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**SENATE COMMITTEE ON ENVIRONMENTAL QUALITY**

**Senator Allen, Chair**

**2021 - 2022 Regular**

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**Bill No:** SB 662  
**Author:** Archuleta  
**Version:** 4/19/2021  
**Urgency:** No  
**Consultant:** Eric Walters

**Hearing Date:** 4/29//21  
**Fiscal:** Yes

**SUBJECT:** Energy: transportation sector: hydrogen

**DIGEST:** Requires the California Public Utilities Commission (CPUC), in collaboration with the California Air Resources Board (ARB) and the California Energy Commission (CEC), to initiate a proceeding to authorize gas corporations to file applications for investments in programs to accelerate zero-emission vehicle transportation, as defined, provided those programs do not result in cost shifts in customer rates nor result in a net increase in energy sector emissions.

**ANALYSIS:**

Existing law:

- 1) Defines “transportation electrification” as electricity from external sources of electrical power, including the electrical grid, for all or part of vehicles, vessels, trains, boats, or other equipment that are mobile sources of air pollution and greenhouse gases (GHG) and the related programs and charging and propulsion infrastructure investments to enable and encourage this use of electricity. (Public Utilities Code (PUC) §237.5)
- 2) Requires the California Public Utility Commission (CPUC) to evaluate and implement policies to promote the development of equipment and infrastructure needed to facilitate the use of electricity and natural gas to fuel low-emission vehicles. The CPUC is required to consider the following policies:
  - a) The sale-for-resale and the rate-basing of low-emission vehicles and supporting equipment such as batteries for electric vehicles (EVs) and compressor stations for natural gas fueled vehicles.
  - b) The development of statewide standards for EV charger connections and compressed natural gas vehicle fueling connections, including installation procedures and technical assistance to installers. (PUC §740.3(a))
- 3) Requires, among other things, under the Clean Energy and Pollution Reduction Act of 2015 (SB 350, De Leon, 2015) the CPUC, in consultation with the ARB

and CEC, to direct investor-owned utilities (IOUs) to propose multiyear programs and investments to accelerate widespread transportation electrification to reduce dependence on petroleum, and meet air quality standards.

- 4) Requires, under SB 1505 (Lowenthal, Chapter 877, Statutes of 2006), ARB to ensure the production and use of hydrogen for transportation purposes contributes to the reduction of GHG emissions, criteria air pollutants, and toxic air contaminants. Also requires ARB to recommend to the Legislature and Governor incentives that could be offered to businesses and consumers to spur the development of clean sources of hydrogen fuel.

This bill:

- 1) Defines “zero-emission vehicle transportation” to mean transportation electrification and the use of hydrogen fuel cell vehicles.
- 2) Requires, under a proceeding dictated by SB 350 (De Leon, Chapter 547, Statutes of 2015), the CPUC, in consultation with ARB and CEC, to authorize gas corporations to file applications for investments in programs to accelerate zero-emission vehicle transportation, provided:
  - a) Those programs or investments do not result in cost shifts in customer rates.
  - b) Those programs or investments do not result in a net increase in emissions from the energy sector, as defined by ARB.

## Background

- 1) *Transportation emissions.* The transportation sector is responsible for more than half of all of California’s carbon pollution, 80 percent of smog-forming pollution and 95 percent of toxic diesel emissions. A 2018 Legislative Analyst’s Office report found that 90% of the transportation sector’s emissions were from on-road sources – 69% passenger vehicles and 22% heavy-duty vehicles. The share of California’s total GHG emissions from transportation has grown in the past few years, despite continuing policy efforts to increase emission standards of—and reduce vehicle miles traveled by—the state’s vehicle fleet. Increasing fuel economy standards on internal combustion engine vehicles and the growing popularity of hybrid engines have contributed to cleaning up the state’s vehicles, but the primary policy attention is on zero-emission vehicles (ZEVs).

Two technologies power the ZEVs on the road today, batteries and fuel cells. The vast majority of ZEVs are battery-electric vehicles (BEVs), though some hydrogen fuel cell electric vehicles (FCEVs) are available today as well. The prevalence and support of the two types of ZEVs is illustrated by the distribution of rebates under the state's Clean Vehicle Rebate Program (CVRP). Buyers of FCEVs have received 1.9% of CVRP rebates to date, while BEVs represent 63.4%. Notably, the standard CVRP rebate is \$4,500 for a FCEV and \$2,000 for a BEV.

Hydrogen FCEVs have benefits for specific applications in transportation. The competitiveness of hydrogen fuel cell cars depends on fuel cell costs and refueling stations, while for fuel cell trucks the priority is to reduce the delivered price of hydrogen. Looking beyond roads, shipping and aviation have limited low-carbon fuel options available and represent an opportunity for hydrogen-based fuels.

- 2) *California's ZEV goals.* California has a number of increasing and complimentary ZEV goals: 1 million vehicles by 2023 as directed by SB 1275 (De León, 2014), over 1.5 million vehicles by 2025 as directed by Executive Order B-16-12, and 5 million vehicles by 2030 as directed by Executive Order B-48-18. While only the 2023 goal is statutory, the Executive Orders have also provided substantial direction to manufacturers, regulators, and (less-directly) consumers.

Based on cumulative sales of vehicles reported by the CEC in 2019, there were an estimated 330,000 ZEVs on the road in California. Next 10 (a nonpartisan, nonprofit think tank) estimates that the number of ZEVs on the road will need to increase by 17.7% annually to reach the 2025 goal, and by 27.2% annually after that to reach the 2030 goal.

Most recently, On September 23, 2020, Governor Newsom signed Executive Order (EO) N-79-20 which established a goal that 100 percent of California sales of new passenger car and trucks be zero-emission by 2035. Under the order, ARB is tasked to work with other state agencies to develop regulations to achieve these goals taking into account technological feasibility and cost effectiveness.

All of these goals serve as important market signals. California, being the largest ZEV market in the US, lets manufacturers invest in bringing ZEVs to market with more certainty that there will be customers (and infrastructure)

awaiting them.

- 3) *ZEV infrastructure, an ongoing chicken/egg problem.* Whether the fuel driving the vehicle is electricity or hydrogen, ZEVs face a consistent hurdle for increasing adoption: the availability of charging infrastructure. Drivers are hesitant to purchase a vehicle if they are unsure they'll be able to refuel reliably and conveniently. However, companies may be unwilling to put capital towards building out charging infrastructure without a reliable customer base to justify the upfront costs.

The state has put significant effort and resources into solving this problem by investing in vehicle and infrastructure incentives. On infrastructure, the Low Carbon Fuel Standard was amended in 2018 to allow credits to be granted based on ZEV fueling station capacity (in addition to delivery), allowing costs to begin being recouped before consumer demand ramps up. This has already prompted the construction of nine new hydrogen fueling stations. The Governor's Office of Business and Economic Development has also led interagency, holistic coordination to ensure permitting facilitates ZEV infrastructure build out. While similar conundrums exist for hydrogen fueling and electric vehicle charging stations, the problem can be greater for hydrogen fueling stations, which require a much higher upfront investment.

The state has set specific hydrogen infrastructure goals to push FCEVs into mainstream use. AB 8 (Perea, Chapter 401, Statutes of 2013) directed CEC to fund at least 100 publicly available hydrogen fueling stations in California. More recently, Executive Order B-48-18 tasked these same agencies with working towards a network of 200 stations by 2025. AB 8 also required ARB and CEC to jointly report annually on progress toward establishing a hydrogen-fueling network that provides adequate coverage and capacity to support FCEVs in the state.

- 4) *AB 8 report findings.* The latest AB 8 report, released in September 2020, found that the above LCFS infrastructure provisions and a recent CEC grant funding opportunity have been the state's strongest mechanisms for achieving the 200 station goal, but that progress towards the goal would have to accelerate.

It also reported that hydrogen industry organizations have announced efforts to increase the use of renewable, low-carbon, and sustainable resources in the production of hydrogen. For example, the Hydrogen Council has identified a goal of 100 percent decarbonized hydrogen for transportation by 2030. This

would represent a massive shift in hydrogen production technology.

- 5) *Sourcing California's hydrogen.* Natural gas is currently the primary source of hydrogen production. According to a 2018 IEA study, it accounts for around three quarters of annual global dedicated hydrogen production. Worldwide, this accounts for about 6% of all natural gas use. There are many technologies, across all stages of technological readiness, to produce hydrogen, but cost remains the overriding advantage that fossil fuel-derived (or “gray”) hydrogen enjoys. Hydrogen from natural gas costs between 90 cents and \$3.20 per kilogram, whereas hydrogen made through water electrolysis power solely by renewables can cost from \$3 to \$7.50 per kilogram.

Today, less than 0.1% of global dedicated hydrogen production comes from water electrolysis. However, with declining costs for renewable electricity and other cleaner carbon feedstocks, there is a rapidly growing interest in so-called “green hydrogen”.

In the California context, the state has been careful to ensure the rush to support and expand a hydrogen-fueled transportation infrastructure does not come at the expense of deepening our dependence on fossil fuels. SB 1505 (Lowenthal, Chapter 877, Statutes of 2006) requires all hydrogen transportation fuel to be at least 33.3 percent renewable hydrogen. SB 1505 also required ARB to ensure all state funding for hydrogen fuel production contributes to the reduction emissions of GHGs, criteria air pollutants, and toxic air contaminants, and ensured that, on average, hydrogen FCEVs operating in California would have emissions of GHGs, nitric oxides, and toxic air contaminants that were considerably lower—on a full lifecycle basis—than the state’s gasoline-powered vehicles.

In practice, these targets have been met or exceeded thus far by the state’s hydrogen distribution system. According to the 2018 AB 8 report, the currently-funded hydrogen distribution network... will dispense hydrogen with a 38% renewable content. Assuming any stations funded and built beyond this 64 station network meet the minimum requirements of SB 1505, the projected 2024 network will dispense hydrogen with a 34% renewable content.” The SB 1505 renewable hydrogen target was further surpassed in the 2018 LCFS amendments allowing for ZEV fueling infrastructure to receive credits based on capacity; qualifying stations for the LCFS credits must have a renewable content of 40% or higher.

## Comments

- 1) *Purpose of Bill.* According to the author, “Hydrogen fuel cell electric vehicles are a fully zero emission technology and provide benefits that are not offered by current battery technology. However, for these vehicles to make a real impact in reducing California’s greenhouse gases we need to focus on increasing the availability and lowering the price of the fuel they run on, hydrogen. This bill takes the first step in accomplishing those goals. SB 662 will allow for investor owned gas utilities to invest in hydrogen distribution infrastructure and in turn accelerate the widespread electrification of the transportation sector in California.”
- 2) *Senate Energy, Utilities, and Communications (SEUC) Committee amendments.* This bill was heard in the SEUC committee on 4/12/21, and amendments agreed to in that hearing were put in print on 4/19/21. In addition to changes to definitions and directives for transportation electrification, two notable limits were placed on projects to be eligible for the funding created by SB 662. Specifically, those provisions mandated CPUC could not approve any program or investment resulting in cost shifts in customer rates, nor a net increase in emissions from the energy sector, as determined by ARB.

These are important and valuable protections, and uphold California’s history of working to minimize regrets while pushing adoption of new technologies. As amended by SEUC, SB 662 likely could not be used to draw funds from an IOU’s entire customer base to fund a specific hydrogen pipeline project because of the cost shift provisions. Instead, the only ratepayers whose rates would go up are those who would directly benefit from the project. Moreover, construction of a new electrolyzer that was powered strictly by grid electricity would not be funded because of the energy sector emissions provision. Both of these amendments function broadly to prevent undesirable outcomes of SB 662 implementation, rather than explicitly state what projects may be eligible.

- 3) *Further guardrails.* SB 662 authorizes gas corporations to seek funding for, “programs and investments in zero-emission vehicle transportation, including hydrogen and hydrogen-related pipelines, hydrogen distribution, and make-ready infrastructure for hydrogen.” In this, California has an opportunity under SB 662 to do more than build out a feedstock-agnostic hydrogen infrastructure; it can continue to lead the charge towards truly zero-emission fuels, across their entire lifecycle from well to wheel.

However, from the hydrogen supply perspective, “zero-emission” is easier said than done. There are ongoing discussions about what criteria should be applied to feedstocks, energy used for production, and other environmental characteristics of the process. At this time, it may be beyond the scope of this

bill to explicitly state which sources of hydrogen strike the appropriate balance between economic feasibility and desirable emissions profiles. As such, the committee may wish to take a similar approach as SEUC to further narrow the scope of projects eligible under SB 662 and avoid the most regrettable outcomes.

*The committee should amend SB 662 to include an additional criterion alongside the two added by SEUC. Specifically, CPUC should be directed to not approve any program or investment involving the sale or use of hydrogen as transportation fuel that does not meet renewable implementation and emission requirements in existing applicable laws and regulations.*

Due to the COVID-19 Pandemic and the unprecedented nature of the 2021 Legislative Session, all Senate Policy Committees are working under a compressed timeline. This timeline does not allow this bill to be referred and heard by more than two committees as a typical timeline would allow.

### **Related/Prior Legislation**

SB 18 (Skinner, 2021) would establish a definition of green hydrogen and incorporates green hydrogen into various climate change and clean energy planning efforts, including ARB's scoping plan, the CEC's Integrated Energy Policy Report, and utility procurement planning at the CPUC. The bill is currently set for hearing on April 29<sup>th</sup>, 2021 in this committee.

SB 439 (Archuleta, 2021) would authorize a gas corporation serving Los Angeles during the 2028 Olympics to identify a green hydrogen project in cooperation with the United States Olympic Paralympic Committee, the City of Los Angeles, or the County of Los Angeles for the purpose of reducing emissions of greenhouse gases associated with the 2028 Olympic games. The bill requires the gas corporation to file an application for any identified green hydrogen project for the 2028 Olympics, and requires the CPUC to approve or modify and approve the project. The bill is currently pending hearing in the Senate Energy, Utilities, and Communication committee.

SB 662 (Archuleta, 2019) would have contained provisions substantially similar to those in this bill allowing gas corporations to file applications for hydrogen fueling infrastructure. The bill would have included renewable hydrogen, as specified, in the definition of transportation electrification. The bill died in the Assembly.

SB 1369 (Skinner, Chapter 567, Statutes of 2018) required the CPUC, CARB, and CEC to consider green electrolytic hydrogen, as defined, an eligible form of energy storage, and consider other potential uses of green electrolytic hydrogen.

**SOURCE:** Western States Hydrogen Alliance

**SUPPORT:**

Alaska Applied Sciences INC.  
Ballard Fuel Cell Systems INC.  
California Hydrogen Business Council  
Community Environmental Services  
Gta INC.  
Hyundai Motor Company  
Longitude 122 West, INC.  
Millennium Reign Energy  
Natural Hydrogen Energy LLC  
Nel Hydrogen  
Neo-h2  
Next Hydrogen  
Nikola Corporation  
Sacramento Air Quality Management District  
Sacramento Metropolitan Air Quality Management District  
Southwest California Legislative Council  
T2m Global  
Tatsuno North America INC.  
Taylor Wharton  
The Protium Company  
Zero Carbon Energy Solutions  
Zero Emission Advisors

**OPPOSITION:**

350 Silicon Valley  
Agricultural Energy Consumers Association  
California Farm Bureau Federation  
Earthjustice  
Pacific Gas and Electric Company  
Sierra Club  
The Utility Reform Network (TURN)



**ARGUMENTS IN SUPPORT:** According to The California Hydrogen Business Council, “Investments in battery-electric charging infrastructure by electrical investor-owned utilities (IOUs) aimed at achieving the state’s greenhouse gas (GHG) reduction targets in the transportation sector, while laudable, will not get us there alone. Hydrogen fuel cell electric vehicles (FCEVs) are undoubtedly another significant option to reduce GHG emissions. The cost of transporting and distributing hydrogen fuel and the lack among supporting distribution infrastructure have proven to be one of the most significant barriers to the widespread adoption of FCEVs. This bill aims to reduce market barriers and make access to hydrogen through utility-supported investments an option.

“By providing gas IOUs the opportunity to participate in transitioning our transportation sector to zero-emissions, California can ensure the successful attainment of air quality standards and accomplish the state’s ambitious emission reduction goals. SB 662 will build on successes made by utilities in other market segments and allow gas IOUs to participate through the advancement of hydrogen transportation fuel.”

**ARGUMENTS IN OPPOSITION:** According to Earthjustice and Sierra Club California, “Hydrogen fueling infrastructure would not deliver climate benefits that could justify the costs to California families. SB 662 creates a scheme for building hydrogen infrastructure that would carry hydrogen that the gas industry produces from fossil fuels, through a highly polluting process. More than 95% of global hydrogen supply comes from fossil fuels. Hydrogen production is so emissions-intensive that it is responsible for the same amount of greenhouse gas (“GHG”) emissions as the United Kingdom and Indonesia combined...

“Renewable electrolytic hydrogen has received enormous media attention because it might one day help decarbonize the economy, but widespread deployment of hydrogen as a climate tool is still decades away. Renewable electrolytic hydrogen is only up and running at research and pilot projects. Multiple independent researchers agree it will be about 10-15 years until this technology is profitable, assuming improved technology and altered regulatory frameworks.”

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