

# Blue Hydrogen: The Federal Role

## *New Legislation Establishes Incentives for Production of Fossil-Fuel-Based Hydrogen*

The new federal Infrastructure Investment and Jobs Act (IIJA) has focused attention on choices to be made in the energy transition. The statute establishes incentives for developing hydrogen production facilities, as well as renewable energy.<sup>1</sup>

The statute authorizes \$8 billion to develop at least four regional hubs to increase the production, delivery, storage and use of “clean hydrogen.”<sup>2</sup> To qualify as a clean hydrogen facility under the IIJA, the hydrogen’s carbon intensity must be no more than 2 kilograms (kg) of CO<sub>2</sub> equivalents (CO<sub>2</sub>e) per kilogram of hydrogen generated at the site of production.<sup>3</sup> By way of comparison, gray hydrogen—which is derived from natural gas but does not include carbon capture equipment—has a mean carbon intensity of 9 kilograms of CO<sub>2</sub> per kilogram of hydrogen when produced by the most common method, steam methane reforming (SMR).<sup>4</sup> Although the goal of the legislation is to promote “cutting-edge clean energy technologies to accelerate our transition to a zero-emission economy,”<sup>5</sup> the statute’s implementation will determine the extent to which it achieves this objective.

The IIJA includes specific incentives for “blue hydrogen” projects. Unlike renewably powered, water-based “green hydrogen,” blue hydrogen relies on methane (natural gas) as a feedstock and often as a power source. Such projects seek to reduce the large quantities of carbon dioxide released during the hydrogen production process by installing carbon capture and sequestration (CCS) technology. The IIJA incentives apply to fossil fuel-based hydrogen only if it includes carbon capture and sequestration.<sup>6</sup> The CCS system installed at a natural gas-based hydrogen production plant, however, only captures a percentage of the production-related CO<sub>2</sub> and typically does not capture any of the emissions from the power required to run the process equipment.<sup>7</sup> Moreover, it cannot and does not capture the upstream

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<sup>1</sup> The law was enacted on November 15, 2021. IIJA Subtitle B, § 40311 *et seq.* It also authorizes \$1 billion for projects to cut the cost of electrolysis in hydrogen production, and \$0.5 billion for hydrogen production, processing, delivery and storage using technologies to enhance reuse and recycling of equipment. IILA, § 40314.

<sup>2</sup> IIJA, §§ 40311(b)(5) and 40314(2).

<sup>3</sup> IIJA, § 40315. The “clean hydrogen” definition must take technical and economic feasibility into account and must be adjusted after five years, if not sooner. IIJA, § 40315. The law provides for grants to improve carbon capture technology. IIJA § 40302; § 40404; and § 40304.

<sup>4</sup> The figure covers onsite emissions only, including both the hydrogen process emissions and onsite power combustion. See: Argonne National Laboratory, Energy Systems Division, Systems Assessment Center. [Updates of Hydrogen Production from SMR Process in GREET@2019](#). October 2019.

<sup>5</sup> The White House. [Factsheet: The Bi-Partisan Infrastructure Deal](#). November 6, 2021.

<sup>6</sup> IIJA, § 40313(a)(4).

<sup>7</sup> IEEFA. [Reality Check on CO<sub>2</sub> Emissions Capture at Hydrogen-From-Gas Plants](#). February 2022.

emissions of methane—a powerful greenhouse gas—from natural gas extraction activities and pipeline leaks.<sup>8</sup>

Three of the four hydrogen hubs included in the IIJA incentive program must be able to produce hydrogen with one of the following methods:

1. Renewable energy;
2. Fossil fuels; or
3. Nuclear energy.<sup>9</sup>

The statute requires establishment of at least one hub of each of the three types listed, “to the maximum extent possible.”<sup>10</sup> While the fossil fuel category could include coal, the overwhelming majority of hydrogen produced today is derived from natural gas feedstock. The options of black hydrogen (from black coal) or brown hydrogen (from lignite, also known as brown coal) present greater pollution challenges.<sup>11</sup> Also, the statute requires that at least two of the hubs must be located in U.S. regions “with the greatest natural gas resource.”<sup>12</sup> The fourth hub may be powered by any of the three categories. The U.S. Department of Energy (DOE) must start inviting applications for hydrogen project funding by May 14, 2022. It must approve at least four hubs within a year of the application deadline.<sup>13</sup>

One of the purposes of the law is “developing a robust clean hydrogen supply chain and workforce by prioritizing clean hydrogen demonstration projects in major shale gas regions.”<sup>14</sup> But the IIJA also requires DOE to give priority to hubs “likely to create opportunities for skilled training and long-term employment to the greatest number of residents of the region.”<sup>15</sup> A proper evaluation of this criterion will require taking a hard look at the market future of hydrogen technologies.

The federal subsidies, although significant, represent only a fraction of the real cost of hydrogen projects. Wise state policymakers will recognize that market forces—first and foremost—are driving the energy transition. Investors and corporations are making decisions based on economics, feasibility, effectiveness and customer preferences, as well as environmental, social and governance (ESG) factors.<sup>16</sup> Subsidies designed to boost the market share of profitable technologies will attract

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<sup>8</sup> IEEFA. [Blue Hydrogen Has Weak Case When It Comes to Emission Reductions](#). February 2022.

<sup>9</sup> IIJA, § 40314(2), establishing new §813(c)(3)(A). Although the statute names this section of the law as “feedstock diversity,” options one and three actually describe the power source, as the feedstock for both options would likely be water. The second category, “fossil fuels,” could be either natural gas or coal.

<sup>10</sup> *Ibid.*

<sup>11</sup> See National Grid. [The Hydrogen Colour Spectrum](#). Accessed February 1, 2022.

<sup>12</sup> ILLJA, § 40314, establishing new § 813(c)(3)(D) in the Energy Policy Act of 2005.

<sup>13</sup> IIJA, § 40314(2), establishing new §813(c)(1) and (2) in the Energy Policy Act of 2005.

<sup>14</sup> IIJA, § 40311(b)(4).

<sup>15</sup> IIJA, § 40314(2), establishing new §813(c)(3)(E) in the Energy Policy Act of 2005.

<sup>16</sup> IEEFA. [Costs of Blue Hydrogen Production Too High Without Fiscal Life Support](#). February 2022.

more investors and yield greater, more lasting benefits than subsidies trying to help otherwise unprofitable ventures survive.

Federal decision-makers should consider whether heavy investments in blue hydrogen are really a practical strategy to cut greenhouse gas emissions.

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## About the Author

### Suzanne Mattei

Suzanne Mattei, an attorney (Yale Law School) and consultant with Lookout Hill Public Policy Associates, has over 30 years' experience in environmental policy. As Regional Director for the NYS Department of Environmental Conservation for four years, she led permitting and enforcement in New York City. Her widely cited recent report on a proposed fracked gas pipeline in New York found flaws in proponents' arguments. As NYC Executive for the Sierra Club, her research exposed federal mismanagement of the 9/11 response; her testimony to Congress helped lead to passage of the James Zadroga Act, providing healthcare to Ground Zero workers.

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