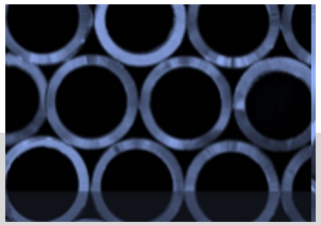
TUBACEX

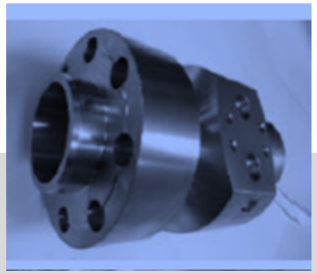
3rd World Hydrogen Energy Summit 2023

October 16th 2023

Green Hydrogen Economy and Energy Transition



Fully integrated supplier of stainless steel tubular systems



High precision machined components

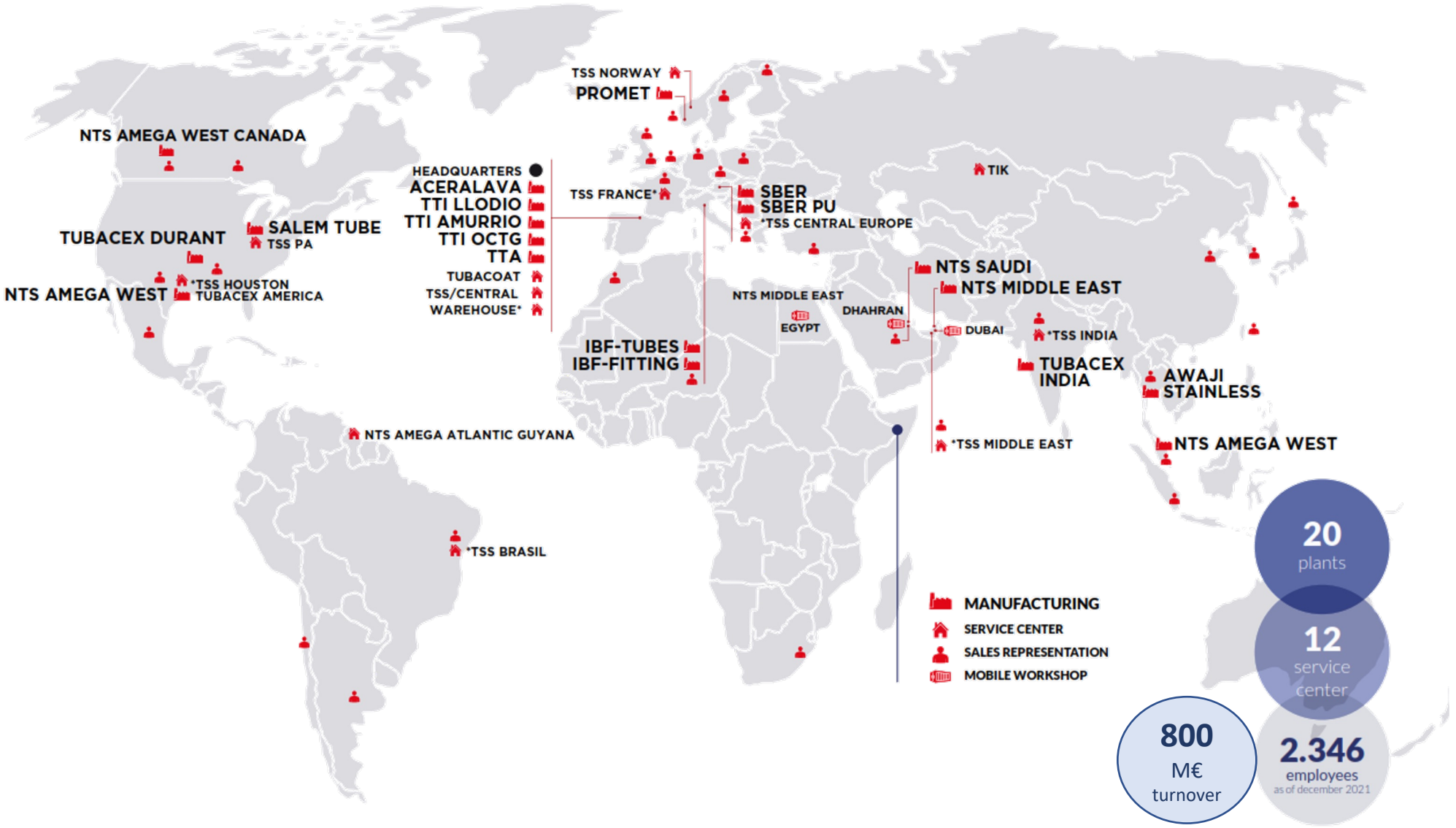
Global logistics

Personalized high value services

A diversified global industrial platform

01. Tubacex Group

Global vision and impact



01. Tubacex Industries

- Global Upstream supplier
- Market leader in critical applications: Umbilical and CRA OCTG Tubes

- Present in the most demanding components
- Benchmark for EDF / Full package solution

- Delivering solutions to reduce OPEX
- High Nickel components for the critical processes

- Frame agreement contracts with main stakeholders
- State of the art facilities meeting customer's requirements

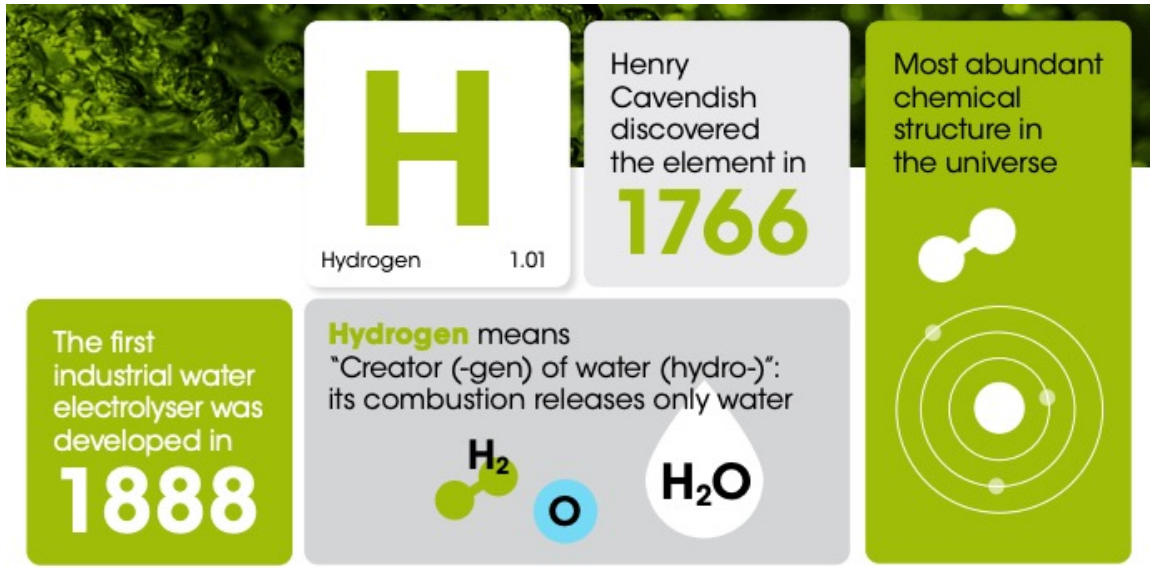
- Market leader in High Nickel Alloy Heat-Exchangers
- Added Value services and cost manufacturing improvements

- Innovative solutions for main applications: CCS, H2
- Joint Collaboration with research and technological centers

Covering the most demanding applications where corrosion, high temperatures and high-pressure resistance are key

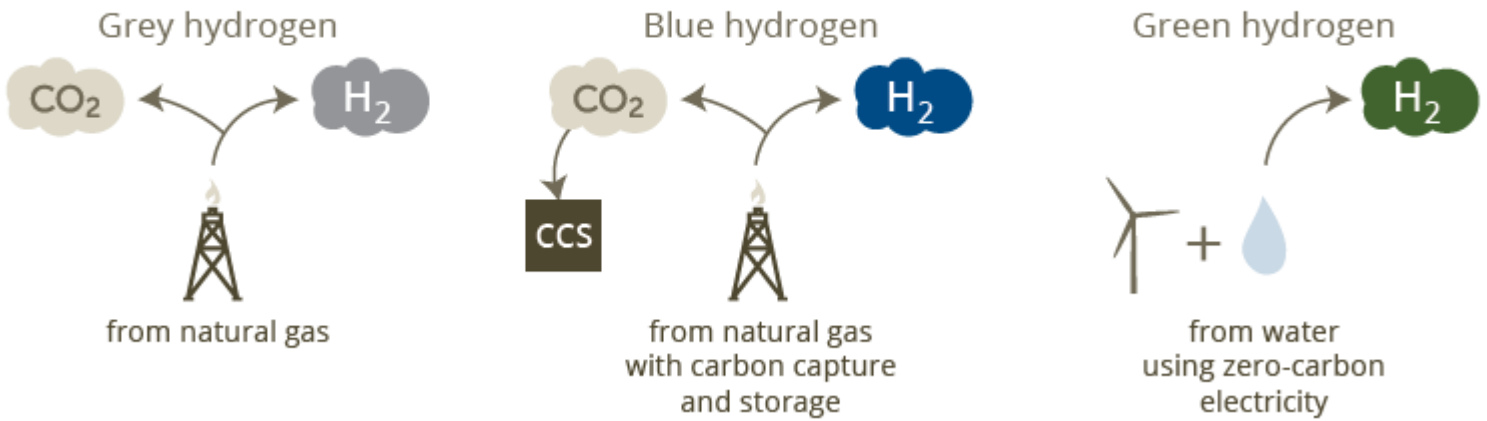
Hydrogen

Introduction



Hydrogen can be produced from a range of resources including fossil fuels, nuclear energy, biomass and renewable energy sources. This can be done via several processes.

The three main types of hydrogen



Hydrogen

Current interest in hydrogen as an energy source and commodity is dominated by four main drivers

Storage of fluctuating (excess) electricity	Pressure to reduce emissions from mobility and industry
Existing infrastructure of pipeline systems and storages	Large costs of infrastructure for high e-mobility shares

H_2

Hydrogen value chain

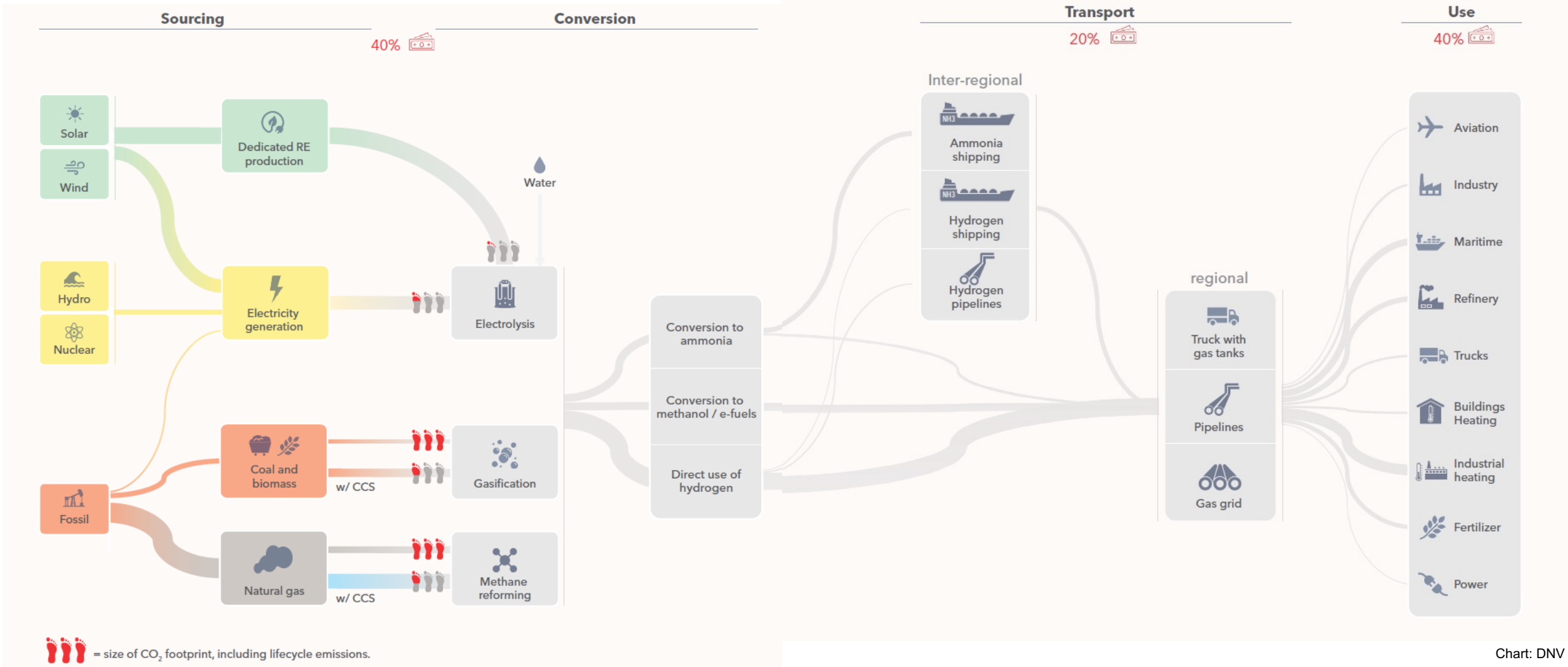
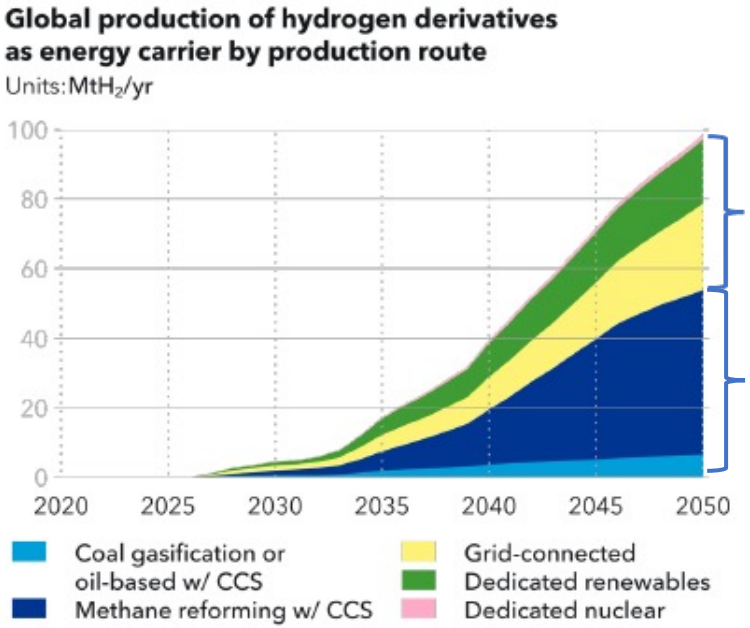


Chart: DNV

Global expected demand of hydrogen



DNV Hydrogen forecast 2022

Electrolyzers

- CAPEX per KW must be significantly reduced
- Some technologies still in its early development
- Manufacturing capacity must be developed by country/región
- From prototypes to serial production. New industrial concepts.
- Needs large amounts of electricity at low cost.

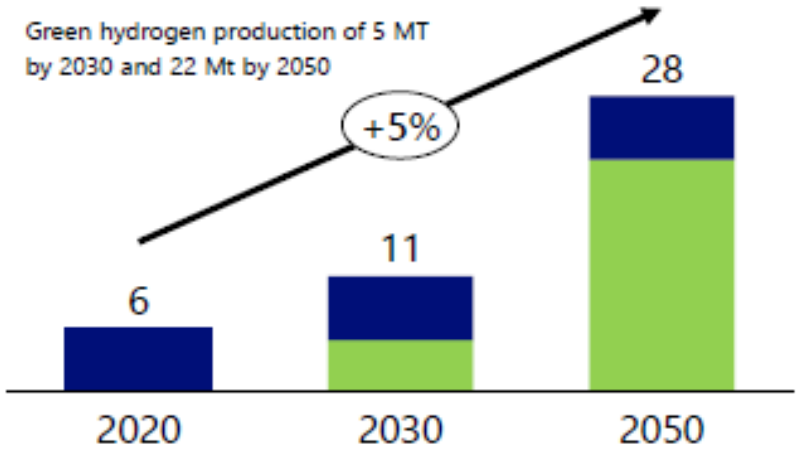
Thermo-chemical process

- Mature technology that must be decarbonized
- CCS will be a must
- Emerging technologies for gasification / pyrolysis
- New feedstocks like waste or biomass
- Need of better high temperature / corrosion resistant materials

Any company in the sector must adapt to the new scenarios

Hydrogen – India Trends

India Hydrogen demand



Types of hydrogen produced

	Grey	Blue	Green
Process	Reforming or gasification	Reforming or gasification with CCUS	Electrolysis
Energy source	Fossil fuel	Fossil fuel	Renewable energy
Emissions from production process (1)	Reforming: 9-11(2) Gasification: 18-20	0.4-4.5 (3)	0

1-CO_2 (eq.)/kg; 2-for grey hydrogen 2Kg CO_2 assumed for methane leakage from steam methane reforming; 3- assuming 98% and 68% carbon capture range and 0.2% and 1.5% of methane leakage

Blue hydrogen outlook

- India's hydrogen demand is expected to grow by ~ 2X by 2030
- Although plan is to meet the demand through green hydrogen, large scale production is expected to pick-up post 2025-26
- Blue hydrogen produced through Natural gas can act as a bridging solution till cost of green hydrogen reduces
- Infrastructure development for blue hydrogen can used readily, when green hydrogen demand comes online

Impact on transportation segment

- Industry players have announced entry into blue hydrogen production
- We expect this increase in production, will also help catalyse movement towards FCEV in transport sector
- Heavy duty trucks are a target for FCEV shift
- Aggressive cost reduction in blue hydrogen production and increase in network will aid this shift

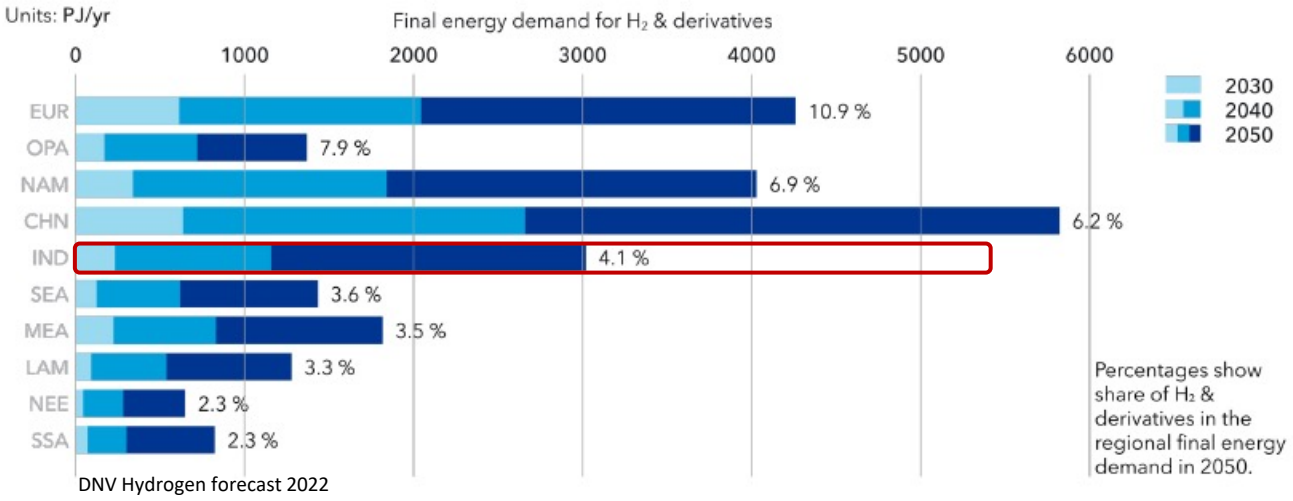
Ambani's Reliance seeks to be world's top blue hydrogen maker
Economic times February 2022

Dastur Energy to set up blue hydrogen unit with Coal India
Economic times May 2022

NRI 25

Regional demand

Regional comparison of hydrogen uptake



DNV Hydrogen forecast 2022

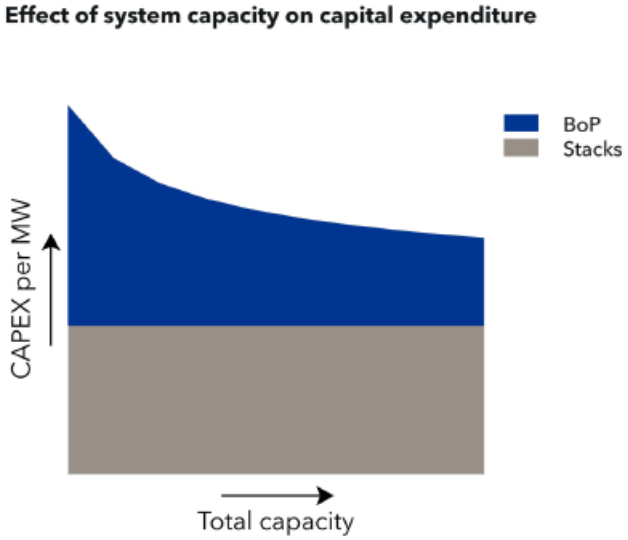
Electrolyser capacity by region

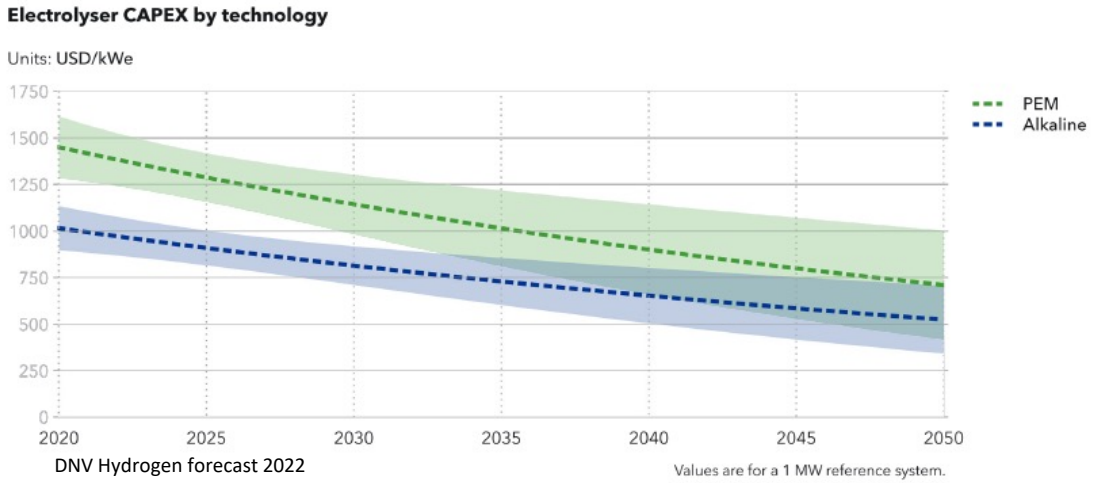
Units: GW

		2030	2040	2050
NAM	North America	10	120	305
LAM	Latin America	4	27	83
EUR	Europe	111	351	574
SSA	Sub-Saharan Africa	4	16	66
MEA	Middle East & North Africa	8	35	147
NEE	North East Eurasia	3	13	22
CHN	Greater China	258	899	1248
IND	Indian Subcontinent	18	80	263
SEA	South East Asia	3	27	123
OPA	OECD Pacific	45	180	244
World		**465**	**1748**	**3075**

- India expected to play a relevant role. 4th region, not far from North America
- The ramp-up of capacity will start after 2030, as in the rest of the world
- The capacity needed in India justifies the development of several electrolyzer Giga-factories (approx 12 GW/year by 2040)

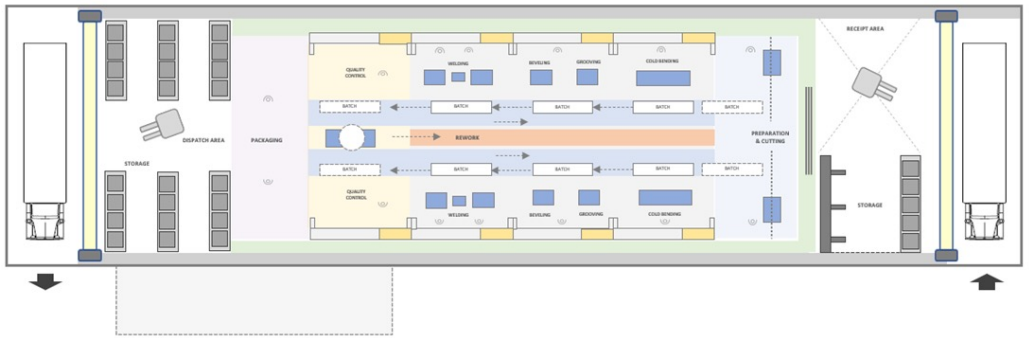
Need of scale for electrolyzers





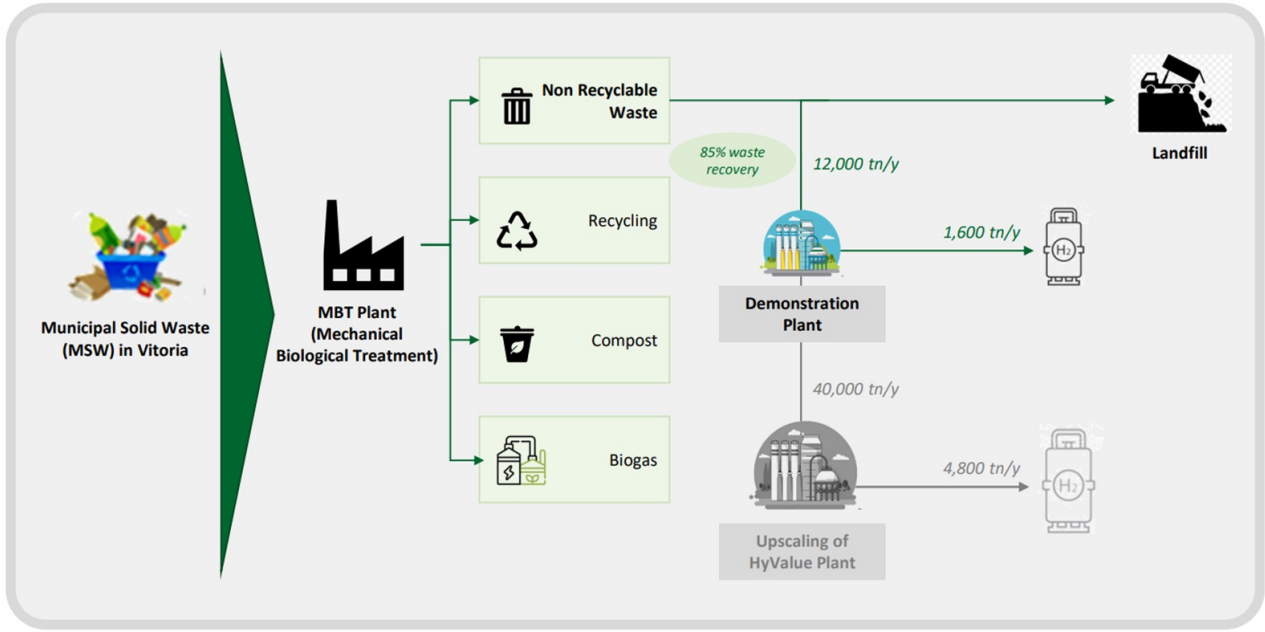
DNV Hydrogen forecast 2022

- The cost of the BoP is very relevant, specially in small containerized sizes
- The tubular systems fabrication and instalation represents a significant part of the cost and time consumption
  - Our proposal for cost optimization is to co-design and implement a JIT industrial setup for serial production
- Serialization and design for manufacturing is a must to achieve economies of scale



Emerging technologies: Waste to H2

- JV created between Tubacex and Novargi (Technological partner)
- New technology to produce hydrogen out of municipal waste
- Support from European Innovation fund
- Demo plant to be built in Spain by 2024
- Addressing the global challenge of landfill waste



Conclusions

- ✓ Hydrogen economy is just starting. Still many open issues on costs, regulation, safety, industrial capacity
- ✓ Significant acceleration of demand after 2030. The time for positioning is now
- ✓ Most of the existing and emerging technologies will play a role. Not only electrolyzers
- ✓ Renewables and circular economy are enablers of hydrogen. Massive investments needed
- ✓ New and innovative business approaches needed to make it happen.
- ✓ Tubacex has been on the Forefront and technology development with products positioned for the future

Make the green industry HAPPEN

Thank you

www.tubacex.com