



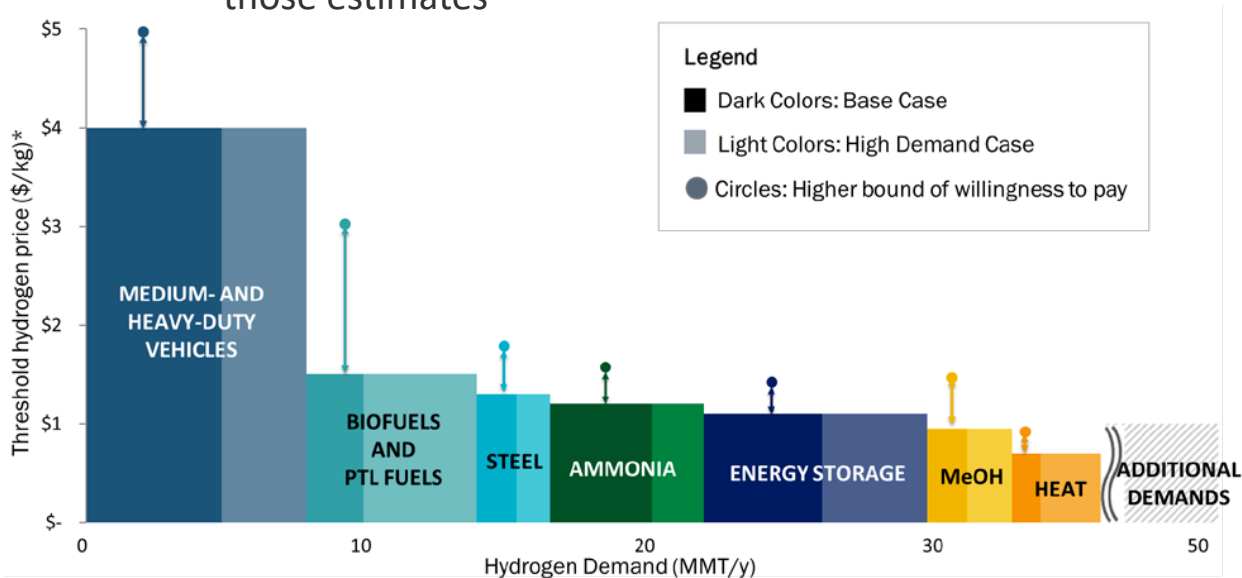
# Updates to Hydrogen Market Potential

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# Updates to Hydrogen Market Potential

- Last year, I reported “The economic potential of hydrogen demand in the U.S. is 2.2-4.1X current annual consumption.” (22-41 MMT/yr) and the serviceable consumption potential is 106 MMT/yr based on an analysis published in 2020.
- The National Clean Hydrogen Strategy Roadmap Updates those estimates



## Estimates & Considerations

Hydrogen volumes dependent upon many variables

Key estimates

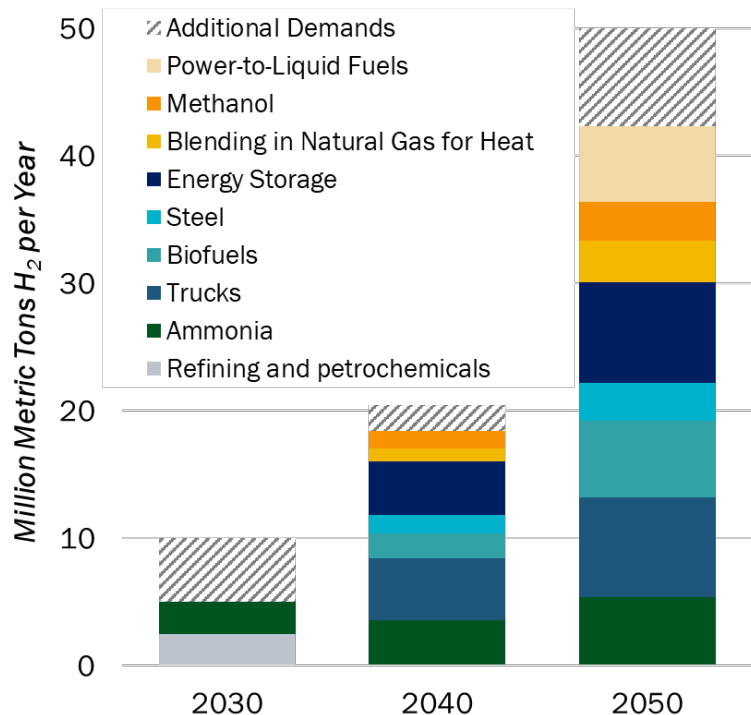
- Trucks:  $\approx$  10%-15% total energy
- Aviation: 100% sustainable aviation fuel using hydrogen
- Steelmaking:  $\approx$  10% using  $H_2$
- Ammonia: 100%
- $\approx$ 50% of methanol
- Blends with natural gas for high-temperature heat
- Additional applications include stationary power, synfuels, and exports

\*Price at point of use (includes production, delivery, and dispensing)

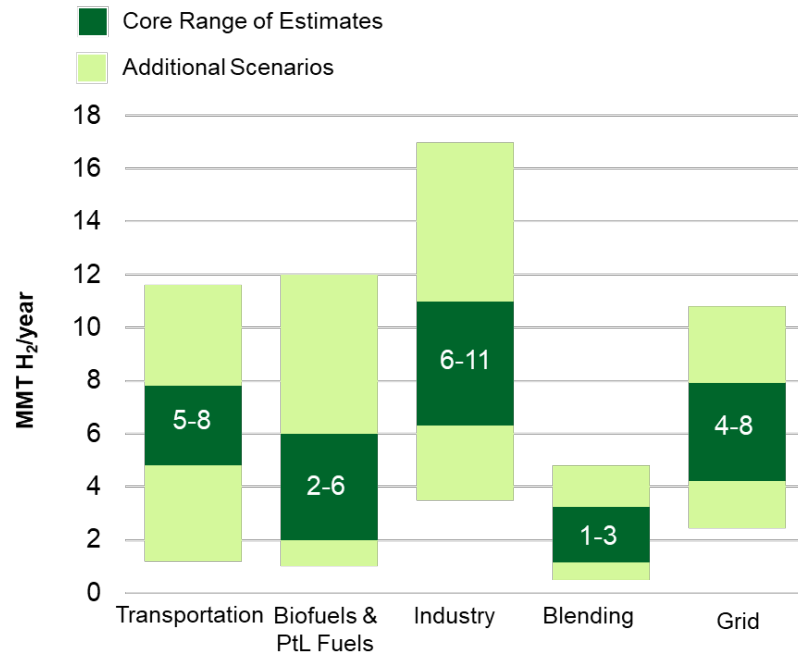
PTL: Power-to-Liquids  
MeOH: Methanol

# Strategy Estimates Market Penetrations for High-Impact End Uses

## Deployment Estimates across Applications



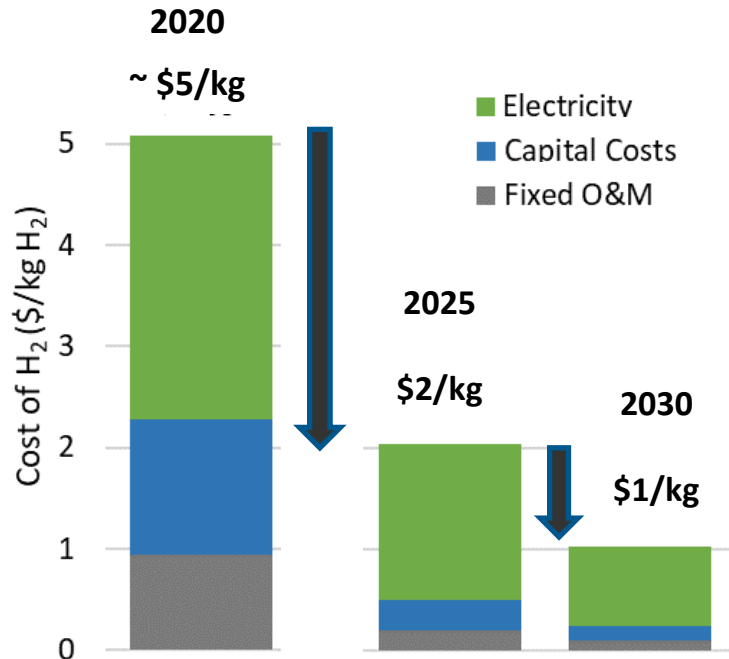
## Deployment Estimate Ranges for 2050



# Hydrogen Shot: “1 1 1”

\$1 for 1 kg in 1 decade for clean hydrogen

## Example: Cost of Clean H<sub>2</sub> from Electrolysis



2020 Baseline: PEM low volume capital cost ~\$1,500/kW, electricity at \$50/MWh. Need less than \$300/kW by 2025, less than \$150/kW by 2030 (at scale)

## Electrolysis:

Reduce electricity cost from >\$50/MWh to

- \$30/MWh (2025)
- \$20/MWh (2030)
- Reduce capital cost >80%
- Reduce operating & maintenance cost >90%

## Bipartisan Infrastructure Law – \$9.5B H<sub>2</sub> Highlights

- \$8B for at least 4 regional clean H<sub>2</sub> Hubs
- \$1B for electrolysis (and related H<sub>2</sub>) RD&D
- \$0.5B for clean H<sub>2</sub> technology mfg. & recycling R&D
- Aligns with H<sub>2</sub> Shot priorities by directing work to reduce cost of clean H<sub>2</sub> to \$2/kg by 2026
- Requires developing a National H<sub>2</sub> Strategy & Roadmap