Renewable hydrogen on the way to fossil parity

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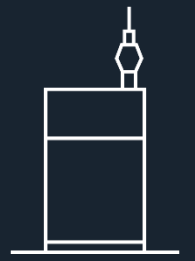
Nel in brief

Leading pure play hydrogen technology company with a global footprint

Pure play hydrogen technology company listed on Oslo Stock Exchange (NEL.OSE)

Manufacturing facilities in Norway, Denmark, and U.S., and a global sales network

World's largest electrolyser manufacturer, with >3,500 units delivered in 80+ countries since 1927



Leading manufacturer of hydrogen fueling stations, with 110+ H2Station™ solutions delivered/in progress to 13 countries

Strong field know-how and manufacturing capacity

PEM electrolysers

Wallingford, USA

Systems delivered: **2,700+**

Production capacity: **>50 MW/year (room to expand)**

History: **~25 years**

Alkaline electrolysers

Herøya, Norway

Systems delivered: **800+**

Production capacity: **~500 MW/year (~2 GW/year)**

History: **~90 years**

Hydrogen refueling stations

Herning, Denmark

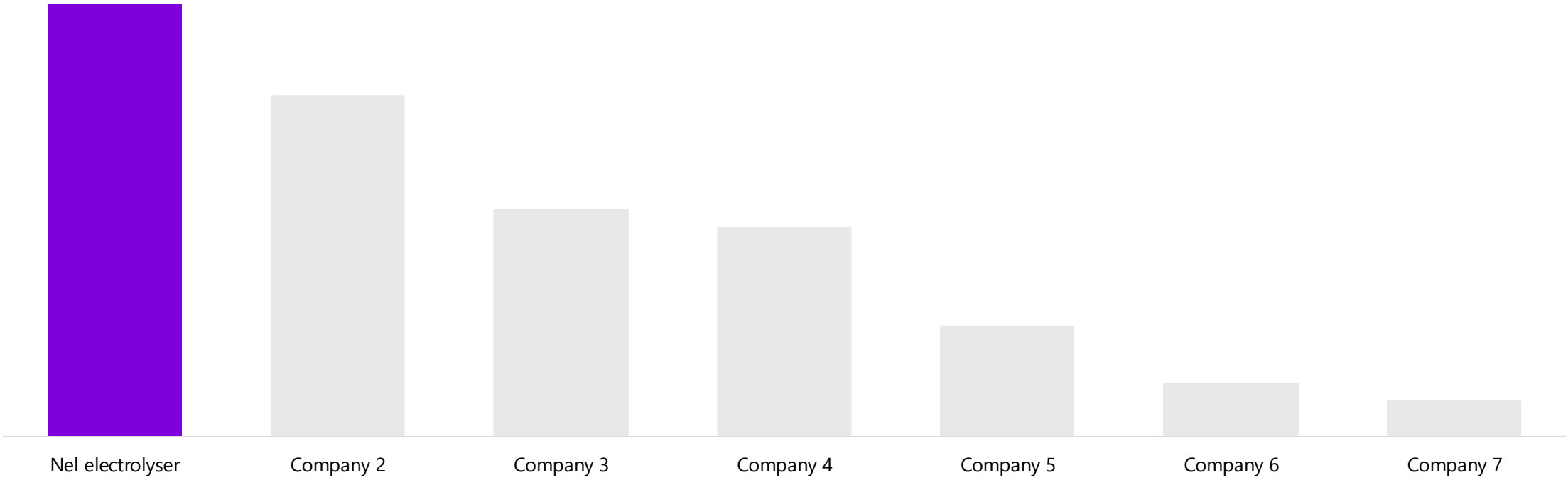
Stations delivered: **110+**

Production capacity: **300 HRS/year**

History: **~20 years**

Nel is the largest electrolyser manufacturer worldwide

The world's largest electrolyser manufacturers
Ranked by 2020 revenues



Source: Company websites, 2020 annual reports, estimates and market intelligence

Scaling technology for a 10x market

HERØYA CAPACITY EXPANSION

Game-changing expansion at Herøya - on time and on budget

Fully automated and designed according to **lean manufacturing and industry 4.0 principles**

Industrial scale production of most efficient electrolysers in the market, at a **game-changing cost**

Large scale production line, name plate capacity of **more than 500 MW**

Room to expand to **~2 GW** annually

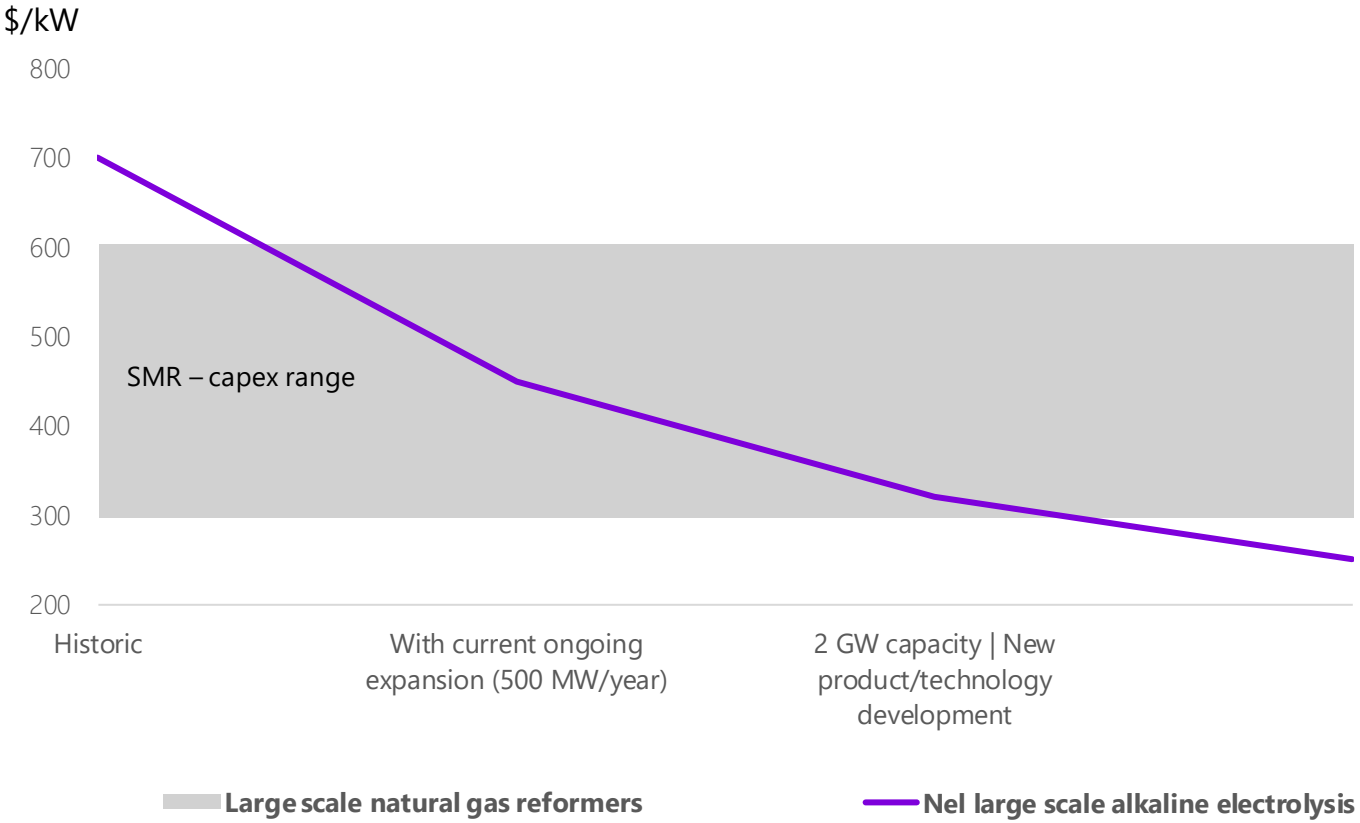
CO_2 reduction potential in line 1 (pilot) of **1.000,000 tonnes** – with 2 GW, **4-5 million tonnes**

Production for **Nikola and Everfuel** will commence in Q4

https://nelhydrogen.com/articles/video/nel-hydrogen-heroya-factory-tour/

Growth in renewable hydrogen will accelerate with reduced capex for electrolysers

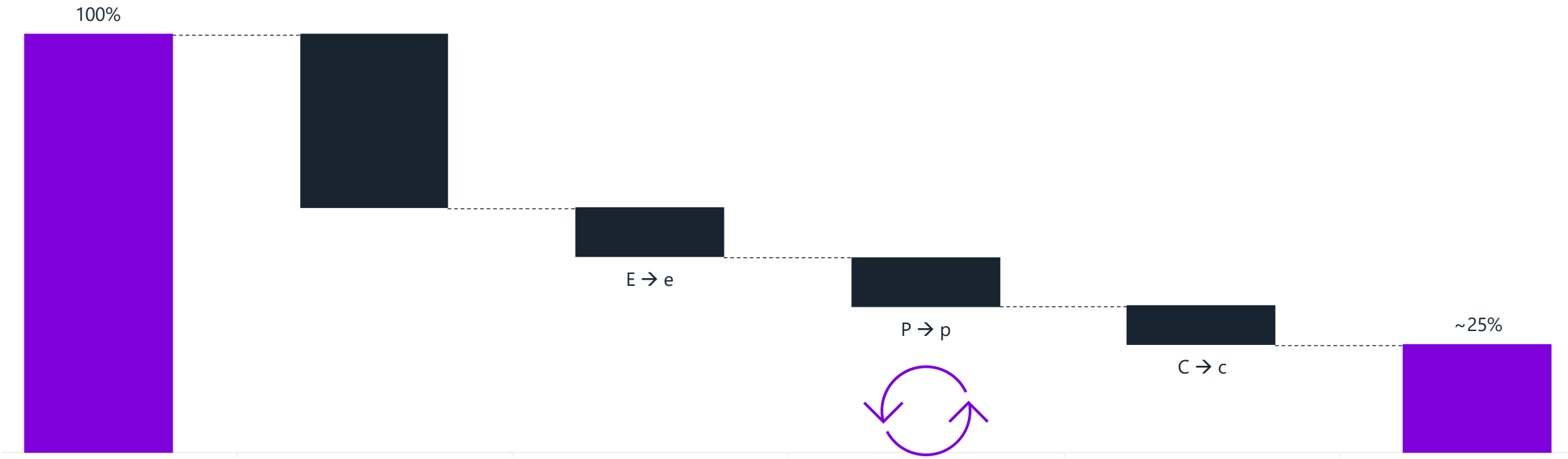
Capex of steam methane reformers (SMR) vs. Nel's alkaline electrolysers



- Steam methane reforming (SMR) dominates hydrogen production using natural gas and steam
- Nel establishing new manufacturing plant targeting >40% cost reduction – further capex reduction expected due to increased production volume and further size scaling
- Nel targets capex to drop below SMR over time
- Electrolysis expected to be preferred production method if opex (i.e. power prices) is low enough, or at parity, with alternative production methods

Source: Company analysis and projections, hydrogen production plant excluding installation, civil works and building.

Standardization reducing system cost to enable $1.5/kg



Electrolyer system cost today
Excludes Civil/Building

Herøya expansion
Increased capacity with Herøya expansion

Engineering
Standardizing large-scale offerings: 20 MW, 50 MW, 100 MW, 250 MW

Procurement
Continuous improvement of supply chains and framework agreements

Construction
Standardised design and pre-fabricated skids reduce time and cost for commissioning and installation

Reduced cost

$1.50/kg

Nel green hydrogen cost target by 2025

Assumptions: Nel analysis based on electricity of $20/MWh, >8% cost of capital, cost of land, civil works, installation, commissioning, building water etc., lifetime 20 years incl. O&M cost, at 30 bar

Our unique electrolyser solutions

Bankability + reliability

Atmospheric alkaline

PEM

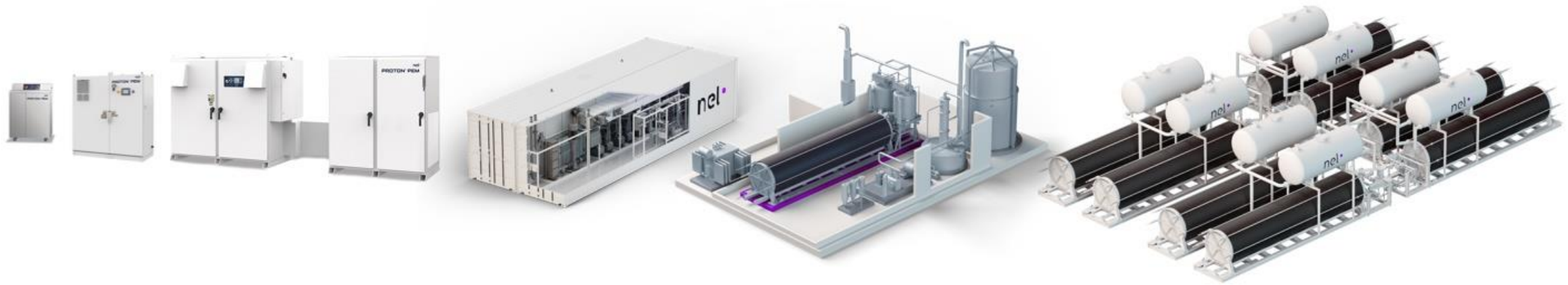
OUR UNIQUE ELECTROLYSER SOLUTIONS

Broadest product portfolio in the market

Alkaline electrolysers since 1927 and PEM electrolysers since 1996

Scalable design from <1 to >8,000 kg/day production capacity – able to deliver 100+ MW systems

Designed for high volume manufacturing to achieve large scale plants with fossil price quality

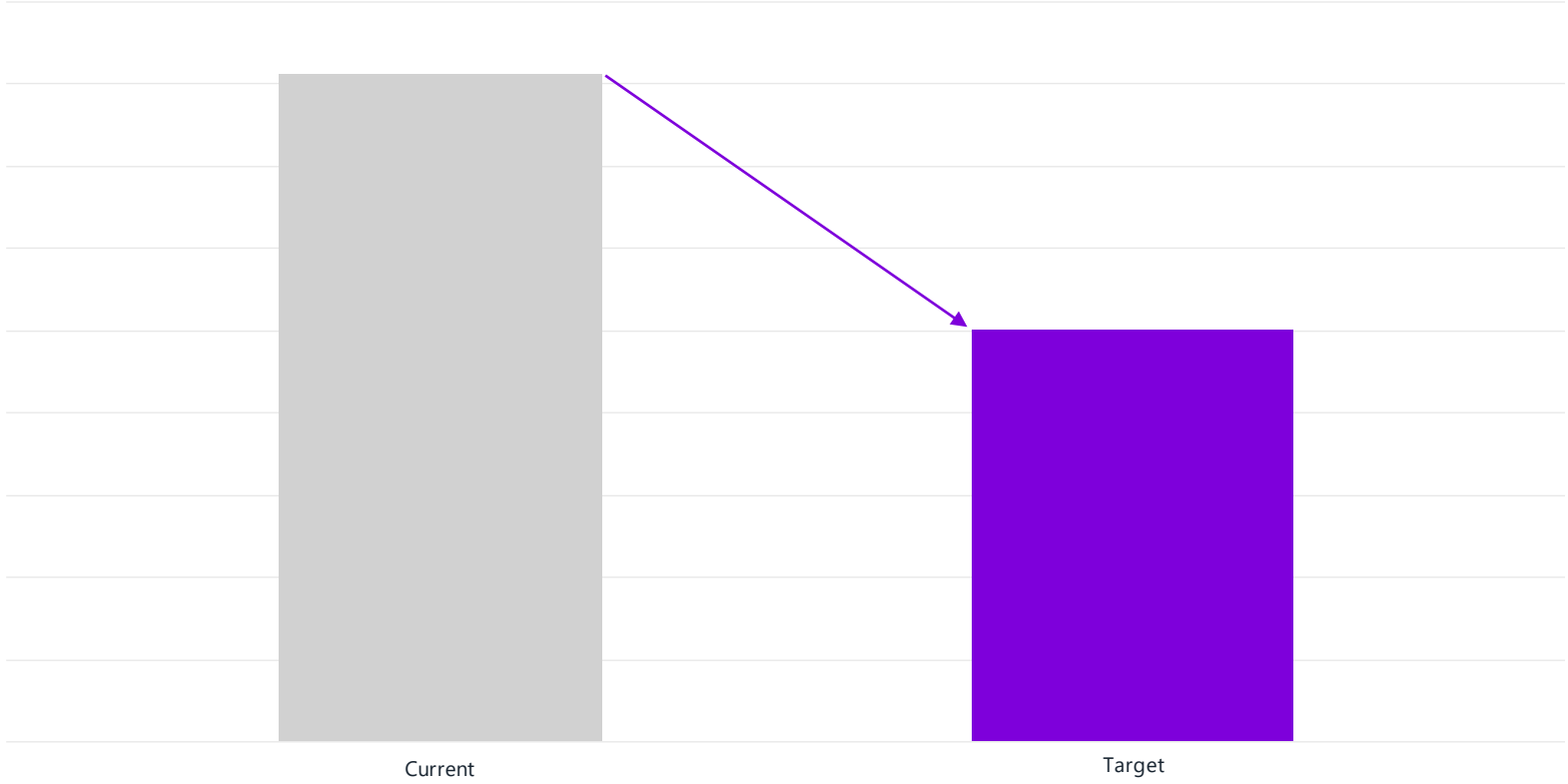


From kW- to multi-MW industrial size hydrogen production plants

The world's most efficient electrolyser becoming even more efficient

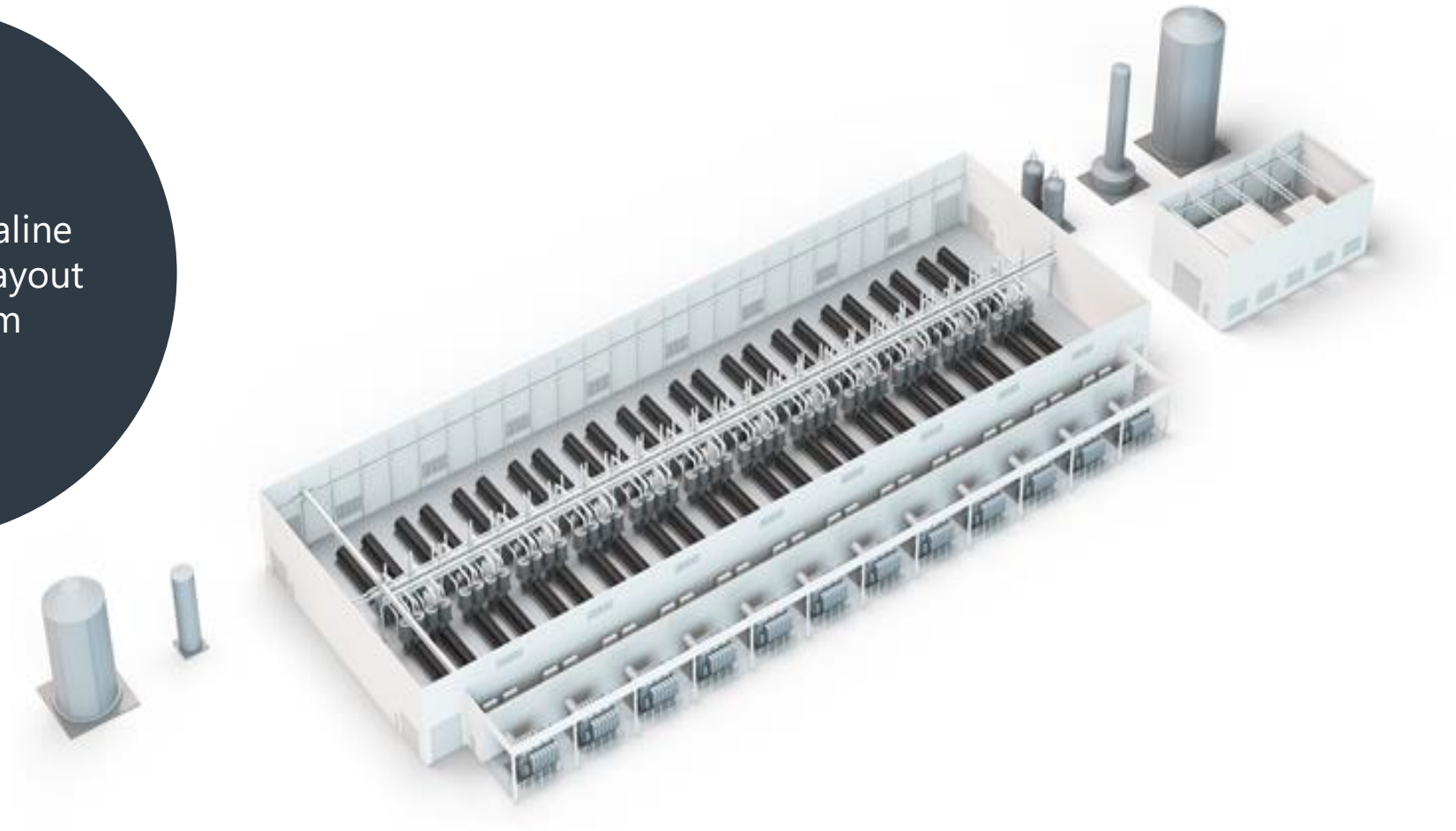
Roadmap to reduce energy consumption towards theoretical minimum

Energy consumption (kWh/Nm^3 H_2)

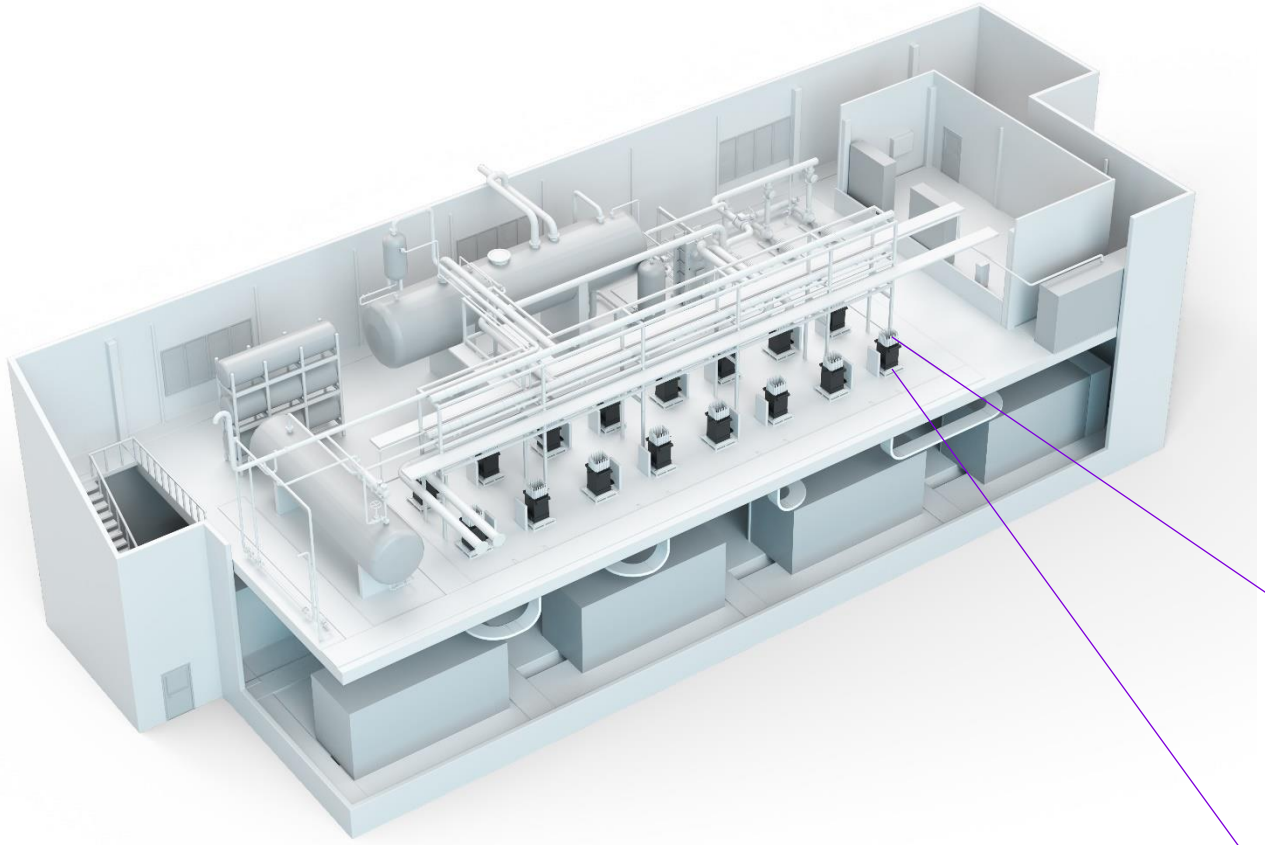


- Improved understanding of technology potential, benchmarking other electrode technologies and input from other industries make it possible to develop a concrete roadmap to meet world-class performance
- Main enablers in product and manufacturing process will reduce specific energy consumption with 5 to 10 pct.
  - Zero gap electrodes
  - Surface treatment / texturing
  - Reduced production variation

Large-scale alkaline
100 MW plant layout
125 m x 60 m



New PEM electrolyser launched including new stack



Large-scale PEM
20 MW plant layout
35 m x 15 m

PARTNERSHIP STRATEGY

Strategic EPC partners enables complete large-scale solutions globally

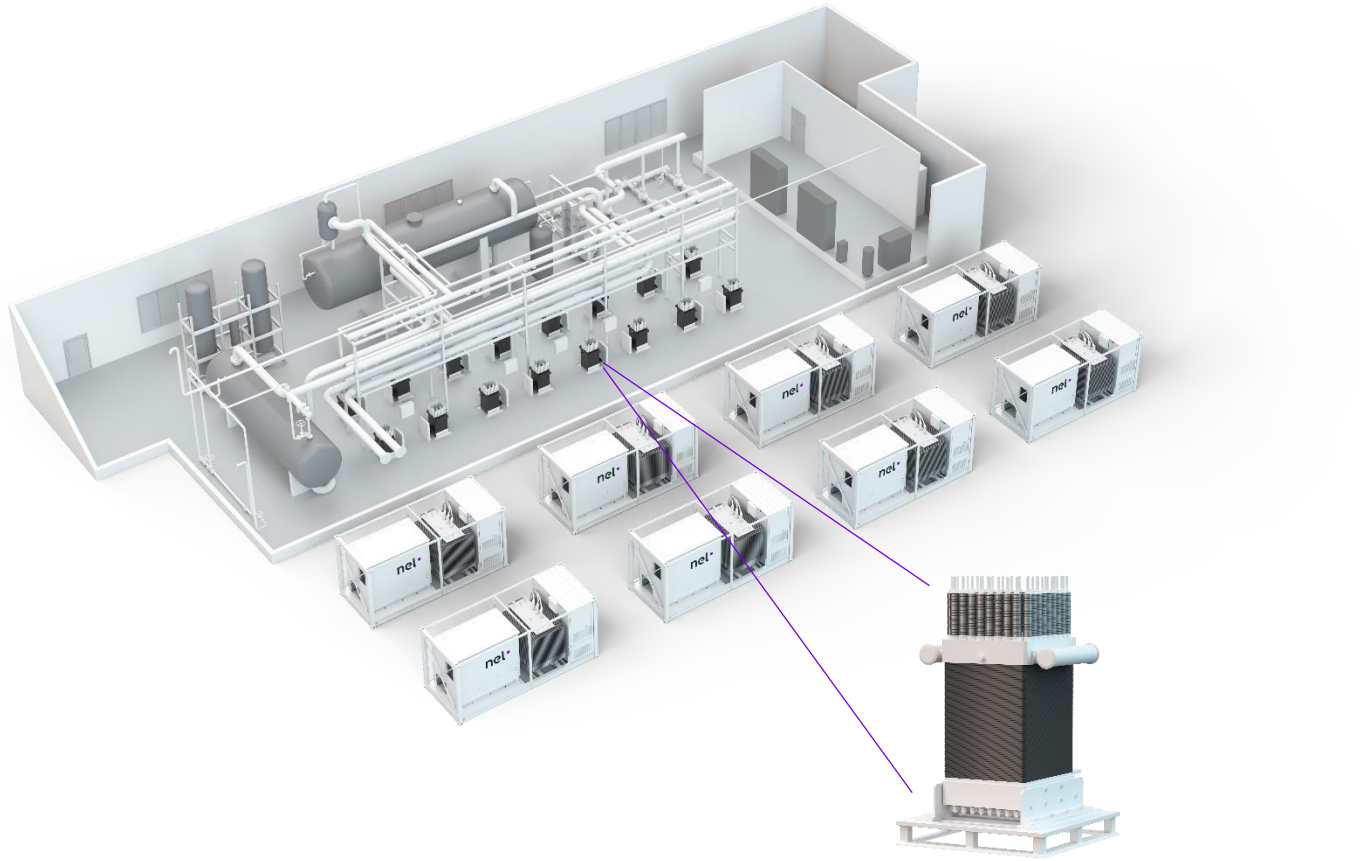
Nel scope	EPC scope
Electrolyser system design	Civil works, building
Controls and safeguards	Site infrastructure and utilities
Electrolyser stack	Project management and execution
Power electronics, gas, and electrolyte handling	Piping, cabling
Installation support and commissioning	Installation and construction

- Benefit from joint development over time and common targets and KPIs
- Building execution muscle
- Standardized turn-key solutions
- Single-purpose vehicle
- Multi discipline engineering and fabrication
- Develop supply chain and frame contracts
- Project execution resources and processes
- EPC partners can support execution also on Nel scope

Large scale projects are materializing

PROJECT EXAMPLES

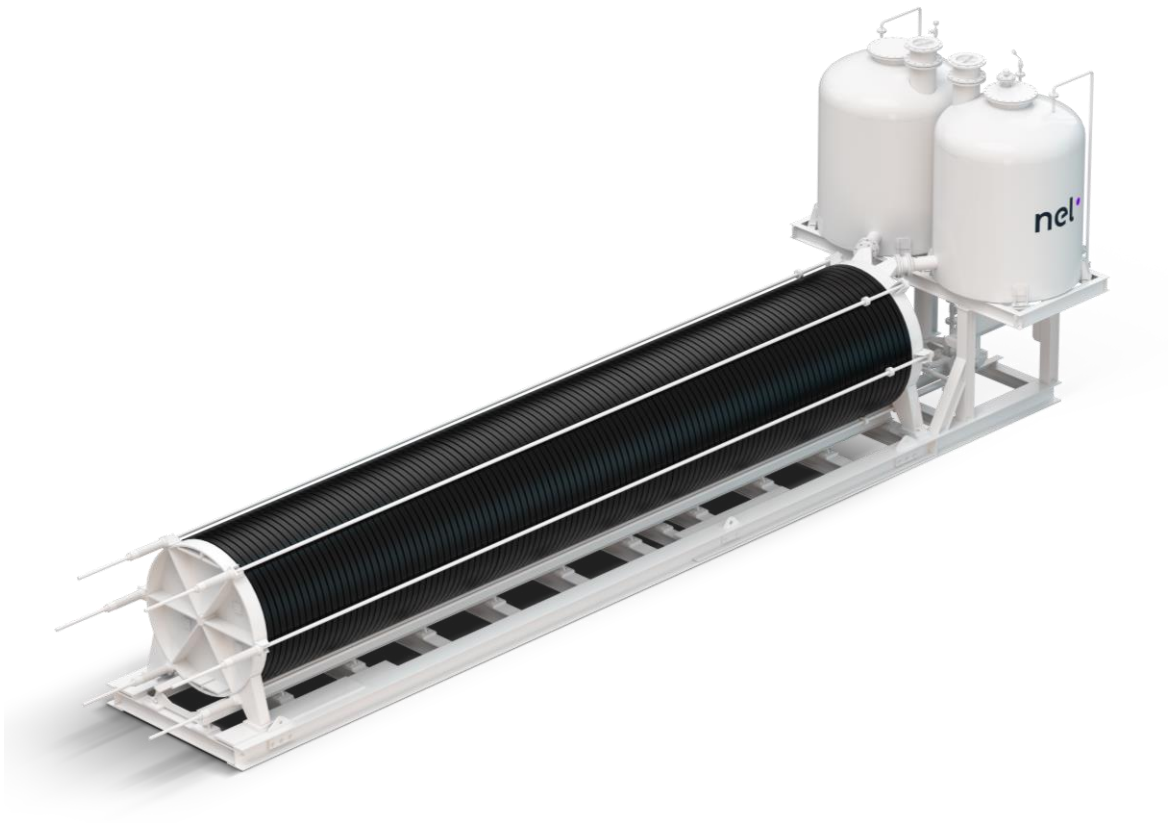
Signed agreement with Iberdrola for the supply of 20 MW PEM to support green fertilizer project in Spain



- Iberdrola, one of the largest electricity utilities in the world, has, together with world-leading fertilizer manufacturer Fertiberia, launched a project to establish the largest green hydrogen plant in Europe
  - Project includes 100 MW photovoltaic plant, a 20 MWh battery and a 20 MW electrolyser
  - Will use hydrogen to produce green fertilizer commencing in 2021
- Purchase order value of EUR 13.5 million

PROJECT EXAMPLES

Purchase order for 20 MW alkaline electrolyser from Ovako



- Nel received PO for a 20 MW alkaline electrolyser from Ovako, a leading European manufacturer of engineering steel
- The electrolyser will be installed at Ovako's existing plant in Hofors, Sweden, the first plant in the world to use hydrogen to heat steel prior to rolling and hot forming.
- The fossil-free hydrogen will replace the use of fossil propane gas currently used in heating furnaces at the site.
- The PO has a value of approximately EUR 11 million, and will be delivered at the end of 2022 for first hydrogen production in 2023

PROJECT EXAMPLES

Approval of 20 MW electrolyser contract for green hydrogen production for Everfuel A/S

H2Synergy 20 MW plant; Image credit: Everfuel

- Nel awarded a 20 MW electrolyser contract for the green hydrogen production facility adjacent to the Federica refinery
- The facility will have a production capacity of up to 8 tonnes per day, based on renewable wind power
- The contract was approved by the Board of Directors in January 2021 and has a value of EUR 7.2 million

PROJECT EXAMPLES

Supplying electrolysers to HYBRIT, the fossil-free steel project in Sweden

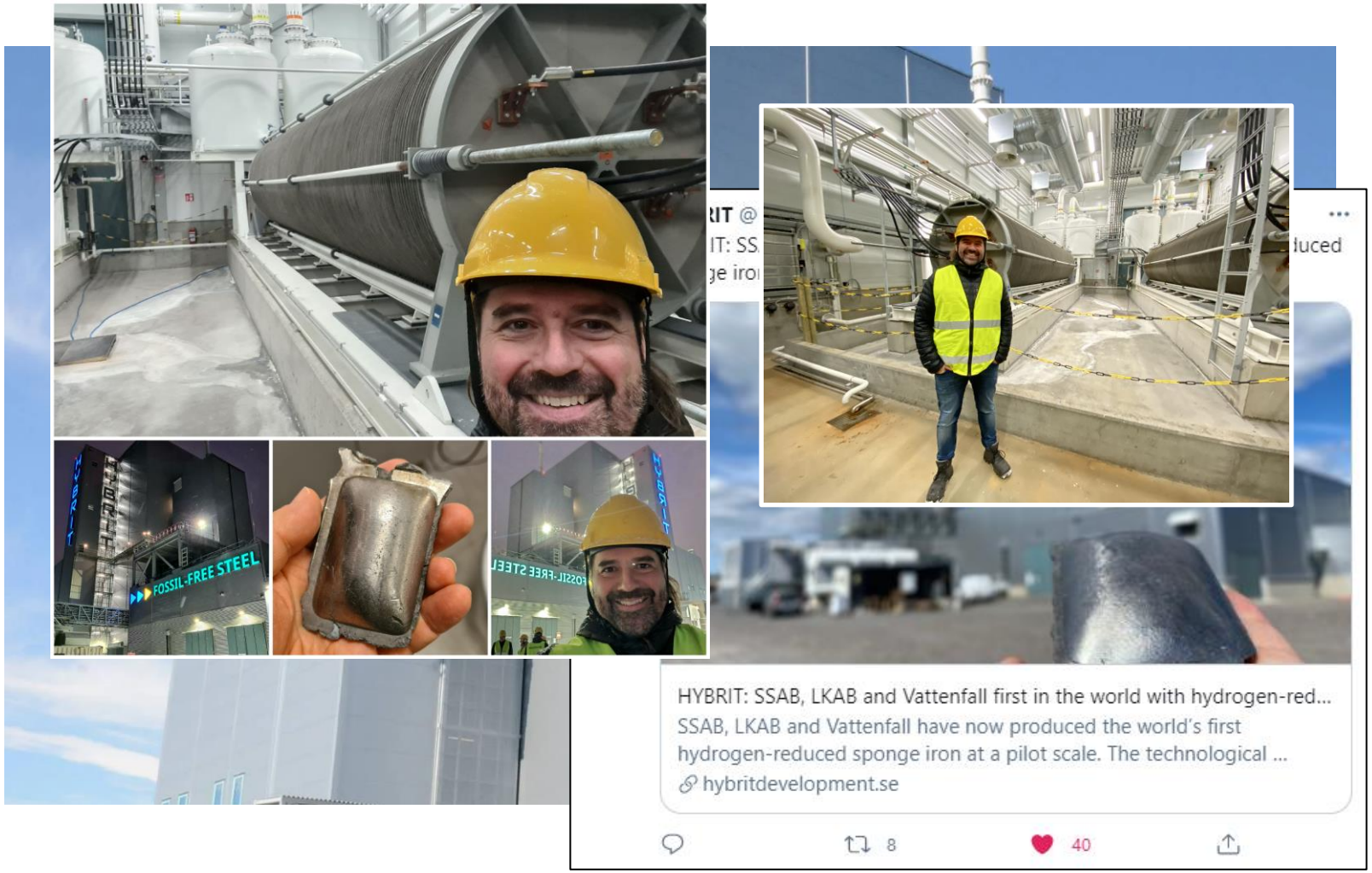


Photo: Vattenfall

Supplying electrolysers to the currently most advanced fossil-free steel project

- Nel has received a purchase order for a 4.5 MW alkaline electrolyser 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
- Pilot plant will operate in Luleå, Sweden from 2021 – 2024, with target of full-scale implementation by 2035


Thanks for the ride, dinosaurs.
We'll take it from here!