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Description:	2A. Matthew Bravante, Bloomberg NEF
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BloombergNEF remarks

California Energy Commission 2022 hydrogen
consultation

Matthew Bravante

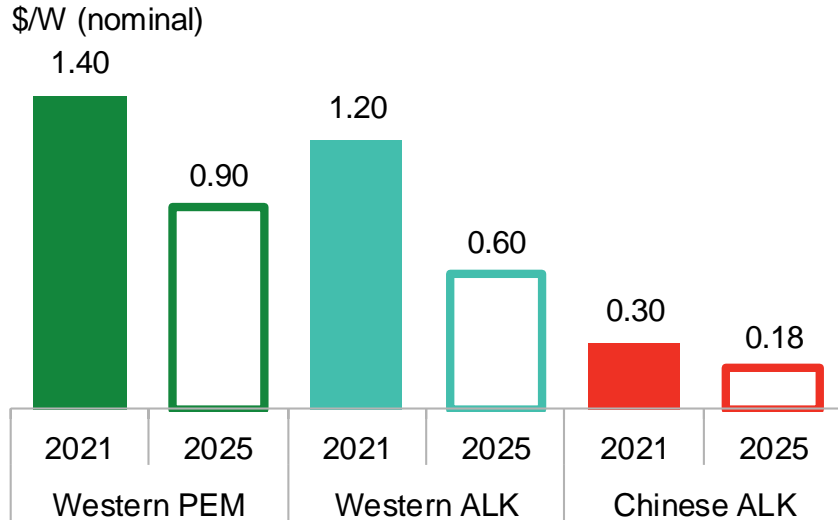
June 21st, 2022

Hydrogen market growth

More scale at a lower cost

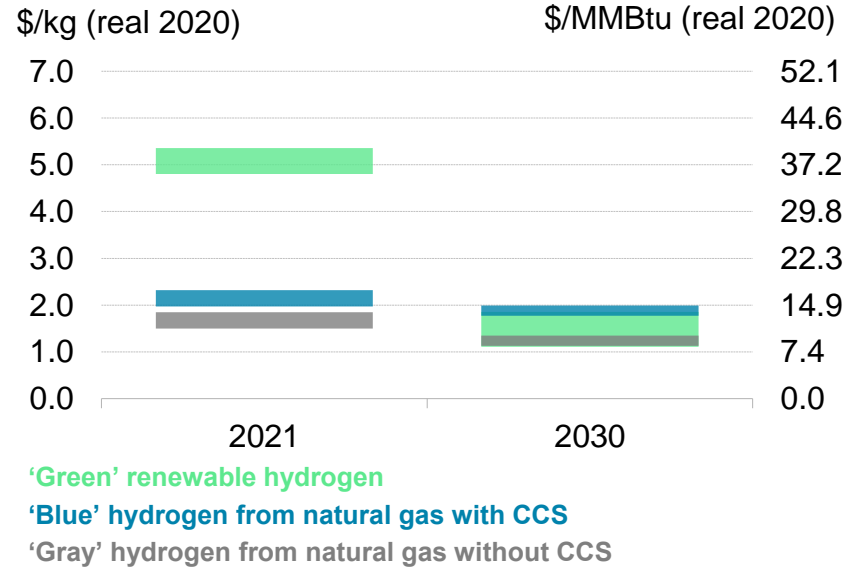
Electrolyzers are getting cheaper, which will lead to cheap hydrogen

BloombergNEF estimates for electrolyzer capital costs, 2021 and 2025



Source: BloombergNEF

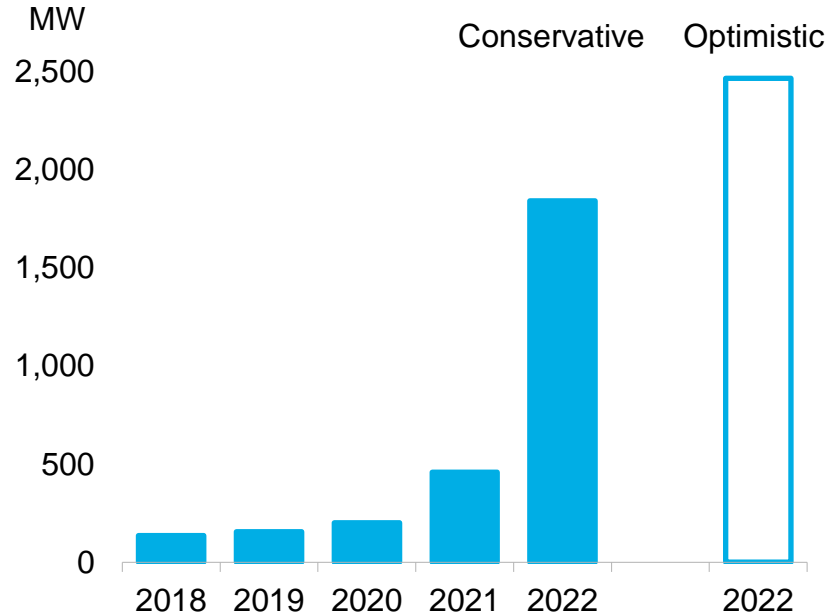
Levelized costs of hydrogen production in California, 2021 and 2030



Source: BloombergNEF

Electrolysis for hydrogen production is gaining traction

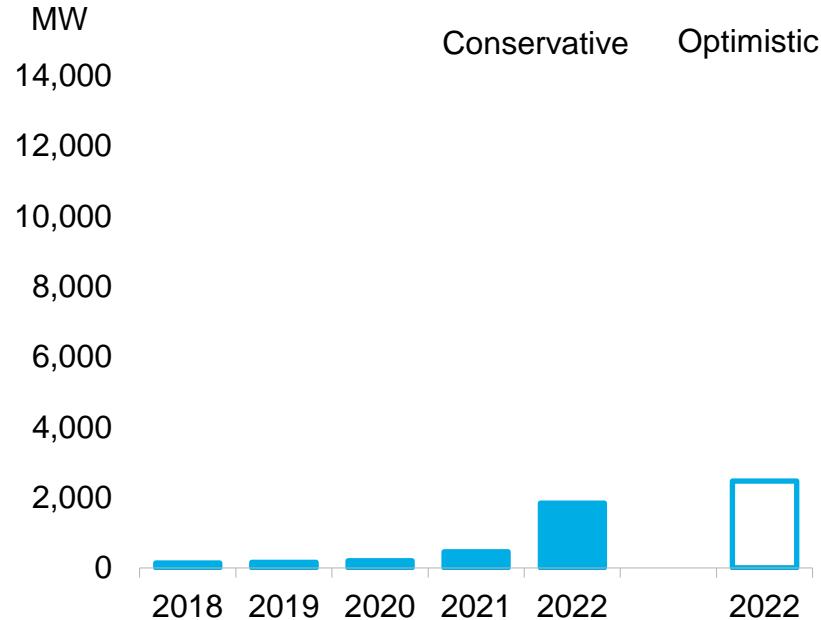
Electrolyzer shipments



Source: BloombergNEF

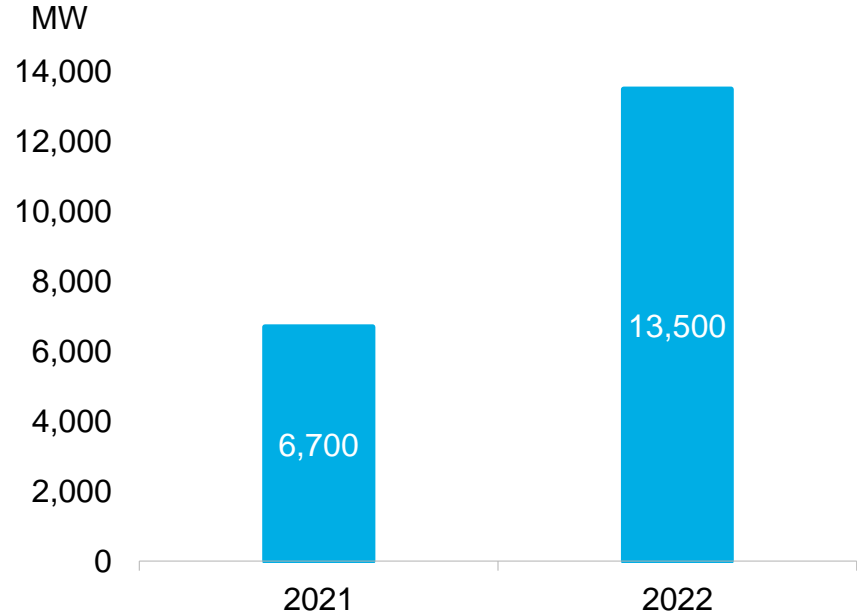
There is a large amount of manufacturing capacity ready for projects

Electrolyzer shipments



Source: BloombergNEF

Electrolyzer Manufacturing

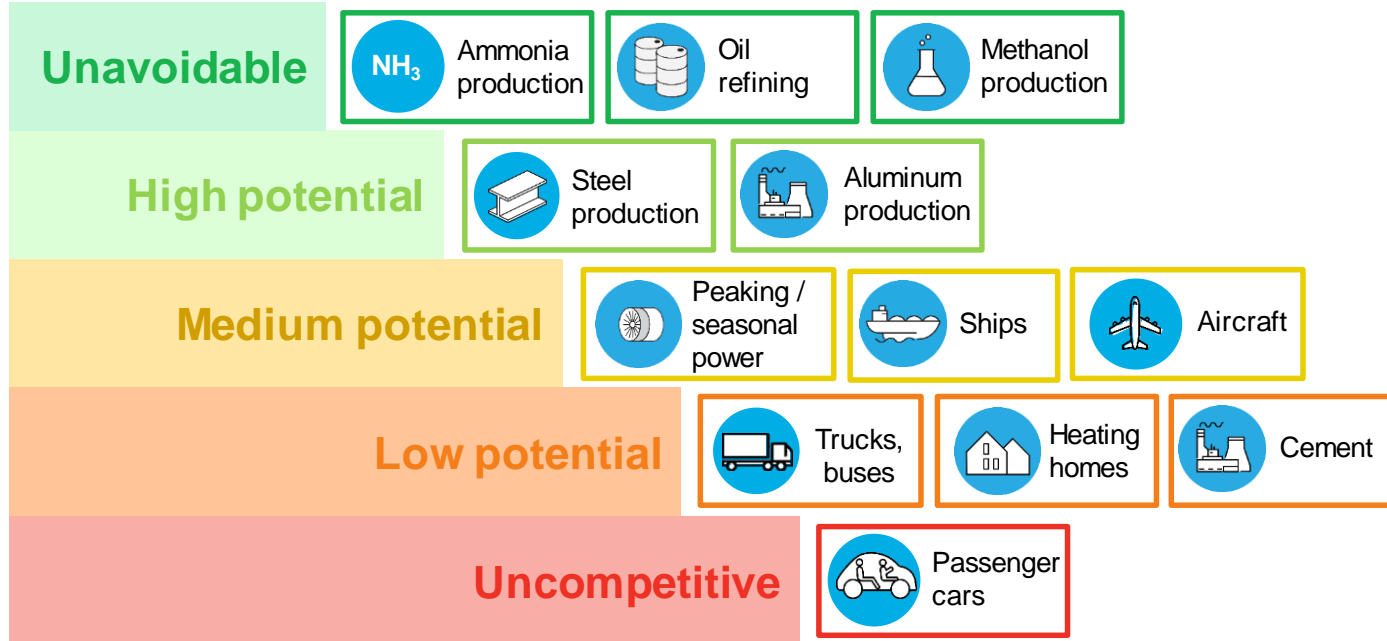


Hydrogen demand in California

How to use a scarce resource

Hydrogen will be most important to decarbonize Industry

The prospects for widespread adoption of clean H₂ in various sectors



Source: BloombergNEF, concept from Liebreich Associates

Low-carbon hydrogen should be thought of as a scarce and valuable resource

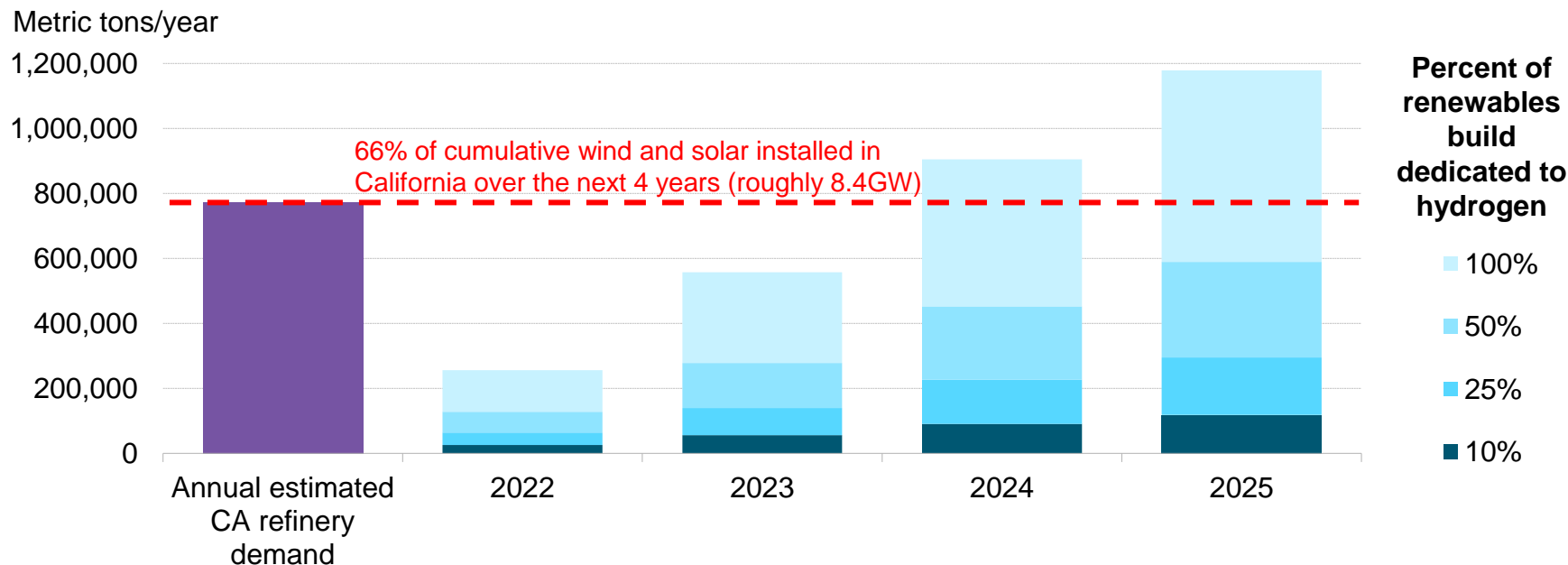
Estimated annual hydrogen demand for California refineries



Source: BloombergNEF. Note: Assumed average hydrogen demand for PADD 5 refineries .

California would have to dedicate a lot of the expected solar and wind to hydrogen

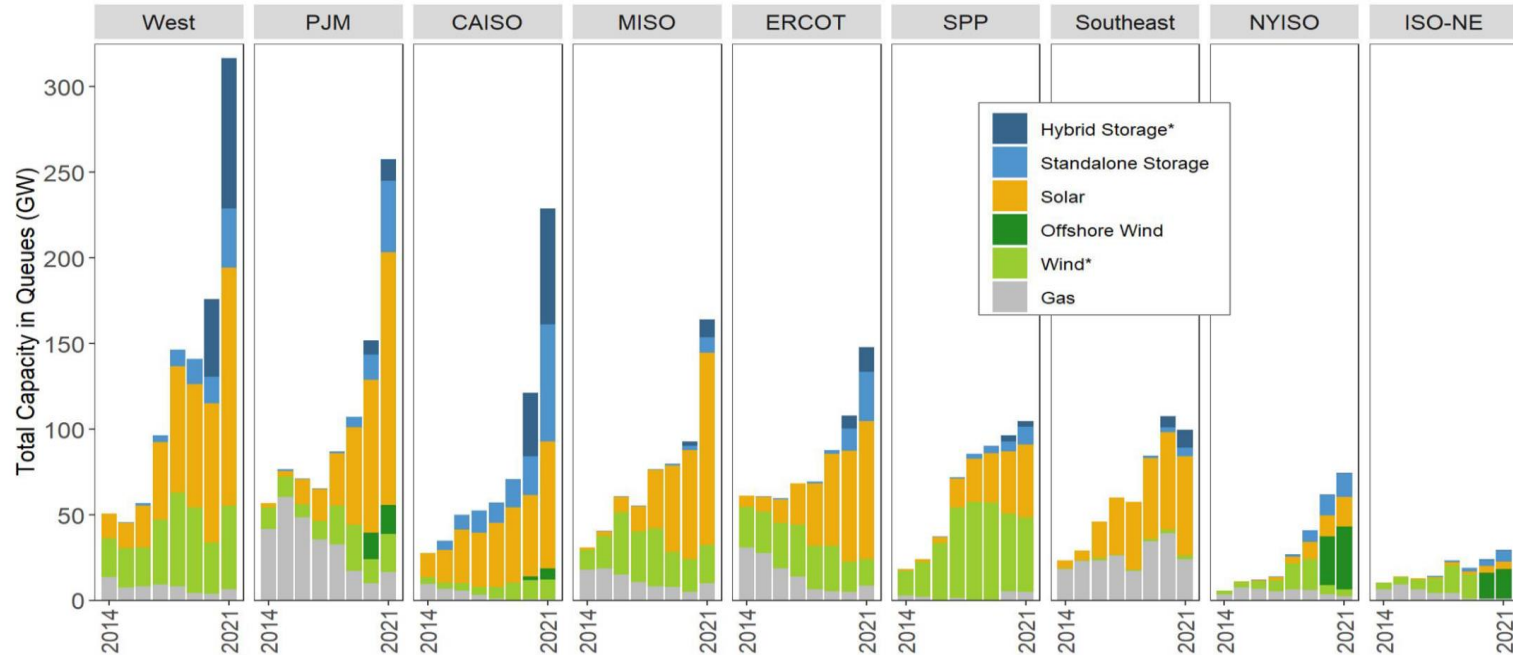
Potential hydrogen production from all expected solar and wind built in CA, 2022-2025



Source: BloombergNEF. Note: Assumed average hydrogen demand for PADD 5 refineries. This analysis assumes a 40% capacity factor for electrolysis system.

Hydrogen could grow if used to alleviate the growing interconnection queue

Interconnection queue for different regions

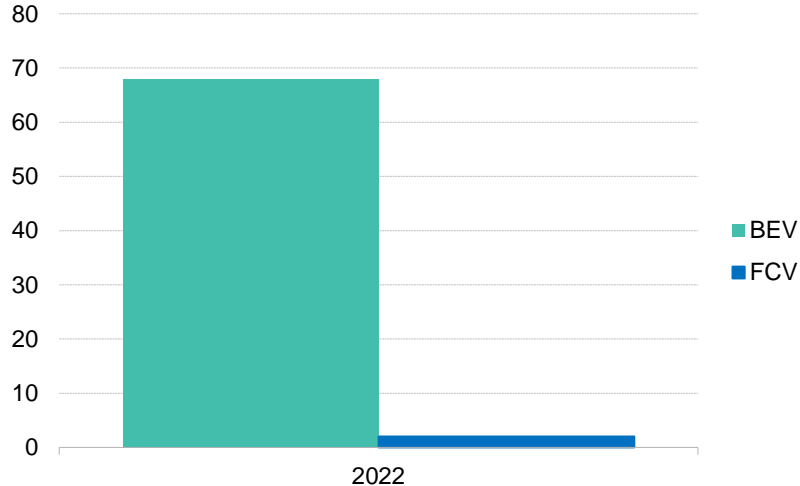


Source: Lawrence Berkeley National Laboratory.

Fuel Cell vehicles are struggling to compete with electric vehicles

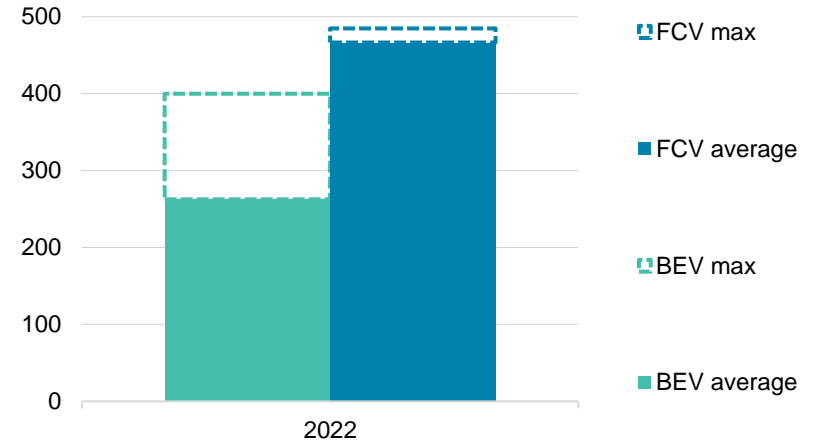
Model availability of zero tailpipe emission heavy trucks

Number of available models



Range of available zero tailpipe emission heavy trucks

Range (km)



Source: BloombergNEF

To summarize

1. Electrolyzers are becoming cheaper and more abundant, which will lead to cheaper hydrogen.
2. In the near term, clean hydrogen will be a scarce resource. It should be thought of as a valuable tool for deep decarbonization.
3. Hydrogen can relieve interconnection challenges and provide a higher value market for renewables competing in low-price electricity environment.

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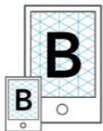
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