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US Clean Hydrogen Market Outlook

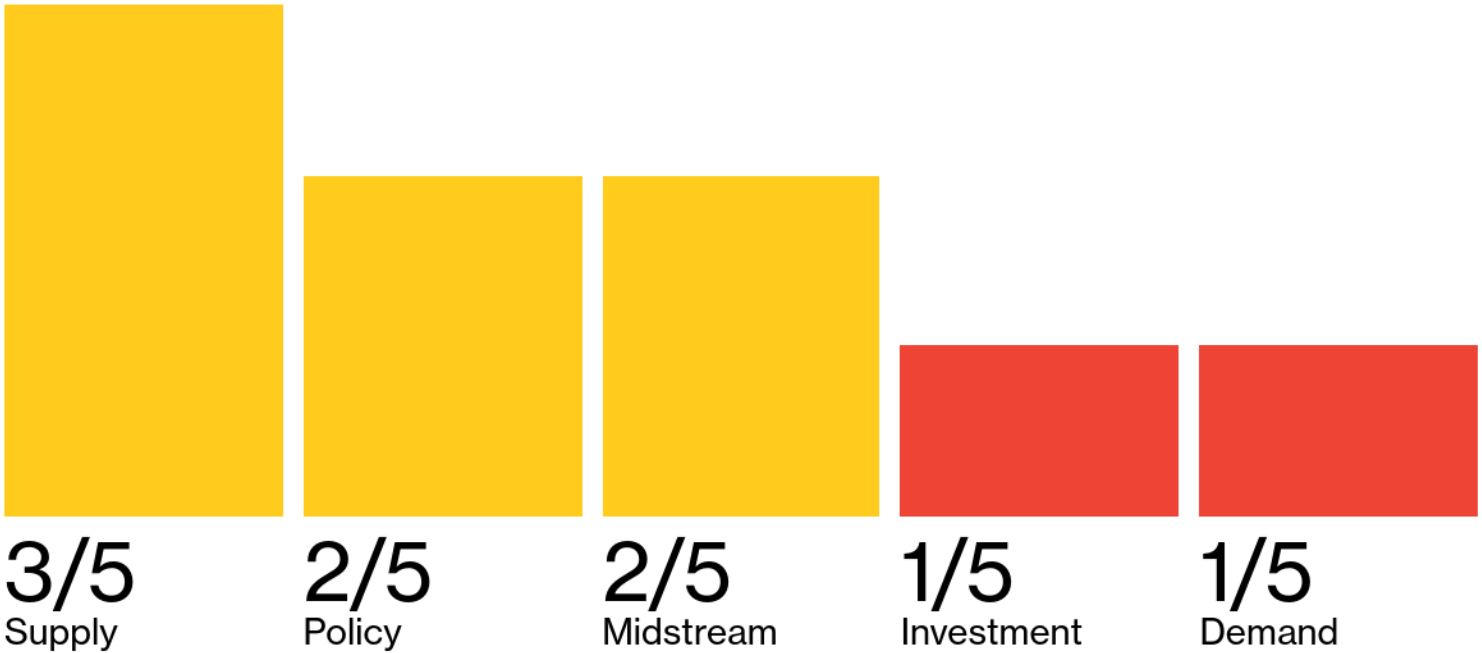
Presented to California Energy Commission

Payal Kaur

July 29, 2025

BloombergNEF

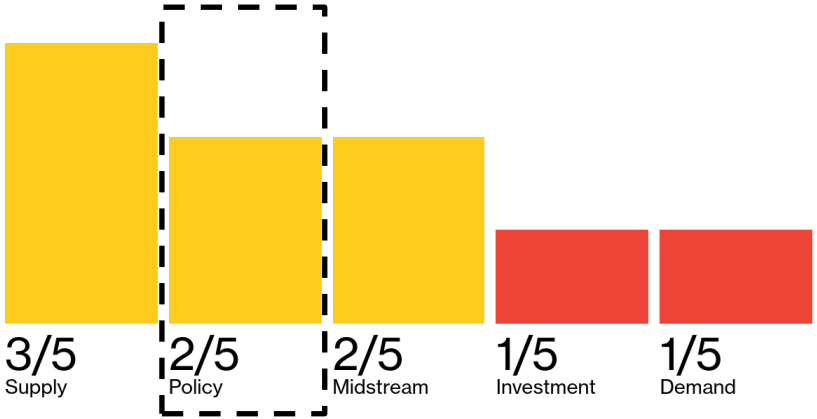
Hard times for hydrogen: BNEF's 1H 2025 H_2 sector scorecard (9/25)



Source: BloombergNEF. Note: 4-5 = on a good track, 2-3 = some progress, 0-1 = more work needed.

Policy

Uncertainty



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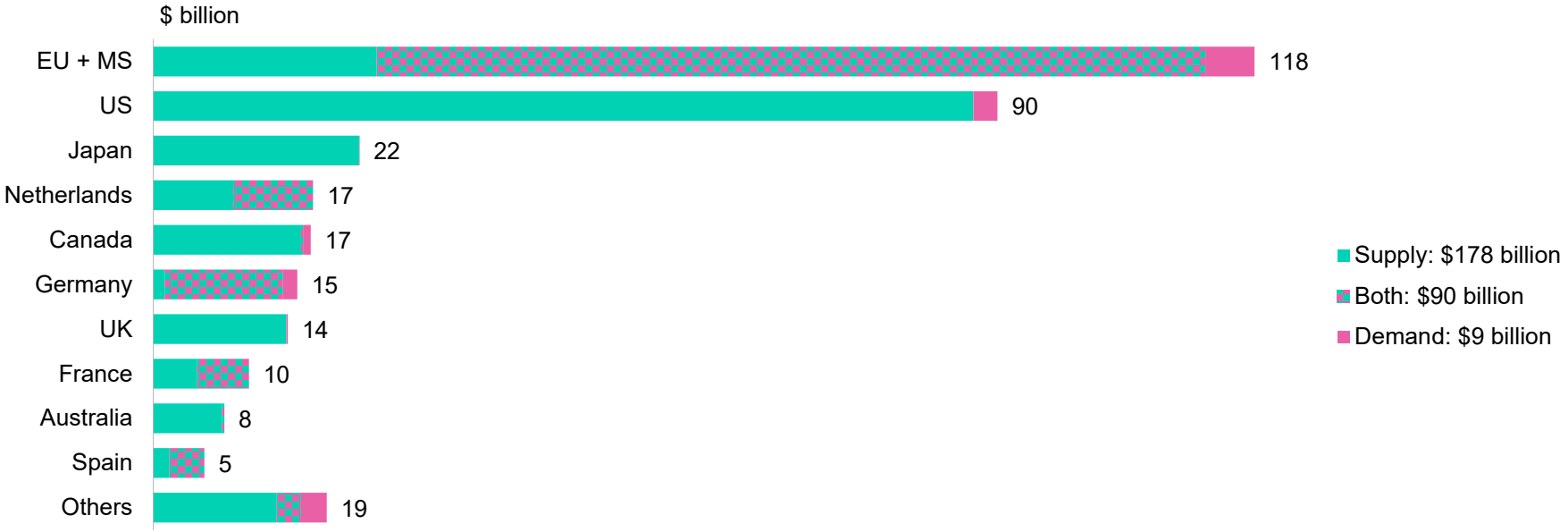
More than $275 billion is available for clean hydrogen, but only a fraction goes to demand

Government support for hydrogen by market and target area



Source: BNEF Hydrogen Subsidies Tracker (web | terminal). Note: EU + MS = European Union plus its member states. 'Both' also includes support for hydrogen midstream (storage and transport). Data as of March 19, 2025.

Polic

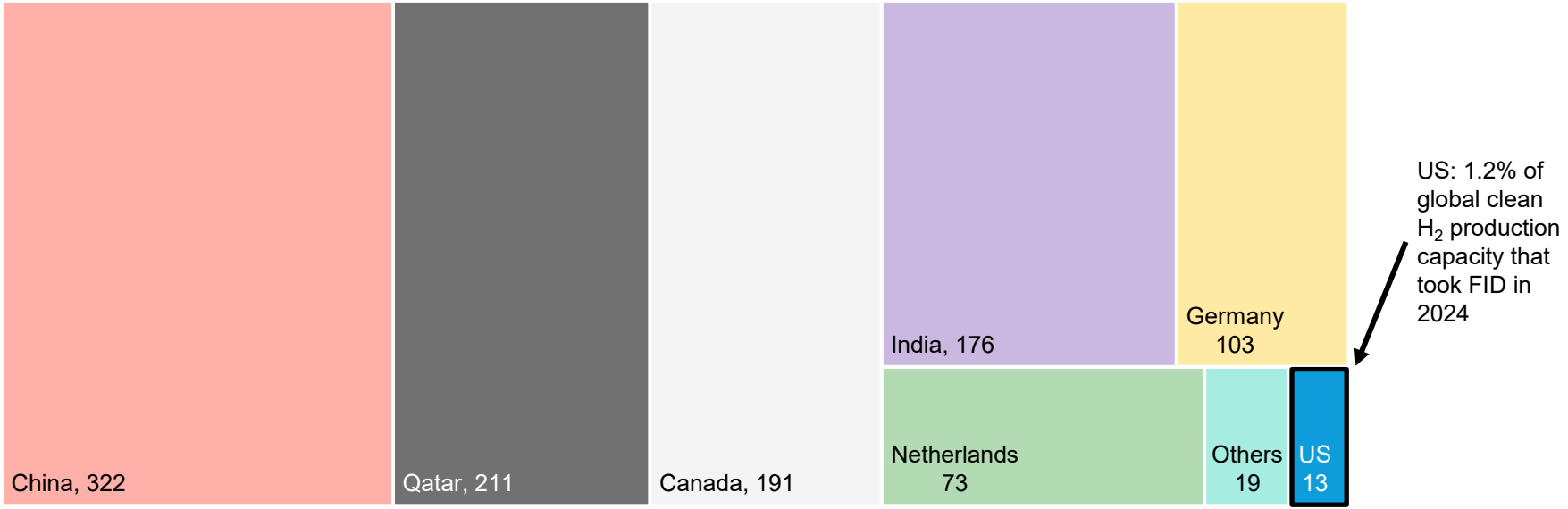
Case study: US policy uncertainty has kept hydrogen developers in limbo

Photographer: Anna Moneymaker/Getty Images/Bloomberg

Case study: US policy uncertainty has kept hydrogen developers in limbo

Clean H_2 project capacity that closed financing in 2024, by market

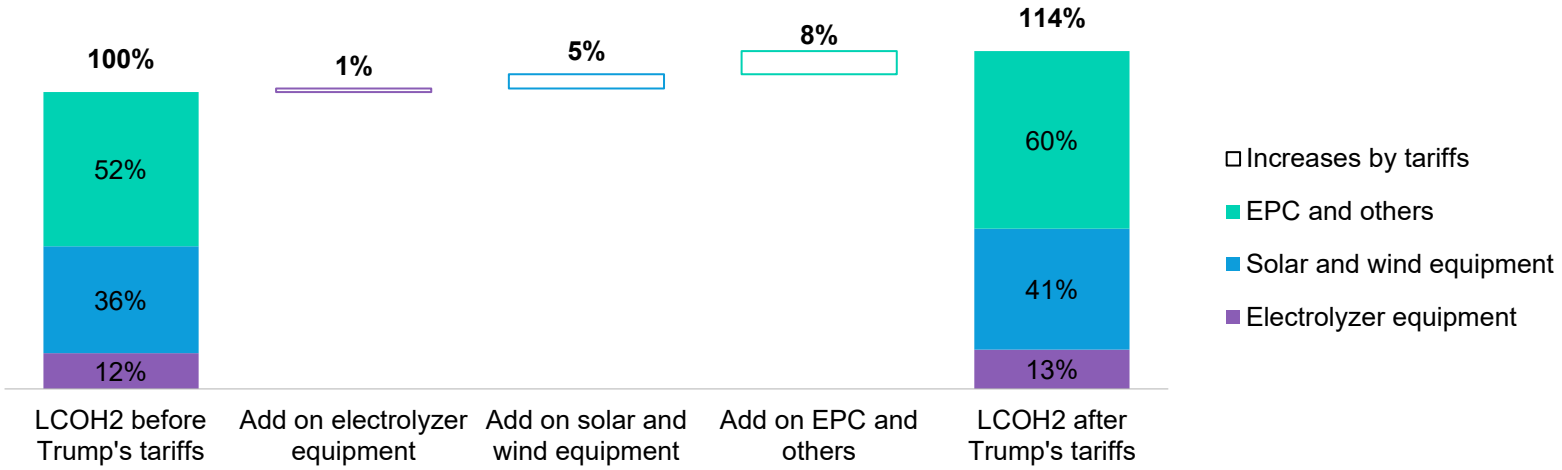
Thousand metric tons of hydrogen



Source: BloombergNEF

President Trump's tariffs could raise US green hydrogen costs by 14%

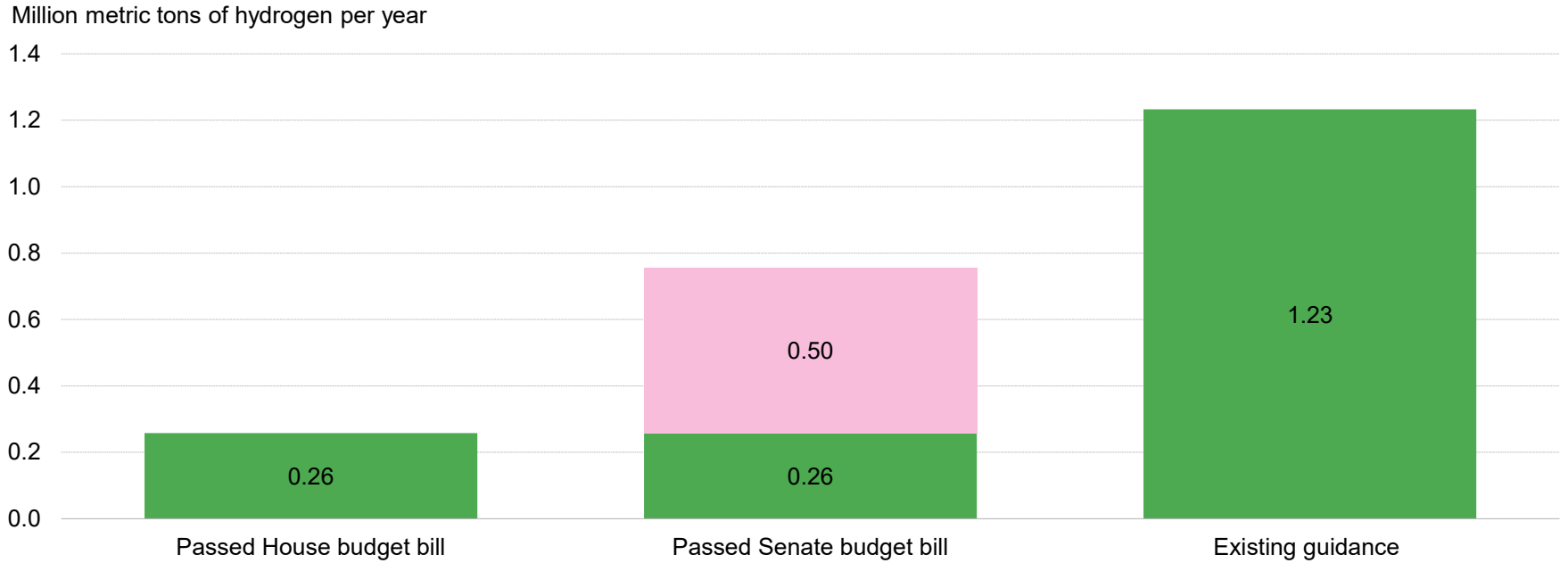
Impacts of Trump's new tariffs on green hydrogen costs in the US, 2025



Source: BloombergNEF. Note: LCOH2 stands for levelized cost of hydrogen production. The year 2025 refers to when final investment decision (FID) is reached. Calculations of tariff impacts are based on announcements by April 8, 2025.

The “One Big Beautiful Bill” boosts blue hydrogen while taking a jab at green hydrogen

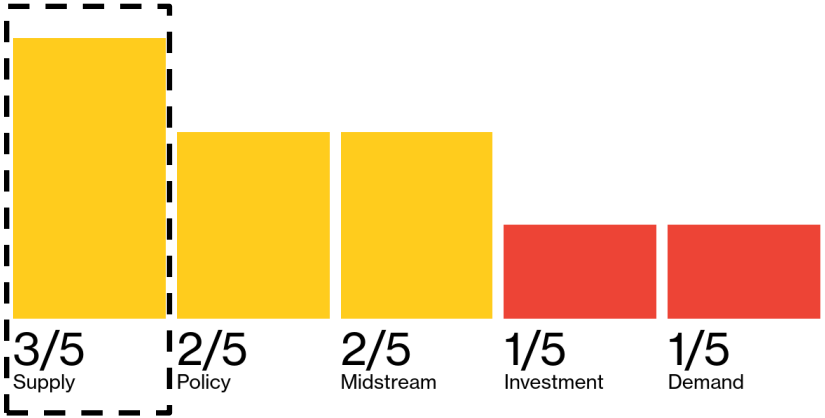
Green hydrogen production volumes eligible for 45V tax credit



Source: BloombergNEF. Note: Forecast is based on clean hydrogen projects in the optimistic scenario of BNEF's supply forecast as of May 2024

Supply

Lots of announced supply, but very little of it is materializing



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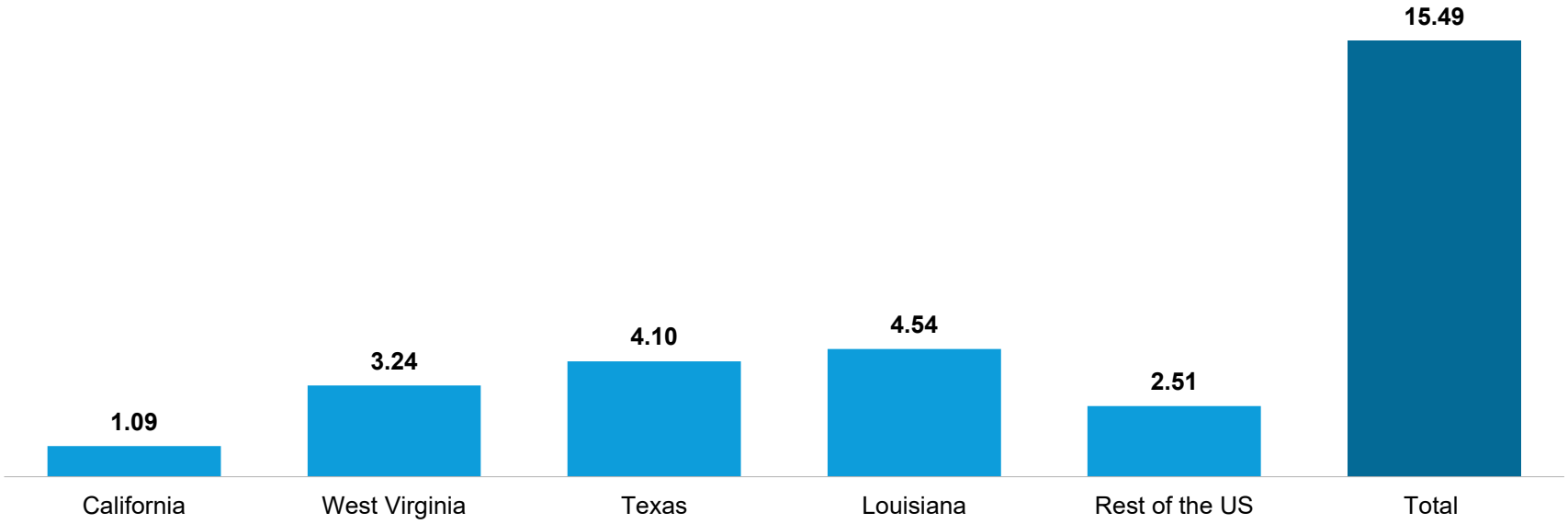
California is in the top four states planning to produce clean hydrogen

Cumulative annual clean H_2 production announced to come online by state

Million metric tons of hydrogen per year

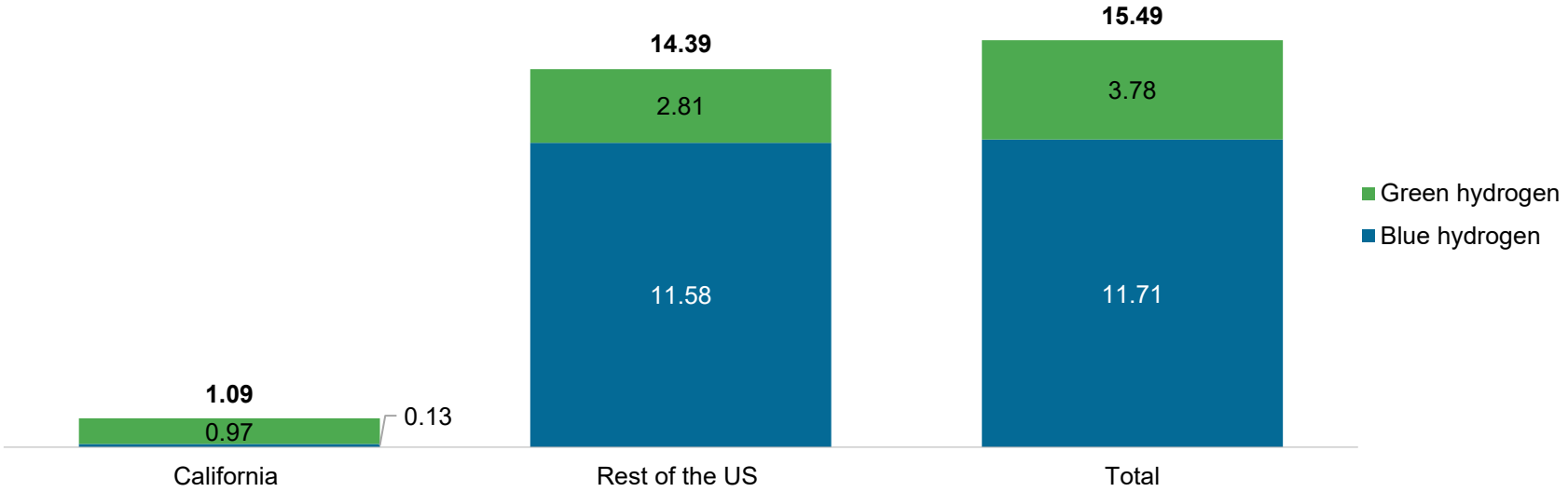


Source: BloombergNEF. Note: Data as of July 28, 2025.

California is planning for more green hydrogen production than blue hydrogen

Cumulative annual clean H_2 production announced to come online by state

Million metric tons of hydrogen per year



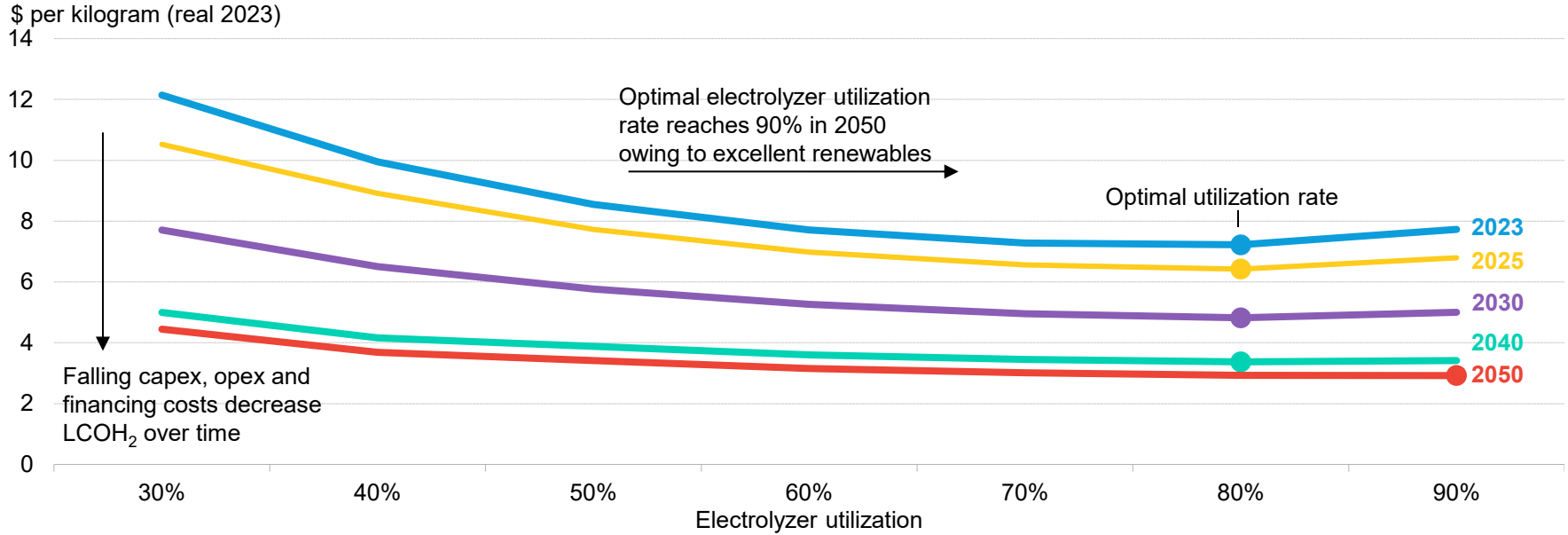
Source: BloombergNEF. Note: Data as of July 28, 2025.

Costs and prices

Higher than anticipated

Texas has the lowest $LCOH_2$ among the three US states modeled due to strong renewables

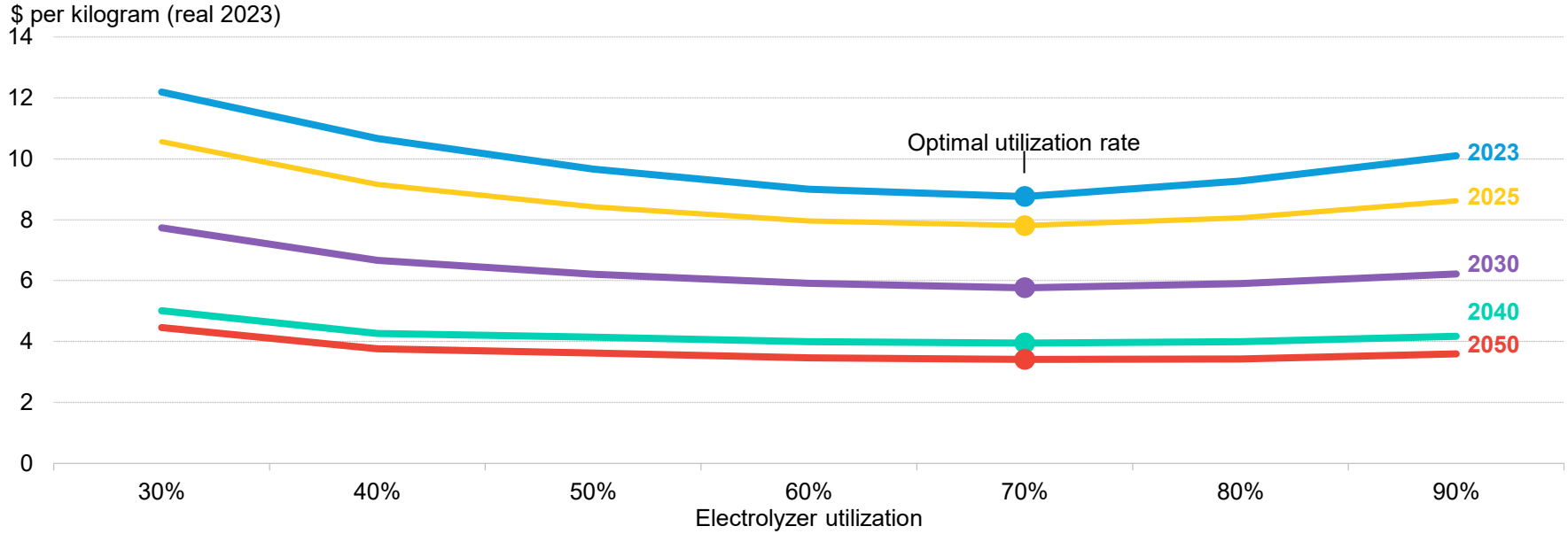
$LCOH_2$ by electrolyzer utilization and financing year, Texas



Source: BloombergNEF. Note: Years represent financing years. The colored circles represent the levelized cost of hydrogen production ($LCOH_2$) at the optimal utilization rate, which is the rate at which an electrolyzer produces the lowest $LCOH_2$. The utilization rate may vary based on coordinates input for the renewables.

Utah $LCOH_2$ is higher than Texas, lower than New York, reflecting solar and wind conditions

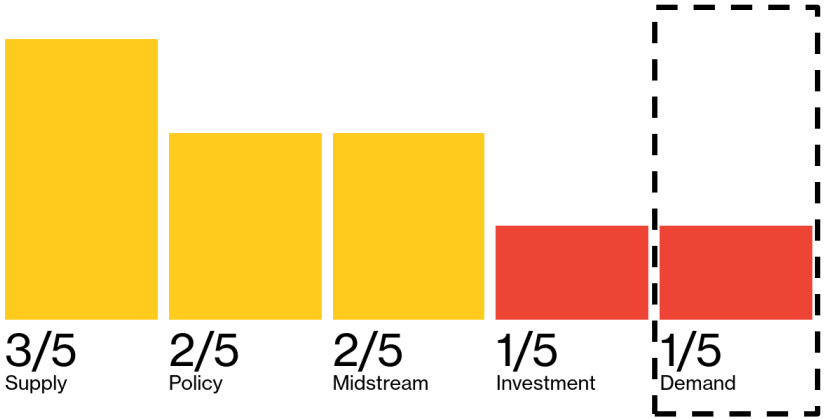
$LCOH_2$ by electrolyzer utilization and financing year, Utah



Source: BloombergNEF. Note: Years represent financing years. The colored circles represent the levelized cost of hydrogen production ($LCOH_2$) at the optimal utilization rate, which is the rate at which an electrolyzer produces the lowest $LCOH_2$. The utilization rate may vary based on coordinates input for the renewables.

Demand

Binding offtake continues to remain elusive



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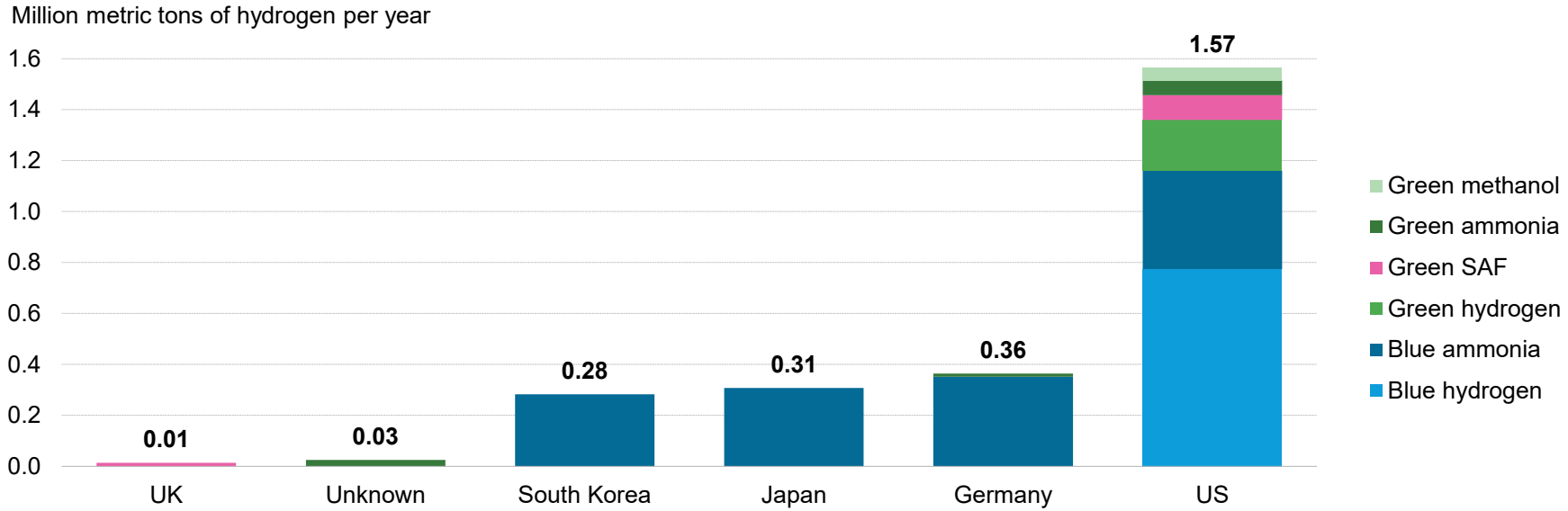
US is supplying clean H_2 mainly for domestic use

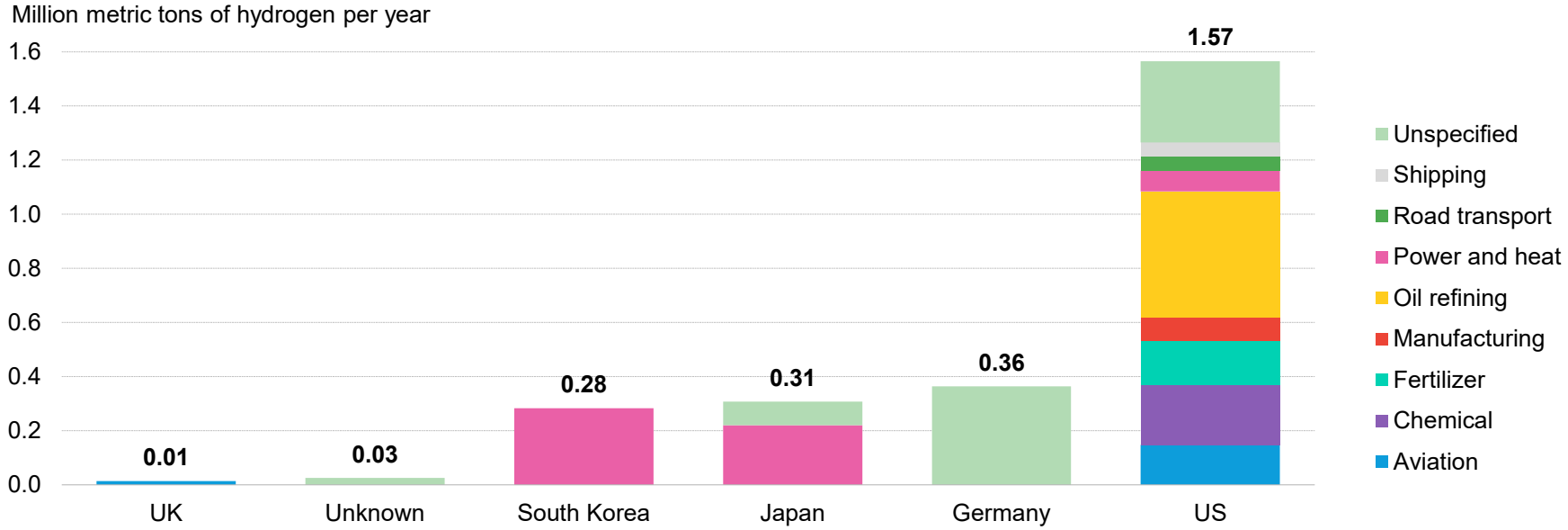
Clean hydrogen offtake volumes by demand market



Source: BloombergNEF. Note: Data as of May 30, 2025. BNEF's Hydrogen Offtake Agreement Database only includes projects of at least 20 megawatts or 2,800 metric tons per year of capacity.

Offtake from US supply is largely for existing uses of H_2

Clean hydrogen offtake by demand market

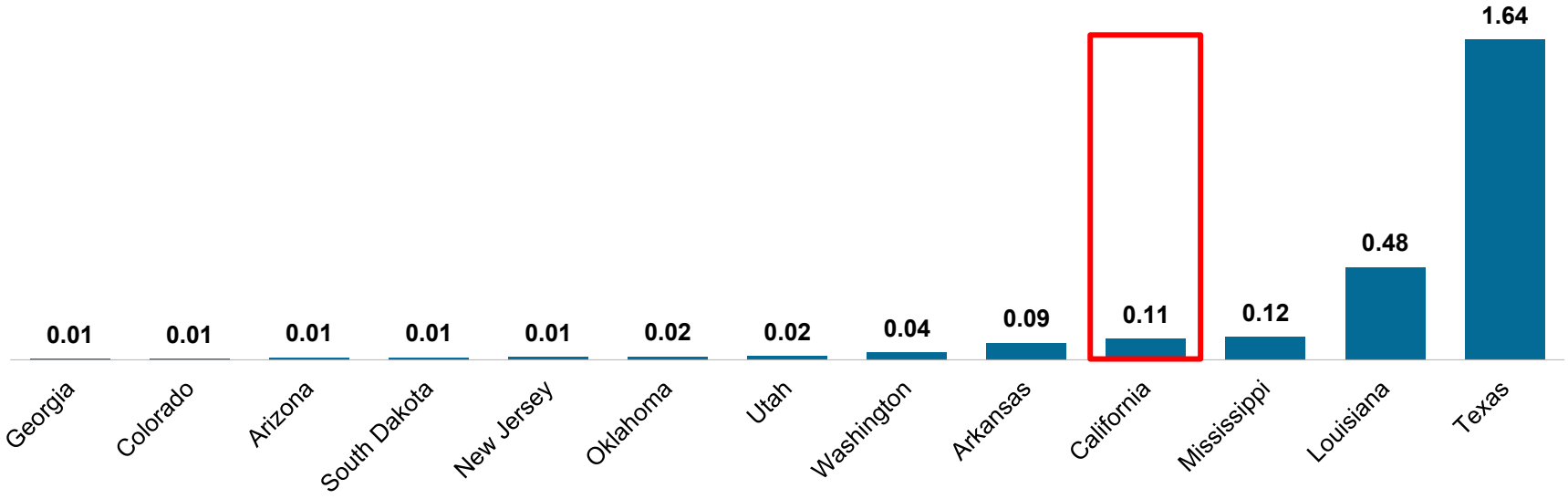


Source: BloombergNEF. Note: Data as of May 30, 2025. BNEF's Hydrogen Offtake Agreement Database only includes projects of at least 20 megawatts or 2,800 metric tons per year of capacity.

California is among the top five states with the most signed offtake

Clean hydrogen offtake by state

Million metric tons of hydrogen per year

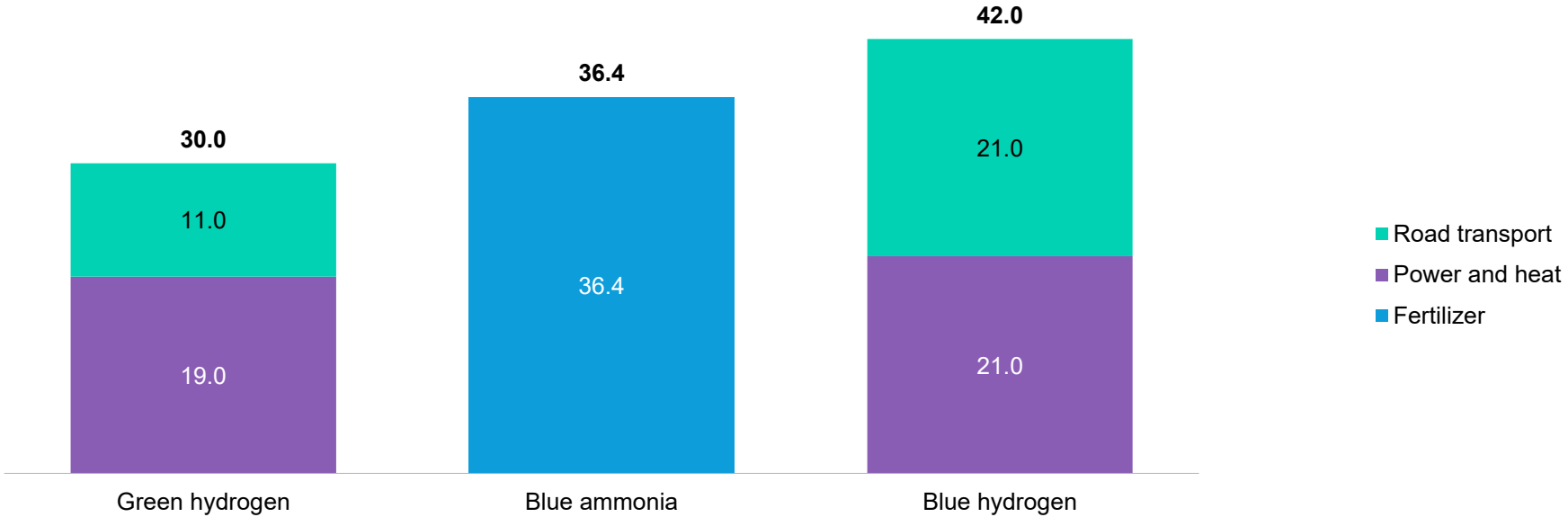


Source: BloombergNEF. Note: Data as of May 30, 2025. BNEF's Hydrogen Offtake Agreement Database only includes projects of at least 20 megawatts or 2,800 metric tons per year of capacity.

Power and heat is the largest end use for California clean hydrogen

Clean hydrogen offtake by state

Thousand metric tons of hydrogen per year



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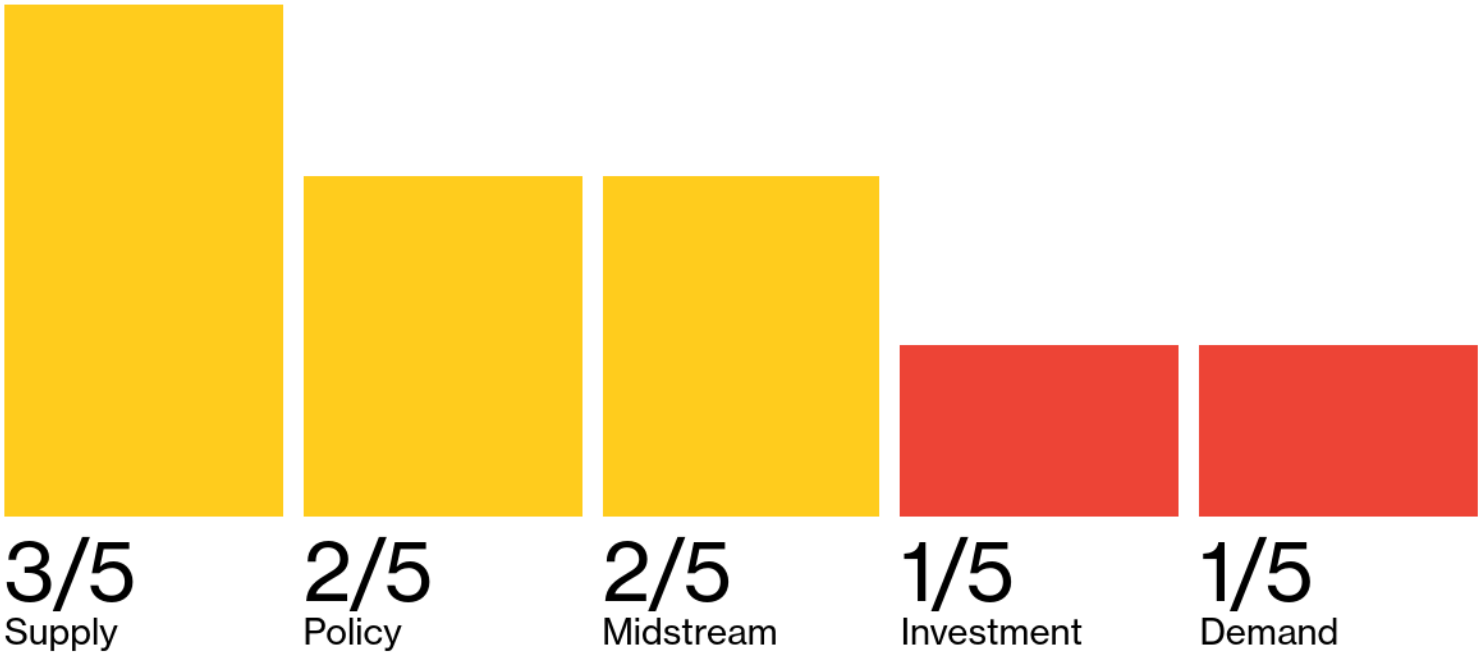
Most applications of clean H_2 have a mix of good and bad news

Key developments since BNEF's 1H 2024 Market Outlook

Sector	Tech readiness	Role in net zero*	Key developments since April 2024 (positive, mixed, negative)
Oil refining	Commercial	Unavoidable	Oil refineries have signed some of the largest offtake deals, including TotalEnergies' binding agreements with Air Products and RWE, and INEOS' contract with RWE
Methanol (chemical)	Commercial	Unavoidable	Maersk launched a new venture to produce plastics using green methanol as a feedstock, while coal-chemical projects in China slowed down adoption of green H_2
Ammonia (chemical)	Commercial	Unavoidable	Fertilizer traders Yara and Ameropa signed new offtake deals globally; fertilizer producers Pupuk Indonesia and CF Industries announced new green H_2 projects
Steel	Commercially ready	Medium	New offtake deals for hydrogen-based steel were signed by Benteler and Amazon, but the deployment of green steel projects is at risk of delays (web | terminal)
Shipping	Commercially ready	Large	Shipping companies are diversifying their clean fuel portfolio: Hapag-Lloyd signed an offtake deal with a Chinese project, while Maersk turned its eyes to LNG ships
Aviation	Pilot stage	Medium	Leading renewable fuel producer Neste canceled its hydrogen project in Finland, and German utility Uniper abandoned an e-SAF project in Europe
Power	Pilot stage	Small	Japan de-prioritized ammonia co-firing in its upcoming auction (web | terminal); South Korea's hydrogen power auction ran into cost hurdles (web | terminal)

*Source: BloombergNEF. Note: *Role in net zero refers to clean hydrogen's role in each sector in BNEF's New Energy Outlook 2024 Net Zero Scenario (Figure 5.29). Large means hydrogen share in final energy consumption over 50%, while medium is between 20% and 50%, under 20% is small. SAF is sustainable aviation fuel.*

Hard times for hydrogen: BNEF's 1H 2025 H_2 sector scorecard (9/25)



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