

SIEMENS

Siemens Advanta

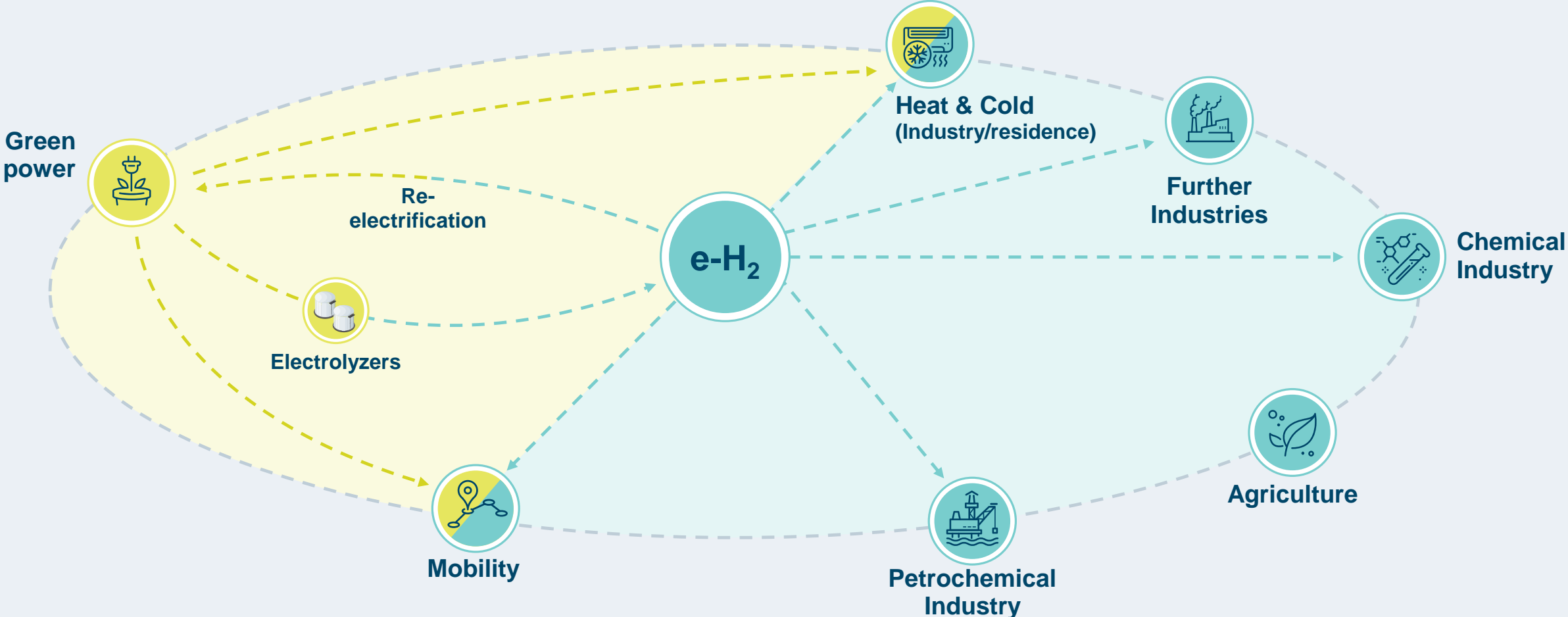
WHY MACHINE BUILDERS SHOULD GET READY FOR GROWTH IN GREEN HYDROGEN

Unrestricted © Siemens 2023

[siemens-advanta.com](https://www.siemens-advanta.com)

Green Hydrogen (H₂)

Hydrogen generated from green power is key to a climate neutral economy with manifold use-cases.



Hydrogen Use Cases



Mobility

Hydrogen is a promising solution for sustainable mobility applications, whether it be by powering fuel-cell electric vehicles (FCEVs), hydrogen combustion engines or as element for synthetic fuels such as ammonia to power cargo ships.



Petrochemical Industry

Refining processes would not be possible without H₂, as companies use the gas to remove sulphur from the fuels they produce. Using green hydrogen for these chemical separation processes helps the petrochemical industry to become more sustainable.



Agriculture

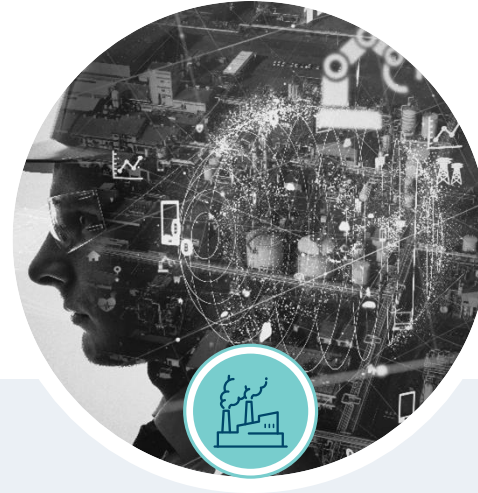
In agriculture, green hydrogen can not only be used to power machinery and equipment, but also to produce ammonia for fertilizers. These fertilizers are essential for crop growth to feed an ever increasing world population.

Hydrogen Use Cases



Chemical Industry

When used as feedstock to produce base chemicals such as methanol, hydrogen from renewable energy sources plays a key role in the transition to a net-zero chemical industry.



Further Industries

Many other energy intensive industries can also benefit from green hydrogen: In the steel industry, for example, H_2 can be used to reduce iron pellets into sponge iron that can then be processed to form steel.



Heat & Cold

Heating homes & buildings in cold northern winters is a challenge that can be addressed by powering heating systems with green hydrogen imported from more sun-rich areas of the world.

Hydrogen Market Drivers

The hydrogen market growth is propelled by various drivers.



Decarbonization to tackle climate change



Reduction of energy dependency due to global conflicts



Hydrogen price competitiveness due to decreasing solar cost



Lack of other sustainable solutions for certain energy demands, e.g., steel production

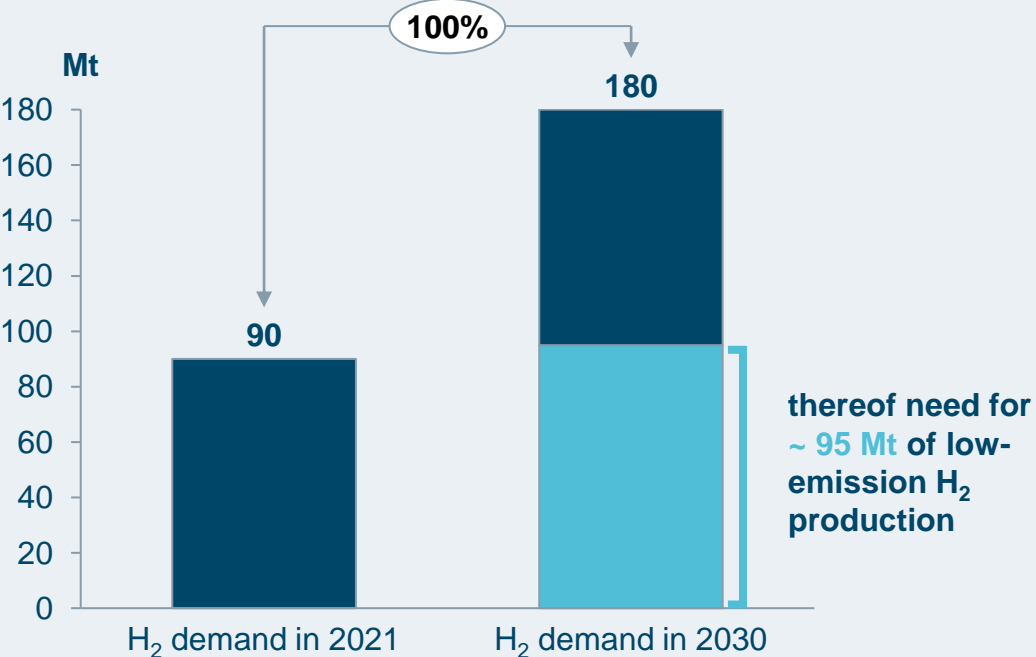


Demand for a storable energy source



Demand for Hydrogen

As a result, a significant increase in the demand for (green) hydrogen is expected. Therefore, more **low-emission H₂ production** projects focused on electrolysis and carbon capture, usage & storage are needed.



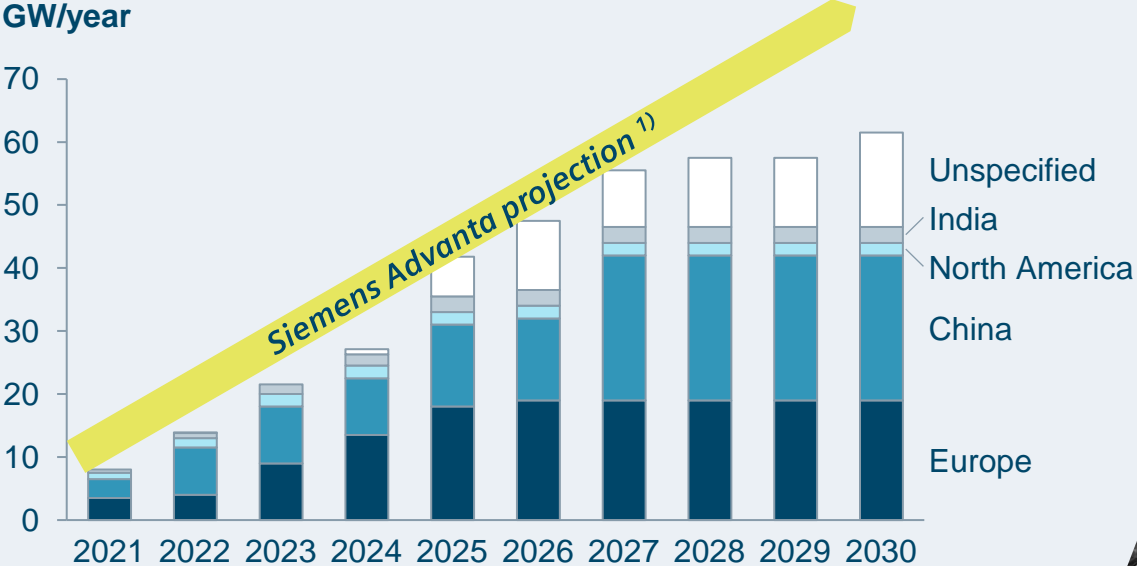
Mt = Mega tons
Source: International Energy Agency (IEA)



Increase of Electrolyzer Manufacturing Capacity

There is a huge market to tap into due to the expected increase of **electrolyzer manufacturing capacity**, creating growth opportunities for machine builders and OEMs to secure their part of the H2 cake.

Planned Electrolyzer Manufacturing Capacity per Region

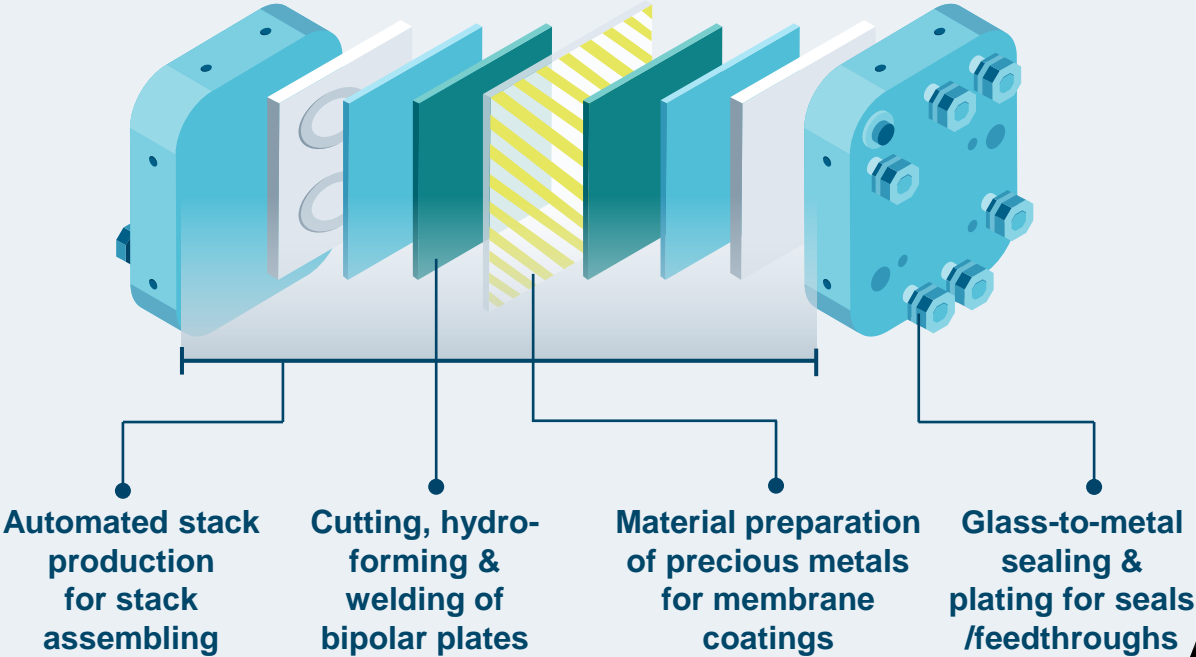


1) Future electrolyzer manufacturing capacity expected to surpass currently available planning figures from IEA due to e.g., additional projects to be announced over the next years
Source: International Energy Agency (IEA), Siemens Advanta Consulting Analysis

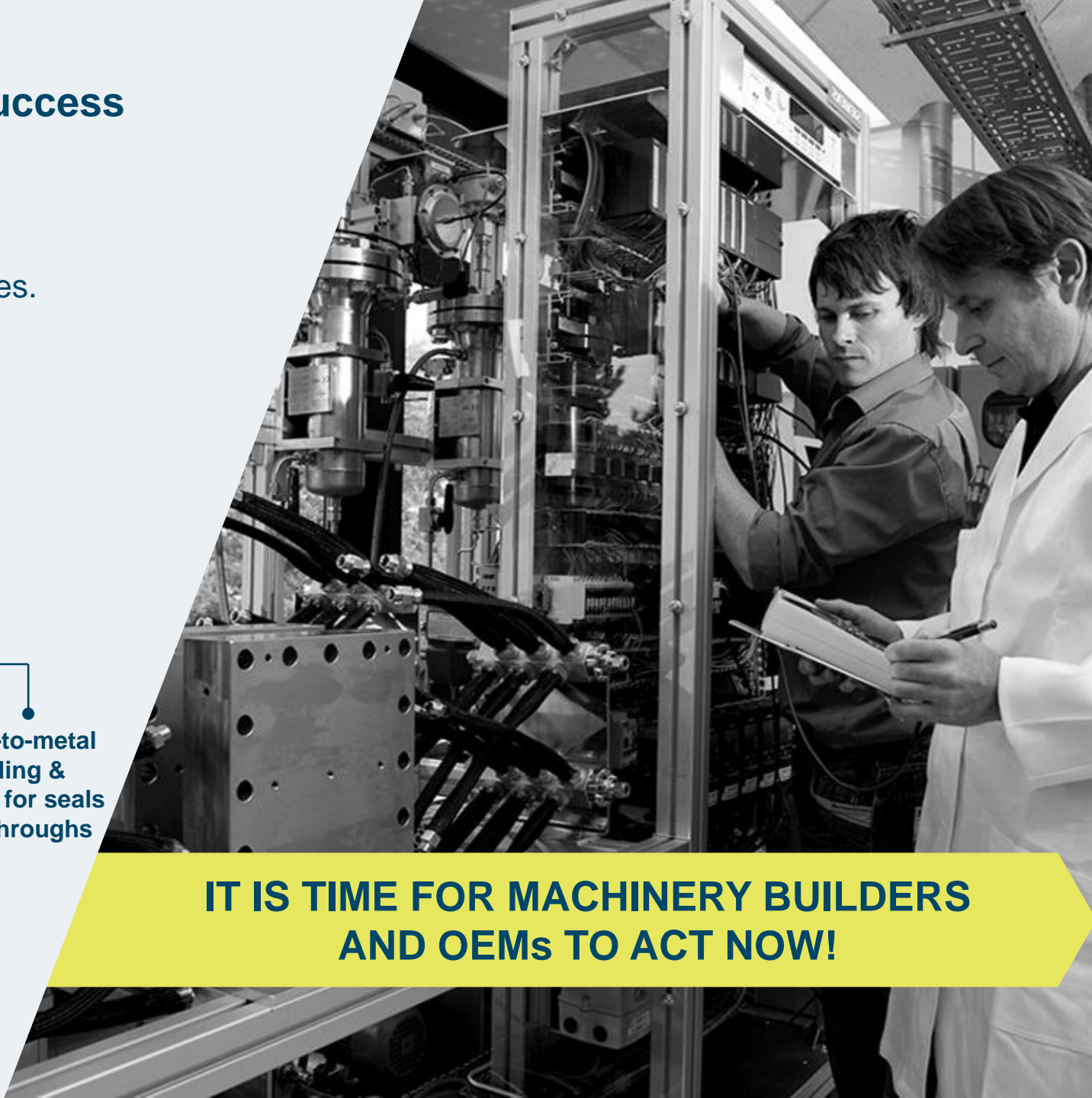


Manufacturing Technologies as Key to Success

Electrolyzer manufacturers will be buying machinery regarding various (high-tech) manufacturing technologies.



(Exemplary technologies shown only)



IT IS TIME FOR MACHINERY BUILDERS AND OEMs TO ACT NOW!

Key Questions to Start Preparing

1

What is the **size** and **timing** of the market opportunity?

2

Which **submarkets** are attractive for my company / business?

3

How to develop a **targeted portfolio** for these markets?

4

What do I need to do **organizationally** to get ready?



Marcus Hülshoff

Vice President
Industrial &
Machine Builders



Dr. Stefan Kneip

Vice President
New Technologies



Markus Brauch

Project Manager

YOUR CONTACTS

