

Understanding potential and demand for hydrogen economy in India

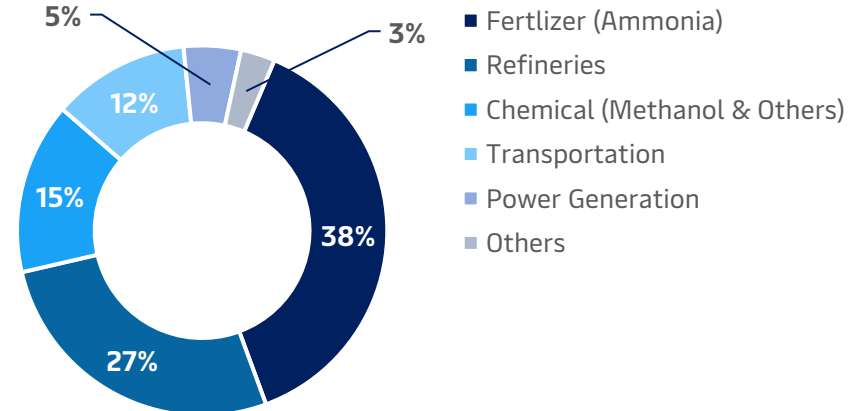
Part -10 (Hydrogen cost benchmarks, demand built-up, transport infra & market size evaluation for India)

India – Potential & Vision for Hydrogen Economy

There is tremendous potential for low-cost, low-carbon production of H₂ in India and the Government along with industry identifies the same.

There is tremendous potential for low-cost, low-carbon production of hydrogen in India, which can enable broad adoption of hydrogen across sectors. Currently in India, hydrogen mainly serve as feedstock in ammonia and methanol production and in refineries. In transportation it is catching up but is in very nascent stages in the country. It is anticipated that good numbers of FCEVs and buses shall come into play in the big cities for public transport in the country. Also, under the mining segment also it is anticipated to evolve as an alternative source.

India Hydrogen Market Share (2021) – Consumption by key sectors in India



Source : eninrac research & analysis & Channel Checks

6 Million Tonnes

Of H₂ is currently consumed in Indian market

US\$ 11 Billion

Is total worth of current H₂ market in India

Close to 80%

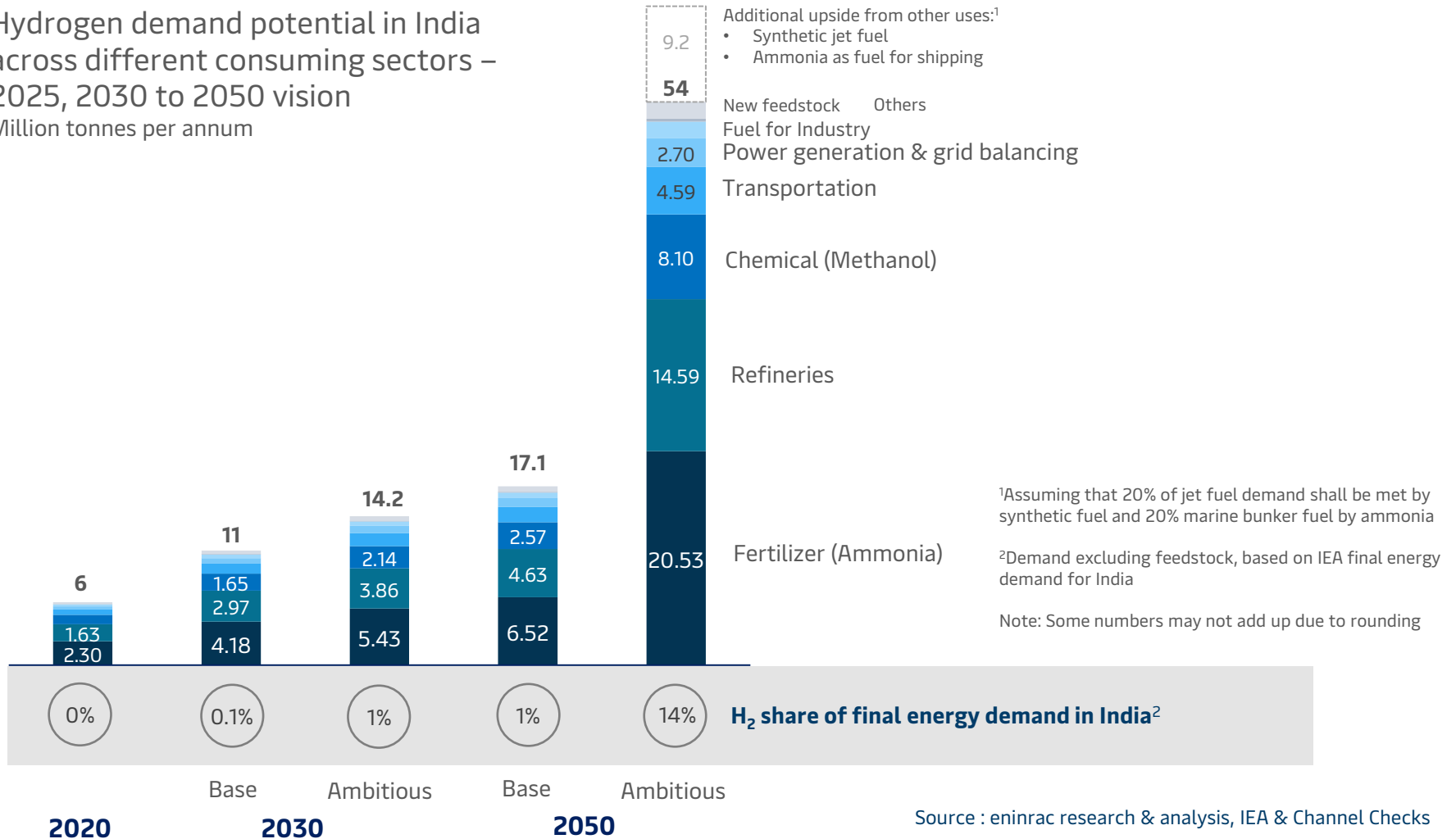
Is captured by fertilizer (ammonia), refineries & chemical segment in India

Only 20%

Is captured by transportation, power generation & other segment in India

India – Hydrogen demand potential across end use application sector – 2025, 2030 & 2050 vision

Hydrogen demand potential in India across different consuming sectors – 2025, 2030 to 2050 vision
Million tonnes per annum



India is uniquely positioned to build a leading hydrogen economy

India has the abundant, low-cost primary energy sources needed to produce low-carbon hydrogen

For electrolytic hydrogen, the country has ample renewable and low-carbon electricity resources, including wind, solar, and hydropower, while nuclear power is gaining grounds in the country and may turn up to be a useful resource as well. Further, India is developing large-scale renewable power, with forecasts for the costs of electricity production as low as \$20-\$25 per MWh in 2030.

Utilizing all forms of domestic energy for hydrogen generation increases energy security by decreasing energy imports. Hydrogen can be flexibly generated, which offers consumers the lowest cost of multiple energy sources at any given time and will create economic growth across India, including in regions that are traditionally not energy producers. Furthermore, this flexibility of hydrogen increases the resilience and reliability of the entire Indian energy system.

India home to industrial sector leaders capable of scaling a hydrogen economy

Indian industrial leaders, such as in the petroleum refining and advanced manufacturing industries, have decades of experience financing and managing capital-intensive megaprojects. With the right regulatory support, the Indian companies could mobilize large private investments in hydrogen equipment development, hydrogen production, and distribution infrastructure. In line plans of RIL and Adani Limited have already been launched to ascertain the LCOH of \$1 by 2030. Further, a large network of Indian companies are leveraging global expertise in fuel cells, electrolyzer, reformers, and CCS are already helping to bring equipment and production costs down through long-term partnerships.

For Indian transport, H₂ is strong low-carbon alternative

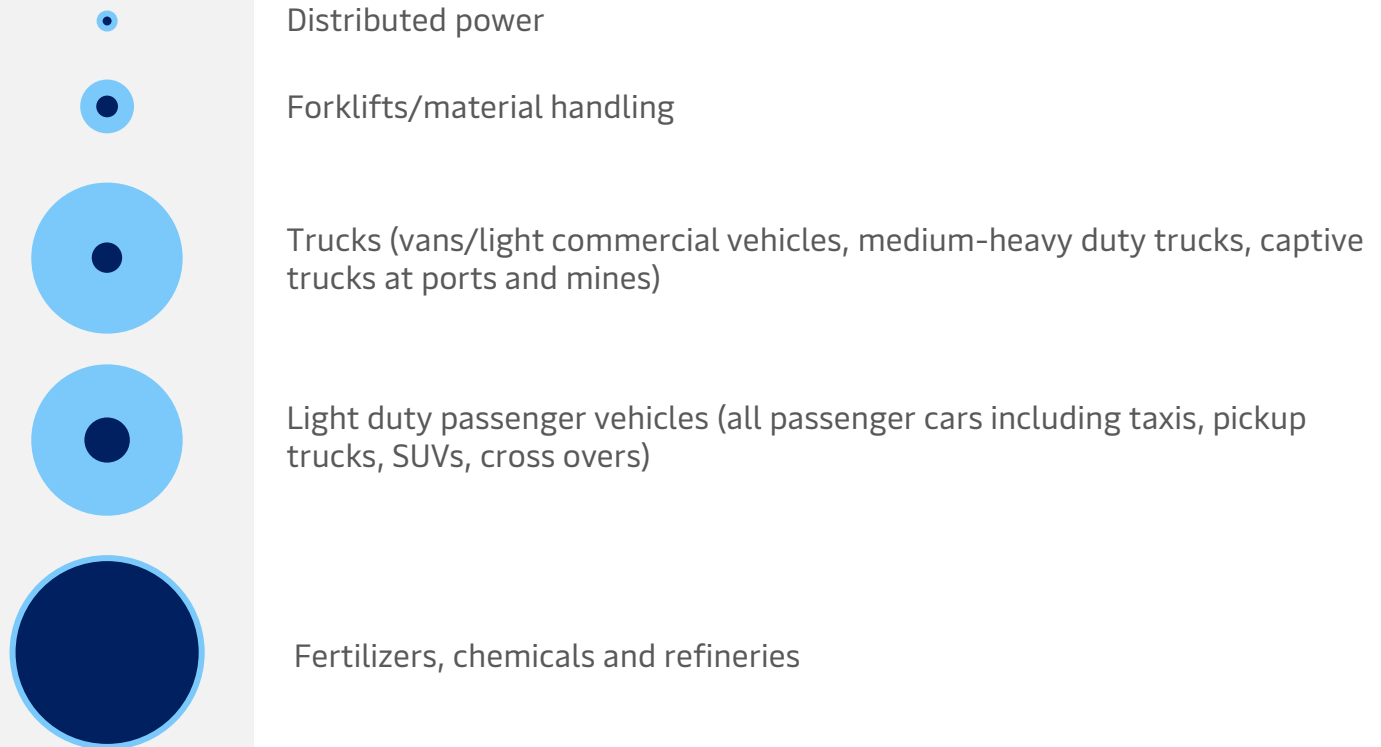
India has consistently seen a rise in in trucking industry and has a long haul when compared to global markets. On an average Indians drive more than 10,000 kms per annum. Buyers' vehicle choices reflect this need for long-distance capability, as sport utility vehicles (SUVs) and crossover vehicles have a projected sales growth of 1 percent per year in the next decade, while a 1 percent decline is projected for passenger cars. Such long distances and preferences for large vehicles favor FCEVs over BEVs.

India already has many industrial applications in motion that are short-term moves

Bubble size in the legend corresponds to 1 million metric tons of hydrogen



- Potential hydrogen demand market size in India 2030
- Potential hydrogen demand market size in India 2050

Established and emerging

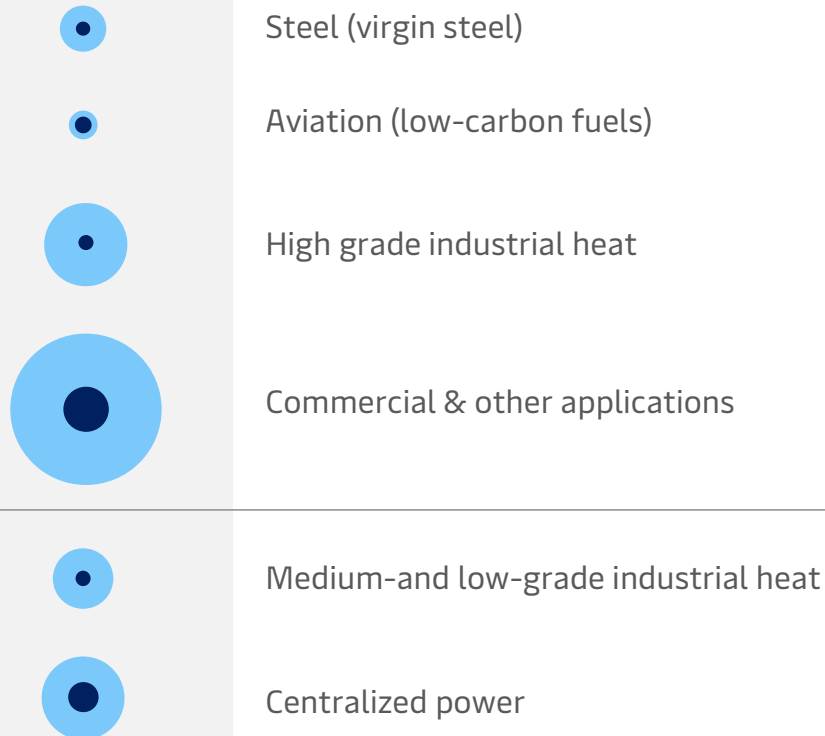


India already has many industrial applications in motion that are short-term moves (contd.)

Bubble size in the legend corresponds to 1 million metric tons of hydrogen

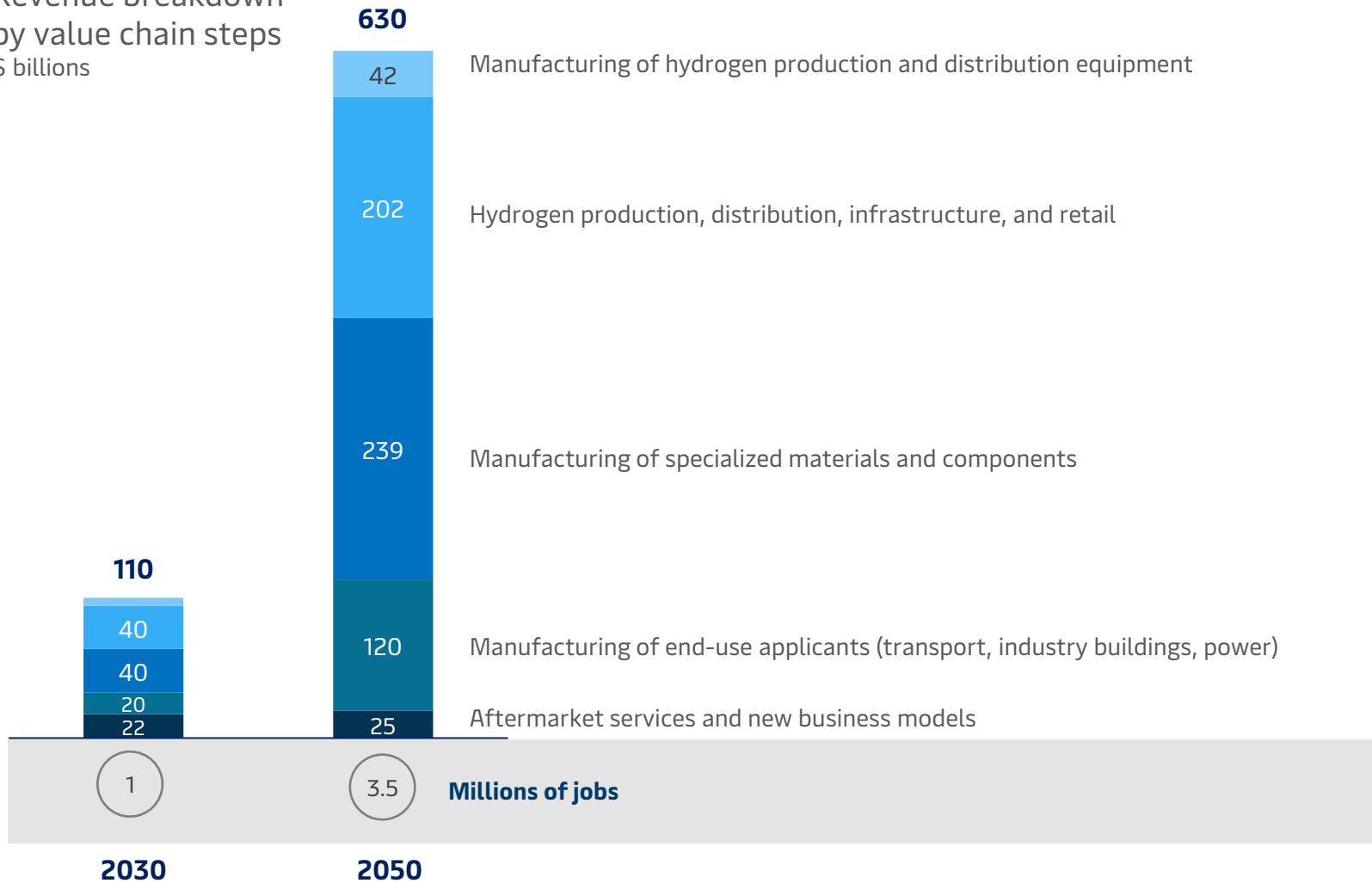
-  Potential hydrogen demand market size in India 2030
-  Potential hydrogen demand market size in India 2050

Short-term decarbonization moves



Estimated revenue generated along the value chain in India 2030 & 2050 end use case

Revenue breakdown by value chain steps \$ billions



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