XINTC ELECTROLYSERS

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Dr. Ahmadreza Rahbari

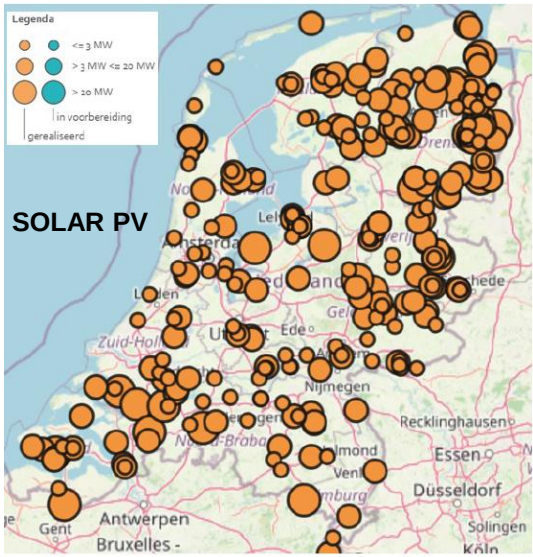
Lead Scientist

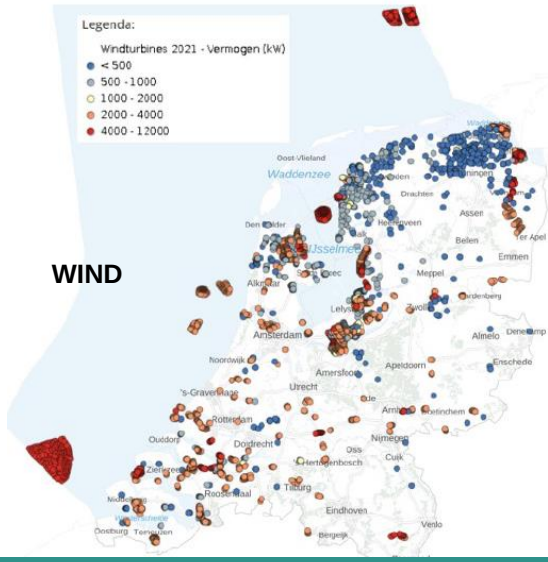
WELCOME

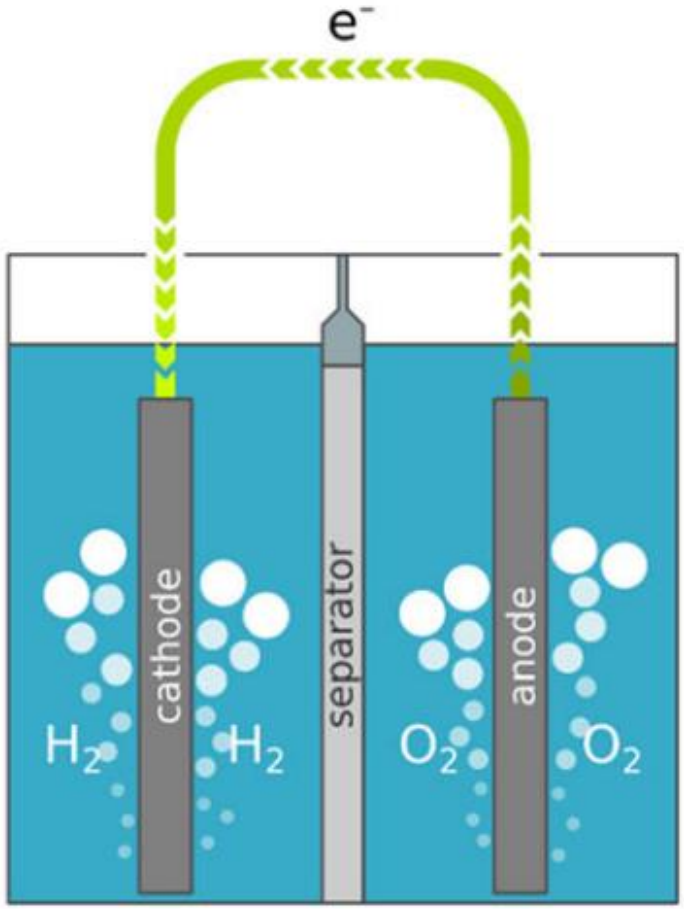
WHY GREEN HYDROGEN

- Increasing surplus of ‘green’ electrons
  - Photovoltaics
  - Wind energy
- Production mainly in rural (and offshore) regions
- Electrical transport problems
    - Grid congestion, losses
- Replacement for fossil fuels
- Medium needed for storage and transport of electrons

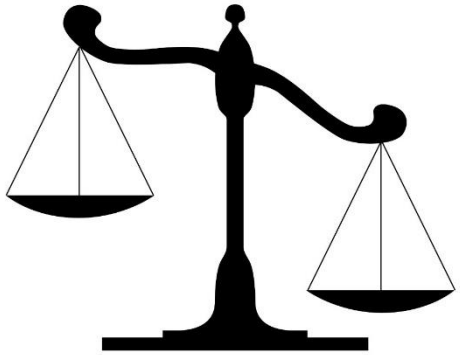
Bron: Nationale Energieatlas & ZonOpKaart.nl



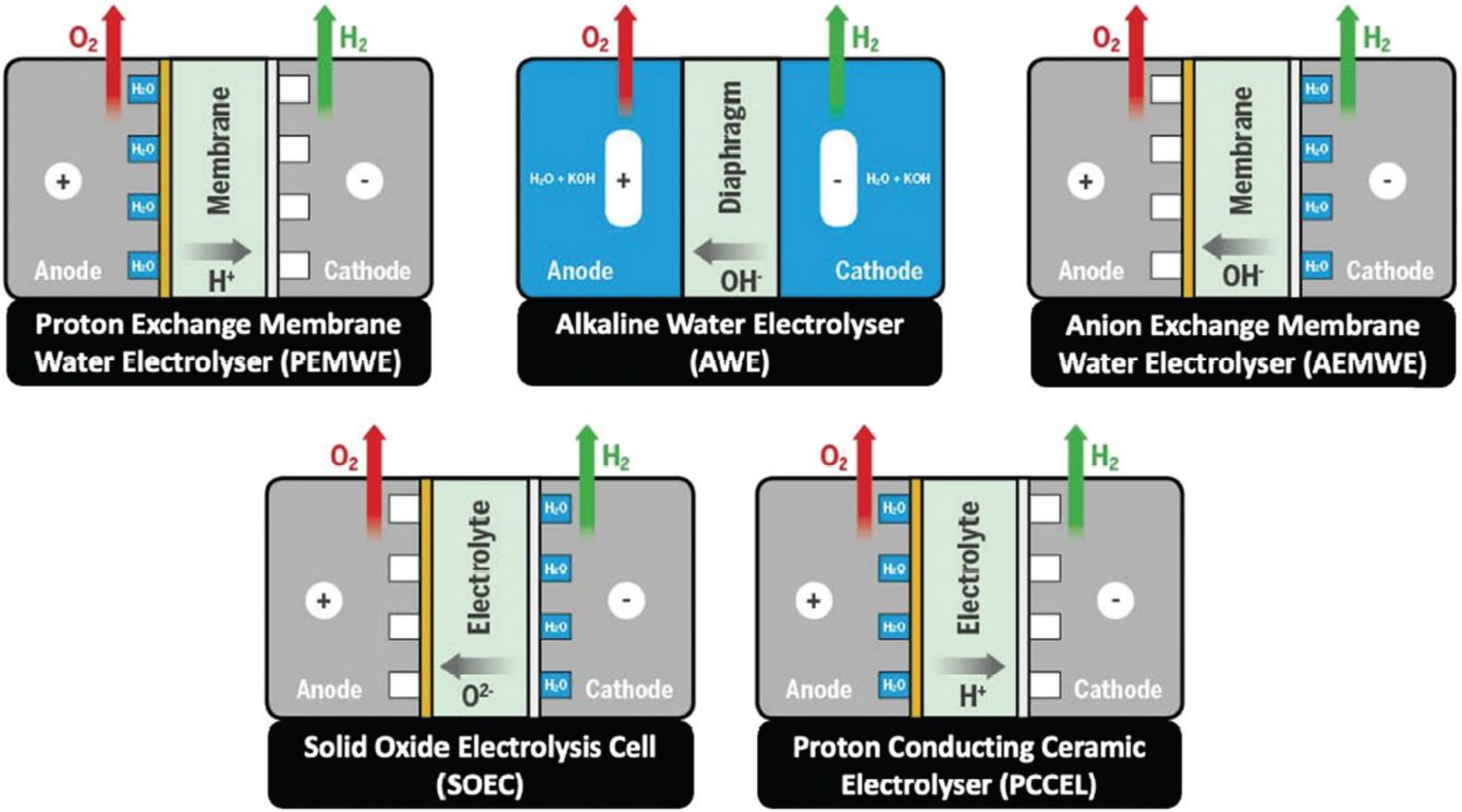




Nature communications, 2022,13,1-11



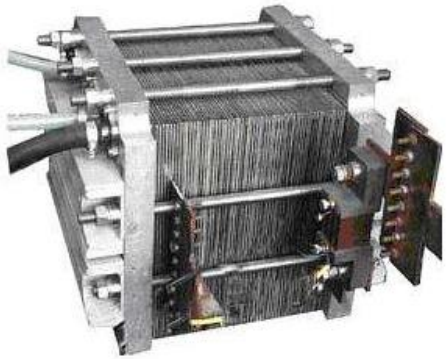
ELECTROLYSIS & MODULARITY



Chem. Soc. Rev., 2022, 51, 4583

TYPE OF ELECTROLYSIS

ALKALINE



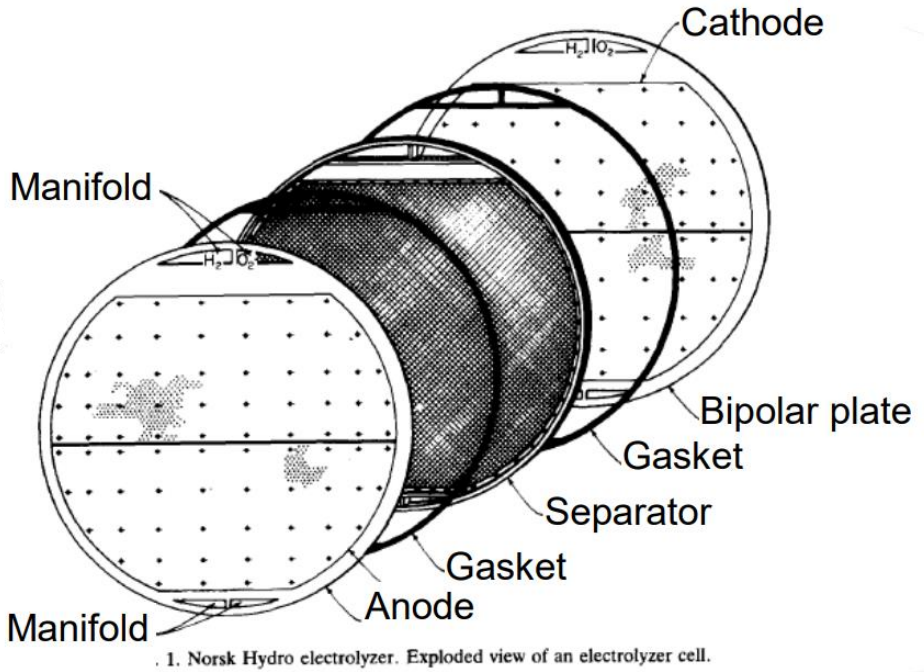
PEM

proton exchange membrane

AEM

anion exchange membrane

A

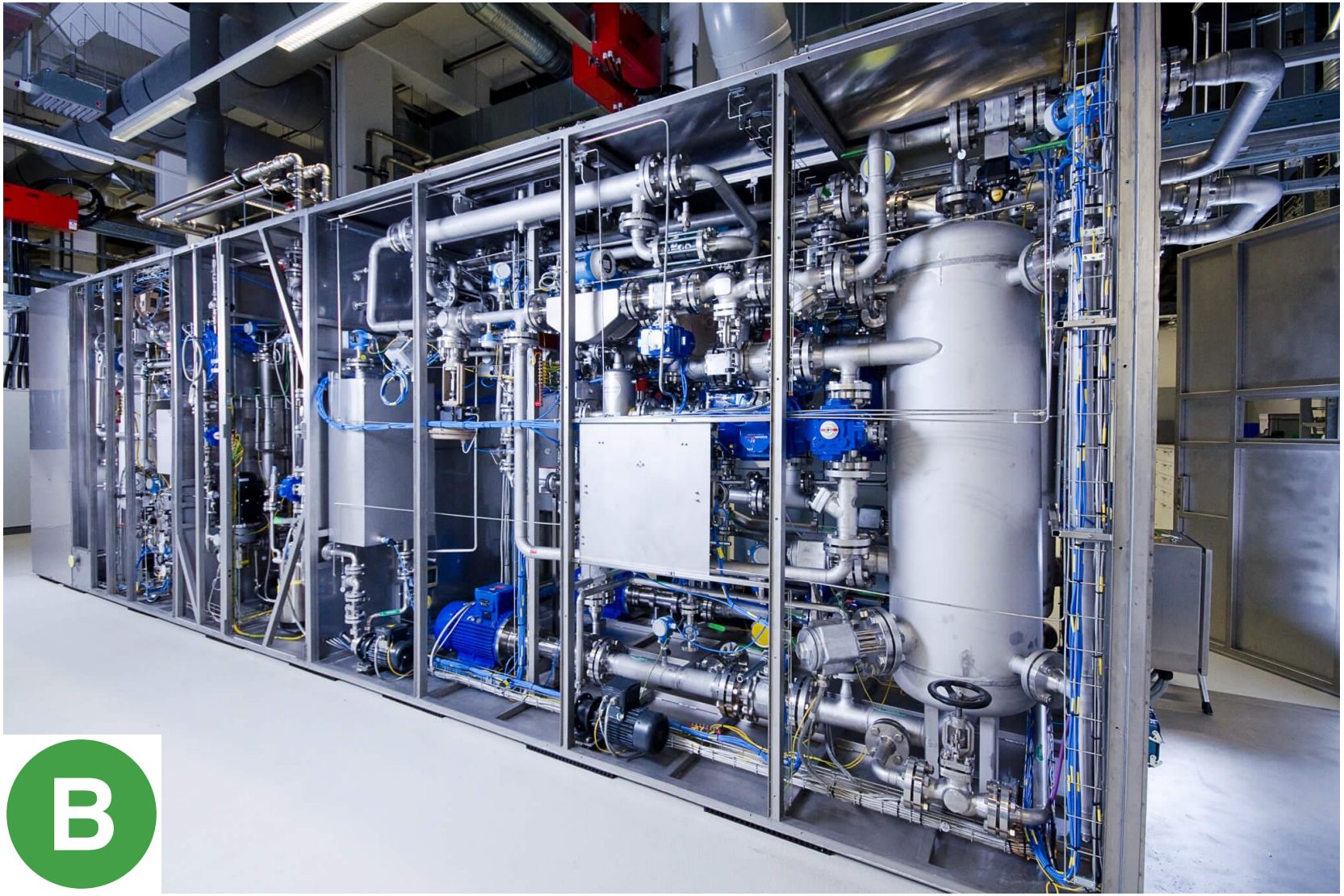


. 1. Norsk Hydro electrolyzer. Exploded view of an electrolyzer cell.

TYPICAL STACKS & STACK COMPONENTS

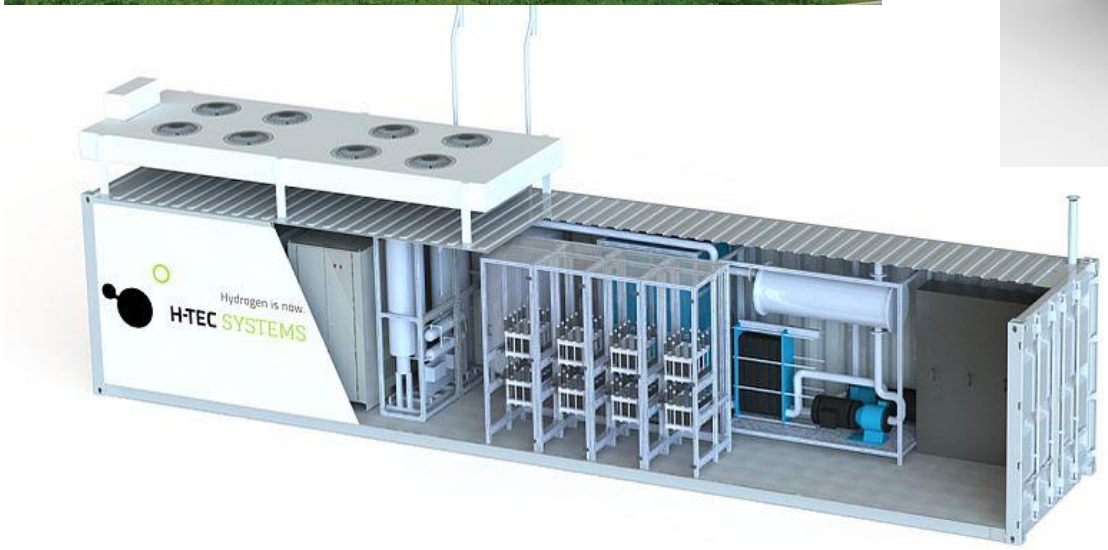
High volume alkaline Installations

TYPE OF ELECTROLYSERS



B

BALANCE OF PLANT



CONTAINERIZED SOLUTIONS

Mission

Develop, manufacture and market scalable industrial alkaline electrolysers for the production of hydrogen gas at any location and for any application in the 150kW to 50+MW range.

Est. 2012

OEM

Technology + Product/Process + Competencies/Skills + Market

BUSINESS PROFILE

GREEN Hydrogen 2030

"The global water electrolysis machine market is projected to surpass the market value of USD 12 billion by 2030."

MARKET

Large industry

50+MW

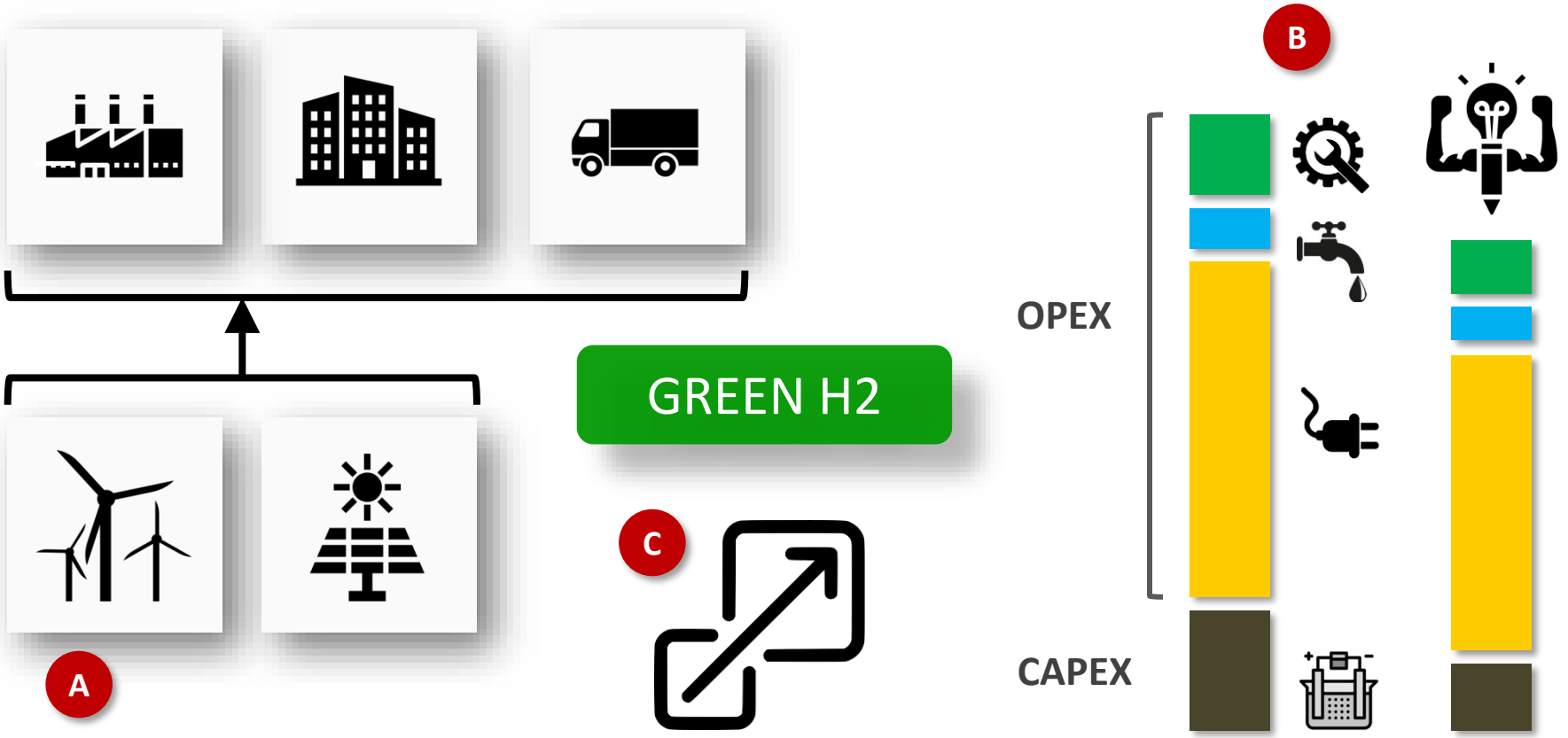
Middel market

150kW

Residential

"The low-carbon hydrogen market would, under still conservative assumptions, be worth about USD 25 billion by 2030."

"The manufacturing gap is expected to surpass 700GW by 2030"



Hydrogen production at the lowest possible costs !!

CHALLENGE

UNIQUENESS

VS

Plastic enclosure

Dynamic operation

Fluid & gas tight

NO gaskets

Recycleble

PATENT

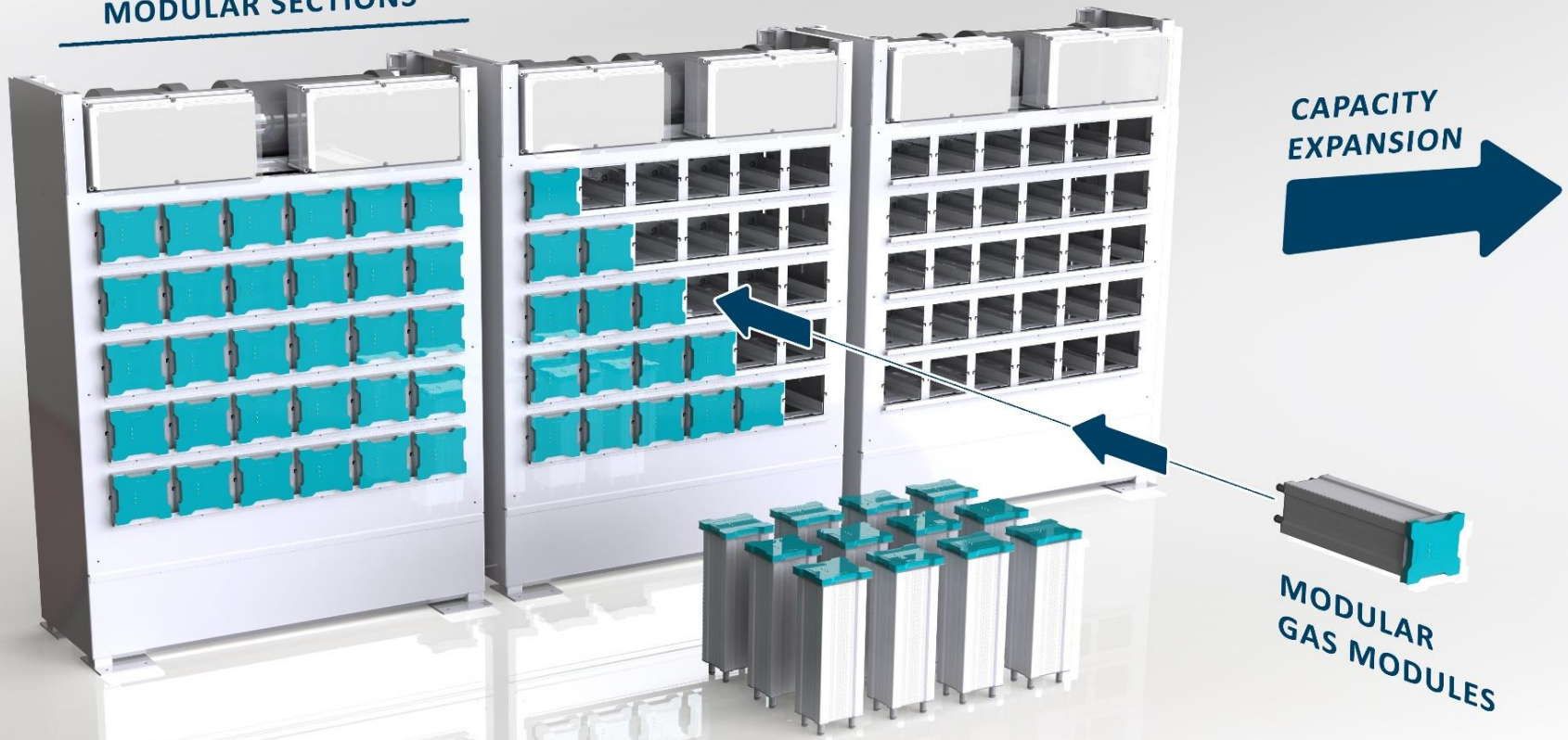
NO membranes

NO critical materials

Embedded software

Service station

Production station



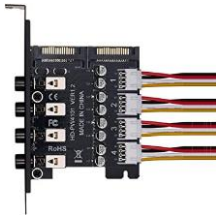
MODULAR DESIGN

ECONOMIES OF NUMBERS

+

+

+



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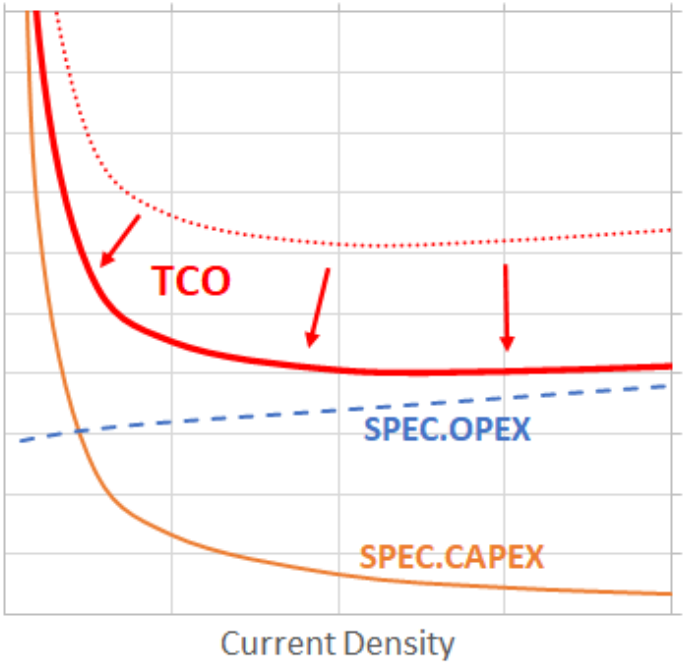
- Standardize, standardize, standardize
  - one ‘size’ fits all (but scalable and flexible)
- Automated manufacturing techniques
- Supply chain
  - Avoid scarce resources (Pt/Ir catalysts)
  - Avoid long-lead specialist supply parts
  - Avoid single-supplier parts
- Logistics
  - Pre-fab modules and sub-parts, warehousing, local assembling partners



$$\mathrm{TCO} = \frac{\mathrm{CAPEX} + \mathrm{OPEX}}{\text{kg produced during lifetime}} + \mathrm{Eff} * \mathrm{E_{cost}}$$

$$\left[\frac{EUR}{kg}\right] \qquad \left[\frac{EUR}{kg}\right] \qquad \left[\frac{kWh}{kg} * \frac{EUR}{kWh}\right]$$

TOTAL COST OF OWNERSHIP

Power electronics

Process control & PM

Water treatment & electrolyte

Gas modules

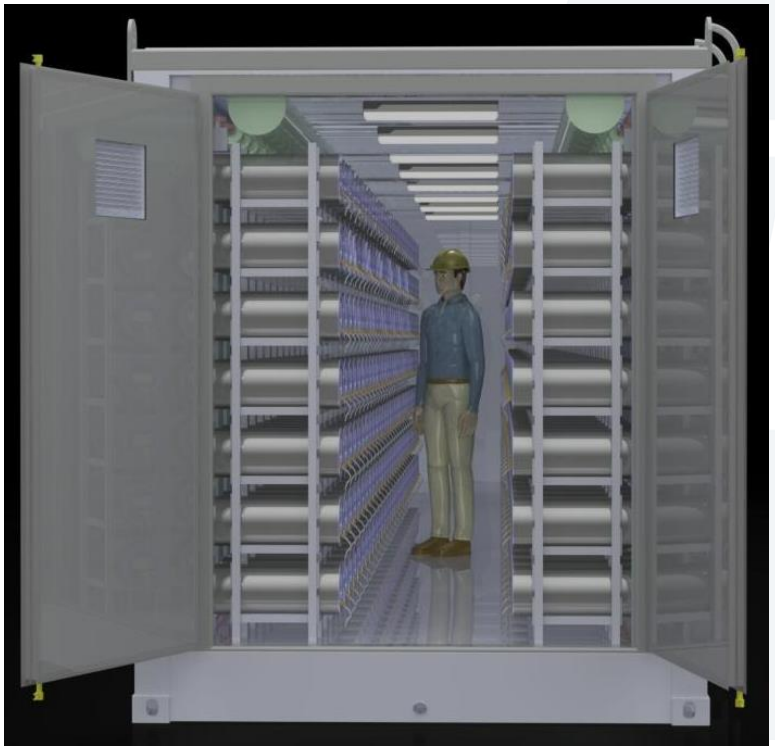
Gas conditioning

Service station

Production station

LAYOUT

XiNTC ELECTROLYSERS



DEMO SYSTEM

XiNTC ELECTROLYSERS

HAN_UNIVERSITY OF APPLIED SCIENCES

- Structural analysis of cell plates
- Thermal analysis of the gas module
- Flow Simulations
- Cooling requirements
- Simulations
- Experiments

TU Delft

- Process modelling
- Modelling polarization of the cell
- Process control
- Power electronics
- Hydrogen purification
- Simulations
- Experiments

COLLABORATIONS – Research & Development

Balancing Service Provider

XiNTC ELECTROLYSERS

Nederlandse Waterstof Maatschappij

Cosun

provincie groningen

Rabobank

FrieslandCampina
nourishing by nature

Rijksdienst voor Ondernemend Nederland

GO2 MARKET

Configurator

Scalable

Fixed EPC tarif

3mth

Plug-and-Play

STRATEGIE

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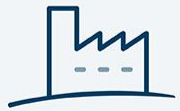

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