accelerate the shift™

Electrolyzer Technologies

We can power
the world with clean,
green hydrogen.

accelerazero.com

accelera™
by Cummins

Introduction



Research and Technology Commitment

Annual spend $1 billion to advance power technologies. Integration expertise to help manufacturers define the best power source for their applications and equipment.

Innovation Leadership

Breakthrough innovations in Proton Exchange Membrane (PEM) technology. Leading the way in hydrogen generation at megawatt (MW) scale.

Best Total Cost of Ownership

Advanced technology with high efficiency, lower maintenance costs and fit-and-forget reliability delivers unrivaled lifetime value.

Specialist Hydrogen Know-How

More than 70 years of hydrogen leadership. Over 600 electrolyzers in 100 countries worldwide.

Impeccable Safety Record

Zero significant safety breaches in decades of use.

Global Reach

Accelera has the global resources to support your hydrogen project, no matter how big and no matter where.

Overview ↓

Born from Cummins, Accelera is solely dedicated to the development of zero-emissions power solutions for commercial and industrial applications. Backed by a legacy of innovation and manufacturing know-how, we are driven by the urgency of climate change to transition the world's most economically critical industries to clean power.

Accelerating the shift to green hydrogen

Green Hydrogen →

If you’re looking for clean power, it doesn’t get any cleaner than green hydrogen from water. It’s a reliable and scalable zero-emissions solution that’s viable today and for generations to come.

As the world marches on to meet the 2050 decarbonization goals set in the Paris Agreement, the role of green hydrogen becomes more and more critical. Yet today, about 95% of the world’s hydrogen is still produced from fossil fuels.

Green hydrogen is the future, and Accelera is one of the few global brands with expertise across both critical technologies — clean zero-carbon hydrogen generation through both primary electrolysis technologies, and the fuel cell technology that the future of power depends on. We’re at the heart of the new hydrogen economy. However large or small your hydrogen ambitions and however hydrogen fits into your future, Accelera is ready to support you today.

Green Hydrogen

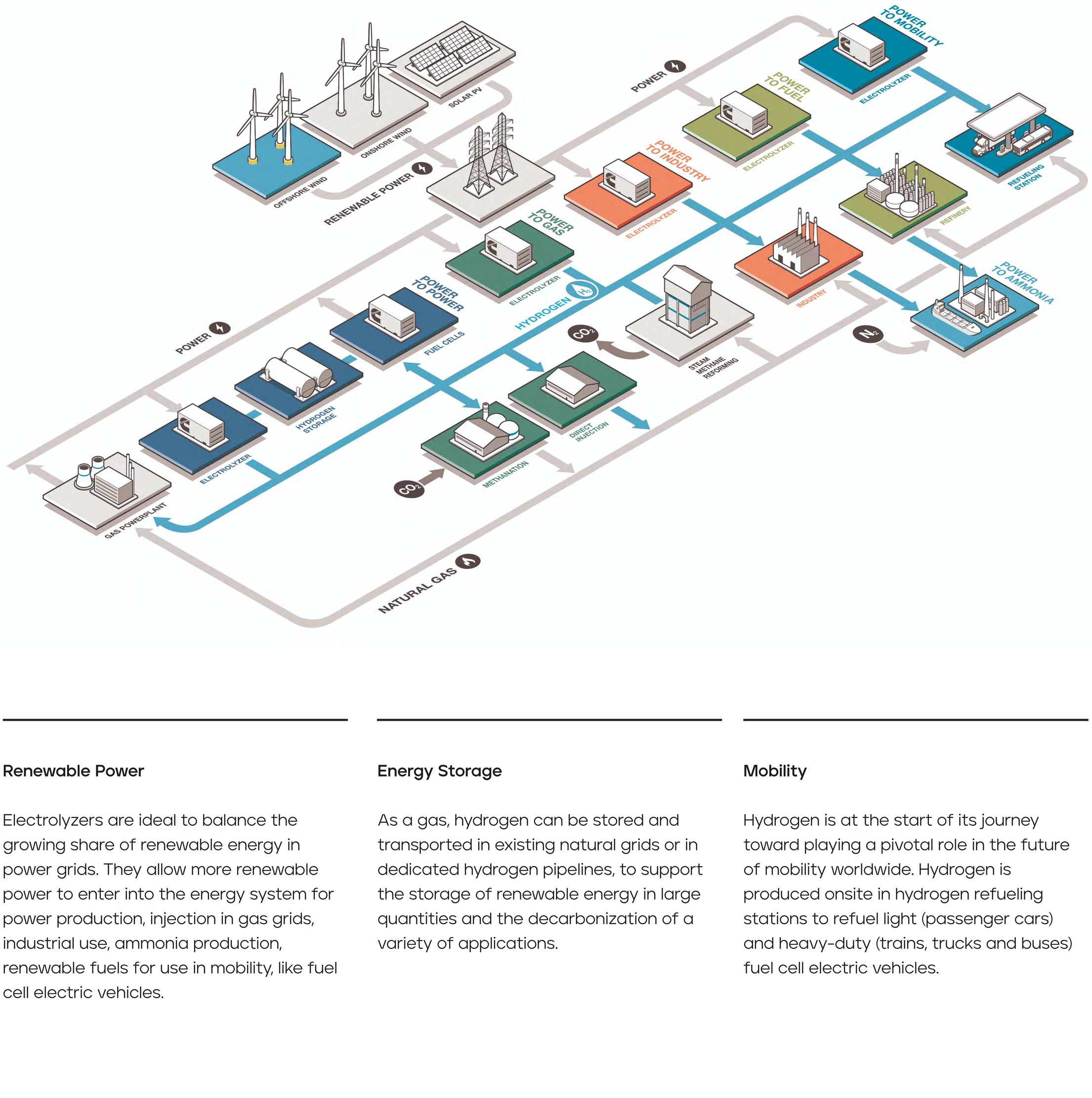
Only 1% of current hydrogen production is green hydrogen using electrolysis to turn hydro, wind or solar power into hydrogen with zero CO2 emissions. This is the future of hydrogen production.

Paris Agreement

Accelera supports the Paris Agreement climate goals; our PLANET 2050 plan includes a target to be carbon neutral by 2050.

The Green Hydrogen Economy

Hydrogen produced from renewable power through advanced electrolysis technology is the key to unlocking a cleaner and more sustainable future.



Renewable Power

Electrolyzers are ideal to balance the growing share of renewable energy in power grids. They allow more renewable power to enter into the energy system for power production, injection in gas grids, industrial use, ammonia production, renewable fuels for use in mobility, like fuel cell electric vehicles.

Energy Storage

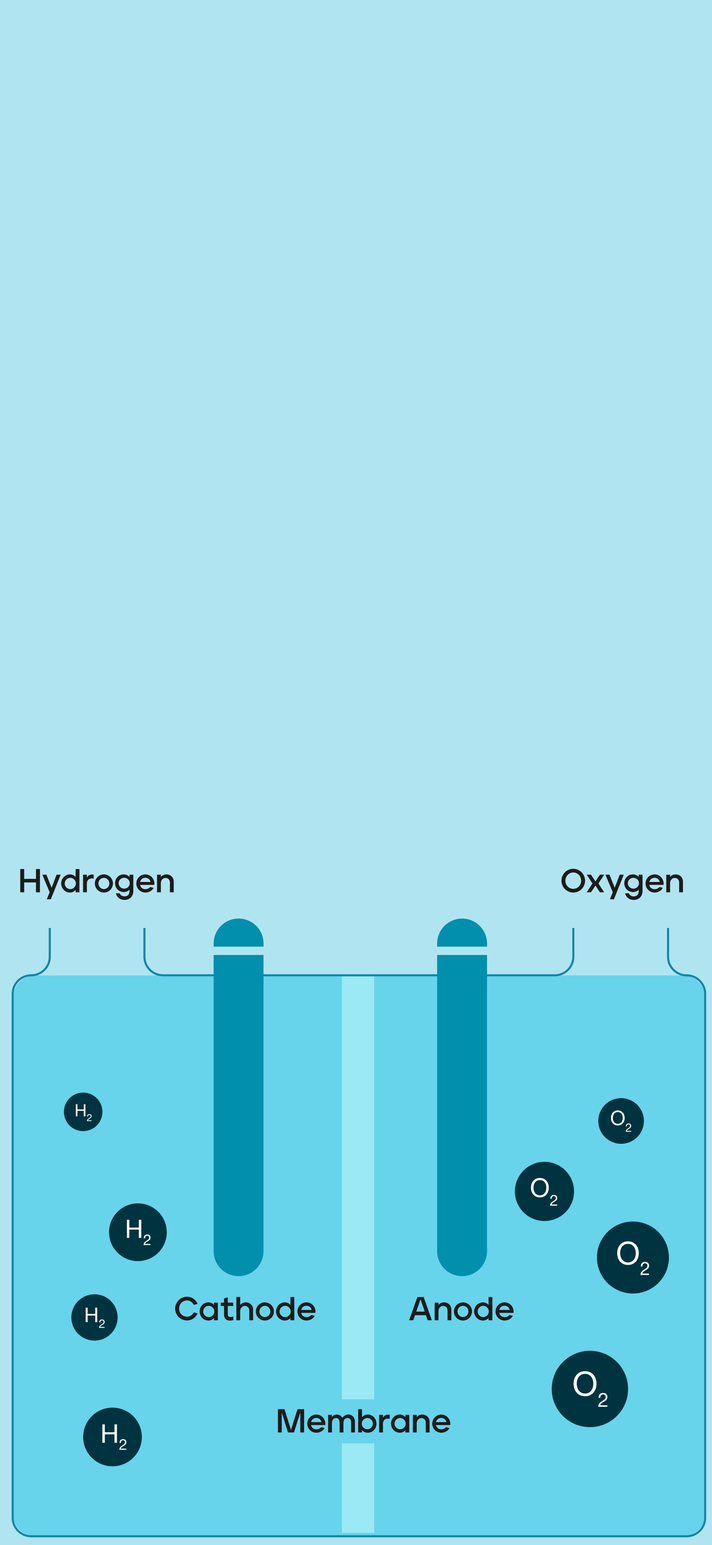
As a gas, hydrogen can be stored and transported in existing natural grids or in dedicated hydrogen pipelines, to support the storage of renewable energy in large quantities and the decarbonization of a variety of applications.

Mobility

Hydrogen is at the start of its journey toward playing a pivotal role in the future of mobility worldwide. Hydrogen is produced onsite in hydrogen refueling stations to refuel light (passenger cars) and heavy-duty (trains, trucks and buses) fuel cell electric vehicles.

The Essentials of Electrolysis

At the heart of Accelera's hydrogen-generation technology is electrolysis, a highly efficient electrochemical reaction using electricity to break down water (H2O) into its constituent elements, hydrogen (H2) and oxygen (O2).



The core components of an electrolyzer are cell stacks containing two electrodes through which electricity enters and exits the system, separated by a membrane across which the current passes. When electricity is applied to the system, hydrogen is formed at the cathode, oxygen at the anode. The membrane effectively keeps the gasses separate while they are harvested.

Hydrogen can be captured as a gas at extremely high purities, leaving oxygen that can be used for other purposes, including industrial and medical uses. The hydrogen gas can be easily stored as a compressed gas or liquid.



Electrolyzer Efficiency

Measurement

Energy experts like to express the efficiency of electrolyzer products as one single percentage (%) value. Hydrogen experts prefer to express electrolyzer efficiency in kilowatt-hours per kilogram (kWh/kg) for two reasons. Firstly, as an electrolyzer uses energy to generate hydrogen, the efficiency can be expressed as the ratio between electrical energy input and energy output (hydrogen). Secondly, the energy content of hydrogen is 33.3 kWh/kg, compared to 39.4 kWh at a high heating value.

Comparing Efficiency

The power consumption of an electrolyzer depends on the exact scope of supply. To allow a fair comparison between various products, the scope of supply (cells stacks, balance-of-stack, balance-of-plant), hydrogen output pressure (in bar) and hydrogen purity (in %) need to be the same.

Consumption will also vary over time — electrolyzers will consume less energy at the beginning of life (BOL) and more energy at the end of life (EOL) — and, over the operating window of the electrolyzer — electrolyzers will be more efficient at partial load (50%) than at nominal load (100%).

Efficiency values for Accelera electrolyzer products are expressed at the product boundaries, at rated pressure, nameplate capacity, hydrogen purity and at the BOL.

Accelera's electrolyzer efficiency degrades by less than 1% per year (assuming 8,500 hours of annual operation). After 80,000 hours, stacks can be easily refurbished to as-new efficiency.

PEM Technology

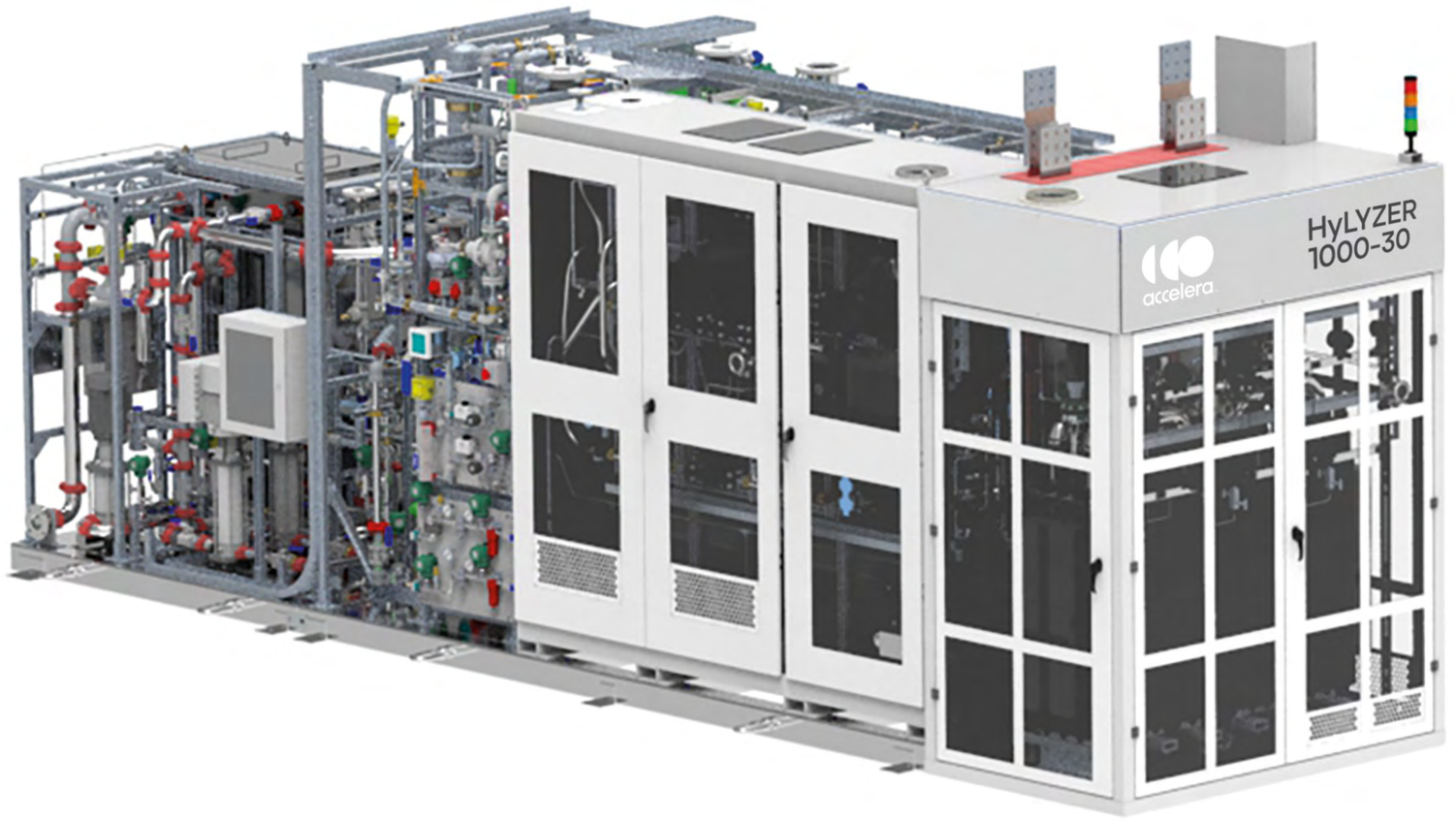
Proton Exchange Membrane (PEM) is the most robust and efficient technology for pure hydrogen generation at scale. Accelera is the industry benchmark for safe, widely proven PEM systems, delivering productivity and return on investment (ROI) beyond our competitors. Our "plug-and-play" systems arrive onsite ready to safely and reliably produce very-high-purity hydrogen, continuously or flexibly, indoors or out.

High efficiency aligns with low maintenance needs, delivering low capital and operational expense, with modularity that allows for simple scaling. Accelera systems connect to standard power and water connections and come equipped with standard water purification, power conditioning, hydrogen purification and remote servicing.

Accelera HyLYZER®

Accelera HyLYZER® Proton Exchange Membrane (PEM) technology is state of the art. With the most efficient and compact solution on the market, HyLYZER® delivers on market-leading operational expense and low levelized cost of hydrogen. Exceptionally compact systems deliver hydrogen at 30 bar without compression at extremely high purities.

Operating flexibly at higher current densities, HyLYZER® is perfectly suited to projects where dynamic operation is valuable, such as in combination with renewables. And where megawatt scale matters, HyLYZER® scales up to meet the highest output needs.



Benefits

01 **Megawatt Scale Stacks**

Industry-leading 2.5 MW stacks, highly scalable for larger demands

02 **Exceptionally Compact**

Industry-leading design: lower land, site preparation and building costs and shorter installation time

03 **Responsive**

Ultrafast responses to changes in hydrogen demand or power input

04 **Long, Maintenance-Free Lifecycle**

Limited and optimized maintenance, minimal degradation, 80,000 hours between stack membrane refurbishments; fast stack swap-out when required

05 **30-Bar Pressurized Stacks**

High output pressure without compressors

06 **High Efficiency and Advanced Control Systems**

Lower power usage and low annual maintenance costs, with integrated safety sensors for safe plant operations

PEM Electrolyzers HyLYZER® Series

Product	H2 Flow (Nm3/h)	System Efficiency (kWh/kg)	Equivalent Power Rating (MW)*	Output Pressure (bar)	Outdoor / Indoor	Size Process Module	Size Power Module
HyLYZER® 200-30	200	≤ 55	1	30	Outdoor	40ft container	20ft container
HyLYZER® 250-30	250	≤ 55	1.25	30	Outdoor	40ft container	20ft container
HyLYZER® 400-30	400	≤ 54	2	30	Outdoor	40ft container	40ft container
HyLYZER® 500-30	500	≤ 54	2.5	30	Outdoor	40ft container	40ft container
HyLYZER® 1000-30	1000	≤ 51	5	30	Indoor	27.7ft x 7.5ft (8.5m x 2.3m)	14.8ft x 8.2ft (4.5m x 2.5m)
HyLYZER® 4000-30	4000	≤ 51	20	30	Indoor	50ft x 25ft (15.2m x 7.5m)	23ft x 30ft (7m x 9m)

The standard scope of supply for our electrolyzers differ between the outdoor and indoor products.

	Outdoor	Indoor
Stack and Balance-of-Stack (BOS)	*	*
Cell Stacks and Gas Generation System	*	*
Power Rectifiers	*	*
Control Panel	*	*
Water Quality Monitoring System	*	*
Rectifier Cooling	*	*
Balance-of-Plant (BOP)	*	*
Gas Cooling with Chiller	*	*
Electrolysis Cooling with Dry Cooler	*	*
Water Purification System	*	*
Instrument Air Compressor	*	*
Hydrogen Purification System	*	*

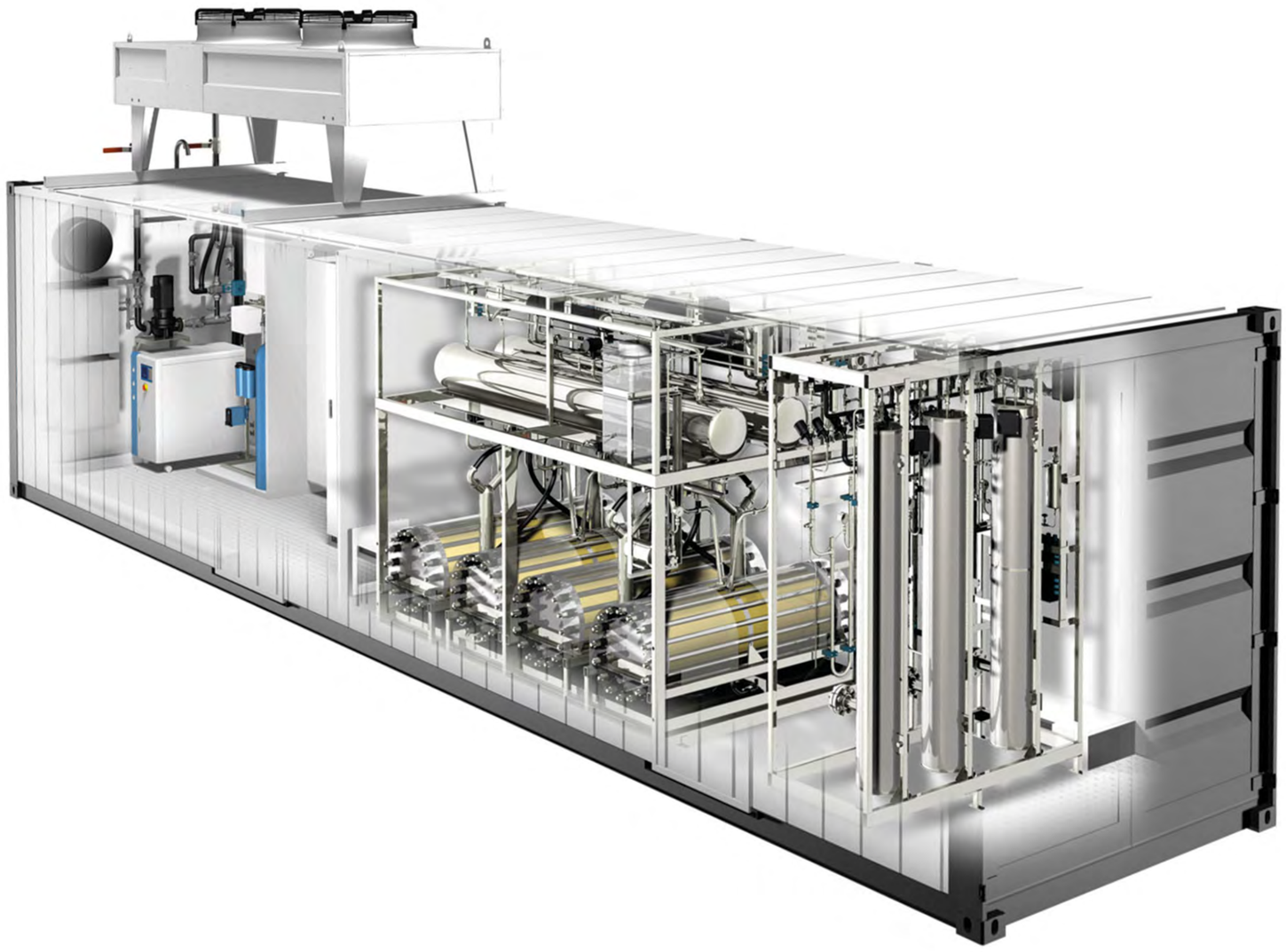
* = standard
* for the indicative power rating, a standard efficiency value of 5 kWh/Nm3 has been used across all products to give an indication of the product power rating.
Our products are designed to supply nominal hydrogen flowrates during their expected lifetime. In practice, our electrolyzers will consume less energy at the beginning of life (BOL) and more energy at the end of life (EOL) for a specific hydrogen production.

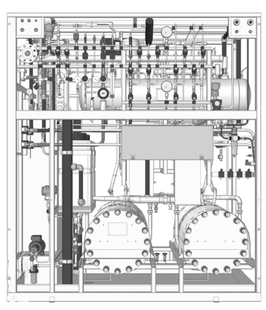
One kilogram of hydrogen is equivalent to 11,126 Nm3 (volume of hydrogen under normalized conditions of 1 atmosphere and 0 ˚C).

Alkaline Technology

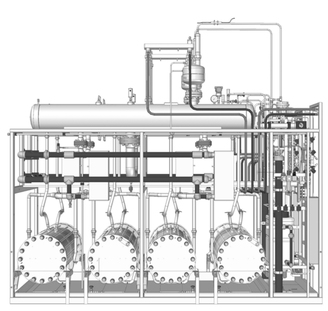
This long-standing technology is based on Accelera-proprietary IMET membrane, offering best-in-class systems with the strongest safety record and reliability in the market.

Accelera HySTAT®
HySTAT® is Accelera's globally proven modular alkaline electrolyzer system designed for easy onsite installation inside or out, with simple interconnectivity to scale up and an unrivaled record for reliability, low maintenance and onsite safety.

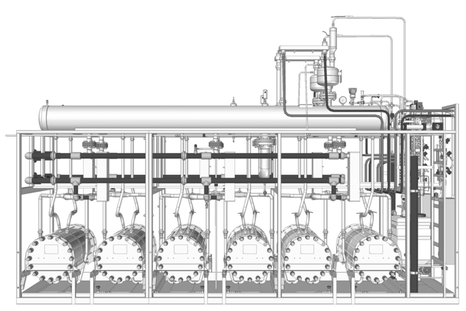




Up to 2 cell stacks
30 Nm3/h



Up to 4 cell stacks
70 Nm3/h



Up to 6 cell stacks
100 Nm3/h

01 **Proven Durability**

Robust technology and long lifetime with minimal maintenance.

02 **Robust Proven Technology**

Over 500 pressurized alkaline installations worldwide.

03 **Modular and Flexible**

Stack configurations available in 1, 2, 4 and 6 stacks with nominal hydrogen outputs from 10 to 100 Nm3/h, easily scalable to future needs.

04 **Safe**

Flawless safety record over decades.

Alkaline Electrolyzers HySTAT® Series

Product	H2 Flow (Nm3/h)	System Efficiency (kWh/kg)	Equivalent Power Rating (MW)*	Output Pressure (bar)	Outdoor / Indoor	Size Power Module
HySTAT® 10-10	10	55-60	50	10	Outdoor & Indoor	20ft container
HySTAT® 15-10	15	55-60	75	10	Outdoor & Indoor	20ft container
HySTAT® 30-10	30	55-60	150	10	Outdoor & Indoor	20ft container
HySTAT® 60-10	60	55-60	300	10	Outdoor & Indoor	40ft container
HySTAT® 70-10	70	55-60	350	10	Outdoor & Indoor	40ft container
HySTAT® 100-10	100	55-60	500	10	Outdoor & Indoor	40ft container

The standard scope of supply for our electrolyzers differ between the outdoor and indoor products.

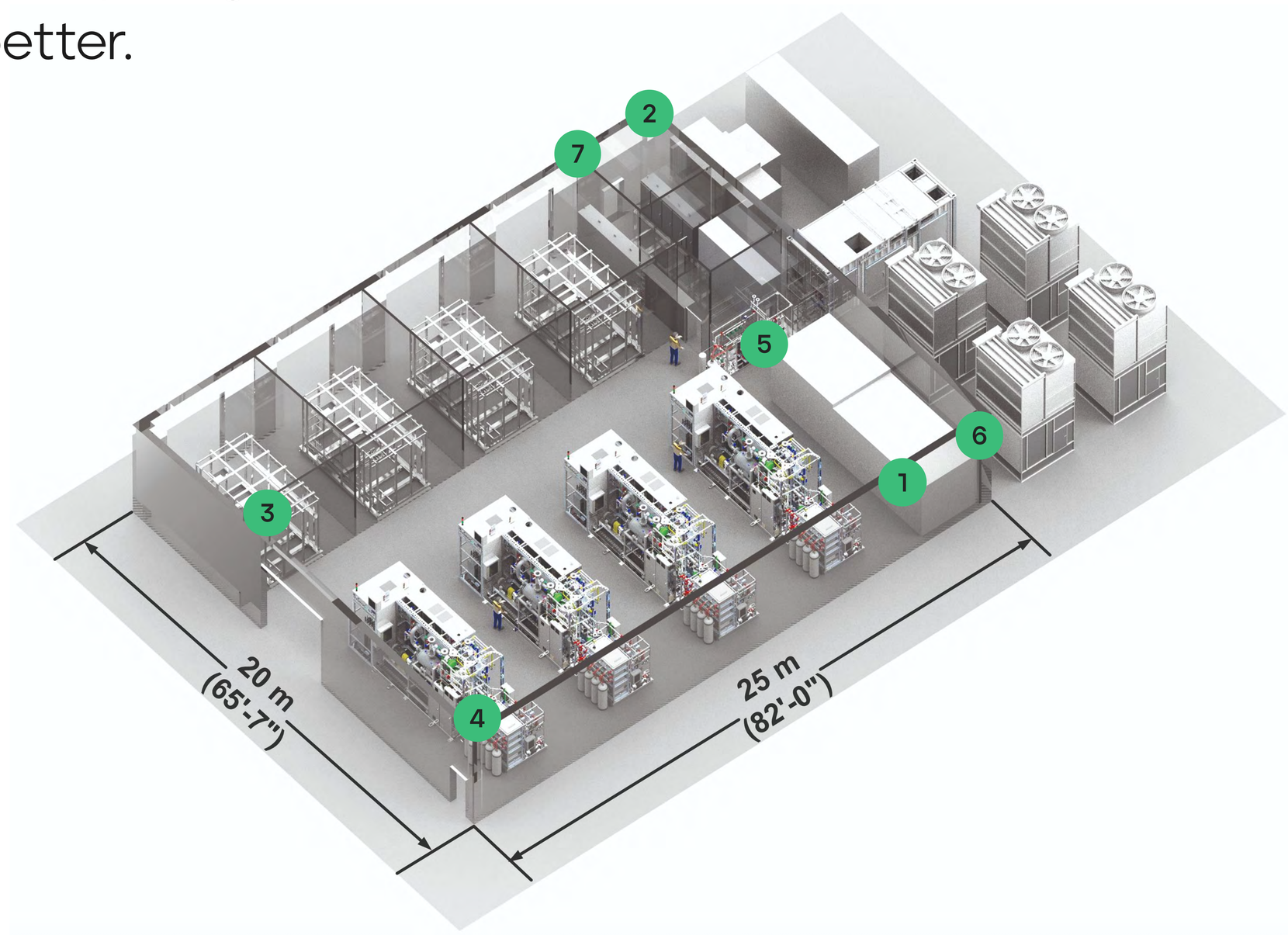
	Outdoor	Indoor
Stack and Balance-of-Stack (BOS)	*	*
Cell Stacks and Gas Generation System	*	*
Power Rectifiers	*	*
Control Panel	*	*
Water Quality Monitoring System	*	*
Rectifier Cooling	*	*
Balance-of-Plant (BOP)	*	*
Gas Cooling with Chiller	*	*
Electrolysis Cooling with Dry Cooler	*	*
Water Purification System System	*	*
Instrument Air Compressor	*	*
Hydrogen Purification System	*	*

* = standard
* for the indicative power rating, a standard efficiency value of 5 kWh/Nm3 has been used across all products to give an indication of the product power rating.
Our products are designed to supply a nominal hydrogen flowrates during their expected lifetime. In practice, our electrolyzers will consume less energy at the beginning of life (BOL) and more energy at the end of life (EOL) for a specific hydrogen production.

One kilogram of hydrogen is equivalent to 11,126 Nm3 (volume of hydrogen under normalized conditions of 1 atmosphere and 0° C).

Pioneering Hydrogen at Scale

Taking hydrogen power generation to megawatt scales and beyond is a complex technical challenge. At Accelera, we're proud to lead the way. We were the first to achieve MW scale, and today, we're setting records with some of the largest plants in the world. If scale is your goal, no one understands it better.



Central Water Purification System 1
Converts tap water into clean, deionized water suitable for the cell stacks.

Electrical Substation 2
Transformer and switchgear where high voltage from the grid is converted to medium-voltage AC.

Rectifier and Transformer 3
Medium-voltage AC is converted into DC power for the cell stacks.

Electrolyzer System 4
Breaks water molecules into hydrogen gas and oxygen gas, separated from water in gas-liquid separators. Enclosed, monitored and ventilated hydrogen production means building does not need to be classified as a hazardous area. The result: 99.99% pure hydrogen produced at 30 bar.

Optional Hydrogen Purification System 5
If required, hydrogen can be further purified to fuel cell quality (99.998%).

Central Cooling System 6
Cools water circulating through the cell stacks to optimize electrolysis efficiency.

Control Room 7
Centralized plant logic and safety control system.



Bécancour, Quebec →

Accelera PEM Technology at Scale

Accelera technology powers the largest PEM electrolyzer in operation in the world.

Installed at the Air Liquide hydrogen production facility in Bécancour, Quebec, the 20 MW Accelera electrolyzer system can produce over 3,000 tons of hydrogen annually using clean hydropower.

The modular and scalable electrolyzer platform addresses utility-scale hydrogen production.



Falkenhagen, Germany →

Helping to Build a Green Energy Economy

At the first demonstration plant for storing wind energy in the natural gas grid, around 360 Nm3/h of hydrogen is generated by six Accelera HySTAT® 60-10 electrolyzers. The hydrogen generated is fed via a pipeline into the gas grid. The energy is available to the electricity, heating, mobility and industrial markets when required, just like normal natural gas. In the first year of operation, more than 2 million kWh of hydrogen ("WindGas") were fed into the gas grid.

360 Nm3/h of hydrogen generated by 6 Accelera HySTAT® 60-10 electrolyzers.

In the first year of operation, more than 2 million kilowatt hours of hydrogen were fed into the gas grid.



Aberdeen, Scotland →

Hydrogen Refueling

Accelera supplied the HySTAT® 60-10 electrolyzer for the Aberdeen City Hydrogen Energy Storage (ACHES) facility. The facility offers hydrogen refueling for cars, vans, trucks and buses. The station has multiple electric recharging points and has the potential to produce 130 kg of hydrogen per day. To enable fast refueling, hydrogen is dispensed at 350 bar and 700 bar pressure.

The refueling station is capable of producing up to 130 kg of 99.999% pure hydrogen per day.

Refueling for cars, vans, trucks and buses.

190

190 countries

$1B

$1 billion annual spend to advance power technologies

Experience Meets Innovation

With the acquisition of Hydrogenics in 2019, Accelera became one of the world's leaders in hydrogen generation and fuel cell development. No one else combines cutting-edge expertise in hydrogen generation with the manufacturing scale, global support network and century-long experience of Accelera. No one is better equipped to support your hydrogen ambitions.

70+

70+ years of hydrogen expertise

600+

600+ electrolyzers systems installed worldwide

accelerate the shift™

Find out more at accelerazero.com

We're ready. Today.

Accelera Inc.
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