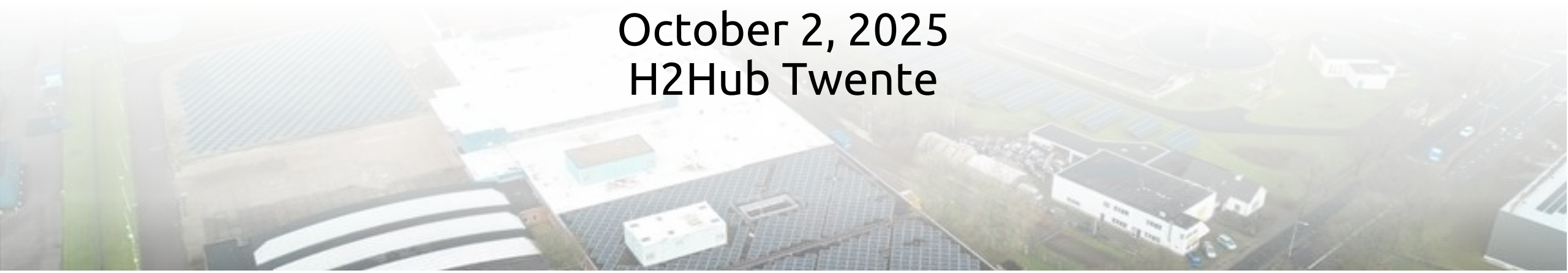
Euregional H2 Business Event

October 2, 2025
H2Hub Twente



H2 Hub Twente
Waterstof Platform

SAXION

UNIVERSITY OF TWENTE.

In cooperation with pioneering

Day host

Emma van Geel

Program

09:15 - 09:30	Welcome & panel interview
09:30 - 10:00	Keynote by **Enapter** (Jan-Justus Schmidt)
10:00 - 10:30	Keynote by **OostNL** (Sem van der Linden, Patrick Cnubben)
10:30 - 11:00	Coffee/tea
11:00 - 11:30	Keynote by **RVO** (David Bolsman)
11:30 - 12:00	Keynote by **XINTC** (Ahmadreza Rahbari)
12:00 - 13:00	Lunch & fair
13:00 - 14:00	Parallel sessions (1/2) & fair
14:00 - 14:10	Change over
14:10 - 15:10	Parallel sessions (2/2) & fair
15:10 - 15:30	Coffee/tea
15:30 - 15:45	Opening ceremony **Energy Building**
15:45 - 17:00	Drinks

No presents this event.

instead, donation to charity!

Panel interview

Tijs de Bree Provincie Overijssel

Eelco Osse Boessenkool

Benno Aalderink Saxion

Ton Beune H2Hub Twente

Presentation

Jan-Justus Schmidt

Co-founder Enapter,
board member Wolong Enapter Hydrogen Technologies

_Enapter

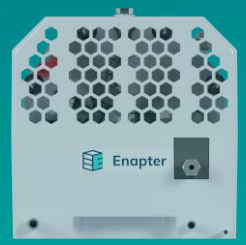
Leading the world in AEM electrolysis

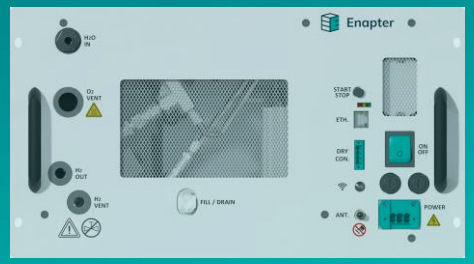
Jan-Justus Schmidt

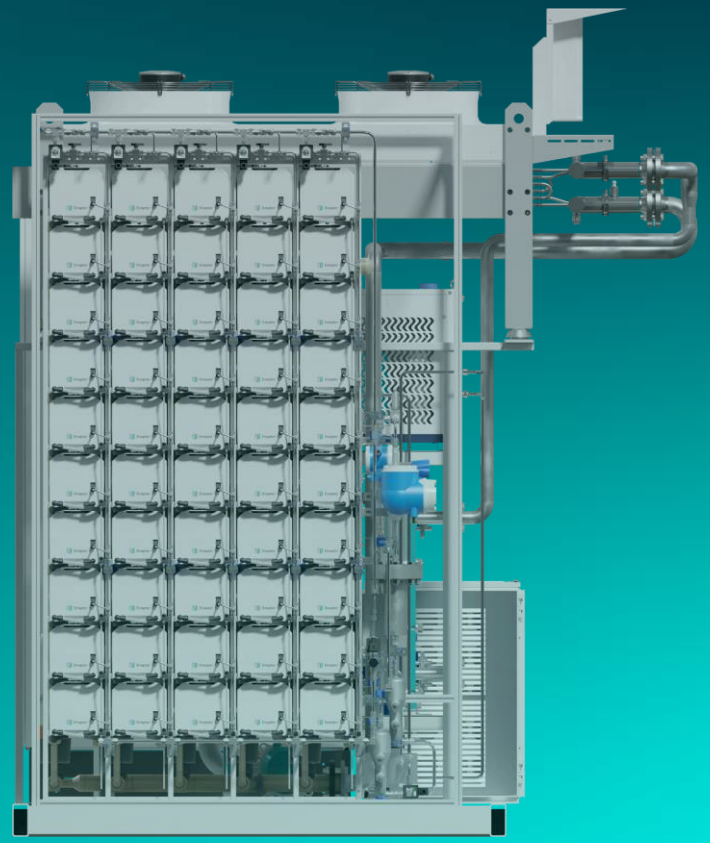
Co-Founder, Enapter

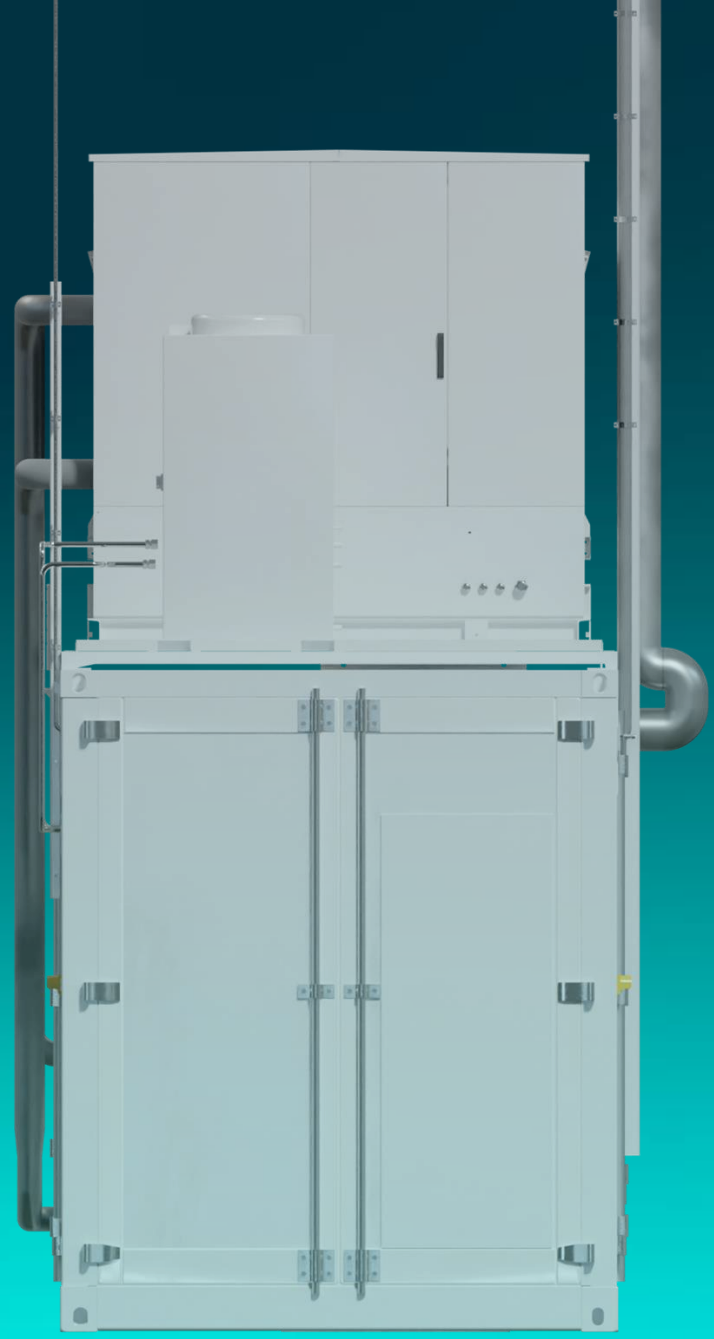
Board Member, Wolong Enapter Hydrogen Technologies Co., Ltd.

Germany/China









Enapter at a glance

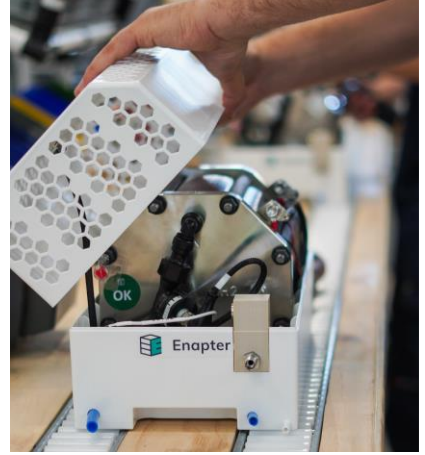
15-year track record in AEM technology

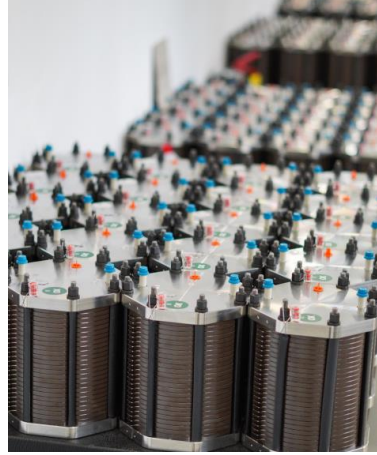
Commercial leader in patented AEM electrolysis

Industrialized high-volume production with quality focus

Uniquely modular product approach

Product-driven innovation with AI software





1_15-year track record in technology R&D

Enapter

_Our vision

To live in a world where fossil fuels are no longer used and **green hydrogen** fuels power the world via renewable energy sources

_Our mission

To make green hydrogen affordable and accessible to all, using **AEM electrolyzers**

_Our AEM electrolyzers

Smart. Simple. Scalable

_15 years of AEM technology

Enapter's story is closely linked with AEM

2004-2009

First prototype of the AEM Electrolyzer and patents of the dry cathode by Italian company ACTA

2017

Sebastian-Justus Schmidt starts Enapter at Phi Suea House in Chiang Mai, Thailand

2021

Enapter receives Earthshot Prize for its game-changing approach to scaling up AEM electrolysis

2023

Enapter unveils the world's first MW AEM Electrolyzer, the AEM Nexus and expands its portfolio with the AEM Flex 120

2024

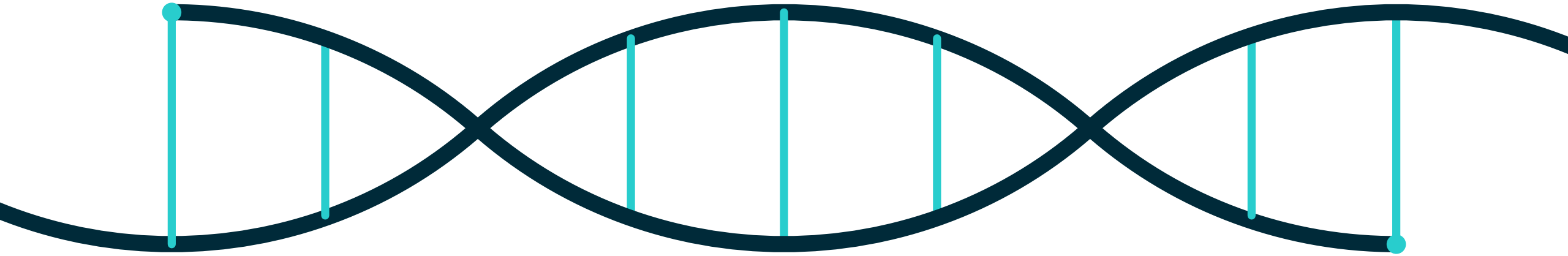
Enapter starts a Joint Venture with Wolong Electric Group and launches Core Partner Program to scale even faster

2025

Enapter launches the Stack T, building block for the AEM Nexus 2500 to participate in even larger projects

_Our foci: Technology, Innovation, CAPEX light

Smart. Simple. Scalable



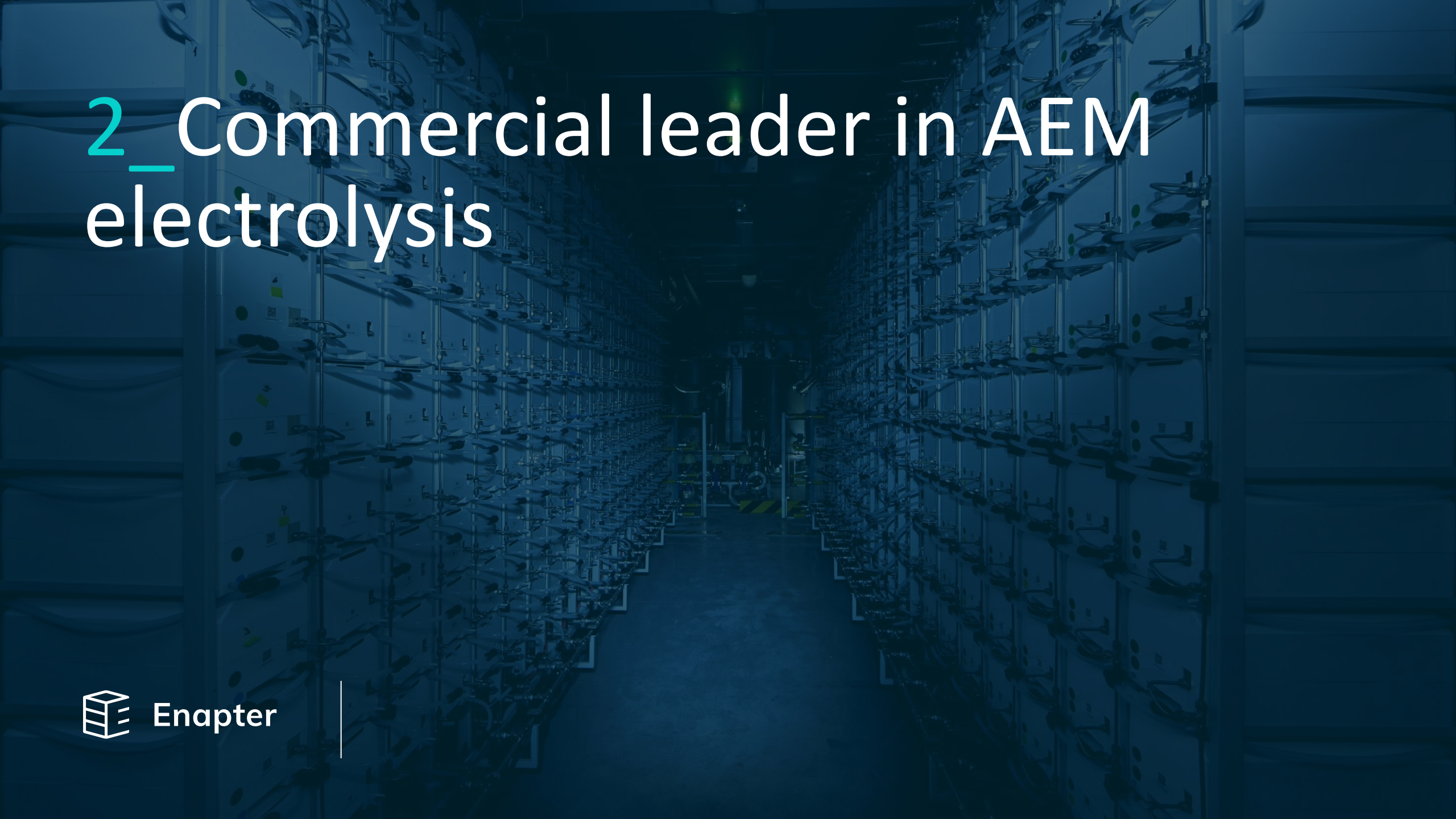
World-class R&D

System Design & Engineering

Project Support

Lighthouse Manufacturing

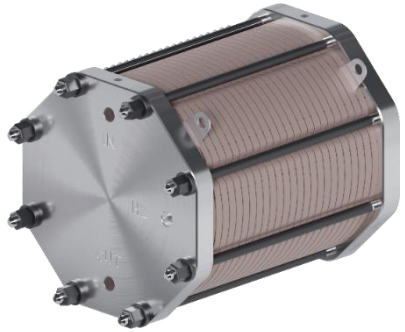
2_Commercial leader in AEM electrolysis



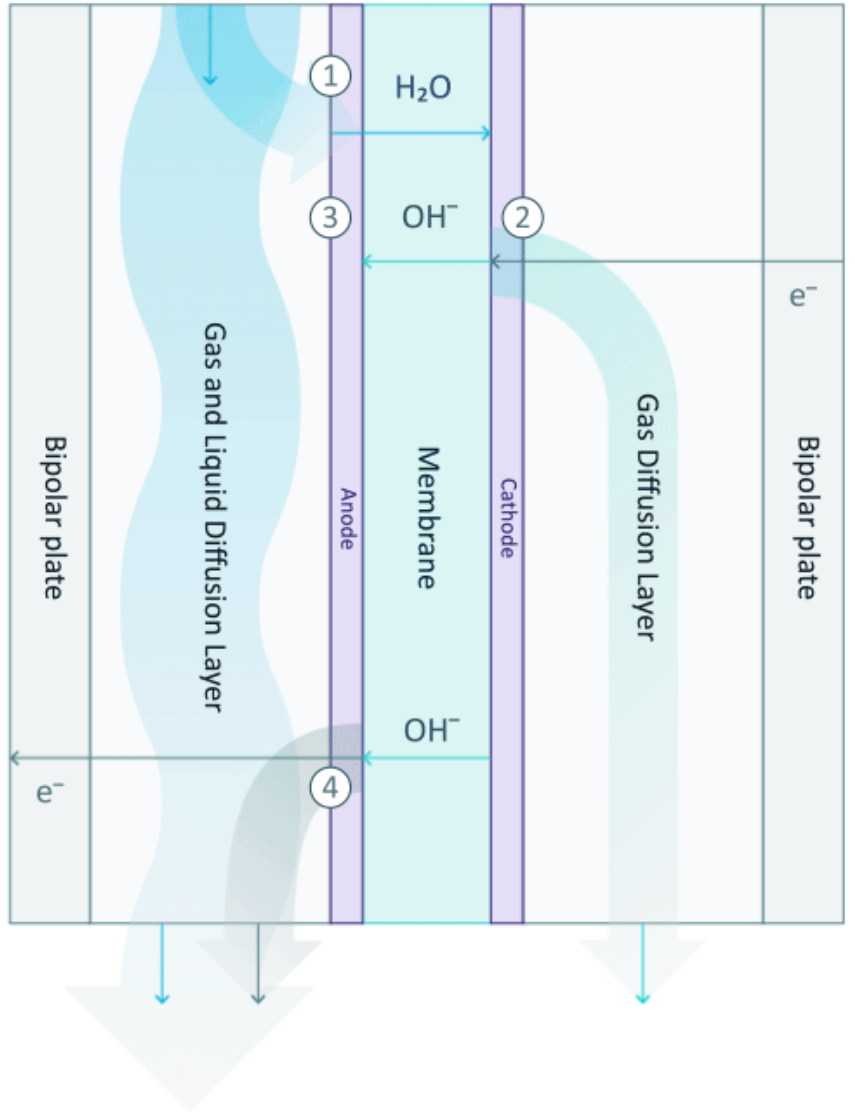
Enapter

How the AEM technology works

patented



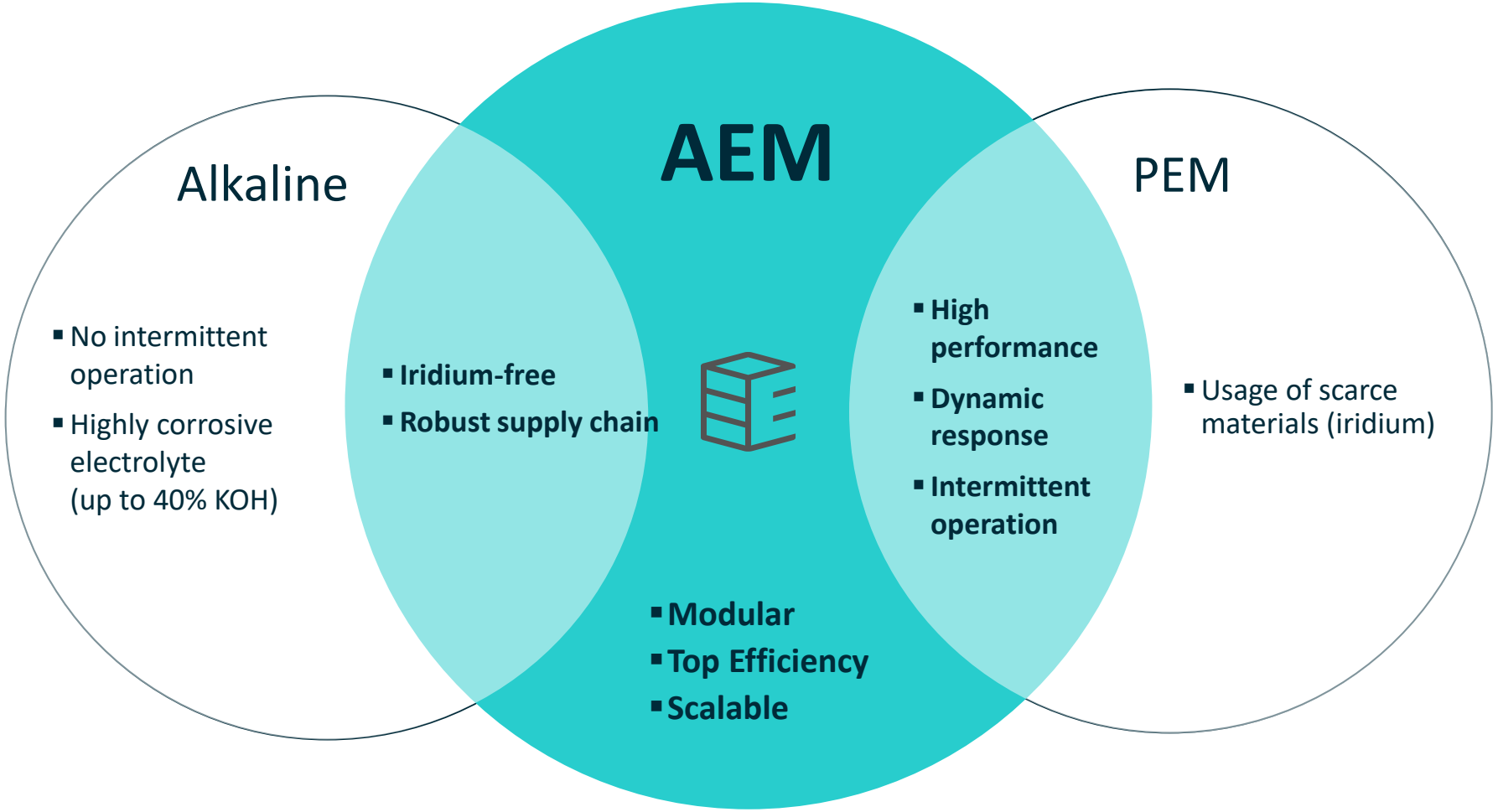
- Dynamic operation with renewable sources
- Strong patents
- Electrochemical compression to 35 bar
- Best-in-class efficiency
- Free from Iridium and PFAS



AEM: The best of both worlds

patented

The strength of our technology



AEM is the future: Technology review

AEM's Competitive Advantage

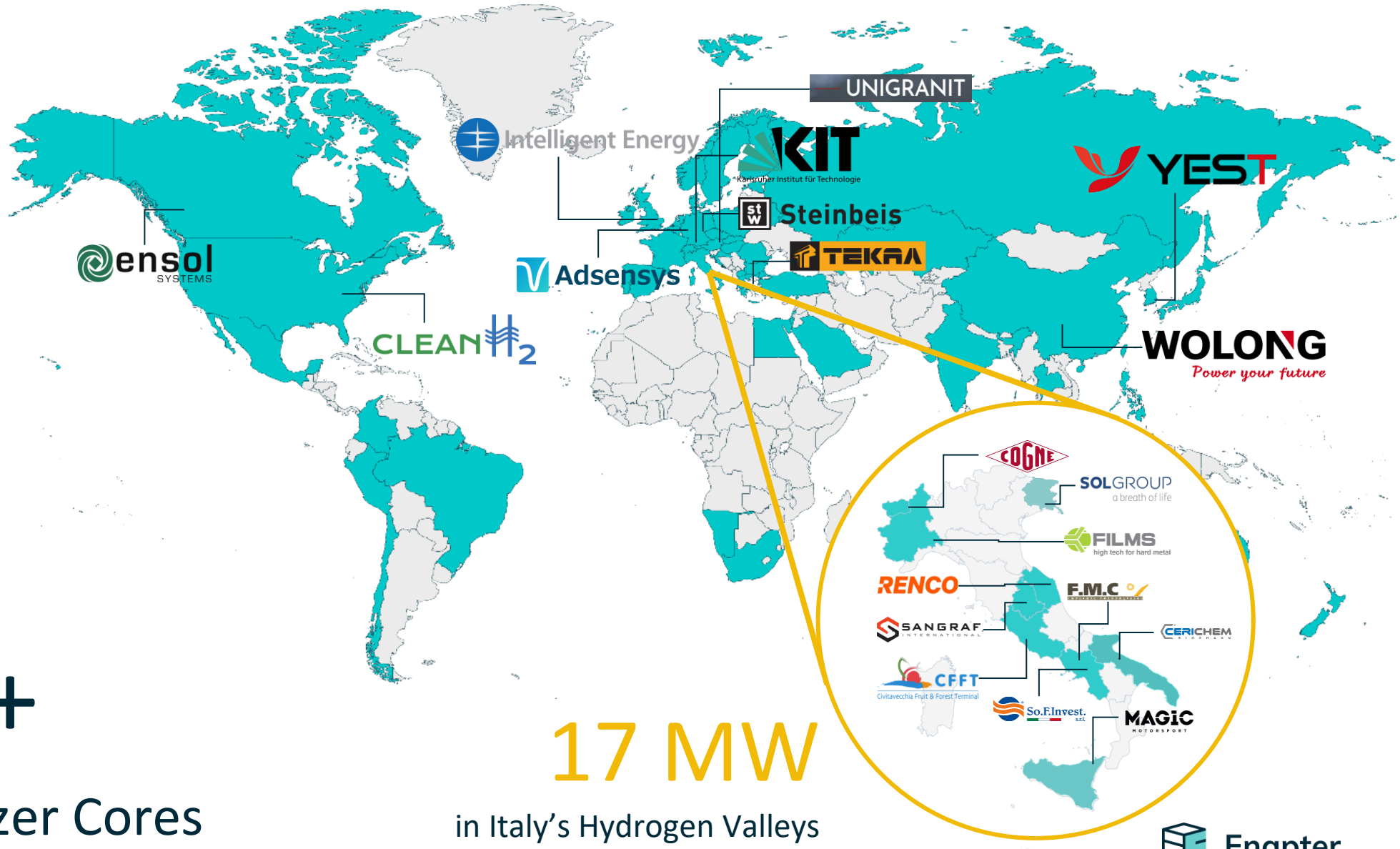
	PEM	Alkaline	**AEM**
Supports intermittent renewables	✓	✗	✓
Iridium free	✗	✓	✓
Titanium free	✗	✓	✓
PFAS regulation ready	✗	✗	✓
Compact design	✓	✗	✓
High current density	✓	✗	✓
Electrochemical compression	✓	✗	✓
Safe-to-handle electrolyte	✓	✗	✓

_Enapter's success

375+
customers

55+
countries

12,000+
AEM Electrolyzer Cores



17 MW
in Italy's Hydrogen Valleys

Enapter

We optimize our electrolyzers with real-life data from our customers

2.700.000

Total operational hours

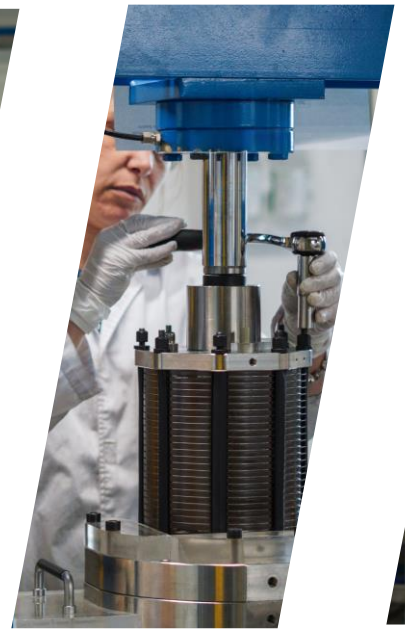
3_Industrialized production with strong quality focus

Enapter

Industrial Mass Production

100% of our stacks are tested multiple times before leaving our factory

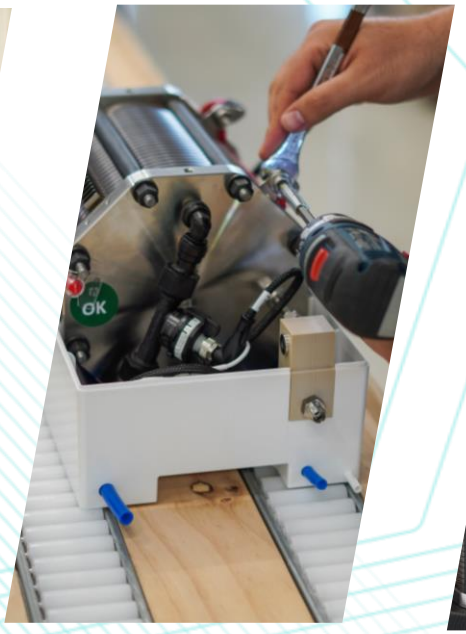
Electrode Manufactung & Coating



Stack Assembly Lines

First Performance Test

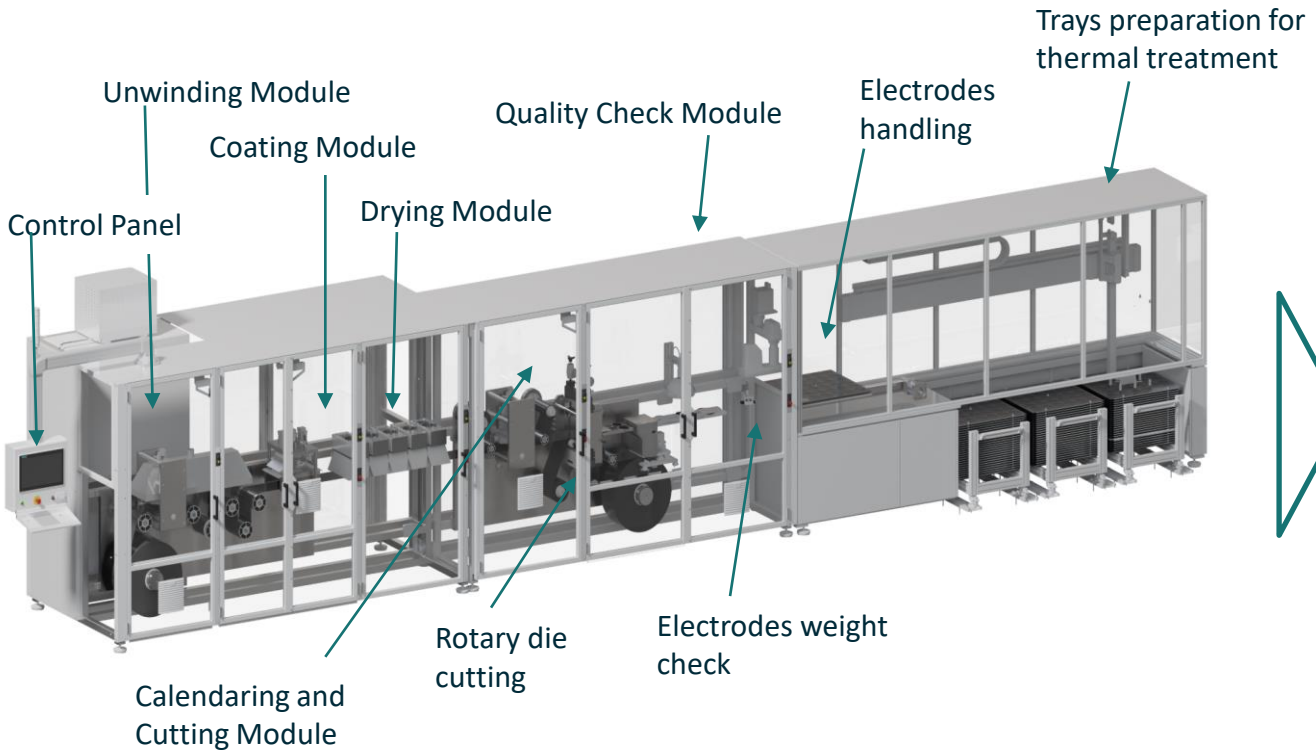
Pressurized Leak Test



System Assembly

Final Acceptance Test (FAT)

We are automating our manufacturing processes with a Lead Factory concept



Automated anode coating

Capacity: 300 stacks v4.1 per day

150MW Lead Factory concept

Replicable globally

_Enapter HQ Pisa

- 100% renewable energies
- Industrialized high-volume production

Wolong Enapter Hydrogen Technologies Co., Ltd

- BoP Manufacturing
- Shaoxing, Zhejiang, China

4_Uniquely modular product portfolio

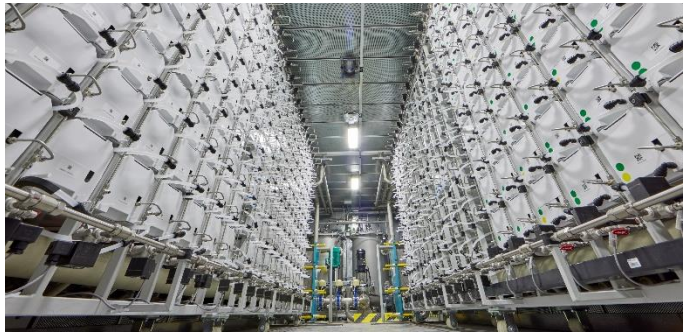
Enapter

Modular systems scale faster

Computing in the past

Multi-core solution today

Electrolyzer in the past

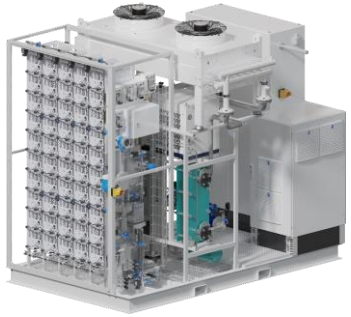


Multi-core solution today

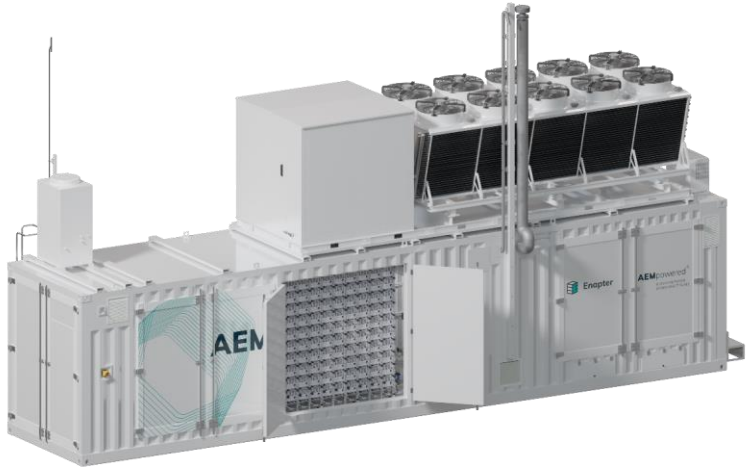
Our Product Portfolio

Stack 4
2.4 kW

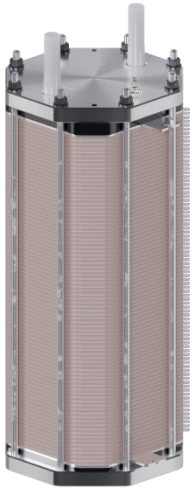
EL 4
2.4 kW



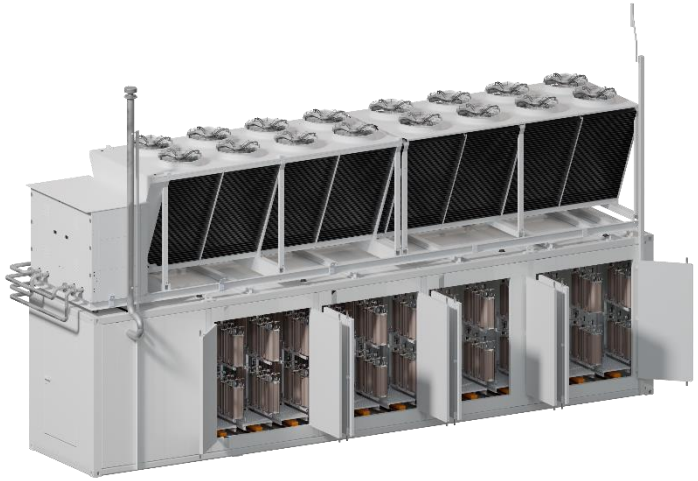
AEM Flex 120
120 kW



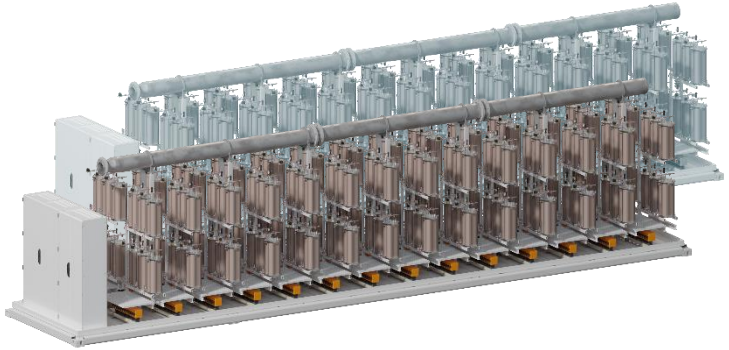
AEM Nexus 1000
1 MW



Stack T
25 kW



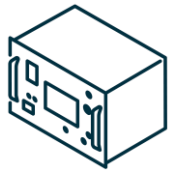
AEM Nexus 2500
2.5 MW



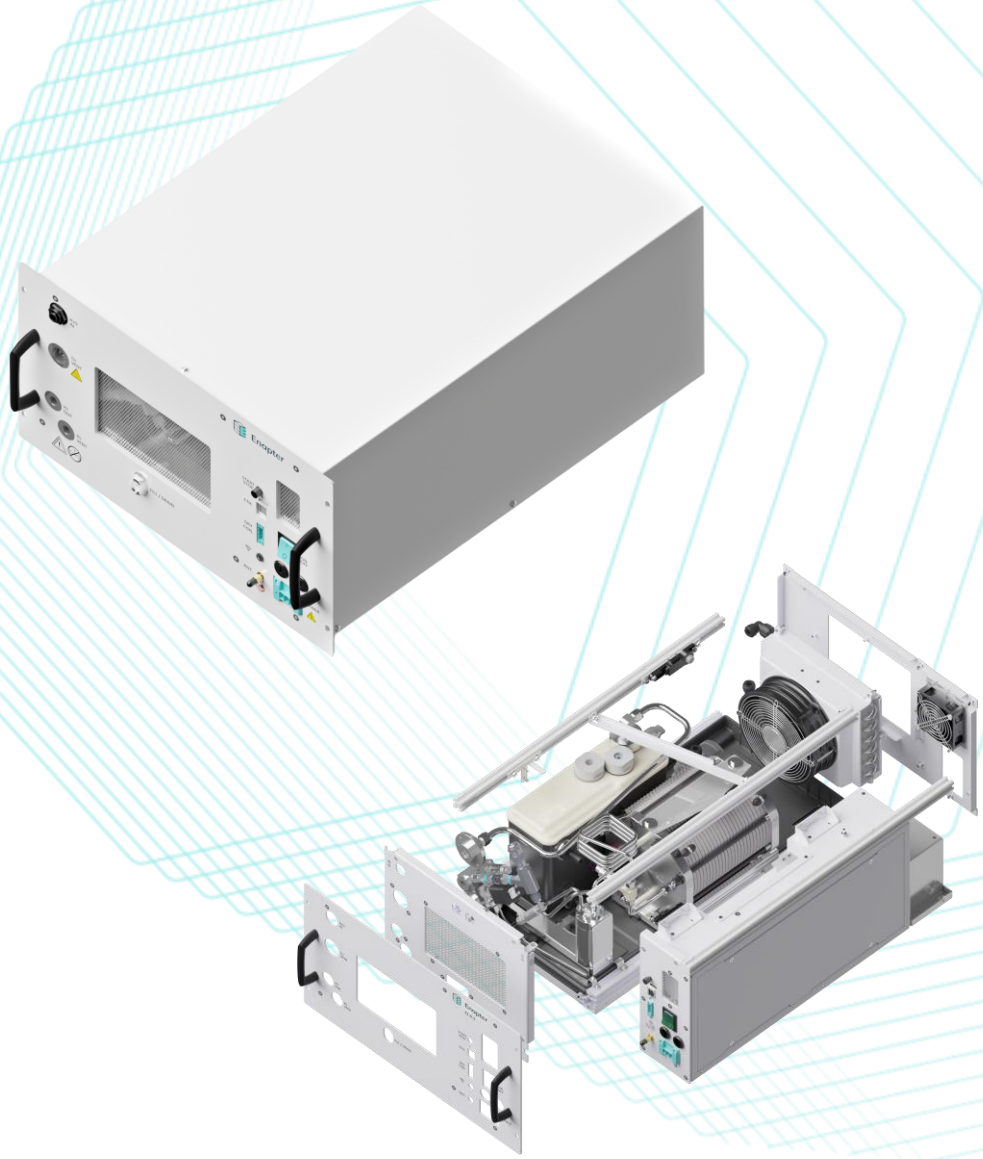
Skid AEM solutions
Up to 100 MW

Single-core: The AEM EL 4

Enapter Electrolyzers



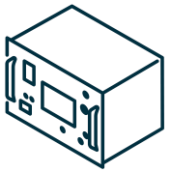
- Production rate: 0.5 Nm^3/hr
- Power consumption: 2.4 kW
- Efficiency: 4.8 kWh/Nm^3 - 53.3 kWh/kg
- 99.9% or 99.999% purity at 35 barg
- Fully automatic operation, AI-optimized
- Modular and scalable

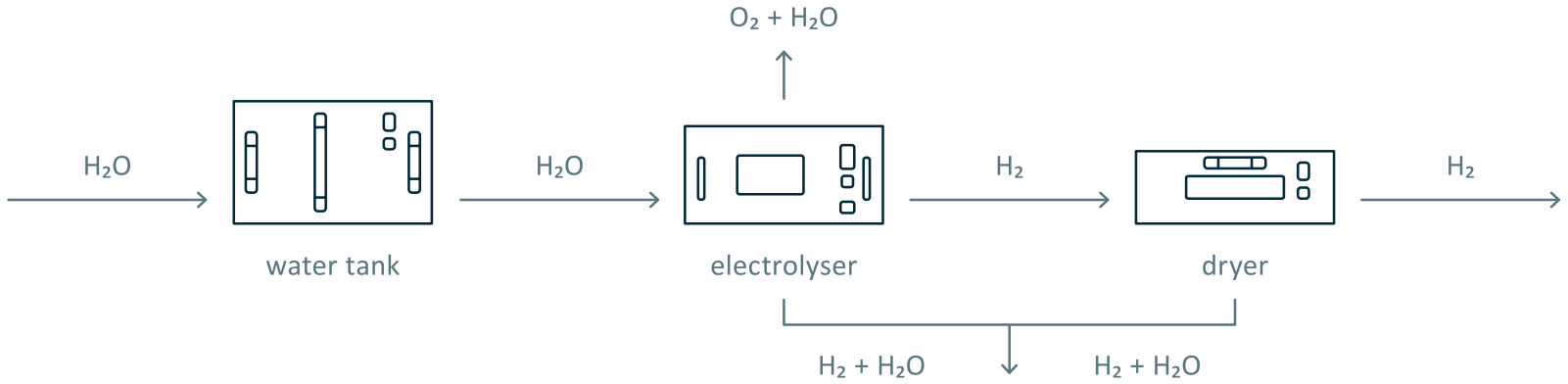


Datasheets:
EL 4 AC (Air cooled / Liquid cooled)

Single-core: The AEM EL 4

Enapter Electrolyzers





Datasheets:

- Dryer DRY 2.1
- Water Tank WT 2.1

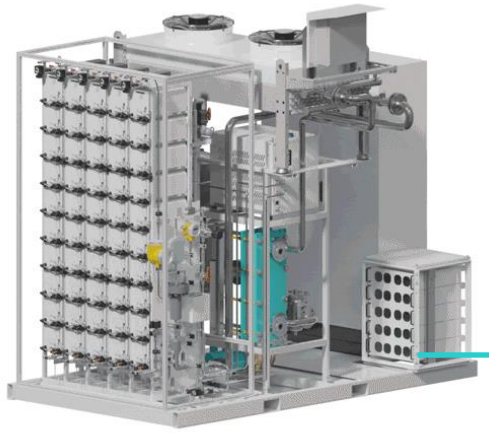
Single-core applications

Enapter’s AEM single-core electrolyzers

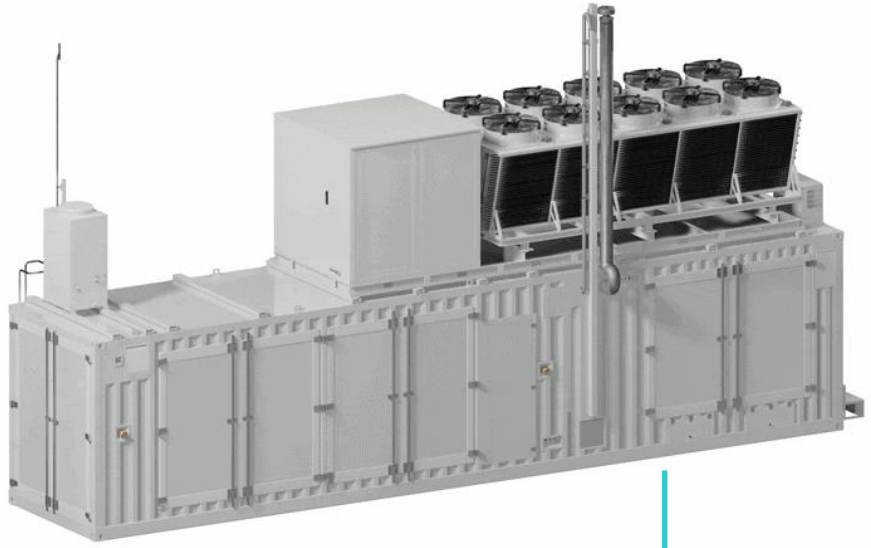
Multi-core solutions

Enapter’s AEM multi-core electrolyzers

- Top-class efficiency
- Modularity
- Built-in redundancy
- Rapid reaction to intermittent renewables
- Fully automatic operation, AI optimized



AEM Flex 120
50 cores | 120 kW



AEM Nexus 1000
420 cores | 1 MW

Multiple stacks, One Balance-of-Plant

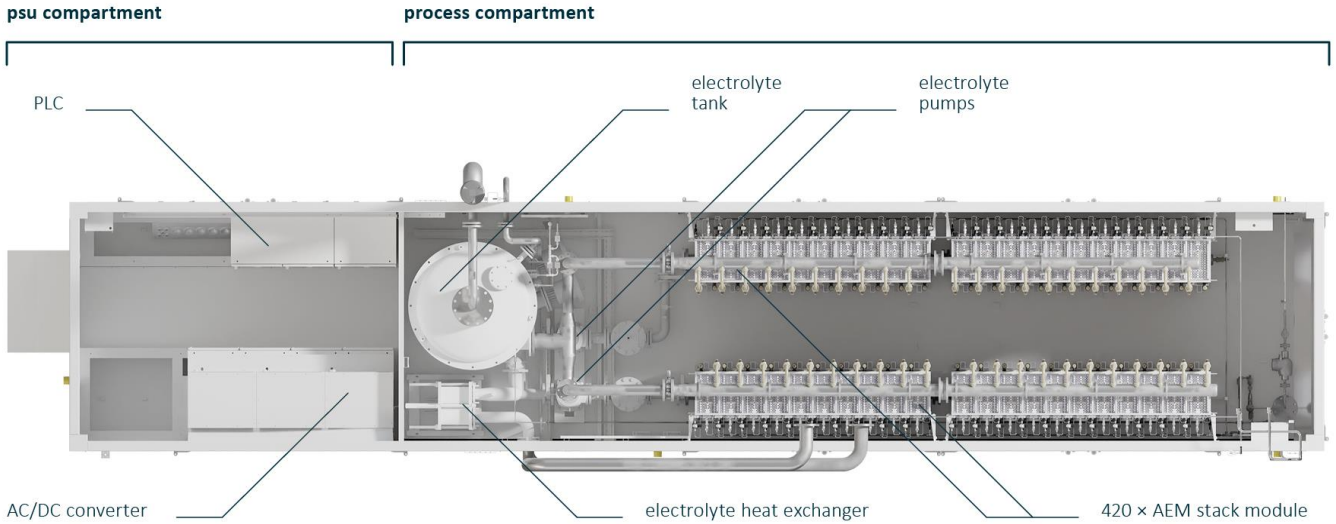
AEM Nexus 1000

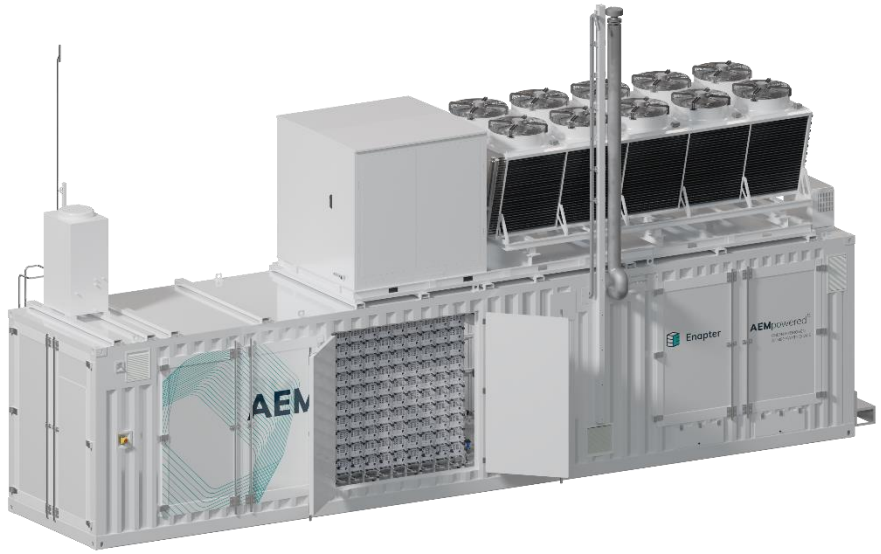
- Best-in-class efficiency
- Modular & redundant

Multi-core: AEM Nexus 1000

Enapter Electrolyzers

- 210 Nm^3/h or 453 kg/d
- Efficiency: **51.3 kWh/kg**
- 99.9% or 99.999% purity
- Operational flexibility: **1-100%**
- Real-time reaction to renewables
- Fully automatic operation, **AI-optimized**
- Modular & scalable



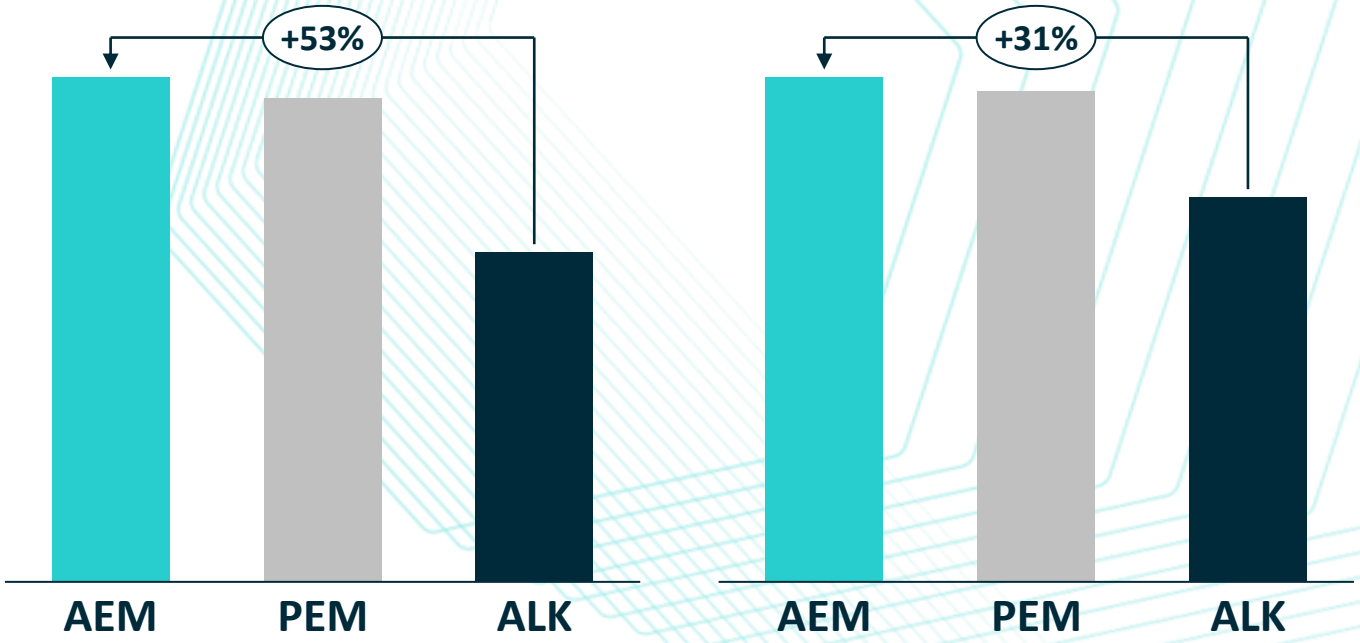


Datasheet:
AEM Nexus

The most flexible MW systems in the market

Enapter's competitive advantage: Best flexibility

- Operational flexibility of 1-100% due to modularity of our multicore electrolyzers
- Up to 53% increase[1] in annual hydrogen production for 1 MW system compared to competitors



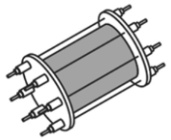
PV asset 1.5x bigger than EL

PV asset 2x bigger than EL

[1] Calculations based on a 1 MW electrolyser (for Enapter: AEM Nexus 1000) coupled with a 1,5 MW & 2 MW solar PV asset in Dusseldorf. Irradiation data from National Renewable Energy Lab (NREL). Operational flexibility of average PEM competitors assumed to be 10-100% and of average ALK competitors assumed to be 40-100%.

Minimal Downtime – Optimized OPEX

Modularity for maximum ROI



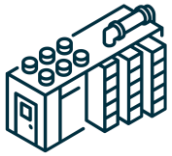
ALK / PEM

1 cell fails

Months of downtime - No H2 produced

Weeks of complex replacement

X00,000 EUR
for stack replacement
and site services



patented

1 cell fails

Plug & Play replacement
in **days**
at a fraction of the cost

99% production continues

Nexus applications

Enapter’s AEM multi-core electrolyzers

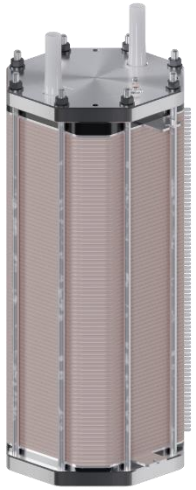
- Industrial applications
- Refueling solutions
- Grid balancing & energy storage

Next Generation AEM Stack

Enapter's consolidated AEM Technology

patented

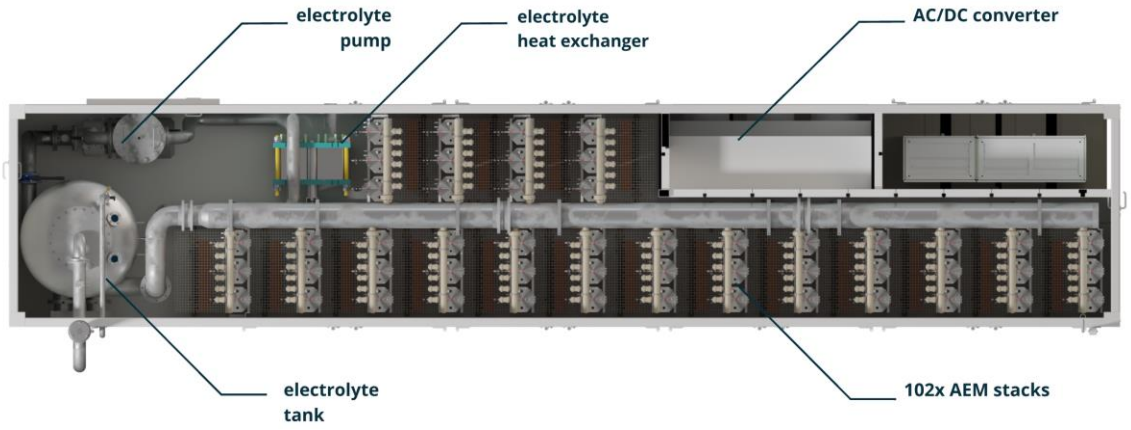
- **>10x** production rate
- Optimized current distribution
- Improved new Fluid Dynamics
- State of the Art Materials
- Designed for **automation**



Multi-core: AEM Nexus 2500

Enapter Electrolyzers

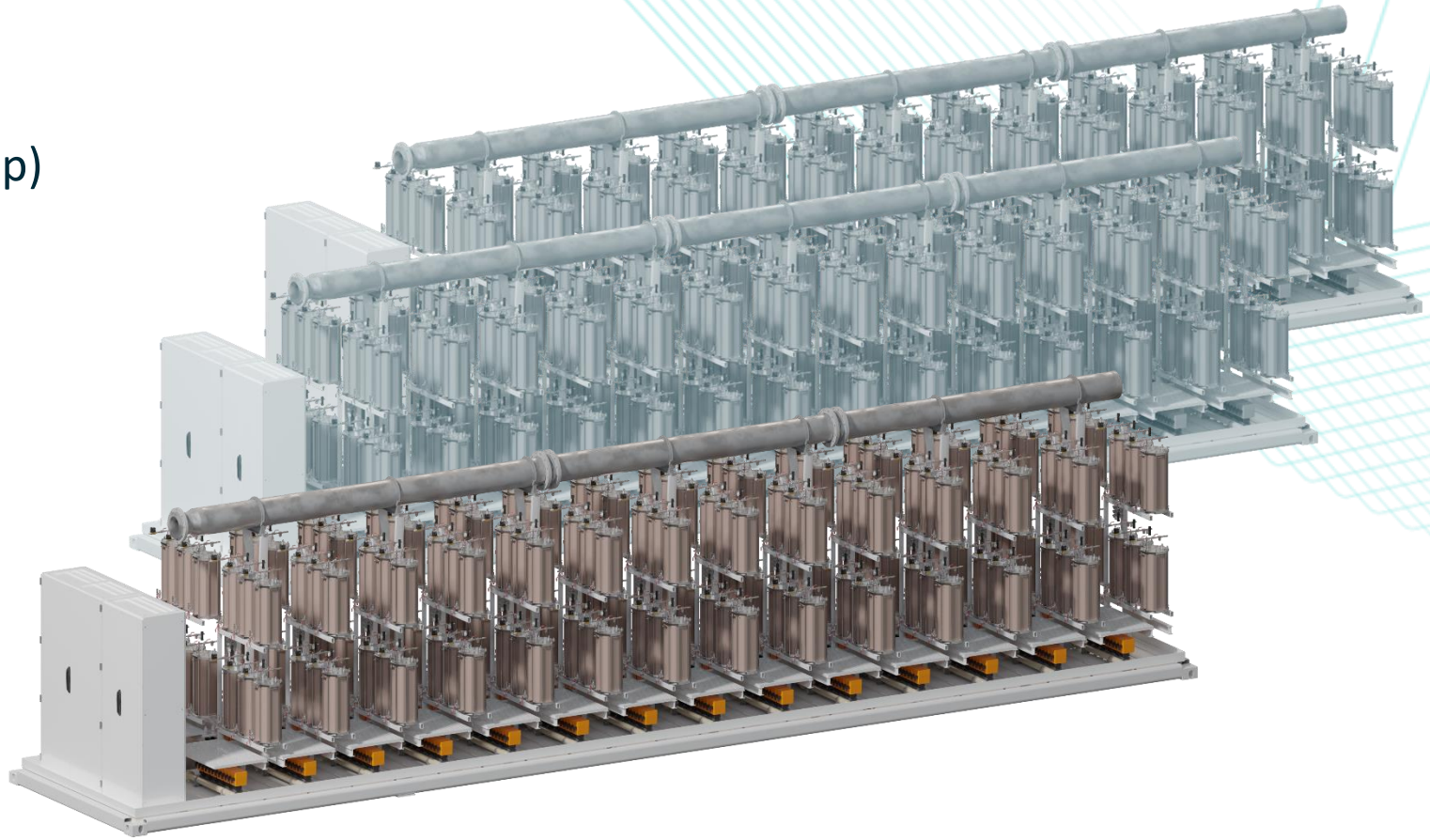
- 500 Nm^3/h
- Efficiency: **51.3 kWh/kg**
- 99.9% or 99.999% purity
- Operational flexibility: **1-100%**
- Real-time reaction to renewables
- Fully automatic operation, **AI-optimized**
- Modular & scalable



Multi-core: AEM skid systems

Enapter Electrolyzers

- Custom **skid-based** solutions
- Core BoP (centralized electrolyte loop)
- **100 MW** projects range
- Real-time reaction to renewables
- Modular & scalable



_Enapter’s electrolyzers in hydrogen projects of any size!

Decentralized hydrogen production systems

Scaling of industrial solutions

Large-scale production of hydrogen derivatives

Central production for global demand

Stack 4

10 MW

Stack T

100 MW

Hybrid applications

>1 GW

5_Product-driven innovation with AI software

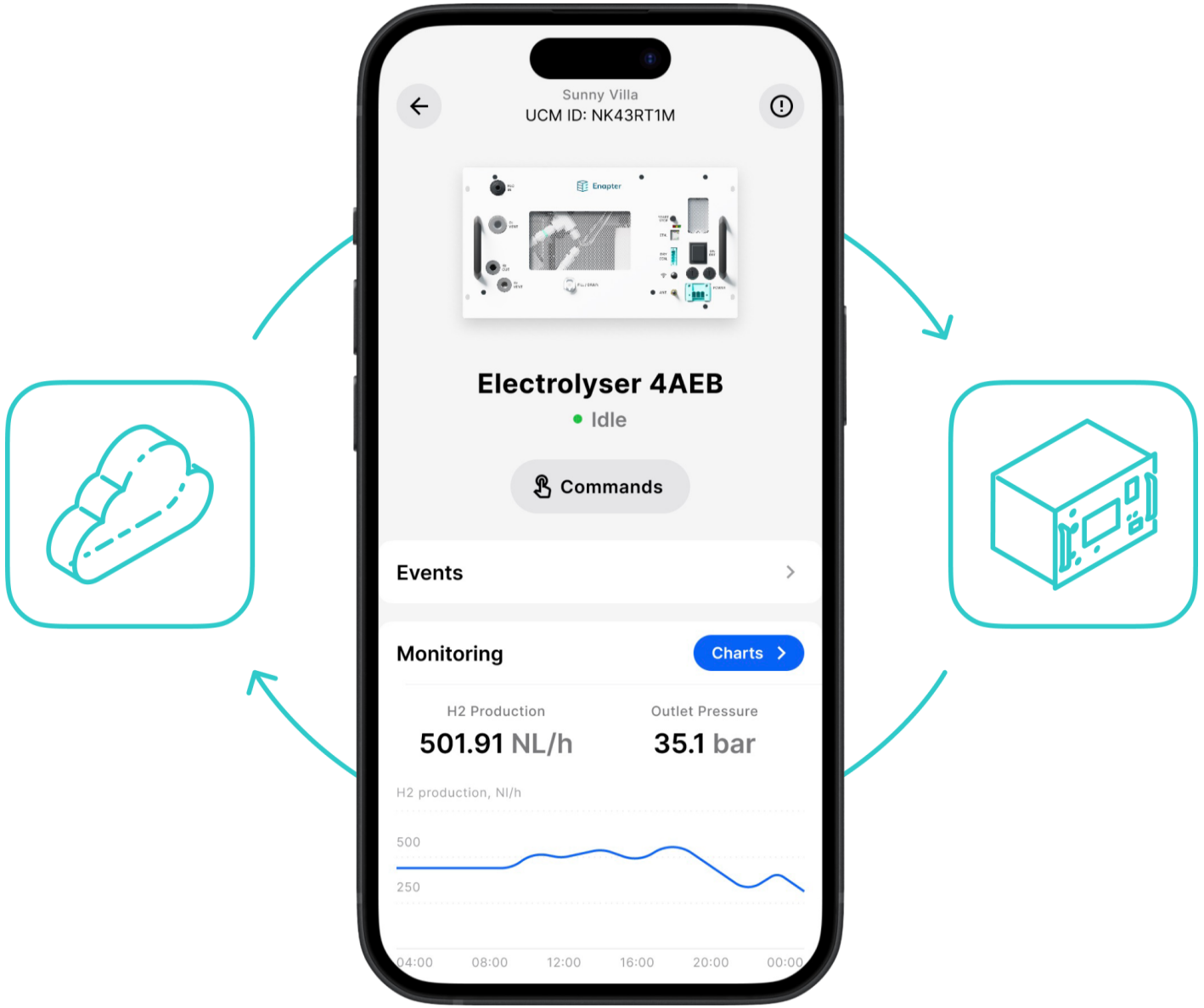
Enapter

Intelligent electrolyzer

Our foundation

Our electrolyzers are equipped with hardware and software which makes them smart:

- Powerful Cloud Dashboards
- Android and iOS Apps
- Preventive Maintenance



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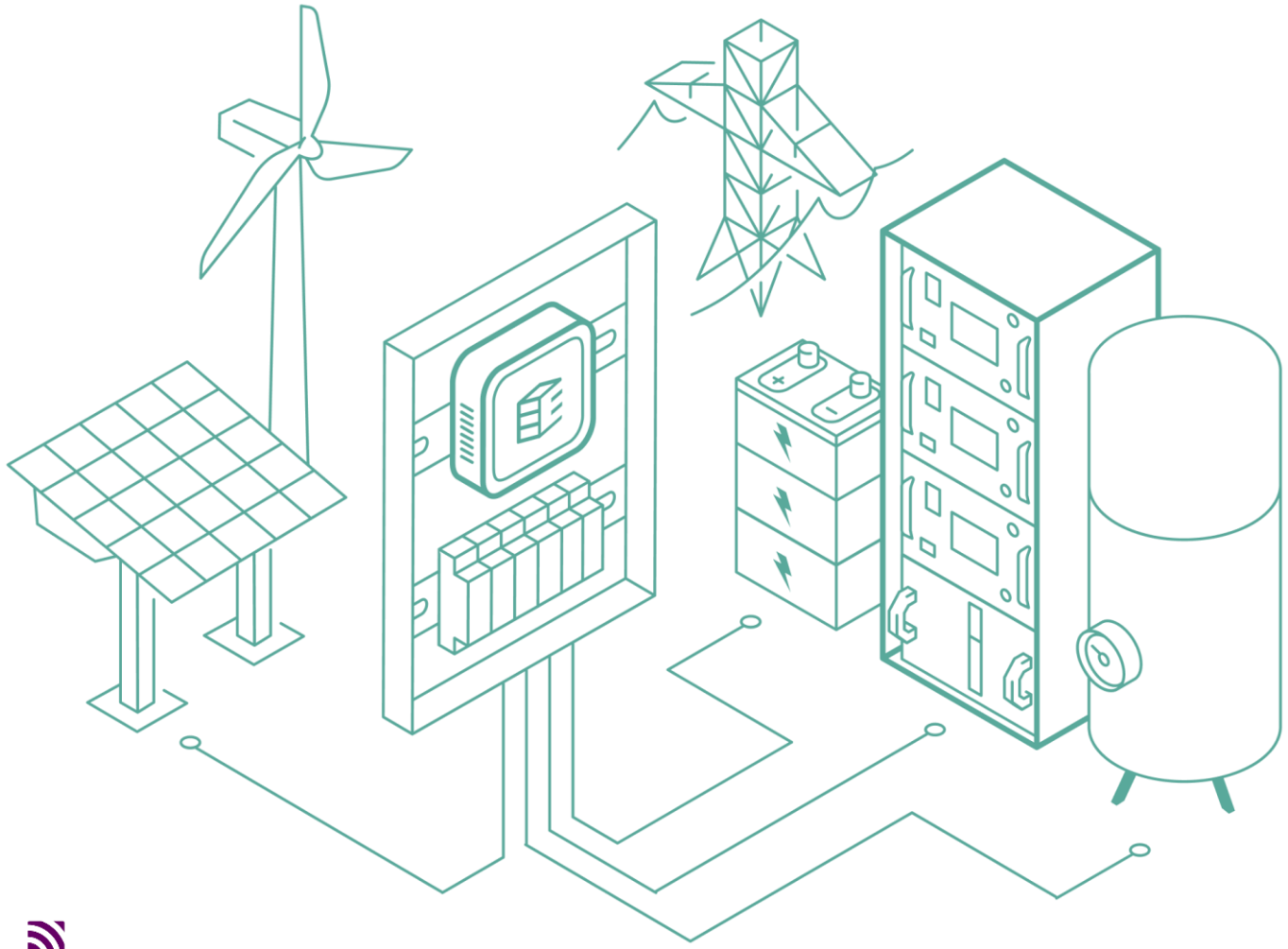
Product-driven innovation with AI software

- One Enapter Software for all devices in an energy system
- Production optimization with innovative AI software
- Based on 2.700.000 million total operating hours
- All Enapter units constantly learning from each other in various climate zones and environments

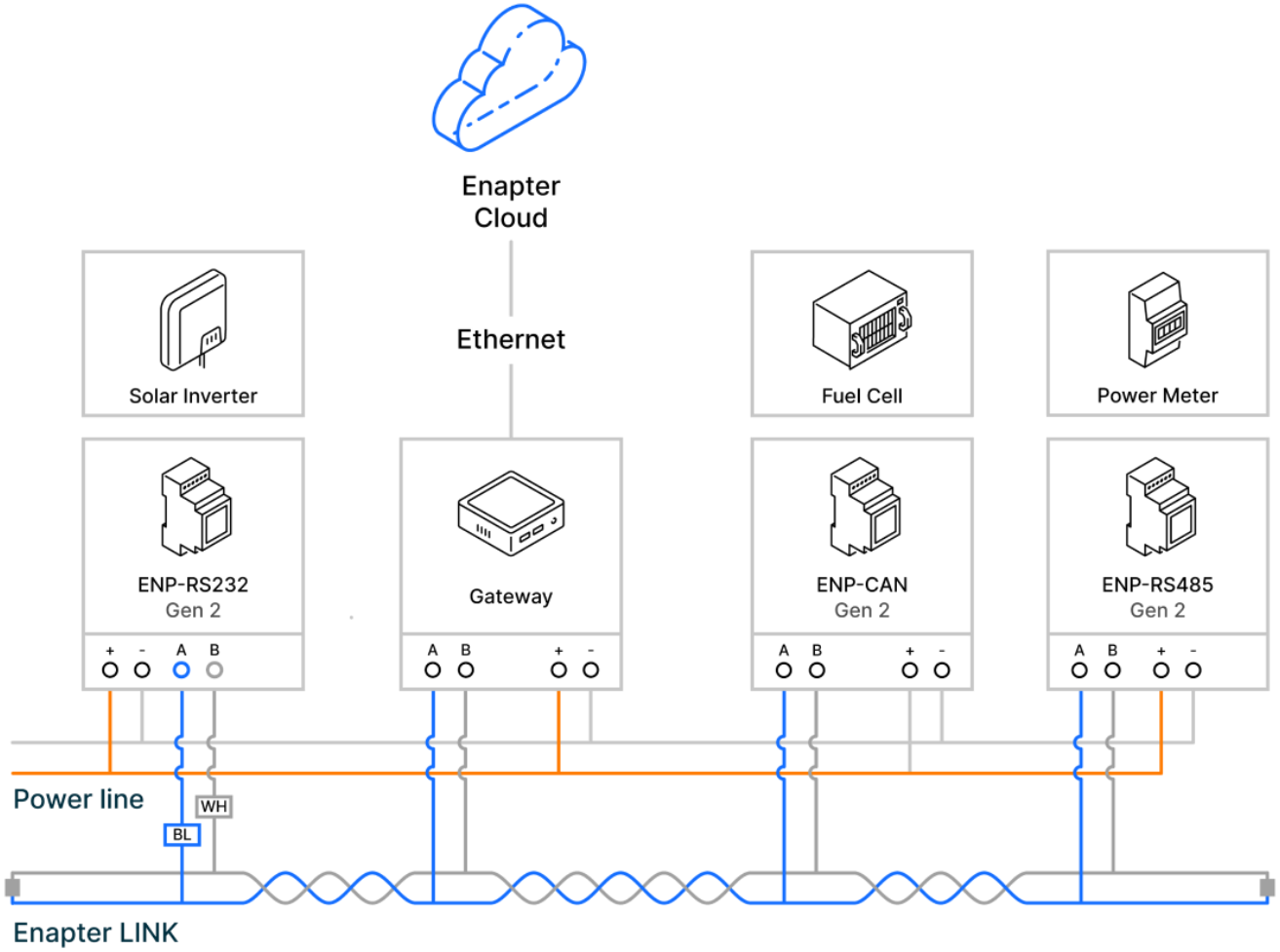


Modbus WiFi CAN LoRa OPC UA SNMPv3 MQTT

Meet the new EMS Toolkit 3.0

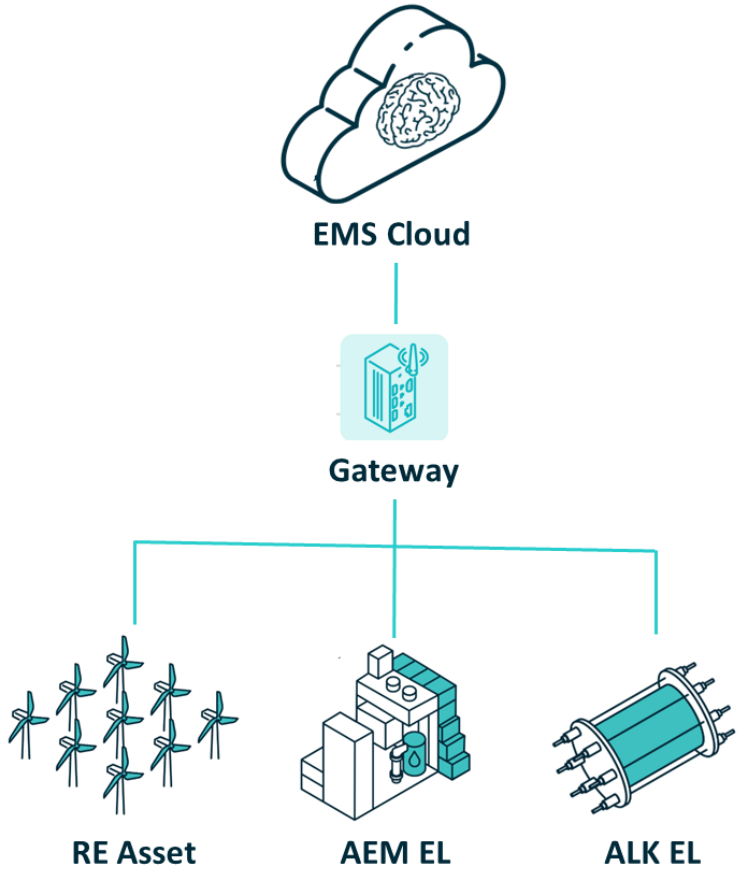
What's new?

- Industrial-ready
  Enapter LINK wired communication via UCM M2, industrial hardware and protocols support: OPC UA and MQTT
- Cybersecurity Compliance
  The system complies with the EU Cyber Resilience Act
- Local-first Architecture
  Secure and reliable energy management system based on open-source Enapter Industrial Linux



_Our AI software in action: Integrated battery energy storage and hybrid electrolysis systems

Enapter EL + Battery Energy Storage System



Enapter EL + Alkaline EL

Enapter

6_JV in China for local market and BOP manufacturing

Enapter

Wolong Enapter Hydrogen Technologies Co., Ltd

- BoP Manufacturing
- Shaoxing, Zhejiang, China

Wolong Enapter JV

Wolong New Energy Group
SH600173

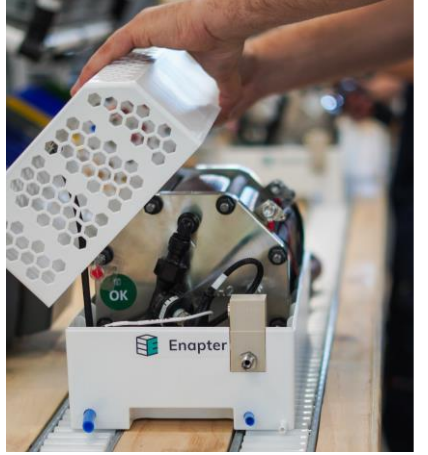
Enapter AG
H2O.FRA

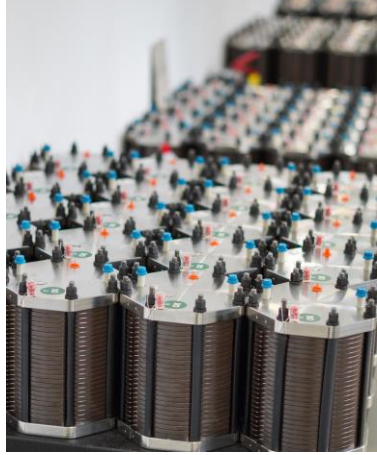
51%

49%

Wolong Enapter (Zhejiang) Hydrogen Technologies Co., Ltd.

- Exclusive Enapter partner in the Chinese market
- Supplier of Enapter for containerized BOP
- Engineering and turn-key integration for hydrogen plants
- Custom products/solutions for local market

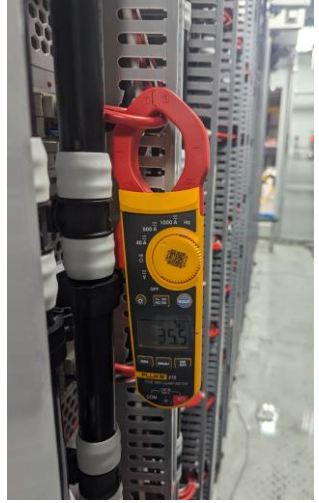


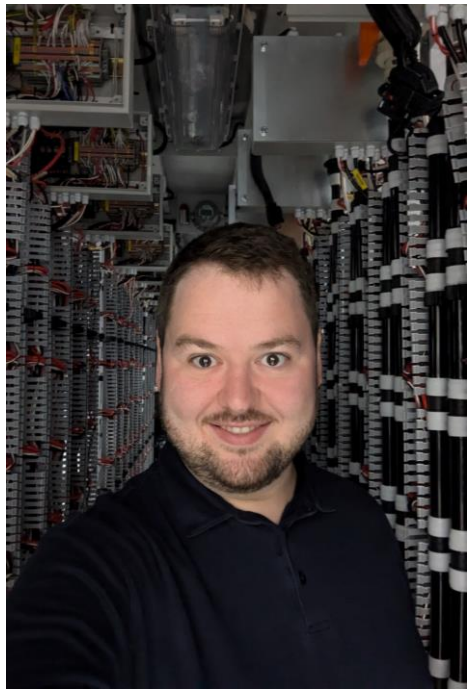


WOLONG Enapter

AEM Nexus BOP Phase 1

- March’24: 3-week workshop in Europe
- Phase 1: 6 month project to redesign the Nexus BOP and build prototype (main tasks: mechanical redesign to fit standard 40ft container, new supply chain)
- October’24: Presentation of first 1MW prototype





WOLONG Enapter

Inauguration of first AEM Nexus made by Wolong Enapter in China

WOLONG Enapter

AEM Nexus BOP Phase 2

- Phase 2: 6 month period for validation of prototype and set up of pre-series production
- May’25: Start of production of Nexus BOP for Enapter
- July’25: Shipment of first Nexus BOP to Germany
- Now: Certifications for different regions, standard product versions and options, production ramp up

Key Takeaway

Enapter – a reliable partner

Commercial leader in AEM technology

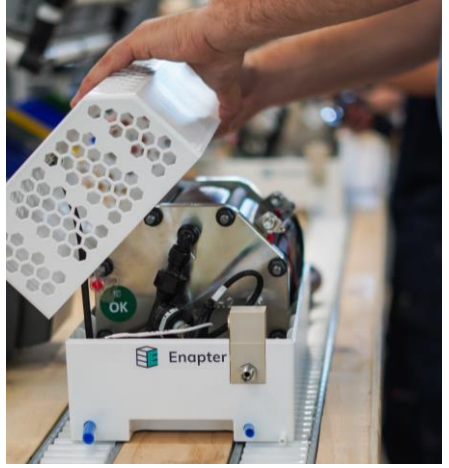
Design Principles: **modularity and redundancy**

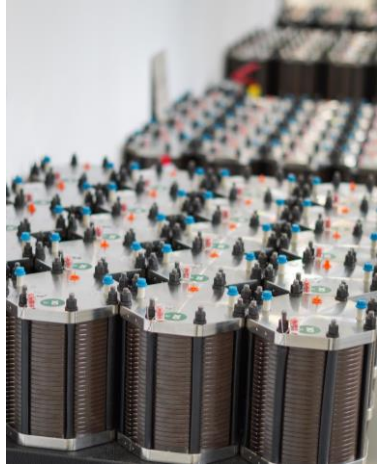
Thousands delivered, millions of operational data

An **AI software** for all devices in your energy system

Stack T and AEM Nexus 2500 – our next generation

Enapter can participate in **hydrogen projects of any size**





Smart.
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Scalable.

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www.enapter.com

Enapter

Presentation

Sem van der Linden
Project manager Energy OostNL

& Patrick Cnubben
Co-founder DEMO

Hydrogen Development East Netherlands

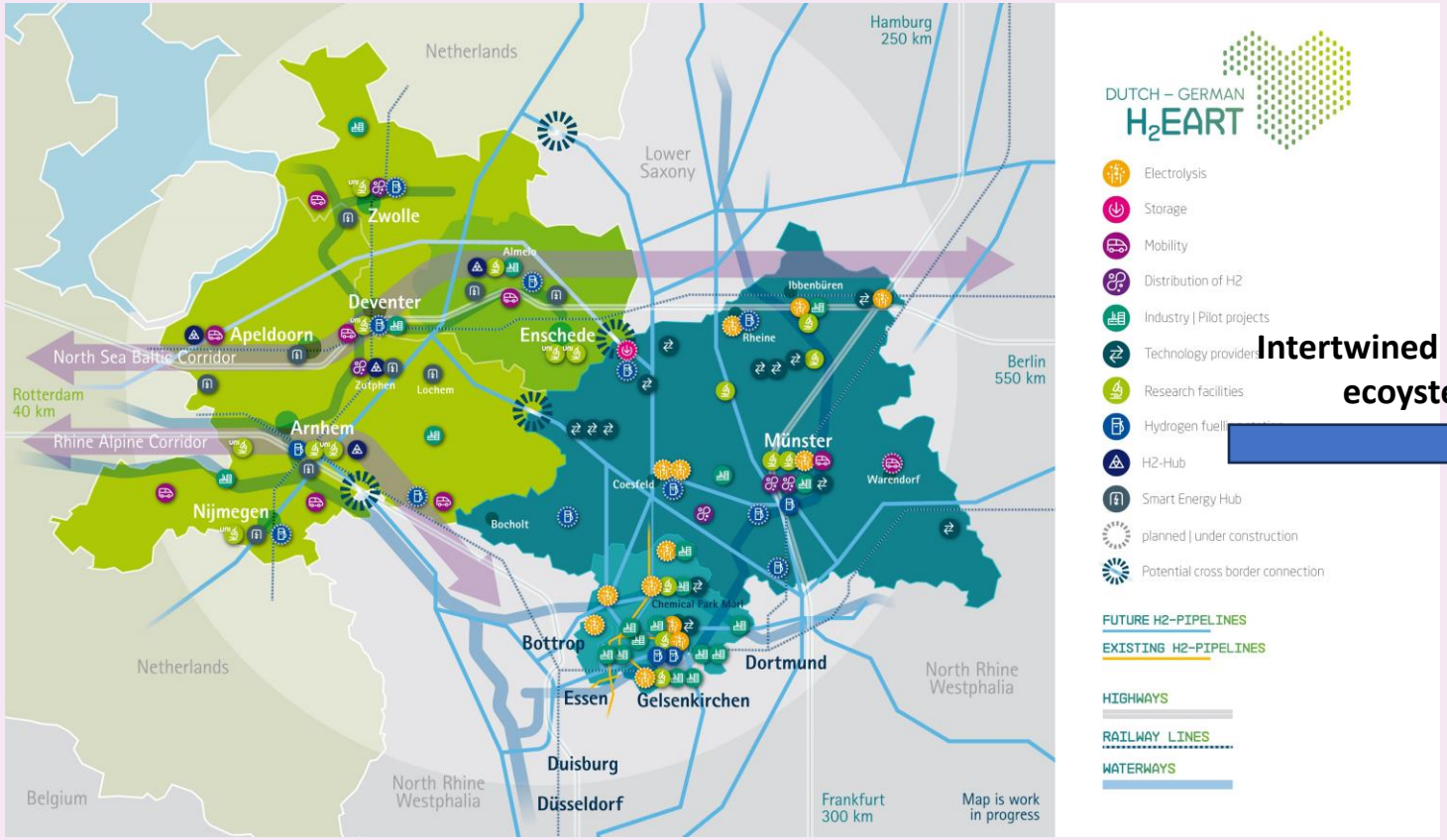
Sem van der Linden (Oost NL)

Patrick Cnubben (DEMO)

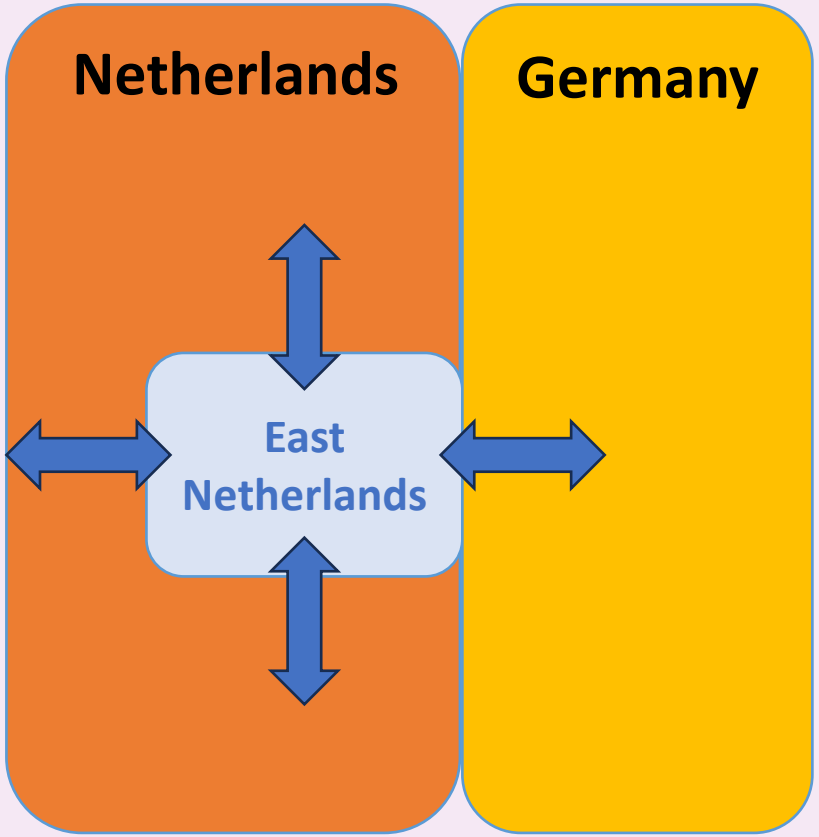
th!nk East NL

02-10-2025

Cross border European Hydrogen Ecoystem



Intertwined hydrogen ecoystems



Hydrogen Ecoystem East Netherlands

SME innovations

Fieldlabs: H2 Hub Twente & HAN H2 LAB

SME examples: XINTC, Nedstack, HyGear, Hyet, Powerspex & Boessenkool

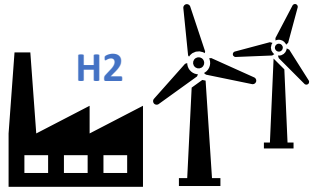
Business support organisation

Human capital

Saxion, HAN, Universtiy Twente, Radboud University, ROC

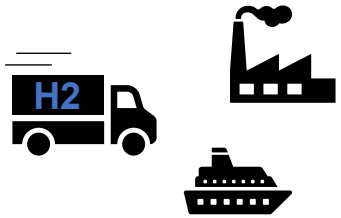
Decentralised Hydrogen hubs

Production



Infrastructure

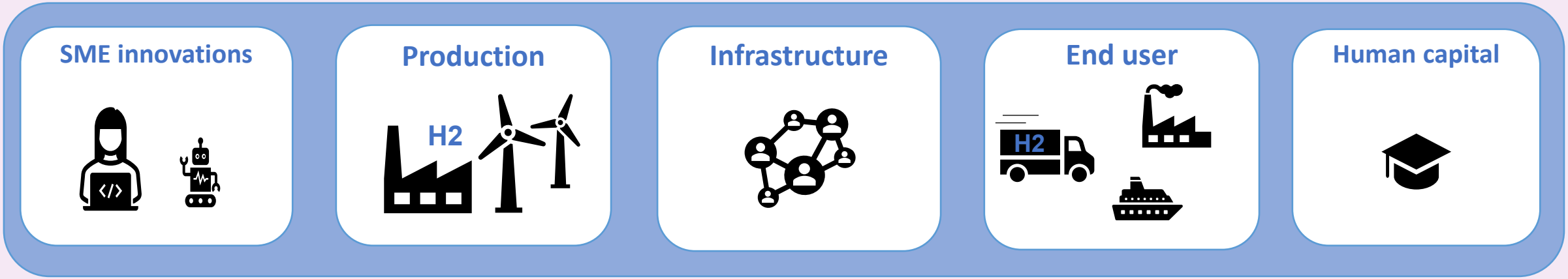
End user



- Harselaar, Barneveld
- Kavegas, Ederveen
- Crematoria Twente
- Steenwijk
- Kootwijker broek
- GROHW, Deventer
- Vriezeveen
- Windpark, Den Tol

Hydrogen Backbone development Netherlands & Germany

Hydrogen Value chain Support (impression)



EU

- Hydrogen valley proposal H2EART (in evaluation)
- Interreg A proposal H2B (in evaluation)
- Interreg A project BOOST
- Horizon project IS2H4C

National

- OWE subsidy: Steenwijk, Zutphen, Gendringen, Deventer
- Groenvermogen Learning Communities (in evaluation)
- Sprong project decentralised hydrogen systems

Regional

- EFRO: GROHW (Deventer)
- Oost NL: i.e. XINTC
- Gelders Climate Fund: i.e. Fountain Fuel

Coffee break

Start again at 11:00 here

Presentation

David Bolsman

Senior Advisor Hydrogen Policy RVO

Keynote talk
Hydrogen: governmental perspective

David Bolsman, Senior Advisor Hydrogen Policy, Netherlands Enterprise Agency (Min Economic Affairs / Min Climate & Green Growth) – Euregional H2 Business Event @ H2Hub Twente 2025 – 2 October 2025

This presentation

1 Policy & import strategy

2 Hydrogen carriers

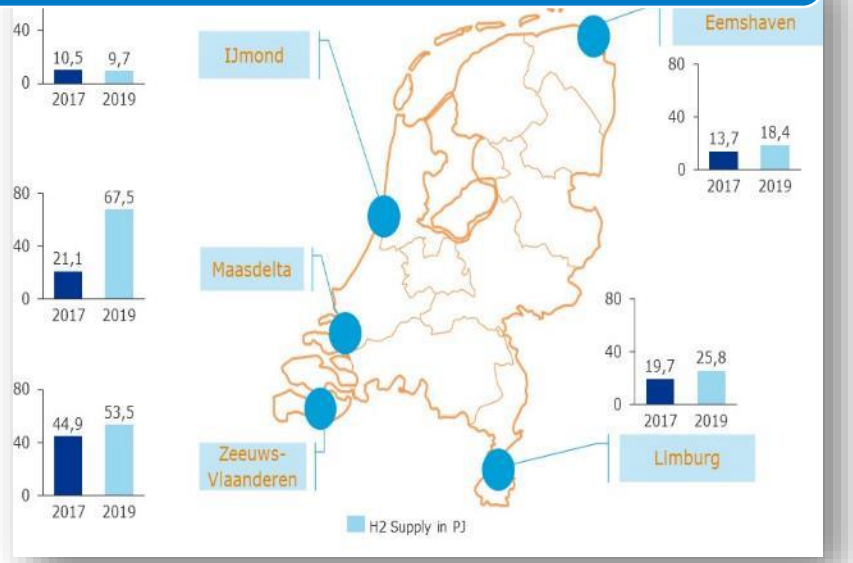
3 Hydrogen hubs

Ministerie van Klimaat en
Groene Groei

Policy and the H2 import strategy

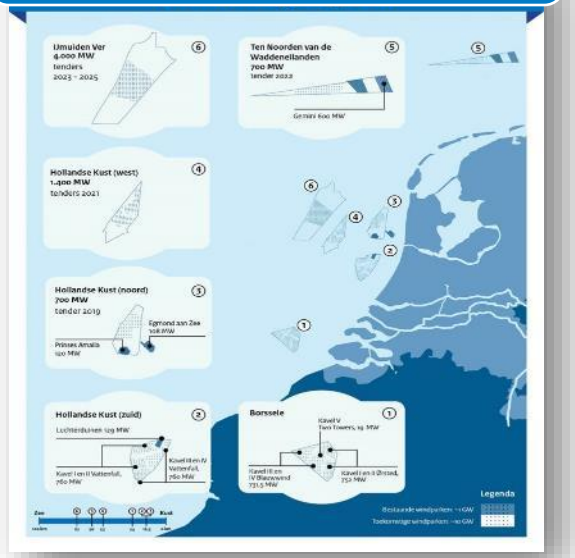
Drivers for hydrogen in the Netherlands

1. DECARBONISING INDUSTRY AND TRANSPORT



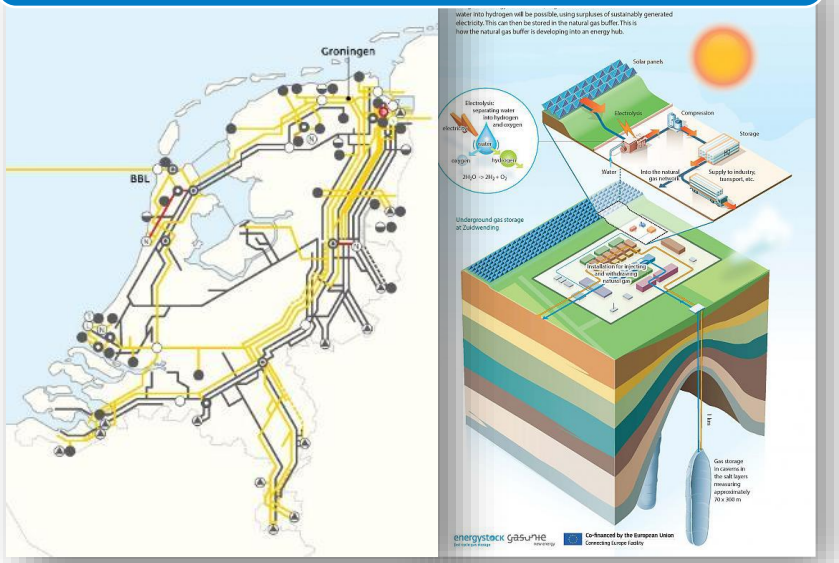
- Large existing grey hydrogen production and usage in industry.
-Large potential in shipping, aviation and heavy duty (road)

2. LARGE OFFSHORE WIND POTENTIAL



- ~20 GW by 2030;
- 30-40 GW by 2040 offshore wind at the North Sea

3. EXISTING GAS INFRA AND KNOWLEDGE



- Shutting down natural gas production in Groningen
- Great potential for large-scale storage of H_2

Policy Package with focus on 5 pillars

1 Infrastructure

- Objective: develop needed infrastructure to connect supply and demand
- Budget: ~€1,3 bln
- Scope:
  - Onshore & offshore pipelines
  - Import facilities
  - Storage locations
  - Market regulation and implementation EU regulatory framework

2 Production

- Objective: ramp-up national production capacity
- Budget: ~€6,7 bln
- Scope:
  - Onshore: project pipeline of 3-4 GW. (±1 GW in 2030)
  - Offshore: Consortium to develop first pilot
- Support Instruments: SDE++, IPCEI and OWE

3 Import

- Objective: diversify supply of hydrogen and position NL as hydrogen hub and entrance to NW EU H2 market
- Budget: €300 mln
- Three pillars policy scope: 1) intra-EU corridors; 2) Multilateral collaboration; and 3) non-EU corridors
- Energy diplomacy : hydrogen missions, B2B matchmaking, royal working visits, and more

4 Demand

- Objective: Stimulate hydrogen offtake through subsidies and obligations
- Budget: ~€660 mln

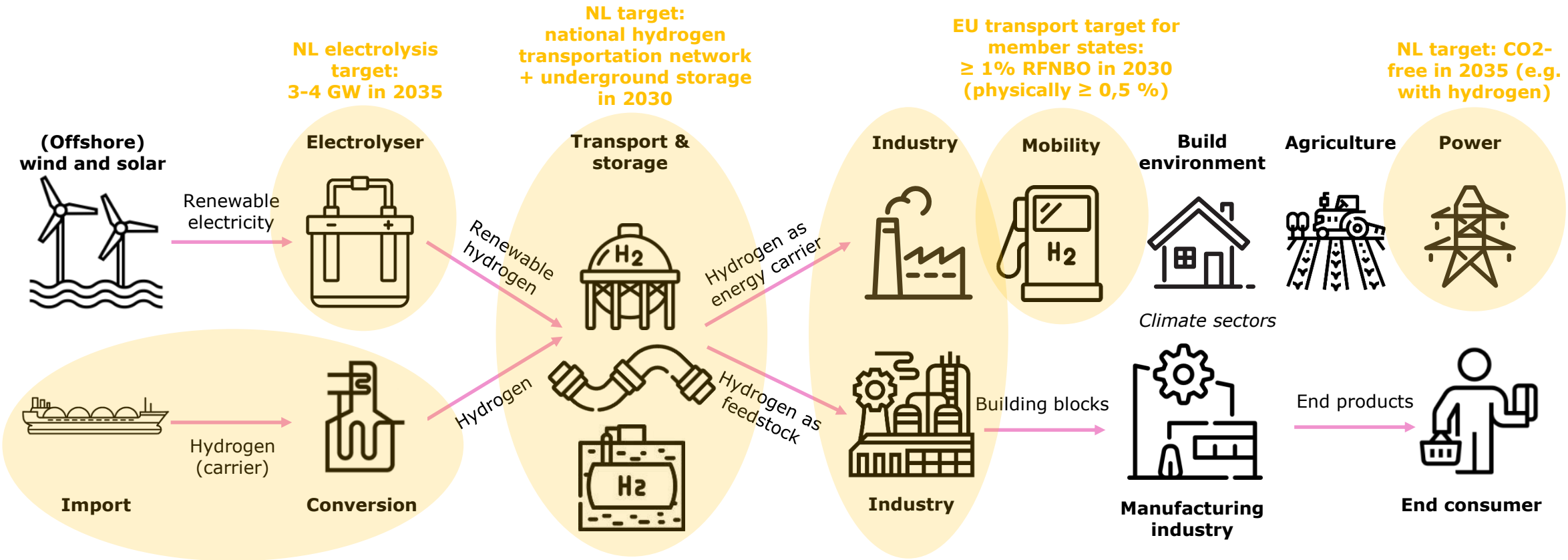
Per sector:

- EU target of 42% RFNBO in industry in 2030
- Transport sector: >1% RFNBO in 2030.
- Electricity sector: CO2 neutral power plants
- Pilots in agricultural and residential sectors

5 Facilitating Conditions

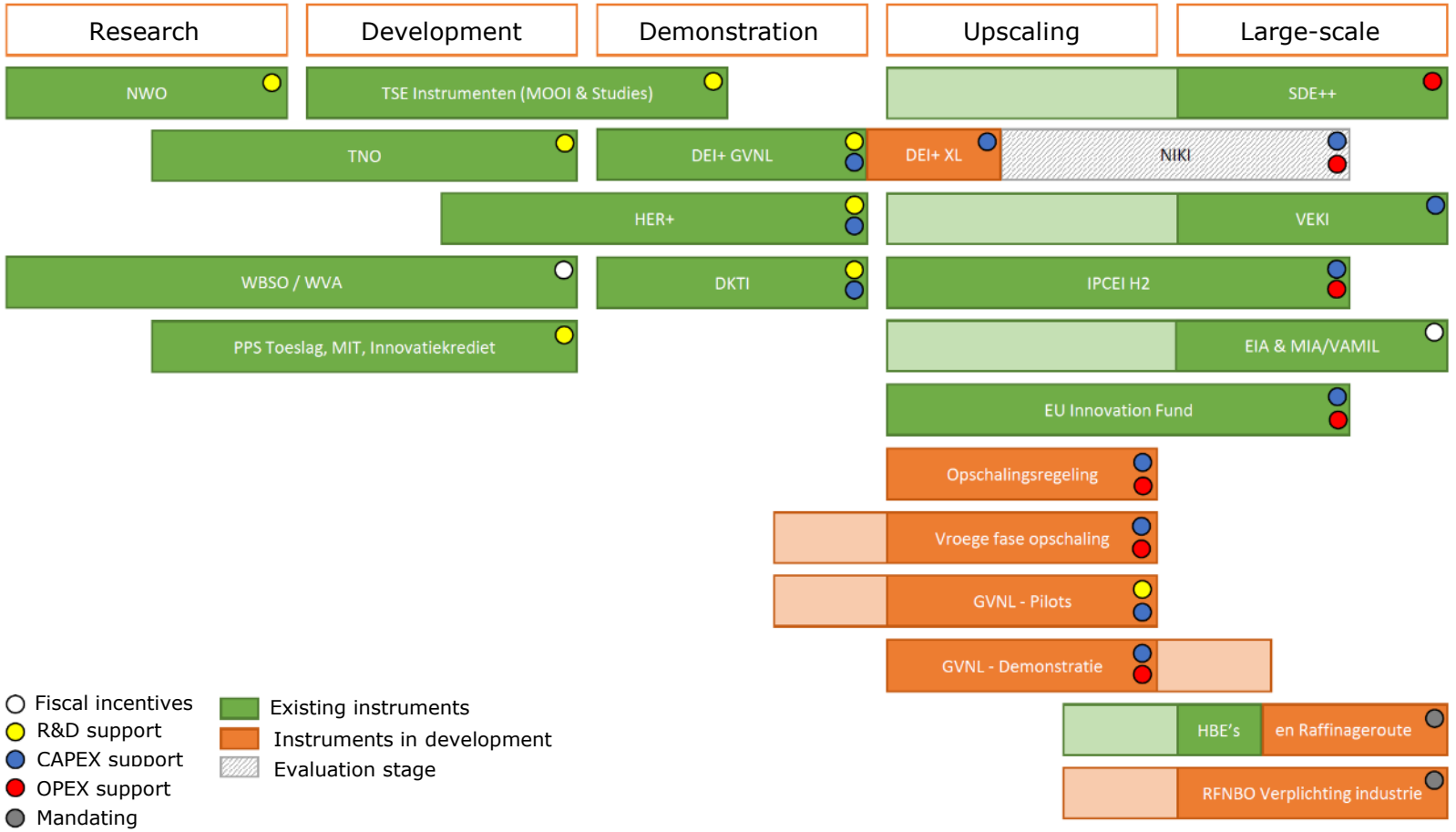
- Offshore wind park development
- Spatial planning (PEH)
- Prioritizing projects of national interest (MIEK)
- Permits (RCR)
- Safety guidelines for hydrogen applications and hydrogen carriers
- Proactive role in EU policy
- Knowledge sharing and dissemination via NWP

Visualisation hydrogen chain and hydrogen targets



NOTE This is a strongly simplified visualisation

Generic and specific instruments for hydrogen: from TRL 1 to TRL 9



Generic instruments can also be used for CCS and CCU related projects, e.g. to store or utilise captured CO_2 from hydrogen production based on natural gas

International Cooperation and Import Strategy

Focus:

1) **Creating a European market** (RED, decarbonization package, regulation on import terminals); *providing certainty on infrastructure, certification & regulation.* **Shared approach** *with Germany (H2Global) and Belgium (EU policy and bilateral).*
2) **Government vision on hydrogen carriers**
3) **Multilateral collaboration** (i.e. IPHE, CEM, IEA H2TCP)
4) **Energy diplomacy focused on security of supply (diversification)** *by establishing cooperation with multiple exporting countries, like Canada*
5) **Learning from first import projects (IPCEI):** *what is needed in terms of regulations and infrastructure.*

Bilateral

- NL has ± 20 formal bilateral collaborations on hydrogen
- Working on MoUs with Brazil, UK and Egypt

Multilateral

Hydrogen TCP · IPHE International Partnership for Hydrogen and Fuel Cells in the Economy · HYDROGEN INITIATIVE AN INITIATIVE OF THE CLEAN ENERGY MINISTERIAL · PENTA Pentalateral Energy Forum · CLEAN HYDROGEN MISSION · BREAKTHROUGH AGENDA

World Hydrogen Summit Rotterdam – May 2024

2nd Roundtable of the International Hydrogen Trade forum – May 2024

Import studies for RFNBO requirements

- Imported Hydrogen will need to meet requirements of REDII/III and Delegated Regulations
- Non-EU systems and schemes are not the same
- How can producers in exporting countries meet the EU requirements for RFNBO?

Hinicio

Ministry of Economic Affairs and Climate Policy of the Netherlands

FICHTNER

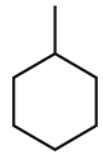
Australian Government
Department of Climate Change, Energy, the Environment and Water

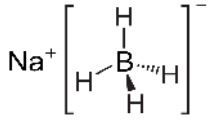
Federal Ministry for Economic Affairs and Climate Action

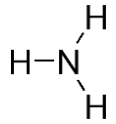
Ministry of Economic Affairs and Climate Policy of the Netherlands

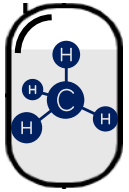
WORLD HYDROGEN 2024 SUMMIT & EXHIBITION

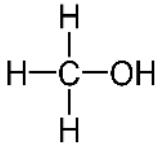
ASIA-PACIFIC HYDROGEN 2024 SUMMIT & EXHIBITION
12 - 13 SEPTEMBER 2024
BRISBANE CONVENTION & EXHIBITION CENTRE

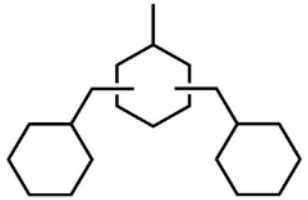










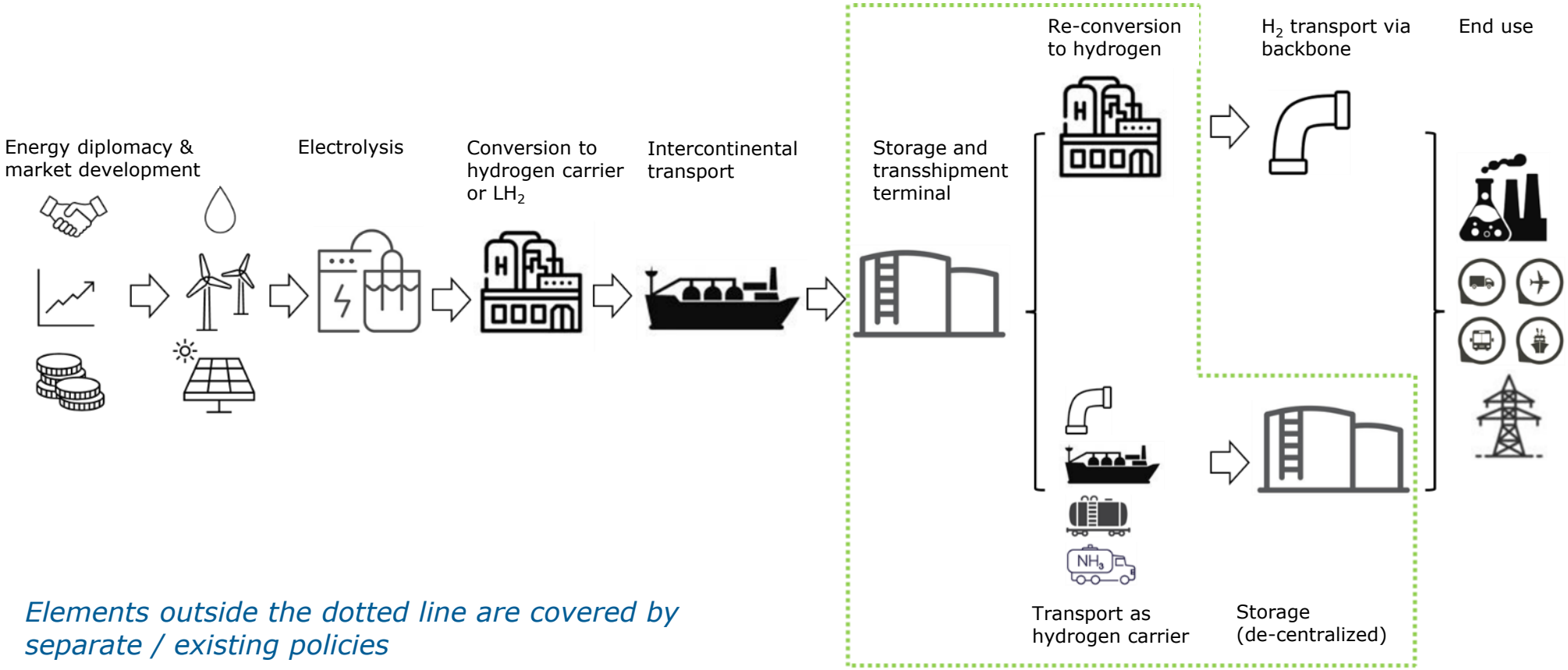


Ministerie van Klimaat en Groene Groei

NL Government vision on Hydrogen carriers

Based on multi-criteria analysis (MCA) by Stratelligence and Dwarsverband

Focus of the hydrogen carriers policy strategy



Elements outside the dotted line are covered by separate / existing policies

Seven hydrogen carriers, in two groups

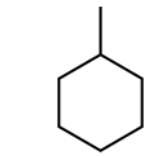
End use is hydrogen gas

1. Liquid hydrogen (LH2)
2. Ammonia
3. Methanol
4. Liquid Synthetic Methane (LSM)
5. Methylcyclohexaan (MCH – een LOHC)
6. (Perhydro)Dibenzyltolueen (DBT - een LOHC)
7. Sodiumborohydride

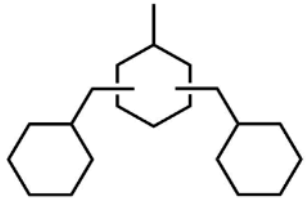
End use is hydrogen carrier

1. Liquid hydrogen (LH2)
2. Ammonia
3. Methanol
4. (Liquid) Synthetic Methane (LSM)

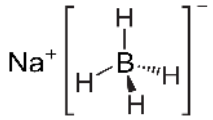
[LOHC = Liquid organic hydrogen carrier]



Methylcyclo-hexaan (MCH)



(perhydro)Dibenzyltolueen (DBT)

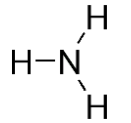


Sodiumboro-hydride ($NaBH_4$)

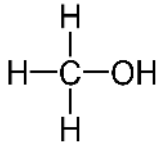
Hydrogen carrier (only)

Hydrogen carrier as fuel/feedstock

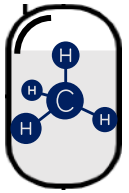
Liquid hydrogen (LH_2)



Ammonia (NH_3)

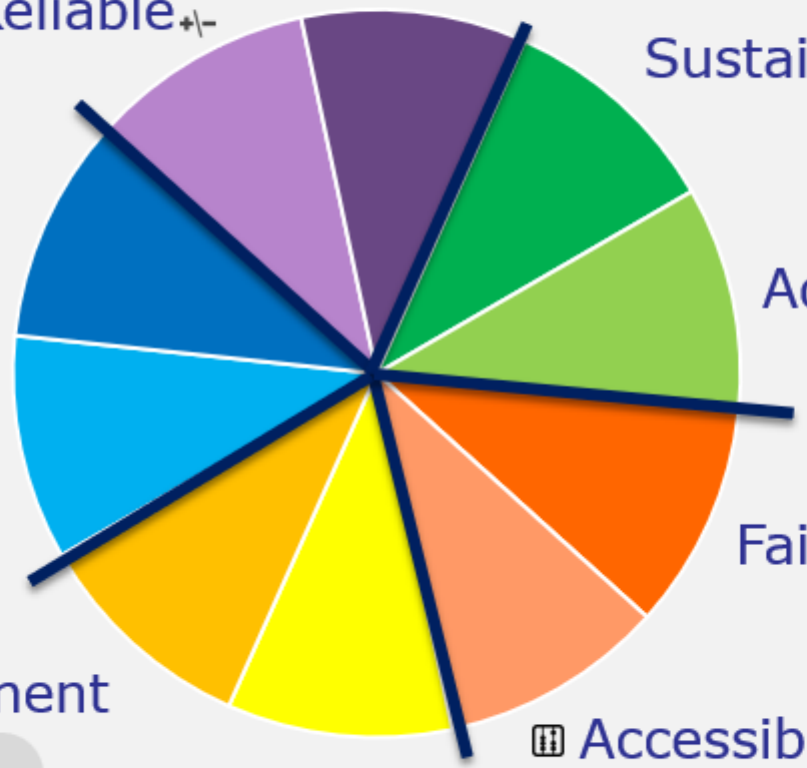


Methanol (MeOH)



Liquid synthetic methane (LSM)

Public interests from the Dutch national energy system plan supplemented with adaptability



Safe & Secure +\-

1) Environmental safety +\-
2) Cybersecurity and terrorism +\-
3) Transport safety

Robustness and security of supply of carrier and supply chain

Reliable +\-

Sustainable

1) Greenhouse gas emissions (CO_2, CH_4, H_2)
2) Consumption of scarce non-renewable materials
3) Energy use and loss in the supply chain

Added value in the Netherlands corrected for vehicle loss hours

Economically robust

Adaptable +\-

Size of new investments and degree of reusability of investments in the event a supply chain alternative becomes obsolete

Costs per hydrogen equivalent for each supply chain (CAPEX and OPEX)

Affordable

Fair

1) Degree of shifting of external costs to producing countries
2) Degree of shifting of external costs to the Dutch society

Environment

External costs of:
- Air emissions (particulate matter, NOx, NH_3)
- Noise emissions
- Habitat damage

Accessible

1) Accessibility to hydrogen economy; same cost level hinterland
2) Accessibility to hydrogen economy; proximity to chain

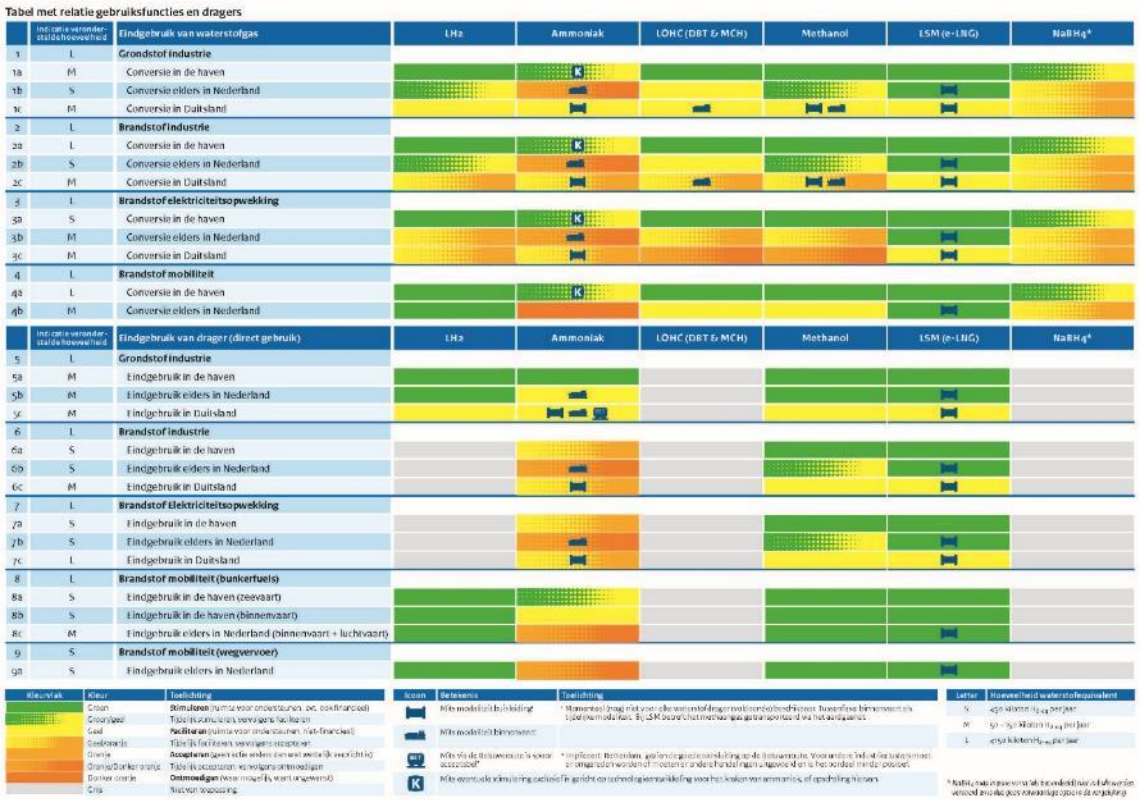
Space use

Opportunity costs of space use, above and below ground

Monetary
Quantitative
+\- Qualitative

Results MCA and conclusions government vision

RESULTS



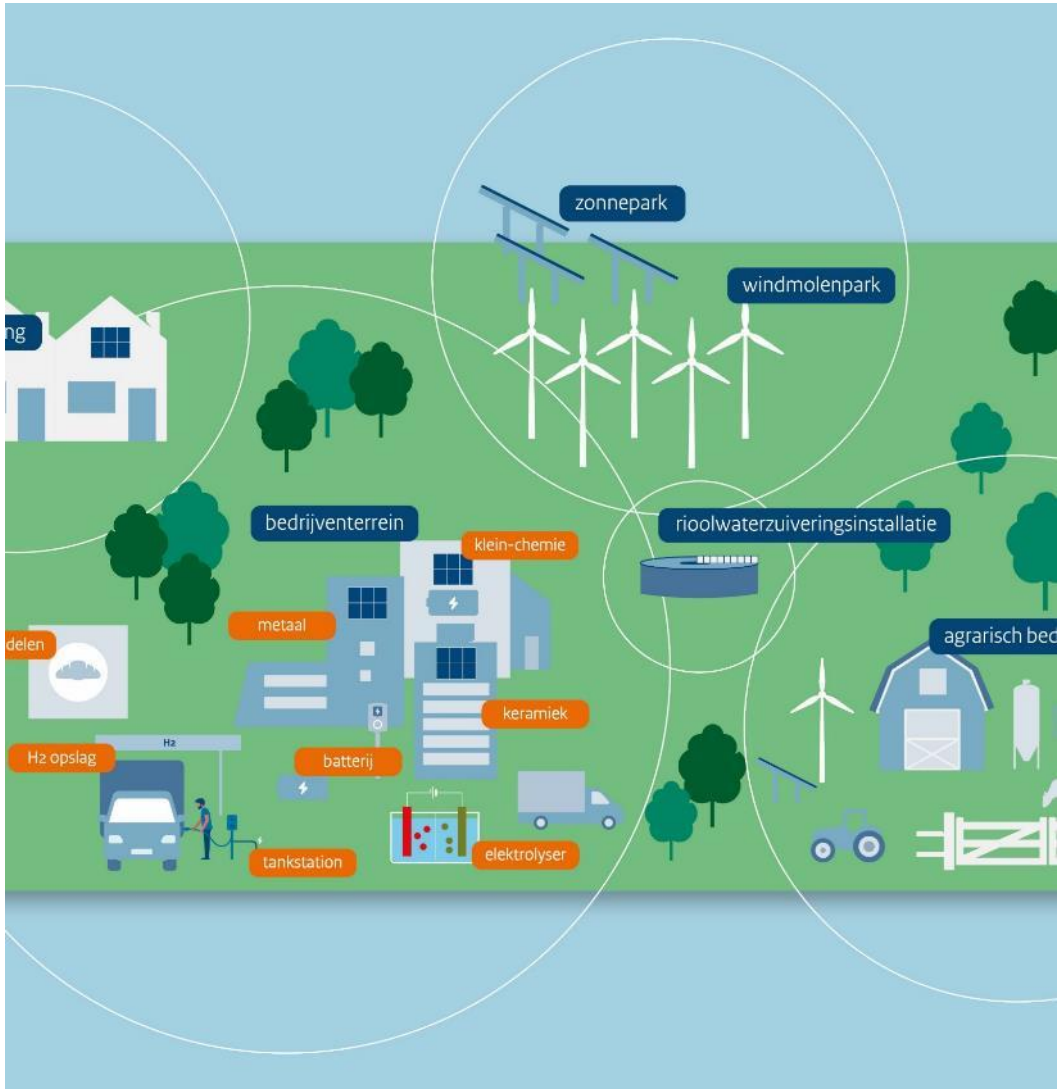
CONCLUSIONS

- **Diversification** of H2 carriers improves security of supply
- Preference for **conversion** and **end-use** in **port**
- **Preferred modalities**: 1. Pipe 2. Barge 3. Rail and 4. Road
  - Nuance based on carrier, quantity, location (accessibility) and time horizon
- Preference for **direct use** (without conversion)
- General impression:
  - **Wide range of carriers** for the energy transition receive government support, especially short/mid term.
  - **Long term**: **more distinction** between different hydrogen carriers and locations
  - **Ammonia** stands out, due to **toxic characteristics**

Energy hubs with hydrogen

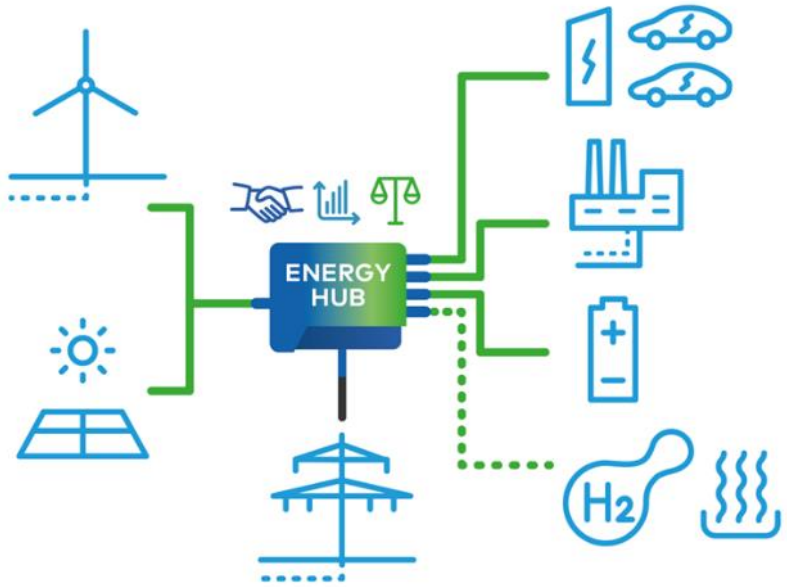
- Hydrogen hubs

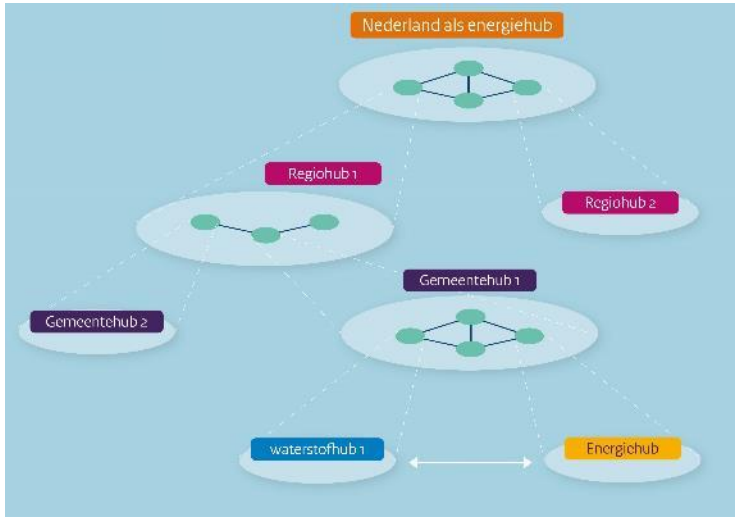
Decarbonisation of local entrepreneurs using hydrogen as part of the ecosystem



Energy hub and hydrogen hub

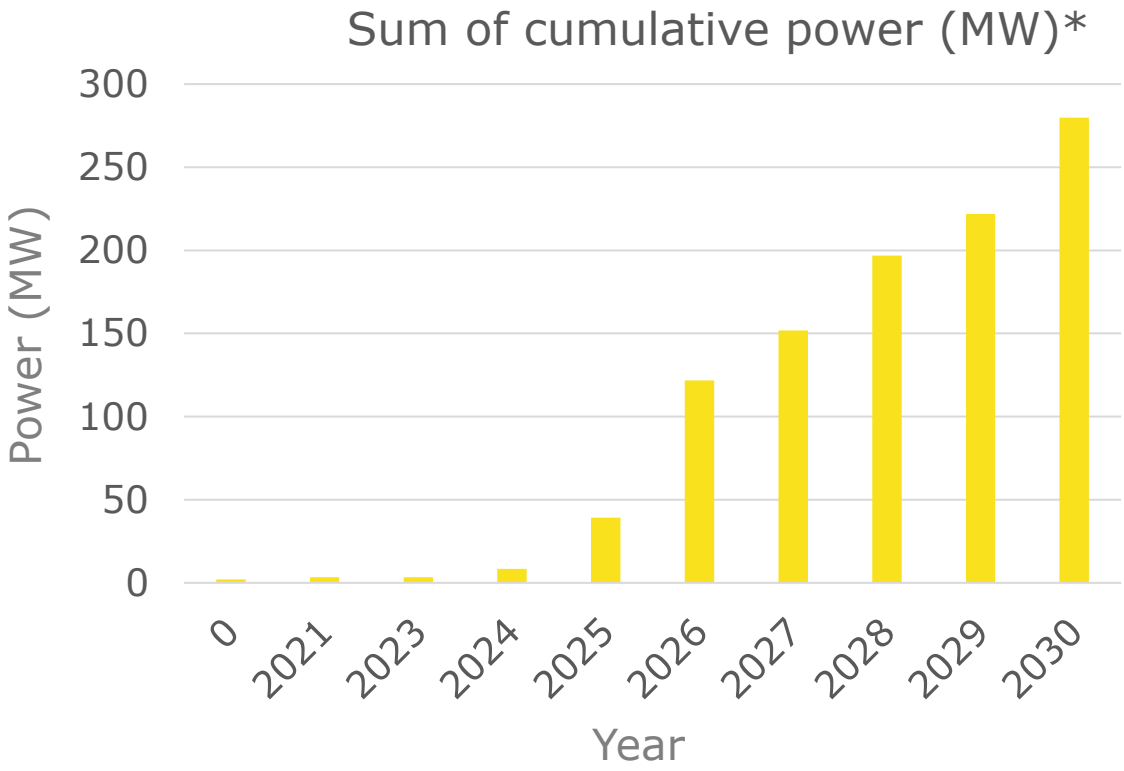
- Connects the **production**, **storage**, **conversion**, and **use** of local sustainable energy within a **specific area**.
- This makes it a local node in an **integrated energy system** *where supply and demand are well-matched*.
- Adding **hydrogen** makes an energy hub with hydrogen as a component in the ecosystem.



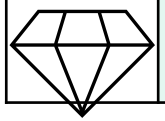


Interviews (2024)

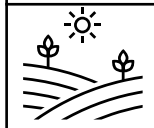
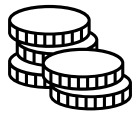
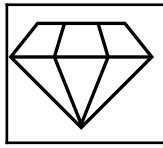
- **30+** initiatives (short list)
  - Different development phases
  - Different sectors
- ~ **300 MW** (cumulative) in **2030**
- ~ 10 % national H_2 target
- Spin off in the Netherlands:
  - 320 wastewater treatment plants
  - 3.800 business parks
  - 1200-1400 cluster 6 industry



Narrative locally

	Accelerate local sustainability drive
	Good chance of succeeding (higher certainty)
	Good economical perspectives
	Improve societal support (for energy transition)
	Utilise regional workforce and expertise
	Lower safety risks
	Future proof and scalable
	Conclusion: value for sustainability, regional economy and society

Narrative nationally

	Upscaling hydrogen market and achieve climate objectives/obligations
	Flexible and efficient energy system
	Future perspectives for the region (net congestion)
	Certainty of supply and energy independency
	Enlarge earning-potential NL
	Industry and mobility offtake targets for hydrogen (RFNBO)
	Pilots for NL make industry with international spin-off
	Conclusion: potentially high contribution national and regional targets

Benefits for SME's in NL

- Manufacturing industry:
  - start-ups have a fair chance to sell and deliver their products, e.g.:
    - Electrolysers
    - Innovative carriers for storage
    - Battery/fuel cell combo
  - Dutch and/or EU supply chain, e.g.:
    - Storage
    - BOP
    - Gas detection equipment
  - Learn together and grow together
- Local industry:
  - Chance to improve their sustainability /footprint
  - Continued business
  - Stepwise introduction to hydrogen (blending up to 20%)
  - Sustained employment
  - Share energy
    - Electricity 'behind the meter'
    - Cable pooling
    - Electricity to hydrogen
  - Innovative new models

Challenges for entrepreneurs

Process & Organization

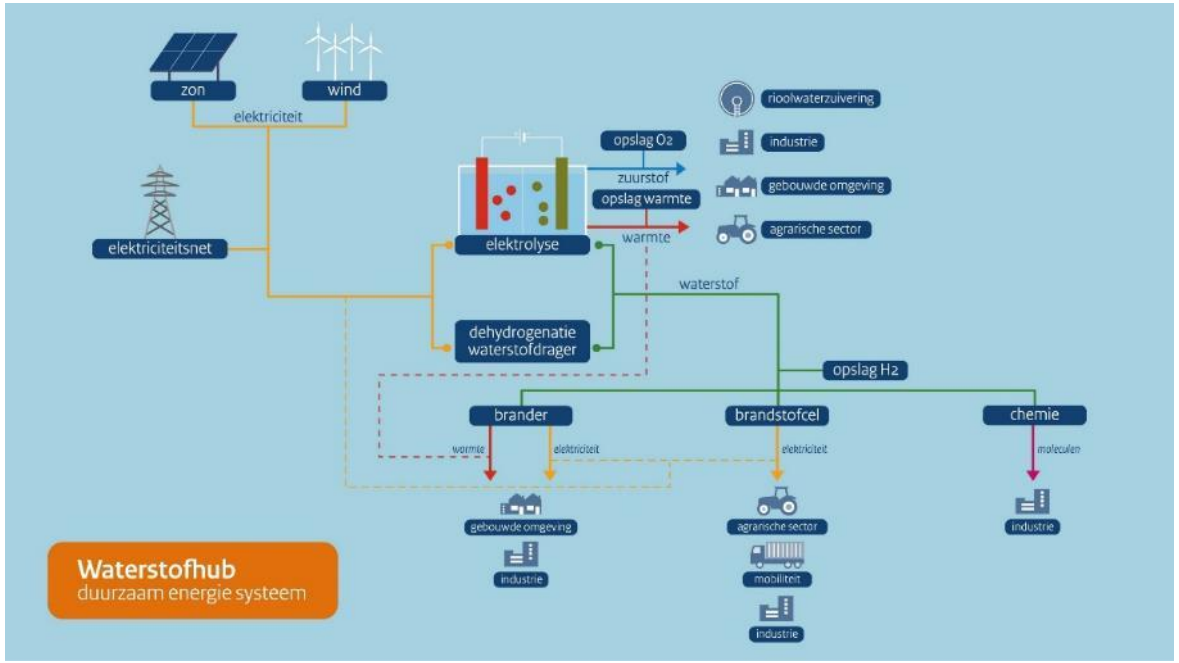
- Bringing and keeping parties together
- Ownership
- Cooperative Environment
- Hydrogen Expertise

Governance

- Subsidy part of the Value Chain
- Hydrogen is expensive
- Still limited overarching policy
- Social benefits invisible and unrewarded

System Integration

- Business case or sustainability focus?
- Infrastructure and later connection of new customers/partners
- Location (e.g., water availability)
- Energy hubs still narrow in scope: Electricity focused and only in business parks



How to proceed? What can you expect?

OWE H2 Hubs

Dedicated subsidy scheme H2 Hubs

Step-by-step plan: how to develop a H_2 hub

(affiliated with EIGEN)

Quick scan tool H_2 hubs

Technical design, business case, societal added value

Close cooperation with Energy Hubs

Guideline for small-scale hydrogen applications

Addressed to permit issuers

Expert group to support competent authorities

- Questions via waterstof@rvo.nl

Thank you

Ministerie van Klimaat en
Groene Groei

Contact

David Bolsman

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Presentation

Ahmadreza Rahbari

Director Research & Development XINTC

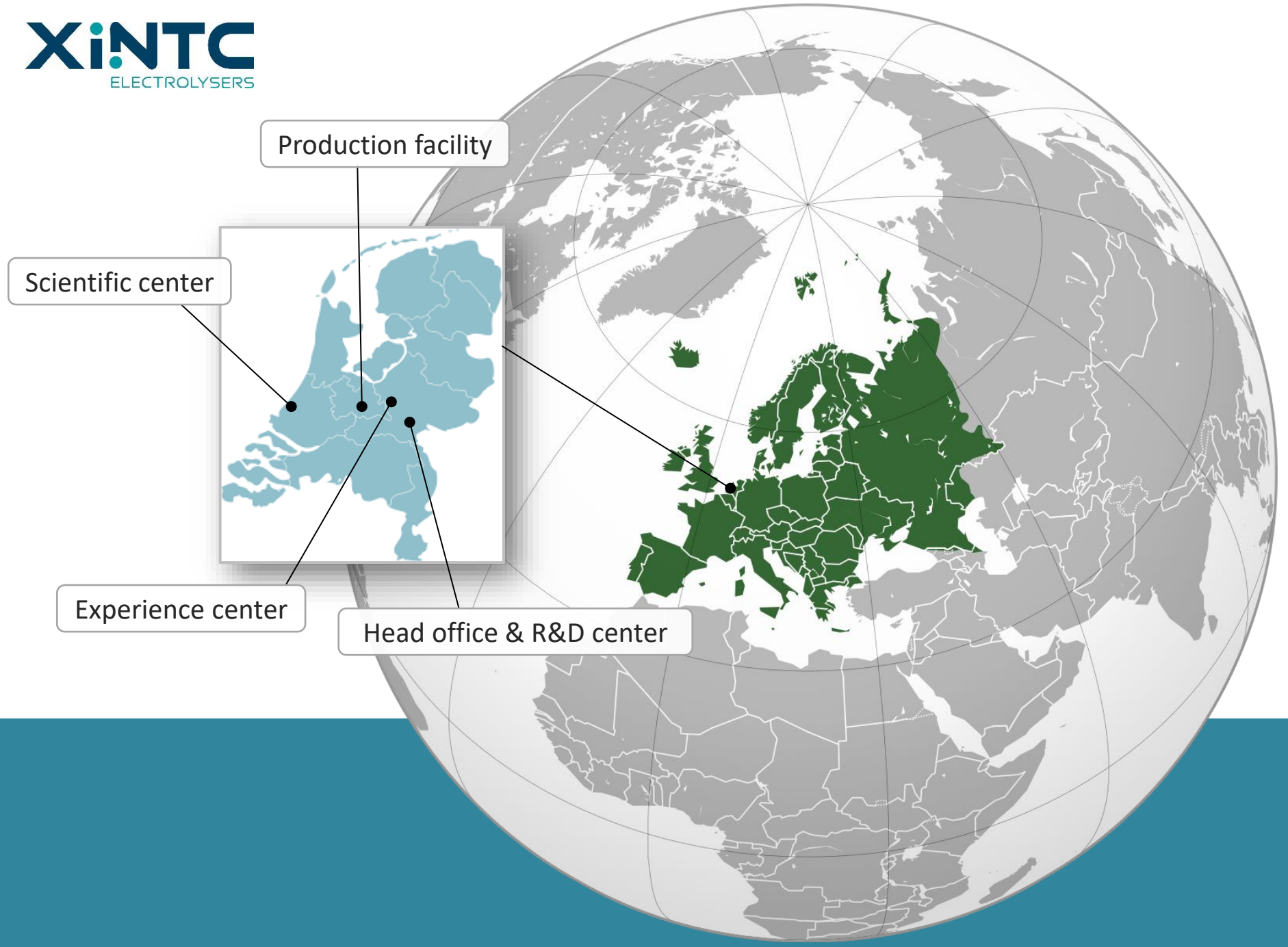
XINTC ELECTROLYSERS

www.XINTC.global

Dr. Ir. Ahmadreza Rahbari

Director of Research & Development

XiNTC
ELECTROLYSERS



XiNTC
ELECTROLYSERS

Hydrogen production anywhere, for any purpose, at the lowest possible cost

NEXT-GEN Hydrogen Production

Multi-core scalable electrolyzer systems

for the world's middle market

LARGE INDUSTRY

100+MW

MIDDLE MARKET

150kW

RESIDENTIAL MARKET

Flexible power supply: Multiple (intermitting) power sources, full dynamic operation

Scalable capacity: Thoughtfull product architecture, smooth assembly with distinct functional units

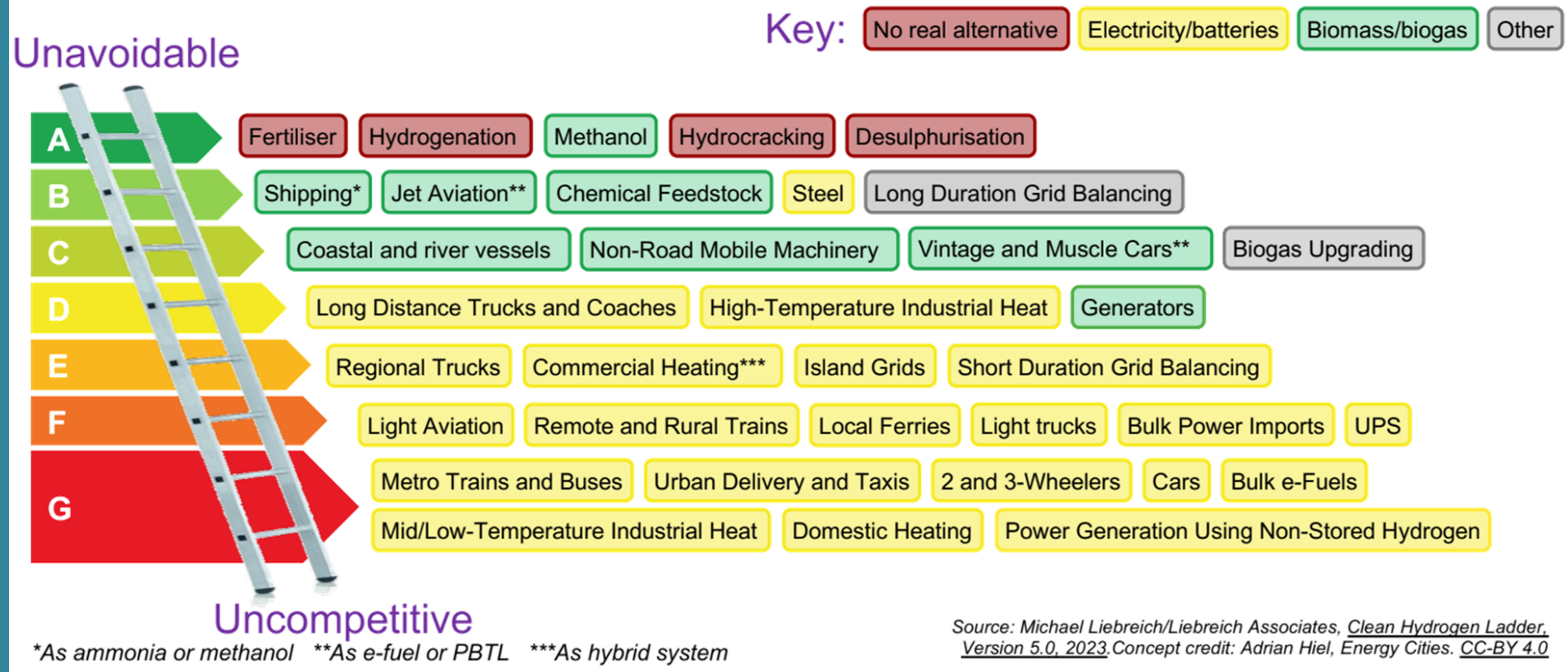
Low maintenance: Little wear parts, long running time components, automated process control, no critical materials

Flexible use: Numerous application, varying hydrogen quality and output pressure

Smart electronics: Both individually and collectively controlled electrolyser modules, high system security

MIDDLE MARKET

XiNTC ELECTROLYSERS

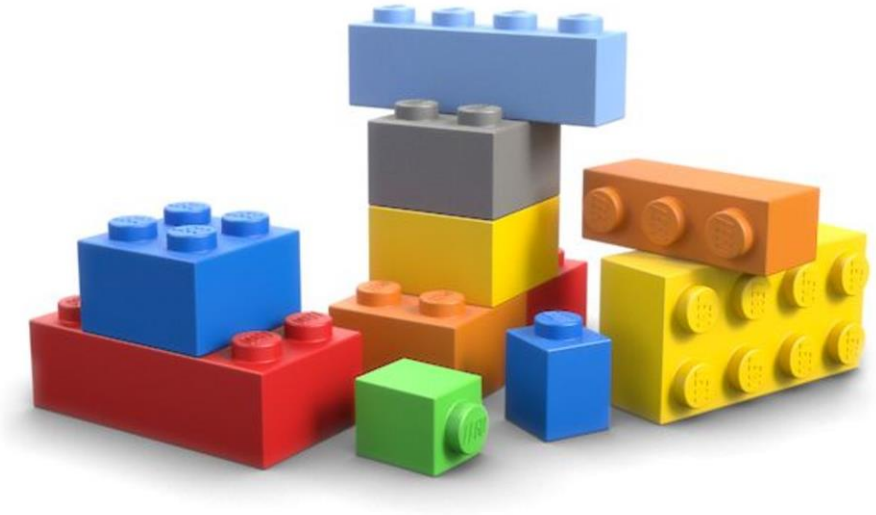


*As ammonia or methanol **As e-fuel or PBTL ***As hybrid system

Source: Michael Liebreich/Liebreich Associates, Clean Hydrogen Ladder, Version 5.0, 2023.Concept credit: Adrian Hiel, Energy Cities. CC-BY 4.0

MOST LIKELY USES OF HYDROGEN

XiNTC ELECTROLYSERS



LEAN, MODULAR, ROBUST

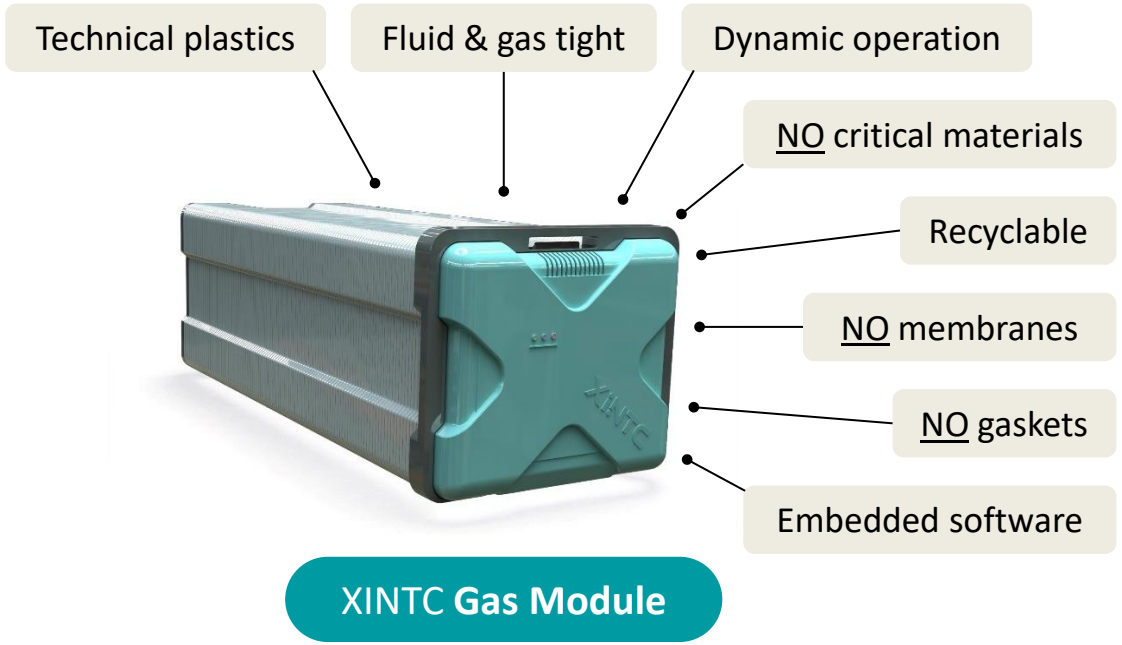
100%

Electrolyzer core
STACK

Auxilary systems
Balance of Plant

LEGO-STYLE ARCHITECTURE

XiNTC ELECTROLYSERS



LEGO-STYLE ARCHITECTURE

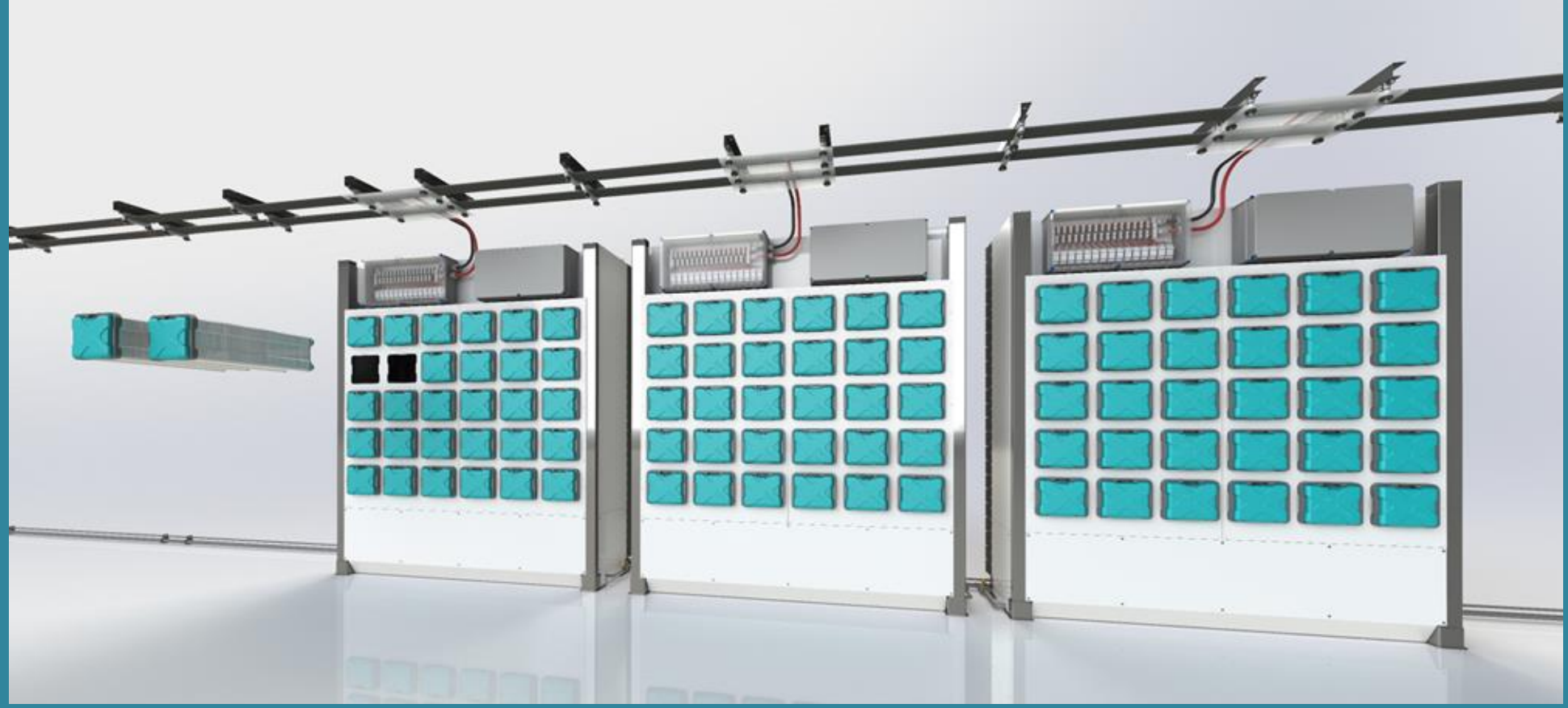
XiNTC ELECTROLYSERS

CONVENTIONAL STACK

Traditional Electrolyzers: Built to Break. High-cost systems relying on rare metals, fragile membranes, and expensive power electronics. Large, rigid stacks suffer under fluctuating renewables, every cycle increases wear, shortens lifespan, and drives up maintenance and replacement costs.

XINTC GAS MODULE

A true “LEGO-style” architecture, built from 5–6.5 kW plug-and-play plastic modules. Individually controlled, each module can switch on/off hundreds of thousands of times without performance loss. No rare metals. No gaskets, No high-maintenance components. Operating at just 45°C, simplifies cooling, slashes energy use, and drives down cost.

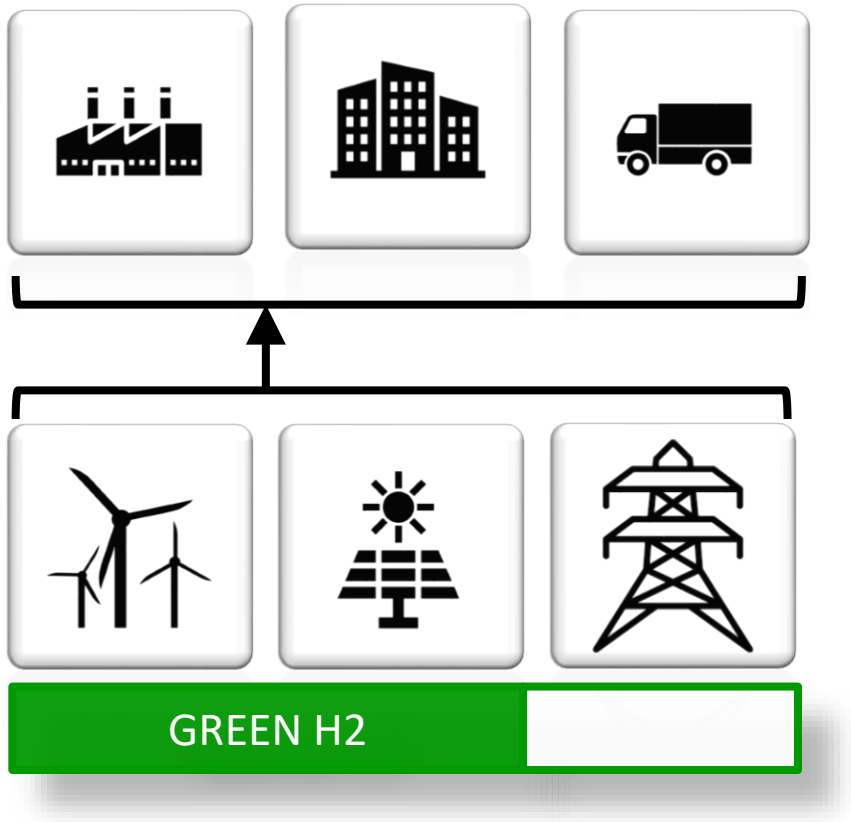


DROP-IN MODULES
30 modules per section, engineered for 150 kW base load, up to 200 kW peak.

STANDARDIZED & INTERCHANGEABLE
Flex capacity without engineering overhead.

BUILT FOR GROWTH
Expand production on demand to match evolving business needs.

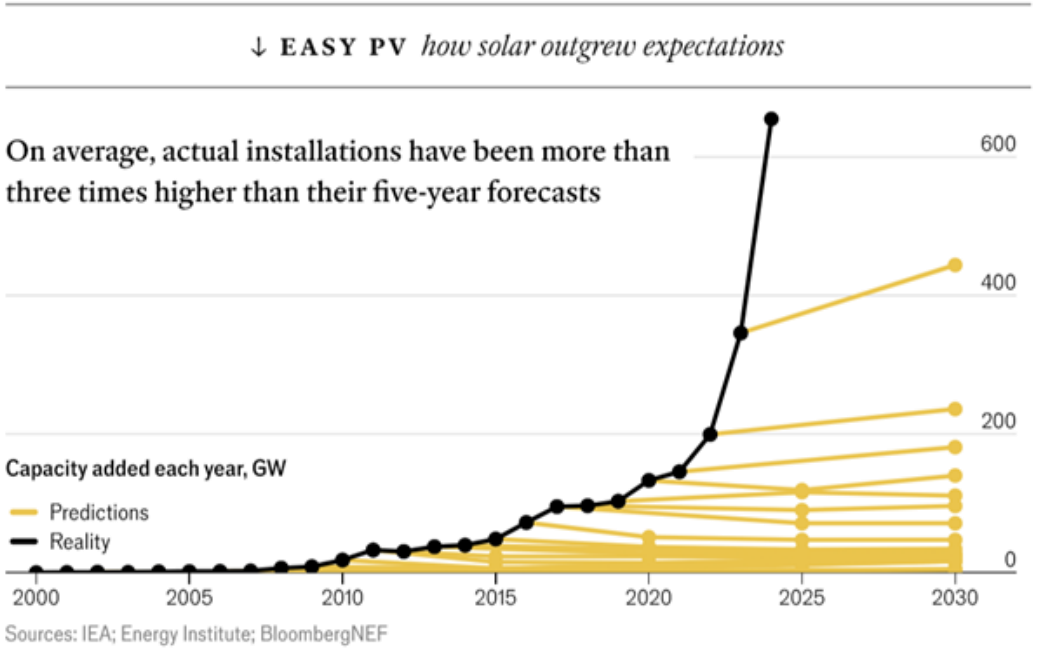
XiNTC ELECTROLYSERS

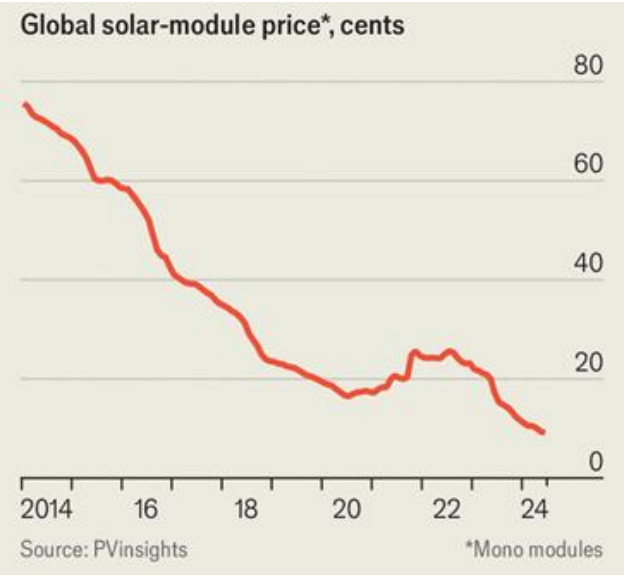


BEST POSSIBLE MARKET FIT

ANY SOURCE, ANY APPLICATION

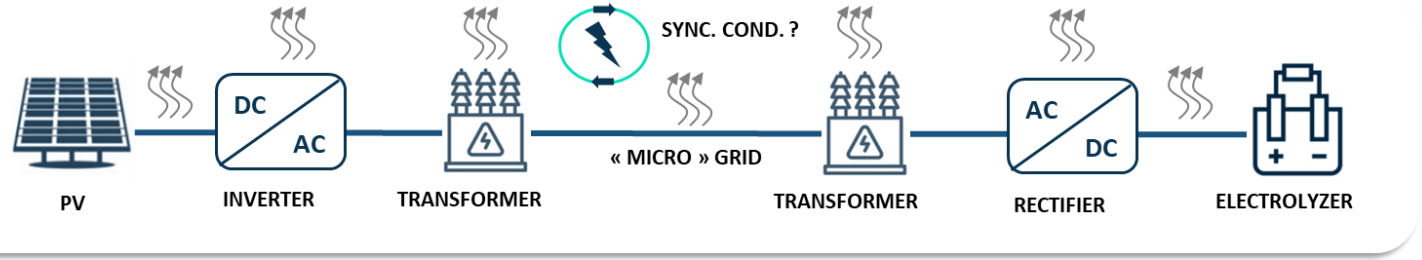
XiNTC ELECTROLYSERS



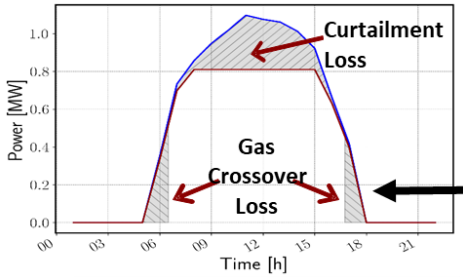


THE EXPONENTIAL GROWTH OF SOLAR POWER

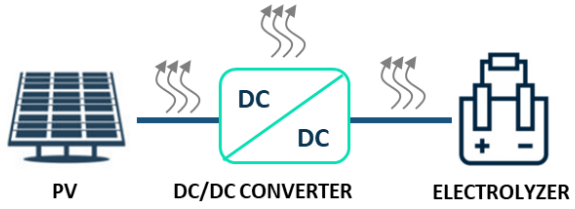
HIDDEN COSTS



TOTAL LOSSES : ~ 15-25%



AVERAGE LOSSES : ~ 7-15%

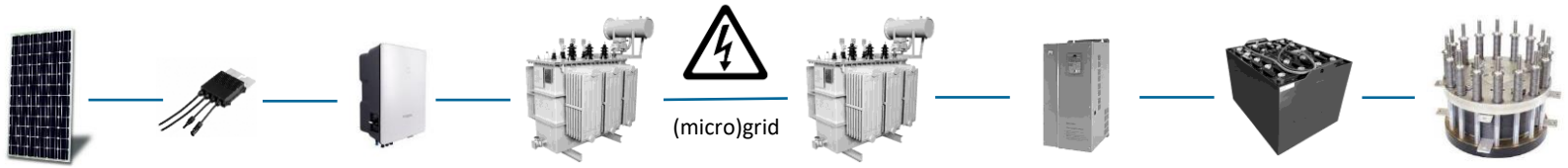


TOTAL LOSSES : ~ 11-20%

XiNTC ELECTROLYSERS

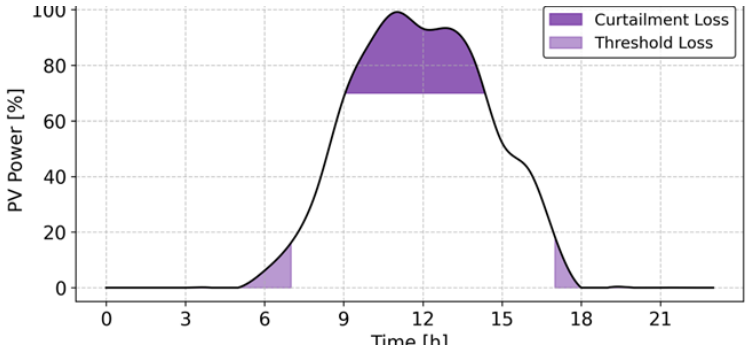
MAKING THE MOST OF THE ELECTRONS

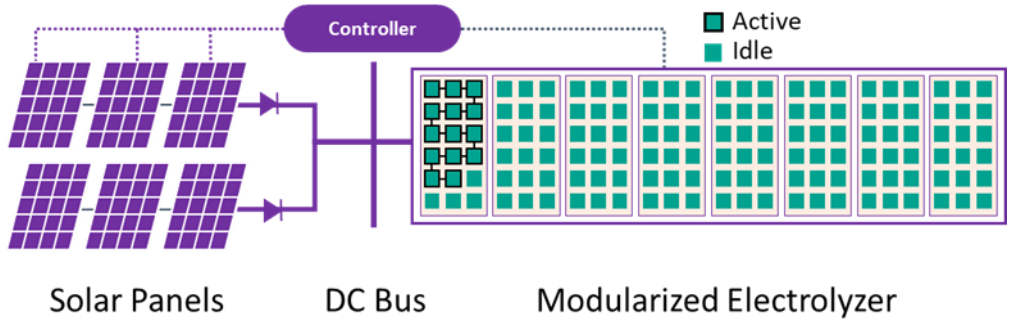
CONVENTIONAL SETUP



1 Solar
2 Optimizer
3 DC/AC inverter
4 Transformer
5 Transformer
6 AC/DC Rectifier
7 Battery
8 Stack

XINTC SETUP





> 20% HIGHER YIELD PER M2 PV

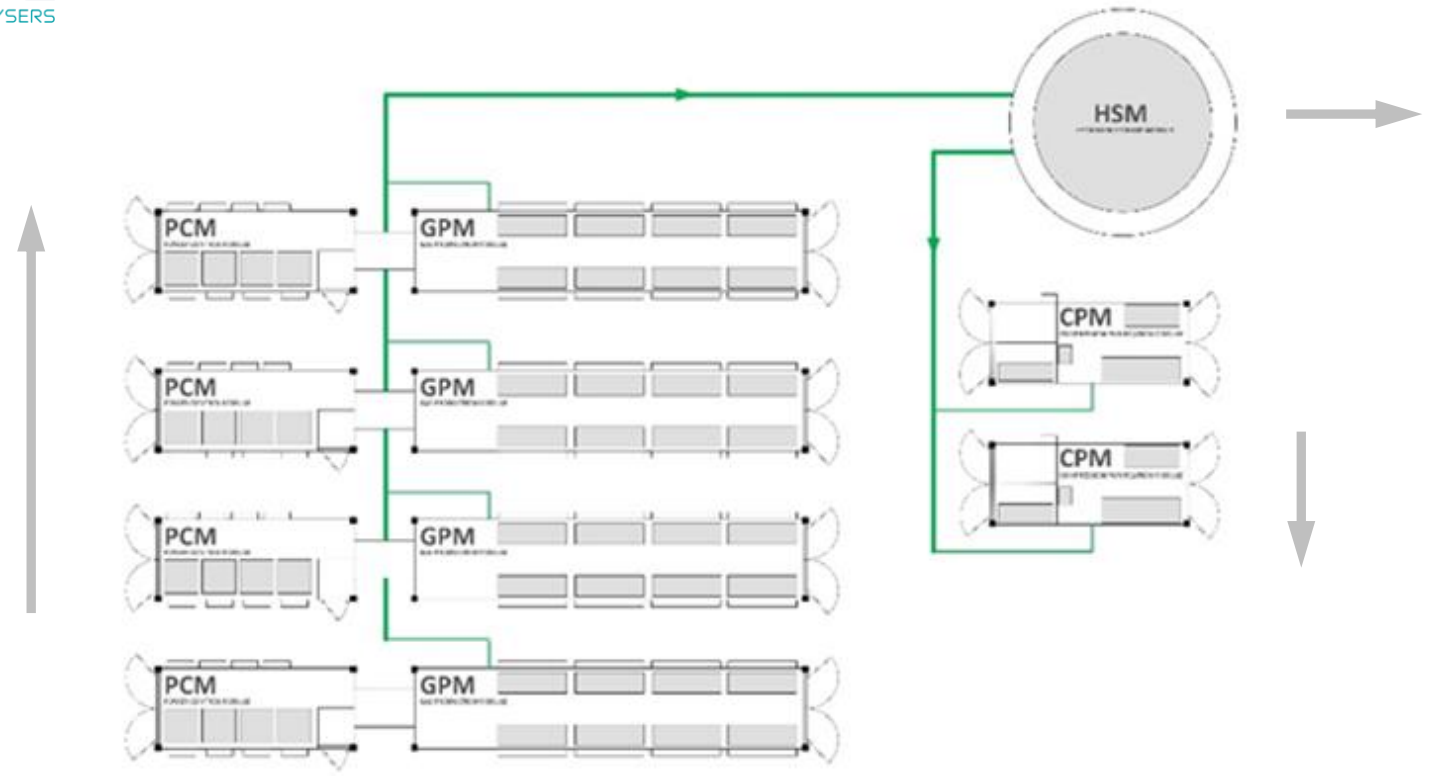
XiNTC ELECTROLYSERS

XiNTC ELECTROLYSERS

XINTC LINEUP

SCALING CAPACITY

XiNTC ELECTROLYSERS



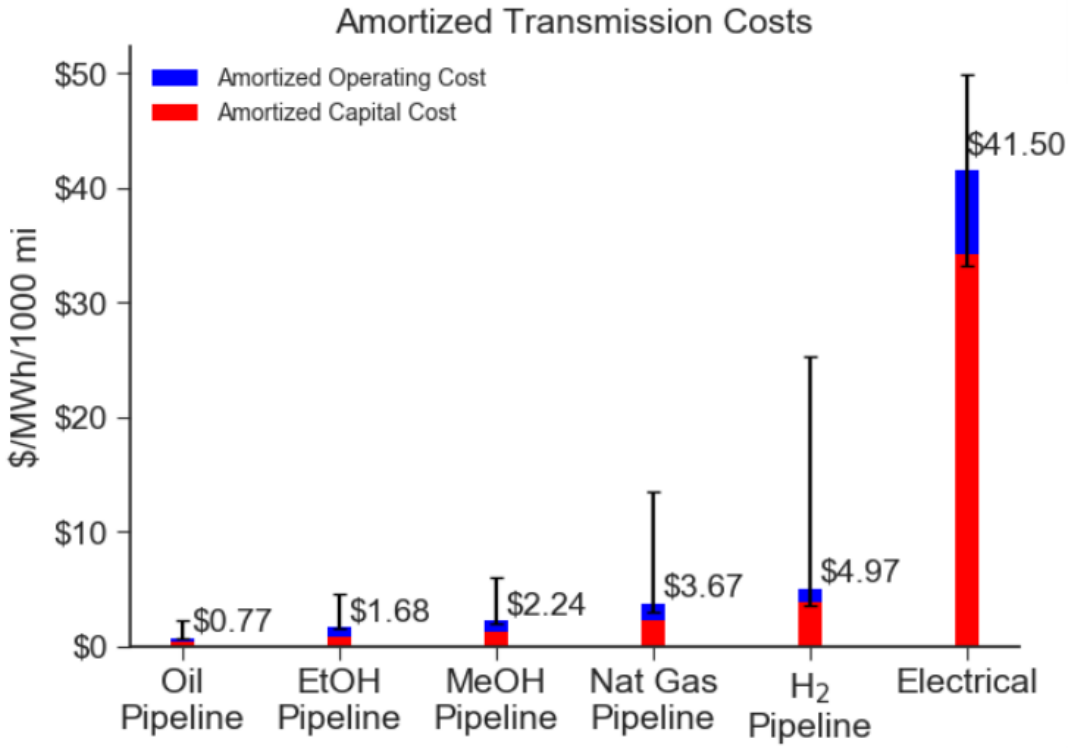
NO ATEX zone

ZERO H_2 consumption

WHY DECENTRALIZED H2 PRODUCTION?

XiNTC ELECTROLYSERS

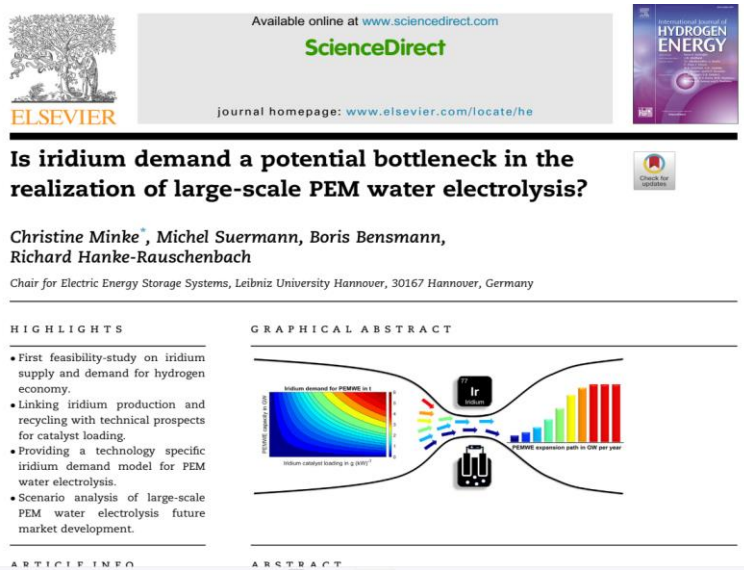
- Congestion & Losses
- Lower space costs in rural areas
- Lower cost infrastructure



https://www.hydrogen.energy.gov/pdfs/review18/pd102_james_2018_p.pdf

WHY NOT PEM FOR XINTC?

- Very expensive to build
- PGM's, Titanium GDL's, Fluoropolymers
- Sensitive for poisoning
- Extreme pure water required
- Degrades in performance over time
- Cannot withstand frequent on/off cycles!



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Is iridium demand a potential bottleneck in the realization of large-scale PEM water electrolysis?

Christine Minke, Michel Suermann, Boris Bensmann, Richard Hanke-Rauschenbach*

Chair for Electric Energy Storage Systems, Leibniz University Hannover, 30167 Hannover, Germany

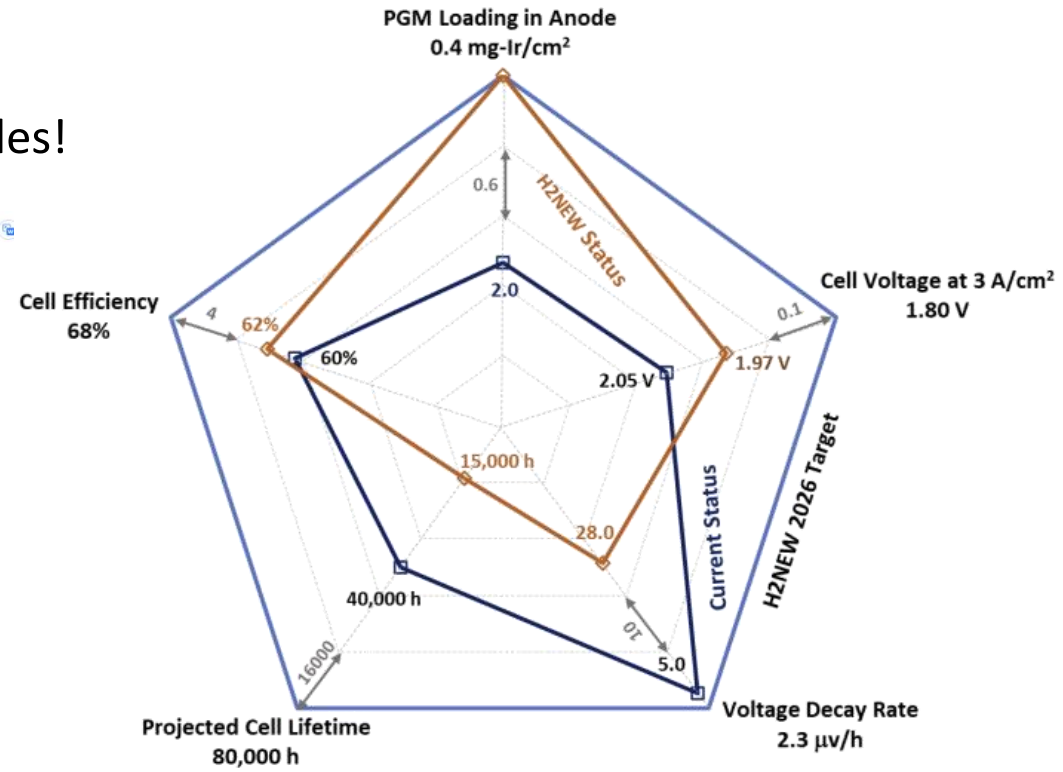
HIGHLIGHTS

- First feasibility-study on iridium supply and demand for hydrogen economy.
- Linking iridium production and recycling with technical prospects for catalyst loading.
- Providing a technology specific iridium demand model for PEM water electrolysis.
- Scenario analysis of large-scale PEM water electrolysis future market development.

GRAPHICAL ABSTRACT

ARTICLE INFO

ABSTRACT



MINIMIZING LCOH

MAINTENANCE

WATER CONSUMPTION

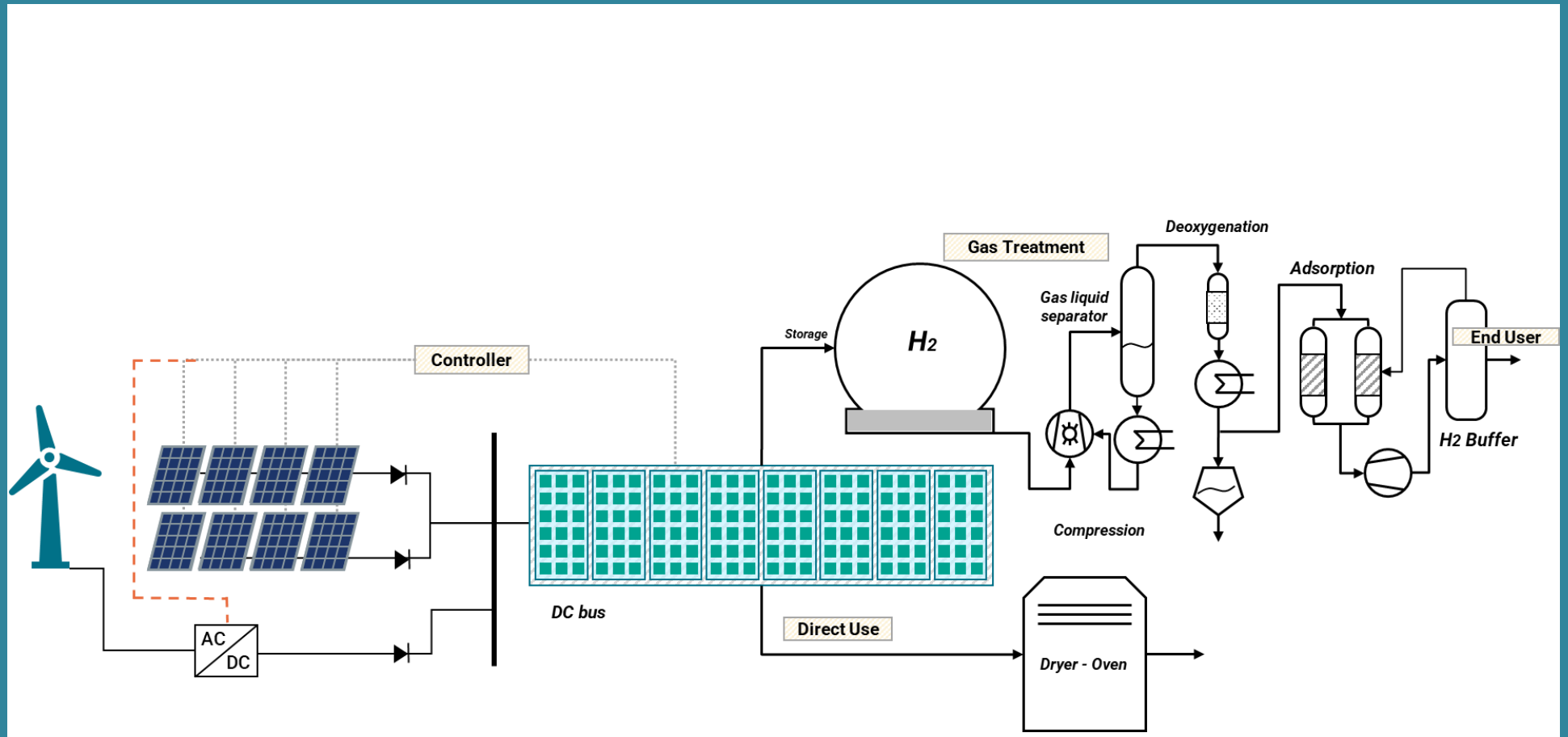
POWER CONSUMPTION

INITIAL INVESTMENT

CAPEX

OPEX

BIG PICTURE


Controller
AC
DC
DC bus
Storage
H_2
Gas Treatment
Gas liquid separator
Deoxygenation
Adsorption
End User
H_2 Buffer
Compression
Direct Use
Dryer - Oven

PUBLICATIONS

INTERNATIONAL JOURNAL OF HYDROGEN ENERGY 48 (2023) 34210–34228

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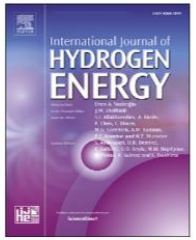

Transient modelling of a multi-cell alkaline electrolyzer for gas crossover and safe system operation

Silvestros Oikonomidis [a], *Mahinder Ramdin* [a], *Othonas A. Moultos* [a], *Albert Bos* [b], *Thijs J.H. Vlugt* [a], *Ahmadreza Rahbari* [a,b,*]

[a] *Engineering Thermodynamics, Process & Energy Department, Faculty of Mechanical, Maritime and Materials Engineering, Delft University of Technology, Leeghwaterstraat 39, 2628CB, Delft, the Netherlands*
[b] *Headquarters, XINTC B.V., Loubergweg 22-24, 6961 EK, Eerbeek, the Netherlands*

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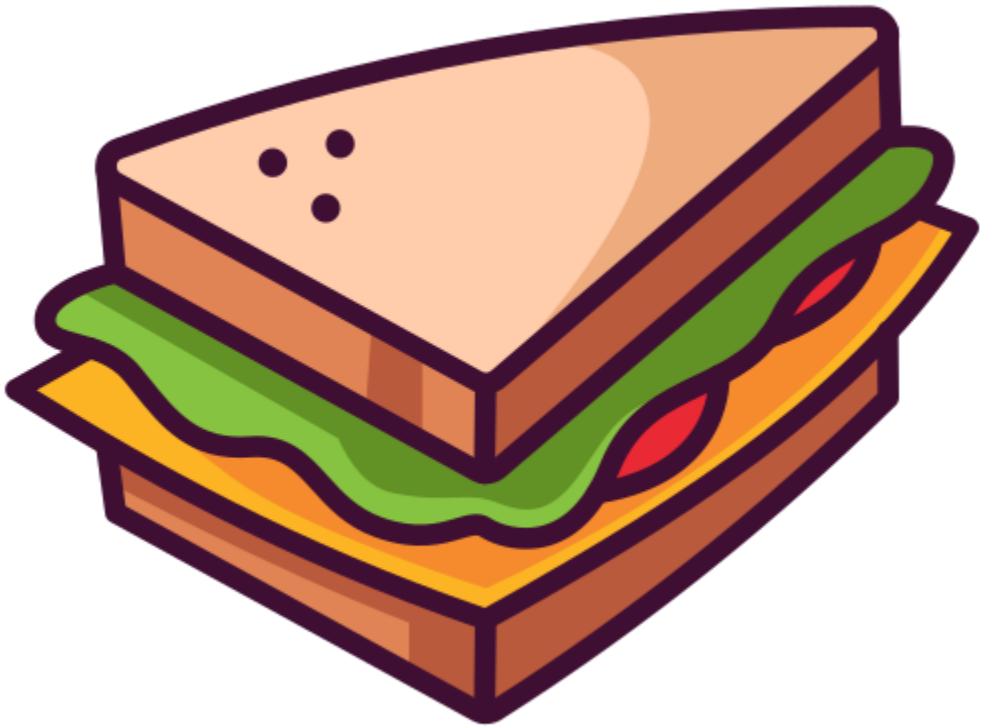
www.XINTC.global

Lunch & Fair



Start again at 13:00 with parallel sessions

Program

13:00 - 14:00 Parallel sessions (1/2) & fair

Green Molecules (plenary session room)

Infrastructure & cross-border supply chains (Fair ground presentation area right)

Education & Learning Communities (Fair ground presentation area left)

14:00 - 14:10 Change over

14:10 - 15:10 Parallel sessions (2/2) & fair

Green Molecules (plenary session room)

Infrastructure & cross-border supply chains (Fair ground presentation area right)

Education & Learning Communities (Fair ground presentation area left)

15:10 - 15:30 Coffee/tea

15:30 - 15:45 Opening ceremony **Energy Building**

15:45 - 17:00 Drinks