



Low-Carbon Hydrogen Is a High-Stakes Investment Opportunity

NOVEMBER 2022



Introduction

The low-carbon hydrogen market today is still nascent and is expected to come in at around 10 million tons per year (mtpa) in 2025. By 2050, however, when low-carbon hydrogen is likely to provide a critical decarbonization option in industries such as aviation and steel, global demand is likely to top 350 mtpa. That would represent a value pool of \$600 billion to \$1.1 trillion.

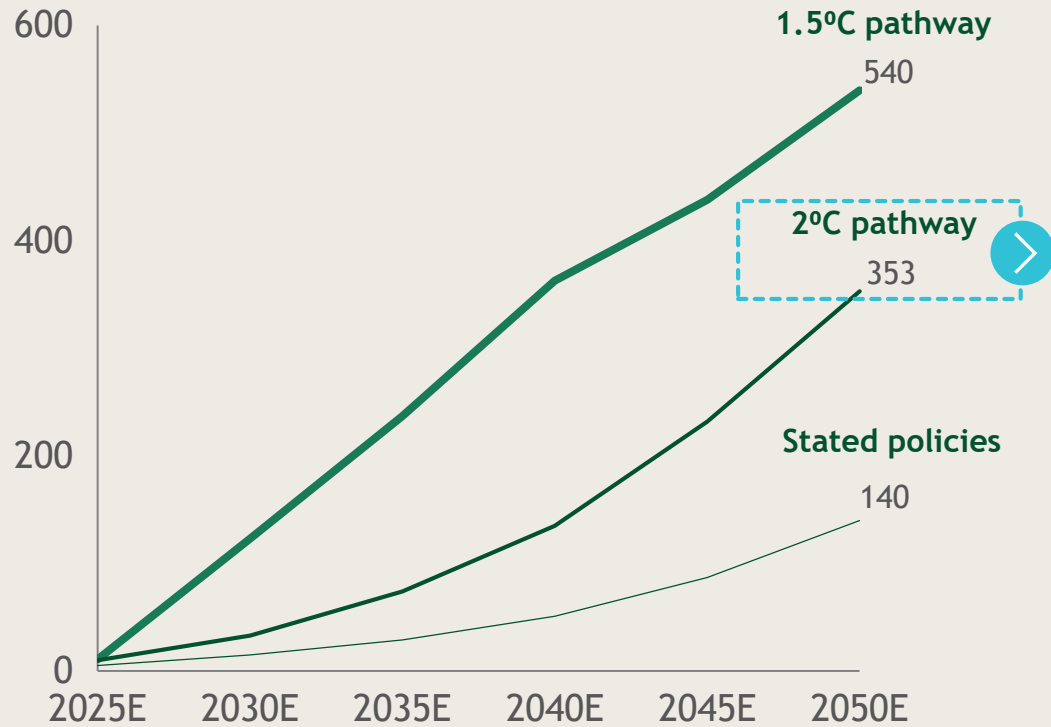
Infrastructure investors are well aware of the high returns earned by those that invested early in new technologies such as solar and wind power. Consequently, they are keen to put money into new low-carbon hydrogen projects. But few large-scale low-carbon hydrogen projects are currently underway.

We have identified the actions that stakeholders across the hydrogen ecosystem—public sector leaders, companies, customers, and lenders and investors—can take to unlock the market and help realize the potential of the hydrogen economy.

Demand for low-carbon hydrogen will soar if climate action accelerates

Low-carbon H₂ demand by scenario

2025-2050 total global demand (Mtpa)

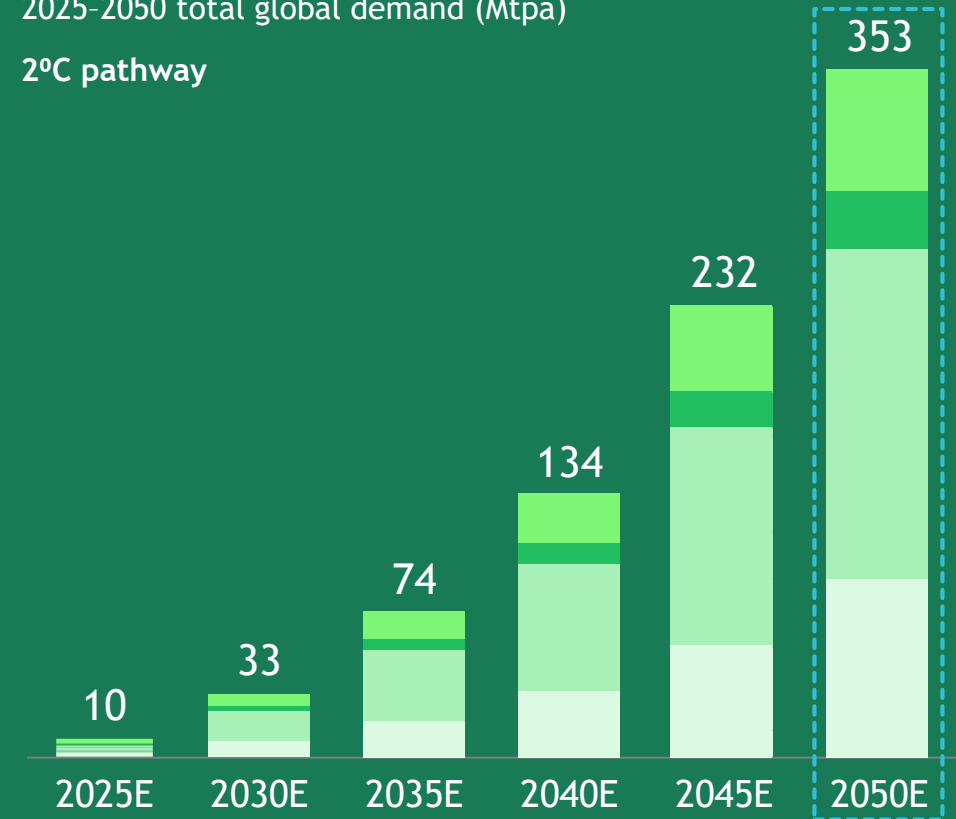


Sources: BCG Global H₂ Demand Model, January 2022; BCG analysis.
Note: Mtpa = millions of tons per year.

Low-carbon H₂ demand by region

2025-2050 total global demand (Mtpa)

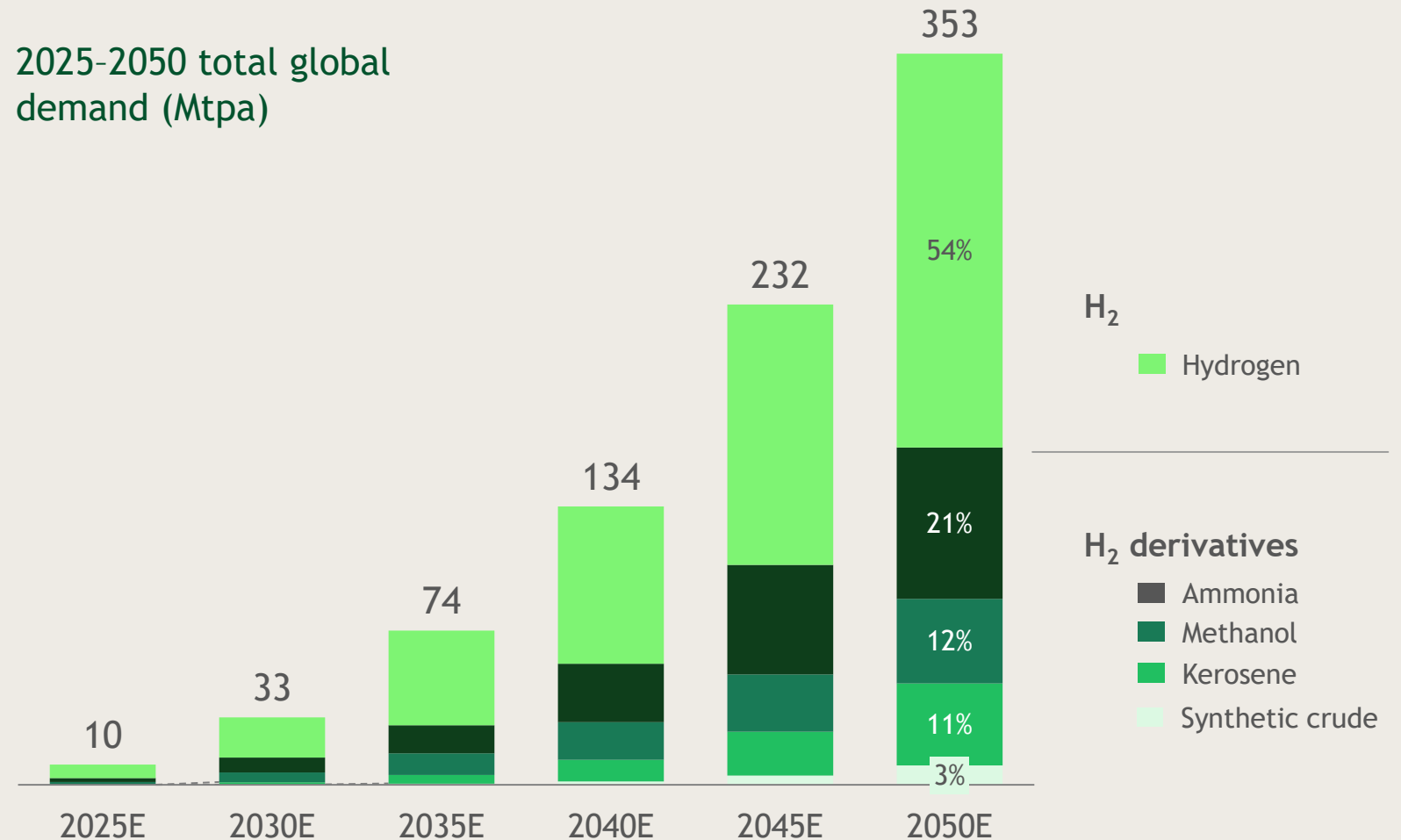
2°C pathway



North America and South America
Middle East and Africa
Asia-Pacific
Europe

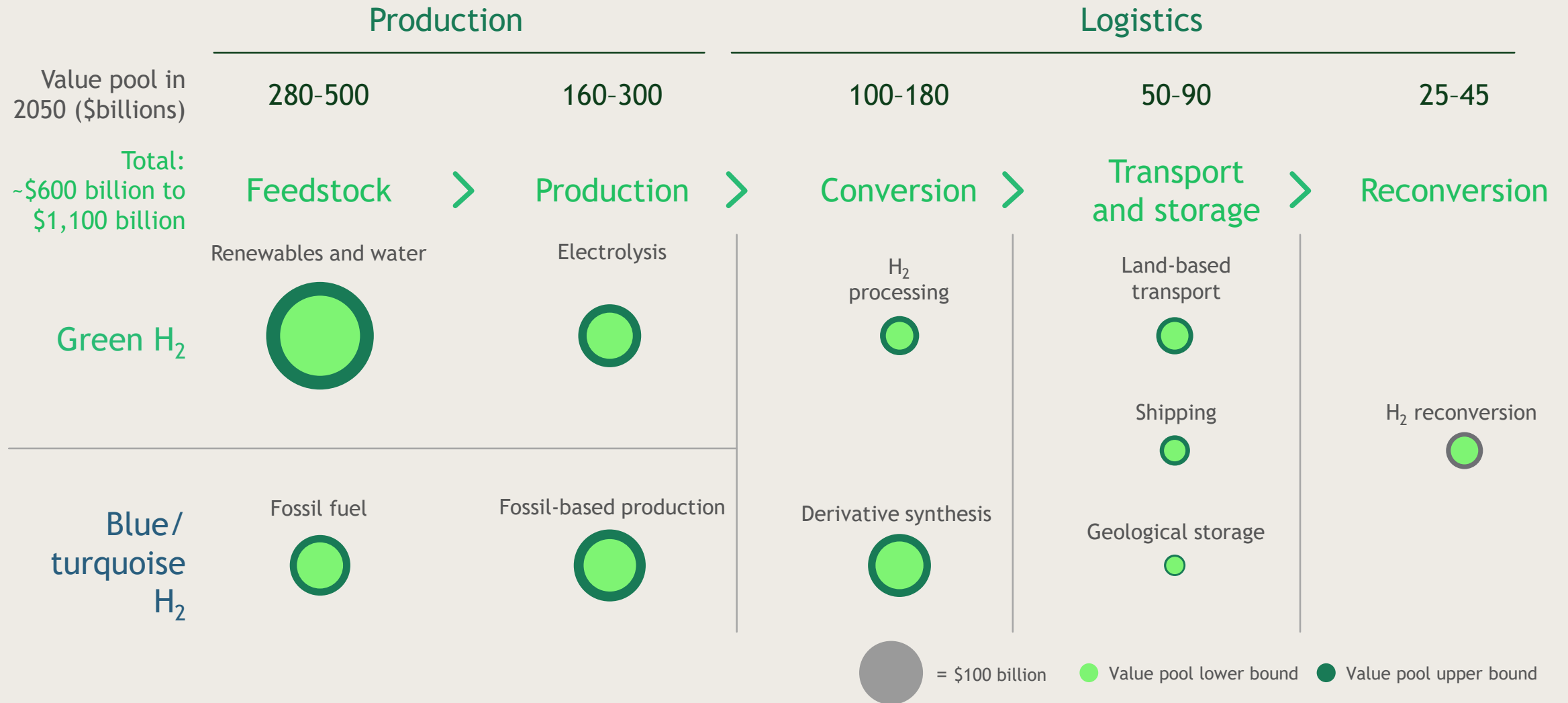
Derivatives are likely to account for more than half of long-term low-carbon hydrogen demand

2025-2050 total global demand (Mtpa)



Sources: IEA World Energy Balances; IEA WEO 2021; GlobalData; Nexant; BCG Global H₂ Demand Model, August 2022.
Note: Hydrogen-derivative fuels are normalized to hydrogen equivalent, and projections are based on the 2°C pathway. Mtpa = millions of tons per year.

Low-carbon hydrogen market revenue could top \$1 trillion by 2050

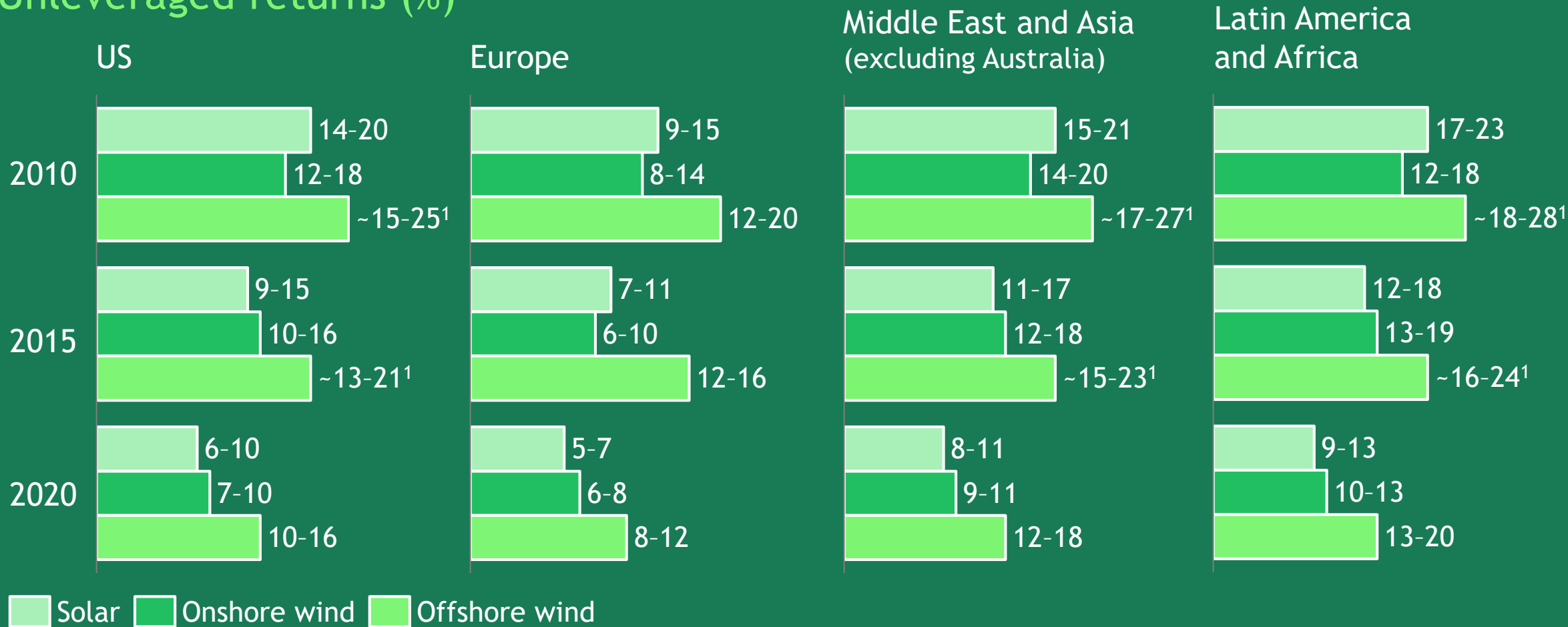


Source: BCG Hydrogen Market Model.



The lesson from renewables: Early infrastructure investors earn the best returns

Unleveraged returns (%)

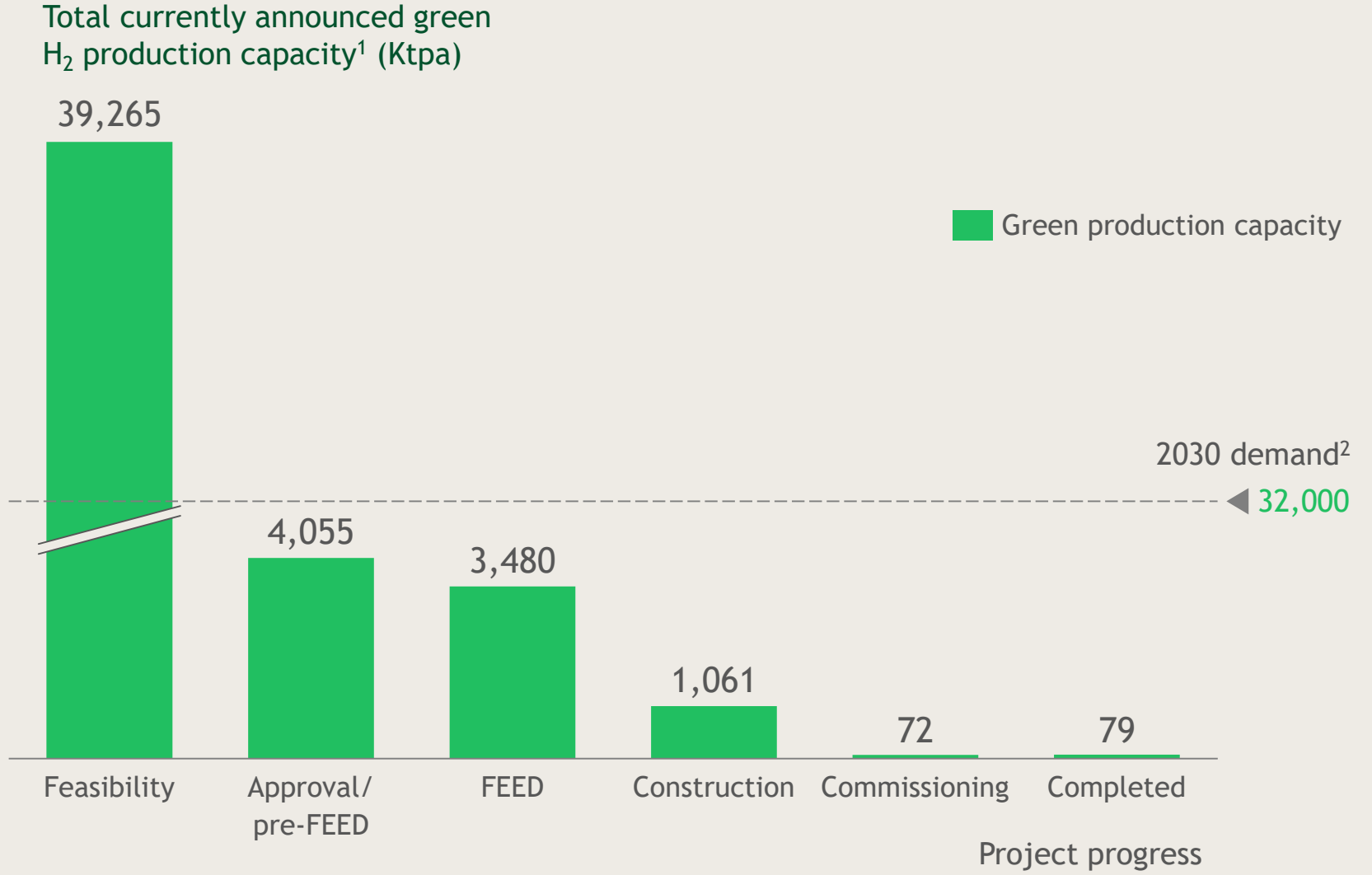


Sources: Analyst reports; BCG analysis.

Note: Estimated range of unleveraged returns over project life for subregions with good renewable resources and suitable market access. Ranges reflect different degrees of policy support, local cost differences, and assumptions about future market pricing.

¹ Conceptual, as there is currently no project volume for the technology or region.

Too few projects are investable today



Sources: GlobalData, May 2022; BCG Global H₂ Demand Model, May 2022; BCG analysis.

Note: FEED = front-end engineering design; Ktpa = kilotons per year.

¹ As of May 2022.

² Expected low-carbon H₂ demand in a 2°C scenario.

Key
actions
that

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stakeholders
can take
to unlock
the market

Public sector: Craft a framework, including subsidies and certification of low-carbon production, to support market development

Companies: Develop and deploy new technology to reduce production costs and increase electrolyzer efficiency and capacity; form joint ventures and consortia to ensure risk-sharing

Customers: Make purchase commitments, including agreements to pay the necessary premium for low-carbon hydrogen

Lenders and investors: Develop new instruments to support development of large-scale low-carbon hydrogen projects

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