

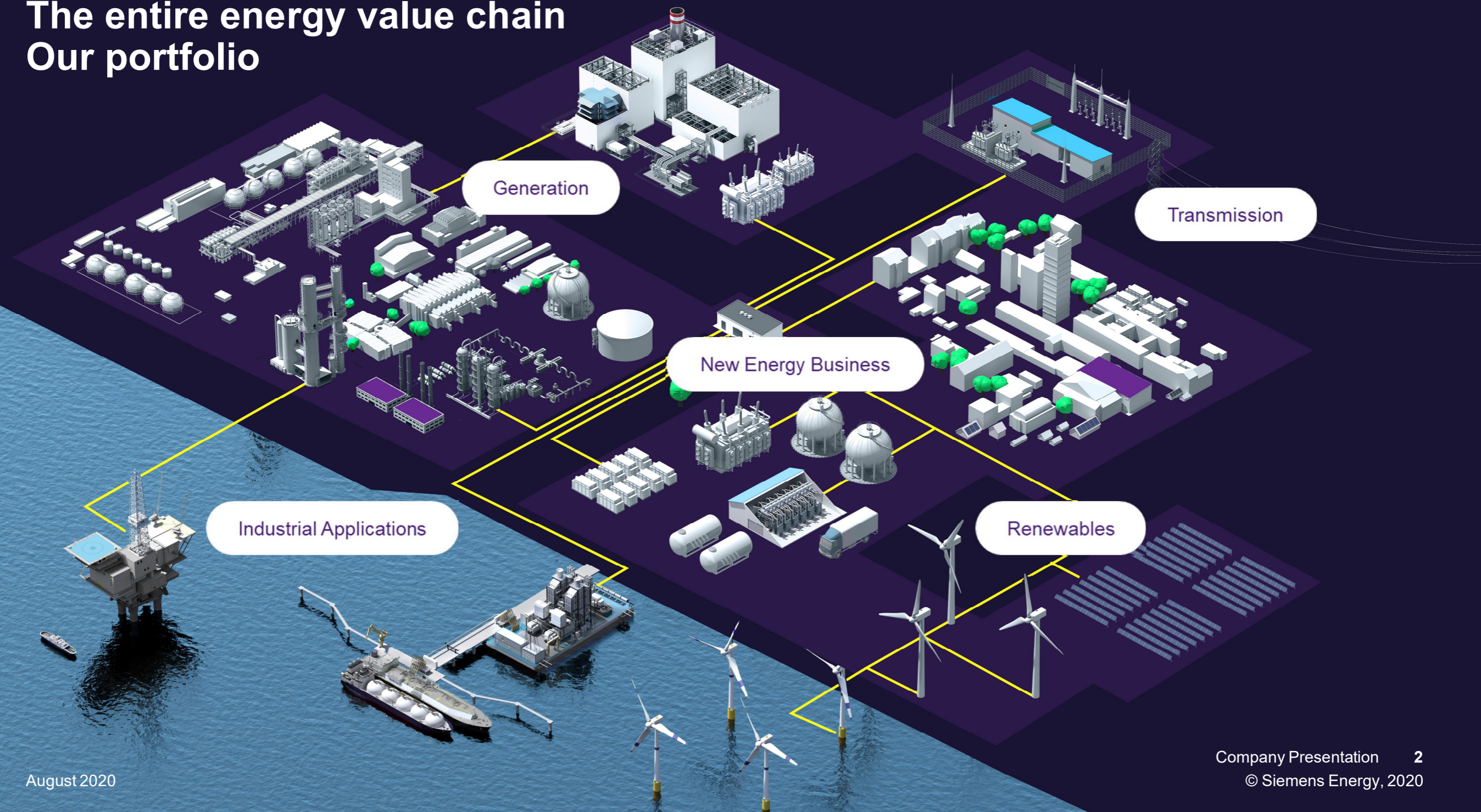
Green H₂ – Development of production technology

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The entire energy value chain

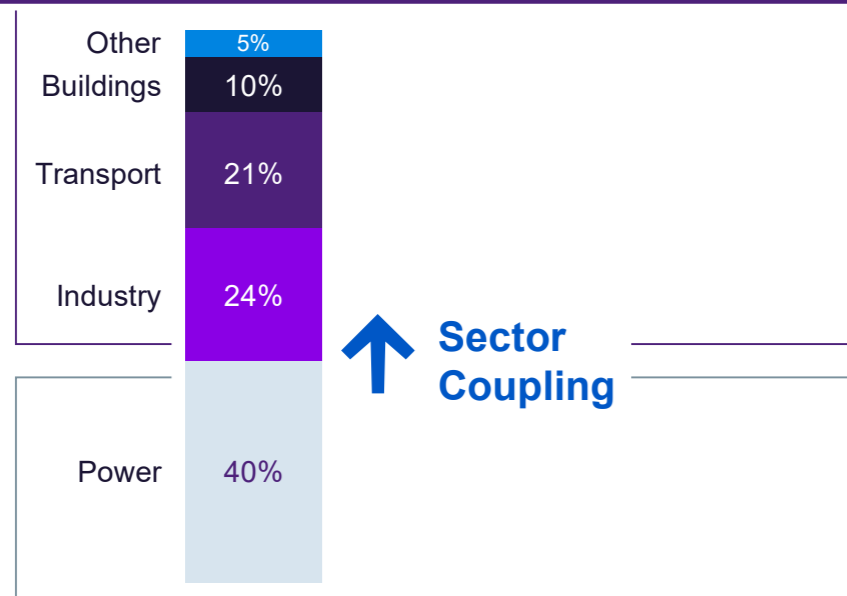
Our portfolio



“Sector Coupling” is the key lever for decarbonization of all end-user sectors

Shares in global CO₂ emissions by sectors

Increased future focus for emission reduction
Share on CO₂ emissions: 60%
Share of Renewables: 8%



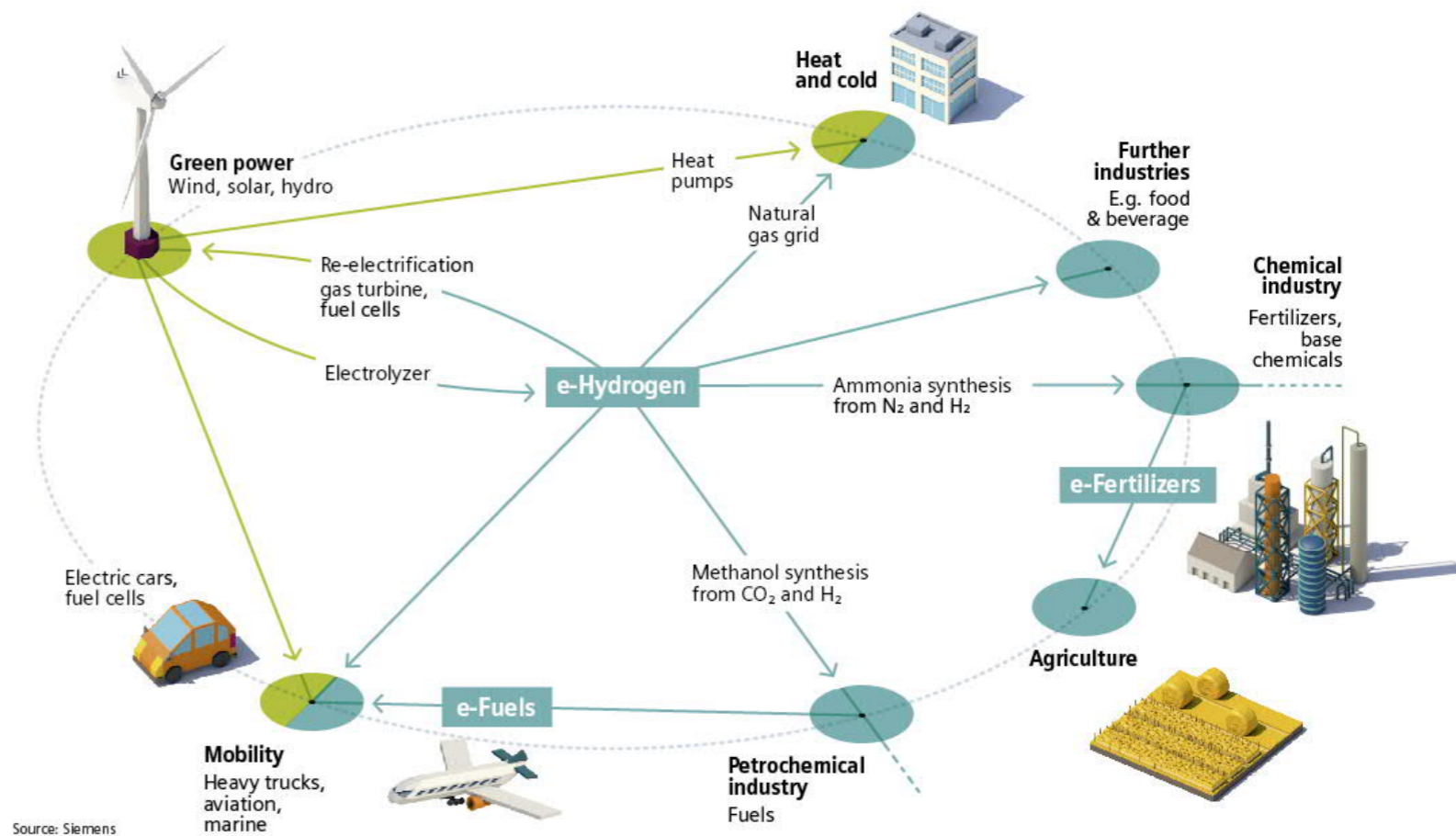
Continuous emission reduction required
Share on CO₂ emissions: 40%
Share of Renewables: 22%

Source: World Energy Balances 2018

2020-08-19

Sector Coupling – Links and Interactions

Pathways ■ Electrical ■ Chemical

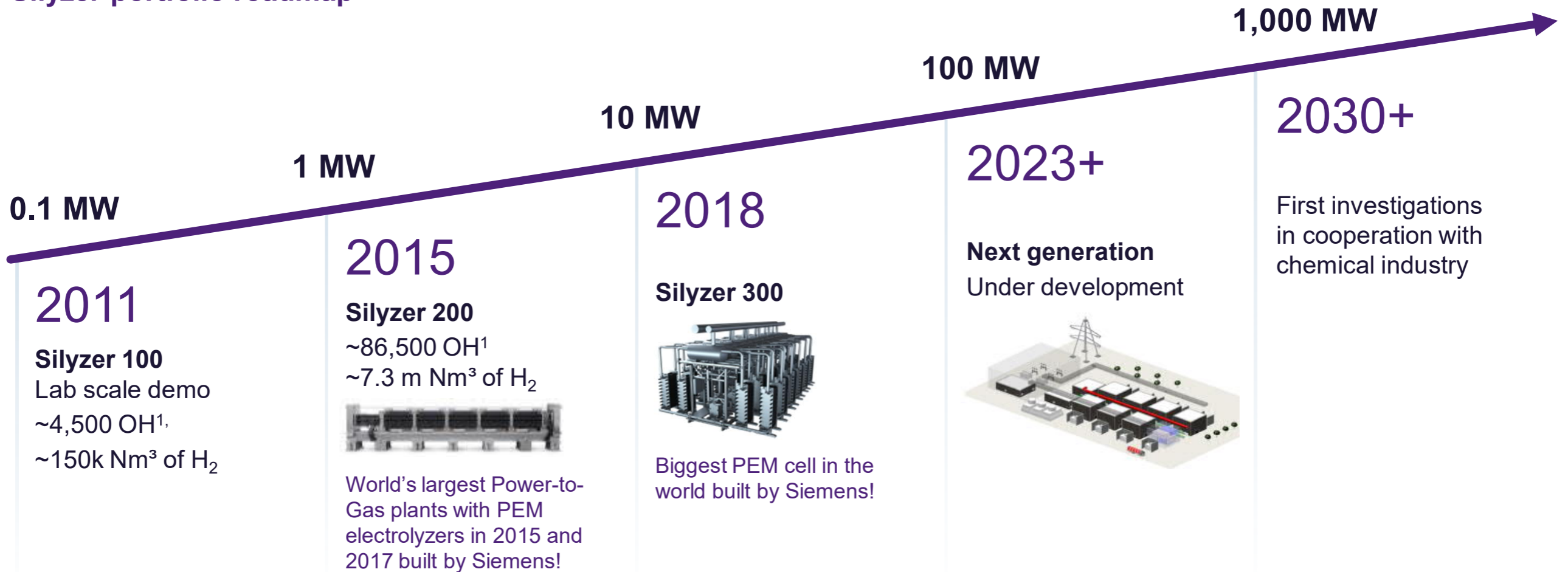


Source: Siemens

Silyzer portfolio scales up by factor 10 every 4 – 5 years driven by market demand and co-developed with our customers



Silyzer portfolio roadmap



¹ Operating Hours; Data OH & Nm³ as of Dec 2019

Silyzer 300

The next paradigm in PEM electrolysis

17.5 MW

Power demand
per full Module Array
(24 modules)

>75%

System efficiency¹
(higher heating value)

24 modules

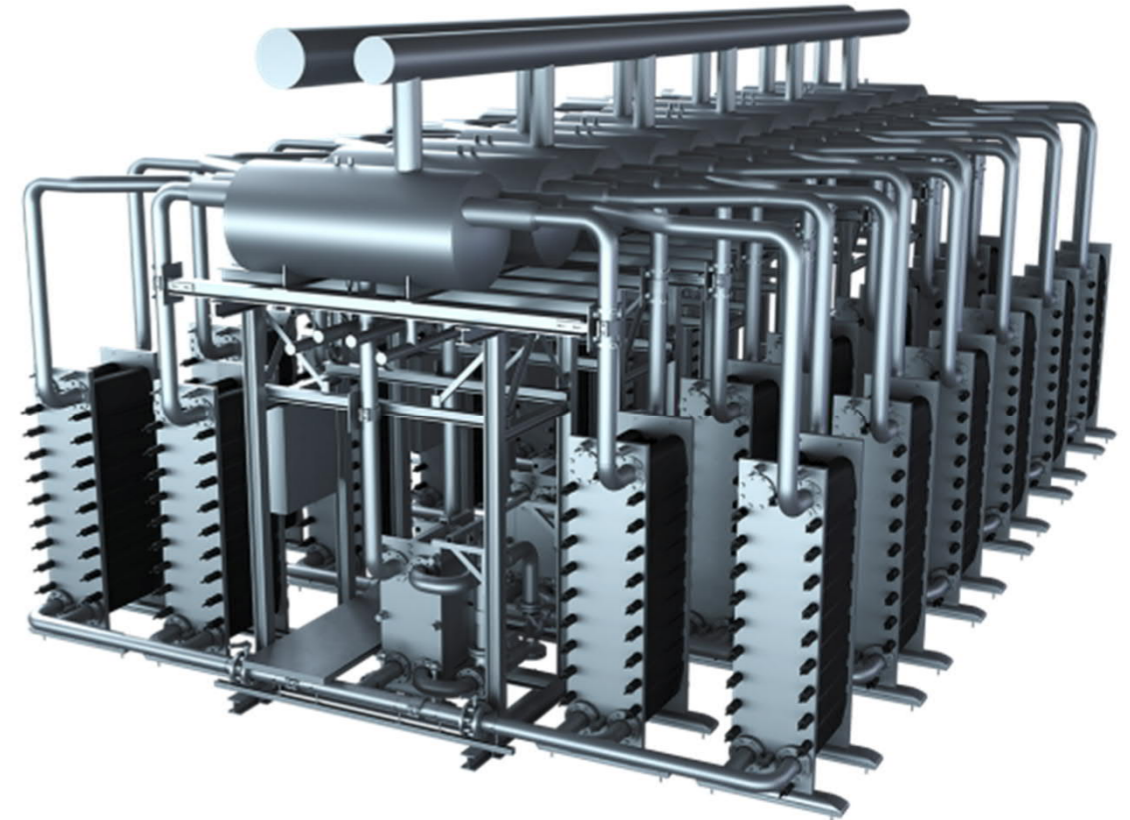
To build a
full Module Array

330 kg

Hydrogen per hour
per full Module Array
(24 modules)

Silyzer 300

Module Array (24 modules)



¹ Ambient temperature 15° C, air cooled

Optimized footprint for 20 MW project Silyzer 300 Plant Layout

Project-specific example

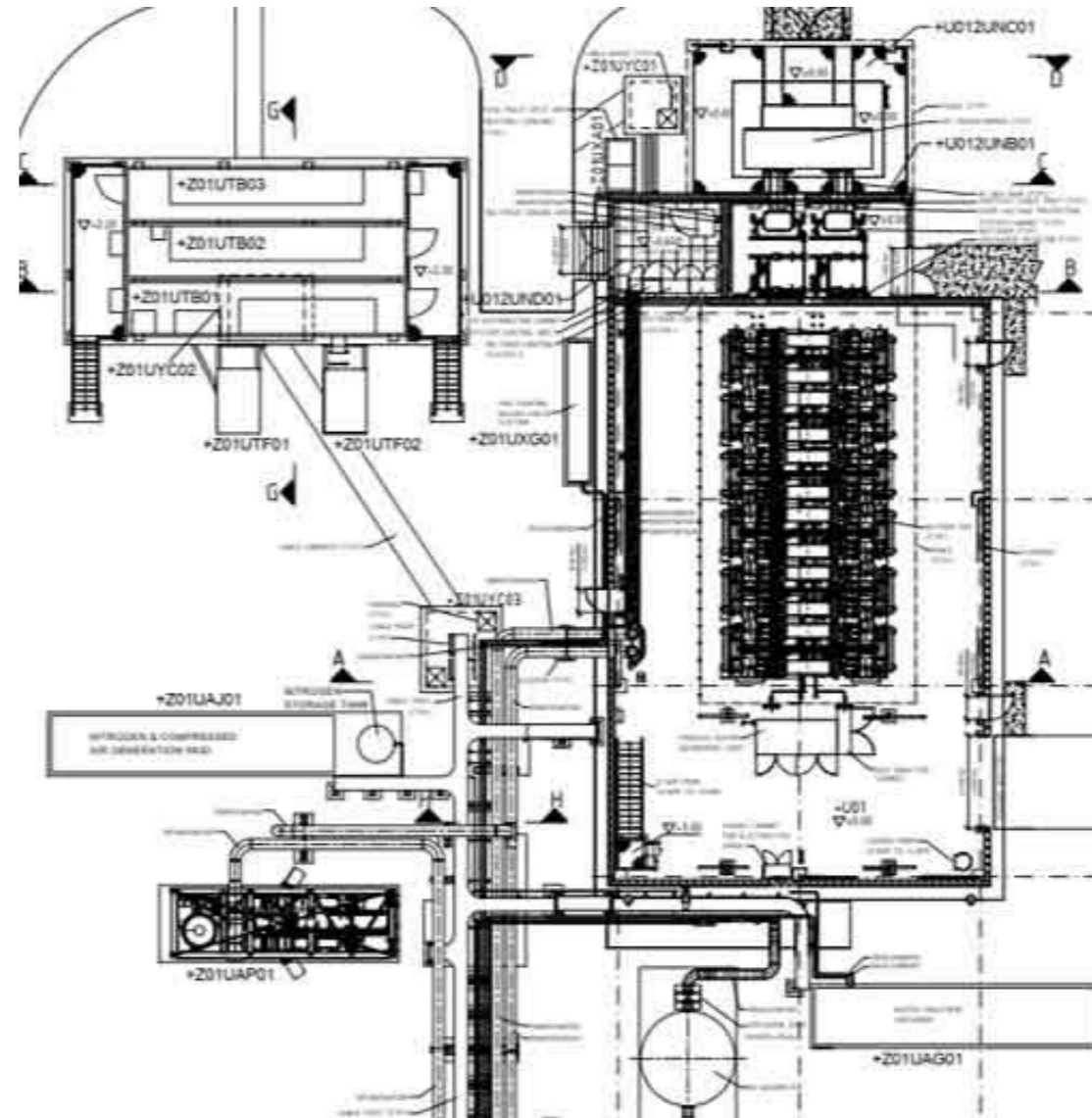


**Hydrogen production
335 kg/h at 20 bar**

The plant arrangement is on the
project basis, for very small areas

→ 335 kg/h H₂

Plant dimensions: 40 x 32 m





750.000 liters

of e-methanol per year from 2022
(130.000 liters of e-gasoline)

>55 mio liters

e-fuel per year
planned from 2024

Supported by:



Federal Ministry
for Economic Affairs
and Energy

on the basis of a decision
by the German Bundestag

2021-03-12

Haru Oni Pilot Project

Worldwide first integrated plant for the production of climate-neutral e-fuel from wind and water

Project

- Customer: HIF (Highly Innovative Fuels)
- Off-taker: Porsche AG
- Country: Chile, Patagonia
- Installation: 2021
- Product: Power-to-methanol solution based on Silyzer 200

Opportunity

- Huge wind energy potential in Magallanes
 - Existing industry and port infrastructure
- Perfect conditions to export green energy from Chile to the world

Use cases



E-Fuel for Porsche cars

Potential for adding Kerosene or Diesel production in future phases

Methanol for ship motors

Solutions

- Production of e-gasoline and e-methanol at one of the best spots worldwide for wind energy
- Co-developer Siemens Energy realizing the system integration from wind energy to e-fuel production
- International Partners like Porsche and AME

Reference PtX: Haru Oni in Chile



Pilot phase until

2022

~130.000
liters e-fuel per year

1st phase until

2024

~55 million
liters e-fuel per year

2nd phase until

2026

~550 million
liters e-fuel per year

