

Hydrogen distribution of global supply chains w.r.t key demand centers

Part-4 (Hydrogen cost benchmarks, demand built-up, transport infra & market size evaluation for India)

Analysing shipping costs of hydrogen in & from India

With hydrogen production costs falling , costs for hydrogen distribution are becoming increasingly more important

7.1 HYDROGEN DISTRIBUTION OF GLOBAL SUPPLY CHAINS

With hydrogen production costs falling, costs for hydrogen distribution are becoming increasingly more important. For production and distribution, three types of value chains are emerging. Largescale hydrogen offtakers that are near to favourable renewables or gas and carbon storage sites will use onsite production. Smaller offtakers, for example refuelling stations or households, will require regional distribution. In regions without optimal resources, both large- and small offtakers may rely on hydrogen imports. The emergence of international distribution is driven by cost differences for hydrogen production stemming from renewables endowment, the availability of natural gas and carbon storage sites, existing infrastructure and the ease and time requirements for its build-out, land use

constraints, and the assignment of local renewables capacity for direct electrification. Many expected hydrogen demand centers, including Europe, Korea, Japan, and parts of China, experience such constraints. In some of these cases, H2 suppliers will meet this demand more effectively by importing hydrogen rather than producing it locally.







Hydrogen can be transported globally using three forms of transportation – trucks, pipelines or ships – using a range of different carriers. Currently, liquid hydrogen, liquid organic hydrogen carriers and ammonia are the carbon-neutral solutions with the most traction. While the optimal choice of transportation depends heavily on the targeted end-use and the terrain to be covered, some general rules on preferable solutions for different distances apply.

”

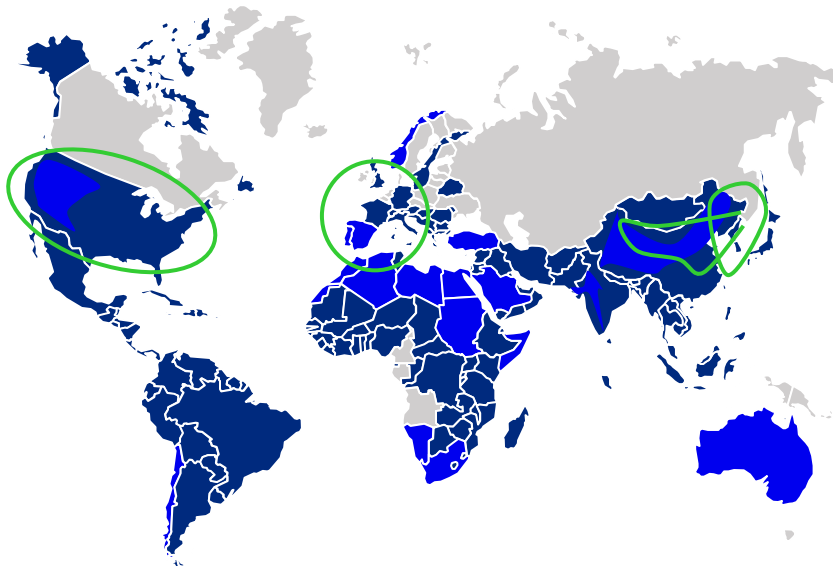
For longer distances , both new and retrofitted subsea transmission pipelines provide cheaper at scale transportation than shipping, but are not relevant for all the regions

– Hydrogen Council

Emerging Hydrogen Distribution Chains

H2 value chain	End user*	Value chain steps			Cost USD/kg
		Production	Transmission	Distribution	
 Onsite	 Industrial, large scale off taker	<ul style="list-style-type: none"> Renewable / low – carbon production 1.6-2.3 USD/kg	<ul style="list-style-type: none"> On-site storage for average of 1 day 1.6-2.3 USD/kg		~ 2-3
 Regional	 Industrial, large scale off taker	<ul style="list-style-type: none"> Renewable / low – carbon production 1.6-2.3 USD/kg	<ul style="list-style-type: none"> Conversion to LH2 and storage for average of 1 day or Storage as GH2 for average of 1 day and compression to 700 bar 0.7-1 USD/kg	<ul style="list-style-type: none"> Trucking as LH2 for 300km + operating of 1,000kg LH2 HRS or Piping as GH2 for 300km and operating of 1,000kg GH2 HRS 1-2 USD/kg	~ 3-5
 International	 Industrial, large scale off taker	<ul style="list-style-type: none"> Renewable / low – carbon production 1-1.4 USD/kg	<ul style="list-style-type: none"> International pipeline for ~9,000km and storage at port for average of 2 week or Carrier conversion/reconversion, shipping for ~9,000km and storage at port for average of 2 weeks 0.6-3.5 USD/kg	<ul style="list-style-type: none"> Trucking as LH2 for 300km & onsite storage for average of 1 day or Piping as GH2 for 300km and operating of 1,000kg GH2 HRS 0.1-2 USD/kg	~ 2-7

Distribution of global hydrogen resources and demand centers



PV/Wind resources for renewable hydrogen generation

Least Most

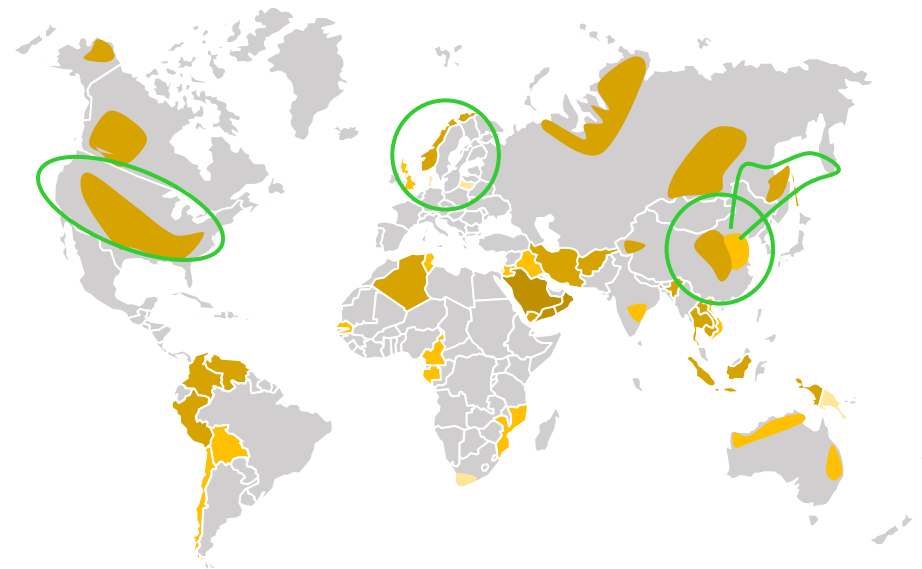
Many expected hydrogen demand centers, including **Europe, Korea, Japan, and parts of China**, experience such constraints. In some of these cases, H2 suppliers will meet this demand more effectively by importing hydrogen rather than producing it locally.



Natural gas resources for low carbon hydrogen generation

Least Most

Demand Centers



WANT TO LEARN MORE ABOUT THE REPORT ?

WRITE OR CALL TO US

at connect@eninrac.com

+91 93190 48963/47963, +91 72900 16953