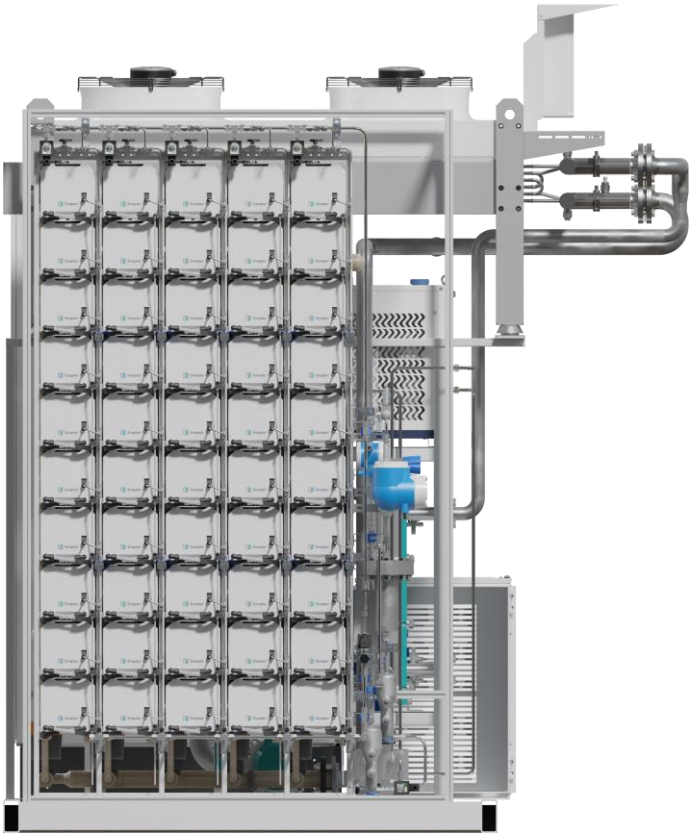
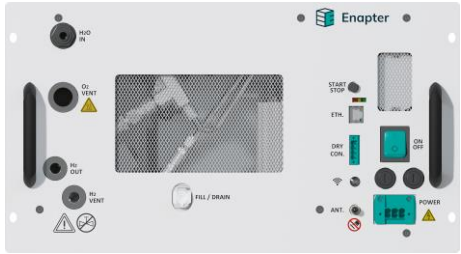


AEM Electrolyzers

Efficient, Scalable, Iridium-free



Enapter



Our company

Enapter at a glance

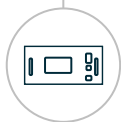


Started in 2017 in Italy

Builds on technology with a **>15-year track record**



Proprietary technology and commercial leader in AEM electrolysis



More than **15,000 AEM electrolyser** cores ordered by 375+ customers across 50+ countries



Focus towards in **Industrialized high-volume production**



First time Ebitda positive and **EUR 31 m revenue** in 2023



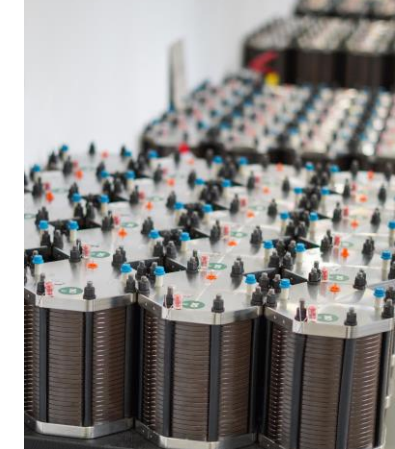
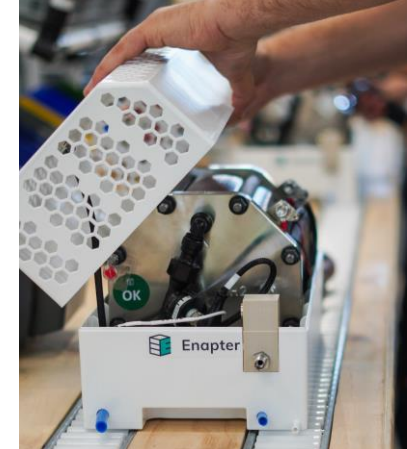
Enapter Pisa

100% powered by renewable energies



Our company

Enapter at a glance



Hardware, electronics and software



Vertically integrated from Chemistry to Electrolyzers



HQ, Manufacturing and R&D in **Italy**



System engineering and R&D in **Germany**

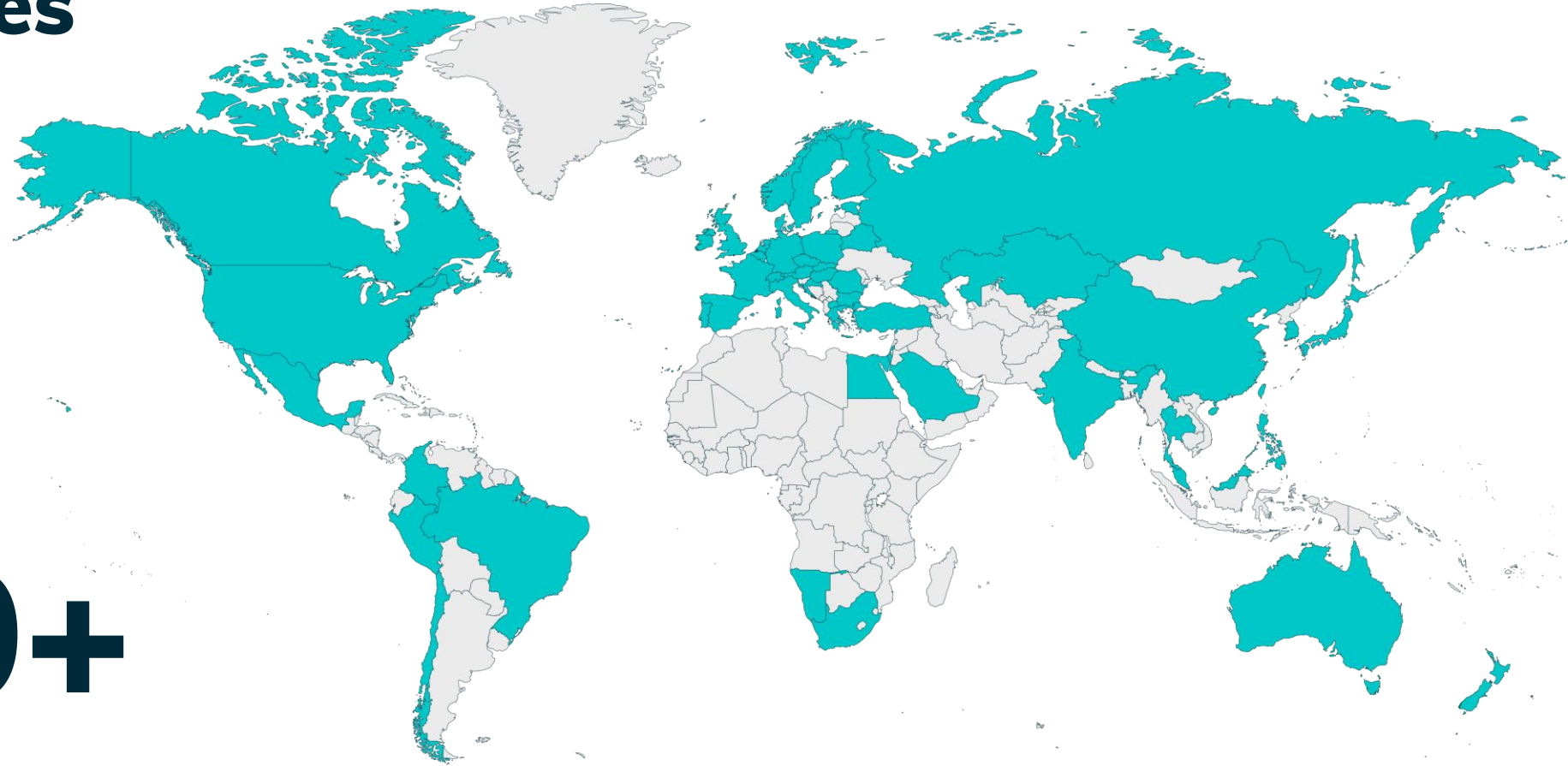


Global network of integration partners



Applications

375+ customers
50+ countries



5,000+
AEM Electrolysers

Applications

Proven technology



1,500,000

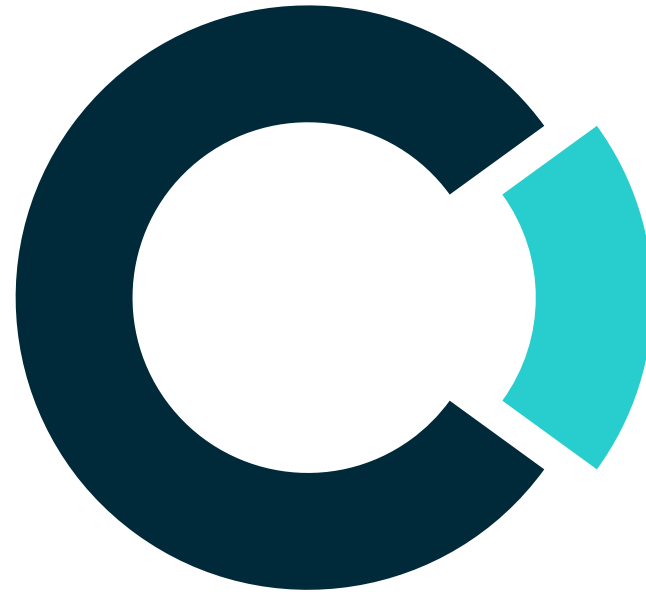
Total operational hours



Electrolyser technology shares in 2030

Technology outlook

80% other technologies



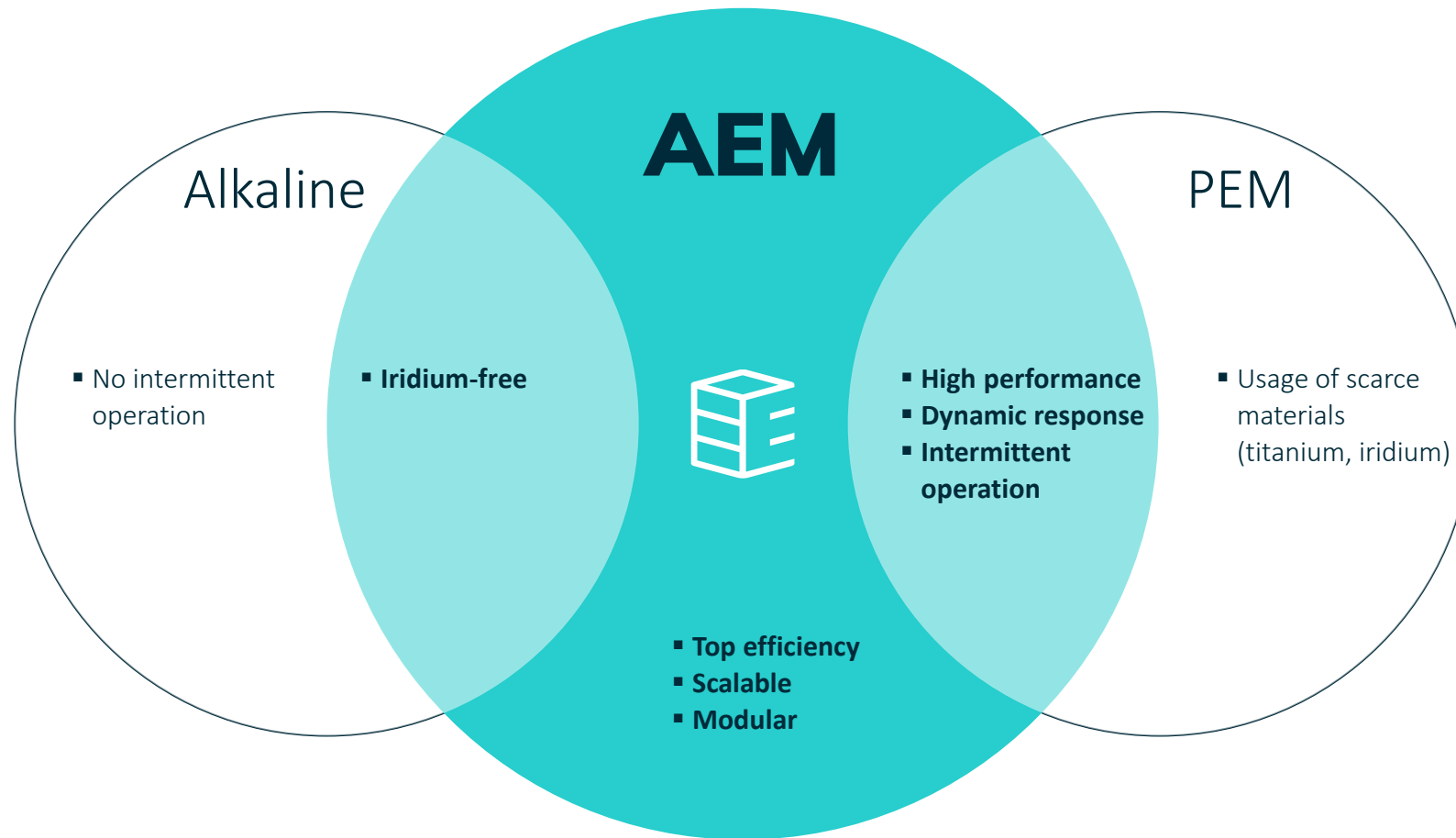
20% AEM

Assumptions: AEM captures market share from all other technologies while PEM industry will not be able to scale up quickly enough due to Iridium shortages

AEM is the future

The only scalable option.

Patented AEM technology



The strengths of AEM

PEM's competitive handicap



- On our planet **Iridium** only makes up ~0.001 parts per million. It's actually about 40x rarer than gold.
- It's one of the **most expensive metals**. As of April 2024, its price is 179,67 USD/g (179,670 USD per kg).
- It's produced as a **by-product** of mining Platinum. Currently, the total yearly production is only 8-9t.
- It's an important component in the anode catalysts of **PEM electrolyzers**. Experts estimate that the demand for iridium by the PEM industry will exceed global supply many times over.

Iridium

Identifying the **ProbleM**.

AEM's competitive advantage



Enapter's AEM technology avoids the use of iridium-based catalysts. This enables Enapter to achieve


- greater **price stability**
- lower **supply chain** vulnerability,
- without **performance** restrictions.

Iridium-free

Our unique selling proposition.

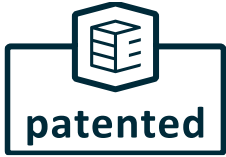
AEM's competitive advantage

AEM is the future

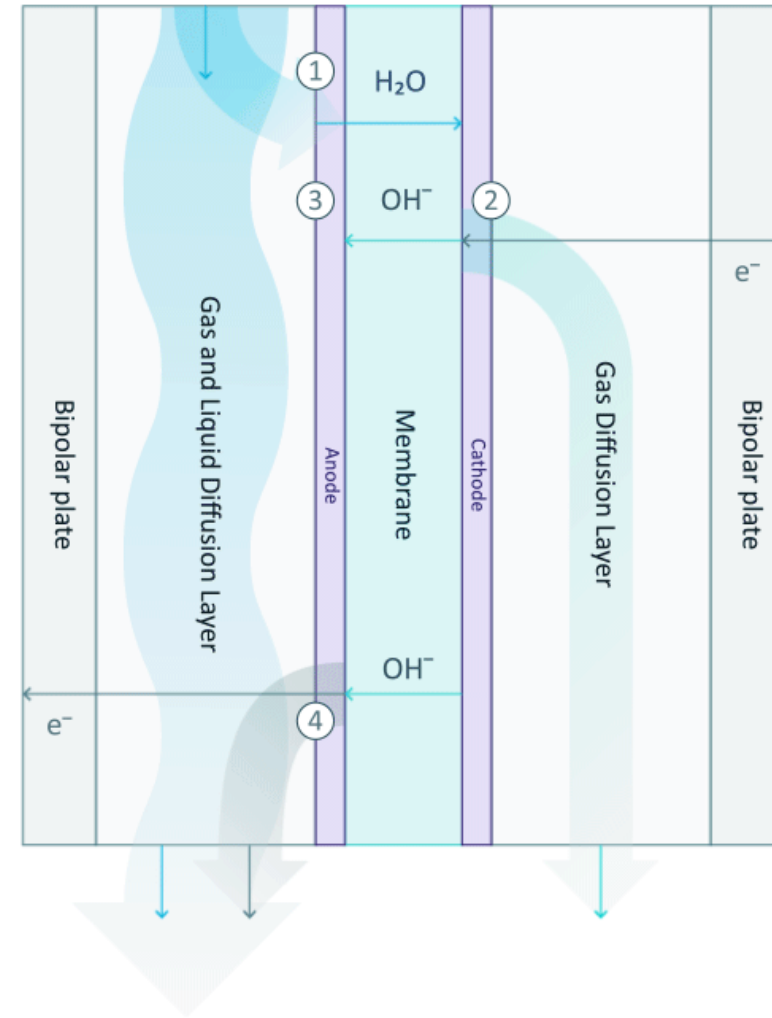
	PEM	Alkaline	 AEM
Supports intermittent renewables	✓	✗	✓
Iridium free	✗	✓	✓
Titanium free	✗	✓	✓
PFAS regulation ready	✗	✗	✓
Compact design	✓	✗	✓
High current density	✓	✗	✓
Electrochemical compression	✓	✗	✓
Safe-to-handle electrolyte	✓	✗	✓

Technology review

Patented AEM technology



- Combining the best of Alkaline and PEM technology
- Modular and scalable
- Iridium-free
- Dynamic response to intermittent renewables
- Simple and scalable BoP
- Top efficiency
- Leading H₂ pressure and purity
- Strong patents granted



Our secret sauce

At scale, standardised modules outcompete made-to-order plants

Modular systems scale faster



Computing in the past



Multi-core solution today



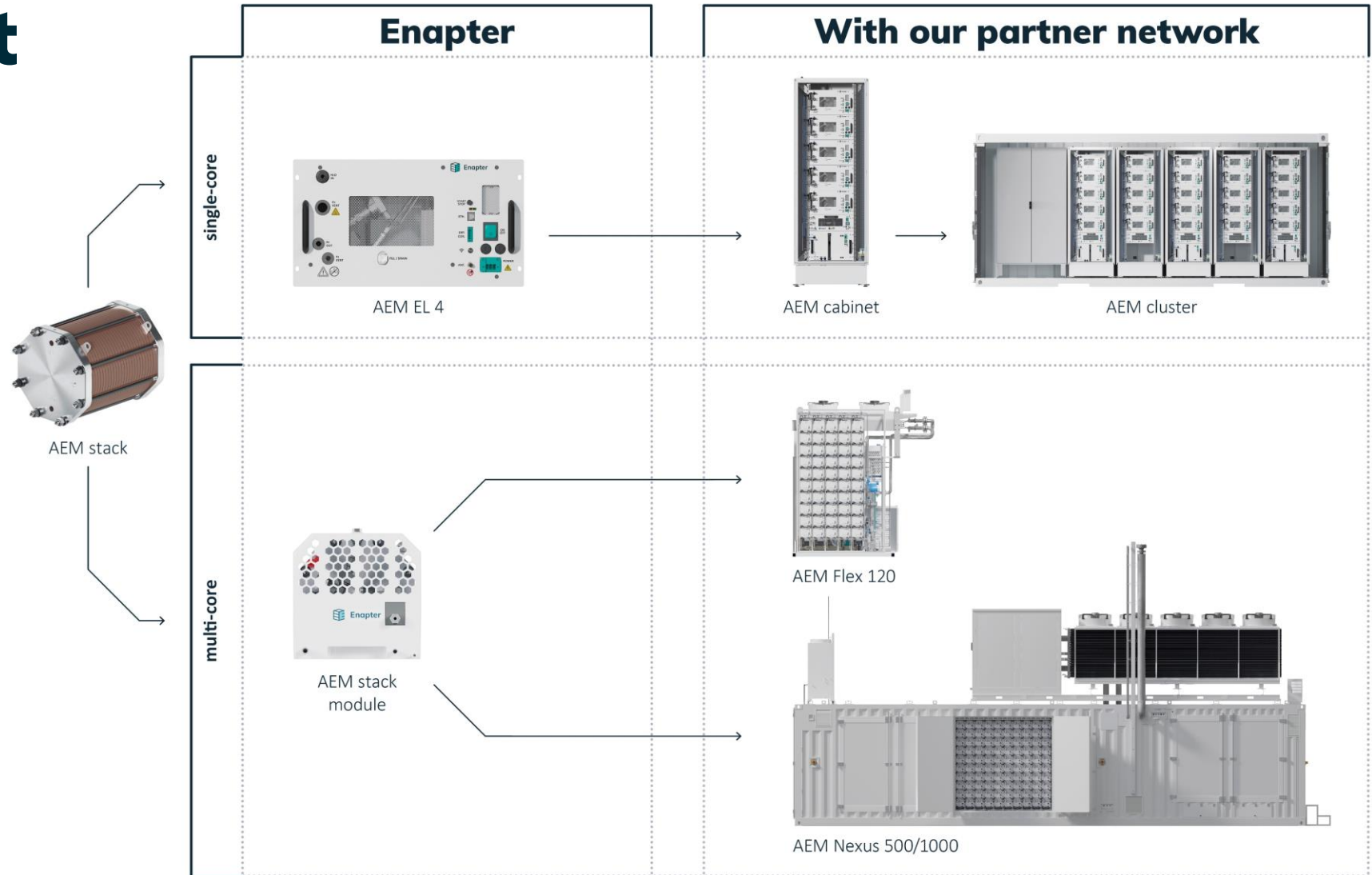
Electrolyser in the past



Multi-core solution today

Enapter's AEM scalability

Our product platform



Enapter Electrolysers

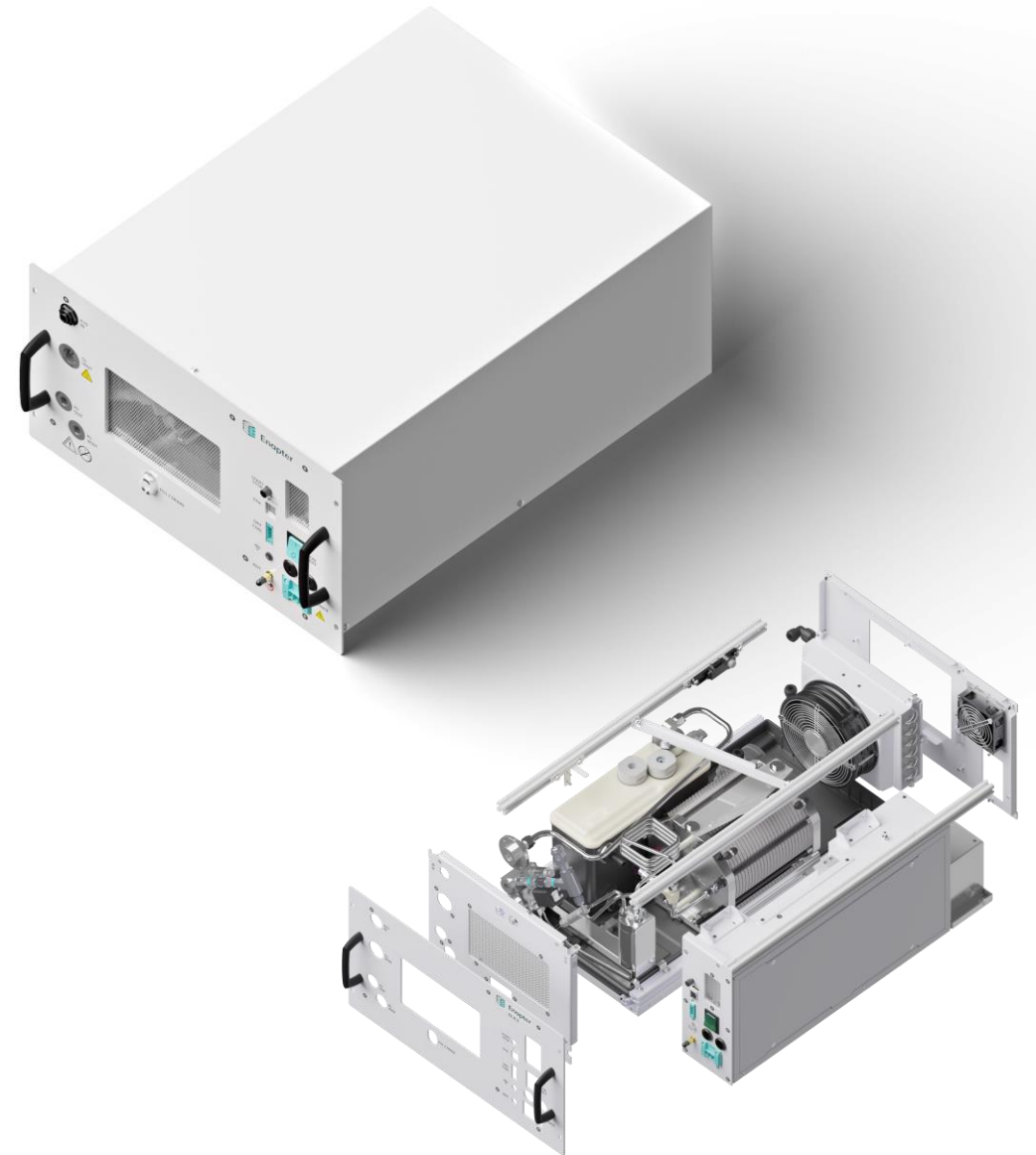
Single-core



- Hydrogen production: 0.5 Nm³/hr
- Power consumption: 2.4 kW
- Efficiency: 4.8 kWh/Nm³
- Hydrogen Purity: 99.9% or 99.999% (with optional dryer)
- Output pressure: 35 barg
- Modular and scalable

Datasheets:

- [EL 4 AC \(Air cooled / Liquid cooled\)](#)



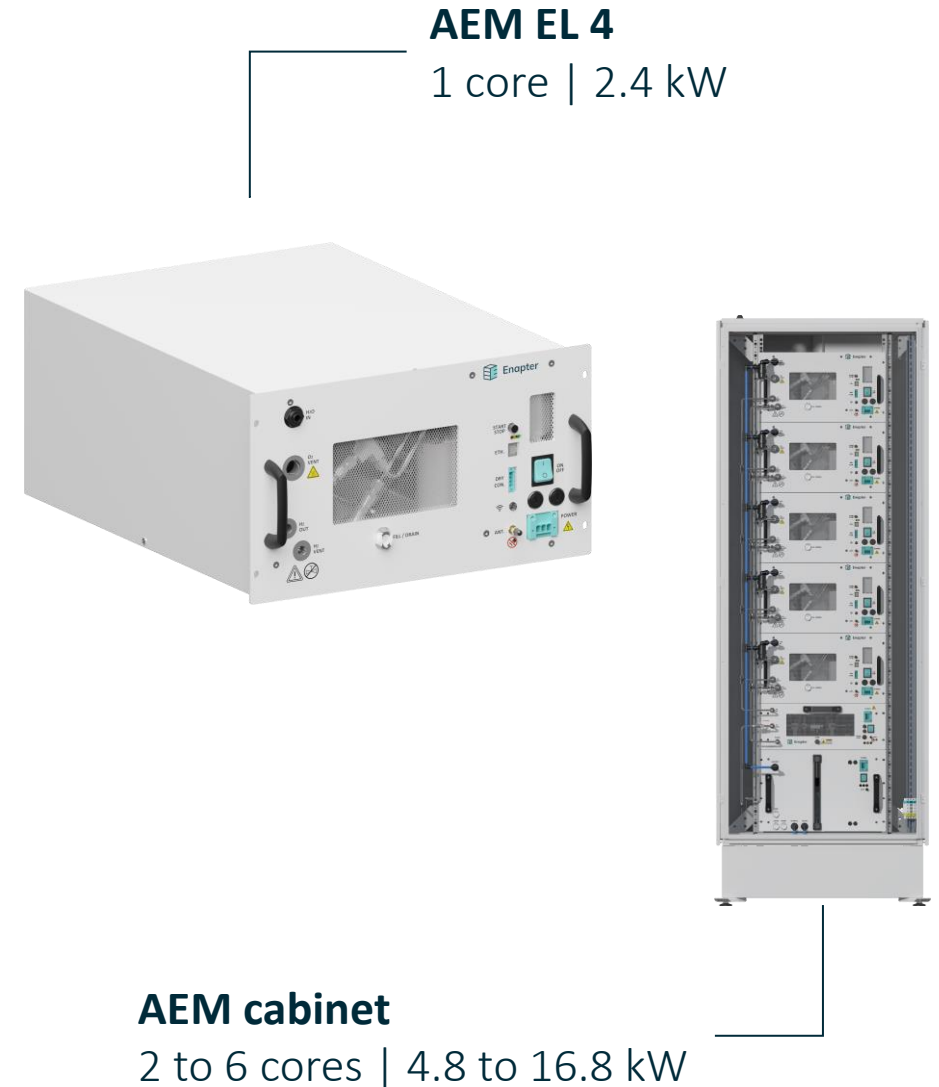
AEM EL 4

Enapter's AEM single-core electrolyzers

Merits of the single-core solutions

- Modular and scalable
- Rapid reaction time to intermittent renewables
- Production rate ≈ 1 kg/24 h
- Outlet pressure up to 35 barg
- Available as air-cooled and liquid-cooled systems
- Automated & remote operation with Enapter's EMS
- Quick and easy installation (OPC UA ready)

1 to 6 stacks



Enapter Devices

Water Tank

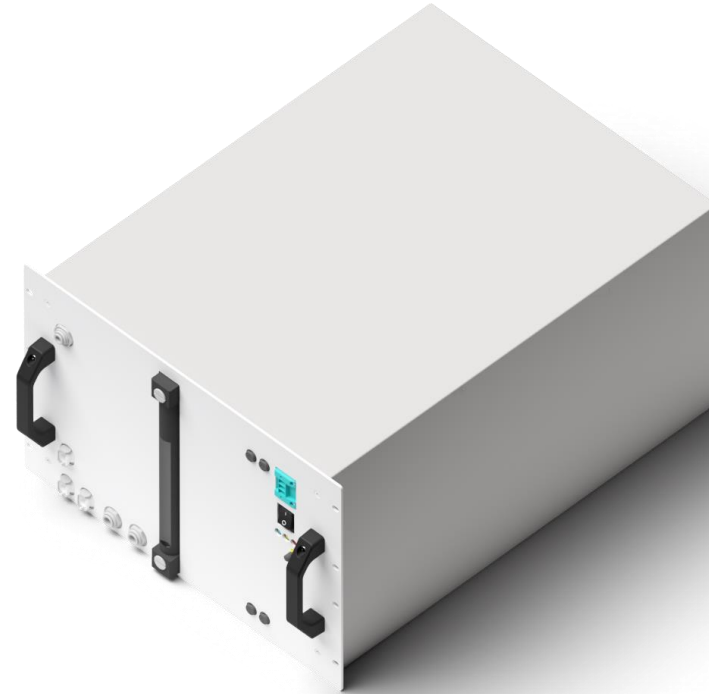


- Capacity: 38.5 L
- Output pressure: Up to 2.75 barg
- Operative power consumption: 35 W
- Power supply: AC 110 – 240 V, 50/60 Hz
- Ambient operative temperature range: 5 – 45 °C
- Control and monitoring: Fully automatic with Enapter's EMS
- Maximum water input conductivity: <math>< 5\mu\text{S}/\text{cm}</math> at 25 °C (at 77 °F)

Datasheet:

[Water Tank WT 2.1](#)

WT 2.1



Enapter Devices

Dryer



- Hydrogen output purity: > 99.999% in molar fraction
- Output pressure: Up to 35 barg
- Hydrogen drying rate: 2,500 NL/h
- Input pressure: 35 barg
- Average dewpoint and impurities: < -70 °C (-94 °F), compliant with ISO14687 (H₂O < 5 ppm, O₂ < 5 ppm)
- Operative power consumption: 200 W

Datasheet:

[Dryer DRY 2.1](#)

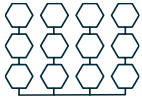


DRY 2.1



Enapter Electrolysers

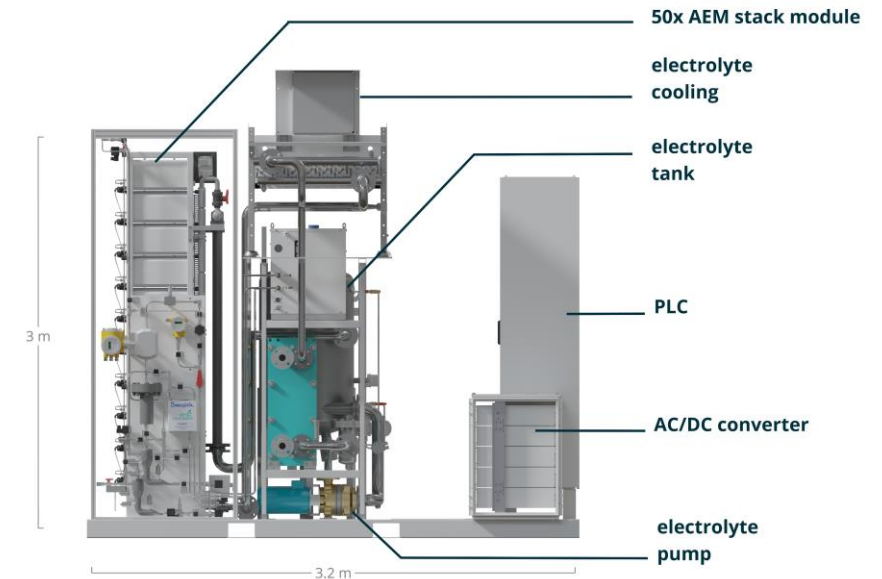
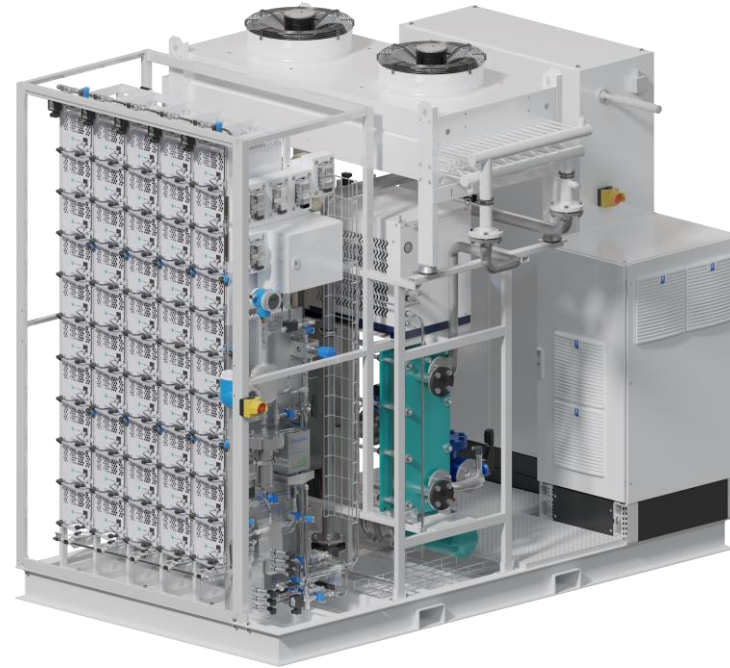
Multi-core



- Hydrogen production: 25 Nm³/h or 53.9 kg/d
- Power consumption: 120 kW
- System efficiency: 4.8 kWh/Nm³
- Hydrogen purity: 99.95% or 99.999%
- Production Flexibility: 12-100%
- Swift reactions: <1 sec load variation
- Smart and fully automatic operation

Datasheet:

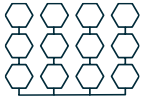
[AEM Flex 120](#)



AEM FLEX 120

Enapter Electrolysers

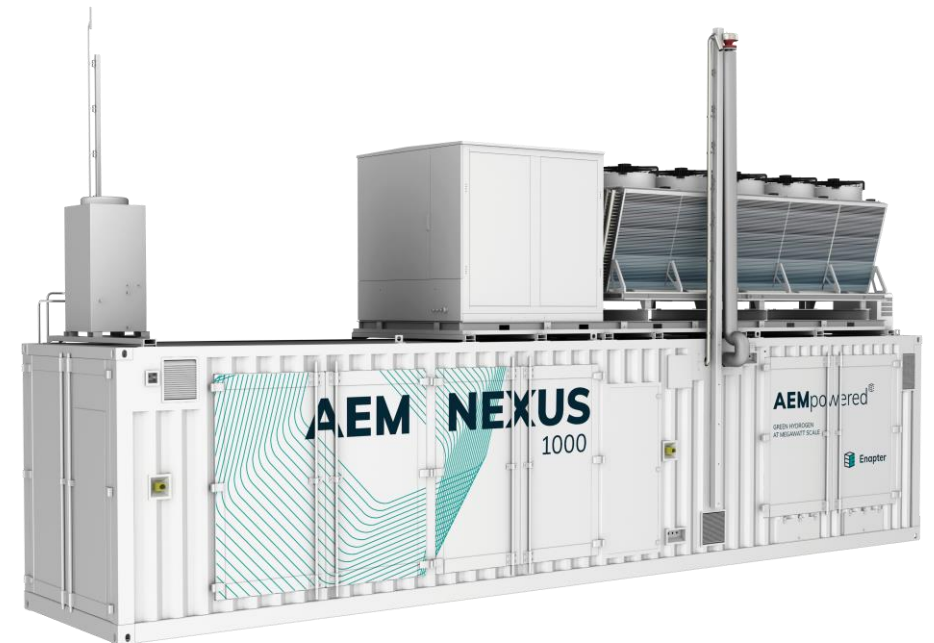
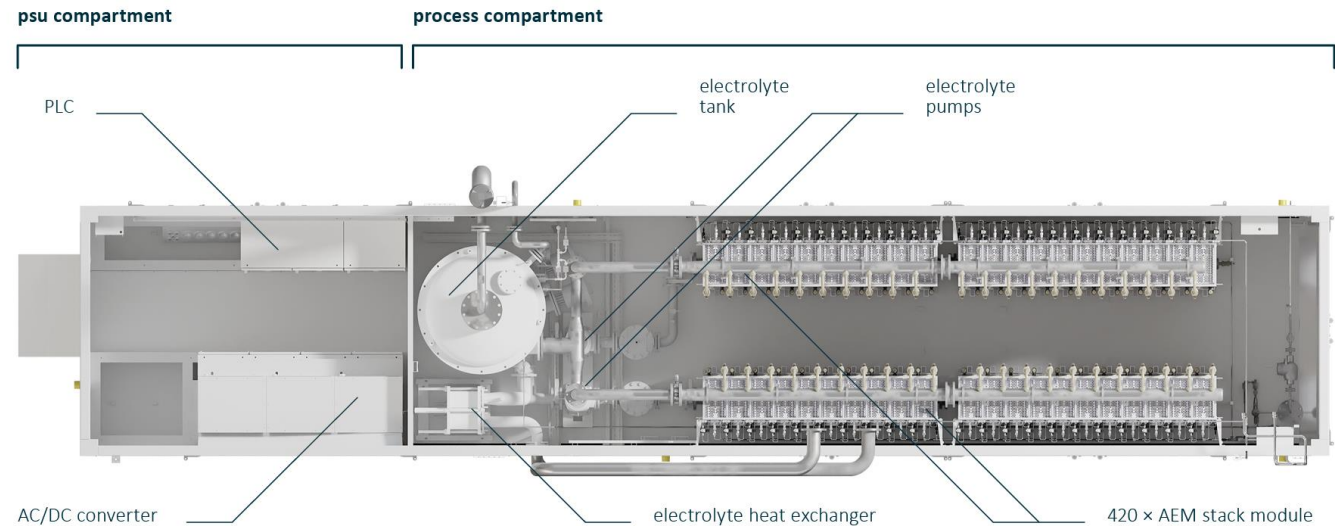
Multi-core



- Hydrogen production: 210 Nm³/h or 453 kg/d
- Power consumption: 1 MW
- System efficiency: 4.8 kWh/Nm³
- Hydrogen purity: 99.95% or 99.999%
- Production Flexibility: 3-100%
- Swift reactions: <1 sec load variation
- Output pressure: Up to 35 barg

Datasheet:

[AEM Nexus](#)



AEM NEXUS

Enapter's AEM multi-core electrolyzers

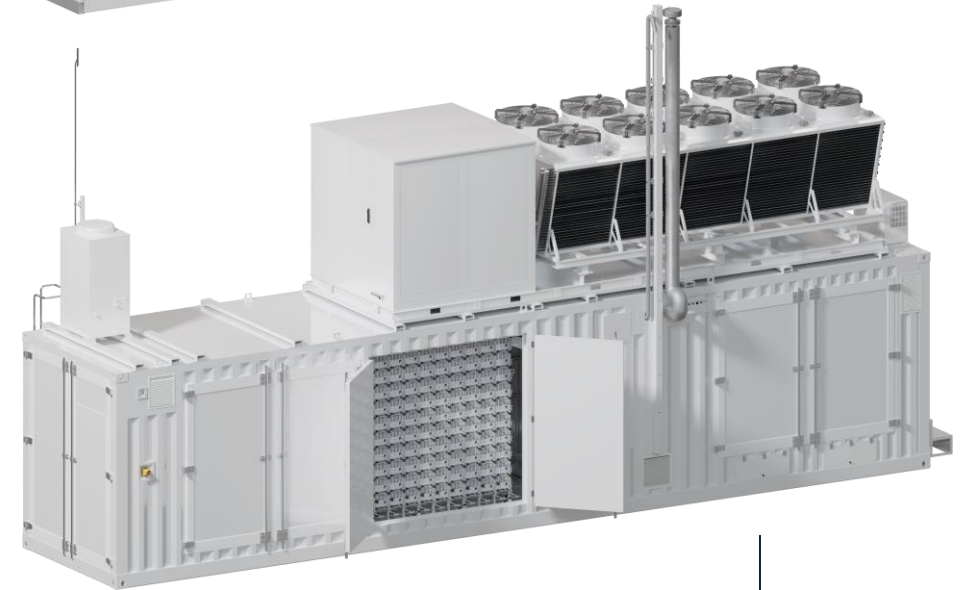
Merits of the multi-core solutions

- High efficiency
- Built-in redundancy and Hot-swapping capability
- Rapid reaction to intermittent renewable energy supply
- Cheaper than similarly sized PEM electrolyzers

50 to 420 stacks



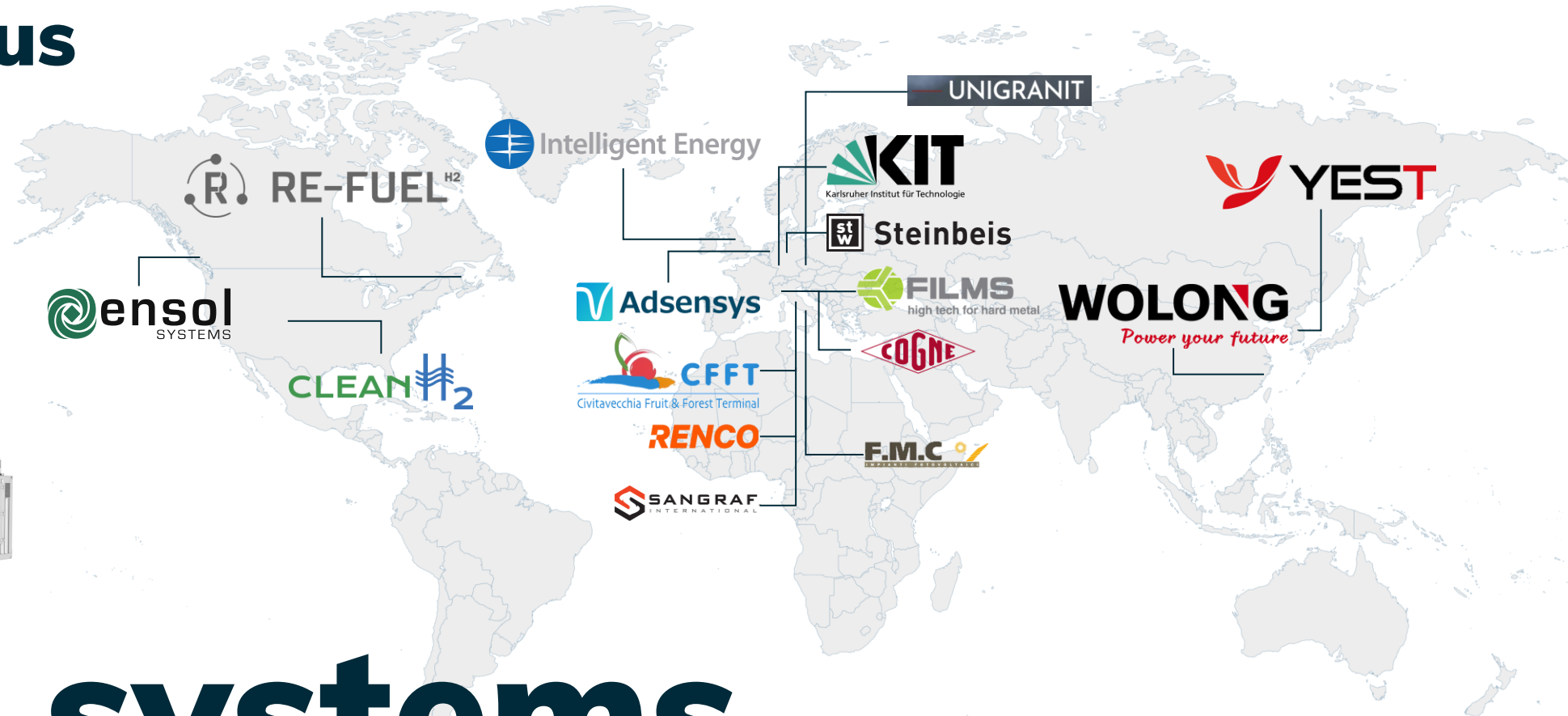
AEM Flex 120
50 cores | 120 kW



AEM Nexus 1000
420 cores | 1 MW

Strong market positioning

AEM Nexus



MW systems

Confirmed multi-core projects

Enabling the AEM Electrolyser

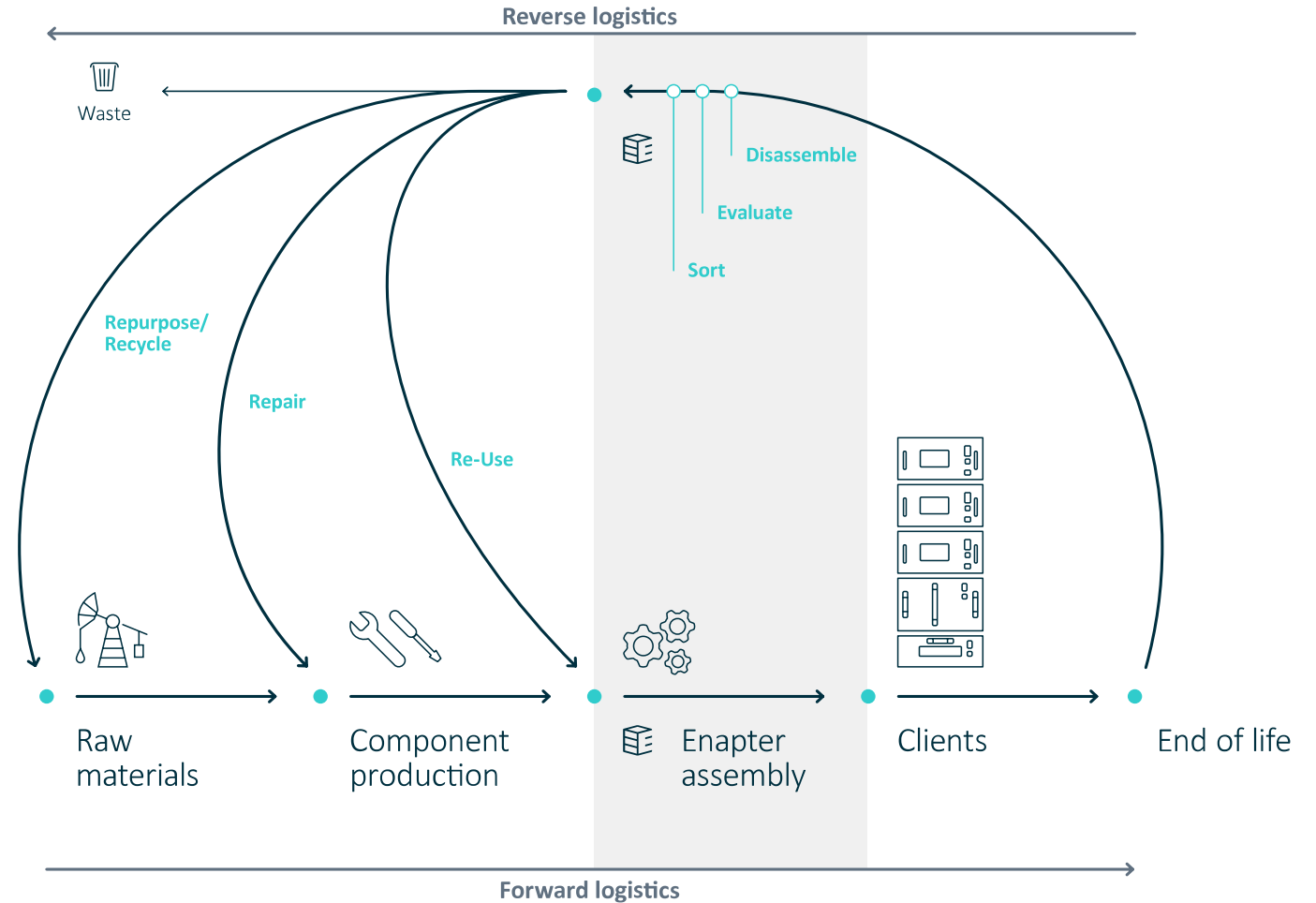
Energy Monitoring and Management

- Remote Monitoring
- Preventive Maintenance
- Integration with Renewable Power



Sustainability

- As a product manufacturer, the biggest positive impact we can have on the environment is to handle natural resources carefully. This is why we aim to make our production as circular as possible.
- We have already developed a reverse logistics process and take back our electrolyzers at the end of their lifetime.
- We report according to SASB standards and publish an annual sustainability report.



Power-to-X | Starfire Energy, USA



Ammonia production

- 21 × Electrolyser AEM EL 2.1 (single-core)
- 21 kg/24 h of green hydrogen



Electricity storage | Wilo, Germany



H2POWERPLANT for backup energy & self-sufficiency

- 95 × Electrolyser AEM EL 2.1 (single-core)
- 95 kg/24 h of green hydrogen



Industrial solution | Roto-Art, Netherlands



Replacing natural gas with green hydrogen for industrial ovens

- 7 × Electrolyser AEM EL 4.0 (single-core)
- 7 kg/24 h of green hydrogen



Industrial solution | Yanmar, Japan



Industrial H₂ pilots at Yanmar Clean Energy Site

- 14 × Electrolyser AEM EL 2.1 (single-core)
- 14 × Electrolyser AEM EL 4.0 (single-core)
- 28 kg/24 h of green hydrogen

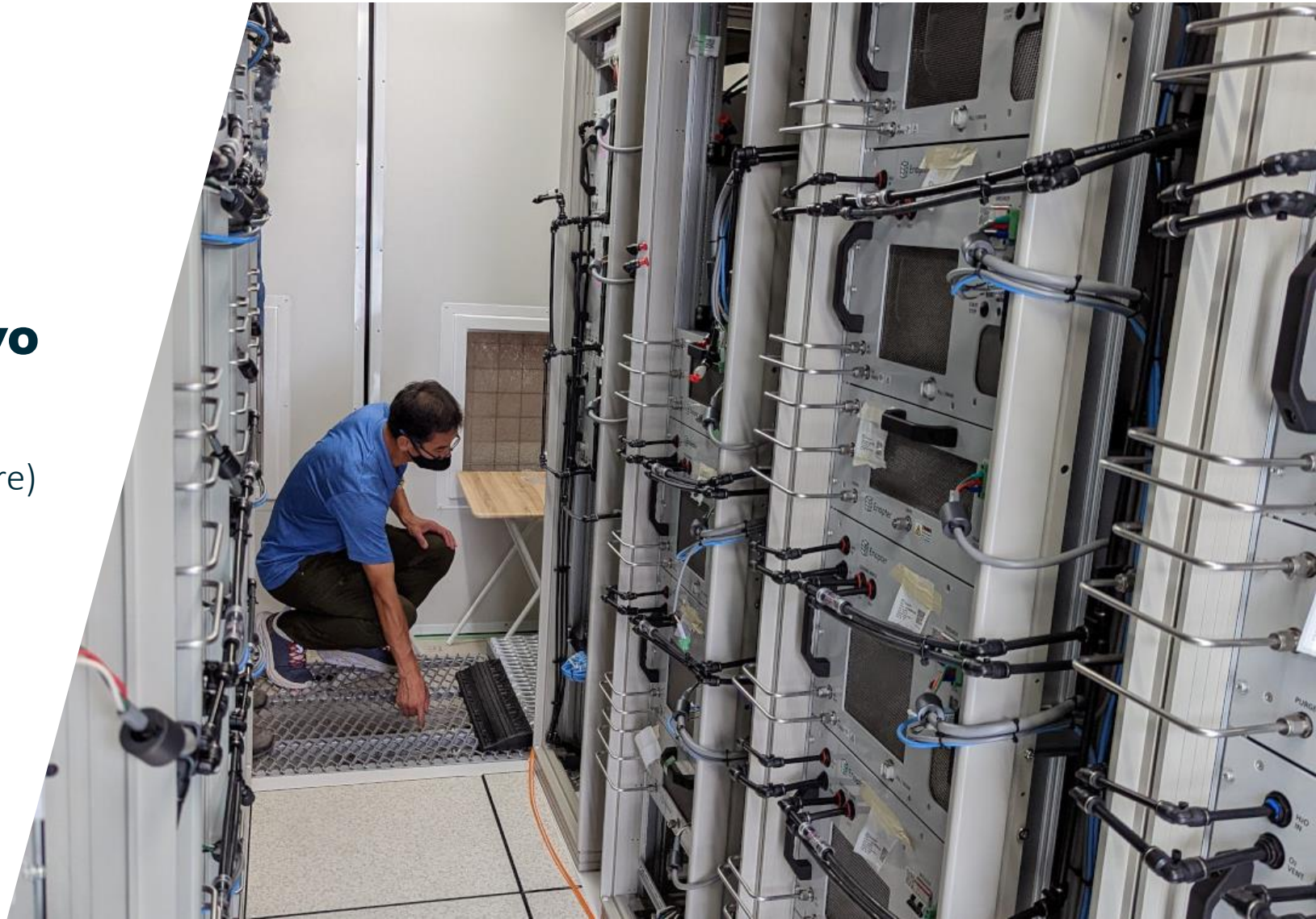


Mobility | Tokyo Gas, Japan



Commercial hydrogen refuelling station in Tokyo

- 30 × Electrolyser AEM EL 2.1 (single-core)
- 30 kg/24 h of green hydrogen



Mobility | ZeroAvia, UK



Mobile refuelling for hydrogen aircrafts

- 10 × Electrolyser AEM EL 2.1 (single-core)
- 10 kg/24 h of green hydrogen



Mobility | Baglietto, Italy



Green hydrogen production for the naval sector

- 10 × Electrolyser AEM EL 4.0 (single-core)
- 10 kg/24 h of green hydrogen



Electricity storage | Hylife Innovations, Netherlands



District-wide energy storage on a Dutch island

- 30 × Electrolyser AEM EL 2.1 (single-core)
- 30 kg/24 h of green hydrogen



Power-to-heat | DNVGL, Netherlands



Residential heating with hydrogen

- 8 × Electrolyser AEM EL 2.1 (single-core)
- 8 kg/24 h of green hydrogen



Research | Industrial Technology Research Institute,
Taiwan



Hydrogen R&D for Taiwan's renewable energy goals

- 20 × Electrolyser AEM EL 4 (single-core)
- 20 kg/24 h of green hydrogen



Smart.
Simple.
Scalable.



Enapter

 @enapter

 youtube.com/enapter

www.enapter.com