

Port infrastructure evaluation for hydrogen & ammonia bunkering services in India

Part-10 (Scaling policy, support infrastructure and trade opportunities for hydrogen in India with technology and policy comprehensive roadmap)

Strengthening port areas

About 10 ports in India are projected to be the first mover in providing hydrogen & ammonia bunkering services

Fuel bunkering

Ports can play a pivotal role as they produce plans and strategies to deliver Government policies and they often have policies for air quality and climate change. Many ports have the capacity to develop large quantities of renewable energy and hydrogen. A wide range of activities are carried out in port areas and regions. These not only include the servicing and refuelling of vessels but also the operation of vehicles in the ports such as cars, vans, heavy duty trucks and buses. Heavy machinery such as yard tractors and lifting machinery can also be converted to hydrogen.

The Indian government has announced plans for new developments in gas grid infrastructure, connecting major demand centres with ports to help the latter become major import/export hubs.

The industry sector has also become involved, with some major companies (e.g. Adani, Arcelor Mittal, the Indian Oil Corporation, NTPC, Reliance Industries and the Solar Energy Corporation of India) announcing ambitious plans to develop projects for low-carbon hydrogen production.

To enable hydrogen and ammonia fuel use in shipping, ports will need to build corresponding bunkering infrastructure. It is expected that ports with hydrogen bunkering infrastructure will remain fairly limited till 2030, with most being first mover advantage in India to the already established LNG/gas terminals such as – Kochi Terminal, Mundra Port, Kakinada Port, Dhamra Port etc.

Presently, there are eight operational LNG terminals in India of cumulative capacity 57 MTPA. Two terminals are likely to get commissioned in year 2022 having a cumulative capacity of approximately 9 MTPA.

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New Mangalore Port Trust (NMPT), Karnataka has signed an agreement with Singapore –based LNG Alliance to develop LNG Terminal with fuel bunkering facility

- NMPT, Karnataka, India

Globally, Rotterdam , Singapore and Keihin port are likely to be the first movers in providing hydrogen and ammonia bunkering

Further, plans are underway for the development of India's first large, LNG import terminal which would have the capacity both to provide bunker as well as fuel industry in the western Indian state of Karnataka. The Government of Karnataka through the New Mangalore Port Trust (NMPT) sign an agreement with Singapore-based LNG Alliance to develop the LNG terminal. Over the next three years till 2025, LNG Alliance intends to invest approximately \$290 million to develop, construct, and operate a Floating Storage and Regasification Unit (FSRU), and manage the LNG supply. The initial capacity will be four million tons annually (MTPA), with provision for LNG virtual pipelines and an LNG bunkering facility. It will also have the potential for expansion up to 8 MTPA to meet the estimated demand increase over the next twenty years.

This will also be India's first dedicated LNG bunkering facility that will be providing LNG as fuel for ships visiting the NMPT port and bunkering shuttles to the west coast of India. In addition, the import and regasification terminal will also have the ISO LNG containerization and LNG truck loading facility for serving the industrial and transportation sector.

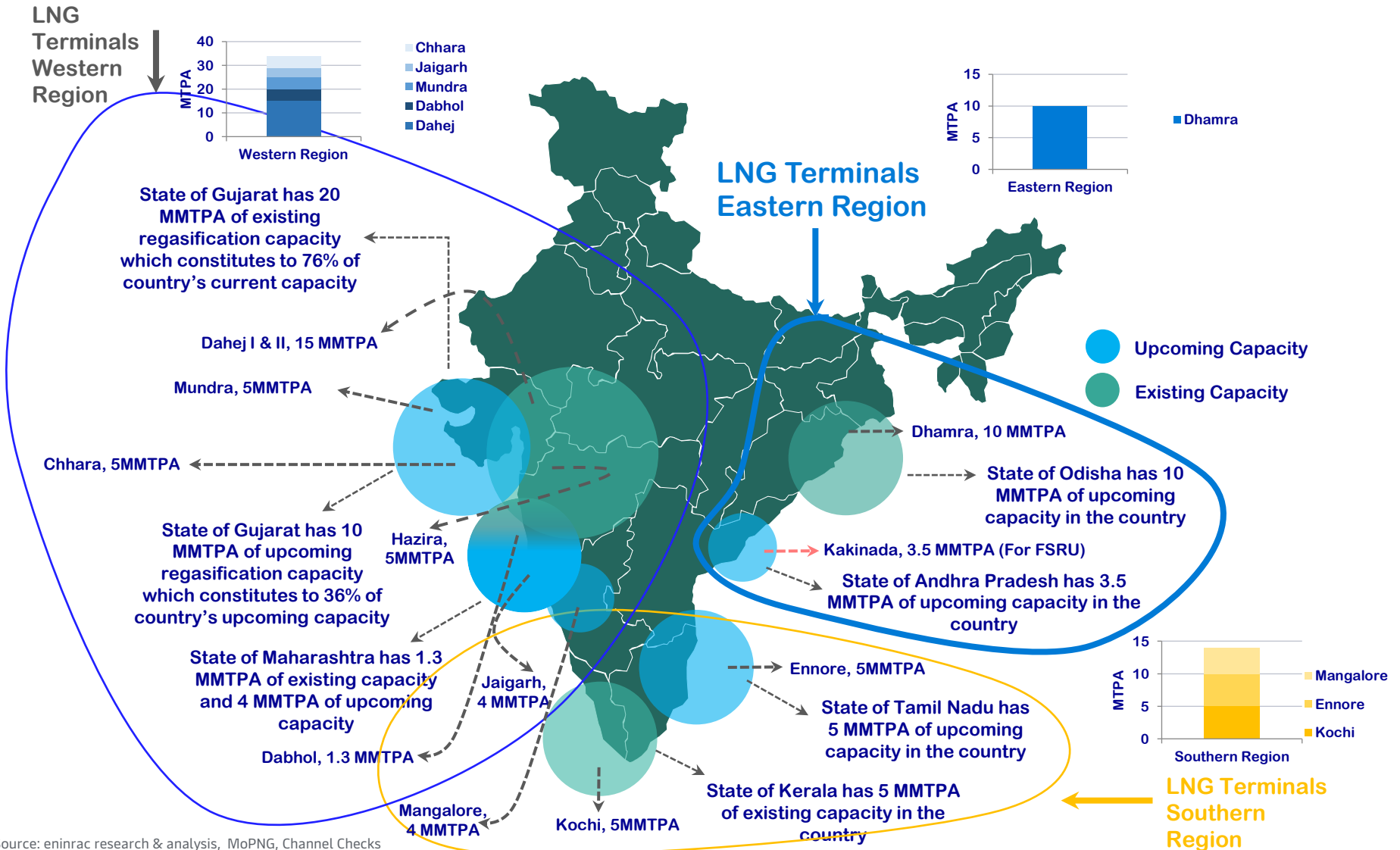
As hydrogen continues to displace fossil fuels in relatively shortrange vessels (especially when battery electrification is difficult), in the long term every port serving ferries, cruise ships and inland and coastal vessels will likely need hydrogen infrastructure.

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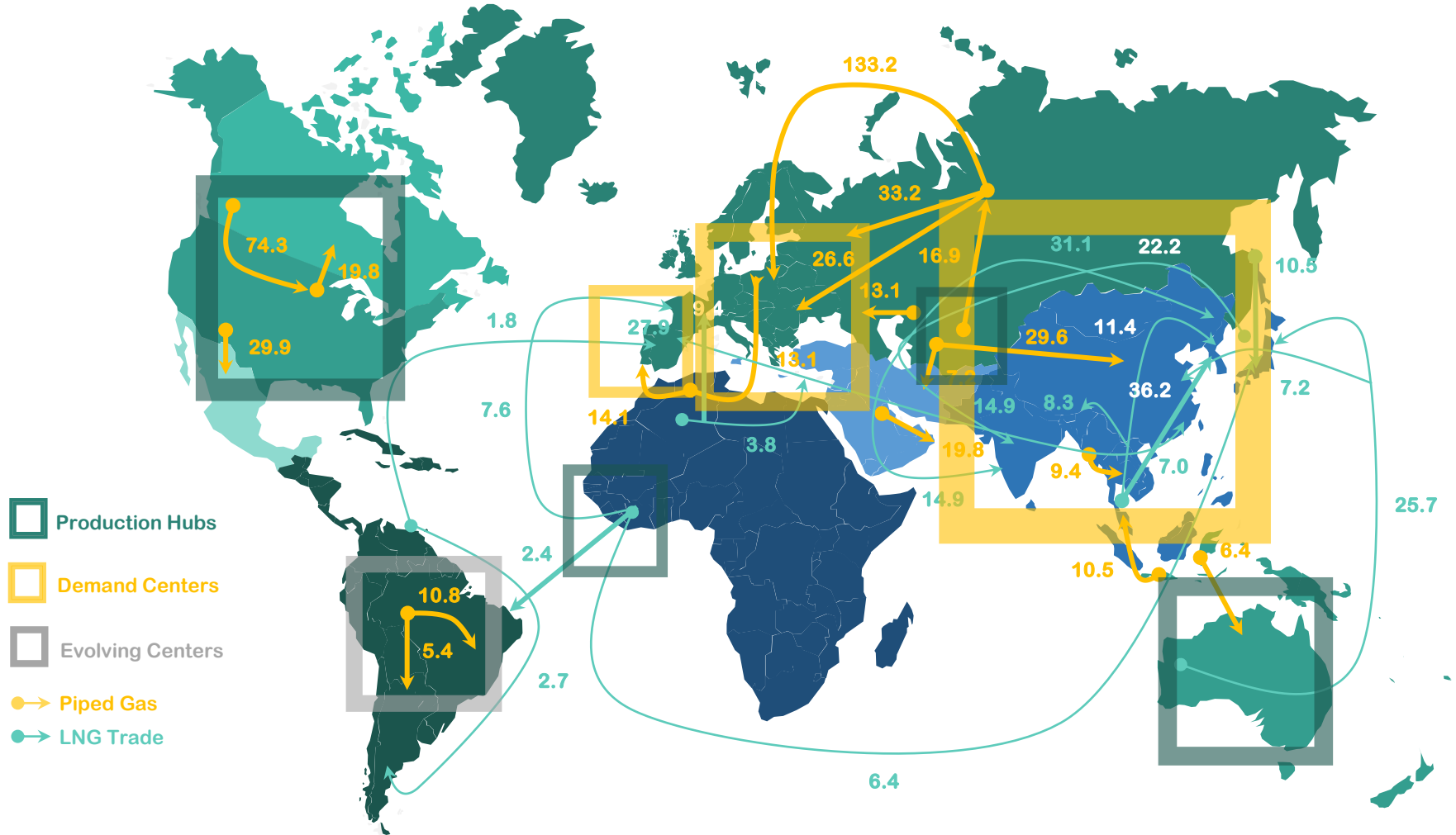
LNG Alliance's goal is to build a global integrated LNG and hydrogen infrastructure portfolio

– NMPT, Karnataka, India

Region wise both existing and upcoming LNG terminals in India- First mover advantage for hydrogen and ammonia bunkering facilities



Major trade movements of piped gas and LNG with global production & consumption hubs, potential for hydrogen and ammonia trade



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