



# HyProvide™ A-Series

Produce your own hydrogen  
from renewable energy  
sources at the lowest cost  
possible



GREEN  
HYDROGEN  
SYSTEMS

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## Cracking the code to viable **green hydrogen**

Infinitely available and potentially green, hydrogen comprises an ever-growing share of the world's energy mix. The barrier has always been the cost of delivering hydrogen "green."

At GHS, we have cracked the code to producing green hydrogen at any volume – from just a few hundred kW to multi-MW scale .

We have done it by combining our highly efficient pressurised alkaline electrolyzers, a modular, scalable approach to system design, and our on-site production philosophy, resulting in low-CAPEX electrolysis solutions that our customers around the world are deploying today.



“Green Hydrogen Systems electrolyzers and on-site production approach have **enabled us to start meeting our customers’ demand** for solar-produced hydrogen.”

— Hans-Olof Nilsson, Nilsson Energy, Sweden







# Meet the HyProvide™ A-Series

The HyProvide™ A-Series is available in standardised, modular configurations for maximum efficiency, versatility and scalability.

Next-generation technology makes the A-Series one of the most efficient alkaline electrolysers available today. And the unit is designed from the ground up to accommodate the input fluctuations that come with renewable energy sources.

The result is consistently high output, very low power consumption and >99.998% pure and dry hydrogen supplied at 35 bar – ideal for further compression, immediate use as is or direct storage.

Based on a decade of research and development, we have achieved a unique, proven, and cost-competitive technology. Available in 30, 60 or 90 Nm<sup>3</sup>/h versions and fully upgradable, the HyProvide units can operate stand alone or clustered to meet required volumes of green hydrogen up to multi-MW scale.

One of the **most efficient** alkaline electrolysers **on the market**

# Technical Overview HyProvide™ A-Series specifications

Electrolyser unit	A30	A60	A90
Hydrogen production rate (Nm <sup>3</sup> /hour   kg/hour)	30   2.7	60   5.4	90   8.1
Hydrogen pressure (bar)	35	35	35
Hydrogen purity (%)	>99.998	>99.998	>99.998
Hydrogen dew point (°C)	-70	-70	-70
Oxygen purity (%)	>99	>99	>99
Maximum stack power consumption (kW) BOL-EOL*	125 - 150	250 - 300	390 - 450
Maximum stack voltage max. (DC)	120	250	250
Stack current at 100% load (A)	1200	1200	1800
<b>Stack at 100% load BOL:</b>			
Power consumption (kWh/Nm <sup>3</sup> )	4.17	4.17	4.33
Efficiency HHV (%)	84.97	84.97	81.8
<b>Stack at 50% load BOL:</b>			
Power consumption (kWh/Nm <sup>3</sup> )	4.15	4.15	4.15
Efficiency HHV (%)	85.2	85.2	85.2
<b>Total system at 100% load BOL container:</b>			
Power consumption (kWh/Nm <sup>3</sup> )	4.69	4.69	4.82
Energy consumption (kWh/kg hydrogen)	52.2	52.2	53.6
Efficiency HHV (%)	75.4	75.4	73.5
Efficiency LHV (%)	63.9	63.9	62.2
<b>Total system at 100% load BOL Electrolyser &amp; Power supply:</b>			
Power consumption (kWh/Nm <sup>3</sup> )	4.5	4.5	4.65
Energy consumption (kWh/kg hydrogen)	50.1	50.1	51.7
Efficiency HHV (%)	78.7	78.6	76.2
Electrical interface	3 phase 400 V +/- 10 %, 50-60 Hz	3 phase 400 V +/- 10 %, 50-60 Hz	3 phase 400 V +/- 10 %, 50-60 Hz
Stack water intake (litres/Nm <sup>3</sup> )	0.9	0.9	0.9
Water quality (µS/cm)	<5	<5	<5
Liquid cooling requirements (kW)	40	80	120
Communication interface	Ethernet/Mod-bus	Ethernet/Mod-bus	Ethernet/Mod-bus
Control software	HyProManager™	HyProManager™	HyProManager™
Installation	Indoors or container	Indoors or container	Indoors or container
Ambient humidity skid frame (, non-condensing)	0-90	0-90	0-90
Ambient temperature skid frame (°C)	+5 - +35	+5 - +35	+5 - +35
Ambient temperature container (°C)	-20 - +35	-20 - +35	-20 - +35
Skid frame measurements wxdxh (mm)	2100x 1300x 2416	2100x 1300x 2416	2100x 1300x 2416
Skid frame weight (kg)	<3400	<3500	<3500
Expected stack service life (operational hours)	100.000+	100.000+	100.000+

**All configurations are CE- approved and compliant with:**

Hydrogen generators 22734: 2019  
EMC directive (2014/30/EU)  
Low voltage directive (2014/35/EU)  
Machine directive 3 (2006/42/EC)  
PED directive (2014/68/EU)  
Measurements carried out in GHS lab

\* BOL - Beginning of life  
EOL - End of life

# Unique scalability and modularity

Start small or scale it up



complete **green**  
**hydrogen factory**  
in a container  
**16m<sup>2</sup>**

## Containerised solution

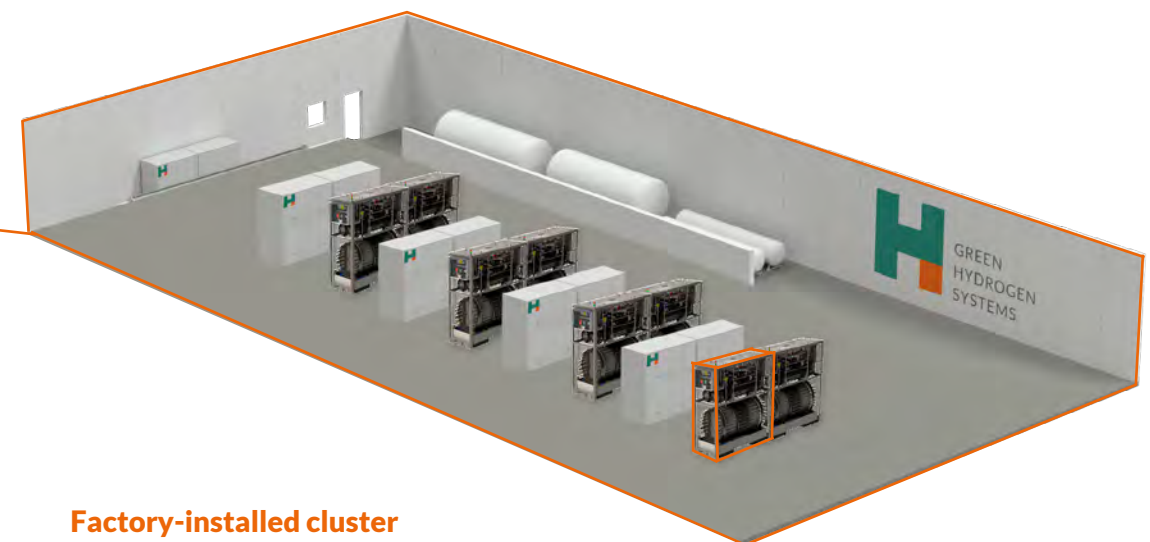
HyProvide™ A-Series installed in a 20ft container, allows for a rapid deployment of a fully self-contained electrolyser with no requirement of construction of a building



## Cluster to scale

As one of the only standardised, modular electrolysers on the market, the A-Series lets you cluster units to scale from 15 Nm<sup>3</sup>/1.4 kg to over 3330 Nm<sup>3</sup>/300 kg of hydrogen per hour. When clustering, our control system enables you to operate units individually or together as a group for ultimate flexibility.

For all these installations, high-efficiency electrolysis, a modular, scalable approach and on-site production can drive costs down to below the cost of hydrogen delivered in pressurized cylinders or tube trailers.



### Factory-installed cluster

A factory-installed HyProvide™ A-Series cluster, including smart controller.



# Who is using GHS's electrolyzers?

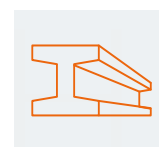
## Applications

### Refueling Stations



Our electrolyzers are currently producing hydrogen from renewable energy for fuel cell electric busses and cars, with several new deployments planned for the near future like zero emission trains and ferries.

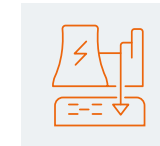
### Industry



Producing green hydrogen on-site using scalable GHS electrolyser clusters is a viable alternative for many industrial sites, enabling them to improve their green profile and become more energy independent.

What's more, green hydrogen produced via on-site electrolysis is often considerably less costly than hydrogen delivered from industrial gas companies.

### Power-to-X

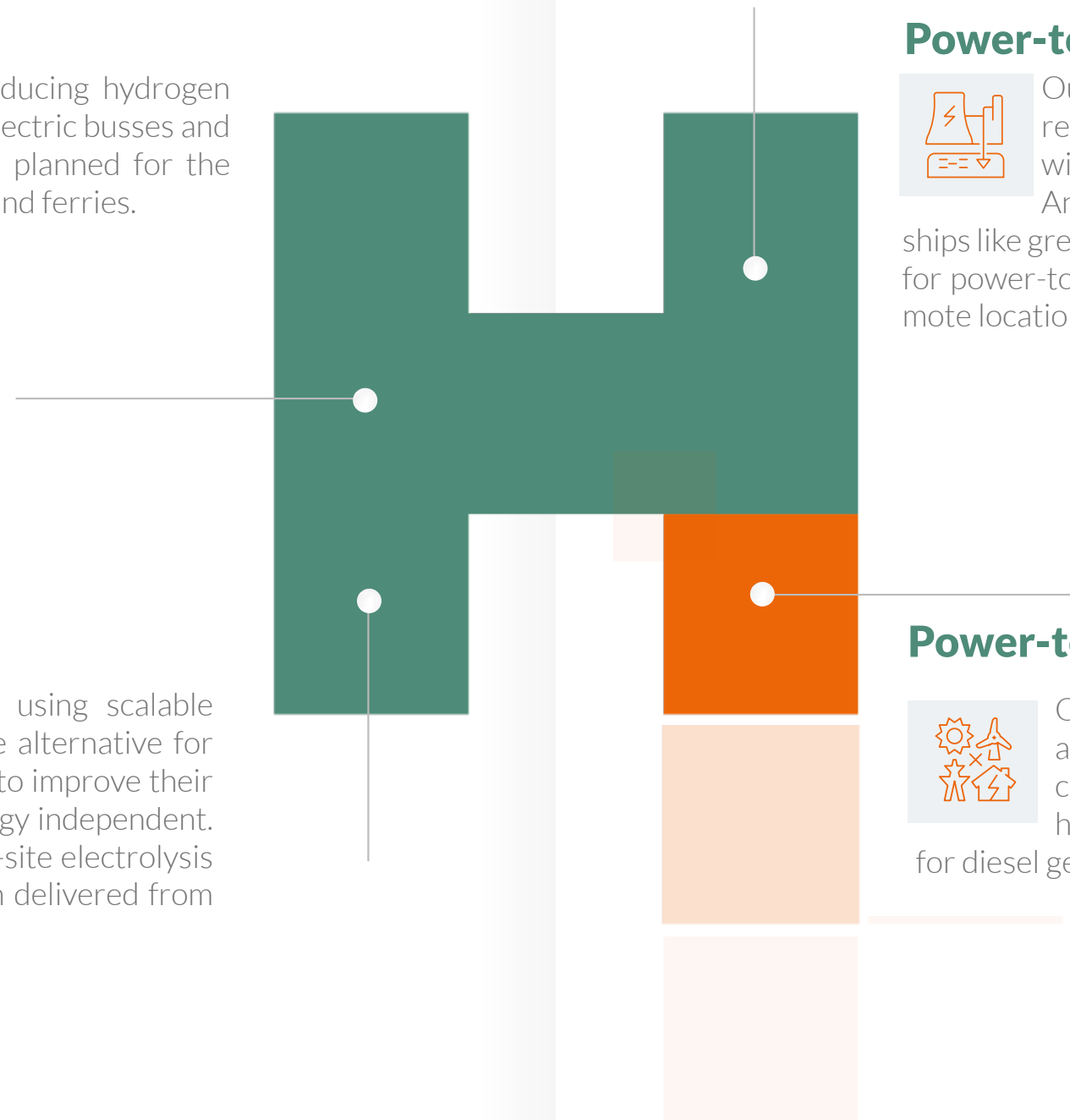


Our electrolyzers can produce green hydrogen for direct injection into the natural gas grid, or for combining with CO<sub>2</sub> to produce clean methane and methanol. Another example is production of alternative fuel for ships like green ammonia or DME. Our electrolyzers are also ideal for power-to-power applications in off-grid communities and remote locations, in combination with hydrogen fuel cells

### Power-to-Power



Our electrolyzers are also ideal for power-to-power applications in off-grid communities and remote locations, in combination with hydrogen fuel cells or a hydrogen-powered generator as a clean replacement for diesel gensets.







# About **Green Hydrogen Systems**

Green Hydrogen Systems is a leading provider of standardised and modular electrolysers for the production of green hydrogen solely based on renewable energy. With its wide range of possible applications, green hydrogen plays a key role in the ongoing fundamental shift in our energy systems towards a net-zero emission society in 2050. As a result, the demand for green hydrogen is surging, requiring a significant scale-up of electrolysis capacity.

Founded in 2007 and building on more than 10 years of technology development, we today have a commercially proven and cost competitive electrolysis technology, endorsed by leading wind energy companies.

Green Hydrogen Systems combines ultra-efficient, standardised and modular electrolysis technology with an on-site production approach to bring cost competitive green hydrogen to producers of hydrogen fueling stations, those requiring hydrogen in power-to-X installations, industrial facilities and more. Our technology is already in use in several places in Europe, with the rapidly emerging OEM segment as a particular focus of future growth.

Our modern and state-of-the-art manufacturing, R&D and office facility in Kolding, Denmark, is armed with production and testing equipment to optimize optimise manufacturing and provide the highest levels of quality and safety. The 4,500 m<sup>2</sup> facility with a production capacity of 75 MW per year completes the first phase of our expansion plan.

Our brand new  
**production and  
R&D** facilities

**4500m<sup>2</sup>**

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