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## DOE Releases Draft Clean Hydrogen Production Standard, Draft Roadmap, and Hydrogen Hub Funding Opportunity

*DOE's coordinated announcements are designed to accelerate clean hydrogen demonstration, development, and deployment programs.*

### Key Points:

- The draft Clean Hydrogen Production Standard (CHPS) proposes a lifecycle GHG emissions target of 4 kg CO<sub>2</sub>e per kilogram of hydrogen, which is in line with the clean hydrogen production tax credit in the Inflation Reduction Act and which could allow DOE to fund an array of hydrogen technologies.
- The CHPS is not a regulatory standard, but is intended to guide (not necessarily determine) DOE's funding decisions. DOE is now seeking comments on the CHPS, which are due by October 20, 2022.
- The draft National Clean Hydrogen Strategy and Roadmap outlines the challenges to scaling up the hydrogen economy and potential strategies to address those challenges, including targeting investments in clean hydrogen on hard-to-decarbonize sectors, reducing the cost of clean hydrogen, and focusing on regional networks to enable critical mass infrastructure, drive scale, and facilitate market lift-off.
- DOE announced a \$7 billion funding opportunity for Regional Clean Hydrogen Hubs. Concept papers are due on November 7, 2023, and applications must be filed by April 2023. Projects funded through the H2Hubs program will be required to "demonstrably aid achievement" of the CHPS.

In a series of coordinated announcements, the US Department of Energy (DOE) has issued draft guidance for a Clean Hydrogen Production Standard (CHPS), a draft National Clean Hydrogen Strategy and Roadmap (Roadmap), and a funding opportunity for Regional Clean Hydrogen Hubs (H2Hubs).

The Infrastructure Investment and Jobs Act of 2021 (IIJA) required DOE to establish the CHPS to: (1) support clean hydrogen production from diverse energy sources; (2) define "clean hydrogen" as hydrogen (H<sub>2</sub>) produced with a carbon intensity equal to or less than 2 kg of carbon dioxide-equivalent emissions (CO<sub>2</sub>e) at the site of production per kilogram of H<sub>2</sub> produced; and (3) take into consideration technological and economic feasibility.

This Client Alert discusses in detail the draft CHPS, Roadmap, and H2Hubs funding opportunity, which together demonstrate the federal government's significant commitment towards developing and supporting a clean hydrogen economy.

## Draft Clean Hydrogen Production Standard

On September 22, 2022, DOE released a [draft Clean Hydrogen Production Standard](#) to meet the requirements of the IIJA (also known as the Bipartisan Infrastructure Law (BIL)).<sup>1</sup> Congress directed DOE in the IIJA to establish the CHPS and required that the standard:

- “support clean hydrogen production from each source described in section 16154(e)(2) of this title,” which includes but is not limited to fossil fuels with carbon capture, utilization, and sequestration (CCUS), hydrogen-carrier fuels (including ethanol and methanol), and renewable energy resources (including biomass and nuclear energy);
- “define the term ‘clean hydrogen’ as provided in section 16166(b)(1)(B) to mean hydrogen produced with a carbon intensity equal to or less than 2 kg CO<sub>2</sub>e produced at the site of production per kg of hydrogen produced”; and
- “take into consideration technological and economic feasibility.”<sup>2</sup>

Therefore, Congress directed DOE to define clean hydrogen based on a carbon intensity rate of 2 kg CO<sub>2</sub>e/kg H<sub>2</sub> at the site of production, but also required the CHPS overall to support hydrogen production from diverse energy sources and take into consideration technology and cost. As DOE notes in its draft guidance, the definition of “clean hydrogen” is “not the sole component of the CHPS.”<sup>3</sup>

## CHPS Lifecycle Target

To that end, DOE's draft CHPS guidance proposes that the CHPS establish an initial target for *lifecycle* greenhouse gas (GHG) emissions of 4 kg CO<sub>2</sub>e/kg H<sub>2</sub>. DOE notes that this would be consistent with both the Inflation Reduction Act's (IRA's) definition of “qualified clean hydrogen” in its clean hydrogen production tax credit (PTC) (i.e., hydrogen produced “through a process that results in a lifecycle greenhouse gas emissions rate of not greater than 4 kilograms of CO<sub>2</sub>e per kilogram of hydrogen”<sup>4</sup>), and likely would be achievable by facilities that meet the IIJA's definition of clean hydrogen (i.e., “hydrogen produced with a carbon intensity equal to or less than 2 kilograms of carbon dioxide-equivalent produced at the site of production per kilogram of hydrogen produced”<sup>5</sup>).

Therefore, DOE's proposed CHPS could extend opportunities for federal hydrogen investment to a broad array of proposed projects that manage to achieve the lifecycle GHG target, while still meeting the IIJA's mandate. By selecting a lifecycle GHG emissions limit, DOE is choosing to be technologically neutral. This approach avoids using potentially subjective terms like “green” or “blue” hydrogen and allows the market to select and advance technologies that achieve an objective ultimate end-goal, which is hydrogen produced with a low carbon footprint.

## What Is Considered in Lifecycle?

DOE proposes that “the emission sources that would be accounted for in the lifecycle target proposed in the draft guidance include upstream processes (e.g., electricity generation, fugitive emissions), as well as downstream processes associated with ensuring that CO<sub>2</sub> produced is safely and durably sequestered.”<sup>6</sup> Upstream processes include the generation of the electricity used, the extraction of any feedstock, and fugitive emissions from feedstock delivery. Downstream processes include any fuel combustion used for

compression of captured CO<sub>2</sub> and fugitive emissions from CO<sub>2</sub> transport and sequestration. DOE indicates that “the lifecycle target corresponds to a system boundary that terminates at the point at which hydrogen is delivered for end use.”<sup>7</sup>

### **What Will the CHPS Be Used For?**

DOE notes that the CHPS is not a regulatory standard, but instead is intended to help guide DOE when investing in clean hydrogen programs. DOE stated that its draft CHPS “is being proposed to encourage low-carbon hydrogen production from diverse feedstocks and using state-of-the-art technologies that are expected to be deployable at scale today.” Further, DOE is clear that “the CHPS will not categorically exclude projects from eligibility for DOE funding programs.”<sup>8</sup> The IIJA “provisions governing Regional Clean Hydrogen Hubs make clear that DOE can select projects that do not meet the CHPS so long as the selected projects ‘demonstrably aid the achievement’ of the CHPS.”<sup>9</sup>

### **DOE Seeking Comments**

DOE is seeking feedback on the proposed CHPS and will accept comments until October 20, 2022. In its draft CHPS, DOE included a list of 15 questions it is seeking feedback on to help inform the final CHPS.

### **A National Clean Hydrogen Strategy and Roadmap**

Also on September 22, 2022, DOE released a [draft National Clean Hydrogen Strategy and Roadmap](#).<sup>10</sup> Congress directed DOE in the IIJA to “develop a technologically and economically feasible national strategy and roadmap to facilitate wide-scale production, processing, delivery, storage, and use of clean hydrogen.”<sup>11</sup> Specifically, the IIJA required the Roadmap to “focus” on establishing the CHPS, “including interim goals to meet that standard.”<sup>12</sup> Thus, the Roadmap is intended to facilitate DOE’s development of the CHPS.

The Roadmap is composed of three sections. First, the Roadmap discusses how hydrogen can help the United States reach its climate goals (a carbon-free electricity sector by 2035 and net-zero GHG emissions economy-wide by 2050).<sup>13</sup> Second, the Roadmap discusses the challenges to scaling up the hydrogen economy and potential strategies to address those challenges, including: (1) focus on hard-to-decarbonize sectors for the use of clean hydrogen; (2) reduce the cost of clean hydrogen; and (3) focus on regional networks to enable critical mass infrastructure, drive scale, and facilitate market lift-off. Third, the Roadmap outlines the actions that are needed to support and develop the clean hydrogen industry in the near, middle, and long term.

### **Hydrogen’s Role in Meeting US Climate Goals**

Although the Roadmap recognizes that achieving the United States’ climate goals is “daunting,”<sup>14</sup> DOE is bullish on clean hydrogen’s role in meeting the challenge, noting that “[h]ydrogen can serve as a key enabler of our goal due to its versatility and potential to complement other clean technologies in three of the most energy and emissions-intensive sectors in the United States: industry, transportation, and electricity generation.”<sup>15</sup> To help realize this potential, DOE’s strategic goal is to increase clean hydrogen production from nearly zero today to 10 million metric tons (MMT) per year by 2030, 20 MMT per year by 2040, and 50 MMT per year by 2050.<sup>16</sup> DOE estimates that achieving these clean hydrogen production targets by 2050 would reduce US GHG emissions by approximately 10% relative to 2005 levels.

### **Incentivizing Clean Hydrogen Adoption**

The Roadmap emphasizes the importance of strategically deploying clean hydrogen to uses that do not have other “high-efficiency and low-cost options,” like electrification.<sup>17</sup>

The Roadmap acknowledges that reducing the price of clean hydrogen is key to adoption across the wide range of potential end uses that are hard to electrify. For this reason, DOE previously launched the [Hydrogen Shot](#), which seeks to reduce the cost of clean hydrogen by 80% to \$1 per 1 kilogram in one decade.<sup>18</sup> The Roadmap discusses how clean hydrogen production costs can be reduced for multiple production processes.

### Path to Clean Hydrogen Adoption

Aside from the cost of clean hydrogen, the Roadmap acknowledges additional challenges to wide-scale clean hydrogen adoption, including “lack of hydrogen infrastructure, lack of manufacturing at scale ... [and] durability, reliability, and availability challenges in the supply base across the entire value chain.”<sup>19</sup> To address these challenges, DOE developed three key strategies: (1) target strategic, high-impact end uses; (2) reduce the cost of clean hydrogen; and (3) focus on regional networks.

### Targeting End-Uses

The Roadmap states that clean hydrogen should be prioritized for end uses that do not have alternative low-cost and efficient decarbonization technologies. Instead, DOE notes that it will focus on clean hydrogen for decarbonizing applications in industry, power generation, and heavy-duty transportation that are otherwise difficult to electrify.<sup>20</sup> The Roadmap discusses each of these potential end uses and describes how clean hydrogen can effectively replace fossil fuels. As examples, the Roadmap notes that “about 30 percent of heat used in industry is at temperatures above 300°C and would likely require clean fuels to decarbonize,”<sup>21</sup> “[t]he use of hydrogen in fuel cells or low-NOx turbines is a leading option to enable multi-day, dispatchable power to the grid,”<sup>22</sup> and “[i]n transportation, hydrogen has a strong value proposition in the trucking sector, particularly for fleets with heavy-duty vehicles, long-distance (>500-mile) routes, or multi-shift operations that require rapid refueling.”<sup>23</sup>

### Focusing on Regional Networks

The final strategy in the Roadmap is to “focus on achieving large-scale, commercially viable deployment of clean hydrogen by matching the scaleup of clean hydrogen supplies with a concomitant and growing regional demand.”<sup>24</sup> The Roadmap identifies parts of the country that could serve as key areas of production, storage, and end-use potential. The Roadmap’s strategy is therefore focused on investments in clean hydrogen infrastructure in areas of the country that have potential to support each of these pieces of the clean hydrogen value chain.

### Guiding Principles

The Roadmap discusses how DOE intends to implement the strategies outlined by offering eight “guiding principles” for developing clean hydrogen infrastructure.

1. *Enable deep decarbonization through strategic, high-impact uses.* “Enable the national net-zero and clean grid goals through targeted deployments of clean hydrogen in sectors where its use has the most impact, including industrial processes, heavy-duty transport, high-temperature heat, and long duration energy storage.”<sup>25</sup>
2. *Catalyze innovation and investment.* “Foster partnerships with [all] stakeholders to invest in innovation across the entire [Research, Development, Demonstration, and Deployment] value chain for clean hydrogen technologies.”<sup>26</sup>
3. *Foster diversity, equity, inclusion.* “Promote diversity, equity, and inclusion to effectively advance the U.S. research, innovation, and commercialization enterprise.”<sup>27</sup>

4. *Advance environmental justice.* “Prioritize energy and environmental justice by seeking to create new economic opportunities and place-based initiatives to improve the health and well-being of communities.”<sup>28</sup>
5. *Grow sustainable jobs.* “Focus on preserving and growing sustainable jobs, defined as good-paying union jobs.”<sup>29</sup>
6. *Spur domestic manufacturing and robust supply chains.* “Promote U.S. manufacturing, ensure robust, secure, and resilient supply chains, and increase exports.”<sup>30</sup>
7. *Enable affordability and versatility.* “Target affordability and create flexibility in the energy system by leveraging and coupling diverse sources, including renewables and nuclear, utilizing fossil and CCS infrastructure where appropriate, and enabling resiliency and energy security.”<sup>31</sup>
8. *Approach holistically.* “Approach clean hydrogen development and deployment holistically and [] cultivate sustainable best practices through targeted development to support – not compete with – other decarbonization technologies such as electrification.”<sup>32</sup>

## Regional Clean Hydrogen Hub Funding Opportunity

Also on September 22, 2022, DOE announced a long-anticipated \$7 billion funding opportunity for applications for regional clean hydrogen hubs (H2Hubs) across the country.<sup>33</sup> DOE’s funding opportunity announcement (FOA) was released during a DOE-sponsored event in Pittsburgh that convened agency officials and industry executives to discuss hydrogen’s role in meeting national clean energy and climate goals.<sup>34</sup>

### H2Hubs Mandate Under the IIJA

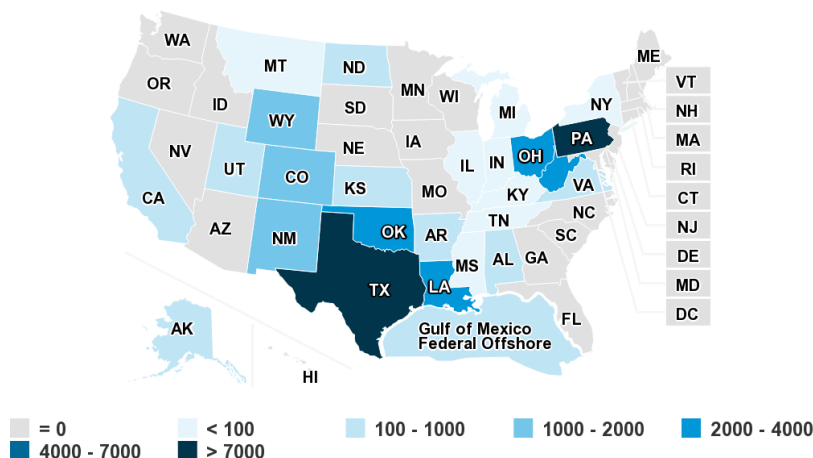
The IIJA originally allocated \$8 billion for DOE’s H2Hubs program for fiscal years 2022-2026.<sup>35</sup> The IIJA mandates that DOE’s program support the development of at least four H2Hubs that would “demonstrably aid the achievement of” the CHPS,<sup>36</sup> and requires at least two of the H2Hubs, “to the maximum extent practicable,” to be located in high natural gas-producing regions (see map below).<sup>37</sup> Further, the final list of H2Hubs that DOE selects must include at least one hub producing hydrogen from fossil fuels, one from renewable energy, and one from nuclear energy. It must also include at least one hub demonstrating end uses of hydrogen in electric power generation, one in industrial applications, one in residential and commercial heating, and one in transportation.<sup>38</sup>

The IIJA gave the Secretary of Energy the discretion to use other additional criteria in the selection process.<sup>39</sup>

Ultimately, the regional H2Hubs are intended for potential growth into a nationwide hydrogen network.<sup>40</sup>

### U.S. dry natural gas production by state in 2020

billion cubic feet



Data source: U.S. Energy Information Administration, *Natural Gas Annual*, September 2021

### Initial DOE Funding Opportunity: Up to 10 H2Hubs, Full Applications Due April 2023

DOE aims to select six to 10 H2Hubs for a combined total of up to \$6-\$7 billion in federal funding. DOE refers to its announcement as an “initial funding opportunity launch,” and states that additional funding opportunities (likely one additional round) may follow.

DOE explains in the FOA that it has defined a four-phase finance and development structure for prospective H2Hubs:

- Phase 1 will encompass initial planning and analysis activities to ensure that an H2Hub’s overall concept is technologically and financially viable, with input from relevant local stakeholders.
- Phase 2 will finalize H2Hub engineering designs and business development, site access, labor agreements, permitting, offtake agreements, and community engagement activities necessary for Phase 3.
- Phase 3 will begin H2Hub installation, integration, and construction activities.
- Phase 4 will ramp up the H2Hub to full operations, including data collection to analyze the H2Hub’s operations, performance, and financial viability.

The FOA will solicit plans for all four phases, but DOE will only “initially” authorize funding for Phase I, with a “Go/No-Go Review” to occur “between or within” phases based on DOE’s evaluation of phase activities and deliverables. DOE describes the Go/No-Go Review as a risk management tool and states that federal funding beyond Go/No-Go decision points will be contingent on a range of factors, including the funding recipient’s adherence to its schedule, continued federal budget authority, and availability of appropriations for the H2Hub program.

## H2Hub Community Benefits Plan Requirement

In its announcement, DOE notes that applications for the funding opportunity will be “expected” to include a “Community Benefits Plan” that will:

- “[s]upport meaningful community and labor engagement,”
- “[i]nvest in America’s workforce,”
- “[a]dvance diversity, equity, inclusion, and accessibility,” and
- “[c]ontribute to the President’s goal that 40% of the overall benefits of certain federal investments flow to disadvantaged communities.”

DOE further notes that “[a]ddressing environmental justice and engaging local communities, particularly historically disadvantaged and underserved communities that have disproportionately borne the brunt of past energy practices, are fundamental priorities of DOE’s approach to developing H2Hubs.”

The FOA notes that H2Hubs will be expected to include “substantial engagement of local and regional stakeholders, as well as Tribes, to ensure that they generate local, regional, and national benefits.”

The Community Benefits Plan requirement is consistent with a number of Biden Administration actions that aim to protect communities from disproportionate impacts from energy and infrastructure projects. DOE is requesting that Community Benefits Plans accompany all DOE funding opportunity announcements relating to such projects and notes that such plans will become part of the contractual obligations of DOE funding recipients.<sup>41</sup>

## H2Hub Application NEPA Information

DOE’s eventual decision to issue and distribute H2Hub funding is a discretionary federal action that will be subject to environmental review under the National Environmental Policy Act (NEPA) and other federal environmental laws. Appendix G of the FOA seeks additional information from H2Hub applicants to assist DOE in determining the appropriate level of environmental review that selected projects will need under NEPA, including the potential need to prepare a full environmental impact statement, or an environmental assessment, which is a less extensive NEPA process.

The additional information may include, among other things: (1) whether there is ongoing or anticipated federal involvement in the project; (2) whether the project will be located on federal land; (3) site location and mapping information, including descriptions and locations of primary and auxiliary project facilities; (4) new or modified permits, licenses, or authorizations required for the project; and (5) potential direct or indirect impacts on a range of natural, historic, and cultural resources.

## Applications and Next Steps

H2Hub concept papers are due by 5 p.m. ET on November 7, 2022, with full applications due by 5 p.m. ET on April 7, 2023. Importantly, only applicants that have submitted an eligible concept paper are eligible to submit a full application.

Following submission of concept papers, DOE aims to issue “encourage/discourage” notifications to applicants in December 2022 to encourage a subset of initial applicants to submit full applications. A full application must include a principal “Technical Volume” along with other required supporting

documentation, including a detailed “techno-economic analysis” and a “lifecycle analysis”, the Community Benefits Plan, the Environmental Considerations Summary, letters of commitment, and other information.

Further information on the FOA, including a link to download the full 153-page FOA document and the official link to apply, is available at the DOE’s Office of Clean Energy Demonstrations (OCED) website.<sup>42</sup>

DOE’s H2Hub program and the FOA will be managed by OCED,<sup>43</sup> with support from DOE’s Office of Energy Efficiency and Renewable Energy.

## Inflation Reduction Act’s Hydrogen Tax Credits

As discussed in this Latham [Client Alert](#), the IRA introduced a new clean hydrogen production tax credit and a new clean hydrogen investment tax credit. For the purposes of these tax credits, the IRA defined “clean hydrogen” as hydrogen produced through a process that results in lifecycle GHG emissions of up to 4 kg CO<sub>2</sub>e/kg H<sub>2</sub>. Thus, DOE is attempting to synchronize its programs with the IRA’s H<sub>2</sub> tax credit eligibility criteria.

## Conclusion

The federal government continues to advance policies aimed at spurring investments in clean hydrogen production, storage, transportation, and end uses.

Latham & Watkins will continue to monitor and report on developments in this area.

For more information about these and other updates regarding hydrogen, [click here](#) to download a recording of Latham & Watkins’ recent webcast, [New Energies: In Pursuit of Greener Pastures with Hydrogen](#), an in-depth presentation on the role of hydrogen in the energy transition and how to translate hydrogen from a concept to reality, taking in account market, financeability, and other considerations.

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If you have questions about this Client Alert, please contact one of the authors listed below or the Latham lawyer with whom you normally consult:

**[Nikki Buffa](#)**

nikki.buffa@lw.com  
+1.714.540.1235  
Orange County / Washington, D.C.

**[Jennifer K. Roy](#)**

jennifer.roy@lw.com  
+1.858.523.3980  
San Diego

**[Janice M. Schneider](#)**

janice.schneider@lw.com  
+1.202.637.2306  
Washington, D.C.

**[Joshua T. Bledsoe](#)**

joshua.bledsoe@lw.com  
+1.714.755.8049  
Orange County

**[Brian McCall](#)**

brian.mccall@lw.com  
+1.714.755.2255  
Orange County

**[Peter R. Viola](#)**

peter.viola@lw.com  
+1.202.637.2304  
Washington, D.C.

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**Endnotes**

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- <sup>1</sup> U.S. Department of Energy (DOE), Clean Hydrogen Production Standard (CHPS) Draft Guidance (Sept. 22, 2022) (CHPS Guidance), <https://www.hydrogen.energy.gov/pdfs/clean-hydrogen-production-standard.pdf>.
- <sup>2</sup> 42 U.S.C. 16166(b).
- <sup>3</sup> CHPS Guidance at 2.
- <sup>4</sup> 26 U.S.C. § 45V(b)(2)(A)(i).
- <sup>5</sup> 42 U.S.C. 16166(b).
- <sup>6</sup> DOE, Clean Hydrogen Production Standard Draft Guidance, at p. 4.
- <sup>7</sup> *Id.* at 5 n.11.
- <sup>8</sup> *Id.* at 6.
- <sup>9</sup> *Ibid.*
- <sup>10</sup> DOE, NATIONAL CLEAN HYDROGEN STRATEGY AND ROADMAP (Draft – Sept. 2022), <https://www.hydrogen.energy.gov/pdfs/clean-hydrogen-strategy-roadmap.pdf>.
- <sup>11</sup> 42 U.S.C. § 16161b.
- <sup>12</sup> *Ibid.*
- <sup>13</sup> See Executive Order 14008, “Tackling the Climate Crisis at Home and Abroad,” 86 Fed. Reg. 7619, 7622, 7624 (Feb. 1, 2021), <https://www.govinfo.gov/content/pkg/FR-2021-02-01/pdf/2021-02177.pdf>.
- <sup>14</sup> Roadmap at 16.
- <sup>15</sup> *Ibid.*
- <sup>16</sup> *Id.* at 21.
- <sup>17</sup> *Id.* at 25.
- <sup>18</sup> DOE, Hydrogen Shot, <https://www.energy.gov/eere/fuelcells/hydrogen-shot>.
- <sup>19</sup> *Id.* at 35.
- <sup>20</sup> *Id.* at 41.
- <sup>21</sup> *Ibid.*
- <sup>22</sup> *Ibid.*
- <sup>23</sup> *Ibid.*
- <sup>24</sup> *Id.* at 64.
- <sup>25</sup> *Id.* at 76.
- <sup>26</sup> *Ibid.*
- <sup>27</sup> *Id.* at 77.
- <sup>28</sup> *Ibid.*
- <sup>29</sup> *Ibid.*
- <sup>30</sup> *Ibid.*
- <sup>31</sup> *Ibid.*
- <sup>32</sup> *Id.* at 78.
- <sup>33</sup> DOE, “Biden-Harris Administration Announces Historic \$7 Billion Funding Opportunity to Jump-Start America’s Clean Hydrogen Economy” (Sept. 22, 2022), <https://www.energy.gov/articles/biden-harris-administration-announces-historic-7-billion-funding-opportunity-jump-start>.
- <sup>34</sup> D. Moore, “White House Launches ‘Generational’ \$7 Billion Hydrogen Plan,” *Bloomberg Law* (Sept. 22, 2022), <https://news.bloomberglaw.com/environment-and-energy/white-house-launches-generational-7-billion-hydrogen-hub-plan>.
- <sup>35</sup> 42 U.S.C. § 16161a(d).
- <sup>36</sup> *Id.* § 16161a(b)(1).
- <sup>37</sup> *Id.* § 16161a(c)(3)(D).
- <sup>38</sup> *Id.* § 16161a(c)(3)(A)-(B).
- <sup>39</sup> *Id.* § 16161a(c)(3)(F).
- <sup>40</sup> *Id.* § 16161a(b)(3).

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- <sup>41</sup> DOE, Bipartisan Infrastructure Law, “Community Benefits Plan Frequently Asked Questions (FAQs),” <https://www.energy.gov/bil/community-benefits-plan-frequently-asked-questions-faqs> (last visited Sept. 30, 2022).
- <sup>42</sup> DOE, Office of Clean Energy Demonstrations, OCED Funding Opportunity Exchange, <https://oced-exchange.energy.gov/Default.aspx#Foald4dbbd966-7524-4830-b883-450933661811>. The funding opportunity number is DE-FOA-0002779.
- <sup>43</sup> DOE, Office of Clean Energy Demonstrations, Leadership Team, <https://www.energy.gov/oced/leadership-team> (last visited Sept. 23, 2022).