

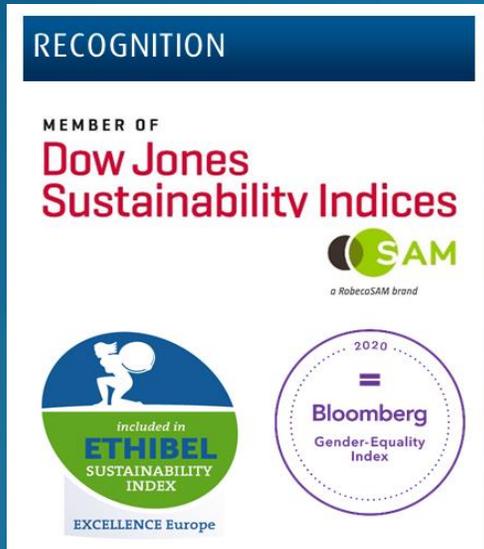


Linde's Hydrogen Value Chain - Enabling the energy transition

Øystein Aasland
Head of Sales & Marketing, Linde Gas Norway
September 2021

Making our world more productive





One Linde

A shared Vision, Mission and Strategic Direction, and common Values and Behaviors

2 million+

customers

A diverse and balanced portfolio

100+

countries

Strong complementary positions in all key geographies and end markets

~80,000

employees

Achieving our full potential, individually and collectively

\$9 million+

charitable giving in 2020

Supporting our communities through contributions and employee volunteerism

6,500+

active patent assets worldwide

Leading with innovative products, solutions and technologies

\$2 billion+

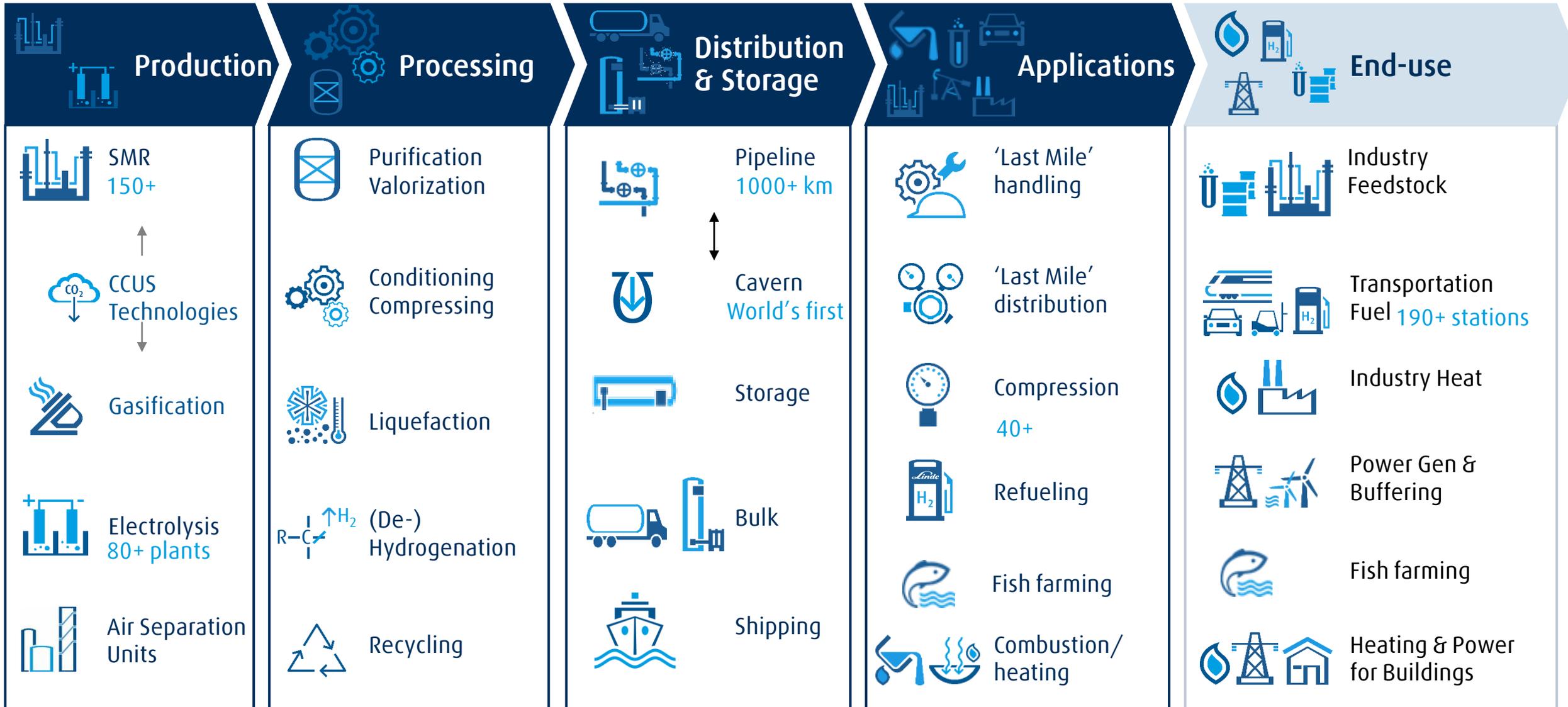
hydrogen business

Equivalent to appr. 8 % of the company turnover



Linde's competence profile in Hydrogen

Strong technology and operational competence along the value chain



The Linde Advantage Results from over 100 years of Hydrogen Experience

Linde is the world's largest operator along the H₂ value chain



Linde Hydrogen Footprint

Linde's asset network & footprint:

- ~\$ 2.2bn revenues within H2
- 158 large hydrogen plants (>8000 TPD)
- 170 TPD world's largest liquid hydrogen capacity
- 1000 km of Hydrogen pipeline
- 80 Electrolyzers (40 MW capacity)
- Linde to Build, Own and Operate World's Largest PEM Electrolyzer for Green Hydrogen in Leuna (24MW)
- 200 Hydrogen Refueling Systems (HRS) built

Selected Partnerships & Ventures

H2MOBILITY

PLUG POWER

SCOTTISHPOWER RENEWABLES

DAIMLER

HYDROSPIDER

SPIC

ALSTOM

snam

OCAP[®]
Powered by Linde.

HYUNDAI

HYOSUNG

CNOOC 中国海油

Examples of current Linde Clean Hydrogen projects



Europe:
Commissioned several H₂ refueling stations with H2 Mobility consortium



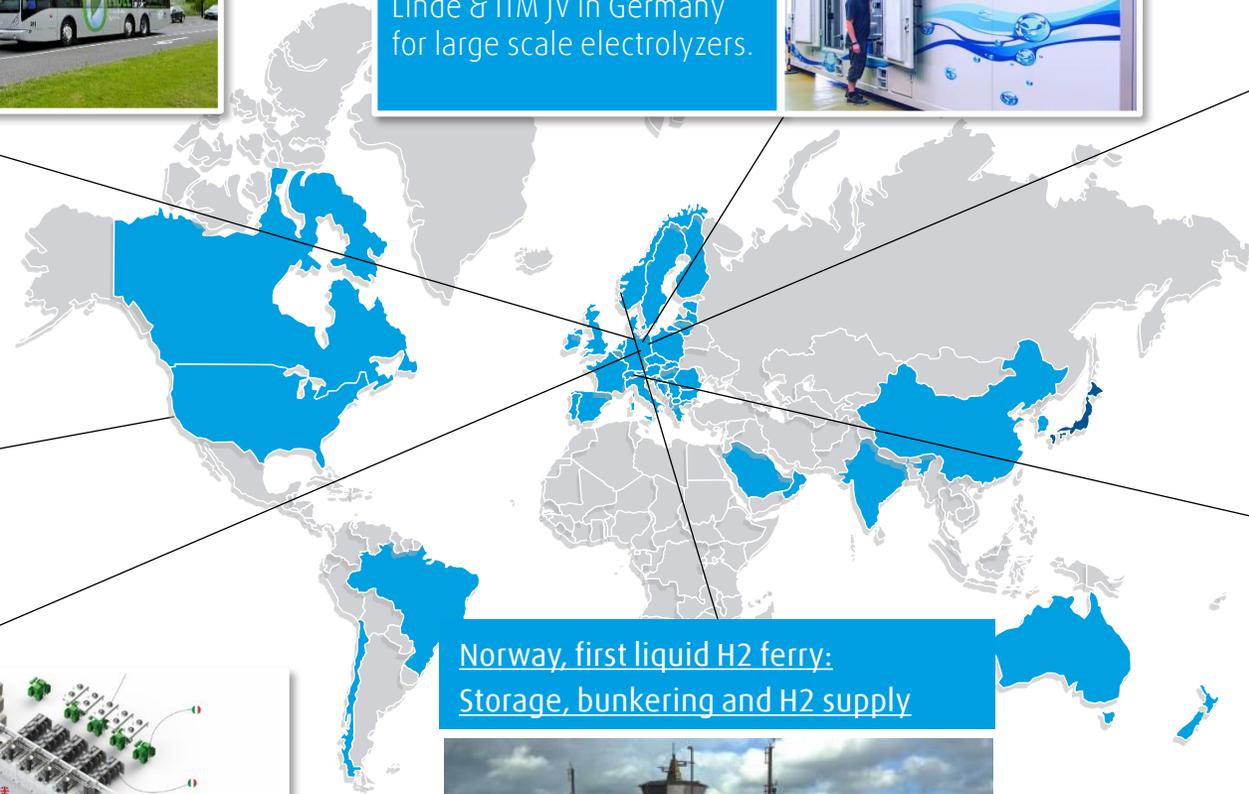
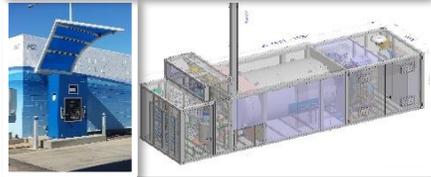
Germany & the UK:
Acquisition of 20% share of ITM Power. Setting up a Linde & ITM JV in Germany for large scale electrolyzers.



Germany, first train HRS:
Planned completion Q2/2021



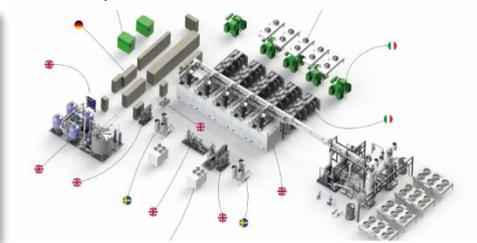
In California:
1st high volume cryo pump H₂ fueling station set into operation.



In Switzerland:
Acquisition of 10% stake of Hydrospider AG. For hydrogen production, logistics and refueling of 1600 Hyundai trucks.



Germany:
Largest PEM Electrolyser announced 24MW, at Linde Leuna facility (10tpd liquefaction)

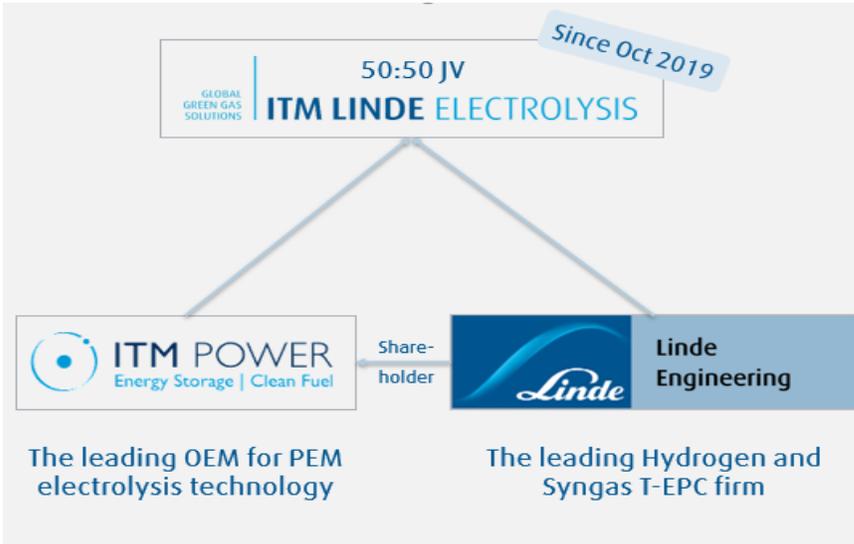


Norway, first liquid H₂ ferry:
Storage, bunkering and H₂ supply



Green Hydrogen Production - Electrolysis

ITM Power and Linde Engineering joining forces for superior solutions.



Sheffield / UK - Bessemer Park:

- First world's PEM Giga-Factory – by ITM.
- Significant increase of manufacturing capacity getting ready for the XXL market
- 2MW and 5MW module ready
- Manufacturing commenced: Q2/2021



Giga-Factory = high throughput @ modern productivity → cost-per-part reduction

Shell Starts Up Europe's Largest PEM Green Hydrogen Electrolyser



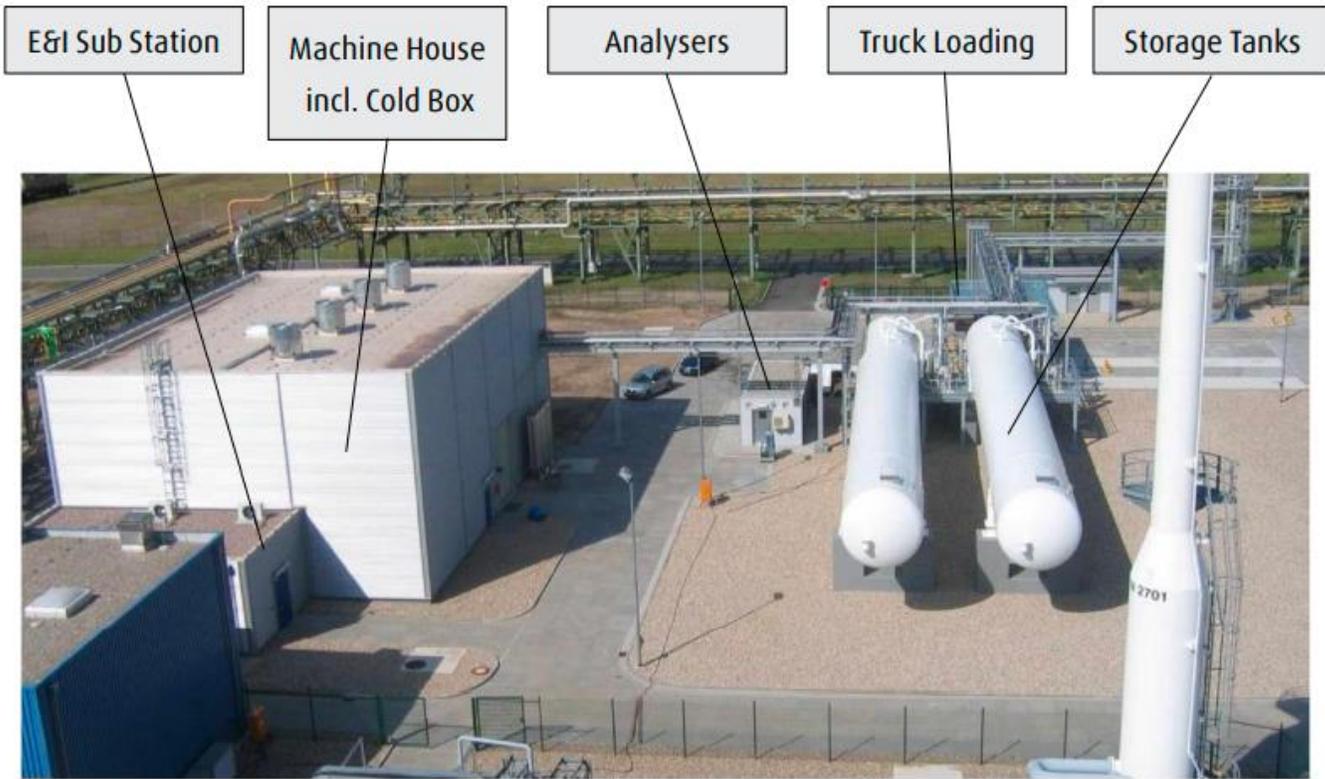
Linde to build 'world's largest electrolyser' to produce green hydrogen

Industrial gases giant to build 24MW PEM electrolyser at Leuna in Germany by the second half of 2022



Linde Leuna - Liquid Hydrogen Center Europe

H2 Production, liquefaction and trailer filling



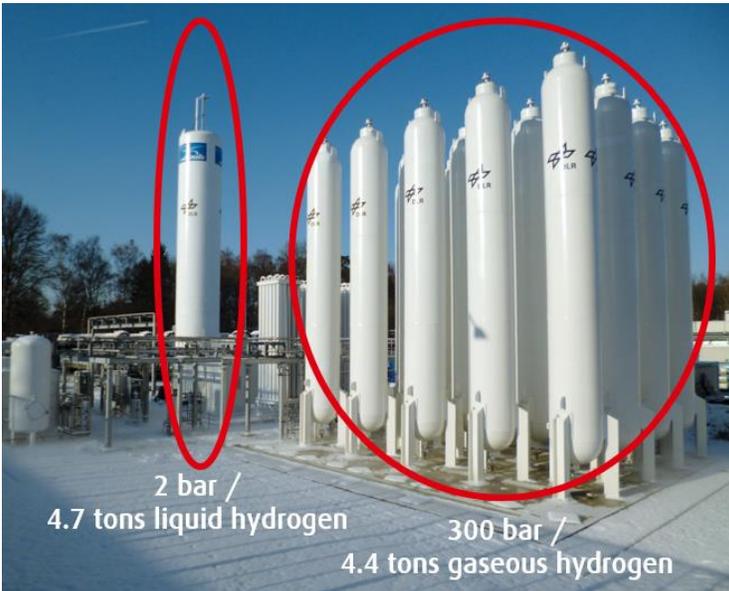
Linde Offering a Broad Hydrogen Distribution Equipment Portfolio

Examples liquid and compressed



Linde Hydrogen Storage

Standardized and tailored customer solutions



Safety is our first priority!



At Linde, we are driven to ensure no harm comes from our actions to people, the environment or the communities in which we operate

Considerations for maritime applications, ex

- Rough weather conditions – Movements, tidal water variations, wind induced vessel movements etc.
- Details dependent on ship design
- Ship connection flange location
- Transfer rate requirements from storage tanks/trailers to ship
- Ship-side system details and interfaces
- Reliquification of H2 from ship tank and bunkering system

Safety assessments/HAZIDs, ex

- Plant concept
- Storage solutions/trailers
- Bunkering tower
- Onboard H2 system
- Bunkering procedures (preparation, transfer, disconnection)
- Hose leakages/hose cut-offs
- Quick releases
- Training of personell

Linde is both a leading EPC and operating company.....we own, operate and maintain what we build.... And for the long term



Think Hydrogen. Think Linde.