U.S. National Clean Hydrogen Strategy and Roadmap Interagency Collaboration

Clean hydrogen is a key part of a comprehensive portfolio of energy technologies that can support the Nation's transition to net-zero while leveraging abundant regional resources, enabling energy security and resiliency, creating value across applications and sectors, and fostering equitable and sustainable growth. The ***U.S. National Clean Hydrogen Strategy and Roadmap,***[1] required by Congress in the Bipartisan Infrastructure Law (BIL), articulates a goal of ***10 million metric tonnes (MMT) per year of clean hydrogen by 2030, 20 MMT per year by 2040, and 50 MMT per year by 2050.*** These scenarios are based on achieving cost competitiveness to enable demand in specific sectors and align with the Administration's climate strategy.

To help execute on the National Hydrogen Strategy, the Biden-Harris Administration is announcing the launch of the Hydrogen Interagency Task Force (HIT) to further advance a whole-of-government approach to clean hydrogen. The United States government can serve a key role in supporting the development of a robust market for clean hydrogen supported by domestic supply chains and sustainable jobs by:

Effective policies as well as research, development, demonstration, and deployment (RDD&D) from supply through end use will enable the United States to achieve its national goals and ensure the benefits of clean hydrogen in the economy.

Efficient and effective collaboration and coordination are vital to implement the U.S. National Clean Hydrogen Strategy and Roadmap. Collaboration builds upon the Interagency Task Force on hydrogen, authorized in the Energy Policy Act of 2005,[2] which required the Secretary of Energy to coordinate across agencies on hydrogen.

Agencies will also ramp up engagement with Tribal communities and communities who have been historically underserved, as well as engagement across the entire spectrum of stakeholders from industry and academia to labor unions. Several collaboration opportunities exist across agencies, building on activities underway over more than a decade[3] to accelerate progress. Examples from federal agencies of their clean hydrogen activities include the following and will be updated regularly as the HIT activities ramp up.

- The Department of Agriculture has several initiatives relevant to clean hydrogen, including the Renewable Energy for America Program which offers guaranteed loan financing and grants to agricultural producers and rural small businesses for renewable energy systems or to make energy efficiency improvements, which can include hydrogen technologies. The use of clean

[1] U.S. National Clean Hydrogen Strategy and Roadmap, June 2023. https://www.hydrogen.energy.gov/clean-hydrogen-strategy-roadmap.html

[2] 42 USC 16155 (Pub. L. 109–58, title VIII, §806, Aug. 8, 2005, 119 Stat. 848)

[3] Hydrogen and Fuel Cells Interagency Action Plan, 2011, https://www.hydrogen.energy.gov/pdfs/hydrogen_fuelcell_interagency_action_plan.pdf

hydrogen for fertilizer and potentially for agricultural and related off-road equipment can offer opportunities for scale-up and rural community benefits.

- The Department of Commerce has a broad range of responsibilities across thirteen bureaus to fulfill its primary responsibility of creating the conditions for economic growth and has several activities relevant to hydrogen. The National Institute of Standards and Technology provides critical data, measurement methods, and models that enable safe and economical transport, delivery, and storage of hydrogen. The International Trade Administration fosters the development of domestic supply chains that can serve export markets. The Economic Development Administration provides grants to regional coalitions to implement projects that develop or scale regional industry sectors, develop and train the workforce of today, and build resilient economies.
- The Department of Defense's efforts include a long history of research and development activities relevant to hydrogen and fuel cells ranging from underwater to aerial vehicles, including portable and auxiliary power, tactical vehicles, and microgrids for stationary applications and critical infrastructure. Additional potential hydrogen and fuel cell uses in the DoD could be supported by this roadmap, catalyzing potential private sector uptake. For instance, an advanced hydrogen (H2) fuel cell truck prototype—known as H2@Rescue—is being developed and tested in partnership between the Departments of Defense, Energy, and Homeland Security, and can provide zero emissions power, heat, and water to a disaster site.
- The Department of Energy is the lead agency on hydrogen and fuel cell technologies and covers RDD&D from basic science through deployment across the value chain from production using renewables, nuclear, fossil, and waste resources (with carbon management) to end use. It also covers hydrogen delivery, storage, and applications across sectors, including transportation, industry, energy storage, and power generation, as well as RDD&D to inform safety, codes, and standards. The Department also provides financing for deployment projects, including clean hydrogen. Through the BIL, DOE is investing $9.5 billion in clean hydrogen, including $8 billion for Regional Clean Hydrogen Hubs, $1 billion for electrolyzer development, and $500 million for clean hydrogen manufacturing and recycling. In addition, the Department collaborates with other agencies to bolster domestic supply chains and enable both domestic and global market development across sectors.
- The Department of the Interior has a key role for multiple portions of the hydrogen value chain, from hydrogen storage to the use of offshore wind and activities by its Bureau of Ocean Energy Management. As hydrogen projects develop and increase in size, greater public engagement and the development of best practices will be necessary to propel the industry forward in a sustainable and holistic manner to reduce land and water impacts.
- The Department of Labor will play an increasingly important role as the clean hydrogen economy develops to advance opportunities for good jobs and equitable employment related to clean hydrogen across the value chain from production through end use. The Occupational Safety and Health Administration will also have a role particularly in the safety of hydrogen applications such as large-scale storage and worker safety.
- The Department of Transportation's activities span rail, maritime, air, and road transportation. The Federal Transit Agency has led the demonstration of fuel cell buses with grant funding as well as hydrogen fueling stations. The Federal Highway Administration is administering grants for fueling corridors that can include hydrogen stations. The Maritime Administration has supported both pier side fuel cell power projects as well as various vessel projects involving hydrogen and

fuel cells. The Pipeline and Hazardous Materials Safety Administration oversees the safety of hydrogen pipelines. The use of clean hydrogen for producing transportation fuels such as sustainable aviation fuels will expand market uptake.

- The Environmental Protection Agency is the lead entity for rulemakings relevant to the production and use of clean hydrogen—including rules under the Clean Air Act to limit emissions of greenhouse gases from transportation sources and from power generation. The Agency also implements a number of funding programs that support hydrogen vehicles, equipment and associated infrastructure usage in the goods movement sectors, including ports. Activities on decarbonizing ports are a key strategy aligned with the National Clean Hydrogen Strategy and Roadmap and include both transportation and stationary pier side applications.
- The National Aeronautics and Space Administration (NASA) has been a global leader in the development of hydrogen and fuel cell technologies for decades in space applications, ranging from using hydrogen as rocket fuel to deliver crew and cargo to space, including the Space Launch System rocket as part of the agency's Artemis missions to the Moon, to providing on-board power for Apollo and space shuttle missions. NASA experts are proficient in hydrogen propellant transportation, storage, training, safety standards, hazard analysis, testing, vehicle demonstration, technology transfer, and outreach.
- The Small Business Administration has several initiatives to bolster small businesses, including the Small Business Innovation Research (SBIR)/Small Business Technology Transfer (STTR) Program which provides innovative small businesses with funding to support R&D, prototyping, and commercialization. Over time, demand growth for clean hydrogen can spur the development of small businesses to diversify the supply chain from production through end use, create resiliency, and provide benefits to regional economies and communities.
- The State Department through the Bureau of Energy Resources (ENR) and other Bureaus, and in collaboration with other agencies, supports global competitiveness and helps drives market opportunities for U.S. private sector entities in various technologies including clean hydrogen. ENR activities, in collaboration with other agencies, will also bolster critical supply chains that underpin clean hydrogen industry expansion domestically and abroad, through diplomatic support and targeted technical assistance.
- Led by the U.S. Special Presidential Envoy for Climate in partnership with the World Economic Forum, the State Department launched the First Movers Coalition at COP26 to bring together large corporate purchasers to Buy Clean. The First Movers Coalition includes over 80 corporate members who have made in total over 100 purchasing commitments—the biggest demand signal in history for innovation across hard-to-abate sectors, including heavy industry. FMC members have made clean purchasing commitments across with steel, aluminum, shipping, trucking, chemicals, concrete, and aviation; and clean hydrogen is a key component in many of these sectors.[4] Taken together, the First Movers Coalition commitments thus far represent 1.5 MMT per year of clean hydrogen demand.

Other agencies will also play essential roles to accelerate progress towards meeting our national clean hydrogen goals. For example, The Treasury Department has a critical role, particularly in developing and

[4] https://www.whitehouse.gov/briefing-room/statements-releases/2023/03/08/fact-sheet-biden-%E2%81%A0harris-administration-advances-cleaner-industrial-sector-to-boost-american-manufacturing-and-cut-emissions/

implementing various tax incentives in the Inflation Reduction Act that will be important in the ramp up of the clean hydrogen economy. Another example is The Department of Homeland Security where the Federal Emergency Management Agency has worked with the Departments of Energy and Defense to develop a hydrogen fuel cell truck to support disaster relief. The U.S. Coast Guard also plays a key role in enabling the safe deployment and operation of hydrogen fuel cell systems for maritime applications. Several others will also play valuable roles as the clean hydrogen industry ramps up. Interagency coordination will continue to expand to implement the national strategy and other agencies may be added to the HIT as the clean hydrogen economy develops over time. Details and updates will be available at www.hydrogen.gov.