

Setting the Stage – National Clean Hydrogen Strategy

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Hydrogen and Fuel Cell Technologies Office

Jan 14, 2025

Workshop Agenda

1:00 - 1:15 pm	<i>Setting the Stage – National Clean Hydrogen Strategy</i>
1:15 – 2:00 pm	<i>Panel: Demand and Offtake Initiative</i>
2:00 – 2:45 pm	<i>Panel: Accelerating Deployment: The Human Factor</i>
2:45 – 3:15 pm	Break
3:15 – 4:00 pm	<i>Panel: Infrastructure, Siting and Permitting</i>
4:00 – 4:45 pm	<i>Panel: Workforce and Upskill Development</i>
4:45 pm	Adjourn

Workshop Objectives

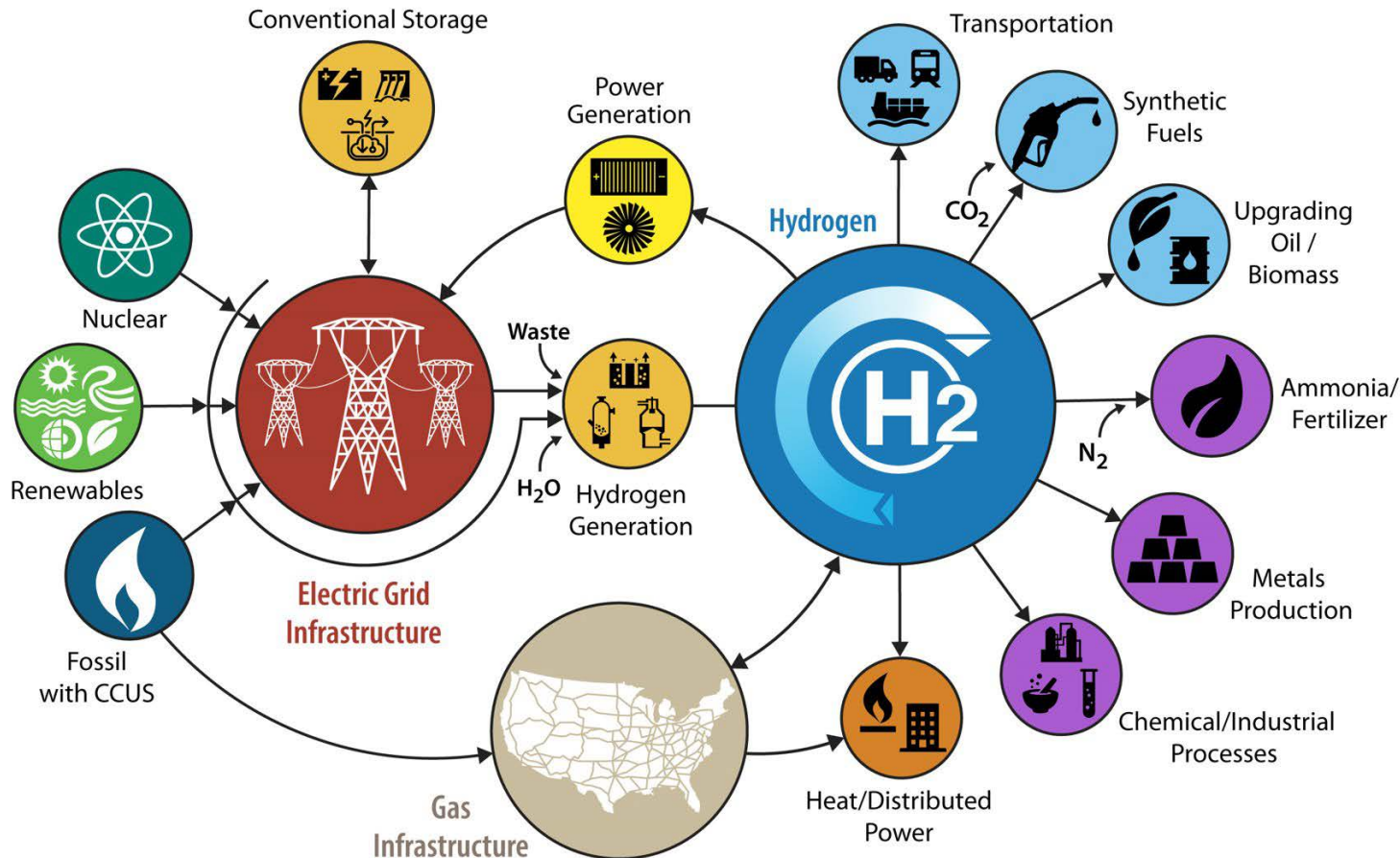
- **Provide an overview on DOE's Hydrogen Program activities**, aligned with the national strategy
- **Discuss gaps and opportunities to enable progress** towards meeting goals in the national strategy
- **Seek feedback from stakeholders** on challenges and enablers to inform liftoff of clean hydrogen and future updates of the national strategy

We want to hear from you!

Scan code and submit feedback by Jan 17



Hydrogen – A Key Element of a Comprehensive Portfolio of Energy Solutions to Enable Energy Resilience and Security



Drivers and Opportunities

Versatility

- Enables multiple benefits across sectors*

U.S. Leadership

- Innovation, energy dominance/exports, jobs, >\$2.5 trillion market

Low-cost Resources

- Natural gas, nuclear, and renewables available

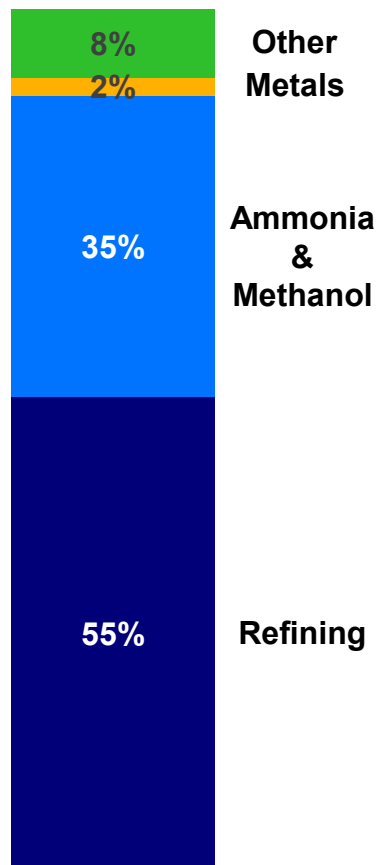
- Over 50 countries with national H₂ strategies
- >\$75B in firm projects, >1,500 projects globally

*Energy security, resiliency, emissions (pollution and carbon) reductions, transportation, industry, stationary power, energy storage

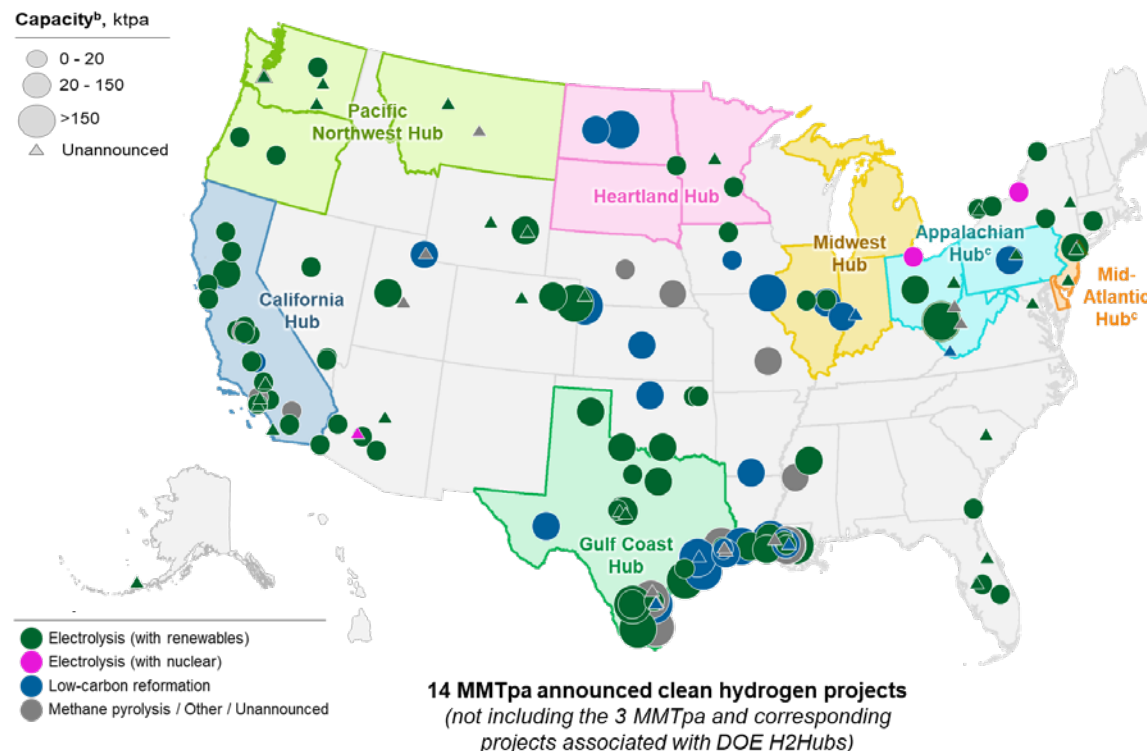
Snapshot of Hydrogen and Fuel Cells in the U.S.

10 million metric tons H₂ produced annually | More than 1,600 miles of H₂ pipeline | World's largest H₂ storage cavern

Use of H₂ in the U.S. Today

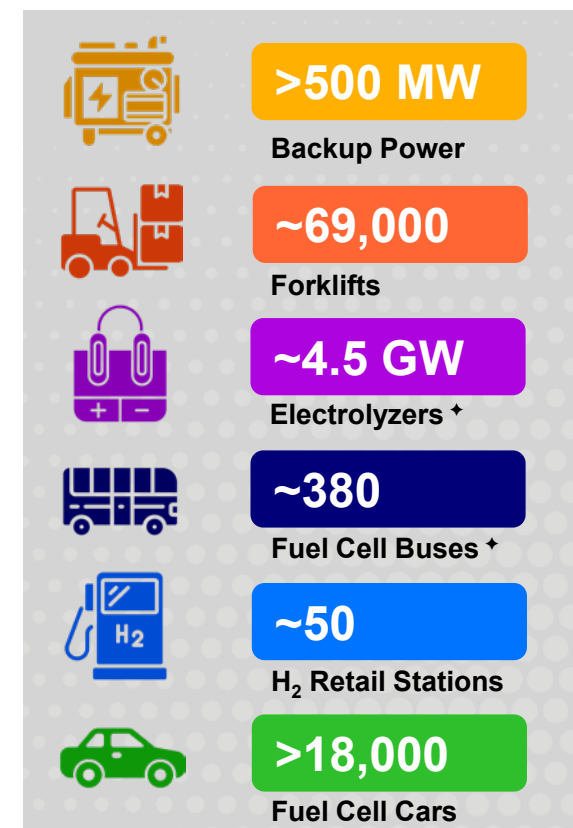


Clean hydrogen production projects announced as of Jan. 2024 *



*DOE Commercial Liftoff Report Updates available soon.

Examples of Deployments



[†] Buses and electrolyzers include planned / under construction / deployed

U.S. National Clean Hydrogen Strategy and Roadmap



www.hydrogen.gov
Released June 5, 2023

Strategy

- 
1 Target strategic, high-impact end uses
 Achieve 10 MMT/year of clean hydrogen by 2030
- 
2 Reduce the cost of clean hydrogen
 Enable \$2/kg by electrolysis by 2026 and \$1/kg H₂ by 2031
- 
3 Focus on regional networks
 Deploy regional clean hydrogen hubs and ramp up scale

Vision:
Affordable clean hydrogen for a net-zero carbon future and a sustainable, resilient, and equitable economy

Benefits:
Emissions reduction; job growth; energy security and resilience

Work with other agencies to accelerate market lift off

Enablers



Good Jobs and Workforce Development



Safety, Codes and Standards



Policies and Incentives



Stimulating Private Sector Investment

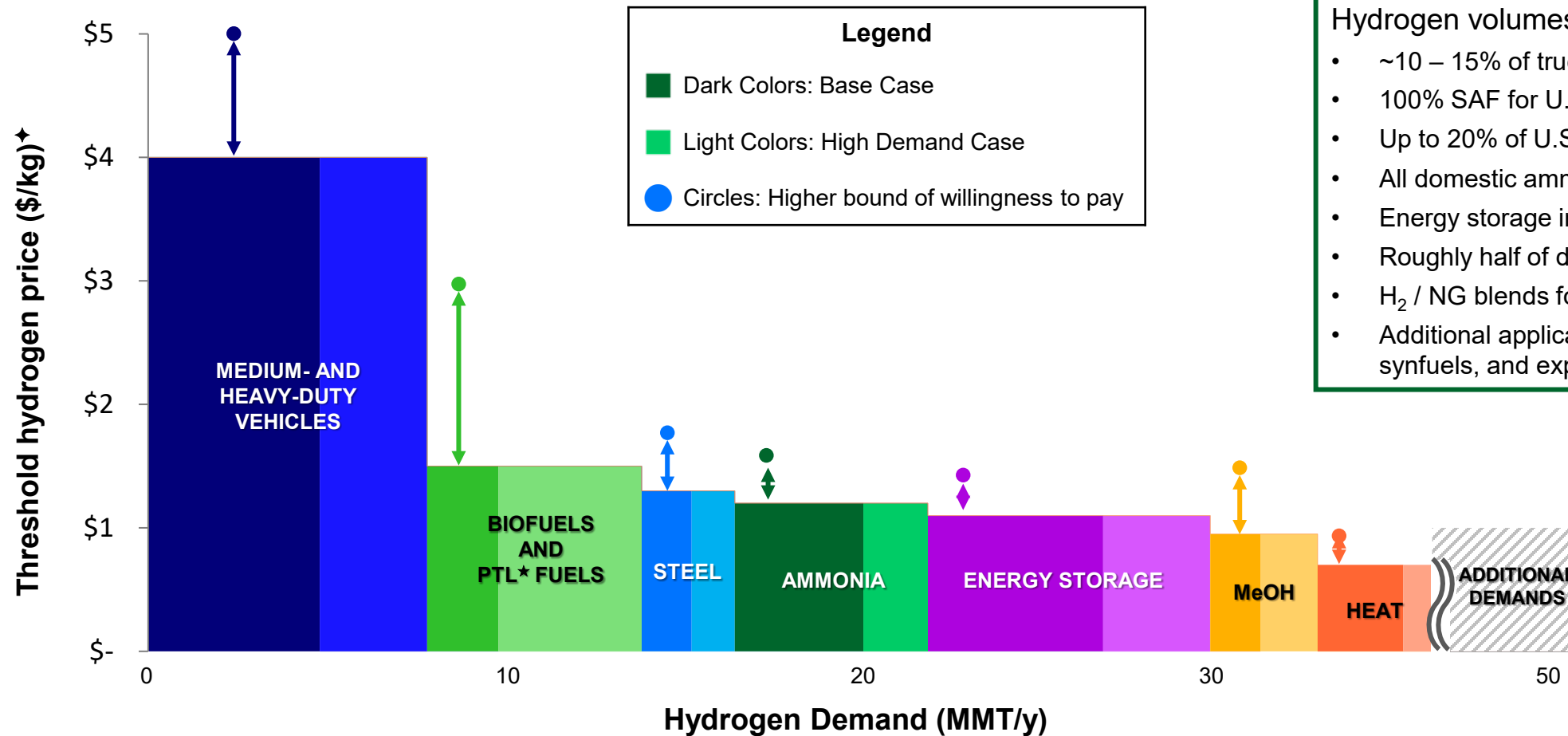


Energy and Environmental Justice

U.S. Opportunity: 10MMT/yr by 2030 | 20 MMT/yr by 2040 | 50 MMT/yr by 2050
~10% Emissions Reduction | ~100K Jobs by 2030

Strategy 1: Target High-Impact Uses of Hydrogen

Clean Hydrogen Demand and Costs for Market Penetration



Scenario Analysis for H2 Demand*

Hydrogen volumes estimated for:

- ~10 – 15% of trucks using fuel cells
- 100% SAF for U.S. aviation (35B gal) in 2050
- Up to 20% of U.S. steel making
- All domestic ammonia demand
- Energy storage in a clean grid
- Roughly half of domestic methanol
- H₂ / NG blends for high-temp heat in industry
- Additional application include stationary power, synfuels, and export potential

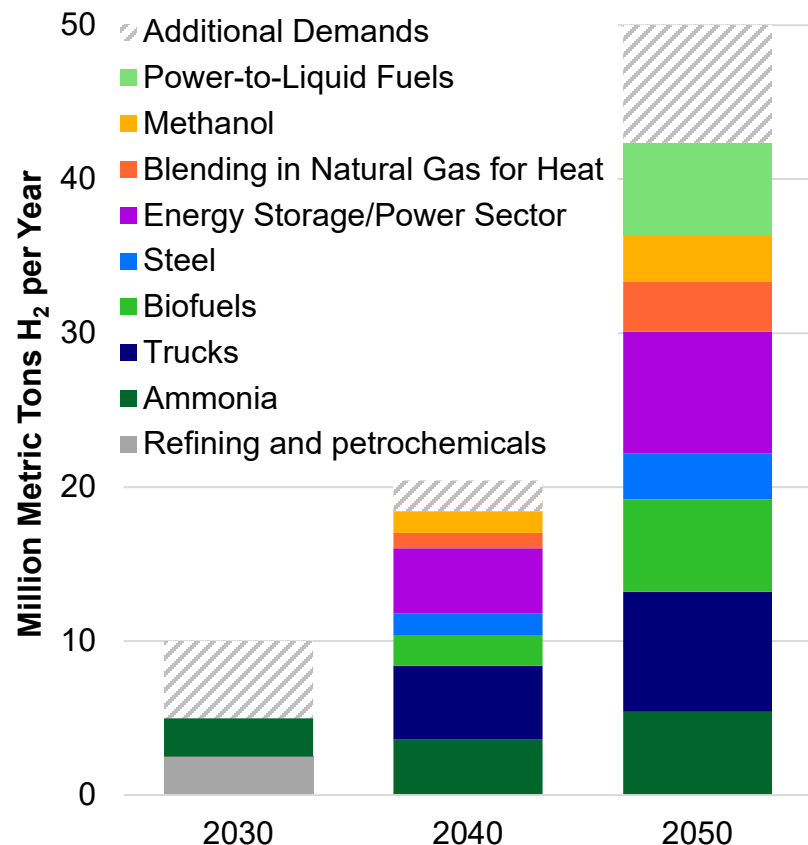
*Costs include production, delivery, dispensing to the point of use (e.g., high-pressure fueling for vehicle applications)

*Power to Liquid

*Volumes dependent on multiple variables

Strategy 1: Target High-Impact Uses of Hydrogen

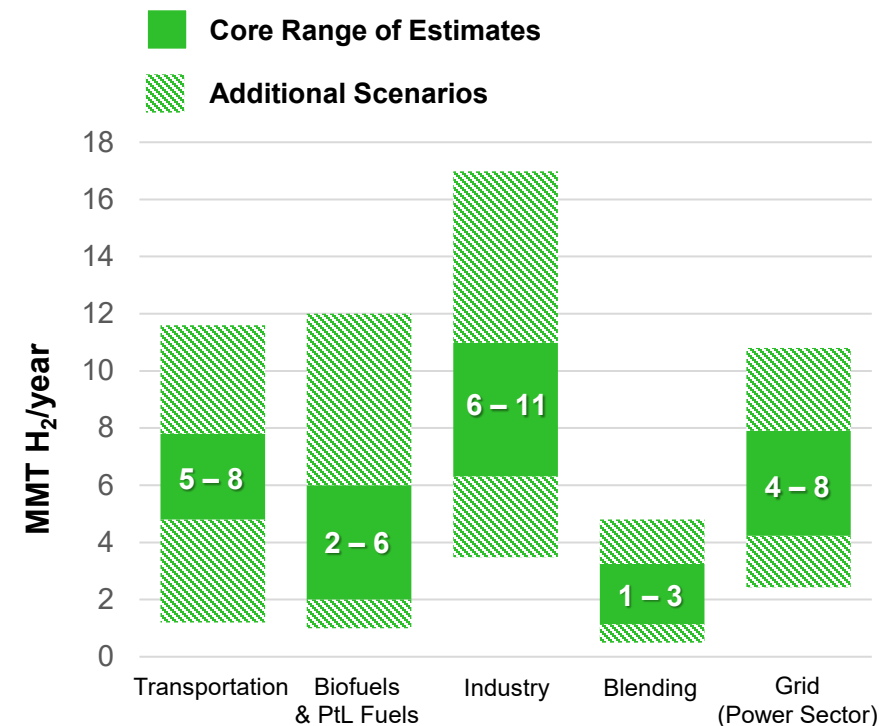
Opportunities for Clean Hydrogen Across Applications



Clean Hydrogen Use Scenarios

- Catalyze clean H₂ use in existing industries (ammonia, refineries), initiate new use (e.g. sustainable aviation fuels [SAFs], steel, potential exports)
- Scale up for heavy-duty transport, industry, and energy storage
- Market expansion across sectors for strategic, high-impact uses

Range of Potential Demand for Clean Hydrogen by 2050

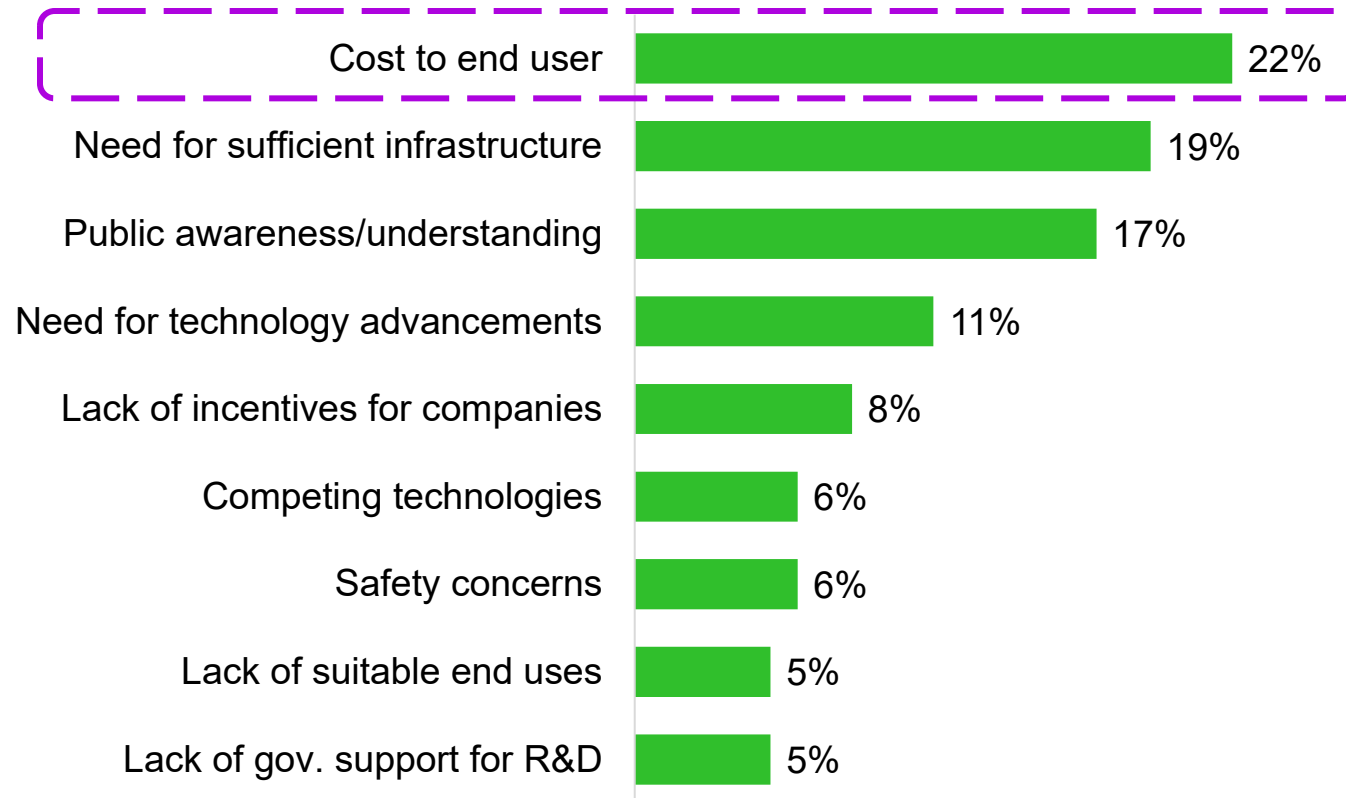


- Core range:** ~ 18–36 MMT H₂
- Higher range:** ~ 36–56 MMT H₂

U.S. Opportunity: 10MMT/yr by 2030, 20 MMT/yr by 2040, 50 MMT/yr by 2050;
~10% Emissions Reduction | ~100K Jobs by 2030

Refs: 1. NREL MDHD analysis using TEMPO model; 2. Analysis of biofuel pathways from NREL; 3. Synfuels analysis based off H₂@Scale; 4. Steel and ammonia demand estimates based off DOE Industrial Decarbonization Roadmap and H₂@Scale. Methanol demands based off IRENA and IEA estimates; 5. Preliminary Analysis, NREL 100% Clean Grid Study; 6. DOE Solar Futures Study; 7. Princeton Net Zero America Study

Strategy 2: Focus on Cost-Reduction



Source: Hydrogen Shot Summit, Sept 2021



Over 3,000 participants at DOE Hydrogen Shot Summit were requested to provide feedback on key barriers to market adoption of hydrogen

<https://www.energy.gov/eere/fuelcells/hydrogen-shot-summit>

“HYDROGEN SHOT”

“1 1 1”



\$1 FOR 1 KG CLEAN HYDROGEN IN 1 DECADE

Strategy also includes delivery and storage infrastructure cost reduction

Strategy 3: Focus on Regional Networks and Ramp-up Scale

DOE announces \$7B for 7 H2 Hubs, Oct 2023



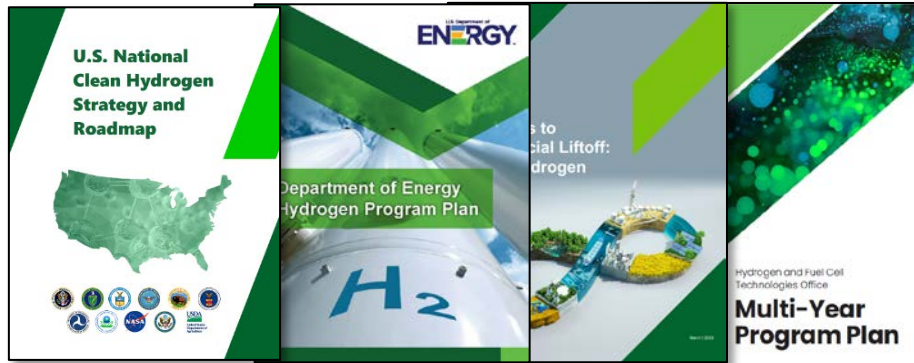
Demand side strategy for Hubs announced

DOE selects consortium to bridge demand for clean H₂ providing market certainty and unlock private capital Jan. 2024

See <https://www.energy.gov/oced/office-clean-energy-demonstrations>

Resources and Opportunities for Engagement

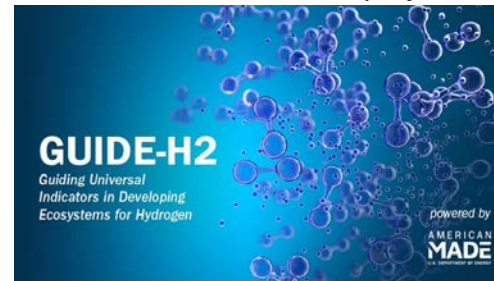
Key Publications



www.hydrogen.energy.gov

Just Announced:

Competition to increase experience and lessons learned for H₂ projects

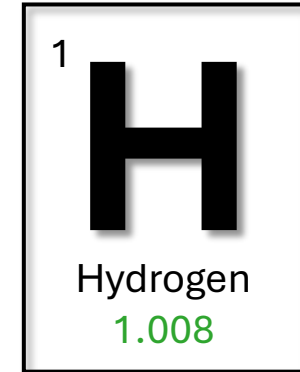


Phase 1 submissions due
June 30, 2025

www.herox.com/GUIDE-H2

Hydrogen and Fuel Cells Day October 8

Held on hydrogen's
very own **atomic
weight** day



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www.energy.gov/eere/fuelcells/fuel-cell-technologies-office-newsletter

Next on the agenda

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Thank you

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Also on **LinkedIn**

www.energy.gov/fuelcells
www.hydrogen.energy.gov



Hydrogen & Fuel Cell Technologies Office

