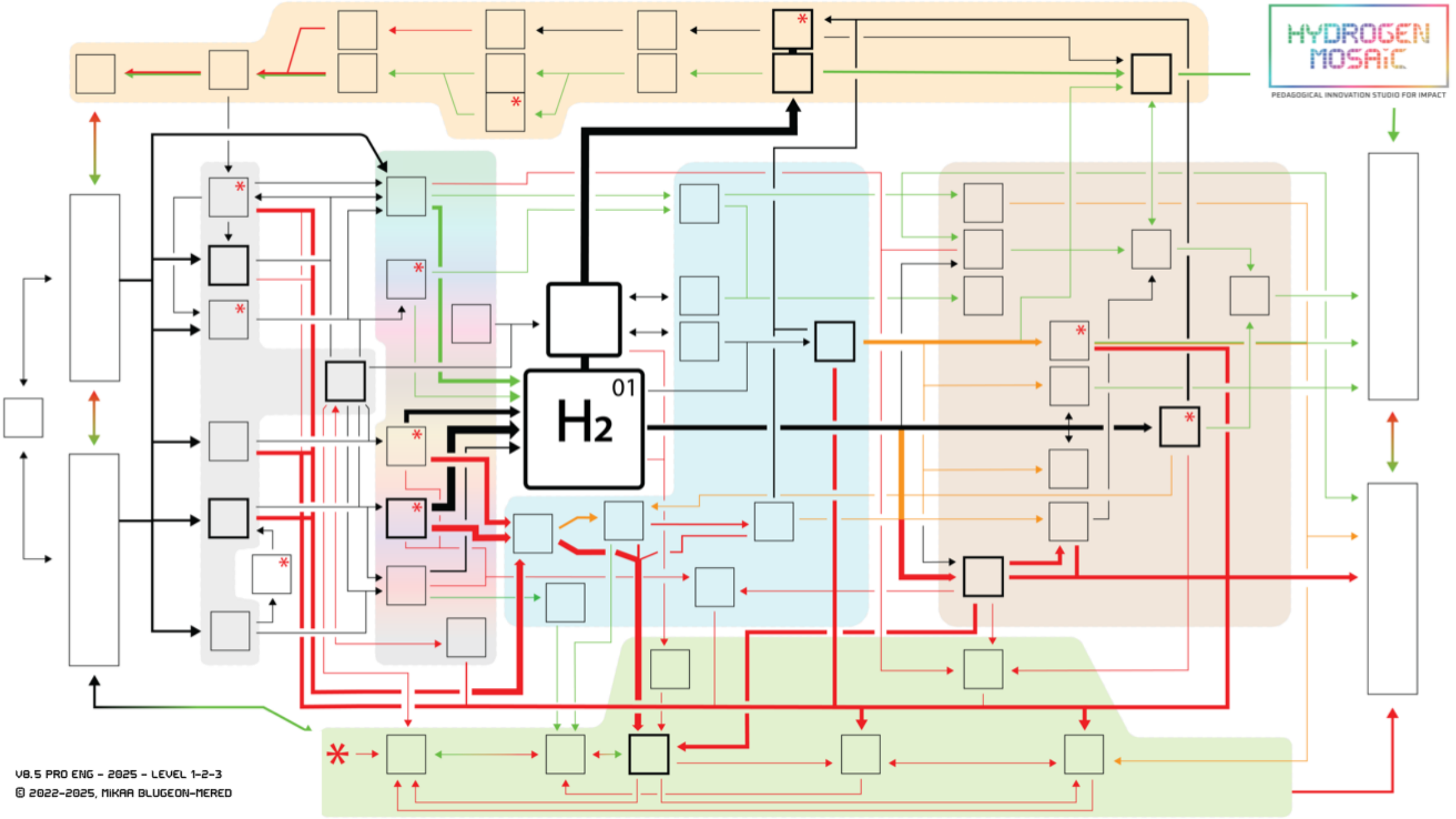
HYDROGEN MOSAIC
PEDAGOGICAL INNOVATION STUDIO FOR IMPACT
H2
01
V8.5 PRO ENG - 2025 - LEVEL 1-2-3
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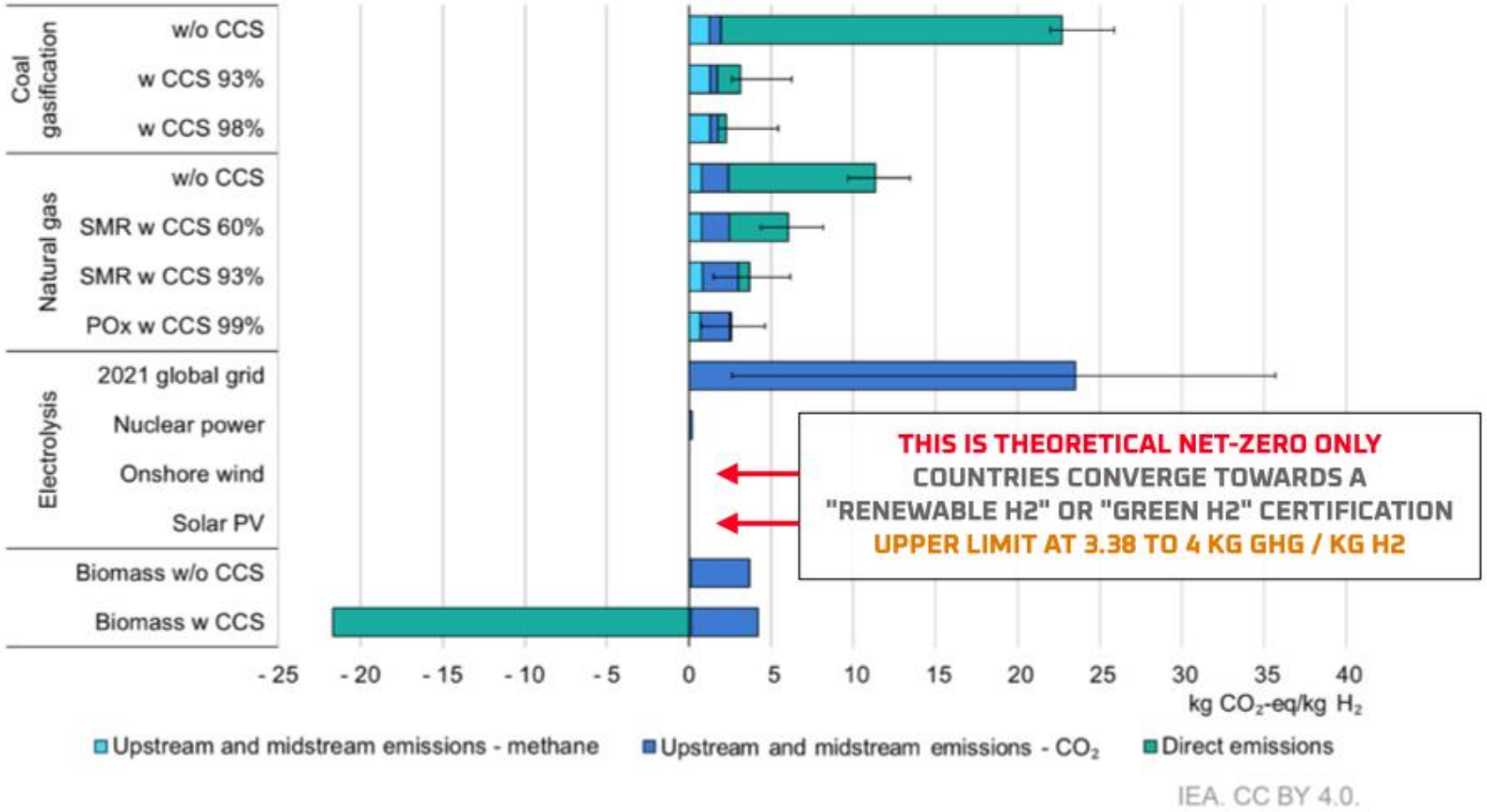
NOT ALL HYDROGENS CAN SUSTAIN AN "ABSOLUTE NET-ZERO" MODEL

Figure 3.15 Comparison of the emissions intensity of different hydrogen production routes, 2021



Notes: CCS = carbon capture and storage; POx = partial oxidation; SMR = steam methane reforming.

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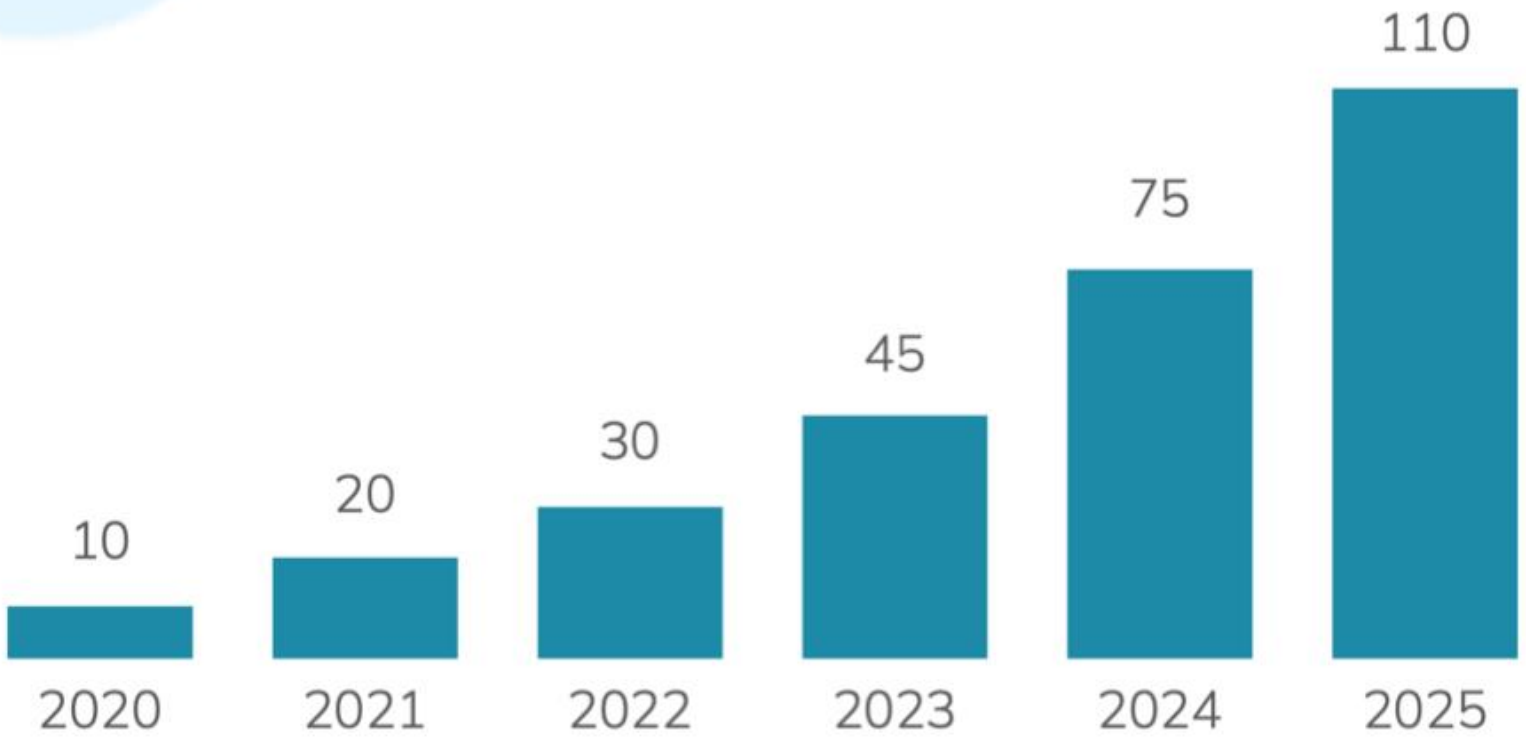
HEADWINDS? WELL, INVESTMENTS ARE GROWING TO ALL-TIME HIGHS

Global cumulative committed (FID+) investment in clean hydrogen projects by 2030, $ billion



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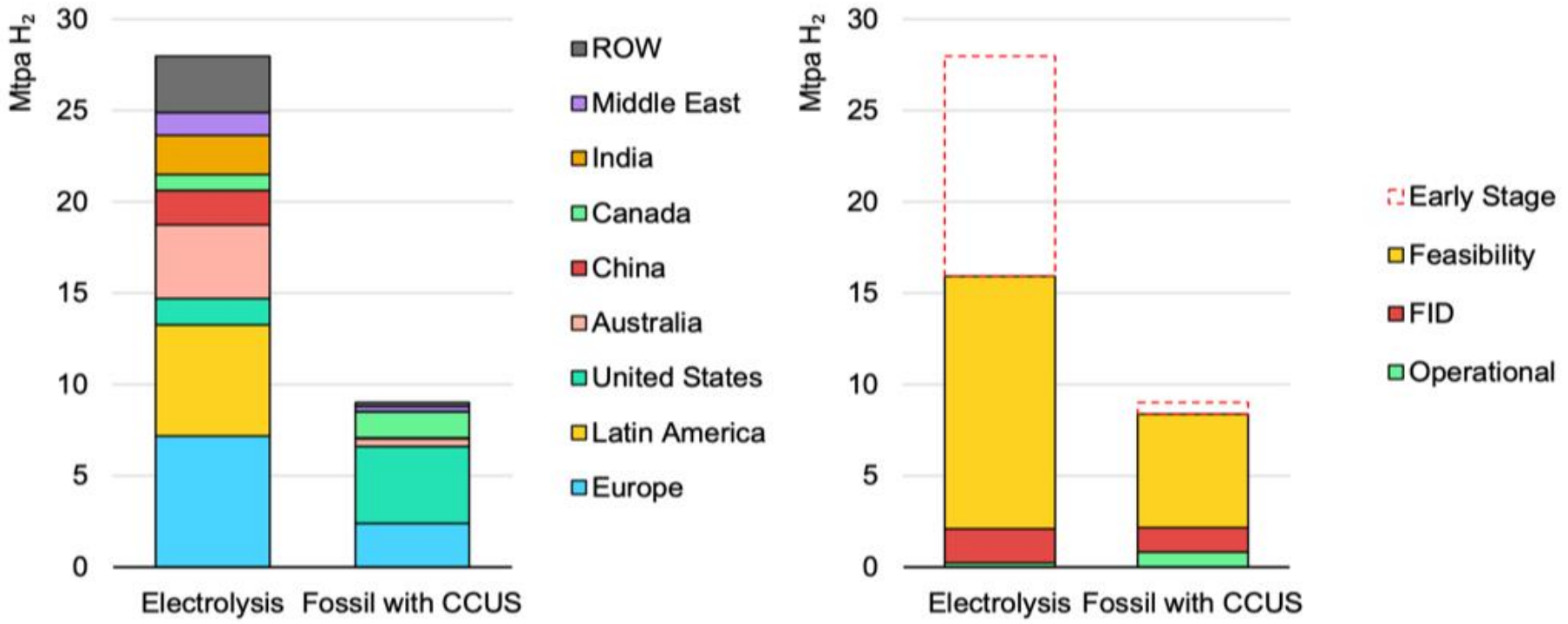
BUT, WILL IT BE ENOUGH? CONSENSUS IS IT'S UNLIKELY TO BE

Figure 3.3 Low-emissions hydrogen production by technology, region and status based on announced projects, 2030



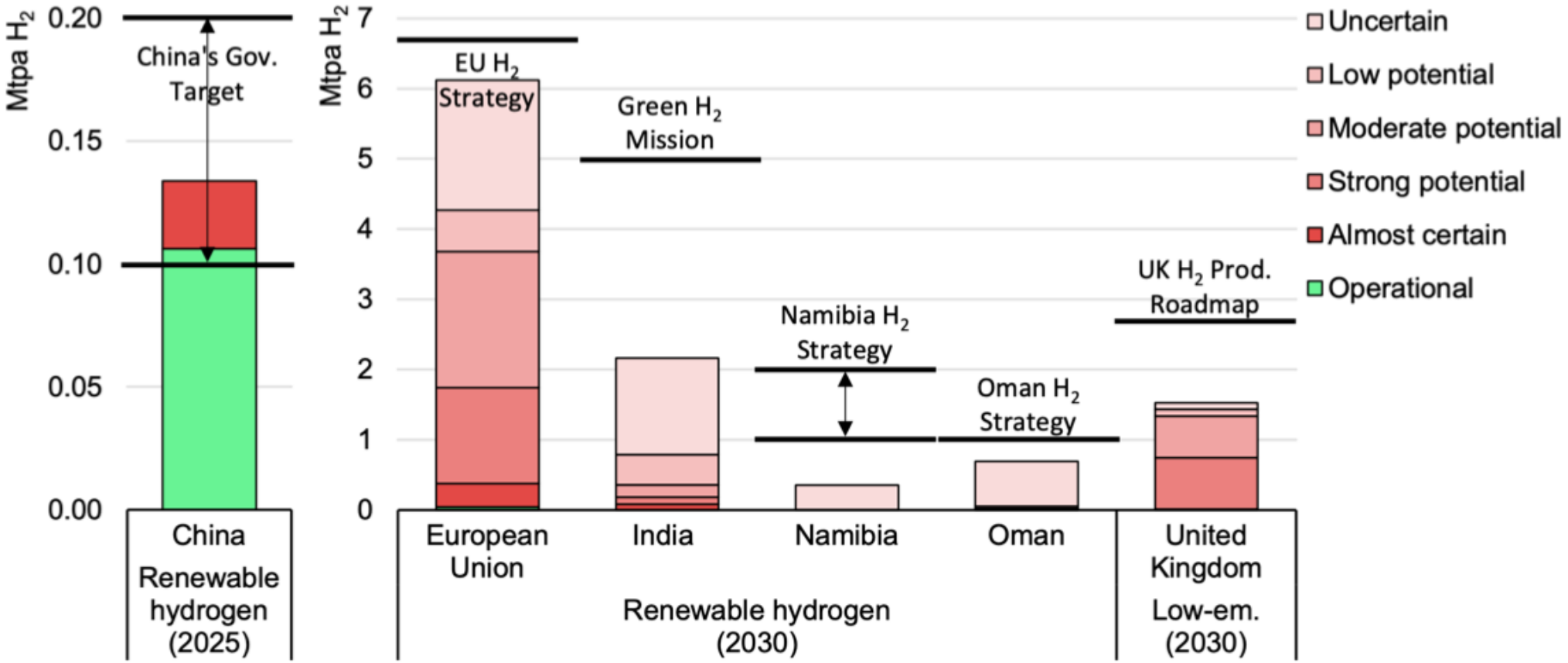
Low-emissions hydrogen production could reach 37 Mtpa by 2030, but only 4.2 Mtpa are operational, under construction or have reached FID.

BUT, WILL IT BE ENOUGH? CONSENSUS IS IT'S UNLIKELY TO BE

Global clean hydrogen capacity by 2030 by pathway and status, mtpa

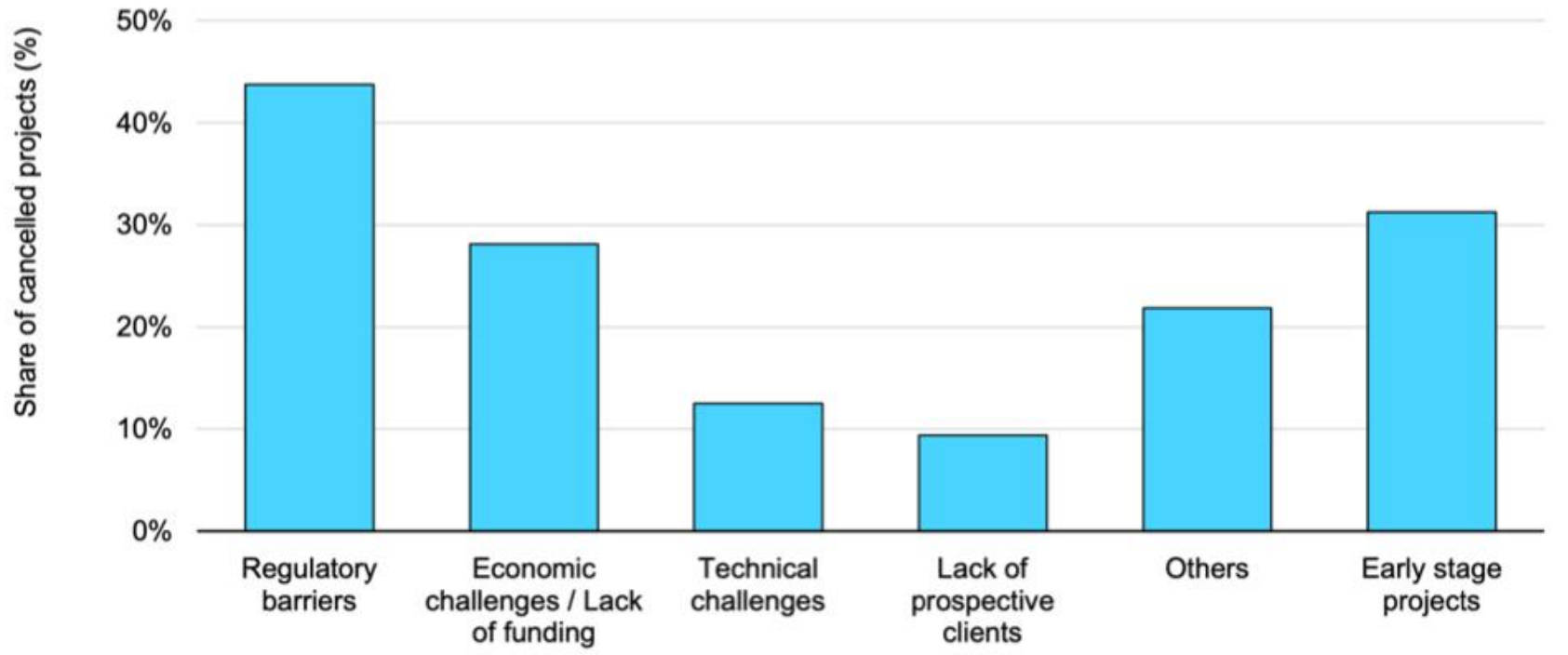
BUT, WILL IT BE ENOUGH? CONSENSUS IS IT'S UNLIKELY TO BE

Figure 3.6 Low-emissions hydrogen production from announced projects compared with government targets for 2025 and 2030



1 IN 10 PROJECT WAS CANCELLED, OVER THE PAST 18 MONTHS…

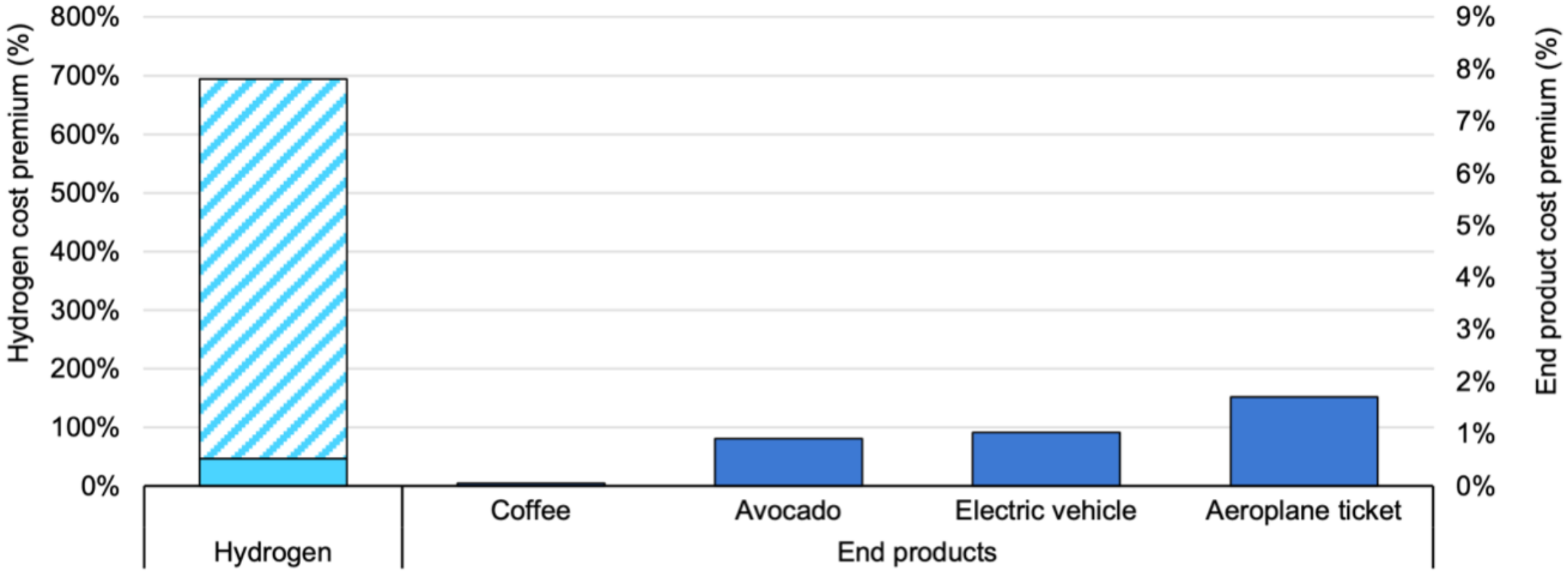
Figure 3.7 Share of cancelled hydrogen projects by reason for cancellation



Notes: A total of 32 projects with available information on the reasons for their cancellation are included. Each project may cite more than one barrier as contributing to its cancellation. Categories reflect self-reported reasons from project developers or official announcements. "Early-stage projects" refer to projects that were cancelled at early stages of development, some without stating publicly a reason for the cancellation and others also citing one of the other reasons shown in the chart.

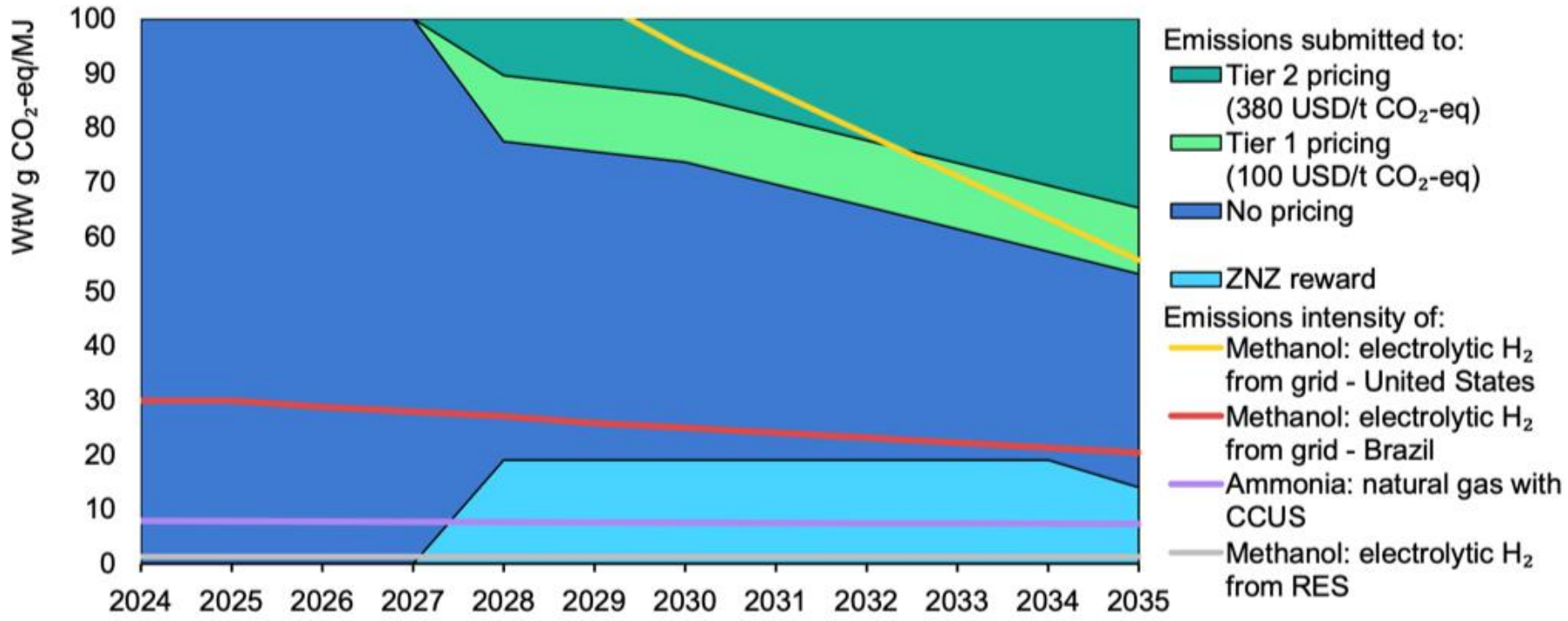
BUT, "PREMIUMS" BECOME ACCEPTABLE AT THE END OF THE VALUE CHAIN

Figure 2.4 Renewable hydrogen cost premium on selected end products



LIKEWISE, MARITIME NEEDS ARE FUELLING THE H2 REBOUND…

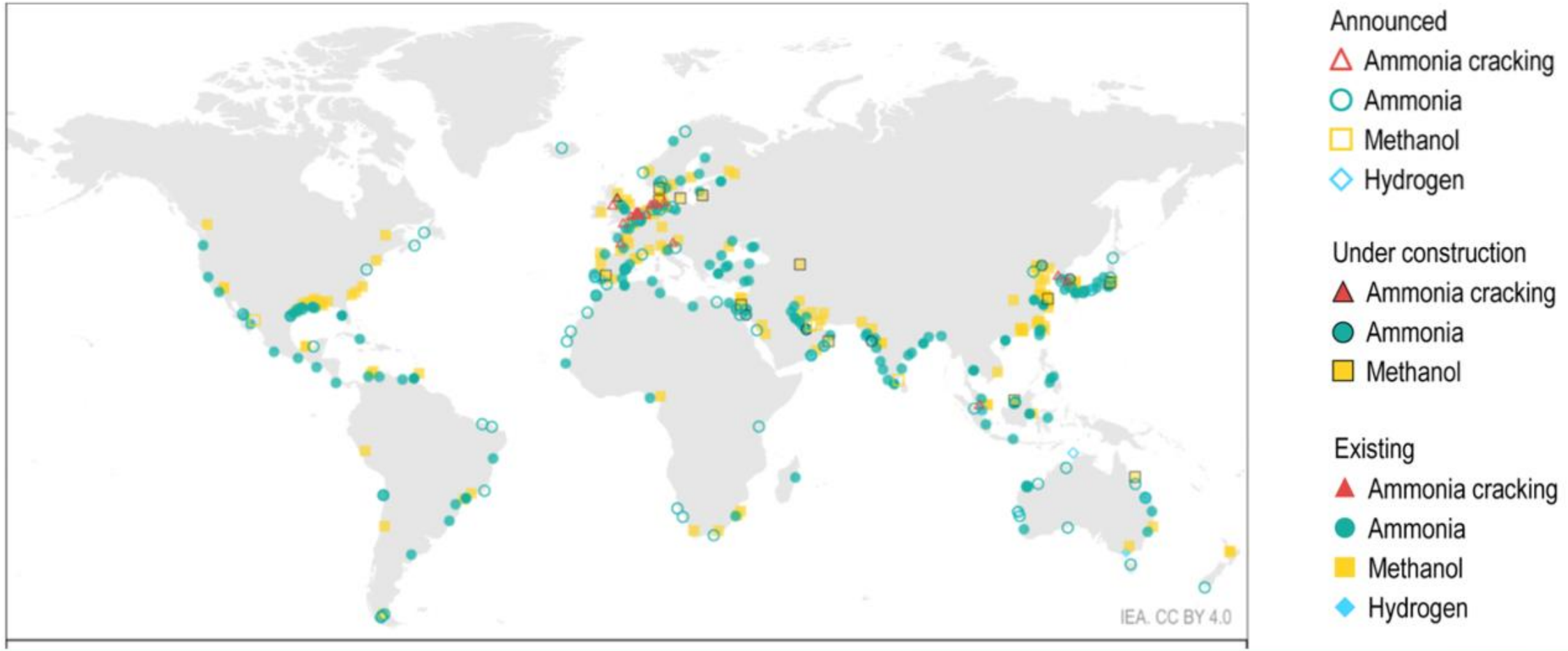
Figure 2.17 International Maritime Organization Net-Zero Framework emission pricing and emission intensity of selected hydrogen-based marine fuels, 2024-2035



The IMO Net-Zero Framework reduces uncertainties for investors and can incentivise the use of hydrogen-based fuels.

MORE THAN 120 NEW PLANNED H2-BASED FUELS TERMINALS FOR 2030

Figure 4.7 Existing and announced port infrastructure projects for hydrogen and hydrogen-based fuels trade and bunkering



MORE THAN 60 GREEN SHIPPING (AND DIGITAL) CORRIDORS FOR 2030

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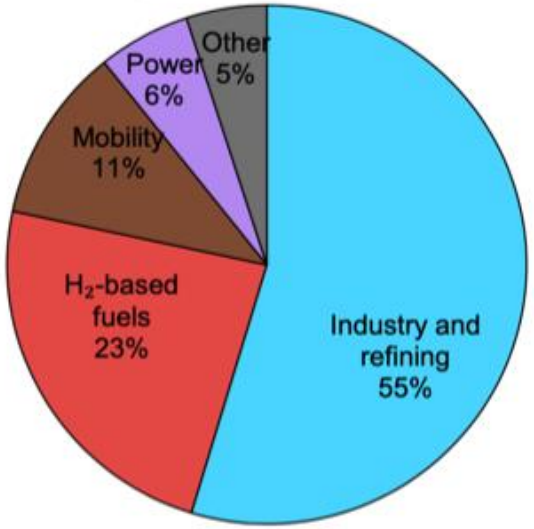
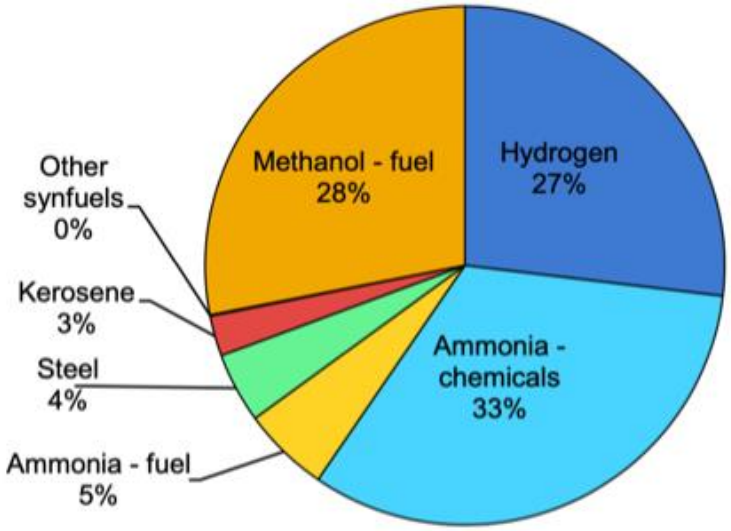
FOR FUEL USE, METHANOL IS PICKING UP FASTER THAN AMMONIA

Investment in low-emissions hydrogen production by intended use and offtake agreements for low-emissions hydrogen by end product

Annual investment in low-emissions hydrogen production by intended use, 2024 (USD 7.9 billion)



Cumulative firm offtake agreements of low-emissions hydrogen by end product, 2021-2025 (1.6 Mt)

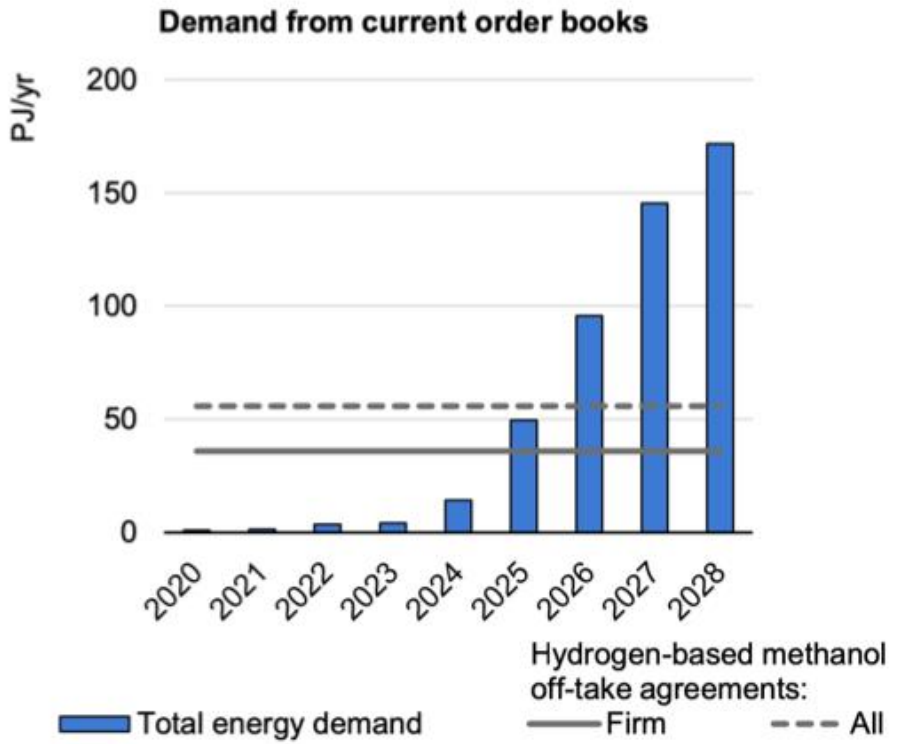


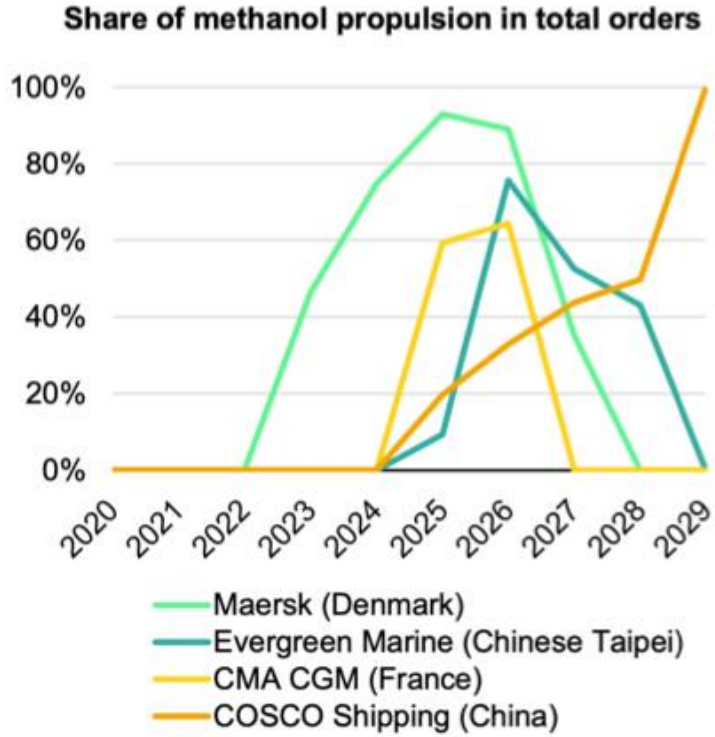
Notes: "Other" intended uses includes undisclosed end uses. Investment values are estimated annualised spending on projects that had taken final investment decision by July 2025.

Traditional hydrogen applications represent "low-hanging fruit" that could stimulate demand for low-emissions hydrogen in the near term.

…BUT, DEMAND DOESN'T BUILD UP EVENLY EVERYWHERE…

Figure 2.16 Energy demand from methanol-propulsion ships on order books, and share of methanol in order books for selected shipping companies, 2020-2028

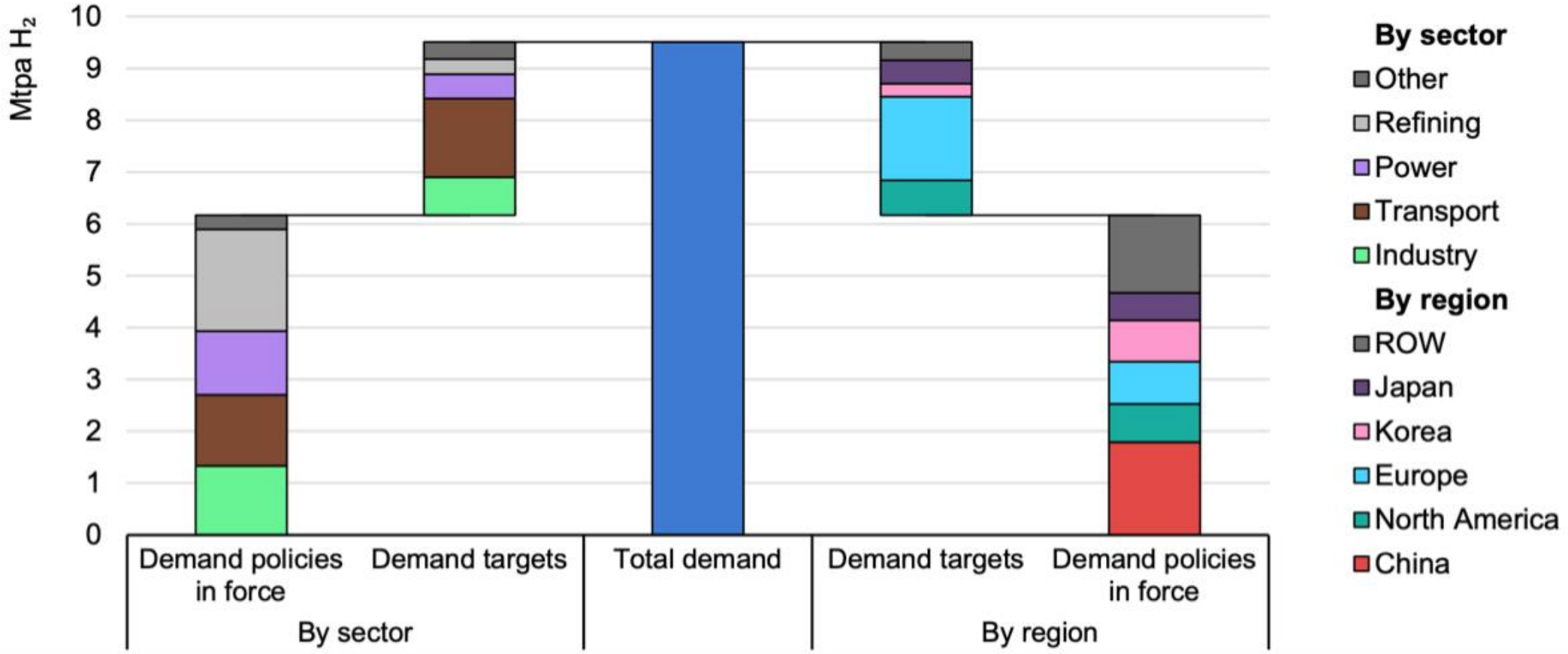




Orders for methanol ships are slowing down amidst concerns around supply of low-emissions fuels.

BEIJING & SEOUL ARE FORCING H2 WHEN OTHERS ARE "INCENTIVISING"

Figure 6.2. Potential annual demand for low-emissions hydrogen created by policies in force and government targets by region and sector, 2030



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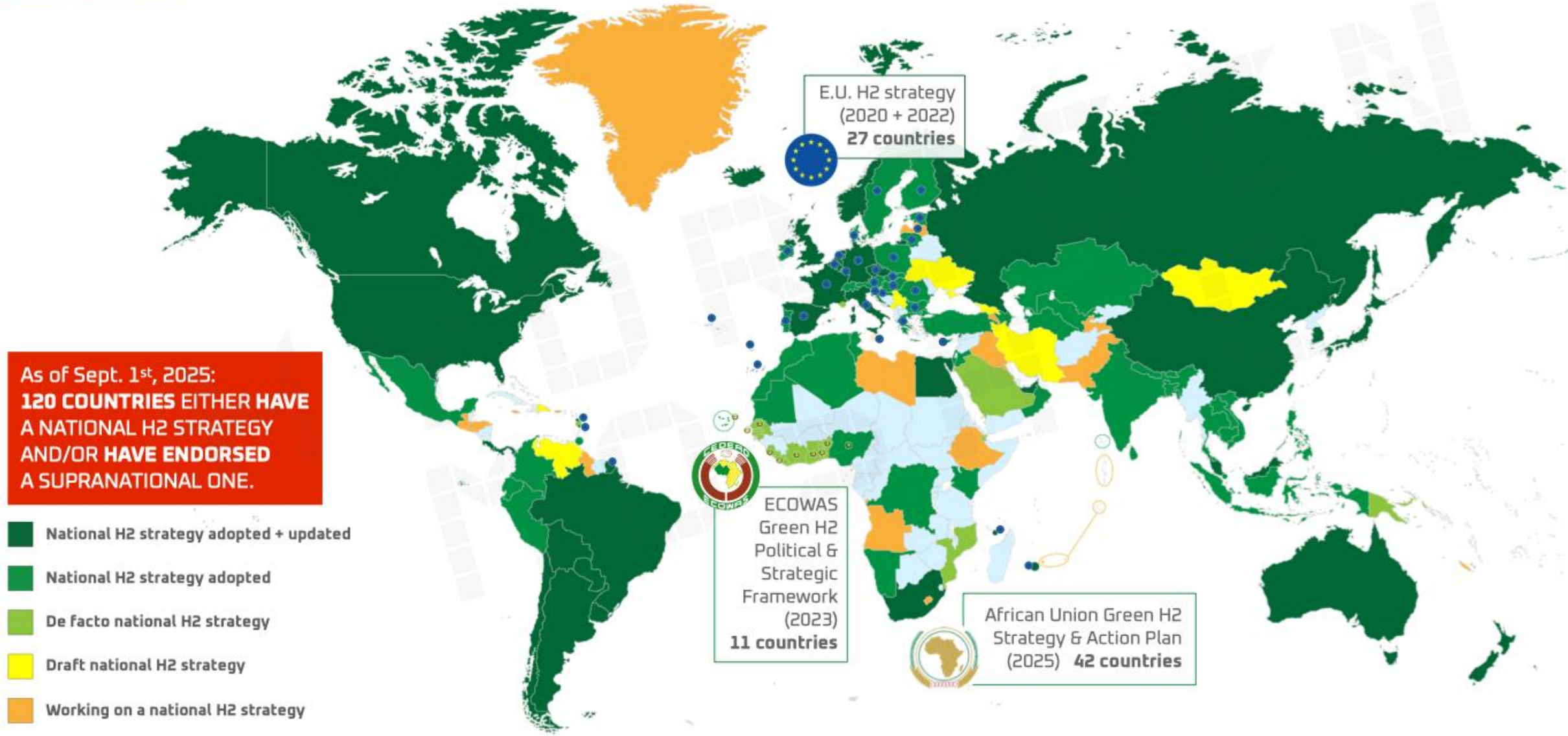
COUNTRIES WITH A NATIONAL OR SUPRANATIONAL HYDROGEN STRATEGY

HYDROGEN POLICY RADAR V.5 • AS OF SEPT. 1ST, 2025



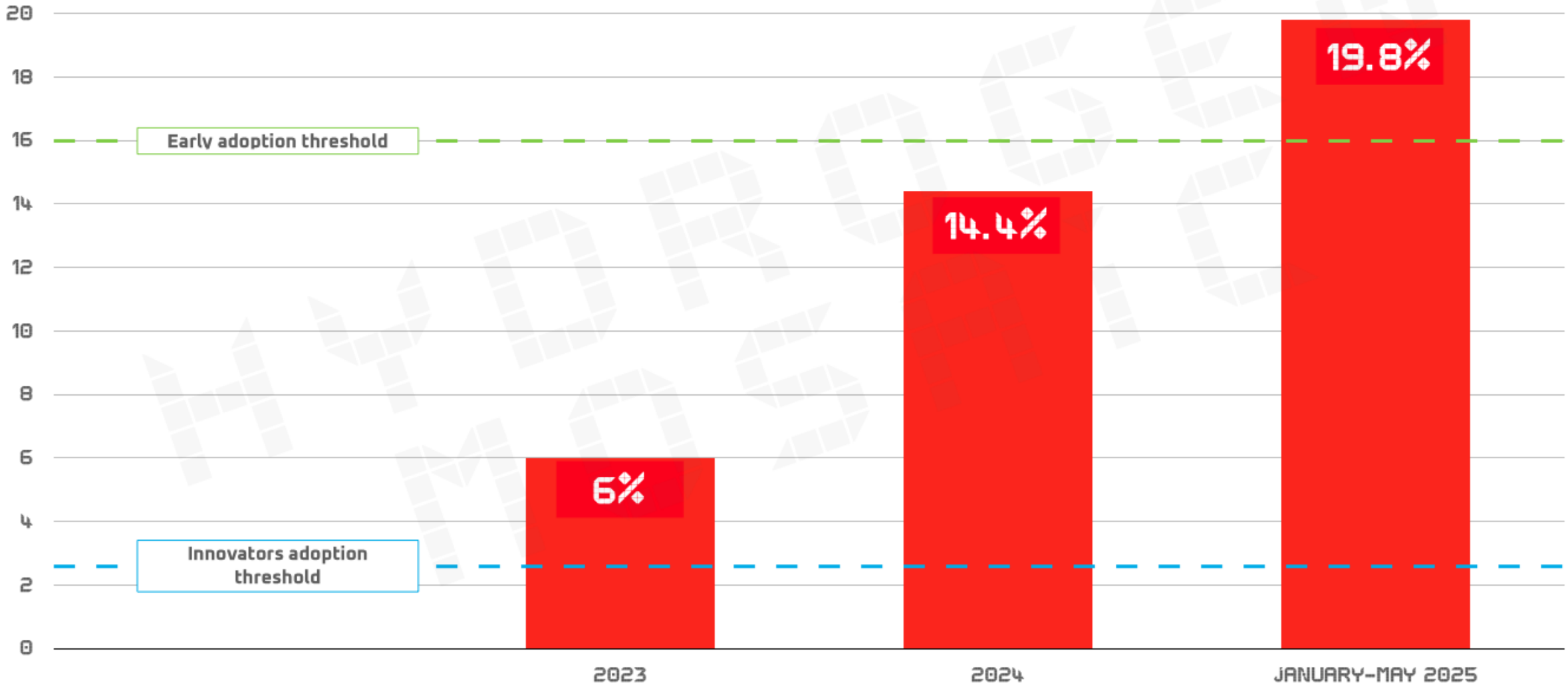
As of Sept. 1st, 2025:
120 COUNTRIES EITHER **HAVE** A NATIONAL H2 STRATEGY AND/OR **HAVE ENDORSED** A SUPRANATIONAL ONE.

- **National H2 strategy adopted + updated**
- **National H2 strategy adopted**
- **De facto national H2 strategy**
- **Draft national H2 strategy**
- **Working on a national H2 strategy**

Sources: compilation of national hydrogen strategies, roadmaps, laws, and assimilated programmatic documents by Mikaa BLUGEON-MERED since April 2022.
Present version based on data collected as of Sept. 1st, 2025 — compiled and verified by Mikaa BLUGEON-MERED on Sept. 5-8, 2025.

Learn more: **H2mosaic.com**

LARGE FUEL CELL ELECTRIC BUS (FCEB) SALES MARKETSHARE REP. OF KOREA, 2023-2025



Source: H2 Korea (July 2025) — contextual add-ons by Mikaa BLUGEON-MERED

Learn more: **H2mosaic.com**

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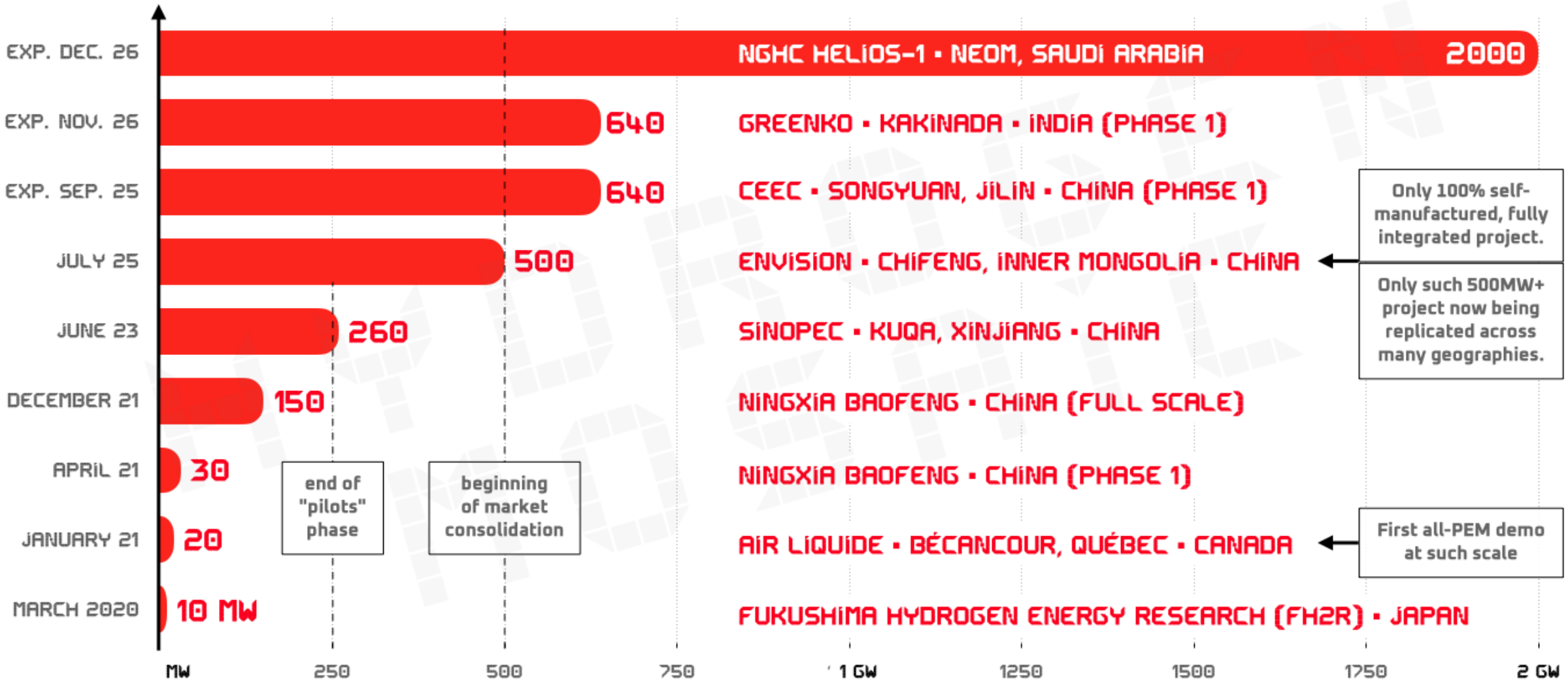
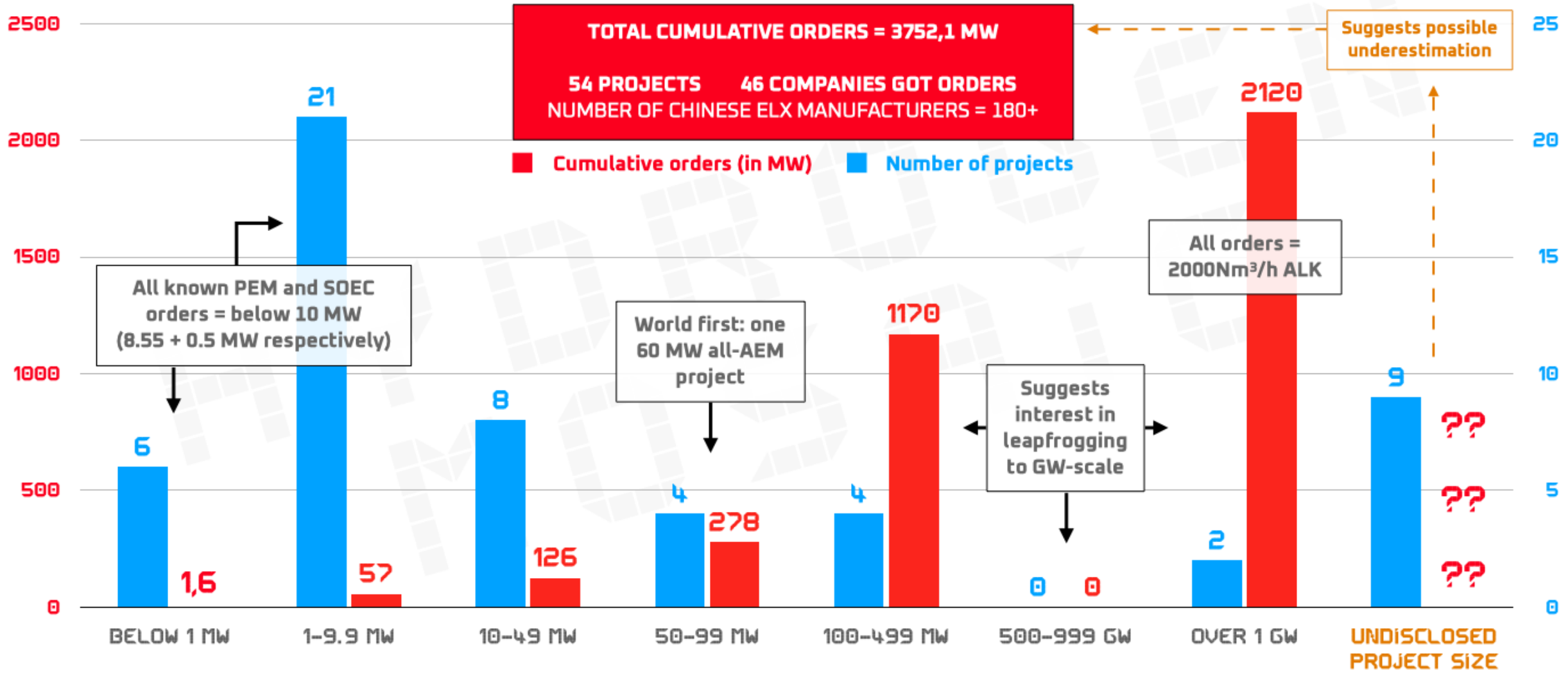
EVOLUTION OF THE WORLD'S LARGEST ELECTROLYTIC HYDROGEN SITES
BY INSTALLED CAPACITY (MW) • 2020–2026



Sources: Companies & project reports + Upstream / Recharge (2022) + Energy Intelligence (2023) + SMM (2025) + contextual & analytical add-ons by Mikaa BLUGEON-MERED

Learn more: **H2mosaic.com**

MARKET SEGMENTATION OF NEW (PUBLICLY CONFIRMED) ELECTROLYZERS ORDERS BY PROJECT SIZE – PEOPLE'S REPUBLIC OF CHINA, H1 2025

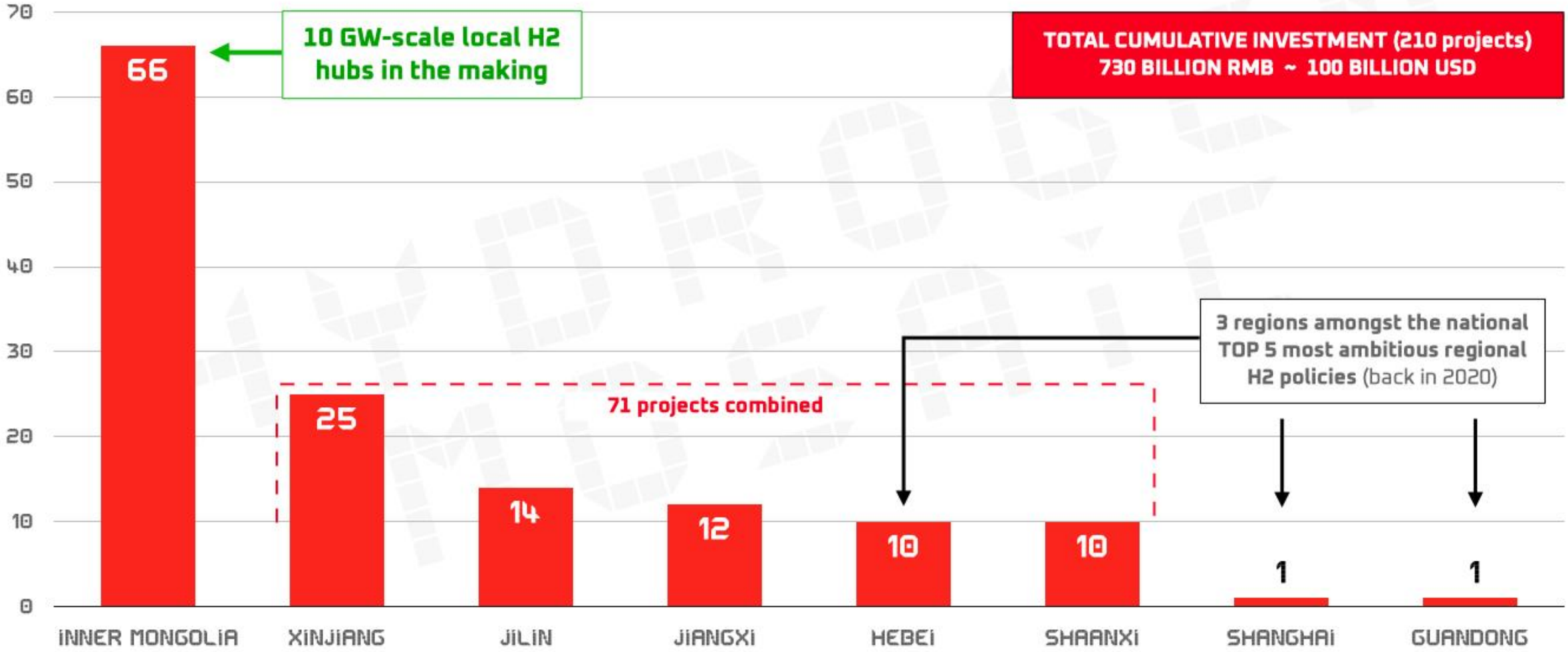


Sources: 国能网 - 氢能项目招中标数据库 (Project Bidding and Award Database) / SMM / 索比 - 氢能数据库 + contextual and analytical add-ons by Mikaa BLUGEON-MERED

Learn more: **H2mosaic.com**

PROVINCIAL DISTRIBUTION OF ADVANCING HYDROGEN PROJECTS IN CHINA – H1 2025

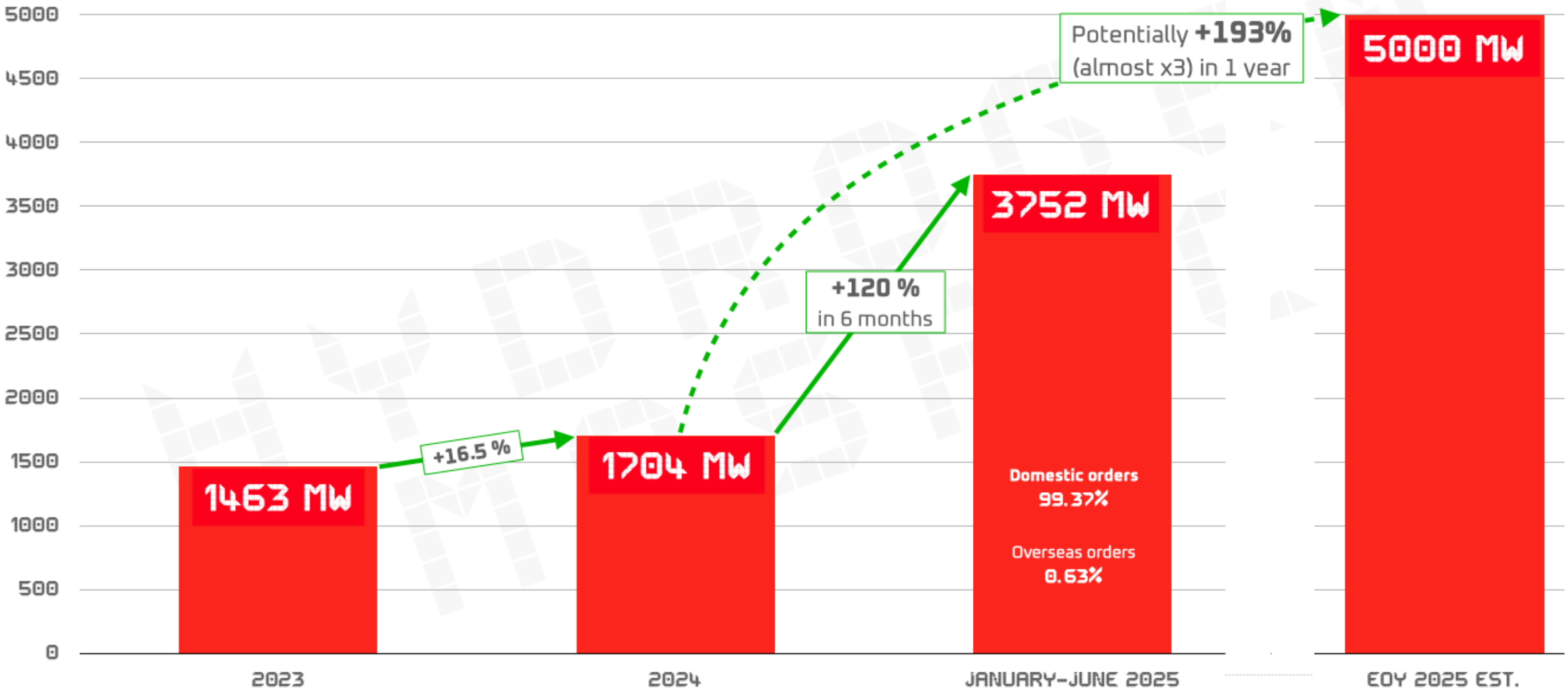
NUMBER OF PROJECTS (OUT OF A DATABASE OF 210 ADVANCING PROJECTS)



Source: 索比 - 氢能数据库 (Hydrogen Energy Database), 年中总结 — contextual add-ons by Mikaa BLUGEON-MERED

NB: RMN/USD conversion based on exchange rate as of 10/08/2025

NEW ELECTROLYZERS ORDERS (PUBLICLY CONFIRMED)
PEOPLE'S REPUBLIC OF CHINA, 2023-2025



Source: 索比 - 氢能数据库 (Hydrogen Energy Database), 年中总结 — contextual add-ons by Mikaa BLUGEON-MERED

Learn more: **H2mosaic.com**

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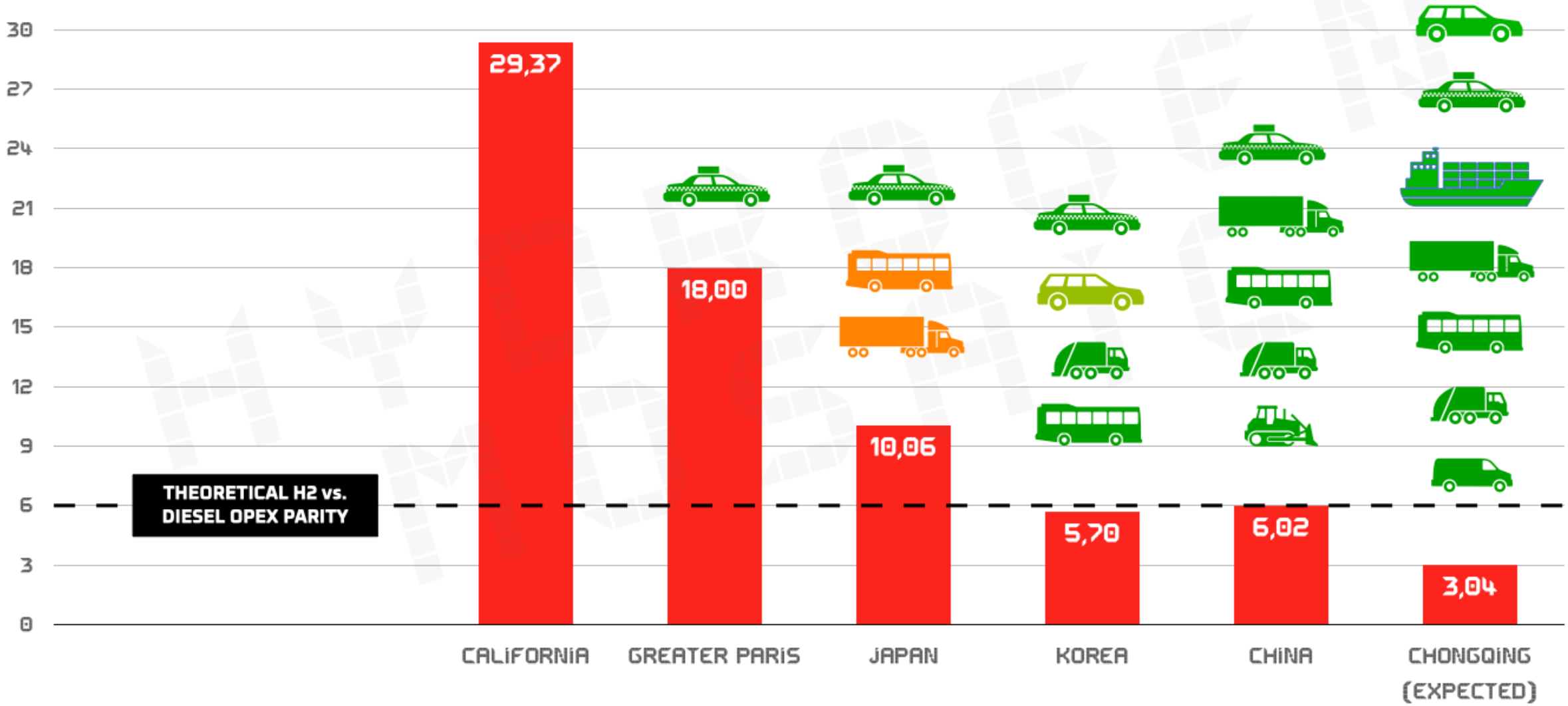
HYDROGEN END-USER RETAIL PUMP PRICE

AVERAGE PRICE, SELECTED GEOGRAPHIES – EUR/KG, Q4 2024

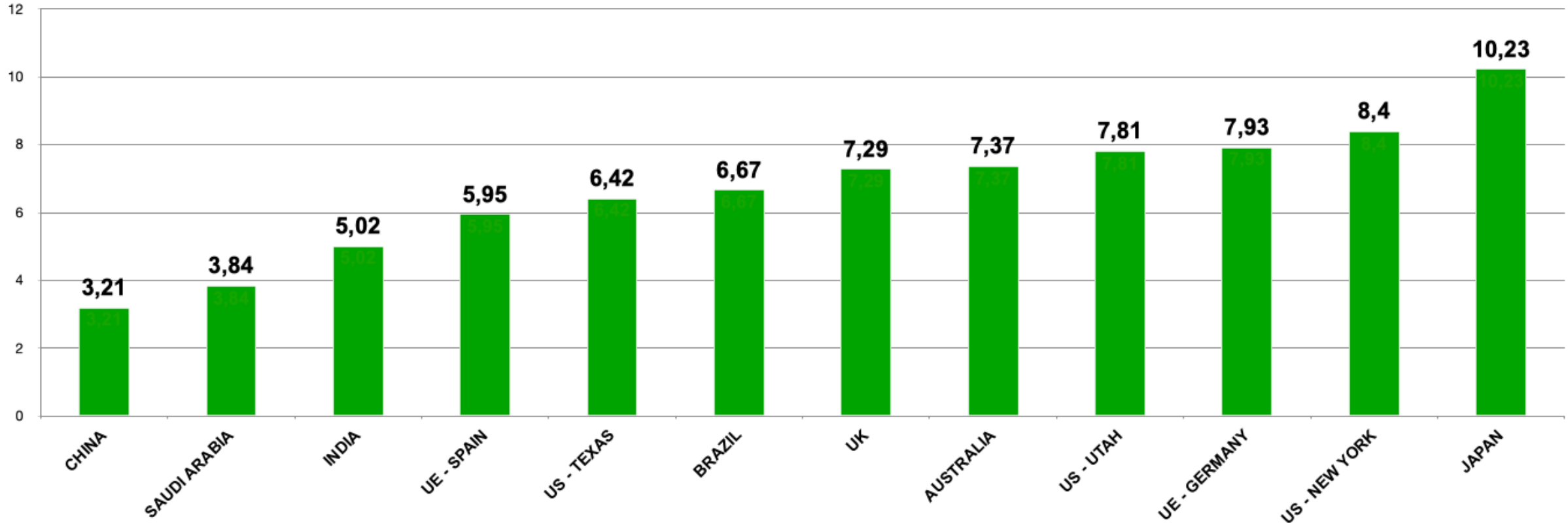


Sources: Platts, Hysetco, JHyM, H2 Korea, HyNet, China National Energy Administration — all prices converted in EUR, exchange rate as of 30/07/2025

Learn more: **H2mosaic.com**

IF YOUR MARGINAL PRODUCTION COSTS DON'T GO DOWN, NO SCALE-UP

PRODUCTION LCOH2 BY MARKETS, Q1 2025 FID COUNTRY AVERAGE USD/KgH_2 (2023)



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TL;DL (CONCLUSION):

NO, WE AREN'T ON COURSE TO GET ENOUGH H2 FOR OUR ABSOLUTE NET-ZERO NEEDS BY 2030 OR 2050.

BUT, THE FIGHT IS ONLY JUST BEGINNING…

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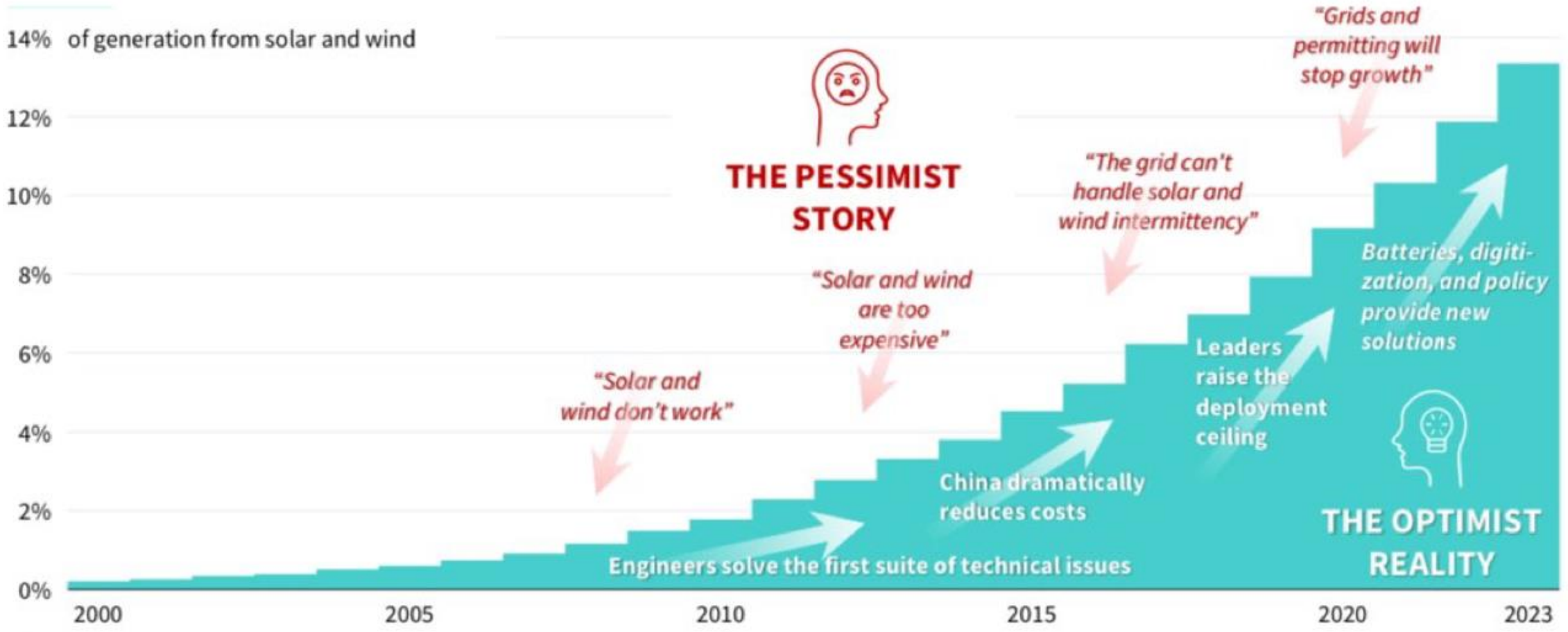
PESSIMISTS SOUND SMART, OPTIMISTS SHAPE OUR FUTURE



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THANK YOU FOR YOUR ATTENTION TO THIS MATTER ;-)

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PEDAGOGICAL INNOVATION STUDIO FOR IMPACT