



U.S. DEPARTMENT OF
ENERGY

U.S. National Clean Hydrogen Strategy and DOE Hydrogen Program Remarks

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U.S. Department of Energy

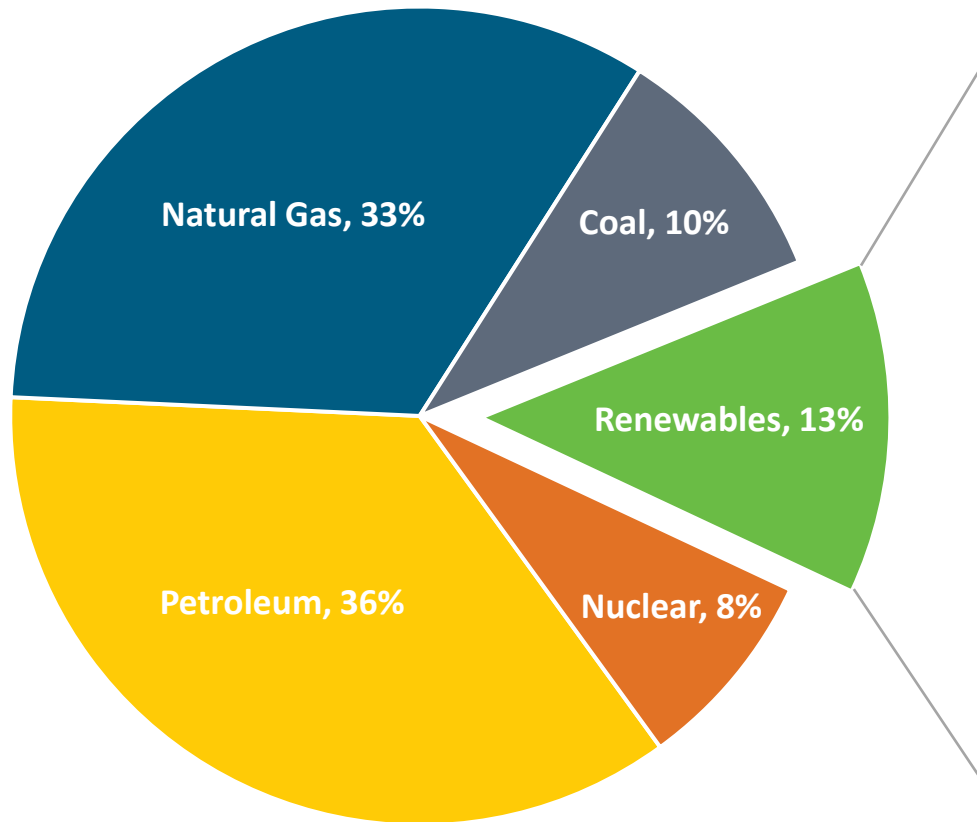
December 2023



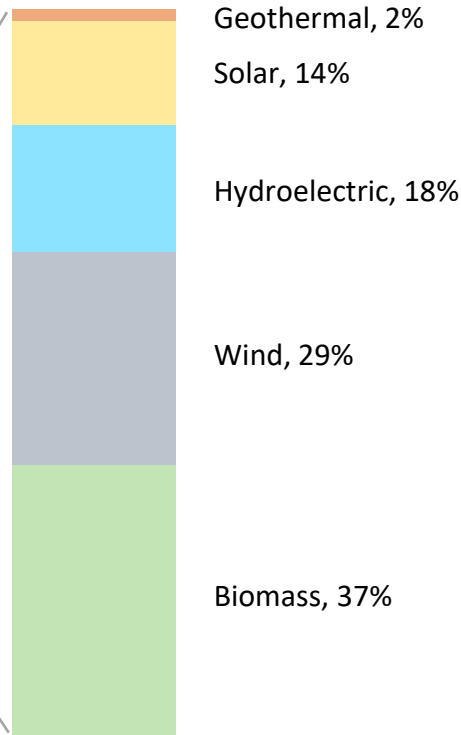
U.S. Energy Landscape and Key Goals

U.S. primary energy consumption by energy source, 2022

Total = 100.4 quadrillion
British thermal units (Btu)



Total = 13.1 quadrillion Btu



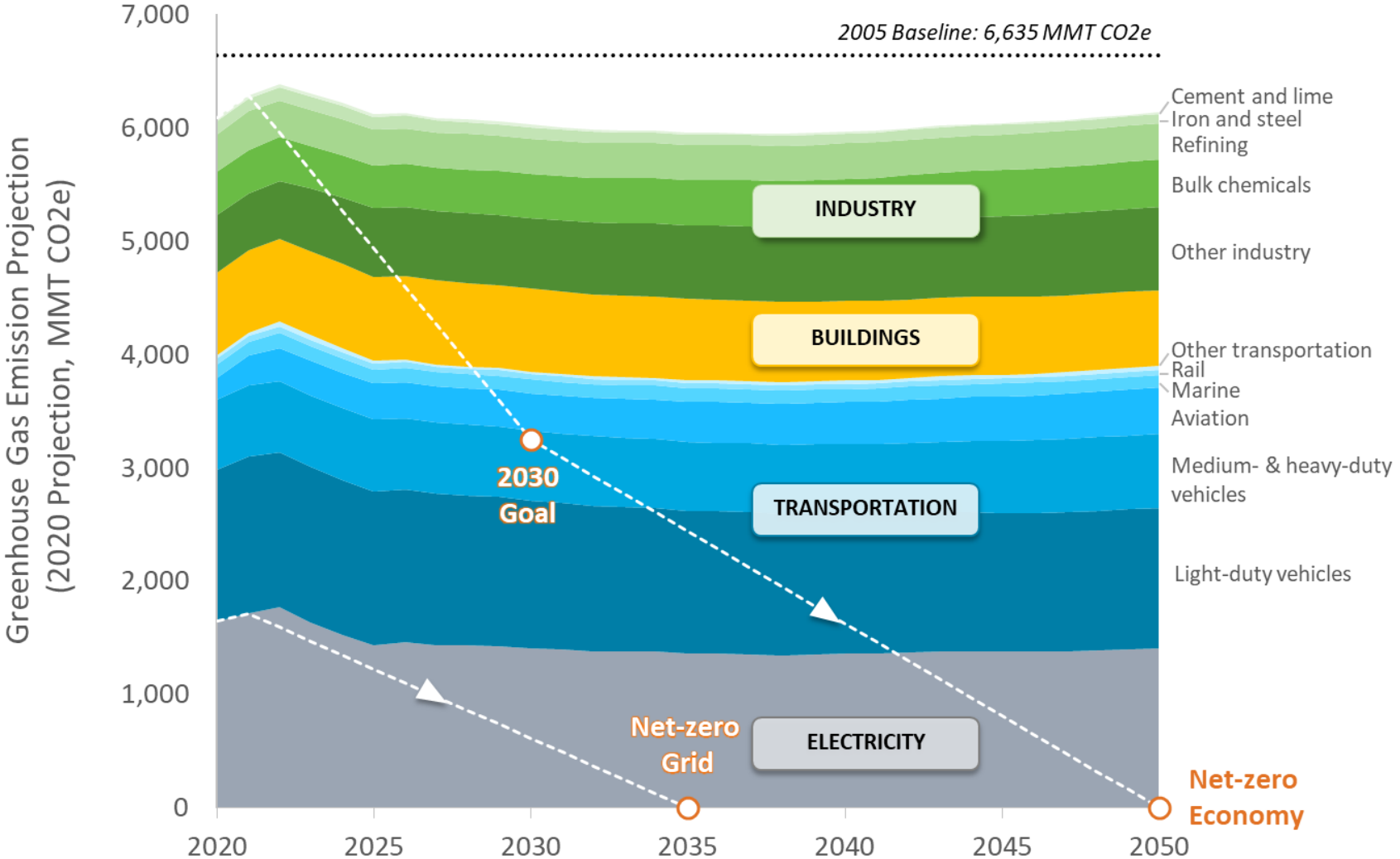
Note: Sum of components may not equal 100% because of independent rounding
Source: Data collected from U.S. Energy Information Administration, May 2023, *Monthly Energy Review*, preliminary data

Administration Goals include:

- Net-zero emissions economy by 2050 and 50–52% reduction by 2030
- 100% carbon-pollution-free electric sector by 2035

Priorities: Ensure benefits to all Americans, focus on jobs, Justice40: 40% of benefits in disadvantaged communities

Carbon Dioxide Emissions by Sector



Source: Annual Energy Outlook 2021, DOE National Clean Hydrogen Strategy and Roadmap

Legislation Highlights: 2021 – 2022

Bipartisan Infrastructure Law

- **Includes \$9.5B for clean hydrogen:**
 - \$1B for electrolysis
 - \$0.5B for manufacturing and recycling
 - \$8B for at least four regional clean hydrogen hubs
- **Requires developing a National Clean Hydrogen Strategy and Roadmap**



President Biden Signs the Bipartisan Infrastructure Bill into law on November 15, 2021. Photo Credit: Kenny Holston/Getty Images

Inflation Reduction Act

- **Includes significant tax credits** (e.g., up to \$3/kg for production of clean hydrogen)

U.S. National Clean Hydrogen Strategy and Roadmap

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



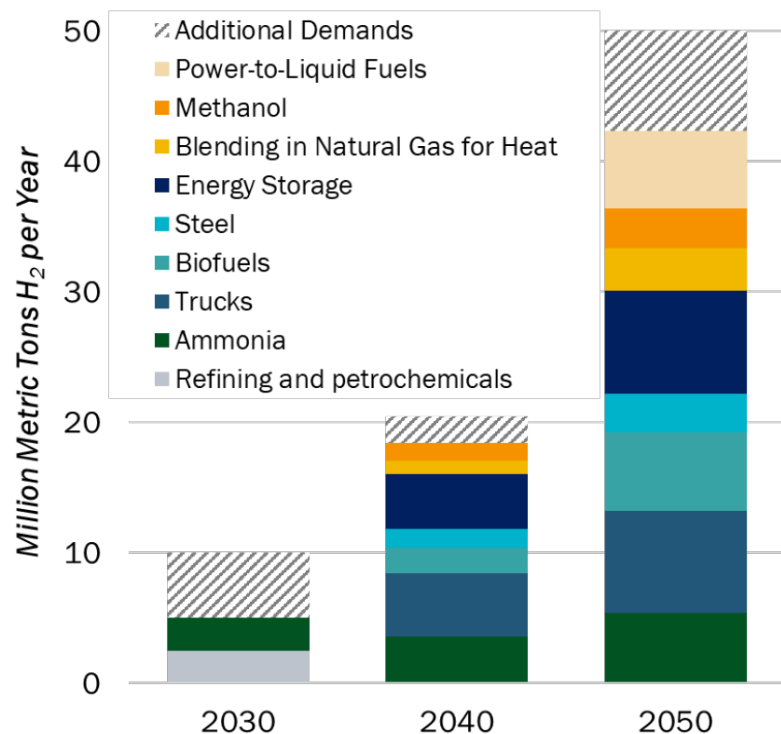
Stimulating private sector investment



Energy and environmental justice

U.S. National Clean Hydrogen Strategy and Roadmap

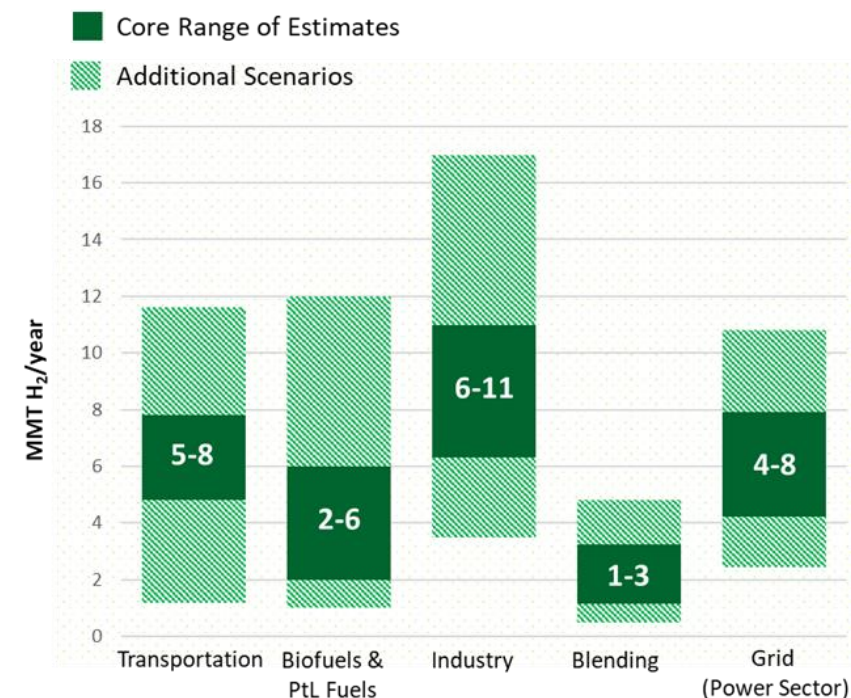
Opportunities for Clean Hydrogen Across Applications



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

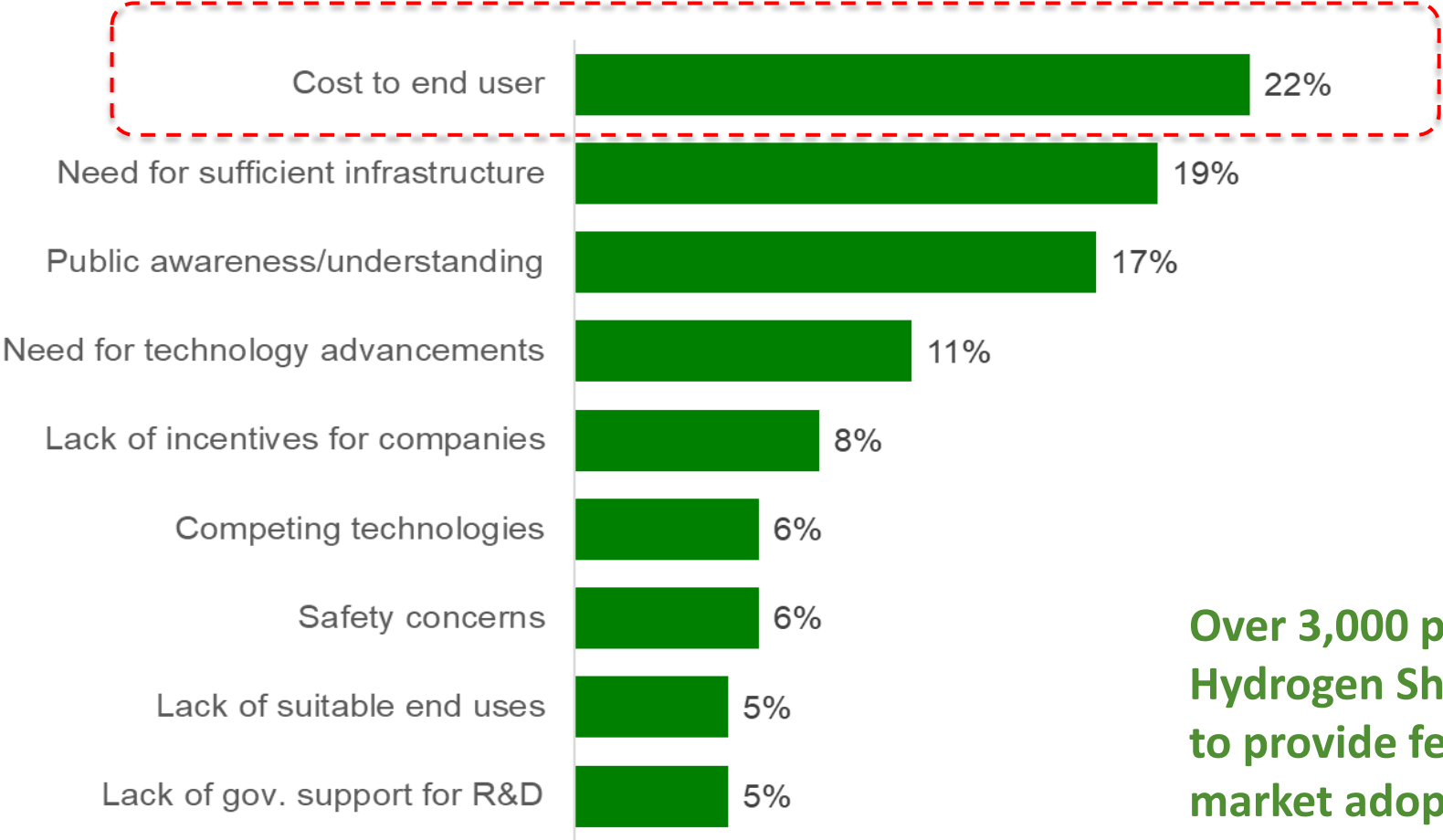
• Higher range: ~ 36–56 MMT H₂

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

Stakeholder Reported Barriers to Hydrogen Market Adoption



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

Source: Hydrogen Shot Summit, Sept 2021

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

Hydrogen Energy Earthshot

“Hydrogen Shot”

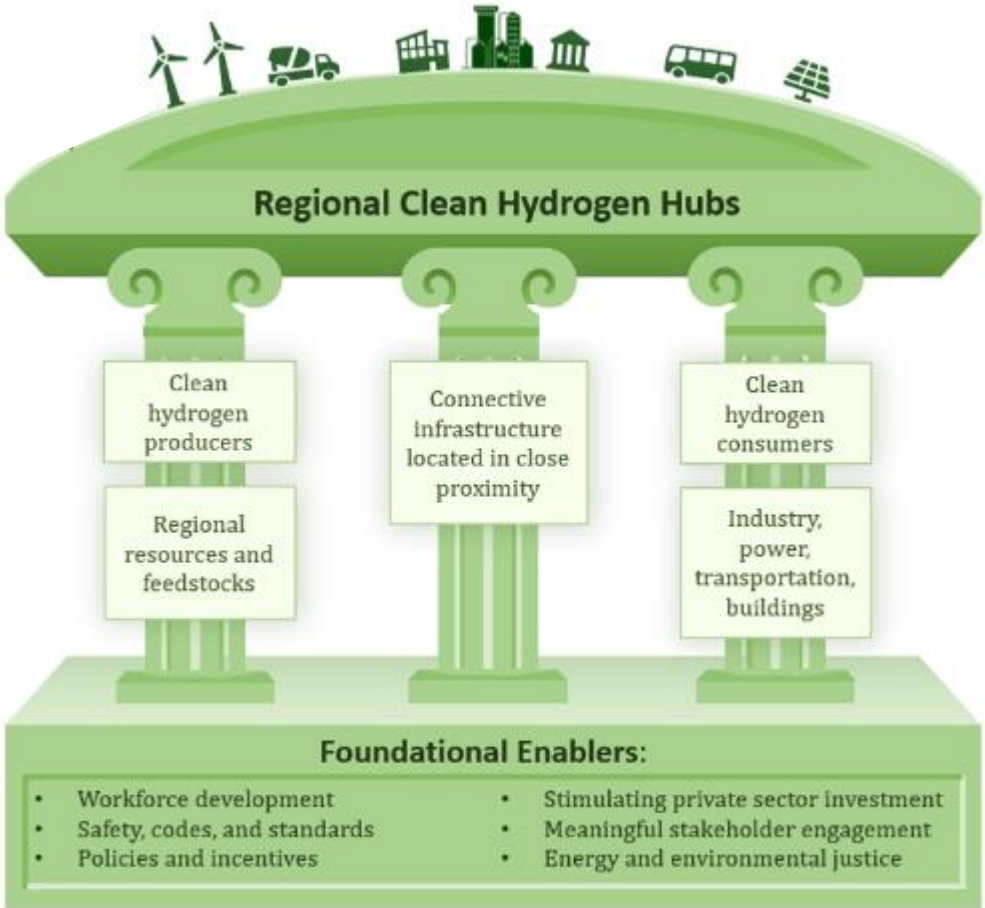
“1 1 1”

\$1 for 1 kg clean hydrogen in 1 decade

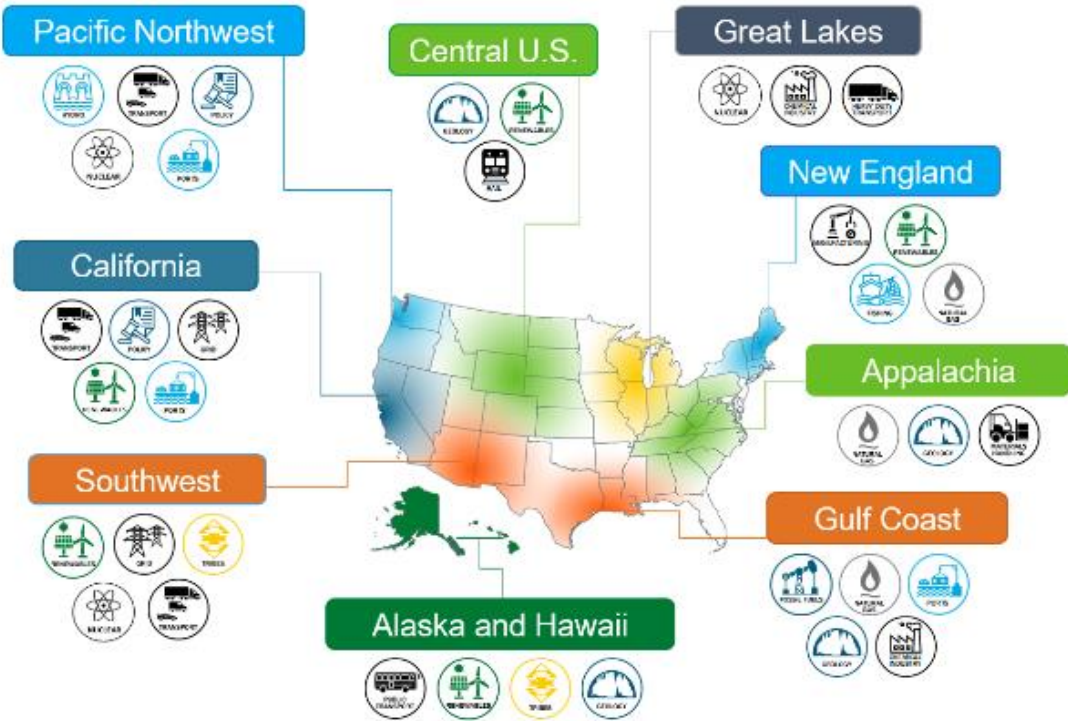
Strategy also includes delivery and storage infrastructure cost reduction

Strategy 3: Focus on Regional Networks and Ramp up Scale

Build Regional Networks through “Clean Hydrogen Hubs”



Examples of Stakeholder and RFI Input



Demand side strategy for Hubs announced

President Biden Announces \$7B for 7 H₂ Hubs – October 13, 2023



Whole-of-Government Approach

HIT

Hydrogen Interagency Task Force

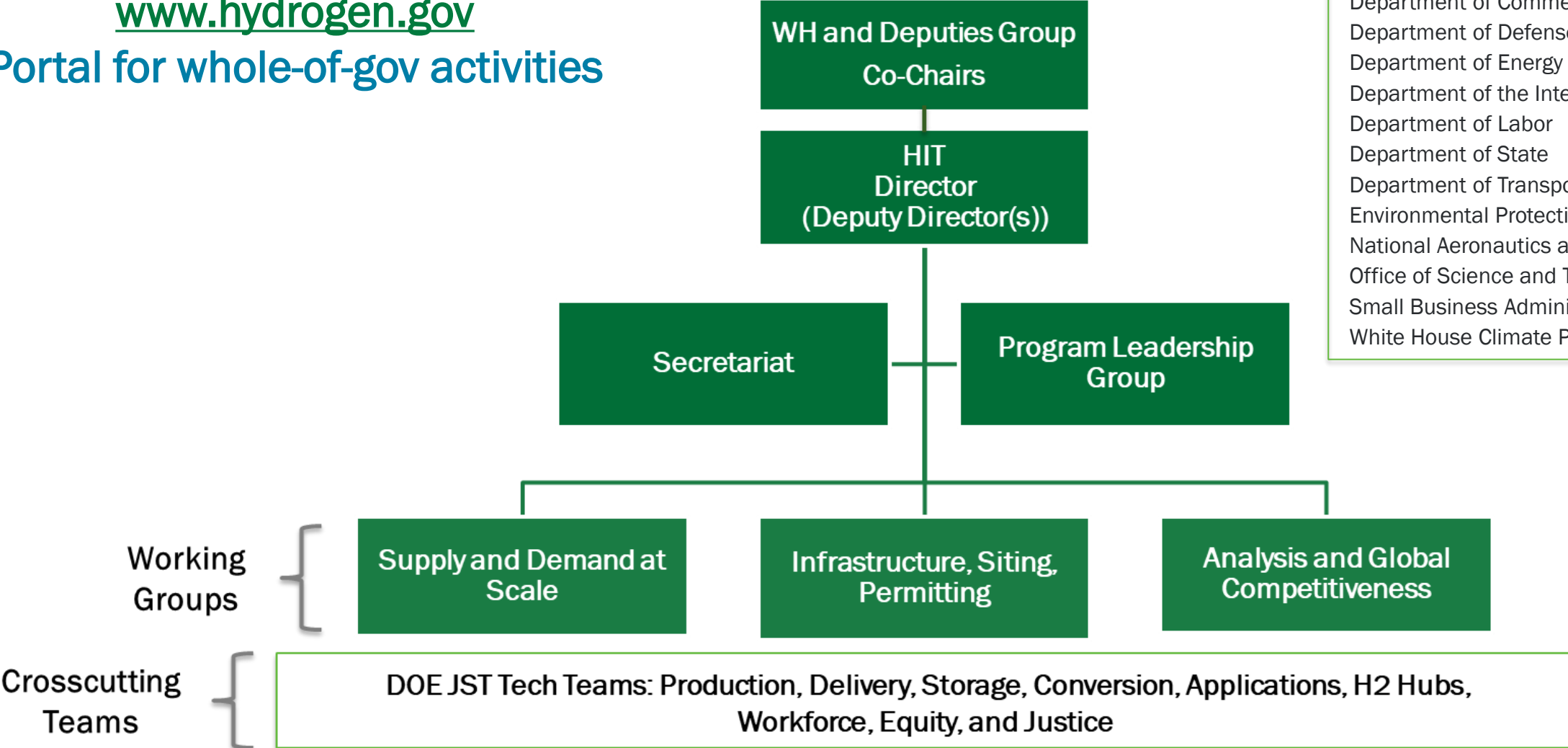
H₂

Hydrogen Interagency Task Force (HIT) across 11 Agencies

www.hydrogen.gov

Portal for whole-of-gov activities

- Department of Agriculture
- Department of Commerce
- Department of Defense
- Department of Energy (Co-Chair)
- Department of the Interior
- Department of Labor
- Department of State
- Department of Transportation
- Environmental Protection Agency
- National Aeronautics and Space Administration
- Office of Science and Technology Policy
- Small Business Administration
- White House Climate Policy Office (Co-Chair)



JST: Joint Strategy Team. Equity, Energy and Environmental Justice is a cross cutting priority across WGs.



Energy and Environmental Justice

***Diversity, Equity, Inclusion, and
Accessibility***

Safety, Codes, Standards

Equity and Environmental Justice Perspectives

I. Listening,
Engaging &
Increasing
Transparency

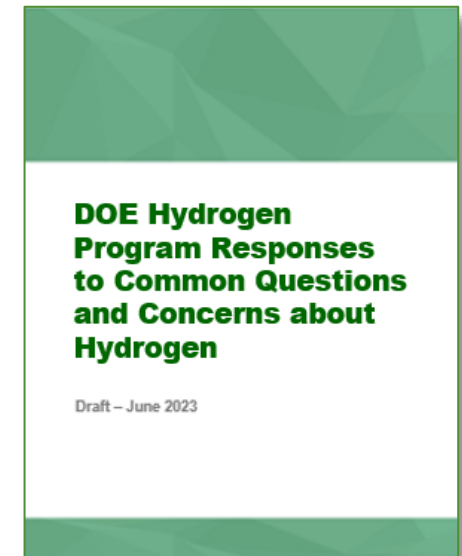
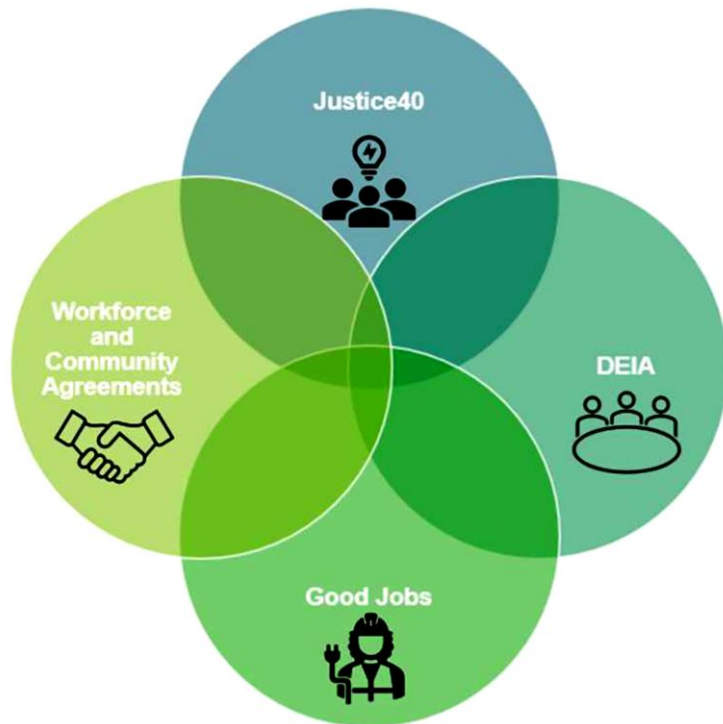
II. Prioritizing
Safety and Positive
Impacts

III. Lowering
Barriers

IV. Diversifying the
Clean Hydrogen
Workforce

V. Building
Capacity & Skills

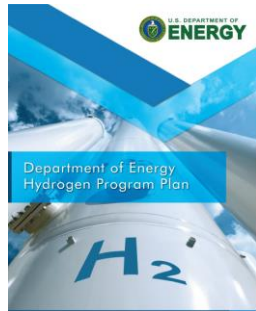
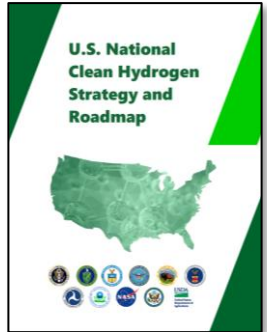
VI. Environmental
Justice in
Permitting and
Siting



Stay tuned for more information on **Community Benefits Plans, Mapping Tools, and upcoming activities**

Resources and Opportunities for Engagement

Key Publications



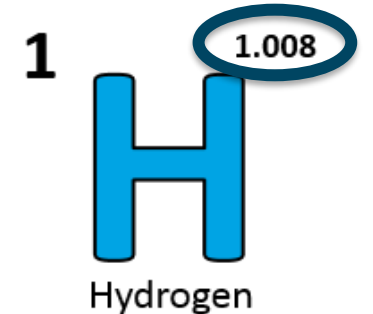
www.hydrogen.energy.gov

Save the date!

**2024 DOE
Annual Merit
Review May 6-9,
2024**

**Hydrogen and Fuel Cells Day
October 8**

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



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H₂IQ**
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Thank you

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