

# Current hydrogen market momentum and unlocks

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**Hydrogen is  
driven by  
decarbonization,  
economics and  
industry  
momentum**

**78%**

Of the world's GDP in countries  
with Net Zero targets

**>500**

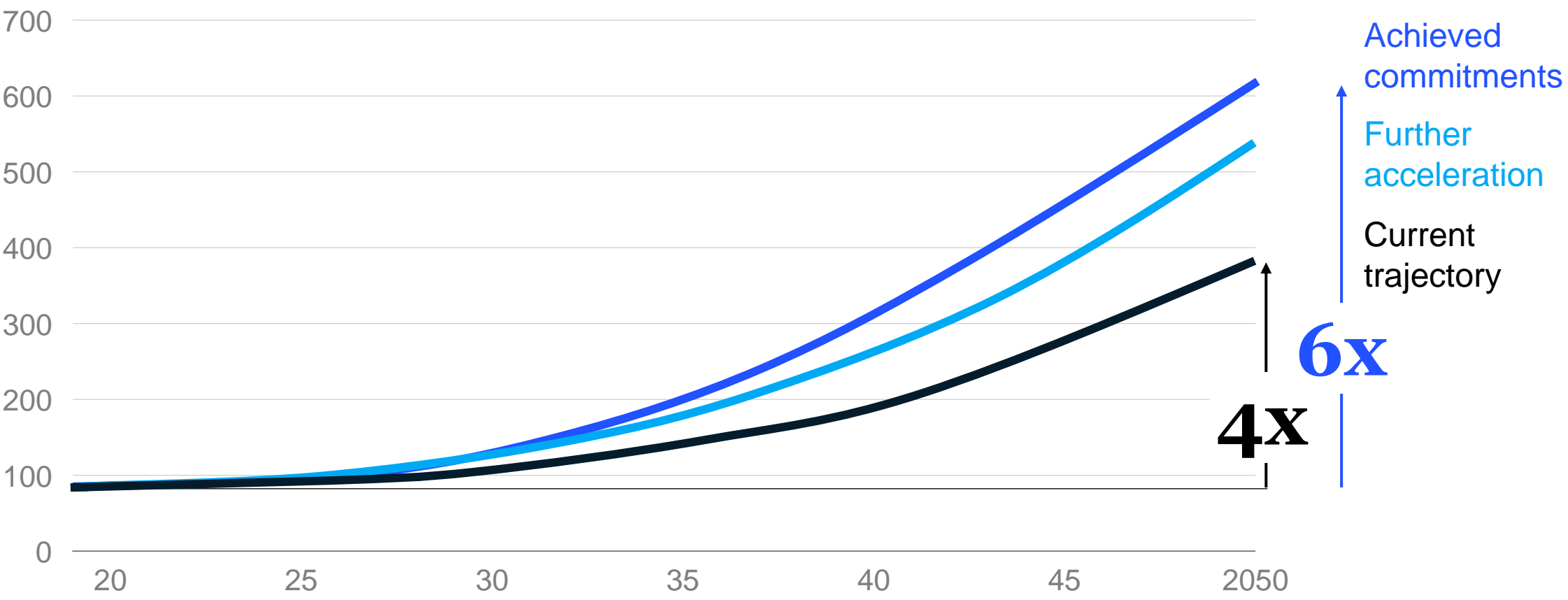
Large-scale hydrogen  
projects globally

**-70%**

Cost of electrolyzer systems

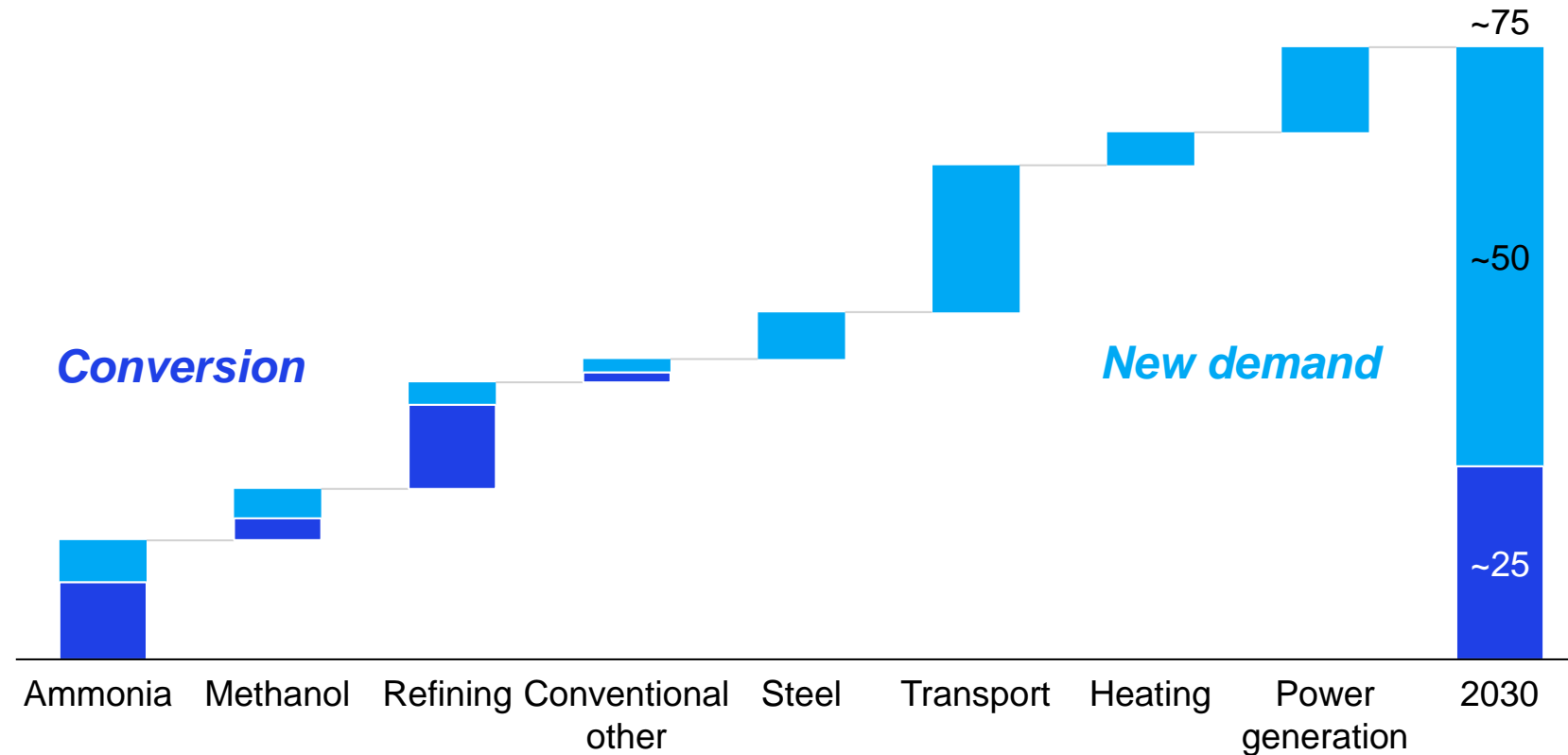
# Hydrogen demand is expected to grow by four to six times by 2050

Global hydrogen demand outlook by scenario,  
Mt



# ~75 MT of clean hydrogen demand expected in 2030 from conversion and new demand

Clean hydrogen end use demand in 2030,  
MT H<sub>2</sub> p.a.



~30%

of grey capacity  
converted to clean

1 GT CO<sub>2</sub>

cumulative abatement  
until 2030

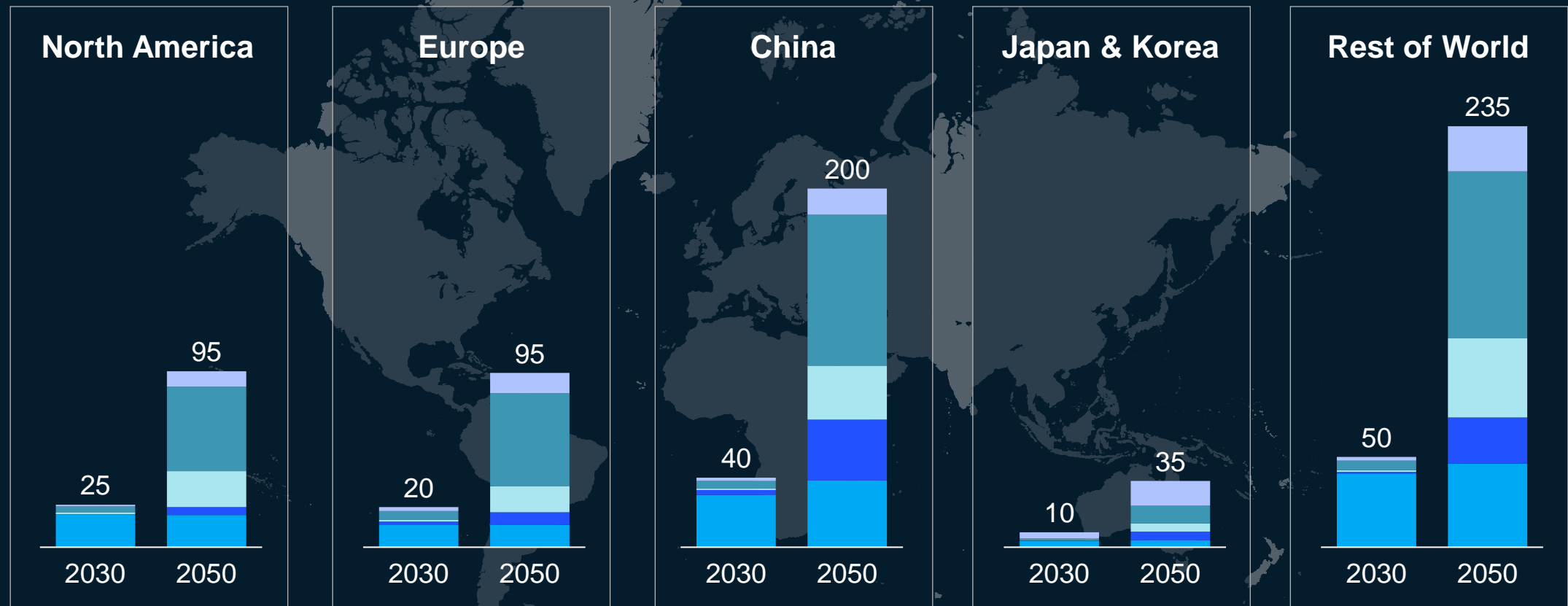
**Ammonia &  
refining**

convert faster than other  
conventional hydrogen  
uses

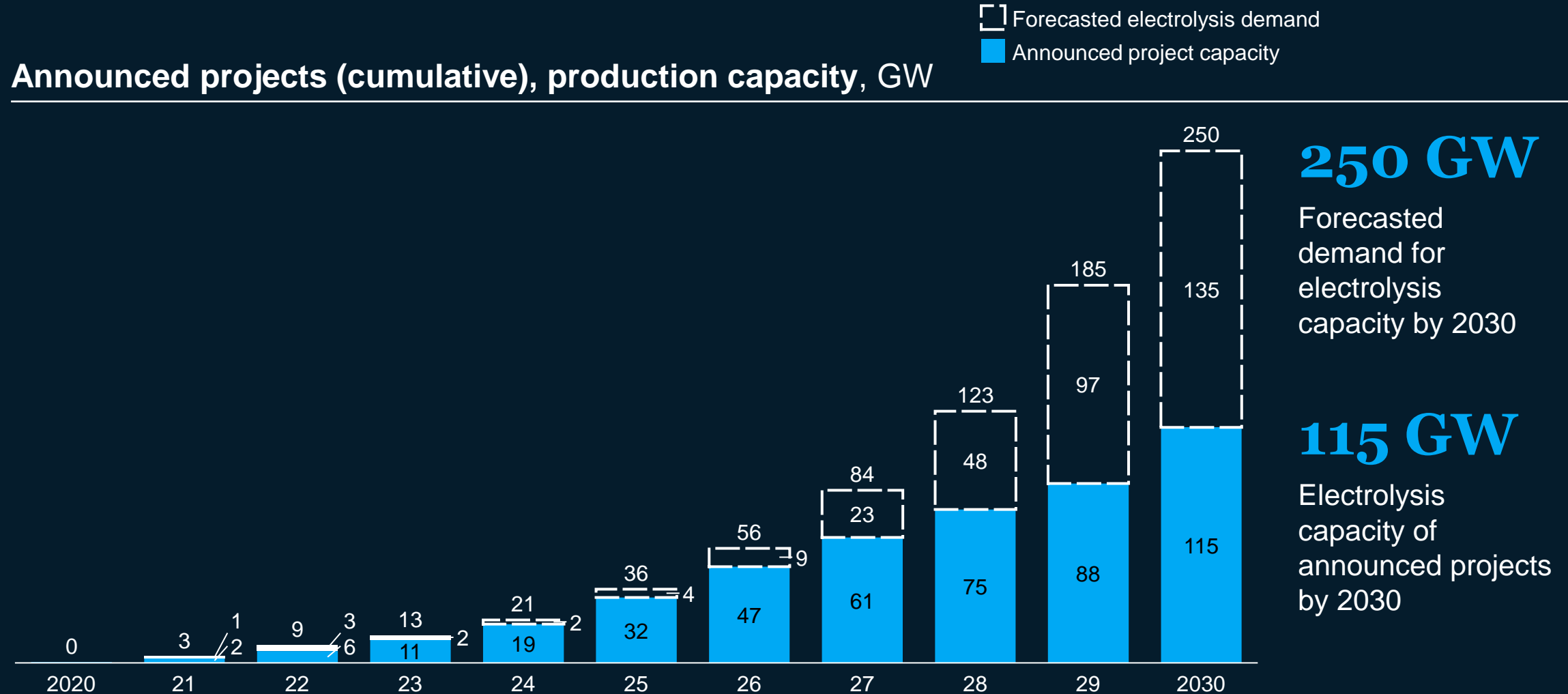
# China, Europe, and North America will be the largest hydrogen demand markets in 2050

■ Power generation ■ Mobility ■ Heating ■ New industry use ■ Existing industry uses

Hydrogen end-use demand by region, MT H<sub>2</sub> p.a. in 2030 and 2050



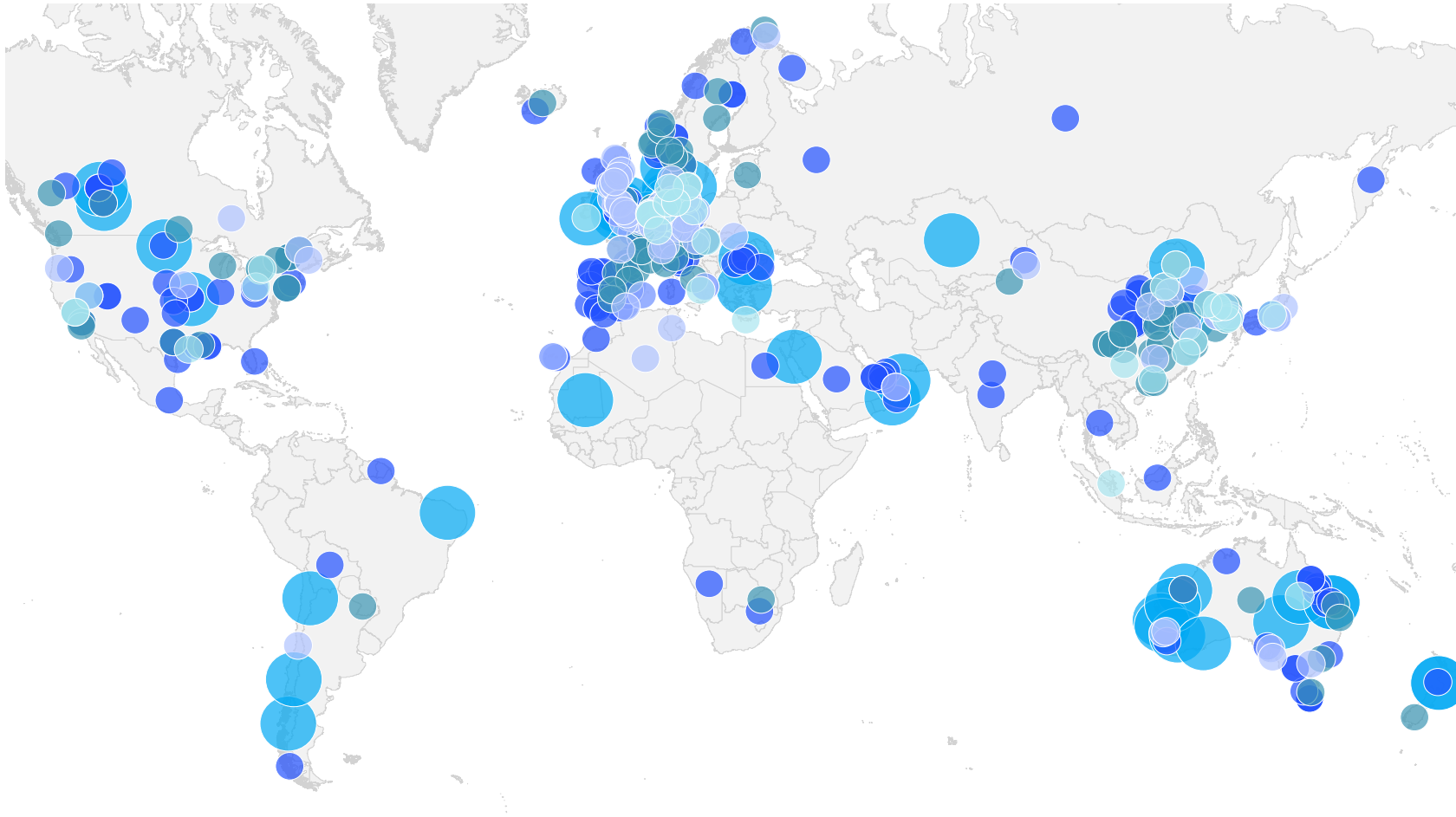
# H2 adoption is accelerating and electrolyzer capacity expected to reach 250 GW by 2030



1. Preliminary studies or at press announcement stage

2. Feasibility study, front-end engineering and design stage, final investment decision has been taken, under construction, commissioned or operational

# We are currently tracking more than 500 projects globally – and continuously adding more



## Giga-scale

Renewable H<sub>2</sub> projects >1GW and low-carbon H<sub>2</sub> projects >200 kt p.a.



## Large-scale industrial usage

Refinery, ammonia, methanol, steel, and industry feedstock



## Transport

Trains, ships, trucks, cars and other hydrogen mobility applications



## Integrated H<sub>2</sub> economy

cross-industry, and different types of end-uses



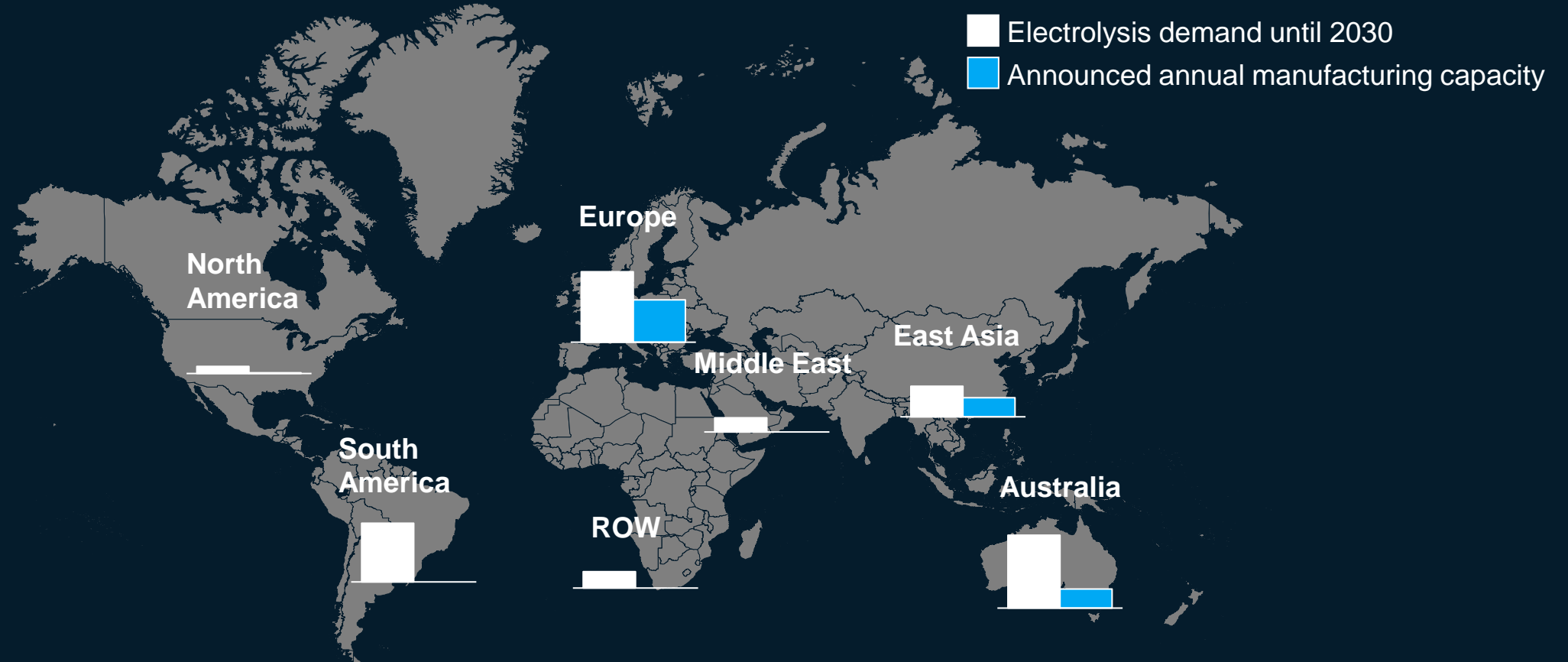
## Infrastructure

H<sub>2</sub> distribution, transportation, conversion, and storage

# Announced projects are spread across hubs around the world, while near-term manufacturing capacity is focused on Europe

Not Exhaustive

## Global electrolysis project announcements until 2030 vs. annual manufacturing capacity GW

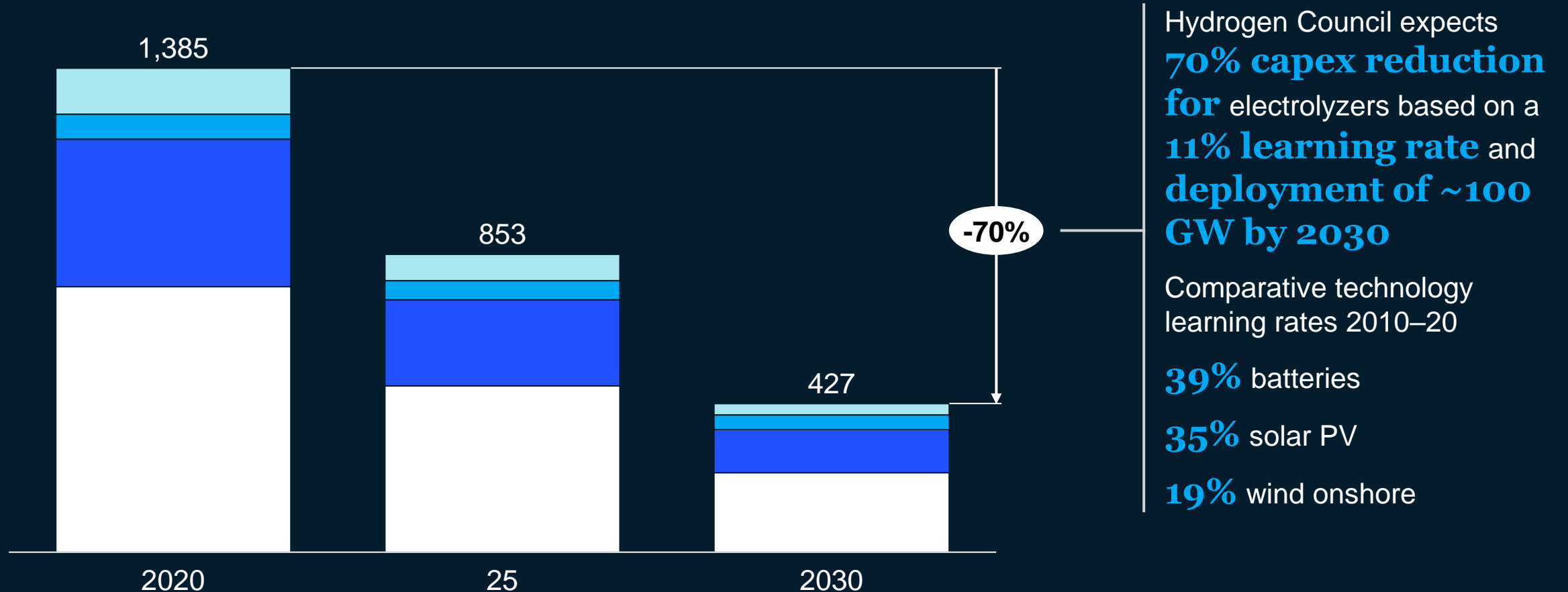




# Achieving cost reductions of ~70% will be key enabler of accelerated build-out towards 2030

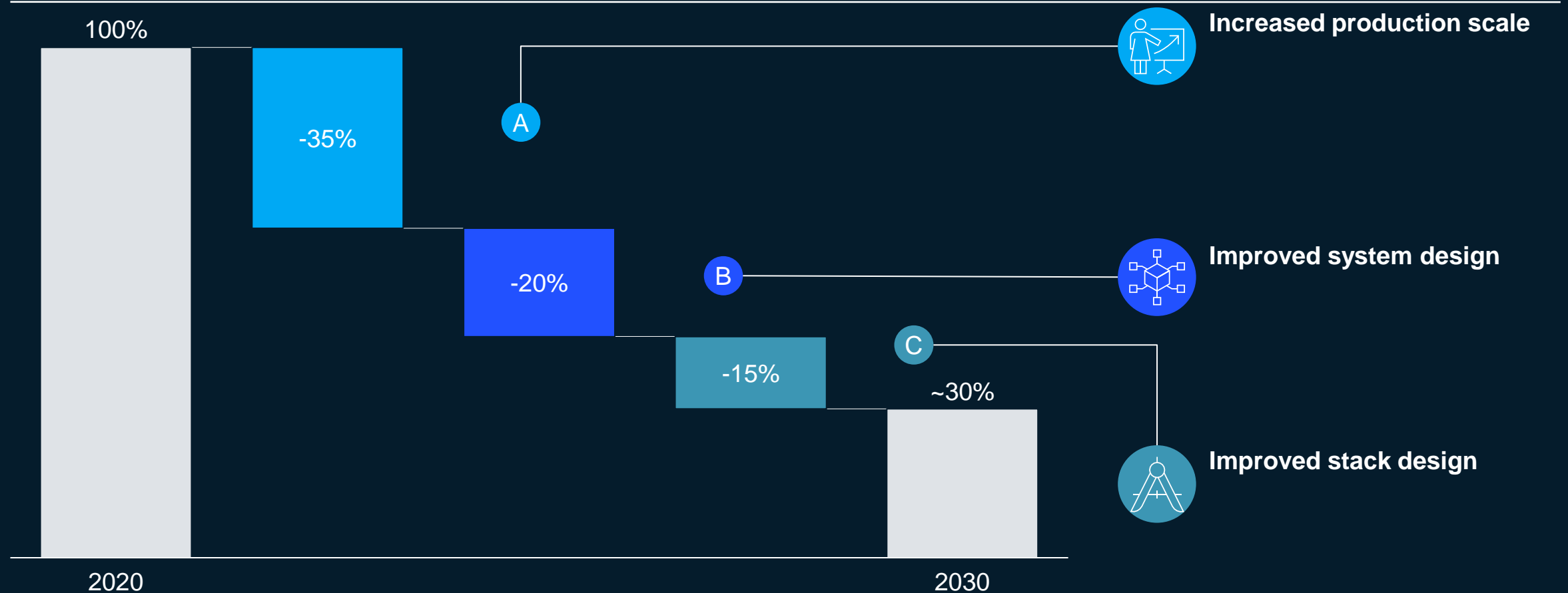
■ Transportation to site ■ Building ■ Indirect costs ■ Installation and assembly ■ System

## Forecasted electrolyzer installed cost, USD/kW



# Production scale and system design play a decisive role to bring down electrolyzer capex

## Expected electrolyzer cost decrease



# Five key risks for hydrogen OEMs



## Constrained raw materials

Insufficient Iridium globally available to supply PEM electrolyzer production (at current Iridium loadings per MW)



## Increase competition

Rapidly growing market attracts global competition from new entrants and incumbent industrial players



## Renewable energy constrains

Increasing interest for RES puts upward pressure on prices, reducing commercial attractiveness of green hydrogen and electrolyzers



## Technology disruptions

Material advancements (e.g., PGM-free catalysts) and next technology S-curve (e.g., AEM, capillary electrolysis) need to be monitored



## Access to talent

Strong competition and aggressive hiring of trained personnel between players

# Thank you!

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