

Biden's Clean Energy Goals Require Big Hydrogen Push

By **Abdon Rangel** and **John Taylor** (June 1, 2021, 5:08 PM EDT)

The U.S. government wishes to shift the economy from fossil fuels to greener energy sources as part of its climate agenda. The government's position is that we face a profound climate crisis, which requires the U.S. to pursue action at home and abroad to tackle the problem.[1] Many global corporations agree, and are acting accordingly.[2]

The Biden administration's strategy incorporates climate change concerns into its environmental, infrastructure and manufacturing policies. President Joe Biden's ambitious infrastructure proposal aims to reshape the U.S. economy, and build out the country's clean energy infrastructure.[3]

The proposal calls for investment on a scale commensurate with building the interstate highway system and winning the space race.[4] This plan and other proposals support the administration's goal to materially reduce U.S. carbon emissions by 2030.

Hydrogen should play a critical role in any long-term climate solution. This article discusses methods the federal government could use to grow the hydrogen energy sector to further its policy goals.

The Case for Hydrogen

Hydrogen's capabilities as a carbon-free fuel, energy storage medium and renewable energy enabler seem almost too good to be true.[5] It has the highest energy content by weight of any fuel, and can generate electricity with only water and heat as byproducts.[6]

Hydrogen is often compared with diesel as a transportation fuel. Even beyond transportation, as Julie McNamara pointed out last year on the Union of Concerned Scientists Blog, hydrogen has "sector-spanning potential ... that can be used in all sorts of otherwise-hard-to-decarbonize applications where fossil fuels have long been considered required." [7]

Hydrogen's usefulness as an energy storage medium are significant. This capability could help make power generation through solar and wind more efficient, by resolving the curtailment problem these projects currently face.[8] Current solutions to the intermittent nature of some renewable energy



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sources have limitations that hydrogen storage can overcome.

While Congress currently evaluates significant energy and infrastructure proposals, hydrogen energy should be a key consideration. The Biden administration's aggressive decarbonization and emissions timelines will be possible only with significant governmental support for alternative energy sources such as hydrogen.

The U.S. Department of Energy views hydrogen as a versatile fuel offering a path to sustainable long-term economic growth, adding value to multiple sectors in the economy. Hydrogen can also be used to reduce emissions in a variety of domestic industries, such as manufacturing steel and cement.[9]

Hydrogen has not been used more widely to date because key enabling technologies are only now reaching sufficient maturity to enable commercial utilization. An effective policy framework and incentives are needed to ensure these capabilities can reach their potential in the near term, and assist the federal government in achieving its policy goals.[10] If the federal government follows the space race analogy, a big push may be just what hydrogen needs to realize its full potential.

The U.S. is not the only country to see hydrogen as an essential building block for a greener economy — and may even be falling behind other countries in this regard. Governments around the world are starting to focus on hydrogen, and are funding programs designed to expand hydrogen's role in their economies.

If the U.S. wants to stay at the forefront of energy innovation, it should act this year to promote hydrogen. Now is the time for the federal government to take action to reduce the financial risk of investing in hydrogen, and to support its widespread adoption in the U.S.

Hydrogen Ecosystem

Hydrogen power has its own ecosystem. This ecosystem has three primary components: storage, production and deployment. Each component needs attention at the federal, state and local government levels to catch up with solar and wind power.

Hydrogen storage is the ecosystem's key enabling technology, and solving this issue should propel hydrogen into a competitive position with other green alternatives. While hydrogen has the highest energy per mass of any fuel, its density at ambient temperatures is significantly lower than fossil fuels.[11] Hydrogen needs advanced storage solutions that solve current cost, material density and safety issues. Expanded focus and investment in storage technologies are needed.

Hydrogen production is the ecosystem's second leg. Hydrogen has been produced on an industrial scale for more than a century, but the push now is for more environmentally friendly green hydrogen production.[12]

Green hydrogen is not currently cost-competitive with other alternatives, but the Biden administration has announced a goal to reduce its cost by up to 80% by 2030.[13] This goal is ambitious, but perhaps solar power's move from an expensive idea to delivering what pioneering Australian solar energy researcher Martin Green calls "insanely cheap energy" well ahead of market expectations is proof of what can be accomplished with the right levels of investment and support.[14]

Hydrogen is most often deployed to generate electricity using a fuel cell, which has led to comparisons

with batteries. While a decade of intense investment into electric vehicles has favored battery technology development, the two technologies should be considered complementary in the same manner as diesel and gasoline. Further investment into fuel cell technologies could narrow the gap between the two technologies to the benefit of both.

Government Assistance

The federal government is one of the largest and most complex organizations that has ever existed. However, it operates within a federal system, and inside a framework of international trade agreements, that limit its ability to act. The federal government has five principal tools at its disposal to foster the growth of the hydrogen energy sector:

- Regulatory standards;
- Direct grants;
- Federal grants in aid;
- Purchasing power; and
- Tax incentives.

We expect that the federal government will use all five tools if it makes building the hydrogen energy sector a priority.

Regulatory standards impose obligations on goods and persons within the U.S. Regulations can ban high-pollution activities, make them more expensive and/or spur on technological change by setting timelines for increasingly stringent minimum standards.[15] Speeding up the regulatory approval process for green technologies by devoting more resources for this purpose would be one means of supporting this sector.

Direct grants, including DOE-sponsored research and development programs, can help achieve specific targets. While very useful, they often have a limited scope, and generally come with significant qualification requirements. Earmarks, while subject to substantial limitations, could be used for particularly worthy projects.

Loan guarantee and similar programs also fall within the direct grant concept, and the Biden administration appears eager to make this tool more accessible.[16] Congress has also signaled its support for state and municipal governments in this space with grants and other financial assistance.[17]

Grants in aid are when the federal government gives money to state and local governments on condition that the money is spent along approved guidelines. Federal grants of highway funds are a good example of grants in aid. In the hydrogen context, the federal government could use grants in aid to create a hydrogen refueling corridor along the entire U.S. interstate system, a modern-day equivalent of its push for a transcontinental railroad.[18]

The federal government's vast purchasing power can also be a potent aid to developing green technology. It is one of the largest consumers in the U.S., and can shape supplier behavior in that capacity alone.

Federal, state and local governments could serve as early adopters for emerging hydrogen technologies. Federal contracts, and the accompanying product validation they convey, could provide a huge boost to

startups in the hydrogen space. For example, the federal government could purchase hydrogen fuel cell vehicles and watercraft for use in ecologically sensitive areas.

Finally, the government can use one of its primary, but least understood tools: tax incentives. The Internal Revenue Code is one of the government's favorite means of encouraging technological progress.

The home mortgage interest deduction is one of the most popular tax incentives — using the tax code to encourage home ownership. The research and development tax credit has been used to drive U.S. growth and bolster the economy. Both the solar and wind energy sectors have benefited significantly from tax incentives that helped their expansion.

The tax code currently contains numerous provisions intended to incentivize renewable energy projects and/or related equipment. According to Sen. Ron Wyden, D-Ore.: "The energy tax code in America is a cluttered, old heap of more than 40 different tax breaks for a variety of energy sources and technologies, including clean energy and transportation." [19]

Wyden's proposed legislation consolidates current energy tax incentives into emissions-based provisions that incentivize clean electricity, clean transportation and energy efficiency. [20] Consolidation may help, if the overall benefit to taxpayers is positive.

Congress should consider all its options in enabling hydrogen to take its place as a key component of a new greener economy. These include considering refundable and/or transferrable tax credits for manufacturing hydrogen-related technology, in addition to credits for those who purchase and deploy those products. State and local governments could benefit from refundable/transferrable tax credits, further supporting the sector.

Summary

Congress and the Biden administration should actively consider every tool at their disposal for encouraging the growth of the hydrogen industry.

We believe the most effective use of tax incentives occurs when legislation is drafted in the simplest way possible, with minimal limitations. If Congress wants to promote something this important, it should do so in a clear and simple manner, with a minimum of traps for the unwary.

Moreover, Congress should allow innovation by the people, through new products or technologies, to promote and encourage a long-term climate solution, rather than only focusing on the best way to capture the tax benefits.

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[1] President Joseph Biden, Executive Order on Tackling the Climate Crisis at Home and Abroad (Jan. 27, 2021).

[2] See, e.g., Lauren Goode, Apple Sets Climate Goals for 2030, Joining Amazon and Microsoft, *Wired* (July 21, 2020), available at: <https://www.wired.com/story/apple-sets-climate-goals-for-2030/>.

[3] See, e.g., Scott Waldman, Biden Says Infrastructure Is the Pillar of His Climate Plan, *Scientific American* (April 8, 2021), available at: <https://www.scientificamerican.com/article/biden-says-infrastructure-is-the-pillar-of-his-climate-plan/>.

[4] Fact Sheet: The American Jobs Plan, White House (March 31, 2021).

[5] In the context of this article, "hydrogen" refers to the hydrogen molecule (H₂) and not the element (H).

[6] U.S. Congressional Research Service, Pipeline Transportation of Hydrogen: Regulation, Research, and Policy, at 2 (R 46700; March 2, 2021), by Paul W. Parfomak.

[7] Julie McNamara, What's the Role of Hydrogen in the Clean Energy Transition?, *Union of Concerned Scientists Blog* (Dec. 9, 2020), available at: <https://blog.ucsusa.org/julie-mcnamara/whats-the-role-of-hydrogen-in-the-clean-energy-transition>.

[8] The term "curtailment" in this context refers to a purposeful reduction in renewable electricity output due to a lack of current capacity to use or store the energy. See Michael Mazengarb, Could hydrogen be the answer to wind and solar curtailment woes?, *Renew Economy* (Feb. 20, 2020), available at: <https://reneweconomy.com.au/could-hydrogen-be-the-answer-to-wind-and-solar-curtailment-woes-92174/>.

[9] U.S. Department of Energy Hydrogen Program Plan, available at: <https://www.hydrogen.energy.gov/pdfs/hydrogen-program-plan-2020.pdf>. Steel manufactured using hydrogen instead of fossil fuels such as coal is commonly called "green steel."

[10] James Bowe and William Rice, Building the Hydrogen Sector Will Require New Laws, Regs, *Law360* (Jan. 13, 2021), available at: <https://www.law360.com/articles/1342390/building-the-hydrogen-sector-will-require-new-laws-regs>.

[11] On a mass basis, hydrogen has nearly three times the energy content of gasoline, but on a volume basis the situation is reversed. See Office of Energy Efficiency & Renewable Energy, Hydrogen Storage, available at: <https://www.energy.gov/eere/fuelcells/hydrogen-storage>.

[12] Hydrogen is increasingly assigned a color designation according to how it is produced with the most popular designations being: green (renewables), blue (natural gas) or grey (fossil fuels). Other colors include: brown (coal), pink (nuclear) and turquoise (methane).

[13] Rachel Frazin, Granholm announces goal to make hydrogen power, EV batteries more affordable, *The Hill* (April 23, 2021), available at: <https://thehill.com/policy/energy-environment/549907-granholm-announces-goal-to-make-hydrogen-power-ev-batteries-more>.

[14] See, e.g., Royce Kurmelovs, 'Insanely cheap energy': how solar power continues to shock the world,

Guardian (April 24, 2021), available at: <https://www.theguardian.com/australia-news/2021/apr/25/insanely-cheap-energy-how-solar-power-continues-to-shock-the-world>.

[15] The Environmental Protection Agency administers the statutory Renewable Fuel Standard, which is primarily responsible for federal targeting of emissions reductions in this context.

[16] Eric Wolff, DOE's First Task for Loan Guarantees: Calming industry nerves, Politico (March 17, 2021), available at: <https://www.politico.com/news/2021/03/17/energy-department-loan-guarantees-476719>.

[17] The American Infrastructure Bonds Act of 2020 allows state and local governments to issue taxable bonds in certain circumstances where the U.S. Treasury pays a percentage of the bond's interest.

[18] Completion of the project could be memorialized with a "platinum spike" in lieu of a golden spike.

[19] Wyden Statement at Finance Committee Hearing on the Climate Crisis and the U.S. Tax Code (April 27, 2021), available at: <https://www.finance.senate.gov/chairmans-news/wyden-statement-at-finance-committee-hearing-on-the-climate-crisis-and-the-us-tax-code>.

[20] The Clean Energy for America Act, S. 1298, 117th Cong., 1st Sess. (2021).