Date of Hearing: April 24, 2023

ASSEMBLY COMMITTEE ON NATURAL RESOURCES
Luz Rivas, Chair
AB 1550 (Bennett) – As Amended April 18, 2023

SUBJECT: Green hydrogen

SUMMARY: Requires, on and after January 1, 2045, all hydrogen produced and used in California for the generation of electricity or fueling of vehicles to be "green hydrogen." Defines green hydrogen for purposes of generation of electricity as hydrogen produced through electrolysis using renewable electricity, as specified.

EXISTING LAW:

1) Defines "green electrolytic hydrogen" as hydrogen produced through electrolysis, not including hydrogen manufactured using steam reforming or any other conversion technology that produces hydrogen from a fossil fuel feedstock. (Public Utilities Code (PUC) 400.2)

2) Requires the Public Utilities Commission (PUC), California Energy Commission (CEC), and Air Resources Board (ARB) to consider green electrolytic hydrogen an eligible form of energy storage and consider its potential uses. (PUC 400.3)

3) Requires, pursuant to the Renewables Portfolio Standard (RPS), utilities and other retail sellers of electricity to procure 60% of their retail electricity sales from eligible renewable energy resources by 2030 and thereafter, including interim targets of 33% by 2020, 44% by 2024, and 52% by 2027. (PUC 399.11, et seq.)

4) Provides that RPS-eligible generation facilities must use biomass, solar thermal, photovoltaic, wind, geothermal, renewable fuel cells, small hydroelectric, digester gas, limited non-combustion municipal solid waste conversion, landfill gas, ocean wave, ocean thermal, or tidal current. (Public Resources Code 25741)

5) Establishes a policy that eligible renewable energy resources and zero-carbon electric generating facilities will supply all electricity procured to serve California customers by December 31, 2045, and directs the PUC, CEC, and ARB to incorporate this policy into all relevant planning and programs. (PUC 454.53)

6) Declares the policy of the state to achieve net zero greenhouse gas (GHG) emissions as soon as possible, but no later than 2045, and to achieve and maintain net negative GHG emissions thereafter. (Health and Safety Code 38562.2)

THIS BILL:

1) Requires, on and after January 1, 2045, all hydrogen produced and used in California for the generation of electricity or fueling of vehicles to be green hydrogen in furtherance of the state's policy to achieve net zero GHG emissions as soon as possible, but no later than 2045.

2) Defines green hydrogen, for purposes of the requirement that all hydrogen produced and used in California for the generation of electricity be green hydrogen, as hydrogen gas produced through electrolysis and consistent with all of the following:

   a) The production process uses both renewable electricity that is eligible under the RPS and a material feedstock that is water;

   b) The facility generating the electricity used for the production of the green hydrogen does not use tradable renewable energy credits to demonstrate reliance on renewable electricity;

   c) The facility generating the electricity used for the production of the green hydrogen demonstrates that the electricity it uses comes from a new renewable generation resource developed specifically to serve the green hydrogen production process, consistent with specified prohibitions of resource shuffling, and that the new renewable generation resource has a first point of interconnection to the California balancing authority in which the electrolytic hydrogen production facility is sited; and,

   d) For purposes of generation of electricity, "green hydrogen" does not include hydrogen gas manufactured using steam reforming or any other conversion technology that produces hydrogen from a fossil fuel feedstock.

3) Adds eligibility requirements to the RPS for green hydrogen delivered via pipeline.

FISCAL EFFECT: Unknown

COMMENTS:

1) **Author's statement**:

   California has set a very ambitious goal to reach a 100% clean grid by 2045. To reach that goal we have focused on wind energy, solar energy, and battery storage. However, CARB's draft 2022 scoping plan identifies a role for hydrogen for the state to reach its climate goals, what is not clear is what type of hydrogen that will be in the long run.

   AB 1550 seeks to bring greater certainty to everyone by making clear that any hydrogen used and produced in this state must be green by the same deadline as the grid, 2045. Bringing greater certainty about California's goal regarding hydrogen produces three major benefits. One, investors in hydrogen projects benefit from increased certainty. This bill lets them know in advance that they must achieve a 100% green level by 2045. Two, we will have less uncertainty and concern as to whether hydrogen projects are going to be used to extend the lifecycle of oil and gas, harming local communities with pollutants and emissions. Three, there are serious concerns that if we do not move forward to begin establishing an infrastructure for hydrogen soon, we will not be able to timely decarbonize hard to electrify sectors and industry will not appropriately invest in California.

   Hydrogen is not the sole solution to our green energy and fueling needs, but it is an important one, especially for hard to electrify sectors like shipping, long-haul trucking, long-term storage, and aviation. We need to give more clarity and certainty to all

stakeholders so that they know that California is committed to the environment, energy reliability, and meeting our green energy goals.

2) **Background**. The environmental impacts of hydrogen, including effects on climate and air quality, can range from very favorable to very unfavorable, depending on production, delivery, end use, and the fuel the hydrogen is replacing. For example, hydrogen produced with fossil fuels and used in a combustion application that replaces a renewable energy source is not a good environmental solution. However, hydrogen produced with zero-carbon energy and used in a zero-emission application that replaces diesel combustion has clear climate and air quality benefits.

   The source of the hydrogen and the source of the energy used to split hydrogen plays a significant role in determining the lifecycle emissions associated with hydrogen use. Today, there are several means of hydrogen production and it is likely that these will evolve as technology advances.

   Green hydrogen can result in almost no GHG emissions. Produced by electrolyzing water, green hydrogen is made using 100% renewable electricity to split hydrogen from water molecules. Less than 0.1% of hydrogen production globally comes from water electrolysis.

   Ninety six percent of the hydrogen today is considered to be gray hydrogen. Gray hydrogen is produced by heating natural gas, or methane, with steam to form syngas (a mixture of hydrogen and carbon monoxide and carbon dioxide). The syngas is separated to produce hydrogen. This process results in a relatively high release of GHGs.

   Blue hydrogen attempts to mitigate some of the GHG emission release during the production of gray hydrogen by pairing production with carbon capture and storage. However, not all carbon dioxide emissions can be captured, and some carbon dioxide is emitted during the production of blue hydrogen. Carbon capture increases the cost and inefficiency of the production of blue hydrogen.

   Currently hydrogen branded "renewable" is produced mainly by steam methane reformation of biomethane from North American landfills. SB 1505 (Lowenthal), Chapter 877, Statutes of 2006, requires 33% of the hydrogen produced for fueling stations that receive state funds be made from eligible renewable energy resources, including biomass, digester gas, landfill gas, solar, and wind. However, compliance is achieved largely on paper, through the use of credits from out of state renewable energy sources, rather than direct production and use of renewable hydrogen in California.

   This bill focuses on green hydrogen, which, if properly defined, promises climate and air quality benefits. The bill's requirement for 100% green hydrogen production and use doesn't take effect until January 1, 2045, and the bill provides no interim targets, or otherwise address implementation.

   As recently amended, the bill includes a stringent definition of green hydrogen for purposes of electricity generation, requiring production through electrolysis using RPS-eligible energy. This is appropriate if green hydrogen is claimed as "renewable" for purposes of complying with the RPS, as a weaker standard would provide a path to launder ineligible energy sources into the RPS by using them to produce hydrogen. The bill also prohibits the use of tradeable

renewable energy credits and requires electricity only from a new renewable generation resource developed specifically to serve the green hydrogen production process, which is stricter than the prevailing RPS requirements for other eligible sources.

The bill leaves the definition of green hydrogen for purposes of vehicle fuel unaddressed. The bill also does not address use of hydrogen outside of electricity generation and vehicle fuel, such as industrial production, buildings, shipping, or aviation.

3) **No matter how green it is, where hydrogen is used matters**. There have been recent evaluations seeking to identify the "least-regrets" end-uses of hydrogen, especially given the costliness of initial hydrogen production and the varied emissions benefits of hydrogen usage in different sectors. For instance, Earthjustice, an environmental law organization, released a report in 2021 identifying promising applications for green hydrogen and ranking hydrogen use by least-regrets uses, sectors to explore with caution, and sectors where hydrogen is not a solution. The report categorizes the least-regrets use for hydrogen as displacing fossil hydrogen in current industrial feedstocks. The usage of hydrogen in maritime shipping, aviation, and long-haul trucks and trains were categorized as "sectors to explore with caution." While Earthjustice categorized hydrogen usage in combustion in fossil gas power plants, gas-burning appliances in homes and commercial buildings, and cars, buses, and regional trucks as sectors where hydrogen is not a solution.

   Following the passage of SB 1075 (Skinner), Chapter 363, Statutes of 2022, ARB, the PUC, and the CEC are evaluating the possible deployment, development, and uses of hydrogen in the state. The evaluation is mandated to be publicly posted by June 1, 2024. ARB must also consult with the California Workforce Development Board and labor and workforce organizations on the evaluation. SB 1075 also requires the CEC to study and model potential growth for hydrogen and its role in decarbonizing the electrical and transportation sectors of the economy as part of the 2023 and 2025 editions of its Integrated Energy Policy Report. Ideally this joint agency work will aide understanding of the appropriate end-uses of hydrogen within the state. It may be worth the Legislature contemplating different definitions of hydrogen corresponding with different end-uses. Sectors identified as yielding less emission benefits for the cost of hydrogen production may be more suited to rigorous, i.e. "cleaner," definitions of hydrogen than those that would realize enormous emissions benefits from hydrogen usage regardless of the source of the hydrogen.

4) **Is any of this binding before 2045**? The definition of green hydrogen in Section 1 of the bill applies to the production and use requirements that don't take effect until 2045. Sections 2 and 3 of the bill make green hydrogen, as defined in Section 1, eligible for the RPS. To the extent these RPS provisions apply before 2045 is a bit unclear, considering they rely on a definition that is explicitly tied to the 2045 requirement. Regardless, the definition does not limit the use of hydrogen in electricity generation, or any other use, before 2045. It would only affect a claim that hydrogen is a RPS-eligible fuel. Without this bill, it is not.

5) **Related legislation**. AB 324 (Pacheco) requires the PUC to consider establishing procurement goals for "renewable hydrogen," as defined, for gas corporations and core transport agents, as specified. The definition of renewable hydrogen for purposes of AB 324 is less stringent than this bill's definition of green hydrogen for purposes of electricity generation. AB 324 is pending in this committee.

6) **Double referral**. This bill passed the Assembly Utilities and Energy Committee, with amendments, by a vote of 11-4 on April 12.

REGISTERED SUPPORT / OPPOSITION:

Support

Coalition for Clean Air

Opposition

California Hydrogen Business Council
California Hydrogen Coalition
Clean Energy
Coalition for Renewable Natural Gas
Oberon Fuels
State Building and Construction Trades Council of California
Western States Petroleum Association

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