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**SENATE COMMITTEE ON ENERGY, UTILITIES AND  
COMMUNICATIONS**

**Senator Ben Hueso, Chair**

**2021 - 2022 Regular**

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<b>Bill No:</b>	SB 18	<b>Hearing Date:</b>	3/15/2021
<b>Author:</b>	Skinner		
<b>Version:</b>	12/7/2020 As Introduced		
<b>Urgency:</b>	No	<b>Fiscal:</b>	Yes
<b>Consultant:</b>	Sarah Smith		

**SUBJECT:** Green hydrogen

**DIGEST:** This bill establishes a new definition for green hydrogen, requires the California Air Resources Board (CARB) to include a strategic plan for green hydrogen in the Climate Change Scoping Plan, requires the California Public Utilities Commission (CPUC) to consider green hydrogen in resource adequacy requirements, and it classifies green hydrogen as a zero-carbon resource for electric utility procurement plans. This bill also requires the California Energy Commission (CEC) to submit a report to the Legislature on the uses of green hydrogen for transportation and energy decarbonization.

**ANALYSIS:**

Existing law:

- 1) Requires CARB to create a Climate Change Scoping Plan to achieve the maximum technologically feasible and cost-effective reductions in greenhouse gas (GHG) emissions from sources or categories of sources of GHG by 2020. The plan must identify and recommend direct GHG emissions reduction measures, alternative compliance mechanisms, market-based compliance mechanisms, and potential monetary and non-monetary incentives that the state board finds are necessary or desirable to meet the 2020 emissions reduction goals. CARB must update this scoping plan at least once every five years through a public workshop process. (California Health and Safety Code §38561)
- 2) Requires the CEC to develop and publish a study on barriers for low-income customers to energy efficiency and weatherization investments, including those in disadvantaged communities. The study must include recommendations on how to increase access to energy efficiency and weatherization investments to low-income customers. (Public Resources Code §25327(c))

- 3) Requires CARB to develop and publish a study on barriers for low-income customers to zero emission and near-zero emission transportation options, including those in disadvantaged communities. The study must include recommendations on how to increase access to zero emission and near-zero emission transportation options. (Public Resources Code §25327(d))
- 4) Requires the CPUC to work with the California Independent System Operator (CAISO) to establish resource adequacy requirements for load serving entities (LSEs). Existing law specifies the criteria the CPUC must consider when establishing resource adequacy requirements and specifies that an electrical corporation's reasonable costs for meeting resource adequacy requirements are recoverable from customers through non-bypassable charges. (Public Utilities Code §380)
- 5) Requires the CPUC and the CEC to take specified steps to support the state's clean energy and pollution reduction goals, including authorizing the procurement of resources to provide grid reliability services that minimize reliance on system power and fossil fuel resources. Existing law requires the CPUC and CEC to increase the use of large and small scale energy storage where feasible using a variety of technologies, including green electrolytic hydrogen, targeted energy efficiency, demand response, eligible renewable resources, and other technologies with zero or the lowest feasible emissions and pollutants. (Public Utilities Code §400)
- 6) 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)
- 7) Requires the CPUC, CEC and CARB to consider green electrolytic hydrogen an eligible form of energy storage and consider its potential uses. (Public Utilities Code §400.3)
- 8) Requires the CPUC to identify a diverse portfolio of resources needed to ensure reliability and integrate renewable energy resources in a cost-effective manner. The CPUC must direct each electrical corporation to develop a strategy for procuring best-fit and least-cost resources to satisfy the portfolio identified by the CPUC. (Public Utilities Code §454.51)
- 9) Establishes the integrated resource plan (IRP) process for LSEs to file plans with the CPUC detailing the resources that the LSE will use to meet the state's climate goals while ensuring reliability at just and reasonable rates. Existing

law specifies the requirements for the IRP process and specifies that for any additional procurements authorized through an IRP or procurement process, the CPUC must ensure that costs are allocated in a fair and equitable manner with no cost-shifting among LSE customers. (Public Utilities Code §454.52)

- 10) Establishes a state goal of procuring 100 percent of electricity from eligible renewable energy resources and zero-carbon resources by December 31, 2045. Existing law requires state agencies, including the CPUC, CEC, and CARB, to take certain actions to support the state’s clean energy goals. Existing law also specifies that achievement of the state’s clean energy goals shall not permit resource shuffling that would increase emissions elsewhere in the western grid. (Public Utilities Code §454.53)

This bill:

- 1) Defines “green hydrogen” as hydrogen gas that is not produced from fossil fuel feedstock sources and does not produce incremental carbon emissions during its primary production process. Green hydrogen is defined separately from green electrolytic hydrogen.
- 2) Requires CARB to include a strategic plan for accelerating green hydrogen’s production and use as part of the Climate Change Scoping Plan by December 31, 2022. This strategic plan must include the following:
  - a) An estimate of the amount of GHG emissions reductions and air quality benefits that green hydrogen deployment could provide.
  - b) A review of similar international efforts to deploy green hydrogen.
  - c) Recommendations to the Legislature for actions to implement the plan, including recommendations for overcoming market barriers and an analysis of how curtailed power could be used for green hydrogen production. CARB must consult with CAISO in the preparation of an analysis of the use of curtailed power.
- 3) Requires the CEC to submit a report to the Legislature by June 1, 2022, studying and modeling green hydrogen’s role in decarbonizing the power and transportation sectors and supporting California’s goal to procure 100 percent of its electricity from zero-carbon resources.
- 4) Requires the CPUC to incorporate green hydrogen into resource adequacy requirements to provide equal consideration for local and system resources made from green hydrogen.

- 5) Requires the CPUC to consider green hydrogen as part of a rule making proceeding on energy storage.
- 6) Requires the CPUC, CEC and CARB to consider green hydrogen and green electrolytic hydrogen as zero carbon emitting resources for the purposes of utility procurement plans, the IRP process, and the agencies' activities supporting California's goal to procure 100 percent of its electricity from zero-carbon resources.

## Background

*Where to draw the line: hydrogen production has many shades, including green.* Hydrogen production methods vary and the resources used in those processes can be fossil fuels. The vast majority of hydrogen currently used is “gray hydrogen,” which is produced from natural gas 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).

Existing law defines green electrolytic hydrogen; however, the existing definition of green electrolytic hydrogen only encompasses hydrogen produced using electrolysis, which is the use of electricity to split water into hydrogen and oxygen. This bill would create a new definition of green hydrogen that can encompass hydrogen produced with methods that are not electrolysis as long as those production methods do not use fossil fuel feedstock and do not produce incremental carbon emissions during its primary production process. This bill's new definition of green hydrogen is broader than existing law's definition of green electrolytic hydrogen; however, the extent to which the bill's definition includes blue hydrogen and turquoise hydrogen is unclear. Forms of renewable hydrogen production that may be encompassed by this bill's green hydrogen definition include anaerobic digestion (which relies on decomposition of certain organic material) and thermochemical (which uses heat and pressure to extract hydrogen and carbon monoxide from biomass). 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.

*This bill incorporates green hydrogen into many of the state's climate planning processes.* This bill requires CARB to include a strategic plan for green hydrogen in the Climate Change Scoping Plan, and it requires the CEC to study and model the potential use of green hydrogen in a report to the Legislature. This bill also requires the CPUC to consider it as part of resource adequacy requirements and part of encouraging a diverse portfolio of resources for utility procurements. While nothing in existing law technically prohibits the CPUC from considering green hydrogen as a resource for the IRP process, consideration in the process does not necessarily result in utility procurement.

Under existing law, the CPUC uses CARB's scoping plan to identify a range of GHG emissions for the electric sector. CPUC then uses modeling to identify the characteristics of resources that help meet GHG emissions reduction goals while ensuring reliability and just and reasonable rates. The CPUC adopts the portfolio with the optimal balance of GHG emissions reductions, rate impacts, and reliability needs as the Reference System Portfolio. While the CPUC may consider a range of commercialized resources as part of the modeling process, the Reference System Portfolio does not always include all the considered resources. Additionally, each LSE is not required to procure a specified resource. Instead, IRPs flexibly require each LSE to procure a collection of the resources in the Reference System Portfolio that have certain collective rate, reliability, and environmental attributes.

*There may be insufficient information about hydrogen to incorporate it into certain resource plans.* This bill requires the CPUC to modify its resource adequacy requirements to give green hydrogen resources equal consideration for local and system resource adequacy. For a resource to be considered dispatchable for resource adequacy, the resource would need to be capable of exporting power for four consecutive hours on three consecutive days. The CPUC would also need to develop a methodology for determining when and where the resource has the capacity to deliver needed power. While hydrogen has many uses, incorporating hydrogen into electricity resource planning will depend on the availability of sufficient information to model hydrogen's impacts on rates, infrastructure costs, long-term safety needs, and electricity reliability. While some hydrogen resources may have sufficient information for resource adequacy other resources may not have sufficient data.

Certain energy sector uses for hydrogen will depend on establishing a reliable method for safely storing and transporting large quantities of hydrogen. Hydrogen can embrittle and crack gas pipeline materials, and hydrogen may also increase the combustibility of gas under pressure. The National Renewable Energy Laboratory (NREL) is currently working with other Department of Energy Labs to research

the long-term effects of hydrogen blends on pipeline materials and potential cost estimates for upgrades needed to incorporate hydrogen into pipelines. However, little information about these impacts currently exists. The absence of sufficient, long-term data on the costs associated with hydrogen development, storage, and use in California may limit the CPUC's ability to determine the extent to which certain hydrogen investments are cost-effective, reliable, and safe by comparison to other eligible procurements.

*Need for amendments.* This bill requires CARB to examine green hydrogen in its scoping plan. However, other forms of hydrogen may provide economy-wide emissions reductions based on the extent to which they displace more carbon-intensive fuels. *As a result, the committee may wish to amend this bill to enable CARB to examine broader hydrogen benefits for emissions reductions through the scoping plan.*

This bill incorporates green hydrogen into multiple agencies' ongoing climate plans and specifies that green hydrogen and green electrolytic hydrogen must be considered zero-carbon resources for the purposes of utility procurements. *While existing law prohibits the achievement of clean energy goals with resource shuffling that would could permit higher carbon emissions in other portions of the western grid, the committee may wish to amend this bill to clarify that green hydrogen and green electrolytic hydrogen cannot be considered a zero-carbon resource for the purposes of clean energy procurement unless it complies with existing protections against resource shuffling.*

This bill also requires the CPUC to give "equal consideration" to green hydrogen in resource adequacy requirements and "advance" green hydrogen in the IRP process; however, it is not clear that there is unequal consideration for different resources in the resource adequacy requirements and limited cost data for in-state hydrogen production exists, limiting the ability to model rate and reliability impacts. Additionally, existing statutes establishing IRP requirements rely on overall climate goals and do not advance one specified resource over other resources. *As a result, the committee may wish to consider amending this bill to make modifications to resource adequacy requirements contingent upon the availability of sufficient data and eliminate the requirement that the CPUC advance green hydrogen in the IRP process in addition to considering green hydrogen in the process.*

This bill requires the CEC to submit a report to the Legislature by June 1, 2022, modeling and studying green hydrogen's role in decarbonizing the power and transportation sectors. However, existing law requires the CEC to regularly report on various energy and decarbonization goals as part of its Integrated Energy Policy

Report (IEPR). Under existing law, the CEC must submit an update to the IEPR in 2022. *To limit additional legislative reporting requirements, the committee may wish to consider amending this bill to incorporate the CEC's green hydrogen reporting into the 2022 IEPR update.*

This bill requires CARB examine the potential uses of green hydrogen and consider recommendations that could maximize economic benefits of green hydrogen while meeting climate goals; however, as currently drafted, this bill does not require CARB to analyze and identify opportunities to transition workers from jobs in more carbon-intensive energy and transportation fuel sectors to jobs in the green hydrogen sector with similar pay and benefits. *To the extent that the committee wishes to ensure that the economic benefits considered by CARB include workforce development benefits, the committee may wish to amend this bill to require CARB to consider these benefits when making recommendations to the Legislature in the green hydrogen strategic plan.*

### **Prior/Related Legislation**

SB 662 (Archuleta, 2021) would require the CPUC to direct gas corporations to file applications for programs and investments that would accelerate the use of hydrogen as a transportation fuel. The bill also requires CARB to adopt regulations requiring in-state hydrogen production for transportation purposes to be green hydrogen. The bill's definition of green hydrogen is substantially similar to the one established by this bill. The bill is currently pending a hearing in the Senate Energy, Utilities and Communications 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 662 (Archuleta, 2019) would have set targets for in-state production of renewable hydrogen for transportation and required the CPUC to allow gas utilities to file applications for investments to accelerate transportation electrification, including hydrogen and hydrogen-related pipelines. The bill died in the Assembly.

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.

SB 100 (De León, Chapter 312, Statutes of 2018) raised the Renewables Portfolio Standard procurement requirement from 50 percent to 60 percent by 2030. The bill also established a goal of procuring 100 percent of the state's electricity from zero-carbon resources by December 31, 2045.

SB 433 (Mendoza, 2017) would have authorized the CPUC to allow a gas corporation to procure zero-carbon hydrogen and recover through rates the reasonable cost of pipeline infrastructure developed to transport the hydrogen to end users. The bill died in the Assembly.

SB 350 (De León, Chapter 547, Statutes of 2015) the Clean Energy and Pollution Reduction Act of 2015, established new clean energy, clean air and GHG reduction goals and established the IRP process through which IOUs file electricity sector procurements, including transportation electrification investments. The bill also required the CEC and CPUC to take certain steps to support the state's clean energy and pollution reduction goals.

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

**SUPPORT:**

Green Hydrogen Coalition (Sponsor)  
350 Silicon Valley  
Advanced Power and Energy Program at UC Irvine  
Bioenergy Association of California  
Brightnight LLC  
California Environmental Justice League  
California Hydrogen Business Council  
Center for Transportation and the Environment  
Elders Climate Action, NorCal Chapter  
Elders Climate Action, SoCal Chapter  
Friends Committee on Legislation of California  
Magnum Development  
Marin Clean Energy  
Mitsubishi Powers Americas  
Natural Resources Defense Council, if amended  
Nikola Corporation  
Northern California Power Agency  
San Diego Gas & Electric  
Southern California Gas Company



**OPPOSITION:**

Leadership Counsel for Justice and Accountability

**ARGUMENTS IN SUPPORT:** According to the author:

The most basic element in the universe – hydrogen – may be poised to help California and the world move to a cleaner economy while protecting well-paying jobs for our workers. Green Hydrogen – which can be created using excess renewable electricity from solar and wind, through steam reformation of biogas, and other clean pathways – can be a gamechanger to decarbonize some of California’s most difficult to decarbonize sectors: transportation, long haul trucking, ocean shipping, even air travel. It can also store renewable energy for later use, and power industry or the electrical grid. All while preserving well-paying jobs in traditional industries. Many countries around the world are accelerating their green hydrogen production capabilities with the explicit goal of becoming a major global exporter – California has an opportunity to also develop a global leadership position in green hydrogen as well but needs to start now.

SB 18 advances green hydrogen by requiring the California Air Resources Board and other state agencies to start planning so our state can take full advantage of the decarbonization and job creation benefits associated with multi-sectoral green hydrogen production and use at scale.

**ARGUMENTS IN OPPOSITION:** The Leadership Counsel for Justice and Accountability opposes this bill unless it is amended because it believes that the bill’s current definition of green hydrogen could encompass hydrogen produced from biomethane derived from dairy farms. The Leadership Counsel for Justice and Accountability argues that hydrogen generated from biomass should not be considered “green” because of the potential for biogas leakage in the production process.

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