

Understanding potential hydrogen hotspots as per demand dynamics in India

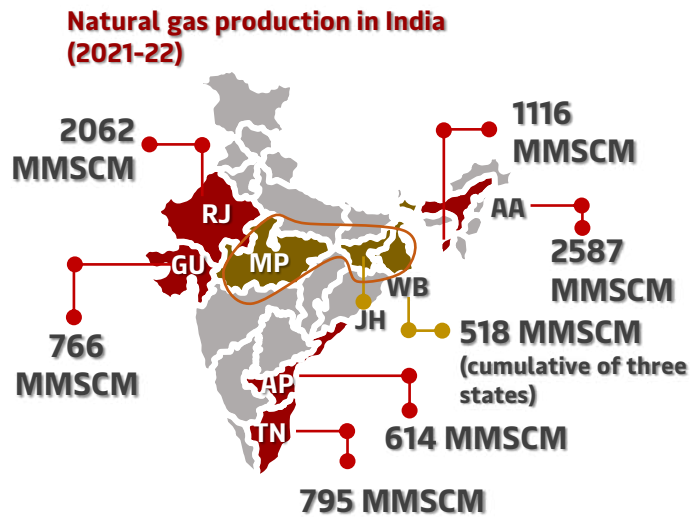
Part -10 (Hydrogen ecosystem development and identification of key future market growth clusters in India)

RES, Power & Utilities

Assessment of natural gas resources for low carbon hydrogen production



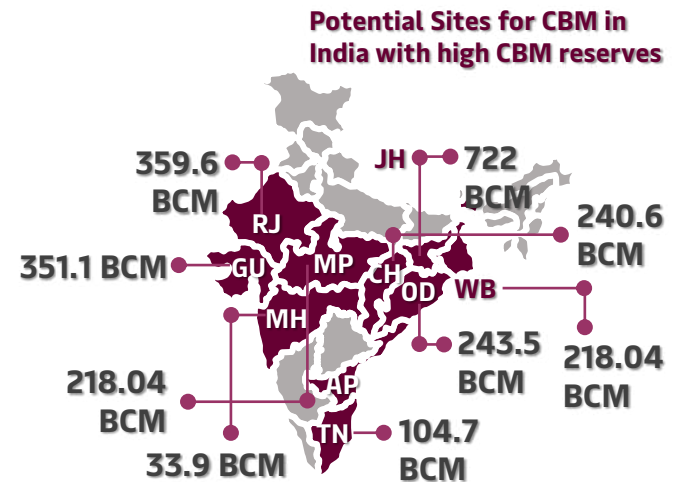
Conventional & unconventional hydrocarbon production sites in India



Capacity in MMSCM indicates the onshore natural gas production for year 2021-2022 (till Jan'2022)

Capacity in MMSCM indicates the onshore CBM production for year 2021-2022 (till Jan'2022)

Capacity in BCM indicates the CBM resources available in India



More than 235 port connectivity projects have been identified in India

India's growing infrastructure need has made it quintessential to develop the transport system to full capacity. Logistics infrastructure covering the road, rail, waterways & air network of a country is the backbone on which the nation marches northbound. Although, the urgency to develop India's logistics infrastructure has been realized well by the Indian government, as many development targets have been rolled out over the past decade. But the task at hand is daunting and needs participation from the deep pocketed players to lift the plans to reality. Since, a large part of India's future logistics network capacity is still to be built, the country has great potential to build infrastructure optimally to meet the growing demand. Doing so requires an integrated and coordinated approach in which the development of each mode – railways, waterways and roads is matched to the needs and existing assets are better utilised.

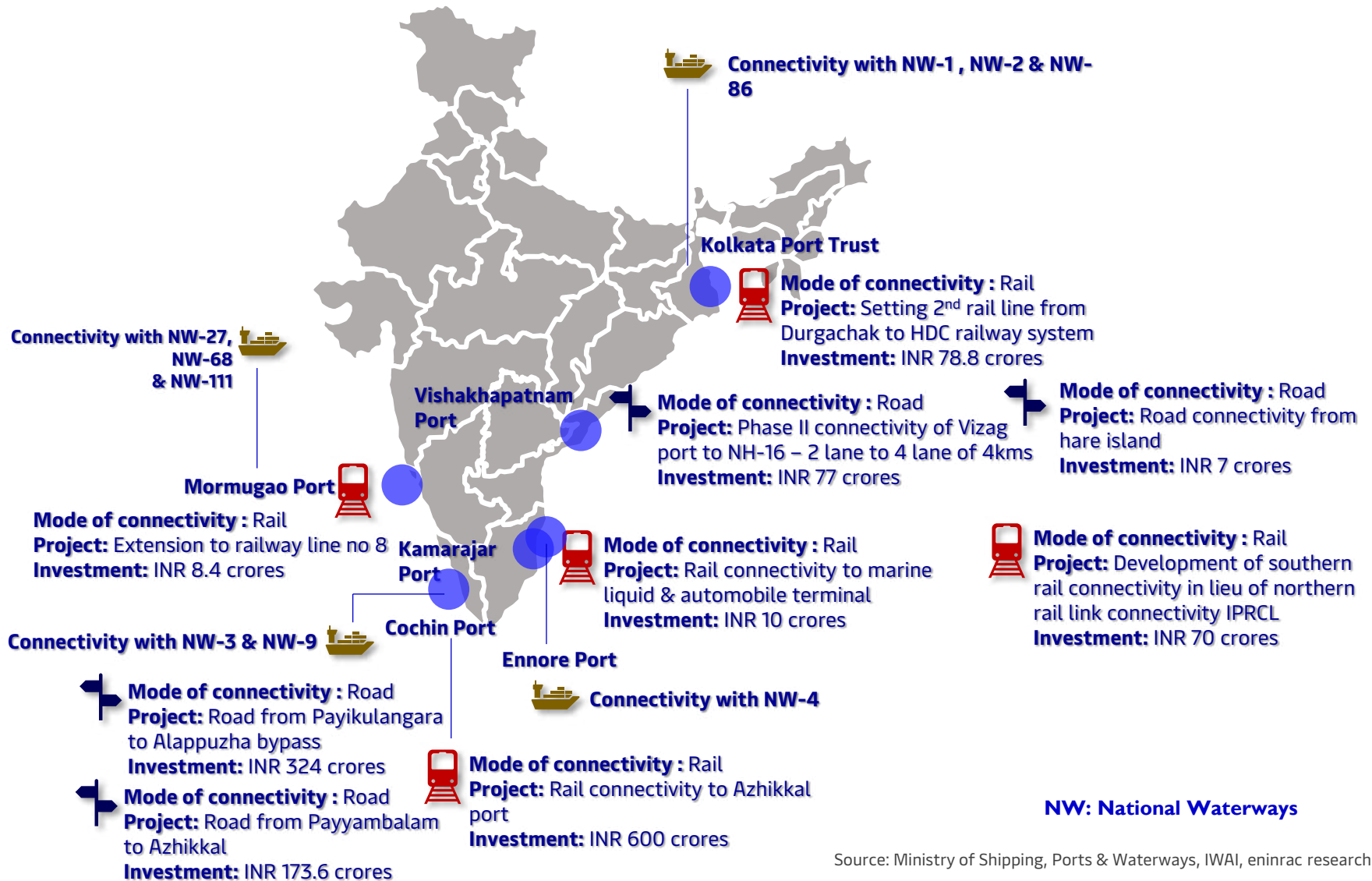
Connectivity is one of the critical enablers for ports and the end-to-end effectiveness of the logistics system drives competitiveness for the maritime industry as well. With infusion of new technology and capacity building, the cumulative/ total capacity available at ports can match demand but will not be able to handle additional traffic if the evacuation to and from the port is restricted. It is, therefore, important that connectivity of major ports with the hinterland is augmented not only to ensure smooth flow of traffic at the present level but also to meet the requirements of projected increase in traffic. India's hinterland connectivity is mainly based on surface transport i.e. road and rail, wherein, domestic waterways (coastal shipping and inland waterways) playing a very limited role. Pipelines are predominantly used only for transporting crude oil, refined petroleum products and natural gas.

In India, smooth connectivity to ports is even more important as the cargo generating centers are mainly in the hinterland instead of in the coastal region. The long lead distance increases the logistics cost and time variability within which the cargo can be delivered.

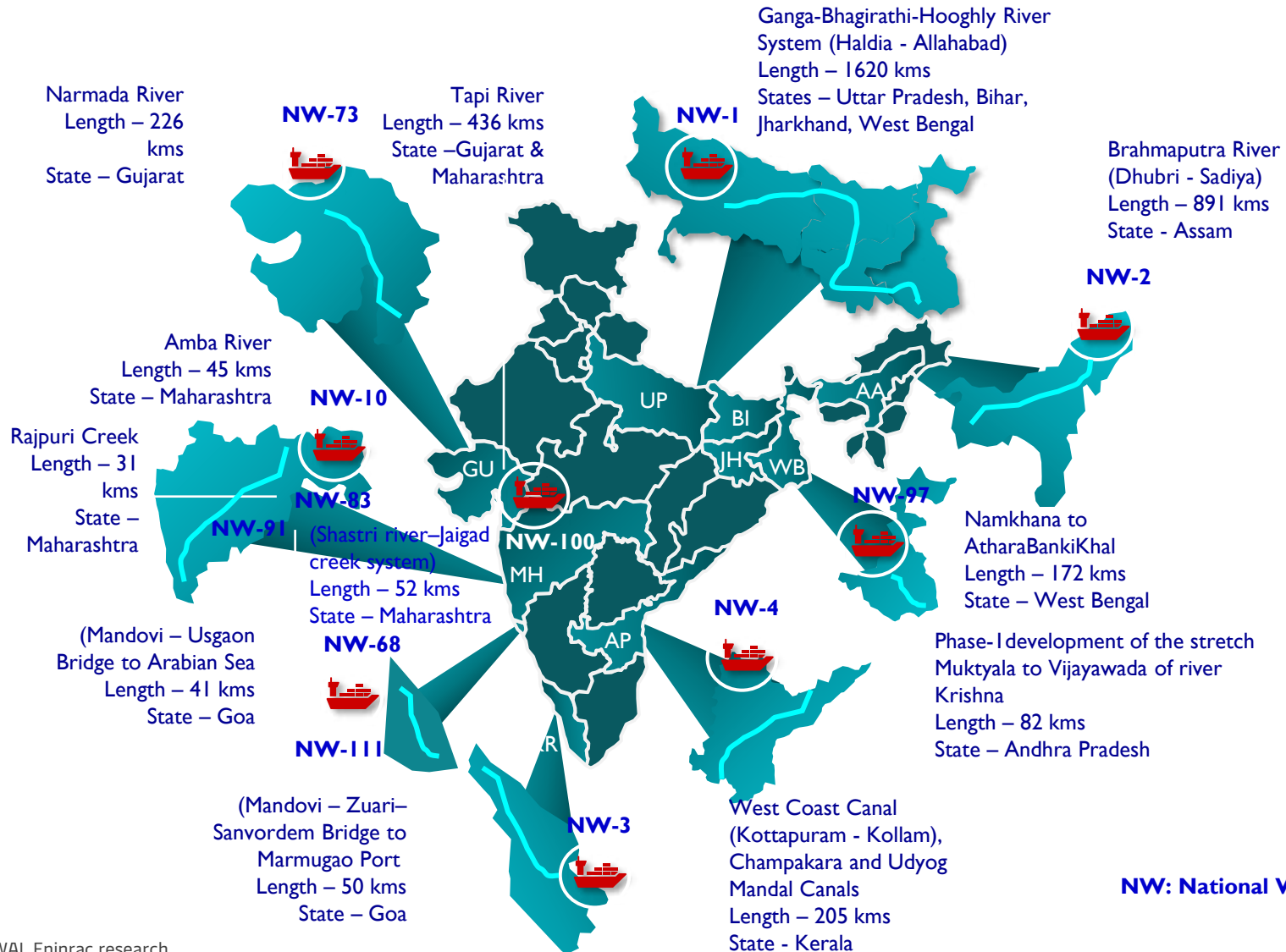
Under Sagarmala Programme, endeavour is to provide enhanced connectivity between the ports and the domestic production/consumption centres. More than 235 connectivity projects at an estimated investment of more than Rs. 2.35 Lac Crore have been identified. Some of the types of connectivity projects considered are listed below:

- National waterways prioritized for development in the first phase
- Connectivity to Dedicated freight corridors
- Last mile rail and road connectivity projects
- Major rail connectivity projects
- Freight friendly Expressway projects connecting the major ports
- Development of Multi-Modal Logistics Parks
- POL Pipelines

Key port connectivity projects awarded in India since 2018 and their connectivity to NW

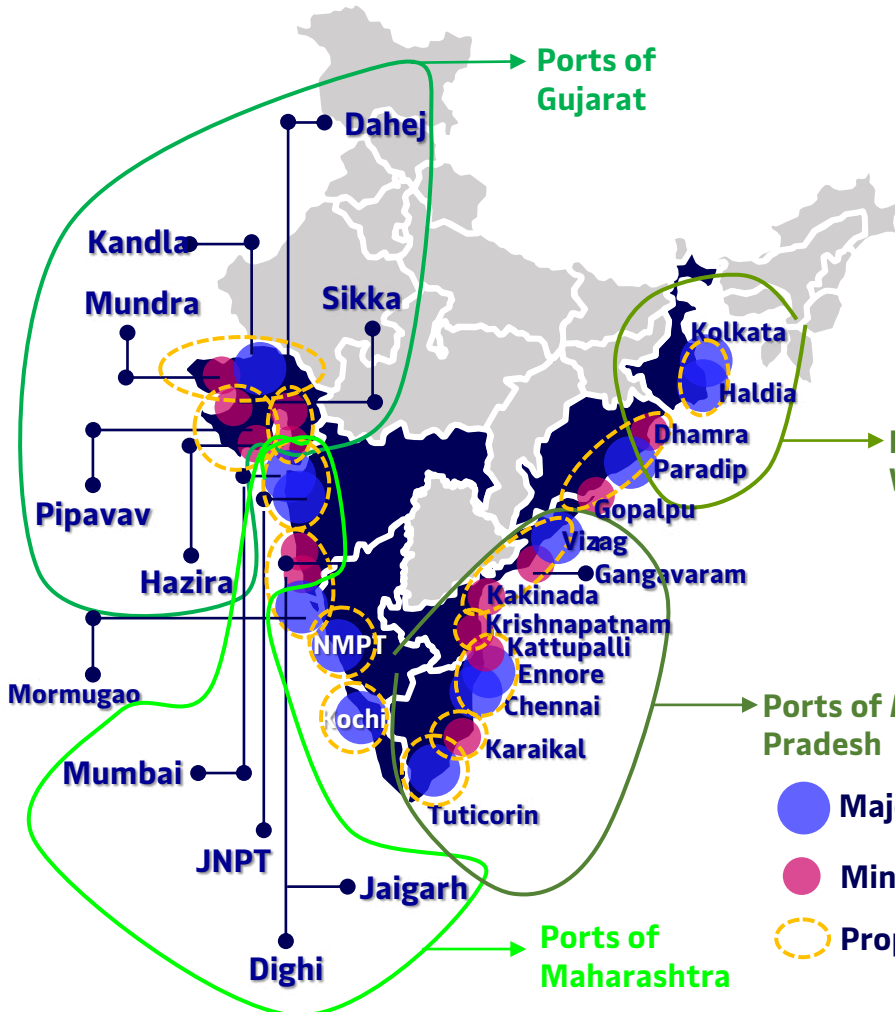


Details of operational national waterways in India providing logistics support



Setting & scaling up industrial clusters in the vicinity of ports for hydrogen application

Proposed coastal economic zones (CEZ)



Industrial clusters in the vicinity of ports

A. Key Petrochemical Clusters

State: Gujarat
CEZ: Kutch
Clusters - Kutch

State: Karnataka
CEZ: Dakshin Kannada
Clusters - Udupi, Dakshin Kannada, Kodagu, Mysore

Clusters - Puri, Jagatsinghapur, Cuttack, Kendrapara, Jajapur, Bhadrak

State: Odisha
CEZ: Kalinga

Clusters - Guntur, Krishna, West Godavari, East Godavari, Visakhapatnam, Vizianagaram, Srikakulam

State: Andhra Pradesh
CEZ: VCIC North

State: Tamil Nadu
CEZ: VCIC South
Clusters - Thiruvallur, Chennai, Kancheepuram

B. Key Refining Clusters

State: Maharashtra
CEZ: South Konkan
Clusters - Ratnagiri, Sindhudurg

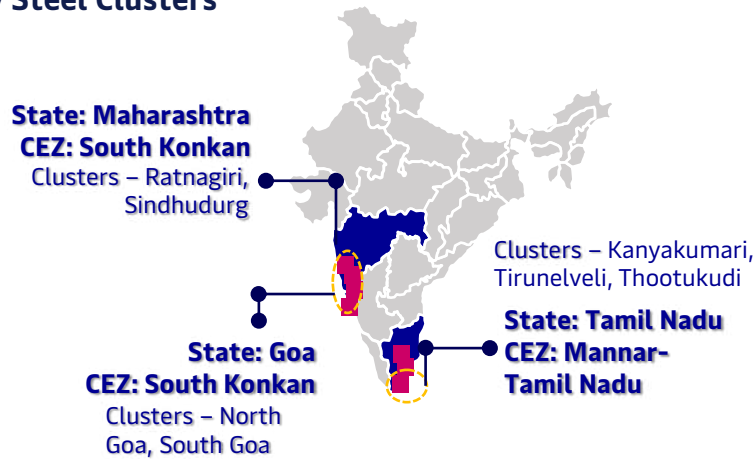
State: Goa
CEZ: South Konkan
Clusters - North Goa, South Goa

Clusters - Kanyakumari, Tirunelveli, Thootukudi

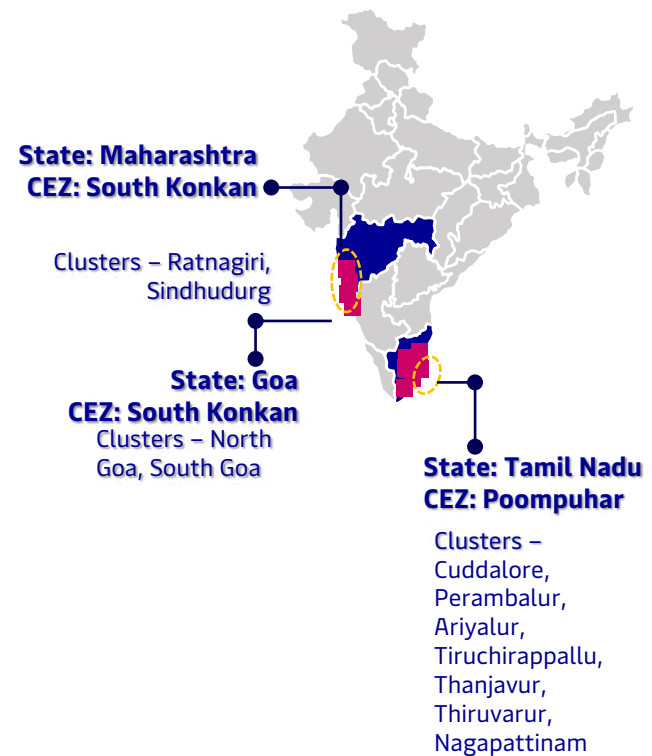
State: Tamil Nadu
CEZ: Mannar-Tamil Nadu

Setting & scaling up industrial clusters in the vicinity of ports for hydrogen application (Contd.)

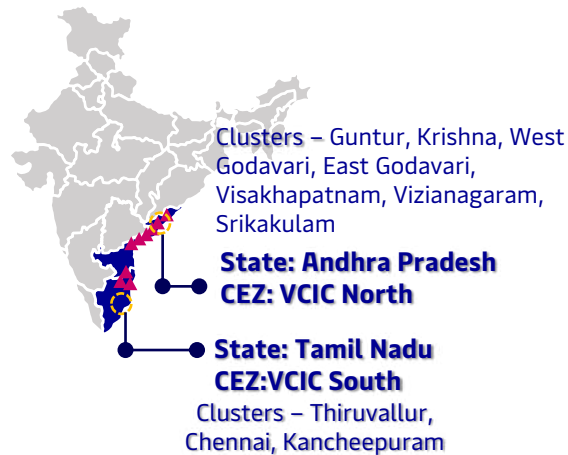
C. Key Steel Clusters



E. Key Power Generation Clusters



D. Key Fertilizer Clusters



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