



# HyProvide™ A series

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



GREEN  
HYDROGEN  
SYSTEMS

v 1.2  
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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."

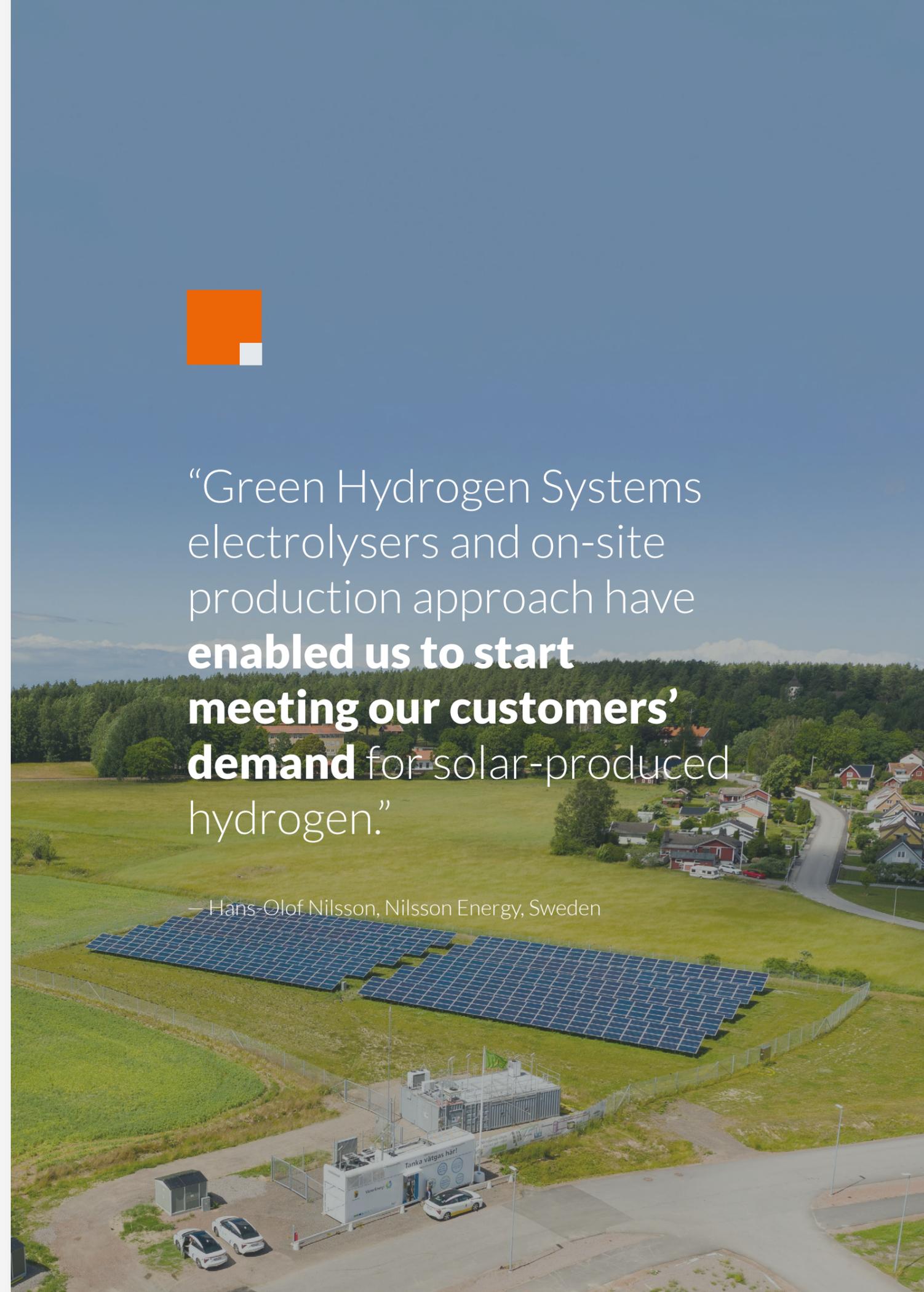
At GHS, we have cracked the code to producing green hydrogen at any volume – from just a few hundred kW to multi-MW scale – at the lowest levelized cost of hydrogen (LCOH) available anywhere.

We've done it by combining our highly efficient alkaline electrolyzers, a modular, scalable approach to system design, and our on-site production philosophy, resulting in low-CAPEX electrolysis solutions that our customers 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 standardized, modular configurations for maximum efficiency, versatility and scalability.

Next-generation technology makes the A-Series the most efficient alkaline electrolyser 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 direct storage, further compression or immediate use as is.

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 standalone 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 (kW/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 (kW/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 (kW/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 (kW/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
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+A31:A39	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

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

**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 GreenHydrogen lab.

# Unique scalability and modularity

Start small or scale it up



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

## Containerised solution

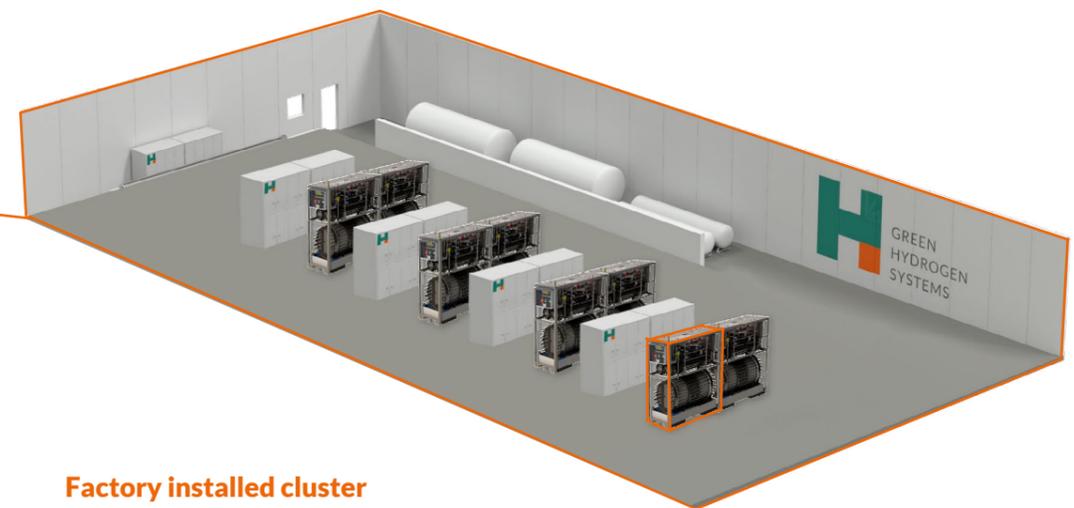
HyProvide™ A-Series installed in a 20ft container, allows for a rapid deployment of a fully self-contained electrolyser with no requirement of construction of a building



## Cluster to scale

As the only standardized, modular electrolyzer 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 control 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 have driven costs down to far 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 ferries and trains. For all these installations, high-efficiency electrolysis, a modular, scalable approach and on-site production have driven costs down to far below the cost of hydrogen delivered in pressurised cylinders or tube trailers.

### 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

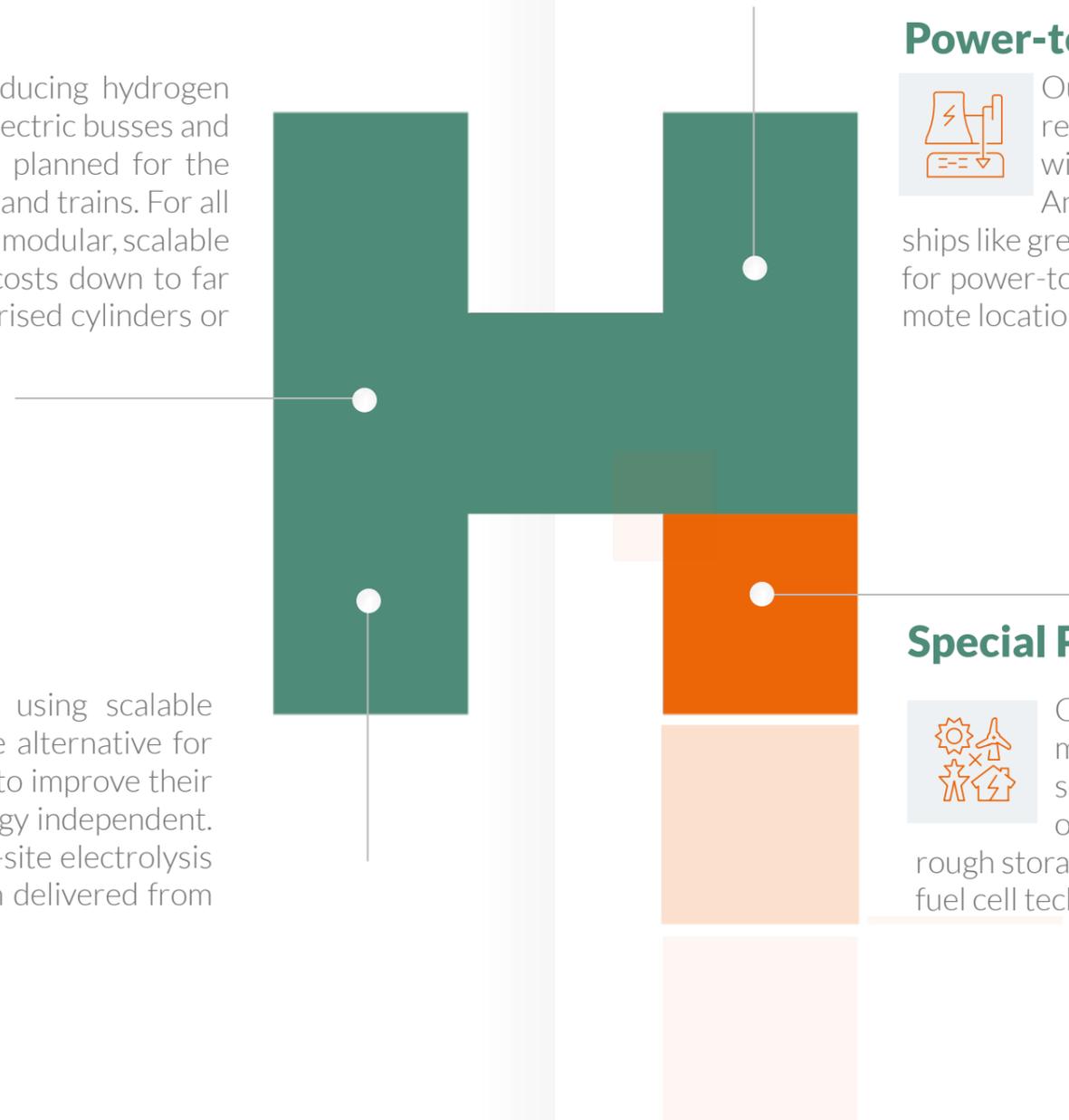


Our electrolyzers can produce green hydrogen for direct injection into the natural gas grid, or for combining with CO2 to produce clean methane and methanol. Another example is production of alternative fuel for ships like green ammonia or DME. Our electrolyzers are also ideal for power-to-power applications in off-grid communities and remote locations, in combination with hydrogen fuel cells

### Special Projects



Green hydrogen is a unique energy carrier, which makes it applicable in various projects. Not all of these fit into easily definable categories. As an example one of special projects could be grid stabilisation through storage of hydrogen and reversion to energy through fuel cell technology.





# About **Green** **Hydrogen Systems**

Founded in 2007, Green Hydrogen Systems provides efficient, standardised and modular electrolysers that produce green hydrogen using renewable energy. Our technology is already in use in Europe, with the rapidly emerging OEM segment as a particular focus of future growth.

Backed by growing revenue and recent investments from among others Mærsk, we are aggressively scaling our operations. We have just completed the first phase of our new state of the art production facility near Kolding, in Denmark, which will be one of the biggest alkaline electrolysis factories in Europe.

The state of the art 150MW capacity factory is armed with the newest equipment to fully optimise the manufacturing process and enable Green Hydrogen Systems to scale the capacity, to meet the growing demand for our technology. Green Hydrogen Systems is owned by a group of investors including Nordic Alpha Partners and Norlys Holding.

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

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

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