### Global Hydrogen Trends and Opportunities

Emily Beagle, PhD UT CLE 1 February 2023



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Background

Webber Energy Group

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Global Hydrogen Trends

6 January 2023

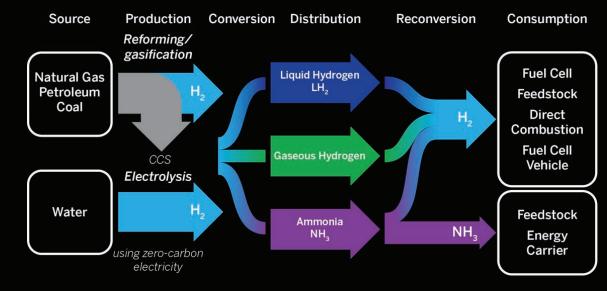
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#### Hydrogen is increasingly being considered a key decarbonization tool Global hydrogen demand by sector in the IEA Net Zero Scenario

Million tonnes (Mt) Hydrogen • Hydrogen (H<sub>2</sub>) releases no 225 greenhouse gases when used Can serve as a fuel, feedstock, or 150 energy carrier 75 Potential emission reduction applications across many sectors 2020 TX H2 production: (industrial, transportation, electricity) 0 3 Mt/year 2020 2025 2030 Refining Industry Transport Power Ammonia - fuel Synfuels **Buildings** Grid Injection Webber Energy Group 3 Emily Beagle, PhD **Global Hydrogen Trends** 1 February 2023 THE UNIVERSITY OF TEXAS AT AUSTIN

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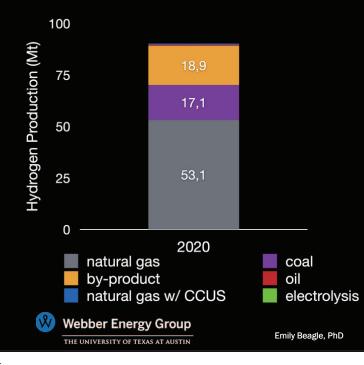
### Energy usage and emissions across the hydrogen supply chain are an important consideration for its use



Hydrogen supply chain may look like some version of this - illustrative of different supply chain components

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# Current hydrogen production methods emit greenhouse gases



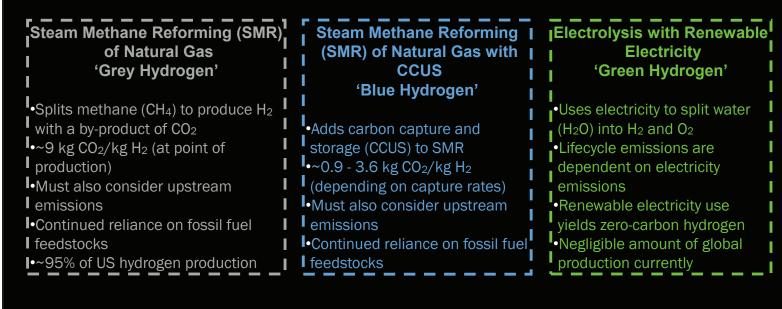
- 59% of global hydrogen produced by steam methane reforming (SMR) of natural gas  $\rightarrow$  ~9 kg CO<sub>2</sub>/kg H<sub>2</sub>
- 19% of global hydrogen produced from gasification of coal  $\rightarrow$  ~19 kg CO\_2/kg H\_2
- Only 0.7% of global hydrogen production from steam methane reforming of natural gas with carbon capture and storage (CCUS)  $\rightarrow$  ~0.9 3.6 kg CO<sub>2</sub>/kg H<sub>2</sub>
- Negligible production of hydrogen from electrolysis

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## Hydrogen production coded by 'color' misses some key considerations





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