Hydrogen from Grid Scale Electrolysis:
The Enabler for a Decarbonized Economy

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About Nel Hydrogen...

NEL HYDROGEN
10 employees – Oslo Norway
Corporate office

HYDROGEN FUELING

120 employees – Herning Denmark
Sales, R&D, manufacturing and service

12 employees – California USA
Sales, installation and service

10 employees – Korea
Sales and service

ELECTROLYSERS

30 employees – Notodden Norway
Alkaline electrolyser Sales, R&D and manufacturing

90 employees – Connecticut USA
PEM electrolyser Sales, R&D, manufacturing and service
Nel Hydrogen US Operations

PEM Electrolyzer Manufacturing Plant

- The worldwide market and technology leader in PEM electrolysis
- A U.S. subsidiary of Nel ASA, based in Oslo, Norway
- All manufacturing done in Wallingford, CT, USA
- 100 employees, 100,000 ft² (9,300 m²) facility
- cTÜVus & TÜV approved for CE mark
- 2,700+ PEM Systems installed in 75+ countries

ISO 90001 certified
Nel’s electrolysis technologies...

• Alkaline
  • Liquid KOH electrolyte

• Proton Exchange Membrane (PEM)
  • Solid polymer electrolyte
Our Legacy – Ultimate Reliability and Safety for Mission Critical Applications

Nel is the exclusive supplier of PEM electrolyzer cell stacks for all new U.S., U.K., and French nuclear submarines...
Full Differential Pressure System Design: the safety and reliability attribute required by the Navy

- Full differential H2>O2 cell-stack
- Low pressure O2/H2O loop
- Gravity gas/liquid separation

Diagram:
- DC Source
- Water Input
- Water Pump
- Oxygen/Water Separator
- Electrolyzer Cell Stack
- Vent
- Pressure Regulator
- High Pressure Hydrogen/Water Separator
- Drain
- O2 VENT
GRID SCALE ELECTROLYZERS: APPLICATIONS THAT DRIVE SCALE
Addressable hydrogen markets are huge

Global hydrogen market, by end-use:

- Ammonia
- Refineries
- Methanol
- Other

56 Mton/year
~150 BUSD

Large potential for growth, driven by increasing focus on climate and renewable energy, decreasing electricity prices and decreasing electrolyser capex

Special focus on refineries and green ammonia accounting for ~80% of the market

Market potential for electrolysis within the existing industry sector alone is 400 – 600 GW (~20 B$/year)

With new opportunities within the steel industry, the addressable industry market has more than doubled
Green Fertilizer Production

Morris, MN Ammonia Pilot Plant

Scaled down conventional Haber-Bosch process, 25 ton/yr capacity

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Green steel production: HYBRIT pilot plant in Sweden

- Nel has received a purchase order for a 4.5 megawatt alkaline electrolyzer which will be used in a pilot plant for fossil free steel production
- Hybrit Development AB (HYBRIT) is a joint venture owned equally by SSAB, LKAB and Vattenfall
- The steel industry accounts for 7% of global and 10% of Swedish CO₂-emissions
Green Chemical Production

Chemicals (1,940Nm$^3$/h, 9.2MW) – Norway
Green Polysilicon Production

25 MW/5,500Nm³/h – Malaysia
Fueling Transit Bus Fleets

2 MW PEM plant
900+ kg/day
26 bus capacity
SunLine Transit
Thousand Palms, CA
Green Hydrogen for Truck Fueling

Framework Agreement with H2 Energy for 30 MWs of PEM electrolysis

Hyundai Motor and H2 Energy Will Bring the World’s First Fleet of Fuel Cell Electric Truck into Commercial Operation

M Series MC400 Containerized 2 MW PEM
Case Study: Nikola Motors supply agreement drives massive cost reduction

Nel’s 8 ton/day (18 MW) electrolyzer plant provides the hydrogen production for each station site. New factory in Norway will enable 40% reduction in stack cost.