisgarh	15	18	0	14	0	0	0	15	0	64
North East	0	0	0	0	0	7	0	0	0	7
<b>Port total</b>	<b>4,202</b>	<b>2,390</b>	<b>1,468</b>	<b>693</b>	<b>551</b>	<b>562</b>	<b>351</b>	<b>263</b>	<b>50</b>	<b>10,711</b>

SOURCE: APMT; Expert interviews

## EXHIBIT 2.39

### Traffic projections for JNPT mn TEUs



SOURCE: Interviews with stakeholders, APMT



### 2.4.9.7 Other coastal shipping potential

Mumbai is strategically positioned to serve the large demand of its hinterland and adjoining areas through coastal shipping. In this case, steel and cement could be major commodities.

Exhibit 2.150 summarises new opportunities possible via coastal shipping for Northern Maharashtra cluster.

#### EXHIBIT 2.40

### Northern Maharashtra: New opportunities possible via coastal shipping

MTPA (except containers)

Commodity	2020		2025	
	Loading	Unloading	Loading	Unloading
Steel	0.45	1.03	0.60	1.38
Cement	–	–	–	–
Fertiliser	0.28	1.73	0.34	2.11
Food grains	0.01	0.01	0.01	0.01

### 2.4.9.8 Projects to be undertaken at JNPT and Mumbai port



Project name	Agency	Concerned state	Investment required (INR cr)	Timeframe
Restructuring of JNPT Yard for optimal yard utilisation	JNPT	Maharashtra	200	18 months
Integrated common rail yard	JNPT	Maharashtra	200	24 months
Flyover at Y Junction for decongestion of traffic flow	JNPT	Maharashtra	200	15 months
Flyover for GTI entry/exit over the rail tracks	JNPT	Maharashtra	70	15 months
JNPT North anchorage	JNPT	Maharashtra	50	6 months
Terminals in Nhava Creek	JNPT	Maharashtra	600	18 months
JNPT multipurpose cargo terminal in Uran Mudflats	JNPT	Maharashtra	1,000	2 years
Utilisation of coastal berth of liquid cargo	JNPT	Maharashtra	20	6 months
Redevelopment of Indira dock	Mumbai Port	Maharashtra	150	24 months
Dry docking facility	Mumbai Port	Maharashtra	50	6 months
Handling of steel cargo at OCT	Mumbai Port	Maharashtra	100	18 months

Source: Master plan

## 2.4.10 Southern Gujarat cluster

The southern Gujarat cluster to the North of Maharashtra consist of three prominent ports—Dahej, Hazira and Magdalla (Exhibit 2.151).

Key growth theme for the cluster is dry bulk cargo handling cluster

Major commodities and their projections

### 2.4.10.1 POL

The demand for gas is expected to go up in Gujarat, which will be supported by the

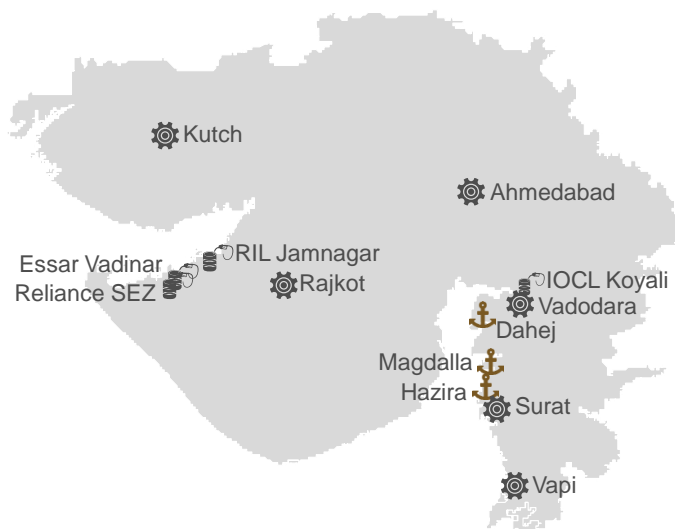
expansion of the LNG terminal in Dahej from the current capacity of 10 MTPA to 17.5 MTPA, and at Hazira it could expand by 2.5 MTPA. Hence, an additional 10 MTPA LNG importing facilities will be required at these two ports.

### 2.4.10.2 Coal

The cluster handled around 21 MTPA of thermal coal in 2014–15 catering to non-power customers in the hinterland.

## EXHIBIT 2.41

### Ports in the southern Gujarat cluster



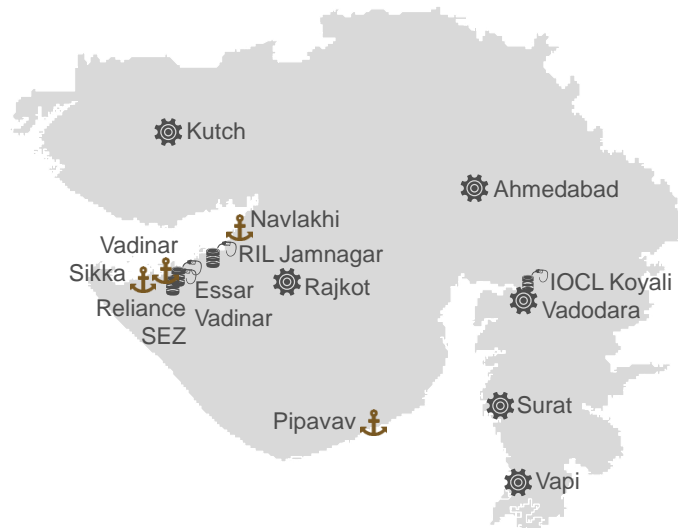
### 2.4.11 Saurashtra cluster

This cluster lies in the lower regions of Gujarat, and has prominent ports, such as Sikka and Vadinar, under the Kandla Port

Trust, which handle POL, and Pipavav that handles containers (Exhibit 2.152).

#### EXHIBIT 2.42

##### Ports in the Saurashtra cluster



Key growth themes for Saurashtra cluster include:

- Biggest crude importing cluster feeding oil refineries in Gujarat and the northern hinterland
- Container port for South Gujarat and northern India

Major commodities and their projections

#### 2.4.11.1 POL

Vadinar and Sikka together handle 180 MTPA of POL. Sikka is a captive port feeding the refineries at Reliance SEZ and Jamnagar. It currently handles 125 MTPA of POL, importing around 75 MTPA of crude

and exporting around 50 MTPA of POL products. Vadinar caters to the Essar refinery as well as the Panipat, Koyali, Mathura and Bina refineries. With planned expansion of these refineries, additional crude handling capacity of around 15 MTPA will be required primarily at Vadinar port. LPG imports could go up to 2 MTPA from the current 0.3 MTPA, requiring new LPG import facilities.

#### 2.4.11.2 Containers

Pipavav port operated by APM Terminals is the container-handling port in the Saurashtra region. Its primary hinterland includes southern Gujarat and northern India. Currently, it handles around 0.7 mn TEUs.

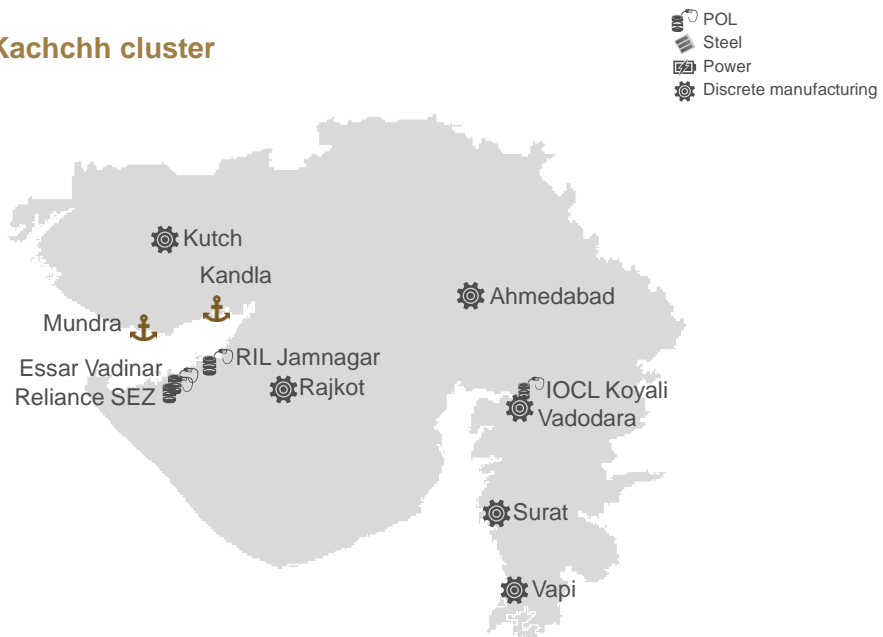
### 2.4.12 Kachchh cluster

This cluster has two prominent ports, Kandla and Mundra (Exhibit 2.153). The cluster's strategic location makes it the gateway cluster for North and north-west India. This cluster is closest to the northern states, which is a large hinterland for both containers and POL. Kandla is a major port handling POL and dry bulk and other break bulk commodities. Most of the POL is

handled at Vadinar which is in the Saurashtra cluster but comes under the purview of Kandla port. Mundra port handles containers, dry bulk as well as liquid cargo, catering to Gujarat and the northern hinterland. It is currently the largest commercial port in the country handling more than 100 MTPA of cargo.

#### EXHIBIT 2.43

##### Ports in the Kachchh cluster



Key growth themes for Kandla are:

- Gateway port for container volumes of Gujarat and North India
- Import of crude oil to feed the refineries in Gujarat and North India
- Handle the break bulk cargo for the northern hinterland
- Imported coal for power plants clusters and for non-power use in Gujarat and North India

## Major commodities and their projections

### 2.4.12.1 POL

POL crude and product constitute the biggest portion of traffic handled in this cluster. Kandla handles roughly 2 MTPA of POL while Vadinar handles the majority of the traffic. Mundra port has been taking away the POL traffic from Kandla, handling around 20 MTPA of crude for HPCL and IOCL, through long-term agreements. This crude traffic is expected to go up as Bathinda refinery expands thereby requiring additional storage capacities at Mundra port. Similarly, additional product berthing and handling capacity of around 10 MTPA will be required at Mundra port because deregulation of MS/HSD prices will make private refineries move their product to the domestic market thereby serving the North-Indian deficit. LPG imports at Mundra and Kandla are also expected to increase by 4-5 MTPA in the next 10 years.

### 2.4.12.2 Thermal coal

Currently, Kandla port imports 9.7 MTPA of thermal coal primarily for the consumption of non-power plants. This is expected to grow at a healthy rate of 10 to 15 per cent given the port already has developed a mega coal terminal at Tuna Tekra and further plans of expansion through a mega bulk terminal outside the creek. Mundra port currently handles around 40 MTPA of coal, a majority of which is thermal coal at 38 MTPA. Imported thermal coal is used to feed thermal power plants in the hinterland, e.g., Adani Power and Tata Power.

Volumes handled by the cluster are expected to be approximately 55 MTPA by 2020, 65 MTPA by 2025 and 80-90 MTPA by 2035.

### 2.4.12.3 Fertilisers

The cluster primarily imports fertilisers to serve the Gujarat, Punjab, Haryana and UP hinterlands in the country. The port imported 4.5 MTPA of fertilisers in FY 15 out of which 0.66 MTPA was rock phosphate (used as a raw material for fertiliser plants), 2.71 is urea (finished fertiliser which is primarily government controlled) and 1.14 MTPA is DAP (finished fertilisers). Going into the future, given the proposal of mechanisation of berths for the import of urea and availability of neem coating facilities with the cluster, it could handle roughly 6.1 MTPA of fertilisers by 2020, around 8 MTPA by 2025 and 11.5–13 MTPA by 2035.

### 2.4.12.4 Food grains

The Kachchh cluster is well placed to serve the northern hinterlands to export key food grains in the country. Wheat and rice are primarily grown in the north and central states, e.g., Punjab, Haryana and Madhya Pradesh and are mainly exported through or sent to south India by rail. In the past few years, exports have steadily declined from around 4 MTPA in FY 2013 to 2.2 MTPA in FY 2015. Owing to the new mechanisation proposal, these volumes might steadily grow up to 3-4 MTPA in the period of 2020 and 2025, primarily from wheat exports, and to around 7 MTPA by 2035.

### 2.4.12.5 Other commodities

Commodities such as salt and sugar are produced in the nearby hinterlands of the port and are one of major drivers of port volumes in the country. Approximately 3 MTPA of salt is exported from Kandla which could grow to around 5 MTPA by 2025 and 8-9 MTPA by 2035. Even sugar volume is expected to grow from 1.5 MTPA to nearly 5 MTPA by 2035.

### 2.4.12.6 Coastal shipping potential

Kandla is strategically positioned to serve large areas in the country's hinterland through coastal shipping. Coal and food grains could be major commodities to and

from Kandla during the coastal shipping revolution.

Exhibit 2.154 summarises new opportunities possible via coastal shipping for Kandla.

### EXHIBIT 2.44

#### Kandla Port: New opportunities possible via coastal shipping

MTPA (except containers)

Commodity	2020		2025	
	Loading	Unloading	Loading	Unloading
Thermal Coal	8.16	–	14.43	–
Steel	–	0.44	–	0.59
Cement	0.08	–	0.11	–
Fertiliser	1.07	0.01	1.30	0.02
Food grains	8.82	–	10.73	–

Additional Coastal shipping Potential if GSECL Gandhinagar, Reliance Power Thane, HPGCL Hisar adopt coastal shipping. Kandla would have to compete with Alewadi, Navlakhi and Ahmedabad Terminal

### 2.4.12.7 Coal

Coastal shipping of coal can be done from MCL to GSECL Gandhinagar, and HPGCL Hisar. Paradip and Dharma could be the origin ports for this cargo and Kandla could be the receiving port.

### 2.4.12.8 Food grains

Wheat and rice produced in the northern states can be coastally shipped to the states of Kerala, Karnataka and Tamil Nadu. Kandla is best positioned to cater to these needs as it is closest to the hinterlands from where these products originate. The port could grow from the current 6-7 MTPA to 10-11 MTPA by 2025.

#### 2.4.12.9 Projects to be undertaken at Kandla port



Project name	Agency	Concerned state	Investment required (INR cr)	Timeframe
Mechanisation of fertiliser handling facility	Kandla port	Gujarat	200	18 months
Mechanisation of food grains handling facility	Kandla port	Gujarat	155	18 months
Mechanisation of barge unloading facility	Kandla port	Gujarat	100	12 months
Development of Tuna Tekra container terminal	Kandla port	Gujarat	2,000	36 months
Development of Tuna Tekra additional bulk terminal	Kandla port	Gujarat	1,200	24 months

Source: Master plan

## 2.5 New port development

Development of new ports could add additional capacity of 450 - 500 MTPA. Six locations have been identified as potential new port locations (Exhibit 2.155; Exhibit 2.156) based on

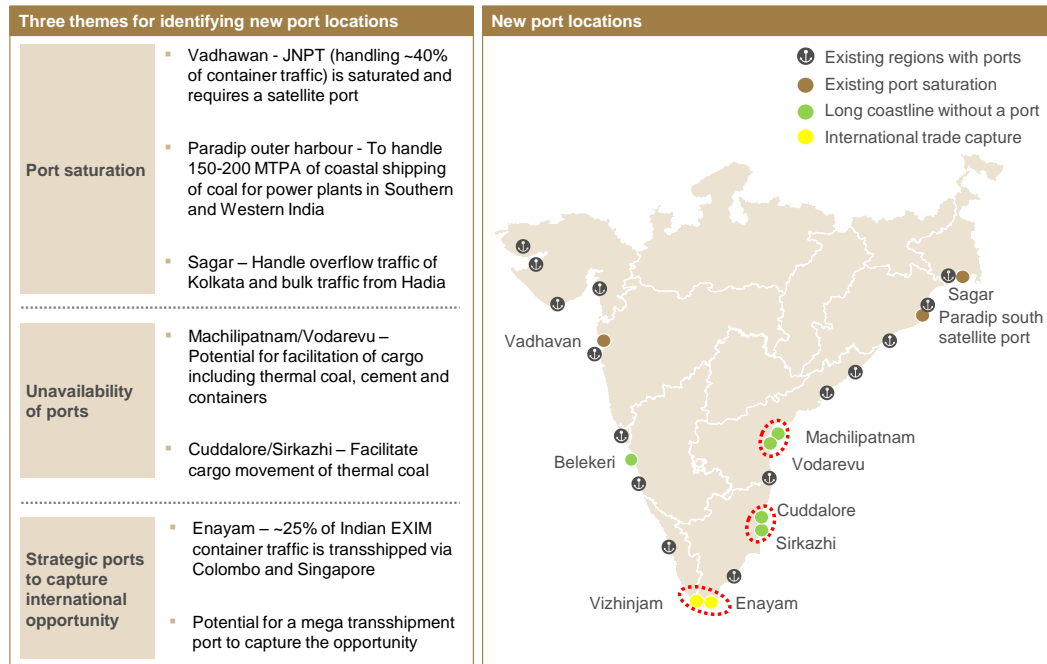
- Existing port saturation
- Non-availability of a port on the coastline stretch

### ■ Strategic location

Vadhavan, Paradip south satellite port and Sagar have been identified in places where existing ports have saturated. Similarly, ports in central AP and central Tamil Nadu have been identified on coastal stretches where ports are not available. Enayam port is strategically located as it falls on the East-West trade route.

### EXHIBIT 2.45

**6-8 potential new ports based on three themes have been identified that could add upto 400 MTPA**





## EXHIBIT 2.46

### New port identification framework

		Existing location	Green field location
Anchor commodity	Bulk	<ol style="list-style-type: none"> <li><b>Sagar:</b> Debottleneck Haldia and Kolkata</li> <li><b>Paradip south satellite port:</b> For coastal movement of thermal coal</li> </ol>	<ol style="list-style-type: none"> <li><b>Machilipatnam/Vodarevu:</b> New AP capital linkage; proximity to key reserves</li> <li><b>Cuddalore/Sirkazhi:</b> Central Tamil Nadu linkage, proximity to power cluster</li> </ol>
	Discrete	<ol style="list-style-type: none"> <li><b>Vadhavan:</b> Debottleneck JNPT and Mumbai ports</li> </ol>	<ol style="list-style-type: none"> <li><b>Enayam:</b> Transshipment hub to arrest the flow of Indian cargo to Singapore, Colombo, etc.</li> </ol>

#### 2.5.1 Vadhavan

The port at Vadhavan could act as a satellite port for JNPT, which currently has Maharashtra as its primary hinterland. It shares the other hinterlands—NCR, Punjab, Rajasthan and UP—with the Gujarat ports, Mundra and Pipavav. While Vadhavan is mainly expected to cater to container traffic, it may also have the potential to handle coal for the power plants in the region.

Vadhavan is on the west coast of India near Dahanu in Maharashtra's Thane district. Bathymetric studies of the region show that the 20 m depth line is about 6,000 m from the shoreline in this location. Vadhavan provides the least R&R issues with ease of construction and expansion. Additionally, issues of impact on the environment and maintenance overhead are the least in this region.

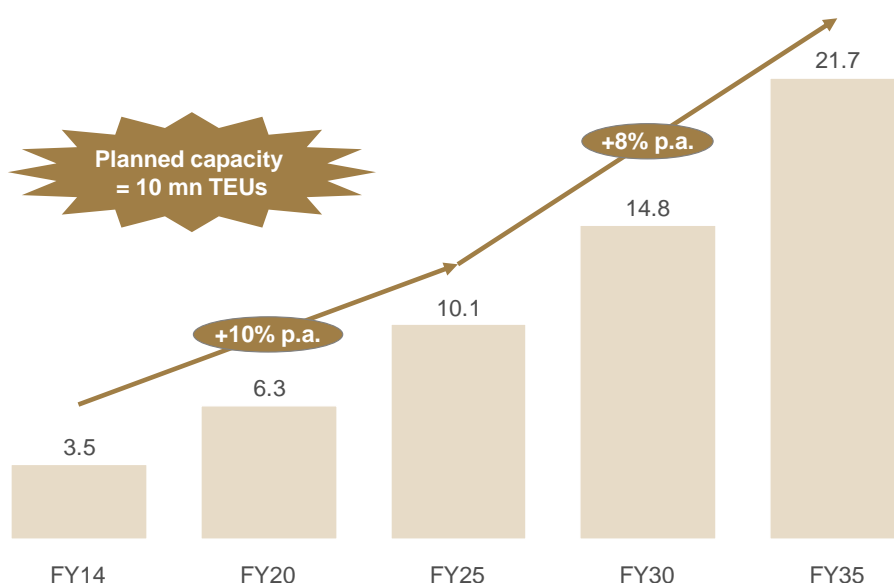
Vadhavan is expected to be a container port primarily. It is assumed to cater to spill-over traffic from JNPT port once its expanded

capacity of 10 mn TEUs is fully utilised (Exhibit 2.157). However, since it is closer to south Gujarat and parts of Madhya Pradesh, e.g., Vapi, Surat, Ahmedabad, Indore, as compared to JNPT, it is assumed that Vadhavan could attract a part of the total traffic from these hinterlands even before JNPT reaches full capacity utilisation. Traffic from areas that are closer to Vadhavan and JNPT is around 30 per cent of the total hinterland considered for JNPT. However, considering the stickiness of container traffic, only 15 - 20 per cent is actually allocated to Vadhavan. 2023 will be the first year of operation for Vadhavan with potential traffic of 0.83 mn TEUs. Traffic is expected to grow over the years and reach 2.7 mn TEUs in 2028, 8.6 mn TEUs in 2033 and 15.1 mn TEUs in 2038. In addition to containers, this port is also expected to handle 2.3 MTPA of coal from 2026 till 2030 and 11.5 MTPA of coal thereafter. Traffic estimates are mentioned in Exhibit 2.158.

## EXHIBIT 2.47

### Traffic projections for JNPT

mn TEUs



SOURCE: Interviews with stakeholders, APMT

A 1,390 m long container and multipurpose berth could be developed in Phase I in 2023. This will add handling capacity of 0.8 mn TEUs of containers and 4 mn tonne of break-bulk. In Phase II, from 2024 to 2028, a 2,350 m container berth and 300 m bulk berth would be developed. This will take total capacity of the port to 4.4 mn TEUs of containers and 13 MTPA of bulk and break-bulk cargo. Between 2029 and 2033, a 350 m berth can be constructed. Cumulative capacity of the port after these three phases will be 6.8 mn TEUs of containers and 16 MTPA of bulk and break-bulk. Between 2034 and 2038, 1,400 m berth could be constructed taking the overall port capacity to 9.9 mn TEUs and 16 MTPA of bulk and break-bulk. Provision to handle liquid bulk cargo is also provided in the overall port master plan.

The cost for construction of Phase 1 of the port is estimated to be INR 9,297 cr, which includes breakwater cost of INR 2,826 cr, dredging and reclamation cost of INR 2,920 cr, equipment cost of INR 796 cr and project management and contingency cost of INR 1,212 cr.

The port would be developed entirely on reclaimed land, with no land acquisition for port development. Land will only be required for road and rail connectivity.

Apart from containers, this port could also serve the proposed coastal power complex around the region by handling the coastally shipped thermal coal from Odisha. A power complex of 5 GW has been proposed in Vadhavan to meet the power demand of the state by 2025.

## EXHIBIT 2.48

### Traffic projection for VadHAVAN

Cargo handled	Projected traffic		
	2025	2030	2035
MTPA			
1 Containers (Mn TEUs)	1.0	4.8	8.6
2 Break bulk	2.5	5	15

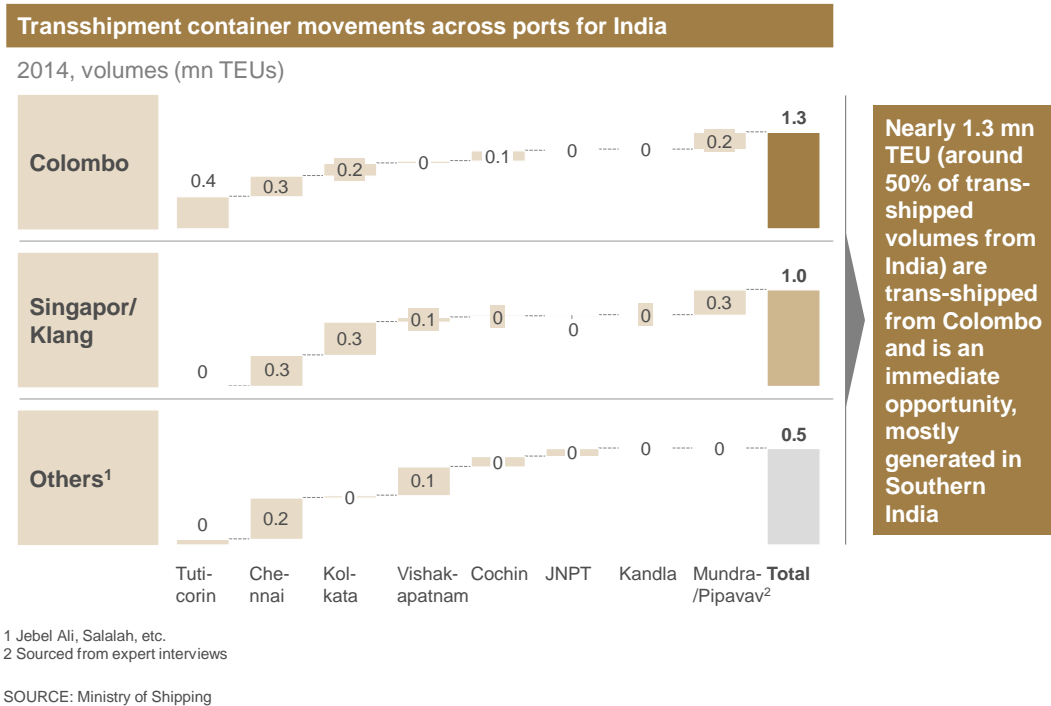
### 2.5.2 Enayam: Transshipment hub in the southern cluster

Container traffic in India has seen strong growth in the last decade. The traffic has grown by more than 10 per cent CAGR and is expected to continue growing at this rate as India's GDP growth rate accelerates to 7 to 8 per cent Y-o-Y. The demand for container traffic can further accelerate if the plans for debottlenecking the logistics infrastructure are implemented in due course under the Sagarmala initiative and the "Make in India" campaign drives greater exports and outsources manufacturing to India.

Currently, there are only a few ports in India which have sufficient draft and can match global cargo handling efficiencies. Given the progressive increase in mainline vessel sizes, liners typically prefer calling at ports that have at least 18 m draft. Approximately, 2.7 mn TEUs of containers destined for India in 2013–14 were transshipped at international ports like Colombo, Singapore, Klang, which fall on the East West trade route (Exhibit 2.159), adding to the cost and resulting in the Indian port industry losing out up to INR 1,500 cr of revenue each year on transshipment handling of cargo originating and destined for India. Transshipment also increases the logistics cost by INR 5,000–6,000 per TEU for the trade making it less competitive.

**EXHIBIT 2.49**

**Transshipment container movements across Indian ports**

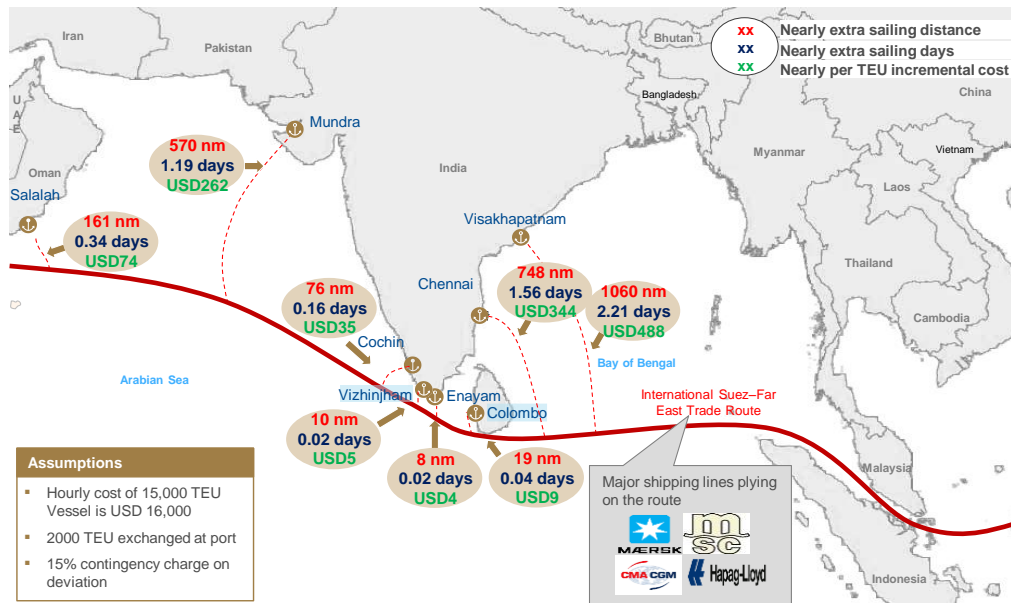


Apart from the lack of a large efficient port with sufficient deep draft, strategic location on main shipping routes is another important reason for transshipment at international ports as mainliners generally prefer minimum deviation from their route, e.g., Colombo is only an hour's deviation

from the busy Suez route. An efficient operating condition in the port with stable labour situation, high-productivity levels, simplified customs processes and linkage with cost-efficient feeder networks are also critical factors for attracting container cargo (Exhibit 2.160).

## EXHIBIT 2.50

### Deviation from main sailing route is the key determinant for Transshipment hub location



SOURCE: AECOM

Enayam is the most suitable transshipment location in India based on the above mentioned factors. It is located on the south-west coast of India at about 14 nautical mile (NM) deviation (around one or two hours) from the International East–West Trade route. This route accounts for 80 per cent share of India's current container transshipment cargo and most of East Asia's trade with Europe.

Enayam has a natural deep draft of around 20 m which makes it feasible for the largest of vessels to call at the port. Minimal need for maintenance dredging gives it a cost edge over other neighbouring ports, including Colombo. In Colombo, only one terminal (CICT) has a draft of 18 m with dredging.

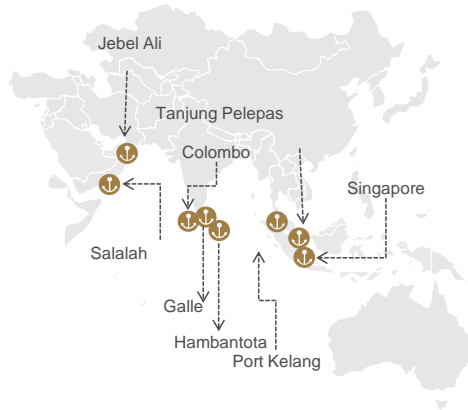
Scale of operations ensures better optimisation of parcel sizes and reduces cost significantly for the port as well as for the customer. All successful transshipment ports in Asia have planned capacities of more than 10 mn TEUs, e.g., Singapore (50 mn), Klang in Malaysia (30 mn), Colombo (13 mn), Hambantota in Sri Lanka (20 mn), Jebel Ali in the UAE (19 mn) and Port Abdullah in Saudi Arabia (25 mn) (Exhibit 2.161). Enayam's low population density and potential expansion capacity up to 10 mn TEUs, due to the availability of a 4-km-long shoreline, and relatively lower environmental and social impact, provides sufficient scale for the port. This capacity can be further expanded to 18 mn TEUs by converting the breakwater into a container-handling berth.

## EXHIBIT 2.51

### Most transshipment ports in the region have capacity between 5–10 mn TEUs annually

#### Major transshipment ports in the region

mn TEUs



1 By 2017; 2 By 2020; 3 2016; 4 Subject to change  
SOURCE: Expert interviews and ADB

#### ... with most ports with capacity of around 10 mn TEUs or expanding towards that

	Current capacity	Planned expansion
1 Port Kelang	11	13 <sup>1</sup>
2 Singapore	40	–
3 Tanjung Pelepas	11	–
4 Salalah	06	9 <sup>2</sup>
5 Jebel Ali	19	–
6 Galle	–	6 <sup>4</sup>
7 Colombo	5	nearly 13 <sup>3</sup>
8 Hambantota	5	nearly 20

The proposed site is at a distance of 11.7 km from NH47, which also connects to NH7. Developing a road link with NH47 has been identified as the fastest and most cost-efficient way of connecting the port with the hinterland. The stretch of NH47 and NH47 B, from Villukuri to Nagercoil to Kavalkinaru, is expected to be the principal evacuation route for the Enayam port. This is the main arterial route along which most of the hinterland industries are located. The NHAI is already undertaking a project to expand NH47 under NHDP Phase III, which includes 4-laning of NH47, from Villukuri to Kanyakumari, and 4-laning of NH47 B, from Nagercoil to Kavalkinaru. Land acquisition for the project is ongoing. This project can further cover the extension of the road to the Enayam port which would ensure that connectivity is established before operations begin.

In the southern cluster, Enayam was identified as optimal locations for transshipment port. Vizhinjam with a natural draft of 18.2 m is located at 18 to 20 NM from the major international shipping route. Total project cost in the first phase involves

an investment of INR 4,098 cr, of which INR 1,635 cr has been sanctioned as viability gap funding shared equally by the state and central governments at around INR 817 cr each). Enayam has several advantages as a location for transshipment hub:

- Possibility of capacity expansion up to 18 mn TEUs due to the availability of a 4 km long waterfront as compared to Vizhinjam's 2.5 km waterfront that restricts the capacity to around 4.3 mn TEUs
- Availability of vast tracts of vacant lands in Radhapuram Taluk, located at a distance of 60 km and Nanganeri SEZ, at a distance of 71 km
- Substantial transshipment cargo originating in the hinterland and the possibility of converting present transshipment cargo to gateway cargo, thus reducing transaction cost to the trade
- Possibility to attract coal traffic in view of the proximity to proposed thermal power stations

- Natural draft of 20 m with minimal maintenance dredging

Transshipment hubs in the world tend to be located in clusters. Singapore, Klang and Tanjung Pelepas in Malaysia are located in the Southeast Asian cluster while Jebel Ali, Salalah and King Abdullah ports are located in the Middle East cluster. Multiple ports at the southern tip of India can help in creating similar cluster of transshipment hubs. Given the shorter shoreline in Vizhinjam

(2.5 km vs. 4 km in Enayam), the port is currently planned for a maximum capacity of 4.3 mn TEU. This will likely not be sufficient to cater to the demand post 2025 as per traffic estimates (Exhibit 2.162); thus, additional capacity or a new port will have to be planned to meet the demand. Additionally, Sri Lanka is also aggressively creating new port capacities in Colombo of around 14 mn TEU and Hambantota of around 20 mn TEU. It is essential to create adequate transshipment port capacity in India itself.

## EXHIBIT 2.52

### Traffic projection for Enayam

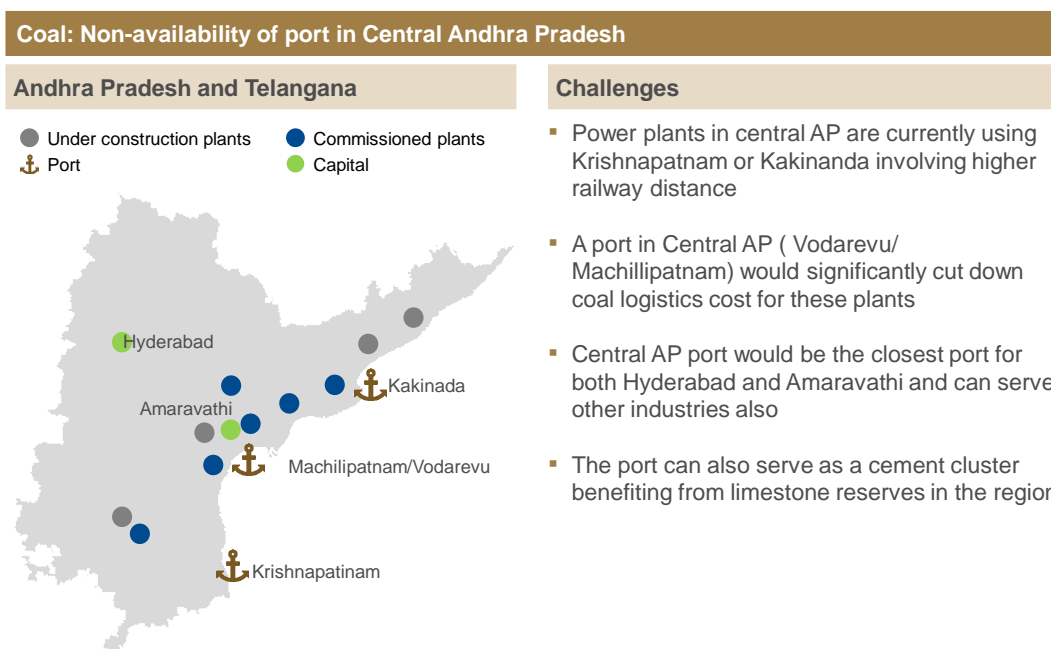
Cargo handled	Projected traffic			
	2020	2025	2030	2035
1 Containers (mn TEUs)	1.7	4.9	6.7	9.2

### 2.5.3 Port in central Andhra Pradesh

Thermal power plants located in central Andhra Pradesh are currently using Krishnapatnam and Kakinada port to receive coal from MCL (Exhibit 2.163). Kakinada is located at a substantial distance from these power plants; thus, Krishnapatnam is significantly sought after for the central power plant cluster. Power plants in central AP include Dr Narla Tata Rao plant in Krishna and Kothagudem II.

Total coal handling potential with these two power plants will be around 10 MTPA. Machilipatnam will also be the closest port to Hyderabad as well as Amaravati, the upcoming capital of AP. With increasing industrial activity in the capital region, the port could significantly boost developmental activity (Exhibit 2.164). In addition, presence of limestone reserves in the hinterland area can be leveraged to build a 20 MTPA cement cluster in central Andhra Pradesh. The cement can be coastally shipped to other states from Machilipatnam.

## EXHIBIT 2.53



## EXHIBIT 2.54

### Traffic projection for Central Andhra Pradesh port

Cargo handled	Projected traffic			
	2021	2026	2031	2036
MTPA				
1 Coal	11.0	21.0	25.0	30.0
2 Containers (mn TEUs)	0.1	0.3	0.7	1.0
3 Others	9	35	41	47

### 2.5.4 Port in Central Tamil Nadu

Ports in Central Tamil Nadu is ideally placed to supply coal to multiple thermal power plants situated in the hinterland, namely:

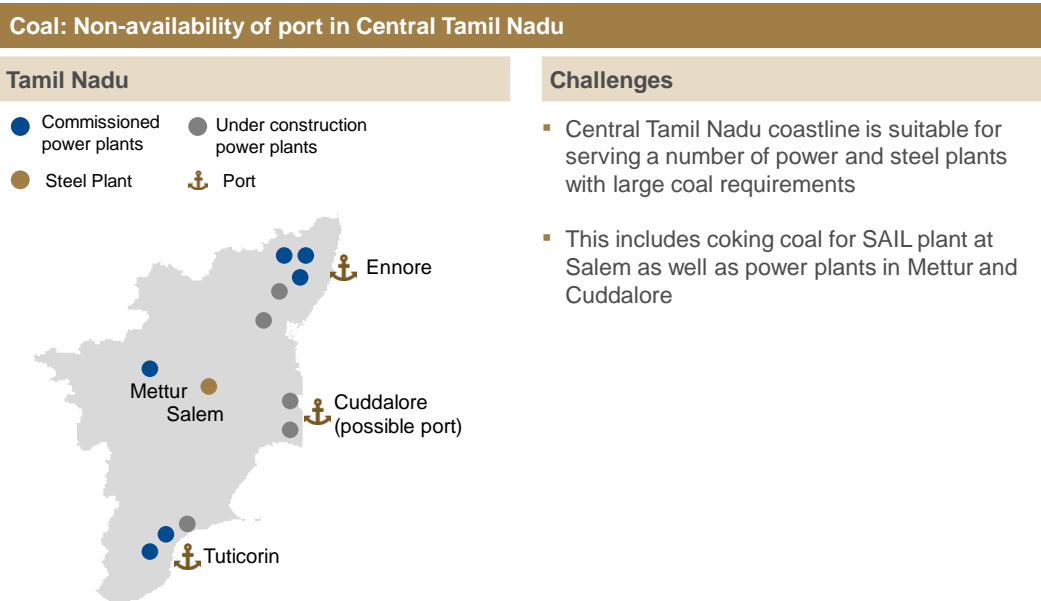
- Neyveli Lignite Corporation
- IL&FS
- Mettur (TANGENCO)

Total coal requirement of these power plants could be around 12 MTPA. Currently, these plants are getting coal through Ennore and Tuticorin ports (Exhibit 2.165).

Additionally, the port could also handle the coking coal cargo for the JSW Salem plant. (Exhibit 2.166).



## EXHIBIT 2.55



## EXHIBIT 2.56

### Traffic projection for Central Tamil Nadu port

Cargo handled	Projected traffic			
	2021	2026	2031	2036
MTPA				
<b>1</b> Coal	10.1	29.3	32.4	35.4
<b>2</b> Containers (mn TEUs)	0.1	0.1	0.2	0.3
<b>3</b> Others	2.7	7.6	9.2	10.8

### 2.5.5 Paradip South satellite port

As part of its vision, Coal India Limited (CIL) is planning to produce 1000 MTPA of coal by 2020<sup>5</sup>, of which 250 MTPA will be produced from MCL, currently 140 MTPA. The current railway system does not have adequate capacity to evacuate an additional 110 MTPA to power Gencos in Andhra Pradesh, Tamil Nadu and Gujarat.

As per an assessment of the movement of coal through various combinations of rail, road and coastal shipping, it has been

observed that the coastal route is the cheapest mode of transfer. Since most of the power plants in the coastal states have linkage agreements with MCL, coal could be brought to Paradip port by rail and be coastally shipped to a destination port nearest to the power plant. Already, 23 MTPA is being coastally shipped primarily to meet the demand of TNEB plants. Considering the commissioned and under-construction power plants as well the demand of thermal coal for non-power

usage, the potential of coastally-shipped coal to meet the requirement of coastal states can be as high as 150 to 180 MTPA by 2020 and 250-300 MTPA by 2025 (optimistic case). Paradip port has a locational advantage of being close to MCL and therefore is a port of choice for the coastal movement of coal to the power plants located in the southern and western states of India. The port does not have adequate capacity to handle projected volumes, through existing or planned capacity and therefore it requires additional capacity. Even after the current development plans of the inner harbour, the port will only be able to ship around 50 MTPA of thermal coal. Also, the port has multiple steel plants in the primary hinterland, which import coking coal mainly from Australia, Indonesia and South Africa.

In view of the long shipping routes, savings in voyage cost are substantial if this commodity is handled in large parcel sizes. Neighbouring ports, e.g., Dhamra, Visakhapatnam and Gangavaram, have the facilities for handling 200,000 DWT cape size ships. For Paradip to be competitive, therefore, an outer harbour will be required to ensure enough draft to handle 200,000 DWT cape size ships (Exhibit 2.167).

To handle projected coal traffic at Paradip, a site for the proposed development of a deep-water port has been identified, which is adjacent to the south of the existing harbour. Since this site would have separate road and rail connectivity, it will not impact the movement of cargo from the existing port.

## EXHIBIT 2.57

### Location of the satellite port

- This harbour is
  - located approximately 3km south of the existing port.
  - arrangement proposed is similar to Option 1 but could be optimised further
- This harbour would require a new rail line from the nearest rail head ≈ 8km
- The port will have an independent access free from constraints posed currently at port.
- Best procedures and practices could be adopted independent of the current operations
- The proposed layout could have the provision of LNG berth as tank farms could be provided nearshore.



- Independent infrastructure – rail, road, water and power requiring additional capital investment.
- There would be some R&R issues for rail connectivity
- Littoral drift management with sand trap arrangement would be necessary

The satellite port will mainly be a bulk handling port, loading thermal coal to power plants in the coastal states and unloading coking coal for steel plants in the

hinterland. By 2025, total volume at the port is expected to reach 70 MTPA (Exhibit 2.168).

**EXHIBIT 2.58**

**Traffic projection for Paradip satellite port**

MTPA

Cargo handled	Projected traffic			
	2021	2026	2031	2036
1 Coal export	30	60	90	120
2 Coal import	10	10	10	20
3 Break bulk	0	0	2	4

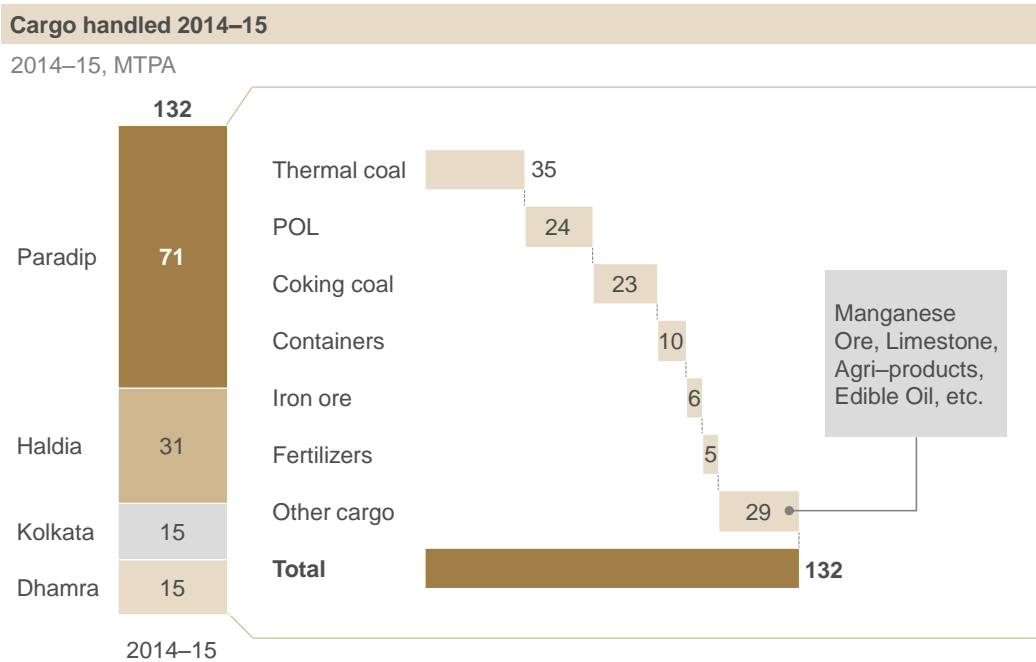
**2.5.6 Sagar**

A port at Sagar will share the hinterland of Haldia and Kolkata ports, covering eastern parts of India, i.e., western UP, Odisha, Jharkhand, Chhattisgarh, and the

neighbouring landlocked countries, i.e., Nepal and Bhutan. On the upper eastern coast, there are currently 4 ports – Kolkata, Haldia, Dhamra and Paradip (Exhibit 2.169).

**EXHIBIT 2.59**

**Current cargo traffic at relevant eastern ports**



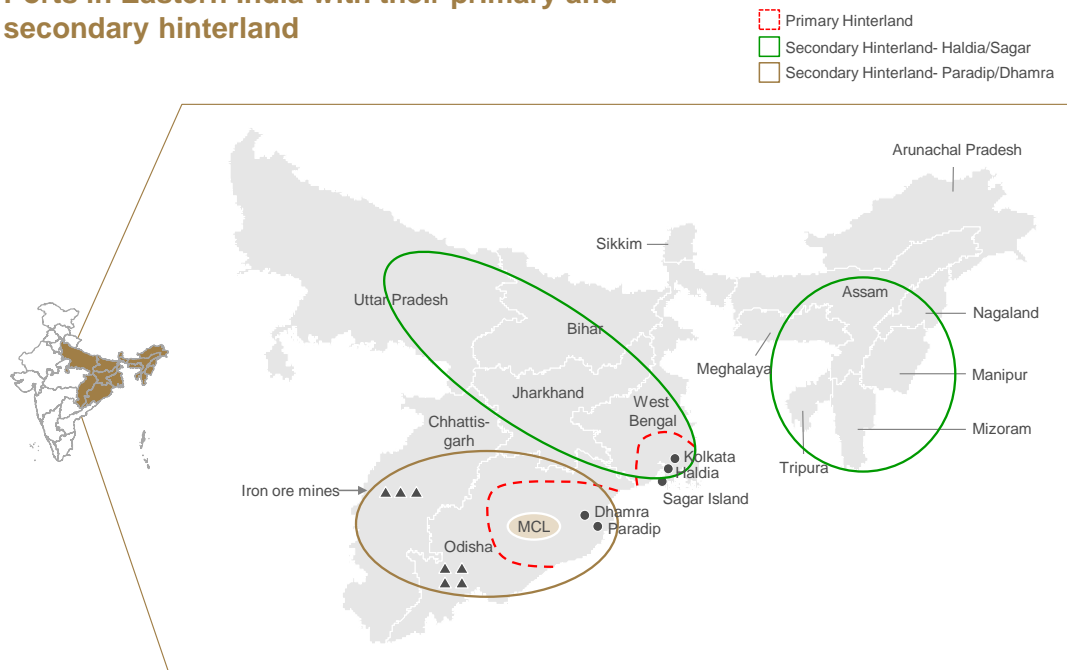
SOURCE: Basic port statistics

Primary hinterland for containers for Haldia and Kolkata ports comprise manufacturing units and agri-based cargo in the vicinity. Secondary hinterland include Bihar, Jharkhand and the northeast, parts of Odisha, Chhattisgarh, Uttar Pradesh and Madhya Pradesh (Exhibit 2.170).

Based on the origin–destination analysis of key commodities and industrial growth in the eastern hinterland, the cargo is projected to increase to around 440 MTPA by 2025 (Exhibit 2.171).

**EXHIBIT 2.60**

**Ports in Eastern India with their primary and secondary hinterland**



## EXHIBIT 2.61

### Eastern Hinterland: Kolkata Dock System, Haldia Dock Complex, Paradip and Dhamra port

Key commodities for the cluster	Current–2014–15 MTPA	2020 MTPA	2025 MTPA	2035 MTPA	Growth drivers for the next 5–10 years
Thermal Coal	35.3	129.0	196.7	291.2	Ujjamala: Paradip and Dharma port to be used as loading ports for coastal shipping
Coking Coal	23.0	37.8	47.5	78.8	Increased coking coal imports due to capacity expansion of steel plants (Meramandali & Patratu) and greenfield plant at TATA, Kalinganagar
Iron Ore	5.7	3.9	5.3	9.4	Linear growth in exports/imports due domestic mining regulation and low global export spot prices
Fertiliser	5.4	10.0	12.6	18.9	Business as usual growth for finished and fertiliser raw material. No major upswing identified
POL	24.1	40.1	53.4	88.5	Operations start of IOCL Paradip. increasing the volume of crude imports at Paradip
Containers (nm. TEU)	10.1	17.2 (1.1)	26.6 (1.7)	34.5 (2.3)	Increased containerisation, port led development and increased export competitiveness
Cement	0.4	8.0	30.7	50.9	Coastal shipping of Steel, Creation of New Steel clusters as part of port led development
Steel	0.0	8.4	20.9	34.6	Coastal shipping of Cement, Creation of New Cement clusters as part of port led development
Others	28.3	57.0	72.4	112.9	
<b>Total</b>	<b>115.6</b>	<b>294.2</b>	<b>439.5</b>	<b>719.0</b>	

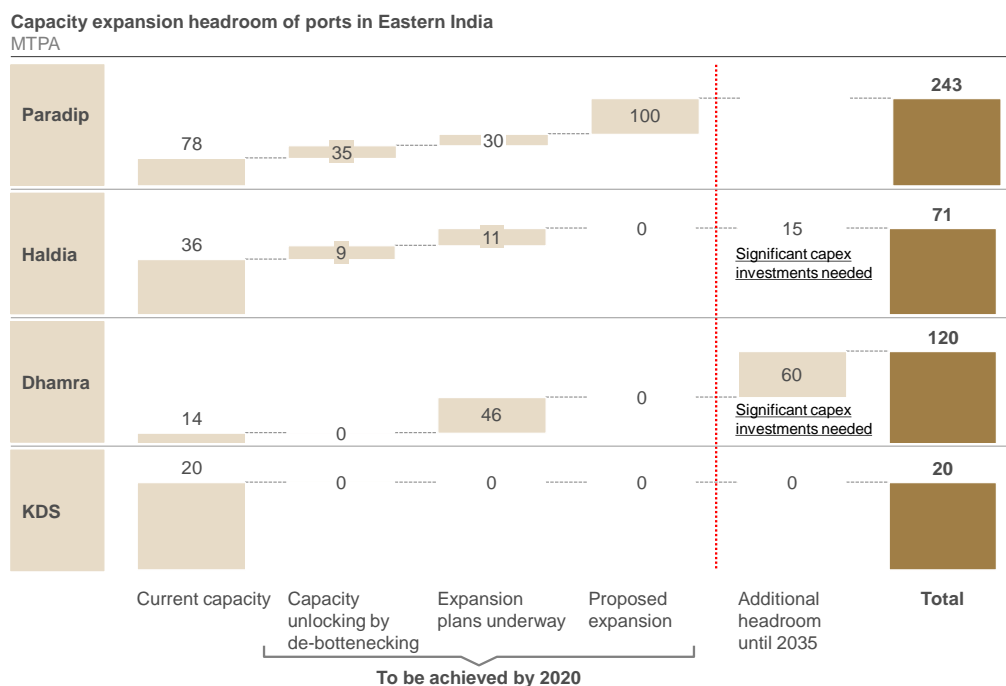
Most of the increase in cargo would be contributed by:

- Coastal shipping of thermal coal, of around 100 MTPA, this traffic is relevant only for Paradip and Dhamra
- Coking coal, with an increase of 12 MTPA increase, to serve upcoming plants of Tata Kalinganagar and JSPL Patratu as well as capacity expansion projects at SAIL and Bokaro
- Containers – Rise in containerisation and manufacturing boost in the region
- Growth in general cargo due to industrial growth in the region

While Paradip and Dhamra ports have the potential for expansion due to the availability of waterfront, land and draft, the Kolkata Dock System (KDS) and Haldia Dock Complex (HDC) have limited headroom for expansion (Exhibit 2.172). KDS is constrained by limited waterfront availability and HDC will need to create a new lock or new berths. Thus, an additional port in West Bengal will be required to handle the spill over cargo from Kolkata and Haldia.

## EXHIBIT 2.62

### Port-wise capacity expansion headroom till 2035



SOURCE: Growth forecasts, expert interviews, Port expansion plans, BCG Unnati

Sagar port will share the hinterland cargo currently being serviced by Haldia and Kolkata ports. The likelihood of the following cargo types spilling over from Haldia and Kolkata ports (Exhibit 2.173) is:

- POL:** Products/crude imported at Haldia port currently is consumed within a radius of 100 to 300 km. Most of the consumption centres are already connected to the Haldia refinery and dock-based storage through the existing pipeline infrastructure. Thus, it is unlikely that this cargo would shift to Sagar port.
- Coal:** A detailed analysis was made of relevant steel plants, including SAIL, TATA and JSPL, and thermal plants on the basis of landed logistics cost, from Australia (coking coal) and Indonesia (Indonesia). The data reveals that only SAIL, Durgapur, will have comparable cost savings of around INR 48 per tonne for all the other plants in the hinterland of Dhamra port. Paradip port will have natural ownership of the coking coal

cargo. Therefore, coal will also not shift to Sagar port.

- Containers:** Apart from traffic originating in the immediate hinterland, KDS and HDC handle container traffic from Bihar, Orissa, the Northeast, parts of Uttar Pradesh and NCR besides the neighbouring countries of Nepal and Bhutan. Capacity at HDC could reach 0.3 to 0.4 mn TEUs. At KDS, current capacity is 0.8 mn TEU but headroom for further expansion is limited. As the container traffic volume increases, overflow traffic from KDS could potentially move to Sagar.
- Break bulk:** Due to capacity constraint at KDS, the break bulk will spill over to Sagar.

Besides containers and break bulk spill over from KDS Sagar port can also cater to the break bulk spill over from HDC in the long run (Exhibit 2.174).

## EXHIBIT 2.63

### Cargo handled at Haldia and Kolkata dock complex

Cargo handled 2014–15

	2014–15, MTPA	Hinterland	Possibility of moving to Sagar <sup>1</sup> ?	
P.O.L.	6	Imports & Exports : Products & crude for processing & consumption in WB	✗	Cargo movement to Sagar port will happen only in case of savings in landed cost vis-à-vis current port used
Coking coal	6	Imports: Consumption in Steel plants of West Bengal & Jharkhand	✓	
Containers	10	Exports: Around 40% generated in West Bengal & Jharkhand; around 30% from Northern India	✓	
Iron Ore	2	Exports: Coastal evacuation for Essar steel plant in Gujarat	✗	
Thermal coal	1	Imports: Thermal power plants in primary hinterland of 300 km	✓	
Fertilizers	1	Imports: Raw materials for plants/ dealer in primary hinterland	✗	
Other cargo	19	Generated & consumed within 100–300 km of the port	✓	
<b>Total</b>	<b>46</b>			

<sup>1</sup> Based on primary hinterland and landed cost economics based on operating cost

SOURCE: Indian Ports Association

## EXHIBIT 2.64

### Traffic projection for Sagar port

Cargo handled	Projected traffic			
	2021	2026	2031	2036
1 Containers (mn TEUs)	0.1	0.5	0.9	1.3
2 Break bulk	2.4	5	6.8	9

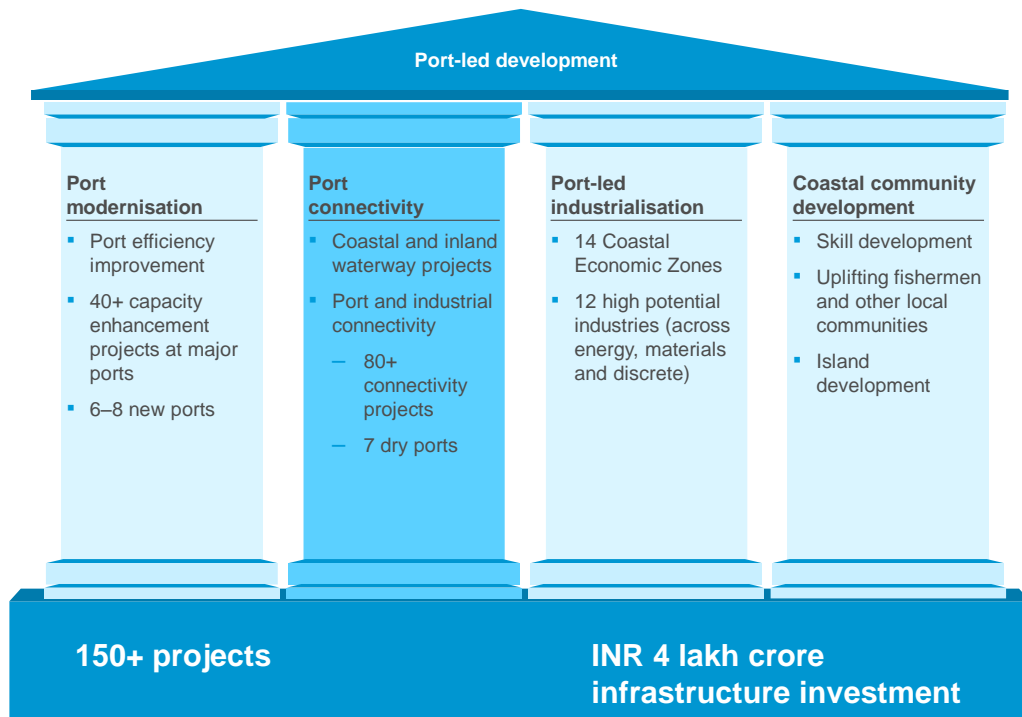
# 3. Port connectivity

Port connectivity is the second pillar of the port-led development model under Sagarmala (Exhibit 3.175). It aspires to provide the most optimal mode of evacuation to and from ports for both EXIM and domestic cargo. The study compared possible modes of connectivity from

domestic production/demand centers to ports. Pipelines, coastal and inland waterways, railways and road networks were studied to provide recommendations on efficient evacuation.

## EXHIBIT 3.65

### Sagarmala: Port-led development



Connectivity is one of the critical enablers for ports as it is the end to end effectiveness of the logistics system that drives competitiveness for industry. For example, intermodal transportation network of rail, inland shipping, road, short sea and pipelines gives the port of Rotterdam the best possible connections to the rest of Europe – transit times to most destinations is less than 24 hours. Superior connectivity has helped Port of Rotterdam to become the largest sea port in Europe handling more than 450 MTPA of cargo.

Connectivity challenges exist in India and even new ports that have world class equipment can see their turnaround times hamstrung because of poor connectivity. This chapter discusses the main challenges to port connectivity that constrain India’s trade competitiveness and increase industrial production costs. The key challenges are underleveraging of domestic waterways, severely constrained rail infrastructure along key routes, sub optimal modal mix for container freight, connectivity to west coast ports through the Western Ghats, lack of coordinated end to



end planning for bulk logistics and last mile connectivity to ports and key industrial hinterlands.

India's hinterland connectivity is mainly based on road and rail networks. Domestic waterways, both coastal shipping and inland routes, so far have played a limited role. This chapter suggests ways of reinventing the modal mix through pipelines, waterways, roads and railways.

Pipelines are an effective means of transporting liquid cargo to and from ports. Cost of transporting the product by pipeline could be about 10–15 per cent of that by rail. Currently, many of the pipelines are operating at utilisation level of more than 90 per cent, therefore any increase in refineries capacity has to be matched by pipeline expansion. With this in mind, potential pipelines projects have been outlined for capacity enhancement and expansion. Development of pipeline from Paradip to Hyderabad and expansion of Salaya Mathura pipeline are some of the high potential projects. Slurry pipelines could also be considered for transporting iron ore from the mines in Chattisgarh and Odisha to the nearest port. NMDC is already building a pipeline from Bailadila to Vizag.

Freight transportation by waterways is highly underutilised in India as compared to US, China and EU. For example the Yangtze River system is one of the most developed inland waterways navigation system with 13 waterways and 92 ports. Port of Shanghai is located in the vicinity of Shanghai, at the confluence of Yangtze, Huangpu and Qiantang rivers and handled 35 mn TEUs in 2014, most of which originates in the industrial clusters located in the Yangtze valley. Similarly in India, National Waterways 1, 2, 4 and 5 can be developed to play an important role in cargo movement.

Railways is the mainstay for carrying long lead distance and bulk cargo. But the expansion of rail network has not been able to keep up with the growing demand – in the past 5 years, rail network has only grown at 0.7 per cent. Most of the routes carrying bulk cargo (like thermal coal) are constrained and running at high utilisation. Evacuation capacity in Odisha and Chhattisgarh is much lower than projected requirement. There is also an issue of constrained infrastructure between receiving ports and demand centres especially around the Western Ghats. Development of Heavy Haul Rail corridor, decongesting RV line, Hospet-Vasco da gama line are some of the high potential rail projects. High freight rates due to cross subsidisation and low priority for goods trains have made railways uneconomical for container movement. Because of this, shippers prefer moving even long distance containers on road. Western DFC with linkages to ports of Hazira, Kandla and Mundra through spur lines can result in modal shift from road to rail for containers generated in the northern hinterland.

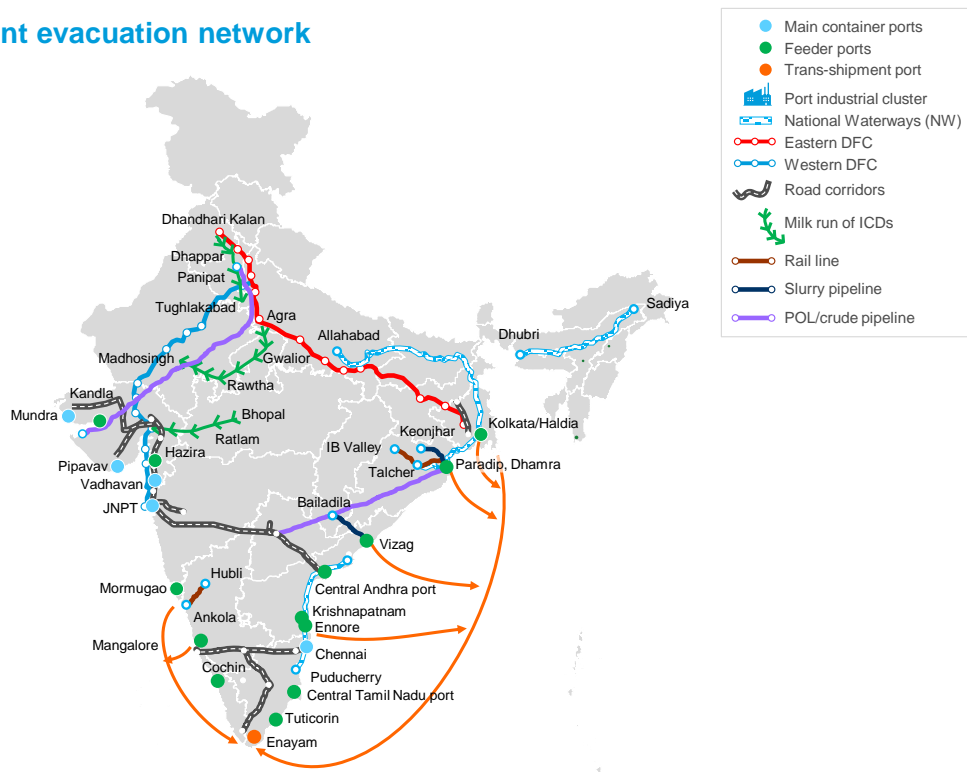
Road is economical compared to rail for covering distances up to 500 to 1,000 km from the port, however the current condition of highway stretches is inconsistent. Moreover, the Indian coastline does not have a coastal road network. To make roads more effective as a mode of cargo movement, ten potential highway stretches have been analyzed as freight friendly expressways. In addition to this the Government of India has undertaken the Bharatmala programme which would also help in joining coastal regions through road links. Policy related interventions can help reduce the overall cost and time for freight movement.

Exhibit 3.176 shows the proposed evacuation network with high potential projects marked.

**EXHIBIT 3.66**

**Efficient evacuation network**

FY 25



### 3.1 Overarching connectivity challenges

Connectivity is one of the critical enablers for ports as it is the end-to-end effectiveness of the logistics system that drives competitiveness for industry. With infusion of new technology and capacity building, the cumulative or total capacity available at ports could meet the requirements. However, when evacuation of cargo is slow, then despite adequate capacity and modern handling facilities, ports will not be able to ensure a quicker turnaround of ships. This could undermine the competitiveness of Indian trade. It is important that connectivity of ports with the hinterland is augmented not only to ensure smooth flow of traffic at

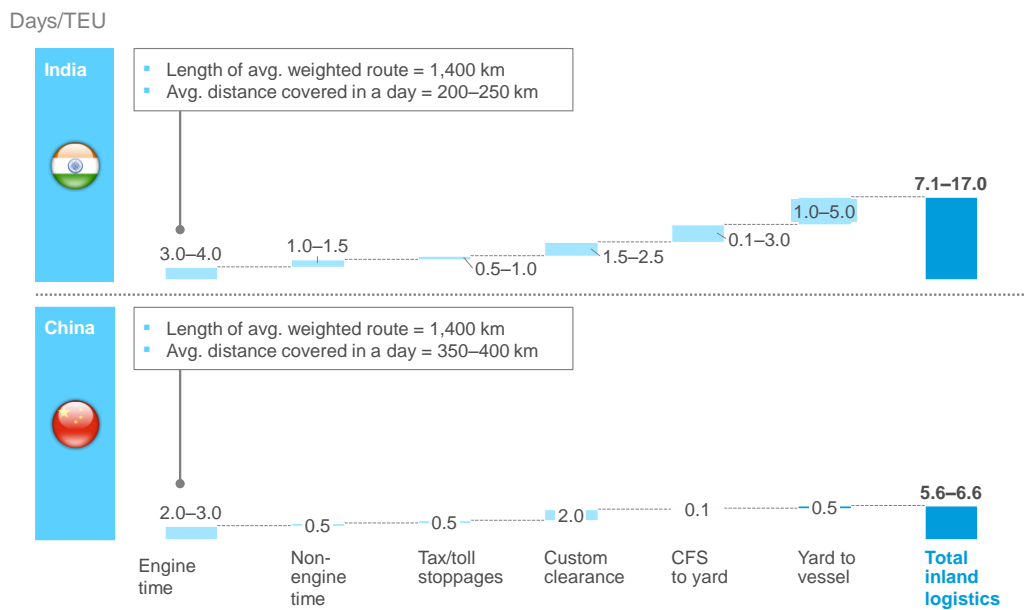
present levels but also to meet the requirements of a projected increase in traffic.

A comparison between India and China for time taken to transport a container by road on similar routes suggests that there is a significant variability in time for inland transportation in India (Exhibit 3.177). Compounding this problem is the long logistics lead distance of India versus comparable countries. While this is good for balanced regional development, it also means logistics costs are structurally higher.

**EXHIBIT 3.67**

#### Comparison of end-to-end time of transporting a container in India and China by road on similar routes

BOTTOM-UP ANALYSIS FOR ROAD TIME



1 Ocean distance = 6,658 NM

SOURCE: Interviews with truck companies; CTOs; freight forwarders; importers; exporters; port management; World Bank

This section covers key port connectivity stretches in India for coal, container traffic, petroleum, oil and lubricants (POL), iron ore, steel, fertilisers, cement and food grains, identified through origin–destination (OD) studies.

#### Energy-focused commodities

- Around 80 per cent of the crude requirement in India is imported and moves through pipelines to refineries. Domestically produced crude from Bombay High is transported via coastal shipping.
- Approximately 75 per cent of the product (MS/HSD) movement from PSU refineries takes place via pipelines while the remaining 25 per cent is transported via road or rail. Product from private refineries is largely exported due to price regulation in the past or is coastally shipped to south in case of a deficit.
- Thermal coal movement is predominantly by rail. While domestic coal is mostly transported directly by rail from mines to power plants, there is some movement to ports as well, e.g., from Mahanadi Coal fields in Odisha to Paradip port. Imported coal-based generation is mostly located in the immediate vicinity of ports with a few exceptions in Rajasthan and Maharashtra. The proposed impetus to coastal shipping could significantly alter connectivity needs for coal movement.

#### Materials-focused commodities




- Coking coal is mostly imported by steel plants by rail from receiving ports of Visakhapatnam, Gangavaram, Dhamra, Paradip and Haldia to steel clusters in Odisha, Jharkhand, Chhattisgarh and West Bengal.
- There is also significant opportunity for movement of coastal cargo especially in steel, cement, fertilisers and food grains apart from coal. Key movement of food grains is mainly by rail from Andhra Pradesh to Tamil Nadu and Kerala. Similarly, steel and cement moves from the east coast of India to south and west. Apart from re-routing existing cargo from rail to coastal movement, there is also potential to set up mega cement cluster in AP and steel clusters in Tamil Nadu, Maharashtra and Gujarat.






























#### Discrete manufacturing

- Container traffic is the heaviest from the northern states, i.e., Delhi, Punjab, Haryana and Uttar Pradesh, to ports in Gujarat, e.g., Mundra and Pipavav and Maharashtra (JNPT). The cargo movement on these stretches is skewed in favour of road at 62 per cent as compared to rail at 38 per cent. Other high density stretches, mainly from the southern cities of Bangalore, Coimbatore and Hyderabad, are considerably shorter and better suited for road than rail. The upcoming dedicated freight corridors will have a significant influence on the rail–road mix, especially for the northern hinterland. Exhibit 3.178 shows the current mapping of commodities to different modes.

**EXHIBIT 3.68**

**Commodity to mode mapping**

-  End-to-End
-  Main transportation leg
-  First mile + Last mile

		Road 	Railways 	Pipeline 	Waterways 
Energy	POL 				
	Coal 				
Materials	Steel 				
	Cement 	 			
	Fertiliser 				
	Food grains 				
Discrete manufacturing	Container 	 			

Projections of cargo traffic create the need to further strengthen connectivity projects so that future demand is met through easing of bottlenecks in the choked rail and road systems and effective shifts in the modal mix toward inland waterways and coastal shipping, which are both cost-effective and environment friendly.

Later sections discuss some of the key connectivity challenges for movement of

EXIM cargo. The implications for key cargo and a corresponding list of initiatives for meeting the projected cargo traffic and connectivity challenges have been identified.

The following section detail out the main challenges to port connectivity, constraining both country's export competitiveness as well as increasing industrial production costs.

### 3.1.1 Waterways

India has around 7,500 kilometers (km) of coastline and 14,500 km of navigable rivers. In spite of this, cargo movement in India through domestic waterways is negligible.

Globally, domestic waterways are seen as cost-effective as well as environmentally friendly means of transporting freight. For instance, the cost of moving coal via coastal shipping is significantly cheaper than cost of moving it by the currently preferred means of railways (for coastal plants).

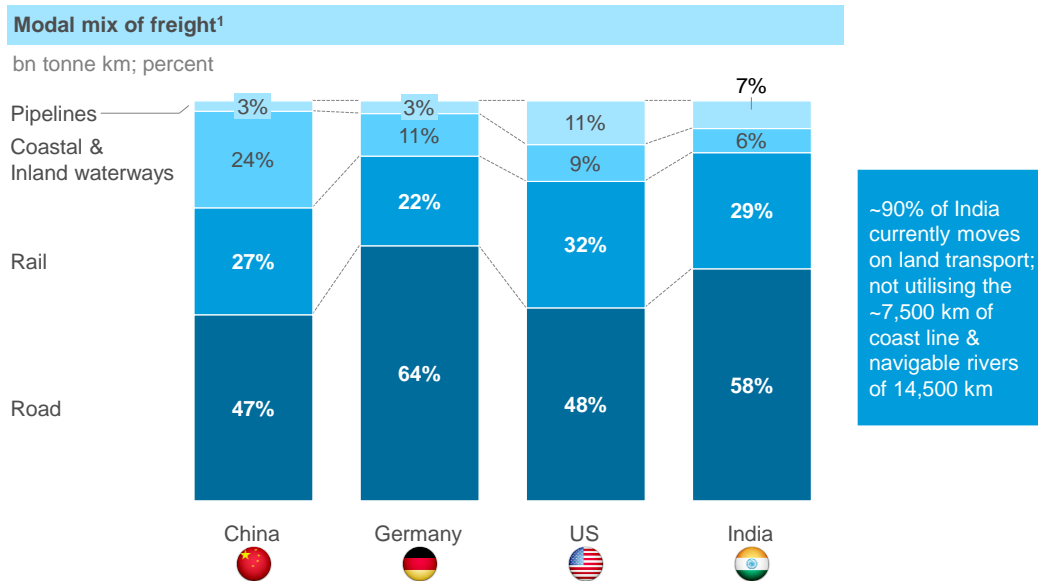
Exhibit 3.179 below shows a comparison of the modal mix of cargo movement in China, the US, Germany and India. It can be seen that while China ships as much as 24

per cent of its freight via waterways, India's utilisation of waterways for freight movement is less than 6 per cent.

By contrast, in the US, waterways are utilised in a much more effective manner. The Mississippi waterway became operational in the 1930s and has a minimum navigable depth of 9 feet, carrying roughly 126 MTPA of traffic every year. The overall inland waterways system in the US has nearly 12,000 miles of navigable rivers with more than 9 feet depth with 192 locks moving more than 600 MTPA of cargo. Underused waterways constitute a major challenge in optimising connectivity to ports in India. This is all the more significant, given that the railway network is heavily constrained, as discussed subsequently.

#### EXHIBIT 3.69

### Waterways have a significant potential to increase share in freight transport



<sup>1</sup> 2012

SOURCE: China statistical yearbook 2012; CEIC; OECD database  
Total transportation study, RITES, NTDPC

### 3.1.2 Railways infrastructure bottleneck on key routes

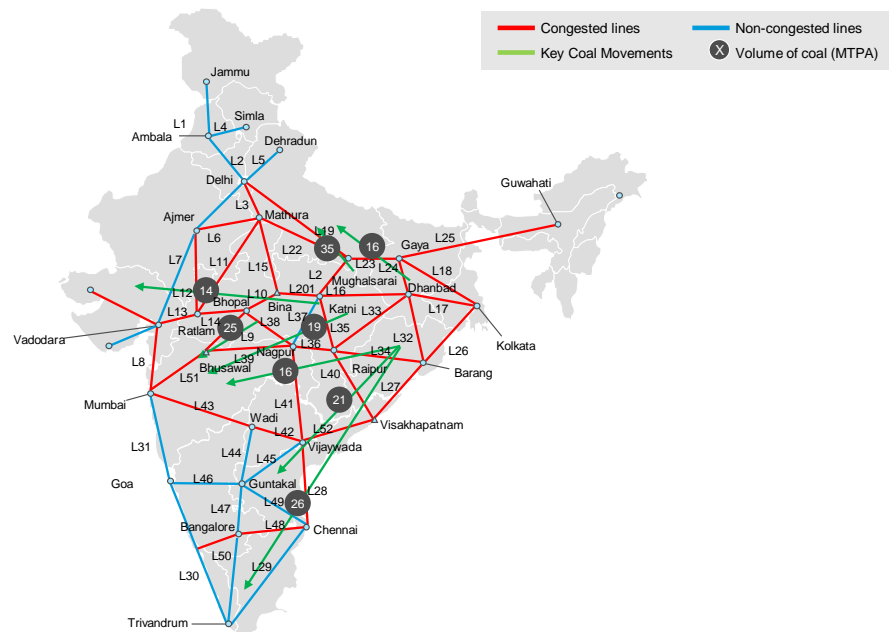
Rail is the primary mode for transporting bulk freight bound to and from ports. Railways carry nearly 60 per cent, i.e., 356 MTPA of the total domestic coal volume moved in India. Chronic underinvestment in infrastructure, however, has resulted in rail capacity failing to keep pace with demand, especially on trunk routes. For example, the stretch from Talcher coalfield to Paradip port is highly constrained and unable to handle the demand from coal traffic. In 2013–14, coal movement in the country was ~740 MT, including domestic production and imports. Though coal production is concentrated mostly in the eastern and central parts of

India, it is transported for power generation to nearly all corners of the country. Coal production is currently growing at a rate of 6 to 7 per cent per annum, but infrastructure for its evacuation has lagged behind with an annual growth rate of 3.5 per cent, which needs to be augmented to keep pace with production.

This has resulted in congestion, high dwell time and an average freight speed of only 25 kmph. More than 90 per cent of rail routes handling coal movement are operating at over 100 per cent utilisation as shown in the Exhibit 3.180. Severe shortage of rolling stock causes overstocking of coal at the ports hampering port productivity and increasing the inventory cost.

EXHIBIT 3.70

**Current rail network is congested and will likely not be able to support future volumes**



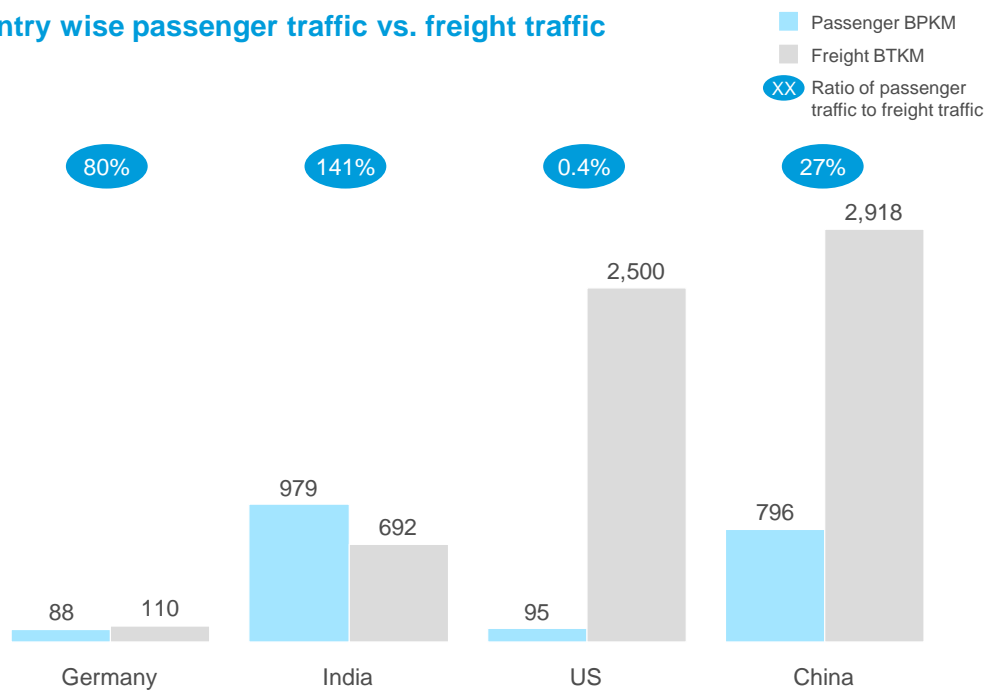
SOURCE: Indian Railways

The Delhi–Mumbai rail route is the most important corridor for container freight in the country. The route, also known as the “Western Corridor”, services the movement of container cargo from prime manufacturing hubs in the northern region, namely Delhi NCR, Punjab and Haryana, to Mumbai and Mundra ports. It is the one of the busiest and most congested passenger route in the country, with capacity utilisation between 115 and 150 per cent. Indian Railway policies have traditionally been

passenger-centric with cargo being a second priority. Freight trains are given the seventh preference in terms of track availability in the railways which further slows down the already congested movement on key trunk routes. This is also reflected in terms of the proportion of the passenger traffic to the freight traffic in which India leads the major industrial countries by a large distance in terms of passenger dependence (Exhibit 3.181).

**EXHIBIT 3.71**

**Country wise passenger traffic vs. freight traffic**



SOURCE: OECD and World Bank database



### 3.1.3 Connectivity to west coast ports through the Western Ghats

India's west coast runs parallel to the Western Ghats. The Western Ghats are steep, creating technical challenges in construction and adding to project costs. The rich yet fragile ecology of the area poses significant environmental challenges. These challenges particularly impact two ports, Mormugao and New Mangalore, as well as potential port locations in north Karnataka, such as Belekeri, Pavinkurve and Tadadi. These ports are severely constrained by the lack of adequate road and rail connectivity to their natural hinterlands, especially power plants and steel clusters located across the Western Ghats to the east.

While several projects have been proposed in the past, none have been successfully

completed. The Castle Rock–Kulem stretch is one of the most challenging rail stretches in the country with a gradient of 1 in 30, 16 narrow tunnels and around 15 bridges. Additionally the Tinaighat–Castle Rock stretch and the Hubli to Ankola line to connect potential new ports in north Karnataka have been delayed due to environmental issues. The Kulem–Vasco railway doubling is a part of the Tinaighat–Vasco doubling sanctioned by Indian Railways in 2010–11, for which land acquisition is required at isolated locations like major bridge approaches, deep cuttings, high bank locations and station yards.

Currently, if a passenger train travels from Castle Rock to Kulem (which is downhill), no other goods train is allowed to move in this section, even though the goods trains are well equipped with supplementary braking power in the event of a brake failure (Exhibit 3.182 and 3.183).

#### EXHIBIT 3.72

##### Railway line in western ghats

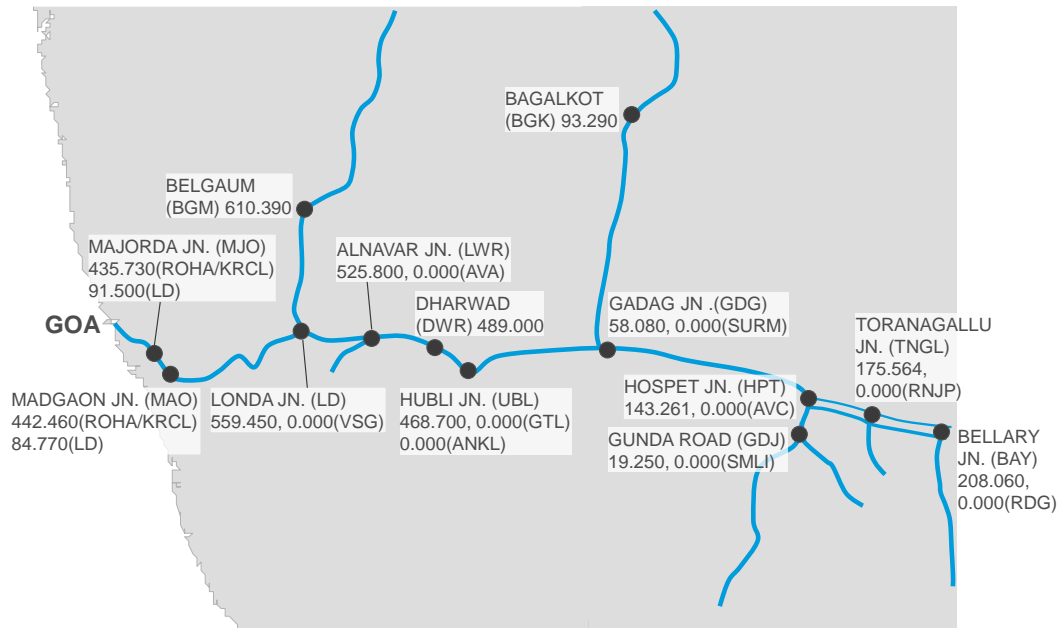


The rocky ghats run close to the railway tracks and laying an additional line next to the existing line poses the challenge of having to blast through hard rock at many

places. The estimated time for completion of this 26 km stretch could be between five and 10 years from now.

**EXHIBIT 3.73 Bellary-Madgaon railway line**

**Bellary – Madgaon railway line**



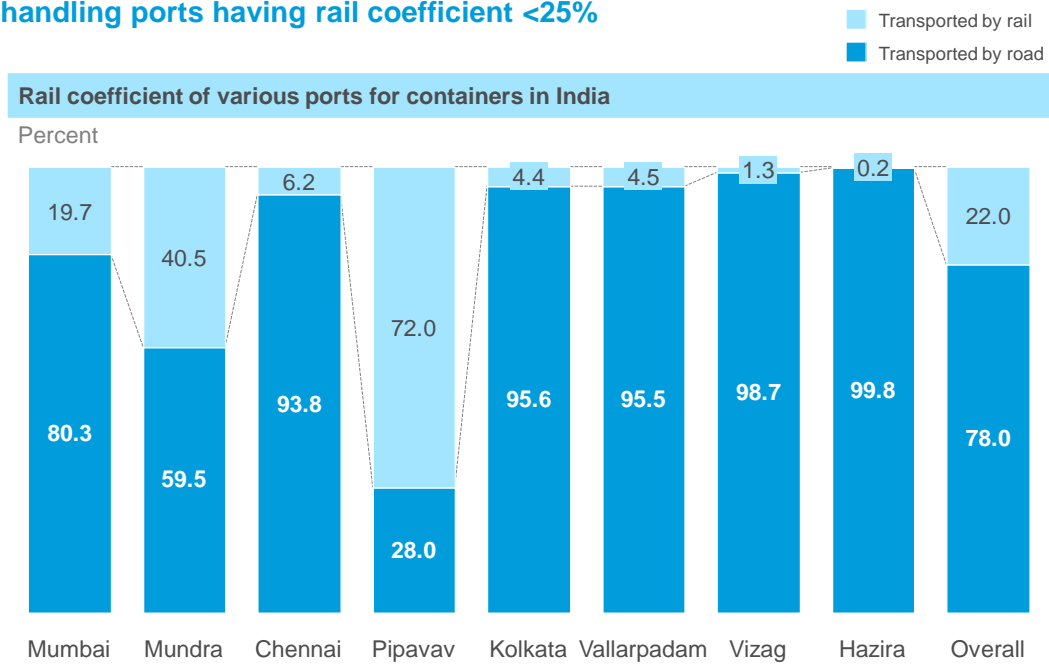
**3.1.4 Sub-optimal modal mix for container freight**

Roads are the predominant mode for transporting containers in India despite the superior cost economics of railways. As seen in the Exhibit 3.184, less than 25 per cent of India's total container

evacuation to ports is handled by rail and of the eight major ports handling containers, only two ports, i.e., Mundra and Pipavav, have appreciable rail coefficients (40 and 72 per cent respectively), while Visakhapatnam and Hazira depend heavily on roads.

**EXHIBIT 3.74**

**Hinterland evacuation is dominated by road with 6 out of 8 major container handling ports having rail coefficient <25%**



The highest container volume in the country is generated in the northern region, namely, Punjab, Rajasthan, Uttar Pradesh and Delhi NCR. Of the 3.7 mn tonnes of container freight currently generated, only 1.4 mn tonnes of container freight is moved by rail and the rest by road.

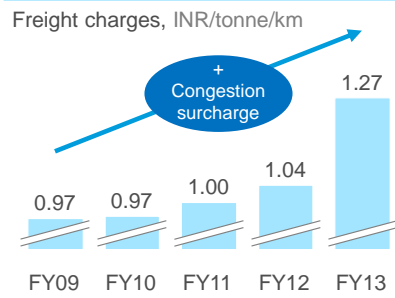
This is despite the fact that not only is rail faster, but also has economies of scale as a result of its consolidated end-to-end logistics, while container traffic by road is run by private transporters at the current de-regulated diesel prices.

One of the reasons behind roads having a larger share in India is the cross-subsidisation of passenger traffic by container freight. This has led to reduction in the economic viability of transporting containers by rail. The top panel in the Exhibit 3.185 below shows the steep increase in freight charges that is driving container traffic away from rail. The bottom panel highlights the significant differential between freight and passenger yield for railways, as well as a comparison with China, where the railways keeps freight yield much below passenger yield.

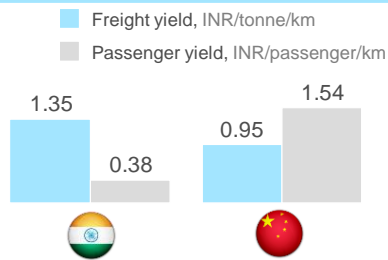
**EXHIBIT 3.75**

**Current performance of Indian freight rail in India**

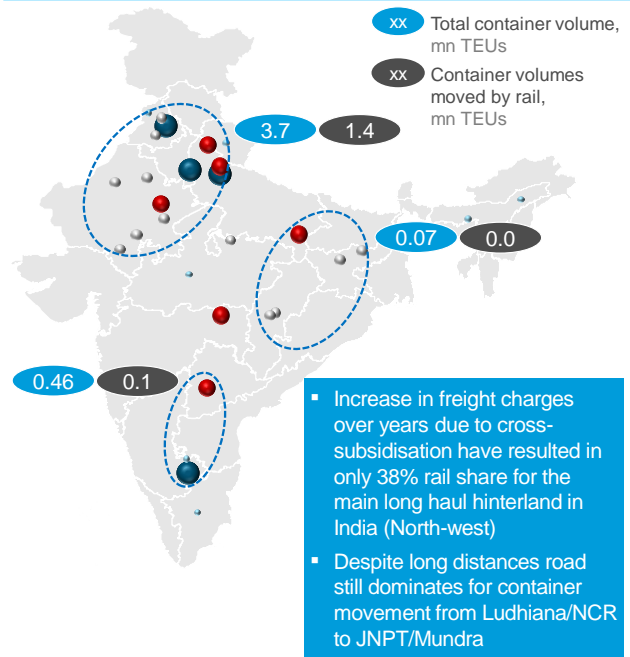
**Trend in freight charges in India**



**Freight and passenger yield in India and China**



**Current share of rail in transporting EXIM containers**



- Increase in freight charges over years due to cross-subsidisation have resulted in only 38% rail share for the main long haul hinterland in India (North-west)
- Despite long distances road still dominates for container movement from Ludhiana/NCR to JNPT/Mundra

SOURCE: APMT; Khambadkones; IPA statistics; Stakeholder interviews, White paper – Indian Railways

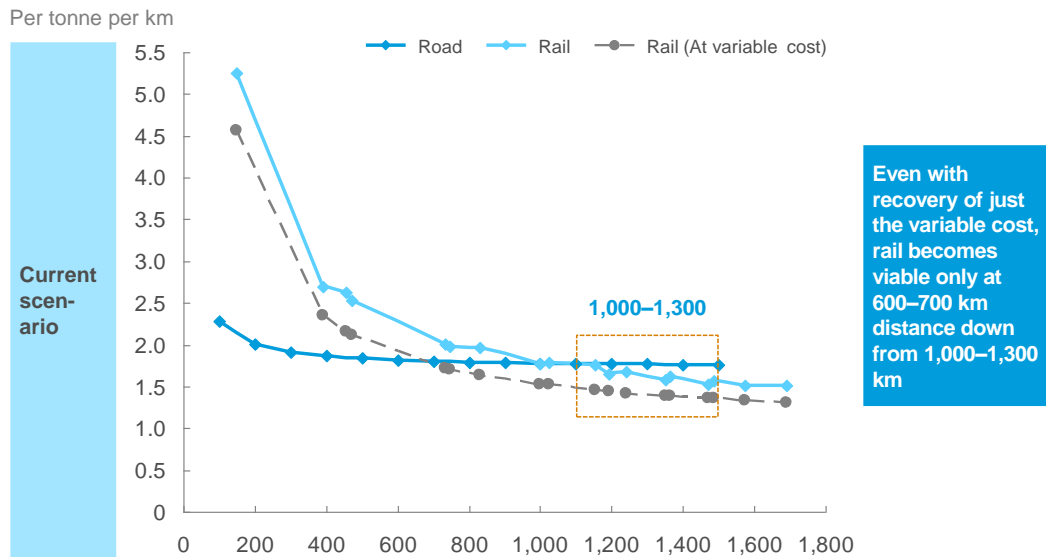
Due to the cross-subsidy to passenger charges with the high cost of container freight, the distance at which the cost of rail transportation of containers breaks even

with road is currently between 1,000 and 1,300 km (Exhibit 3.186).

## EXHIBIT 3.76

### High freight charges making rail uncompetitive

Break even number of km for cost of carrying containers by rail and road in India



SOURCE: CONCOR; transporter interviews

### 3.1.5 Lack of coordinated end-to-end planning for multimodal bulk logistics

Bulk cargo in India is naturally amenable for centrally planned logistics networks because of certain characteristics:

- Typically bulk movements are concentrated among a few players in India. For example, in coal there are only a few generating companies and Coal India is the largest coal miner. This means the corresponding logistics network also involves fewer players.
- Bulk logistics can be projected with relative accuracy as compared to

variable container flows. Projections of power and steel capacity under development and construction, for example, can accurately inform logistics infrastructure capacity.

- However, the current logistics system is unbalanced due to multiple other challenges. Compared to the complex rail-sea-rail route movement, the railways provide a door-to-door single-window service through a transparent and smooth process. The railways can also charge a higher price for the convenience over coastal shipping (Exhibit 3.187).

## EXHIBIT 3.77

### What needs to happen to capture the coastal shipping opportunity

#### Stakeholder involvement & enabling port infrastructure is required

- 1 On-boarding of PSU players (Power utilities, SAIL, DCI) and private players (Steel producers, cement producers) to initiate coastal shipping
- 2 Creation of supporting transport infrastructure (e.g., Talcher-Paradip railway line), slurry pipelines
- 3 Dedicated berths, bunkering & storage capacities at relevant ports
- 4 Aggregation services: Identifying or setting-up aggregation agency to handle small parcel sizes & operate logistics
- 5 Dedicated capacity fleet under Shipping Corporation of India
- 6 Appropriate ship-repairing/ship-building facilities on key ports; currently most of the ship repairs happen outside the country

#### 3.1.6 Challenges faced in road transport

Despite the push to expand the highway network, multilane roads (4+ lanes) in India is low. In addition, incomplete stretches in NHDP and lack of city bypasses on key corridors add to congestion in the road network. Lack of standardisation in documentation requirements across different states hinders inter-state freight transportation. In addition, lack of digitization, with requirement of manual documentation at a few states results in higher waiting time for clearance at inter-state borders. Also, the differences in entry taxes across states increases the complexity in documentation requirement, resulting in higher freight transit times. In

addition, differences in entry restrictions across different cities increases complexity in route planning

#### 3.1.7 Last-mile connectivity to ports and key industrial hinterlands

A large number of ports still lack basic connectivity through rail and road. Even if ports are connected via these modes, there are multiple issues pertaining to congestion which cause exporters and importers to pay the price for using these ports. It is of utmost importance under the programme that all last-mile/gate-related issues are addressed so that the overall supply chain functions in the manner it is intended to.

## 3.2 Mode wise projects

To address the above challenges, a detailed study of all modes of evacuation was undertaken to come up with detailed list of mode wise projects and initiatives to ensure efficient port evacuation.

### 3.2.1 Pipelines

Pipelines are the primary means of transport for liquid cargo to and from ports. Broadly, this can be split into crude, which is imported by refineries, and products which moves from refineries to the hinterland.

#### 3.2.1.1 Crude oil

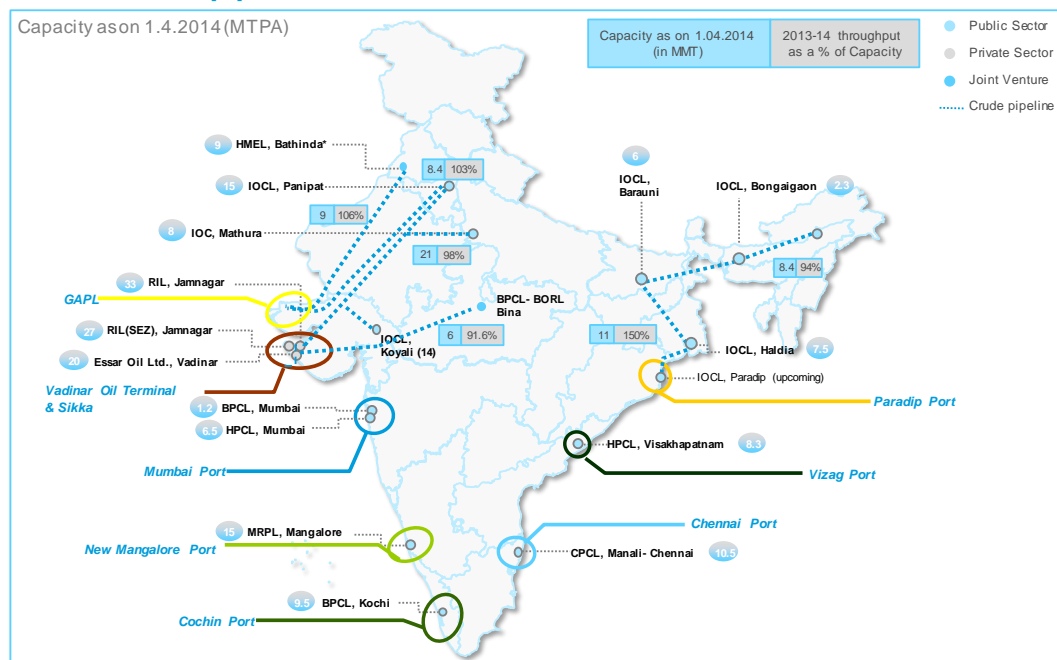
India currently consumes around 227 MTPA of crude oil, of which 189 MTPA is sourced through imports and 38 MTPA through domestic production. The imported product is handled by seven port clusters—the Gujarat cluster, Paradip, New Mangalore,

Mumbai, Chennai, Cochin and Visakhapatnam, with the Gujarat cluster handling around 65 per cent of the total crude imports. Mumbai, New Mangalore and Paradip account for 7 to 8 per cent each, while the rest handle 4 to 5 per cent each of the total import.

Significant percentage of refinery capacity is coastal, largely optimising the movement of crude. Around 34 per cent of the crude landed at the Gujarat cluster is transported inland through pipelines to the Bhatinda, Panipat, Mathura and Bina refineries. Similarly crude landed at Paradip port is moved inland to serve Paradip, Haldia, Barauni and Bongaigon refineries (Exhibit 3.188). Some part of the domestically produced crude (around 13 to 16 mn tonnes) is also shipped coastally. Emergency coastal shipping of crude also takes place in cases of disruption of the regular supply.

## EXHIBIT 3.78

### Current crude pipeline network in India



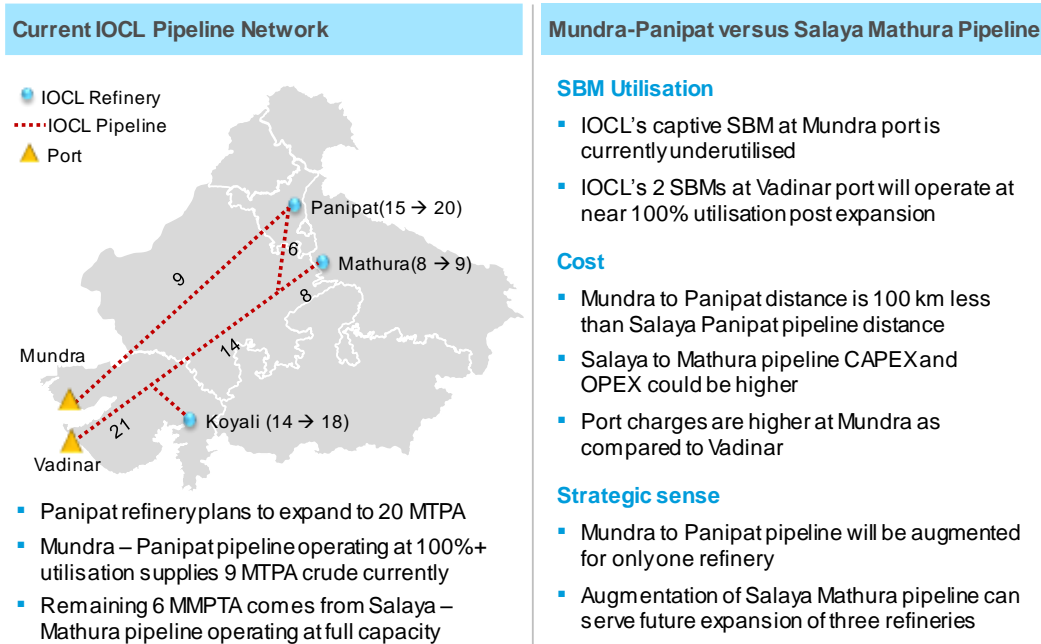
Most current crude pipelines operate at over 90 per cent utilisation and any plans to expand the existing refineries will also need to factor in a capacity increase for the relevant pipeline. For example the IOCL refineries in Panipat and Mathura get their crude from Mundra and Vadinar ports in Gujarat via pipelines (Exhibit 3.189). These pipelines currently operate at near-capacity utilisation levels. As the refineries expand, corresponding augmentation will be required in the crude pipelines as well. The current capacity of the Salaya to Mathura

pipeline, which feeds crude to the refineries in Koyali, Mathura and Panipat (partially), is around 21 MTPA, and IOCL has plans to augment its capacity to 25 MTPA. There is a proposal for further augmentation of the pipeline to around 40MTPA to align with future expansion of the Panipat, Mathura and Koyali refineries<sup>1</sup>

Some of the other projects could include upgradation/replacement of old crude pipelines serving CPCL Manali from Chennai port.

**EXHIBIT 3.79**

**Salaya – Mathura pipeline could be expanded to cater to future expansion of Matura, Koyali and Panipat refineries**



<sup>1</sup> Discussion with IOCL and Kandla port



### 3.2.1.2 Product

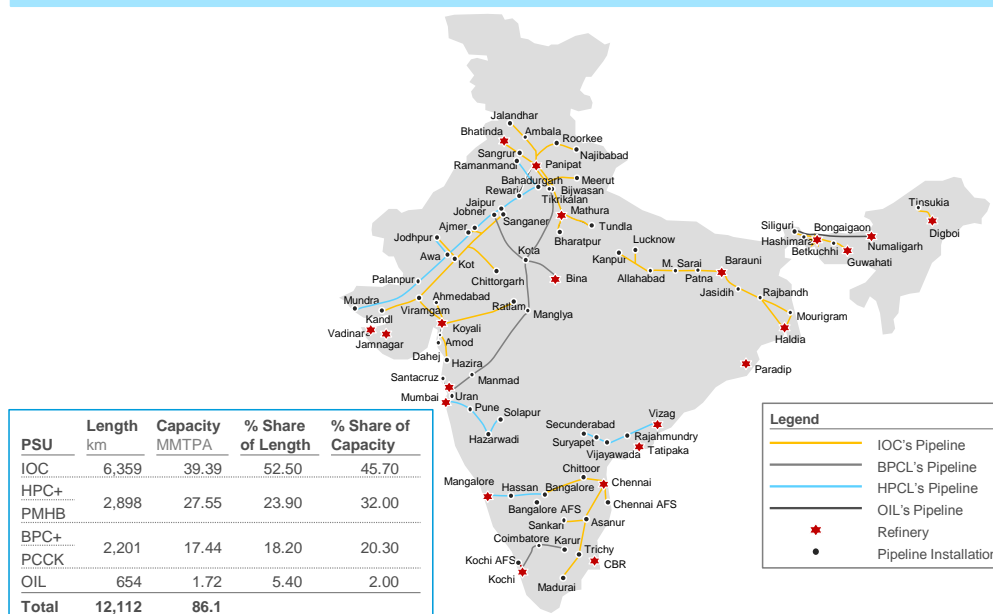
Refineries rely on the pipeline network for domestic evacuation of products, since the cost of transporting the product by pipeline comes to around INR 0.14 to 0.18 per tonne km compared to INR ~1.2 per tonne km by

rail. India has ~12,000 km of product pipeline with a total capacity of ~86 MTPA (Exhibit 3.190). Approximate 75 per cent of the MS/HSD evacuation currently happens through pipelines. Pipelines dominate distribution from the refineries to the depots, with the balance moving via road or rail.

### EXHIBIT 3.80

#### Current product pipeline network in India

Existing Petroleum Product Pipelines Network



Note: Map is Indicative only, not to scale

SOURCE: IOC: Indian Oil Corporation Ltd., | HPC: Hindustan Petroleum Corporation Ltd., | BPC: Bharat Petroleum Corporation Ltd., | OIL: Oil India Ltd., PCCK: Cochin-Coimbatore-Karur Petronet Ltd., | PMHB: Mangalore-Hassan-Bangalore Petronet Ltd.,

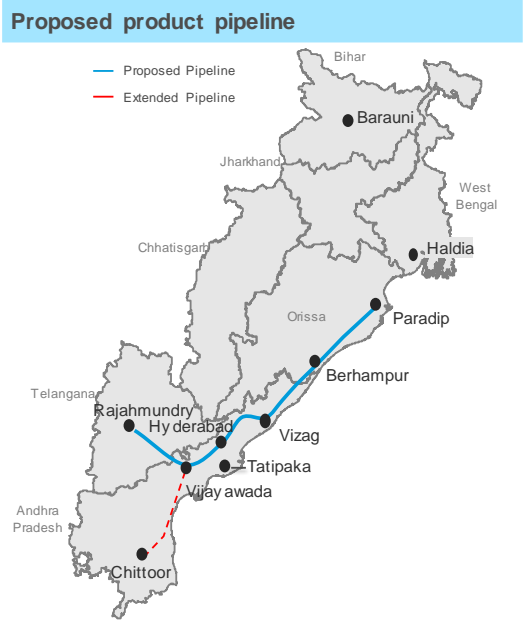
IOCL has proposed the construction of a new product pipeline:

**Product pipeline from Paradip to Hyderabad:** By 2025, the eastern region's demand for MS/HSD will be around 21 MTPA and production will be around 27 MTPA, creating a surplus of 6 MTPA. This will primarily be due to capacity expansion of the Paradip refinery to 15 MTPA. On the

other hand, the AP region is expected to face a deficit of around 6 MTPA, even after the Visakhapatnam refinery expansion. Hence, a 4 MTPA pipeline connecting Paradip to Hyderabad will be needed to meet the AP and Telangana demand (Exhibit 3.191). The pipeline is already part of IOCL's plans and the construction should not be delayed.

**EXHIBIT 3.81**

**Product pipeline proposed by IOCL with ~5MTPA capacity from Paradip to Hyderabad will cater to the AP deficit**



**Rationale**

- Product pipeline from Paradip to Hyderabad
  - By 2025, demand for MS/HSD in East would be ~21MTPA and production would be ~27MTPA
  - On the other hand, AP region is expected to face deficit of ~6MTPA
  - Pipeline from Paradip to Hyderabad with ~5MTPA capacity will help meet this deficit

SOURCE: IOCL, Press Research



**List of pipeline projects**

Project name	Agency	Concerned state	Investment required (INR cr)	Timeframe
Enhanced pipeline capacity to CPCL Manali, increasing diameter from 30" to 42"	CPCL	Tamil Nadu	500	24 months
Expansion of Salaya Mathura Pipeline	IOCL	Gujarat, UP	1,000	60 months
Pipeline from Paradip to Hyderabad	IOCL	Odisha and AP	3,000	120 months

### 3.2.2 Waterways

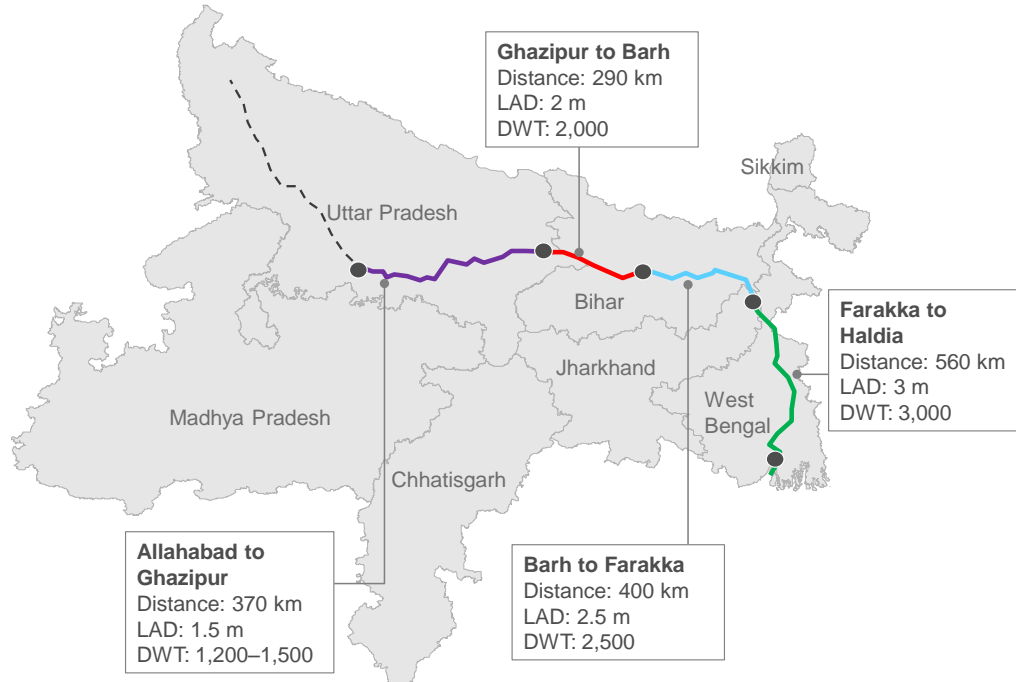
India has an extensive network of inland waterways in the form of rivers, canals, backwaters and creeks. Of the total navigable length of 14,500 km, 5,200 km of the river and 4,000 km of canals can be used by mechanised craft. Freight transportation by waterways is highly underutilised in the country as compared to the US, China and the European Union (EU). India has five recognized national waterways and 106 other waterways. Indian parliament has recently passed a bill to convert these 106 waterways to national waterways. Economic viability of a waterway to carry traffic as an alternative to rail and road depends on its length, which should be a minimum 500 km and 250 km for both cases respectively. Apart from this, it should have a large hinterland coverage area and potential in order to generate enough traffic on routes. Considering this, National Waterways 1, 2, 4 and 5 could be developed to play an important role in transportation.

#### 3.2.2.1 National Waterway 1

With a length of 1,620 km, the National Waterway 1 (NW1) is the longest waterway in India passing through four states, i.e., UP, Bihar, Jharkhand and West Bengal (Exhibit 3.192). It was declared a national waterway in October 1986. NW1 is a stretch of the Ganga Bhagirathi–Hooghly river system starting from Allahabad in UP, extending up to Haldia in West Bengal, and is navigable by mechanical boats up to Patna. Key opportunities in the region lie in 11 major power plants located on the banks of NW1 with a cumulative capacity of 12,000 MW as well as multiple chemicals and food exporters in UP and West Bengal.

#### EXHIBIT 3.82

**NW1 is 1,620 km navigable stretch of the river Ganga from Allahabad to Haldia with a minimum channel width of 45 m**



Commodities like thermal coal and food grains from the hinterland of UP to various South and East Indian states, automobiles in containers as well as containers to be exported from UP to the port of Haldia/Kolkata and imported steel from the Kolkata/Haldia port into UP and Bihar along with by-products like fly ash can be catered to by the waterway provided issues related to high sedimentation of the river, maintenance of constant draft of 3 m throughout the system and possibility of high-capacity barges plying on the river can be addressed successfully. Other challenges include the high rate of waste dumping from industrial cities along the Ganga as well as the difficulties faced in creating barrages along a religious river like the Ganga. Additionally, light manufacturing clusters could be developed around NW1. These clusters are discussed in detail in Chapter 4.

### **3.2.2.2 National Waterway 5**

National Waterway 5 (NW5) (Exhibit 3.193) runs through the states of Odisha and West Bengal along the Mahanadi River. The main rationale for NW5 is its proximity to the Talcher–Paradip region, which is abundant in resources and provides opportunities for evacuation of coal as well as other commodities like coking coal and iron ore.

An external study conducted on NW5 established a potential of 80 to 90 MTPA of coal and about 12.5 MTPA of coking coal in back haul in addition to some potential for iron ore transport. While the capacity of the waterway is limited to around 20 MTPA using a conventional system, it can be enhanced if

barge trains are used. The viability of using tugged barges, however, would need to be established through a detailed technical study.

Based on high-level estimates, the investment to operationalise NW5 could be INR 5,000 cr for dredging purposes, INR 900 cr for terminal development at Talcher and Paradip and INR 200 cr for annual maintenance. For tugged barges, the overall capital expenditure will be higher.

The revenues to the developer—assumed to be the Inland Waterways Authority of India (IWAI)—would consist of a usage fee of INR 1 per tonne km, vessel berthing fee of INR 750 per terminal and cargo-handling fees of INR 1 per tonne at each terminal.

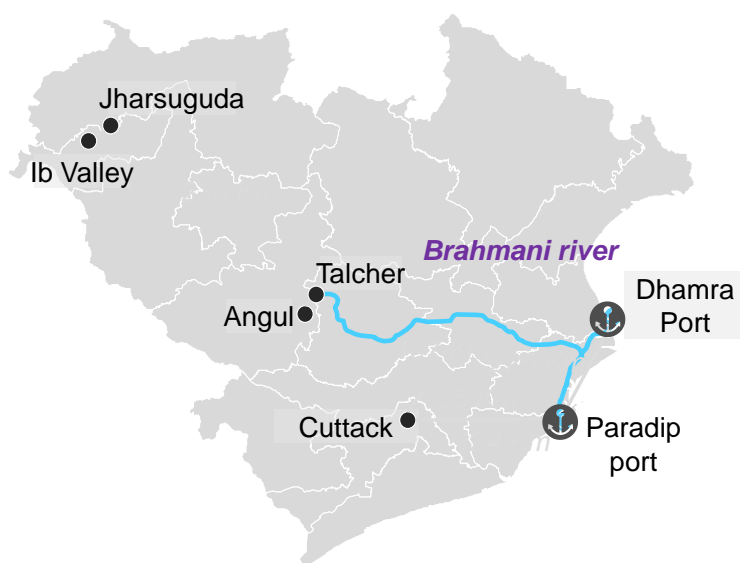
For barge operators, this revenue would be an operating cost. In addition, they would incur INR 2.4 cr per barge towards fuel, manning and repair and maintenance. On the capex front, operators will need to invest about INR 700 cr. The revenue for barge operators is assumed to be INR 1.2 per tonne km, based on benchmarking with alternative modes of transport.

Based on a single barge configuration of 20 MTPA with a draught of 2.5 metres over 55–60 km with five navigational locks and three barge terminals. This yields an estimated return of 13 per cent to the IWAI as the developer, whereas barge operators would earn 18 per cent.

These initial estimates would need to be revalidated based on a detailed feasibility report.

## EXHIBIT 3.83

### National waterway – 5



#### 3.2.2.3 National Waterway 4

National Waterway 4 (NW4) is a 1,095 km-long waterway connecting several South-Indian states through parts of the Krishna and Godavari rivers. It also connects Tamil Nadu via the Buckingham Canal (Exhibit 3.194).

A two-phased development of the project has been proposed at a total cost of INR 1,515 cr. Phase I of the project envisages the development of a stretch comprising the Godavari and Krishna rivers and Kakinada and Eluru canals, which has maximum cargo potential, at an estimated cost of INR 390 cr and land acquisition for remaining stretch at an estimated cost of INR 219 cr. Phase II of the project involves development of the North and South Buckingham Canals,

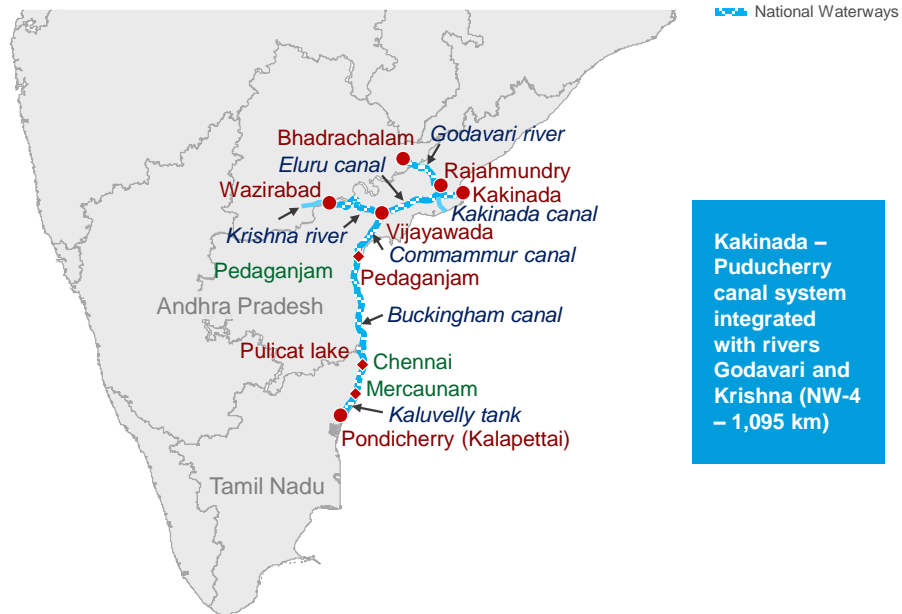
Commamur canal, and Kaluvelly tank at an estimated cost of INR 906 cr.

However, the stretch with the highest potential would be between Amaravati, the new capital of Andhra Pradesh, and the new proposed ports along the coast, such as Machilipatnam and Vodarevu. The stretch may have potential to transport 3 to 5 MTPA of bulk commodities by 2020. It may also be possible to transport containers using a multimodal hub along the riverfront near Amaravati.

While it has preliminary potential, the viability of the NW4 project needs to be assessed through a more detailed project report to estimate project cost and validate the estimated traffic potential.

## EXHIBIT 3.84

### National Waterway 4



#### 3.2.2.4 National Waterway 2

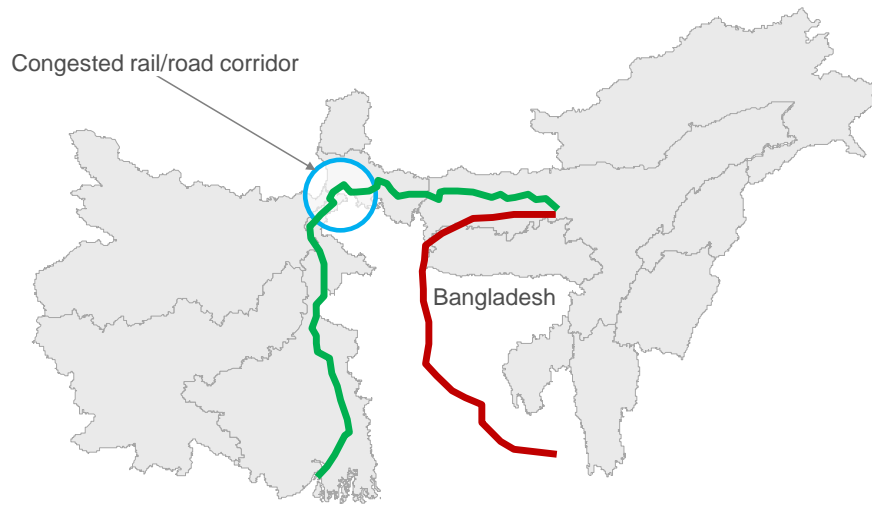
National Waterway 2 (NW2) is an 891-km long waterway connecting Dhubri on the Bangladesh border with Sadiya in Assam. It currently has nine fixed terminals and one floating terminal (Exhibit 3.195).

The Brahmaputra, along with its continuous water routes leading up to the ports of Kolkata and Haldia, is a very important traditional IWT route. Under an agreement with the Government of Bangladesh, the Central Inland Water Corporation Limited and other Indian vessel operators are plying their cargo vessels between the Assam and Kolkata regions using IWT transit facilities through Bangladesh.

The waterway has a potential to cater to the traffic in the northeastern region of the country and relieve pressure on the already congested Siliguri corridor, as shown in the exhibit. Instead of travelling by road or rail, goods from the Northeast can instead travel by waterway down the Brahmaputra (Jamuna) river into Bangladesh and Chittagong port from where they can be either exported or coastally shipped to other states of India. Several basic commodities, including food grains and fertilisers, could be transported more efficiently through this route. Exports from this region, such as handicrafts, spices and rubber, could also be exported using this waterway.

**EXHIBIT 3.85**

**National Waterway 2**



A more detailed project report needs to be prepared to validate the traffic potential,

assess the capital and operating costs and determine feasibility.

### 3.2.3 Railways

#### 3.2.3.1 Basic infrastructure creation

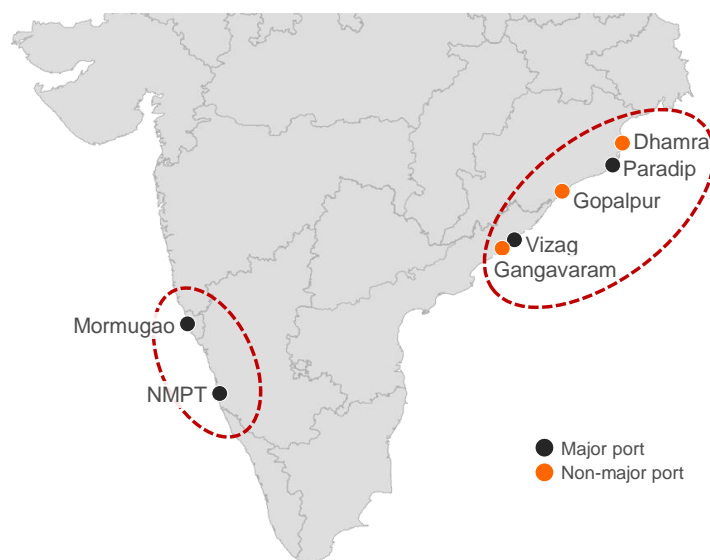
Indian railways is the mainstay for the freight transportation in the country. Major commodities moving on rail include thermal coal, coking coal, iron ore, steel as well as EXIM containers from the Northern hinterland. The growth in the network of railways has not been able to keep pace with the economic and cargo growth, putting

pressure on the existing network creating multiple bottlenecks.

Two pockets have been identified where the rail infrastructure would need to significantly ramp up - resource rich region of Odisha and Chhattisgarh for movement of bulk cargo, and Northern Karnataka and Southern Maharashtra lying to the east of Western Ghats (Exhibit 3.196).

#### EXHIBIT 3.86

##### Railway infrastructure bottlenecks



As mentioned in Chapter 2, 150 to 180 MTPA of coal can be shifted from the conventional rail mode of transport to coastal shipping by 2020. However, for such a shift to take place, large capacity augmentation at the ports will have to be accompanied by expansion of port connectivity to the hinterland which produces and consumes coal. Given that mine to port movement of coal in India is entirely by rail, increasing the capacity of the relevant railway lines is an essential prerequisite.

The most important stretch for coastal shipping of coal is the Ib/Talcher to Paradip route. A total potential of approximately 150 to 180 MTPA of thermal coal movement from Ib/Talcher to Paradip by 2020 as well as about 20 MTPA of coking coal/imported coal in backhaul is identified across commodities. Added to this is the increased opportunity for iron ore/coking coal traffic as a result of the installation of new steel plant/steel pelletisation clusters.



## COAL VOLUMES EXPECTED ON ORISSA-CHHATTISGARH RAIL LINE

Commodity	Location	Volume (MTPA)
Thermal coal	MCL mines (Talcher/Ib valley)–Paradip	150–180
Imported coal	Paradip–Odisha/Chhattisgarh power plants	5
Coking coal	Paradip–SAIL Rourkela, Bhushan Steel Sambalpur, TISCO Kalinganagar	15

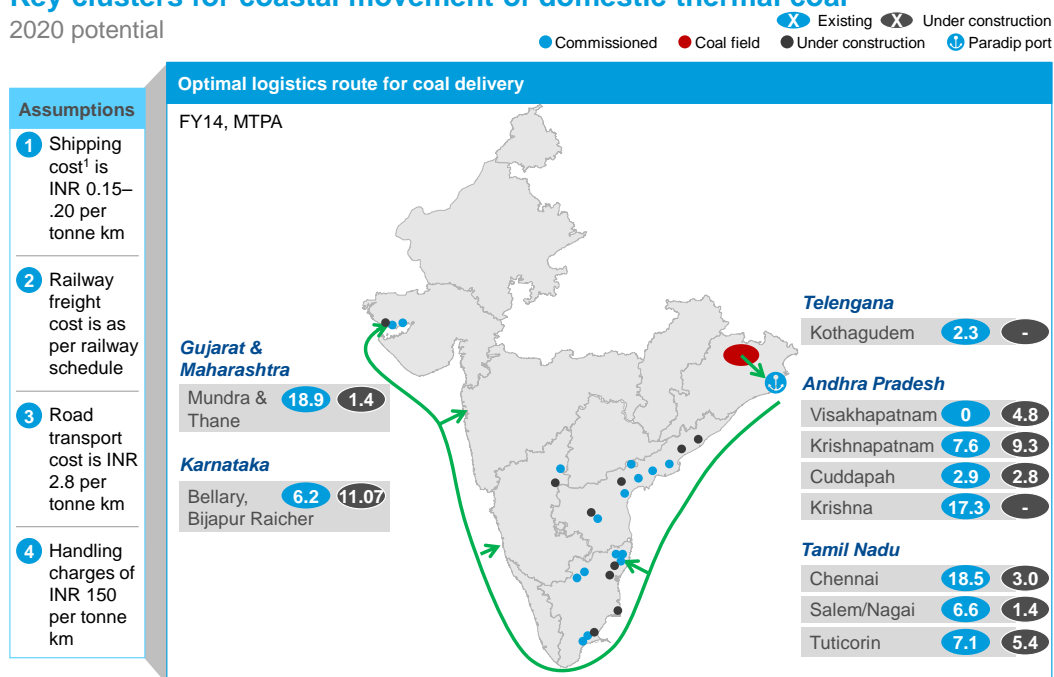
As most receiving plants for thermal coal are situated in the coastal regions of Andhra Pradesh, Tamil Nadu and Gujarat and are close to the ports, greater focus will be on

strengthening supply-side connects from mine to port and onwards in connectivity projects (Exhibit 3.197).

### EXHIBIT 3.87

#### Key clusters for coastal movement of domestic thermal coal

2020 potential



<sup>1</sup> Excluding handling cost which is considered separately

SOURCE: Sigma Insights; coal optimisation model

Currently, only about 17 rakes on an average move daily from Talcher to Paradip. There are many sectors within these routes between Talcher/Ib Valley and Paradip/Dhamra where the line capacity utilisation is quite high (Table below). At present, although the entire Talcher-Paradip line is doubled and electrified, the heavy freight traffic on that line makes it imperative to expedite 2 critical initiatives between Talcher – Paradip – Automatic Signalling and Intermediate Block Signalling projects

on the entire Talcher-Paradip route, and 3rd and 4th line from Budhapank to Salagaon. Similarly, in case of the rail corridor towards Dhamra port, there is heavy congestion on the stretch between Kapilas Road and Bhadrak on the main Howrah to Chennai line, with utilisation as high as 130-140 per cent on the ~85 Km long Kapilas Road—Bhadrak stretch. On the Ib Valley side, there is heavy congestion on the railway lines from Jharsuguda up to Angul and Titlagarh.

### IB VALLEY/TALCHER TO PARADIP/DHAMRA RAIL LINK

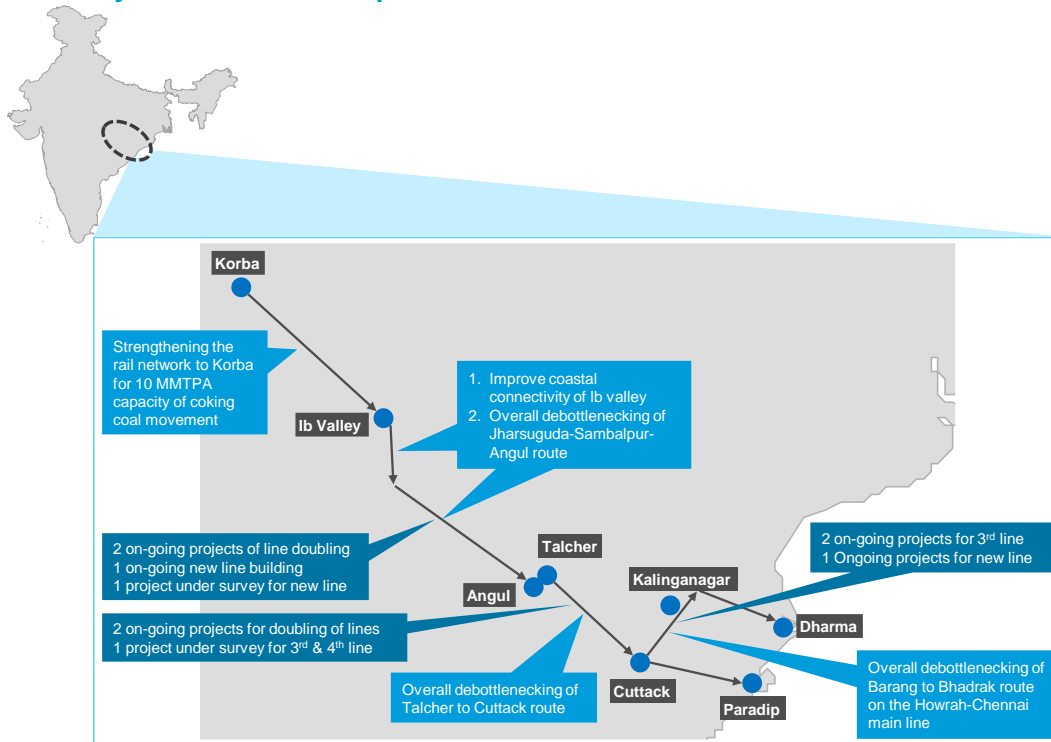
S No.	Section	Div./Rly	Distance (km)	Line capacity	Capacity utilisation (%)
1	Talcher–Budhapank	Khurda Road–ECOR	11	61	100
2	Budhapank–Rajatgarh	Khurda Road–ECOR	62	52	117
3	Rajathgarh–Salagaon	Khurda Road–ECOR	23	56	92
4	Salagaon–Nirgundi	Khurda Road–ECOR	3	61	47
5	Nirgundi–Cuttack	Khurda Road–ECOR	9	60	134
6	Cuttack–Paradip	Khurda Road–ECOR	83	43	89

As per the projected volumes of coastal shipment of thermal coal, the required daily movement could potentially increase almost five to seven times demanding up to 120 rakes per day. Therefore, alongside the heavy haul rail system, certain line strengthening/expansion interventions would be required in many sectors for realising the full opportunity.

Exhibit 3.198 present the ongoing and upcoming projects of the Indian Railways, which in the near and medium term (by 2020) would lead to a capacity increase of roughly 60 to 70 MTPA. Expeditious and smooth execution would enable quick ramp up of coastal cargo from the state.

## EXHIBIT 3.88

### IB Valley/Talcher to Paradip/Dhamra rail link



To service the demand of blast furnace-based steel production, around 60 to 65 MTPA of coking coal is transported in the country and around 54 MTPA is consumed for the production of steel. Around 80 per cent of the coking coal consumed is imported. Key challenges faced by the industry are related to congested railway lines and shortage of rolling stock and locomotives. The current rail network is already congested and may not be sufficient for the projected freight load due to the growth caused by programmes like “Make in India” and anticipated increase in steel production. Over 90 per cent of rail routes relevant for the movement of coking coal have more than 100 per cent utilisation, such as the Howrah–Bilaspur, Visakhapatnam–Bhilai, Dhamra/Paradip–Bhilai/Rourkela and Dhamra/Paradip–

Durgapur/IISCO lines. This causes delays in transporting coking coal from the ports to the plants. For example, the travel time for coking coal from Visakhapatnam port to Bhilai plant is approximately 1.5 times the average.

Keeping these factors in mind, capacity augmentation on multiple routes would be required to solve port evacuation issues on the eastern side of the country.

While the Ib/Talcher to Paradip/Dhara capacity augmentation and Eastern DFC will solve many of the mentioned capacity issues, the other major route is between Chhattisgarh steel belt and Visakhapatnam port which is quite important for steel-related connectivity.



## Projects for the Eastern coast

Project name	Agency	Concerned state	Investment required (INR cr)	Timeframe
3rd and 4th Line from Budhapank (BDPK) to Salegaon (SQQ) via Rajathgarh (RJGR)	Indian Railways (ECOR)	Odisha	1,500	12 months
Doubling of line from Rajathgarh (RJGR) to Barang (BRAG)	Indian Railways (ECOR)	Odisha	276	12 months
New Line from Angul (ANGL) to Sukinda Road (SKND) (~99 km)	Indian Railways (ECOR)	Odisha	302	12 months
New Line from Haridaspur (HDS) to Paradip (PRDP) (~82 km)	Indian Railways (ECOR)	Odisha	1,118	12 months
3rd Line from Bhadrak (BHC) to Nergundi (NRG)	Indian Railways (ECOR)	Odisha	837	12 months
3rd Line from Jakhapura (JJKR) to Haridaspur (HDS)	Indian Railways (ECOR)	Odisha	150	12 months
New line from Talcher (TLHR) to Kharagpur (KGP) via Baripada	Indian Railways (ECOR)	Odisha	5,000	12 months
New line from Talcher (TLHR)-Angul (ANGL)	Indian Railways (ECOR)	Odisha	500	12 months
Doubling of Line from Titlagarh (TIG) to Sambalpur (SBPY)	Indian Railways (ECOR)	Odisha	1,351	12 months
Doubling of Line from Sambalpur (SBPY) to Talcher (TLHR)	Indian Railways (ECOR)	Odisha	679	12 months
New line from Jharsuguda (JSG) to Barpalli (BRPL)	Indian Railways (ECOR)	Odisha	1,000	12 months
Third line from Sukhinda Road to Jakhapura	Indian Railways (ECOR)	Odisha	69	12 months
IB Signalling for RV line	Railways	Andhra Pradesh	50	12 months
New Railway line bridge between Jajpur and Sukinda Road stations for ~50 km	Railways	Odisha	400	12 months
Doubling of rail line from Bhadrak to Dhamra Port	Railways	Odisha	1,500	24 months
Heavy Haul rail corridor between Ib Valley–Talcher and Paradip, Dhamra port	Railways	Odisha	6,500	120 months

Even if all the rail projects proposed in the area were to be developed in the next five years, the lines would still be running at 100 per cent utilisation, assuming the base case

of 80 to 90 MTPA of coal being coastally shipped. In the event that all power plants, for whom coastal shipping works out to be cheaper than rail, were to opt for the coastal

route, the volume of coastally shipped coal would reach around 130 MTPA by 2020. Additionally, in case port-based linkage enabled smaller non-power players to take coastally shipped coal, an additional capacity of 50 MTPA will be required on this line.

Hence, in the longer term, larger solutions are required to cater to the demand on this route. In this regard, a heavy haul rail system between Talcher-Ib Valley and Paradip could be considered. A heavy haul system has a number of advantages:

- Higher capacity wagons and more wagons per rake resulting in lesser number of rakes required (41 rakes vs. 96 rakes per day based on current rail system for transporting 140 MTPA of coal)
- Decrease in the number of loading and unloading streams required due to fewer rakes

The configuration of the potential heavy haul rail system from Talcher to Paradip would be:

- Number of rakes per day: 41
- Locomotive: WAG 7 (4 locos per rake)
- Wagons: 118 BOXN/BOBR (two rakes combined) with payload 80 tonnes per wagon

To establish such a heavy haul system, the following projects would need to be undertaken:

- Building long haul loops in the Talcher–Paradip stretch
- Building holding lines in various sections to avoid passenger traffic interruption
- Procuring heavy haul wagons and locomotives as per the given configuration

The Railways have already started undertaking a number of projects towards moving to a heavy haul system:

- The line between Talcher and Paradip already has a 25T axle load, which is sufficient for the proposed heavy haul system
- Currently, a heavy haul rake runs approximately once every two days, usually on an ad hoc basis, which could be increased to five per day in less than a year
- New wagons are being procured with payload capacity increased from 67T to 80T

Infrastructure required	Per unit cost	Investment required (INR cr)
4 WAG–7 locomotives required per rake for about 41 rakes	INR 10 cr per locomotive	1,650
118 wagons per rake for about 41 rakes	INR 20 lakh per wagon	970

The current connectivity between the Goa and Bellary clusters is running at critical utilisation, with very limited scope for increasing capacity, hindering the

development of new ports in North Karnataka, e.g., Belekeri, Tadadi and Pavinkurve.

Hospet–Vasco is a key line which connects the Mormugao port with the steel clusters located in Bellary and Tornagallu and with the power plant clusters situated in Kudgi, Belgaum. The average daily rake frequency of 10 to 11 transports mainly thermal coal and imported coking coal at a current

effective capacity utilisation of around 95 per cent<sup>43</sup>. Efforts to improve connectivity would need be taken keeping in mind the expected increase in demand of coking coal and thermal coal to amount to 30 MTPA from the existing 13.5 MTPA (Exhibit 3.199).

**EXHIBIT 3.89**

**Hospet – Mormugao connectivity improvement**

Line doubling is essential for the volume requirements of port in future

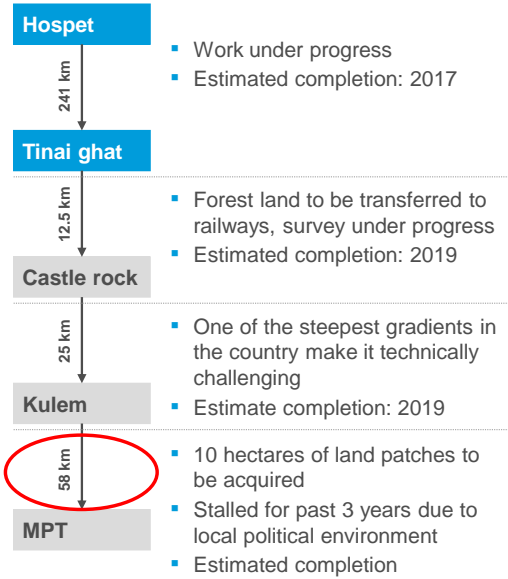
**Current scenario – single line**

Line capacity	14 rakes
Avg. rakes from port	11 rakes
Maximum cargo capacity	13.5 MTPA
Expected demand by 2020	30 MTPA

**Capacity enhancement by doubling line**

Avg. rakes from port	45–50 rakes
Maximum cargo capacity	>60 MTPA

Last mile connectivity is a challenge



The commissioning of double line on the entire Hospet–Vasco route would need to be considered with a long-term view of boosting rail line capacity post 2025. Expediting construction of the section passing through the Western Ghats on the Castle Rock–Kulem stretch would require significant technical expertise.

In the short to medium term, two strategies could be considered to boost the capacity on this line:

- Exploring the feasibility of using heavy haul rail system by strengthening the existing line and making it 25T axle load

compliant. This would lead to an increase of 25 to 30 per cent in capacity.

- Allowing goods trains to run simultaneously with passenger trains from Castle Rock to Kulem. Currently, as per the order of the Railway Commissioner (Safety), if a passenger train travels downhill on that route, no other goods train is allowed to move in this section even though the goods trains are well equipped with supplementary braking power in the event of a brake failure. If allowed to run simultaneously, there could be a

<sup>43</sup> South Western Railway Headquarters, Hubli

potential to increase the rakes per day by 15 to 20 per cent.

As a result of brisk doubling of the Hospet–Tinaighat section, there is also a “risk” of

passenger trains getting augmented on the Mumbai–Bengaluru route (via Londa junction). The long-term impact of this on the freight route between Hospet–Vasco needs to be assessed.



### Key projects

Project name	Agency	Concerned state	Investment required (INR cr)	Timeframe
Hospet–Hubballi–Londa–Tinaighate–Vasco da Gama	Railways	Karnataka	1,458	12 months
Doubling of Hospet–Vasco line through Castle rock	Railways	Goa	3,500	60 months
Bellikeri port to Ankola railways line	Railways	Karnataka	1420	60 months
Rail evacuation from port to Hospet and Bellary (Hubli–Ankola link)	Railways	Karnataka	1000	24 months

#### 3.2.3.2 Last mile connectivity

In addition to the sending ports, it is important to improve the connectivity of the receiving ports to the final consuming power plants in the country. Krishnapatnam and Tuticorin are the two major ports that need to be connected to power plants to ensure that the end-to-end landed cost of this mode is cheaper than a mine-to-plant rail connect.

- Krishnapatnam: Laying of new line between Obulavaripalle–Krishnapatnam

and doubling of Krishnapatnam–Venkatachalam line to ensure smooth connectivity from Krishnapatnam port to Nellore district, thereby catering to multiple power plants in that region

- Tuticorin: Building rail connectivity from Hare Island to trunk railway route to ensure that the coal evacuated at the new berths can be evacuated from the stack yard and connected to the mail line



### Last mile connectivity projects

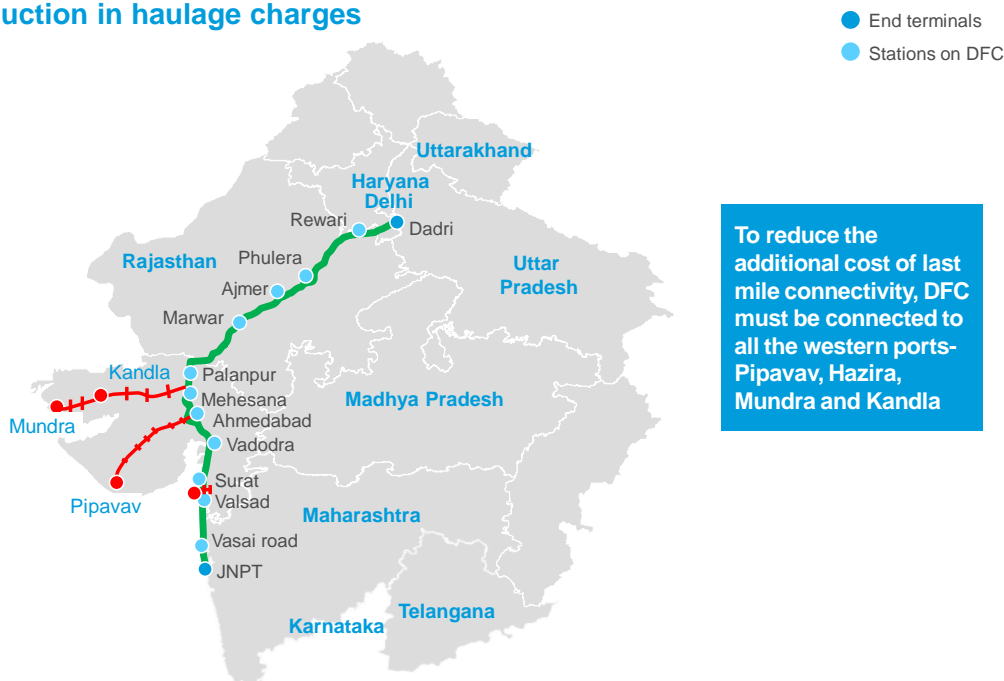
Project name	Agency	Concerned state	Investment required (INR cr)	Timeframe
New rail line between Obulavaripalle and Krishnapatnam	Railways	Andhra Pradesh	1185	12 months
Doubling of Krishnapatnam–Venkatachalam	Railways	Andhra Pradesh	87	12 months
Rail connectivity from Hare island to Tuticorin port	Railways	Tamil Nadu	105	24 months

Last-mile connectivity of the western Dedicated Freight Corridor (DFC) to Gujarat/Maharashtra port is critical for EXIM container evacuation. To avoid at least last mile connectivity charges, DFC stations

need to be connected to the nearest ports. Three spur line projects, which connect the ports to the western DFC, have been proposed (Exhibit 3.200).

### EXHIBIT 3.90

#### DFC can make rail economically more viable due to reduction in haulage charges



SOURCE: DFCCIL





### Proposed spur lines for railways

Project name	Agency	Concerned state	Investment required (INR cr)	Timeframe
Spur line connecting Western DFC to Mundra	Railways	Gujarat	3,500	24 months
Spur line connecting Western DFC to Pipavav	Railways	Gujarat	2,500	24 months
Spur line connecting Western DFC to Hazira	Railways	Gujarat	300	24 months

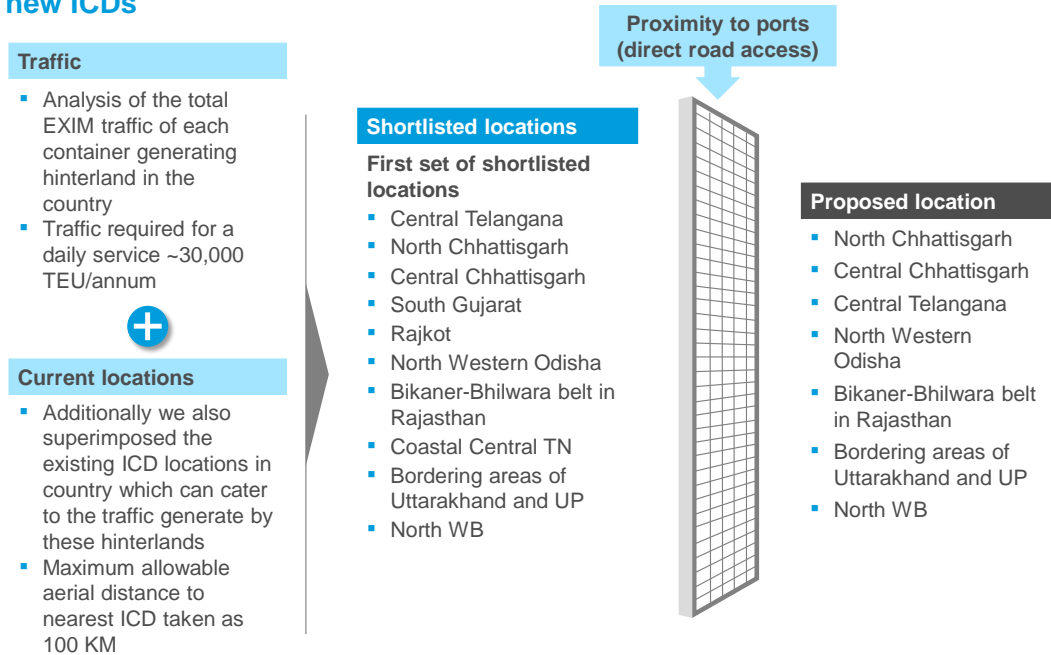
#### 3.2.3.3 New multi modal hubs

Setting up multimodal hubs at the right locations enables the overall transportation grid of the country to function efficiently and also reduce the cost and time taken to export, making the exporters competitive in the global market. In order to address this challenge, seven locations have been identified, as potential sites for multimodal hubs, through the multi-model optimisation model where the total EXIM traffic at each container generating point in the country and the traffic required for daily service were analysed. These container generating

points were superimposed on the existing multimodal hub network in the country to locate regions where containers have to travel long distances to reach an aggregation point. Some of the shortlisted locations were later removed due to their proximity to ports. An illustration of the process can be seen in Exhibit 3.201. Isolated pockets and locations for proposed multimodal hubs are shown in Exhibit 3.202 and 3.203. In this section, ICDs refer to land based multimodal hubs and have been used interchangeably.

## EXHIBIT 3.91

### Methodology used to come up with hypothesis for the locations of new ICDs

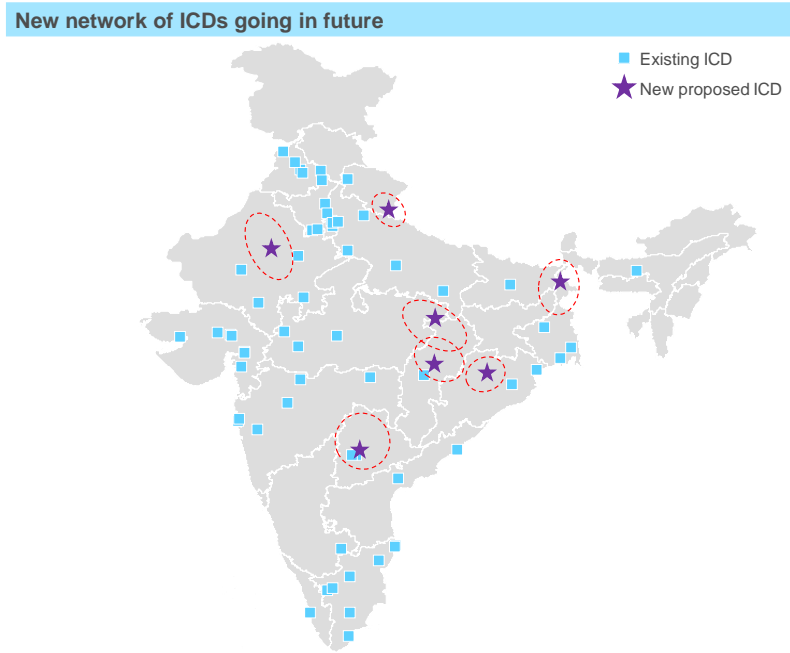


The seven proposed multimodal hubs lie in the states of Madhya Pradesh, Chhattisgarh, Rajasthan, Odisha, Uttarakhand and West Bengal. All the multimodal hubs are situated in regions of high potential for traffic with important industrial clusters, which makes their presence advantageous for the transport of containerized commodities. The presence of these multimodal hubs reduces the distance that the commodities have to travel in order to be aggregated for formal

transport. For instance, the proposed ICD in West Bengal reduces the distance for perishable commodities, such as pineapples, mangoes, litchis and tea, to reach an ICD. ICDs in Chhattisgarh, Odisha and Telangana would ideally be linked to container terminal at Visakhapatnam port for optimizing the movement. Specific details about the seven ICDs are given in the following Exhibit 3.204, 3.205, 3.206, 3.207 3.208 and 3.209.

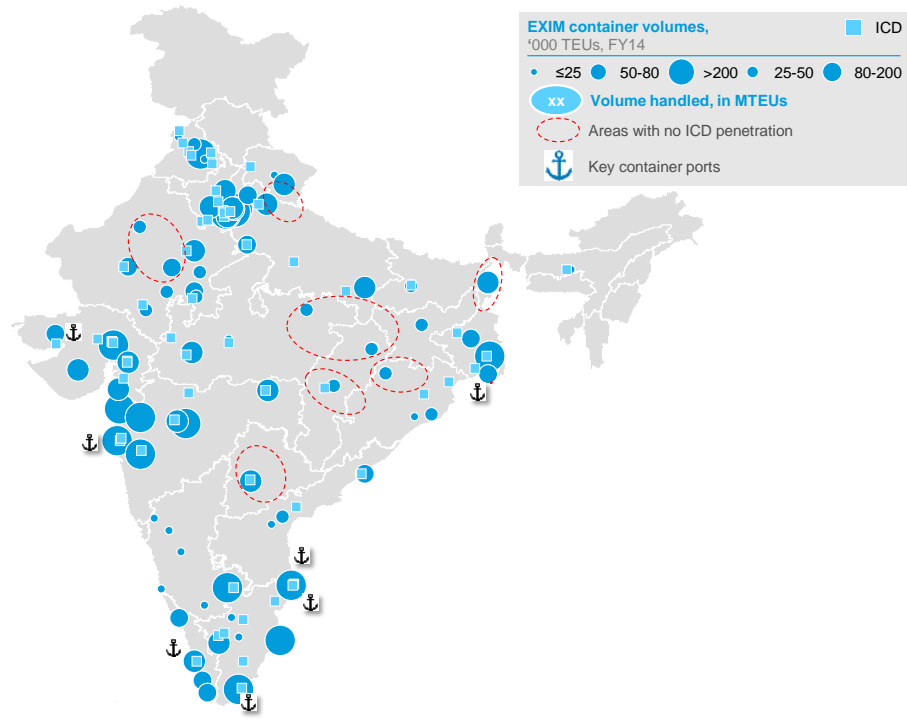
**EXHIBIT 3.92**

**Based on the above analysis we have shortlisted 7 new ICD locations where significant traffic can be foreseen**



**EXHIBIT 3.93**

**There are 6-7 isolated pockets with limited ICD connectivity in the country**



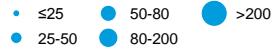
**EXHIBIT 3.94**

**Location justification for East MP/North Chhattisgarh**

**Hinterland for ICD**



EXIM container volumes, '000 TEUs, FY14



■ ICD  
★ Proposed location

**Rationale and impact**

**Rationale**

- Key Hinterland
  - Korba/Bilaspur belt in Chhattisgarh
  - Katni, Jabalpur, Satna region (Cement production)
  - South East UP
- Nearest alternate: Madhosingh and Raipur

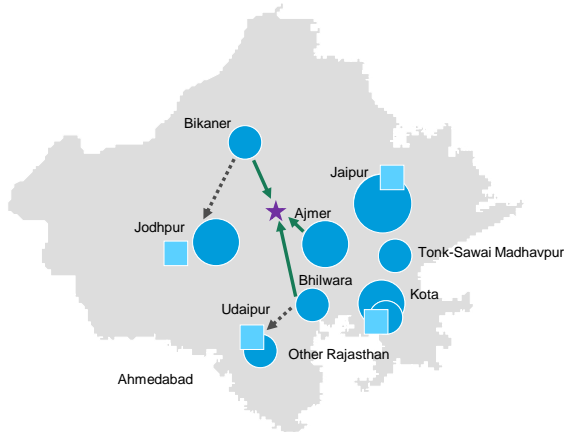
**Impact**

- Distance reduction: 150 km
- Capacity required in 2020: 104,000

**EXHIBIT 3.95**

**Location justification for Central Rajasthan ICD**

**Hinterland for ICD**



EXIM container volumes, '000 TEUs, FY14



■ ICD  
★ Proposed location

**Rationale and impact**

**Rationale**

- Key Hinterland
  - Bikaner
  - Ajmer
  - Bhilwara
- Nearest alternate: Bhagat ko Kothi and Kankura

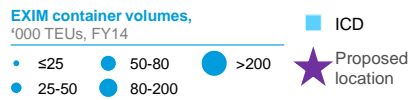
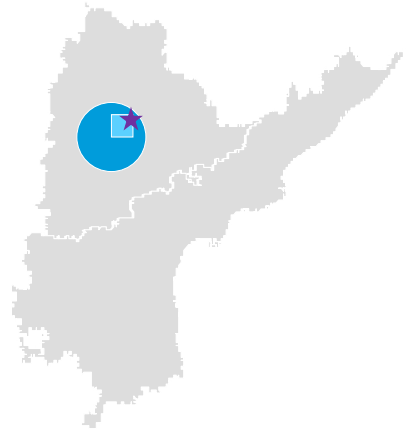
**Impact**

- Distance reduction: 130 km
- Capacity required in 2020: 200,000

**EXHIBIT 3.96**

**Location justification for Telangana ICD**

**Hinterland for ICD**



**Rationale and impact**

**Rationale**

- Key Hinterland
  - Hyderabad
- Nearest alternate: Sanatnagar (which is already congested and does not have linkages to VPT)

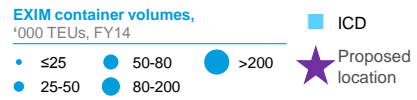
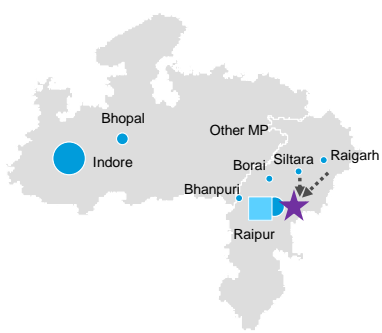
**Impact**

- Capacity required in 2020: 100,000

**EXHIBIT 3.97**

**Location justification for Central Chhattisgarh ICD**

**Hinterland for ICD**



**Rationale and impact**

**Rationale**

- Key Hinterland
  - Raipur
  - Raigarh
  - Siltara
  - Borai
  - Bhanpuri
- Nearest alternate: Raipur ICD

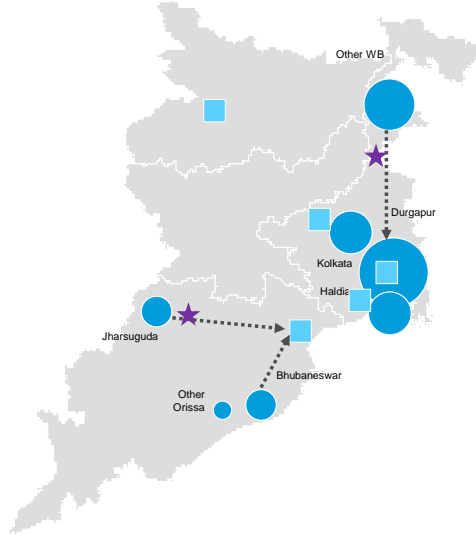
**Impact**

- Capacity required in 2020: 40,000

**EXHIBIT 3.98**

**Location justification for Bengal and Odisha ICDs**

**Hinterland for ICD**



EXIM container volumes, '000 TEUs, FY14

- ≤25
- 25-50
- 50-80
- 80-200
- >200

■ ICD

★ Proposed location

**Rationale and impact**

**Rationale**

- Key Hinterland
  - Darjeeling
  - Bhubaneswar
  - Jharsuguda
  - Farraka
- Nearest alternate: Balasore or Kolkata

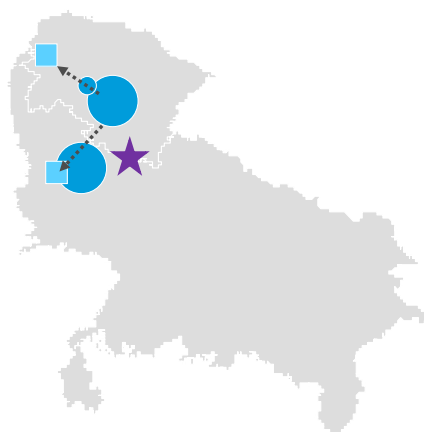
**Impact**

- Distance reduction: 300 km (Jharsuguda) and 300 km (North Bengal)
- Capacity required in 2020: 45,000 Bhubaneswar and 120,000 Northern Bengal

**EXHIBIT 3.99**

**Location justification for Uttarakhand/UP ICD**

**Hinterland for ICD**



EXIM container volumes, '000 TEUs, FY14

- ≤25
- 25-50
- 50-80
- 80-200
- >200

■ ICD

★ Proposed location

**Rationale and impact**

**Rationale**

- Key Hinterland
  - Western UP
  - Eastern Uttarakhand
- Nearest alternate: Baddi or Moradabad

**Impact**

- Distance reduction: ~100 km for UP and Uttarakhand hinterlands (except Baddi and Moradabad)
- Capacity required in 2020: 200,000



## Key projects

Project name	Agency	Concerned state	Investment required (INR cr)	Timeframe
New ICD Development in south Uttarakhand	Railways	UP/Uttarakhand	85	60 months
New ICD Development in North MP/CG border (Singrauli)	Railways	MP/CG	85	60 months
New ICD Development in Central Rajasthan (Nagaur)	Railways	Rajasthan	85	60 months
New ICD Development in Hyderabad	Railways	Telangana	85	60 months
New ICD Development in Jharsuguda	Railways	Odisha	85	60 months
New ICD Development in Raipur	Railways	Chhattisgarh	85	60 months
New ICD Development in North Bengal (Darjeeling)	Railways	West Bengal	85	60 months

### 3.2.3.4 Initiatives

#### 3.2.3.4.1 Aggregation of ICDs through milk runs

Many ICDs in India currently suffer from infrequent and unpredictable train schedules. Aggregation of ICDs in the form of a “milk-run” would mean the same train going through different ICDs to aggregate containers to improve frequency of trains at

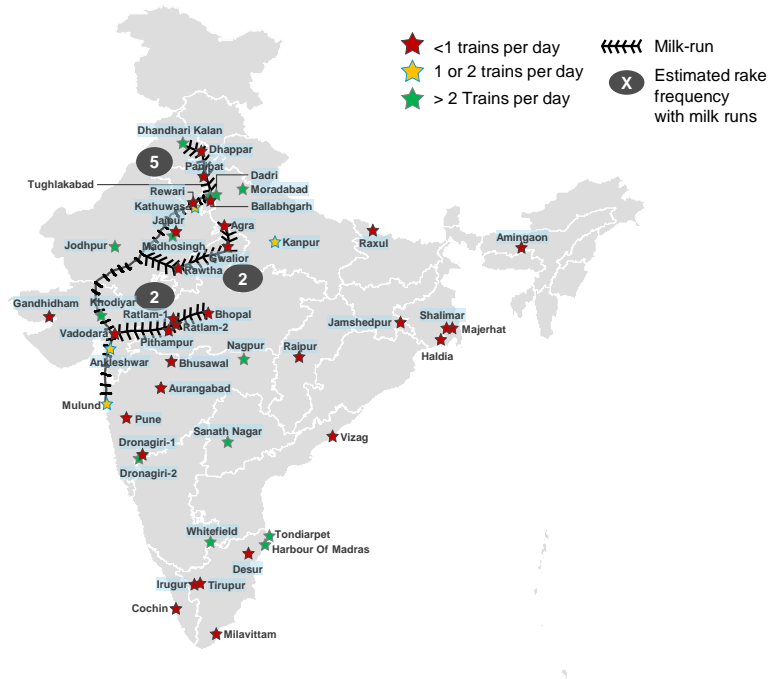
different ICDs. Some ICDs which can be inter-connected to finally connect to a DFC station include (Exhibit 3.210):

- Dhandhari Kalan → Dhappar → Panipat → Tughlakabad
- Agra → Gwalior → Rawtha
- Bhopal → Ratlam → Pithampur → Vadodara

**EXHIBIT 3.100**

**A “milk-run” service connecting ICDs will improve rail rake frequency**

FY14



**3.2.3.4.2 Price rationalisation for containers on railways**

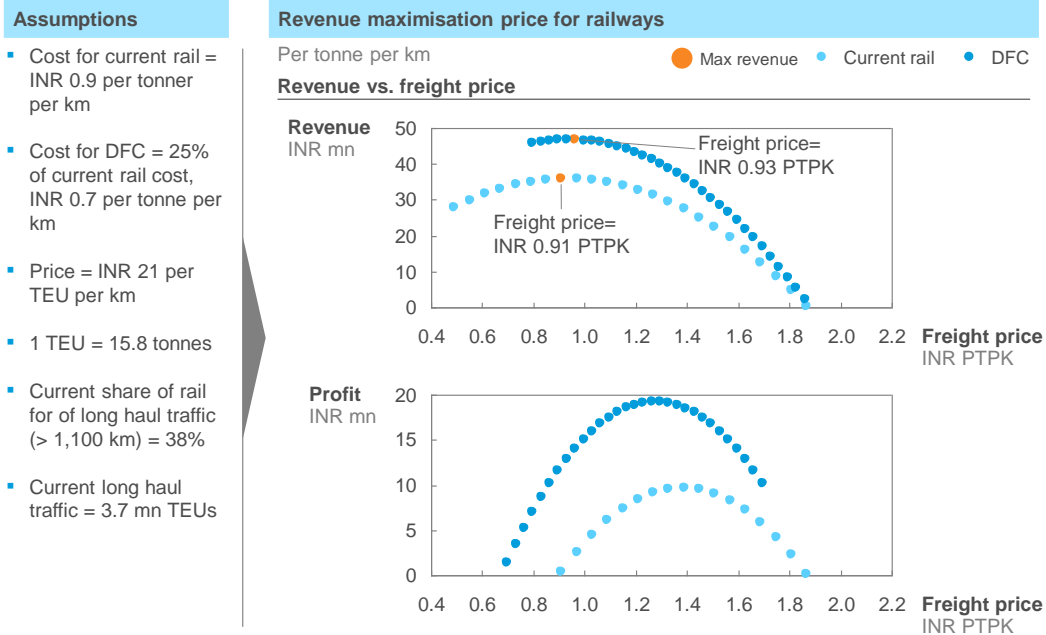
The analysis of current and optimal revenue for railways shows that current rail can maximise its revenue at charges of INR 14 to 15 per TEU per km for an average distance of 1,100 km as opposed to the prevailing charges of around INR 21 per TEU per km (reduction of roughly

33 per cent). The same analysis for DFC shows that revenue would be maximised at around INR 15 per TEU per km (Exhibit 3.211). The higher price in DFC as compared to current rail is because DFC is dedicated to cargo handling with the ability to carry four times the cargo (DFC will be double the length with double-stacked containers as compared to current rail).



## EXHIBIT 3.101

### Enabler for increased rail share: Rationalisation of rail freight charges



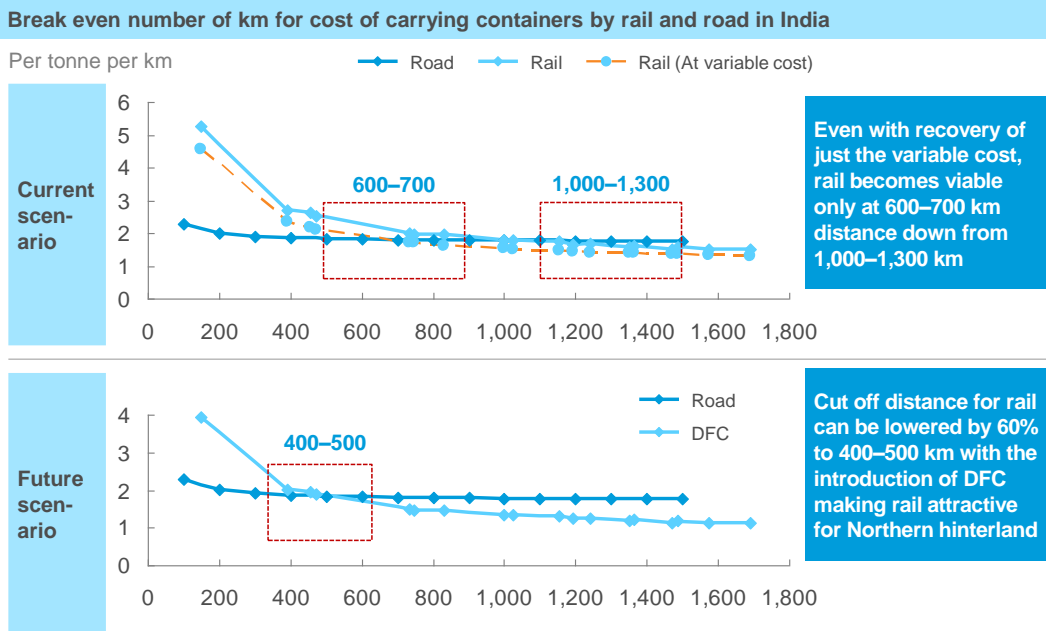
SOURCE: CONCOR; transporter interviews

Even a 25 per cent reduction in freight charges for DFC (from INR 21 per TEU per km to INR 16 per TEU per km) can still yield an IRR of 16 per cent assuming DFC investment of INR 48,000 cr and amortization period of 30 years. This

reduction in price can reduce the cut-off distance where rail becomes more economical than road for current rail current rail from 1,000 or 1,300 km to 400 or 500 km (Exhibit 3.212).

**EXHIBIT 3.102**

**Enabler for increased rail share: Rationalisation of rail freight charges**

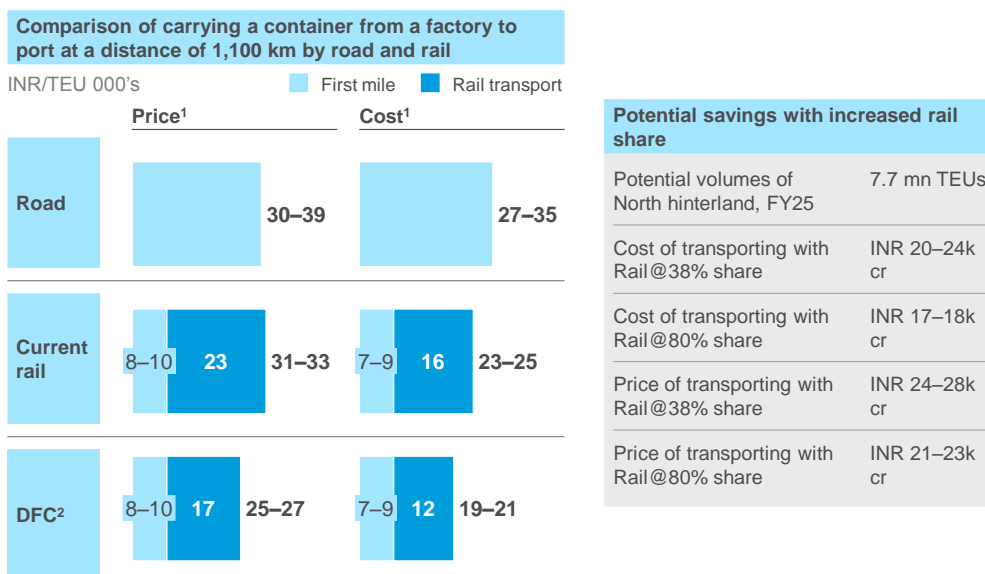


SOURCE: CONCOR; transporter interviews

The shift from road to rail will be driven primarily by the northern hinterland, including NCR, Punjab, Haryana, Rajasthan and western UP, which would contribute around 30 per cent of container volumes by FY 2025. With 25 per cent reduction in freight charges allowing DFC to handle 80

per cent of the above volumes, rail share could go up from 18 to 25 per cent (Exhibit 3.213). Assuming a growth rate of around 8 per cent in container volumes until FY 2025, the higher rail share could lead to potential savings of INR 2,000 to 3,000 cr.

### EXHIBIT 3.103



<sup>1</sup> Does not include ICD/CFS and port handling charges

<sup>2</sup> To achieve IRR of 16%, prices can be reduced to 25% assuming cost of building western DFC is INR 48,000 cr at current cost of construction, 25% lesser operating cost due to double stacking, no cross subsidisation and capex amortisation over 30 years

SOURCE: Interviews with DFCCIL; transporters

#### 3.2.3.4.3 Increasing priority for freight trains on railways network

One of the major reasons for the slow movement of the freight trains on the rail network is the fact that freight traffic is given the lowest priority in terms of right of way on the tracks. Given that freight is one of the biggest revenue generators for the railways, due weightage should be given to freight while deciding the right of way on the tracks.

#### 3.2.3.4.4 Integrated pricing for first and last mile stretch

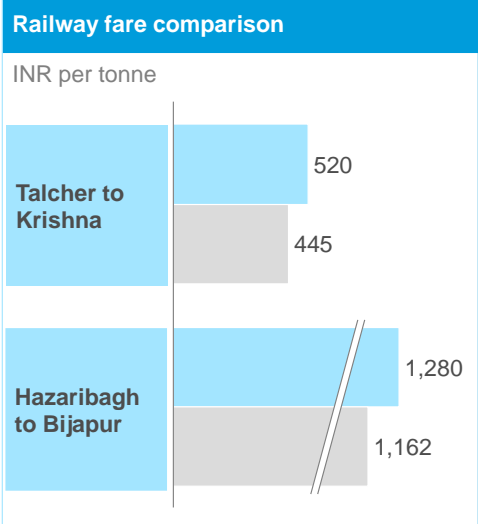
For an efficient multi modal model, it is important to have an integrated system for all the legs of transport. Currently, railways charges separately for the first and last mile of connectivity, based on their slab rates. Having an integrated pricing for the total distance including the first and last mile will have a huge impact on reducing the cost as well as integrating the multi modal model. Exhibit 3.214 shows an illustrative example of integrated rail freight charges. For instance rail freight charge for Talcher to Krishna with first mile (Talcher to Paradip) and last mile (Kakinada to Krishna) taken separately would be significantly higher than the freight charge in case of integrated pricing for first and last mile.

**EXHIBIT 3.104**

**Build a true multimodal system by having integrated rail freight charges for first and last mile connectivity**



- Current – separate charges for first and last mile
- Integrated charges for first and last leg



### 3.2.4 Roads

Road is economical compared to rail for covering distances up to 500 to 1,000 km from the port and is convenient for final exporters or importers as it provides delivery at the doorstep without additional handlings. But the current condition of highway stretches is inconsistent. In addition, the Indian coastline does not have a coastal road network.

The following interventions have been proposed for highways.

#### 3.2.4.1 10 highway stretches to be developed as freight friendly expressways

Freight friendly lanes would be needed to improve road transit time from factory to port. Exhibit 3.215 outlines potential road corridors based on traffic intensity. These corridors could to handle approximately 6 mn TEUs by FY 2025.

#### EXHIBIT 3.105

##### Current and potential critical road routes for containers

Road	EXIM volumes '000 TEUs	
	FY14	FY25
① Ahmedabad/Surat/Vadodara/Vapi-JNPT	552	1,597
② Pune-JNPT	576	1,551
③ Coimbatore-Colachel	0	167
④ Ahmedabad-Mundra	234	678
⑤ Bangalore/Trichy-Enayam	0	483
⑥ Durgapur-Haldia	227	439
⑦ Ahmedabad- Pipavav	145	432
⑧ Hyderabad-JNPT	60	147
⑨ Hyderabad-Amravati-Central Andhra port	60	139
⑩ Bangalore-Chennai	141	136
<b>Total</b>	<b>1,997</b>	<b>5,768</b>

■ Probable case for construction of 10 freight friendly road corridors expected to handle ~6 mn TEUs by FY25

SOURCE: APMT

Project name	NH	Description	Status	Cost (INR cr)
Ahmedabad to JNPT (Concerned State: Gujarat)	<ul style="list-style-type: none"> <li>■ NE1 from Ahmedabad to Vadodara</li> <li>■ NH8 from Vadodara to Ghodbunder</li> <li>■ State highway 42 from Ghodbunder to Thane</li> <li>■ NH4 from Thane to JNPT</li> </ul>	<ul style="list-style-type: none"> <li>■ 6-laning from Ahmedabad to Vadodara completed recently</li> <li>■ 6-laning of Vadodara–Surat section under construction</li> <li>■ 6-laning of Surat–Dahisar section completed</li> <li>■ 4-laning of NH4B connecting JNPT to Mumbai–Pune Expressway under way</li> <li>■ Mumbai–Vadodara Expressway project: 2 phases under construction; 1 phase scrapped due to land acquisition</li> </ul>	<ul style="list-style-type: none"> <li>■ 6-laned from Ahmedabad to Ghodbunder except Vadodara–Surat section</li> <li>■ 4-laning underway from Mumbai–Pune Expressway to JNPT</li> </ul>	18,000
Pune to JNPT (Concerned State: Maharashtra)	<ul style="list-style-type: none"> <li>■ SH50 from Dighi ICD to Mumbai–Pune Expressway</li> <li>■ NH4 from Talegaon to Panvel</li> <li>■ NH4B from Panvel to JNPT</li> </ul>	<ul style="list-style-type: none"> <li>■ Mumbai–Pune Expressway is an access controlled 6-lane Expressway</li> <li>■ 4-laning of NH4B connecting JNPT to Mumbai–Pune Expressway underway</li> </ul>	<ul style="list-style-type: none"> <li>■ 6-laned up to Panvel</li> <li>■ 4-laning underway from Mumbai–Pune Expressway to JNPT</li> </ul>	4,500
Coimbatore to Enayam (Concerned State: Tamil Nadu)	<ul style="list-style-type: none"> <li>■ SH172 to Kangayam</li> <li>■ NH67 to Vallaikoil</li> <li>■ SH84c to Aravaakurichi</li> <li>■ NH7 to Kavalkinary</li> <li>■ NH47 to Enayam</li> </ul>	<ul style="list-style-type: none"> <li>■ 4-laned from Aravakurichi to Kavalkinaru</li> <li>■ 2-laned road from Kavalkinaru to Enayam</li> </ul>	<ul style="list-style-type: none"> <li>■ 4-laned from Aravakurichi to Kavalkinaru</li> <li>■ 2-laned road from Kavalkinaru to Enayam</li> </ul>	13,000
Ahmedabad to Mundra (Concerned State: Gujarat)	<ul style="list-style-type: none"> <li>■ NH947 from Sarkhej to Maliya</li> <li>■ NH8A from Maliya to Mundra</li> </ul>	<ul style="list-style-type: none"> <li>■ 6-laning in projects from Samakhiyali to Mundra in 2 packages</li> </ul>	<ul style="list-style-type: none"> <li>■ 4-laned; 6-laning partly in progress</li> </ul>	10,000

Project name	NH	Description	Status	Cost (INR cr)
Bangalore to Enayam (Concerned State: Karnataka, Tamil Nadu)	<ul style="list-style-type: none"> <li>■ SH45 from Whitefield to Attibele</li> <li>■ NH45 from Attibele to Krishnagiri</li> <li>■ NH7 from Krishnagiri to Kavalkinaru</li> <li>■ NH47 from Kavalkinaru to Enayam</li> </ul>	<ul style="list-style-type: none"> <li>■ 6-laned up to Krishnagiri</li> <li>■ 4-laned from Krishnagiri to Kavalkinaru</li> <li>■ 2-laned road from Kavalkinaru to Enayam</li> </ul>	<ul style="list-style-type: none"> <li>■ 6-laned up to Krishnagiri</li> <li>■ 4-laned from Krishnagiri to Kavalkinaru</li> <li>■ 2-laned road from Kavalkinaru to Enayam</li> </ul>	20,000
Panagarh (Durgapur) to Haldia (Concerned State: West Bengal)	<ul style="list-style-type: none"> <li>■ NH2 From Panagarh to Dankuni</li> <li>■ NH6 from Dankuni to Kolaghat</li> <li>■ NH41 from Kolaghat to Haldia</li> </ul>	<ul style="list-style-type: none"> <li>■ Entire stretch has been 4 lanes</li> </ul> <p>NHA has identified Kolkata–Dhanbad as one of 7 Expressway projects but feasibility to be revisited</p> <p>Panagarh–Dankuni also identified as a 6-laning project under NHDP 6</p>	<ul style="list-style-type: none"> <li>■ 4-laned</li> </ul>	9,000
Ahmedabad to Pipavav (Concerned State: Gujarat)	<ul style="list-style-type: none"> <li>■ NH 8A from Sarkhej to Bagodara</li> <li>■ SH 40, 6 and 36 from Bagodara to Budhel</li> <li>■ NH 8E from Budhel to Pipavav</li> </ul>	<ul style="list-style-type: none"> <li>■ 4 laning from Budhel to Pipavav</li> </ul> <p>balance for award for 4 laning under NHDP IV</p>	<ul style="list-style-type: none"> <li>■ 4 lane road from Sarkhej to Budhel</li> <li>■ 2 lane road from Budhel to Pipavav</li> </ul>	9,000
Hyderabad to JNPT (Concerned State: Andhra Pradesh, Maharashtra)	<ul style="list-style-type: none"> <li>■ NH8 from Sanathnagar to Solapur</li> <li>■ Mumbai–Pune Expressway to Panvel</li> <li>■ NH4B from Panvel to JNPT</li> </ul>	<ul style="list-style-type: none"> <li>■ Mumbai–Pune expressway is an access controlled 6-lane Expressway</li> <li>■ 4-laning of NH4B connecting JNPT to Mumbai–Pune Expressway underway</li> </ul>	<ul style="list-style-type: none"> <li>■ City roads from Sanathnagar to Sangareddy</li> <li>■ 4-laning underway from Sangareddy to Maharashtra–Karnataka border</li> <li>■ 4-laning underway from Maharashtra–Karnataka border to Solapur</li> <li>■ 4-laning underway from</li> </ul>	22,000

Project name	NH	Description	Status	Cost (INR cr)
			Solapur to Pune <ul style="list-style-type: none"> <li>■ 6-laned from Pune up to Panvel, Mumbai–Pune Expressway</li> <li>■ 4-laning underway from Mumbai Pune Expressway to JNPT</li> </ul>	
Hyderabad to Vodarevu <sup>1</sup> (Concerned State: Andhra Pradesh)	<ul style="list-style-type: none"> <li>■ City roads from Saanthnagar to LB Nagar</li> <li>■ NH9 from LB Nagar to Vijayawada</li> <li>■ NH5 from Vijayawada to Chilakuripeta</li> <li>■ Local road from Chilakuripeta to Vodarevu</li> </ul>	<ul style="list-style-type: none"> <li>■ 6-laning underway from Vijayawada to Chilakuripet on NH5</li> </ul>	<ul style="list-style-type: none"> <li>■ 4-laned up to Vijayawada</li> <li>■ 4-laned from Vijayawada to Chilakuripeta</li> </ul>	10,000
Bangalore to Chennai (Concerned State: Karnataka, Tamil Nadu)	<ul style="list-style-type: none"> <li>■ SH45 from Whitefield to Attibele</li> <li>■ NH45 from Attibele to Maduravoyal Poonamallee High Road to Chennai Port</li> </ul>	<ul style="list-style-type: none"> <li>■ 6-laning from Attibele to Walajahpet Completed</li> <li>■ 6-laning underway from Walajahpet to Poonamalle The stretch is identified as one of the 7 proposed expressways</li> </ul>	<ul style="list-style-type: none"> <li>■ 6-laned up to Walajahpet</li> <li>■ 4-laned up to Maduravoyal</li> </ul>	10,000

1 Central Andhra port – Location subject to change



### 3.2.4.2 Last-mile connectivity and Bharatmala

Apart from containers, all other types of cargo utilise road primarily for their first and last mile movement. As part of the Sagarmala study, around 45 projects were identified for the last-mile road connectivity of key cargo types to enable this movement.

In addition to this, Government of India has undertaken the Bharatmala programme, a government programme announced in April 2015, for roads to be built along India's borders and coastal states, from Maharashtra to Bengal. Bharatmala will

eventually connect with Sagarmala, to serve its aim of joining ports and coastal regions with the hinterland through road links. Emphasis on port connectivity needs to be embedded in Bharatmala early on so that it remains a priority right from the initial stages of rollout.

Under the Bharatmala programme, roughly INR 80,000 cr is dedicated to the development of coastal/border areas including the connectivity to non-major ports of the country, which is a positive step towards enhancing the connectivity of the ports.



#### Port connectivity projects proposed under Bharatmala

Project name	Category	Concerned state	Investment (INR cr)	Timeframe
4-laning of Kakinada Anchorage Port Uppada beach road connection up to NH16 in East Godavari District of Andhra Pradesh	Roadways	Andhra Pradesh	980	24 months
4-lane road connectivity from the existing 2-lane road from Achampeta Junction to joining NH16 at Kathipudi in Godavari District in AP	Roadways	Andhra Pradesh	500	24 months
Upgrading of 24 km road to 4-lanes, connecting Nellore city to Krishnapatnam port to NH5 in SPSR Nellore District of AP	Roadways	Andhra Pradesh	350	24 months
Upgrading of existing R&B road from Chilakaru cross (NH16) to power plants	Roadways	Andhra Pradesh	300	24 months
Development of flyover bridge from sea-horses junction area to dock area	Roadways	Andhra Pradesh	277	24 months
Development of dedicated port road connectivity from NH65, 7.2-km-long dedicated greenfield 4-lane road with provision for upgrading to 6-lanes	Roadways	Andhra Pradesh	175	60 months
Upgrading of the existing 4-lane road connecting to NH16 at Gajuwaka to Gangavaram Port in to 6-lane road in Andhra Pradesh	Roadways	Andhra Pradesh	50	24 months

Project name	Category	Concerned state	Investment (INR cr)	Timeframe
RoB at Dummalapeta and Old Port Area (Kakinada)	Roadways	Andhra Pradesh	80	24 months
Port connectivity to NH-5 (Phase II)	Roadways	Andhra Pradesh	99	12 months
Development of 5 km greenfield road connecting north and south industrial clusters of Khandaleru Creek near Krishnapatnam port	Roadways	Andhra Pradesh	90	24 months
Development of greenfield bypass road for better connectivity of Gangavaram port in Visakhapatnam district (lanes to be specified)	Roadways	Andhra Pradesh	80	24 months
Upgrading of Manginapudi Beach Road to a 4-lane road to connect to cater to Machilipatnam	Roadways	Andhra Pradesh	60	24 months
Formation of a new bypass parallel road west of NFCL and CFL in Kakinada Port (Kakinada), AP	Roadways	Andhra Pradesh	70	24 months
Formation of new road from L-Arm road Junction to Dummulapeta Beach Road at NCS storage system including construction of bridge on Dummulapeta Creek at Kakinada Anchorage Port	Roadways	Andhra Pradesh	50	24 months
Upgrading existing BT Road into CC pavement from Burmah Shell area to security gate near Sakthi Gas Plant at Kakinada Anchorage port, AP	Roadways	Andhra Pradesh	31	24 months
Providing alternative road from Bhavnagar to Sosiya–Alang Ship Recycling Yard	Roadways	Gujarat	90	60 months
2 RoBs on Kandla-Kutch Road	Roadways	Gujarat	125	24 months
NH169 conversion of 2-lane into 2-lane roads from Mangalore to Mudabidri	Roadways	Karnataka	280	24 months
4-laning of Shiradi Ghat Road (Concretising for smoothening of traffic road)	Roadways	Karnataka	16	12 months

Project name	Category	Concerned state	Investment (INR cr)	Timeframe
Azhikkal Port—Proposed NH bypass and widening of 2 km.	Roadways	Kerala	61	24 months
Upgradation of SH 164 to connect Jaigad port to NH17 at Nivali	Roadways	Maharashtra	333	24 months
Flyover for GTI Entry/Exit Over the Rail Tracks at JNPT	Roadways	Maharashtra	70	24 months
Evacuation road for proposed standalone Container Terminal (330 mt extension to DPW terminal)	Roadways	Maharashtra	120	24 months
Road connectivity to Gopalpur port to connect to NH5	Roadways	Odisha	49	24 months
Development of Coastal road to the East of container Terminal II at Chennai Port	Roadways	Tamil Nadu	90	24 months
Connectivity to Colachel through Nagarcoil	Roadways	Tamil Nadu	86	60 months

### 3.2.4.3 Initiatives

#### 3.2.4.3.1 Reduction of cost and time by policy initiatives

Currently, India ranks 54th on the logistics performance index (LPI) issued by the World Bank. There are potential options for policy-related actions that could help reduce the overall cost and time for export. The details of these interventions are given in

Exhibits 3.216 and 3.217. The numbers in these examples have been taken for a sample Delhi-to-Mumbai route, which is currently one of the major trunk routes of the country.

#### EXHIBIT 3.106

#### Possible levers identified for transit time reduction

Element	Levers for time reduction	Time impact (hrs saved per 100 tonne transported)	Rationale
A Reduction stoppage time during transit	1 Integrating dynamic weighbridges, toll nakas and RTO check points	2–3	30 min per RTO x 5 RTO points (MAH o/b, AHM- i/b and o/b, Rajasthan i/b and o/b)
	2 RFID enabled seals on vehicles to enable 'zero' stoppage at RTO check posts		
	3 Integrated online sales tax platform fed through RFID seal detection on vehicles	3–5	1 sales tax per State x 2.5 hrs per sales tax point
	4 Moving 100% tolling counters to electronic tolling	3–4	15 min per naka x 15 naka per way
	5 Implement chain linking/ double driver models to ensure continuous travel	40	Double driver expected to do away with nearly 90% of resting time currently
B Loading/ unloading centers	6 DP norms for warehousing/ loading centres to mandate for necessary parking lots and sufficient approach roads to avoid truck lines	8–10	Ideally considered 1–2 hrs per truck
C Overall travel speed	7 SLA defined on timely delivery; performance based incentives on % SLA achievement	20–25	Potential speed of 45–50 km/hr can be achieved from current 25–30 km/hr
	8 Control tower operations to debottleneck issues enroute		
<b>Total time impact</b>		<b>60–80</b>	<b>Hrs per 100 tonne</b>

SOURCE: Expert interviews

**EXHIBIT 3.107**

**Four levers identified for cost reduction**

Element	Levers for time reduction	Cost impact INR PTPK	Rationale
A RTO expense	9 100% containerisation of vehicles leading to minimal overloading/ tampering possibilities	Up to 0.1	TBD
	10 Cashless transactions enabled through fuel cards/online sales tax systems/ electronic tolling, etc.		
	11 Rationalizing of state wise entry taxes for goods with state GST		
B Fuel cost	12 Reduction in time stops (as described in next section)  Infrastructure initiatives to improve % of paved surface roads	0.1–0.15	13% increase in vehicle mileage (from ~3.5 to 4 km/L of diesel)
<b>Total cost impact</b>		<b>0.15–0.2</b>	<b>INR per tonne per km</b>

SOURCE: Expert interviews

### **3.2.4.3.2 Logistics efficiency programme**

As a part of Logistics Efficiency Enhancement Program, following key initiatives could be explored to help improve India's Logistics Performance Index (LPI) ranking

#### **9. Logistics Park Development**

A master plan for logistics parks would need to be developed to facilitate freight aggregation and disaggregation at key locations, based on assessment of freight flows in the country. In addition, there is a need to focus on enabling improvements in multimodal freight movement in the country. Quick win opportunities to improve efficiencies and capacity utilisation of existing logistics infrastructure (railway freight terminal, transport nagars, etc.) through asset light interventions would need to be identified and evaluated.

#### **10. Freight Corridor Upgradation**

Corridors would need to be identified and prioritised for development/ upgrade based on assessment of freight flows and existing road infrastructure. In addition, there is a need to identify bottlenecks around existing road infrastructure (lack of city bypasses, road over bridges, etc.) on key corridors resulting in congestion and a roadmap needs to be developed to remove these bottlenecks.

#### **11. Procedural Complexity Reduction**

There is a need to look at opportunities for consolidating documentation requirements and to standardize documents across states. Reduction, standardisation and digitisation of documentation required can be explored to enable easier inter-state freight movement. In addition, there is a need to standardize processes for enabling EXIM cargo, in line with global best practices

#### **12. Development of Information and Communication Technology backbone**

There is a need to design a comprehensive Information and Communication Technology (ICT) backbone to facilitate efficient freight movement. Opportunities to connect various government departments to enable process standardisation through an ICT backbone would need to be explored. Investments in ICT infrastructure to improve freight tracking and traceability would need to be considered.

#### **13. 3PL service provider ecosystem development**

Existing landscape of 3PL service providers would need to be mapped to assess the nature of organisations, reach, and services provided, etc. In addition, a compelling business case could be explored for 3PL service providers/ other partners to partner and operate the logistics parks

### **3.2.4.4 Simplification of Customs processes**

Simplifying customs procedures could help in reducing the time taken in custom clearances. Initiatives like rollout of EDI, implementation of en-block movement in selected ports, introduction of Risk Management System (RMS) etc. have greatly improved India's perception as a facilitator of international trade. There is further scope for improvement in terms of requirement for documents and signatures indicating immediate need for automated and integrated systems.

Based on multiple interactions with Port authorities, Importers, Exporters, Shipping lines, Transporters, Freight forwarders, Customs Handling Agents, Container Freight Station officials and Ex-Customs officials, following five issues have been identified.

14. Manual filing of IGM/ EGM/SMTP even after electronic filing/generation in ICE GATE and separate submission of documents to different authorities

**Current process**

- The IGM form asks for 84 inputs to be filled including ~30 mandatory fields and need manual filing, e.g., 8 hard copies need to be submitted at various customs section at JNPT
- Sub-Manifest Transshipment Procedure (SMTP) generated automatically in ICE GATE and transmitted automatically to all concerned parties still needs to be printed and signed by customs officials and couriered to ICD operators by shipping lines (Each vessel has >20 hard copies of SMTP)
- The current Electronic Data Interchange (EDI) system has limited provisions of attaching supporting documents because of which physical copies of Bill of Entry along with supporting documents are submitted to multiple parties including customs house, port authority, regulators like FSSAI, etc. leading to delays in the clearance process

**Proposed solution**

- Submission of hard copy to be dispensed with through development of a robust Electronic Signature (ES) module in the ICE GATE
- Activate all modules of ICE GATE especially Generation of rotation number and Port clearance modules
- Provision for submission of all documents online with access to all concerned authorities including different ministries, regulators, ICD operators etc.; Eventually move towards a Port community system with integrated access to Shipping lines, Port authorities, Marine Department, Customs and Traders, e.g., HAROPA system developed by SOGET in France.
- Ensure qualified and committed manpower and infrastructure with the DG systems in the CBEC (Central Board for Excise and Customs) to ensure robust automation of Customs clearance procedures

15. Long and manual procedure for rectification of errors in filing EGM/IGM

**Current process**

- Physical application along with fee to be submitted to Customs for any modification to IGM/EGM for all kinds of fields. Customs further needs verification from Port of Landing after which BoE has to be re-submitted

**Proposed solution**

- Classification of fields into sensitive and non-sensitive with provision for modification of non-sensitive fields online without any permission from Customs or need for re-submission

16. Submission of Form 13 at port gate

**Current process**

- In ports where en-block movement has been identified (eg. JNPT), Form 13 has to be submitted in the presence of CFS agent and customs officer for gate movement of goods. This leads to congestion of up to 6-8 hours at the gates

**Proposed solution**

- Use of OCR technology to avoid paper form submission while still allowing for tracking of vehicles and containers in and out of port

17. Lack of specialized clearance system for accredited importers/exporters and requirement of large number of documents to become an accredited importer/exporter

**Current process**

- Accredited importers have to go through the normal method of movement of cargo till it reaches the CFS after which they are able to clear the cargo immediately through customs green channel procedure
- Requirement of ~200 documents to become an accredited player

**Proposed solution**

- Earmarking a separate area in the Port premises to enable faster delivery of cargo of accredited importers/exporters
- Simplification of process, e.g., history of trade, number of containers imported and exported to be taken into account to become an accredited player to register for factory stuffing and self-sealing of containers

18. Limited resources for scanning and provision for factory stuffing for accredited importers/exporters

**Current process**

- Number of scanners inadequate for the increased quantity of containers needed to be scanned



### **Proposed solution**

- Ports should supplement CBEC in providing necessary scanning equipment according to guidelines issued by CBEC

19. Same rules for checking coastal cargo as EXIM cargo

### **Current process**

- Customs treat coastal cargo the same way as EXIM cargo which is time consuming and coastal cargo is given the last preference as customs consider it as non-important cargo
- India is part of the World Customs Organization, under which coastal cargo is not subject to the same clearances as EXIM cargo; The Indian customs act also doesn't force coastal cargo to undergo the same scrutiny as EXIM cargo
- International examples of ports exists where coastal and EXIM cargo have segregate much like the airports system (e.g., Port of Antwerp)

### **Proposed solution**

- Treatment of coastal cargo to be done as per World Customs Organization (of which India is a part) and Indian Customs Act both of which dictate different scrutiny for coastal and EXIM cargo
- Benchmarking based on international examples like Port of Antwerp where coastal and EXIM cargo are segregated as is done on Airports.

This is an indicative list of some directional areas that require intervention and actions by various stakeholders of handling customs procedures.

Alignment and coordination between the stakeholders involved is critical for the transformation, and therefore the immediate action plan involves creating working groups with representation from key stakeholders such as Central Board for Excise and Customs, Port Authorities, Ministry of Shipping, Indian Railways, CONCOR and other CTOs, Port Rail Company, etc.

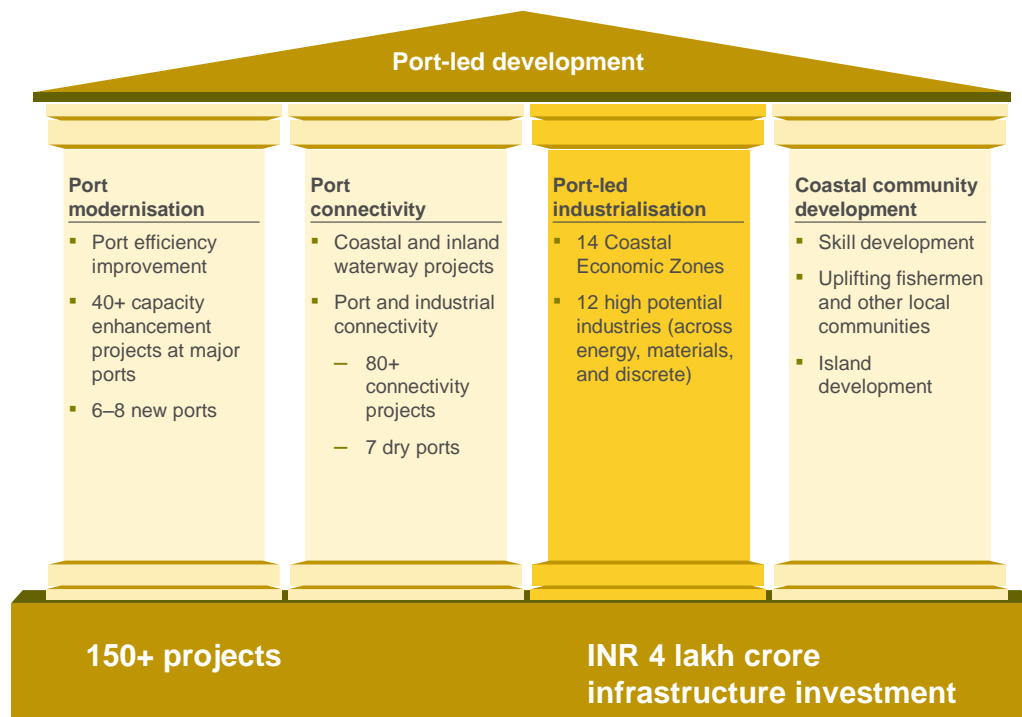
# 4. Port-led industrialisation

Port-led industrialisation is the third pillar of the port-led development model (Exhibit 4.218). Ports play a crucial role in reducing domestic logistic costs and facilitate EXIM oriented manufacturing by reducing logistics time and variability. Many countries with large coastlines like China

have leveraged ports for aiding industrialisation.

## EXHIBIT 4.72

### Sagarmala: Port-led development



An integrated and comprehensive plan for port led industrialisation has been developed which combines the growth potential of port-linked industries with the competitive location for each industry. These locations have also been mapped to the relevant major and non-major ports in the region which can most optimally facilitate the movement of cargo from the industrial locations. Reduction in overall logistics cost has been the overarching rationale for shortlisting industries and locations for port-led industrialisation. The

different industries under port-led industrialisation can be classified under three archetypes: energy, material and discrete manufacturing.

Oil refining and thermal power plants are the main industries that come under the energy archetype of port-linked industries. Similarly, under materials, steel and cement constitute the major part. This study identifies six discrete manufacturing sectors (including automotive) as high potential after the three-step evaluation process.

Overall twelve major industries covering energy, material and discrete manufacturing have been identified for port linked industrialization. Invested capital, gross value added, and direct employment have been estimated using the Annual Survey of Industries. Investment required in land and

supporting infrastructure (like roads, utility provision, etc.) for the proposed industrial parks is based on Indian benchmarks. Based on the calculations, there could be potential to generate around 40 lakh new jobs and INR 7–8 lakh cr investment from the industry (Table 1).

**Table 1**

	Proposed industrial clusters	Investment in land (INR cr)	Investment in basic infrastructure (INR cr)	Potential industrial investment (INR cr)	Employment potential (lakh)	Incremental GDP (INR cr)
<b>Energy</b>	2 refinery and petrochemical clusters	7,200	1,200	45,000	0.1	20,000
	4 gas-based petrochemical clusters	1,500	250	16,000	0.3	5,500
	3 coastal power clusters	20,000	3,500	75,000	0.2	15,000
<b>Material</b>	2 steel clusters	18,000	3,000	1,35,000	2.5	80,000
	2 marine clusters	6,000	1,000	40,000	2.5	10,000
	2 cement clusters	1,300	200	50,000	0.1	9,000
	1 automotive cluster	4,000	700	55,000	2.5	25,000
<b>Discrete</b>	2 food processing clusters	4,300	700	50,000	3	9,000
	2 science and technology clusters (electronics, instruments)	6,000	1,000	1,40,000	7	60,000
	3 apparel clusters	8,500	1,500	50,000	10	20,000
	3 leather and footwear clusters	5,000	1,000	25,000	6	13,000
	3 furniture clusters	6,000	1,000	60,000	4.5	20,000
	<b>Total</b>		<b>~85,000–90,000</b>	<b>~12,000–15,000</b>	<b>~7,00,000–8,00,000</b>	<b>~40</b>

The port led industrialisation program would be delivered through Coastal Economic Zones (CEZs) and industrial clusters. Coastal Economic Zone is an important aspect of the Sagarmala program and will be the main vehicle for kick-starting port led industrialisation in India.

Within each CEZ, there will be multiple industrial clusters categorized under energy, material and discrete industries. Competitive locations for these industries have also been shortlisted with the aim to reduce the overall logistic costs. Other factors of production that impact competitiveness like availability of raw material and skills, supporting infrastructure and existing industrial agglomeration have

also influenced the selection of locations. This has been broadly aligned with state industrial plans. Similarly, existing and proposed ports that can most optimally serve the proposed industrial locations, have been mapped.

Hence, major and non-major ports, industrial units and evacuation infrastructure have been linked into a single system at a regional level through the concept of CEZs. A CEZ would typically comprise a few coastal or coast proximate districts, and would constitute a planning unit to align various infrastructure elements within the CEZ. The exact districts covered under the CEZ could evolve.

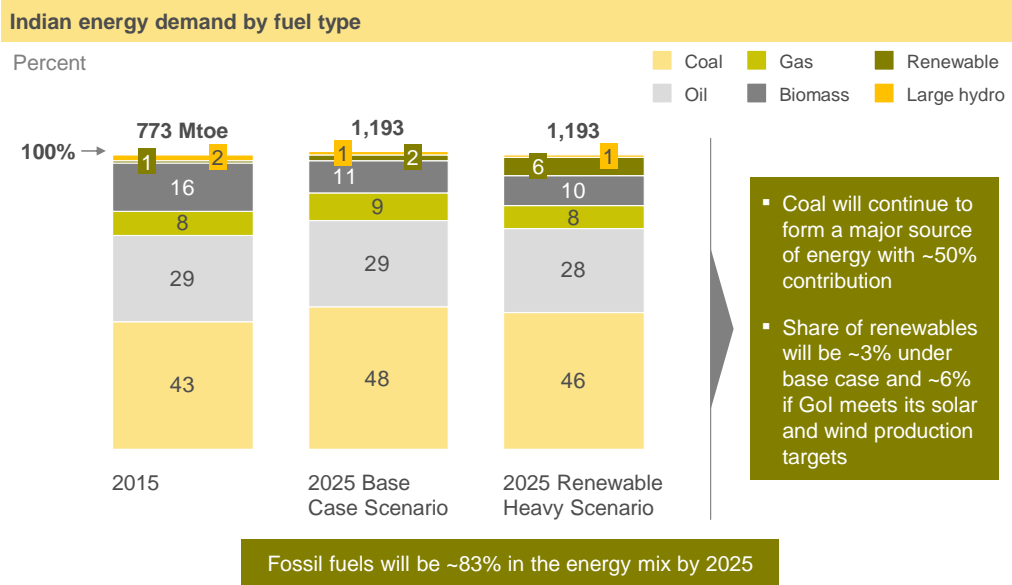
## 4.1 Energy industries

India's energy demand is estimated to grow from 773 MTOE in 2015 to about 1,200 MTOE in 2025. Coal, Oil and Gas are expected to remain central to the energy

supply mix with coal at 46 to 48 per cent and oil and gas combined at 36 to 38 per cent (Exhibit 4.219).

### EXHIBIT 4.73

#### Projections for India's energy supply mix over next 10 years



Nuclear is less than 0.5%

1 MTOE – mn tonnes of oil equivalent – The amount of energy released by burning one MT of crude oil  
2 Renewables include small hydro, solar, wind and biomass

SOURCE: IEA website; bottom up forecast

### 4.1.1 Oil and gas

#### Opportunity for India

As discussed in chapter 1, India's current oil refining capacity is ~219 MTPA. With refining expansion projects already announced, the capacity is estimated to increase to around 280 MTPA by 2025. Of this, 30 MTPA is earmarked for exports from SEZs. Hence, only 250 MTPA may be available for serving domestic demand.

Demand for petroleum products is estimated to grow to ~270 MTPA creating a shortfall of 15–20 MTPA for MS/HSD (Exhibit 4.220). Based on the analysis of regional MS/HSD flows, this deficit will primarily be in the North Indian states along

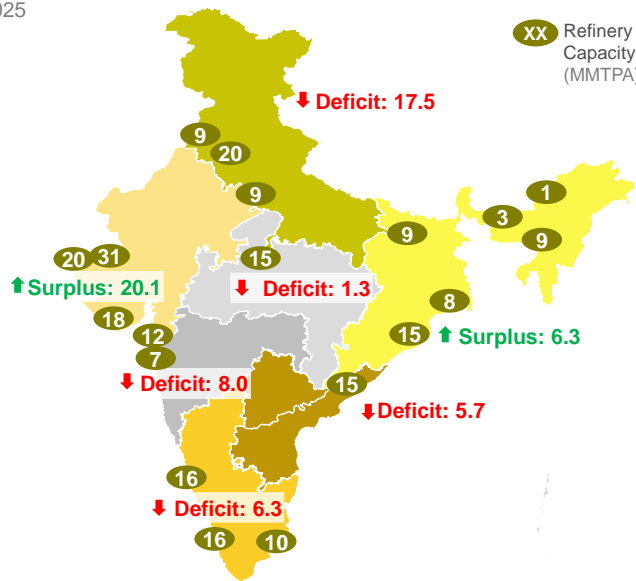
with Maharashtra, Tamil Nadu and Andhra Pradesh. Gujarat and the eastern states will have net surplus and can serve the North Indian hinterland demand. Some parts of South India can also be served through coastal shipping.

Two coastal refineries of ~10 MTPA may be required to serve the deficit in the country, one each on the West and East coast. These could be developed as port-based energy and petrochemical complexes. Prioritising coastal areas for setting-up new refineries will help to reduce logistics cost as most of the crude processed in the Indian refineries is imported through ports.

**EXHIBIT 4.74**

**By 2025, India may face ~15 MMTPA MS/HSD deficit which may require construction of two greenfield refineries**

2025



- In 2025, country is expected to face net deficit of ~15 MMTPA MS/HSD<sup>1</sup>
- This deficit will primarily be in the northern states and Maharashtra, Tamil Nadu and Andhra Pradesh
- Gujarat and the eastern states will have net surplus and can serve the North Indian hinterland demand
- Some parts of South India can also be served through coastal shipping
- There will be a requirement of two coastal refineries, one each on West and East coast

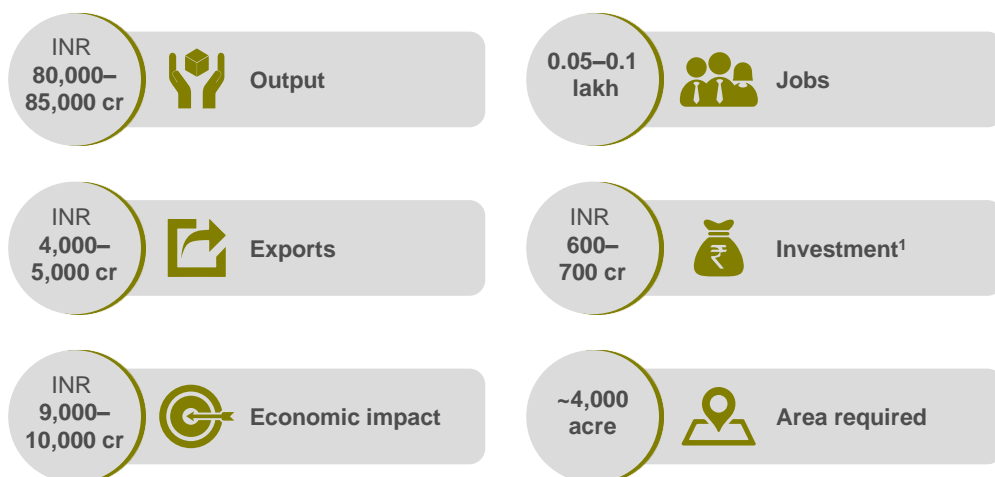
<sup>1</sup> Assumes RIL Jamnagar and Essar Oil export nothing while Reliance SEZ exports 100% product

Coastal refineries will also enable setting-up downstream petrochemical sectors as Naphtha produced from the refineries could be used as a feedstock for petrochemical production. While deficit in Andhra Pradesh could be met through the product pipeline,

greenfield refineries could come up in Southern Maharashtra and Southern Tamil Nadu. The potential impact from setting up a 10 MTPA greenfield refinery housing petrochemical manufacturing is shown in Exhibit 4.221.

**EXHIBIT 4.75**

**Potential Impact from each refinery and petrochemicals cluster**



<sup>1</sup> Investment includes only internal roads and provision for water, sewage, electricity and land levelling

## 4.1.2 Petrochemical clusters

### Opportunity for India

The consumption of petrochemicals has risen at a consistent rate of around 6 per cent in the last few years. Demand in 2006–07 was ~22 MTPA which rose to around ~33 MTPA in 2013–14. Polymers has been a mainstay of this demand with a consistent share of around 25 per cent. The category has recorded a growth of 8 per cent over years. Performance plastics, although a small category, grew at the highest rate of 12 per cent in this timeframe

Petrochemical demand is strongly correlated to GDP growth in the country. If India's GDP grows by 6 to 7 per cent over the next 10 years, the demand for

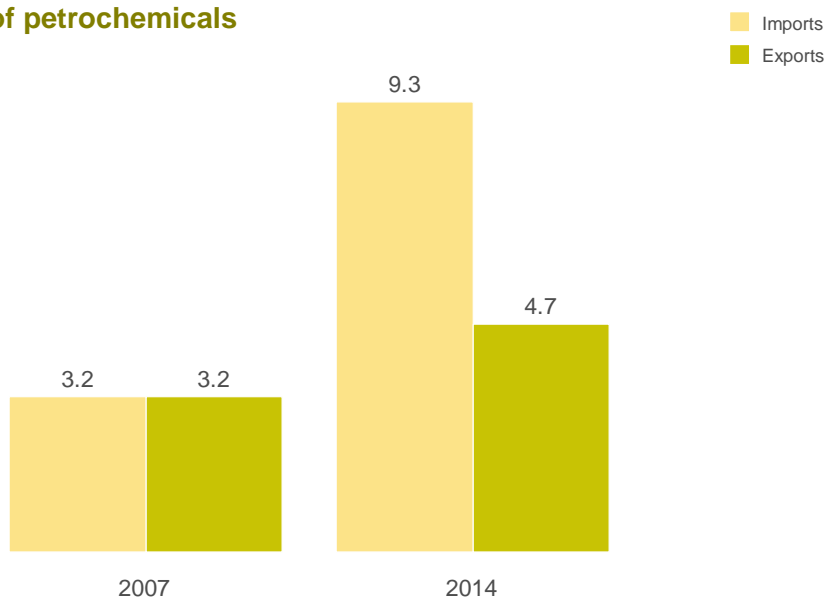
petrochemicals could be in the range of 60 to 70 MTPA by 2025.

In 2013–14, total installed capacity for petrochemicals production was around 33 MTPA. Operating at around 85 per cent capacity utilisation, the country produced around 28 MTPA of petrochemicals in 2013–14, an increase from 21 MTPA in 2006–07.

The rising gap between domestic demand and production of petrochemicals has increased India's dependence on imports. It is interesting to note that from zero trade balance in 2000, India's net trade balance in petrochemicals in 2014 was negative at around 4.6 MTPA (Exhibit 4.222).

### EXHIBIT 4.76

#### Trade balance of petrochemicals



SOURCE: MLCPCSTAT14

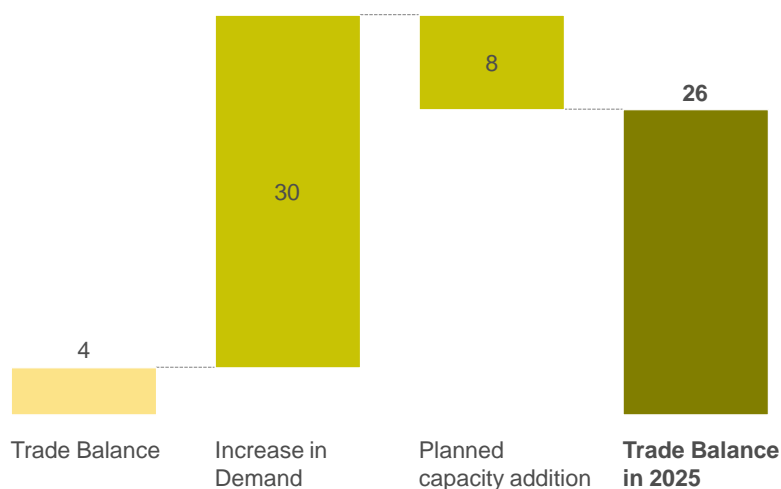
### Planned capacity expansion

It is expected that around 8 MTPA of petrochemical production capacity may be commissioned in the next 10 years. As mentioned earlier, the demand of petrochemicals might rise to around 60 MTPA and production might rise to 40 MTPA in the optimistic case. It is evident that India may require significant capacity

addition or else the import dependence will further increase. Around 25 MTPA of additional production capacity may be required to eliminate country's import dependence for petrochemicals (Exhibit 4.223). The competitiveness of these plants will need to be carefully examined under various feedstock price scenarios.

## EXHIBIT 4.77

### Trade balance in 2025 with planned capacity addition



SOURCE: MLCPCSTAT 14

### Feedstock for petrochemicals

Petrochemical plants use naphtha or gas as feedstock. Some plants are purely naphtha or gas-based, while others use dual feed.

**Availability of naphtha:** India produces around 18 MTPA of naphtha which is around 8-10 per cent of refinery crude throughput capacity. Some of the domestic consumption of naphtha happens in petrochemical plants with the balance being used as a feedstock for power generation, fertiliser plants and refineries. As Indian refineries expand capacity from the current ~220 MTPA to ~280 MTPA in 2025, the amount of naphtha produced domestically may grow to ~25 MTPA and ~20 MTPA of it can be used for petrochemical production in the optimistic case. With additional petrochemical plants coming up, the export of naphtha seems unlikely, as most of it may be used in domestic production of petrochemicals.

**Availability of gas:** Domestic gas production was around 25 MTPA in 2013–14 and no significant increase in supply from domestic sources is expected in the near future. There is currently ~20 MTPA of operational terminal infrastructure for re-gasification of LNG imports at Dahej, Hazira and Dabhol with another 5 MTPA awaiting pipeline connection at Kochi. Projects of around 45 MTPA capacity have been announced to come in the next 10 years.<sup>1</sup>

Based on the above assessment, the incremental capacity of petrochemical plants could be set up in locations where greenfield refineries are coming up (Maharashtra, Tamil Nadu) and at locations where LNG import terminals are coming up (Mundra, Mangalore, Kakinada and Ennore).

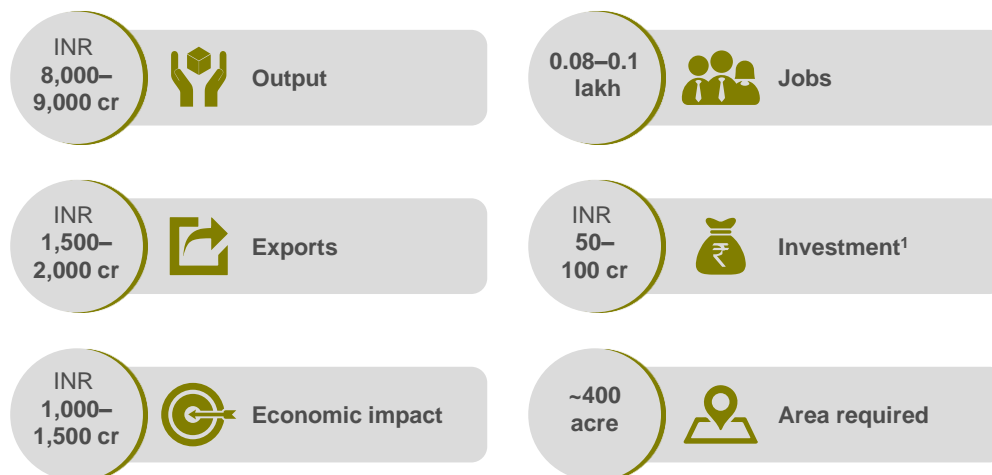
The potential impact from a ~1 MTPA petrochemical plant is shown in Exhibit 4.224.

<sup>1</sup> Natural Gas Infrastructure in India - 2030



## EXHIBIT 4.78

### Potential Impact from each gas-based petrochemicals cluster



<sup>1</sup> Investment includes only internal roads and provision for water, sewage, electricity and land levelling

### 4.1.3 Thermal power complexes

#### Opportunity for India

India's demand for coal in 2014–15 was around 850 MTPA, primarily from coal-fired power plants. With installed capacity of more than 250 GW, there was a peak deficit of around 5 per cent<sup>45</sup>. Power demand in the country could reach 280 GW by 2020. If power reforms are successful and there is mass electrification, then due to the "24x7 power to all" the peak demand could be higher. While there is a push towards renewable energy and significant capacity addition is planned under solar and wind projects, coal-based thermal power plants may still continue to meet more than 70 per cent of the country's power requirement.

Tamil Nadu and Maharashtra are both industrial states with high power demand. Maharashtra has the highest consumption in the country with ~138 bn units, while Tamil Nadu's consumption is ~93 bn units. As both the states continue to dominate the urban and industrial landscape of the country, the power demand is expected to witness a steady growth for the next

10 years. Significant capacity expansion in these states may be required—power demand in Maharashtra is likely to reach around 400 bn units by 2025, while Tamil Nadu's demand may be close to around 300 bn units.<sup>46</sup>

Pithead plants are more economical as it is cheaper to wire the power than transporting thermal coal from the minehead to plants near the demand centres. However, capacity may also be set up within the respective states with coal being transported. South Eastern and Mahanadi coalfields are expected to account for bulk of the growth in coal production. Coastal power complexes can leverage the coastal shipping of thermal coal from MCL to significantly reduce the logistics cost which could be as high as 30 per cent of the cost of power production.

Tamil Nadu is already a successful model, with plants at Tuticorin, Ennore, and Chennai leveraging coastal shipping. Southern Andhra Pradesh also leverages coastal shipping through its power complex in Krishnapatnam. Logistics cost of transporting thermal coal through rail-sea-

<sup>45</sup> CEA

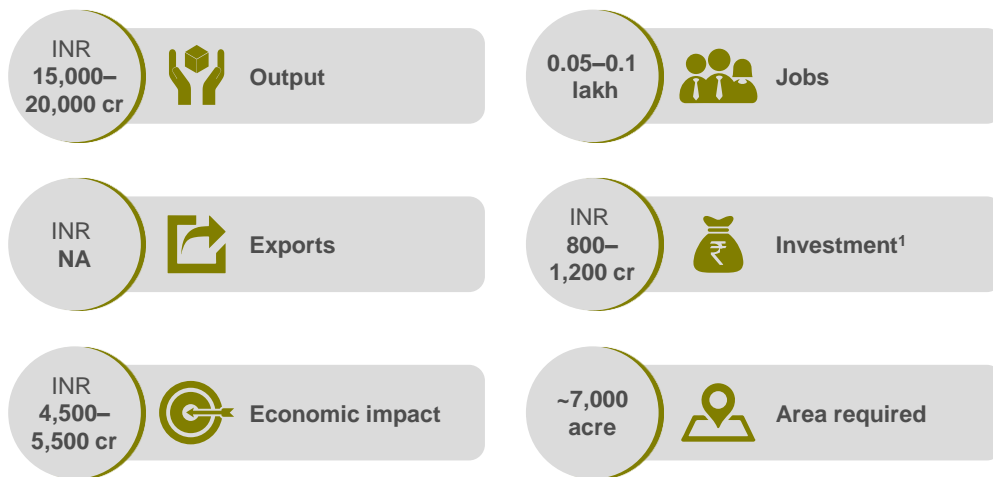
<sup>46</sup> CEA data used for projections

rail route is around 40 per cent cheaper than the rail only route. Power plants located at coastal locations benefit the most from the difference as the cost of last mile transportation is minimal. Sirkazhi in Tamil Nadu, Vodarevu in Central AP and Vadhavan in Maharashtra could be the

potential locations for building power complexes to support the power demand of these states. Coastal power complexes also have the natural advantage of access to water. The potential impact from a 5 GW power complex is shown in Exhibit 4.225. Some of these are already under planning.

#### EXHIBIT 4.79

##### Potential impact from each power cluster



<sup>1</sup> Investment includes only internal roads and provision for water, sewage, electricity and land levelling

## 4.2 Material industries

India could reduce cost of logistics by 25 to 30 per cent for serving the coastal demand of construction materials, e.g., steel and cement. While the traditional model of setting up capacity for these has been close to the hinterland, a part of the future capacity could be developed in coastal regions. Coastal steel clusters can have a multiplier impact on downstream sectors, e.g., shipbuilding and automotive.

### 4.2.1 Cement clusters

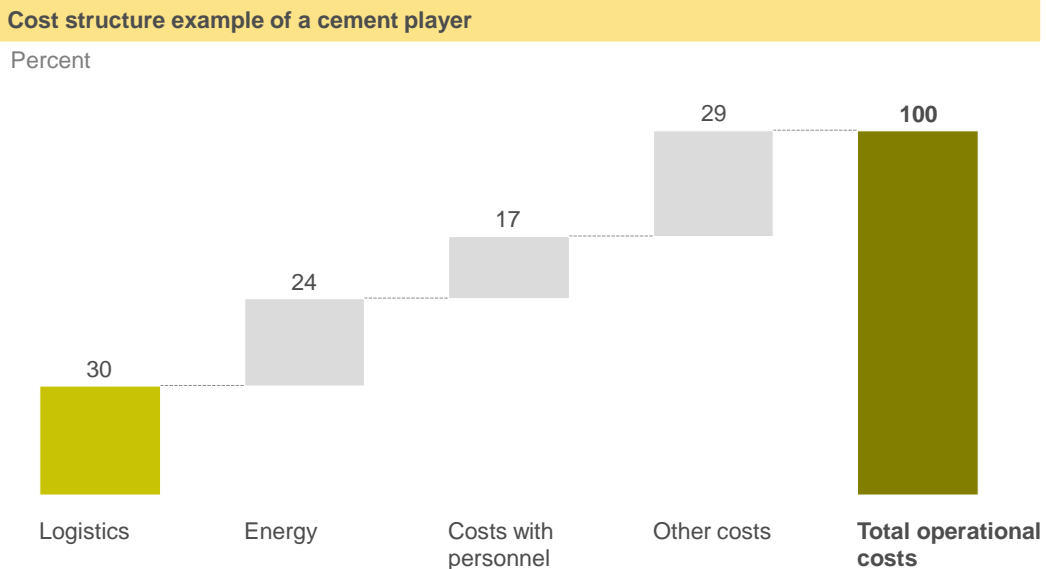
Industry overview

India's cement industry has grown from 160 MTPA capacity in 2004 to 362 MTPA in

2014. India is now the second largest global producer of cement. While the global cement market is on a downturn, the cement demand in India is projected to grow to 700–800 mn tonnes by 2025 under the base case scenario of GDP growing at 7 to 8 per cent per annum<sup>47</sup>. One tonne of cement requires 2 tonnes of raw materials. Volume of material to be transported for the cement industry may reach 1.6 bn tonnes by 2025. Logistics contribute about 25 to 30 per cent of the cost for cement. Logistics efficiency is critical for making existing capacity more competitive (Exhibit 4.226).

#### EXHIBIT 4.80

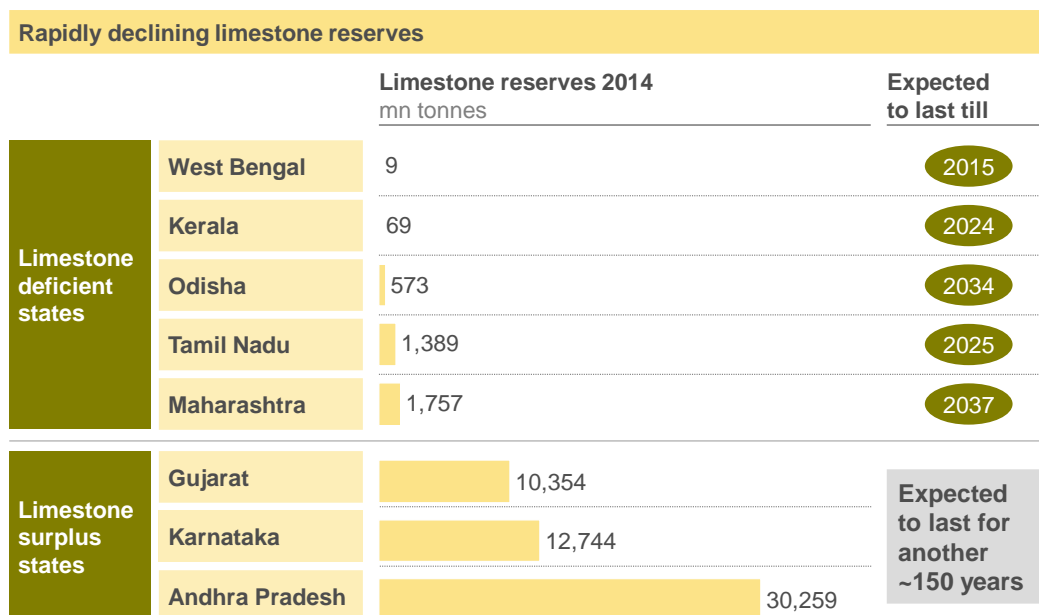
#### Logistics is the largest cost item in the cement industry



<sup>47</sup> CMAI, International Cement Reviews

## EXHIBIT 4.81

### Limestone reserve mapping for maritime states



SOURCE: International cement review, Planning commission report

### Opportunity

The traditional mode of setting up cement capacity in India has been inland plants located close to limestone reserves. Exhibit 4.227 shows that five coastal states West Bengal, Kerala, Odisha, Tamil Nadu and Maharashtra have limited and declining limestone reserves. On the other hand, Andhra Pradesh, Karnataka and Gujarat have excess limestone reserves that can support future capacity development.

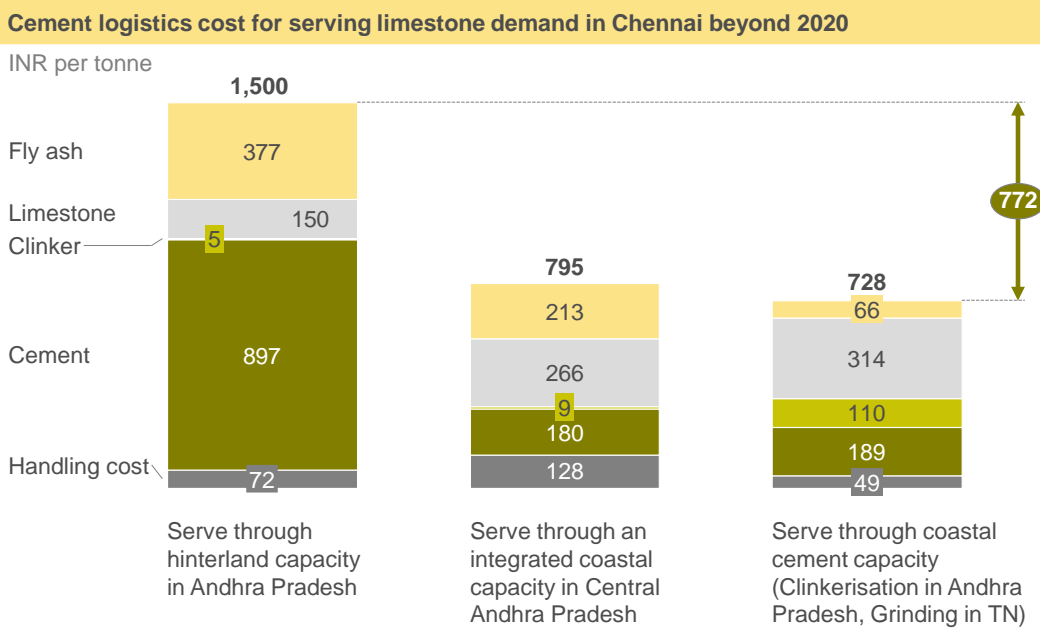
Cement demand in the limestone deficient coastal states is expected to grow to 190 mn tonnes in 2025 from the current 86 mn tonnes. Of ~100 MTPA of additional capacity required, 40 MTPA could be through coastal clinkerisation clusters in southern Gujarat and central Andhra Pradesh, with grinding units at ports close to demand centres, e.g., Mumbai, Cochin, Chennai/Ennore, Kolkata, etc. This configuration could save INR 700-800

per tonne (10 to 15 per cent of total delivered cost of cement) compared to serving this demand through hinterland plants located close to limestone reserves. The savings are driven by lower cost of fly ash and cement transport to demand centres (Exhibit 4.228).

By 2025, this 40 MTPA coastal cement capacity could be expected to save around INR 2,500 cr per annum in logistics cost. Based on the mapping of limestone reserves in India, two possible locations for setting up these clusters could be considered. In the highest limestone reserves z. In Andhra Pradesh, Guntur, Nalgonda, Kurnool and Cudappah are districts with the highest limestone reserves. These clusters could host the clinkerisation units while receiving ports could host the grinding units (Exhibit 4.229). The potential impact from a 20 MTPA cement cluster is shown in Exhibit 4.230.

**EXHIBIT 4.82**

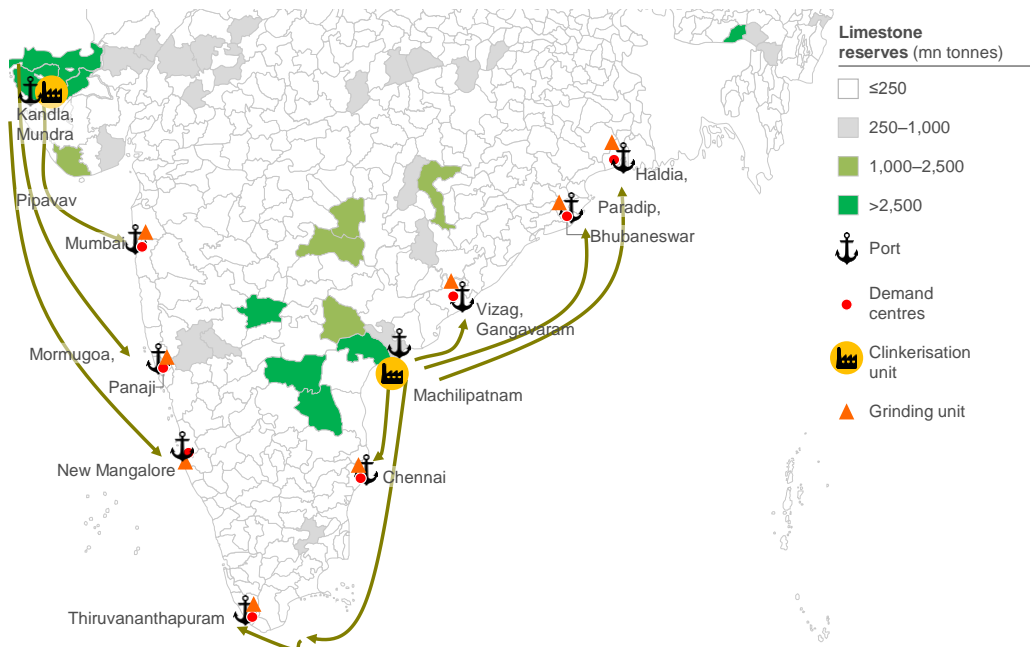
**Coastal cement plants provide logistics cost saving of ~INR 700–800 per tonne**



SOURCE: DGCIS data – 2013-14

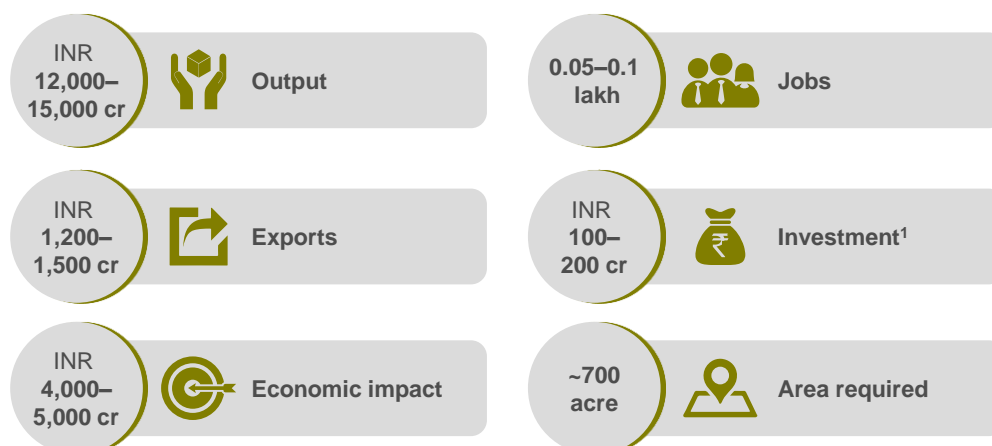
**EXHIBIT 4.83**

**Gujarat & Central Andhra Pradesh are potential locations for coastal cement clinkerisation clusters, with grinding units near demand centres**



## EXHIBIT 4.84

### Potential impact from each cement cluster



<sup>1</sup> Investment includes only internal roads and provision for water, sewage, electricity and land levelling

### 4.2.2 Steel clusters

The traditional pattern of setting up steel capacity in India has been hinterland plants located close to iron ore reserves. Of the current 103 MTPA steel capacity, ~85 MTPA follows this model. About 16 MTPA capacity is coastal, of which 3 MTPA is located close to iron ore reserves (e.g., RINL Vizag) and 13 MTPA is located close to demand centres<sup>48</sup> (e.g., Essar Hazira and JSW Dolvi) (Exhibit 4.231).

International examples of large coastal steel clusters include Pohang in South Korea which benefit from logistics cost saving, flexibility in sourcing raw material, and better linkage with global markets. About 75 per cent of the total steel capacity in South Korea is coastally located. India could aspire for 25 to 30 per cent of its steel capacity to be coastal by 2025. This could entail setting up new coastal capacity of ~40 MTPA. Coastal steel plants located close to iron ore reserves connected via a slurry pipeline could, on average, save INR 900 per tonne. Coastal capacities near demand centres could be even more cost effective (Exhibit 4.232). Based on demand projections till 2025, two new 20 MTPA capacity steel clusters could be developed

and existing coastal clusters could be further advanced.

40 MTPA of coastal steel capacity could save around INR 3,500 cr per annum in logistics cost by 2025 compared to setting up new capacity close to iron ore reserves. These savings are on account of:

- **Minimised inland logistics for coking coal:** Saves INR 1.5 per tonne-km due to import of coking coal directly at steel plants
- **Reduction in steel transportation through coastal shipping:** Saves INR 1.30 per tonne-km in steel transportation due to coastal shipping
- **Use of new technology (slurry pipelines):** These offer a low cost method of transporting iron-ore fines from mine to coast – INR 0.70 per tonne-km compared to INR 1.50 per tonne-km for rail. In addition, pelletisation at the dispatch port location also leads to valuable iron-ore fines being utilised for domestic production.

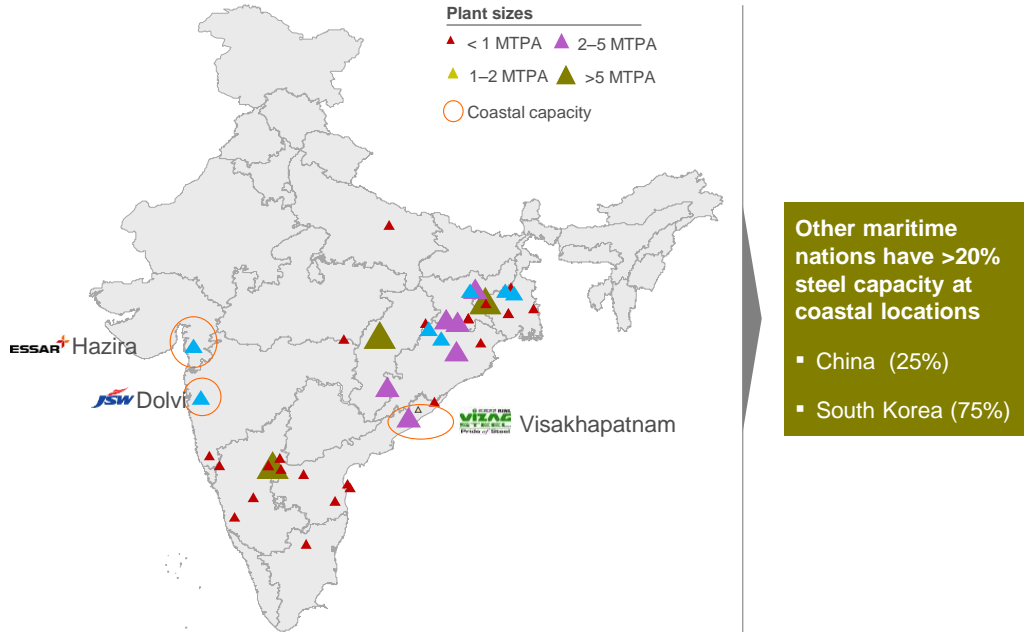
Specifically, two additional coastal steel clusters could be developed close to demand centres near Chennai and Dolvi (Exhibit 4.233), in addition to expansion of the current coastal cluster in Visakhapatnam.

<sup>48</sup> Ministry of steel

The potential impact from a 20 MTPA steel cluster is shown in Exhibit 4.234.

**EXHIBIT 4.85**

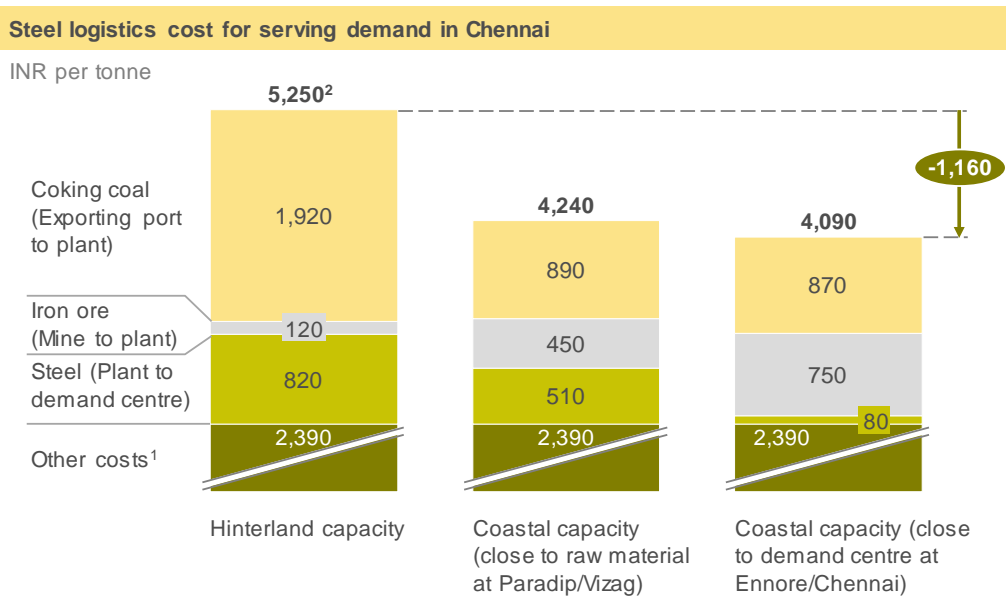
**Coastal steel capacity in India**



SOURCE: Ministry of steel; VDEH plant facts

**EXHIBIT 4.86**

**Coastal steel plants provide logistics cost saving of ~INR 1,000 per tonne**

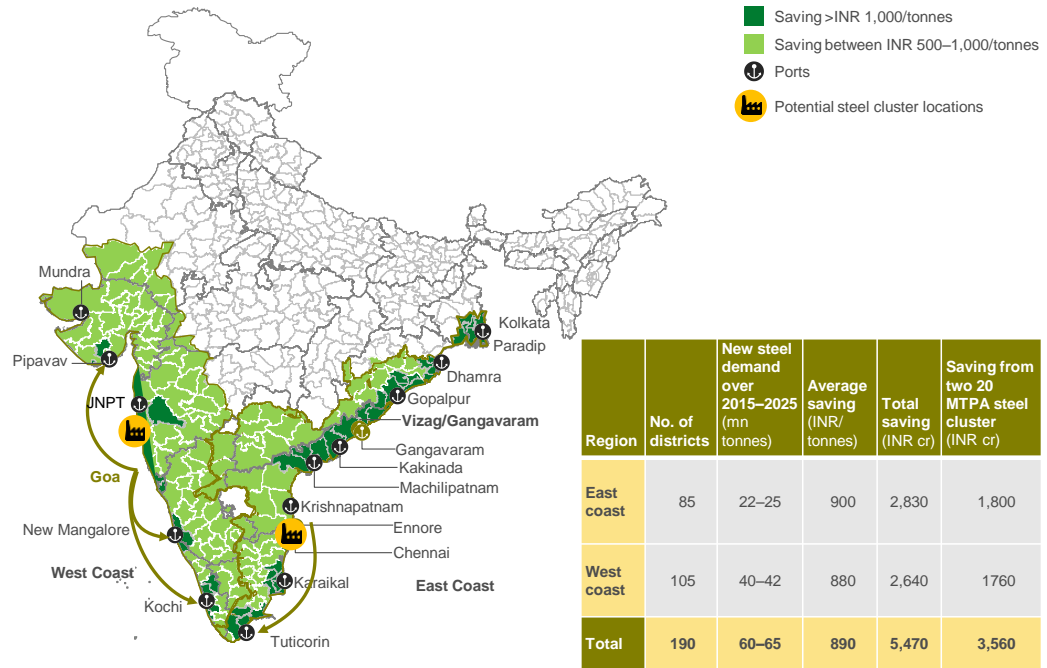


<sup>1</sup> Other cost includes internal logistics cost and logistics cost for other materials such as refractory, spares, etc.  
<sup>2</sup> Base case logistics cost is estimated as 15% of total steel production cost

SOURCE: DGCIS data – 2013-14

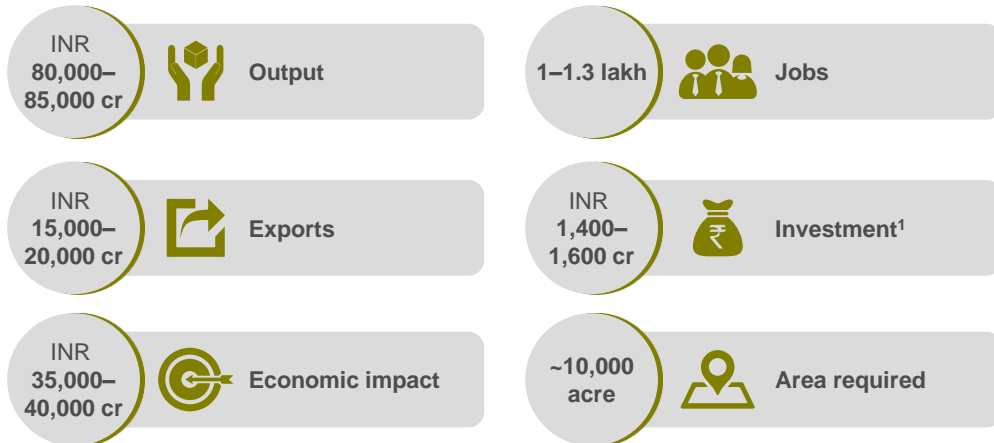
**EXHIBIT 4.87**

**Two new proposed steel clusters (40 MTPA capacity) that would save the economy annual savings of ~INR 3,500 cr**



**EXHIBIT 4.88**

**Potential Impact from each steel cluster**



<sup>1</sup> Investment includes only internal roads and provision for water, sewage, electricity and land levelling

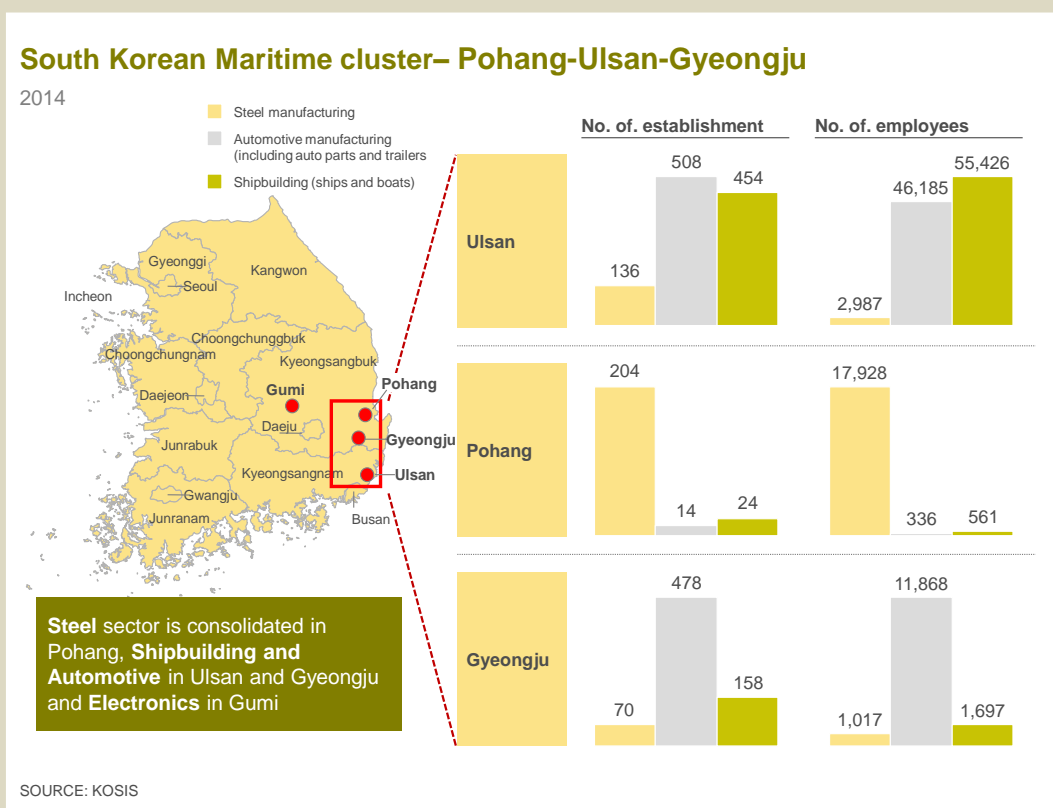


### 4.2.3 Maritime cluster based on “steel-multiplier”

Over time, the coastal steel clusters in India could be expanded into steel based manufacturing clusters focusing on shipbuilding, automotive and other ancillary activities. Logistics cost is a significant component of the overall costs in shipbuilding, automotive, etc., and steel is a major raw material for these downstream

industries. Considering the port linkages, it is optimum for these industries to be co-located. Steel contributes 25–30 per cent of the cost of a newly built ship while the engine contributes another 15–20 per cent. In automobiles, the cost of steel is 20–22 per cent. Therefore, there are strong synergies between steel-shipbuilding-automobile.

#### Global success story



One-third of South Korea’s economic growth between 1980 and 2010 was contributed by steel and related downstream sectors. Steel in Korea is consolidated in Pohang, shipbuilding and automotive in Ulsan and Gyeongju and electronics in Gumi. All these locations are in close proximity to each other, reducing the logistics cost of input materials. The role of government was instrumental in the growth of steel and downstream industries. The Government of South Korea selected Pohang as a location for building a national steel mill (POSCO) in 1967 considering availability of land, port and other utilities. Development of Ulsan as a major industrial cluster came from the government’s plan to foster heavy and chemical industries. From 1962–1966, the government developed infrastructure including roads, civil works, harbours, etc., in the region. It attracted Hyundai motors to invest in Ulsan in 1968, Hyundai Heavy Industries (HHI) in 1972, Samsung in 1979 and Daewoo in 1981.

POSCO's growth was supported by multiple factors- adoption of new technologies, capital and resource commitment to R&D, development of deep water ports and JV investments in other countries. POSCO adopted new technologies and facilities from Japan and Europe like larger scale blast furnace, continuous casting equipment, etc. Establishment of two world's leading research organizations- Pohang University of Science and Technology (POSTECH) and Research Institute of Industrial Science and Technology (RIST) helped in the growth of POSCO. South Korea also replicated Japanese strategy of using large bulk carriers coupled with international investments to secure long-term access to iron-ore.

Shipbuilding sector's growth was also supported by a number of factors – focus on advanced technologies, efficient operations and use of external know-how. HHI obtained advanced shipbuilding technologies from European shipbuilders: Dockyard designs from Scottish Naval architecture firm – A&P Appledore, Ship design and operating instructions from Scottish shipbuilding firm – Scatlithgow. Experienced European shipbuilders worked as employees of HHI for first 3 years. HHI also obtained production know-how from Kawasaki shipbuilding company of Japan. During the period of overcapacity and price competition in the 1970s, HHI altered its product mix away from VLCCs to smaller high value ships and branched into off-shore structures.

As of 2014, Pohang had 204 establishments for steel manufacturing providing employment to ~20,000 people. Ulsan and Gyeongju together have ~1,000 automotive and ~600 shipbuilding units providing employment to ~115,000 people.

## 4.2.4 Marine clusters

### Global trade flows

Shipbuilding market is currently dominated by China, Korea and Japan which cumulatively account for ~90 per cent of the world's shipbuilding capacity. China and Japan are dominant in bulkers while South Korea dominates container vessels, tankers and gas carriers (Exhibit 4.235).

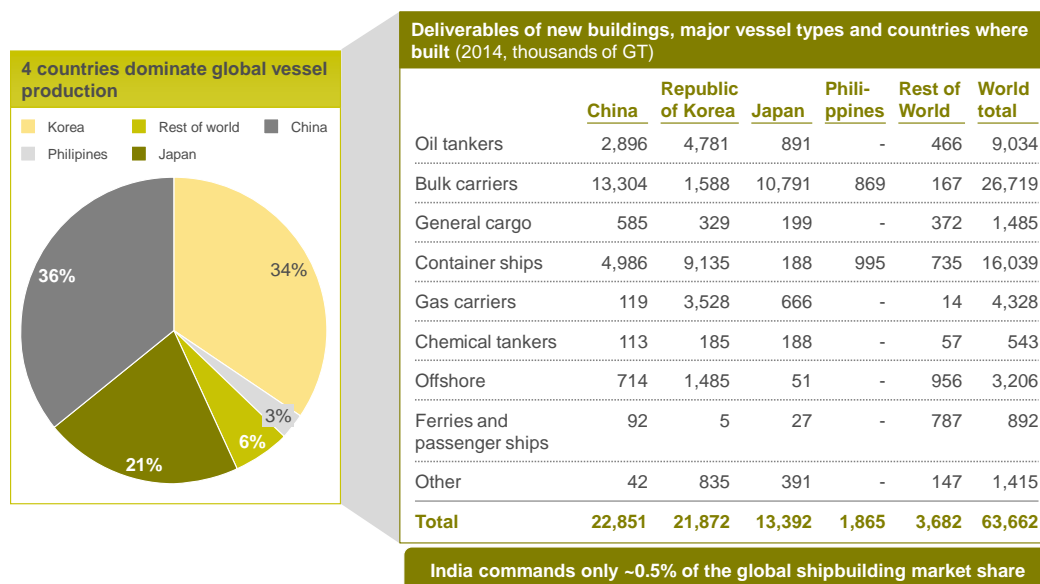
Shipbuilding is a cyclical industry and is currently on a downturn with excess

capacities globally. After the peak in deliveries in 2011, the industry's output is decreasing and reached 91.2 mn DWT in 2014. However, strong demand is expected in the long term, driven by shipping companies' move towards ultra-large vessels, demolition of the old vessel fleet and growth in global exports. This demand is expected to go up to ~150 mn DWT by 2025 and ~300 by 2035 (Exhibit 4.236).

### EXHIBIT 4.89

#### MARKET TRENDS

**China, Korea and Japan account for ~90% of the world's production; China and Japan specialise in bulk carriers, while Korea leads in container ships**



Note: Propelled seagoing merchant vessels of 100 GT and above. More detailed data on other countries where vessels were built is available under <http://stats.unclad.org/shipbuilding>.

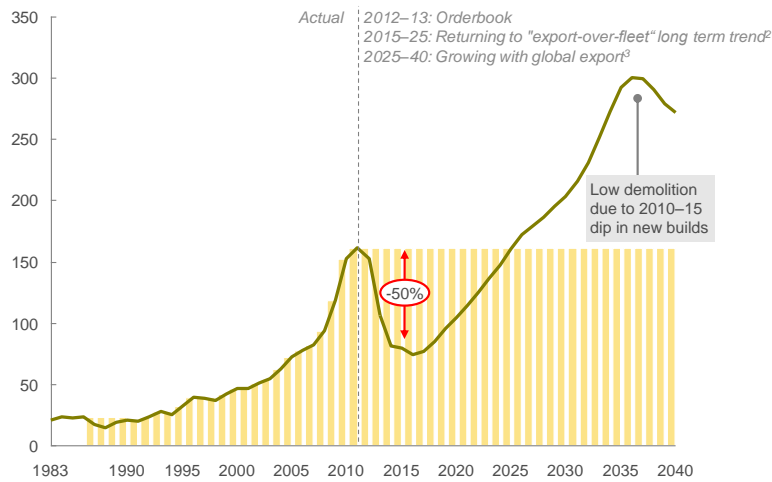
SOURCE: UNCTAD secretariat, based on data provided by Clarkson's Research

## EXHIBIT 4.90

### MARKET TRENDS

**Globally, overcapacity at shipyards expected next years, however, strong growth in the longer term is expected**

Supply and demand trends in global shipbuilding, DWT mn



1 Capacity measured as maximum output last 5 years. Capacity at 2011 level in forecast period

2 Oversupply eliminated and shipping market returning to supply-demand balance

3 Fleet growing with global export from 2015, demolition estimated using average 25 year lifetime and

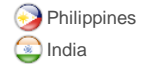
SOURCE: Clarksons; Global Insight; expert interviews; team analysis

- Current capacity sufficient to serve demand until ~2025
- Rationalisation of capacity expected, however, overcapacity at shipyards will persist for many years due to sunk cost investments

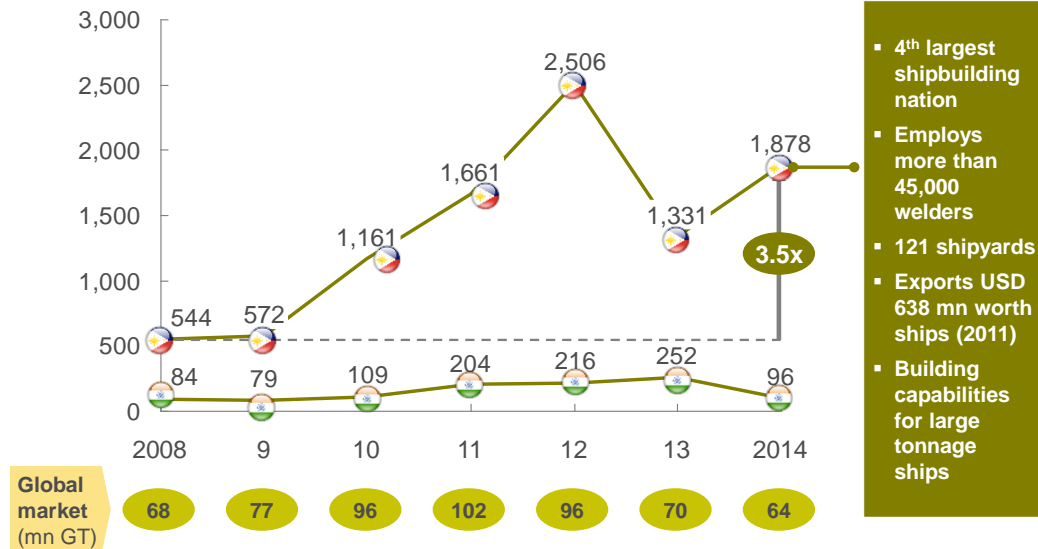
## Global success story<sup>49</sup>

Despite the global slowdown, Philippines has been able to grow its shipbuilding sector 3.5 times over the last 6 years and has become the 4th largest shipbuilding nation. The shipbuilding sector in Philippines, comprising of 121 shipyards, employs more than 45,000 welders.

### Philippines grew the shipbuilding section 3.5 times over last six years, despite global slowdown



Shipbuilding completions  
'000 GT



## Shipbuilding Industry in India

India currently accounts for only ~0.45 per cent of the global shipbuilding market. General cargo, bunkering and platform supply vessel accounted for most of the vessel deliveries (in DWT terms) in 2015.

Drilling or production platforms and dredgers are the main exports from India and over 60 per cent of the shipbuilding in India is for Singapore and UAE based entities (Exhibit 4.237, 4.238, 4.239 and 4.240).

<sup>49</sup> Clarksons

## EXHIBIT 4.91

### India currently produces only ~0.5% of world's ships

World shipbuilding production capacity  
mn, DWT



Indian shipyards <sup>1</sup>	Ownership	mn DWT	# of ships
ABG	Private	0.49	48
Pipavav	Private	0.30	4
Bharati	Private	0.22	31
Cochin	State owned	0.11	16
Chowgule	Private	0.08	18
Alcock Ashdown	Private	0.06	6
Others <sup>2</sup>	–	0.05	14

1 Top 7 by DWT production capacity

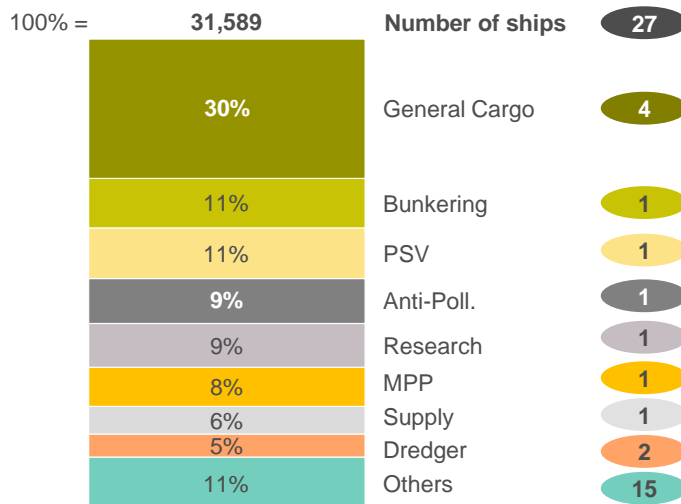
2 Includes L&T, Tebma, etc.

SOURCE: Drewry Maritime Services

## EXHIBIT 4.92

### Shipbuilding deliveries in India – By type of vessel

DWT



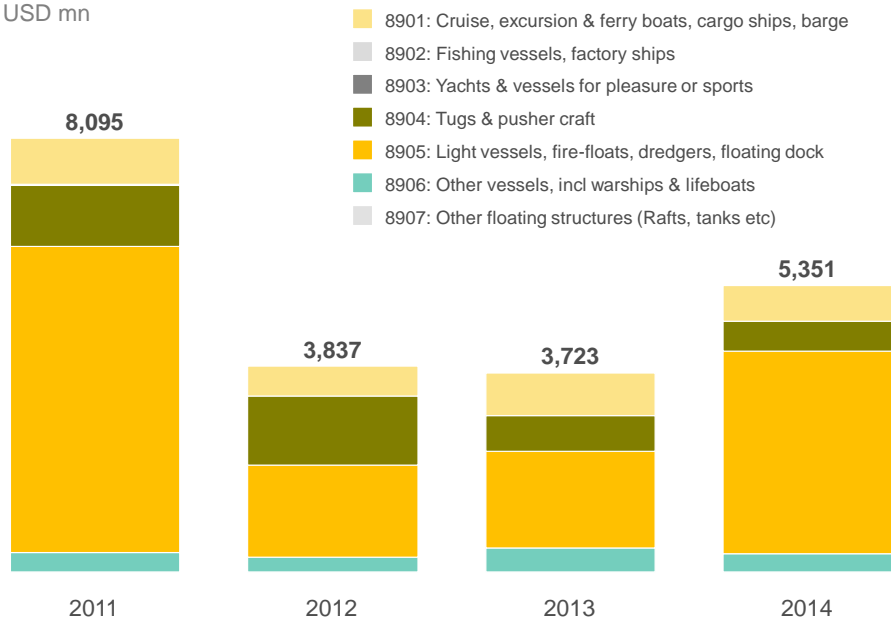
2015

SOURCE: Clarksons

### EXHIBIT 4.93

#### Foreign exchange earnings through shipbuilding activities in India

In USD mn

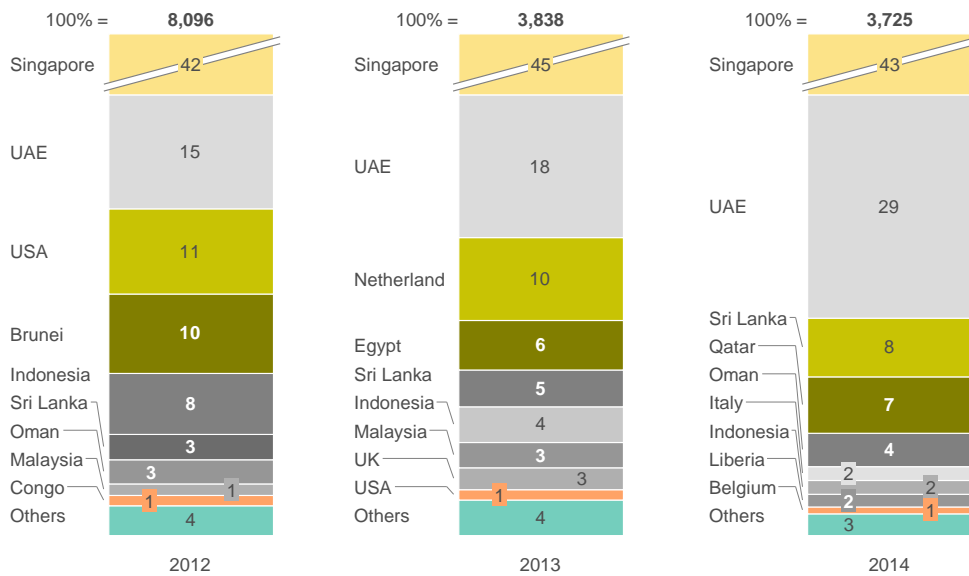


SOURCE: Ministry of commerce and industry, HS code: 89 ships, boats and floating structure

### EXHIBIT 4.94

#### Foreign exchange earnings through shipbuilding activities in India

In USD mn



SOURCE: Ministry of commerce and industry, HS code: 89 ships, boats and floating structure

## Opportunity for India

India could target 3–4 mn DWT shipbuilding industry by 2025, through a combination of some smart choices and government support. Indian shipyards are competent at building smaller size/ specialty vessels. They could focus on building specialty and coastal vessels less than 80m length (e.g., offshore supply vessels, anchor handling tugs, etc.).

The Government of India has recently introduced policies and initiatives for development of the sector. These initiatives are expected to reduce the unfavorable cost differential faced by the Indian shipyards (Exhibit 4.241).

Opportunity in defence sector (Exhibit 4.242), growth in coastal shipping,

and replacement of the existing vessel fleet could be the drivers of growth of the shipbuilding industry in India.

Given the cyclical nature of the shipbuilding industry, it is important to complement shipbuilding with ship repair facilities.

India could develop two potential locations for marine clusters: Gujarat and Tamil Nadu. Pipavav, Dahej and Hazira ports in Gujarat have shipyards and Alang has a ship breaking yard. The potential marine cluster could leverage the existing ecosystem and with steel supplies from Hazira. Similarly, Kattupali in Tamil Nadu has a large shipyard and near a proposed steel. The potential impact from the proposed marine cluster is shown in Exhibit 4.243.

### EXHIBIT 4.95

#### Key Government Policies and Initiatives instituted by Union Government for the development of shipbuilding sector

Initiatives	Description
1 Financial assistance for local shipbuilders	<ul style="list-style-type: none"> <li>Introduction of INR 4,000 cr financial assistance policy for 10 years – Financial assistance to be granted to Indian shipyards equal to 20% of the lower of “Contract price” or the “Fair Price” of each vessel built by them for a period of 10 years commencing 2015–16. Rate of 20% to be reduced by 3% every three years</li> </ul>
2 Exemption from Customs and central Excise duty	<ul style="list-style-type: none"> <li>Exemption from Customs and Central Excise Duties on inputs used in Shipbuilding</li> </ul>
3 Infrastructure status	<ul style="list-style-type: none"> <li>Grant of infrastructure status to shipyards – To help Indian shipyards avail flexible structuring of long term project loans, long term funding from infrastructure funds at lower interest rates and longer tenure equivalent to the economic life of their assets</li> <li>Shipyards to have access to relaxed External Commercial Borrowing norms, issuance of infrastructure bonds for meeting working capital requirements and benefits under IT Act, 1961</li> </ul>
4 FDI in shipbuilding	<ul style="list-style-type: none"> <li>Permit for 100% FDI in shipbuilding</li> </ul>
5 Revision of domestic eligibility criteria	<ul style="list-style-type: none"> <li>All Govt. departments and agencies shall undertake bulk tendering for their vessel related requirements with deliveries starting from 2016–17 and will grant a Right of First refusal for Indian shipyards for such orders till 2025. From 2025, only Indian build vessels are to be procured by these agencies</li> </ul>

SOURCE: Ministry of Shipping



## EXHIBIT 4.96

INDIA OPPORTUNITY

**Defence: ~USD 23 bn orders under execution and ~USD 51 bn in pipeline**

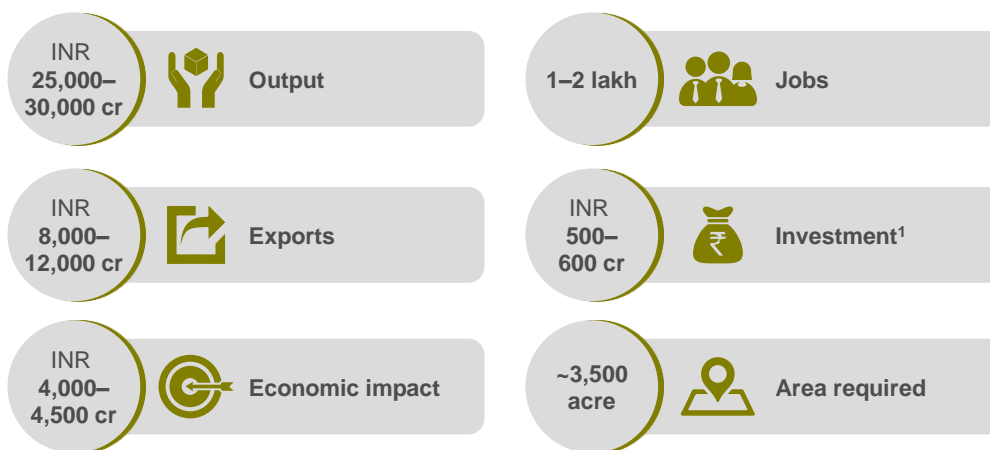
Present orders		Future orders (3-5 years) <sup>3</sup>		
Project	App. value INR cr	Project	App. value INR cr	
Surface ships	P15B <sup>1</sup> , P17 A <sup>1</sup>	16 ASW SWC	15,300	
	6 CG OPVs, 2 SLOPVs, 2 FPV & 11 FICs, MCMV <sup>2</sup>	Next Gen Missile Boats	12,000	
	4 ASW Corvette, 8 LCU MK-IV, 4 WJFACs, P17A <sup>1</sup>	Next Gen Corvettes	24,500	
	IAC* , 20 CG FPV	Next Gen Frigates	35,000	
	IPVs/Midget Submarines	Next Gen Destroyers	50,000	
	5 NOPVs	04 Survey Vessels – Large	3,500	
	3 Cadet Training Ships	Survey Vessel (trg)	2,500	
	6 Survey Vessels	02+02 LPD Vessels	14,500	
	15 Interceptor Boats	Fleet Support Ships/Other Support Vessels	9,000	
	54 Interceptor Boats, 7 CGOPVs, Floating Dock			
	80 FICs			
	<b>~ USD 20 bn opportunity</b>		<b>~ USD 25 bn opportunity</b>	
	Submarine	P 75 <sup>1</sup>	P-75 I	75,000
Nuclear Submarine SSBN <sup>1</sup>		Other Submarine Projects	>10,000	
<b>~ USD 3 bn opportunity</b>		<b>~ USD 26 bn opportunity</b>		

1 EDC 2022; 2 EDC 2025 3 To be implemented from 2020–2030

SOURCE: Expert interviews; Ministry of Defence, Ministry of Shipping

## EXHIBIT 4.97

### Potential impact from each marine cluster



<sup>1</sup> Investment includes only internal roads and provision for water, sewage, electricity and land levelling

## 4.2.4 Automotive clusters

### Global trade flows

Global automotive production across two-wheelers, commercial vehicles and passenger vehicles—reached USD 2.5 trillion in 2013, recovering from a low of USD 1.4 trillion in 2009. Exports comprised 35 per cent of the global automotive production in 2013, recording a value of USD 870 bn. Passenger vehicles (including three-wheelers) formed the biggest share in global exports at USD 670 bn followed by commercial vehicles and two-wheelers. Germany is the largest exporter followed by

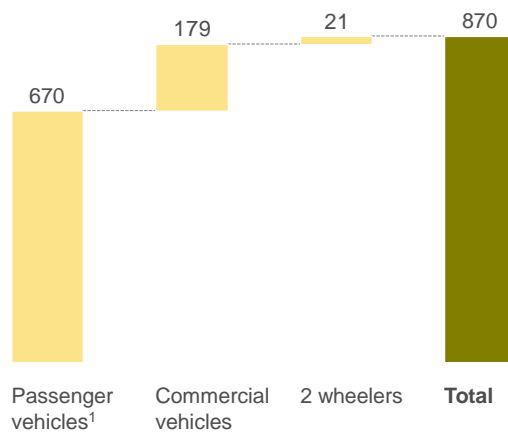
Japan, the US, Mexico, South Korea, Canada and the UK (Exhibit 4.244).

India accounts for 3 per cent of the global auto production but its share of global exports is only 1 per cent. Also, India's exports comprise just 12 per cent of its total production suggesting a huge potential for global footprint expansion. Exhibit 4.245 shows India's individual shares and the corresponding export value in the three auto segments, indicating reasonable share in the export of two-wheelers.

### EXHIBIT 4.98

#### Passenger vehicles have the biggest share in the global automotive exports

Global automotive exports, 2013, USD bn

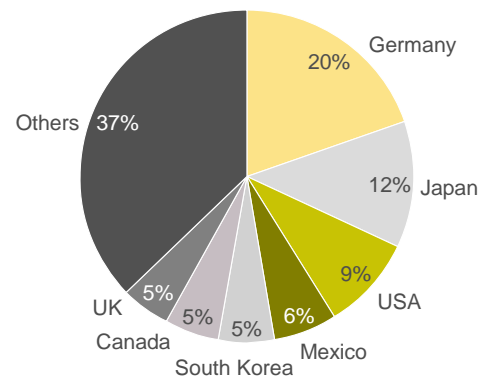


<sup>1</sup> Including 3-wheelers

SOURCE: ITC trade map

#### Share of global automotive exports

Global automotive exports, 2013, Percent



### Indian automotive industry

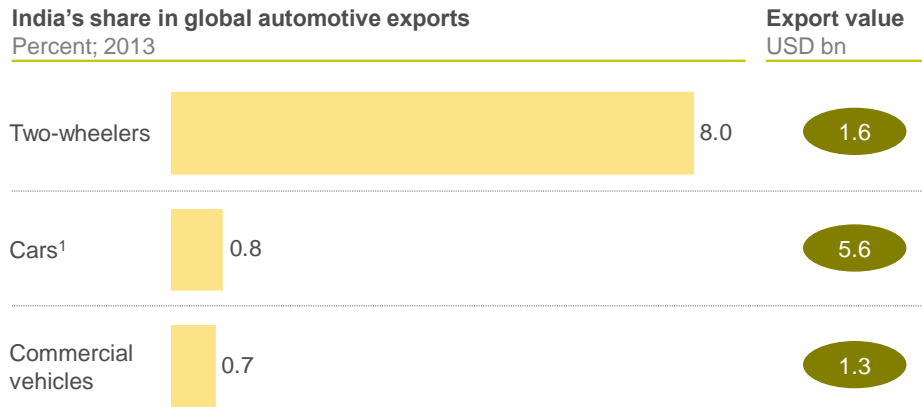
The Indian automotive industry has been growing at around 9.6 per cent between 2005 and 2015 while exports have grown at around 18.9 per cent. The industry achieved a gross turnover of USD 67.6 bn in 2012–13 and is projected to reach USD 300 bn by 2026 according to SIAM.

The country produced 23.4 mn units of vehicles in the year 2014–15, serving a domestic demand of 19.8 mn units and exporting 3.6 mn units. The split of domestic sales and exports for the different automobile segments for 2014–15 is shown in Exhibit 4.246. South Africa, Sri Lanka, Nigeria, Bangladesh, the UK and Algeria are the top importing countries from India (Exhibit 4.247).

**EXHIBIT 4.99**

**India has a significant share in global two-wheeler exports but minimal share in other product segments**

Indian automotive exports are getting to scale in two-wheelers ...

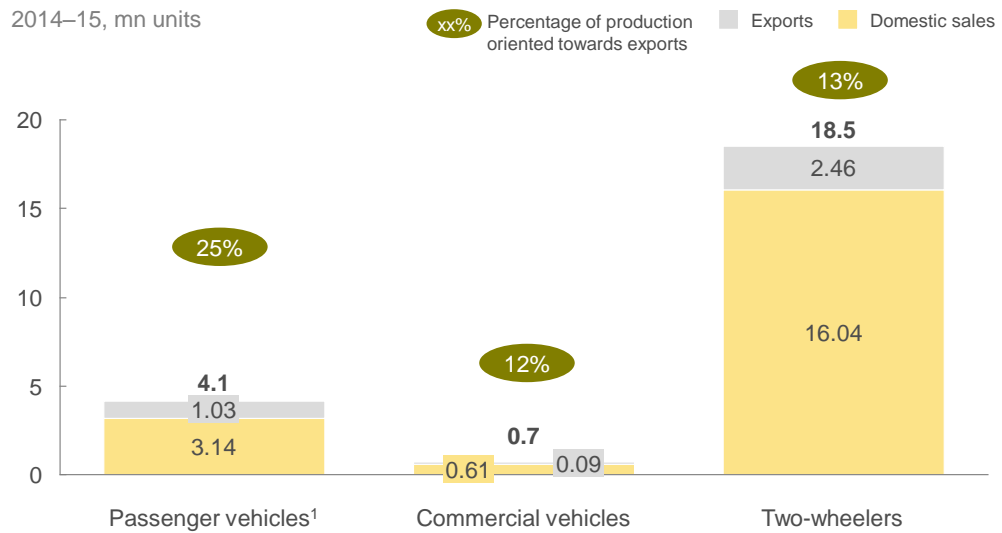


<sup>1</sup> Including three-wheelers  
SOURCE: Comtrade data

**EXHIBIT 4.100**

**India's production and export volumes of different vehicle segments in 2014–15**

25% of the passenger vehicle production is export oriented as compared to 12% and 13% in commercial and two-wheeler vehicle segments



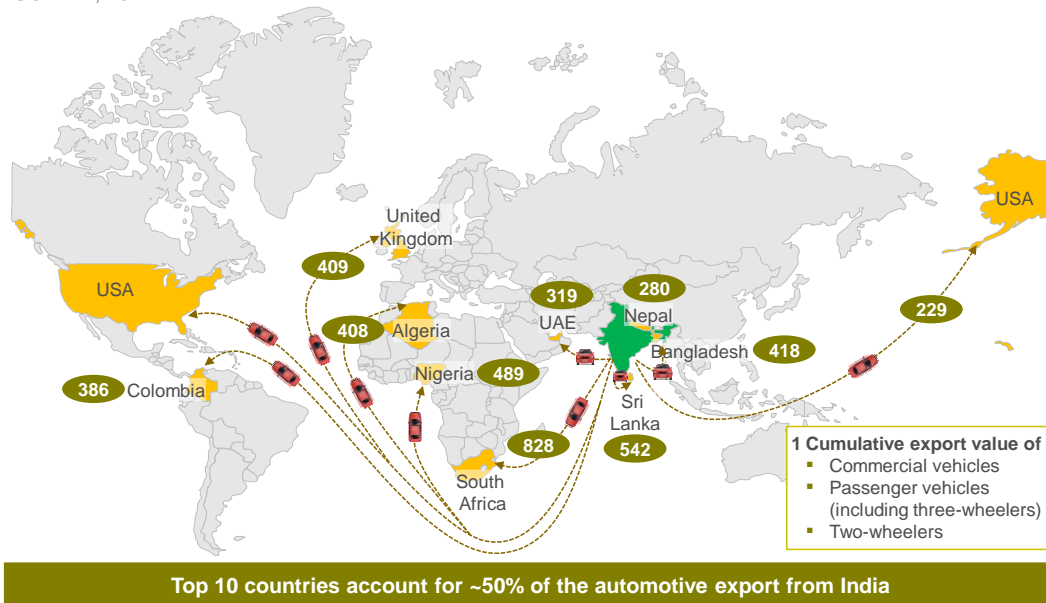
<sup>1</sup> Including 3-wheelers  
SOURCE: IHS data, Comtrade data, SIAM

## EXHIBIT 4.101

### Automotive cargo flows from India

#### Automotive export cargo<sup>1</sup>

USD mn, 2014



SOURCE: ITC Trade Map

### Automotive clusters in India

India has five key automotive clusters which have significant export volumes:

- Northern India cluster:** It comprises Gurgaon, Manesar, Haridwar and Pantnagar and has many established automotive players including Hero, Maruti, TVS and Bajaj. This cluster primarily uses Mumbai, Pipavav and Mundra ports for exports. Despite being far inland, this cluster has a high share of exports.
- Sanand:** Ford, Maruti and Tata have set up manufacturing plants in this cluster for manufacturing passenger and commercial vehicles. The cluster has been developed recently.
- Chennai/Hosur:** This cluster is dominated by passenger vehicle

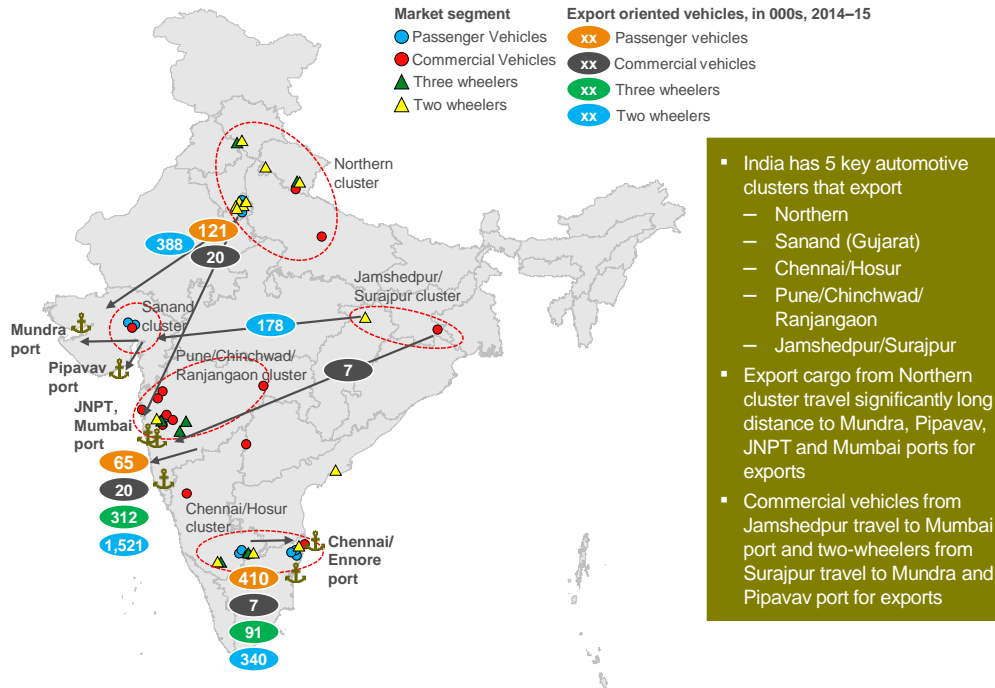
manufacturers including Nissan, Ford, Toyota and Hyundai. However, this also has presence of commercial vehicle manufacturers. This cluster uses Chennai and Ennore ports for exports.

- Pune/Chinchwad/Ranjangaon:** This cluster has many manufacturing plants for commercial vehicles. Tata and Mahindra are the key players in this region. This cluster uses Mumbai and ports in Gujarat for export.
- Jamshedpur/Surajpur:** Tata currently manufactures commercial vehicles in Jamshedpur and Yamaha manufactures two-wheelers in Surajpur.

Exhibit 4.248 shows the automotive export cargo flows from the different manufacturing clusters.

**EXHIBIT 4.102**

**Key automotive production clusters in India**



SOURCE: Interviews with key stakeholders

**Opportunity for India**

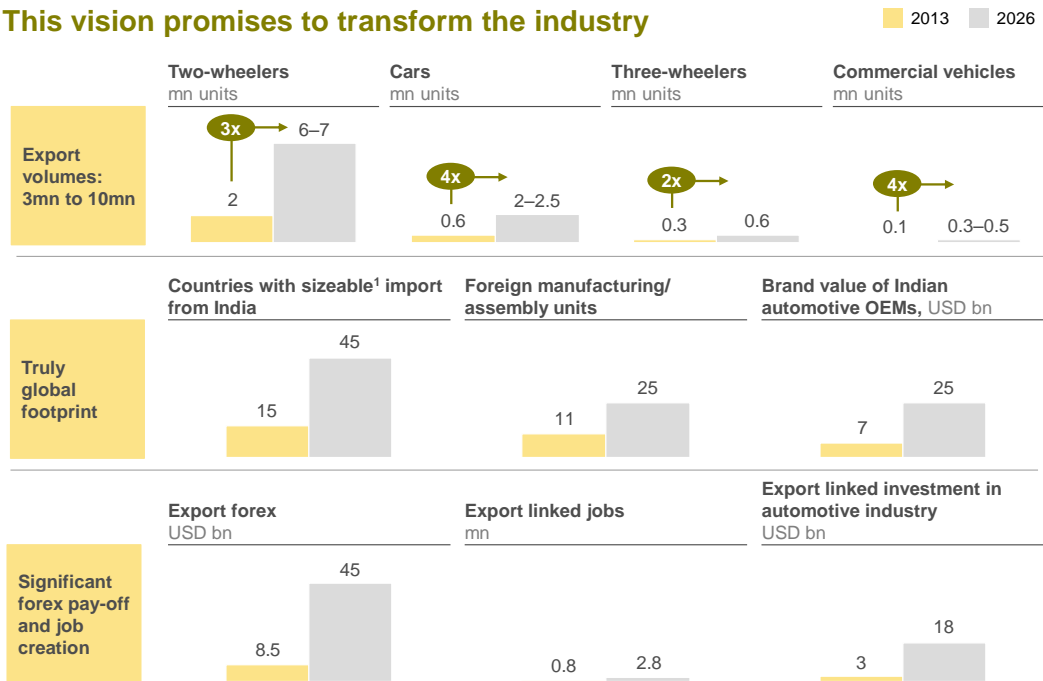
A mature industry ecosystem providing best-in-class cost, quality and technology advantages positions India to capture a higher share of the global export market. While it needs to establish a strong hold in the passenger and commercial vehicles segment, India already has a significant share in the global export volumes of two-wheelers.

The industry’s export vision is to increase export volumes to about 10 mn by 2026, which may trigger significant and tangible positive pay-offs for the economy by:

- Generating foreign exchange of USD 45 bn (against the current USD 8.5 bn)
- Creating 2 mn new export linked jobs
- Attracting new investment of USD 15 bn to the industry (Exhibit 4.249)

## EXHIBIT 4.103

### This vision promises to transform the industry



<sup>1</sup> Higher than target global average share of exports from India (i.e., 3%) by 2026

SOURCE: SIAM: Accelerating exports and globalizing the Indian auto industry

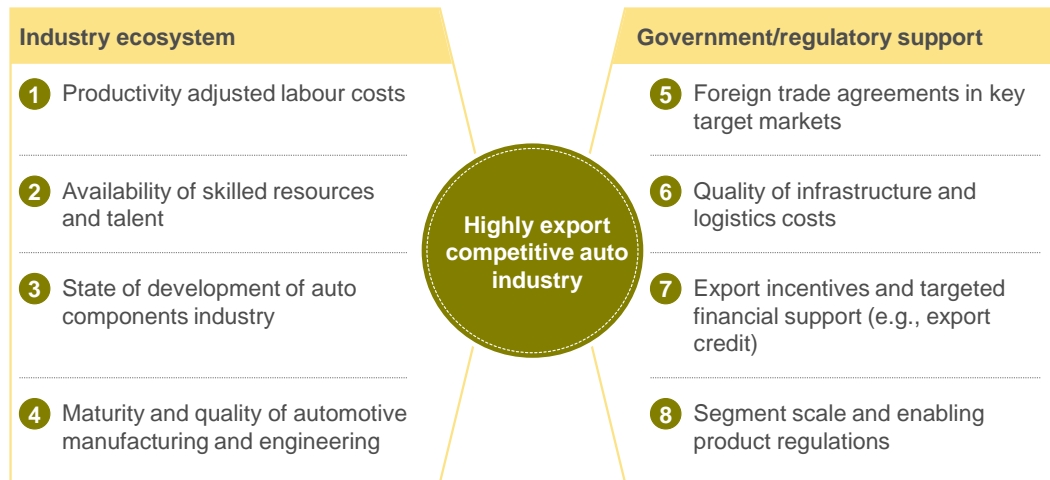
### Challenges faced and the role of port-led industrialisation

India's 8 per cent share in the two-wheeler segment is a testimony to its potential in making a global mark in the sector. However, India faces tough competition from a number of other countries, including Mexico, South Korea, China, Thailand and

Turkey, which are witnessing rapidly growing automotive exports. To identify the challenges for the Indian automotive sector, export competitiveness was benchmarked against key automotive exporting countries. The assessment was done in two parts – industry ecosystem and government/regulatory support comprising of eight factors (Exhibit 4.250 and 4.251).

**EXHIBIT 4.104**

**India's auto export competitiveness was assessed on a set of eight success factors**



SOURCE: SIAM: Accelerating exports and globalizing the Indian auto industry

**EXHIBIT 4.105**

**Indian industry ecosystem emerges as a strength; government support could be enhanced**

Thailand 
 China 
 Mexico  
 Turkey 
 South Korea 
 India

RANKINGS ARE INDICATIVE

Competitiveness evaluation framework	Ranking (5 = Most competitive)				
	1	2	3	4	5
1 Productivity adjusted labour costs					
2 Availability of skilled resources & talent					
3 State of development of auto components industry					
4 Maturity and quality of automotive manufacturing and engineering					
5 Foreign trade agreements in key target markets					
6 Quality of infrastructure and logistics costs					
7 Export incentives and targeted financial support (e.g., export credit)					
8 Domestic segment scale and enabling product regulations					

SOURCE: WIS; World Bank reports; press search; EIU; IHS database

## Role of ports and logistics infrastructure

India scores poorly on the quality of infrastructure and logistics costs which is key for driving export competitiveness. Export cargo moving from the manufacturing clusters to the ports, especially from the Northern cluster is subjected to high inland logistics cost. Transit time of cargo, including processing time at the port, varies from 7 to 17 days for a distance of 1,400 km. This has implications on the time buffer that automotive manufacturers keep for planning the logistics of export-oriented cargo.

Logistics inefficiency impacts cost in two ways—direct freight cost and the inventory cost during transit. As described in exhibit 4.252, freight and insurance contribute around 1 to 2 per cent to the export price of a passenger vehicle. For an industry where the OEM operates at a 6 to 7 per cent margin (on export price), the share of logistics cost is significant.

It is, therefore, important to develop a port-led industrialisation strategy for the sector. Some possibilities include:

### Global success story<sup>50</sup>

A large part of export-oriented manufacturing in other nations is port-based, e.g., the Samutprakarn cluster in Thailand has emerged as a world-class export hub hosting 500+ automotive players and directly employing close to 2 lakh workers. The presence of a deep-sea port in Rayong near the industrial estate hosting OEMs was one of the critical success factors for this cluster.

Another international example of a thriving port-based automotive manufacturing cluster is of Bremen in Germany which comprises the city of Bremen and the seaport city of Bremerhaven. Bremen is known as the car city, housing leading automobile manufacturers and automotive technology suppliers. Bremerhaven port is one of the largest car ports in the world with storage and parking capacity of 1,20,000 cars. It is a port of call for nearly 1,500 automobile carriers. The cluster has also become a centre of scientific excellence that includes automotive research. There are various research and development institutions at the Bremen Technology Park. Automotive companies collaborate on technology creation with education & research institutions in the area, thereby creating an entire ecosystem for the automotive sector.

- **Port linkages of existing clusters:** Due to the limited “Ro-Ro” handling capacity at Maharashtra ports, the automobile cargo from Pune cluster goes to Gujarat ports, travelling longer distances. Going forward, Vadhavan port could be developed with sufficient handling facilities for automotive cargo
- **Expansion of Sanand cluster in medium to long term:** Currently, a significant part of automotive exports happens from the inland Northern cluster. Even though Sanand has come up as a new cluster proximate to the Gujarat ports, it still has a small share in the total exports from India. Sanand could evolve as an export hub in the medium term, with adequate linkages to the ports of Mundra and Pipavav

The potential impact from the proposed automotive cluster is shown in Exhibit 4.253.

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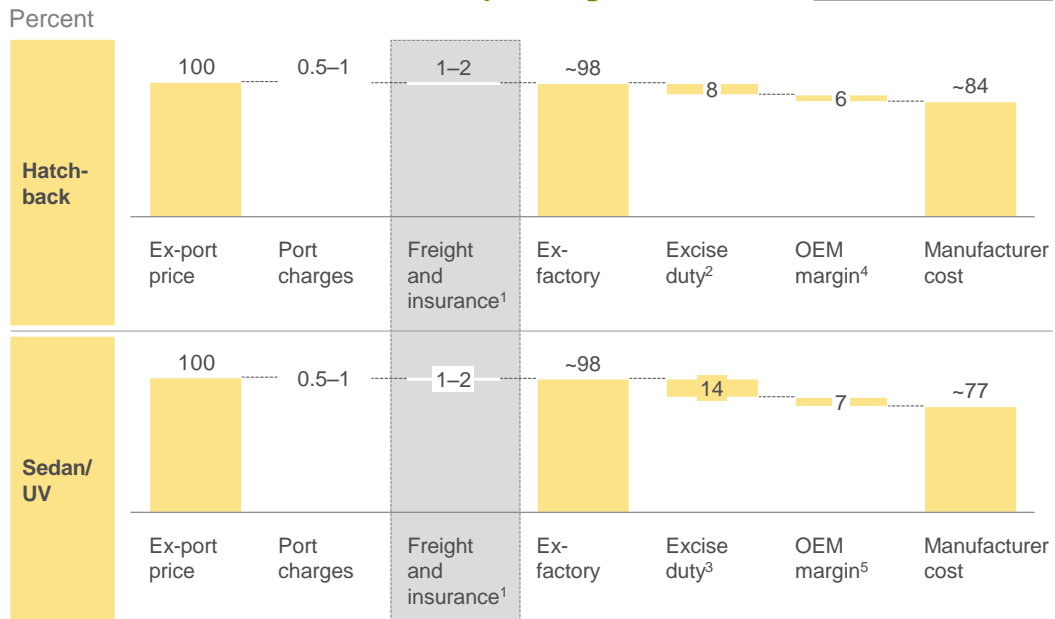
<sup>50</sup> Press research



**EXHIBIT 4.106**

**Breakdown of value chain cost of passenger car**

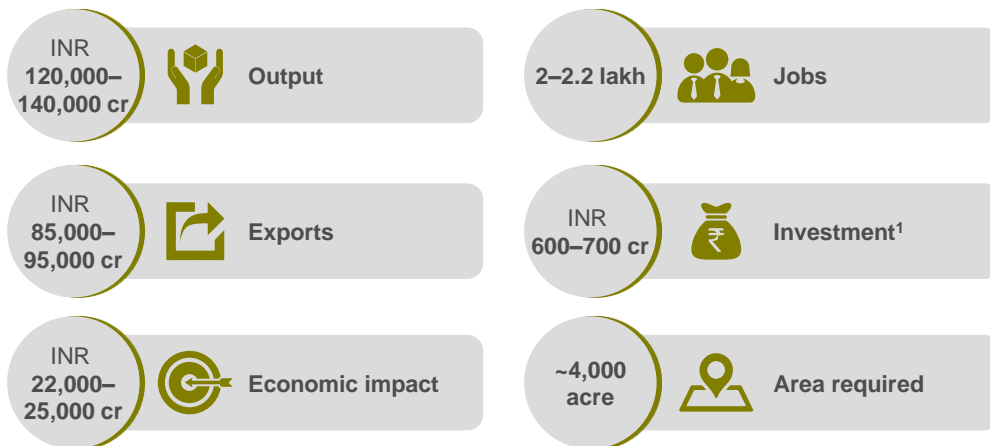
FOR EXPORT FROM INDIA



Note: Typical figures for India market; may differ substantially across brands and OEMs  
 1 Variable between 0-1% and location; 2 10% excise on manufacturer cost and margin  
 3 22% + INR 10,000 excise duty for cars >4,000 mm in length; 4 6-8% OEM margin on manufacturer cost  
 5 8-10% OEM margin considered on manufacturer cost and margin  
 SOURCE: Expert interviews

**EXHIBIT 4.107**

**Potential Impact from the automotive cluster**



<sup>1</sup> Investment includes only internal roads and provision for water, sewage, electricity and land levelling

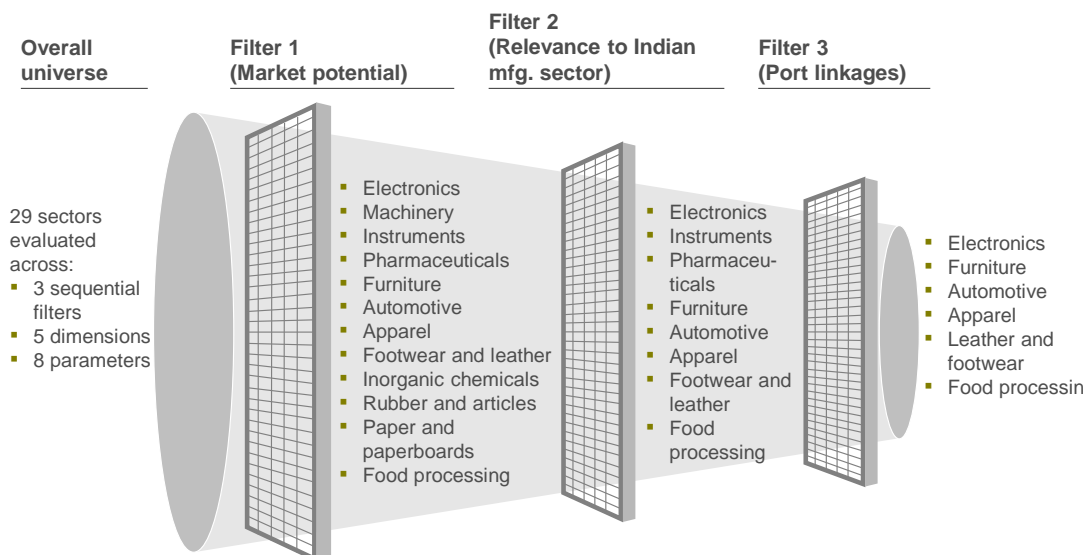
### 4.3 Discrete manufacturing clusters

Several nations have leveraged export-oriented/import-substituting discrete manufacturing for bridging trade deficit. The “Make in India” programme of the Government of India will be instrumental in promoting discrete manufacturing in India. Port-based or port-proximate manufacturing could play a pivotal role in supporting this initiative. Ideally, ports could target sectors where they could take the lead and make manufacturing more competitive. This study

identified high potential sectors for port-based or port-proximate manufacturing. A total of twenty nine possible sectors were evaluated through a filtering criteria comprising five dimensions and eight parameters. Six sectors—electronics, furniture, automotive, apparel, leather and footwear and food processing—emerged as high potential after the three-step filtration process (Exhibit 4.254 and 4.255).

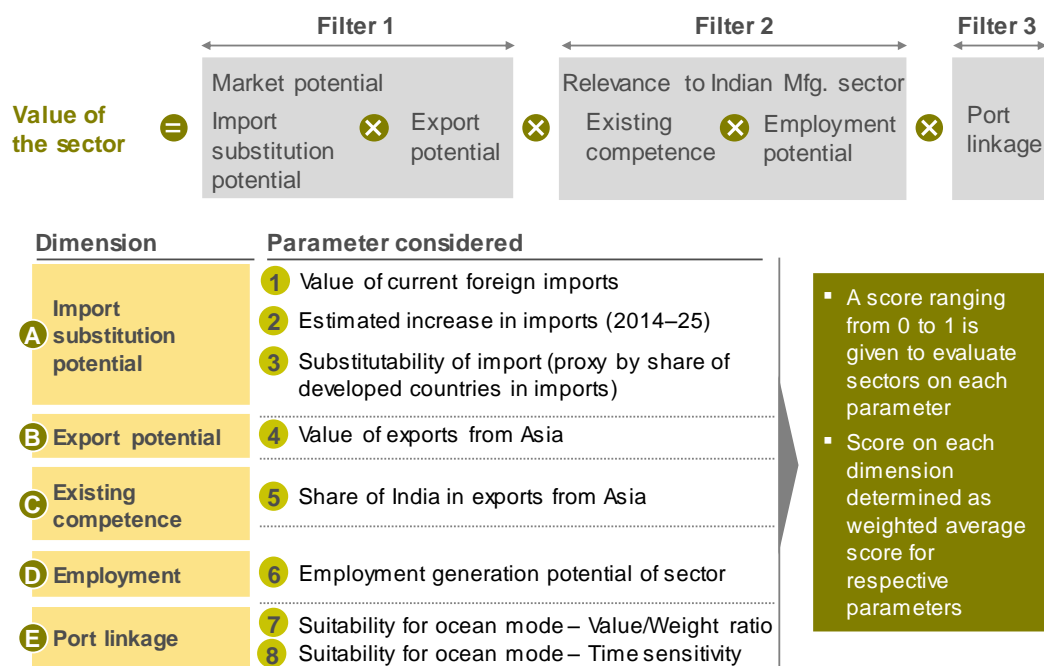
EXHIBIT 4.108

#### Summary of the selection process



**EXHIBIT 4.109**

**Discrete manufacturing selection criteria**



The value of a sector to be selected for port-based or port-proximate manufacturing may be defined in terms of three factors – market potential, relevance to Indian manufacturing and linkages to the port. These three factors then become the most suitable filters for selection:

**Market potential:** Any sector selected for port-based or port-proximate manufacturing would need to have the potential to substitute current imports and generate exports. For the purpose of the study, four parameters across both dimensions were considered:

- **The import substitution potential** of a sector has been assessed on three

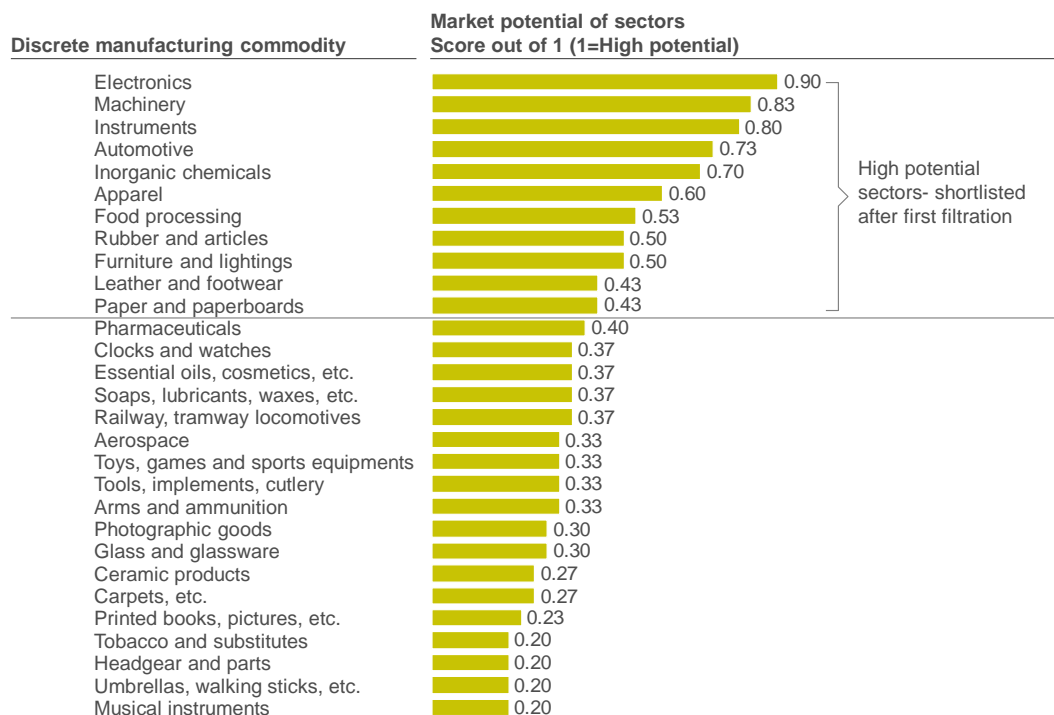
factors – quantum of current foreign imports, estimated increase in import requirement over the next 10 years (assuming past growth rate) and substitutability of imports (proxy indicator of share of developed economies in imports into India used for this).

- **The export potential** of a sector has been assessed based on quantum of exports from Asia. This may serve as an aspirational benchmark for India.

Eleven high-potential sectors were shortlisted after the first filter. These were then evaluated for their relevance to the Indian manufacturing sector (Exhibit 4.256).

**EXHIBIT 4.110**

**Scoring of discrete manufacturing sectors: Market potential (filter 1)**



**Relevance to Indian manufacturing:** Two factors were examined to establish relevance of sectors:

- **Existing competence** of India in a sector has been assessed based on its share in exports from Asia.
- **Employment generation potential:** Employment intensity of the sector, measured in terms of direct employment per INR cr of value added, has been used as an indicator.

Eight sectors were shortlisted after the second filter which were then evaluated for their linkages to port (Exhibit 4.257).

**Linkages to port:** If a sector has adequate linkages to a port, it is considered suitable for port-based or port-proximate manufacturing. This has been assessed

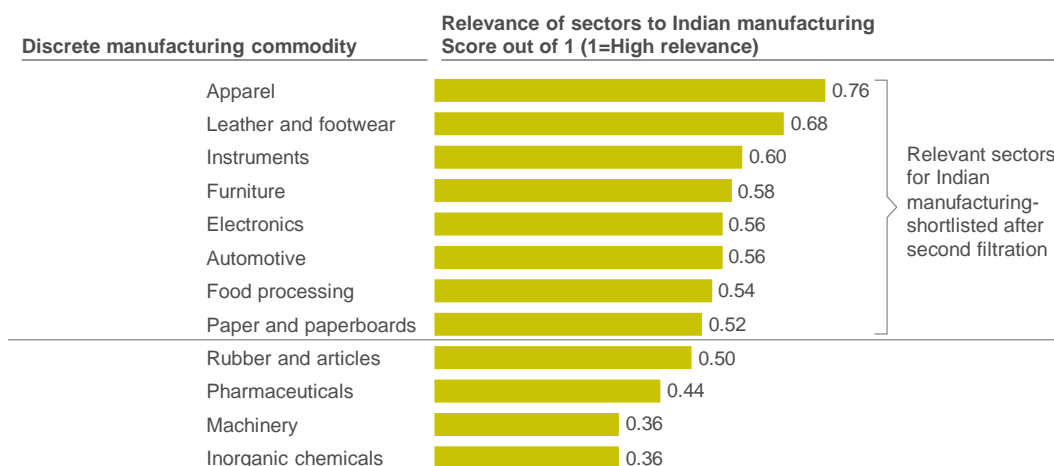
based on the suitability of ocean mode of transport by using value-to-weight ratio and time sensitivity index as proxies. These explain if the cargo generated by a sector is suitable for ocean mode of transport in comparison with other modes (Exhibit 4.258).

The following six industries were shortlisted for port-led manufacturing:

- **Labour intensive sectors:** 1) Apparel, 2) Leather and footwear; 3) Furniture, 4) Food processing
- **Skill/knowledge intensive sectors:** 1) Electronics, 2) Automotive.

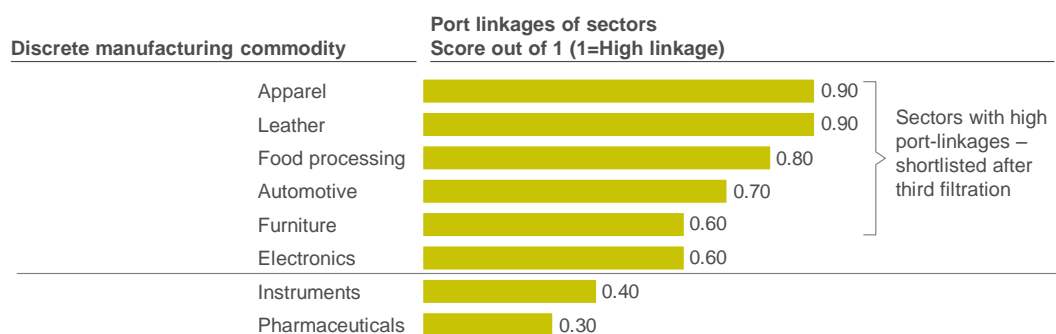
**EXHIBIT 4.111**

**Scoring of discrete manufacturing sectors: Relevance to the Indian manufacturing sector potential (filter 2)**



**EXHIBIT 4.112**

**Scoring of discrete manufacturing sectors: Port linkages (filter 3)**



India’s total exports of goods in 2014 were around USD 317 bn. Apparel had the largest share of around 7 per cent. Cumulatively, the six sectors contributed around 18 per cent to the total goods exports. India has set a target of increasing the exports of goods and services to USD 900 bn by 2020<sup>51</sup>; goods may continue to contribute ~ 60-70

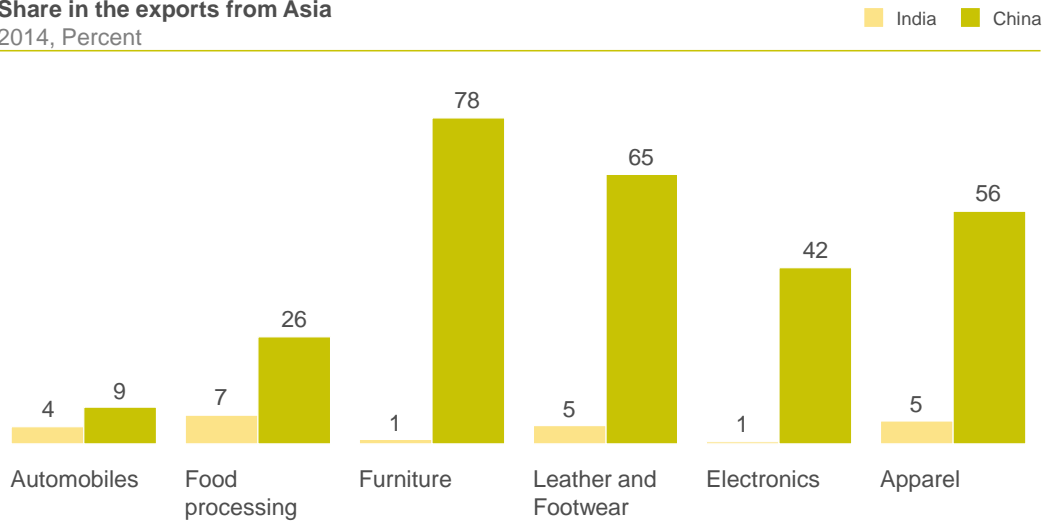
per cent in the total mix. Exports from these six sectors exports could grow to from USD 60 bn currently to USD 210 bn by 2025. Exhibit 4.259 shows the comparison of India’s share in exports from Asia vis-à-vis China for the shortlisted sectors.

51 DIPP

**EXHIBIT 4.113**

**Share of India vis-à-vis China in Asia's exports**

Share in the exports from Asia  
2014, Percent



SOURCE: ITC trade map

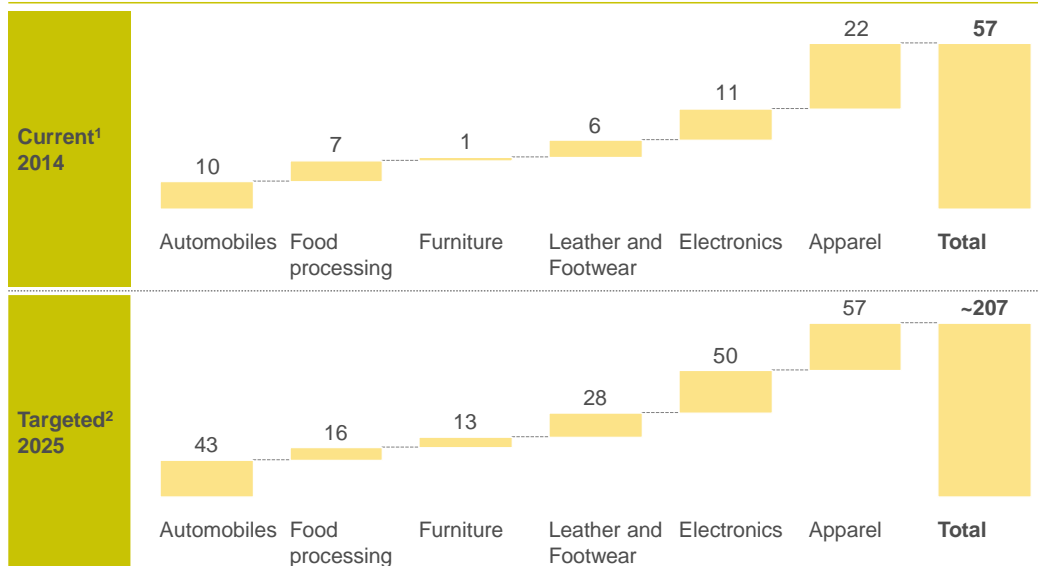
Indian could aspire to increase the share of exports for these sectors and aim to be among the top five exporting countries in Asia. These sectors may then have a cumulative contribution of around 20 per cent in the export basket leading to exports

of around USD 200 bn by 2025. Exhibit 4.260 shows the current (2014) and the targeted export value from these sectors in 2025.

**EXHIBIT 4.114**

**Current and expected share of shortlisted discrete manufacturing sectors**

Value of exports from India  
2014, USB bn



1 India's total goods export in 2014: ~ USD 320 bn

2 India's target to capture position amongst the top 4-5 exporting countries from Asia by 2025, Asia's exports from these sectors expected to grow at past CAGR

SOURCE: ITC trade map

Assuming business-as-usual growth of hinterland clusters, a significant part of the increased exports (~USD 90 bn) from these

sectors could come from port-based or port-proximate manufacturing clusters.

Sector	Exports (2014), USD bn	Targeted exports (2025), USD bn	Estimated exports under BAU, USD bn	Estimated increase in exports from new clusters, USD bn
Automobiles	10	43	27	16
Food processing	7	15	8	7
Furniture	1	13	3	10
Leather and Footwear	6	28	17	11
Electronics	11	50	18	32
Apparel	22	57	44	13

### 4.3.1 Apparel clusters

#### Opportunity for India

India has raw material-based competitive advantage in apparel manufacturing. It is the third largest cotton producer in the world. The downstream activities of converting cotton to textile and then to apparel are highly labour-intensive.

India's share in exports from Asia has remained stagnant at 5 per cent (Exhibit 4.261). Analysis of global trade flows

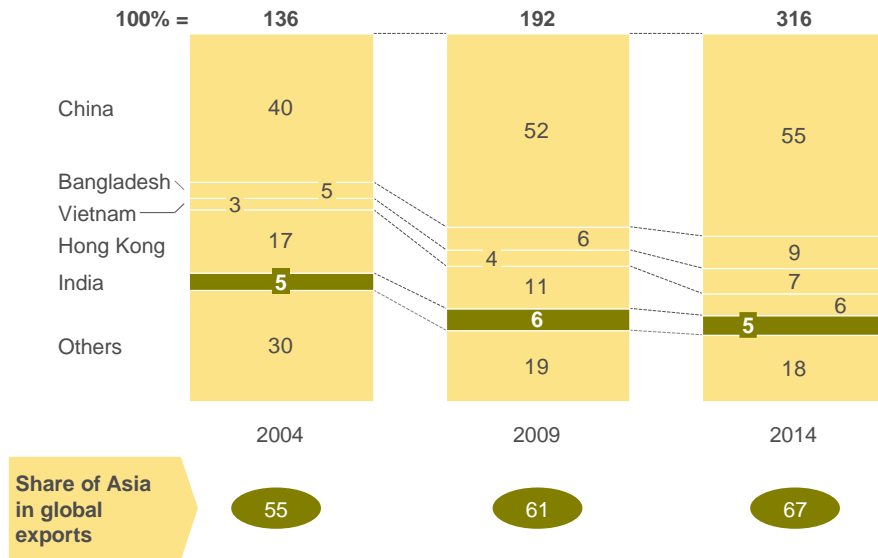
reveals that while China has consolidated its position, Bangladesh and Vietnam are emerging as the next "hot spots" for export-oriented apparel manufacturing.

In 2013, a survey of 29 chief procurement officers (CPO) of leading apparel companies indicated that around 72 per cent planned to decrease sourcing from China in the next five years. However, India ranked a distant third, after Bangladesh and Vietnam as a substitute (Exhibit 4.262).

**EXHIBIT 4.115**

**India's share of apparel exports from Asia has remained stagnant at ~5%**

**Split of export of apparel from Asia**  
Percent, USD bn



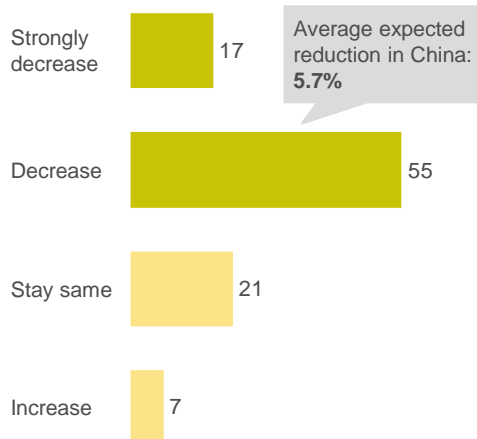
SOURCE: International trade database by ITC

**EXHIBIT 4.116**

**Chief purchasing officers plan to move some of their sourcing out of China over the next 5 years, Bangladesh top emerging sourcing market**

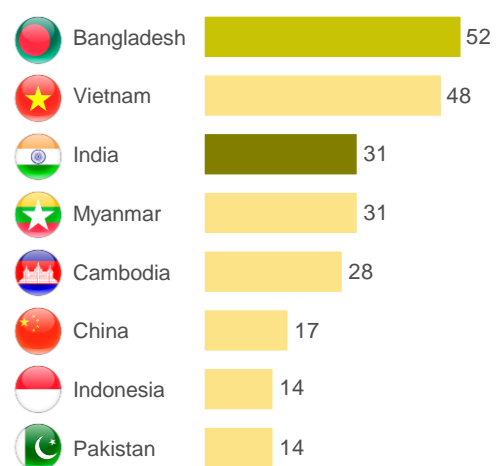
**Expected change in sourcing share (value) from China in next 5 years**

% of respondents, n=29



**Expected top sourcing markets over the next 5 years**

% of respondents ranking countries among top 3, n = 29



SOURCE: Public report - What's next in apparel sourcing



If India were to target a 10 per cent share in apparel exports from Asia (close to Bangladesh's current share) by 2025, it could grow to ~USD 60 bn by 2025.

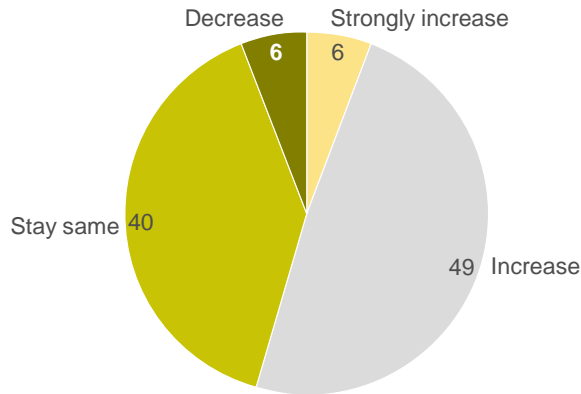
80 per cent of sourcing companies are present in India, even though India's share of their wallet is only about 6 per cent. More than half of the CPOs based in India would like to increase sourcing from here (Exhibit 4.263).

**EXHIBIT 4.117**

**More than 50% of CPOs want to increase their sourcing share from India**

**How do you expect your sourcing value share to develop during the next years until 2020?**

Percent of respondents per category, n = 40



SOURCE: Public report – What's next in apparel sourcing

**Challenges faced and the role of port-led industrialisation**

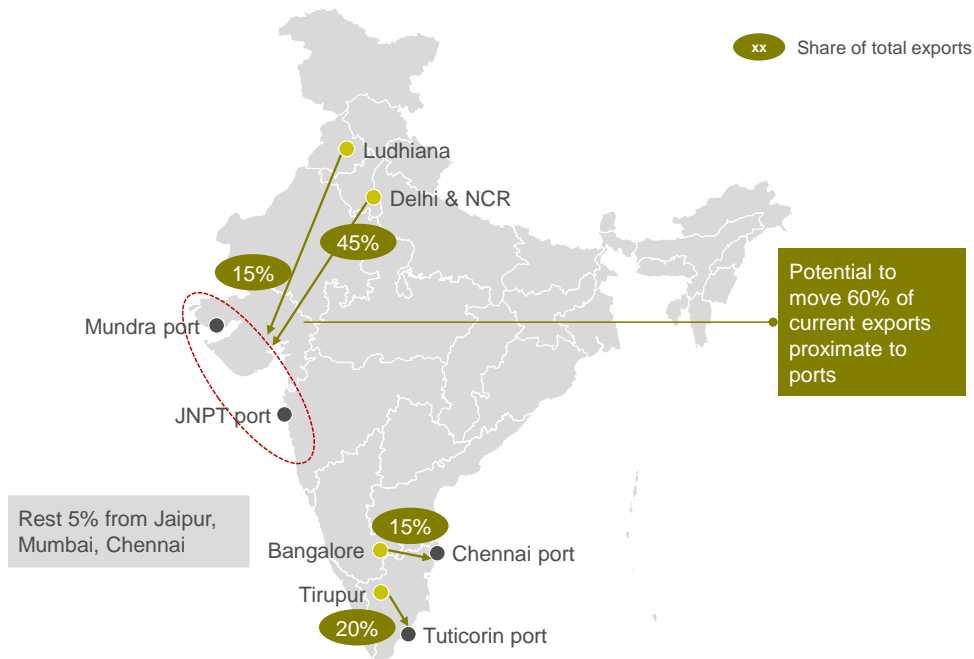
Port-based manufacturing could help the industry overcome two key impediments in India's rise as an export hub:

- **Lead time:** Responsiveness of supply-chain and low and predictable lead time has been the primary selection factor expressed by buyers. For India, the logistics lead time is longer than the

manufacturing process, creating a major disadvantage. A significant portion of Indian apparel exports are transported by air (at 5 times the logistics cost compared to shipping) due to non-reliability of road, rail and port infrastructure against short and fixed turnaround times. Based on the analysis of "origin–destination" pairs of apparel, nearly 60 per cent of the current production is located distant from the ports (Exhibit 4.264).

**EXHIBIT 4.118**

**Origin–destination pairs for apparel exports in India**



SOURCE: Discussions with industry

■ **Sub-scale operations:** Apparel manufacturing in India is dominated by small-scale, stand-alone firms that are not able to compete with other low-cost nations. India has about 11,000 apparel manufacturing firms in comparison with around 18,000 firms in China, which produce 20 times more apparel by volume.

In addition to these port-related factors, restrictions on importing man-made fabric in India also put export-oriented manufacturing at a disadvantage with respect to other competing nations. Man-made fabrics could cut down wastages from 8–9 per cent to 1–2 per cent, thereby improving the overall competitiveness of the industry.

Setting-up port-based or proximate manufacturing clusters could help address these issues and significantly increase the competitiveness of apparel manufacturing. Welspun is a good example of setting up an at-scale facility (800 acres, 14,000 workers, own power supply) and a close-to-port

location (50 km away from India’s largest container port, Mundra).

To replicate the Welspun success model, three or four “apparel parks” could be set up in the country, linking cotton-producing regions with ports. A mapping of cotton-producing regions in India shows three possible locations for setting up these clusters (Exhibit 4.265).

**Saurashtra region in Gujarat:** Amreli, Bhavnagar, Jamnagar, Rajkot, Surendranagar and Ahmedabad are among the highest cotton-producing districts in this region.

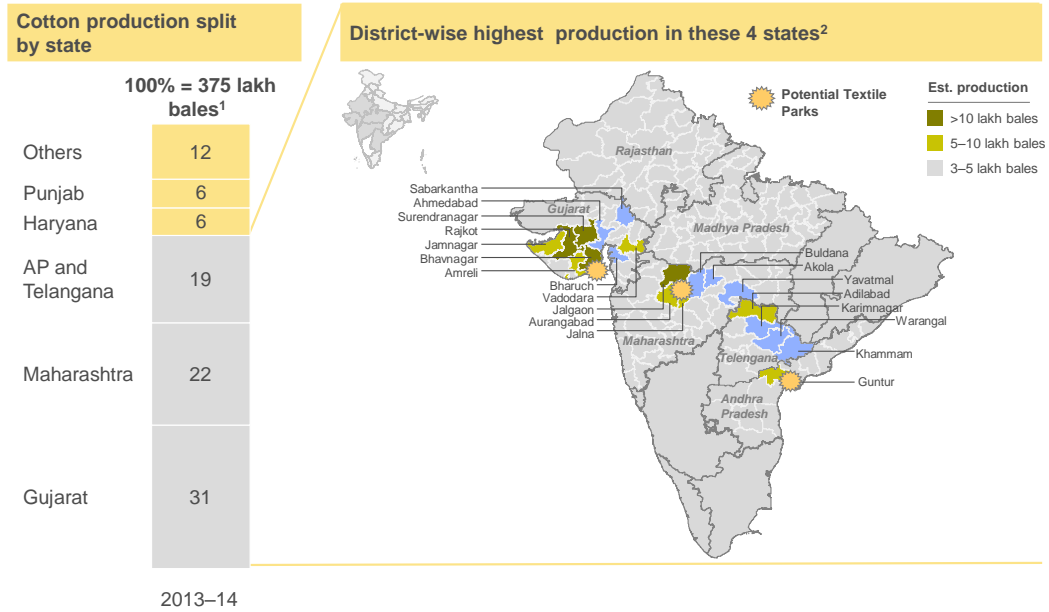
**Central Andhra Pradesh:** Guntur is a key cotton-producing district. This cluster can also tap into cotton being produced in Khammam, Warangal, Karimnagar and Adilabad districts in Telangana.

**Vidarbha region in Maharashtra:** Jalgaon, Aurangabad, Jalna, Buldana and Akola are they key cotton-producing districts in this region.

The potential impact from a proposed apparel park is shown in Exhibit 4.266.

**EXHIBIT 4.119**

**Three clusters of cotton production in India that can be linked to port based apparel clusters**

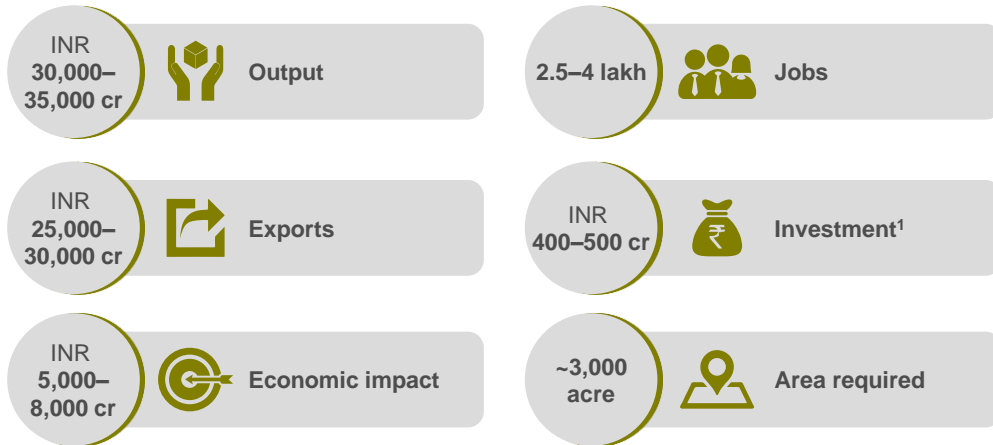


1 of 170kg

2 Based on "Cotton statistics at a glance" published by Directorate of Cotton Development & National Centre for Integrated Pest Management

**EXHIBIT 4.120**

**Potential Impact from each apparel park**



1 Investment includes only internal roads and provision for water, sewage, electricity and land levelling

### 4.3.2 Leather and footwear clusters

#### Global trade flows

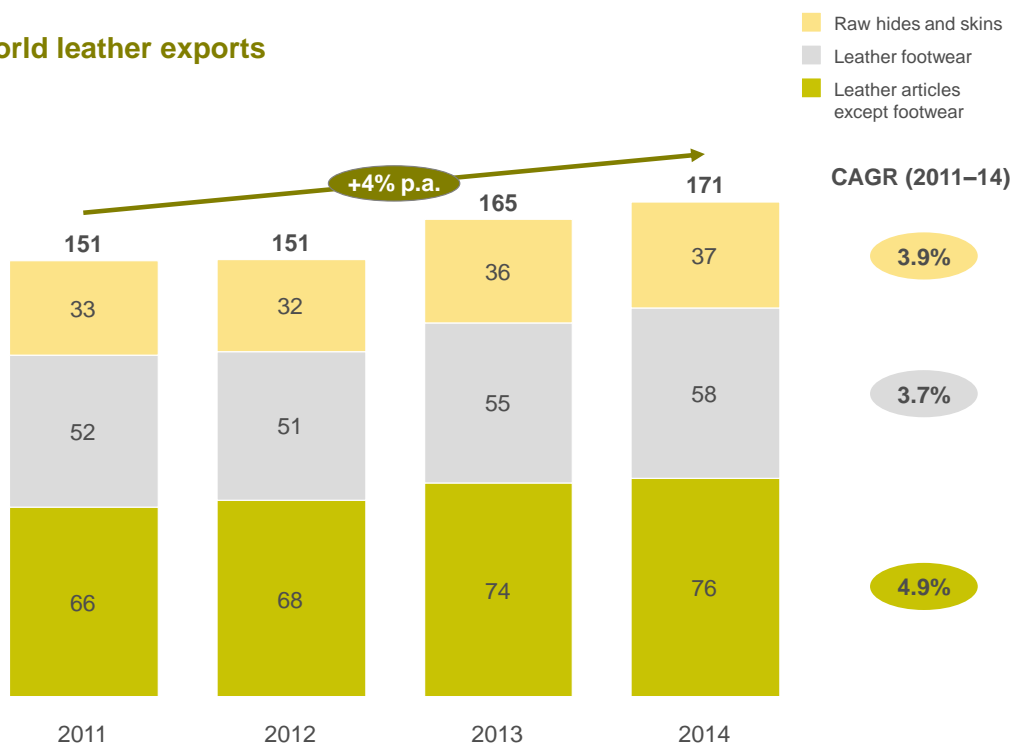
The global leather industry is USD 80 bn in size, with China being the largest producer and US being the largest consumer. Industry revenue is forecasted to reach USD 91 bn, with a CAGR of 3 to 4 per cent, over the next five years. There are four segments of leather products—footwear, finished leather, saddlery and harness, leather apparel and leather goods. Footwear, along with by apparel and goods, forms the major share of the leather industry. About 65 per cent of global leather goes into the

production of leather footwear. Leather and leather goods trade globally was around USD 170 bn in 2014 growing at 4 per cent per annum in the last few years (Exhibit 4.267). Around 80 per cent of it is from the export of leather goods and footwear. China has the largest share of exports in leather footwear and other leather articles, followed by Italy. In exports of raw hides and skins, Italy takes the first place followed by the US and Brazil

Leather is a highly traded commodity, on average, global leather trade accounts for around 75 per cent of total leather production.

EXHIBIT 4.121

#### World leather exports



SOURCE: ITC trade map

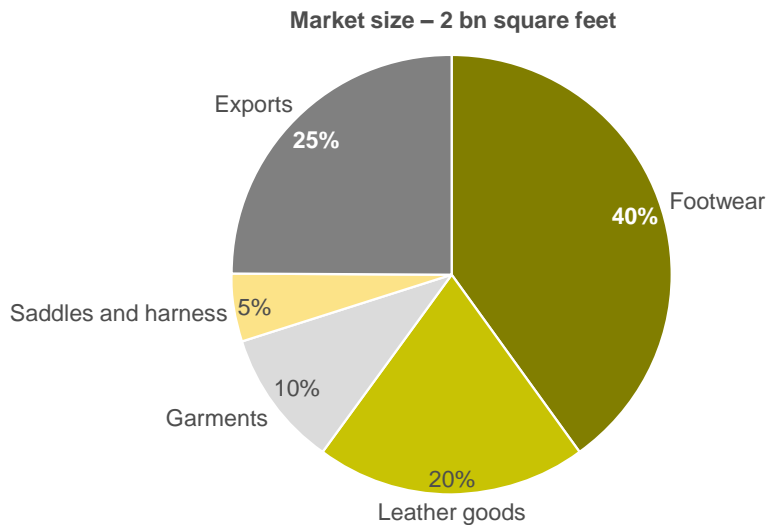
## The Indian leather industry

The livestock population in the country is 512 mn consisting of cattle, buffalo, sheep, goat, pig, etc. This serves as the source of a steady supply of around 2 bn square feet of leather for the industry every year of which a quarter is exported (Exhibit 4.268).

Besides access to raw material, India has a natural advantage in this labour-intensive industry in terms of workforce. Leather and leather products' industries together employ over 2.5 mn Indians, primarily belonging to the economically weaker sections, of which 30 per cent are women.

### EXHIBIT 4.122

#### Leather consumption in India



SOURCE: CLE

#### Leather clusters in India

The industry is an important foreign exchange earner. India exported around USD 6 bn of leather and associated products in 2014. Exports have grown rapidly, achieving annual growth of around 9 per cent over the last four years.

The three major leather clusters which have significant export volumes are (Exhibit 4.269):

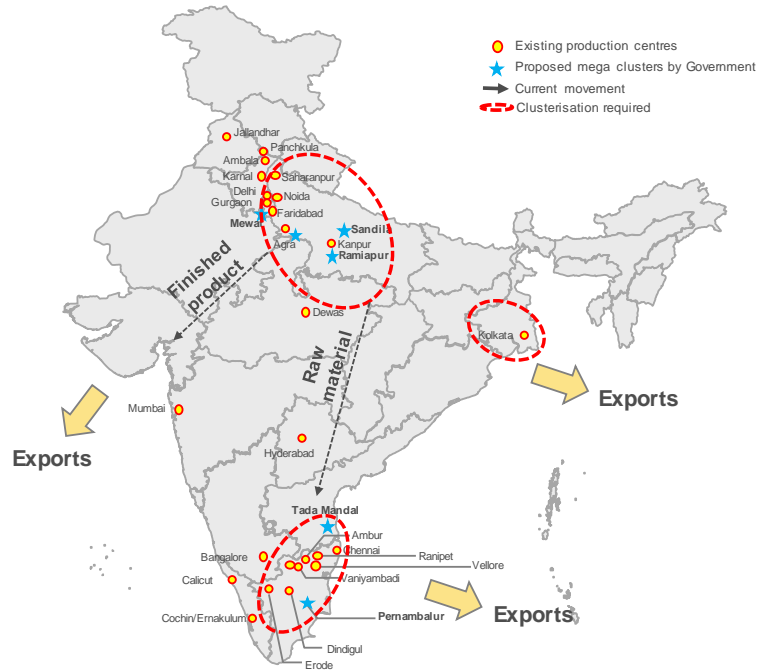
- Tamil Nadu has a significant concentration of exporting units (~33 per cent). Perambur, Chennai, Ambur and Ranipet constitute the leather cluster, primarily using the Chennai port to export leather-related products.

- Uttar Pradesh has around 28 per cent of exporting units spread across Kanpur, Noida, Faridabad and Agra. Most of the leather articles are exported through container ports in the west, e.g., Mundra and JNPT.
- West Bengal: Kolkata houses a leather cluster in the Bantala region and exports through ports on the east coast.

The top five destinations for Indian leather products were with the US with 13.3 per cent share, Germany with 12.8 per cent, the UK with 12.5 per cent, Italy with 8.4 per cent and Hong Kong with 7.4 per cent respectively. The top 10 countries account for more than 75 per cent share of leather and related products (Exhibit 4.270).

**EXHIBIT 4.123**

**Leather production centres in India**

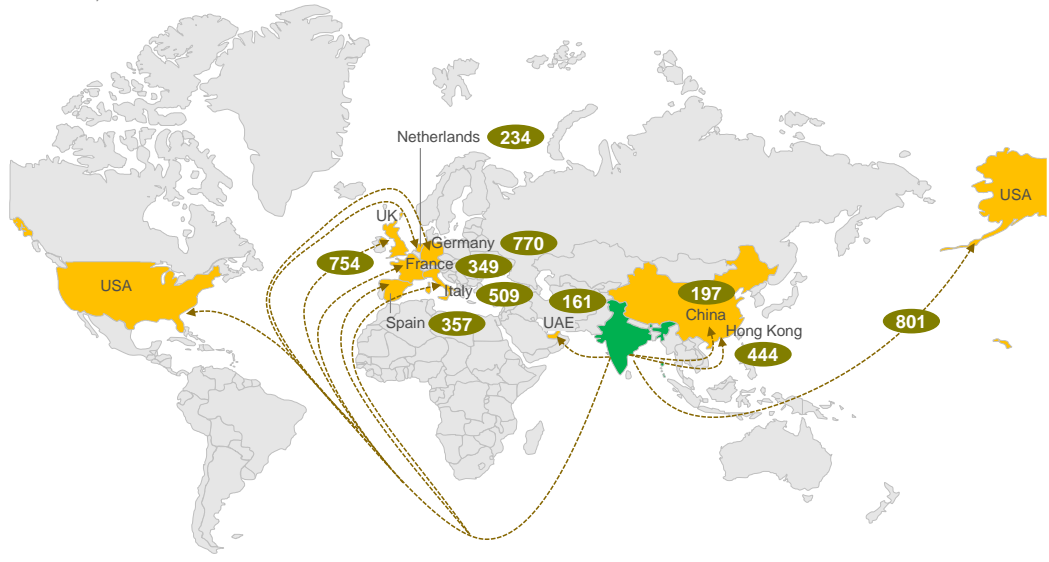


**EXHIBIT 4.124**

**Leather cargo flows from India**

**Leather export cargo**

USD mn, 2014



**Top 10 countries have 75%+ share of leather exports from India**

SOURCE: ITC Trade Map

## Opportunity for India

At 42 per cent, footwear forms the largest share of leather and leather products exports from India. India has grown tremendously from being a raw leather exporter to becoming a supplier of high value-added products in the last few decades.

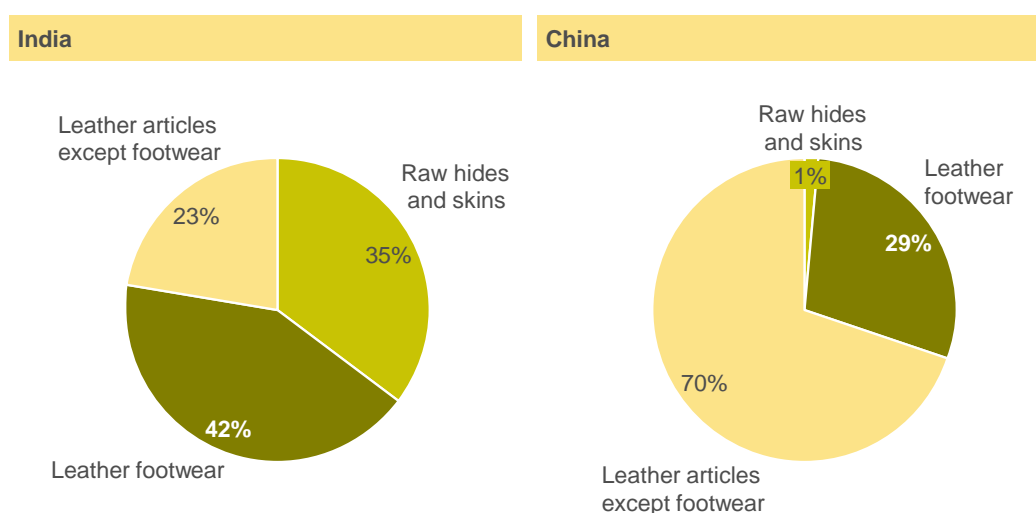
Indian leather exports are around 3.5 per cent of India's export basket. Leather and leather goods together accounted for 1.8 per cent of India's total exports in 2013–14, compared to 2.9 per cent in 2004–05.

Although India is the second largest manufacturer of leather footwear after China, our exports were only 5.6 per cent of the total 2,065 mn pairs produced in 2014.

The industry may find it difficult to meet the export target of USD 14 bn by 2016–17 for which about 6.2 bn square feet of leather is required, more than thrice the present production. Even at a more realistic target of doubling its exports to USD 10 bn in 2016–17 from USD 5 bn in 2013–14, the Indian leather industry may need an additional 3 bn square feet of raw hide, which needs more than export substitution.

### EXHIBIT 4.125

#### Comparison of Indian and China Leather Export Split – 2014



As shown in the exhibit 4.271, China has a much higher share in value-added leather articles—footwear, apparel and goods while India exports large amounts of raw hides and skins. India needs to change this.

#### Challenges faced and the need for port-led industrialisation

The shortage of raw material is not the only challenge for the industry in India. When compared to China and Vietnam, Indian leather products in the international market are of higher cost, due to:

- Half the labour productivity of China or Vietnam in leather manufacturing
- Relatively high dependence on imports for inputs needed for footwear, garments and goods
- Another challenge is the unorganised structure of the Indian leather manufacturing. Nearly 85 per cent of the industry consists of very small manufacturers, who are often uncompetitive

- Infrastructure in China is more developed than India across all utilities – electricity, water, roads and ports

- Most of the big leather clusters in India are land-locked, transportation costs are higher for manufacturing units (Exhibit 4.272)

**EXHIBIT 4.126**

**India lags behind the other Asian footwear players primarily because of high transportation costs**

RANKINGS ARE INDICATIVE

		Ranking (1 = Most competitive)			
		1	2	3	4
<b>Cost competitiveness evaluation framework</b>					
1	Raw material				
2	Energy				
3	Labour				
4	Land and building rent				
5	Interest charges				
6	Transportation				

**Role of ports and logistics infrastructure**  
Building leather clusters near ports could reduce transportation costs involved in product exports and input imports.

Port-proximate manufacturing has played an important role in the competitiveness of leather footwear and leather goods manufacturers in China. Wenzhou is a port-based footwear cluster and is known as shoe capital of the world.

However in India, only the Chennai leather clusters leverages port. Several other clusters could be developed with a similar focus. In these clusters, there will be need to augment the raw material base, enhance capacity, modernise and upgrade leather units, address environmental concerns, develop human resource, support traditional

leather artisans, address infrastructure constraints and establish institutional facilities.

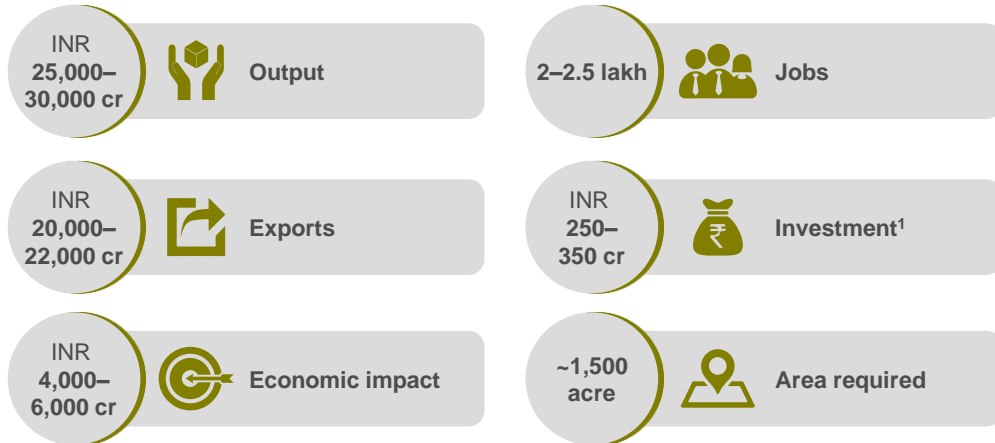
Bihar is excellent for development of the leather industry owing to the availability of raw materials, traditional skills and labour and proximity to NW1. The leather complex at Bantala near Kolkata can also be connected to Haldia port. Similarly, in the South, Perambur may be connected to Chennai or Ennore ports to reduce travel and export costs. Leather clusters in other parts of Tamil Nadu, such as Ambur and Ranipet could also emerge.

The potential impact from the proposed leather and footwear cluster is shown in Exhibit 4.273.



**EXHIBIT 4.127**

**Potential Impact from each leather and footwear cluster**



<sup>1</sup> Investment includes only internal roads and provision for water, sewage, electricity and land levelling

### 4.3.3 Food processing clusters

#### Global trade flows

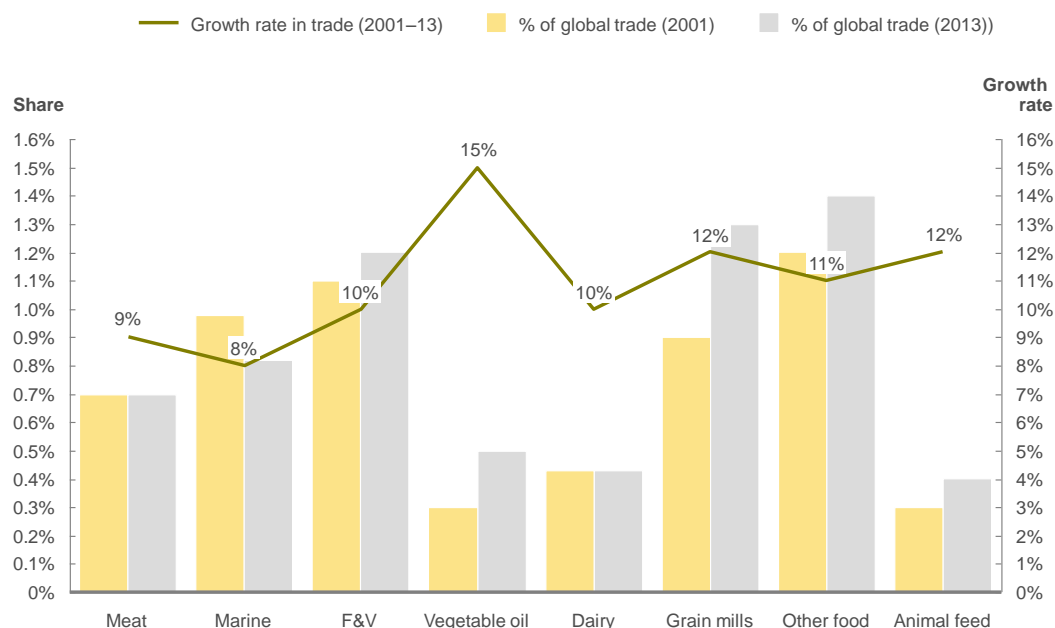
The global food processing industry was estimated to be USD 3,200 bn in 2010<sup>52</sup>, and can be categorised into eight major segments—meat, marine, fruits and vegetables, vegetable oil, dairy, grain mills, ready-to-eat and other foods, and animal feed. The industry contributes around 7 per cent to global exports. Sector-wise contribution to global export volumes in 2001 and 2013 and corresponding growth rates for the same period is shown in Exhibit 4.274.

Fruits and vegetables, grain mills, marine and meat formed the biggest part of global

exports in processed food segments. It is also important to note that grain mills, ready-to-eat foods and vegetable oil were the fastest growing segments. The US is the single biggest market for sale of processed food, while the US, Europe and Japan together account for over 60 per cent of the total retail processed food sales in the world<sup>53</sup>. India's share in global exports has been estimated to be around 1.2 per cent<sup>54</sup>. Sugar and sugar confectionery, animal and vegetable fats and oils, dairy products and frozen and preserved meat, and fish and marine products command the biggest share. Exhibit 4.275 shows the split of global demand for processed food and the split of global exports between countries.

#### EXHIBIT 4.128

#### Segment-wise contribution to global exports 2001–13



SOURCE: ITC Trade Map, VCIC Conceptual Development Plan

<sup>52</sup> Gyan Research and Analytics Pvt Ltd., 2012

<sup>53</sup> Cygnus APF Quarterly Report, May 2007

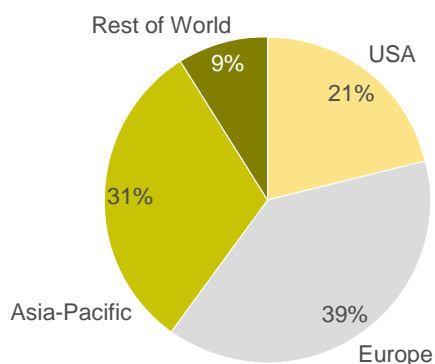
<sup>54</sup> Government of India, National Manufacturing Competitiveness Council (2009). Enhancing firm

level competitiveness Indian food and agro-processing industry: Strategies and road map development

## EXHIBIT 4.129

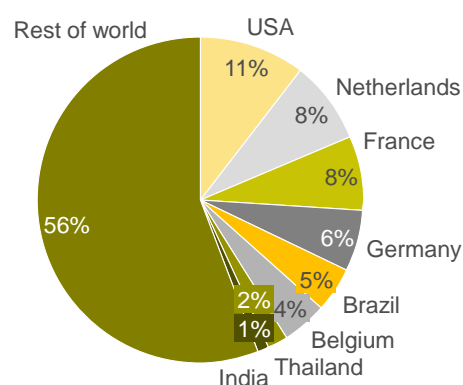
### Share of global processed food market

Global processed food market demand, Percent



### Split of global exports of processed food

Global exports of processed food, Percent



SOURCE: FICCI Knowledge paper on "Processed food and Agribusiness", Cygnus APF Quarterly Report, May 2009, GOI National Manufacturing Competitiveness Council, 2009

### Indian food processing Industry

The Indian food processing industry was estimated to be USD 121 bn in FY 2012<sup>55</sup> and ranks fifth in the world in exports, production and consumption. It contributes around 9 per cent of the GDP in manufacturing and around 11 per cent of the GDP in agriculture<sup>56</sup>.

Indian exports of processed food and related items rose at a CAGR of 23.3 per cent during FY 11–15 reaching

USD 21.5 bn in FY 2015<sup>57</sup>. The share of processed food exports in total food exports was 32 per cent in FY 2014.

US, Bangladesh and the UAE are the major countries that import processed food and agriculture-related products from India. US, Canada and Belgium are also major importers of processed marine foods from India. Exhibit 4.276 shows the export value of some key processed food categories from India in 2014.

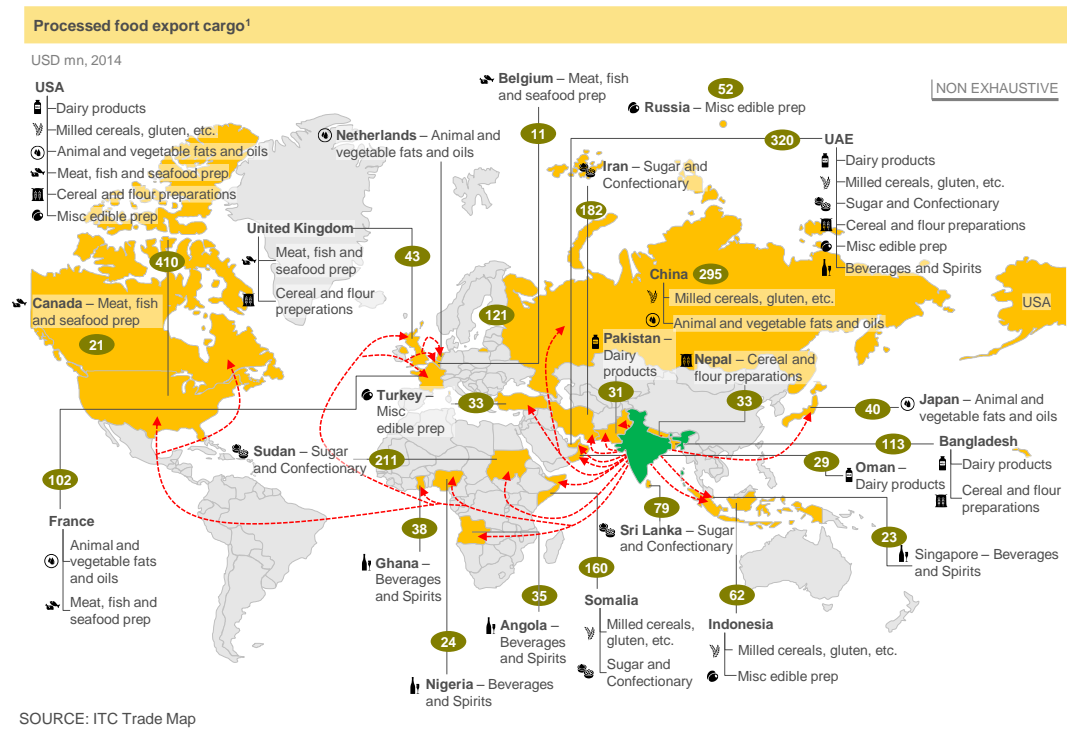
<sup>55</sup> D&B Research

<sup>56</sup> MOSPI Annual Report 2014-15

<sup>57</sup> IBEF

## EXHIBIT 4.130

### Processed food cargo flows from India



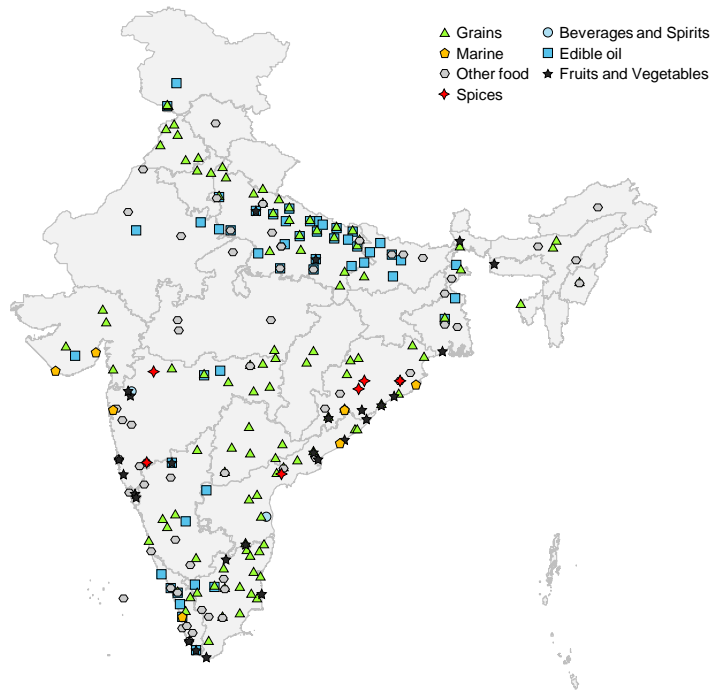
### Food processing clusters in India

Small-scale and unorganised sectors account for around 75 per cent of the total food processing industry in India (Exhibit 4.277). SMEs in the food processing industry are spread across the country. In the organised sector, Andhra Pradesh, Gujarat, Maharashtra and Uttar Pradesh have the maximum share. Exhibit 4.278 shows the share of different states in the organised food processing units.

Andhra Pradesh is the centre for fruits, vegetables and grain processing; Gujarat is the centre for edible oils and dairy, Maharashtra for fruits, vegetables, grains and beverages while Uttar Pradesh has food processing units across most product categories.

**EXHIBIT 4.131**

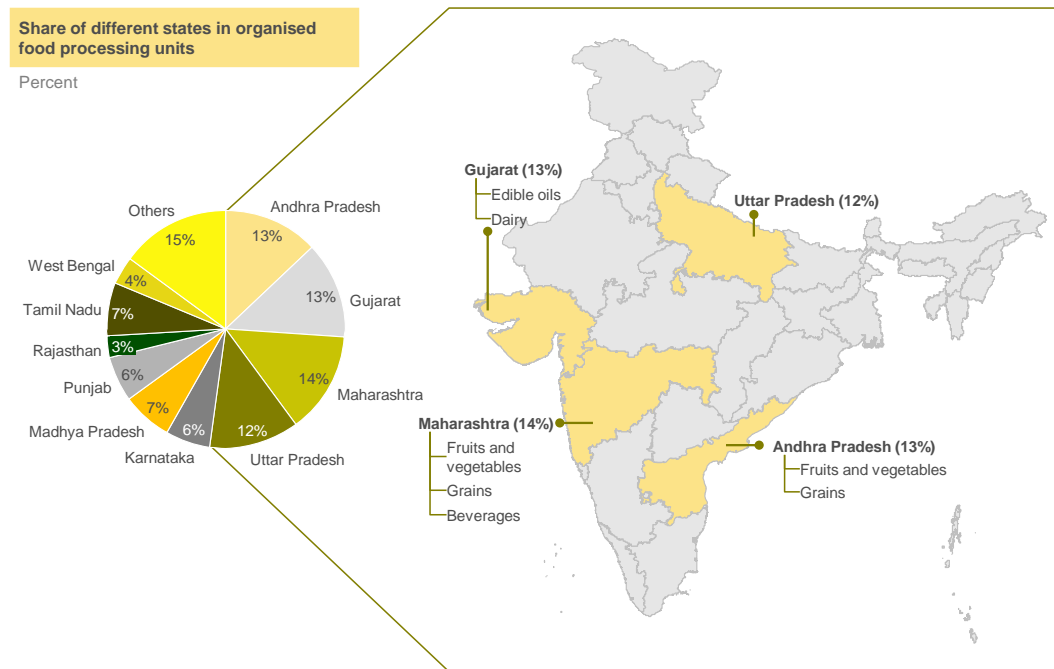
**Footprints of processed food segment in unorganised sector**



SOURCE: Cluster observatory

**EXHIBIT 4.132**

**Key food processing clusters in India: Organised sector**

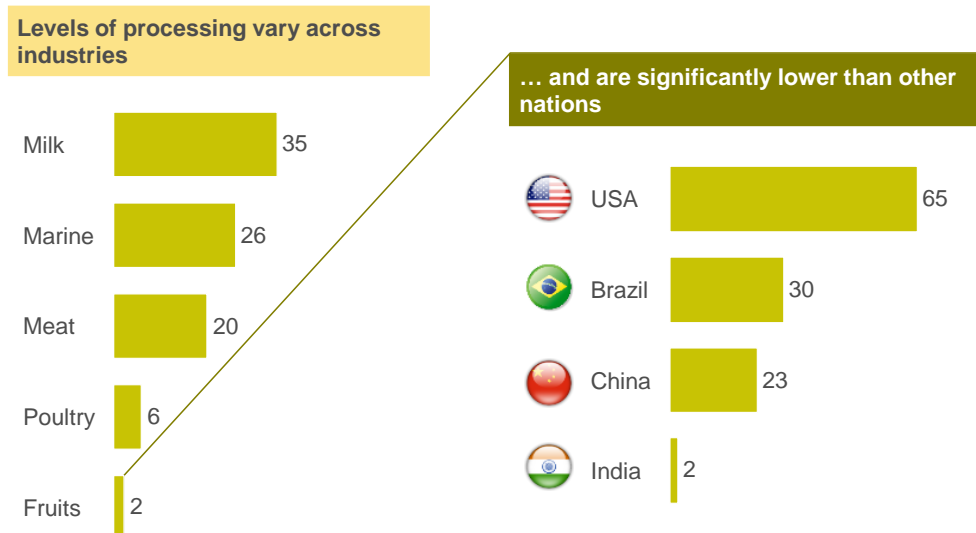


SOURCE: GOI Ministry of Statistics and Programme Implementation (2010) Annual Survey of Industries

## EXHIBIT 4.133

### Levels of food processing in India are much lower than those in other countries

Processing level (Percent)



SOURCE: Ministry of food processing Annual Report, 2009–10

### Opportunity for India

India is the second largest producer of food after China. India processes much less than other countries across segments (Exhibit 4.279).

Even though India has been a major exporter of food, processed foods form a very small share in India's export share across all kinds of products:

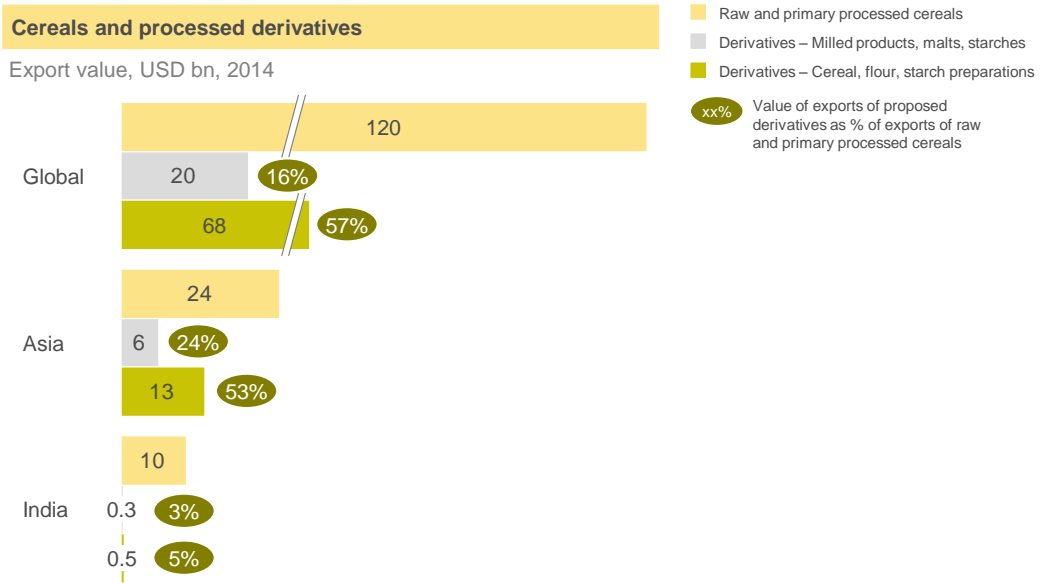
- Cereals and processed derivatives:** India is one of the largest exporters of cereals, including wheat, rice, barley and oats, contributing around 40 per cent of the total exports from Asia in 2014. However, in comparison, the export of value-added derivatives of cereals forms a very small share in the export basket of India (Exhibit 4.280). In 2014, value of export of milled products,

malts and starches was 3 per cent of the value of export of cereals as compared to the average 24 per cent from Asia and 16 per cent globally. This suggests a huge untapped potential of value addition in food processing of cereals for exports from India.

- Meat, fish and marine products:** India is one of the largest exporters contributing around 20 per cent to the total exports from Asia in 2014. However, the value of export of processed derivatives of meat, fish and marine products is merely 1.4 per cent of the value of export of raw, frozen and preserved meat, fish and marine products. This figure was around 41 per cent and around 20 per cent for Asia and the world respectively (Exhibit 4.281).

**EXHIBIT 4.134**

**India's export basket comprises mainly of raw and primary<sup>1</sup> processed cereals**

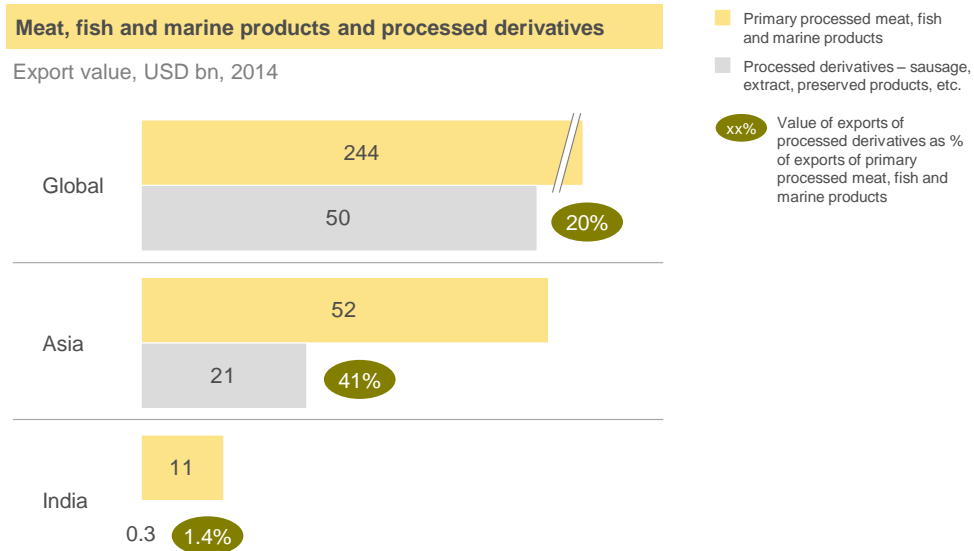


<sup>1</sup> Primary processing refers to quick and simple transformation of food like packaging, milling of rice, etc.

SOURCE: ITC Trade Map

**EXHIBIT 4.135**

**India's export basket comprises mainly of primary<sup>1</sup> processed meat, fish and marine products**

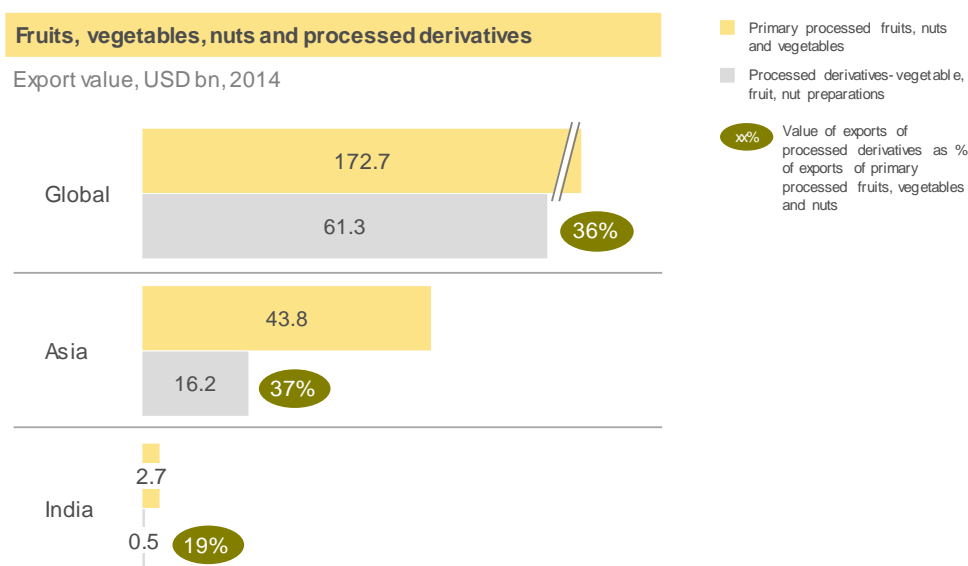


<sup>1</sup> Primary processing refers to quick and simple transformation of food like packaging, milling of rice, etc.

SOURCE: ITC Trade Map

## EXHIBIT 4.136

### India's export basket comprises mainly of primary<sup>1</sup> processed fruits, vegetables and nuts



<sup>1</sup> Primary processing refers to quick and simple transformation of food like packaging, milling of rice, etc.

SOURCE: ITC Trade Map

■ **Fruits, vegetables and nuts:** The value of export of processed derivatives of fruits, vegetables and nuts from India was 19 per cent of the value of export of primary processed fruits, vegetables and nuts in 2014. Owing to higher value-added food processing, this figure was around 37 per cent and around 36 per cent for Asia and the world respectively (Exhibit 4.282).

This suggests a huge potential for manufacturing processed derivatives from cereals, meat, fish and marine products and fruits, vegetables and nuts in India. The industry's aspiration is to triple food processing levels in India from around 7 per cent in 2010 to 20 per cent in 2020 by augmenting manufacturing capacity in secondary and tertiary processing, increasing cold storage and warehouse capacity and developing skilled resources to manage different steps of the food processing value chain<sup>58</sup>. The expected impact could be:

- 20 to 40 per cent increase in farm incomes
- 50 per cent reduction in wastage levels
- Around 20 to 30 mn direct and 60 to 80 mn indirect jobs

Considering the small domestic market for processed foods in India currently, the aspired growth in the processed food industry has to be fuelled by exports. This requires that the industry prepares itself for high export competitiveness.

#### Challenges faced and the role of port-led industrialisation

India is resource rich but absence of domestic scale, outdated technology, inefficient logistics and supply chain and unavailability of infrastructural facilities constrains food processing. India faces tough competition from China, Brazil,

<sup>58</sup> FICCI's India Food Processing: Mission 2020



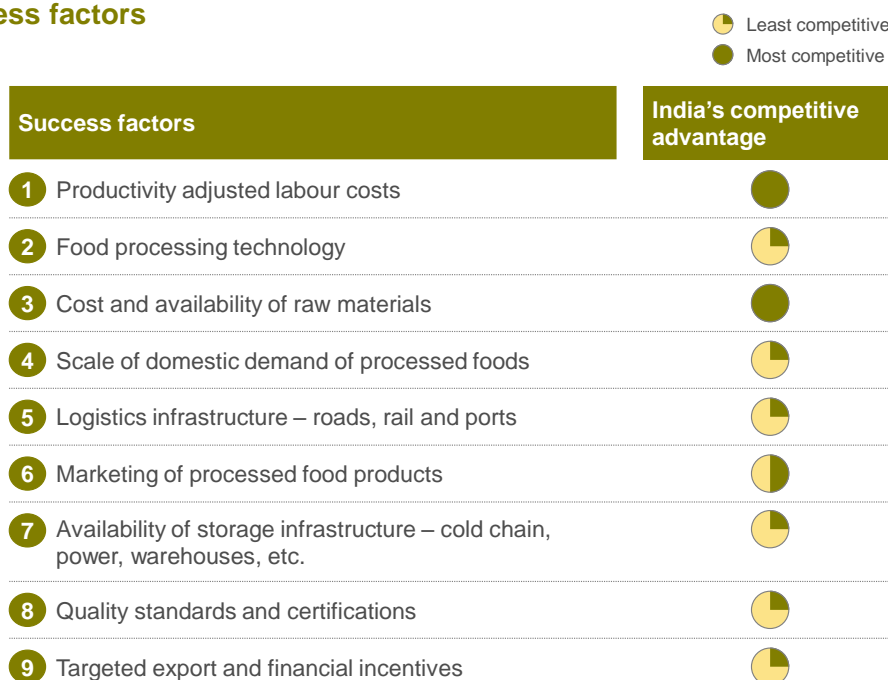
Thailand, Germany, Indonesia and Vietnam in the processed meat, fish and marine foods market. Greece, Italy, the Netherlands, France and Belgium are the main competitors in the cereal derived food products' segment.

An analysis of India's export competitiveness reveals that India ranks favourably on productivity adjusted labour costs and availability and cost of raw materials (Exhibit 4.283). However, it lags behind on most of the other aspects of the

industry ecosystem and government and regulatory support required for the sector. India also lacks in food processing technology and availability of support infrastructure required for the industry. There are severe constraints due to the non-availability of or limited access to quality control and testing infrastructure, storage facilities and inefficient supply chain and logistics infrastructure leading to huge wastages and high costs of processed food products.

**EXHIBIT 4.137**

**India's food-processing competitiveness was assessed on a set of nine success factors**



**Role of ports and logistics infrastructure**

Due to the perishable nature of most food products, it is particularly important to have efficient logistics to reduce transportation time of both raw materials and finished

products. Transit cost is also an important factor in the overall product cost where India already has a disadvantage. Therefore, port infrastructure and hinterland connectivity are extremely important for export-oriented cargo.

### Global success story

There are international cases of food parks which have thrived primarily because of the optimal location, e.g., Penang International Halal Hub in Malaysia which caters to sea food processing, herbs extraction, bakery products, canned foods and beverages, and others. This hub is strategically located between the large markets of India and China and has linkages to good ports. The location is complemented by efficient transport infrastructure and availability of skilled resources through the Penang Skill Development Centre. It is also monitored by the Halal Industry Development Corporation which laid down the guidelines for HALMAS status – an accreditation given to Halal Park operators as a mark of excellence indicating that the products are of the highest quality. Companies eligible under the guidelines also receive various fiscal incentives, such as tax and income tax exemptions.

Considering the export orientation of the food processing sector, it is important that Mega Food Parks be port-based or have adequate linkages to ports. Possible locations include:

- Kakinada in Andhra Pradesh: Since Andhra Pradesh has the necessary factors of production, including proximity to raw materials, port infrastructure and existing industrial agglomeration, it is most suitable for a port-based Mega Food Park with significant export orientation of value-added food products of rice, fruits and vegetables. The proposed Mega Food Park could also draw synergies from VCIC where food processing is a focus sector with Kakinada, Gannavaram and

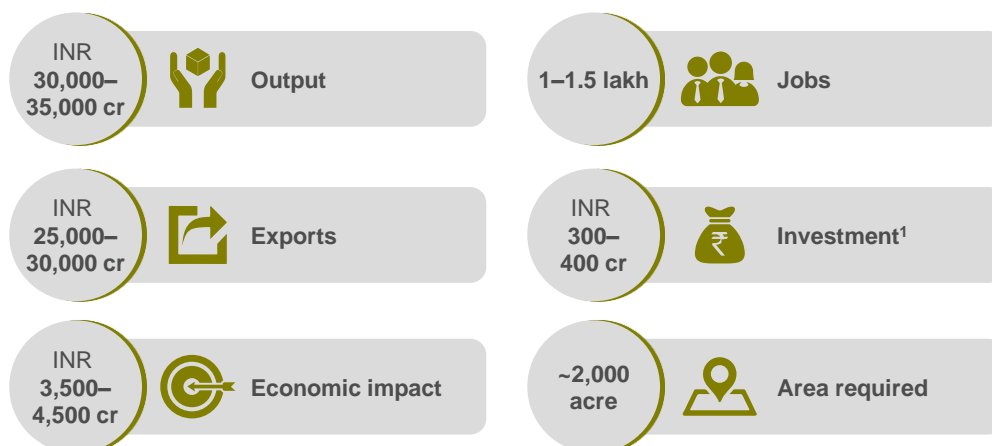
Yerpedu–Srikalahasti as the proposed nodes for development.

- Southern Maharashtra: The state is a leading producer of mango, cashews and fish. However, food processing is currently done using traditional methods and oriented primarily towards domestic consumption. A Mega Food Park specialising in the manufacturing and export of value-added products from mango, cashews and fish can come up in resource-rich districts of Ratnagiri and Sindhudurg, closely linked to Jaigad and Vijaydurg ports.

The potential impact from food processing industrial cluster is shown in Exhibit 4.284.

### EXHIBIT 4.138

#### Potential Impact from each food processing cluster



<sup>1</sup> Investment includes only internal roads and provision for water, sewage, electricity and land levelling

### 4.3.4 Furniture clusters

#### Global trade flows

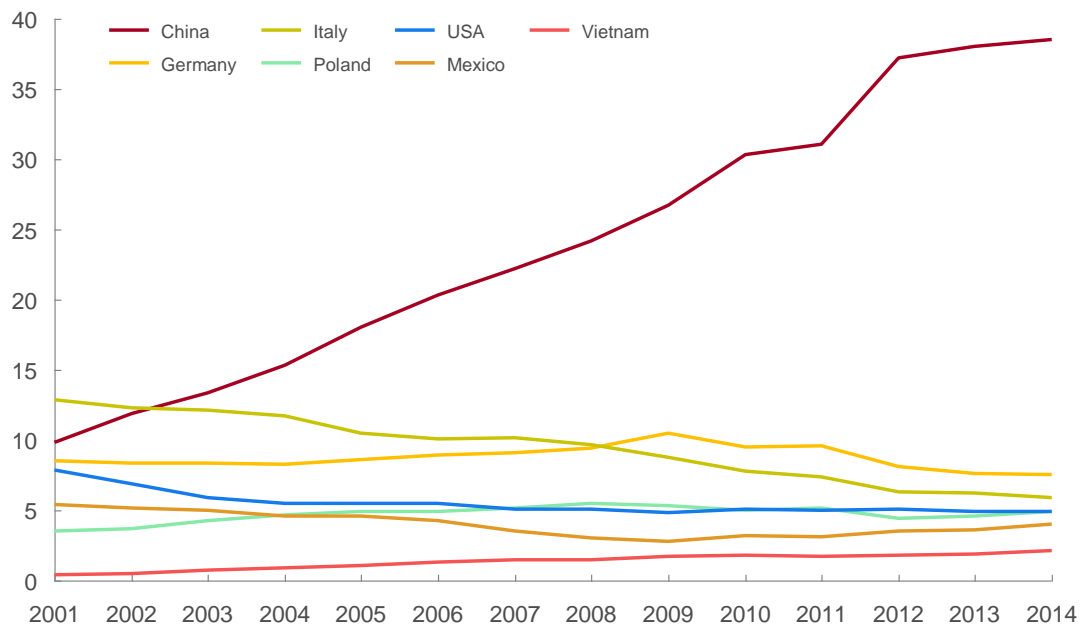
The global furniture market comprises six major categories and amounted to around USD 420 bn in 2014 and is pegged to grow at around 3.5 per cent Y-o-Y to reach USD 450 bn by 2019. Globally, furniture is a highly traded commodity with global exports of USD 242 bn, which amount to 58 per cent of consumption. Global exports are primarily driven by four of the six key categories—office and domestic furniture (USD 85 bn),

seats (USD 73 bn), lamps and lightings (USD 54 bn) and mattresses (USD 16 bn). In the furniture market, across all categories, China is a dominant force with 40 per cent share in global exports (Exhibit 4.285). The largest importers are the US (24 per cent) and Germany (10 per cent).

Vietnam has grown its share in global export five times in the last 15 years owing to the availability of cheap raw material and labour. India has less than one per cent share of global exports. (Exhibit 4.286).

#### EXHIBIT 4.139

##### Global furniture markets exports

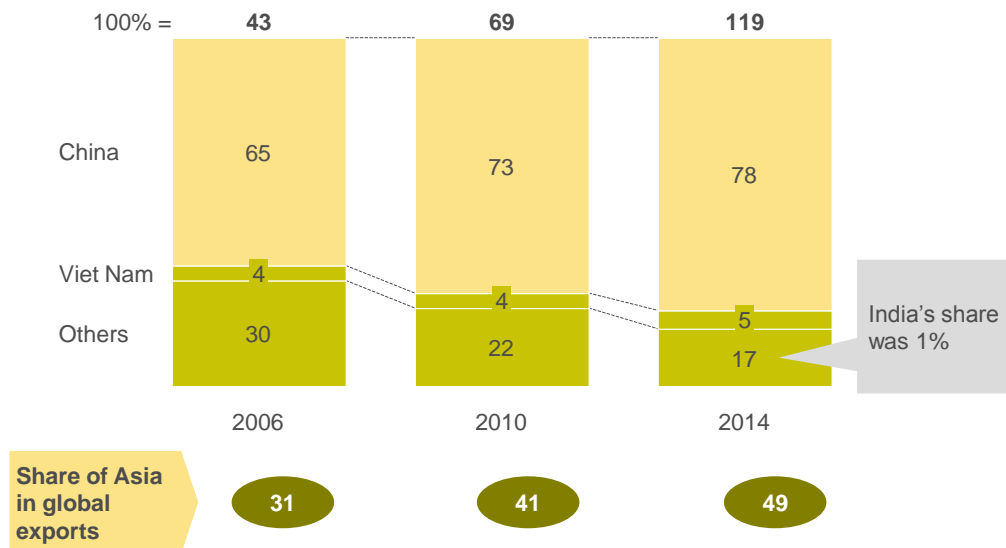


SOURCE: ITC Trademap

**EXHIBIT 4.140**

**China has a near monopoly in export of furniture from Asia**

**Split of export of “Furniture, Lighting, signs and pre-fabricated buildings” from Asia**  
Percent, USD bn



SOURCE: International trade database by ITC

Import markets are primarily developed economies. The US is the largest importer with 24 per cent share in global imports, followed by Germany (10 per cent), the UK (5 per cent), France (5 per cent), Canada (4 per cent) and Japan (4 per cent).

Key trade flows in the world are primarily from China to the developed economies. Another major trend in the global trade is the flow of furniture from markets with cheaper labour to the markets in proximity, e.g., Mexico to the US (Exhibit 4.287).

## EXHIBIT 4.141

### Key global trade flows

From ...	... to	Trade (in USD bn)
 China	US	24.1
 Mexico	US	9
 US	Canada	5.5
 China	Japan	5.17
 Canada	US	4.5
 Poland	Germany	4.4
 China	Germany	4.1
 China	UK	4
 China	Malaysia	3.1
 China	Singapore	3
 China	Australia	2.9
 China	Hong Kong	2.6
 China	Canada	2.5
 China	Russia	2.4
 China	UAE	2.3
 US	Mexico	2.3
 Germany	France	2.2
 China	Netherlands	2.2
 Vietnam	US	2.2
 Italy	France	2.1

SOURCE: ITC Trademap

### The Indian furniture industry

Demand for furniture in India increased at 12 per cent annually from 2007 to 2014, forming a USD 25 bn market.

Home furniture is the largest segment in the Indian market contributing to roughly 65 per cent of the overall market, whereas the other large sectors of the global market like lamps and lightings and seating contribute

only 2.5 per cent and 8 per cent respectively.

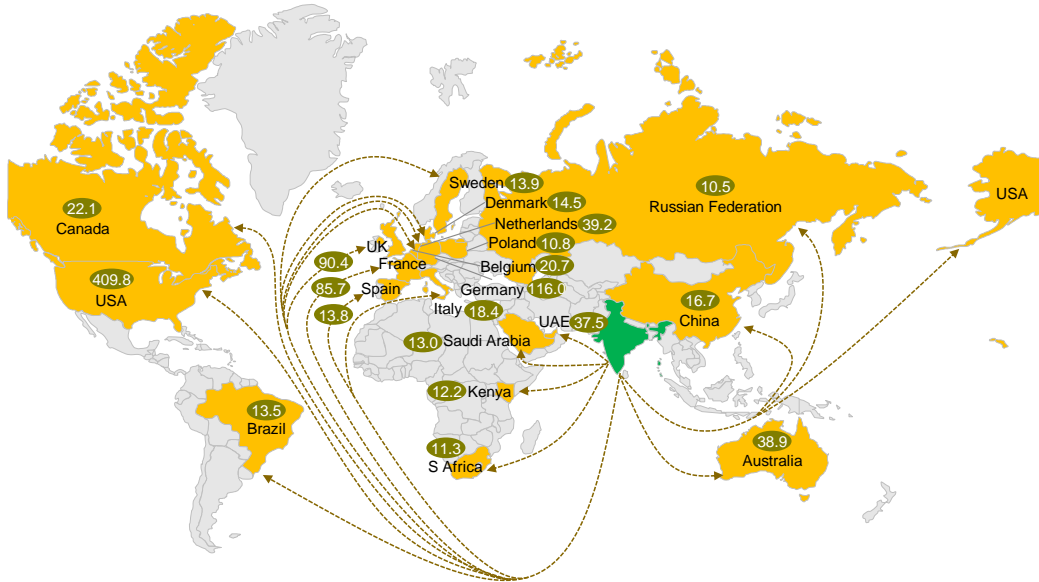
India has been exporting the maximum share of furniture to the US and the UK accounting for 47 per cent of the total export. India is primarily a self-sufficient market with both exports and imports being less than 5 per cent of the overall market. Exhibit 4.288 shows key cargo flows in from India.

## EXHIBIT 4.142

### Furniture cargo flows from India

#### Furniture export cargo

USD mn, 2014



SOURCE: ITC trade database

### Furniture clusters in India

Furniture in India is manufactured in key pockets that include:

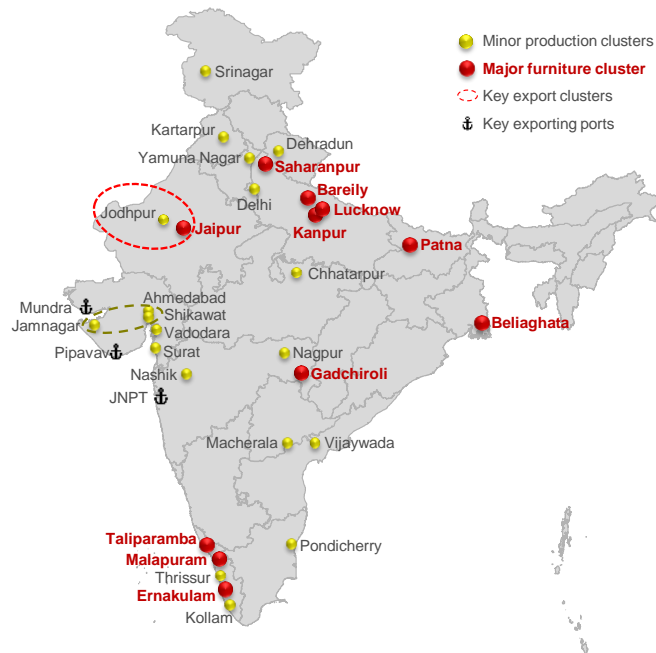
- Jaipur – Marble – Rajasthan
- Kanpur – Steel Furniture – UP
- Saharanpur – Wood Furniture – UP
- Lucknow – Steel Furniture – UP
- Malappuram – Wood Furniture – Kerala
- Ernakulum – Wood Furniture – Kerala
- Taliparamba – Wood Furniture – Kerala
- Gadchiroli – Bamboo – Maharashtra
- Bareilly – Cane and Bamboo – UP

- Beliaghata – Lamp – West Bengal
- Patna – GLS Lamps – Bihar

Mundra is the largest exporting port from the country, contributing to around 70 per cent of furniture exports. Mundra primarily gets its cargo from its immediate hinterlands in Kutch and secondary hinterlands of North India, mainly the Rajasthan belt (Jodhpur and Jaipur). Pipavav is the second biggest port in terms of volume catering to the South Gujarat and Rajasthan clusters. Only two other clusters in the country are oriented towards exports, while the majority serve domestic demand (Exhibit 4.289). India could build on its large domestic market, traditional craft skills and the trend of shifting production centres to make a substantial dent in the export market.

## EXHIBIT 4.143

### Key clusters in India



#### Challenges faced and the role for port-led industrialisation

India may need to resolve some of its constraints:

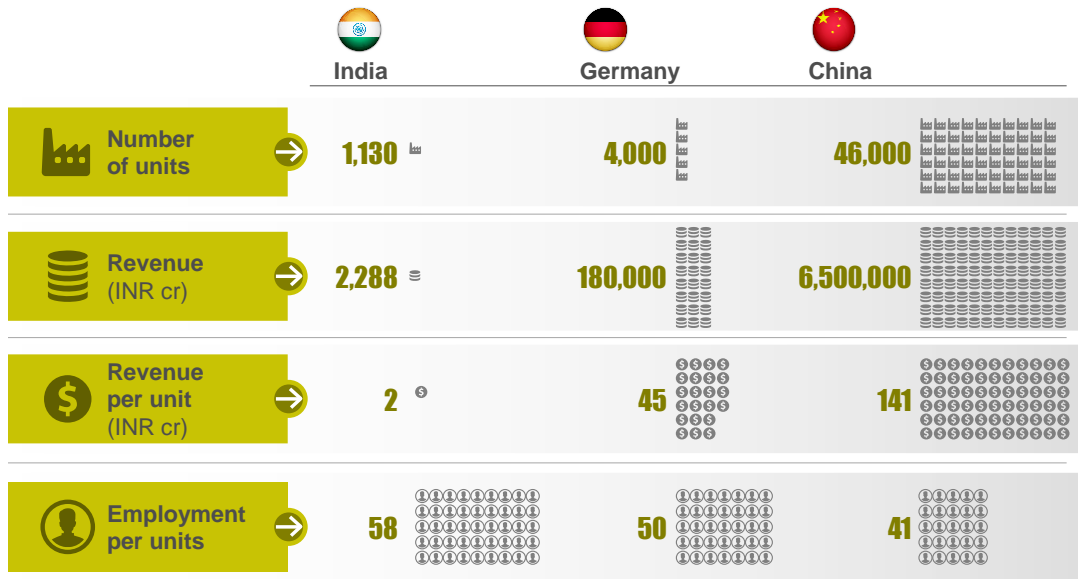
- **Sub-scale operations** - India has 1,384 registered manufacturing units for furniture production in India. Units are much smaller and highly labour-intensive in comparison with Germany and China (Exhibit 4.290).
- **Import dependence for raw material** – India is heavily dependent on sourcing

wood from other countries. Currently, India imports around 5 mn cubic metres of wood primarily through Mundra and Kandla ports.

- **Logistics cost** - Logistics cost of the finished product contributes around 10 to 12 per cent overall value, while importing raw materials contributes another 5 per cent. Hence, port-based clusters could be cost-effective and help in reducing the overall cost of exports from the country (Exhibit 4.291).

**EXHIBIT 4.144**

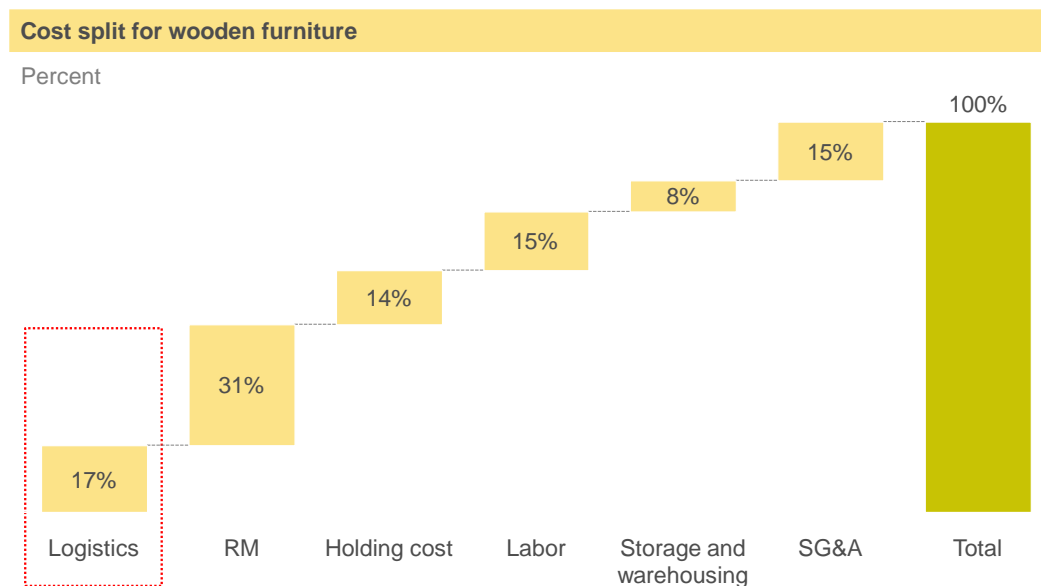
**Comparison of Indian units in terms of size to global examples**



SOURCE: ASI, FAO International furniture market, China light manufacturing yearbook

**EXHIBIT 4.145**

**Furniture cost breakdown**



SOURCE: Market research

**Role of ports and logistics infrastructure**

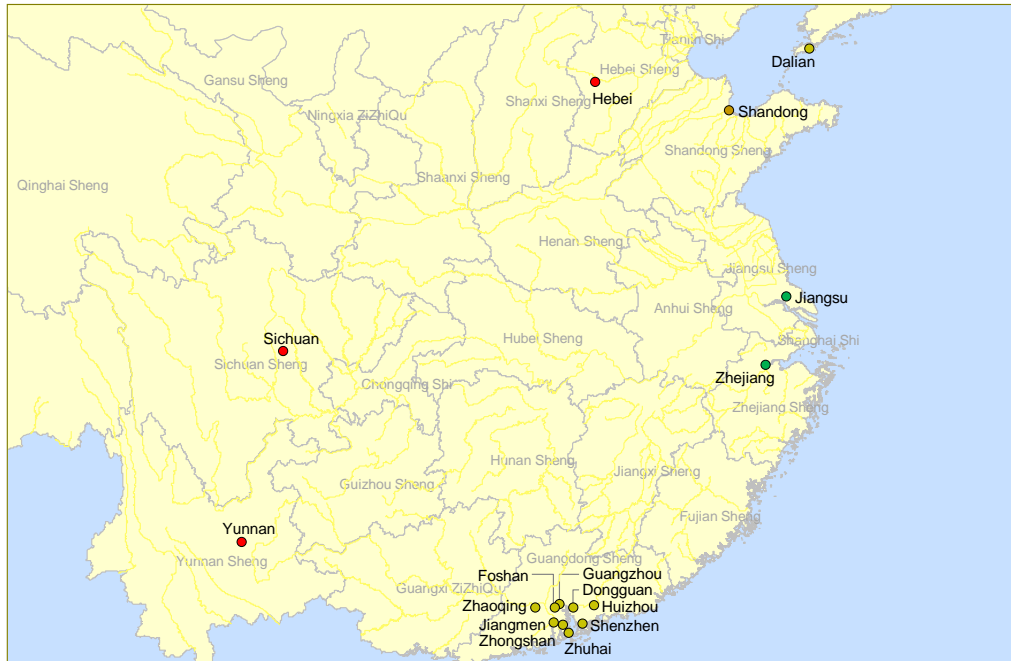
China is the biggest producer of furniture and the biggest importer of timber in the

world. In China, around 70 per cent of the overall capacity is installed coastally (Exhibit 4.292). Malaysia is similar (Exhibit 4.293).



**EXHIBIT 4.146**

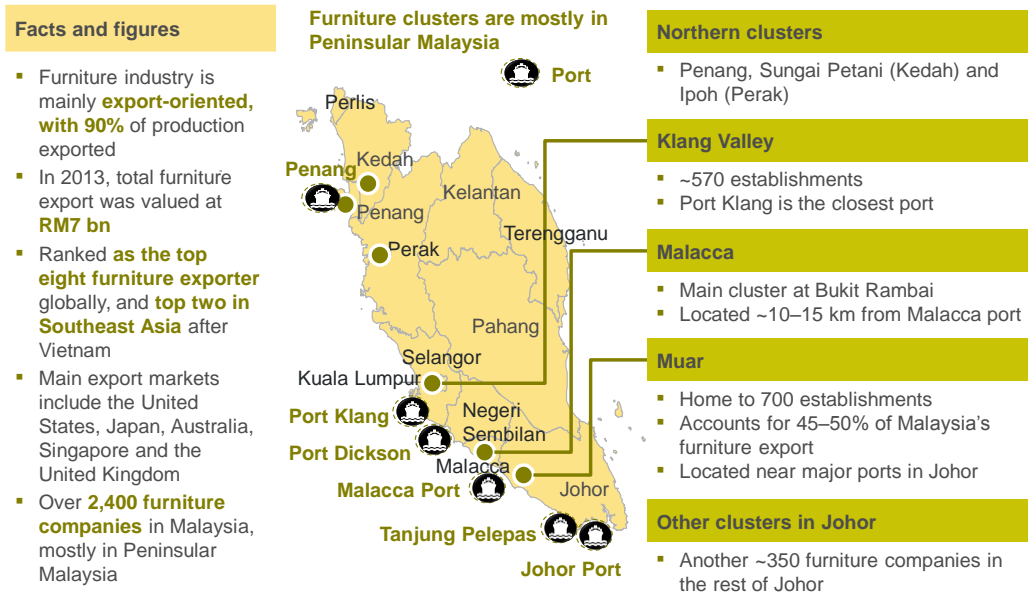
**70% of the installed capacity in China is coastal**



SOURCE: China light manufacturing yearbook

**EXHIBIT 4.147**

**Malaysia is a major furniture exporter with furniture clusters located in close proximity to major ports**



SOURCE: Ministry of International Trade and Investment; Malaysian Furniture Promotion Council; furniture cluster association

Going forward, it seems logical to develop coastal clusters for exports-based manufacturing, as discussed in the previous section. Given that the current manufacturing set-up is present in Kerala, it would be ideal to develop it further. There is also significant potential to expand the current clusters in Gujarat and Assam. For Gujarat, the raw material of marble is available close to the existing sites. A concerted effort in trying to make these

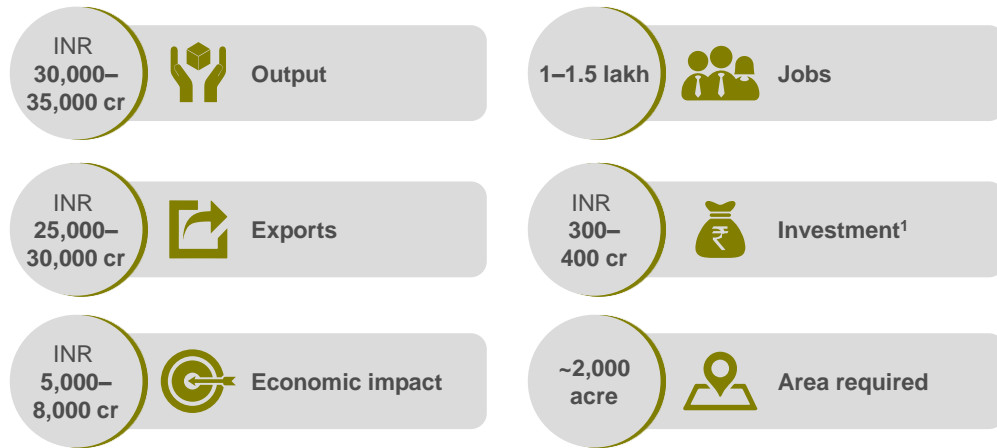
clusters export competitive can go a long way.

Additionally, the existing bamboo processing industry could also be upgraded to an export-centric cluster with proper connectivity to the ports. The proposed ICD in North Bengal along with the existing NW2 can play an important role in making this cluster exports competitive.

The potential impact from the proposed furniture cluster is shown in Exhibit 4.294.

#### EXHIBIT 4.148

##### Potential Impact from each furniture cluster



<sup>1</sup> Investment includes only internal roads and provision for water, sewage, electricity and land levelling

### 4.3.5 Electronics clusters

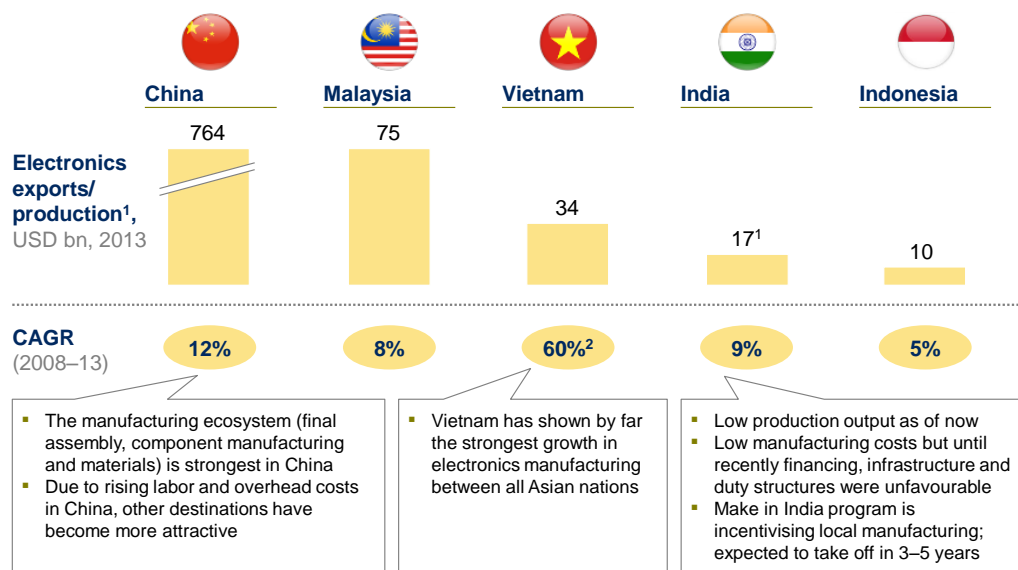
#### Global trade flows

In Asia, China is the leading manufacturer of electronic goods followed by Malaysia and Vietnam. The manufacturing ecosystem is strongest in China but due to rising labour and overhead costs, other destinations are

becoming more attractive. Vietnam has shown the strongest growth in electronics manufacturing among all the Asian nations (Exhibit 4.295). With the “Make in India” programme which incentivises local manufacturing, electronics manufacturing is expected to take off in the coming years.

**EXHIBIT 4.149**

**China is by far the largest electronics manufacturing hub in Asia, but other destinations are starting to emerge**



<sup>1</sup> Local electronics production for India, electronics exports for all other countries; <sup>2</sup> 2009-14

SOURCE: Miti, Vietnam GSO, BDG Asia, IESA, China National Bureau of Statistics

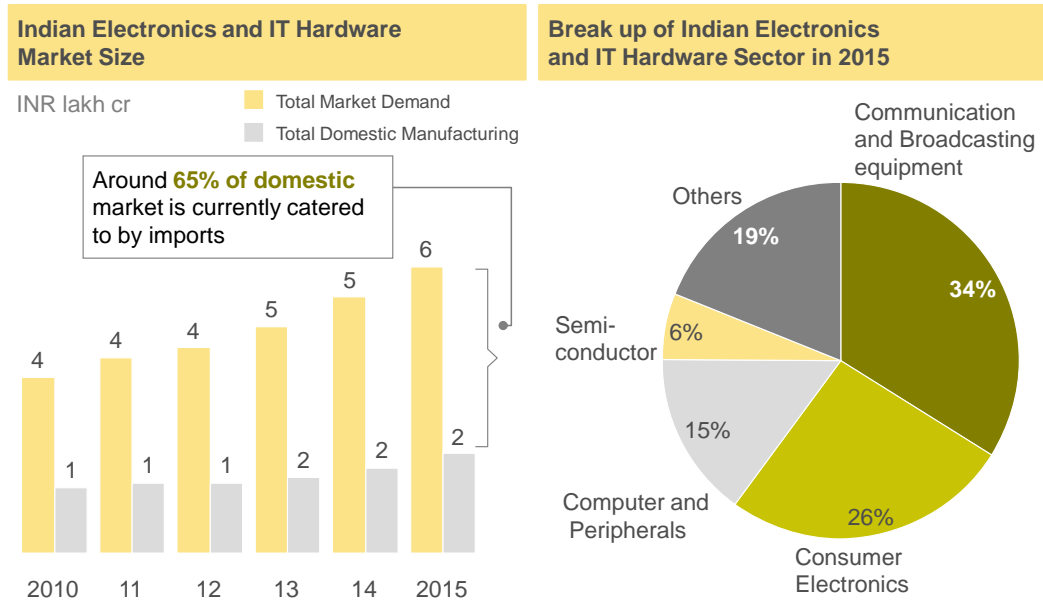
#### The Indian electronics industry

The demand for electronics has grown at a consistent pace in the country, reaching INR 6 lakh cr in 2015. Communication and broadcasting equipment and consumer electronics form the majority of the demand.

However, the production sector has not been able to keep pace with the demand and has remained static at around INR 2 lakh cr. This has led to ~65 per cent of the domestic demand being served through imports in 2015 (Exhibit 4.296 and 4.297).

**EXHIBIT 4.150**

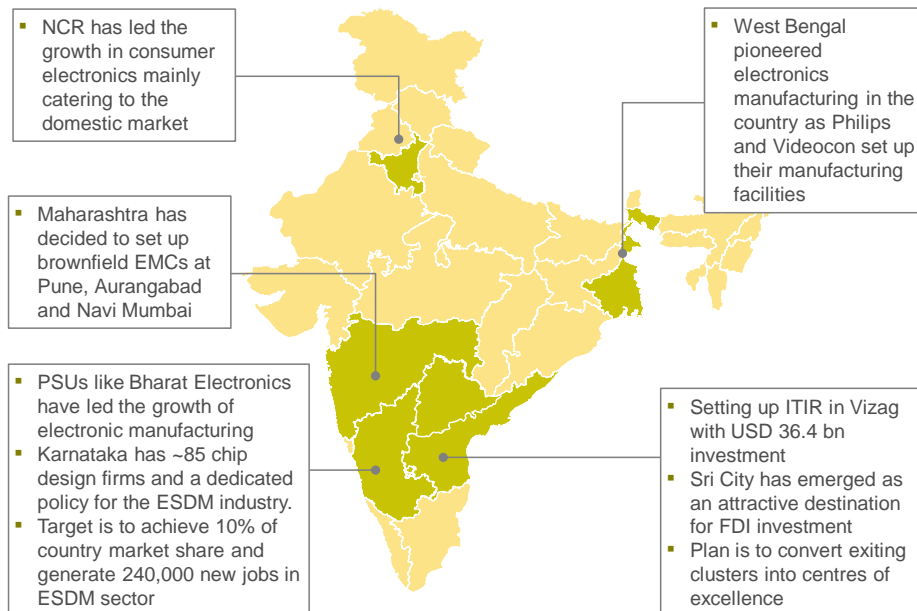
**Indian electronics and IT hardware demand has grown at a steady pace of 10% CAGR in the last 5 years**



SOURCE: NSDC report on Electronic and IT Hardware

**EXHIBIT 4.151**

**Domestic manufacturing in Electronics cluster in India has been led by NCR, West Bengal and Karnataka with Andhra Pradesh and Maharashtra stepping up recently**



SOURCE: iesaonline.org; www.dqindia.com

## Opportunity for India

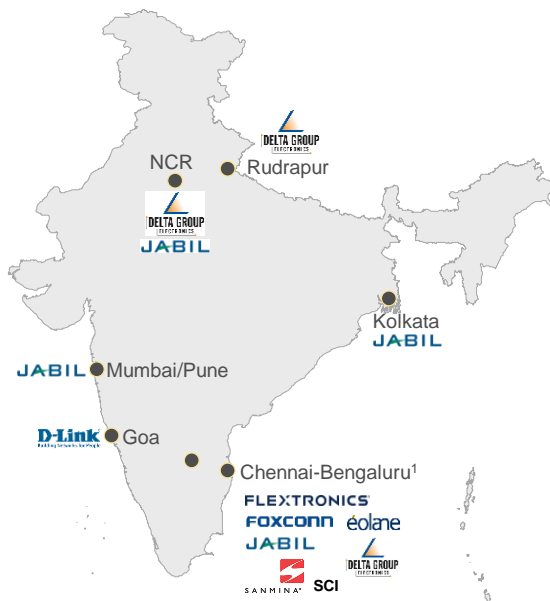
In 2014, India imported electronics items worth nearly USD 40 bn. At the current growth rate, electronics import could reach USD 85 to 100 bn by 2025.

In addition, there is a huge and expanding export market that India could tap into. Total exports of electronics from Asia was USD 1.9 trillion in 2014 and had been growing at the rate of 5 per cent per annum over the last seven years. India's share in exports from Asia is a miniscule 0.5 per cent. India could build onto three distinct sources of competitive advantages for electronics manufacturing:

- **Strong and growing domestic demand**
- **Already established as an electronics design hub:** Nearly 2,000 chips are designed per year in India with more than 20,000 engineers working in this field.
- **Emerging centre for downstream assembly operations:** India has started undertaking downstream activities of assembly operations. For example, Sri City in Andhra Pradesh is emerging as a centre for mobile phone assembly operations (Exhibit 4.298).

### EXHIBIT 4.152

#### Chennai–Bengaluru cluster is emerging as the largest assembly cluster



1 Including Pondicherry  
SOURCE: NVR

#### Manufacturing space

mn sq. ft.

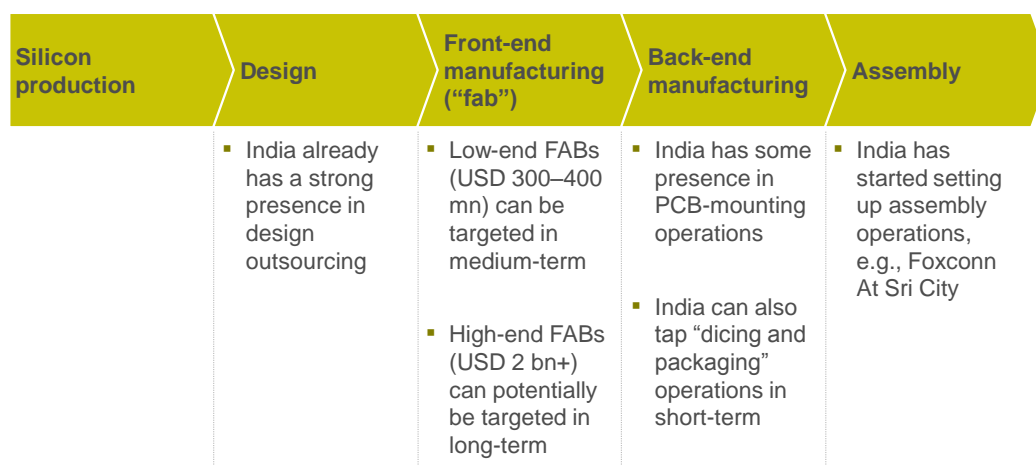
Chennai-Bengaluru	4.30
Goa	0.50
NCR	0.30
Mumbai/Pune	0.30
Rudrapur	0.30
Kolkata	0.01

India focuses on the low value-added part of electronics manufacturing (assembly operations) and does not have significant footprint in upstream activities (fabs). India could target “dicing and packaging operations” in the medium term. Over a medium-to-long term, India could target to establish a “fab”, which is a manufacturing facility for wafer and chip production. Setting

up a high-end fab today requires capital investments of more than USD 5 bn. India could target low-end fabs in the medium term, i.e., USD 300 to 400 mn investments, focusing on analog chips, subsequently attracting a high-end fab in the long term. A typical electronic supply chain is shown in Exhibit 4.299.

## EXHIBIT 4.153

### Electronics supply chain



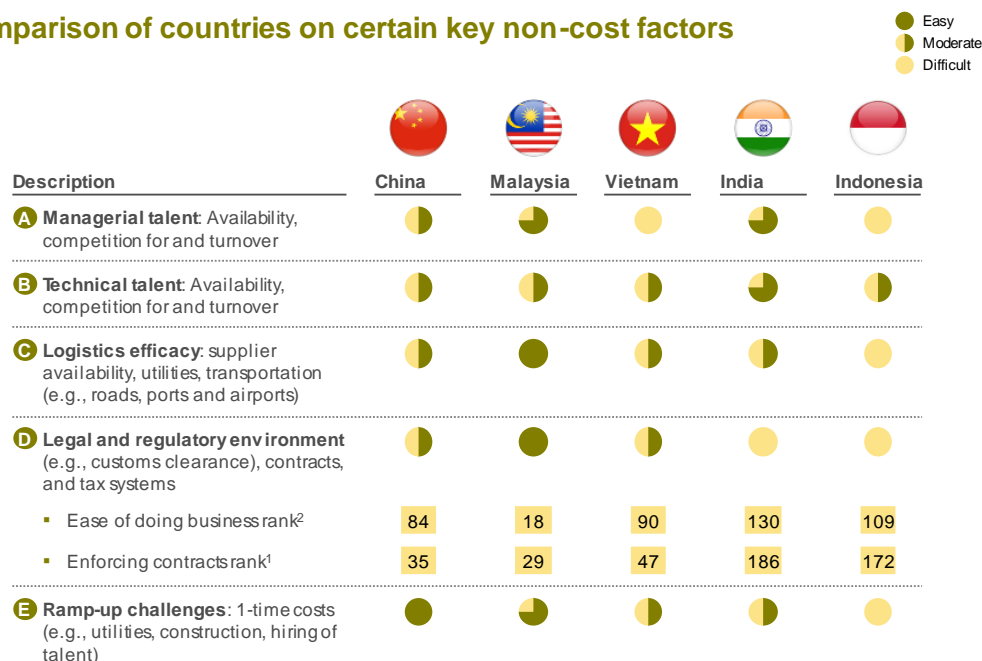
### Challenges faced and the role of port-led industrialisation

The National Policy on Electronics (2012) lays out the vision of developing the domestic electronics sector (ESDM) to achieve a turnover of around USD 400 bn,

attract investment of around USD 100 bn and generate around 28 mn jobs. A comparison between India and competitor countries on a number of non-cost factors reveals that India fares poorly on the legal and regulatory environment and is average on logistical efficiency (Exhibit 4.300).

## EXHIBIT 4.154

### Comparison of countries on certain key non-cost factors



<sup>1</sup> Out of 189 nations – Only these rankings have been updated with 2014 World Bank data

<sup>2</sup> World bank 2016 data

SOURCE: Expert interviews; World Bank

## Role of ports and logistics infrastructure

Electronics manufacturing tends to have a global supply chain spanning across countries and continents. Port-proximate locations could be a critical success factor for setting up fabrication units to link them with global supply chains:

- **Import of raw materials:** India could continue to import the raw materials needed for dicing and packaging operations (in the short term) and for wafer production (in medium-to-long term). Many of these are classified as “photo-sensitives” and begin to lose yield after a period of 35 to 40 days.

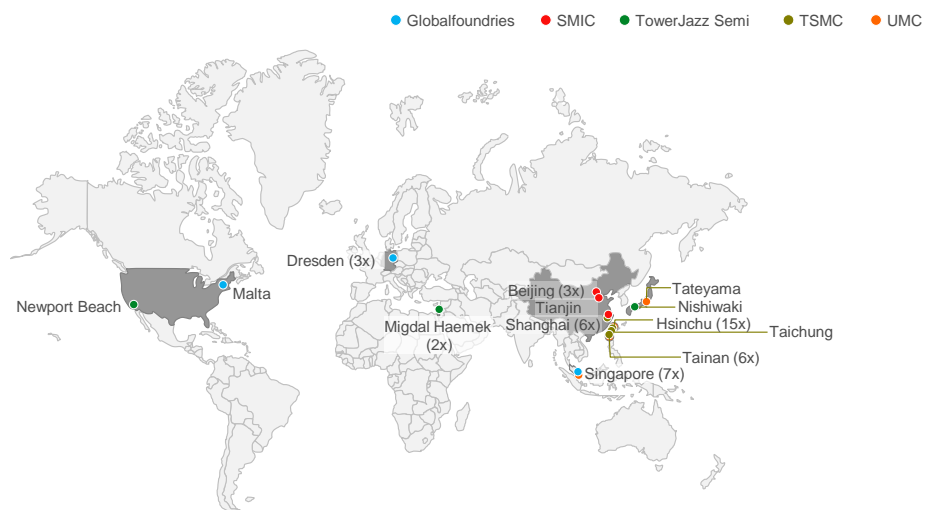
- **Linkage with export markets:** The domestic demand for electronics chips in India could be insufficient to keep the fab fully loaded. The cost of not loading a fab for one day could be USD 1 to 2 mn. The most feasible business model for India could be for a global player to set up the fab in India to source their global requirement in addition to serving local demands.

Of the 48 fabs across the globe, owned by top-five semi-conductor foundries, 42 are within 40 km of a sea port (Exhibit 4.301).

### EXHIBIT 4.155

#### Nearly all the Fabs across the world are port-based or port-proximate

Regional front-end FAB distribution (status: in production) of Top-5 semiconductor foundries<sup>1</sup>



- Out of 48 FABs (includes expansions) in production
- 41 (85%) are based in the Asia-Pacific region, 5 in EMEA and 2 in North America

<sup>1</sup> Top-5 vendors (TSMC, UMC, GF, SMIC, TowerJazz) are holding a 2012E revenue share of close to 90%

<sup>2</sup> Includes FAB expansions

<sup>3</sup> 200mm equiv.

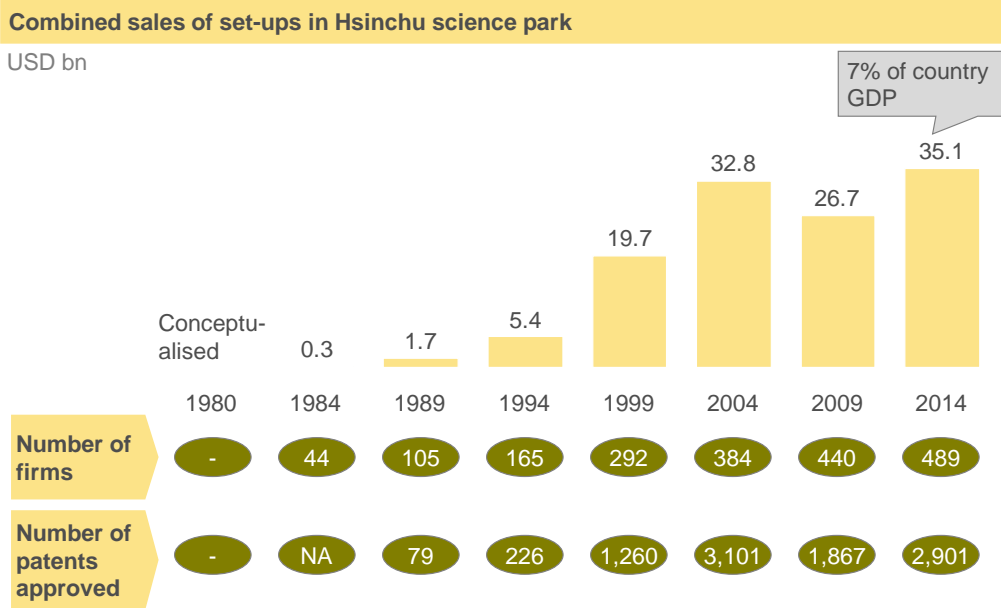
SOURCE: iSuppli (4Q 2012); WorldFABWatch (2Q 2012)

### Global success story

Successful port-based or port-proximate clusters create disproportionate value for the nation in terms of value added, exports and jobs. For example, the Hsinchu Science Park has grown to be a USD 35 bn revenue zone, which is equivalent to 7 per cent of Taiwan’s GDP, starting from scratch in 1980 (Exhibit 4.302). The Chittagong Export Processing Zone generates USD 2 bn of exports, primarily apparel, which is equivalent to 2.5 per cent of Bangladesh’s GDP. Value-added at Port of Antwerp is 6 per cent of Belgium’s GDP.

**EXHIBIT 4.156**

**Hsinchu science park has grown to be a USD 35 bn revenue zone, starting from scratch 35 years ago**



SOURCE: Hsinchu science park bureau, ministry of science and technology, Taiwan

Kick-starting upstream manufacturing may require an “ecosystem” approach. India may need to set up a “Science and Technology Park” and create this ecosystem, instead of piecemeal electronics clusters as these may need to be backed by strong technical research capabilities.

The selection of location for setting up the electronics manufacturing clusters could depend on two criteria:

- **Availability of urban and social infrastructure:** “Science and Technology Parks” may need to attract expats and Indians working abroad in high-tech industries. An existing developed social and urban infrastructure (e.g., proximity to research universities, international airports, metropolitans) may be a key success factor.
- **Synergies with other sectors:** By 2020, almost 35 per cent of total car

costs may be related to electronics components. Hence, a science and technology park can derive synergies from other proximate automotive cluster (Exhibit 4.303).

Based on these considerations, possible locations for setting up the first “Science and Technology Parks” in India could be Northern Maharashtra (Mumbai or proximate) as it would have synergies with the Pune/Satara-based automotive cluster and Northern Tamil Nadu/Southern Andhra Pradesh as these locations would have synergies with the Chennai/Ennore-based automotive cluster. Both these locations also have an established urban and social infrastructure which is required for the development of science and technology parks.

The potential impact from the proposed Science and Technology park is shown in Exhibit 4.304.

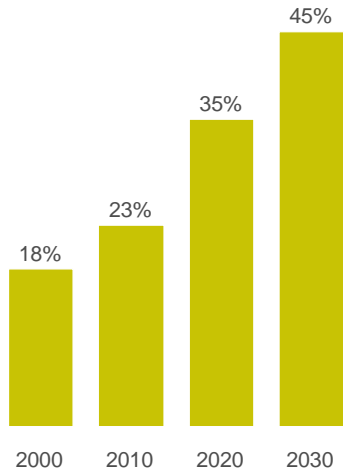


**EXHIBIT 4.157**




**High synergies between automotive and electronics clusters**

**Electronics to account for 35% of car costs by 2020 globally**

Automotive electronics cost as a % of total car cost, global average

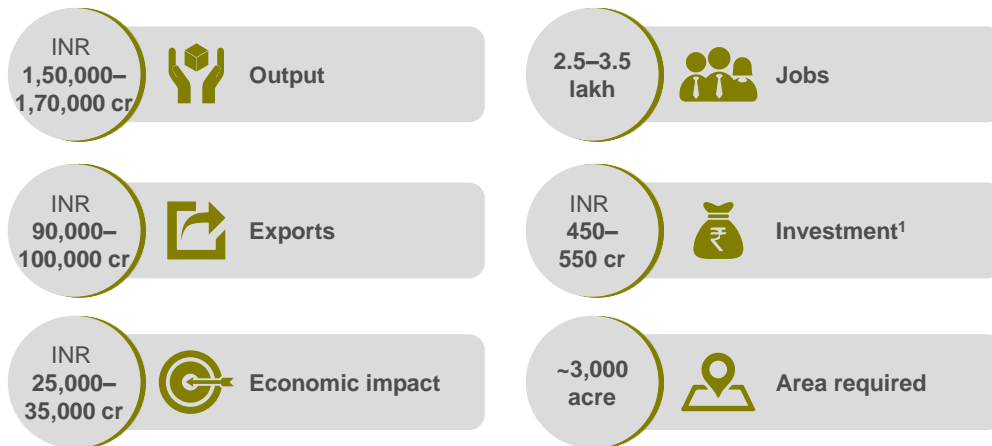


SOURCE: PTW-Hawk survey; strategy analytics

Functional area	Evolving features
 <b>Safety</b>	<ul style="list-style-type: none"> <li>▪ Pedestrian recognition</li> <li>▪ Collision alert</li> <li>▪ Accident emergency call</li> </ul>
 <b>Navigation</b>	<ul style="list-style-type: none"> <li>▪ On-board/removable navigation device</li> <li>▪ Traffic control system</li> </ul>
 <b>Entertainment</b>	<ul style="list-style-type: none"> <li>▪ In-vehicle OS</li> <li>▪ Cloud functionality</li> <li>▪ Internet connectivity</li> </ul>
 <b>Convenience</b>	<ul style="list-style-type: none"> <li>▪ Communication with service centre</li> </ul>

**EXHIBIT 4.158**

**Potential Impact from each electronic cluster**



<sup>1</sup> Investment includes only internal roads and provision for water, sewage, electricity and land levelling

## 4.4 Coastal economic zones

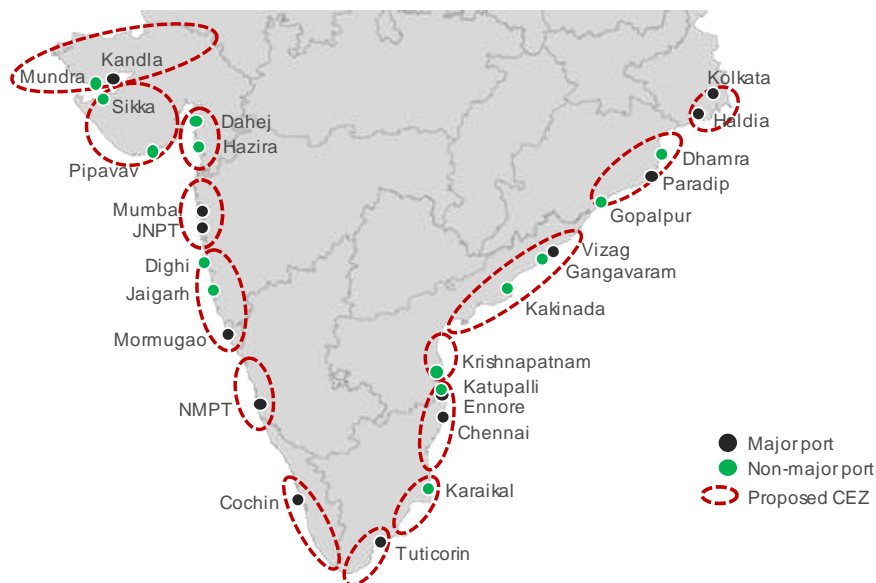
Coastal Economic Zone (CEZ) is a concept introduced under Sagarmala as the focal point for development along India's coastline. It envisions ports to actively participate and contribute to economic development of India similar to other large global ports are doing for their respective nations. The CEZs could be spatial economic regions comprising a group of coastal districts or districts with a strong port linkage. Each CEZ could be in the immediate hinterland of ports (existing and new proposed ports), in a radius of 100 km with a sizeable domestic market along with export potential. Within each CEZ, there will be multiple industrial clusters, each with

discrete land bank and a minimum size based on analysis of scale economics for a given industry. These are bounded land parcels that could actually house industrial units and requisite infrastructure.

Fourteen coastal economic zones have been identified along the coastline of the country, with each coastal state having one or more CEZ. These CEZs have been geographically mapped out covering one or more districts, and potential industries relevant for each CEZs have been proposed. Each of these CEZs is also mapped to the nearby ports (Exhibit 4.305).

### EXHIBIT 4.159

#### Proposed coastal economic zones



The chart below gives details of the possible geographical coverage, port linkages and

high potential industries for each of the coastal economic zones.

	CEZ	Probable districts	Port	Potential industries	Other sample projects
1	Kachchh – Gujarat	Kachchh	Kandla, Mundra	Petrochemicals, Cement, Furniture	LPG import terminals, container and bulk terminals at Kandla port
2	Saurashtra – Gujarat	Junagarah, Amreli, Bhavnagar, Ahmedabad	Pipavav, Sikka	Apparel, Automotive	Connection of western DFC to Pipavav, Expressway from Sarkhej to Pipavav
3	Suryapur – Gujarat	Bharuch, Surat, Navsari, Valsad	Dahej, Hazira	Marine clusters	Connection of western DFC to Hazira, Ro – Pax Ferry Services between Gogha and Dahej
4	North Konkan – Maharashtra	Nashik, Thane, Mumbai, Pune, Raigarh	JNPT, Mumbai	Power, Electronics, Apparel	Vadhvan port, Expressway from Ahmedabad and Dighi to JNPT, Terminals in Nhava Creek
5	South Konkan – Maharashtra	Ratnagiri, Sindhudurg, North Goa, South Goa	Dighi, Jaigarh, Mormugao	Refining, Steel, Food processing	Up gradation of SH 164 to connect Jaigad port to NH 17, Connectivity of NH 17 to North and South banks of Dighi port
6	Dakshin Kanara – Karnataka	Udupi, Dakshin Kannada, Kodagu, Mysore	Mangalore	Petrochemicals	Railway line from Bellikeri port to Ankola, Food grain and fertiliser handling facility in NMPT
7	Malabar – Kerala	Ernakulam, Alappuzha Kollam, Thiruvanthapuram	Kochi	Furniture	Food grain import terminal, fertiliser bagging facility
8	Mannar – Tamil Nadu	Kanniyakumari, Tirunelveli, Thoothukudi	Tuticorin	Apparel, Refining	Enayam port, Expressway to Enayam, Road to Hare island, container berth at Tuticorin
9	Poompuhar – Tamil Nadu	Cuddalore, Perambalur, Ariyalur, Tiruchirappallu, Thanjavur, Thiruvarur, Nagapattinam	Cuddalore	Leather processing, Power	Sirkazhi/Cuddalore port, Road connectivity to Cuddalore port
10	VCIC South – Tamil Nadu	Thiruvallur, Chennai, Kancheepuram	Chennai, Ennore and Katupalli	Steel, Petrochemicals, Electronics, Shipbuilding	LNG import terminal, Rail link to KPL, MLT-2 at Ennore

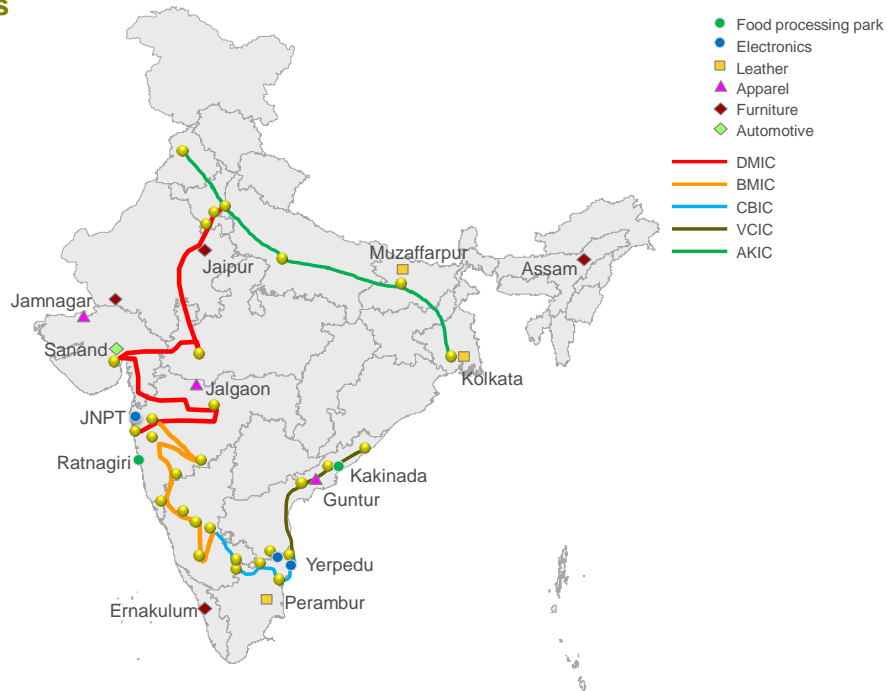
	CEZ	Probable districts	Port	Potential industries	Other sample projects
11	VCIC Central – Andhra Pradesh	Chittoor, Nellore	Krishnapatnam	Electronics	Upgradation of road connecting Krishnapatnam port to Nellore, road to Krishnapatnam Port from Naidupeta
12	VCIC North – Andhra Pradesh	Guntur, Krishna, West Godavari, East Godavari, Visakhapatnam, Vizianagaram, Srikakulam	Vizag, Kakinada	Food processing, Petrochemicals, Cement, Apparel	Machilipatnam/ Vodarevu port, Oil jetty at Vizag, road from Machilipatnam to NH-SH-46
13	Kalinga – Odisha	Puri, Jagatsinghapur, Cuttack, Kendrapara, Jajapur, Bhadrak	Paradip, Dhamra	Petrochemicals, Marine processing	Paradip outer harbour, IWT terminal, Heavy haul, LPG import terminal
14	Gaud – West Bengal	Purba Medinipur, South twenty Parganas	Kolkata, Haldia	Leather processing	Sagar port, ICD, LPG import terminal, expressway from Durgapur to Haldia

These 14 coastal economic zones are also envisaged to tap synergies with the planned industrial corridors. The Government of India has planned for five industrial corridor projects—the Delhi–Mumbai Industrial Corridor (DMIC), Bengaluru–Mumbai Economic Corridor (BMEC), Chennai–Bangalore Industrial Corridor (CBIC), Visakhapatnam–Chennai Industrial Corridor (VCIC) and Amritsar–Kolkata Industrial Corridor (AKIC) to provide a thrust to manufacturing and industrialisation. Industries could be developed at selected nodal points along the corridors, leveraging their inherent strength on raw materials, labour, connectivity and infrastructure. These corridors could facilitate the government’s push in the manufacturing sector to “Make in India”. Several projects could be undertaken to provide essential infrastructure—widening roads, setting up railway linkages and connectivity with ports at nodal points. It is essential to tap into the potential of the manufacturing industry and

utilise it by developing discrete manufacturing clusters alongside the industrial corridors. The proposed industrial clusters under Sagarmala have been mapped to the corridors—Apparel cluster in Guntur could fall on the VCIC near the Kakinada node and the other cluster in Jalgaon could be on the DMIC and BMEC. The leather clusters proposed in Muzaffarpur and Kolkata could fall on the AKIC and leather clusters in Perambur could fall on the twin corridors of CBIC and VCIC. The proposed Mega Food Park could draw synergies from the VCIC where food processing is a focus sector for development at the Kakinada node. The electronics clusters proposed in northern Maharashtra could fall on the DMIC at the JNPT node. The cluster may also benefit from being on the western DFC. The other electronics cluster has been proposed near the Yerpedu–Srikalahasti node, to be developed as a focus industry under the VCIC (Exhibit 4.306).

## EXHIBIT 4.160

### Most of the proposed discrete manufacturing clusters lie on industrial corridors



SOURCE: Make in India website

The states are expected to come forward to work with the centre to develop these CEZs and the corresponding industrial clusters. All the 14 CEZs come under the influence area of major or non-major ports. The influence area is considered flexible and districts covered under the CEZ could change in the future depending upon the industry growth.

It is envisaged that of the 14 CEZs, three or four could be taken up as early pilots, and the learning from these replicated across other CEZs. The early pilot CEZs could be shortlisted on the basis of availability of large contiguous land parcels, access to urbanisation and supporting infrastructure, prime manufacturing locations and availability of deep draft container terminals.

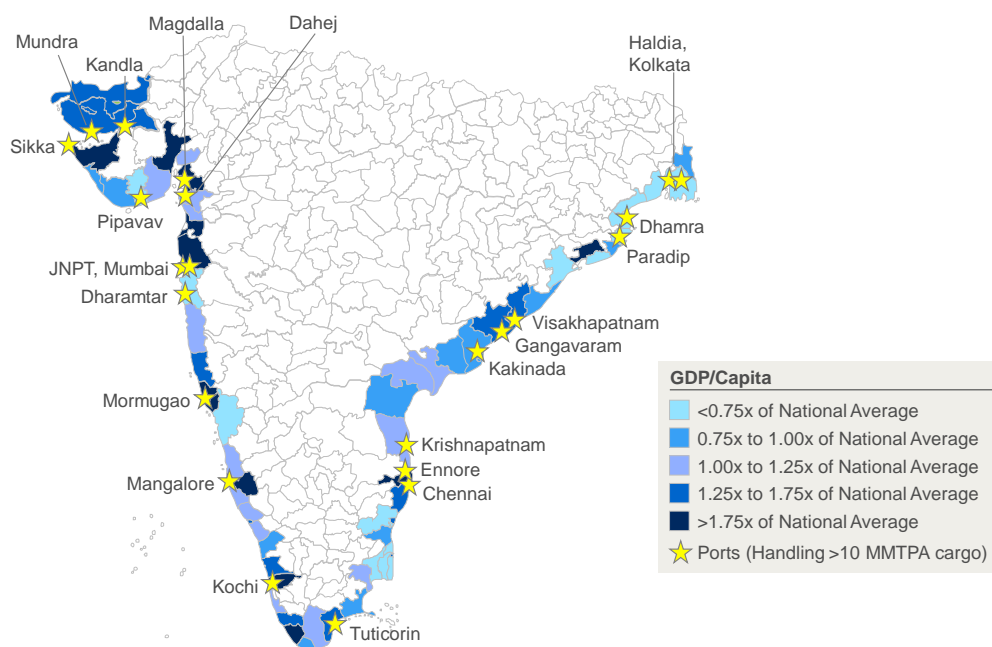
# 5. Coastal community development

Approximately 18 per cent of India's population<sup>59</sup> lives in the 72 coastal districts<sup>60</sup> that comprise 12 per cent of India's mainland. Since these people are critical stakeholders in the Sagarmala Programme's "port-led development" agenda, ensuring their socio-economic well-being is one of the programme's key objectives. The pace of socio-economic development among the maritime states has not been uniform in terms of per capita

income, poverty reduction and infrastructure build out (Exhibit 5.307). In addition, some coastal communities including fishermen, are poor and lack basic facilities. Therefore, there is a need for holistic and sustainable development of coastal communities as well as for the 1,382 islands which are a part of India.

## EXHIBIT 5.1

### Untapped potential of coastal districts in India



<sup>59</sup> Census 2011

<sup>60</sup> Districts covering all maritime states and union territories; Mumbai City and Mumbai Suburb considered as separate districts

Some of the salient drivers of coastal community development include:

- The development and modernisation of ports, envisaged as part of Sagarmala, will be a key driver for socio-economic development of the coastal regions
- Port-linked industrialisation in Sagarmala, across industries like shipbuilding, auto, electronics, etc. will provide the economic stimulus for the development of coastal districts. This will also create approximately 1 cr jobs, including 40 lakh direct ones. In addition to this, there will be job creation from construction for infrastructure development
- To ensure sustainable development of the coast, it is critical that the appropriate environmental and social impact of Sagarmala related projects be analysed and concerns addressed
- For the new jobs created, a three-pronged approach for skill development in coastal regions is proposed. The first area of focus could be to promote skill training programmes for job roles related to the ports and maritime sector. The second focus area could be to promote skill training to support development of human capital for the proposed industrial clusters. The third focus area could be to provide access to the training facilities of major ports for third-party skills training programmes in the coastal districts which may reduce the need for developing new training infrastructure in the coastal areas
- The marine fisheries sub-sector, is vital for the coastal districts and the 3.9 mn fisherfolk<sup>61</sup> (as of 2010), living in 3,288 marine fishing villages spread across the Indian coastline. A Community

Development Fund (CDF) to fund skilling, infrastructure and social development projects related to coastal community is envisaged. The CDF should fund projects related to value addition in fisheries, aquaculture, cold chain development, skill development, local tourism and recreational facilities

- A sustainable fishing strategy also needs to be implemented which is tailored for each local community. This might include provision of larger vessels (and corresponding capability building) which allow for sustainable deeper sea fishing than is possible by the current smaller vessels (beyond 500m depth)
- On islands, the remote location and ecological sensitivity makes most forms of economic activity unviable. A broad set of potential development areas have been identified for both oceanic and mainland islands (transport, communication, skilling, community infrastructure, fishing, etc.). Island specific developmental activities will need to be identified as part of the detailed development planning process. While some funding will come from the budget, public-private partnership (PPP) route and CSR schemes should also be considered. A roadmap for island development and an institutional mechanism need to be created

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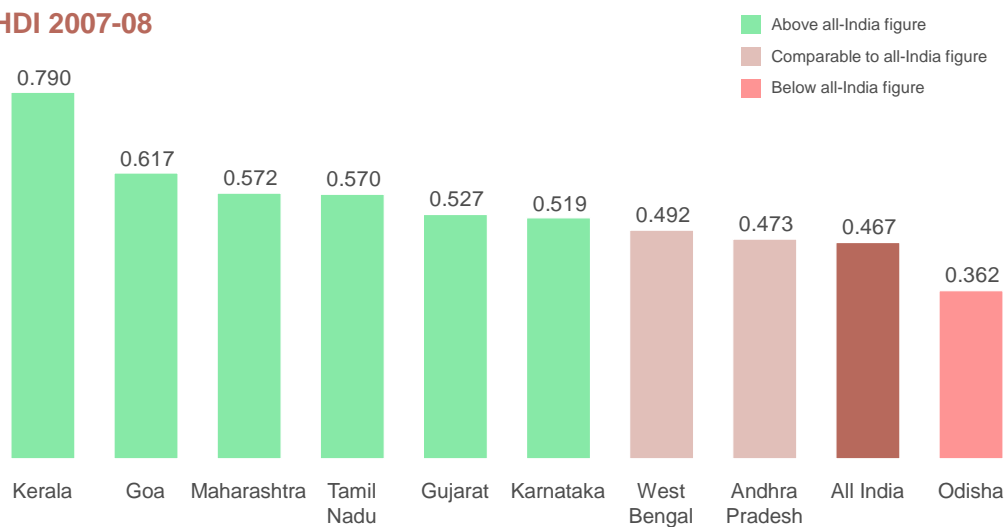
<sup>61</sup> Marine Fisheries Census 2010, India, Central Marine Fisheries Research Institute

## 5.1 Socio-economic development status of coastal communities through economic stimulus

While most coastal states have done better than the national average, the pace of socio-economic development among the maritime states has not been uniform in terms of per capita income, poverty, infrastructure and socio-economic development. For example, the Human

### EXHIBIT 5.2

#### HDI 2007-08



SOURCE: "Relationship of socioeconomic parameters in coastal litigations of coastal states of India", 2013, International Journal of Humanities and Social Science Invention

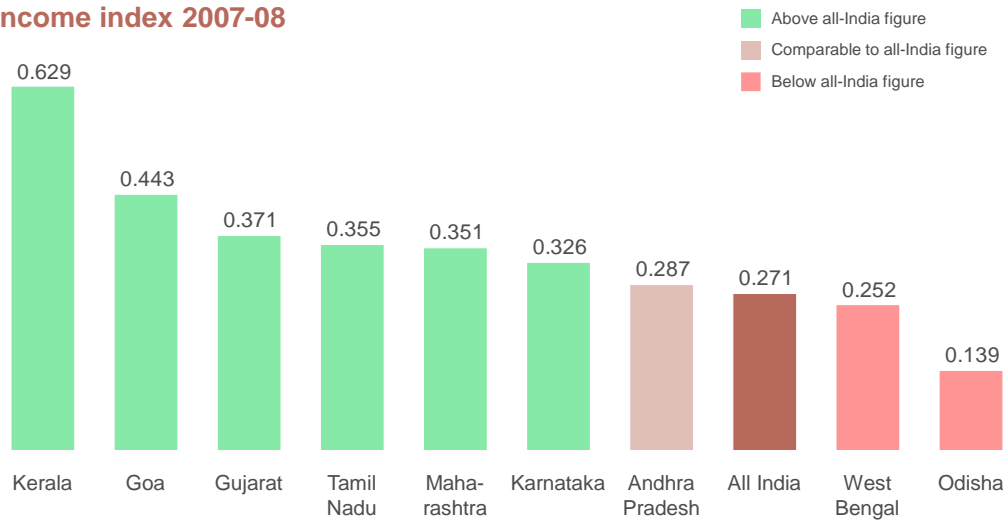
<sup>62</sup> Pre-bifurcation Andhra Pradesh covered in this analysis

Development Index (HDI) of eight out of the nine maritime states<sup>62</sup> was above the all-India figure in 2007–08 (Exhibit 5.308 and 5.309). There were also variations across the maritime states on access to basic facilities such as drinking water, toilets, hospitals and electricity in 2008–09.



## EXHIBIT 5.3

### Income index 2007-08



SOURCE: "Relationship of socioeconomic parameters in coastal litigations of coastal states of India", 2013, International Journal of Humanities and Social Science Invention; India – Human Development Report 2011

### 5.1.1 Port as a driver of growth

Ports can be engines of sustainable development for coastal communities and could provide direct and indirect benefits to the coastal region. The impact of the port on the economy could include:

- **Direct impact:** Jobs and business revenue directly generated by port activity (e.g., longshore workers, truckers and fishermen)
- **Indirect impact:** Jobs and revenue resulting from purchases by port-related businesses (equipment suppliers and business services such as insurance and law firms, tourism, etc.)
- **Induced impact:** Jobs and revenue resulting from purchases by direct employees (education, grocery stores and transportation)
- **Related impact:** Benefits from activity by firms that use port cargo and passenger facilities (farmers, manufacturers)

For example, Port of Seattle<sup>63</sup> is a key port in the USA and is an important driver for the sustainable development of the Seattle region. The impact of marine cargo activity of the port combined with fishing, cruise operations, recreational boating, port real estate and Seattle-Tacoma International Airport are explained in Exhibit 5.310 and 5.311. Cargo moved through the port accounted for 11.6 per cent of Washington State GDP. Port cargo facilities created 8,900 direct jobs in 2013. In addition to the direct, indirect and induced jobs generated by the port, 176,000 jobs were related to the cargo movement via the port terminals.

The Port of Seattle's Office of Social Responsibility (OSR) also supports the port's job creation and economic development efforts (e.g., skill training, job placement, pre-apprenticeship assistance, etc.) and facilitates the participation of small businesses in port-related business opportunities and community development initiatives.

Exhibit 5.4

<sup>63</sup> Report of Port of Seattle, 2013

## PORT OF SEATTLE: ECONOMIC IMPACT

Job type	Number of jobs
Direct	129,774
Induced	53,148
Indirect	33,379
<b>Total</b>	<b>216,271</b>

## EXHIBIT 5.5

Personal income type	Income (USD bn)
Direct	4.18
Re-spending/local consumption	4.32
Indirect	1.13
<b>Total</b>	<b>9.63</b>

An OECD report<sup>64</sup> estimates that one tonne of port throughput is associated with USD 100 of economic value addition, and an increase of one mn tonnes of port throughput is associated with an increase in short-term employment of 300 jobs in the port region.

Therefore, the modernisation of existing ports and development of new ports, envisaged as part of Sagarmala programme, could be a key driver for socio-economic development of the coastal regions through new job creation and social infrastructure development.

Very little documentation is available on the social impact of port construction and operations in India. Some of the indirect social costs of port development include displacement and ineffective rehabilitation, restriction of access and loss of beaches.

Coastal regions are also endowed with a wide range of coastal and marine ecosystems including mangroves, coral reefs, sea grasses, salt marshes, mud flats, estuaries, lagoons and unique marine and coastal flora and fauna. The conservation of the coastal ecosystem and sustainable use

of its resources is important as they impact the livelihood, health and well-being of the coastal communities.

The “port-led development” agenda of the Sagarmala Programme will incorporate this as part of its sustainable coastal community development objective. The environmental and social impact of the Sagarmala projects would be considered, and the requisite clearances obtained before the commencement of the projects.

### 5.1.2 Economic stimulus from port-led industrialisation

Industrial development acts as a catalyst for the economic development of the associated region. For example, development of power, steel and aluminum industries in the Angul district has led to higher economic growth rate in the district compared to Odisha<sup>65</sup>. From 2002 to 2012, Angul’s GDP per capita grew at the rate of 10 per cent, while the state’s GDP grew at the rate of 7 per cent during the same period. The proportion of lowest income group in Angul has also decreased from 67 per cent in 2002 to 25 per cent in 2012, at a faster rate than in the rest of the state. (Exhibit 5.312 and 5.313). Similar results

<sup>64</sup> The Competitiveness of Global Port-Cities: Synthesis Report, OECD

<sup>65</sup> McKinsey-CII Report 2014 – Putting India on Growth Path

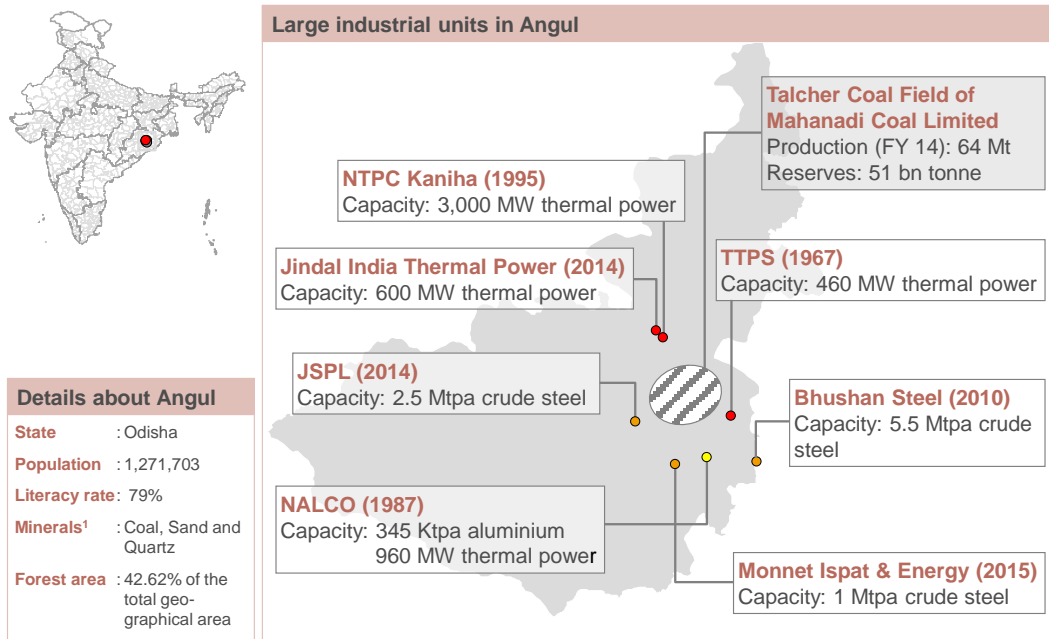
might be expected from port-led industrialisation.

As part of the port-led industrialisation objective of Sagarmala, 12 high potential industries have been identified (e.g., refining, steel, cement, shipbuilding, auto, electronics, etc.) which could be developed at an estimated infrastructure investment of INR 1 lakh cr within 14 CEZs. These coastal industrial clusters, if developed, could

provide the economic stimulus for the development of coastal districts in terms of employment generation (approximately 1 cr jobs, including 40 lakh direct jobs) and social infrastructure development.

**EXHIBIT 5.6**

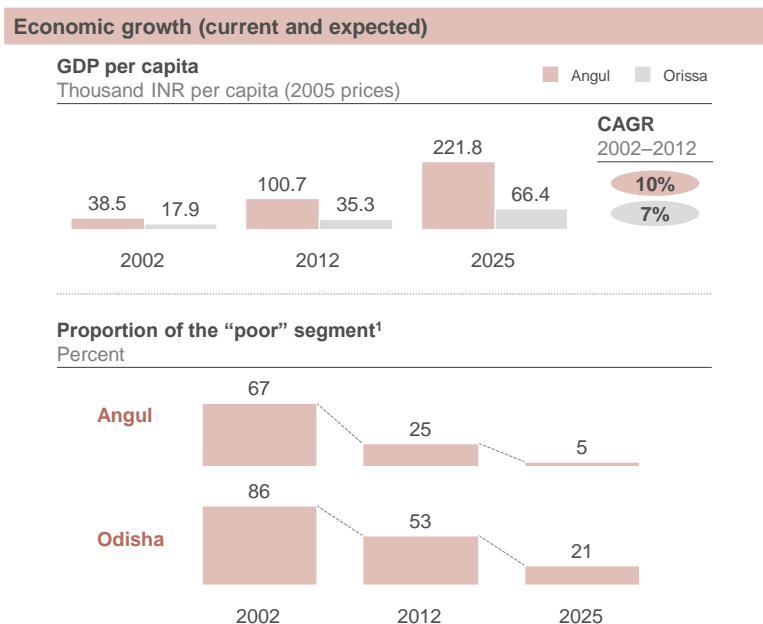
**Impact of economic development: Angul example**



<sup>1</sup> Commercially exploited minerals  
SOURCE: Press search

## EXHIBIT 5.7

### Impact of mining activity on Angul district: incomes



<sup>1</sup> Having <INR 180,000 disposable family income p.a.; at 2012 prices  
<sup>2</sup> Not exhaustive

SOURCE: McKinsey global institute; press search

## 5.2 Skill development

### 5.2.1 Demand

The port-led development through Sagarmala is envisaged to generate 1 cr

new jobs, including approximately 40 lakh direct jobs (Exhibit 5.314). In addition, there is a substantial job creation in constructing the necessary infrastructure.

## EXHIBIT 5.8

### Direct job creation potential of port led development

Sector	Industry	Direct Jobs (Lakhs)
<b>Discrete Manufacturing</b>	Electronics	7
	Apparel	10
	Furniture	4.5
	Footwear	6
	Automotive	2.5
	Food Processing	3
<b>Materials</b>	Steel	2.5
	Cement	0.1
<b>Energy</b>	Power	0.2

	Refinery & Petchem	0.1
	Gas based Petchem	0.3
<b>Maritime</b>	Marine Cluster	2.5
<b>Total</b>		<b>~40</b>

## 5.2.2 Supply side challenges

India has almost 12,000 industrial training institutes (ITIs) and more than 2,000 polytechnics. The National Skill Development Corporation (NSDC), with more than 200 training partners and 3,000 training centres, has facilitated private sector participation in the training space.

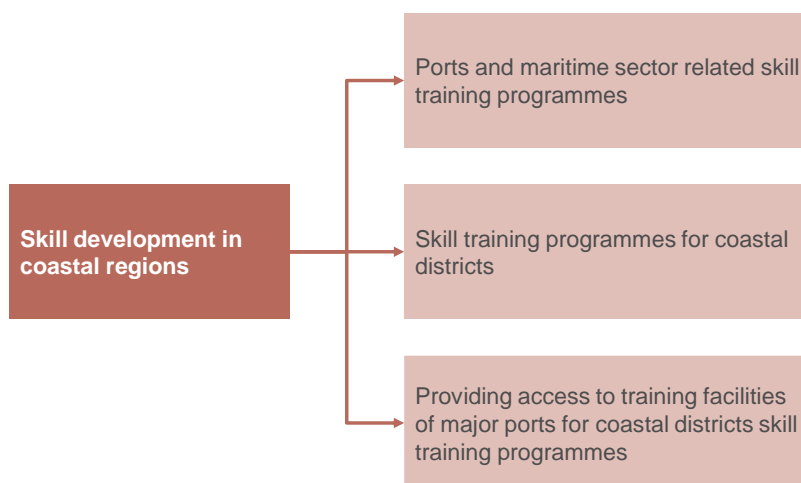
The Government of India has also launched multiple initiatives such as National Skill Development Mission, Skill Development and Entrepreneurship Policy 2015, Common Norms and Standards for

Schemes implemented by different Central Ministries, New Skill Loan Scheme and the Pradhan Mantri Kaushal Vikas Yojana (PMKVY) to promote skill development in the country. All infrastructure ministries have been requested to identify skill requirements at a cutting-edge level in their sectors and coordinate with the MSDE to operationalise skill-development courses.

In spite of the availability of training facilities, challenges still exist in closing the skill demand–supply gap in India—low levels of vocational training, high proportion of school drop-outs, huge informal workforce, etc.

### EXHIBIT 5.9

#### Approach for skill development



## 5.2.1 Proposed plan of action

A three-pronged approach to skill development in coastal regions is proposed to be adopted under the Sagarmala Programme (Exhibit 5.315).

The first focus is to promote skill training programmes for job roles related to the ports and maritime sector. To this effect, first step should be to conduct a skill gap analysis in coastal districts covering the major ports to identify the skill requirements in the ports and maritime sector and develop a training

implementation roadmap. Cutting edge skill requirements in the ports & maritime sector with the stimulus expected from Sagarmala should be included in the same. It has been found that 60 job roles from the ports & maritime sector have been mapped to the existing Sector Skill Council (SSC) modules<sup>66</sup>.

The second area of focus is to promote skill training and livelihood generation programmes (not related to the maritime sector) in the coastal districts to expand the skill base and employment opportunities for the coastal communities and to support in development of human capital for the proposed industrial clusters. Convergence with programmes like Deen Dayal

### **5.3 Marine fishermen and other community development**

The marine fisheries sub-sector, impacting the nutrition availability in the country accounts for approximately 0.5 per cent of India's total GDP<sup>67</sup>. It is vital for the coastal districts and for India. In 2010–11 the marine fisheries sub-sector represented approximately 38 per cent of the total fish production of 8.42 mn tonnes<sup>68</sup>. The 3.9 mn fisherfolk<sup>69</sup> (as of 2010), living in 3,288 marine fishing villages spread across the Indian coastline, form a critical component of the coastal communities.

#### **5.3.1 Occupational profile and economic condition**

As per the World Bank Report on India Marine Fisheries, fishing and allied activities are labour-intensive and age is a critical criterion for inclusion into or exclusion from these activities. Factors such as hard

Upadhyaya Grameen Kaushalya Yojana (DDU-GKY) Scheme of the Ministry of Rural Development is also required.

The third thrust is to provide access to the training facilities of major ports for third-party skill training programmes in the coastal districts. This could effectively use existing facilities and reduce the need to develop new training infrastructure in the coastal areas.

working conditions, poor living conditions, lack of insurance and healthcare can limit the scope for productive work at a relatively early age. As per the Marine Fisheries Census 2010, only 47 per cent of fisherfolk population (excluding children below 5 years of age) was actively employed (Exhibit 5.316). Approximately 28 per cent of the population (excluding children below 5 years of age) was actively engaged in fishing and fish seed collection (either full time or part time), 17 per cent of fisherfolk population (excluding children below 5 years of age) was actively engaged in fishing allied activities, and 2 per cent was engaged in non-fishing activities.

Poverty and the open access nature of the fishery resource also lead to forced inclusion into fishing activities at a relatively young age. This reduces educational opportunities and also diminishes the scope for livelihood diversification in future. As per the Marine Fisheries Census 2010, approximately 58 per cent of the fisherfolk population (excluding children below 5

<sup>66</sup> Ministry of Shipping

<sup>67</sup> "Indian Marine Fisheries – Issues, Opportunities and Transitions for Sustainable Development", World Bank Report, 2010

<sup>68</sup> Department of Animal Husbandry, Dairying and Fisheries

<sup>69</sup> Marine Fisheries Census 2010, India, Central Marine Fisheries Research Institute

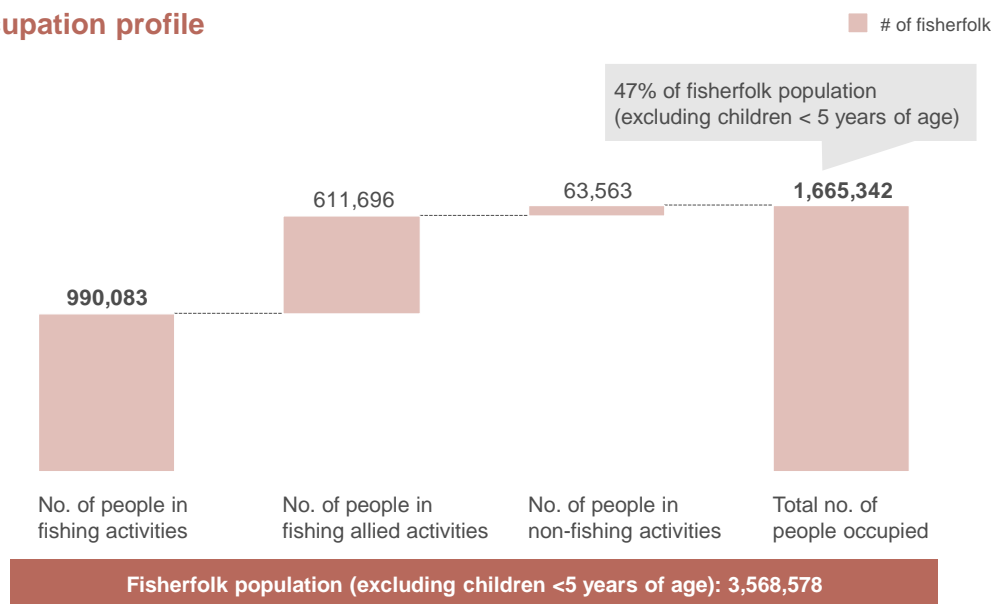
years of age) was educated, though the level of education varied. The rest (42 per cent, excluding children below 5 years of age) were unschooled, equally divided into male and female (21 per cent each). The percentage of unschooled among marine fisherfolk was highest in Andhra Pradesh (65.7 per cent) and lowest in Goa (14 per cent) (Exhibit 5.317). Among the schooled, only 2.7 per cent of males and 2 per cent of females were educated beyond the higher secondary level.

Nearly 61 per cent of marine fishermen families were below the poverty line (BPL) according to 2010 data (Exhibit 5.318). A

heavy dependence on the informal money market and the high cost of credit also impact the fishermen (especially the small-scale fishermen), creating a perpetual cycle of household debt and reduced household savings to provide for the lean season or to access basic healthcare and educational facilities. The households are vulnerable to market or natural resource-based shocks<sup>70</sup>.

#### EXHIBIT 5.10

##### Occupation profile

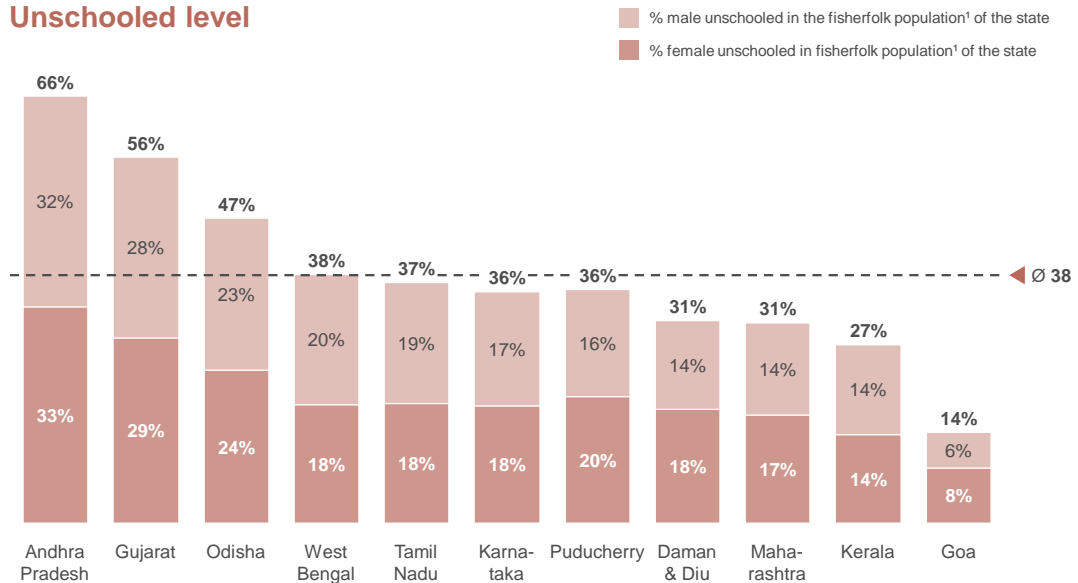


SOURCE: Marine Fisheries Census 2010, India, Central Marine Fisheries Research Institute

<sup>70</sup> "Indian Marine Fisheries – Issues, Opportunities and Transitions for Sustainable Development", World Bank Report, 2010

## EXHIBIT 5.11

### Unschooling level



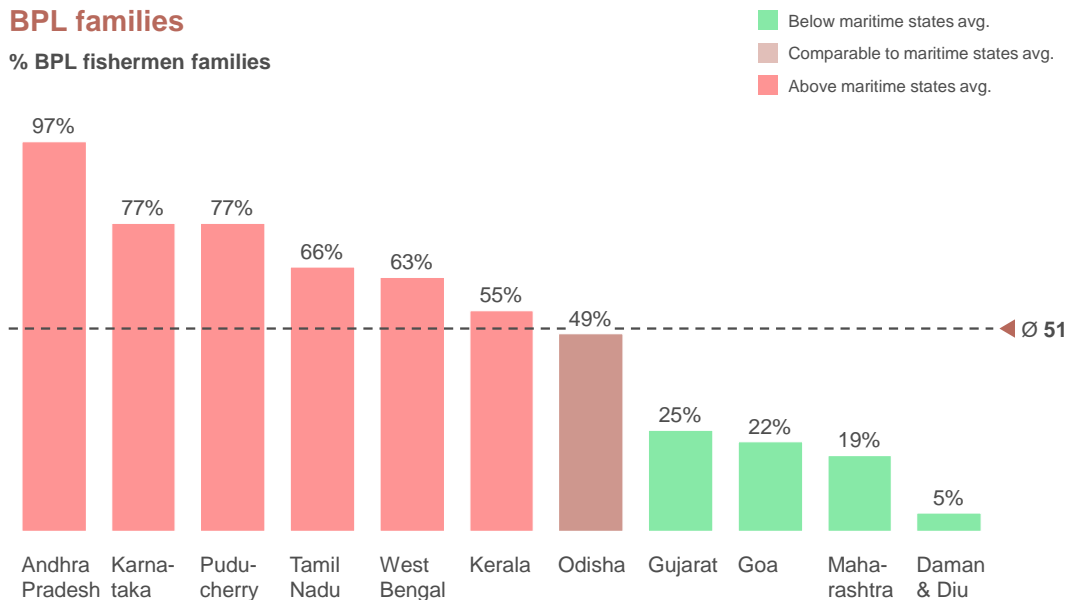
<sup>1</sup> Excluding children < 5 years of age

SOURCE: Marine Fisheries Census 2010, India, Central Marine Fisheries Research Institute

## EXHIBIT 5.12

### BPL families

% BPL fishermen families



SOURCE: Marine Fisheries Census 2010, India, Central Marine Fisheries Research Institute

### 5.3.2 Access to basic infrastructure

In terms of access to basic infrastructure, more than 34 per cent of fishermen families were living in kutcha houses; 88 per cent of

all fishermen villages had electricity and 58 per cent had a bus stand/stop. Access to healthcare facilities varied widely among the states and union territories, with only 27 per cent of all fisherman villages having hospitals (Exhibit 5.319 and 5.320).



### 5.3.3 Access to fishing infrastructure and need for sustainable fishery management

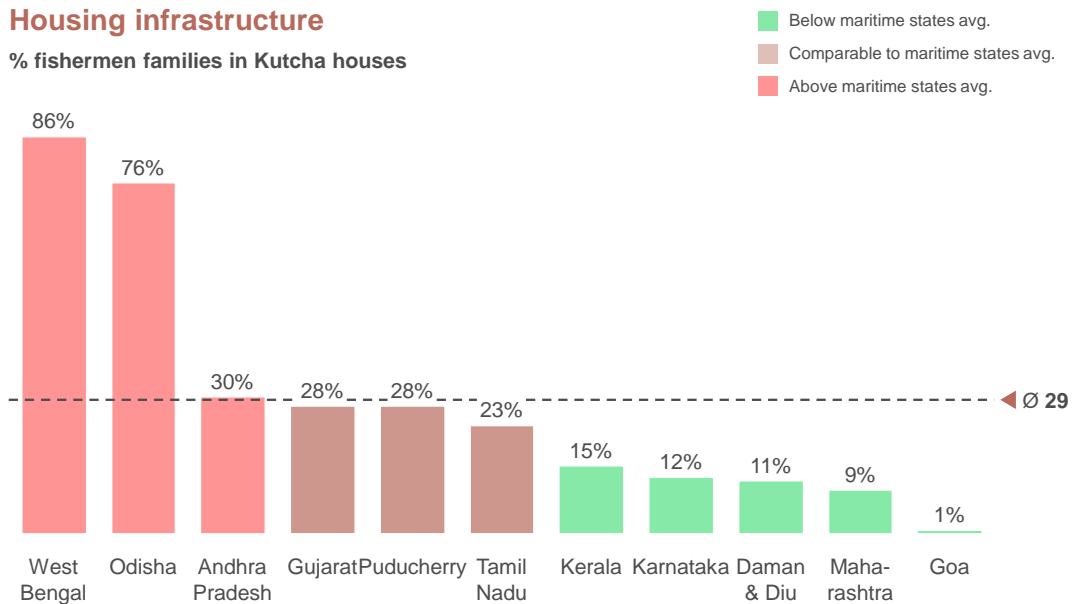
As per 2010 figures, there were 1,511 marine fish landing centres, the top three states being Tamil Nadu (407) Andhra Pradesh (353) and Kerala (187). Of a total of 1,94,490 marine fishing vessels, 37 per cent (72,559) were mechanised vessels, 37 per cent (71,313) were motorised vessels and 26 per cent (50,618) were non-motorised vessels (Exhibit 5.321). Of all the motorised and non-motorised vessels, only 63 per cent could be used for inshore

waters. Around 86 per cent of the total marine fishing vessels were owned by fisherfolk—52.6 per cent were non-motorised, 24.2 per cent motorised and 23.1 per cent mechanised. It has also been estimated that India has more than the optimal number of fishing vessels and that reducing capacity could ensure support for more sustainable fishing, especially for inshore waters (Exhibit 5.322).

#### EXHIBIT 5.13

##### Housing infrastructure

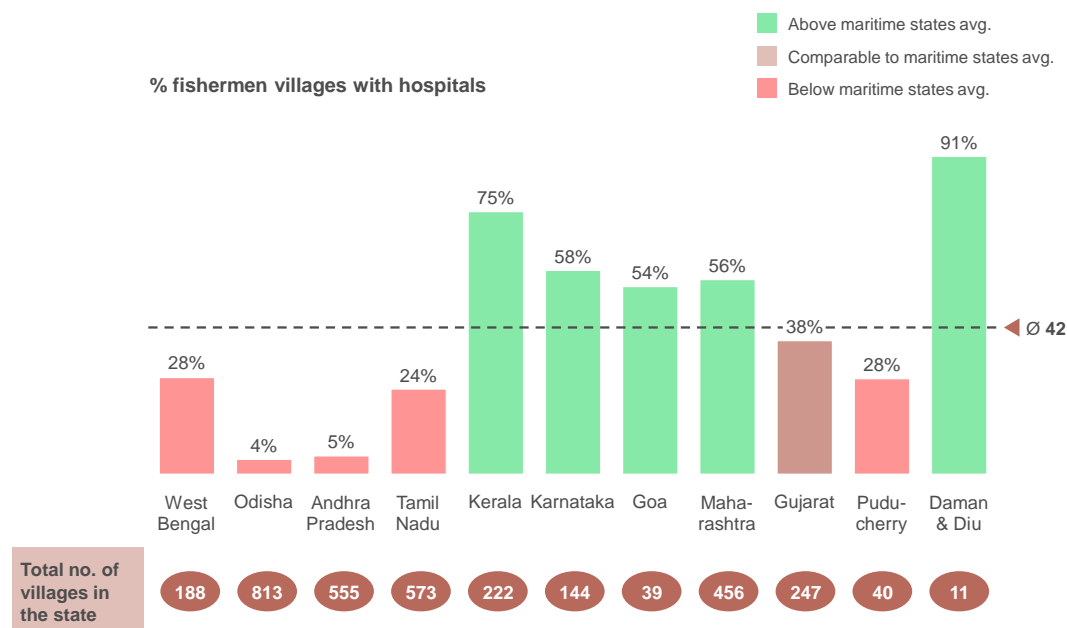
% fishermen families in Kutcha houses



SOURCE: Marine Fisheries Census 2010, India, Central Marine Fisheries Research Institute

## EXHIBIT 5.14

### Healthcare infrastructure



SOURCE: Marine Fisheries Census 2010, India, Central Marine Fisheries Research Institute

## EXHIBIT 5.15<sup>71</sup>

### Marine fishing vessels by state

State	Mechanised vessels	Motorised vessels	Non-motorised vessels	Total vessels
West Bengal	14,282	0	3,066	17,348
Odisha	2,248	3,922	4,656	10,826
Andhra Pradesh	3,167	10,737	17,837	31,741
Tamil Nadu	10,692	24,942	10,436	46,070
Puducherry	369	1,562	662	2,593
Kerala	4,722	11,175	5,884	21,781
Karnataka	3,643	7,518	2,862	14,023
Goa	1,142	1,297	227	2,666
Maharashtra	13,016	1,563	2,783	17,362
Gujarat	18,278	8,238	1,884	28,400
Daman & Diu	1,000	359	321	1,680
<b>Total</b>	<b>72,559</b>	<b>71,313</b>	<b>50,618</b>	<b>194,490</b>

<sup>71</sup> Marine Fisheries Census 2010, India, Central Marine Fisheries Research Institute

**EXHIBIT 5.16<sup>72</sup>**

Fishing vessel type	Actual numbers as of 2010	Estimated optimal numbers	Potential overcapacity (per cent)
Non-motorised vessels	50,618	31,058	63
Motorised vessels	71,313	20,928	241
Mechanised vessels	72,559	15,998	354
<b>Total</b>	<b>194,490</b>	<b>67,984</b>	<b>186</b>

Marine fish production levels have remained steady, with a growth rate of only 1 per cent between 2000–01 and 2009–10 (Exhibit 5.323). The inland fish production level has grown at a rate of over 6 per cent during the same period. A sustainability assessment carried out on 98 marine fish species indicated a medium level of sustainability for most fish<sup>73</sup>. Another study conducted on 26 marine resource groups, based on annual landing-related metrics, indicated that 18 resource groups were under the “abundant class”, 5 under “less abundant” class and one each under “declining”, “depleted” and “collapsed” classes<sup>74</sup>. This also highlights the need to provide modern vessels, wherein the fishermen can venture beyond the territorial waters into the deep-sea waters for fishing.

An open access system with declining fish stocks and over-capitalisation of fishing capacity can reduce fishery productivity (returns per unit of labour or capital), resource stocks, and negatively impact household livelihoods, human health and gender workloads<sup>75</sup>. According to the 2007

report of the South Indian Federation of Fishermen Societies (SIFFS), marine fish production in Kerala has stagnated since the early 1990s despite an increase in fishing capacity, and the catch levels have declined for certain species (mackerel, sharks, rays, catfish, goat fish, croakers, etc.).

It has been noted that our fishermen community has engaged in fishing within 12 nautical mile distance from the sea shore. Due to this, high value tuna and other marine resources in deep-sea waters beyond 500 m depth zone have largely remained under-exploited. The existing fishing vessel fleet is not capable of reaching to deep-sea resources due to the lack of modern equipments. Provision of well-equipped fishing vessels with locating and tracing devices, advanced fishing gear, refrigeration facilities and development of expertise can be instrumental in promoting deep-sea fishing. Considering the high cost of mechanized vessels, financial assistance to the fishermen community may be explored.

<sup>72</sup> Varkey et al. (2006), “Indian Marine Fisheries – Issues, Opportunities and Transitions for Sustainable Development”, World Bank Report, 2010

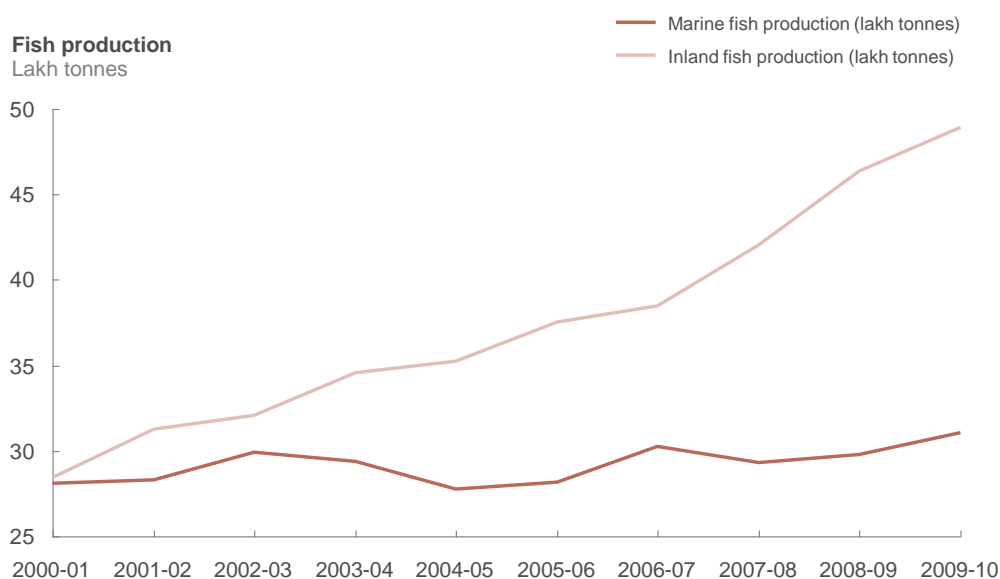
<sup>73</sup> “Status of marine fish stock assessment in India and development of a sustainability index”, CMFRI, 2009

<sup>74</sup> “Indian marine fishery resources: optimistic present, challenging future”, ICAR, 2011

<sup>75</sup> “Indian Marine Fisheries – Issues, Opportunities and Transitions for Sustainable Development”, World Bank Report, 2010

## EXHIBIT 5.17

### Marine fish production trend



SOURCE: Department of Animal Husbandry, Dairying and Fisheries, 2010

#### 5.3.4 Proposed plan of action

A concerted effort is required to help improve the status of the marine fishermen community in terms of human development indices, ensuring uniform access to basic infrastructure such as housing, electricity, transport accessibility and healthcare and for promoting sustainable fishery management.

A “Community Development Fund” (CDF), has been envisaged to fund coastal community development projects under Sagarmala. The CDF will promote socio-economic development of coastal communities, provide livelihood generation opportunities, enable coastal communities to acquire knowledge and skills and develop basic infrastructure to raise their living standards.

Other aspects of the fund could include:

- Set up as a trust, with an appropriately diverse advisory board comprising independent experts
- Managed through the Sagarmala Development Company (SDC), with management potentially done by a professional fund manager
- The projects considered would be specific time-bound local interventions not covered under existing central/state government schemes.
- Set up with an initial corpus as grant from the Union Budget and may provide grants from the budget every year for the next five years.
- CDF may also be open to partnerships with multilateral/bilateral funding agencies and corporates/ports (through their CSR funds) to support its programmes.
- Provide funding grants for marine fishermen related social welfare projects, projects for generating livelihood opportunities within the fisheries sector (e.g., new fish

processing and value-added product development, cold chains, aquaculture, etc.) or outside the fisheries sector (e.g., projects for local tourism, training in new skills and trades in small business development, agriculture, or handicrafts, etc.) and projects related to the promotion of sustainable marine fisheries management (e.g., sustainable fishery practices, promoting aquaculture, spreading fish quality literacy among fishermen, as well as developing facilities for fish landing and handling at harvest and post-harvest stages).

- Cover infrastructure (e.g., INR 1–250 cr) and non-infrastructure projects
- Appropriate project identification and selection mechanisms involving local institutions should be put in place; project monitoring processes would be set-up

In addition to the CDF, a scientific and well considered strategy for sustainable

### Global Case Examples

#### 1) Social Investment Funds in Latin America<sup>76</sup>

The Social Investment Fund (SIF) model was conceived in Bolivia in 1986 with the establishment of the Emergency Social Fund. The initiative was replicated throughout Latin America in the early 1990s, with the financial assistance of the Inter-American Development Bank, the World Bank, and other donors.

Most social investment funds were centered on increasing the scope, rationality, and effectiveness of public social investment and were essentially autonomous government institutions that maximize the delivery of projects. The bulk of their portfolio was oriented towards small infrastructure projects (e.g., small schools and health posts). Although this type of fund generally stressed municipal development and promotion of participatory democracy, the promotion of self-sustaining community groups and autonomous civic action was not a key concern.

A small number of funds concentrated their activities on improving the problem-solving capacity of the communities and on furthering their autonomous development. Typically, this type of fund focused directly on developing social capital, on small grassroots projects including community-based projects that fostered women's participation and increased their benefits.

#### Key Features of the Social Investment Funds

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development of fishing itself is necessary. Such an effort should suggest locally appropriate solutions for different parts of the Indian coastline, like more modern fishing fleets, mix between marine (close to shore and deep-sea) and inland fishing, etc.

This might include provision of larger vessels (and corresponding capability building) which allow for sustainable deeper sea fishing than is possible by the current smaller vessels (beyond 500m depth)

Such a holistic effort, with appropriate stakeholder participation, is needed to manage this resource well, and sustain socio economic development.

A number of other countries like Bolivia (Latin America) and UK established social development funds focused on improving the problem solving capacity of the communities and furthering their development by promoting sustainable economic growth and jobs.

<sup>76</sup> Source: "Employment and Social Investment Funds in Latin America" Report, International Labour Office

- **Governance structure:** Social investment funds have enjoyed strong political backing, but at the same time have been granted considerable independence from government controls. Conceptually, the funds were institutions within the public sector that were managed as private enterprises.
- **Time frame of operations:** Most funds were set up as temporary institutions (with a three to four year horizon) with the explicit objective of aiding the poor in a time of economic crisis and demonstrating the governments' concern about rising poverty
- **Types of projects considered:** Social investment funds were not set up to build individual, well-tailored public works but to establish an "assembly line" to generate hundreds, or even thousands, of small, technically unsophisticated projects catering to the poorest sections of the society
- **Project selection mechanism:** The social investment fund model advocated a bottom up approach for the selection and conceptualization of projects. All funds claimed to be demand-driven, i.e. their project portfolios were to be determined not by central directives but at the local level by future beneficiaries. Community participation and project ownership was sought in order to bring projects in line with the needs of the communities and increase the possibilities that they will be sustained.
- **Project funding mechanism:** Almost all financial operations of social investment funds were grants. Funds acted as financial intermediaries whose function was to mobilize resources (largely from foreign donors) and channel them directly to projects.
- **Project execution mechanism:** Social investment funds normally did not execute projects directly and thus were managed by a relatively small number of staff. Their role was generally confined to project appraisal and supervision. The construction and often the design of the projects were left to private sector contractors and NGOs, and sometimes to government agencies.

## 2) Coastal Communities Fund in UK<sup>77,78</sup>

The Coastal Communities Fund was announced in July 2011. The Fund is designed to support the economic development of coastal communities by promoting sustainable economic growth and jobs, so that people are better able to respond to the changing economic needs and opportunities of their area

The Fund is UK wide, although different levels of funding have been allocated to England, Wales, Scotland and Northern Ireland on the basis of revenue generated. In Scotland there are two funds: one for the Highlands and Islands and one for the rest of Scotland.

### Key Features of Community Development Fund

- **Governance structure:** As the fund is UK wide, the devolved administrations will have country specific boards who will work with the Big Lottery Fund to deliver this Fund on the ground in their areas
- **Time frame of operations:** Started in 2011, the Fund is intended to be a rolling fund with annual bidding rounds. Bidding and funding rounds for 2012 – 2014 have been completed.
- **Types of projects considered:** Some examples of projects that might be supported by this fund include:

<sup>77</sup> Source: Coastal Communities Fund Annual Report 2011

<sup>78</sup> Source: Coastal Communities Fund Prospectus

- Supporting skills and training initiatives to improve job prospects of local residents and encourage additional new businesses
  - Maintaining and developing specialized tourist infrastructure, including support for new green tourism opportunities
  - Managing and adapting to flood and coastal erosion risk, and managing pollution risks associated with the coast, where this supports local economic development
  - Supporting social enterprises to bring new economic opportunities and jobs to coastal towns and make best use of local assets
- **Project selection mechanism:** Project proposals have to meet the following criteria for selection:
- Encourage sustainable economic growth in their area
  - Demonstrate that the proposal fits with the broad economic priorities of the local area and unlocks a barrier, addresses a need or opportunity within the area
  - Demonstrate that the project is unlikely to go ahead without Coastal Communities Fund support
- Project funding mechanism:** The Fund will be equal to 50 per cent of the revenues generated by the Crown Estate’s marine assets. Although the level of funding is linked to Crown Estate revenues, this money will be provided by the Exchequer and the Government has committed funding based on the same. Only project proposals for amounts in excess of £50,000 will be considered for funding. Both capital projects and revenue projects will be funded. Revenue schemes will need to demonstrate how they will continue to support the project after this funding ends
- **Project execution mechanism:** Projects are executed by the project proposer while the Fund monitors the project progress and outcomes

## 5.4 Island development

### 5.4.1 The need for island development

India has 1,382 offshore islands and islets, of which 868 are in the Andaman and Nicobar and Lakshadweep island groups (Exhibit 5.324). Their remote location and small size makes most forms of economic activity unviable. As per Census 2011, some

of these islands are inhabited—the Andaman and Nicobar and Lakshadweep group of islands alone are home to more than 440,000 people. Strategically positioned in the Indian maritime zone, these islands are significant from a national security perspective, making it important to focus on their development.

**EXHIBIT 5.18****Islands by state**

Coast	State/UT	Number of islands			
		Shapes (islands)	Points (rocks/ rocky islets)	Total	
<b>A &amp; N island</b>	A & N island	649	187	836	
<b>Lakshadweep</b>	Lakshadweep	28	4	32	
<b>East coast</b>	Odisha	11	0	11	
	Tamil Nadu	24	4	28	
	Puducherry	0	0	0	
	Andhra Pradesh	14	18	32	
	West Bengal	18	4	22	
	<b>Sub Total</b>		<b>67</b>	<b>26</b>	<b>93</b>
	<b>West coast</b>	Gujarat	118	26	144
Daman & Diu		3	6	9	
Maharashtra		96	28	124	
Goa		41	2	43	
Karnataka		84	10	94	
Kerala		7	0	7	
<b>Sub Total</b>			<b>349</b>	<b>72</b>	<b>421</b>
<b>Grand total</b>		<b>1,093</b>	<b>289</b>	<b>1,382</b>	

SOURCE: Ministry of Home Affairs, Surveyor General of India

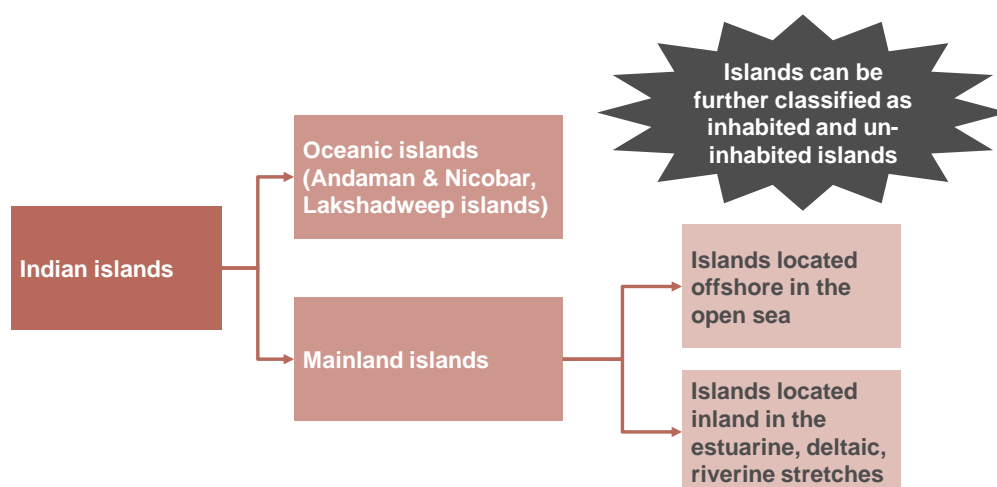
Based on their location, Indian islands are classified into two types: oceanic and mainland (Exhibit 5.325).

India's oceanic islands, namely, Andaman and Nicobar Islands and Lakshadweep Islands, harbour some of the world's most

diverse flora and fauna and are biodiversity hot spots.



## EXHIBIT 5.19



SOURCE: Ministry of Environment, Forest and Climate Change

### 5.4.2 Constraints in commercial development of islands

The environmental and security regulations governing Indian islands define the primary constraints for island development<sup>79</sup>.

The two groups of oceanic islands (Andaman and Nicobar, Lakshadweep) are covered under IPZ Notification, 2011, which governs all developmental activities in these islands. It requires the preparation of Integrated Island Management Plans (IIMPs) for each of the islands, which the Ministry of Environment, Forest and Climate Change (MoEFCC) is charged to do. So far, IIMPs have been prepared for four islands.

One of the main components of the integrated plans is to identify suitable locations for tourism, keeping in view all the environmental features and hazards. A similar process has been adopted for the

Lakshadweep group of islands, with 10 IIMPs prepared so far.

The mainland islands fall under the provisions of Coastal Regulation Zone (CRZ) Notification, 2011, and fall within the jurisdiction of the concerned state/UT governments and are required to prepare Coastal Zone Management Plans (CZMPs).

While the environment regulations have been defined for the islands (IPZ & CRZ Notifications), the security regulations have not yet been defined. For the island development activities, security clearance has to be provided for each island by the Ministry of Defence.

Other constraints in the commercial development in islands include:

- Remote location with limited transport or communication accessibility

<sup>79</sup> Ministry of Environment, Forest and Climate Change

- Small and scattered population with limited skill development opportunities and livelihood support
- Minimal or no basic infrastructure (e.g., power, drinking water, shelter, etc.) and high per unit cost of development.

Any island development activity could factor in the above points, island features (e.g., size, geography, climate, flora and fauna, etc.), jurisdiction and the regulations governing the island to ensure successful development.

### 5.4.3 Potential island development activities

A broad set of development areas identified for both oceanic and mainland islands include:

- Connectivity through submarine Optical Fibre Cable (OFC) from continental mainland to the islands (such as from Chennai to Andaman and Nicobar Islands). Augmenting the satellite bandwidth and the intra-island OFC network
- Increasing tele-density through a comprehensive telecom development plan for Andaman & Nicobar, Lakshadweep Islands and, 2G mobile coverage
- For oceanic islands, improve transportation links and supporting infrastructure like additional berthing facilities for inter-island and mainland vessels, cruise terminals and sea port terminals to attract tourists. Augmenting existing dry dock facilities for future requirements, ship repair facilities for mainland vessels and tug facilities at the island ports, Night navigational facilities on all inhabited islands
- For mainland islands, the transportation accessibility focus could include setting up fishing and cruise boat landing and berthing facilities, sea plane services from mainland ports to the islands and

night navigational facilities, weather monitoring and early warning systems.

- An island skill development strategy could focus on relevant sectors like tourism, fisheries, agriculture, maritime services and other sectors (e.g., handicrafts, consumer products). Keeping in mind the remote and dispersed nature of the islands, a “hub-and-spoke” training delivery model may be needed, particularly for the Oceanic islands
- Livelihood through fisheries: To generate employment on islands, the scope for increasing fish production from the islands (oceanic and mainland islands) may need to be broadened. It could include:
  - Promoting aqua-culture, exploring the possibility of tuna and shrimp farming on the islands, introducing Fish Aggregating Devices in lagoons, development of mariculture, cage culture, sea-weed culture, in the lagoons
  - Promoting fish landing equipment and facilities, including purchase of fishing boats and introduction of large deep sea fishing vessels for offshore fisheries
  - Creating adequate fish landing and berthing facility so as to land the fish catch in fresh condition and
  - Setting up fish processing and marketing facilities
- Developing island infrastructure and utilities like housing, sanitation and healthcare facilities
- Setting up utilities like bunkering facilities, adequate drinking water facilities at the ports and remote islands, renewable energy facilities on remote islands for power generation.
- Providing well-equipped vessels for fishing beyond territorial waters

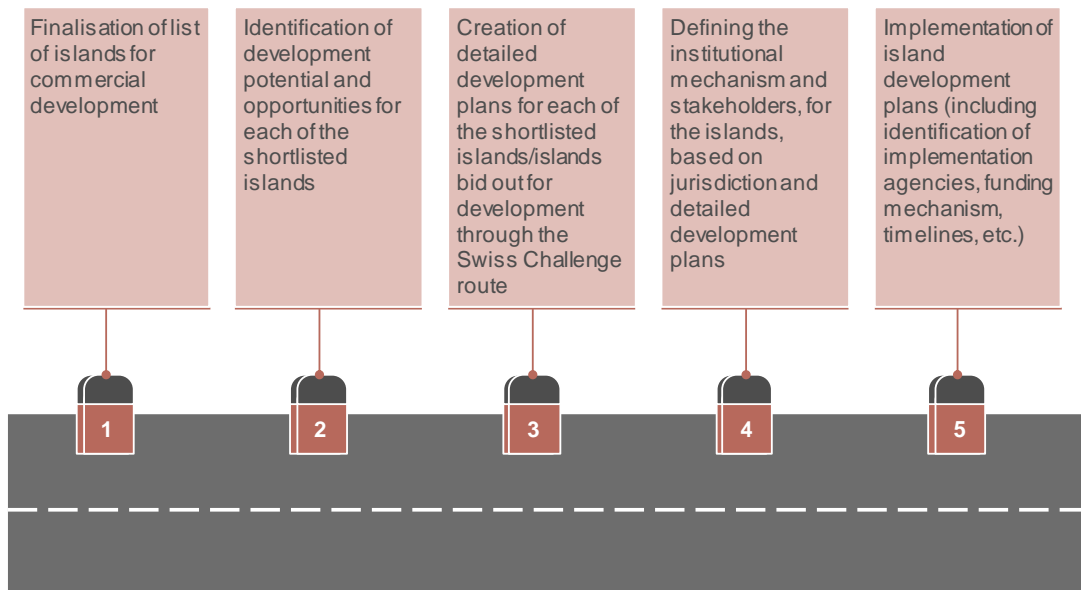
#### 5.4.4 Island development roadmap

An island development roadmap should be created (Exhibit 5.326), starting with the finalisation of a list of islands for commercial development and steps involved all the way through till implementation. The roadmap could include the creation of detailed

development plans for the islands. It could also define an institutional mechanism for island development that accounts for the island jurisdiction and recommendations of development plans.

#### EXHIBIT 5.20

#### Roadmap for island development



It is recommended that funding for the island development activities could be obtained through the private or public–private partnership (PPP) route. In the case of non-commercial developmental activities (e.g., health and sanitation facilities), funding could be solicited as part of CSR schemes of the private organisations/ports. Central line ministries could also earmark a fixed percentage of funds for island development activities



# Report on government imperatives including financing plan

Ministry of Shipping, Indian Ports Association  
August 2016



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# Executive summary

The Sagarmala Programme envisions India's ports as drivers of economic development in coastal areas. As a Government of India initiative, Sagarmala intends to comprehensively and holistically address the challenges and capture the opportunities of port-led development. The programme will work to optimise the use of existing and future transport assets, develop new lines/linkages for transport (including roads, rail, inland waterways and coastal routes), set up logistics hubs, and establish industries and manufacturing centres to be served by the ports in EXIM and domestic trade.

Implementing a project of such scale and achieving the desired impact calls for many interventions at the regulatory level, co-ordination between multiple stakeholders, and ascertaining alternative measures. This report looks at the key government imperatives for Sagarmala—the five crucial levers that can determine the success of the programme:

1. A cost-effective funding plan for implementing the Programme
2. A robust environment for public–private partnerships (PPPs)
3. Transparent business-friendly and stable regulations policy
4. An enabling environment to attract investors for port-led development projects
5. Setting up the right institutional structure to implement the Sagarmala Programme. This includes setting up the Sagarmala Development Company (SDC) and liaising with other stakeholders like line ministries and state governments

## **COST-EFFECTIVE FUNDING PLAN FOR IMPLEMENTING THE PROGRAM**

Around 398 projects, including projects under construction, have been identified under the Sagarmala Programme for port-led development in the country, requiring an investment of roughly INR 7.7 lakh cr. Out of the 398 projects, 120 project are under implementation and 85 projects will be taken up only after FY20. Thus, financing for ~198 projects worth INR 331,534 cr needs to be identified. The breakup of the funding needs is as follows:

- Around **75 road projects, worth INR 150,000 to 175,000 cr** will be primarily funded on a 50 per cent basis by the National Highways Authority of India (NHAI)
- Around **INR 35,000 to 50,000 cr** will be required for 44 rail projects
- Around **INR 4,500 to 6,000 cr** is the estimated need for a **heavy-haul railways** corridor from Talcher to Paradip Port, which would be implemented using non-government railway model

- **Development of new ports**, such as Paradip outer harbor, Wadhwan, Sagar and Enayam, is estimated to cost **around INR 25,000 to 35,000 cr.** These could be implemented using the landlord model

While multiple agencies would own the projects as per their purview, major ports could choose to explore and leverage alternative financing tools and their lower interest rates. These include **dollar-denominated loans** and financing from **development banks**.

Globally, dollar-denominated loans are a commonly used phenomenon, but in India only the Jawaharlal Nehru Port Trust has used these. Similarly, development banks such as the World Bank, Asian Development Bank and China EXIM Bank provide funding—loans as well as grants—for developing infrastructure related to ports. Both these forms of finance can be much cheaper (1.5 to 2.5 per cent compared to >12 per cent) compared to domestic market loans or capital markets.

## **A ROBUST ENVIRONMENT FOR PUBLIC–PRIVATE PARTNERSHIPS**

While PPPs have driven a lot of activity in the ports sector, the ecosystem is still nascent. Various challenges along the project lifecycle have meant that of the planned **91 projects, only 35 have been completed, 27 are under construction, while the remaining 27 are in the pipeline** and two projects have been terminated. Certain shifts are necessary to develop a conducive ecosystem, such as:

- Providing flexibility in reviewing the cargo to be handled
- Exploring traffic risk taken out of developer scope, e.g., Hybrid Annuity Model used in highways
- Ensuring the modification of selection processes and opt for good-quality consultants, e.g., QCBs, TI
- Checking that land and other key clearances are in place before award of contract, e.g., environmental clearances
- For projects dependent on external connectivity, exploring the option of conversion to PPP after the project is in place
- Reviewing TAMP and exploring options for mitigation to common light touch regulatory regime

## **TRANSPARENT BUSINESS-FRIENDLY AND STABLE REGULATIONS POLICY**

Efficient logistics for the evacuation of cargo require plugging some regulatory and process gaps. For example, the taxes levied on coastal shipping make it around 30 per cent costlier than comparable shipping costs in other countries.



Similarly, the time taken for Customs processes can vary widely compared to best-in-class examples like China. This increases storage time, necessitates more planning for the cargo receiver and shipper, and translates into higher inventory-holding costs. These issues could be addressed in the following manner:

- To maximise the potential of coastal shipping, bunkering and service taxes levied on coastal shipping need to be moderated
- Customs processes need to reduce manual intervention and specify separate scrutiny and clearances for EXIM and coastal cargo
- Coastal Regulations Zones (CRZs) should be made separately for the East and West coast, taking into account the different topography and tidal cycles, with flexibility on exemptions and exceptions on a special case basis
- The port-land allocation policy is recommended to shift from an H1 model (highest-price bidder) to an integrated development—the lease price can be benchmarked with the nearest industrial development zone, giving weightage to the contribution to throughput, the investments made and the employment generation potential.

## **AN ENABLING ENVIRONMENT TO ATTRACT INVESTORS FOR PORT-LED INDUSTRIALISATION PROJECTS**

Ports play a crucial role in reducing domestic logistics costs and facilitating EXIM-oriented manufacturing by reducing logistics time and variability. China is a best-in-class example of such an approach. While industrial zone development has been a prevailing concept in India, greenfield industrial zones (e.g., SEZs, FTZs) have not been as successful as traditional industrial agglomerations.

After reviewing past initiatives, the proposed industrial unit locations were mapped to the relevant major and non-major ports in the region to optimally facilitate the movement of their cargo. Reducing overall logistics cost has been the overarching rationale for shortlisting industries and locations for port-led industrialisation.

## **SETTING UP THE RIGHT INSTITUTIONAL STRUCTURE**

The Sagarmala Programme consists of a diverse set of projects and initiatives with multiple stakeholders at the state and central level. Key enablers for delivering such a Programme consist of the governance framework, institutional set-up and financing plan, including PPPs. It is, therefore, suggested that:

- The coastal economic zones (CEZs) programme should be spearheaded by the National Industrial corridor development authority.
- Promoting ease of doing business should be a priority. This calls for changes in policies for compliance, streamlining trade clearance processes, ensuring implementation through a risk-based model, and appointing a secretary

level empowered Nodal Officer for the top five investment sources/industries.

- A marketing cell, dedicated to marketing industrial and infrastructure projects, should be created within the ambit of the Ministry of Shipping (MoS). It can operate with a lean team initially and work through a geography-based model. An external marketing consultant can be brought on board on a retainer basis to create a roadshow and branding theme for the programme.

## **SETTING UP THE SAGARMALA DEVELOPMENT COMPANY**

There is a proposal to create the Sagarmala Development Company (SDC) under the ambit of the the Sagarmala Programme to fast-track its objectives and implementaion. The SDC would be under the administrative control of the MoS, which will monitor the implementation of projects identified under the National Perspective Plan (NPP) and provide experts in the field of technical, financial and project restructuring to various stakeholders, including partner states and maritime boards.

The SDC's aim would be to:

- Create a roadmap of projects identified through the NPP and prepare a coherent development strategy for the ports sector in India
- Augment capacity to cater to increased cargo traffic at the ports through improved efficiency, mechanisation and new terminals, and by building six to eight greenfield ports
- Liaise with various central line ministries to facilitate effective administrative co-ordination and ensure all identified projects are completed in a time-bound manner
- Complete all residual projects in the minimum time period by involving the SDC

The company would be led by an MD/CEO on deputation or hired externally. Keeping in mind its mandate, it will comprise four teams: Finance, Strategy and Business Development and the Project Management Unit.

□ □ □

These enablers are important for the smooth execution of the Sagarmala Programme. While the MoS has been appointed as the nodal ministry for its implementation, all relevant stakeholders—line ministries, state governments and private participants—must make a synergised and consolidated effort to ensure that the Programme realises its vision in the coming years.

# 1. Cost-effective funding plan for projects under the National Perspective Plan

Financing of projects is one of the key enablers for the Sagarmala Programme's success. This section discusses the funding needed for projects identified under the Programme along with the implementing agencies and financing models for each type of project. It also mentions some of the challenges affecting PPPs in ports with potential measures to resolve them, since PPPs will be critical for the financing of port projects.

## 1.1 FUNDING NEEDS AND ALLOCATION

Around 400 projects, including projects under construction, have been identified under the Sagarmala Programme for port-led development in the country, requiring an investment of roughly INR 4.5 lakh cr, from different stakeholders, including the MoS, Ministry of Commerce, state governments and other central agencies, e.g., NHAI and Indian Railways (IR). In addition, contribution from the private sector, e.g., through PPPs, is also expected. These projects are categorised across four pillars: port modernisation, port connectivity, port-led industrialisation and coastal community development.

Out of the 397 projects, 111 project are under implementation and 83 projects will be taken up only after FY20. Thus, financing for the remaining ~200 projects worth INR 2,86,000 cr needs to be identified (Exhibit 1).

## EXHIBIT 1

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### Overview of shelf of projects under Sagarmala

Category	Number of projects	Cost (in INR Cr)
Total projects	398	~ 773,385
Projects under implementation	120	~ 61,768
Long term projects	85	~ 385,893
Focus projects	~193	~ 331,534

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Exhibits 2, 3 and 4 give a summary of funding needs and the corresponding financing models.

## EXHIBIT 2

### Financing plan for identified focus projects

  Internal resources might not be enough to fund projects

S. No.	Agency	Sector	Financing <sup>1</sup>	Financing plan	Remarks
1	Major Port Trusts	54 Port Expansion projects	Rs 19,000 Cr	<ul style="list-style-type: none"> <li>Rs 14,000 Cr through PPP</li> <li>Rs 5,000 Cr through internal resources</li> </ul>	<ul style="list-style-type: none"> <li>Only profitable ports to finance non-PPP projects</li> <li>Major ports in India are profitable and have surplus available</li> <li>In addition money can be raised through dollar denominated bonds by leveraging foreign currency earnings</li> </ul>
		7 New Mega Ports	Rs 31,000 Cr	<ul style="list-style-type: none"> <li>Rs 15,500 Cr through internal resources</li> <li>Rs 15,500 Cr through PPP</li> </ul>	
		6 Internal Road projects	Rs 460 Cr	<ul style="list-style-type: none"> <li>Rs 460 Cr through internal resources</li> </ul>	
		3 Internal Rail projects	Rs 145 Cr	<ul style="list-style-type: none"> <li>Rs 145 Cr through internal resources</li> </ul>	
		2 CEUs	Rs 5,000 Cr	<ul style="list-style-type: none"> <li>Rs 2,000 Cr through PPP</li> <li>Rs 3,000 Cr through internal resources</li> </ul>	
2	Indian Railways	6 Rail projects	Rs 12,800 Cr	<ul style="list-style-type: none"> <li>Rs 12,800 Cr through internal resources</li> </ul>	<ul style="list-style-type: none"> <li>Railway capital expenditure for FY 16 was Rs 94,000 Cr.</li> </ul>
3	NHAI	25 Highway projects	Rs 16,000 Cr	<ul style="list-style-type: none"> <li>Rs 5,000 Cr through PPP</li> <li>Rs 11,000 Cr through internal resources</li> </ul>	<ul style="list-style-type: none"> <li>Budget for highways development in FY 16 was Rs 55,000 Cr</li> <li>In addition Rs. 42,000 Crore of toll generation is expected over 3 years</li> <li>Rs. 75,000 approval sought under 6th instalment of border and coastal roads</li> </ul>
		10 Expressways	Rs 125,000 Cr	<ul style="list-style-type: none"> <li>Rs 45,000 Cr through PPP</li> <li>Rs 80,500 Cr through internal resources (includes land acquisition)</li> </ul>	<ul style="list-style-type: none"> <li>Rs. 150,000 proposed by MO RTH under 6th instalment for Expressways project</li> </ul>

<sup>1</sup> Only includes total cost for focus projects to be initiated in next 3 years

## EXHIBIT 3

### Financing plan for identified focus projects

Internal resources might not be enough to fund projects

S. No.	Agency	Sector	Financing <sup>1</sup>	Financing plan	Remarks
4	INWAI	3 Waterway projects	Rs 7,515 Cr	Rs 7,515 Cr through internal resources	A separate budget for development of inland waterways will be needed of about Rs. 7,500 Crore
5	MOPNG	2 Refinery projects	Rs 8,400 Cr	Rs 8,400 Cr through internal resources of which ~ Rs. 4,200 Cr needed as equity	Surpluses with PSU OMCs is Rs. 56,000 Crore <sup>2</sup>
6	CONCOR	2 Multimodal hub projects	Rs 170 Cr	Rs 170 Cr through internal resources of which ~ Rs. 85 Cr needed as equity	Surpluses available with CONCOR is Rs. ~3,000 Crore
7	IPRCL	1 Road project	Rs 350 Cr	Rs 350 Cr through internal resources	IPRCL current budget allocation might be insufficient to meet the financing needs
		22 rail projects	Rs 11,000 Cr	Rs 11,000 Cr through internal resources (some equity can come from port as well)	

<sup>1</sup> Only includes total cost of focus projects to be initiated in next 3 years

<sup>2</sup> Includes current investments, cash and cash equivalents, and short term loans and advances

## EXHIBIT 4

### Financing plan for identified focus projects

Internal resources might not be enough to fund projects

S. No.	Agency	Sector	Financing <sup>1</sup>	Financing plan	Remarks
8	DIPP	12 Discrete clusters 1 CEU	Rs 34,000 Cr Rs 2500 Cr	Rs 24,000 Cr through internal resources and PPP Rs 2500 Cr through internal resources and PPP	A separate budget for development of CEUs and clusters under the CEZ program will be needed of about Rs. 25,000 Crore
9	Tourism	2 Tourism projects	Rs 120 Cr	Rs 120 Cr through internal resources	Budgetary allocation to Ministry of Tourism for FY 16 was ~Rs. 1600 Cr
10	SDC Projects	37 projects	Rs 7,500 Cr	Rs 1500 Cr through internal resources Rs 4,000 Cr as equity from states/ports Rs 2,000 Cr through PPP	SDC's current allocation is Rs. 450 Cr which if extrapolated over 3 years will be ~ Rs. 1500 Cr
11	Other state projects including private port projects	8 projects	Rs 5,800 Crore	Rs 5,800 Cr through internal resources Private ports can also fund a part of the investment	Small projects in Gujarat and Maharashtra that can be funded by state budgets Other projects need to be funded by private port developers

<sup>1</sup> Only includes total cost of focus projects to be initiated in next 3 years

Exhibits 5 and 6 show the total project capex needed by categories and the financing needed for each year for the next 10 years.

## EXHIBIT 5

### Yearwise funding requirement for the projects (1/2)

Funding Agency	Type of Project	# of projects	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total
Major Port Trusts	Port Modernization - Major Ports	62	-	4,525	9,236	6,737	3,422	1,769	-	-	-	-	25,688
Major Port Trusts	New Ports	7	-	-	-	4,074	6,611	10,148	7,012	2,475	418	-	30,737
Major Port Trusts	Last Mile Road projects	3	-	90	174	65	-	-	-	-	-	-	329
Major Port Trusts	Internal Port Road Projects	7	-	84	273	414	-	-	-	-	-	-	771
Major Port Trusts	Internal Port Rail Projects	4	-	40	103	16	-	-	-	-	-	-	160
Major Port Trusts	Port Rail Connectivity Projects	2	-	-	-	325	707	605	54	-	-	-	1,690
Major Port Trusts	Port Road Connectivity Projects	3	-	-	37	124	155	70	-	-	-	-	386
Major Port Trusts	CEU	2	-	-	1,750	3,250	-	-	-	-	-	-	5,000
Indian Railways	Port Rail Connectivity Projects	6	-	894	1,616	1,178	1,767	2,170	2,790	2,325	-	-	12,740
Indian Railways	Internal Port Rail Projects	0	-	-	-	-	-	-	-	-	-	-	-
NHAI	Last Mile Road projects	9	-	231	498	145	-	-	-	-	-	-	874
NHAI	Internal Port Road Projects	0	-	-	-	-	-	-	-	-	-	-	-
NHAI	Port Road Connectivity Projects	17	-	1,776	3,712	2,963	2,095	2,033	972	360	-	-	13,911
NHAI	Expressways Projects	9	-	-	-	17,325	28,875	46,200	23,100	-	-	-	115,500
<b>TOTAL</b>		<b>131</b>	<b>-</b>	<b>7,640</b>	<b>17,399</b>	<b>36,615</b>	<b>43,631</b>	<b>62,995</b>	<b>33,928</b>	<b>5,160</b>	<b>418</b>	<b>-</b>	<b>207,786</b>

## EXHIBIT 6

### Yearwise funding requirement for the projects (2/2)

Funding Agency	Type of Project	# of projects	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total
IWAI	Inland Waterways Projects	3	-	-	500	1,002	1,377	2,003	2,005	629	-	-	7,515
MoPNG	Bulk Cluster Projects	2	-	-	-	5,200	7,800	10,400	15,600	13,000	-	-	52,000
CONCOR	Multi Modal Hubs	2	-	-	-	34	77	60	-	-	-	-	170
IPRCL - Major Port Trusts	Last Mile Road projects	0	-	-	-	-	-	-	-	-	-	-	-
IPRCL - Major Port Trusts	Internal Port Road Projects	0	-	-	-	-	-	-	-	-	-	-	-
IPRCL - Major Port Trusts	Port Road Connectivity Projects	1	-	123	228	-	-	-	-	-	-	-	350
IPRCL - Major Port Trusts	Port Rail Connectivity Projects	10	-	45	2,175	5,296	2,656	-	-	-	-	-	10,172
IPRCL - Major Port Trusts	Internal Port Rail Projects	11	-	350	279	176	-	-	-	-	-	-	804
DIPP	Discrete Cluster Projects	12	-	-	-	3,393	5,089	6,785	10,178	8,482	-	-	33,926
DIPP	CEU	1	-	-	-	875	1,625	-	-	-	-	-	2,500
Ministry of tourism	Tourism Projects	2	-	-	-	42	78	-	-	-	-	-	120
Sagarmala Development Corp	SDC -Project	-	-	-	-	-	-	-	-	-	-	-	-
Other state projects/Agencies	Projects	24	-	1,840	4,762	4,843	4,440	159	80	67	-	-	16,191
<b>Total</b>		<b>68</b>	<b>-</b>	<b>2,358</b>	<b>7,943</b>	<b>20,860</b>	<b>23,142</b>	<b>19,407</b>	<b>27,862</b>	<b>22,177</b>	<b>-</b>	<b>-</b>	<b>123,748</b>
<b>GRAND TOTAL</b>		<b>199</b>	<b>-</b>	<b>9,998</b>	<b>25,342</b>	<b>57,475</b>	<b>66,773</b>	<b>82,401</b>	<b>61,790</b>	<b>27,337</b>	<b>418</b>	<b>-</b>	<b>331,534</b>

The funding plan<sup>1</sup> for each category of projects is as follows:

### Roads

Around 55 projects have been identified for improving port connectivity to major industrial clusters. NHA will be the key agency responsible for the implementation of these projects. The estimated cost is approximately INR 140,000 to 150,000 cr, of which 35 per cent will be financed by the PPP model, while the remaining 65 per cent will be publicly funded.

### Rail

The Indian Railways will be responsible for the funding and implementation of various rail projects, such as installing additional lines on existing routes and setting up new lines for improving connectivity and decongesting the rail network. Funds of roughly INR 25,000 to 31,000 cr will be required for 38 projects identified as part of the initiative.

<sup>1</sup> Only basic infrastructure cost has been estimated for envisioning the financing and funding plan



**Heavy-haul railways corridor:** A heavy-haul railways corridor from Talcher to Paradip port will be one of the pioneering connectivity initiatives of the Sagarmala Programme. The cost of the corridor from Salegaon to Paradip port is estimated INR 3,000 cr.

The non-government railways (NGR) model is being evaluated for implementing this project. Under this model, 70 per cent is proposed to be financed through debt and the remaining 30 per cent through equity shared between Paradip port, MCL, IRPCL and RITES as a representative of Indian Railways.

### **Dry ports and multi-modal hubs**

New inland container depot development in central Rajasthan (Nagaur) and northern Madhya Pradesh/Chhattisgarh border (Singrauli) will require a total investment of around INR 170 to 200 cr. These projects could be financed through a mix of investments from CONCOR (container handling agency) and private investments, i.e., private container train operators.

### **New ports**

The development of new ports, Wadhwan, Sagar and Enayam, has been proposed as part of the Sagarmala initiative. The total cost of these projects is estimated to be around INR 25,000 to 35,000 cr, of which 50 per cent can be funded through PPPs. The MoS will be responsible for preparing the detailed project report (DPR) for these projects, which would amount to about 10 per cent of the overall cost. Private funding could be employed for berth and terminal development whereas state funds could be used for providing the basic infrastructure.

### **Existing ports**

The MoS will be the nodal agency for 54 modernisation projects at existing ports, to be largely implemented through respective port trusts. These port trusts will also be responsible for preparing the DPR preparation, estimated at about 5 to 10 per cent of the total cost. The required investment of around INR 19,000 to 24,000 cr could be financed largely through the PPP model.

### **Coastal economic zones and coastal economic units<sup>2</sup>**

Projects spanning across 13 industries have been identified for port-led industrialisation through coastal economic zones (CEZs). These include bulk and discrete units, such as shipbuilding and automotives, food processing parks, science and technology parks, apparel and textile parks and leather and footwear parks. Around INR 50,000 to 60,000 cr will be required for these projects, which could be funded equally by the state and the central governments. The Centre along with state governments will jointly undertake the basic infrastructure

<sup>2</sup> Only basic infrastructure cost has been considered for all bulk and discrete clusters

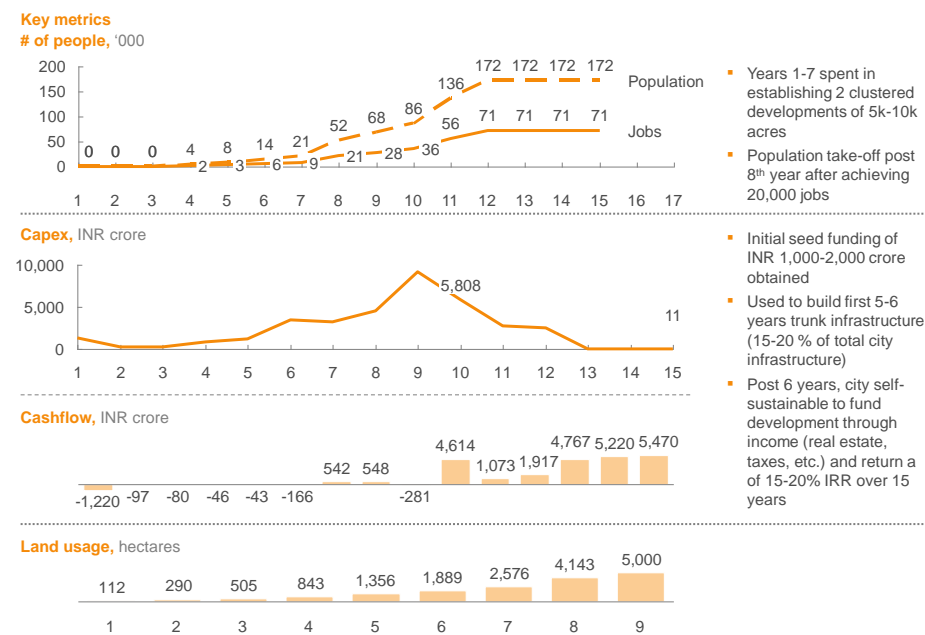
development for three to four pilot coastal economic units (CEUs). While the financing could be largely through budgetary sources, it is estimated that PPPs in individual components of CEUs can fund up to 40 per cent of the project cost. In addition, some of the CEUs can also be developed by private developers

Innovative models can be leveraged for financing CEU projects using a land monetisation strategy that minimises investment in upfront capex.

Exhibit 7 illustrates how a 5,000 hectare CEU can be sustainably developed with a seed capital of only INR 1,000 to 2,000 cr.

## EXHIBIT 7

### Building a 5,000 hectares CEU with initial capital of INR 1,000-2,000 cr



## Bulk clusters

Two bulk clusters have been identified in the refinery and petrochemicals sector with a total investment requirement of INR 8,000 to 10,000 cr. Funding of the project cost could be through public sector units.

## Maritime clusters

Two clusters have been identified in Saurashtra and Ennore with a total investment requirement of INR 8,00 to 1,000 cr. These clusters could be funded by the MoS. Similar to CEUs, PPPs in individual components of maritime clusters can fund up to 40 per cent of the project cost.

## **Community development**

An important element of port-led industrialisation is coastal community development. Around 10 projects have been identified with a total project cost of around INR 1,000 to 1,500 cr. Implementation of projects will be handled by the MoS, Ministry of Tourism, and Ministry of Agriculture, the Department of Animal Husbandry, Dairying & Fisheries, port trusts and maritime boards. A majority of the various projects proposed will be publicly funded.

## **1.2 ALTERNATIVE AND INNOVATIVE FUNDING MECHANISMS**

Private investment activity, especially in infrastructure, is constrained by stressed balance sheets. The domestic banking system is also affected by high levels of non-performing assets. Thus, it becomes necessary to find alternative and innovative financing models to finance the large shelf of projects under the Sagarmala Programme. Two such methods are:

- Dollar-denominated loans
- Development banks

### **Dollar-denominated loans**

For companies or investors managing multiple currencies, and earning a certain part of their income in international currencies (like USD), dollar-denominated loans can be used to raise funding.

In the Indian context, vessel-related charges, such as port dues, berth hire fees and pilotage, are paid by ships calling at a port. Such charges for foreign-going vessels are denominated in dollars but collected in rupees, after applying the prevailing exchange rate, according to a practice followed since 1991. On the other hand, cargo-related charges at ports, such as wharfage, crane hire, storage, warehouse, demurrage and estate rentals, are denominated and collected in rupees.

Two ports in India, JNPT and Adani, have raised dollar-denominated loans (Exhibit 8) to benefit from low borrowing costs, i.e., 2.5 per cent compared to the roughly 12 to 15 per cent available in the domestic market.

### **EXHIBIT 8**

**Only 2 ports in India have raised dollar denominated loans and dollar bond issue to take advantage of lower borrowing cost**

Concept	\$ denominated debt	\$ bond issue
▪ Port	▪ JNPT	▪ Adani Ports
▪ Amount Raised	▪ \$ 400 mn (~INR 2,660 Cr)	▪ \$ 650 mn (~INR 4,100 Cr)
▪ Date	▪ 16-Mar	▪ 15-Jul
▪ Interest Rate	▪ 2.36%	▪ U.S. Treasury Rate + 195 bp <sup>2</sup>
▪ \$ Denominated revenue	▪ INR 236 Cr (2013-14)	▪ N.A. <sup>1</sup>
▪ Purpose of funds	▪ Enhancing road connectivity to port	▪ Refinance foreign currency denominated external commercial borrowings and fund capital expenditure

**Foreign currency denominated funds provide access to much cheaper sources of funding than domestic loans**

<sup>1</sup> Information unavailable  
<sup>2</sup> 10 year U.S. Treasury Bond rates on 01 July 2015 was 2.43%

This can be emulated across all 12 major ports in the country with the potential of raising around INR 18,000 cr cumulatively based on present value (Exhibit 9). Specifically, during FY14, the Kolkata port trust and Paradip port had dollar-denominated revenues of more than INR 250 cr, making them the top contenders for raising the loans.

**EXHIBIT 9**

**12 major ports in India have a total potential of dollar denominated debt of ~ INR 18,000 Cr**

Port	Dollar denominated revenue (FY 2014, INR Cr)	Present value
KOPT Kolkata	277.87	2,145.64
PPT Paradip	265.98	2,053.83
VPT Visakhapatnam	195.63	1,510.60
KPL Ennore	111.33	859.66
CHPT Chennai	187.13	1,444.97
VOCP T Tuticorin	97.08	749.63
COPT Cochin	92.88	717.19
NMPT New Mangalore	114.04	880.59
MGPT Mormugao	58.53	451.95
MBPT Mumbai	399.84	3,087.46
JNPT JNPT	236.29	1,824.57
KPT Kandla	350	2,702.61
<b>Total<sup>1</sup></b>	<b>2386.6</b>	<b>18,428</b>

**Major Assumptions**

- Loan period – 10 years
- Interest rate – 5.0% p.a.

SOURCE: Client Data, Team analysis

## Development banks

Development banks such as the World Bank, Asian Development Bank (ADB) and the Japan International Cooperation Agency (JICA) provide funding in the form of loans as well as grants for developing infrastructure related to ports.

Development banks fund activities, which include:

- Construction of port facilities to increase cargo-handling capacity
- Maintenance activities to extend the life of the port and enhance safety and efficiency of operations
- Construction of berths
- Technical assistance in the preparation of master plans

The funding is provided for long repayment periods (of 20 years or more) with interest rates linked to the LIBOR or rates as low as 1.5 to 2 per cent. Interest free or reduced interest grace periods are also part of the terms.

The following table provides a few examples of development banks funding port-development activity globally.

<b>Development Bank</b>	<b>Project</b>	<b>Brief scope of Project</b>	<b>Date</b>	<b>Country</b>	<b>Amount Funded</b>	<b>Terms of Financing</b>
Asian Development Bank (ADB)	Lae Port Development Project	Construction of port facilities, and consulting services for project management to expand the cargo handling capacity of the port	2007	Papua New Guinea	USD 100 mn	60% as loan from LIBOR based lending facility for 24 years and rest as ADF loan for 32 years at 1.5% interest rate
Asian Development Bank (ADB)	Avatiu Port Development Project	Expansion of the port to extend the life of the port by 30 years and enhance safety and efficiency of operations	2009	Cook Islands	USD 20.71 mn	LIBOR based variable lending rate for 25 years with a five-year grace period
China EXIM Bank (Export–Import Bank of China)	Kribi Deep Sea Port Project	Construction of a multipurpose berth and container berth, loading and unloading equipment, rear stackyard, electro-mechanical facilities and other auxiliary buildings and devices, etc.	2015	Cameroon	85% of the total project value	Loan maturity period of 20 years with interest rate of as low as 2% p.a.; interest free grace period of seven years
Asian Development Bank (ADB)	Ports Development Master Plan	Technical assistance (TA) in the preparation of a port's development master plan	2015	Samoa	USD 500,000	Financed on a grant basis by ADB's Technical Assistance Special Fund (TASF-Others)

Indian major ports could also partner with development banks to arrange funding for greenfield ports, port connectivity and port modernisation projects. The funding is available as a grant or a long-term loan which can enable development.

### **1.3 POTENTIAL OF TRANSFORMING MAJOR PORTS FROM THE STATE-OWNED TO LANDLORD MODEL**

The Indian government owns all major ports in the country. The cargo-handling berths/ports are managed either by private operators or the port. Of the total 240 berths at the major ports, categorised as per majority cargo, 174 berths are state owned, while the remaining 66 are managed by PPPs.

Some of the major ports globally follow the landlord model of ownership, wherein the berths are owned and operated by private players and the revenue is shared with the state.

In order to create more efficient ports, it is necessary to evaluate the PPP potential of ports/berths to migrate to the landlord and other PPP models.

#### **Potential of state-owned ports/berths for PPP**

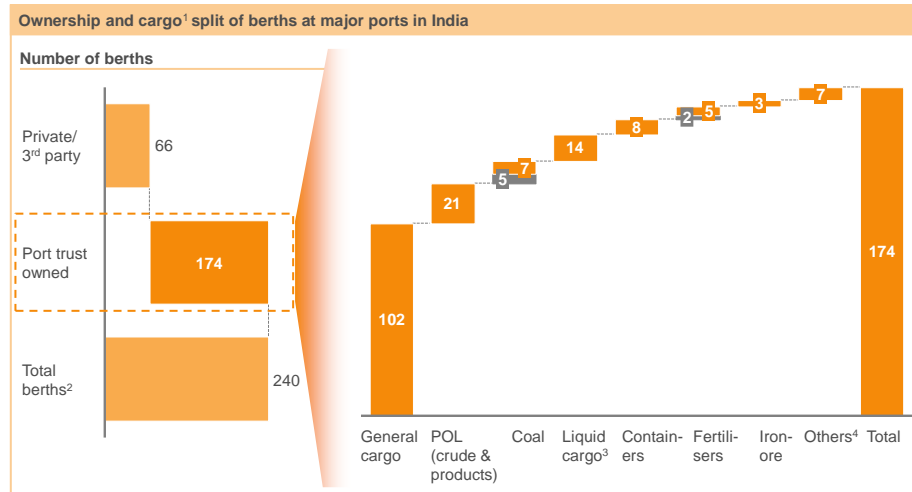
The PPP potential for the 174 state-owned berths can be gauged on the following four parameters:

- Traffic projections/cargo growth for next 10 years (until 2025): Berths with estimated steady cargo growth of more than 6 per cent seem to have more potential for PPP.
- Dedicated cargo berths: Currently, around 104 berths of the 174 are used for multiple or general cargo. To build financial returns, berths with dedicated cargo have greater potential for PPP.
- Mechanised/conventional: Current mechanised berths as well as berths with scope for mechanisation have more potential for PPP since it ensures larger cargo handling and throughput.
- Port health (profitability): Berths in ports with overall strong financials, i.e., with over 20 per cent PAT, seem to have higher potential for PPP. This is reassuring for prospective investors interested in higher returns.

Currently, only around 28 per cent of 240 all ports/berths follow the PPP model. Of the 174 port-trust berths, 102 berths (around 60 per cent) are used for general cargo (Exhibit 10). Since berths dedicated to a single cargo or product have more potential for PPP, the PPP potential of the remaining 72 berths needs to be gauged.

## EXHIBIT 10

**~60% of port trust owned berths are dedicated to general cargo; with only ~28% of total as privatized** ■ Dedicated



1 In case of mixed use categorised as per majority cargo in 2014-15  
 2 Excluding SBM's and transhippers  
 3 Edible oil and liquid fertilisers  
 4 General cargo/Passenger/RoRo etc.

SOURCE: Indian Ports Association; Project Unnati

### Suggested concession models for migrating major ports to the landlord model

In the previous PPPs for major ports, terminals were privatised through the revenue-sharing model since these projects were viable on a standalone basis. However, some of the berths with PPP potential may be constrained by revenue potential. The following new models could be explored for such berths:

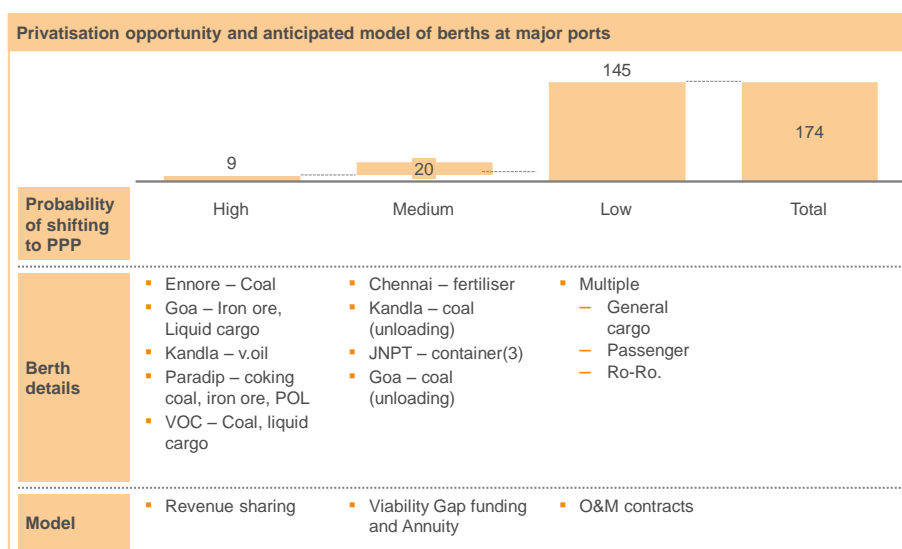
- **Viability gap funding (VGF):** This model can be used if revenue from the berth is inadequate to service the capital expenditure. In such cases, VGF can be provided by the Centre to make the berth viable for PPP investment. This is commonly availed in BOT (Toll) projects of NHAI.
- **Annuity:** This model can be used to remove traffic and revenue risk for PPP projects. In such cases, (a) the port authority can pay a fixed semi-annual fee to the concessionaire to compensate for capital cost and operational expenses, along with an assured percentage of returns. (b) Also, the concessionaire will not have the right to any charges levied on cargo. A variation of this model is the Hybrid Annuity Model of NHAI, wherein 40 per cent capital support is provided and annuities are replaced by fixed cash flows that mirror developer cash outflows.
- **Management contract:** In case a berth has no potential for PPP concession, it can enter into an O&M contract for operations management with O&M fees charged annually.



As per an initial analysis based on these factors, around 10 berths have the potential to take the PPP route in the next five to seven years through the revenue-sharing models. Exhibit 11 provides details of berths at major ports with PPP potential.

## EXHIBIT 11

**~9 berths have potential to move to PPP through revenue sharing**



1 Without TAMP

## SUB-PROGRAMMES WITH AN EARMARKED BUDGET

As per the recommendations of the Cabinet Note of the Sagarmala Programme, identified projects will be executed by respective line ministries. Extensive discussions have taken place with key ministries, especially Railways, Road Transport and Highways and Commerce, to understand their willingness to take up and execute these projects and the status of budgetary sanctions. These Ministries have consented to undertake several of these projects.

To enable line ministries prioritise the implementation of these projects and the streamline co-ordination and monitoring of the Programme, the creation of a sub-programme under each key line ministry, especially Railways, MoRTH and DIPP, along with a nodal officer within the respective ministry for reporting and delivering these projects has been proposed. It has also been suggested that a dedicated earmarked budget be carved out for implementation.

## 2. A robust environment for PPPs: Lessons and recommendations

Public–private partnerships (PPPs) have been integral to the financing of port projects in the country. PPPs have historically been the predominant mode of financing port projects in the past 10 years across both major and non-major ports.

Port-expansion projects could be largely financed through PPPs. The landlord model (privately-owned berths at ports) could be used for new ports, breakwater and dredging works could be funded by the government, while other projects could be executed entirely through PPPs.

While PPPs in ports have been more successful than in other sectors, several bottlenecks, including implementation issues, continue to impede efficiency. Of the 91 total projects planned for execution through PPP, only 35 were complete<sup>3</sup> as of March 2014, 27 each are under construction and in the pipeline respectively, while two projects have been terminated.

This section examines the state of PPPs in the port sector, current challenges and potential solutions for resolving them.

### **TAPPING THE POWER OF PPP IN INDIA'S PORT SECTOR**

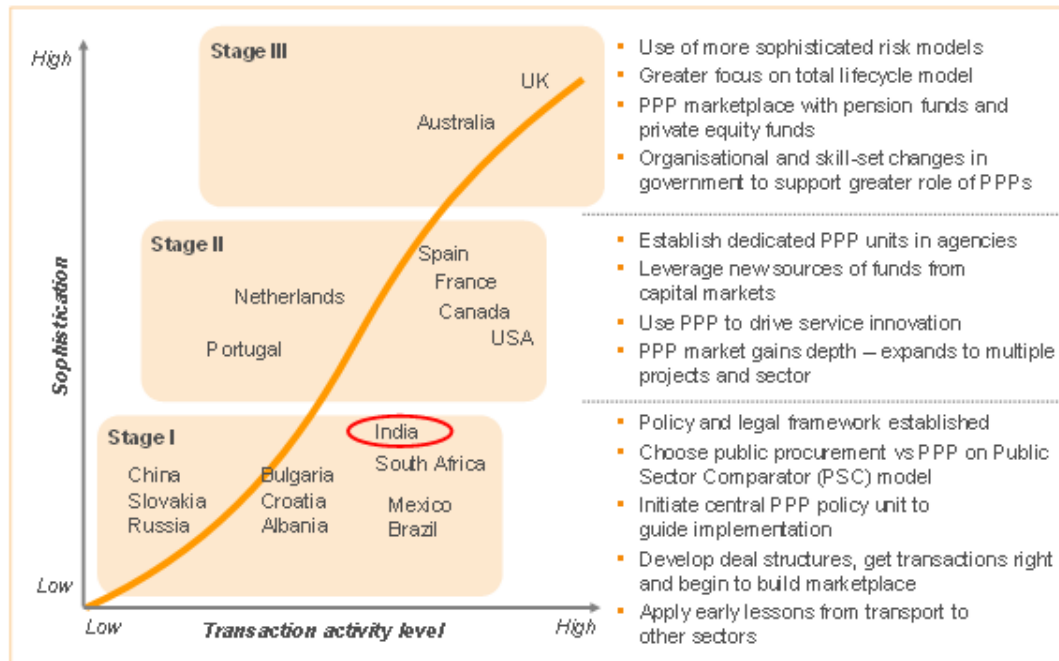
India has a lot of PPP activity in the ports sector but the ecosystem still needs to evolve significantly. In India's Maritime Agenda for 2010–20, the government has envisaged around 60 per cent contribution from the private sector to ensure faster capacity augmentation and improve hinterland connectivity. But as of March 2014, PPP projects in ports contributed only 35 per cent of the total expected capacity addition. Creating an ecosystem that can truly tap into the power of PPPs for the ports sector is crucial for future success.

The World Bank research shared in 2014 ranked India quite low in having a sophisticated PPP ecosystem, even though transaction activity is on the higher side (Exhibit 12).

<sup>3</sup> PPP in India: Ministry of Finance

### India scores high on activity levels in the PPP sector, but the ecosystem can be far more sophisticated

SCHEMATIC



SO URCE: World Bank, January 2014

This sort of sophistication is essential to fulfil the government’s goals for port-led development. It can only be built up through strategic governance initiatives to put in place the following three pillars:

- **Commitment:** The government is eager to fully tap into the power of PPPs for the ports sector but to truly demonstrate its commitment, it needs to ensure three things:
  - A clear vision of the role of PPPs in infrastructure delivery
  - A robust and transparent pipeline of viable PPP projects
  - A positive perception of PPPs among all key stakeholders
- **Effective governance:** A lot still needs to happen on this front to create an environment conducive for PPPs:
  - A robust legal and institutional framework and regulations
  - Standardised PPP models with clear parameters for project selection
  - Effective, capable government institutions
- **Executional excellence:** The government still needs to resolve roadblocks in execution and work towards:
  - Robust business plans with attractive and stable risk allocation

- A transparent and robust tendering process
- An effective controlling and feedback process

However, in reality a number of PPP projects are performing below par. The troubled performance of these projects is affecting the private sector’s investment and involvement in the sector. It is necessary to closely examine the challenges that are hampering PPP project performance.

## 2.1 CHALLENGES IMPACTING PPP PROJECTS

Based on the analysis of PPP projects (operational and under execution in major ports) in the ports sector. Following exhibits (13-15) outline the identified challenges in current PPP projects in Major Ports.

### EXHIBIT 13

#### Troubled PPP projects in Major Ports – Operational

Project	Concessionaire	Capacity	Cost	Key issues
		MMTPA	Rs Cr	
Coal handling at EQ-1 Inner harbor at VPT	Adani	5.25	323	<ul style="list-style-type: none"> <li>Required draft of 16.1 m unavailable; cannot sail 80K DWT vessels;</li> </ul>
Multi-purpose cargo berth 13 & 15 at KPT	RAS & JRE Infraport Pvt Ltd.	3	378	<ul style="list-style-type: none"> <li>Rail connectivity between hinterland and port, poor project structuring (risk sharing)</li> </ul>
Mechanized coal handling at GCB-VPT	Vedanta	10.18	444	<ul style="list-style-type: none"> <li>Delayed EC; issues with storage space</li> </ul>
NSICT terminal at JNPT	DP World	13.2	750	<ul style="list-style-type: none"> <li>Issues with stackyard space availability</li> </ul>
GTI terminal at JNPT	APM	15.6	1,078	<ul style="list-style-type: none"> <li>Issues with stackyard space availability</li> </ul>

SOURCE: Team analysis, Expert interviews

## EXHIBIT 14

### Troubled PPP projects in Major Ports – Operational

Project	Concessionaire	Capacity	Cost	Key issues
		MMTPA	Rs Cr	
International Container T/S Terminal- CoPT	DP World	40	2,118	▪ Low draft (11m), issue with trucker's union
Coal handling terminal (Berth 7)- Mormugao	Adani	4.6	406	▪ Issues in handing over project land, Issue in shifting of POL and other service pipelines
Container terminal- Berth 11 & 12- KPT	ABG & PSA	7.2	447	▪ 12.8 m draft not available, absence of night navigation facilities

SOURCE: Team analysis, Expert interviews

## EXHIBIT 15

### Preliminary analysis: Troubled PPP projects in Major Ports – Under construction

Project	Concessionaire	Capacity	Cost	Key issues
		MMTPA	Rs Cr	
4 <sup>th</sup> Terminal at JNPT	PSAMIPL & ABGPPL	60	7,915	▪ Intense competition resulting in high revenue share bid; eventual cancellation of LoA by JNPT after delay of 14 months
Deep draft coal berth at PPT	ESSAR	10	479	▪ Dispute with mines department and existing iron-ore plot allottees; poor project planning

SOURCE: Team analysis, Expert interviews


The poor performance of PPP projects in the ports sector can be attributed to four factors—imbalanced risk-sharing, rigid concession agreements, inadequate project preparation, tariff risk and multiple tariff for the same cargo at the same port and lack of financial capacity of the developer.




### Imbalanced risk-sharing

In the current ownership pattern, the concessionaire bears greater risk than the concessioning authority (Exhibit 16). Even where the concessioning authority is liable for ensuring enablers for the project, such as connectivity or land availability, the concessionaire has to bear a part of the risk because any delay significantly impacts the investments due to opportunity cost.

EXHIBIT 16

Potential risks in PPP projects and current ownership pattern

 Imbalanced risk sharing

Risk impact <sup>1</sup>	Risks	Majority risks owned under current scenario	
		Concessions authority	Concessionaire
High	DPR correctness and adequateness		✓
High	Land unavailability/delay	✓	
High	Delay in land side connectivity <sup>2</sup>	✓	✓
High	Delay in shore side connectivity <sup>2</sup>	✓	✓
High	Traffic below forecasts		✓
High	Delay in environmental clearances	✓	
High	Changes in tariff		✓
High	Risky financial structure		✓
High	Delay in security clearances		✓

<sup>1</sup> Risk impact is the relative impact of the risk on project viability

<sup>2</sup> Risk is shared by both parties if the connectivity is included as conditions precedent in the CA, else concessionaire bears the risk

SOURCE: Expert interviews, McKinsey analysis

Other risks, such as those associated with design and scope changes, are borne by the concessioning authority only till the nominal allowed limit of 20 per cent cumulative. Changes beyond that are not allowed even if necessary for improvements in project facilities or for keeping pace with the technological enhancements.

A comparison with international norms (such as Australia, the UK, South Africa and Chile<sup>4</sup>), on managing risks and balancing them between both parties reveals that (Exhibits 17 and 18):

- There is no provision for the government to intervene in case of macro-economic shocks
- The concessioning authority is liable to pay damages only in case of non-fulfilment of conditions ascertained and agreed on before site availability and procurement of clearances (other conditions vary between projects)
- There are no mechanisms to mitigate risks associated with the risky financial structure of concessionaire or naïve lending

<sup>4</sup> Considered successful countries in execution of PPP projects in ports

## EXHIBIT 17

### International comparisons on managing risks and balancing between parties (1/2)

Issues	International experience <sup>1</sup>		India (current)
	How dealt with	Contractual form	How dealt with in MCA
Macro-economic shocks	No trigger unless loan covenants breached: private party risk	Lender step in and substitution	Not covered
	Purchase of equity by Government to enable financing in financial crisis	Renegotiation	
Delay to completion	If public party then compensation for delay to place private party in no-better-no-worse position	Compensation event	If site related- then completion date extended
	If no fault then relief on completion date granted	Relief event	If force majeure then completion date extended
	If private party fault then relief on completion granted and liquidated damages payable	Private party risk- no change	If private party then liquidated damages payable

<sup>1</sup> International refers to comparative cases in Australia, UK, South Africa and Chile

SOURCE: Developing a framework for renegotiation of PPP contracts – DEA, Expert interviews

## EXHIBIT 18

### International comparisons on managing risks and balancing between parties (2/2)

Issues	International experience <sup>1</sup>		India (current)
	How dealt with	Contractual form	How dealt with in MCA
<b>Naïve lending</b>	Lenders bear loss on sale of concessionaire, so due diligence is thorough	NA	Limited ability to exclude bids with high risk to lenders
<b>Financial structure</b>	Debt/equity ratios assessed by Treasury commercial viability tests	NA	Limited commercial viability testing
<b>Factors outside concessionaire's control</b>	Private party bears financial risks but relieved from completion and liquidated damages	Relief event	Not covered unless political or indirect political event

<sup>1</sup> International refers to comparative cases in Australia, UK, South Africa and Chile

SOURCE: Developing a framework for renegotiation of PPP contracts – DEA, Expert interviews

### Rigid concession agreements

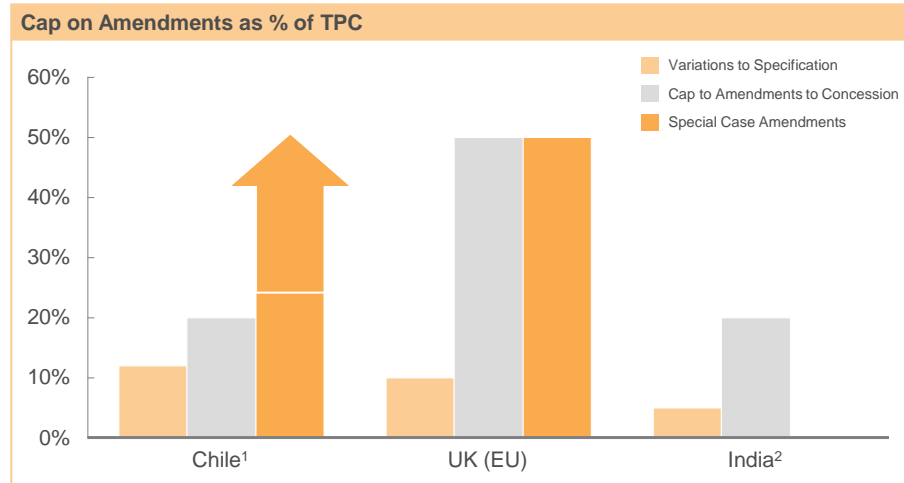
The rigidity of concession agreements (CAs) is also a challenge. India has the lowest cap on amendments allowed in CAs among comparator countries (Exhibit 19).

CAs are prescriptive in terms of which commodity is to be handled—with no provision for handling volatility in the traffic of commodities that tend to significantly impact project viability. CAs also do not permit any deviation in the types of equipment during the concession period. A renegotiation is only possible in case of “change in law”.



## EXHIBIT 19

### India has the lowest cap on amendments allowed in Concession Agreements amongst comparator countries



Note: Australia and South Africa allow a greater range of discretion by using the concept of "materiality" or "significance"

<sup>1</sup> Chile permits special case amendments above 25% subject to approval

<sup>2</sup> In India the cap on amendments relates to change in traffic demands only

SOURCE: Developing a framework for renegotiation of PPP contracts- DEA

A comparison on amendments to CAs in India as opposed to other countries, such as Australia, the UK, South Africa and Chile<sup>5</sup>, indicates that (Exhibit 20):

- The concession period in most cases extends for 30 years and beyond
- Limits on amendments to CAs cause PPP projects to suffer in case of major market changes
- Amendments are allowed in only a few limited cases, such as "change in law" or "force majeure"

<sup>5</sup> Considered successful countries in execution of PPP projects in ports

EXHIBIT 20

International comparisons on amendments in CAs

Issues	International Experience <sup>1</sup>		India (Current)
	How dealt with	Contractual form	How dealt with in MCA
Design and scope changes	Through specification committee (if zero cost increase) or variation (if cost increase)	Variation	Change in scope within 5% of TPC
Changes in operating requirements	Variation	Variation	Change in scope within 5% of TPC
Variations with cost increases	Public party ordered then costs as per schedule or no-better-no-worse	Variation	Change in scope within 5% of TPC
Amendments	Can be made by the public party and paid for to leave private party no-better-no-worse	Renegotiation	Change in scope within 5% of TPC or change in law

- In most cases, Concession period extends for 30 years and beyond
- Due to limits on amendments of CAs, PPP projects suffer in scenarios of major market changes
- Amendments are allowed in CAs only in a few limited cases- "Change in Law" and "Force Majeure"

<sup>1</sup> International refers to comparative cases in countries of Australia, UK, South Africa and Chile  
 SOURCE: Developing a framework for renegotiation of PPP contracts- DEA, Expert interviews

Volatility of traffic in terms of the commodity handled is another key issue that impacts the project’s viability. Volatility in traffic of coal and iron ore, for example, has been a major issue for dedicated berths handling these commodities. Traffic has slowed down due to regulatory and cargo-specific issues:

- Iron ore: Government restrictions on mining and export caused a drop in all-India export volumes from 130 mn tonnes (MT) in 2008–09 to around 100 MT currently
- Coal import: Coal import volumes have declined in recent times mainly due to higher domestic production by Coal India limited

International comparisons on handling traffic volatility indicate that (Exhibit 21):

- Concession periods are extended in case traffic demand is lower than forecast due to regulatory changes and connectivity issues
- Projects get stalled in the absence of any provisions of renegotiation/compensation

## EXHIBIT 21

### International comparisons on handling traffic volatility

Issues	International Experience <sup>1</sup>		India (Current)
	How dealt with	Contractual form	How dealt with in MCA
Traffic demand below forecast	1) No trigger unless loan covenants breached then lender step in/liquidation/termination	Lender step in and substitution	For every 1% decrease in traffic 1.5% increase in concession period (cap of 20%)
	2) Loan to private company to make good shortfall, repaid once debt service complete	Renegotiation	
Actions that divert traffic away (connectivity)	Triggers compensation or renegotiation on no-better-no-worse basis	Compensation Event	Increase in concession period

- In case of traffic demand being below forecast due to regulatory changes and issues with connectivity, concession periods are extended which does not solve the immediate problem of cashflows
- In absence of any provisions of renegotiation/compensation projects get stalled

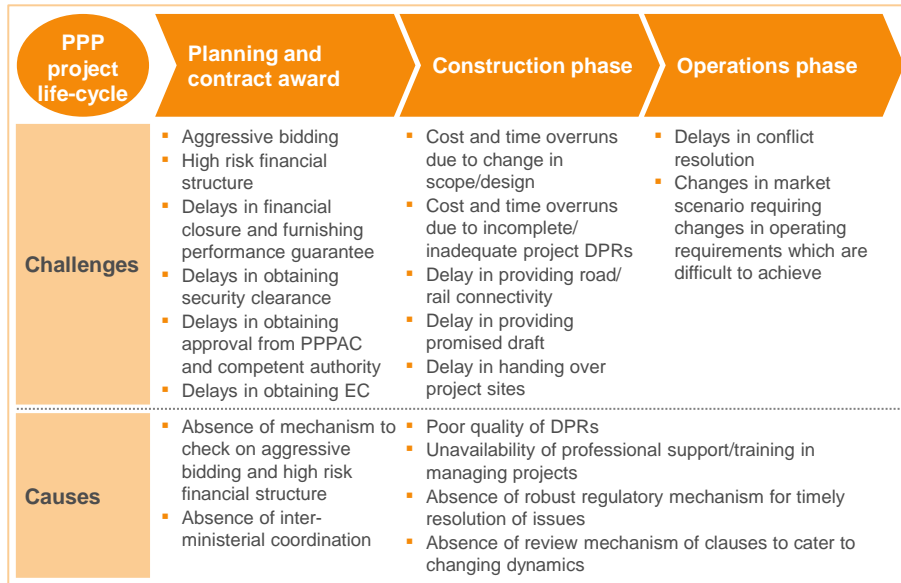
<sup>1</sup> International refers to comparative cases in countries of Australia, UK, South Africa and Chile

SOURCE: Developing a framework for renegotiation of PPP contracts- DEA, Expert interviews

## Inadequate project preparation

Various bottlenecks or challenges plague the entire lifecycle of a project, from planning and contract award phase to construction, right up to operations (Exhibit 22).

**Poor planning and execution impact performance across project life cycle**



SOURCE: Team analysis, Expert interviews

**Tariff risk and multiple tariff for same cargo at same port**

The presence of four different tariff regimes results in widely varying computations of tariff at a port. There is no level playing field among operators under different TAMP (Tariff Authority for Major Ports) regimes and operators in non-major ports. The latter are free to set their own tariffs, creating immense competitive pressure for major ports which are restricted from doing so by TAMP.

**Lack of financial capacity of developer**

The screening criteria for a project concession does not entail strict financial norms which can bar developers with weak financial performance to bag the contract. Also, the current agreement does not specify the rights to reclaim the project in case of non-execution in a stipulated time period.

**2.2 PPP IN RAILWAYS**

Connectivity is one of the four pillars of the Sagarmala Programme, with rail infrastructure as a key component. More than 50 projects have been identified, amounting to over INR 40,000 cr, of which railway PPP projects form a large part. Given the substantial number of port-linked rail lines, it might be possible to identify and develop several of these through the PPP model. This section gives an overview of the PPP experience in Indian Railways (IR), presenting key issues and offering a proposed way forward.

## PPP models and history

Currently, two PPP models are followed in Indian Railways while a few are in the pipeline. These are the NGR model, joint venture (JV) model, BOT model, Annuity model and the revenue-sharing model.

- The NGR model is intended to provide first and last-mile connectivity for mines, plants, SEZs, logistics parks, etc. The private player/developer will focus on land acquisition, construction and opex. IR will pay 95 per cent of the revenue share deduction of reserve services. It will also look after train operations and provision of rolling stock.
- In JV models, IR does the land acquisition—non-interest bearing deposit against cost of acquisition to be provided to IR which will be refunded upon expiry of concession. The construction will be done through JV or through IR on nomination basis. In this model, PSUs and government entities can participate in JV equity through nomination while other participants will be selected through Expression of Interest (EoI). In this case, revenue share will be 50 per cent and 30 years' concession with flexibility for extension or compression based on traffic (year for every 4 per cent change in traffic versus threshold traffic).
- The BOT model is applicable where it is not possible to identify the stakeholder or strategic investor. It is a competitive bidding process based on premium of grant. The model could be implemented following the Design, Build, Finance, Operate and Transfer pattern. As in the JV model, IR does the land acquisition. Around 50 per cent of the applicable freight, minus reserved services, will be paid to the concessionaire. This model also has a concession for 25 years with flexibility for extension or compression based on traffic (year for every 4 per cent change in traffic versus threshold traffic).
- The Annuity model can be used for line expansions. It follows a competitive bidding process based on annuity and is applicable where it is not possible to identify the stakeholder or strategic investor. The model could be implemented following the DBFOT pattern. As in the JV model, IR does the land acquisition. This model also has a concession for between 15 and 20 years with flexibility for extension or compression based on traffic (year for every 4 per cent change in traffic versus threshold traffic).

## Current status

Owing to various challenges, only one PPP project in IR has been completed in Gujarat—the Viramgam Mehsana Gauge conversion project.

As of December 2015, 20 projects worth INR 14,000 cr have been undertaken since 2012

- Seven projects worth INR 5,693 cr are under implementation in the JV model

- Three projects worth INR 3,016 cr have been identified for development through the Annuity model
- Projects worth INR 2,236 cr have also been identified for implementation in the customer-funded model
- Six other projects worth INR 3,078 cr have been approved in principle
- From April 2015 to October 2015, PPP projects for new lines, expansions, etc., amounting to around INR 11,100 cr have been awarded for concessions

In 2012, a new policy on participative models renewed private investor interest in the Railways sector. The Railway Budget 2016–17 also laid emphasis on PPP initiatives building on the 11<sup>th</sup> and 12<sup>th</sup> five year plans. The following PPP projects are expected in FY17:

- Implementation of rail connectivity for Nargol and Hazira ports
- Station redevelopment strategy still under formation, project take off expected to take more than a year and a half at least
- Financial bid received for Habibganj station; implementation could take around two to three years
- Three line-tripling projects to be executed under the BOT–Annuity model at an estimated cost of INR 2,450 cr between Nagpur and Wardha (Maharashtra), Kazipet (Telangana) and Balharshah (Maharashtra) and Bhadrak and Nergundi (Odisha)

## **ISSUES HAMPERING THE DEVELOPMENT OF PPP IN RAILWAYS**

Indian Railways has been facing a massive infrastructure development challenge. One of the keys to achieving the budgeted plans is the financing of the development plan. PPPs form an important component of the financing mix for all sophisticated infrastructure development agencies.

In this context, IR needs to take forward the commendable direction mentioned in the Railways Budget to develop a robust PPP program. This will also significantly benefit the ports sector and the Sagarmala Programme given that rail infrastructure is one of the main issues hampering logistics movement in the country. These include:

- Unlike other transport sectors, such as highways, ports and airports, IR has negligible share of PPPs in the overall financing mix.
- While the JV and NGR models have been employed for developing projects with external financing, these are not true PPPs as they are mostly “reactive”, i.e., these are dependent on a project beneficiary to propose a PPP.
- Even JV and NGR projects face a number of difficulties including:
  - One-sided concession agreement

- Significant delays in approval
- Operational issues
- Over-designed specifications that increase costs—which IR would not normally require
- Risk due to changes in safety standards, which cannot be anticipated
- Annuity and revenue-sharing models also face a number of issues. While a number of projects have been identified, there is not much progress. Historically, only one project has been identified in the Annuity model. Similar to the JV and NGR models, the concession agreements are biased towards IR. Moreover, many of the identified lines for PPPs are not bankable.

## **2.3 RECOMMENDATIONS TO ENHANCE PPP EFFECTIVENESS IN THE PORTS SECTOR**

Specific actions to address the challenges described in the earlier section can boost investor interest in PPPs in the ports sector.

### **Balanced risk-sharing between parties**

A big area of concern is that the concessionaire is more liable for risk than the concessioning authority. The government needs to introduce certain mechanisms to better balance out this risk between stakeholders:

- The concessioning authority could share the risk of incorrect or inadequate detailed project report if it results in cost and time overruns for the concessionaire
- Delays in setting up road/rail connectivity could be compensated both through extending the concession period and recovering the damages payable
- Clauses may be introduced to renegotiate the revenue share payable to the concessioning authority, applicable in cases where traffic is below forecast consistently for five years due to reasons beyond the control of the concessionaire

### **Flexibility in CAs**

Permitting greater amendments to CAs can ease the challenges affecting PPP performance. Going forward:

- CAs could include a provision for renegotiation under specified cases
- The assumptions for project design will need to be outlined clearly so that any changes over the project lifecycle can be identified and used as a trigger for renegotiation

- The cap on amendments might be increased from 5 per cent of the total project cost (TPC) for a single “change of scope” to 10 per cent and cumulatively during the concession period from 20 per cent of TPC to 40 per cent
- A process could be established to review clauses in a timely manner in the light of changing market scenarios

### **Facilitating more efficient execution**

Bottlenecks in execution have been some of the biggest challenges affecting the performance of PPP projects in the ports sector. The following best practices can help to ease execution and implementation of projects in the future:

- Ensure accuracy and comprehensiveness in DPR preparation
- Set up a Centre of Excellence (CoE) in PPP to assist with policy implementation and regulatory issues; enable research and development of sophisticated models in PPP; and provide training for government authorities in PPP project management
- Set up a Facilitation Committee for inter-ministerial issues to help with the alignment between state and central governments and different ministries and also to assist with timely clearances
- Adopt project-management best practices such as:
  - Obtaining EC before issuing requests for proposals
  - Ensuring that the majority of land is available before issuing RfPs and that the remaining land is made available before award of contract
- Adopt best practices learnt from PPPs in highways such as:
  - A policy on one-time fund infusion by NHAI for languishing projects, on a case-to-case basis
  - Rationalised compensation to concessionaires for delays which were not under the scope of activities covered by them prioritising these various initiatives can transform the way PPPs operate in the ports sector.

As more projects go from planning to completion with minimal delays and challenges, the PPP sector will be reinvigorated and will help to meet the government’s vision for port-led development in India.



## 3. Transparent business friendly and stable regulations policy

### **3.1 STREAMLINING CUSTOMS PROCESSES TO OPTIMISE CONTAINER TRANSIT TIME WITHIN PORTS**

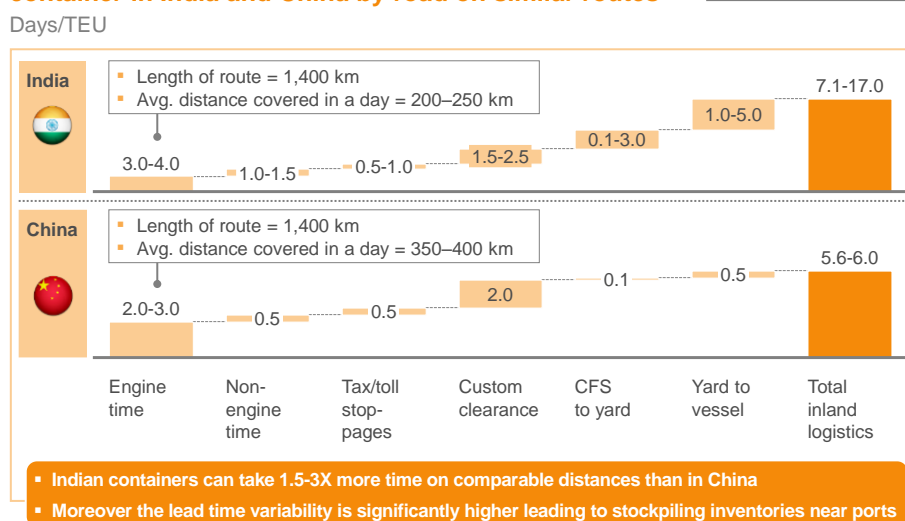
In 2013–14, India's container movement was 10.7 mn TEUs, which is estimated to grow to 22 to 25 mn TEUs by 2025.

Reducing cost and time for moving containers will be critical for unlocking the potential of export-oriented manufacturing in India. Studies on container movement revealed a high time variability in exporting containers from India (Exhibit 23). In comparison to China, with similar route length, Indian containers can take 1.5 to 3x more time in transportation. Moreover, the lead time variability is significantly higher leading to stockpiling inventories near ports.

## EXHIBIT 23

### Comparison of end-to-end time of transporting a container in India and China by road on similar routes

BOTTOM UP ANALYSIS  
FOR ROAD TIME



<sup>1</sup> Ocean distance = 6,658 NM

Simplifying Customs procedures could help in reducing the time taken during clearances. Initiatives like the rollout of electronic documentation, implementation of en-bloc movement in selected ports and the introduction of a Risk Management System (RMS) have greatly improved India's perception as a facilitator of international trade. There is further scope for improvement in terms of the documents and signatures required, indicating the immediate need for automated and integrated systems. A comparison of the efficiency of Customs procedures at Indian ports with selected countries is shown in Exhibit 24.

## EXHIBIT 24

### Indian custom processes needs to be simplified and brought at par with competing ports

Performance indicators	Indian ports	Klang	Singapore	Jebel Ali	Colombo
Rank as per perception of customs process	78	14	1	3	72
Average number of documents – Import	10	4	3	5	7
Average number of documents – Export	7	4	3	3	7
Average number of signatures required – Import	27	5	3	3	10
Average number of signatures required – Export	22	3	3	3	13
Clearance Lead Time in days – Import	2	1	1	2	2
Clearance Lead Time in days – Import	2	1	2	2	2

The following section outlines the preliminary findings to reduce variability related to Customs clearance procedures at Indian ports, especially with reference to containers.

### **Suggestions for reducing the time taken in customs procedures for container exports**

Based on multiple interactions with port authorities, importers, exporters, shipping lines, transporters, freight forwarders, Customs handling agents, former Customs officials and container freight station officials, the following issues were identified.

- Manual filing of Import General Manifest/Export General Manifest/Sub-Manifest Transshipment Procedure (SMTP) even after electronic filing/generation in ICE GATE and separate submission of documents to different authorities. In the current process:
  - The IGM form has 84 inputs for completion, including around 30 mandatory fields. It needs to be filed manually, e.g., eight hard copies need to be submitted at various Customs sections at JNPT
  - The SMTP, generated automatically at the ICE GATE and transmitted to all concerned parties, still needs to be printed and signed by Customs officials and sent by courier to ICD operators by shipping lines. Each vessel has more than 20 hard copies of SMTP
  - The current electronic data interchange (EDI) system has limited provisions of attaching supporting documents. As a result, physical copies of the Bill of Entry (BoE) along with supporting documents are submitted to multiple parties, including the Customs house, port authority and regulators like FSSAI, leading to delays in the clearance process
  - The proposed solution is to:
    - Develop a robust Electronic Signature (ES) module at the ICE GATE for submission of the hard copy
    - Activate all modules of ICE GATE, especially generating rotation numbers and port clearance
    - Make provisions for submitting documents online with access to all concerned authorities including different ministries, regulators and ICD operators. Eventually move towards a port community system, e.g., the HAROPA system developed by SOGET in France, with integrated access to shipping lines, port authorities, the marine department and Customs and traders
    - Ensure qualified and committed manpower and infrastructure with the Directorate General Systems (DGS) in the Central Board for Excise and Customs (CBEC) to ensure robust automation of Customs clearance procedures

- Long manual procedure for rectifying errors in filing EGM/IGM: In the current process, a physical application (hard copy) and the fee is submitted to the Customs department for any modification required (in various fields) to the EGM/IGM. The Customs department needs further verification from the port of landing after which the BoE has to be resubmitted. The proposed solution is to classify fields into sensitive and non-sensitive with the provision for modification of non-sensitive fields online, without any permission from Customs or the need for resubmission
- Submission of Form 13 at port gate: Currently, in ports where en-bloc movement has been identified, e.g., JNPT, Form 13 has to be submitted in the presence of a Container Freight Station (CFS) agent and the Customs officer for gate movement of goods. This leads to a congestion of up to six to eight hours at the gates. The proposed solution is to use OCR technology to avoid paper form submission while still allowing tracking of vehicles and containers in and out of ports
- Lack of a specialised clearance system for accredited importers/exporters: Accredited importers have to go through the regular method for movement of cargo until it reaches the CFS, after which they are able to clear the cargo through the Customs green channel procedure. Around 200 documents are required to become an accredited importer/exporter. The proposed solution is to:
  - Allocate a separate area within port premises to enable faster delivery of the cargo from accredited importers/exporters
  - Simplify the process of becoming an accredited player. For example, the history of trade, number of containers for import and export previously, etc., will be taken into account to register for factory stuffing and self-sealing of containers
- Limited resources not only for scanning the increased quantity of containers but also for providing factory stuffing to accredited importers/exporters. Going forward, ports could supplement the CBEC in providing the necessary scanning equipment according as per the CBEC's guidelines
- Same rules for checking coastal and EXIM cargo: In the current process, the Customs department treats coastal cargo in the same manner as EXIM cargo which is time consuming. Customs considers coastal cargo the least preference since it is considered to be unimportant. However, India is part of the World Customs Organisation, wherein coastal cargo is not subject to the same clearances as EXIM cargo. The Indian Customs Act also does not force coastal cargo to undergo the same scrutiny as EXIM cargo.
  - Going forward, coastal and EXIM cargo should not be subject to the same rules for scrutiny and preference. Benchmarking should also be done

based on international examples, such as the Port of Antwerp, where coastal and EXIM cargo are segregated in a manner similar to airports

Alignment and co-ordination between the stakeholders involved is critical for efficient Customs clearances of containers. Therefore, the immediate action plan involves creating working groups with representatives of key stakeholders, such as CBEC, port authorities, Ministry of Shipping, Indian Railways, CONCOR and other CTOs, and the Indian Port Rail Corporation Limited (IPRCL).

### **3.2 REFORMS AND CHANGES NEEDED IN THE COASTAL REGULATORY ZONE POLICY TO ESTABLISH CEZ**

The Ministry of Environment and Forests (MoEF) had issued the coastal regulation zone (CRZ) notification in 1991, which stipulated uniform regulations India’s coastline—including the 5,500 km mainland coastline and the 2,000 km of the islands of Andaman and Nicobar and Lakshadweep. The notification, however, did not take into account the biodiversity, hydrodynamic conditions, demographic patterns, natural resources, geo-morphological and geological features specific to various parts of the country. The objective of this notification was to provide comprehensive measures for the protection and conservation of India’s coastal environment.

This notification has been amended several times based on requests from NGOs, state bodies, ministries and other concerned agencies. In 2006, the MoEF tried to bring in a new legislative framework called the Coastal Management Zone (CMZ), which was heavily opposed by environmentalists as it seemed to contain a pro-industry–builder bias. Therefore, a new committee was set to consolidate all comments and amendments. A new comprehensive notification was issued by the MoEF in the 2011, in accordance with and based on the recommendations of the Dr Swaminathan committee. The objectives of the CRZ Notification 2011 are to:

- Ensure livelihood security for the fishing and other local communities living in the coastal areas
- Conserve and protect coastal stretches
- Promote development in a sustainable manner based on scientific principles, taking into account the dangers of natural hazards in the coastal areas and rise in sea levels due to global warming

<b>CRZ area specified</b>	<b>Permissible activities in CRZ area</b>
CRZ-I (ecologically sensitive areas— mangroves, corals, coral reefs, sand dunes, mudflaps, national parks,	1. Projects relating to the Department of Atomic Energy

<p>marine parks, sanctuaries, reserve forests, wildlife habitats, etc.)</p>	<ol style="list-style-type: none"> <li>2. Pipelines, conveying systems, transmission lines</li> <li>3. Installation of weather radars for monitoring cyclones by the IMD</li> <li>4. Trans-harbour sea links and roads on stilts/pillars allowing free flow of tidal water</li> <li>5. Development of the green field airport at Navi Mumbai (already approved)</li> <li>6. Activities permitted in the area between Low Tide Line and High Tide Line, which are not eco-sensitive, are: Exploration and extraction of natural gas, dispensaries, schools, public rain shelters, community toilets, bridges, roads, jetties, water supply, drainage, sewerage, salt harvesting by solar evaporation, desalination plants, storage of non-hazardous cargo like food grain, fertilisers and edible oil in notified ports</li> </ol>
<p>CRZ-II (areas which are developed up to or close to the shorelines falling within municipal limits)</p>	<ol style="list-style-type: none"> <li>1. Buildings are permissible on landward side of existing road</li> <li>2. Desalination plant</li> <li>3. Storage of non-hazardous cargo</li> </ol>
<p>CRZ-III (areas which are relatively undisturbed and do not fall in CRZ-I or CRZ-II)</p>	<ol style="list-style-type: none"> <li>1. The HTL has a no-development zone (0 to 200 m) wherein only some agriculture, horticulture, gardens, pastures, parks, playfields, forestry, projects of the Department of Atomic Energy, mining of rare minerals, salt manufacture from sea water, facilities for receipt, storage,</li> </ol>

	<p>regasification of petroleum products and LNG, and non-conventional power generation are permitted</p> <p>2. Between 200 and 500 m of the HTL, construction and repair of houses of local communities, tourism projects including construction of the green field airport at Navi Mumbai, facilities for receipt, storage, degasification of petroleum products and LNG, storage of non-hazardous cargo, desalination plants and non-conventional power generation activities are permitted</p>
CRZ-IV (water area from LTL up to territorial waters including area of tidal influenced water body)	<p>1. There is no restriction on traditional fishing and allied activities undertaken by local communities. However, no untreated sewage, effluents or solid wastes shall be let off or dumped in these areas.</p>

The CRZ Notification 2011 has some flexibility. As mentioned, 0 to 200 m area in CRZ-III is a No Development Zone (NDZ). However, in case of housing for coastal communities including fishermen, the NDZ has been reduced to 100 m. Hence, housing can be constructed in 100 to 200 m from the HTL along the sea front. Special provisions have been made for fishermen living in the coastal areas of Maharashtra, Goa, Kerala, the Sunderbans and other ecologically sensitive areas. The CRZ Notification 2011 has also brought up the concept of hazard line which will be demarcated by the MoEF, after a thorough survey of the country, taking into account tides, waves, sea-level rise and shoreline changes.

The notification also has some unfavourable aspects:

- Disallowing Special Economic Zone (SEZ) projects in the CRZ
- Reduction of NDZ from 200 to 100 m for traditional coastal communities may lead to increased construction on the coast and higher pressure on coastal resources

- No restrictions on expansion of housing for rural communities in CRZ-III

The MoEF also issued further amendments—drafted by the six-member committee headed by Shailesh Nayak, former Secretary, Ministry of Earth Sciences—presumably drawing from the report of the committee to review issues related to CRZ Notification 2011. One of the draft amendments related to ports and port-based facilities is dated 25.04.2016 (draft) – Permitted storage of Acetic Acid and Mono Ethylene Glycol in CRZ (Except CRZ-I).

### **Relevance of CRZ in for ports**

The Ministry of Shipping (MoS) has already initiated a number of proactive measures for development of ports, from the Sagarmala Programme to ambitious port-led development projects that involve setting up around 400 projects. Undertakings of this magnitude will be successful with the full support of private investments.

While these initiatives are expected to provide an encouraging response and improve the investment climate for ports and port-led developments, parallel measures are also required for providing an effective, efficient and transparent procedure for environment clearances and CRZ approval for ports and port-led development projects.

In the past 25 years, CRZ regulations have seen several shifts in their objectives and policies based on feedback and suggestions from the concerned communities and stakeholders. Based on the objective of sustainable development and in the interest of ports and port-led development, for supporting higher levels of international trade, the following aspects need to be re-evaluated:

- **Special economic zones (SEZs):** Development of port-based industries provides base cargo support for the volume of traffic. Internationally, most types of ports encourage development of value-adding business in the form of distriparks, bulk storage to repacking/distribution and vice versa, bunkering and other allied services. These shore-based developments provide essential support and services to the main business of the ports. Locating such value-added facilities and services in the SEZs is commercially more viable. Therefore, the condition of “Disallowing Special Economic Zone (SEZ) projects in the CRZ” in the CRZ Notification 2011 needs to be reviewed.
- **Shore-based warehousing/storage for bulk cargo:** For efficient cargo handling, every port needs to develop the back-up area and transit storage for dry and liquid (including gases) bulk cargo. As per the current CRZ regulations, only petroleum products, fertilisers, food grains and edible oils can be stored in the CRZ area of notified ports. All other import/export cargos need to be provided with transit storage facilities at a considerable distance from the ship-side. Long leads (distance between the ship and storage area) result in (i) lower productivity, (ii) additional capital expenditure (longer pipelines for liquid cargo and longer conveyors for bulk



cargo or additional trucks/dumpers in absence of conveyor), and (iii) additional operational expenses.

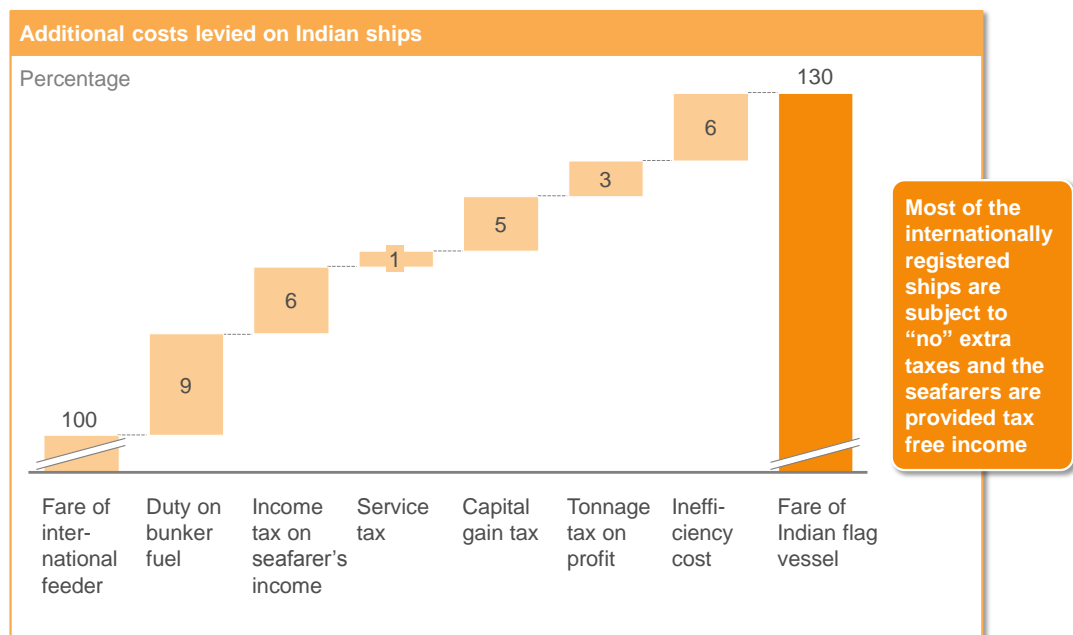
### 3.3 REFORMS AND CHANGES NEEDED IN CABOTAGE LAW

In India, cabotage is a statutory provision wherein ships plying entirely within the country need to be registered within the country for accessing cargo/freight generated in the country. Usually cabotage restriction is placed on flag carriers and not on ownership of the person/nationality. Indian ship owners may choose to register their vessels abroad or foreign vessel owners may choose to register in India. Often, many vessel owners choose to register their vessels in countries that have a favorable taxation regime—this is called “flag of convenience”. Certain countries have abolished cabotage whereas others continue to retain it.

Cabotage in India can significantly impact shipping costs (Exhibit 25). Domestic flag carriers are subject to taxation as per Indian law, which adds to shipping costs by roughly 30 per cent. Additional taxes like income tax on seafarer’s income, service tax and duty on bunker fuel, considerably affect the viability of coastal shipping since only domestic flag carriers, which carry transshipment or within India cargo, are subjected to taxation. On the other hand, foreign ships operate at lower costs because they do not have to pay extra taxes.

EXHIBIT 25

**E Cabotage law makes coastal shipping on Indian flag ships to be ~30% costlier than foreign flagged ships ...**



SOURCE: Expert interviews

Going forward, the shipping industry would prefer the exemption of certain vessels from cabotage, including:

- Special cargo vessels, e.g., RoRo, ODC, by the Indian National Shipowners' Association (INSA). These special cargo vessels are in short supply and their market demand remains unfulfilled as additional taxes increase shipping costs.
- Vessels carrying EXIM and empty containers (International Container Shipping Lines)—these will facilitate transshipment of containers at Indian ports
- Ports in Andhra Pradesh, Kerala and Gujarat (respective state governments) as the exemption will benefit non-major ports in these states

### **Concerns on relaxation of Cabotage**

If cabotage laws are relaxed in the country, Indian shipping companies could lose coastal container traffic to foreign lines because of their lower operating costs. Without cabotage, Indian shipping companies could choose to flag abroad, which will result in the loss of Indian tonnage, lower tax revenue to the government and reduced employment opportunities for Indian seafarers and free on-board training slots.

Though rates may reduce in the short term, cost to trade may increase due to monopolistic trade practices of foreign shipping lines once Indian liners stop operating.

### **Proposed policy changes**

The government has proposed an exemption period limited to five years for specialised vessels such as Ro-Ro, hybrid Ro-Ro, Ro-Pax, pure car carriers, pure car and truck carriers, LNG vessels and over-dimensional cargo or project cargo. Certain types of vessels and cargo will also be excused from extra taxes. These include specialised vessels handling EXIM and empty containers on the east coast between and including Kolkata and Chennai. Finally, additional taxes will not be levied on vessels carrying over 50 per cent containers bound for transshipment.

Other incentives will also be introduced to compensate the industry, including coastal berths scheme, another scheme for incentivising modal shift of cargo and exemption of duty on bunker fuel for domestic flag carriers.

## **3.4 REFORMS AND CHANGES NEEDED IN THE TARIFF AUTHORITY FOR MAJOR PORTS**

Tariff Authority for Major Ports (TAMP) was established in April 1997, through the Tariff Authority for Major Ports Act, to regulate tariffs at major ports. TAMP

regulations are not applicable to state ports, also known as minor or non-major ports. As seen in the given table, there have been varying tariff guidelines, as per TAMP, in 1998, 2005, 2008 and 2010. The year of setting up a terminal or berth determines the applicability of the guideline.

**A comparative assessment of TAMP guidelines:**

<b>Issues</b>	2005 guidelines <sup>6</sup>	rate2008 guidelines
<b>Applicability</b>	Terminals proposed before 26 February 2008	Terminals proposed after 26 February 2008
<b>Capital and operating costs</b>	<ul style="list-style-type: none"> <li>■ No norms for capital and operating costs for the cargo terminal</li> <li>■ Only reasonableness of the costs being checked by TAMP</li> </ul>	Norms for operating costs to be followed
<b>Tariff validity period</b>	<ul style="list-style-type: none"> <li>■ Tariffs to be set for a maximum period of three years</li> <li>■ Modalities of review are explicit—50% of credit for operational efficiency and 0% of credit</li> </ul>	<ul style="list-style-type: none"> <li>■ Tariffs to be reviewed after five years</li> <li>■ Contains reference to changed norms for tariff revision but modalities are not explicit</li> </ul>

<sup>6</sup> The basic principle of tariff fixation in both scenarios is: Annual Revenue Requirement (ARR) divided by Operating Capacity. ARR consists of operating costs, ROCE and depreciation.

	for (projected) traffic increase will accrue to the operator	
<b>Principle of tariff setting</b>	<ul style="list-style-type: none"> <li>■ 15% cap on ROCE</li> <li>■ Tariff finalised every three years based on the extant “capital employed”, i.e., after depreciation</li> </ul>	<ul style="list-style-type: none"> <li>■ 16% cap on ROCE</li> <li>■ ROCE based on “project cost”</li> </ul>
<b>Yearly tariff escalation</b>	No annual escalation allowed on tariff set	Annual escalation to the extent of 60% of WPI
<b>Tariffs for similar facilities at the same port being bid in the future</b>	New SOR to be finalised for each new terminal being bid out	Tariff fixed would apply to all terminals bid out subsequently in the same port for the next five years
<b>Operating capacity</b>	As per traffic forecast subject to a minimum of 60% of capacity	70% of capacity as per norms irrespective of traffic forecast/demand

The 1998 guidelines provided a normative cost plus 20 per cent return on equity (RoE). In the 2005 guidelines, the rate of return was modified to a 15 per cent pre-tax return on capital employed (RoCE). Capital employed was calculated as net fixed assets plus normative working capital. The main revision in the 2005 regulation was to eliminate the royalty quoted by a private operator in the cost calculations for RoCE purposes. For projects bid before July 2003, the revenue share or royalty, as quoted by the second highest bidder, was allowed as pass-through but the process has been discontinued since.

The 2008 guidelines were designed for PPP projects in major ports. Key changes included increase in RoCE from 15 to 16 per cent and a new “normative” basis for determining costs and traffic. Inflation indexation of tariffs was also allowed at 60 per cent of the wholesale price index (WPI). Until then tariff computations were based on estimates of the Port Trust or the private operator, who changed this to a normative assessment without any consideration for actual costs or traffic potential.

However, the role of TAMP needs to be re-examined in light of the following developments:

- In 2010, the MoS introduced a policy for preventing private sector monopoly in major ports. This policy limits the participation of private developer from bidding for another berth at a port where it already operates an existing berth handling the same cargo.
- The Competition Commission, set up in 2003, already has the mandate to look into anti-competitive behaviour and expressly covers protection of consumers and ensuring freedom of trade.
- The competitive landscape in ports has evolved significantly with a large number of private terminals in major ports and with numerous non-major ports (which are not regulated by TAMP)

Going forward, the MoS can leverage a number of potential solutions to liberalise the regulatory regime, by:

- Completely eliminating port-sector regulation and reviewing the role of TAMP
- Migrating all terminals in ports to a common tariff regime, possibly the latest regulations, and fix tariff ceilings for key commodities by port once and for all, with changes based only on inflation indexation thereafter.

In considering the above, there could be certain doubts on the fairness of the process, i.e., permitting terminal operators to avail higher tariffs when they bid with full knowledge of TAMP regulations.

Reworking the revenue share could help to address the problem at hand by placing terminal operators financially in the same position, based on the internal rate of return (IRR) from the project.

### **Concerns of port developers**

Investor uncertainty is engendered by frequent changes in the rules of the game, sometimes with retrospective effect. In 2005, the ROCE cap of 16 per cent less revenue share had not generated the acceptable level of returns. The inflation indexation was also not provided. In case of revision every three years, higher traffic will be factored into the operating capacity for the next review period and thus bring down the tariff. During this period, efficiency gains to the private sector was limited to 50 per cent.

The 2008 guidelines seem to be an improvement from the investor's viewpoint because the tariff in inflation is indexed at 60 per cent of WPI and a higher ROCE of 16 per cent is allowed. The five-year review period, instead of three years, means that investors are provided with a longer timeframe for benefiting from efficiencies and higher traffic. The basis for ROCE is "project cost", which does not change, instead of "capital employed", which will reduce by the depreciation amount. However, it is possible that this is an oversight that could be modified later.

However, developers felt that TAMP was restrictive because only the minimum guaranteed traffic (MGT) was taken into account for tariff computation. Even if the actual traffic is below MGT at the time of the bid, only MGT was considered and not the actual traffic. Furthermore, the revenue share was not considered for computing tariff.

Besides, the guidelines lack clarity on the consequences of growth in traffic and higher operational efficiencies after the first review. It is not clear whether this will be taken into account for computation of tariff or not.

The calculation of "Operating Capacity" is not related to the traffic forecast. This is beneficial to developers if the terminal operates at high capacity. However, new terminals will attain capacity over a period of time. In this context, the debt-servicing burden is also onerous.

The tariff set for any terminal at a port would be applicable for all terminals handling the cargo in the same port for five years. The investment in different terminals for same cargo could be varied and does not necessarily depend on volume alone.

Finally, the larger question is the competitiveness of major port operators versus non-major ports which have complete tariff flexibility.

While the new set of TAMP regulations are a significant improvement in terms of addressing the concerns of developers, the following issues still remain:

- Inconsistency in the tariff scenarios at major and minor ports.
- Inconsistency among major port terminals operating under various tariff guidelines

### **3.5 IMPACT OF GST ON PORTS AND THE SHIPPING INDUSTRY**

Good and service tax (GST) will be a dual tax system with parallel Central and state government levies—including State levy (SGST) and inter-State levy (IGST)—on the same transactions/services.

The higher tax may not seriously affect most B2B situations (except cash flow) as GST credit will be available. However, in B2B situations where credit is not

available for a variety of reasons, like outside GST, non-taxable, exempt, it will lead to higher costs due to GST credit leakage. Furthermore, petroleum products and power will be excluded from GST. Credit on inputs consumed in non-GST goods will be incompatible for credit.

For example, if a port handles both GST and non-GST items, unless the rules specifically allow GST credit, proportionate credit may be disallowed on input and input services consumed in non-GST goods. Currently, this credit is available.

There will be cascading effect on energy cost due to petroleum products and power which are outside GST. Petroleum is a key input in the shipping and logistics sector. This is because input tax credit on petroleum products may be unavailable for non-GST goods pushing up cost.

The rules relating to reverse charge mechanism must be carefully calibrated as it can lead to the credit build-up of un-utilisable credit as assesseees are compelled to pay tax on both input and output services.

Major activities associated with port services which will attract GST include:

- Agreements between Maritime Boards and the developer which could be based on one of these policies—BT (Build and Transfer), BLT (Build, Lease and Transfer), BOO (Build, Own and Operate), BOOT (Build, Own, Operate and Transfer, BTO (Build, Transfer and Operate), etc.
- Lease of land by the Maritime Board to the developer
- All kinds of services as spelt out in Chapter V of the Major Port Trust Act or Chapter V of the Indian Ports Act.

There should be no restriction on the utilisation of GST credit. This means any credit availed on an input service or capital goods, even if it is not used for providing the output service, should be allowed for utilisation. The condition that it should be used “in or in relation to the output service” should be done away with.

### **Services rendered by other service providers within the port**

Other services will also be provided at ports, such as inland road, rail and waterways transport, clearing and forwarding, material handling, loading and unloading, warehousing, containerisation, stevedoring, insurance, surveyor, literage, clearing, forwarding and chemical testing.

Currently these services, irrespective of the provider, are taxable by the service provider. The input credit is also available on the subject to the provisions of the CCR. The Model GST rules, i.e., CGST, SGST and IGST, seem to reflect approximately the same approach as in the CCR.

## **Shipping and logistics**

Customs IGST should be applicable only on vessels imported as “goods” and not to ocean-going vessels which enter India as “conveyance” regardless of whether they are Indian or foreign vessels. The current exemption u/n 12/2012 from Customs, CVD and SAD should be made applicable under GST covering CGST, SGST and IGST.

Consumption of goods on board the vessel which is “ship stores” should be treated as “export”. This is currently accepted by the Central Excise and Customs as export, but under VAT this is not considered as “export”. The definition of “export” and “import” should reflect in IGST law which applies to these transactions. Currently, the Model CGST Act defines “export” but is not mentioned in the Model IGST Act.

Zero rating of GST on export of goods and services (which will include ships) should be absolute. But this term is not defined in the Model IGST Act.

GST rules need to reflect the provisions currently available in the Central Excise and Customs rules and VAT relating to exports and foreign trade policy, including Services Export from India Scheme.

### **3.6 PORT LAND ALLOCATION POLICY FOR INDUSTRIAL DEVELOPMENT**

One of the important means of fast-tracking port-led industrialisation is to leverage port land for industrial use. Currently, in India, the highest bidder (H1) is offered the lease for industrial development. However, leading ports across the world allocate land based on the economic value added in terms of investments and jobs created.

This policy of selecting investors for industrial development on port land needs to be changed from a price-based evaluation to a more global model that considers project quality and community development. (Exhibit 26) The focus of the proposed policy should be on integrated and coastal community development to generate more cargo and also create more employment opportunities.



## EXHIBIT 26

### A point based mathematical system for investor selection is not practiced globally across ports

Parameter	Port of Antwerp	Singapore Port	Port of Dampier	Port of Hamburg	KIZAD, Abu Dhabi Port
Lease price payable	✗	✓	✓	✗	✗
Increase in cargo volume due to activity proposed	✓	✓	✓	✓	✓
Total planned investment/Built up area	✓	✓	✓	✗	✗
No. of employees proposed	✓	✓	✗	✓	✓
Environmental initiatives	✓	✗	✓	✓	✓
Economic returns to State	✗	✗	✓	✓	✗
Efficient use of space (Density of development)	✓	✗	✗	✗	✗
Transfer of expertise	✗	✓	✗	✗	✗
Social Infrastructure proposed	✗	✗	✓	✗	✗

✗ Not considered  
 ✓ Considered as primary  
 ✓ Present, but not a deal breaking criteria

Multiple parameters including the judgement on qualitative factors are used to allocated industrial port land

SOURCE: Expert Interviews, Port Authority Websites

### Criteria followed by international ports for selecting investors

A point-based mathematical system for investor selection is not practiced globally across ports. But international ports such as Antwerp, Singapore, Dampier, Hamburg and KIZAD (Abu Dhabi port) use a range of parameters—lease price payable, increase in cargo volume due to the proposed activity, total planned investment/built-up area, number of employees proposed, environmental initiatives, economic returns to the state, efficient use of space (density of development), transfer of expertise, and social infrastructure proposed—for selecting investors and allocating port land for industrial development.

For example, the port of Hamburg considers factors such as type of activity, returns to state, employment generation, value addition, and environmental initiatives, while evaluating an investment proposal for industrial sites. On the other hand, the port of Singapore considered price, total planned investment, employment generation, cargo volume generated, and transfer of expertise to select an investor for the processing plant in the oil and gas terminal. Unlike these two ports, employment generation is not one of the factors for selecting investors at the port of Dampier.

However, of the parameters mentioned, increase in cargo volume due to the proposed activity, total planned investment/built-up area and number of employees proposed, along with environmental initiatives are seen as the main criteria. Antwerp is considered to be the best example of a global port that effectively follows these criteria during the selection of investors.

The Antwerp Port Authority has very specific rules for selecting the concessionaire:

- Company's financial position: The potential concessionaire needs to have the necessary financial strength to complete the project
- The aim or the nature of activities: Projects that generate additional maritime traffic for the port are preferred
- Proposed investment amount
- Direct or indirect employment perspectives
- Optimum and efficient use of the available space
- Overall quality of the project
- Compliance with the strategy and vision of the concession policy: Maintain the homogeneity of the cargo a port handles as an industrial area and increase its competitiveness

The concession period is determined by the amount of investment proposed per built-up area and quality of infrastructure offered, with a market-linked concession fee (Exhibit 27)

EXHIBIT 27

**Concession period and fee in the Port of Antwerp are determined based on the proposed investment and quality of infrastructure offered**

Concession period is determined by the amount of investment per built up area proposed		
Investment work	Term (extension)	
▪ Investment $\geq$ 375 EUR/m <sup>2</sup> built-on area	▪ 40 years (5)	
▪ 225 EUR $\leq$ investment < 375 EUR/m <sup>2</sup> built-on area	▪ 35 years (5)	
▪ 175 EUR $\leq$ investment < 225 EUR/m <sup>2</sup> built-on area	▪ 30 years (5)	
▪ 150 EUR $\leq$ investment < 175 EUR/m <sup>2</sup> built-on area	▪ 25 years (5)	
▪ 125 EUR $\leq$ investment < 150 EUR/m <sup>2</sup> built-on area	▪ 20 years (5)	
▪ 100 EUR $\leq$ investment < 125 EUR/m <sup>2</sup> built-on area	▪ 15 years (5)	
▪ 25 EUR/m <sup>2</sup> $\leq$ investment < 100 EUR/m <sup>2</sup> built-on area	▪ 10 years (3)	
▪ 0 EUR/m <sup>2</sup> $\leq$ investment < 25 EUR/m <sup>2</sup> built-on area	▪ Quarter (0)	
Concession price for industrial land in the Port of Antwerp is fixed and uniform across sites, with a premium being charged only for quality of the site (paved vs. unpaved)		
Tariff 2016 (EUR/m <sup>2</sup> /year)		
Churchill Industrial Zone and Delwaide Development Zone, Port of Antwerp	Unpaved Site	Paved Site
▪ Processing and industrial companies	2.51	4.39

SOURCE: Port of Antwerp Authority Website

The concession price/fee for industrial land is fixed and uniform across sites, with a premium charged only for the quality of the site, i.e., paved vs. unpaved. For example, as per Tariff 2016, at the Churchill Industrial Zone and Delwaide Development Zone at Antwerp, the premium for processing and industrial companies is EUR 2.51/m<sup>2</sup>/year for unpaved sites and EUR 4.39/m<sup>2</sup>/year for paved sites. (Exhibit 28)

EXHIBIT 28

**Globally, ports lease industrial land for long periods, at market linked concession fee**

	Port of Antwerp	Port of Dampier	Abu Dhabi Port
<b>Concession Period</b>	▪ Linked to the proposed total investment per built up area	▪ Fixed, with a minimum of 10 years	▪ Fixed as per client requirement, minimum of 15 years
<b>Concession Fee</b>	▪ Market linked	▪ Market linked (determined by independent valuation)	▪ Market linked (annual benchmarking exercise is done)

SOURCE: Expert Interviews, Press Search

## **Proposed selection criteria for investors for industrial projects in India**

Based on the criteria followed by international ports, the selection criteria for investors needed for the industrial development of port land could include the total investment proposed, direct employment generated and environmental initiatives (no weightage in proposal) offered. The selection will be done on the basis of the weight awarded to a particular parameter:

- Incremental cargo volume generated is given 50 per cent weightage
- Five-year fixed assets investment: (a) Plant and machinery; (b) Building and Civil, is given 35 per cent weightage
- Direct employment generated, given 15 per cent weightage

In the proposed policy change, the concession fee or lease payment for land parcels in the industrial zone will be a fixed market-linked fee with no premium or bidding. The minimum rate will be benchmarked to current rates in the nearest industrial centre under a particular state industrial development corporation, e.g., SIPCOT and MIDC. Other factors to be considered for final land rates will include location in the industrial zone and present condition of the site.

## **IMPLEMENTATION OF ENVIRONMENT-FRIENDLY MEASURES TO CURTAIL POLLUTION FROM PORTS**

Ports are increasingly expected to implement solutions to mitigate the external negative spillover of emission. Port cities are strained by emissions from container ships and tankers that call at their ports and from emissions from storage and transshipment of bulk or dangerous materials at the ports.

Shipping emissions have considerable external costs in ports amounting to about EUR 12 bn per year in the 50 largest ports in the OECD for NO<sub>x</sub>, SO<sub>x</sub> and PM emissions, affecting the local population. To address this, a strong policy with stringent global regulation is required.

Meanwhile, ports are also increasingly pressed by environmental regulations from local and regional regulatory bodies to control, suppress and reduce particulate matter (PM) emissions from the handling and storage of dry bulk commodities. For example, the Chennai port has been banned from handling coal.

The Port of Rotterdam implements strict technical and behavioural measures facilitated by the EU and its environmental regulations (Exhibit 29).

EXHIBIT 29

**Port of Rotterdam implements strict technical and behavioral measures facilitated by EU and its environmental regulations**



**Background**

- **Biggest port in Europe**
- Has the **largest independent coal terminal in Europe**, EMO that can unload 175,000 tonnes of coal per day, is established on the Maasvlakte
- Started **expanding further with Maasvlakte 2** that opened its new harbors for business in 2013
- Due to the nature and size of activities that take place in the Port of Rotterdam and the hinterland, **Maasvlakte 2 has attracted stakeholders attention with regards to environmental aspects**
- Environmental organizations have taken legal action against the Port of Rotterdam Authority and EU requested the port of Rotterdam to provide **plans to limit the impact of Maasvlakte 2 on air quality**

“Sustainable development is something we now consider very seriously when making a decision. That is due to the stringent **European regulations governing environmental issues** and on the basis of our responsibility for the environment in which we work.”

*Hans Smits , Port Authority CEO*

**Measures taken against dry bulk air quality impact**

- In 2009, The Rijnmond (environmental protection agency) determined which **technical and behavioral measures** a company involved in dry bulk handling has to implement
  - 1 **Technical Measures**
    - To decrease the emission of transshipment and prevent dust emissions from the storage of dry bulk outdoors (ore, coal), include
      - Closed Transshipment
      - Use of Suction Filters
      - Surfaces are kept wet or are covered under a crust of cellulose or latex materials
  - 2 **Behavioral Codes**
    - Conditions for material handling with machinery are clearly described
    - Include factors such as the maximum wind speed under which handling is allowed to take place
- Additionally, **monitoring digital network** has been installed around the major dry bulk terminals **providing information when dust is emitted**

SOURCE: Port of Rotterdam; OECD

Similarly, multiple solutions are being implemented by ports globally to limit the impact of potentially hazardous coal dust on the environment and on human health. These solutions include Wet systems—fogging, Stockpile enclosure—additives, Stockpile enclosure—physical structures, Stockpile design, Covered transshipment, Surface wetting—surfactants, Dust suppression hoppers, Temperature, Wind speed and direction monitoring, and Coal dust monitoring.

1. **Wet systems—fogging:** This involves injecting micron-sized droplets of pressurised water into the air to suppress dust to the ground. It has already been implemented at the Newcastle Coal Infrastructure Group (NCIG) Coal Terminal, Australia. Its features are:

Application	Working System	Implementation
<ul style="list-style-type: none"> <li>■ Wharf-side reception hoppers</li> <li>■ Conveyor transfer points</li> </ul>	<ul style="list-style-type: none"> <li>■ Injecting very small droplets of pressurised water</li> </ul>	<ul style="list-style-type: none"> <li>■ Fast and straightforward</li> <li>■ Long-term solution that can provide good</li> </ul>

<ul style="list-style-type: none"> <li>■ Stockpile building</li> <li>■ Wagon loading</li> </ul>	<p>into the air during operational activities</p> <ul style="list-style-type: none"> <li>■ Coal dust particles adhere to the pressurised water droplets and accumulate until they become heavy and wet enough to fall or sink to the ground</li> <li>■ The pressurised water droplet size is important. Needs to be of similar size to the coal dust particle to suppress it</li> <li>■ Can also be used to prevent dust from crossing a boundary/perimeter but will be expensive</li> </ul>	<p>performance with regular maintenance required</p> <ul style="list-style-type: none"> <li>■ Requires additional investment to purify the toxic water</li> </ul>
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2. Stockpile enclosure—additives: Surface coverage formed using water mixed with additives to cover a stockpile. It has already been implemented at the EMO, EECV and EBS Coal Terminals at the Port of Rotterdam, Netherlands. Its features are:

Application	Working System	Implementation
<ul style="list-style-type: none"> <li>■ At coal terminals, stockpiles usually remain in the same position for a longer period of time</li> <li>■ Some piling shapes, while easier to build, can dry quickly in the wind and become airborne</li> </ul>	<ul style="list-style-type: none"> <li>■ A specially formulated additive, mixed with water, is prepared to be sprayed on the stockpile</li> <li>■ The sprayed agent agglomerates the dust into larger,</li> </ul>	<ul style="list-style-type: none"> <li>■ Requires considerably smaller expenditure compared to its benefit</li> </ul>

	<p>heavier particles on the stockpile</p> <ul style="list-style-type: none"> <li>■ The surface created will become highly resistant to the effects of winds due to its weight</li> <li>■ The shapes of the enclosures are largely dependent on the stockpile layout, which in turn is determined by the stacking and reclaiming systems</li> </ul>	
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3. Stockpile enclosure—physical structures: Surface coverage using physical structures of galvanised sheets to enclose the dust within. It has already been implemented at the Elk Run Coal Terminal at Boone County, West Virginia, the US. Its features are:

Application	Working System	Implementation
<ul style="list-style-type: none"> <li>■ At coal terminals, stockpiles usually remain in the same position for a longer period of time</li> <li>■ Physical enclosure helps to house stockpiles and support controlling, prevention and monitoring of fugitive coal dust emissions without affecting operation</li> </ul>	<ul style="list-style-type: none"> <li>■ Circular stockyards are common in the coal requiring dome type enclosures</li> <li>■ The enclosure structure can be fabricated or the modular geodesic dome, clad with galvanised sheeting can be used. Developments in vinyl and inflatable structures are also an option</li> </ul>	<ul style="list-style-type: none"> <li>■ Cost-effective, lightweight and easy to assemble, geodesic domes enclose more space without intrusive supporting columns</li> </ul>

	<ul style="list-style-type: none"> <li>■ The civil support for these structures is limited to a foundation and a low wall on which the structure is anchored</li> </ul>	
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4. Stockpile design: This involves applying stockpile designs that help to tightly pile bulk to prevent oxygen entering in-between openings of the stockpile. It has already been implemented at the EMO Coal Terminal at the Port of Rotterdam, Netherlands. Its features are:

Application	Working System	Implementation
<ul style="list-style-type: none"> <li>■ At coal terminals, stockpiles usually remain in the same position for a longer period of time</li> <li>■ Some piling shapes, while easier to build, can dry quickly in the wind and become airborne</li> </ul>	<ul style="list-style-type: none"> <li>■ EMO compacts the stored coal. Compacting means storage of layer by layer, where each layer will be rolled to prevent space for oxygen as much as possible</li> <li>■ The distribution of free gaseous oxygen in a stockpile (specially coal) creates self-heating within the stockpile forcing emissions that can negatively impact health</li> </ul>	<ul style="list-style-type: none"> <li>■ Dependent on the coal movement in and out of the storage area</li> <li>■ Involves low cost</li> </ul>

5. Covered transshipment: This involves covering conveyor belts and wagons using galvanised steel hoops to control the dust emission during transshipment. It has already been implemented at the EMO Coal Terminal at the Port of Rotterdam and OBA Coal Terminal at the Port of Amsterdam in Netherlands. Its feature are:



Application	Working System	Implementation
<ul style="list-style-type: none"> <li>■ Conveyor belts</li> <li>■ When material is being conveyed from one point to another, cross-winds over the conveyor can lift the dust</li> </ul>	<ul style="list-style-type: none"> <li>■ All belts need to be covered to avoid windborne dust and are kept clean by means of scrapers (e.g., EMO and EBS terminals in Rotterdam)</li> <li>■ The measures can be applied simply with galvanised steel hoops covers fitted over the conveyor belt</li> <li>■ The cover can be tailored for different conveyors. It can be completely enclosed, with one side access or with quick release side covers</li> <li>■ Similarly, train wagons and other modes of transshipping coal will be covered Z</li> </ul>	<ul style="list-style-type: none"> <li>■ Low installation cost</li> </ul>

6. Surface wetting—surfactants: This involves wetting the surface by sprinkling water to keep it wet and curtail dust emissions. It has already been implemented at the EMO Coal Terminal at the Port of Rotterdam, Port Kembla Coal Terminal in NSW, Australia and Mundra Coal Port, India. Its features are:

Application	Working System	Implementation
<ul style="list-style-type: none"> <li>■ Terminals also use trucks to spray coal</li> </ul>	<ul style="list-style-type: none"> <li>■ Water is sprinkled on the ground by using a</li> </ul>	<ul style="list-style-type: none"> <li>■ The volume of water required can be</li> </ul>

<p>terminals roadways and stockpiles with water to dampen the dust on the ground</p> <ul style="list-style-type: none"> <li>■ It is mostly applied where regular vehicle movements stir up dust regularly</li> </ul>	<p>sprinkler system or trucks</p> <ul style="list-style-type: none"> <li>■ Works in a similar way as in fogging but usually fails to capture coal dust particle</li> <li>■ It uses more water than a fogging system—typically 10 times the amount</li> <li>■ The use of surfactants and chemical wetting agents can halve the number of times that a surface has to be treated</li> </ul>	<p>significant, causing drainage and run-off treatment problems</p> <ul style="list-style-type: none"> <li>■ Irrigation might be required systems can be used to control dust on outdoor stockpiles</li> </ul>
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7. Dust suppression hoppers: Use of machines to produce powerful blower with specialised nozzle that creates water droplets to take dust down to the ground. It has already been implemented at the AES Hawaii Power Plant, Oahu, Hawaii and GD power development, Shanghai, China. Its features are:

Application	Working System	Implementation
<ul style="list-style-type: none"> <li>■ Dust suppression hoppers can be used wherever large-scale dust emissions occur, for instance at construction sites in the demolition of buildings, in tunnel construction or in surface mining and quarrying (open pit mining, quarries,</li> </ul>	<ul style="list-style-type: none"> <li>■ The nozzles are tailored to the specific requirement, depending on the type and size of the dust particles—to bind the various types of dust most effectively</li> <li>■ The powerful blower, combined with the special nozzle pattern, enables</li> </ul>	<ul style="list-style-type: none"> <li>■ Can be integrated easily with other means of dust suppression methods</li> <li>■ Involves substantial capital cost</li> </ul>

gravel pits and stone-crushing works)	water output for a longer distance	
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8. Temperature, wind speed and direction monitoring: Air-quality monitoring tools help to provide real-time operational guidance and tips when dust concentration is high. It has already been implemented at the Newcastle Coal Infrastructure Group (NCIG), Carrington Terminal and Kooragang Island Terminal in Australia and Port of Rotterdam in the Netherlands. Its features are:

Application	Working System	Implementation
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9. Coal dust monitoring: An appropriate coal dust monitoring system needs to be in place to implement effective coal dust suppression methods, such as those in at the Ridley Coal Terminal in Australia, Port of Rotterdam and Port of Amsterdam in Netherlands. Its features are:

Application	Working System	Implementation
<ul style="list-style-type: none"> <li>■ Provides the necessary information on the concentration of dust particles in the air. This will initiate the necessary actions required to limit the concentration below the regulation set</li> </ul>	<ul style="list-style-type: none"> <li>■ Fully integrated and networked equipment monitoring for total suspended particles which captures all particle sizes from the large to very small</li> <li>■ Coal ports/terminals install nephelometer for measuring PM10 particulates and a fully integrated weather station to measure wind speed</li> </ul>	<ul style="list-style-type: none"> <li>■ Can be implemented relatively easy with low to moderate cost</li> </ul>

	and direction, liquid precipitation, barometric pressure, air temperature and relative humidity	
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## **EFFECTS OF CLIMATE CHANGE ON PORTS AND SHIPPING**

There is a complex relationship between climate change and shipping. It can be considered from the point of view of what the maritime industry contributes toward climate change and any mitigation and adaptation that can be achieved with respect to the impact. Alternatively, the relationship can be considered in terms of how climate change impacts on the maritime industry, e.g. Extreme weather events, erosion of coastal infrastructure and opening of new sea routes.

Ships and ports operate in two distinct but interrelated sectors. The regimes which are present to control emissions in each sector are different.

### **Next steps to curtail effects of climate change on shipping:**

The threat of global warming through climate change has its impact on ship and engine designers. Many conceptual designs and ideas are being developed which could be used to reduce or eliminate the need to use fossil fuels as a primary power source for ships. Some of the more recent design

Ideas include:

- Supplementary wind power
- New fuels
- Economies of Scale
- New routes

Ship designs and primary power plants continue to be developed to reduce carbon emissions. A fossil fuel free cargo ship design and model was tested in 2012 and found economically viable for specific routes. Fossil fuels predominantly power ships, In the future, the foreseeable increase in demand for ships will create an increase in green-house gas (GHG) emissions.

Shipping company AP Moller-Maersk recently won the sustainable shipping operator of the year award by the Petromedia Group. It was praised for the way it challenged conventional wisdom by proving that container ships can save fuel by sailing much slower than traditionally recommended. By halving its top cruising speed over the last two years, Maersk has cut fuel consumption on major routes by as much as 30 percent, greatly reducing costs and achieving an equal cut in the ships emissions of greenhouse gases.

## 4. An enabling environment to attract investors for port-led development projects

Port-led industrialisation is the third pillar of the port-led development model. Ports play a crucial role in reducing domestic logistic costs and facilitating EXIM-oriented manufacturing by reducing logistics time and variability. Many countries with large coastlines like China have leveraged ports for aiding industrialisation.

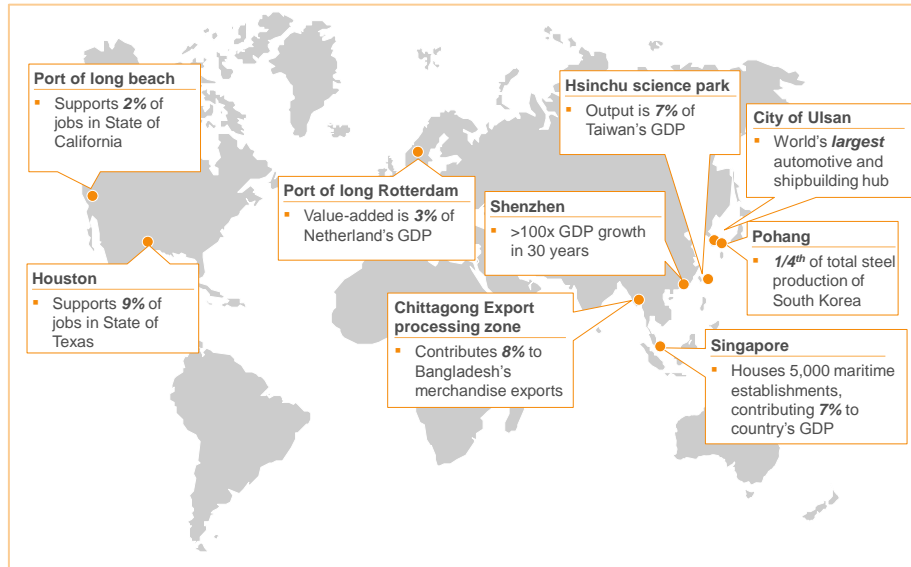
Ports create significant economic payoffs for their city and state—they help to generate jobs, add value, mobilise new investment, bring in tax revenues and support trade by reducing logistics costs (Exhibit 30). One tonne of port throughput is associated with a value addition of USD 100, and a 1 mn tonne increase in port throughput is associated with 300 new jobs being created in the port region in the short term<sup>7</sup>.

Many countries with long coastlines have leveraged ports for supporting industrial growth. Some examples of success stories include the refinery and petrochemical complex in Rotterdam, the steel cluster in Pohang and the electronics manufacturing cluster in Shenzhen.

<sup>7</sup> Based on The Competitiveness of Global Port Cities: Synthesis Report by OECD

EXHIBIT 23

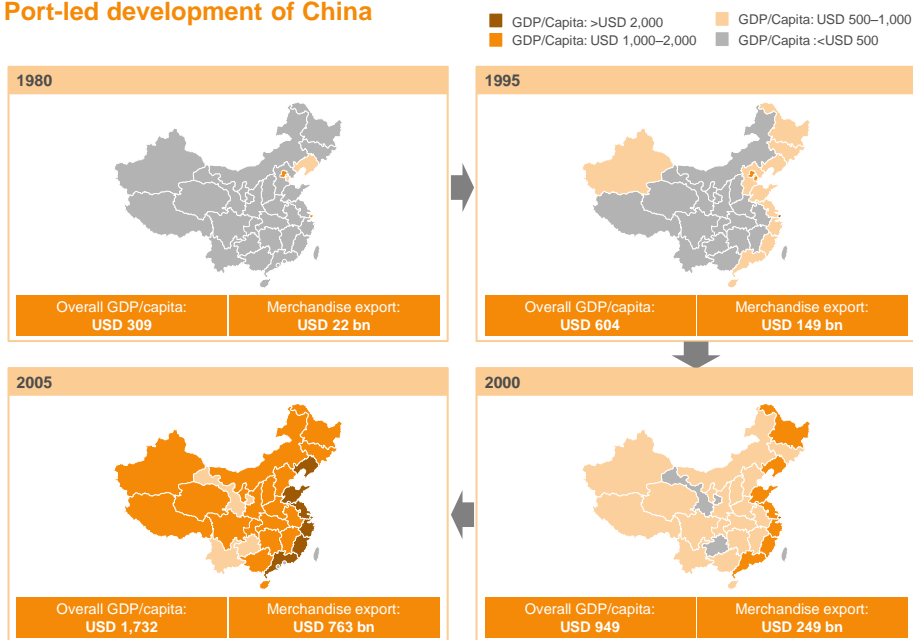
Globally, ports have had a significant economic impact



Countries with long coastlines have successfully used ports and maritime sectors to usher in broader economic development and improve the living standards of their people. China and the US, for example, leverage their coastlines to effectively boost export manufacturing, leading to economic prosperity for their countries. (Exhibit 31)

EXHIBIT 24

Port-led development of China






## LEARNINGS FROM INDUSTRIALISATION IN CHINA

### 4.1 LEARNINGS FROM SHENZHEN

The Shenzhen Export Processing Zone or SEZ is a special closed area in Shenzhen city, supervised by the Customs department with the approval of the State Council. Set up in 1980, it was the first SEZ in the country (Exhibits 32).

#### EXHIBIT 25

##### Overview of Shenzhen

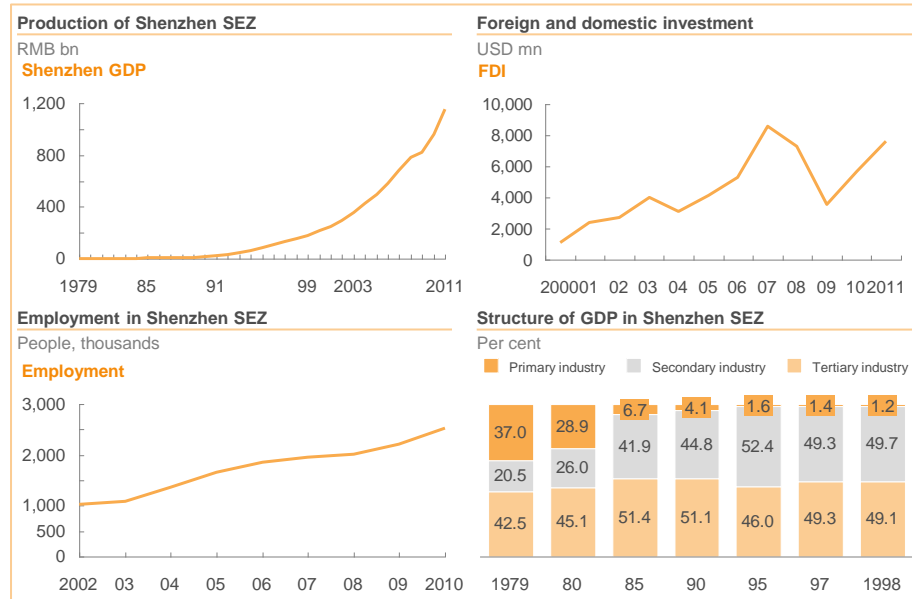
Key facts and figures	Competitiveness of Shenzhen	
<ul style="list-style-type: none"> <li>▪ <b>Location:</b> Shenzhen, China</li> <li>▪ <b>Established:</b> 1980</li> <li>▪ <b>Land area:</b> 2,000 sq.km</li> <li>▪ <b>Population:</b> 10.6 mn (2013)</li> <li>▪ <b>SEZ area:</b> 400 sq.km (benefits extended to whole city post 2010)</li> <li>▪ <b>No. of units:</b> 6,500 large-scale enterprises (&gt;20 mn revenue), 59,000 small &amp; micro entities</li> <li>▪ <b>No. of workers in manufacturing:</b> 4 million</li> <li>▪ <b>Sector focus:</b> Computer software, IT, microelectronics and components, High Tech and medical instruments, etc.</li> <li>▪ <b>Industrial zones:</b> Many industrial zones (1 to 5 sq km) within Shenzhen, each dedicated to an industry</li> </ul>	<b>Geography</b> 	<b>Shares a common border with Hong Kong:</b> Serves as a cost-efficient alternative for manufacturers
	<b>Infrastructure</b> 	<b>Owns seaports, airport and land ports</b> <ul style="list-style-type: none"> <li>▪ Expressways link Hong Kong, Shenzhen and inland cities</li> <li>▪ Connected via multiple inland waterways             <ul style="list-style-type: none"> <li>– Seaports – 9</li> <li>– Airports – 1</li> <li>– Railway – 3,200 km</li> <li>– Metro – 2 lines</li> <li>– Road – 1,600 km</li> </ul> </li> </ul>
	<b>Talent</b> 	<b>Strong coverage and supply of talent</b> <ul style="list-style-type: none"> <li>▪ 3,800 state-level high-tech enterprises</li> <li>▪ 1,313 preschool institutions</li> <li>▪ 335 primary schools</li> <li>▪ 10 full-time and one part-time institute for higher education</li> </ul>

### Developing Shenzhen SEZ

Between 1980 and 1986, infrastructure and service facilities were developed in the Shenzhen SEZ. Construction also doubled in this period. There were reforms in capital raising, pricing, finance and investment, and wages and employment systems. In the years between 1986 and 1992, the SEZ pursued an export-oriented and an open-door policy. State-owned enterprises and systems were created during this time. Hong Kong accounted for 66 per cent of the overall FDI in Shenzhen. In the next few years until 2010, the SEZ established and consolidated its investment environment and upgraded the economic development model. The value of exports increased from USD 900 mn in 1978–79 to USD 101,518 mn in 2005. Exhibit 33 shows how Shenzhen impacted China's national economy, especially through FDI.

EXHIBIT 26

**Shenzhen had a substantial impact on China's national economy**

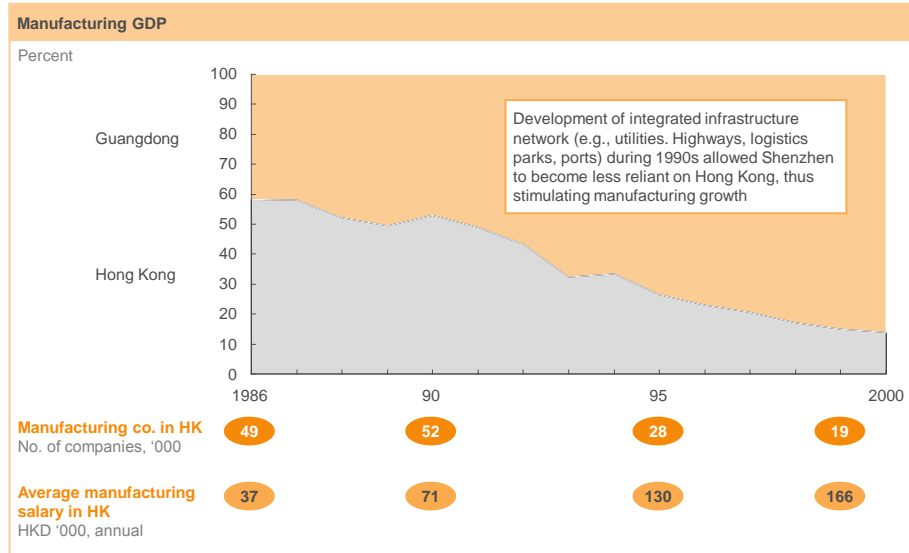


The development of an integrated infrastructure network, e.g., utilities, highways, logistics parks and ports, during the 1990s, allowed Shenzhen to become less reliant on Hong Kong and encourage manufacturing growth. The Hong Kong–Guangdong manufacturing shift seems to indicate that shifts can be gradual, while the Taiwan and mainland China shift in the 1990s indicates a precedent for step change (Exhibits 34 and 35).



## EXHIBIT 27

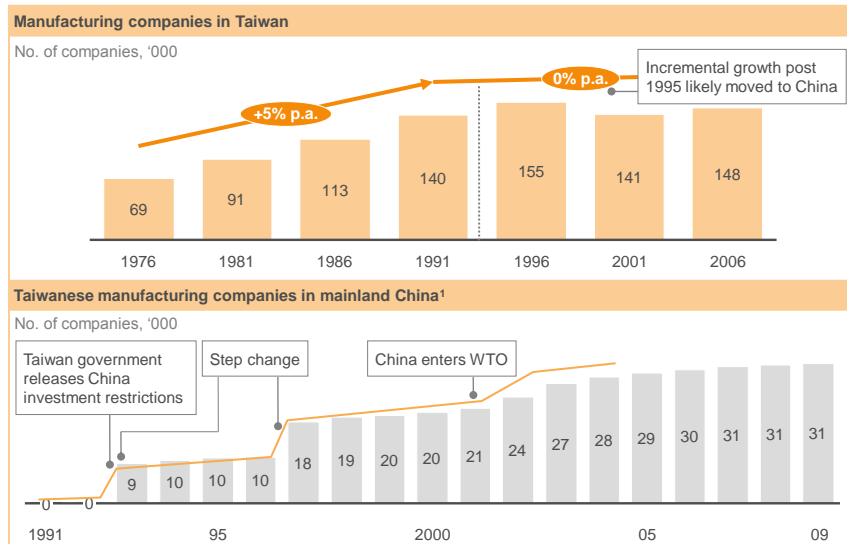
### Hong Kong Guangdong manufacturing shift



SOURCE: CEIC; Hong Kong Census and Statistics Department; team analysis

## EXHIBIT 28

### Taiwan-mainland China shift in manufacturing



<sup>1</sup> No. of applications as proxy

SOURCE: Directorate-General of Budget, Accounting and Statistics

## **Governance model of Shenzhen SEZ**

In Shenzhen, a professionalised state-owned enterprise was responsible for developing, operating and promoting the SEZ.

- Governance structure:
  - Municipal government established with relative independence for local planning
  - Local government had direct access to planning units at the provincial and central level
  - One-stop shop provided a single interface to investors; key transfers, like land, approved at the central or provincial government level
  - Shenzhen investment promotion bureau set up at the SEZ government for high-level promotional activities
- Zone services and fees:
  - State-owned enterprise responsible for zone infrastructure development and operations
  - Type of services offered by zone operator determined by Shenzhen SEZ industrial strategy
  - Co-ordinated promotion at the level of central and local governments and at zone level

At the provincial level, the Guangdong Provincial Administration of Special Economic Zones (GPASEZ) supervised the administration and co-ordination of Shenzhen SEZ. Assisted by the Guangdong Provincial Special Economic Zone Development Company, the GPASEZ dealt directly with the SEZ, independent of the pre-existing Guangdong administration, and was responsible for:

- Drawing up development plans and organising their implementation
- Examining and approving investment projects of investors
- Handling registration of industrial and commercial enterprises and land allotment
- Co-ordinating working relations among different departments, such as banking, insurance, taxation and customs; providing enterprises with staff members and workers, and protecting the legitimate rights and interests of these workers
- Establishing educational, cultural, health and various public welfare institutions
- Maintaining law and order

The Shenzhen SEZ Development Company was also responsible for locating appropriate Chinese partners for JVs and attracting Chinese capital for investment. The company worked together with the municipality, which looked

after the legal aspects of development and oversaw the general planning of the zone.

The Shenzhen Municipal authority has authorities within the SEZ, instead of the GPC. Since 1992, Shenzhen Municipal has managed the SEZ.

Exhibits 36 and 37 highlight different activities along with the departments or operators responsible for these under the governance structure.

**EXHIBIT 29**

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**Shenzhen – Governance model**

Stages	Activities	Responsibility
Zone set up	National zones strategy	▪ Shenzhen Municipal People's Government
	Setting up new entities	▪ The Shenzhen Municipal industrial and commercial administration department
	Provide land	▪ Shenzhen Municipal People's Government
	Partner selection	▪ Zones Corp
	Partner coordination and master planning	▪ Zones Corp
	In-zone infrastructure planning	▪ Shenzhen City People's Government
	Infrastructure development (standard)	▪ Shenzhen City People's Government
	Infrastructure financing for large projects	▪ The Municipal Government
	Infrastructure development large projects	▪ Shenzhen City People's Government
	Country marketing (parallel)	▪ The Administrative Department of Industry and Commerce of Shenzhen Municipality
	Anchor tenant attraction	▪ Zones Corporation
	Other tenant attraction	▪ Private sector operator

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### Shenzhen – Governance model

Stages	Activities	Responsibility
Zone operations	Provide services to tenants	▪ Private sector operator
	One-stop shop	▪ Zones Corp
	Improve doing business	▪ Investment Promotion Agency
	Financing – facilitation	▪ The Municipal Government
	Financing – provision	▪ The Municipal Government
	Logistics	▪ Private sector logistics company
	Other services	▪ Other private sector companies
	Daily zone operations	▪ The Municipal Government
	Steer zone strategically	▪ Zones Corporation

### Macro-level regulations in Shenzhen

- Regulations on Special Economic Zones in Guangdong Province, the Standing Committee of the National People’s Congress, Guangdong Provincial Committee, 1980: The purpose of this regulation:
  - In order to develop economic cooperation and technical exchanges with foreign countries and to promote the socialist modernisation programme, certain areas shall be delineated respectively in the three cities of Shenzhen, Zhuhai and Shantou in Guangdong Province for the establishment of special economic zones (hereinafter referred to as “special zones”).
    - Through this regulation, enterprises and individuals in the special zones must abide by the laws, decrees and pertinent provisions of the People’s Republic of China. Where there are specific provisions in these regulations, they shall be observed accordingly
    - A Guangdong Provincial Committee for the Administration of Special Economic Zones shall be set up to exercise unified administration of the special zones on behalf of the Guangdong Provincial People’s Government
    - Investors may open accounts and conduct their foreign exchange transactions with the Bank of China established in the special zones or with other banks established there with the approval of the Chinese side
    - Investors may operate their enterprises independently in the special zones and employ foreign personnel for technical and managerial work

- Regulations on Special Economic Zones in Guangdong Province, the Standing Committee of the National People’s Congress, Guangdong Provincial Committee: The main purpose was to allot land to investors at a reasonable rate. Land use rights came into the country quite late as compared to the US. There is absolutely no private ownership of land in China. The State owns land exclusively in urban areas and agricultural collectives own land in the countryside.
- Land Administration Law of the People’s Republic of China, the State Council, State Authorities, State Government: This Law is enacted in accordance with the Constitution for the purpose of strengthening land administration, maintaining the socialist public ownership of land, protecting and developing land resources, making rational use of land, effectively protecting cultivated land and promoting sustainable development of the society and the economy.
  - Ownership by the whole people means that the right of ownership in State-owned land is exercised by the State Council on behalf of the State
  - No units or individuals may encroach on land or illegally transfer it through buying, selling or other means. However, the right to the use of land may be transferred in accordance with law
  - The State applies a system of control over the purposes of use of land
  - The land administration department under the State Council shall be in charge of unified administration of and supervision over the land throughout the country

### **Micro-level regulations in Shenzhen**

- Regulations of the Shenzhen Special Economic Zone on Land Management, the Shenzhen Municipal People’s Government: These regulations were formulated in accordance with the Law of the People’s Republic of China on Land Management and other relevant laws in order to improve the management of land in the Shenzhen Special Economic Zone (hereinafter referred to as the “Special Zone”), to exploit the resources of the land and to implement rational utilisation of the land.
  - The Special Zone shall practice a system of compensatory usage and compensatory assignment of State-owned land
  - Municipal Government should be responsible for the uniform management of all areas of land, mineral reserves, waterways, mountain forest and other natural resources
  - A land user unit or individual shall only have the right of use of its allotted piece of State-owned land and shall not be authorised to alter the purpose of usage of the land without approval

- Regulations of the Shenzhen Special Economic Zone concerning the management of commodity house property, the Shenzhen City People's Government: The present regulations are formulated in line with relevant laws and decrees of the People's Republic of China and the "Regulations Concerning the Special Economic Zones in Guangdong Province", in order to strengthen the management of commodity house property in the Shenzhen Special Economic Zone and protect the legitimate rights and interests of house property managers and householders.
  - The Shenzhen City People's Government encourages overseas firms to engage in house property management (e.g., construction, sales and renting of houses) in the Shenzhen Special Economic Zone independently or jointly with state-owned enterprises authorised by the Shenzhen City People's Government to manage house property. Overseas firms are encouraged to buy house property. The Shenzhen City People's Government shall allow the people to transfer their house property rights to others.

## **INCENTIVES TO ATTRACT INVESTORS**

China provides numerous incentives—economic or tax, labour, administrative, market—to attract investors for FDI.

- Economic or tax incentives include access to tax breaks, free or low duties on imported equipment and production materials, free or low-rent business accommodation as well as depreciation allowances
- Labour incentives offer flexibility in employing workers. Foreigners working within the SEZ are given residence and work permits as well as income tax exemptions. A labour services company provides manufacturers with ideal candidates as employees
- Administrative incentives help in streamlining the administrative process for business registration. These also provide investment and financial consultation
- Market incentives also negotiate the limited access to domestic Chinese markets for goods produced within SEZs

Incentives for investors are further categorised into hard and soft incentives. Hard incentives include:

- Economic/tax: Shenzhen offers a company tax rate of 15 per cent compared to the 30 per cent in rest of China. For enterprises whose export value is more than 70 per cent of total product value, it provides tax exemption on remitted profits. It also exempts exports and imports from custom duties

- Labour/labour laws: Wages set by the market are free from the rigid Chinese centralised wage-setting system. It also involves less bureaucracy and red-tapism
- Location/infrastructure: Shenzhen is the only SEZ to own seaports, airport and land ports in China. With 797 post offices, Shenzhen functions as the centre for express mail on the southern mainland. It also has a developed telecommunications system, with around 5 mn fixed telephone users, 25.5 mn mobile users 4.3 mn broadband users in 2013

Soft incentives include:

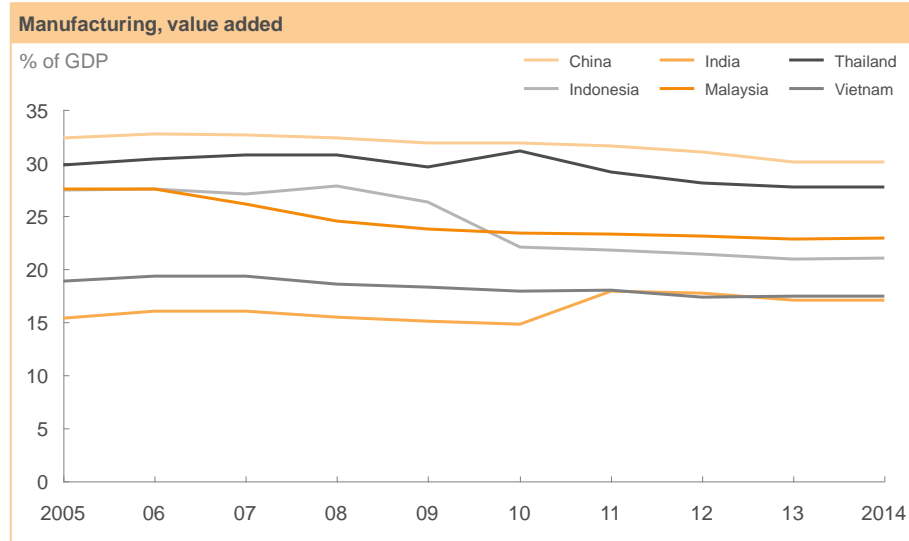
- Livability readiness: Shenzhen ranks 14 in the overall living standards index, out of 207 cities. It has an efficient government service system and an advanced information network. It provides easy access to residential accommodation, healthcare, shopping and entertainment services. It has a “special passage” for the convenience of passengers to and from Hong Kong and Macau. Cars with Hong Kong license plates have easy access to the special zone. Foreigners who have investment or residential housing in Shenzhen can apply for multiple entry visas
- Administration: Shenzhen SEZ can approve investments below 100 mn Yuan. Investments need to be under 30 mn Yuan for light industries and under 50 mn Yuan for heavy industries. The SEZ is also authorised to approve applications by Chinese citizens who wish to travel abroad
- Financial stability: Qianhai in Shenzhen will allow for China’s Yuan liberalisation and financial reforms and reduce financial and trade restrictions, with cross-border interbank Yuan lending and customs integration as the key areas in need of further reforms

## **PORT-LED INDUSTRIALISATION IN INDIA**

India's economic growth over the past decades was a result of the dynamism in its service sector, while the manufacturing sector remained stagnant, contrary to many developed global economies including China. In these nations, a robust manufacturing sector led to growth. The Indian manufacturing sector’s contribution to GDP has become stagnant at 17 per cent, which is lower than the corresponding share in economies such as China, Thailand and Malaysia (Exhibit 38).

EXHIBIT 31

**Manufacturing sector contribution to GDP in India has lagged other economies in the region**

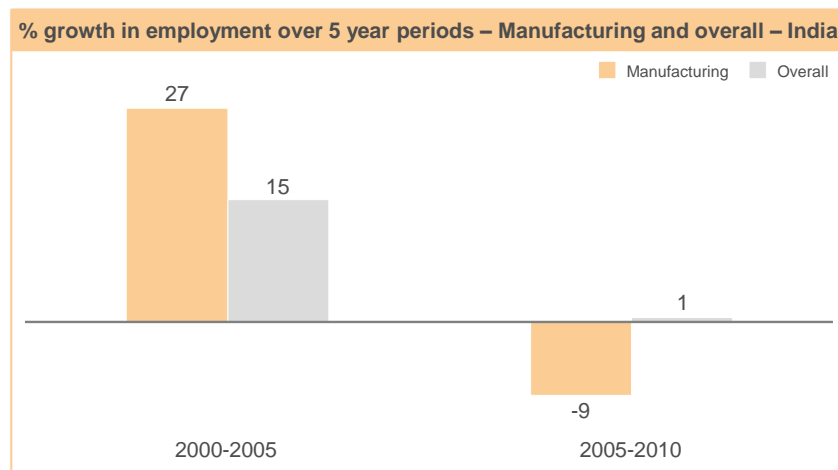


SOURCE: World Bank World Development Indicators

The relatively lower contribution from the manufacturing sector has meant that employment growth in India has failed to keep pace with the economic growth (Exhibit 39).

EXHIBIT 32

**Growth in employment generation in India is strongly correlated to growth in manufacturing sector employment growth**



SOURCE: Twelfth Five Year Plan (2012–2017) Economic Sectors Volume II, Planning Commission, Government of India

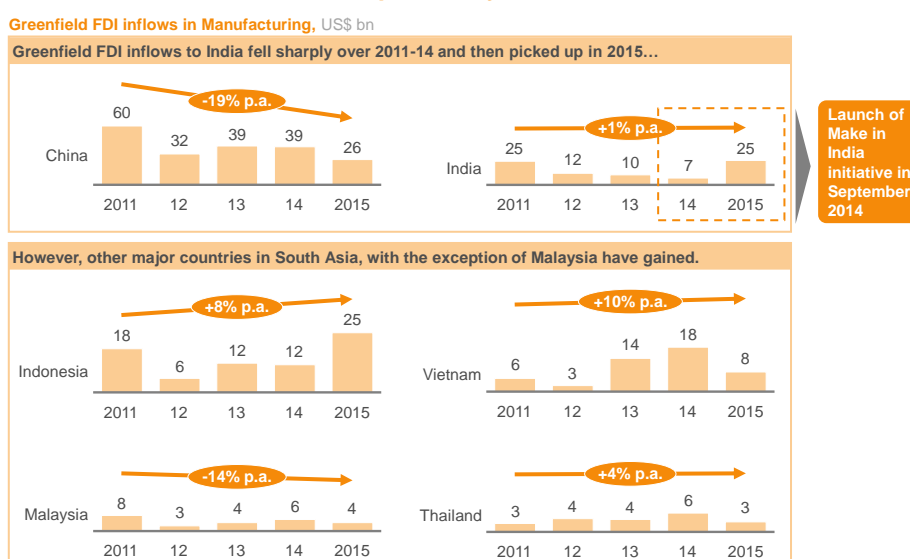


Results of an analysis estimates that if India’s manufacturing sector realised its full potential, it could generate 25 to 30 percent of GDP by 2025, propelling the country into the manufacturing big leagues, along with China, Germany, Japan, and the US. Along the way, India could create 60 to 90 mn new manufacturing jobs and become an attractive investment destination for multinational companies and its own entrepreneurs.

India has also not been able to capture investments moving away from China. Some Southeast Asian countries have been able to capture those by offering attractive incentives (Exhibit 40).

## EXHIBIT 33

### However, India has not been able to gain from reduced manufacturing investments in China over the past few years



SOURCE: Dealogic, Team Analysis

## 4.2 CHALLENGES IN DEVELOPING INDUSTRIAL ZONES IN INDIA

India has made several attempts to develop industrial zones and corridors with moderate success. Reviewing past initiatives and drawing relevant learnings seems to be a good starting point for the proposed CEZs.

### Export processing zones

India’s experiment with industrial zones commenced with the Export Processing Zones (EPZs) set up in 1965. These state-driven projects, like SEEPZ, MEPZ, were fairly successful but lacked the scale to deliver large-scale employment and investment impact. For example, SEEPZ stands at only 110 acres in comparison with the 10,000 acres for SEZs in China.

## **Special economic zones**

A more ambitious experiment was the Special Economic Zones Act of 2005. The Act envisaged a private-led development with a scale of 2500 acres and above. However, industry-focused zones could be at a smaller scale of around 25 acres.

But the SEZ Act failed to completely fulfil expectations. Most of the SEZs created since the Act are IT SEZs of less than 100 and were set up with the objective of availing tax incentives. Recently, however, a number of non-IT SEZs with reasonable scale have come up, e.g., Mundra SEZ and Mahindra World City SEZs at Chennai and Jaipur.

Reasons affecting the potential of SEZs include:

- The private sector-led development model was not wholly effective since financial returns from building industrial infrastructure are fairly low and the capital required is substantial. To some extent this was mitigated by the opportunity to develop real estate in the Non-Processing Area (50 per cent) of the zone. However, this upside was significantly limited by the restrictions on selling units—space can only be leased under the SEZ Act—and subsequent erosion of tax breaks.
- Attractive tax breaks offered to developers of SEZs were mostly rolled back. The 2011 Budget which imposed Minimum Alternate Tax on SEZs effectively led to the loss developer interest in the sector.
- The economic recession of 2008 came at an inopportune moment. In particular, the adverse impact of the recession on real estate destroyed the economics of many SEZ business plans.
- The SEZ Act in its final form scaled back many of the administrative provisions of the initial drafts, which would have facilitated a higher ease of doing business. These provisions included a more investment-friendly labour regime, exchange-rate convertibility, exemptions from state-government levies and repatriation of profits.

## **Industrial corridors projects**

The government in collaboration with the Ministry of Commerce launched the Delhi–Mumbai Industrial Corridor (DMIC) project in 2007. It follows the public-sector model for development with substantial funding support. Individual components of the project could be taken up on PPP basis. DMIC projects are along the alignment of the proposed Dedicated Freight Corridor (DFC) between Delhi and Mumbai which is currently under construction.

Seven early bird projects have been identified for initial development. Similar projects have been planned for other DFCs including the Amristsar–Delhi Industrial Corridor, Vizag–Chennai Industrial Corridor, Chennai–Bangalore Industrial Corridor and the Bangalore–Mumbai Economic Corridor.

The industrial corridor projects amend some of the shortcomings of the approaches followed earlier by (a) Adopting a public sector–led approach; and (b) Envisaging significantly larger scale as compared to previous industrial infrastructure projects.

While the industrial corridor projects have been making good progress, some of the development considerations may be worth noting.

### **Lessons learnt**

Based on the lessons learnt from past experience and the overall context of port-led development, the following key enablers could be considered for effective development of CEZs and CEUs.

- Integrate manufacturing locations with social and connectivity infrastructure:
  - Access to land, skills, social facilities, urbanisation and an industrial base is important to gain momentum quickly. Most successful programmes kick off with “pilot” CEU equivalents in established manufacturing areas, with existing, large container ports where land is available. For example, Shenzhen’s proximity to Hong Kong helped attract manufacturers from the region, giving it a strong start.
  - CEUs will be set apart by their strong integration with ports. The master plan of the CEU could fully integrate it with the port through a seamless physical connectivity and also through documentation and IT systems. For example, the CEU could be a part of the Port Community System, with Customs Bonded status similar to SEZs, CFS’ and ICDs.
  - An integrated master plan, which includes external infrastructure and port connectivity, needs to be developed for each CEU. The master plan could provide for urban access and world-class social infrastructure to enable expatriate talent flow.
- Create land banks and leverage existing land parcels:
  - Land acquisition is easier for around 500 to 1000 acres; this needs to be balanced with the minimum scale for identified industry clusters.
  - States can be incentivised to acquire land through a Challenge Fund wherein the Centre makes equity contributions to eligible projects and individual states contribute land as equity.
  - Existing land banks with central, state and private sectors can be leveraged to circumvent the time-consuming process of land acquisition.
- Offer special administrative dispensation:
  - Based on benchmarking with Chinese and other SEZs, a special dispensation could be created for approved CEUs under each CEZ that result in “Ease of Doing Business” metrics, comparable with world class standards. Some critical elements include approval and clearance







processes, inspections, labour regulations, fiscal incentives and currency exchange and repatriation.

- One of the ways to achieve this is by leveraging provisions of the Constitution and specific state laws pertaining to town and country planning, municipalities and industrial development. For example the Andhra Pradesh Infrastructure Investment Corporation (APIIC) is empowered to undertake certain municipal functions and retain some of the taxes under the APIIC Act. Recently, Punjab set up the Punjab Investment Board (PIB) which is seen as a good example of a “single window” clearance agency. Specific interventions in this regard could include:
  - Delegating administrative powers—especially municipal and town and country planning functions—to the SPV
  - Reforming and streamlining the “single window” system to provide approvals for setting up new enterprises
  - Enabling a more investor-friendly inspection regime

### **Recommended model for coastal economic units in India**

Major industrial developments in India are much smaller when compared to those in China. Exhibit xx summarises the major findings from case studies of industrial developments from different countries.

**Major industrial developments in India are much smaller when compared to those in China**

						
	Shenzhen City	Lingang Industrial Area	Ras Al Khaimah Free Trade Zone	Hemaraj Chonburi Industrial Estate	Sri City	Mahindra World City
	Shenzhen	Shanghai	Ras Al Khaimah	Thailand	Andhra Pradesh	Chennai
<b>Total Industrial Area (sq.km.)</b>	400	315	2.5	8	30	7
<b>No. of Units</b>	6,500 large scale enterprises, 59,000 small & micro entities	More than 9,000		~130	More than 100 currently operating;	More than 50 currently operating
<b>Established Date</b>	1980	2003	2000		2007	2002
<b>Major Industries</b>	Computer software, IT, Microelectronics and components, High Tech and medical instruments	Heavy equipment manufacturing, telecommunication, information technology and logistics services	Automotive, industrial manufacturing, food processing	Manufacture of steel, electronics, power, auto parts, logistics and export-oriented industries	Automotive, Engineering, Apparel & Fashion, Electronics H/W, Pharma, Food Processing, Renewable Energy, IT/ITES, Logistics & Warehousing	IT, Auto ancillary, Textile

The proposed CEUs should have industrial areas having total extend of 1,000 – 1,500 acre, having capacity to accommodate 150 – 200 units and the required supporting and social amenities

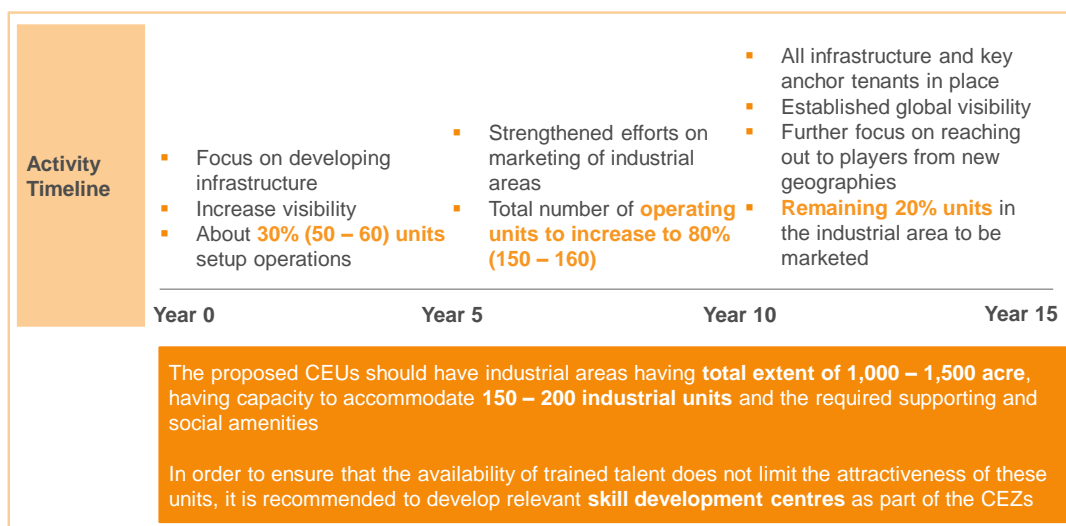
SOURCE: Press search, Team analysis

Based on these case studies, the following structure had been recommended for the proposed CEUs in India:

- Proposed CEUs should have industrial areas of around 1,000 to 1,500 acres, with the capacity to accommodate 150 to 200 industrial units and the required supporting and social amenities
- To ensure that the availability of trained talent does not limit the attractiveness of these units, relevant skill development centres could also be set up as part of the CEZs

The focus for the initial years would be on developing the infrastructure and increasing visibility, with 10 to 15 units being added per year per CEU. The following activity timeline indicates the 15-year vision for each proposed CEU (Exhibit 42).

**The focus for the initial years would be on developing the infrastructure and increasing visibility, with 10 – 15 units being added per year per CEU**



SOURCE: Case studies, Expert interviews

### 4.3 ENABLERS FOR PORT-LED INDUSTRIALISATION IN INDIA

#### Creating an inter-ministerial committee for CEZs

As an enabler for port-led industrialisation, each CEZ will consist of multiple CEUs for setting up industrial and manufacturing facilities. While CEZs shall largely be planning units, comprising a few coastal districts or districts with strong port linkages, similar to industrial corridors such as the DMIC, CEUs will be specific industrial-estate projects with a demarcated boundary similar to the DMIC nodes. Both CEZs and CEUs could emerge as one of the prime movers of the “Make in India” initiative. Manufacturing growth in countries like China was mainly the result of such port-led industrialisation initiatives.

As part of the NPP, 27 bulk and discrete manufacturing clusters have been proposed. While bulk clusters will be implemented by respective line ministries and PSUs and will form a CEU in itself because of its size, discrete manufacturing clusters will be implemented through the CEUs. More than one industrial cluster can be housed within a CEU and within each cluster there will be several manufacturing units.

The proposed NICDA, currently awaiting the Cabinet’s approval, could be responsible for setting up the discrete manufacturing clusters and CEUs. The NICDA could create a sub-programme, on the lines of the DMIC and the Vizag–

Chennai Industrial Corridor, known as “Sagarmala Coastal Economic Zones” and, if necessary, a separate entity too on the lines of the DMICDC for this purpose.

To accelerate the development process, it is suggested that CEUs be prioritised in locations where land parcels are available in areas close to a deep draft port, with strong potential for manufacturing. Such pilot CEU locations have been identified in Kandla, Paradip and JNPT ports where the concerned port trusts own adequate land. In addition, the Salt Department owns about 5,000 acres of land near Ennore port. Since this is prime industrial land, it is highly desirable that this be developed as a CEU too.

As some CEUs may be export oriented, those meeting all the qualifying criteria for SEZs should also be approved as SEZs and benefits under the Programme should be available to them.

The formation of an inter-ministerial committee (IMC) is suggested for implementing the CEZ programme. This proposed committee will comprise the Ministries of Commerce (DIPP), Shipping and Finance (Expenditure, DEA and Revenue), Railways and Road Transport and Highways. Concerned state governments and line ministries responsible for key bulk industries, such as chemicals and fertilisers, petroleum and natural gas, power, steel and cement, could be special invitees.

### **Setting up an industrial marketing cell dedicated to CEZs**











Attracting investors for port-led industrial development will be a crucial task in the near future. This calls for a strategic organisational structure for the marketing cell, and a focused marketing approach through four levers:

- Forums/events/exhibitions
- International offices for client development
- Key account management
- Advertising on media

Global research indicates that several organisations—such as the Singapore Economic Development Board (SEDB), Malaysian Investment Development Authority (MIDA), Khalifa Industrial Zone, Abu Dhabi (KIZAD), Ras al-Khaimah Free Trade Zone and the Investment Promotion Centre for Central Vietnam—have successfully followed a structured marketing approach (Exhibit 43). Some of these organisations have been discussed later in this volume.

EXHIBIT 36

Participation in events and forums and key account management are key elements for attracting investors to industrial developments

Very important	Activity										
		Sri City	Mahindra World City	Mundra Port SEZ	IPCC Vietnam	Singapore EDB	IDA, Malaysia	MODON, KSA	Abu Dhabi DED	FTZ, Ras Al Khaimah	KIZAD, Abu Dhabi
Optional	Forums/Events/Exhibitions	✓	✓	✓	✗	✓	✓	✓	✓	✓	✓
	Key Account Management	✓	✓	✓	✗	✓	✓	✗	✗	✓	✗
	Media advertisements	✓	✓	✗	✓	✓	✓	✗	✓	✓	✓
	International Offices	✗	✗	✗	✓	✓	✓	✗	✗	✓	✗
	One Stop Shop	✗	✓	✓	✓	✗	✓	✗	✗	✗	✗
	Overseas client development visits	✗	✗	✗	✗	✗	✓	✗	✗	✗	✗

✗ Not relevant   
 ✓ Very relevant   
 ✓ Partially relevant

SOURCE: Expert Interviews, Authority Websites

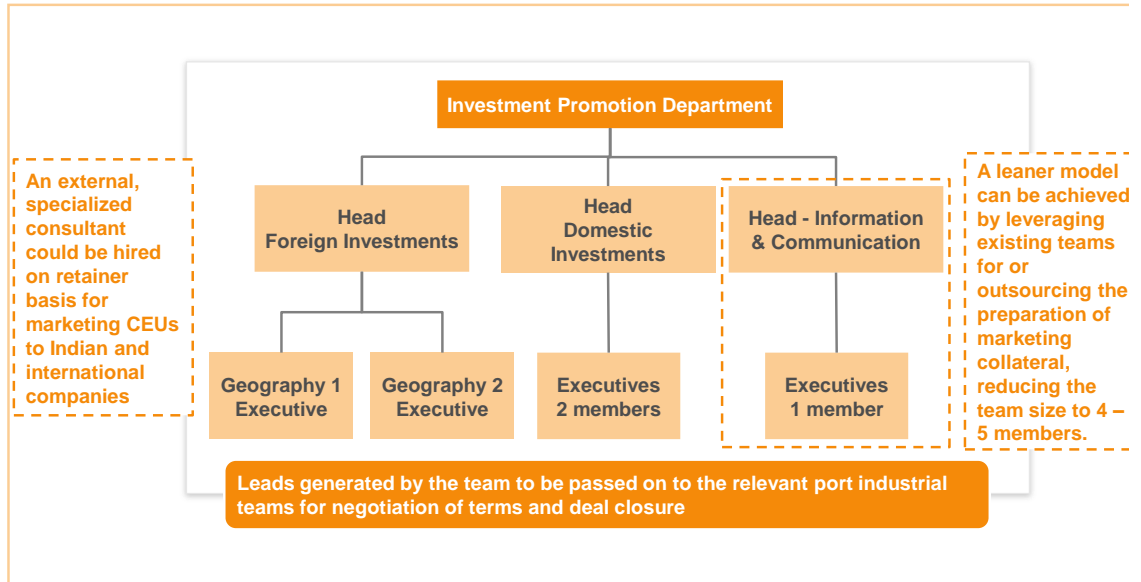
Organisational structure for the marketing cell

It will be best to have geography-focused teams that can prioritise relationship-building with the relevant investors or tenants and government agencies (Exhibit 44). It is suggested that an external consultant be hired on a retainer basis to develop a roadshow and a branding campaign for the Sagarmala Programme.

EXHIBIT 37



**A 5 member team with geography focus, working together with an external specialized consultant should handle the marketing of the CEUs (2/2)**



## Marketing levers

The marketing approach to attract investors for port-led industrial development could focus on four strategic levers:

- Forums/events/exhibitions: Organise and participate in exhibitions, trade fairs and other events, with the help of cell representatives, to improve visibility and increase networking opportunities.
- International offices for client development: Cell representatives should regularly interact with potential investors and key stakeholders through international offices and frequent visits to those offices.
- Key account management: Create dedicated teams for key existing and potential clients to track and understand their future plans and potential opportunities.
- Media advertisements: Conduct targeted promotions in well-read, reputed and relevant publications, choosing the right placement and timing for maximum impact.

## Global case studies of successful industrial marketing

### 1. Singapore Economic Development Board (SEDB)

SEDB has successfully attracted investment through a focused marketing approach. Established in 1961, it facilitates and supports local and foreign

investors in the country. It attracts investments, nurtures the growth of industry verticals, enhances the business environment by ensuring an efficient and competitive business infrastructure, and sets the direction for the Singapore of the future.

SEDB's marketing strategy has six major components that have supported its success:

- **Key account management:** SEDB has a carefully structured team that manages priority and potential investors, working with them on a continuous basis.
- **International offices and outreach:** SEDB set up offices in Hong Kong, New York, Zurich, Paris, Osaka and Houston and also visited foreign ministers to promote Jurong Island as an attractive investment destination with ready infrastructure, factories and skilled manpower.
- **Participation in forums and events:** SEDB uses these platforms to actively promote industrial zones.
- **Ease of doing business:** SEDB procures and shares industry feedback with government agencies. While Singapore already offers attractive tax incentives and a business-friendly environment, constant feedback can help to ensure that Singapore remains competitive.
- **SEDB's organisation structure** comprises a global and domestic industry-wise cut. Each team comprises five or six members who engage in relationship management and promotion of specific zones assigned to them (Exhibit 45).
- **Global outreach and targeted promotion** by SEDB was critical in the attracting tenants to Jurong Island. The organisation set up the Jurong Town Corporation (JTC) which looks after the management and operations of Jurong island.

### The SEDB promotes industrial investments through its industry clusters and global operations teams



<sup>1</sup> Planning and policy – Business environment, Finance, Legal, Research  
Corporate Development – Administration, Human resources, IT

SOURCE: Expert Interviews, SEDB Website

## 2. Malaysian Investment Development Authority

MIDA was established in 1967 by the Government of Malaysia to attract export-oriented FDI to the country's Free Industrial Zones.

Current functions of MIDA include:

- Promoting investments in the manufacturing and services sector in Malaysia
- Undertaking planning for industrial development in Malaysia
- Recommending policies and strategies for industrial promotion and development
- Evaluating applications for manufacturing licenses, incentives and duty exemptions
- Assisting investors with implementation and operations by providing consultancy services, training and technical assistance
- Assisting Malaysian companies in seeking technology and investment opportunities abroad
- Facilitating and assisting the activities of other institutions engaged in or connected with industrial development

MIDA's promotion strategy to attract investments in manufacturing and services has four major components:

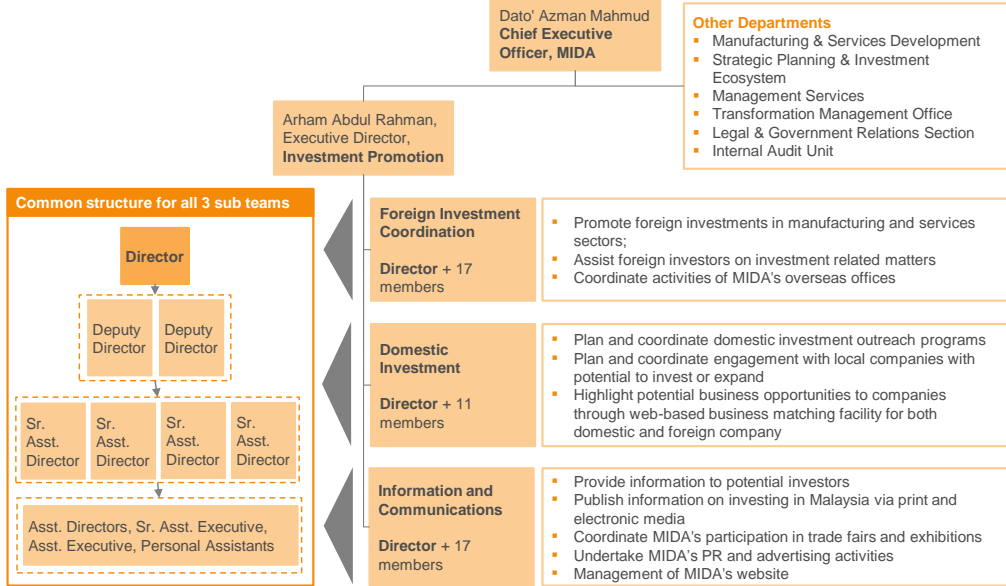
- Overseas client development visits: Minister-led overseas investment missions to Asia, Europe and North America to:

- Organise seminars on business opportunities in Malaysia
- Invite Malaysian firms for testimonial purposes and facilitation of possible JV opportunities
- Targeted meetings with potential investors in the high-technology, high value-added and knowledge-based industries
  - Follow-up visits arranged with firms that express an interest in investments
- Advertisements: Industry-focused promotion of "Investing in Malaysia"; success stories of MNCs that set up facilities
  - Campaigns are run for a short time prior to major industrial events in the Americas, Europe and Asia
- Forums/events/exhibitions: Participation in trade exhibitions both at home and abroad, e.g., World Heavy Engineering Show, Langkawi International Maritime and Aerospace Exhibition

The Investment Promotion team in MIDA has three sub-teams of nearly 50 members, with three specific departments—Foreign Investment Co-ordination, Domestic Investment and Information and Communications (Exhibit 46).

EXHIBIT 39

The Investment Promotion team in MIDA has 3 sub teams with a total size of ~ 50 members (3/3)



SOURCE: MIDA Website

The establishment of an industrial marketing unit within the Indian Ports Association/Ministry of Shipping is highly recommended. This could be an industrial marketing unit with a lean team of around four senior people recruited specifically for the marketing cell who can liaise with potential investors. Marketing activities like roadshows could be looked after by an external marketing consultant, hired on retainer basis with specific KPIs (Exhibit 47).

**Total investments generated is the most important KPI for marketing teams in industrial developments**

Roles and responsibilities	Key skills required
<ul style="list-style-type: none"> <li>Leading business development and providing strategic direction in building strong sales &amp; marketing network</li> <li>Planning &amp; undertaking destination building activities and working out strategies to develop a robust sales pipeline for the projects</li> <li>Undertaking marketing research for various business requirements &amp; working on customized solutions for the companies and prospective investors</li> <li>Developing solutions for 'Smart City' concepts with cross functional &amp; cross border teams and establishing operational protocols for the projects</li> </ul>	<ul style="list-style-type: none"> <li>B2B Business Development</li> <li>Trade &amp; Investment Promotion</li> <li>Industrial Parks, SEZ &amp; Economic Clusters Selling</li> <li>Customer Relationship Management</li> <li>Negotiation</li> <li>Team management</li> </ul> <p><b>Prior Experience</b></p> <ul style="list-style-type: none"> <li>Total of 15+ years in Real Estate and Marketing</li> <li>Experience of working with/for Government agencies to be given preferential weightage</li> </ul>

Key results area	Key performance indicators	Description
Revenue	Investment/leads Generated	<ul style="list-style-type: none"> <li>Total value of investments signed during the year</li> <li>No. of leads and enquiries generated (pipeline generated)</li> </ul>
Marketing	Marketing Activities	<ul style="list-style-type: none"> <li>No. of new relationships developed</li> <li>No. of meetings attended with target companies</li> <li>No. of conferences and exhibitions attended</li> <li>New marketing and promotion campaigns launched</li> </ul>
	Reporting	<ul style="list-style-type: none"> <li>Regular maintenance of MIS</li> <li>Regular presentations to CEO</li> </ul>
Knowledge Development	Industry reports	<ul style="list-style-type: none"> <li>No. of periodic reports on different industries that can be used for knowledge development and as marketing material</li> </ul>
	Seminars and trainings	<ul style="list-style-type: none"> <li>No. of industry relevant seminars and training programs attended</li> </ul>

SOURCE: Expert Interviews

**Promoting ease of doing business**

India's rank is 130 per the World Bank's *Ease of Doing Business Report 2016* (Exhibit 48).

### Ease of doing business ranking for India

	2015	2016	
Overall ranking	134	130	↑
Starting a business	164	155	↑
Dealing with the construction permits	184	183	↑
Getting electricity	99	70	↑
Registering property	138	138	↔
Getting credit	36	42	↓
Protecting minority investors	8	8	↔
Paying taxes	156	157	↓
Trading across borders	133	133	↔
Enforcing contracts	178	178	↔
Resolving insolvency	136	136	↔

The central government has taken several steps to improve the ranking:

- Using the single window concept is helping to speed up clearances across multiple areas:
  - CBEC has launched the SWIFT project, integrating the requirements of six agencies into one entity, which enables importers to seek a single approval instead of nine separate ones.
  - Manufacturers can now register online at the Shram Suvidha portal and file a self-certified single compliance report for eight central labour laws.
  - The MAITRI initiative (by the Maharashtra government) functions as a clearing house for all investment-related information besides co-ordinating with various government departments across the business cycle. It provides a common interface for business users and government officials to issue 31 clearances and approvals required for setting up of industries.
- Streamlining policies and procedures is making compliance easier:
  - More than 1,000 obsolete laws have been repealed in the last two years to reduce operational complications

- The Directorate General of Foreign Trade has reduced the number of mandatory documents required for the import and export of goods to three each, from 10 and seven respectively
- Launching a computerised risk-based inspection in various states has reduced the processing time
- Ensuring that the delivery time for big ticket projects improves. Some state governments have followed the Centre’s directive to put in place a specialised team to fast-track approvals and manage issues

Furthermore, taking specific action on three particular levers could improve India’s “ease of doing business” ranking and increase foreign investment inflows:

- Simple policy and compliance regime:
  - Move from a “prescriptive” to a “compliance” regime for contracting and procurement
  - Institutionalise a mechanism to issue notices prior to implementation
  - Leverage technology to remove overlaps and speed up compliance
  - “Learn by doing” using accelerators to simplify policies
- Global supply-chain competitiveness:
  - Streamline trade clearance processes, that is, ensure implementation through a risk-based model
  - Enable participation in trade-facilitation schemes
  - Rapidly adopt global product standards and best practices
- Accessible and responsive governance:
  - Appoint a secretary-level empowered nodal officer for the top five investment sources or industries
  - Transform the government’s project management and execution capabilities
  - Develop specialised talent and conduct rigorous performance management

Business houses across the country have also identified the following levers which can help to improve rankings across parameters:

- Supporting “Ease of Entry” initiatives to attract new investments
- Developing a legal environment to ensure enforcement and fast recourse
- Building adequate infrastructure to support business growth
- Ensuring predictability and stability in the taxation system



- Simplifying and streamlining policies and the compliance regime
- Enabling trading across borders—global supply-chain competitiveness
- Improving efficiency and responsiveness of the government and regulatory bodies

## 5. Setting up the right institutional structure

The Sagarmala Programme consists of a diverse set of projects and initiatives with multiple stakeholders at the state and Central levels. Some of the key enablers for delivering the Programme includes governance framework, institutional set-up and a financing plan with PPPs.

The Sagarmala Programme (as envisaged) needs to be implemented by all relevant stakeholders—central ministries, state governments and other agencies— while the MoS will serve as the nodal ministry and play the role of an anchor. Stakeholders should proactively participate in taking forward the Programme and own the projects and interventions relevant to them. This chapter discusses the proposed institutional structure required for implementation.

### 5.1 INSTITUTIONAL SET-UP

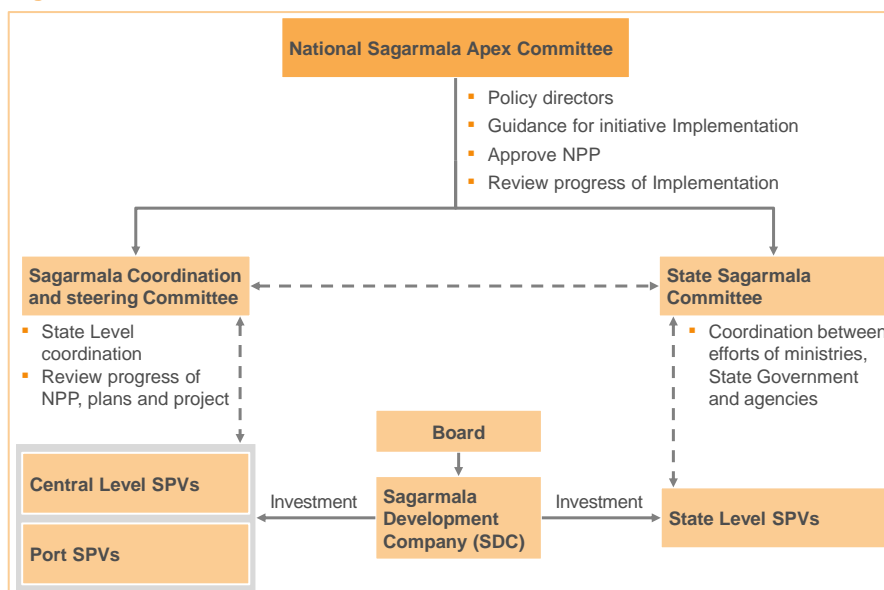
#### Overall structure

The overall institutional set-up of the Sagarmala Programme could consist of the following key bodies (Exhibit 49):

- **National Sagarmala Apex Committee (NSAC):** This is an apex inter-ministerial body for driving the Sagarmala Programme with Minister-level representations from the Ministries of Home Affairs Coal, Petroleum and Natural Gas, Steel, Defence, Environment, Forest and Climate Change, Road Transport and Highways and Tourism.
- **Sagarmala Co-ordination and Steering Committee (SCSC):** The SCSC consists of Secretaries from the Ministries of Home Affairs Coal, Petroleum and Natural Gas, Steel, Defence, Environment, Forest and Climate Change, Road Transport and Highways and Tourism.
- **State Sagarmala Committee:** This institution will be the primary driver of the Sagarmala Programme at the state level.
- **Sagarmala Development Company (SDC):** The SDC will be the main development agency of the MoS.
- **Special Purpose Vehicles (SPVs),** as needed for specific projects, will be formed at the central and state levels.
- **IMCs and working groups** for taking forward key themes and initiatives, e.g., the IMC for coastal shipping.

## Sagarmala Institutional Framework

← - - - → Coordination



## 5.2 CONCEPT OF CEZS AND CEUS

To boost economic trade and tap into the advantages of the many port/coastal regions in India, the government intends to establish 14 CEZs across the country in the coastal states. These shall largely be planning units, like the upcoming industrial corridors, e.g., DMIC, comprising a few coastal districts or districts with strong port linkages. Planning of ports, connectivity infrastructure, industrial zones and corresponding social infrastructure could be done within the context of the CEZ to create complete convergence.

### Coastal economic zones

Each of India's coastal districts will be included in one of the 14 CEZs, and each CEZ will be aligned to the relevant port in the state. Some states with multiple ports may even have two or three CEZs. As an enabler for port-led industrialisation, each CEZ will consist of multiple CEUs for setting up industrial/manufacturing facilities. A CEZ could be around 500 km long and located up to 200 km within the coastal boundary.

NICDA could help in the supervision of the CEZ programme, by creating a separate development entity for the preparation and implementation of the master plan for each CEZ. This includes the identification and project preparation of industrial clusters and CEUs that are within or proximate to ports.

A CEU is a discrete land bank based on the concept of free trade zones, such as those in China which focus on certain specific types of industries. There are two types of CEUs:

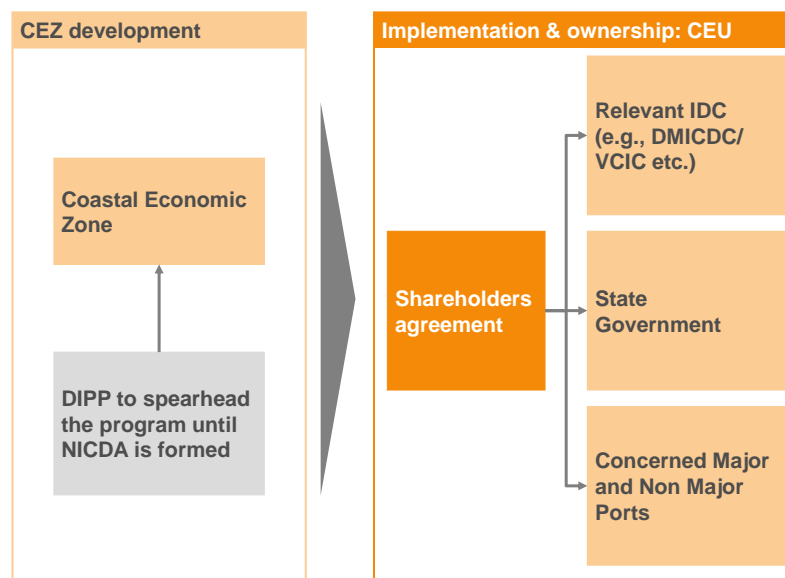
- A contiguous parcel of land within a CEZ having a minimum area of 1,000 acres
- Non-contiguous areas of land within a CEZ district, each having a minimum area of 200 acres and jointly adding up to a minimum of 1,500 acres.

### **Institutional structure for delivering the CEZ master plan in coordination with state and central ministries**

A separate development entity needs to be created for the preparation and implementation of the master plan for each CEZ. This includes the identification and project preparation of industrial clusters and coastal economic units that are within or proximate to ports. In this sense, the programme could be driven by DIPP with the help of the SDC. The latter can bring in port focus along with strategic land parcels near ports. The DIPP can contribute in its institutional capacity in developing industrial corridors (Exhibit 50).

EXHIBIT 43

#### **CEZ development plan**



The institutional structure of the CEZs will follow certain design principles:

- They will operate within the ambit of existing institutional structures and build on work done by other ministries: The CEZs will work within the industrial corridors programme of the DIPP and NICDA.

- They will leverage existing laws and regulations: The SEZ Act will be amended to include qualifying CEUs. The Shareholders Agreements of DMICDC with key states such as Gujarat and Maharashtra will also help to address key areas of zone administration and governance.
- They will leverage existing land parcels near ports to minimise lead time in acquiring land. They will also reduce the contiguous land requirement (200 acres) to a minimum and empower the SPVs formed for CEU development to acquire land.
- They will prioritise prime port-based manufacturing locations for establishing a demonstration effect in the first set of CEUs, through three or four pilots in available land parcels near JNPT, Ennore, Kandla and Paradip ports.
- They will adopt a public-led financing model while keeping the flexibility to accommodate private-led industrial zones. In this context, they can explore the possibility of tweaking the DMIC model.

### **Kick-starting CEZs in India**

Perspective plans are being prepared by the Sagarmala consultants for the 14 CEZs and also being shared with respective state governments for their inputs. These perspective plans are based on detailed analysis of traffic flows through key ports within each CEZ, projection of future traffic flows for 20 years, competitive advantages and natural resources in the CEZ and benchmarking of best practices from international examples of port-led development. These plans include:

- Physical demarcation of the CEZ area
- Overview of the current economic and industrial scenario of the CEZ
- Summary of existing industrial estates/parks and SEZs within the CEZ
- Opportunities for port-led industrialisation, i.e., bulk and discrete manufacturing clusters, emerging from a detailed assessment of origin–destination movement of key traffic flows through the relevant port
- Identification of land parcels suitable for industrial development
- Identification of key infrastructure projects needed to enable port-led industrialisation in the CEZ by suitably linking industrial clusters to ports

In order to take the development of these 14 CEZs forward, the MoS will make detailed master plans, in phases. These master plans will build on the perspective plans to project investment, population and employment growth, identify specific land parcels to be developed as CEUs, detail out specific infrastructure and connectivity projects required with preliminary engineering studies for cost estimates.

In addition, for the prioritised CEUs, the master plan will also lay out zoning and land use plan, circulation frameworks, radial infrastructure diagrams, massing,

landscape plan, development norms and regulations, infrastructure needs assessment, project cost estimates and financial feasibility assessment

### **Institutional structure**

From an institutional point of view, DIPP could take forward the CEZ programme through NICDA, or through DMICDC pending NICDA approval. Institutional expertise in the following areas is required for the development of CEZs:

- Infrastructure design
- Procurement of land
- Tendering and contracting
- Construction and project management
- Project finance and investment marketing
- Skill development
- Fostering ease of doing business
- Evaluating fiscal concessions

These capabilities are institutionally well-embedded within the DMICDC. DIPP is also developing some of the proposed CEZs like the VCIC through the industrial corridors program. Until NICDA is formed, it is suggested that a dedicated cell be set up within DMICDC focusing on the development of CEZs and the five prioritised CEUs. Eventually, upon approval of NICDA, the cell may be spun off into a separate CEZ Development Corporation along the lines of DMICDC.

As some of the CEUs could be export oriented, it is recommended that the CEUs which meet the qualifying criteria of SEZs should be approved as SEZs and benefits under the SEZ programme should be available to them.

### **Inter-ministerial committee for the CEZ programme**

It is suggested that an IMC be constituted for taking forward and implementing the CEZ programme. The IMC will include representation from NITI Aayog, DIPP, Department of Expenditure, Department of Revenue, Department of Economic Affairs, Ministries of Shipping, Railways and Road Transport and Highways with other concerned central ministries and state governments as special invitees. The terms of the IMC should include:

- Finalising the responsibility and institutional structure for developing and implementing CEZs and CEUs
- Examining the legal status for CEZ and CEUs
- Appraising fiscal incentives that will be available to developers and industrial units in CEUs, e.g., tax holidays, indirect taxes, benefits under SEZ Act

- Examining the reforms needed on aspects of ease of doing business to compete with global manufacturing locations, e.g., labour laws, currency convertibility, Customs, approval and inspection procedures, single window clearances
- Assessing the amendments required, if any, to confer benefits under the SEZ Act for qualifying CEZs
- Identifying strategic land parcels in prime manufacturing locations and near deep draft ports for setting up CEUs
- Examining powers to acquire land for the purpose of setting up CEUs
- Agreeing, in principle, with the Shareholders' Agreements with states of pilot CEUs

# 6. Business plan for the Sagarmala Development Company

## 6.1 VISION

Under the ambit of the Sagarmala Programme, the SDC strives to reduce logistics costs for both domestic and EXIM cargo. It intends to create ports and a transshipment hub of international standards to generate economic-activity clusters along the Indian coastline, with the participation of coastal communities.

## 6.2 MISSION

The SDC is committed to:

- Creating a pipeline of projects through project development activities, either by itself or by assisting stakeholders through the Project Development Fund
- Building port capacity with world-class quality and the right quantity to enhance port efficiency and cargo evacuation. In this regard, it will accelerate the pace of implementation of the requisite infrastructure projects
- Identifying projects across pipeline, water, rail and road that are essential to enhance logistics connectivity in the hinterland. This will reduce logistics costs for both domestic and EXIM cargo
- Implementing residual infrastructure projects through equity participation. This will create the most optimal mode of evacuation to/from ports for domestic and EXIM cargo
- Creating a plan for the development of coastal districts by facilitating the establishment of CEUs
- Assisting in the implementation of socially important projects by participation through Community Development Fund
- Developing coastal communities and matching their skills with opportunities
- Increasing the economic output and ranking of the human development index (HDI) of coastal districts



## **OBJECTIVES**

The SDC's aim is to:

- Create a roadmap of projects identified through the NPP and prepare a coherent development strategy for the ports sector in India
- Augment capacity to cater to increased cargo traffic at the ports through improved efficiency, mechanisation and new terminals, and by building six to eight greenfield ports
- Liaise with various central line ministries to facilitate effective administrative co-ordination and ensure all identified projects are completed in a time-bound manner
- Complete all residual projects in the minimum time period by involving the SDC
- Align the Sagarmala Programme with other government initiatives like the industrial corridor project or Bharatmala to achieve synergy and also assist in the implementation of projects, wherever possible
- Prepare detailed master plans for the identified CEZs within two years
- Manage the Community Development Fund for providing grants to coastal community-development projects considered under the Sagarmala Programme
- Assist in the development of maritime activity-based economic clusters in all coastal states, involving coastal communities through skill-development programmes
- Focus on integrating coastal communities in the development initiatives of the Smart Cities programme through innovative master planning, optimising land use instead of resettlement

To achieve the objectives of the Sagarmala Programme and fast-track the implementation of the port-led industrialisation, has been set up under the Companies Act, 2013 to provide equity support to state and zone level SPVs along with port SPVs for implementation of projects. The implementation will be done by line ministries, state governments and state maritime boards (SMBs) and SPVs. The SDC will provide a funding window and/or implement only those residual projects that cannot be funded by any other means.

The proposed company shall be under the administrative control of the MoS, which will monitor the implementation of projects identified under the NPP and provide the necessary experts in technical, financial and project restructuring to various stakeholders, including partner states and maritime boards. The SDC shall play the role of a project development partner and knowledge partner to specific SPVs and state governments and maritime boards. It will also help to continuously disseminate the learning from various successful port-led

development projects undertaken globally and in the country, and also create an effective management information system for better planning and implementation. The company will support and synergise infrastructure development by other agencies, like the NICDA, and will ensure that there is no duplication of projects/infrastructure development.

The SDC shall raise funds as debt/equity as per requirements, leveraging the resources provided by the Government of India and providing equity/debt to the SPVs formed in the JV with the state governments/other stakeholders to implement port-led development projects. The company can also raise long-term capital from financial institutions and, after due approvals, acquire funds through appropriate debt instruments, tax-free bonds, capital-gain bonds, credit enhancement, etc., to support the development of projects under the Sagarmala Programme.

Various state and central government agencies are responsible for implementing many projects with mid-term or long-term perspective plans under their own scheme. However, some of these already planned projects may need to be realigned and expedited under Sagarmala depending on the demand–supply gap analysis of the infrastructural requirement of the region.

## **ROLE OF THE SDC**

The SDC will provide equity support to SPVs set up by state and central agencies and by ports for the implementation of projects. It will work with the SCSC as part of the Sagarmala Institutional Framework to execute projects under Sagarmala. It will also provide equity support for SPVs based on the requirement and availability of funds, while the SCSC will co-ordinate between central and state ministries for all SPVs under the Programme.

The registered office of the SDC shall be at New Delhi to facilitate effective administrative co-ordination with various central line ministries, NITI Aayog, and state governments, planning boards and maritime boards. The corporate office will also be located at New Delhi to facilitate effective business co-ordination and functioning.

The SDC will be incorporated with an initial authorised capital of INR 1,000 cr, as recommended by EFC, which may be increased subsequently, if required, and a subscribed share capital of INR 90 cr. The MoS will bear the entire cost towards authorised capital for the SDC along with the initial subscribed share capital.

The affairs of the SDC will be administered by the Board of Directors comprising the Managing Director, two other Functional Directors, one Government Director and one Non-Official (Independent) Director. The two Functional Directors will consist of the Director (Finance and Admin.) and Director (Projects) of SDC. The Secretary (Shipping) will be the ex-officio Chairman of the Board and shall act as a non-executive Chairman.

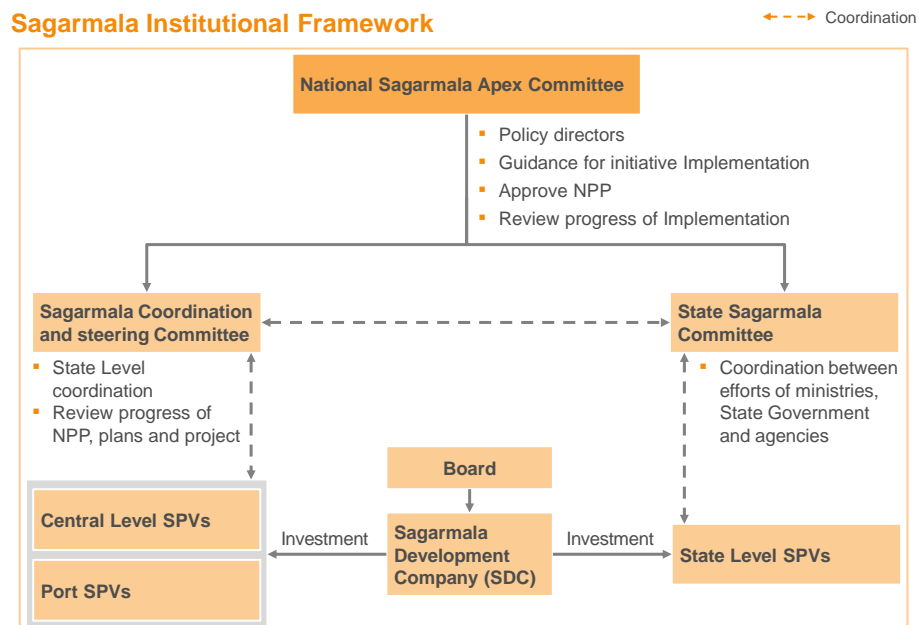
## INSTITUTIONAL FRAMEWORK OF SAGARMALA AND THE ROLE OF SDC

As per the recommendations of the Cabinet Note on Sagarmala, a National Sagarmala Apex Committee (NSAC) will provide overall policy guidelines and high-level co-ordination. The NSAC will be chaired by the Minister in charge of Shipping with cabinet ministers from stakeholder ministries and the Chief Ministers/ministers in charge of ports of maritime states. The committee shall:

- Provide policy guidance for implementing the initiative
- Approve the overall NPP
- Review progress and implementation of these plans

The SCSC will be constituted under the chairmanship of the Cabinet Secretary. Committee members will include the Secretaries of the Ministries of Shipping, Road Transport and Highways, Tourism, Defence, Home Affairs, Environment, Forest and Climate Change, Departments of Revenue, Expenditure, Industrial Policy and Promotion, the Chairman of the Railway Board and the CEO of NITI Aayog. Chief secretaries of particular states, projects for which are included in the agenda for a particular meeting, shall be co-opted as members for relevant meetings. The SCSC will co-ordinate the efforts of various ministries, state governments and agencies connected for the implementation and review of implementation progress of NPP, detailed master plans and projects (Exhibit 51).

### EXHIBIT 44



## THE SDC'S SCOPE OF ACTIVITIES

- Act as the custodian for Sagarmala's vision and the NPP:
  - Ensure that projects are conceptualised and prioritised in line with the NPP
  - Periodically review the NPP and update it based on progress and future projections
  - Align with national priority programmes of the central government including development of smart cities, national waterways, "Make in India"
  - Disseminate knowledge and information on best practices available within the country as well as globally
  - Provide a funding window for residual projects that have no other access to funding; these include important/pilot/path-breaking projects with high ERR but low IRR
- Finance and implement projects related to:
  - Road connectivity projects that provide last-mile connectivity to the port and which ease congestion at roads/junctions leading to the port
  - Dredging to enhance the port's vessel-handling capacity
  - Parking terminals to ease congestion on roads and junctions leading to port
  - Developing the stackyard for storage of container and other cargo
  - Tourism-related projects in coastal areas, e.g., construction of passenger jetties and cruise terminals
  - Lighthouse development projects to increase the tourism potential of coastal districts
  - Skill-development programmes to enhance employment opportunities for coastal communities
  - Mechanisation of berths for more effective and efficient cargo handling at ports that need equity support
  - Projects to transform the ports into green ports through maximum use of renewable energy
  - Development activities (preparation of feasibility/DPR, etc.) for related projects, industrial clusters and zones
  - Detailed master plans for the identified CEZs within two years
  - Other infrastructure (internal or external) projects that enhance the cargo-handling capability and capacity of a port and for which the port needs equity support

- Identify and develop infrastructure projects with the additional objective of giving the private sector an opportunity to invest in and implement such projects:
  - SDC will undertake due diligence, analyse, examine and appraise proposals, assist stakeholders in structuring proposals in the SPV mode, and also assist in the monitoring of such projects. It will also assist each project SPV in translating the vision to reality through identifying port-led development projects, undertaking project preparatory activities like preliminary project reports, feasibility studies, preparation of DPRs, development of projects, bidding out projects for private participation and help SPVs to:
    - Put in place suitable risk-management measures for strategic projects cutting across states/regions, e.g., power plants, water supply, transportation and logistics parks
    - Legally vet documents and obtain requisite approvals from the competent authority
    - Finalise commercial arrangements like off-take agreements/substitution agreements, etc.
    - Obtain viability gap support from the state and central governments
  - For early impact, the SDC may also take up ready projects based on existing reports carried out by leading firms on behalf of government agencies
  - Each project shall be structured to access strategic investors, PE investors and the capital market at an appropriate juncture
  - Undertake studies related to assessment of port capacity, selection of projects, shortlisting of suitable port locations, development of roads, waterways, etc., and help with obtaining project clearances, economic and trade consequences, challenges faced by the maritime sector and interventions required, international port-building techniques
  - Conceptualise, structure and finance projects and conduct investor consultations
  - SDC shall assist SPVs in the selection of developers and O&M players, in obtaining viability gap funding where required and finalising commercial arrangements
  - Review project financials to develop innovative financing and implementation mechanisms for Sagarmala projects and assist the SCSC to finalise the project implementation model, that is, PPP, annuity, hybrid or EPC/rate contract
  - The SDC will begin with less complex projects and gradually move to more complex projects after capacity building in the SDC and building up supportive links with other stakeholders

- It will function as a pass-through entity for specific projects and raise capital through various financing instruments
- SDC shall also act as Fund Manager of the Community Development Fund which the Ministry of Shipping will be incorporating for the development of coastal communities
- Act as holding company for MoS’ investments in SPVs for projects being undertaken by other line ministries/agencies/state governments/ports
  - Hold shares in SPVs undertaking projects at the state or central level
  - SDC shall empanel consultants experienced in the preparation of feasibility studies, detailed project reports through which SDC shall provide project development services and project management services to the SPVs
  - Develop suitable risk allocation frameworks for the SPVs
  - All expenditures incurred by the SDC on the project will be capitalised in a manner and form determined and approved by the Board of Directors of the SDC

## **ORGANISATION STRUCTURE OF SDC**

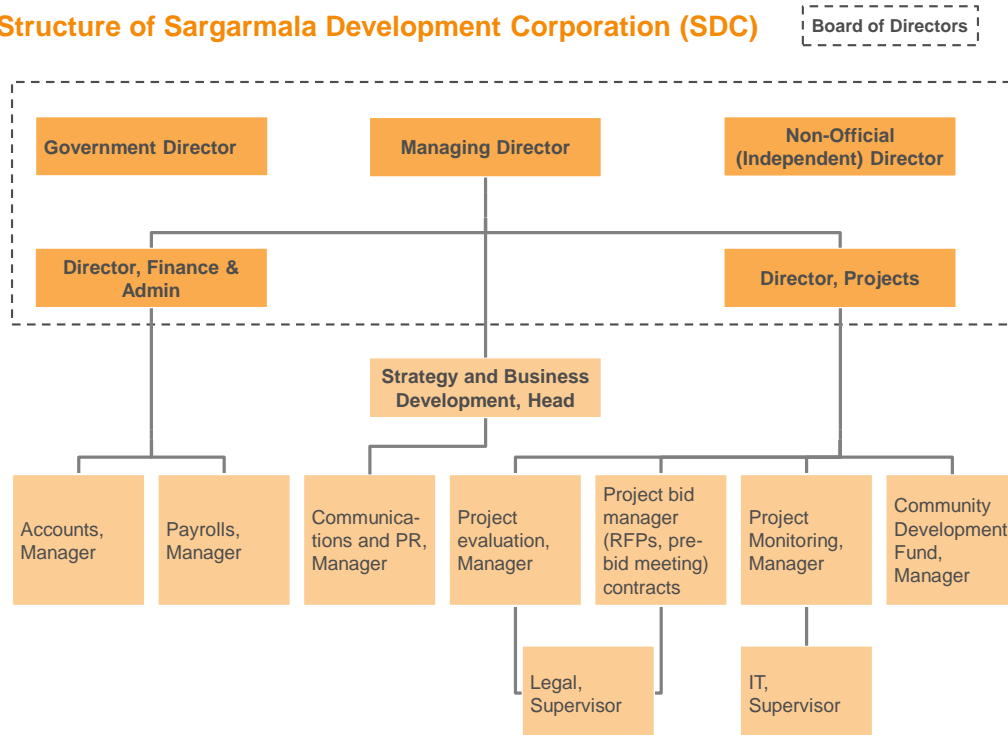
SDC is envisaged as a multi-disciplinary professional company, with high-quality technical, financial and management expertise, which will channel central and institutional funds and ensure the development, planning and implementation of the various projects planned under the Sagarmala Programme in line with the NPP.

SDC will be led by an MD/CEO on deputation or hired extenally. Keeping in mind its mandate, it will comprise three teams—Finance, Strategy and Business Development and the Project Management Unit (Exhibit 52).

The company will initially deploy 13 employees to commence operations. Additional Secretary (MoS) and JS (Ports) are to be permanent invitees for all Board meetings. Secretaries of appropriate state departments will be invited to these meetings when specific state project(s) are discussed.

SDC will be a “lean” company with skeleton staff to carry out its functions. Other functionalities of SDC shall be decided by the MoS in consultation with the MoF.

## Structure of Sargarmala Development Corporation (SDC)



## Board

SDC will be administered by the Board of Directors comprising the Managing Director (MD), two Functional Directors (FDs), one Government Director and one Non-Official (Independent) Director. The Secretary (Shipping) will be the ex-officio Chairman of the Board and shall act as a non-executive Chairman.

The two FDs will consist of the Director (Finance and Admin.) and Director (Projects) of SDC. Directors of SDC shall be appointed as:

- The MD and the two FDs shall be appointed by the MoS through a Search-cum-Selection Committee chaired by the Cabinet Secretary, with the Secretary (Shipping), Secretary (DOPT) and an expert (to be nominated by the MoS) as its members. The MD shall have relevant experience in ports/highways/railways/urban and industrial development and project execution/project financing/risk management and portfolio management. The MD's remuneration will be fixed as per market-based salary levels.
- The Government Nominee and the Non-Official (Independent) Director, on the company's Board shall be appointed by the MoS. The Non-Official (Independent) Director shall be selected from among individuals competent and experienced in project planning and execution, financial management, shipping and maritime affairs, logistics planning, etc.
- For the purpose of incorporation, as a short-term measure, the MoS will nominate interim Directors of SDC, prior to the selection of the Directors.

Interim Directors will resign once the actual Directors have been selected/nominated.

## SDC team

The SDC working team will primarily be responsible for identifying projects, implementing them through agencies and tracking their progress.

**Managing Director:** The MD is responsible for all company functions. He liaises with the board and the MoS and ensures that the company functions on the principles decided by the Board. He works with the planning department and PMO and establishes the target and goals for each project. He reviews and evaluates the progress at each stage and informs the Board of any issues. He is also ultimately responsible for ensuring compliance with company policies and norms besides facilitating information flows between the various functions (Exhibit 53).

## EXHIBIT 46

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### Managing Director

#### 1. JOB DETAILS

- **Position Title:** Managing Director
- **Reports to:** Board of Sagarmala Development Company
- **Location :** Corporate office

#### 2. JOB PURPOSE

- Provide leadership and direction for Sagarmala Development Company, overseeing operations and formulating short, medium and long term strategy of SDC through active engagement with the Board and Ministry of Shipping

#### 3. KEY RESPONSIBILITY AREAS

- Set objectives for financial and operational targets for SDC in line with strategic plans developed by Ministry of Shipping
- Provide strategic advice and inputs to the Board to ensure the institutionalization of the right systems and policies to meet the company's objective while complying to all the statutory norms and regulations
- Provide leadership to the day to day operations of SDC while maintaining focus on the company's strategic goals
- Liaise with various industry bodies and develop relationships with key port personnel and officials from different line ministries (MoRTH, Railways, MoP&NG) etc
- Represent the company at all major external events and platforms
- Build strong and motivated subordinate teams by supporting direct reports in professional development; instructing and mentoring to develop required knowledge and skills for better performance and succession planning
- Manage and resolve conflicts between various departments to ensure smooth functioning of projects

#### 4. EDUCATION/EXPERIENCE

- **Minimum Qualification:** University degree in General Management/Engineering/Finance from a recognized university; MBA is a plus
  - **Minimum Experience:** 10+ years' experience preferably in relevant industry or function role; Minimum 3 years as head of another organisation
-



**Director (Finance and Admin.):** He oversees the sourcing and disbursement of funds, ensuring that ministry grants are received on time. He also plays an important role in negotiating with the project stakeholders to decide on SDC's equity in projects. He formulates the administration of the company's financial policies and developing long-term financial goals. He directs all key finance departments within the group (accounting, taxation, audit, AR/AP and treasury operations). He also identifies the financing route for the residual projects to be implemented directly by the SDC and opportunities for equity participation in projects being executed by the MoS, line ministries and central and state agencies (Exhibit 54).

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## EXHIBIT 47

### Director, Finance and Admin

#### 1. JOB DETAILS

- **Position Title:** Director, Finance and Admin
- **Reports to:** Managing Director
- **Location :** Corporate office

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#### 2. JOB PURPOSE

- Act as a key advisor and strategic partner to SDC's Board and MD on finance-related matters. Participate in development of strategic plans to increase profitability, mitigate financial risks and increase economic value.

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#### 3. KEY RESPONSIBILITY AREAS

- Oversee the formulation and administration of SDC's financial policies and developing long-term financial goals
- Support MD, Board of Directors and Senior Management Team in making strategic finance-related decisions
- Lead the development of annual financial and operating budgets and manage the finances of the firm
- Negotiate with stakeholders to decide on equity stake to be taken up by SDC in residual and PPP projects
- Steer and oversee development and approve finance-related guidelines, policies and procedures
- Confers with MD and other department heads to review achievements and discuss required changes in goals or objectives resulting from current status and conditions
- Directs all key finance departments within SDC i.e. accounting, taxation, payroll etc

#### 4. EDUCATION/EXPERIENCE

- **Minimum Qualification:** High ranking Chartered Accountant with additional ICWA, ACS etc qualifications a plus; Graduation and post graduation in finance and accounting preferred
- **Minimum Experience:** 5+ years' experience in Finance or General Management field; 2+ years in in progressive senior financial roles

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**Accounts Manager:** He is responsible for the actual disbursement of funds and maintaining accounts. He prepares reports that summarise and forecast company business activities and financial position in areas of income, expenses and earnings based on past, present and expected operations. He helps the Finance Head in the annual business planning process including projects and corporate projections on revenue, costs and synthesises the same into the organisational budget (Exhibit 55).

## EXHIBIT 48

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## Accounts Manager

### 1. JOB DETAILS

- **Position Title:** Account Manager
- **Reports to:** Director, Finance and Admin
- **Location:** Corporate Office

### 2. JOB PURPOSE

- Responsible for accuracy of books of accounts of SDC and adherence to accounting principles
- Prepare accurate and timely financial information for internal and external reporting
- To provide financial, clerical and administrative services to ensure efficient, timely and accurate payment of accounts under his or her control

### 3. KEY RESPONSIBILITY AREAS

- Standardise operations and create policies and procedures for accounts function
- Create and monitor a system of controls, procedures, and forms for the recording of investments in various projects
- Coordinate with Finance, head to ensure adequate liquidity by aligning funds disbursement dates with other operational needs
- Ensure timely and accurate preparation of required statutory financial reports and annual consolidated results in accordance with accounting standards
- Manages monthly closing of SDC financial records and posting of month end information

### 4. EDUCATION/EXPERIENCE

- Minimum Qualification: Degree in Accounting, Finance or related discipline; CPA or other professional qualification would be a plus
- Minimum Experience: 5+ years' ledger, accounting and treasury experience; 2+ years' in a supervisory position\

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**Payroll Manager:** His role is to lead and co-ordinate all HR activities relating to recruitment, planning, performance management cycle, training and development, policies, HR-related communication, activities for employee engagement and HR procedures. He is also responsible for salary disbursement to SDC employees (Exhibit 56).

## EXHIBIT 49

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## Payroll Manager

### 1. JOB DETAILS

- **Position Title:** Payroll Manager
- **Reports to:** Director, Finance and Admin
- **Location:** Corporate office

### 2. JOB PURPOSE

- Responsible for compensation and benefits across SDC
- Sets strategy and policies for performance management

### 3. KEY RESPONSIBILITY AREAS

- Oversee the development and refinement of pay administration policies and procedures for SDC employees
- Reviews national, regional and local compensation surveys and propose adjustments to compensation for SDC employees accordingly
- Ensures proper integration of salaries and benefits as part of the company's compensation package
- Be aware of emerging trends and as well as changes to legislations and requirements across different regions
- Develops and oversees implementation of performance evaluation systems and policies
- Assist in recruitment of future SDC employees and generate their monthly payslips/taxslips

### 4. EDUCATION/EXPERIENCE

- Minimum Qualification: Masters' / Graduate degree with strong emphasis on Human Resources is recommended
- Minimum Experience: 5+ years' experience in Human Resources, including 3 years in strategic Human Resources practices and/or compensation & benefits roles

**Strategy and Business Development Head:** He decides on the kind of projects the company will undertake and the overall company strategy. He meets with stakeholders at all the ports and the line ministries to identify projects. He identifies potential opportunities for new projects and develops a business case for all the projects to be taken up in a year (Exhibit 57).

## EXHIBIT 50

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### Strategy and Business Development Head

#### 1. JOB DETAILS

- **Position Title:** Strategy and Business Development Head
- **Reports to:** Managing Director
- **Location :** Corporate office with frequent visits to project locations

#### 2. JOB PURPOSE

- Develop and communicate SDC's strategic vision, identify projects and initiatives to drive growth and value creation. Lead projects in the pre-execution stages: (1) fund availability, (2) project initiation, (3) concept definition, (4) project definition - within the constraints of schedule, budget, and scope. Ensure realization of the strategic, operational and financial objectives set for the project

#### 3. KEY RESPONSIBILITY AREAS

- Initiate and drive business development, growth opportunities across SDC in conjunction with the board of directors and the senior management team
- Responsible for liaising with ports and government stakeholders to identify residual projects
- Translate MoS strategy into actionable set of initiatives and lead the development of a project business plan with revenue and cost side view of the project from the point of project conceptualisation till initial document preparation
- Liaise with internal and external stakeholders, including government authorities and JV Partners to obtain required permits and approvals for successful project execution
- Responsible for managing the reputation of the company across its wide stakeholder group and developing, leading and executing robust and fully-integrated communications that both promote and protect the reputation of SDC

#### 4. EDUCATION/EXPERIENCE

- **Minimum Qualification:** Masters/Graduate degree in general management, economics, engineering or other related field
- **Minimum Experience:** 5+ years' experience in General Management, Strategy, Business Development or Finance; Experience of working with multiple government stakeholders; Work in Port sector/Roads/Railways a plus

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**Communication and PR Manager:** He is responsible overall for enhancing the profile of Sagarmala and ensuring that the work done is effectively broadcasted in the media. He is responsible for appointing the PR agency and overseeing their work. He will develop new strategies, tactics, and plans to get wider alignment on the concept of Sagarmala, create a buzz around four or five large themes, ensure visibility of Sagarmala outside the ambit of the MoS and leverage new media for more impactful communication (Exhibit 58).

### Communications and PR Manager

#### 1. JOB DETAILS

- **Position Title:** Communications and PR Manager
- **Reports to:** Head of Strategy and Business Development
- **Location:** Corporate Office

#### 2. JOB PURPOSE

- Responsible for all internal, external and marketing communications for SDC
- Principle person responsible for promoting Sagarmala initiatives

#### 3. KEY RESPONSIBILITY AREAS

##### Corporate Communications:

- Responsible for corporate communications in promoting Sagarmala brand
- Create and manage relationships with a broad range of key stakeholders, both internal (by establishing champions and creating business partners across the network) and external

##### Strategic Planning:

- Develop a coherent and comprehensive communications strategy that support the overall strategic direction of Sagarmala
- Provide expertise and share knowledge on appropriate response to issues according to directions of Ministry of Shipping

##### External Communications

- Creates and manages channels, including social media, for engaging with audiences on Sagarmala story
- Direct and manage the company website and portal and lead the introduction of new social media channels
- Create an effective system for managing relationships with external communications consultants and partners such as advertising, creative and PR agencies

#### 4. EDUCATION/EXPERIENCE

- Minimum Qualification: : Masters' / Graduate degree with strong emphasis on Communications is recommended
- Minimum Experience: Experience in strategic planning, corporate communications, advocacy and stakeholder management, and business management

---

**Director (Projects):** He is responsible for predicting and planning the delivery of projects, completion of various stages and monitoring progress at the sites to ensure a timely completion. He plans, executes, and finalises projects according to strict deadlines and within budget. He oversees the development of transparent, regular (at least monthly) project progress reports. He ensures appropriate risk assessments, management plans and mitigation measures are in place for smooth project delivery. He also facilitates information flow between the actual execution work at sites and the management teams (Exhibit 59).

## EXHIBIT 52

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### Director, Projects

#### 1. JOB DETAILS

- **Position Title:** Director, Projects
- **Reports to:** Managing Director
- **Location :** Corporate office

#### 2. JOB PURPOSE

- Responsible for overall planning, construction, testing and handover stages to ensure project delivery within the set project cost, time and quality outcomes for SDC and non-SDC projects

#### 3. KEY RESPONSIBILITY AREAS

- Oversee the planning of construction schedules, costing and all related inputs of SDC and non – SDC projects being implemented by other agencies but identified under National Perspective Plan
- Plan, execute, and finalize projects according to strict deadlines and within budget. This includes acquiring resources and coordinating the efforts of team members and third-party contractors and consultants in order to deliver projects according to plan
- Overall accountability for outcomes set in the development business plans on all aspects of design and construction
- Review and evaluate tenders and proposals to ensure that the right vendor and contractor are chosen with a focus on timeliness and cost control
- Oversee the development of transparent regular (at least monthly) project progress reports to ensure rigorous construction planning and monitoring of all projects
- Oversee the community development fund manager to ensure that amount sanctioned under CDF is spent on projects that are aligned to Sagarmala's vision

#### 4. EDUCATION/EXPERIENCE

- Minimum Qualification: Preferably an engineer with a Masters/Graduate degree in general management
- Minimum Experience: 10+ years of experience in construction and handling contract execution; Led at least 2 projects of 100 Cr from start of construction to handover; Formal training in project management a big plus

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**Project Evaluation Manager:** He reviews drawings and technical specifications for the purpose to pinpoint potential constructability issues, deviations from industry norms and standards, customer requirements and commitments to customers. He works with the project team and relevant departments to create a project master program, identifying all parts of the projects, detailing design and construction milestones, summarising all activities (including those of the consultant, contractor and other specified direct material suppliers) (Exhibit 60).

### Project Evaluation Manager

#### 1. JOB DETAILS

- **Position Title:** Project Evaluation Manager
- **Reports to:** Director, Projects
- **Location:** Corporate Office

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#### 2. JOB PURPOSE

- Oversee preparation of investment documents and project proposals
- Responsible for DPR preparation of projects under scope of SDC and master plan preparation for CEZs

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#### 3. KEY RESPONSIBILITY AREAS

- Ensure preparation of preliminary studies for new concepts including the detail design and permitting of new projects
- Drive preparation of feasibility studies, including costs and timetable preparation for proposed capital projects
- Review and evaluate the DPR prepared by consultants to ensure quality and timely delivery of documents
- Review project technical specifications for the purpose of identifying potential issues and any deviations from norms
- Review project financial estimates including traffic studies, IRR calculations to identify projects that fit into SDC's gambit
- Ensure all local and central statutory requirements are taken into account for evaluating project feasibility
- Ensure complete compliance to document management process in accordance with processes followed at Government of India (specifically Ministry of Shipping)
- Champion the master plan preparation of coastal economic zones liaising with state industrial development corporations

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#### 4. EDUCATION/EXPERIENCE

- **Minimum Qualification:** Masters' / Graduate degree in Business Management; Architecture degree is a plus
- **Minimum Experience:** 5+ years management experience within contracting function; Worked on large scale projects

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**Project Bid Manager:** He formulates reviews and evaluates tenders and proposals to ensure that the right vendor and contractor are chosen, with a focus on timeliness and cost control. He oversees the drafting, evaluation, negotiation and execution of all construction contracts, sub-contracts and specialised construction contracts. He reviews and evaluates invitations to tender and proposals to ensure transparency and accountability in the process followed, while also selecting contractors and entering contracts which will help to reduce overall construction costs. In addition, he ensures compliance with company policies and norms while inviting tenders, releasing proposals and awarding contracts, etc. (Exhibit 61).

## Project Bid Manager

### 1. JOB DETAILS

- **Position Title:** Project Bid Manager
- **Reports to:** Director, Projects
- **Location:** Corporate Office

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### 2. JOB PURPOSE

- Oversee bid management process from project document preparation to actual start of construction

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### 3. KEY RESPONSIBILITY AREAS

- Oversee drafting, evaluation, negotiation and execution of contracts including bidders shortlisting, tenders, selection and award processes.
- Due diligence and vetting of local contractors/vendors and approve project contracts and changes in contracts.
- Review and evaluate invitation to tender and proposals to ensure transparency and accountability in the process followed while also selecting contractors and entering contracts which will help reduce overall costs
- Ensure compliance with company policies and norms while inviting tenders, releasing proposals and awarding contracts etc.
- Monitor and track the mobilization schedules of contracts in order to ensure achievement of project milestones agreed
- Ensure that the scope of work in the contract reflects the full scope of work to be executed on site and incorporates inputs from the site teams to limit out of contract costs and change orders
- Manage relationship with contractors and ensure adherence to agreed terms and conditions

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### 4. EDUCATION/EXPERIENCE

- Minimum Qualification: Masters' / Graduate degree in Business Management
- Minimum Experience: 5+ years management experience within contracting function; Worked on large scale projects

---

**Project Monitoring Manager:** He follows up with implementing agencies (line ministries, port trusts, state maritime boards, etc.) to track project status. He monitors and controls the schedule and generates relevant cash flows to assist in financial planning. In addition, he reports the status of individual projects on a monthly basis, identifies any gaps between the planned and actual completion schedule and updates the plan in accordance with the current status. He generates monthly reports on the development and construction status of each project in accordance with the planned timelines (Exhibit 62).

## EXHIBIT 55

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### Project Monitoring Manager

#### 1. JOB DETAILS

- **Position Title:** Project Monitoring Manager
- **Reports to:** Director, Projects
- **Location:** Corporate Office

#### 2. JOB PURPOSE

- Review and evaluate the SDC progress at each stage and inform the Projects, Head and senior management of any issues
- Identify any gaps between the planned and actual completion schedule of projects

#### 3. KEY RESPONSIBILITY AREAS

- Follows up with the implementing agencies (Line ministries, port trusts, state maritime boards etc) to track the projects for their status
- Generates monthly reports on the development and the construction status of each project in accordance to the planned time lines
- Manage and resolve conflicts between various stakeholders of projects to ensure smooth functioning of projects
- Conduct regular project review and highlight progress and performance to the senior management
- Inspect project sites to identify deviations from quality standards based on specifications, industry norms and standards
- Develop planning and micro-planning templates using the IT tool which are easy to use and help project teams identify issues

#### 4. EDUCATION/EXPERIENCE

- Minimum Qualification: Masters' / Graduate degree with strong emphasis on Project Management is recommended
- Minimum Experience: 5 years or more experience in senior planning and scheduling roles with at least 2 years of supervisory experience in planning and scheduling

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**Legal Supervisor:** He drafts, reviews and amends, as applicable, agreements, legal documents, legal correspondence, contracts and other legal terms and conditions for any business activity. He also ensures the quality of documents prepared for sanctions and approvals (Exhibit 63).

## EXHIBIT 56

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### Legal Supervisor

#### 1. JOB DETAILS

- **Position Title:** Legal Supervisor
- **Reports to:** Project evaluation and Project bid Managers (Dual reporting)
- **Location :** Corporate office

#### 2. JOB PURPOSE

- Drafts, reviews and amends, as applicable, agreements, legal documents, legal correspondence, contracts and other legal terms and conditions for any project undertaken by SDC

#### 3. KEY RESPONSIBILITY AREAS

- Assist project evaluation manager and project bid manager with the legal aspects of project documents, corporate governance and policies
- Advise on the litigation risks of taking up possible projects, providing preventive counselling with respect to the legal risks
- Offers guidance to business leaders on negotiation of claims and contracts
- Drive the creation of a portfolio of standardized legal contracts to support the projects taken up by SDC
- Assist with or monitor negotiations of team members with contract agreements and bid documents and proactively resolve escalated business and legal issues
- Ensure process efficiency and accurate and timely completion of deliverables
- Overall scope is broad and covers commercial/contractual issues, litigation/dispute management, employment/labor law matters, corporate law, regulatory compliance and proactive risk management advice & training

#### 4. EDUCATION/EXPERIENCE

- Minimum Qualification: JD, LLB or equivalent degree from an accredited law school
- Minimum Experience: 5+ years of legal experience gained in an infrastructure firm



**IT Supervisor:** He is responsible for implementing the project tracking IT tool at various ports, reviewing the tool, and handling other IT-related queries (Exhibit 64).

## EXHIBIT 57

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### IT Supervisor

#### 1. JOB DETAILS

- **Position Title:** IT Supervisor
- **Reports to:** Project monitoring, Manager
- **Location :** Corporate office

#### 2. JOB PURPOSE

- Ultimate global responsibility for all IT Systems and applications across the entire organization

#### 3. KEY RESPONSIBILITY AREAS

- Troubleshoot problems in the project monitoring tool and assist project monitoring manager in collating the data and generating reports
- Technically support the SDC's IT infrastructure and identify need for changes and/or enhancement to architecture
- Review servers, Storage, Networks, Backup and other aspects of IT infrastructure periodically and identify areas of improvement
- Works on special IT projects as needed
- Maintain and foster collaborative efforts with IT staff of Ministry of Shipping to ensure issues related to cyber security are taken care of

#### 4. EDUCATION/EXPERIENCE

- Minimum Qualification: Master/Graduate degree in Computer Science, Computer Engineering, or Information Management
  - Minimum Experience: 2+ years of experience in IT in a reputed firm
- 

**Community Development Fund Manager:** He manages the Community Development Fund, from the identification of projects to the disbursement of funds. He co-ordinates with other government ministries to ensure that funds do not get duplicated to programmes outside the ambit of SDC. He suggests new schemes to train the coastal community with the right set of skills by undertaking skill-gap studies, etc. He liaises with the state government's skill development programmes and ensures timely execution of beneficiary projects taken up under the Community Development Fund (Exhibit 65).

## Community Development Fund Manager

### 1. JOB DETAILS

- **Position Title:** Community Development Fund Manager
- **Reports to:** Director, Projects
- **Location :** Corporate office

### 2. JOB PURPOSE

- Overall accountability, responsibility and authority for the management of CDF in accordance with the strategic plan of SDC and MoS. The CDF Head spearheads initiatives for coastal communities and leads skill development programmes.

### 3. KEY RESPONSIBILITY AREAS

- Obtaining the approval of the Board, implementing the initiatives identified for funding under CDF and keeping the MD informed in a timely manner of the progress of the initiatives
- Instituting transparency in implementation of initiatives and projects identified under National Perspective Plan for development of coastal communities and provide the highest level of service to the public.
- Partnering with other national level schemes and foundations to understand the best practices for executing such type of programmes
- Manage the Community Development Fund from identification of projects to disbursement of funds.
- Launch new schemes to train the coastal community with the right set of skills by undertaking skill gap studies etc.
- Liaison CDF with state government's skill development programmes and ensures timely execution of beneficiary projects taken under CDF

### 4. EDUCATION/EXPERIENCE

- **Minimum Qualification:** Preferably an engineer with a Masters/Graduate degree in general management
- **Minimum Experience:** 5+ years' experience of working in a non-profit setting; led roll out of government skill development programmes in the past; work in port sector is a plus

## **6.2 FINANCIAL PLAN**

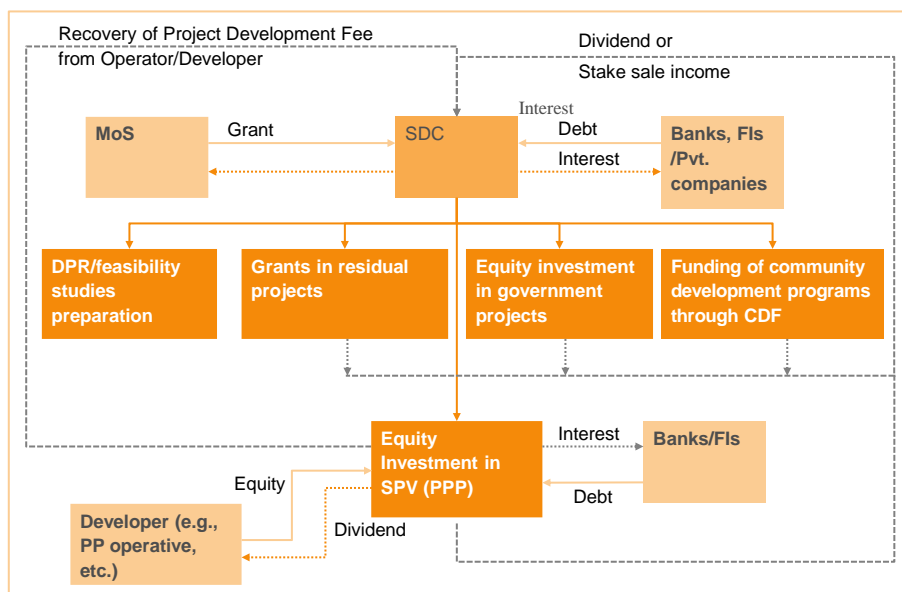
The primary funding source for SDC will be equity/grants from the MoS. The SDC may also borrow money from banks/ financial institutions and raise capital through various financial instruments.

## **6.3 Execution model of projects taken up by SDC**

Residual projects or part financial projects undertaken by the SDC could follow the give execution models (Exhibit 66):

- **Grant projects:** Grants would be provided for projects which have limited revenue stream. No separate SPV is usually needed for such projects—it is usually paid to the concerned implementing agency for execution of specific works.
- **Equity in government projects:** For larger projects and those having some revenue streams, the SDC can take an equity stake in the project SPV. The co-investor in the project would be other central or state government entities. At a later stage there may be potential to monetise the project by bringing in external equity or private developers.
- **PPP projects undertaken by private developers:** These will primarily be larger projects where there is a clear demarcation of revenue streams and the majority control of the project is with a private developers. Most of these projects will have sound financial returns, with or without VGF funding. Private sector design efficiencies will also be leveraged in this project.
- **Innovative financing:** If at any stage an appropriate model (as per project suitability) has been devised by SDC, it will be adopted after due diligence and approval by the Board.
- **Community development fund:** Most community development projects funded by the CDF involve non-capital spend (such as skill development). Once again there is no revenue stream from this project. Such projects will typically be implemented by government agencies through relevant specialist agencies. In some cases small size infrastructure works may be needed which will be implemented in a manner similar to Grants.

**Funding and investment mechanism of SDC**



**6.4 Future projections**

The funding available from the MoS to SDC may be around INR 1,000 cr per annum within a period of four to five years. It is to be noted that this amount also includes funds to be disbursed for the community development programmes<sup>8</sup>.

The following analysis assumes that the SDC shall identify over 20 new projects every year from various sectors/states to take up for project development activities. As most of these will be residual projects, the average cost of these projects has been assumed at INR 80 cr.

**Assumptions**

<b>Project Development</b>	
<b>Ratio of PPP able/ non-PPP able projects</b>	20:80
<b>Debt equity ratio in PPP projects</b>	70:30
<b>Equity taken by SDC in PPP projects</b>	26% of total equity
<b>SDC share in a non-PPP project</b>	40% of total project cost

<sup>8</sup> The funding available from the MoS for 2016–17 is INR 450 cr

<b>Revenue from a non-PPP project in a financially constrained port</b>	12% ROE ramped up in 3 years post construction
<b>Revenue from last-mile road/rail project</b>	10% ROE ramped up in 4 years post construction
<b>Revenue from other projects (tourism, passenger jetty, Ro Ro)</b>	5% ROE ramped up in 3 years post construction
<b>Depreciation time</b>	10 years
<b>Average salary</b>	INR 15 lakh per annum
<b>Rent per month</b>	INR 1 lakh
<b>Incorporation expenses</b>	INR 1 cr p.a.
<b>Other expenses</b>	INR 1 cr p.a.

It is further assumed that equity participation by SDC is required in projects which are above a certain threshold project cost. Considering a D/E ratio of 1:1 and that the government would like to keep the controlling stake during the initial years, the SDC shall take up about 26 per cent of equity investment in these projects. The ratio of state government/central ministry's equity and that of the private player, if any, will depend upon the project contours. SDC's equity will also be disbursed in the first two years of SDC taking up the project.

Yearwise Projects									
Year	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
Projects taken up by SDC	12	20	25	30	30	30	30	30	30
Total project cost	960	1,600	2,000	2,400	2,400	2,400	2,400	2,400	2,400
PPP Projects	2	4	5	6	6	6	6	6	6
Total equity in a PPP project	55	77	108	132	144	144	144	144	144
SDC equity in a PPP project	14	20	28	34	37	37	37	37	37
Non-PPP Projects	10	16	20	24	24	24	24	24	24
SDC equity in non PPP projects	294	410	576	704	768	768	768	768	768
Total SDC equity	309	430	604	738	805	805	805	805	805
Community Development Fund	100	100	100	100	100	100	100	100	100

## 6.5 Financial statements

### Income Statement

	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
<b>I. INCOME</b>									
Non-PPP projects (financially constrained port)	0.00	0.70	3.69	10.24	20.04	33.33	49.98	68.64	87.97
Last-mile road projects	0.00	0.88	5.05	14.45	31.17	55.00	85.61	121.85	161.12
Other projects (tourism, passenger jetty, Ro Ro)	0.00	0.53	2.54	6.79	13.12	21.66	32.29	44.13	56.39
<b>Total income</b>	<b>-</b>	<b>2</b>	<b>11</b>	<b>31</b>	<b>64</b>	<b>110</b>	<b>168</b>	<b>235</b>	<b>305</b>

	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
<b>II. EXPENDITURE</b>									
Depreciation	20	47	85	132	183	234	285	336	387
Number of employees	5	13	13	13	13	13	13	13	13
Total salary outflow	1	2	2	2	2	2	2	2	2
Office rental	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
General expenses	1	1	1	1	1	1	1	1	1
PDC	23	-	-	-	-	-	-	-	-
Incorporation expenses	1	-	-	-	0	0	0	0	0
<b>Total</b>	<b>45</b>	<b>50</b>	<b>88</b>	<b>135</b>	<b>186</b>	<b>237</b>	<b>288</b>	<b>339</b>	<b>390</b>
<b>PBDIT</b>	<b>-45</b>	<b>-48</b>	<b>-77</b>	<b>-103</b>	<b>-122</b>	<b>-127</b>	<b>-120</b>	<b>-104</b>	<b>-85</b>

Depreciation_Roads	14.67	35.07	63.76	98.83	137.09	175.35	213.61	251.87	290.13
Depreciation Other	5	12	21	33	46	59	71	84	97

The financial analysis suggests that while the SDC will create a host of investment opportunities for different sets of investors and developers, it should not expect short-term returns on investment given the nature of these projects.

### Cash-flow statement

	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
<b>Source of funds</b>									
Grant from Ministry of Shipping	350	550	750	900	900	900	900	900	900
Community Development Fund	100	100	100	100	100	100	100	100	100
Revenue	0.00	2.11	11.27	31.49	64.34	110.00	167.87	234.62	305.48
<b>Total</b>	<b>450</b>	<b>652</b>	<b>861</b>	<b>1,031</b>	<b>1,064</b>	<b>1,110</b>	<b>1,168</b>	<b>1,235</b>	<b>1,305</b>

	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
<b>Application of funds</b>									
SDC equity	309	430	604	738	805	805	805	805	805
Coastal community development programmes	100	100	100	100	100	100	100	100	100
Expenses	26	3	3	3	3	3	3	3	3
<b>Total</b>	<b>435</b>	<b>533</b>	<b>707</b>	<b>841</b>	<b>909</b>	<b>909</b>	<b>909</b>	<b>909</b>	<b>909</b>
<b>Net cash flow</b>	<b>15</b>	<b>119</b>	<b>154</b>	<b>190</b>	<b>156</b>	<b>201</b>	<b>259</b>	<b>326</b>	<b>397</b>

The SDC is envisaged to remain a project development vehicle, creating infrastructure investment opportunities for a diversified set of investors. This implies that it can explore the option of part exit in favour of financial institutions and infrastructure companies interested in the project pipeline once SDC's operations are streamlined and substantial funds have been invested.

## **6.6 DRAFT GUIDELINES FOR DISBURSEMENT OF FUNDS UNDER THE SAGARMALA PROGRAMME**

Under the Sagarmala Programme, SDC can take equity in projects and SPVs formed for the purpose of implementation of an infrastructure project—port infrastructure, connectivity infrastructure or other related infrastructure which will assist in enhancing the efficiency of the port evacuation or port-led development initiatives.

The MoS has specialised entities under its ambit for implementation of rail projects, projects related to development of waterways and port trusts which have the authority to undertake infrastructure projects within their respective ports. However, maritime states/UTs manage to operate/develop minor ports through the state maritime boards or port department. The number of minor ports has also been developed and is being operated by private entities or under the PPP model. Port infrastructure, connectivity and any other port-led development for non-major ports can also be funded under the Sagarmala Programme—which necessitates the formation of the following guidelines for taking the equity in projects and SPVs:

- Funds will be released for projects that are related to port connectivity, efficiency improvement and port related infrastructure.
- The preferred mode of working with the state government for port-related projects will be through the state maritime board. State maritime boards should be made accountable to MoS.
- Maximum financial assistance to any project is limited to 50 per cent under the Sagarmala Programme.
- Funds will be sanctioned for projects with project documents (TEFR/DPR) with the financial analysis duly approved by the competent appraising and administrative authorities.
- The project will be implemented through an SPV incorporated for the purpose of implementation, operation and management of the project.
- Projects with high social impact like a fishing harbour, skill development, etc., can be funded for implementation under the EPC mode. Maximum financial assistance to these projects will also be limited to 50 per cent only (from all sources/government schemes). Skill development of the coastal community will also be funded under the Sagarmala Programme either completely or through a convergence scheme with any other related ministry. Such a project will subsequently be funded through the CDF after its inception.
- Funds released for a project being proposed by any other ministry for funding assistance after its appraisal and approval cannot be higher than the approved limited under the Central Sector Scheme (CSS) to ensure a convergence of scheme under Govt. of India.

- Projects for which SPV can be/have been created will be given preference for the disbursement of funds.
- SDC can also take equity in the umbrella SPV—either existing or newly incorporated—for the development of port connectivity and port-related infrastructure, provided it has been duly approved by the competent authority.
- Priority funding shall be given to projects which may be implemented immediately, or to big-ticket projects like new port development which ensure healthy return on equity over a period of five to seven years. Realisation of value in case of equity disinvestment will also be much more in these large projects. It is important to have a framework for taking equity in existing and newly formed SPVs.
- SDC can take up an equity contribution in existing as well as new SPVs formed by states/maritime boards/ports, etc. provided that these SPVs have projects that are ready for implementation. This is important as SDC's revenue will depend on the revenue of these projects.
- SDC shall take only token equity to initiate/assist with project development in those SPVs that are scouting for projects or have projects under development stage only.
- For an umbrella SPV level, it will always be difficult to ascertain the revenue flow from a particular project. Separate accounting for each project will therefore be an important clause in the SPV contract document.
- For each SPV, “waterfall model” for the priority of revenue sharing should be finalised and placed as an annexure to the SPV contract document.
- Participation in the umbrella SPV will not restrain SDC from taking part in any other SPV by any other state agency for the implementation of their sector-specific projects.



## 7. Actionable roadmap

### 7.1 FINANCING

Topic	Suggested action points
<b>Dollar-denominated loans</b>	Learning from examples of JNPT and Mundra port; this can be emulated across the other 11 major ports in the country with the potential of raising around INR 18,000 cr cumulatively based on present value. Specifically, during FY2014, the Kolkata Port Trust and Paradip port had dollar-denominated revenues of more than INR 250 cr, making them the top contenders for raising the loans.
<b>Project partnership with development banks</b>	Indian major ports could also partner with development banks to arrange for funding of greenfield ports, port connectivity and port modernisation projects. The funding is available as a grant or a long-term loan which can enable development.
<b>Sub-programmes with an earmarked budget</b>	To enable line ministries prioritise the implementation of projects and streamline co-ordination and monitoring of the Sagarmala Programme, the creation of a sub-programme under each key line ministry, especially Railways, Road Transport and Highways and DIPP, with a nodal officer within the respective ministry responsible for reporting and delivering these projects has been proposed. It is also suggested that a dedicated earmarked budget be carved out for implementation.

## 7.2 PPP

Topic	Suggested action points
<p><b>Potential of state-owned ports/berths for PPP</b></p>	<p>As per an initial analysis, around 10 berths have the potential to undergo PPP in the next five to seven years through revenue sharing models.</p> <p>The following three models may be considered for privatising the identified ports/berths, based on their suitability:</p> <ul style="list-style-type: none"> <li>■ <b>Viability gap funding (VGF):</b> This model can be used if revenue from the berth is inadequate to service the capital expenditure. In such cases, VGF can be provided by the centre to make the berth viable for PPP investment. This is commonly availed in BOT (Toll) projects of NHAI</li> <li>■ <b>Annuity:</b> This model can be used to remove traffic and revenue risk for PPP projects. In such cases, (a) the port authority can pay a fixed semi-annual fee to the concessionaire to compensate for capital cost and operational expenses, along with an assured per cent age of returns. (b) Also, the concessionaire will not have the right to any charges levied on cargo. A variation of this model is the Hybrid Annuity Model of NHAI, wherein 40% capital support is provided and annuities are replaced by fixed cash flows that mirror developer cash out flows</li> <li>■ <b>Management contract:</b> In case a berth has no potential for PPP concession, it can enter into an O&amp; M contract for operations management with O&amp;M fees charged annually</li> </ul>
<p><b>Making PPP more effective</b></p>	<p><b>Balanced risk-sharing between parties</b></p> <ul style="list-style-type: none"> <li>■ The concessioning authority could share the risk of incorrect or inadequate detailed project report if it results in cost and time overruns for the concessionaire</li> <li>■ Delays in setting up road/rail connectivity could be compensated both through extending the concession period and recovering the damages payable</li> </ul>

Clauses may be introduced to renegotiate the revenue share payable to the concessioning authority, applicable in cases where traffic is below forecast consistently for five years due to reasons beyond the control of the concessionaire

**Flexibility in CAs:**

- CAs could include a provision for renegotiation under specified cases
- The assumptions for project design will need to be outlined clearly so that any changes over the project lifecycle can be identified and used as a trigger for renegotiation
- The cap on amendments might be increased from 5 per cent of the total project cost (TPC) for a single “change of scope” to 10 per cent and cumulatively during the concession period from 20 per cent of TPC to 40 per cent
- A process could be established to review clauses in a timely manner in the light of changing market scenarios

**Facilitating more efficient execution**

- Ensure accuracy and comprehensiveness in DPR preparation
- Set up a Centre of Excellence in PPP to assist with policy implementation and regulatory issues; enable research and development of sophisticated models in PPP; and provide training for government authorities in PPP project management
- Set up a Facilitation Committee for inter-ministerial issues to help with the alignment between state and central governments and different ministries and also to assist with timely clearances
- Adopt project management best practices such as:
  - Obtaining EC before issuing requests for proposals
  - Ensuring that the majority of land is available before issuing RfPs and that the remaining

	<p>land is made available before award of contract</p> <ul style="list-style-type: none"> <li>■ Adopt best practices learnt from PPPs in highways such as: <ul style="list-style-type: none"> <li>– A policy on one-time fund infusion by the NHAH for languishing projects (on a case-to-case basis)</li> <li>– Rationalised compensation to concessionaires for delays which were not under the scope of activities covered by them prioritising these various initiatives can transform the way PPPs operate in the ports sector</li> </ul> </li> </ul>
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### 7.3 POLICY RECOMMENDATIONS

Topic	Suggested action points
<b>Streamlining Customs processes</b>	<ul style="list-style-type: none"> <li>■ Reduce manual intervention by: <ul style="list-style-type: none"> <li>– Developing a robust Electronic Signature (ES) module at the ICE GATE for submission of the hard copy</li> <li>– Activating all modules of ICE GATE, especially generating of rotation number and port clearance</li> <li>– Making provisions for submitting documents online with access to all concerned authorities including different ministries, regulators and ICD operators. Eventually move towards a port community system, e.g., the HAROPA system developed by SOGET in France, with integrated access to shipping lines, port authorities, the marine department and Customs and traders</li> <li>– Ensuring qualified and committed manpower and infrastructure with Directorate General Systems in the Central Board for Excise and Customs (CBEC) to ensure robust automation of Customs clearance procedures</li> </ul> </li> <li>■ Classify fields into sensitive and non-sensitive, with the provision for modification of non-</li> </ul>

	<p>sensitive fields online without any permission from Customs or the need for resubmission</p> <ul style="list-style-type: none"> <li>■ Use OCR technology to avoid paper form (Form 13) submission while still allowing tracking of vehicles and containers in and out of ports</li> </ul> <p>Going forward, coastal and EXIM cargo should not be subject to the same rules for scrutiny and preference. The benchmarking should be done based on international examples, such as the Port of Antwerp, where coastal and EXIM cargo are segregated in a manner similar to airports.</p>
<p><b>Coastal regulatory zone policy</b></p>	<p>Coastal regulations are currently followed indiscriminately and are applied to both East and West coasts with no differentiations on the basis of geography and severity of cyclonic activities. It is, therefore, recommended that CRZ policies are revisited on the basis of occurrences of tidal activity.</p>
<p><b>Port land allocation policy</b></p>	<p>Based on the criteria followed by international ports, it is recommended that the selection of investors for industrial development of port land in India may include total investment proposed, direct employment generated and environmental initiatives (no weightage in proposal) offered. The selection will be done on the basis of the weight awarded to a particular parameter:</p> <ul style="list-style-type: none"> <li>■ Incremental cargo volume generated is given 50 per cent weightage</li> <li>■ Five-year fixed assets investment: (a) Plant and machinery; (b) Building and Civil, is given 35 per cent weightage</li> <li>■ Direct employment generated, given 15 per cent weightage</li> </ul> <p>In the proposed policy change, the concession fee or lease payment for land parcels in the industrial zone will be a fixed market-linked fee with no premium or bidding. The minimum rate will be benchmarked to current rates in the nearest industrial centre under a particular state industrial development corporation, e.g., SIPCOT and MIDC. Other factors to be</p>

	considered for final land rates will include location in the industrial zone and present condition of the site.
<b>Cabotage law</b>	<p>The government has proposed an exemption period limited to five years for specialised vessels, such as Ro-Ro, hybrid Ro-Ro, Ro-Pax, pure car carriers, pure car and truck carriers, LNG vessels and over-dimensional cargo or project cargo.</p> <p>Certain types of vessels and cargo will also be excused from extra taxes. These include specialised vessels handling EXIM and empty containers on the east coast between and including Kolkata and Chennai. Finally, additional taxes will not be levied on vessels carrying over 50 per cent containers bound for transshipment.</p> <p>Other incentives will also be introduced to compensate the industry, including coastal berths scheme, another scheme for incentivising modal shift of cargo and exemption of duty on bunker fuel for domestic flag carriers.</p>
<b>TAMP</b>	<ul style="list-style-type: none"> <li>■ Completely eliminating port-sector regulation and reviewing the role of TAMP</li> <li>■ Migrating all terminals in ports to a common tariff regime, possibly the latest regulations, and fix tariff ceilings for key commodities by port once and for all, with changes based only on inflation indexation thereafter.</li> </ul>
<b>Formation of coastal shipping cell</b>	<p>Each major port must work towards establishing a dedicated coastal shipping cell which could govern the dedicated coastal berths, discharge and unload of coastal cargo separately and have MoUs with shipping services and providers which can run services for homogenous cargo items with origination and destination specific to the concerned port.</p>

## 7.4 PORT-LED INDUSTRIALISATION

Topic	Suggested action points
<p><b>Interventions/policy changes to be initiated by the government</b></p>	<ul style="list-style-type: none"> <li>■ Integrate manufacturing locations with social and connectivity infrastructure:           <ul style="list-style-type: none"> <li>– Access to land, skills, social facilities, urbanisation and an industrial base is important to gain momentum quickly. Most successful programmes kick off with “pilot” CEU equivalents in established manufacturing areas, with existing, large container ports where land is available. For example, Shenzhen’s proximity to Hong Kong helped attract manufacturers from the region, giving it a strong start</li> <li>– CEUs will be set apart by their strong integration with ports. The master plan of the CEU could fully integrate it with the port through a seamless physical connectivity and also through documentation and IT systems. For example, the CEU could be a part of the Port Community System, with Customs Bonded status similar to SEZs, CFS’ and ICDs</li> <li>– An integrated master plan, which includes external infrastructure and port connectivity, needs to be developed for each CEU. The master plan could provide for urban access and world-class social infrastructure to enable expatriate talent flow</li> </ul> </li> <li>■ Create land banks and leverage existing land parcels:           <ul style="list-style-type: none"> <li>– Land acquisition is easier for around 500 to 1000 acres; this needs to be balanced with the minimum scale for identified industry clusters</li> <li>– States can be incentivised to acquire land through a Challenge Fund wherein the Centre makes equity contributions to eligible projects and individual states contribute land as equity</li> <li>– Existing land banks with central, state and private sectors can be leveraged to circumvent the time-consuming process of land acquisition</li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>■ Offer special administrative dispensation: <ul style="list-style-type: none"> <li>– Based on benchmarking with Chinese and other SEZs, a special dispensation could be created for approved CEUs under each CEZ that result in “Ease of Doing Business” metrics, comparable with world class standards. Some critical elements include approval and clearance processes, inspections, labour regulations, fiscal incentives and currency exchange and repatriation</li> </ul> </li> </ul>
<p><b>Nodal agency for CEZs</b></p>	<p><b>Inter-ministerial committee for CEZs</b></p> <p>The formation of an inter-ministerial committee is suggested for implementing the CEZ programme. This proposed committee will comprise the Ministries of Commerce (DIPP), Shipping and Finance (Expenditure, DEA and Revenue), Railways and Road Transport and Highways. Concerned state governments and line ministries responsible for key bulk industries, such as chemicals and fertilisers, petroleum and natural gas, power, steel and cement could be special invitees.</p>
<p><b>Industrial marketing cell dedicated to CEZs</b></p>	<p>It will be best to have geography-focused teams that can prioritise relationship-building with the relevant priority investors or tenants and government agencies. It is suggested that an external consultant be hired on a retainer basis who can develop a roadshow and a branding campaign for the CEZ programme.</p> <p>The efforts to attract investors for port-led industrial development can focus on four strategic levers:</p> <ul style="list-style-type: none"> <li>■ Forums/events/exhibitions: Organise and participate in exhibitions, trade fairs and other events, with the help of cell representatives, to improve visibility and increase networking opportunities</li> <li>■ International offices for client development: Marketing cell representatives should regularly interact with potential investors and key stakeholders through international offices and frequent visits to those offices</li> </ul>



	<ul style="list-style-type: none"> <li>■ Key account management: Create dedicated teams for key existing and potential clients to track and understand their future plans and potential opportunities</li> <li>■ Media advertisements: Conduct targeted promotions in well-read, reputed and relevant publications, choosing the right placement and timing for maximum impact</li> </ul>
<p><b>Ease of doing business</b></p>	<ul style="list-style-type: none"> <li>■ Simple policy and compliance regime: <ul style="list-style-type: none"> <li>– Move from a “prescriptive” to a “compliance” regime for contracting and procurement</li> <li>– Institutionalise a mechanism to issue notices prior to the implementation</li> <li>– Leverage technology to remove overlaps and speed up compliance</li> <li>– “Learn by doing” using accelerators to simplify policies</li> </ul> </li> <li>■ Global supply-chain competitiveness: <ul style="list-style-type: none"> <li>– Streamline trade clearance processes, that is, ensure implementation through a risk based model</li> <li>– Enable participation in trade facilitation schemes</li> <li>– Rapidly adopt global product standards and best practices</li> </ul> </li> <li>■ Accessible and responsive governance: <ul style="list-style-type: none"> <li>– Appoint a secretary-level empowered nodal officer for the top five investment sources or industries</li> <li>– Transform the government’s project management and execution capabilities</li> <li>– Develop specialised talent and conduct rigorous performance management</li> </ul> </li> </ul>

## 7.5 INSTITUTIONAL STRUCTURE

Topic	Suggested action points
<p><b>Institutional structure for delivering CEZ master plan</b></p>	<p>A separate development entity needs to be created for the preparation and implementation of the master plan for each CEZ. This includes the identification and project preparation of industrial clusters and coastal economic units that are within or proximate to ports. In this sense, the programme could be driven by DIPP with the help of the SDC. The latter can bring in port focus along with strategic land parcels near ports. The DIPP can contribute in its institutional capacity in developing industrial corridors</p>
<p><b>Immediate action points for CEZ development</b></p>	<ul style="list-style-type: none"> <li>■ Regulatory and governance enablers:           <ul style="list-style-type: none"> <li>– Include CEZs under DIPP/NICDA programme; all 4 pilot CEU’s can be kick started</li> <li>– All other identified CEZ’s should be taken up parallel by the relevant states</li> <li>– Enter into shareholders’ agreements with key states along the lines of DMIC</li> <li>– Amend the SEZ Act to include CEUs</li> <li>– Empower SPVs for land acquisition</li> </ul> </li> <li>■ Launch of first phase (i.e., priority CEZ projects)           <ul style="list-style-type: none"> <li>– Master plan for specific phases</li> <li>– Budgetary support and approval from relevant bodies</li> </ul> </li> </ul>

## 8. Annexure to the report

### 8.1 CASE STUDIES OF MAJOR INDUSTRIAL DEVELOPMENTS IN INDIA

#### 8.1.1. Sri City, Andhra Pradesh

Sri City is a privately owned and developed 7,000 acres integrated township comprising SEZ, FTWZ and DTZ areas and support facilities. It is located in Andhra Pradesh. The following table reflects its major features.

Currently, Sri City is under development and partly operational. Major tenants include Alstom, Kobelco, Lavazza, Control Components Inc, Amphenol, Venture, BFG, Al-Reyami/Rockworth.

#### Sri City: An overview

<b>Total area</b>	~ 7,000 acres
<b>Nearest city</b>	Chennai (55 km)
<b>Nearby highway</b>	NH5/Chennai–Kolkata Highway (adjacent)
<b>Proposed nearby infrastructure</b>	Chennai–Bangalore Industrial Corridor
<b>Project details</b>	Integrated township comprising SEZ, FTWZ and DTZ areas and support facilities such as residential, commercial and social infrastructure.
<b>Start date</b>	2008
<b>Land percentage for industries</b>	~70%
<b>Target industries</b>	Automotive, Engineering, Apparel and Fashion, Electronics H/W, Pharma, Food Processing, Renewable Energy, IT/ITES, Logistics and Warehousing, and other eco-friendly industries.
<b>Target population upon completion</b>	150,000 (employment) 450,000 (resident population)

#### Overview of land usage

Approx. 5,000 out of the total 7,000 acres in Sri City is intended for different industrial developments under SEZ, DTA and multiple use zones.

#### Key success factors

The following factors have been important in ensuring the success of Sri City:

■ **Product offering:**

- Developed infrastructure: Common infrastructure such as internal roads and power and water supply are in place
- Low cost land: Sri City has been able to offer industrial land at much cheaper rates compared to competing locations in Chennai
- Single window clearance for approvals: Sri City management acts as the nodal agency and co-ordinates the approval process with the Government on behalf of its clients

■ **Location and connectivity:**

- Multi-modal connectivity: Sri City is well connected by road (NH5, Tada–Tirupati Road), Rail (Tada station at 800 m) and air (Chennai and Tirupati).
- Krishnapatnam port: Proximity to the Krishnapatnam port has given Sri City an advantage over Chennai. The Krishnapatnam port currently has handling capacity of 25 mn tonnes, which on completion by 2020 will increase to 100 mn tonnes. Chennai port currently has a capacity of 55 mn tonnes, but high demand leads to delays.

### **Challenges and learnings**

Sri City has also had to overcome many challenges during the past eight years, such as:

■ **Economic slowdown during 2008–09:**

- The global financial slowdown in 2008–09 occurred as Sri City was being launched and severely slowed down tenant interest in such developments
- However, with backing from private equity funding, Sri City was able to focus on developing the infrastructure
- This meant that once the demand picked up later, Sri City was able to market itself better, with ready infrastructure

■ **Lack of skilled human resources in the vicinity; social infrastructure lacking to attract them as well:**

- Currently, skilled resources for the operational units in Sri City, especially for management roles, is being sourced from Chennai and Nellore
- Lack of organised residential and social infrastructure, e.g., shopping, healthcare, education etc., in the vicinity has held back employee interest
- Sri City is currently focusing on improving the residential and social infrastructure

### 8.1.2. Mahindra World City, Chennai, Tamil Nadu

Mahindra World City (MWC) Chennai is India's first integrated business city, established as a PPP venture between the Mahindra Group and the Tamil Nadu Industrial Development Corporation (MIDCO). It is spread across roughly 1,550 acres in Chengalpattu, about 60 km from Chennai. Currently, more than 60 industrial customers (including Infosys, Wipro, BASF, Renault-Nissan, BMW, TVS Group and Capgemini) have been confirmed with over 50 being currently operational. About 37,000 people are employed and 700 families reside within MWC Chennai.

Current status: Currently operational; 95% industrial land leased, residential and social developments ongoing

#### Mahindra World City, Chennai: An overview

<b>Total area</b>	1,550 acres
<b>Nearest city</b>	Chennai (60 km)
<b>Nearby highway</b>	NH45, Chennai–Trichy Highway
<b>Proposed nearby infrastructure</b>	Peripheral Ring Road
<b>Developer</b>	Mahindra World City (MWC) Chennai is a Public Private Partnership between the Mahindra Group (89%) and TIDCO (A Government of Tamil Nadu undertaking, 11%)
<b>Start date</b>	2002
<b>Land percentage for industries</b>	~75%
<b>Target industries</b>	IT, Auto ancillary, Textiles
<b>Target population upon completion</b>	~ 8,000 families

#### Overview of land usage

MWC Chennai offers four products for industrial and residential use—sector specified SEZs, ready-to-move office space, domestic tariff area and residential area (Exhibit 67)

## EXHIBIT 60

### Mahindra World City Chennai offers 4 products for industrial and residential use

1	<b>Sector specified SEZs</b>	<ul style="list-style-type: none"> <li>420 acres dedicated to three sector specific SEZs with dedicated zones for IT (services and manufacturing), Auto ancillaries, and Apparel and fashion accessories</li> <li>Tax benefits offered to units in SEZs</li> </ul>
2	<b>Ready to move office space – Cybervale</b>	<ul style="list-style-type: none"> <li>A technology park, developed in partnership with Ascendas, with 1 Mn sq. ft. office space spread over 4 buildings spread over 18.5 acres</li> <li>Four companies, including Tech Mahindra, Mindtree, Helios and Matheson and Renault-Nissan have taken up the entire space</li> </ul>
3	<b>Domestic tariff area</b>	<ul style="list-style-type: none"> <li>A 423 acre area with multiple tenancy formats, plug and play infrastructure, well connected road network and fail safe utilities to support any line of business</li> </ul>
4	<b>Residential space</b>	<ul style="list-style-type: none"> <li>A 289 acre area planned to support ~8000 families across various segments with residential space and other social infrastructure which includes schools, hospitals, hotels, clubs, parks, community center etc.</li> </ul>

SOURCE: Press search; MWC Jaipur website

Approximately, 75 per cent of the land area in MWC, Chennai is dedicated towards industrial zones—SEZ (IT, Apparel or Auto) and Domestic Tariff Area (Exhibit 68).

## EXHIBIT 61

### Overview of land usage – ~75% of the land area in Mahindra World City is dedicated for industrial activity

Area	Acres (% of total)	Leased (%)	Details	Key tenants
IT SEZ	279 (25%)	100%	Houses 16,000 software professional across 8 big names in IT industry	Capgemini, Infosys, Mindtree, Wipro
Auto SEZ	93 (8%)	100%	SEZ harnesses natural advantages of the location being in proximity of a port	MARUDAS ENGINEERING INDUSTRIES PRIVATE LIMITED, TIMKEN, TVS
Apparel SEZ	51 (4%)	100%	A clean and green space with the best infrastructure for this industry	Hangers PLUS, ROVERCO, LINEA FASHION, Capella Fashion
Domestic tariff area	423 (37%)	89%	Conceived to cater to MNCs interested in setting up business in India	BMW, Mahindra, Parker, Ingersoll Rand
Residential and social infrastructure	289 (25%)	10% <sup>2</sup>	Social infrastructure to support 8,000 families	
<b>Total</b>	<b>1,135<sup>1</sup></b>			

1 Out of total land area of 1,558 acre, the saleable/leasable area is 1,135 acre 2. 700 units out of total expected 8,000 units have been sold

SOURCE: Press search, MWC website, Investor presentation

## Key success factors

The following factors have been vital in ensuring the success of MWC Chennai:

### ■ **Partnership with the government:**

- MWC Chennai was developed as a PPP venture between the Mahindra Group and TIDCO
- This helped in accelerating the approvals and clearances process for the city as well as for individual tenants
- The Tamil Nadu government offered incentives to BMW (one of the early key tenants) to deter the automaker from going to Maharashtra

### ■ **Contracts were designed to avoid speculative investments** by having clear terms on setting up of the facility and operations with prohibition on transfer of vacant land

### ■ **Proximity to transport corridor and connectivity nodes:** Chennai around 60 km) connected via NH45; railway connectivity via Chengalpattu station (around 10 km), proximity to Chennai international airport (around 35 km) and to Chennai port (around 60 km)

## Challenges and learnings

MWC Chennai has also had to overcome many challenges during its development, such as:

### ■ **Long period of inactivity during initial development stage:**

- Gap of eight years between start of land acquisition (in 1996) and signing of first tenant (in 2004)
- This period of inactivity saw early investors such as IL&FS (which had 38 per cent stake) exit from the project

### ■ **Changing economic conditions during early stages of development forced MWC to modify project scope**

- To address MNCs' growing interest to enter Indian market, MWC changed its model to dedicate 50 per cent of the industrial area to DTA (against full SEZ as planned)
- MWC also modified its offering in residential space to focus on affordable housing

### 8.1.3. Shanghai–Lingang Industrial Area

The Shanghai–Lingang Industrial Area was established in 2003 over an area of 315 sq km in Shanghai. Currently, it has more than 9,000 industrial units operating out of it in various sectors such as heavy equipment manufacturing, telecommunication, information technology and logistics services. The area has industrial units established by such tenants as Shanghai Automobile Industry Corporation, Shanghai Electric, Siemens, Volvo, Caterpillar and Kalmar.

#### Shanghai–Lingang Industrial Area: An overview

<b>Location</b>	Shanghai, China
<b>Established</b>	2003
<b>Land area</b>	315 sq km
<b>No. of units</b>	9,000+ enterprises operating in the industrial area
<b>No. of workers in manufacturing</b>	N.A.
<b>Sector focus</b>	Multiple zones catering to different industries such as heavy equipment manufacturing, telecommunication, information technology and logistics services
<b>Industrial zones</b>	6 development zones, each having a different set of target industries

#### Development zones

The Shanghai–Lingang industrial area has six development zones, each with a different set of target industries. The following table shows the extent and key features of each zone.

<b>Urban area</b>	68 sq km
	Finance, trade, commerce, convention and exhibition, education, R&D and tourism
<b>Heavy equipment manufacturing zone</b>	65 sq km
	Technology-intensive industries including new energy, power equipment, large ship equipment, automobile and parts, offshore engineering, logistics engineering, construction equipment, civil aviation equipment as well as equipment remanufacturing



<b>Compound zone</b>	41 sq km
	Mix of industries and urban facilities including light manufacturing and services to producers with focus on telecommunication, information technology, photoelectron, electromechanical equipment, related to civil-aviation
<b>Logistics zone</b>	16 sq km
	Sub-area adjacent to the onshore part of the Yangshan section of China (Shanghai) Pilot Free Trade Zone, aims to become a world-class logistics terminal for the co-ordinated development of port logistics, logistics services for industries and special-need logistics
<b>Greater industrial zone</b>	108 sq km
	Extended area of the heavy equipment manufacturing zone as well as a new major concentrated area for emerging industries of strategic importance such as civil aviation and new energy as well as services to producers
<b>Fengxian zone</b>	17 sq km
	Targets to become a comprehensive and self-operating industrial cluster and city in which the industries will correspond to those in the Heavy Equipment Zone, or high-end manufacturing, new energy, logistics and trade as well as commercial services

### Shanghai Lingang Industrial Area – Incentives offered to investors

The Shanghai Lingang industrial area offers many incentives to its tenants to attract investments from industries globally. Broadly, these can be classified as financial (tax rebates, subsidies and grants), personnel (for attracting and retaining talent) and land related. The following table summarises the major incentives offered by the area:

<b>Financial</b>	Special Industrial Development Fund Pool	Promote strategic, emerging industry projects, key technological transformation projects, energy-saving and emission-cutting projects
	Lingang Seed Fund and Lingang Industrial Fund	Promote industrial developments in Lingang

Financial support for Development of Key Industries	Maximum 60% the fiscal contribution by equipment manufacturing industries to Pudong to be returned to facilitate their development
Support for Strategic Emerging Industries	Projects that are recognised as national-level or municipal-level strategic emerging industry projects can enjoy an extra bonus of maximum 10% of the project's equipment investment
Support for Key Technological Transformation, Energy Saving and Emission Cutting Projects	Eligible projects to earn extra bonus of maximum 10% of the awarded benefit from the Special Industrial Development Fund
Support for Corporate Innovation	Eligible projects to earn extra bonus of maximum 10% of the awarded benefit from the Special Industrial Development Fund
Support the Development of High-tech Companies	Lump-sum bonus of up to RMB 500,000 for eligible companies, products or projects
Congregation of Innovation Participants	Lump-sum bonus of up to RMB 1 mn for innovation participants recognised as at least a municipal-level public platform of services to R&D, a research institution, a strategic alliance for industrial and technological innovation, or a testing and certification organisation
Encourage the Growth of Modern Service Industries	Lump-sum bonus of up to RMB 500,000 for a project recognised as a municipal-level key service sector project
Plan and Build Central Business Districts In the Main Urban Area	Lump-sum bonus equal to an amount from 10%-30% of the property investment to accommodate corporate headquarters, industrial associations and financial institutions
Encourage Setting up Corporate Headquarters	Basket of subsidy including a maximum RMB 10 mn for office rent subsidy and a maximum RMB 2 mn for property management fee subsidy
Industrial Associations and other Civil Organisations	Basket of subsidy including a maximum RMB 1 mn for subsidising office rent and a maximum RMB 300,000 for subsidising property management fee

<b>Personnel</b>	Housing benefits, elderly care, relaxed border entry and exit	Fixed price apartments and public leasing apartments are being developed in Lingang area
		Corporate pension programme and occupation pension programme for Elderly care
		Relaxed Border Entry and Exit Management for professionals working in the public sector
		Incentives for eligible important talents and influential professionals
<b>Land</b>	Lower Land Acquisition Cost for Investors	Policy controlled land costs to ensure Lingang's competency
	Flexible Use Right Assignment for Industrial-Use Land	Investors are offered flexibility of land lease duration for industrial use land varying from 10-50 years, with price being determined by evaluation, depending on the duration

### Key success factors

The following table summarises the key factors that contributed to the success of Shanghai–Lingang industrial area

<b>Location</b>	<b>The area is located between the Shanghai–Pudong International Airport and Yangshan Deep-Water Port. Its unique geographical location and the expressway network around bring convenient traffic to the containerised shipment of Shanghai–Lingang Area</b>
<b>Infrastructure support</b>	The Shanghai–Lingang industrial area has excellent physical and social infrastructure support to back the industrial developments—Metro Line 16, bus line systems, high-quality education, medical care and other essential services, service station integrating all government functions
<b>Policy and incentives</b>	Tenants were offered the policy support on project planning, project approval, enterprise establishment and talent introduction. By offering financial, personnel and land incentives, the administration succeeded in attracting strategically important industries and the best talent towards the development

<b>Industrial factors</b>	Shanghai–Lingang industrial area has six zones focusing on different strategically important industries, thus ensuring an overall and integrated development. The administration also succeeded in developing an ecosystem model for development. For example, industrial clusters comprising a large anchor tenant, together with their complementing upstream and downstream partners, were established. The administration has so far succeeded in establishing about 200 such clusters
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#### 8.1.4 Jiangyin Harbour Economic Development District

The Jiangyin Harbour Economic Development District was established in the 2006 in Jiangyin near Shanghai. It is spread over an area of 188 sq km and has more than 8,000 operational units. It has four industrial parks/zones, each dedicated to a different industry sector.

##### Development zone

The following table indicates the different zones that are part of the Jiangyin Harbour Economic Development District:

Comprehensive industrial district	38.3 sq km
Port logistics area	17.8 sq km
Chemical industry area	13.3 sq km
Comprehensive area (including public service facilities, residential area)	15.3 sq km
Living quarters	14 sq km
Biological reserve	47.2 sq km

##### Incentives offered

The Jiangyin Harbour Economic Development District offers different incentives to its tenants to attract investments from industries across the globe, such as:

- Reduced corporate income tax rates for high-tech enterprises
- Limited period tax rebate for newly-established regional headquarters
- Limited period offices and apartment support for eligible scientific talent
- Supporting funds ranging from RMB 1 to 5 mn to be granted to eligible scientific projects according to the project's total investment

- Special funds to provide financial support for tenants from emerging industries

### **Key success factors**

The following key factors contributed to the success of the Jiangyin Harbour Economic Development District:

- Location and connectivity:
  - Located on the Yangtze River Delta, one of the most developed regions in China
  - Important transport hub connecting the areas in the south and north of the Yangtze River
  - Well connected by Rail (Xinchang and Zhennan railway); expressways (Jinghu, Huning and Yanjiang expressways); air (Changzhou Benniu Airport, Wuxi Shuofang Airport and Shanghai Pudong International Airport); and port (Jiangyin—Shanghai Waigaoqiao/Yangshan Port)
- Personnel and social infrastructure:
  - Jiangyin's educational infrastructure comprises seven colleges and universities, eight national key schools, 32 vocational colleges and training centres, 143 scientific research institutes in all the fields and eight post-doctoral research stations. This ensures ready availability of talent for the industries
  - Additionally, Jiangyin also has well-developed residential, healthcare and urban infrastructure such as public transportation and open parks
- Incentives: Various incentives and funds are offered to tenants such as reduced corporate income tax, tax rebates of up to 100 per cent and special funds to provide financial support

## 8.2 DEFINITION OF RESIDUAL PROJECTS

The mandate for the SDC is to provide a funding window and/or implement only those residual projects that cannot be funded by any other means. Residual projects are typically those that are not being implemented because of various issues but are critical for port-led development. Non-completion of these projects hamper the capability of ports to work efficiently and effectively. By assisting line ministries, ports, state governments and maritime boards and SPVs in implementing these residual projects, the SDC shall significantly reduce the logistics cost, turnover time, pilferage, etc., and thereby the cost of conducting business at ports.

## 8.3 DETAILED FINANCING PLAN

Yearwise funding requirement - Consolidated by Implementing Agency by type of project																
Funding Agency	Type of Project	# of projects	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total			
Major Port Trusts		90	-	4,739	11,573	15,004	10,894	12,592	7,066	2,475	418	-	64,761			
IPRCL - Major Port Trusts		22	-	518	2,681	5,471	2,656	-	-	-	-	-	11,326			
India Railways		6	-	894	1,616	1,178	1,767	2,170	2,790	2,325	-	-	12,740			
NHAI		35	-	2,007	4,210	20,433	30,970	48,233	24,072	360	-	-	130,285			
MopNG		2	-	-	-	5,200	7,800	10,400	15,600	13,000	-	-	52,000			
CONCOR		2	-	-	-	34	77	60	-	-	-	-	170			
DIPP		13	-	-	-	4,268	6,714	6,785	10,178	8,482	-	-	36,426			
MoTourism		2	-	-	-	42	78	-	-	-	-	-	120			
IWAI		3	-	-	500	1,002	1,377	2,003	2,005	629	-	-	7,515			
Other Agencies		24	-	1,840	4,762	4,843	4,440	159	80	67	-	-	16,191			
		199	-	9,998	25,342	57,475	66,773	82,401	61,790	27,337	418	-	331,534			

<b>Agency wise - PPP and budgetary split for focus projects - by category</b>						
<b>Agency</b>	<b>Type of project</b>	<b>Total project cost</b>	<b>PPP</b>	<b>State</b>	<b>Central</b>	<b>Comments</b>
Major Port Trusts	Port Modernization - Major Ports	25,688	13,250		12,438	Based on PPP/Non PPP as per port master plan
Major Port Trusts	New Ports	30,737	15,369	3,074	12,295	50% PPP based on DPR assumptions
Major Port Trusts	Last Mile Road projects	329	-		329	0% PPP
Major Port Trusts	Internal Port Road Projects	771	-		771	0% PPP
Major Port Trusts	Internal Port Rail Projects	160	-		160	0% PPP
Major Port Trusts	Port Rail Connectivity Projects	1,690	-		1,690	0% PPP
Major Port Trusts	Port Road Connectivity Projects	386	-		386	0% PPP
Major Port Trusts	CEU	5,000	2,000		3,000	40% PPP towards infrastructure assets that can be implemented in PPP mode
Indian Railways	Port Rail Connectivity Projects	12,740	-		12,740	0% PPP
Indian Railways	Internal Port Rail Projects	-	-		-	0% PPP
NHAI	Last Mile Road projects	874	306		568	35% PPP (60% is civil cost out of which 60% is PPP based on NHAI norms)
NHAI	Internal Port Road Projects	-	-		-	35% PPP (60% is civil cost out of which 60% is PPP based on NHAI norms)
NHAI	Port Road Connectivity Projects	13,911	4,869		9,042	35% PPP (60% is civil cost out of which 60% is PPP based on NHAI norms)
NHAI	Expressways Projects	115,500	40,425		75,075	35% PPP (60% is civil cost out of which 60% is PPP based on NHAI norms)
IWAI	Inland Waterways Projects	7,515	-		7,515	0% PPP
MoPNG	Refineries	52,000	-		52,000	0% PPP
CONCOR	Multi Modal Hubs	170	-		170	0% PPP
IPRCL - Major Port Trusts	Last Mile Road projects	-	-		-	0% PPP
IPRCL - Major Port Trusts	Internal Port Road Projects	-	-		-	0% PPP
IPRCL - Major Port Trusts	Port Road Connectivity Projects	350	-		350	0% PPP
IPRCL - Major Port Trusts	Port Rail Connectivity Projects	10,172	-		10,172	0% PPP
IPRCL - Major Port Trusts	Internal Port Rail Projects	804	-		804	0% PPP
DIPP	Discrete Cluster Projects	33,926	6,785	6,785	20,356	20% PPP towards infrastructure assets that can be implemented in PPP mode
DIPP	CEU	2,500	500	500	1,500	20% PPP towards infrastructure assets that can be implemented in PPP mode
Ministry of tourism	Tourism Projects	120	-		120	0% PPP
SDC funding	Projects	-	-		-	0% PPP
Other agencies	Projects	16,191	3,238	8,096	4,857	0% PPP
<b>Total</b>		<b>331,534</b>	<b>86,741</b>	<b>18,454</b>	<b>226,338</b>	

<b>Agency wise - PPP and budgetary split for focus projects - consolidated</b>					
<b>Proposed implementation Agency</b>		<b>Total</b>	<b>PPP</b>	<b>State</b>	<b>Center</b>
Major Port Trusts		64,761	30,618	3,074	31,069
Major Port Trusts		130,285	45,600	-	84,685
Indian Railways		12,740	-	-	12,740
IWAI		7,515	-	-	7,515
MoPNG		52,000	-	-	52,000
CONCOR		170	-	-	170
IPRCL - Major Port Trusts		11,326	-	-	11,326
DIPP		36,426	7,285	7,285	21,856
Ministry of Tourism		120	-	-	120
SDC funding		-	-	-	-
Other agencies		16,191	3,238	8,096	4,857
<b>Total</b>		<b>331,533.72</b>	<b>86,741.28</b>	<b>18,454.40</b>	<b>226,338.04</b>



# Report on Project Management Office Structure



# Executive summary

Sagarmala's vision is to reduce logistics costs for domestic and EXIM cargo with minimal infrastructure investment. Under Sagarmala, the MoS has drafted a National Perspective Plan (NPP) that identifies opportunities for reducing overall logistics costs to improve economic efficiency and increase export competitiveness. The Programme has identified 337 projects to unlock opportunities for port-led development, which require an investment of around INR 4 lakh crore.

This massive effort requires close supervision to ensure that projects are completed within the allocated time and budgeted cost. That comes with its own set of challenges. The PMO is a crucial enabler in this context. It needs to be carefully set up and staffed to maximise the impact from all Sagarmala projects.

## 1. INTRODUCTION TO SAGARMALA

India's long coastline of around 7,500 km and extensive inland waterways of around 14,500 km form a significant component of the country's EXIM trade. The country's 200 and more ports collectively handled over 1 bn tonnes of cargo in FY 2015. The associated logistics costs account for a large part of India's non-services GDP as compared to developed nations. In addition, India has lagged behind in utilising its ports for hinterland economic development. The Sagarmala Programme will spearhead port-led development in the country through 337 projects across four pillars: port modernisation, port connectivity, port-led industrialisation and coastal community development.

## 2. CHALLENGES IN THE IMPLEMENTATION OF SAGARMALA PROJECTS

A unique programme in terms of sheer size and complexity, Sagarmala has identified many projects that will be delivered through multiple central line ministries and state governments. Various challenges can impact the success of these projects:

- **Limited organisational resources:** A team of only two members has been handling the current set of 337 projects
- **Diverse set of projects:** The projects are divided into four categories and 18 sub-categories based on their alignment with the four pillars of port-led development
- **Multiple stakeholders:** Each sub-category of projects has its own ministries, state bodies, implementing agencies and concerned port trusts
- **Information variability:** The required and relevant information for identified projects has not been shared by the project's proponents

- **Lack of clarity on financing:** The proposed financing plan differs with individual projects depending on the nature of the project and other variables
- **Lack of tools and monitoring platforms:** Unavailability of a comprehensive project monitoring and tracking tool resulting in lack of visibility on the status of projects

Chapters 3 to 8 of this report discuss how these challenges can be addressed (Exhibit 3).

## EXHIBIT 1

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### Challenges and interventions undertaken

S. No.	Challenges	Interventions
1.	Limited organisation resources	<ul style="list-style-type: none"> <li>Dedicated Project Management Office proposed to co-ordinate and monitor the implementation of projects</li> </ul>
2.	Diverse set of projects	<ul style="list-style-type: none"> <li>Classification of projects into 18 sub-categories</li> <li>Prioritisation and phasing of projects based on impact and readiness</li> </ul>
3.	Multiple stakeholders	<ul style="list-style-type: none"> <li>Alignment meetings with stakeholders on projects and availability of funding</li> <li>Creation of sub-programs with a ring-fenced budget proposed</li> <li>Residual projects identified (to be taken up by SDC along with states)</li> <li>SDC to coordinate along with State Sagarmala Committees at state level</li> </ul>
4.	Information variability	<ul style="list-style-type: none"> <li>Validation of projects' feasibility, criticality and key metrics with project proponents</li> <li>Change in scope of proposed projects based on feedback</li> </ul>
5.	Lack of clarity on financing	<ul style="list-style-type: none"> <li>Specific financing plan proposed for each of 18 sub-categories. In some cases financing mode identified at project level</li> </ul>
6.	Lack of tools and monitoring platforms	<ul style="list-style-type: none"> <li>An IT tool developed to provide a comprehensive view and aid in monitoring projects</li> </ul>

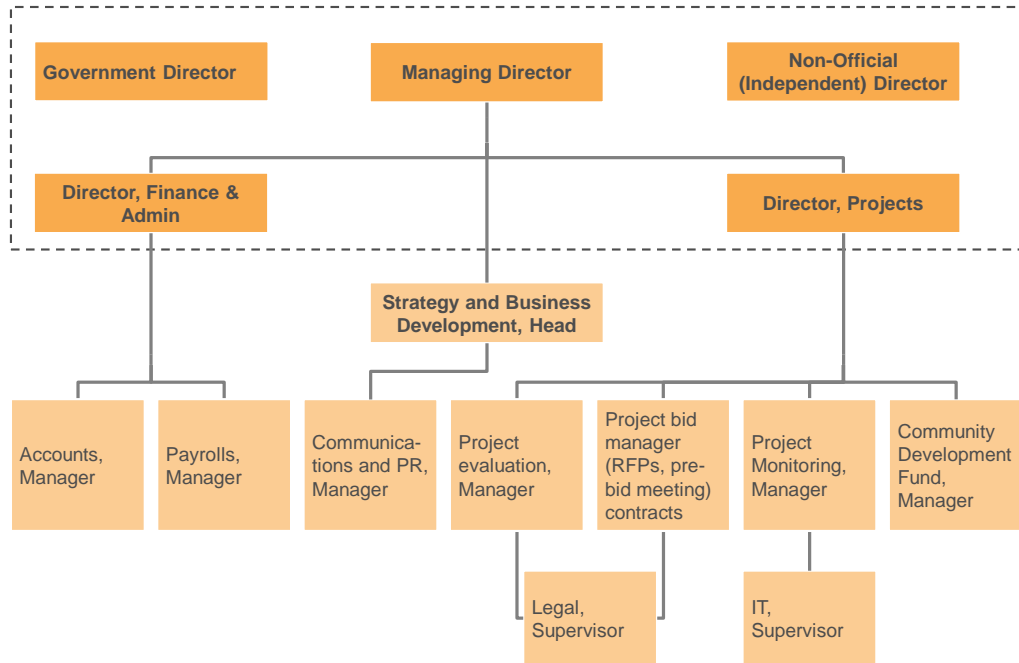
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### 3. PROGRAMME MANAGEMENT OFFICE

The PMO will play a very important role in driving the execution of Sagarmala projects across the country. It will operate as a seven-member team under the Sagarmala Development Corporation (SDC) (Exhibit 4). The PMO's scope of work will vary across different stages of the lifecycle of various projects.

## EXHIBIT 2

### Structure of Sargarmala Development Corporation (SDC) Board of Directors



## 4. PROJECT CLASSIFICATION AND PRIORITISATION

It is expected that the classification and prioritisation of projects will help the PMO to effectively track the progress of the projects, discover the root causes for delays and then facilitate debottlenecking to meet project timelines.

While highly diverse, these 337 projects align with the four pillars of port-led development based on their end objectives. They are further divided into 18 sub-categories based on the implementing agency involved and their individual scope (Exhibit 5). Year-wise phasing of projects takes into account the expected impact resulting from the execution of these projects (Exhibit 6). The projects have been divided into five stages based on their readiness for implementation—concept stage, TEFR under preparation, DPR under preparation, under tendering and under construction (Exhibit 7).

## EXHIBIT 3

### 18 sub-categories and their implementing agency

Category	Sub-category	Implementing agency
Port modernisation	New ports	Ministry of Shipping, Trusts of nearby major ports
	Port modernisation – Non-major ports	State Maritime Boards, Port Trusts
	Port modernisation – Major ports	Port Trusts
Port connectivity	Expressways projects	NHAI
	Internal port road projects	Port Trusts
	Last mile road projects	NHAI/State Highways/Port Trust
	Port road connectivity projects	NHAI
	Port rail connectivity projects	Railways, State Maritime Boards, Port Trusts, IPRCL
	Internal port rail projects	Port Trusts, IPRCL
	Inland waterways projects	IWAI
	Pipeline projects	MoPNG
Port-led industrialisation	Bulk cluster projects	Ministries
	Discrete cluster projects	DIPP, Ministries
	Tourism projects	Ministry of Tourism, State Ports Department
Coastal community development	CCD other projects	State Maritime Boards, Port Trusts, Ministries
	CCD skill initiatives	State Maritime Boards, Port Trusts, Ministries
	Fishing harbor projects	Ministry of Agriculture, Dept. of Animal Husbandry, Dairying & Fisheries

## EXHIBIT 4

### Yearwise phasing of projects

	Category	FY 16		FY 17		FY 18 & FY 19		FY 20–25		FY 26–35		Total	
		#	Value (INR cr)	#	Value (INR cr)	#	Value (INR cr)	#	Value (INR cr)	#	Value (INR cr)	#	Value (INR cr)
1.	Port modernisation	72	23,291	68	26,520	25	32,984	24	20,928	13	13,220	202	116,944
2.	Port connectivity	7	1,264	50	23,282	15	14,117	13	130,060	3	750	88	169,472
3.	Port-led industrialisation	-	-	5	91	14	38,884	15	64,600	-	-	34	103,575
4.	Coastal community development	6	138	2	739	2	79	3	768	-	-	13	1,724
	<b>Total</b>	<b>85</b>	<b>24,693</b>	<b>125</b>	<b>50,632</b>	<b>56</b>	<b>86,064</b>	<b>55</b>	<b>216,356</b>	<b>16</b>	<b>13,970</b>	<b>337</b>	<b>391,715</b>

## EXHIBIT 5

### Classification of projects based on readiness

	Concept	TEFR under preparation	DPR under preparation	Under tendering	Under implementation	Completed	Total
Port modernisation	54	15	23	34	73	3	202
Port connectivity	28	5	24	5	23	3	88
Port-led industrialisation	29		5				34
Coastal community development	4		2	2	5		13
<b>Total</b>	<b>115</b>	<b>20</b>	<b>54</b>	<b>41</b>	<b>101</b>	<b>6</b>	<b>337</b>

## 5. STAKEHOLDER ALIGNMENT

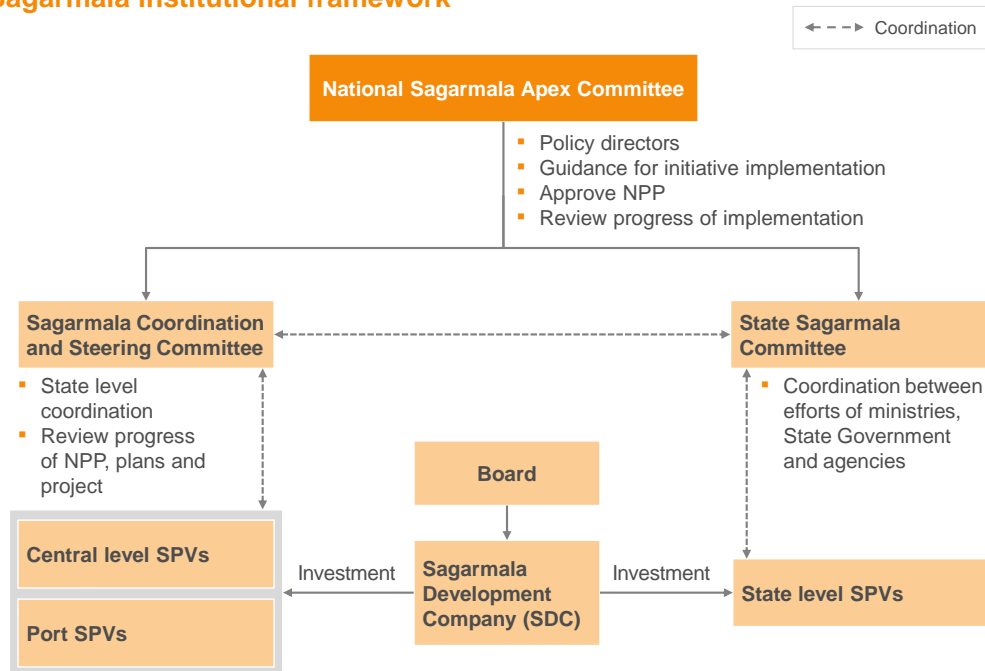
The different implementing agencies operate according to their own plans, priorities and budgets. They need to be aligned to the vision of Sagarmala as that can help convince them about the necessity of each project. Getting various stakeholders on board can have multiple challenges—line ministries have their own internal plans, with their own prioritisation of projects. Discussions with the different stakeholders have attempted to prioritise the Sagarmala projects within the budgets of the executing line ministries and state governments.

The creation of sub-programmes has been proposed for each relevant central ministry or department or agency. It is also recommended that the central ministries allocate a dedicated ring-fenced budget for implementing Sagarmala projects. In addition, the proposed SDC can take up the 21 projects that need to be prioritised but are facing problems (a) because of their scope or (b) because of the port's inability to fund them.

To co-ordinate the implementation of this complex programme, a suitable institutional framework has been proposed (Exhibit 8): the National Sagarmala Apex Committee, the Sagarmala Coordination and Steering Committee, the State Sagarmala Committee, the Sagarmala Development Corporation, special purpose vehicles (SPVs) as required and inter-ministerial committees and working groups.

## EXHIBIT 6

### Sagarmala institutional framework



## 6. STANDARDISATION OF INFORMATION

In order to ensure that the information on the projects is accurate and actionable, over 20 meetings were held with various stakeholders and implementing agencies to verify the current status of identified projects and update the information accordingly.

## 7. FINANCING PLAN

The 337 identified projects need around INR 4 lakh crore of investment from various stakeholders—the MoS, the Ministry of Commerce, state governments and other central agencies like the NHAI and Indian Railways. In addition, some contribution from the private sector, e.g., through PPPs, is also expected. A funding plan has been proposed for each category of projects across the four pillars (Exhibit 9).



## EXHIBIT 7

### Proposed funding plan at a project category level

Theme	Categories	Number of projects	Cost (INR cr)	Funding agency
Port modernisation	Port modernisation – Major ports	185	75,000 – 80,000	PPP
	New ports	8	35,000 – 40,000	PPP
	Port modernisation – Non-major ports	9	6,000 – 8,000	State
Port connectivity	Expressways projects	10	120,000 – 130,000	PPP
	Internal port road projects	5	300 - 500	Port trusts
	Last mile road projects	18	1,000 – 1,500	PPP
	Port road connectivity projects	13	4,000 – 6,000	PPP
	Port rail connectivity projects	30	28,000 – 32,000	Centre
	Internal port rail projects	3	100 - 200	Port trusts
	Multi modal hubs	6	500 – 1000	PPP
	Pipeline projects	3	4,000 – 5,000	Centre
Port-led industrialisation	Bulk cluster projects	15	60,000 – 70,000	PPP
	Discrete cluster projects	14	35,000 – 40,000	PPP
	Tourism projects	5	50 - 100	Centre
Coastal community development	CCD skill initiatives	4	30 - 50	Centre
	Fishing harbor projects	4	300 - 400	Centre
	CCD other projects	5	1,000 – 1,500	Centre

## 8. PROJECT MONITORING DASHBOARD

A web-based project-tracking IT tool has been developed to track all projects identified under the Sagarmala Programme. The Project Monitoring Manager at the PMO will own the tool while the IT Supervisor can help with day-to-day maintenance. The IT tool will have an executive dashboard with a high-level visual overview of projects, highlighting delayed projects and allowing the Project Monitoring Manager to view projects with upcoming milestones to enable (and prompt) a follow-up to ensure progress and completion. The tool allows projects to be filtered through multiple metrics—status, theme, associated port/state, sub-category and severity of delay. An automatic Gantt chart is generated for each project based on the milestone dates provided to help track the progress on key milestones and identify the root cause of any delays.

All these initiatives are expected to drive the success of Sagarmala and fulfill the vision of port-led development in India.

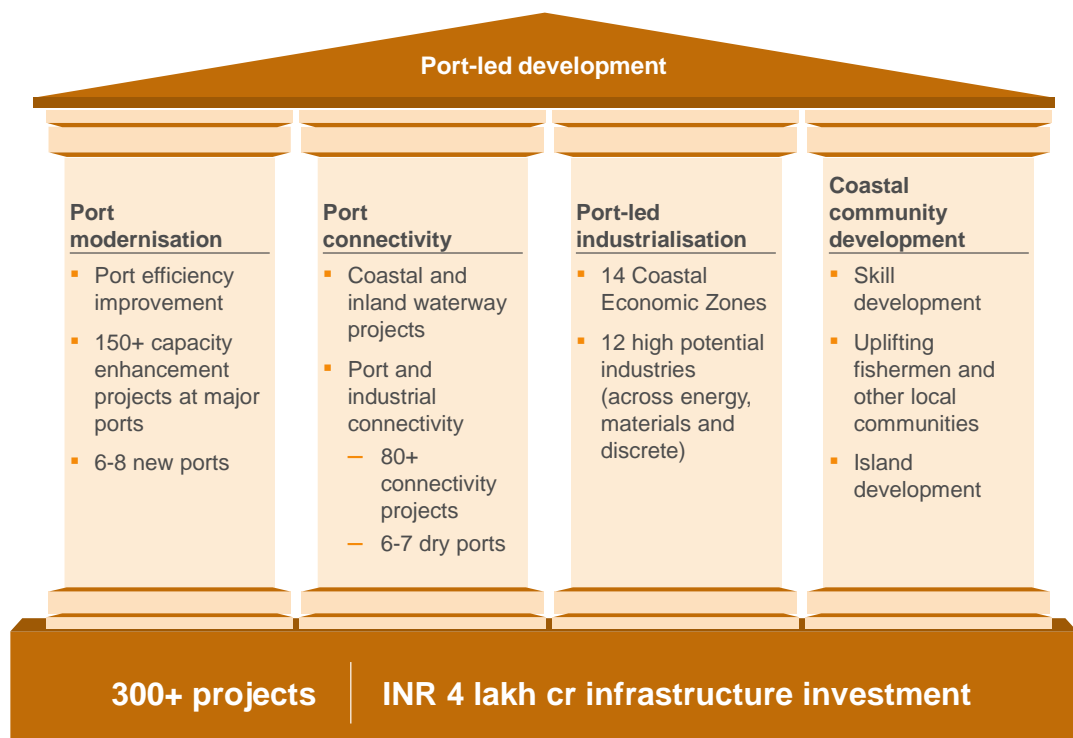
# Introduction to Sagarmala

India is richly endowed with natural maritime advantages—its 7,500-km coastline covers 13 states and union territories, making it a strategic location on key international trade routes. It also has 14,500 km of navigable and potentially navigable waterways. Maritime logistics has been an important component of the Indian economy, accounting for 90 per cent of EXIM trade by volume and 72 per cent by value. Over 200 ports handled more than 1 bn tonnes of cargo in FY 2015. The associated logistics costs account for a large part of the Indian non-services GDP as compared to developed nations. Since adequate road and rail connectivity links to ports have not been developed in tandem with port development, new ports with modern facilities are often underutilised.

The Government of India conceived of Sagarmala as a solution to these challenges. The vision of Sagarmala is to reduce logistics costs for domestic and EXIM cargo with minimal infrastructure investment. Under Sagarmala, the MoS has drafted the NPP that identifies opportunities for reducing overall logistics costs, thereby improving the efficiency of the economy and increasing the competitiveness of exports. Around 337 projects have been identified under the four pillars of Sagarmala to unlock opportunities for port-led development (Exhibit 10).

## EXHIBIT 8

### Sagarmala: Port-led development



## Port modernisation

Indian ports are generally small—most lack the necessary draft to handle the largest (cape sized) vessels—and handled around 1,050 MTPA of cargo in 2014–15. A growth rate of 4.5 per cent per annum projects a cargo volume of around 2,500 MTPA by 2025. As part of Sagarmala, detailed masterplans have been developed to modernise and expand the capacity of all major ports (Exhibit 11).

### EXHIBIT 9

#### Capacity expansion plan at major ports

Capacity expansion at major ports					
S. No.	Name	Existing capacity (MTPA)	Ongoing expansion	Additional capacity from masterplan projects	Capacity (MTPA)
1.	Kandla	121.4	24.5	55.0	185.9
2.	Mumbai	44.5	29.5	4.0	48.5
3.	JNPT	79.4	60.0	45.0	124.4
4.	Mormugao	43.8	0.0	35.0	78.8
5.	Kamarajar (Ennore)	37.0	42.0	3.0	82.0
6.	Chennai	86.0	0.0	12.0	98.0
7.	V. O. Chidambaranar	44.6	38.9	30.6	75.2
8.	New Mangalore	77.8	6.7	5.5	90.0
9.	Cochin	49.7	4.1	2.0	51.7
10.	Visakhapatnam	96.8	38.8	8.0	143.5
11.	Paradip	119.8	65.6	10.0	195.4
12.	Kolkata Port Trust	70.9	10.8	12.0	82.9
<b>Total capacity (MTPA)</b>		<b>871.5</b>	<b>320.9</b>	<b>222.1</b>	<b>1,414.5</b>

Greenfield port locations have also been identified at Sagar in West Bengal, Paradip Outer Harbour in Odisha, Enayam in Tamil Nadu and Vadhavan in Maharashtra. Potential has also been identified for new ports in other coastal cities.

Besides proposing the establishment of new ports and the modernisation of existing ports, the NPP has also identified a few projects to modernise infrastructure at prominent non-major ports in India.

## Port connectivity

Port connectivity is aimed at providing the most optimal mode of evacuation to/from ports for both EXIM and domestic cargo. Connectivity is a critical enablers for ports, since the overall effectiveness of the logistics system determines industry competitiveness. India's hinterland connectivity is mainly

based on road and rail networks, with domestic waterways, i.e., coastal shipping and inland routes, playing a limited role.

The railways are the mainstay for carrying long-lead distance and bulk cargo. The expansion of the rail network—0.7 per cent growth in the last five years—has not kept up with rising demand. Several strategic projects to enhance capacity on key corridors have been proposed—a heavy-haul rail line from IbValley/Talcher to Paradip/Dhamra Port could be developed to coastally ship large volumes of thermal coal from MCL to coastal power plants in southern India. The connectivity of Mormugao Port to Hospet/Bellary is also proposed to be taken up on a priority basis. Several specific last-mile connectivity projects are proposed, e.g., spur lines to connect the ports to DFC and to establish connectivity to Dhamra, Gopalpur, Krishnapatnam and Tuticorin ports.

Although road is more economical than rail for covering distances up to 1,000 km from the port, India's highway conditions vary widely. Moreover, the Indian coastline does not have a coastal road network. To make roads more effective in transporting cargo, 10 potential highway stretches have been identified as freight-friendly expressways. Nearly 70 road projects have been identified to improve connectivity to the ports. These include road connectivity of JNPT to the industrial hinterland, last-mile connectivity for ports in the Western Ghats and connectivity to new potential port locations like Enayam, Vadhavan and Sagar along with sites in central Andhra Pradesh and central Tamil Nadu.

Pipelines are predominantly used for transporting crude oil, refined petroleum products and natural gas. Most pipelines are operating at utilisation levels of over 90 per cent, so any increase in the capacity of refineries has to be matched by pipeline expansion. With this in mind, potential pipeline projects have been outlined for capacity enhancement, such as the expansion of the Salaya–Mathura pipeline and a new pipeline from Paradip to Hyderabad.

Freight transportation by national waterways (NW) is highly underutilised in India as compared to the US, China and the EU. It has been proposed to develop NW1, NW2, NW4 and NW5 as they can play an important role in cargo movement.

### **Port-led industrialisation**

A comprehensive plan for port-led industrialisation has been proposed as part of Sagarmala. It combines the growth potential of specific industries that have port linkages with the most competitive location for each industry. These locations have also been mapped to the relevant major and non-major ports in the region that can optimally facilitate the movement of cargo from the industrial locations. Twelve major industries covering energy, material and discrete manufacturing have been identified on the basis of the suitability of sea transportation for import of raw materials or export of finished products. Competitive locations for these industries have also been shortlisted with the aim of reducing overall logistics costs.

On this basis, 29 port-linked industrial clusters have been proposed that will help to meet the country's projected long-term energy needs, save logistics costs by up to INR 1,000 per tonne, make domestic manufacturing more competitive and boost exports in industries like food processing, automotive, electronics, furniture, apparel, leather products and footwear.

### Coastal community development

Approximately 18 per cent of India's population lives in the 72 coastal districts that comprise 12 per cent of the country's mainland. Since these people are critical stakeholders in Sagarmala's port-led development agenda, ensuring their socio-economic well-being is one of the Programme's key objectives. Under Sagarmala, various projects have been proposed for value addition in fisheries and aquaculture, cold chain development, skill development, development of local tourism and recreational facilities, which can be beneficial to the livelihood of coastal communities. These projects are specific time-bound local interventions not covered under existing central or state government schemes.

These 337 projects cover the entire range of port modernisation, port-connectivity projects, industrial clusters for port-led industrialisation and development of coastal communities (Exhibit 12).

#### EXHIBIT 10

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#### Overview of shelf of projects under Sagarmala

Category	No. of projects	Value (INR cr)
Port modernisation	202	~116,944
Port connectivity	88	~169,472
Port-led industrialisation	34	~103,575
Coastal community development	13	~1,724
<b>Total</b>	<b>337</b>	<b>~391,715</b>

Now that projects have been defined, the next step is implementation, and overcoming related challenges. The effective implementation of these projects will drive the success of the port-led industrialisation model in India.

# Challenges in project implementation

Sagarmala is a unique programme in terms of both size and complexity. Besides the large number of projects and the envisaged size of investment, the Cabinet Note on Sagarmala advises that it needs to be delivered through multiple central line ministries and state governments. This unique set-up implies a number of challenges in implementing the Programme (Exhibit 13).

- **Limited organisational resources:** The current set-up of a two-member team will be overstretched if it handles the continuous influx of projects, monitors the progress of 337 projects, and pursues alignment with multiple stakeholders across ministries and ports. It is critical to build an effective PMO that strikes a balance between the tactical and the strategic. It can fluidly manage the entire portfolio of projects and skillfully control them to maximise their impact. It can also constantly check that projects are strategically aligned with business goals.
- **Diverse set of projects:** The Sagarmala Programme has so far identified 337 projects. While these have been divided into four categories, projects within each set can still vary widely in scope, scale and implementation agency. Designing the implementation mechanism is thus a very complex task.
- **Multiple stakeholders:** The identified projects align with the four pillars of port-led development and are spread across 18 sub-categories that determine their specific (and multiple) stakeholders and agencies, e.g., rail projects managed by the Ministry of Railways, Indian Port Rail Corporation Limited (IPRCL), private developers and port trusts. In addition to multiple stakeholders, another issue is the prioritisation of Sagarmala projects within the budgets of the executing line ministries and state governments.
- **Information variability:** A standard set of metrics has been defined and illustrated in the concept note for each project, which intends to capture all required and relevant information. But the concept notes shared by the respective authorities while proposing a project frequently lack the requisite details or contain outdated details. There is also no set standard of communication schedules, preferred modes of communication, single point of contact and timelines for sharing the required and relevant information.
- **Ambiguity on financing:** Every identified project requires a huge investment for implementation. The challenge lies in laying out a different financing plan for each, depending on the nature of the project and other variables, such as expected traffic and potential due to upcoming industrialisation in nearby areas. The proposed financing plan might involve central funding, state funding or PSU funding. It could even follow the PPP mode.
- **Lack of tools and monitoring platforms:** Multiple projects are implemented simultaneously across the country by different implementation agencies and port authorities. It is difficult to track how these projects are

being implemented, discover risks that can become bottlenecks and identify delayed projects or projects with cost overruns. There is a lack of visibility and stakeholders do not have the information they need to make informed and necessary decisions. Project tracking is largely Excel-based, resulting in inefficiencies and multiple versions.

The sheer scale of this programme will naturally invite multiple challenges. The subsequent chapters focus on ways to overcome these challenges—through the strategic classification and prioritisation of projects, alignment with stakeholders, standardisation of information, selection of proposed financing models, adoption of an IT-based project-tracking dashboard and establishment of a dedicated PMO.

## EXHIBIT 11

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### Challenges and interventions undertaken

S. No.	Challenges	Interventions
1.	Limited organisation resources	<ul style="list-style-type: none"> <li>Dedicated Project Management Office proposed to co-ordinate and monitor the implementation of projects</li> </ul>
2.	Diverse set of projects	<ul style="list-style-type: none"> <li>Classification of projects into 18 sub-categories</li> <li>Prioritisation and phasing of projects based on impact and readiness</li> </ul>
3.	Multiple stakeholders	<ul style="list-style-type: none"> <li>Alignment meetings with stakeholders on projects and availability of funding</li> <li>Creation of sub-programs with a ring-fenced budget proposed</li> <li>Residual projects identified (to be taken up by SDC along with states)</li> <li>SDC to coordinate along with State Sagarmala Committees at state level</li> </ul>
4.	Information variability	<ul style="list-style-type: none"> <li>Validation of projects' feasibility, criticality and key metrics with project proponents</li> <li>Change in scope of proposed projects based on feedback</li> </ul>
5.	Lack of clarity on financing	<ul style="list-style-type: none"> <li>Specific financing plan proposed for each of 18 sub-categories. In some cases financing mode identified at project level</li> </ul>
6.	Lack of tools and monitoring platforms	<ul style="list-style-type: none"> <li>An IT tool developed to provide a comprehensive view and aid in monitoring projects</li> </ul>

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A dedicated Project Management Office (PMO) can be alert to these challenges, and work collaboratively with all stakeholders to resolve the challenges in a timely fashion. This will facilitate the smooth selection and execution of projects undertaken under the Sagarmala Programme.

# Project Management Office

The SDC is envisaged as a multidisciplinary professional organisation with high-quality technical, financial and management expertise. It is expected to channel central and institutional funds, ensuring the development, planning and implementation of various projects undertaken under the Sagarmala Programme in line with the NPP. The company will be led by an MD/CEO on deputation or hired externally for the purpose. Keeping in mind its mandate, it will comprise three teams—finance, strategy and business development, and the PMO. This chapter outlines the scope of work for the PMO and outlines the roles and responsibilities of its team members.

## Scope of work

The PMO will play a crucial role in enabling a resolution to the challenges that obstruct the execution of Sagarmala projects. It will also be responsible for any other work related to the Sagarmala Programme, mandated by the MoS. The PMO's scope of work includes (but is not limited to) soliciting and evaluating projects and initiatives, coordinating the implementation of project, tracking and monitoring various projects and initiatives and assisting the MoS.

- Soliciting and evaluating projects and initiatives under the Sagarmala Programme: While the Sagarmala Programme has identified an initial set of 337 projects under the NPP, it is envisaged that new projects will be continually added. In this regard the PMO will:
  - Solicit new projects from proponents and evaluate these for viability and fit with the objectives of Sagarmala
  - Evaluate preliminary business cases put forth by project proponents, outlining the project scope and its rationale, and conduct a high-level cost-benefit analysis on the basis of the information provided
  - Periodically review the NPP and update it based on past progress and future projections envisaged under other national priority programmes of the Government of India, including development of national waterways and “Make in India”
- Coordinating the implementation of projects under Sagarmala:
  - For projects to be taken up by MoS, the PMO will:
    - Prepare the ToR for appointment of consultants or agencies for the necessary feasibility studies, detailed project reports, EIA, land acquisition proposals and other studies as needed
    - Prepare the bidding documents (e.g., RFQ, RFP, concession agreement) based on model documents
    - Advise on suitably structuring projects, e.g., PPP structure, contracting strategy, project financing structure and formation of SPVs based on the Sagarmala Programme's requirements



- Run the process to select the contractor and PPP concessionaire
  - Take up any other related activity till the project is finally awarded
  - Undertake site visits for inspection on a need basis, if requested by the MoS
- For projects undertaken by agencies outside the MoS, the PMO will provide the standardised ToR/RFP/RFQ document templates to appoint consultants for the necessary feasibility studies and detailed project reports and will coordinate and provide relevant inputs in the implementation of such projects
- For coastal community development projects, the PMO will support the Sagarmala Programme in identifying, evaluating and selecting the coastal community development project proposals for funding.
- Tracking and monitoring various projects and initiatives: The PMO will:
  - Track and monitor various projects and initiatives under the Sagarmala Programme using the IT-based MIS tool and dashboard created for this purpose by the consultant. The consultants are expected to update the IT tools or apps to include all the projects identified. They will also have to ensure timely updates of the project status and deploy the tool for review, monitoring and tracking
  - Periodically review the overall year-wise implementation roadmap of projects within the NPP and update it to align with the priorities of the Programme. The PMO will also develop a specific monitoring and evaluation matrix for various projects under the Programme
  - Monitor progress on implementation of projects taken up by other stakeholders or project proponents or implementing agencies, e.g., central line ministries, ports, state governments, maritime boards. Also liaise with relevant stakeholders or project proponents within and outside the Government to identify and suggest measures to fast-track implementation
  - Manage documentation related to identified projects and initiatives under the NPP
  - Be responsible for overall project management and coordination with consultants, engineering companies, central line ministries, state governments and any other agency appointed by the MoS for Sagarmala
  - Issue comments and recommendations or discuss opinions as sought by the ministries/ departments/implementing agencies under the state or central governments with respect to the projects being developed and implemented under Sagarmala
- Assisting the MoS in managing key meetings, outreach and communications: The Sagarmala Programme will necessitate interaction with various internal and external stakeholders for successful implementation. The PMC will assist the MoS in

- Conducting outreach events including one-on-one meetings, presentations, joint meetings, workshops, road shows with stakeholders; also facilitating interactions and meetings with potential investors for the Programme
- Preparing responses to formal communication (related to projects under Sagarmala) from various departments and agencies of the central and state governments

A Project Management Office (PMO) has been proposed to carry out the numerous tasks across the lifecycle of all projects undertaken as part of the Sagarmala Programme. These roles are described in the next section.

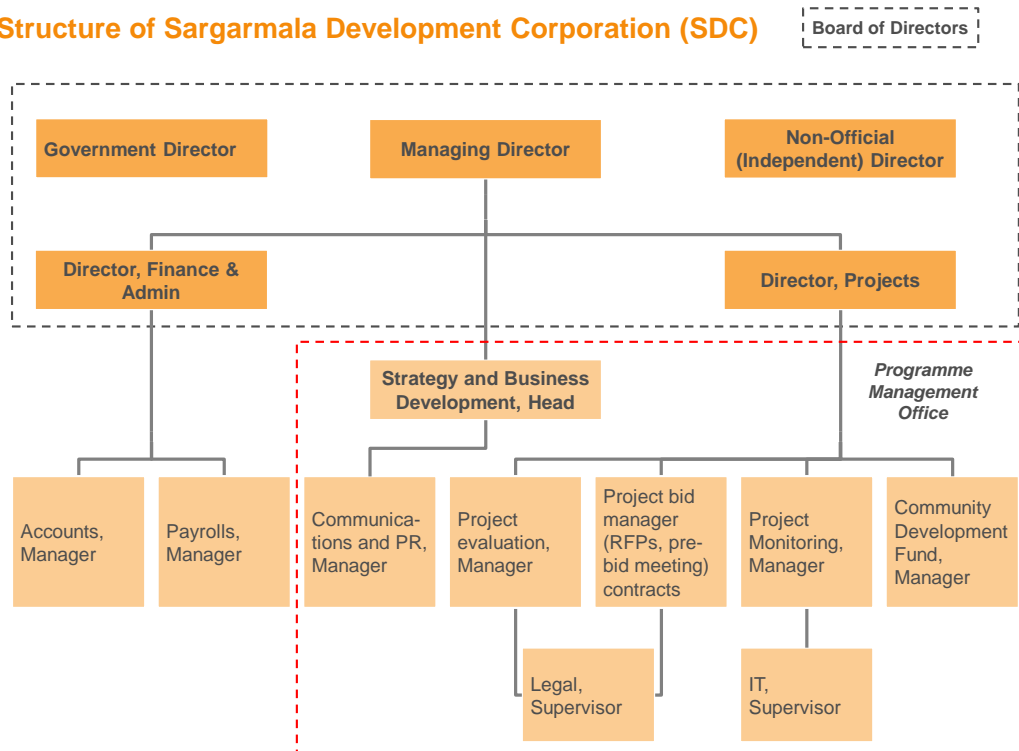
### **PMO job descriptions**

The Project Management Unit (PMU) looks after the various tasks that project selection, management and monitoring entail. At the outset, the process of selecting projects for implementation is a sensitive and strategic task. Evaluation and approval of bids and then project monitoring and management are crucial to ensure that projects are executed appropriately, on time, and within budget. The entire process also involves a lot of paperwork from a legal perspective. IT processes need constant maintenance and updates to work smoothly and facilitate progress. In addition, the Community Development Fund needs dedicated management. And finally these efforts require strategic media visibility.

This eight-member team will be headed by the Director, Projects, who will be a part of the Board of Directors. The respective managers will oversee different aspects of programme management (Exhibit 14).

## EXHIBIT 12

### Structure of Sargarmala Development Corporation (SDC)



An overview of the job description and profiles of people under the PMO follows:

#### **Strategy and Business Development Head**

They decide on the kind of projects the company will undertake and the overall company strategy. They meet with stakeholders at all the ports and the line ministries to identify projects; identify potential opportunities for new projects and develop a business case for all the projects to be taken up in a year (Exhibit 15).

## EXHIBIT 13

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### Strategy and Business Development Head

#### 1. JOB DETAILS

- **Position Title:** Strategy and Business Development Head
- **Reports to:** Managing Director
- **Location :** Corporate office with frequent visits to project locations

#### 2. JOB PURPOSE

- Develop and communicate SDC's strategic vision, identify projects and initiatives to drive growth and value creation. Lead projects in the pre-execution stages: (1) fund availability, (2) project initiation, (3) concept definition, (4) project definition - within the constraints of schedule, budget, and scope. Ensure realization of the strategic, operational and financial objectives set for the project

#### 3. KEY RESPONSIBILITY AREAS

- Initiate and drive business development, growth opportunities across SDC in conjunction with the board of directors and the senior management team
- Responsible for liaising with ports and government stakeholders to identify residual projects
- Translate MoS strategy into actionable set of initiatives and lead the development of a project business plan with revenue and cost side view of the project from the point of project conceptualisation till initial document preparation
- Liaise with internal and external stakeholders, including government authorities and JV Partners to obtain required permits and approvals for successful project execution
- Responsible for managing the reputation of the company across its wide stakeholder group and developing, leading and executing robust and fully-integrated communications that both promote and protect the reputation of SDC

#### 4. EDUCATION/EXPERIENCE

- Minimum Qualification: Masters/Graduate degree in general management, economics, engineering or other related field
- Minimum Experience: 5+ years' experience in General Management, Strategy, Business Development or Finance; Experience of working with multiple government stakeholders; Work in Port sector/Roads/Railways a plus

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### Communication and PR Manager

They report to the Head of Strategy and Business Development and are responsible overall for enhancing the profile of Sagarmala and ensuring that the work done is effectively broadcasted in the media. They are responsible for appointing the PR agency and overseeing their work, developing new strategies, tactics, and plans to get wider alignment on the concept of Sagarmala, creating a buzz around four or five large themes, ensuring the visibility of Sagarmala outside the ambit of the MoS and leveraging new media for more impactful communication (Exhibit 16).

## EXHIBIT 14

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### Communications and PR Manager

#### 1. JOB DETAILS

- **Position Title:** Communications and PR Manager
- **Reports to:** Head of Strategy and Business Development
- **Location:** Corporate Office

#### 2. JOB PURPOSE

- Responsible for all internal, external and marketing communications for SDC
- Principle person responsible for promoting Sagarmala initiatives

#### 3. KEY RESPONSIBILITY AREAS

##### Corporate Communications:

- Responsible for corporate communications in promoting Sagarmala brand
- Create and manage relationships with a broad range of key stakeholders, both internal (by establishing champions and creating business partners across the network) and external

##### Strategic Planning:

- Develop a coherent and comprehensive communications strategy that support the overall strategic direction of Sagarmala
- Provide expertise and share knowledge on appropriate response to issues according to directions of Ministry of Shipping

##### External Communications

- Creates and manages channels, including social media, for engaging with audiences on Sagarmala story
- Direct and manage the company website and portal and lead the introduction of new social media channels
- Create an effective system for managing relationships with external communications consultants and partners such as advertising, creative and PR agencies

#### 4. EDUCATION/EXPERIENCE

- Minimum Qualification: : Masters' / Graduate degree with strong emphasis on Communications is recommended
- Minimum Experience: Experience in strategic planning, corporate communications, advocacy and stakeholder management, and business management

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### Project Evaluation Manager

The Project Evaluation Manager reviews drawings and technical specifications for the purpose of pinpointing potential constructability issues, deviations from industry norms and standards, customer requirements and commitments to customers. They work with the project team and relevant departments to create a project master programme, identifying all parts of the projects, detailing design and construction milestones, summarising all activities (including those of the consultant, contractor and other specified direct material suppliers) (Exhibit 17).

### Project Evaluation Manager

**1. JOB DETAILS**

- **Position Title:** Project Evaluation Manager
- **Reports to:** Director, Projects
- **Location:** Corporate Office

**2. JOB PURPOSE**

- Oversee preparation of investment documents and project proposals
- Responsible for DPR preparation of projects under scope of SDC and master plan preparation for CEZs

**3. KEY RESPONSIBILITY AREAS**

- Ensure preparation of preliminary studies for new concepts including the detail design and permitting of new projects
- Drive preparation of feasibility studies, including costs and timetable preparation for proposed capital projects
- Review and evaluate the DPR prepared by consultants to ensure quality and timely delivery of documents
- Review project technical specifications for the purpose of identifying potential issues and any deviations from norms
- Review project financial estimates including traffic studies, IRR calculations to identify projects that fit into SDC's gambit
- Ensure all local and central statutory requirements are taken into account for evaluating project feasibility
- Ensure complete compliance to document management process in accordance with processes followed at Government of India (specifically Ministry of Shipping)
- Champion the master plan preparation of coastal economic zones liaising with state industrial development corporations

**4. EDUCATION/EXPERIENCE**

- Minimum Qualification: Masters' / Graduate degree in Business Management; Architecture degree is a plus
- Minimum Experience: 5+ years management experience within contracting function; Worked on large scale projects

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### Project Bid Manager

They formulate reviews and evaluate tenders and proposals to ensure that the right vendor and contractor are chosen, ensuring transparency, and with a focus on timeliness and cost control. They oversee the drafting, evaluation, negotiation and execution of all construction contracts, sub-contracts and specialised construction contracts. In addition, they ensure compliance with company policies and norms while inviting tenders, releasing proposals and awarding contracts, etc. (Exhibit 18).

### Project Bid Manager

#### 1. JOB DETAILS

- **Position Title:** Project Bid Manager
- **Reports to:** Director, Projects
- **Location:** Corporate Office

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#### 2. JOB PURPOSE

- Oversee bid management process from project document preparation to actual start of construction

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#### 3. KEY RESPONSIBILITY AREAS

- Oversee drafting, evaluation, negotiation and execution of contracts including bidders shortlisting, tenders, selection and award processes.
- Due diligence and vetting of local contractors/vendors and approve project contracts and changes in contracts.
- Review and evaluate invitation to tender and proposals to ensure transparency and accountability in the process followed while also selecting contractors and entering contracts which will help reduce overall costs
- Ensure compliance with company policies and norms while inviting tenders, releasing proposals and awarding contracts etc.
- Monitor and track the mobilization schedules of contracts in order to ensure achievement of project milestones agreed
- Ensure that the scope of work in the contract reflects the full scope of work to be executed on site and incorporates inputs from the site teams to limit out of contract costs and change orders
- Manage relationship with contractors and ensure adherence to agreed terms and conditions

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#### 4. EDUCATION/EXPERIENCE

- Minimum Qualification: Masters' / Graduate degree in Business Management
- Minimum Experience: 5+ years management experience within contracting function; Worked on large scale projects

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### Project Monitoring Manager

They follow up with implementing agencies (line ministries, port trusts, state maritime boards, etc.) to track project status. They monitor and control the schedule and generate relevant cash flows to assist in financial planning. In addition, they report the status of individual projects on a monthly basis, identify any gaps between the planned and actual completion schedule and update the plan in accordance with the current status. They generate monthly reports on the development and construction status of each project in accordance with the planned timelines (Exhibit 19).

## EXHIBIT 17

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### Project Monitoring Manager

#### 1. JOB DETAILS

- **Position Title:** Project Monitoring Manager
- **Reports to:** Director, Projects
- **Location:** Corporate Office

#### 2. JOB PURPOSE

- Review and evaluate the SDC progress at each stage and inform the Projects, Head and senior management of any issues
- Identify any gaps between the planned and actual completion schedule of projects

#### 3. KEY RESPONSIBILITY AREAS

- Follows up with the implementing agencies (Line ministries, port trusts, state maritime boards etc) to track the projects for their status
- Generates monthly reports on the development and the construction status of each project in accordance to the planned time lines
- Manage and resolve conflicts between various stakeholders of projects to ensure smooth functioning of projects
- Conduct regular project review and highlight progress and performance to the senior management
- Inspect project sites to identify deviations from quality standards based on specifications, industry norms and standards
- Develop planning and micro-planning templates using the IT tool which are easy to use and help project teams identify issues

#### 4. EDUCATION/EXPERIENCE

- Minimum Qualification: Masters' / Graduate degree with strong emphasis on Project Management is recommended
- Minimum Experience: 5 years or more experience in senior planning and scheduling roles with at least 2 years of supervisory experience in planning and scheduling

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## Legal Supervisor

They draft, review and amend, as applicable, agreements, legal documents, legal correspondence, contracts and other legal terms and conditions for any business activity. They also ensure the quality of documents prepared for sanctions and approvals (Exhibit 20).

## EXHIBIT 18

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### Legal Supervisor

#### 1. JOB DETAILS

- **Position Title:** Legal Supervisor
- **Reports to:** Project evaluation and Project bid Managers (Dual reporting)
- **Location :** Corporate office

#### 2. JOB PURPOSE

- Drafts, reviews and amends, as applicable, agreements, legal documents, legal correspondence, contracts and other legal terms and conditions for any project undertaken by SDC

#### 3. KEY RESPONSIBILITY AREAS

- Assist project evaluation manager and project bid manager with the legal aspects of project documents, corporate governance and policies
- Advise on the litigation risks of taking up possible projects, providing preventive counselling with respect to the legal risks
- Offers guidance to business leaders on negotiation of claims and contracts
- Drive the creation of a portfolio of standardized legal contracts to support the projects taken up by SDC
- Assist with or monitor negotiations of team members with contract agreements and bid documents and proactively resolve escalated business and legal issues
- Ensure process efficiency and accurate and timely completion of deliverables
- Overall scope is broad and covers commercial/contractual issues, litigation/dispute management, employment/labor law matters, corporate law, regulatory compliance and proactive risk management advice & training

#### 4. EDUCATION/EXPERIENCE

- Minimum Qualification: JD, LLB or equivalent degree from an accredited law school
- Minimum Experience: 5+ years of legal experience gained in an infrastructure firm



## IT Supervisor

They are responsible for implementing the project tracking IT tool at various ports, reviewing the tool, and handling other IT-related queries (Exhibit 21).

### EXHIBIT 19

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#### IT Supervisor

##### 1. JOB DETAILS

- **Position Title:** IT Supervisor
- **Reports to:** Project monitoring, Manager
- **Location :** Corporate office

##### 2. JOB PURPOSE

- Ultimate global responsibility for all IT Systems and applications across the entire organization

##### 3. KEY RESPONSIBILITY AREAS

- Troubleshoot problems in the project monitoring tool and assist project monitoring manager in collating the data and generating reports
- Technically support the SDC's IT infrastructure and identify need for changes and/or enhancement to architecture
- Review servers, Storage, Networks, Backup and other aspects of IT infrastructure periodically and identify areas of improvement
- Works on special IT projects as needed
- Maintain and foster collaborative efforts with IT staff of Ministry of Shipping to ensure issues related to cyber security are taken care of

##### 4. EDUCATION/EXPERIENCE

- Minimum Qualification: Master/Graduate degree in Computer Science, Computer Engineering, or Information Management
  - Minimum Experience: 2+ years of experience in IT in a reputed firm
- 

## Community Development Fund Manager

They manage the Fund, from the identification of projects to the disbursement of funds. They coordinate with other government ministries to ensure that funds do not get duplicated to programmes outside the ambit of SDC. They suggest new schemes to train the coastal community with the right set of skills by undertaking skill-gap studies, etc. They liaise with the state government's skill development programmes and ensure timely execution of beneficiary projects taken up under the CDF (Exhibit 22).

## Community Development Fund Manager

### 1. JOB DETAILS

- **Position Title:** Community Development Fund Manager
- **Reports to:** Director, Projects
- **Location :** Corporate office

### 2. JOB PURPOSE

- Overall accountability, responsibility and authority for the management of CDF in accordance with the strategic plan of SDC and MoS. The CDF Head spearheads initiatives for coastal communities and leads skill development programmes.

### 3. KEY RESPONSIBILITY AREAS

- Obtaining the approval of the Board, implementing the initiatives identified for funding under CDF and keeping the MD informed in a timely manner of the progress of the initiatives
- Instituting transparency in implementation of initiatives and projects identified under National Perspective Plan for development of coastal communities and provide the highest level of service to the public.
- Partnering with other national level schemes and foundations to understand the best practices for executing such type of programmes
- Manage the Community Development Fund from identification of projects to disbursement of funds.
- Launch new schemes to train the coastal community with the right set of skills by undertaking skill gap studies etc.
- Liaison CDF with state government's skill development programmes and ensures timely execution of beneficiary projects taken under CDF

### 4. EDUCATION/EXPERIENCE

- **Minimum Qualification:** Preferably an engineer with a Masters/Graduate degree in general management
- **Minimum Experience:** 5+ years' experience of working in a non-profit setting; led roll out of government skill development programmes in the past; work in port sector is a plus

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While the PMO will be housed under the SDC, all its functions in the interim will be carried out by the Programme Management Consultancy (PMC). The PMC will work directly under the guidance of MoS and will report to the Joint Secretary, Sagarmala. To be effective, the PMO and the PMC, will need to coordinate with various stakeholders. This necessitates a strategic project coordination mechanism, detailed in the next section.

## PMO project coordination mechanism

Sagarmala is a complex infrastructure delivery programme with an array of diverse projects identified for execution to make the programme successful. Multiple implementation agencies will be involved in executing these projects, which are spread out over time and have various modes of financing. While the Ministry of Shipping has been appointed as the nodal ministry for implementation, all relevant stakeholders—line ministries, state governments and private participants—must make a synergised and consolidated effort to realise the Sagarmala vision.

After multiple selection rounds, several projects have been selected based on their alignment with Sagarmala objectives. The PMO must coordinate with different line ministries to effectively monitor the progress of these projects and debottleneck any issues. To help line ministries prioritise work on these projects, there is a proposal to create a sub-programme under each key line ministry

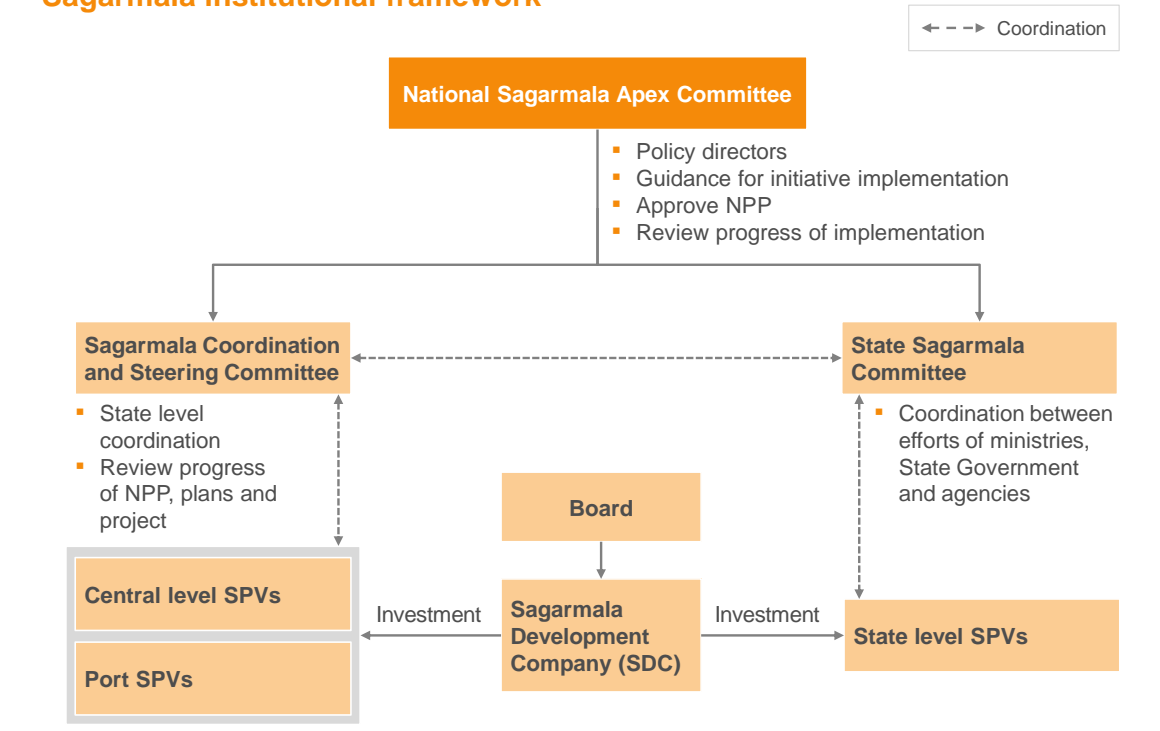
(especially Railways, MoRTH and DIPP) with a nodal officer from the respective ministry responsible for reporting and delivering these projects. The PMO will coordinate with these nodal officers on a regular basis to track the progress, ideally through a monthly meeting between the Project Monitoring Manager and the Director, Projects with the nodal officers to resolve any bottlenecks in a timely manner.

The PMC will need to follow this process for projects already under implementation until the SDC is incorporated. They will have to be guided by the MoS in their interactions with the other government stakeholders.

Inside the Ministry of Shipping, the Programme Management Office will have to coordinate with the overall institutional structure set up to facilitate the various Sagarmala projects. The PMO can also leverage these bodies to debottleneck issues that cannot be resolved at the Ministry level.

- National Sagarmala Apex Committee (NSAC): This apex inter-ministerial body will drive the Sagarmala Programme with minister-level representations from the ministries of Home Affairs, Coal, Petroleum and Natural Gas, Steel, Defence, Environment, Forest and Climate Change, Road Transport and Highways, and Tourism.
- Sagarmala Coordination and Steering Committee (SCSC): The committee consists of Secretaries from the central ministries of Home Affairs, Coal, Petroleum and Natural Gas, Steel, Defence, Environment, Forest and Climate Change, Road Transport and Highways, and Tourism.
- State Sagarmala Committee: This will be the primary driver of the Sagarmala Programme at the state level.
- Sagarmala Development Corporation: This will be the main development agency of the Ministry of Shipping.
- Special purpose vehicles (SPVs): These will be formed at the central and state levels as needed for specific projects.
- Inter-ministerial committees and working groups: These entities will take forward key themes and initiatives (e.g., Inter-Ministerial Committee for Coastal Shipping).

**Sagarmala institutional framework**



The PMO is advised to conduct frequent reviews with these agencies to ensure that any issues in the implementation of these projects are escalated in a timely manner. This will also help provide NASC, SCSC and SSC visibility over the projects taken up by SDC. They can intervene and resolve issues that would otherwise take much more time and effort.

- **Weekly review:** PMO to report to Director, Projects on a daily basis with the objective of guidance and coordination on Sagarmala projects. In the case of PMC, these meetings will be chaired by Joint Secretary (Sagarmala)
- **Monthly review:** Director, Projects along with PMO to update Board of Directors. Key decisions shall be taken on debottlenecking issues in implementation and projects to be taken up by SDC. For PMC, these meetings will be chaired by Secretary, Ministry of Shipping
- **Quarterly review:** SCSC will hold quarterly reviews to make key decisions and guide on the way forward for the SDC with regard to Sagarmala activities. Joint Secretary, Sagarmala along with PMC will be a part of these meetings until the SDC is incorporated.

A structured PMO, a strategic coordination mechanism and a regular cadence of reviews can facilitate the timely selection and execution of Sagarmala projects. Another important step, outlined in the next chapter, is the classification and (accordingly) prioritisation of these numerous projects.

# Project classification and prioritisation

All the identified projects have been aligned with the four pillars of port-led development based on their end objectives. They have been further divided into 18 sub-categories based on the implementing agency involved and their scope, e.g., while port trusts will focus on internal port roads, the concerned state departments will take care of the last-mile road connectivity (Exhibit 24). This categorisation helps to ensure optimal project implementation and tracking. Projects have been classified based on their implementation (in phases) and their readiness for execution.

## EXHIBIT 22

### 18 sub-categories and their implementing agency

Category	Sub-category	Implementing agency
Port modernisation	New ports	Ministry of Shipping, Trusts of nearby major ports
	Port modernisation – Non-major ports	State Maritime Boards, Port Trusts
	Port modernisation – Major ports	Port Trusts
Port connectivity	Expressways projects	NHAI
	Internal port road projects	Port Trusts
	Last mile road projects	NHAI/State Highways/Port Trust
	Port road connectivity projects	NHAI
	Port rail connectivity projects	Railways, State Maritime Boards, Port Trusts, IPRCL
	Internal port rail projects	Port Trusts, IPRCL
	Inland waterways projects	IWAI
	Pipeline projects	MoPNG
	Multi modal hubs	CONCOR, Private CTO
Port-led industrialisation	Bulk cluster projects	Ministries
	Discrete cluster projects	DIPP, Ministries
	Tourism projects	Ministry of Tourism, State Ports Department
Coastal community development	CCD other projects	State Maritime Boards, Port Trusts, Ministries
	CCD skill initiatives	State Maritime Boards, Port Trusts, Ministries
	Fishing harbor projects	Ministry of Agriculture, Dept. of Animal Husbandry, Dairying & Fisheries

### Project classification based on year-wise phasing and implementation

Port capacity needs to be developed to keep pace with the anticipated rise in traffic at Indian ports, expected to go up to 2.5 bn tonnes per annum by 2025. This increase in traffic will also require overhauling rail and road connectivity to these ports. Upcoming greenfield ports will also require road and rail connectivity.

Therefore, a phased approach to project implementation is necessary. A detailed timeline for project execution has been developed to ensure that Indian ports do not suffer from overcapacity in the near term, even though there is sufficient

capacity currently to meet the traffic demand. Prioritisation of projects also takes into account the expected impact of the execution of these projects.

### Port modernisation

As part of Sagarmala, detailed masterplans have been developed for modernising the 12 major ports. For non-major ports, the calculation of traffic potential takes into account existing capacities and expansion announcements. These masterplans have also considered the competitive dynamics between ports located within the same cluster. Around 202 projects have been identified and further classified into three sub-categories (Exhibit 24):

- Projects for modernisation—major ports
- Projects for modernisation—non-major ports
- New port development

These projects have to be undertaken in sync with the growth of traffic at the ports. The year-wise breakup of projects under the three sub-categories is given in Exhibit 25.

#### EXHIBIT 23

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#### Breakup of projects under port modernisation

Category	No. of projects	Value (INR cr)
Port modernisation – Major ports	185	73,820
Port modernisation – Non-major ports	9	7,387
New ports	8	35,737
<b>Total</b>	<b>202</b>	<b>1,16,944</b>

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## EXHIBIT 24

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### Phasing of port modernisation projects

	FY 16	FY 17	FY 18 & FY 19	FY 20–FY 25	FY 26–FY 35	Total
Port modernisation – Major ports	71	64	15	22	13	185
New ports			7	1		8
Port modernisation – Non-major ports	1	4	3	1		9
<b>Total</b>	<b>72</b>	<b>68</b>	<b>25</b>	<b>24</b>	<b>13</b>	<b>202</b>

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### Port connectivity

As part of the Sagarmala Programme, 88 port-connectivity projects have been identified to provide efficient evacuation to and from ports for both EXIM and domestic cargo. These include:

- Six-to-eight-lane highways proposed as expressway projects, primarily for carrying containerised cargo
- Internal port-road projects
- Last-mile road projects that provide road connectivity between a port and its nearest state or national highway
- Port–road connectivity projects that connect ports to the hinterland
- Internal port–rail projects
- Port–rail connectivity projects that provide rail connectivity between the port and the nearest railway line
- Strategic rail projects for the efficient movement of cargo
- Multi-modal logistics hubs that include dry ports/inland container depots
- Pipeline projects that include product and crude pipeline projects for carrying POL

These connectivity projects have been further classified based on the mode of cargo evacuation (Exhibit 26).

## EXHIBIT 25

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### Breakup of projects under port connectivity

Category	No. of projects	Value (INR cr)
Expressways projects	10	125,500
Internal port road projects	5	388
Last mile road projects	18	1577
Port road connectivity projects	13	5944
Internal port rail projects	3	149
Port rail connectivity projects	30	30712
Multi modal hubs	6	702
Pipeline projects	3	4,500
<b>Grand total</b>	<b>88</b>	<b>169,472</b>

As traffic at ports increases, they will require an overhaul of their connectivity infrastructure as well. Such proposed connectivity projects should be taken up in line with the expected growth in traffic. The year-wise breakup of projects under these three sub-categories is seen in Exhibit 27.

## EXHIBIT 26

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### Phasing of port connectivity projects

	FY 16	FY 17	FY 18 & FY 19	FY 20–FY 25	FY 26–FY 35	Total
Expressways projects				10		10
Internal port rail projects	1	2				3
Internal port road projects		5				5
Last mile road projects	2	11	3		2	18
Multi modal hubs	1	3	2			6
Pipeline projects	1		1	1		3
Port rail connectivity projects	2	19	7	2		30
Port road connectivity projects		10	2		1	13
<b>Total</b>	<b>6</b>	<b>51</b>	<b>15</b>	<b>13</b>	<b>3</b>	<b>88</b>



## Port-led industrialisation

Ports create significant economic payoffs for their city and state—they help generate jobs, add value, mobilise new investment, bring in tax revenues and support trade through reduced logistics costs. Port-led industrialisation models can be classified as energy focused, materials focused or discrete-manufacturing focused. Industries with an energy or materials focus have strong port linkages due to the volume of cargo handled. Logistics account for a significant proportion of the total costs in these industries. For discrete manufacturing, the time to export is critical and adequate port linkages can significantly improve the competitiveness of these industries. The breakup of projects under port-led industrialisation is illustrated in Exhibit 28, while the year-wise phasing of projects is given in Exhibit 29.

### EXHIBIT 27

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#### Breakup of projects under port-led industrialisation

Category	No. of projects	Value (INR cr)
Bulk cluster projects	15	64,600
Discrete cluster projects	14	38,884
Tourism projects	5	91
<b>Total</b>	<b>34</b>	<b>1,03,575</b>

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## EXHIBIT 28

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### Phasing of port-led industrialisation projects

	FY 17	FY 18 & FY 19	FY 20–FY 25	Total
Bulk cluster projects			15	15
Discrete cluster projects		14		14
Tourism projects	5			5
<b>Total</b>	<b>5</b>	<b>14</b>	<b>15</b>	<b>34</b>

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### Coastal community development

A concerted effort is required to help improve the status of coastal communities on human development indices, ensuring uniform access to basic infrastructure such as housing, electricity, transport accessibility and healthcare. It is essential that people have the right skills to reap the benefits of port-led industrialisation. Multiple projects related to skill development for coastal communities, development of marine fishermen communities, among others, have been proposed under the Sagarmala Programme (Exhibit 30). The year-wise phasing of these projects is given in Exhibit 31.

## EXHIBIT 29

### Breakup of projects under coastal community development

Category	No. of projects	Value (INR cr)
CCD skill initiatives	4	38
Fishing harbor projects	4	362
CCD other projects	5	1,324
<b>Total</b>	<b>13</b>	<b>1,724</b>

Note: CCD Other projects include projects like setting up logistics and Maritime University at Kakinada, development of lighthouse in Kanhoji Angre Island, development of mega-cruise terminal in Mumbai, etc.

## EXHIBIT 30

### Phasing of coastal community development projects

	FY 16	FY 17	FY 18 & FY 19	FY 20–FY 25	Total
CCD other projects	1	1		3	5
CCD skill initiatives	4				4
Fishing harbor projects	1	1	2		4
<b>Total</b>	<b>6</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>13</b>

Across the four pillars of Sagarmala, 85 projects were taken up for implementation in FY 2016; 125 projects have been proposed for FY 2017; 56 projects have been proposed for FY 2018 and FY 2019; 55 projects have been proposed for FY 2020–25; and 16 projects have been proposed for FY 25–35 (Exhibit 32).

## EXHIBIT 31

### Yearwise phasing of projects

	Category	FY 16		FY 17		FY 18 & FY 19		FY 20–25		FY 26–35		Total	
		#	Value (INR cr)	#	Value (INR cr)	#	Value (INR cr)	#	Value (INR cr)	#	Value (INR cr)	#	Value (INR cr)
1.	Port modernisation	72	23,291	68	26,520	25	32,984	24	20,928	13	13,220	202	116,944
2.	Port connectivity	7	1,264	50	23,282	15	14,117	13	130,060	3	750	88	169,472
3.	Port-led industrialisation	-	-	5	91	14	38,884	15	64,600	-	-	34	103,575
4.	Coastal community development	6	138	2	739	2	79	3	768	-	-	13	1,724
	<b>Total</b>	<b>85</b>	<b>24,693</b>	<b>125</b>	<b>50,632</b>	<b>56</b>	<b>86,064</b>	<b>55</b>	<b>216,356</b>	<b>16</b>	<b>13,970</b>	<b>337</b>	<b>391,715</b>

### PROJECT CLASSIFICATION BASED ON READINESS FOR EXECUTION

To help the PMO track the progress of these projects, they have been broken down into six stages based on their readiness for implementation.

- **Concept stage:** The first stage during which the project is proposed with a proper rationale, but no formal documentation has been prepared. Basic project details like its brief, rationale, expected impact, estimated time required for project completion and land availability should be captured by the proposing authority with the help of a project concept note. These initial details can help decide if the project can be taken forward for further deliberation.
- **TEFR under preparation:** The second stage involves creating a techno-economic feasibility report (TEFR) for the concerned project to establish its initial viability. Preparing the TEFR can help prompt a decision on the feasibility of investing in further analysis.
- **DPR under preparation:** The third stage includes creating a detailed project report (DPR). It features detailed analyses of the market and the demand as well as technical and financial details in a systematic format related to the project. The DPR is critical as it forms the basis of all future investments in the project. It is the foundation for the final decisions on project implementation, timelines, financials and economic viability.
- **Under tendering:** This stage includes the process of awarding the project through tendering to a suitable vendor. It involves floating the RFP,

launching the bidding process and performing a technical and financial evaluation to select the project execution vendor. All financial closures, board approvals, clearances from various statutory agencies and land acquisition formalities need to be completed as the tendering process closes.

- Under implementation: This stage includes the beginning of construction or development for the project. Funds, linked to project completion milestones, have to be allocated to the developer during this phase.
- Finally, there is the “construction completed” stage, when the project is commissioned.

All the projects identified under Sagarmala have been classified under one of these six stages. The PMO could try to ensure that the project proponents detail the timelines for every stage of the project. This will enable the PMO to effectively track the progress of the project, discover the root cause for delays and then facilitate debottlenecking to meet project timelines. A classification of projects based on their readiness is seen in Exhibit 33.

#### EXHIBIT 32

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#### Classification of projects based on readiness

	Concept	TEFR under preparation	DPR under preparation	Under tendering	Under implementation	Completed	Total
Port modernisation	54	15	23	34	73	3	202
Port connectivity	28	5	24	5	23	3	88
Port-led industrialisation	29		5				34
Coastal community development	4		2	2	5		13
<b>Total</b>	<b>115</b>	<b>20</b>	<b>54</b>	<b>41</b>	<b>101</b>	<b>6</b>	<b>337</b>

The categorisation of projects as described here supports project implementation and tracking. In addition, stakeholder alignment is a crucial aspect of project implementation in a timely manner.

# Stakeholder alignment

It is essential to align the implementing agencies with the vision of Sagarmala so that they are convinced of the necessity of each project. Getting various stakeholders on board is challenging as line ministries have their own internal plans. This may lead to a lack of consistency on the prioritisation of projects, necessitating strong follow-ups while tracking project progress.

## **DISCUSSIONS WITH STAKEHOLDERS**

For each project category, alignment meetings were held with stakeholders to understand their appetite for specific projects and to estimate the funding available. The meetings also helped to understand the current status of these projects and to prioritise Sagarmala projects within the budgets of the executing line ministries and state governments.

### **Ministry of Railways for rail-connectivity projects**

In the meeting with the ED (Planning), Railway Board, on 13 May 2016, 27 prioritised rail projects were discussed, which were shared with the Ministry of Railways on 25 April 2016. It was proposed that the Ministry would take up 21 projects. The remaining six would be taken up either by non-government rail (NGR) or under a JV model through the IPRCL. The Ministry of Railways has agreed to the proposed approach vide its letter dated 13 June 2016.

### **MoRTH/NHAI for road-connectivity projects**

A letter that listed the 48 prioritised road projects was sent to the Ministry of Road Transport and Highways (MoRTH) on 29 April 2016. Subsequently, the NHAI decided that 18 port connectivity projects will be taken up under the Bharatmala scheme.

A meeting was also held on 14 June 2016 under the chairmanship of the Minister for Road Transport, Highways and Shipping and attended by the Secretary (Shipping), the Secretary (MoRTH) and a Member (PPP, NHAI). It was decided that the DPR for these 18 projects will immediately be initiated by MoRTH/NHAI, which will prioritise these projects based on viability. Subsequently, the NHAI has conveyed that it will either take up or is already implementing 22 port-road connectivity projects (excluding projects under the Bharatmala scheme and expressway projects).

### **Ministry of Petroleum and Natural Gas for pipelines, LPG terminals and refineries**

A meeting was held on 27 January 2016 with the Minister, Ministry of Petroleum and Natural Gas (MoPNG) to discuss projects related to pipelines, LPG terminals

and refineries. Subsequent meetings have been conducted with Oil Marketing Companies (OMCs) to gauge their interest in the identified projects.

### **CONCOR for multi-modal logistics hubs**

The relevant project brief and letters were sent to the Container Corporation of India (CONCOR), the container handling agency, seeking its views and likely timelines for the implementation of seven multi-modal logistic hubs at the identified locations. CONCOR has informed, vide its letter dated 7 June 2016, that domestic operations have already commenced at one MMLH in Pantnagar, South Uttarakhand, while other MMLHs are already under development at the four proposed locations. CONCOR has communicated that action will be initiated for feasibility and traffic analyses for the remaining two locations as well.

### **Other meetings**

In addition, meetings were conducted with specific ministries to seek their views and action steps on relevant projects. These include the Ministry of Steel for steel clusters, the Ministry of Power for power clusters, the Ministry of Chemicals and Fertilizers for petrochemical plants and fertiliser-related projects; the Ministry of Tourism for cruise terminals and passenger jetties and the Department of Animal Husbandry, Dairying and Fisheries for fishing-harbour projects.

### **CREATION OF SUB-PROGRAMMES WITH A RING-FENCED BUDGET**

To enable the prioritisation of projects identified under the Sagarmala Programme and to streamline the coordination and monitoring of project implementation, creation of sub-programmes has been proposed for each relevant central ministry or department or agency. These include the Ministry of Railways, MoRTH, MoPNG, Ministry of Steel, Ministry of Power, Ministry of Tourism, Ministry of Chemicals and Fertilizers, Ministry of Agriculture and Farmers' Welfare and DIPP. Nodal officers should be appointed in the relevant central ministries for monitoring and reporting on the implementation of these projects. It is also suggested that a dedicated ring-fenced budget be allocated by the central ministries to implement these projects.

### **RESIDUAL PROJECTS TO BE TAKEN UP BY THE SDC**

The Sagarmala Programme has identified ~20+ projects that the SDC should take up on a priority basis for FY17 (Exhibit 34). These projects are crucial for port-led development and their non-completion is hampering the efficient and effective operation of ports. But no implementing agency has taken ownership of these because of (a) their scope and (b) the port's inability to fund them.

By assisting line ministries, ports, state governments or state maritime boards (SMBs) and SPVs to implement these residual projects, the SDC shall

significantly reduce logistics costs, turnover time and pilferage, among other issues, thereby reducing the cost of conducting business at ports.

### EXHIBIT 33

S. No.	Project name	Investment (INR cr)
1.	Ro Ro service at Mandwa (Phase 2 of Mandwa port development)	63
2.	Providing broad Gauge Rail linkages to Old Bedi Port	27
3.	Ro – Pax ferry services between Gogha and Dahej in Gulf of Cambay	509
4.	Providing railway connectivity from the Tuticorin port to the power plants	300
5.	Modernisation and upgradation of the existing railway network at Kolkata Dock System under KoPT	9
6.	Full rake wagon handling line with paving 24m wide at Mormugao	15
7.	Circulating road & gate complex for ease of movement of break/bulk cargo at Mormugao Port	50
8.	Improvement of road connectivity to facilitate the trade and port users at Kolkata Port	24
9.	Upgradation of the track nos – 10,12,14,16,18,19,20,21, 22 and 23 at EJC yard of Kolkata port	35
10.	Construction of Hardstand with concrete Paver Blocks including drainage facility behind berth no. 9 & 13 at G.C. Berth within Dock Interior Zone at Haldia	45
11.	Construction of a liquid cargo terminal (outer terminal-II) north of lock entrance at Haldia Dock Complex, Kolkata Port Trust	190
12.	Rail connectivity from Dighi port to Roha	721
13.	Construction of grade separator from H-7 area to port connectivity road by passing Convent Junction, Vizag Port	90
14.	Development of adequate road connectivity from Vizag port-connectivity from Sheela Nagar junction to Anakapalli-Sabbavaram/Pendurti- Anandapuram road, i.e., NH-16 (Former NH-5)	505
15.	Unlocking capacity of CJ1 & CJ2 at Tuticorin	250
16.	Development of passenger Jetty at Mypadu, Nellore, Andhra Pradesh	17.5
17.	Development of Passenger Jetty at Baruva In Srikakulam District, AP	17.5
18.	Development of Tourism Passenger Jetty at Kothapatnam, Prakasam, AP	17.5
19.	Development of Passenger Jetty at S. Yanam, East Godavari Sites, AP	17.5
20.	Development of Coastal food export berth at Kakinada (P-33)	150
21.	Development of Passenger Jetty, Sea Plane Jetty and upgradation of existing jetty at Kakinada, East Godavari, A.P.	21
	<b>Total</b>	<b>~3,072</b>

Convincing multiple stakeholders of the necessity and relevance of Sagarmala projects can help ensure that these are prioritised to help achieve India's goals of port-led development.



# Standardisation of information

In the last few months, the MoS has encouraged and made multiple efforts to identify, sanitise and strengthen the case for the 337 projects undertaken as part of Sagarmala. This was a major effort to standardise all available information to cater to the requirements of various stakeholders and enable effective decision-making on project scope, timelines, implementation and funding.

As the first step, it worked on aligning with the concerned authorities on the feasibility and relevance of projects emerging from the NPP. This was followed by syndication meetings with various implementing agencies to verify the current status of projects, including:

- The Ministry of Railways for rail projects
- The NHAI and MoRTH for road projects
- The MoPNG for pipelines, LPG terminals and refineries
- The Department of Animal Husbandry, Dairying and Fisheries for fishing harbour projects
- The Container Corporation of India for multi-modal hubs
- The Indian Port Rail Company for rail connectivity to ports
- The Ministry of Tourism for cruise terminals and passenger jetties
- The Ministry of Steel for steel clusters
- The Ministry of Power for power clusters
- The Ministry of Chemicals and Fertilizers for petrochemical plants and fertiliser-related projects
- State industrial corporations and maritime boards for syndicating state projects
- Major port trusts for syndicating projects at each port

Based on suggestions from state maritime boards and port trusts, additional projects were included in the master list. These also included port-modernisation projects from the port masterplan in the master project list.

Consultations with project proponents helped to validate key metrics like investment cost, land requirement and capacity addition. Duplicate projects that may have been proposed under different names were identified. The MoS also provided clarity on the exact requirements of a project by assessing the increase or decrease in the scope of a project from the time it was proposed. Project concept notes were amended based on the information provided by project proponents.

A dedicated team also worked on collating the readiness status of all projects after validating the information from project stakeholders, e.g., DPR and TEFRR prepared, under tendering. Projects were prioritised for year-wise phasing and

clearly selected for being taken up in the short, medium and long term. A dedicated team worked to identify projects that the SDC could take up for funding in the current financial year. It began the process of obtaining all necessary documents from the port trust or state maritime board for approvals.

# Financing plan

A total of 337 projects have been identified for port-led development in India. These require an investment of around INR 4 lakh crore from different stakeholders, including the MoS, the Ministry of Commerce, state governments and other central agencies like the NHAI and Indian Railways. In addition, some contribution from the private sector, in the form of PPPs, is also expected. The proposed funding plan for each category of projects is discussed in the following sections (Exhibit 35).

## PORT MODERNISATION

### Major port projects

The MoS will be the nodal agency for over 200 modernisation projects at existing ports. Respective port trusts will be responsible for implementing these projects and for preparing the DPR, estimated at about 5 to 10 per cent of the total cost. The required investment of around INR 70,000 to 80,000 crore is entirely expected through the PPP model.

### New ports

The development of new ports, such as Paradip Outer Harbour, Vadhavan, Sagar and Enayam, proposed as part of the Sagarmala Programme, is estimated to cost around INR 35,000 to 40,000 crore. The MoS will be responsible for preparing the DPR for these projects, which will amount to about 10 per cent of the overall cost. Private funding could be employed for berth and terminal development whereas state funds could be used for providing the basic infrastructure. A split of 50–50 contribution from PPP and the Centre is proposed for these projects.

### Non-major port projects

Around 10 projects have been identified for modernising non-major ports and will cost around INR 10,000 crore. Respective states will be responsible for the funding and implementation of these projects.

## PORT CONNECTIVITY

### Road projects

- Ten freight-friendly expressways have been identified to decrease road transit time from factory to port. The proposed split is 60 per cent from PPP and 40 per cent from public funding. The NHAI, under the Ministry of Roads, will be responsible for the implementation of these projects.

- Eighteen last-mile road projects between ports and their nearest highways have been identified. The proposed funding split is 25 per cent from PPP and 75 per cent from public contribution. The NHAI, along with port trusts and state maritime boards, will be responsible for the implementation of these projects.
- Port–road connectivity projects will link ports with the hinterland. Around 75 per cent PPP contribution is proposed for these projects. The NHAI, under the Ministry of Roads, will be responsible for the implementation of these projects.
- Internal port–road projects will operate through 100 per cent public funding. Major port trusts will be responsible for implementing these projects.

### **Rail projects**

- Thirty port–rail connectivity projects have been identified, ranging from installing additional lines on existing routes to setting up new lines for improving connectivity and decongesting the rail network. Some of these projects have been identified by the Indian Railways and IPRCL for implementation. Public funding is proposed for these projects that will cost around INR 28,000 to 32,000 crore. A non-government railways model is being evaluated for implementing some of these projects.
- Three internal port rail projects have been identified under the Sagarmala Programme and respective port trusts will be responsible for implementation.

### **Dry ports and multi-modal hubs**

New inland container depot developments in Raipur, Darjeeling (North Bengal), Hyderabad, Nagaur (Central Rajasthan), Singrauli (North Madhya Pradesh/Chhattisgarh border), South Uttarakhand and Jharsuguda will require a total investment of around INR 500 to 1,000 crore. These projects can be financed through a mix of funding from CONCOR and private investments, e.g., private container-train operators.

### **Pipeline projects**

Three pipeline projects have been identified and complete funding from the respective PSUs is proposed for these. The MoPNG will be responsible for implementation.

## **PORT-LED INDUSTRIALISATION**

### **Bulk and discrete clusters**

Twenty-nine clusters have been identified across 13 industries for port-led industrialisation through coastal economic zones (CEZs). These include bulk and discrete units such as shipbuilding and automotive, food processing parks, science and technology parks, apparel and textile parks and leather and footwear parks. Innovative models can help finance coastal economic unit (CEU) projects, such as using a land monetisation strategy that minimises investment in upfront capex. These projects will require around INR 50,000 crore, provided equally by the state governments and the central government. The centre, along with the state governments, will jointly undertake the basic infrastructure development for these clusters. Some of the CEUs can also be developed by private developers. Funding for around 60 per cent of the project cost could be through public sector units while private investment can account for the rest.

### **Tourism projects**

Complete public funding is proposed for the five tourism projects identified. The Ministry of Tourism and the respective port trusts will be responsible for the implementation of projects.

## **COASTAL COMMUNITY DEVELOPMENT**

Around 13 projects have been identified for coastal community development with a total project cost of around INR 2,000 crore. The Ministries of Shipping, Tourism, and Agriculture, the departments of Animal Husbandry, Dairying and Fisheries and port trusts and maritime boards will handle the implementation of these. Among the various projects proposed, cruise terminals can be developed under PPPs whereas the other projects will be publicly funded.

EXHIBIT 34

**Yearwise funding requirement for the projects (1/2)**

Funding Agency	Type of Project	# of projects	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total
Major Port Trusts	Port Modernization - Major Ports	62	-	4,525	9,236	6,737	3,422	1,769	-	-	-	-	25,688
Major Port Trusts	New Ports	7	-	-	-	4,074	6,611	10,148	7,012	2,475	418	-	30,737
Major Port Trusts	Last Mile Road projects	3	-	90	174	65	-	-	-	-	-	-	329
Major Port Trusts	Internal Port Road Projects	7	-	84	273	414	-	-	-	-	-	-	771
Major Port Trusts	Internal Port Rail Projects	4	-	40	103	16	-	-	-	-	-	-	160
Major Port Trusts	Port Rail Connectivity Projects	2	-	-	-	325	707	605	54	-	-	-	1,690
Major Port Trusts	Port Road C connectivity Projects	3	-	-	37	124	155	70	-	-	-	-	386
Major Port Trusts	CEU	2	-	-	1,750	3,250	-	-	-	-	-	-	5,000
Indian Railways	Port Rail Connectivity Projects	6	-	894	1,616	1,178	1,767	2,170	2,790	2,325	-	-	12,740
Indian Railways	Internal Port Rail Projects	0	-	-	-	-	-	-	-	-	-	-	-
NHAI	Last Mile Road projects	9	-	231	498	145	-	-	-	-	-	-	874
NHAI	Internal Port Road Projects	0	-	-	-	-	-	-	-	-	-	-	-
NHAI	Port Road C connectivity Projects	17	-	1,776	3,712	2,963	2,095	2,033	972	360	-	-	13,911
NHAI	Expressways Projects	9	-	-	-	17,325	28,875	46,200	23,100	-	-	-	115,500
<b>TOTAL</b>		<b>131</b>	<b>-</b>	<b>7,640</b>	<b>17,399</b>	<b>36,615</b>	<b>48,631</b>	<b>62,995</b>	<b>33,928</b>	<b>5,160</b>	<b>418</b>	<b>-</b>	<b>207,786</b>

EXHIBIT 35

Yearwise funding requirement for the projects (2/2)

Funding Agency	Type of Project	# of projects	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total
IWAI	Inland Waterways Projects	3	-	-	500	1,002	1,377	2,003	2,005	629	-	-	7,515
MoPNG	Bulk Cluster Projects	2	-	-	-	5,200	7,800	10,400	15,600	13,000	-	-	52,000
CONCOR	Multi Modal Hubs	2	-	-	-	34	77	60	-	-	-	-	170
IPRCL- Major Port Trusts	Last Mile Road projects	0	-	-	-	-	-	-	-	-	-	-	-
IPRCL- Major Port Trusts	Internal Port Road Projects	0	-	-	-	-	-	-	-	-	-	-	-
IPRCL- Major Port Trusts	Port Road Connectivity Projects	1	-	123	228	-	-	-	-	-	-	-	350
IPRCL- Major Port Trusts	Port Rail Connectivity Projects	10	-	45	2,175	5,296	2,666	-	-	-	-	-	10,172
IPRCL- Major Port Trusts	Internal Port Rail Projects	11	-	350	279	176	-	-	-	-	-	-	804
DIPP	Discrete Cluster Projects	12	-	-	-	3,393	5,089	6,785	10,178	8,482	-	-	33,928
DIPP	CEU	1	-	-	-	875	1,625	-	-	-	-	-	2,500
Ministry of tourism	Tourism Projects	2	-	-	-	42	78	-	-	-	-	-	120
Sagarmala Development Corp	SDC -Project	-	-	-	-	-	-	-	-	-	-	-	-
Otherstate projects/Agencies	Projects	24	-	1,840	4,762	4,843	4,440	159	80	67	-	-	16,191
<b>Total</b>		<b>68</b>	<b>-</b>	<b>2,358</b>	<b>7,943</b>	<b>20,860</b>	<b>23,142</b>	<b>19,407</b>	<b>27,862</b>	<b>22,177</b>	<b>-</b>	<b>-</b>	<b>123,748</b>
<b>GRAND TOTAL</b>		<b>199</b>	<b>-</b>	<b>9,998</b>	<b>25,342</b>	<b>57,475</b>	<b>66,773</b>	<b>82,401</b>	<b>61,790</b>	<b>27,337</b>	<b>418</b>	<b>-</b>	<b>331,534</b>

Clarity on the funding plan for each project is an important enabler in ensuring the project's timely completion.

# Project monitoring dashboard

A web-based, project-tracking IT tool has been developed to track the progress of all projects identified under Sagarmala. While the Project Monitoring Manager will own the tool, the IT Supervisor can help with day-to-day maintenance. The tool will help to generate automated project-tracking reports that can be used by the SDC for key meetings.

The tool uses a range of technologies—Database—MySQL, NodeJS with SailsJS framework as a server platform and an AngularJS-based application for the user interface. It is hosted on a RedHat Linux server from NIC. It has the following features:

- **Executive dashboard:** It provides a high-level visual overview of projects grouped by project status. It highlights delayed projects, classifying them by severity of delay, e.g., less than three months, three to six months, six to 12 months, more than 12 months. The tool also allows the Project Monitoring Manager to view projects that have upcoming milestones to enable (and prompt) a follow-up to ensure progress and completion.
- **Filters:** It allows projects to be filtered through multiple metrics—status, theme, associated port or state, sub-category and severity of delay. These filters allow multiple selections across metrics. The lists generated can be downloaded and then shared as Excel files.
- **Gantt chart:** An automatic Gantt chart is generated for each project based on the milestone dates provided, offering a visual overview of the entire project timeline. It helps to track the progress on key milestones and identify the root cause of any delays.
- **Online editing:** It allows the user to add new projects, update details for existing projects and archive old projects.

The Project Monitoring Dashboard will have to be deployed to various line ministries and ports, where the nodal officers will update the relevant information for these projects. To deploy the tool, the MoS needs to:

- **Identify the IT person responsible for the tool:** They will be accountable for ongoing maintenance and tech support of the tool. Their tasks include installation (one-time) and maintenance (ongoing) of the database server and application server. The PDC will provide the code, database scripts and installation instructions to this IT person.
- **Select the domain name for the tool:** A decision has to be taken on the domain name to use for the tool (.nic domain) and accordingly get it registered by the NIC team. Once the domain is registered, it has to be linked to the application server via DNS settings and NAT settings, which will be done by the NIC team.
- **Conduct security audit of the application:** As per NIC requirements, a third-party vendor must undertake a security audit of the application. The MoS



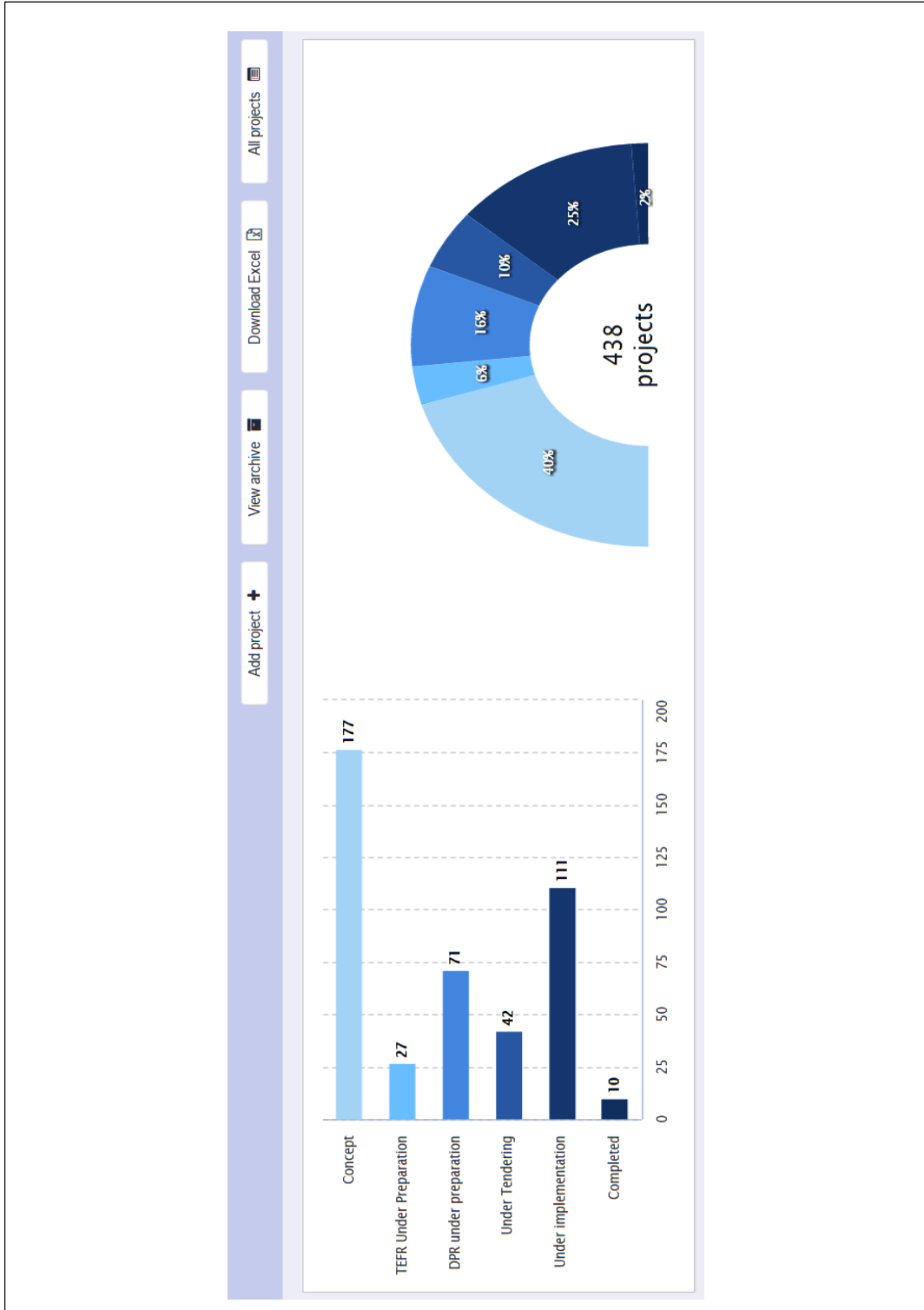
needs to select this vendor from a list of pre-approved, eligible vendors. Once the audit is successful, the audit certificate needs to be provided to the NIC.

- **Create user IDs and passwords for all users:** The tool has an admin interface for this task, and is available only to the admin user. A Ministry person has already been identified to act as the admin user for the application.

Fulfilling the Sagarmala vision of port-led development can transform the significance of ports in India. As discussed in this report, systematically addressing the various challenges inherent in the execution of the 337 projects identified can help to ensure the success of this massive initiative.

# PROJECT-TRACKING IT TOOL SNAPSHOTS

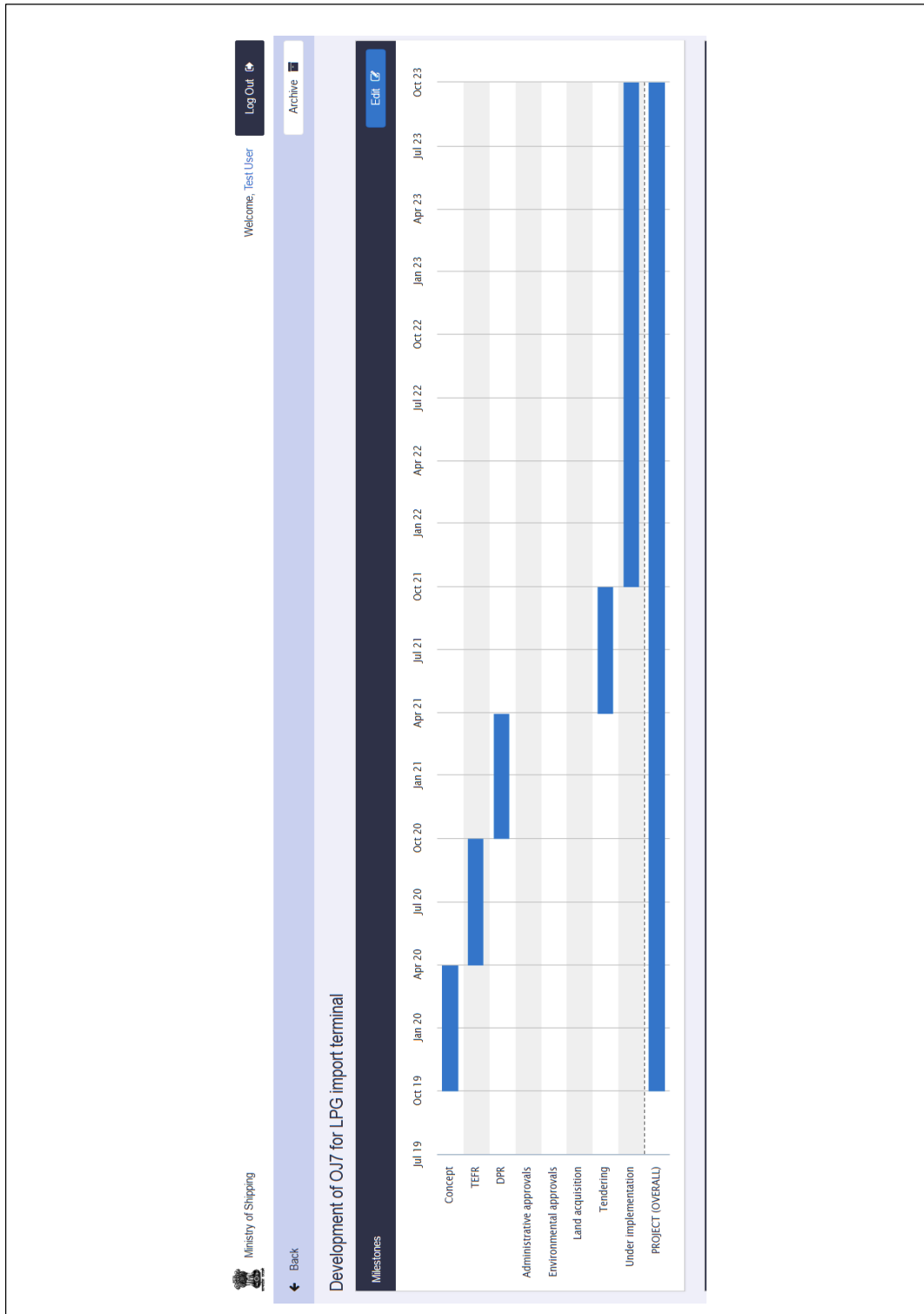
## Dashboard



# Project list

Ministry of Shipping		Welcome, Test User		Log Out		Download Excel							
Back		Theme - All		Port - All		State - All		Status - 1 of 6 selected		Sub Category - All		Is Delayed ? - All	
S.No.	Project Name	Project Theme	Associated Port	State	Project Cost (INR Cr)	Project Status	Units (in Kms/MTPA/etc)	Implementing Agency	Project Sub Category	Contact Person	Next milestone due date		
1	Development of OJ7 for LPG import terminal	Port modernisation	Kandla	Gujarat	500	Concept	4 MTPA	MoPNG	Port Modernization - Major Ports		Apr 20		
2	Expressway from Dighi Industrial Cluster (Pune) to JNPT	Port connectivity	JNPT	Maharashtra	4500	Concept	150 Kms	NHAI	Expressways Projects		Apr 20		
3	Petrochemical cluster in Ennore	Port led industrialisation	Ennore	Tamil Nadu	420	Concept		MoPNG	Bulk Cluster Projects		Apr 20		
4	Petrochemical cluster in Gujarat	Port led industrialisation	Mundra	Gujarat	420	Concept		MoPNG	Bulk Cluster Projects		Apr 20		
5	Petrochemical cluster in Kakinada	Port led industrialisation	Kakinada	Andhra Pradesh	420	Concept		MoPNG	Bulk Cluster Projects		Apr 20		
6	Petrochemical cluster in Mangalore	Port led industrialisation	Mangalore	Karnataka	420	Concept		MoPNG	Bulk Cluster Projects		Apr 20		
7	Port-based Mega food processing park in Kakinada	Port led industrialisation	Kakinada	Andhra Pradesh	2479	Concept		Ministry of Commerce	Discrete Cluster Projects		Apr 18		

# Gantt chart to track milestones



## Concept notes for each project

Project Description <a href="#">Edit</a>			
Project Name	Development of OJ7 for LPG import terminal	Project Theme	Port modernisation
Port - Major /Non-major	Major	Associated Port	Kandla
State	Gujarat	Project Id	PM334
Project Cost (NR Cr)	500	Project Status	Concept
Units (in Kms/MTPA/etc)	4 MTPA	Implementing Agency	MoPNG
Project Sub Category	Port Modernization - Major Ports		
Project Contents <a href="#">Edit</a>			
Proposed mode of execution - PPP/EPC/Amnity	Project Brief		
Project Justification	Contact Person	NAME	DESIGNATION
		PHONE	EMAIL
Status of requisite approvals - Environment, forest, irrigation etc	Land acquisition details		
Other Statutory Clearances (status and approving authority)			