
**SENATE COMMITTEE ON ENERGY, UTILITIES AND
COMMUNICATIONS**
Senator Steven Bradford, Chair
2023 - 2024 Regular

Bill No: SB 663 **Hearing Date:** 4/18/2023
Author: Archuleta
Version: 3/20/2023 Amended
Urgency: No **Fiscal:** Yes
Consultant: Sarah Smith

SUBJECT: California Renewables Portfolio Standard Program: renewable hydrogen

DIGEST: This bill defines renewable hydrogen and adds renewable hydrogen as a renewable energy resource under the Renewable Portfolio Standard (RPS). This bill also establishes criteria for renewable hydrogen acquired from a pipeline to meet RPS standards.

ANALYSIS:

Existing law:

- 1) Defines a “renewable electrical generation facility” as a facility that uses biomass, solar thermal, photovoltaic, wind, geothermal, fuel cells using renewable fuels, small hydroelectric generation of 30 megawatts (MW) or less, digester gas, municipal solid waste conversion, landfill gas, ocean wave, ocean thermal, or tidal current. To meet the definition of a renewable electrical generation facility, the facility must be in state, have its first point of connection to the transmission network of a balancing authority area primarily located within the state, or has its first point of interconnection to the transmission network outside the state, within the Western Electricity Coordinating Council (WECC) and meets certain specified requirements. (Public Resources Code §25741)
- 2) Defines an “eligible renewable energy resource” as an electrical generating facility that meets the definition of a “renewable electrical generation facility” in the Public Resources Code, subject to specified conditions. (Public Resources Code §399.12)
- 3) Establishes the Renewable Portfolio Standard (RPS) program and establishes a goal of procuring at least 60 percent of total retail sales of electricity from renewable energy resources by December 31, 2030, with specified benchmarks up to that date. Existing law requires the California Public Utilities

Commission (CPUC) to oversee electrical corporations' compliance with renewable energy procurement mandates and requires the California Energy Commission (CEC) to oversee publicly owned electric utility renewable energy procurement compliance. (Public Utilities Code §399.11 et. seq.)

- 4) Defines a renewable energy credit (REC) and requires the CEC to design and implement an accounting system to verify electric utilities' compliance with the RPS, to ensure that electricity generated by an eligible renewable energy resource is counted only once for the purpose of meeting the RPS, to certify RECs produced by eligible renewable energy resources, and to verify retail product claims. (Public Utilities Code §399.25)
- 5) Defines "green electrolytic hydrogen" as hydrogen gas produced through electrolysis and does not include hydrogen gas manufactured using steam reforming or any other conversion technology that produces hydrogen from a fossil fuel feedstock. (Public Utilities Code §400.2)
- 6) Requires the CPUC, CEC and California Air Resources Board (CARB) to consider green electrolytic hydrogen an eligible form of energy storage and consider its potential uses. (Public Utilities Code §400.3)
- 7) Requires CARB to evaluate by June 1, 2024, market barriers to accelerate the use of green hydrogen, potential beneficial uses of hydrogen, and an estimate of greenhouse gas (GHG) emissions reductions that can be achieved through deploying green hydrogen in various settings. Existing law requires CARB's evaluation to include an analysis of life-cycle GHG emissions from various forms of hydrogen, including green hydrogen. (Health and Safety Code §38561.8)
- 8) Requires the CEC to administer a program to provide financial incentives to hydrogen projects that produce, process, deliver, store, or use hydrogen. Existing law specifies that hydrogen projects are only eligible for these incentives if the hydrogen is derived from water using RPS-eligible energy resources, or hydrogen derived from RPS-eligible energy resources. Existing law specifies that the CEC may only provide these financial incentives to projects that help reduce sector-wide emissions, as determined by the CEC. (Public Resources Code §25664 – 25664.1)
- 9) Authorizes the Governor's Office of Business and Economic Development (GO-Biz) to take steps necessary to apply for federal regional clean hydrogen hubs funding. Existing law defines "clean hydrogen" for the purposes of the clean hydrogen hub funding as hydrogen produced from RPS-eligible energy

resources and otherwise consistent with federal law for the clean hydrogen hub program. (Government Code §12100.161 – 12100.162)

This bill:

- 1) Defines “renewable hydrogen” as any of the following:
 - a) A resource produced from either RPS-eligible electricity or from energy, other than electricity, produced from biomass, solar thermal, photovoltaic, wind, geothermal, fuel cells using renewable hydrogen, linear generators using renewable hydrogen, gas turbines using renewable hydrogen, small hydroelectric generation of 30 MW or less, digester gas, municipal solid waste conversion, diverted organic waste, landfill gas, ocean wave, ocean thermal, or tidal current.
 - b) A resource produced from feedstock that is either water or a material from biomass, solar thermal, photovoltaic, wind, geothermal, fuel cells using renewable hydrogen, linear generators using renewable hydrogen, gas turbines using renewable hydrogen, small hydroelectric generation of 30 MW or less, digester gas, municipal solid waste conversion, diverted organic waste, landfill gas, ocean wave, ocean thermal, or tidal current.
 - c) For a production process that uses landfill gas, biomass, or digester gas as feedstock consistent with certain existing guidelines.
 - d) Any other process yielding hydrogen from only renewable inputs, as determined by the commission.
- 2) Adds renewable hydrogen as an RPS-eligible resource used in renewable electric generation facilities.
- 3) Requires facilities that use renewable hydrogen to meet all of the following criteria:
 - a) If the facility uses combustion to generate electricity, the combustion process is controlled and regulated to avoid higher air pollutants when compared to emissions resulting from methane combustion.
 - b) The procurement of electrolytic renewable hydrogen does not result in resource shuffling or increase the net emissions of GHG emissions within the WECC.

- c) RECs are not produced, claimed, or retired for the feedstock or energy used to produce the renewable hydrogen.
- 4) Establishes criteria by which renewably hydrogen obtained from a pipeline can meet the definition of an RPS-eligible resource.

Background

The hydrogen rainbow: many colors, many attributes. The vast majority of hydrogen currently used is “gray hydrogen,” which is produced from steam methane reforming. This process uses methane and high temperature steam to produce hydrogen. However, it also creates carbon dioxide, which is released into the atmosphere. Other, cleaner forms of hydrogen production exist, including “blue hydrogen,” (which captures the carbon emissions emitted from steam methane reforming), the emerging “turquoise hydrogen” (which can use natural gas to split methane gas into hydrogen and solid carbon) and “green hydrogen” (which is produced using only renewable forms of feedstock, including renewable electricity, solar energy, and biomass). While many different colors of hydrogen exist, existing state law only defines green electrolytic hydrogen, which includes hydrogen produced through the use of electricity to split water into hydrogen and oxygen. The relative environmental benefits of different forms of hydrogen depend on which fuels are displaced by the hydrogen and the economy-wide emissions reductions associated with different feedstocks and hydrogen production processes.

Bill’s definition of renewable hydrogen may or may not be renewable and may or may not be hydrogen. This bill establishes a definition of renewable hydrogen for the purposes of including renewable hydrogen in the list of RPS-eligible resources. However, this bill’s definition of renewable hydrogen is broad and defines renewable hydrogen based on the processes used to create the resource. As a result, potentially any form of hydrogen created through these processes would be RPS-eligible under this bill, regardless of the emissions resulting from that hydrogen’s production. Additionally, this bill broadly defines renewable hydrogen as any resource produced from water or a specified list of other resources, including gas turbines and linear generators using renewable hydrogen. Since natural gas and hydrogen may be blended and linear generators may use a variety of fuels, it is not clear that linear generators and gas turbines that primarily use fossil fuels would not qualify as an RPS-eligible resource under this bill.

Bill may encourage the production of hydrogen using out-of-state energy resources. The WECC is one of six regional entities federally-authorized to conduct reliability planning activities. California is one of several states covered

by WECC. Existing law specifies that an electric generation facility can only be RPS-eligible if that facility is one of the following:

- Located in California.
- Located near the California border with a first point of connection to the transmission network of a balancing authority primarily located in California.
- Located out of the state and has its first point of interconnection to a transmission system within the WECC and satisfies certain other requirements.

Under existing law, the CEC administers a system to track California RPS compliance across the WECC, including tracking the status of utilities' RECs. For electric generation facilities seeking to generate RPS-eligible electricity using renewable hydrogen, this bill retains the WECC interconnection requirements. However, this bill's definition of renewable hydrogen does not specify that hydrogen used to re-power natural gas facilities must be created using energy resources that have a first point of transmission interconnection within WECC. While this bill sets some emissions restrictions on and prohibits resource shuffling by facilities using renewable hydrogen, no mechanism exists for the CEC to track RECs or the environmental attributes of energy produced outside the WECC. As a result, this bill may permit electric generators to use renewable hydrogen to produce RPS-eligible electricity made from energy resources that increase emissions elsewhere.

Bill extends pipeline biomethane RPS criteria to renewable hydrogen. Biomethane has long existed as an RPS-eligible resource; however, the process of counting biomethane procured from natural gas pipeline systems has not been without controversy. Unlike other resources produced on a specific site, biomethane obtained through pipelines is hard to track. In some cases, California entities have procured pipeline biomethane created out-of-state, and it is unclear whether these procurements were ever delivered in-state. In other cases, it is unclear if biomethane injected into pipelines has helped displace other harmful emissions. These concerns and subsequent legislation led the CEC to suspend RPS-eligibility for biomethane in March 2012. In response to the suspension, the Legislature passed AB 2196 (Chesbro, Chapter 605, Statutes of 2012) to address stakeholders' concerns about verifying pipeline biomethane's RPS eligibility and ensuring that ratepayers did not incur additional costs from the abandonment of procurement contracts that had already been completed. Consequently, pipeline biomethane procured after March 29, 2012, must meet certain requirements to increase the likelihood that the biomethane is physically used within the state.

This bill would apply these pipeline biomethane requirements to pipeline renewable hydrogen, setting criteria for pipeline renewable hydrogen to be RPS-eligible. While this bill specifies criteria for pipeline renewable hydrogen to be RPS-eligible procurements, it is not clear whether the existing gas pipeline and storage system is appropriately equipped for hydrogen. Hydrogen can embrittle and crack certain metals, and it can increase combustion resulting from flares and leaks. In studies reviewed by the National Renewable Energy Laboratory (NREL), injecting up to 25 percent hydrogen into natural gas systems increases explosion risks in confined areas and raises the probability of fires. Mitigating these risks would likely require additional investments in upgrading natural gas infrastructure to facilitate hydrogen transportation.

Need for amendments. As currently drafted, this bill's definition of renewable hydrogen does not clearly identify which resources would meet the definition. While this bill specifies that no resource shuffling is permitted for electric generation facilities using renewable hydrogen, it may encourage the use of hydrogen produced from unverifiable resources outside of the WECC. Additionally, this bill establishes criteria for procuring RPS-eligible renewable hydrogen injected into natural gas pipelines without ensuring the safety of hydrogen injection into common carrier pipelines. *As a result, the author and committee may wish to amend this bill to conform this bill's definition of renewable hydrogen to the definition of hydrogen used by the CEC's Clean Hydrogen Program and delete section 2 of the bill.*

Dual Referral. Should this bill be approved by this committee, it will be referred to the Senate Committee on Environmental Quality.

Prior/Related Legislation

AB 324 (Pacheco, 2023) would establish a definition of renewable hydrogen and require the CPUC to consider establishing renewable hydrogen procurement goals for gas corporations and core transport agents. The bill is currently pending in the Assembly.

SB 1075 (Skinner, Chapter 363, Statutes of 2022) required CARB and the CEC to analyze options for using hydrogen as part of decarbonization strategies.

AB 157 (Committee on Budget, Chapter 570, Statutes of 2022) contained provisions substantially similar provisions previously contained in this bill regarding the creation of a hydrogen hub funding program. The bill authorizes GO-Biz to take steps to prepare and submit an application to receive funding from the regional clean hydrogen hubs program or to otherwise participate in the regional

clean hydrogen hubs program. The bill also establishes a definition of clean hydrogen.

AB 209 (Committee on Budget, Chapter 251, Statutes of 2022) among other provisions, establishes a hydrogen funding program at the CEC to support projects that produce, process, deliver, store, or use hydrogen. The bill adopts a definition of hydrogen identical to the definition of “clean hydrogen” in AB 157.

SB 733 (Hueso, 2022) would have established a definition of renewable hydrogen and required the CPUC to consider establishing hydrogen procurement targets for gas corporations. The bill was held in the Assembly Appropriations Committee.

SB 18 (Skinner, 2021) would have required CARB, CPUC and the CEC to incorporate green electrolytic hydrogen into various decarbonization strategies, and would have required CARB to analyze and provide recommendations regarding potential uses of hydrogen to reduce economy-wide emissions. The bill was held in the Assembly Appropriations Committee.

SB 697 (Hueso, 2021) would have required CARB to establish a Green Hydrogen Credit Program to provide industrial facilities that produce green hydrogen with an additional Cap-and-Trade GHG allowance of 10 tons for every metric ton of green hydrogen produced during a compliance period. The bill was held in the Senate Appropriations Committee.

SB 1122 (Skinner, 2020) would have required CARB to incorporate planning and recommendations for green electrolytic hydrogen into the scoping plan. The bill contained provisions substantially similar to some of those contained in this bill. The bill died in the Senate.

SB 1369 (Skinner, Chapter 567, Statutes of 2018) established a definition of green electrolytic hydrogen, required the CEC and CPUC to incorporate green electrolytic hydrogen as a resource that may be considered for procurement to reach state clean energy goals, and required the CPUC, CEC, and CARB to consider green electrolytic hydrogen an eligible form of energy storage.

FISCAL EFFECT: Appropriation: No Fiscal Com.: Yes Local: Yes

SUPPORT:

Green Hydrogen Coalition, Sponsor
AquaHydrex
Bioenergy Association of California

California Hydrogen Business Council
California Hydrogen Coalition
HCycle
Los Angeles County Sanitation Districts
Mainspring Energy
Mitsubishi Power
NewHydrogen, Inc.
NovoHydrogen

OPPOSITION:

None received

ARGUMENTS IN SUPPORT: According to the author:

Renewable hydrogen is necessary for California to meet its ambitious climate and decarbonization goals. It can be used as a fuel for electricity production and transportation, as well as energy intensive, hard-to-decarbonize industrial sectors such as agriculture, steel manufacturing, cement production, and even aviation. California's Renewable Portfolio Standard's current approach to hydrogen is limited since it excludes important commercially available technologies that can convert hydrogen to electricity. As a result, this restricts the flexibility needed to meet the state's increasing renewable hydrogen demand. In recognition of this critical need, SB 663 seeks to establish a renewable hydrogen definition and Renewable Portfolio Standard (RPS) eligibility.

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