



HYDROGEN POLICY UPDATES AND OPPORTUNITIES

Green hydrogen and renewable fuels opportunities

Thanks to its potential to help achieve decarbonization and clean energy targets, **hydrogen (H₂)** is generating buzz in Washington and beyond. Hydrogen is the lightest and most abundant material in the universe, and it is an energy carrier. Used strategically, it can provide fuel pathways with no or low greenhouse gas (GHG) emissions, which is vital for the hard-to-decarbonize parts of our economy. However, pure hydrogen is not found in nature and must be produced (as a gas or supercooled liquid) from other materials, then transported, stored, and ultimately used through a fuel cell or in combustion turbines to generate energy.

Hydrogen production and carbon intensity

About nine million to 15 million tons of hydrogen are produced in the U.S. each year, [accounting for about 10% of the global total](#). Approximately 95% of this hydrogen is produced using methods that result in GHG emissions. **For H₂ to contribute to the state's energy and climate transformation, it must be produced without emitting significant GHGs.**

In Washington, clean hydrogen is defined as “green electrolytic hydrogen” and “renewable hydrogen.” There are incentives for their production.¹ The U.S. Department of Energy (DOE) uses the term “clean hydrogen” to describe hydrogen produced with a low carbon intensity.² Clean or green hydrogen is at least five times as expensive as conventional hydrogen, and it is critical to reduce its cost.

Hydrogen should be used strategically because its production requires significant amounts of electricity and water. On average, it takes about

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¹ “Green electrolytic hydrogen” is defined in RCW 54.04.190, and “renewable hydrogen” in 54.04.190.

² IJA definition: 2kgCO₂e per kgH₂ at the point of production. DOE’s fall 2022 draft [Clean Hydrogen Production Standard](#) proposes a full “well-to-gate” lifecycle carbon intensity for clean hydrogen as 4kgCO₂e/kgH₂.

50 kWh of electricity and 14-20 liters of water to produce one kilogram of H₂; one kilogram of H₂ provides about 39 kWh of energy.³ It is important to use H₂ where it is the most effective option and avoid applications where renewable or nuclear electricity, energy efficiency, or other clean fuels are more efficient and less costly.

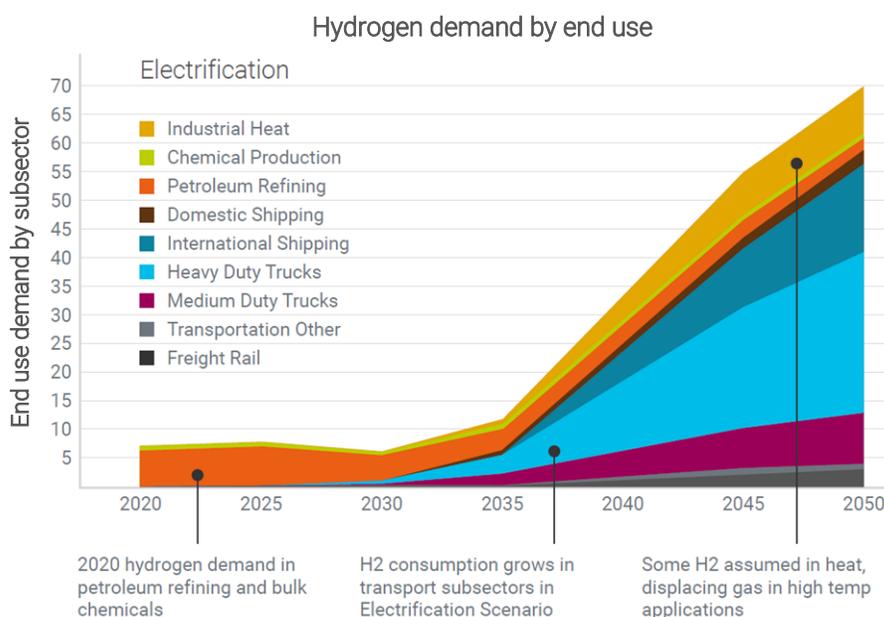
Strategic end uses

Hydrogen produced with very low or no GHG emissions can be used strategically to replace fossil fuels in hard-to-decarbonize sectors of the economy and drive down the emissions of those activities. The [2021 Washington State Energy Strategy](#) (SES) identified key roles for hydrogen in achieving a 100% clean energy system and net-zero emissions across the economy. These include:

- Flexible load for the power system and energy storage opportunity
- Transportation fuels, particularly maritime, aviation and heavy-duty transportation
- Industrial operations, replacing existing fossil-based H₂, and alternative to fossil fuels for high-temperature processes

H₂ modeling in the State Energy Strategy

Commerce published additional detail in 2022 on the State Energy Strategy's energy modeling related to hydrogen uses, including expectations regarding hydrogen deployment and use for producing synthetic fuels. **H₂ end uses by subsector** were also evaluated. These findings show the current uses of hydrogen and how it can change by 2030 and beyond as the state reduces fossil fuels and GHG emissions. For example, use of H₂ declines over time in petroleum refining, while its use increases in industrial heat and several transportation sectors. H₂ is rarely used for residential and commercial heating or for light-duty vehicles. More information is available on Commerce's SES website under [Data Supplement – Hydrogen Uses](#).



Deploying hydrogen in Washington

Washington's Legislature passed laws in 2022 designed to **accelerate the production and use of green electrolytic hydrogen**:

- SB 5910 (Chapter 292, Laws of 2022) established an Office of Renewable Fuels at Commerce and directed us to work with stakeholders and advise on funding and projects related to renewable fuels and green electrolytic hydrogen.
- HB 1812 (Chapter 183, Laws of 2022) addressed siting of hydrogen manufacturing projects.

³ The stoichiometric requirement to produce 1 kg of H₂ is 9 liters of water. However, additional water is required for system cooling or other process needs. Total water demands may be 14-20 liters per 1kg H₂, depending on electrolyzer characterizes and system design.

- HB 1988 (Chapter 185, Laws of 2022) provided incentives for green electrolytic hydrogen manufacturing and storage projects, and supports clean energy manufacturing projects and incentivizes the use of labor and community benefitting tools such as apprenticeship standards and Community Workforce Agreements.

This legislation is part of a broader policy landscape that makes Washington a compelling place to produce and use H₂. Earlier legislation includes the Clean Energy Transformation Act (CETA), net-zero GHG emission limits by 2050, and the Climate Commitment Act. Complementary policies include the Healthy Environment for All (HEAL) Act to ensure environmental justice is advanced in state environmental policy and programs.

Energy system considerations

Given the high energy need for producing green electrolytic hydrogen, it is important to carefully evaluate hydrogen's effect on the state and region's overall energy systems. Any significant increase in hydrogen production requires a corresponding increase in electricity generation and transmission capacity. In addition to expectations of increasing needs for clean power for direct electrification of things like light duty vehicles and home heating, the state will need to strategically assess new renewable generation and transmission requirements for H₂ production, transportation, and use.

Federal hydrogen updates

The federal government announced new initiatives and draft guidance in 2022 aimed at deploying clean hydrogen nationally. DOE produced a draft National Hydrogen Strategy and Roadmap with recommendations about strategic end uses for hydrogen, which align with Washington's SES – specifically, the **industrial sector, heavy-duty transportation and long-duration energy storage**.⁴ The roadmap contains recommendations around methods to reduce the cost of clean hydrogen by 80% in the next 10 years (the DOE [Hydrogen Shot](#)), and recommends regional approaches to aligning production and use. The regional approach forms the cornerstone of DOE's Regional Clean Hydrogen Hubs (H₂Hubs) program.

DOE also proposed a draft [Clean Hydrogen Production Standard](#) that defines the lifecycle carbon intensity for clean hydrogen. This will connect to a proposed new hydrogen production tax credit in the Inflation Reduction Act. These federal standards and incentives had public comment periods in late 2022, and final provisions are expected in 2023.

Developing a PNW regional clean hydrogen hub

Commerce Director Lisa Brown co-chairs the [Pacific Northwest Hydrogen Association](#) (PNWH₂), which is one of just 33 organizations nationally to be invited to submit a full proposal to DOE to develop a **Regional Clean Hydrogen Hub (H₂Hub)**.

The 2021 Infrastructure Investment and Jobs Act allocated **\$8 billion to support development of at least four H₂Hubs across the United States**, and DOE reports that 6-10 are expected. Each H₂Hub will be a network of clean hydrogen producers and consumers, with connective infrastructure nearby.⁵ The program priorities include reducing the cost of clean hydrogen and creating



⁴ Department of Energy (2022) [Draft Clean Hydrogen Strategy and Roadmap](#).

⁵ Infrastructure Investment and Jobs Act ([IIJA, 2021](#)).

community benefits, such as job creation and equity. H2Hubs is part of the federal [Justice40](#) initiative, meaning that 40% of benefits should flow to disadvantaged communities.

Commerce created the PNWH2 in early 2022 at Gov. Jay Inslee's direction. The organization brings together public and private sector partners to develop a compelling, results-oriented Pacific Northwest H2Hub proposal. PNWH2 is co-chaired by Brown and Oregon Department of Energy Director Janine Benner. Numerous tribes, private companies, utilities, labor unions, and environmental groups sit on the board and advisory committees.

PNWH2's full proposal is due in April 2023. There were 79 pre-applicants. While the details of a Pacific Northwest H2Hub are under development, the hub is expected to align with the State Energy Strategy. It will focus on green electrolytic and renewable hydrogen and their applicability in hard-to-decarbonize sectors, such as maritime, heavy-duty transportation, and industrial uses. Commerce will support energy policy analysis and contribute to developing Community Benefits Plan for the hub.

Tribal engagement in hydrogen

Tribal nations are critical partners in work that contributes to the state's clean energy and climate action.

While perspectives and participation vary, tribal leaders and members have expressed interest and participated in key areas of hydrogen-related work, including:

- Taking leadership roles in regional hydrogen project planning, including several tribes with representation on the board and advisory committees of PNWH2.
- Partnering in the development or review of hydrogen projects where they align with renewable energy efforts, energy storage and energy sovereignty needs, as well as economic development opportunities for tribal members.
- Providing input on how hydrogen should be strategically incorporated into Washington's energy landscape. Hydrogen's role must be developed in balance with interrelated issues regarding hydropower and fish and wildlife impacts and other considerations.

Commerce is committed to supporting multiple pathways for tribal engagement on hydrogen and the many issues with which we work with tribal leaders.

Environmental justice and workforce considerations

It is critical to ensure that **equity, environmental justice and workforce benefits** are centered in local and federal hydrogen planning and deployment. A hydrogen economy should benefit worker and community health and well-being while driving down GHG emissions in areas that are difficult to decarbonize.

Environmental justice

- Ensure that meaningful community engagement occurs as projects are proposed and evaluated in the state and region. Communities must have an opportunity to learn about and provide feedback on proposed projects.
- Understand and mitigate environmental, health and safety concerns related to hydrogen. This includes addressing nitrogen oxides (NOx) emissions through combustion of hydrogen.
- Ensure an equitable distribution of benefits from hydrogen projects and investments, especially in communities with a disproportionate pollution burden from industrial plants, airports, maritime ports and heavy freight. Communities must be engaged in the determination of benefits from proposed H2 projects.

Workforce

- Engage with labor unions, workers, and educational and training institutes. The voice of relevant workers and unions can help ensure hydrogen deployment creates and supports good jobs.
- Use tools such as Community Workforce Agreements to ensure that hydrogen projects promote well-paying jobs and support apprenticeship utilization and local job opportunities. Permanent hydrogen jobs should be family-wage jobs.
- Analyze workforce opportunities and impacts as a clean hydrogen economy advances. This includes understanding how to deploy current energy workers in new hydrogen jobs, and ensuring training and workforce opportunities are available and accessible for all, including overburdened communities.

Next steps for Commerce

- Grow the **Office of Renewable Fuels**. This includes hiring additional staff, establishing a website for hydrogen updates, and establishing regular stakeholder engagement processes.
- Publish a **report and recommendations on hydrogen and renewable fuel deployment** by December 2023. This includes recommendations on policy gaps, pilot projects, and additional grant and funding recommendations for consideration by the Legislature.
- Advance research and analysis that fills gaps in hydrogen knowledge and policy. This includes efforts related to **NOx emissions, safety standards** and other key considerations.
- Evaluate and provide comments on **federal hydrogen policy and funding opportunities**. This includes the draft [National Hydrogen Strategy and Roadmap](#), [Clean Hydrogen Production Standard](#), [clean hydrogen production tax credit](#) (IRS § 45V), and related policies.
- Engage in **inter-state efforts**, including U.S. Climate Alliance and National Association of State Energy Officials (NASEO) hydrogen working groups.
- Contribute to the development of a competitive and strategic **H2Hub application** through work with the PNWH2. This includes leadership and staff support to the association regarding energy policy and a Community Benefits Plan, and aligning the work with Commerce's responsibilities under the HEAL Act.