

Date of Hearing: April 3, 2024

ASSEMBLY COMMITTEE ON UTILITIES AND ENERGY

Cottie Petrie-Norris, Chair

AB 1921 (Papan) – As Introduced January 25, 2024

SUBJECT: Energy: renewable electrical generation facilities: linear generators

SUMMARY: Adds “linear generators using renewable fuels” as an eligible facility under the California Renewables Portfolio Standard (RPS), and provides a definition of linear generator that includes designating new categories of fuel “renewable,” including hydrogen and ammonia.

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 and meets certain specified requirements. (Public Resources Code § 25741)
- 2) Defines an “eligible renewable energy resource” as a 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 RPS program and establishes a goal of procuring at least 60% 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 “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. 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 §§ 400.2-400.3)

FISCAL EFFECT: Unknown. This bill is keyed fiscal and will be referred to the Committee on Appropriations for its review.

BACKGROUND:

RPS – The California RPS program began with a mandate to all retail sellers to provide 20% RPS-eligible generation by the end of 2017.¹ The initial RPS statute sought to establish a market for renewables, by financially incentivizing long term contracting between electricity providers and above-market renewable generators. This mandate sought market stimulation, creation of a local economy, and a modicum of environmental benefits. Policies to directly address the impacts of climate change came after the first RPS bills. It was not until 2011 that the RPS program incorporated greenhouse gas (GHG) reduction into its purpose.² In the past 15 years since the original RPS mandate was adopted, not only has the retail landscape of renewable energy changed dramatically, but so has the conversation to urge action to address climate change. The Legislature has modified the goals and details of the RPS program several times since the original enactment. The most recent major changes were made by SB 100 (De León, Chapter 312, Statutes of 2018), which set a new obligation of 60% of retail sales from RPS-eligible generation by 2030. That measure likewise added a new obligation that the remaining 40% of retail sales be from zero-carbon resources.

The RPS program is statutorily prescriptive regarding which technologies and fuel types are eligible. Currently facilities that use 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 are eligible. The new category of “zero-carbon” adopted under SB 100, however, is statutorily undefined. The prescriptive nature of the RPS program, and its associated statutory procurement obligations on the utilities, have led most new technologies or fuels to seek RPS status. How agencies interpret, or a future Legislature defines, “zero-carbon” will determine whether a similar jockeying will emerge for that procurement category.

Linear Generators – Traditional energy production often relies on rotational motion; namely, the spinning of a turbine.³ Linear generators behave more like a car piston, using back-and-forth motion to create electricity. And like car pistons, that motion is initiated by a fuel-air mixture; sometimes with an ignition source (flame or spark), or sometimes by compressing the reaction chamber at high pressures.⁴ Recent linear generator designs claim to be fuel flexible; i.e. able to switch between different types or blends of fuel, from biogas, traditional fossil sources, hydrogen, and ammonia.⁵ A number of linear generators are deployed throughout the state, including some recipients of CEC grants.⁶

¹ SB 1078 (Sher, Chapter 516, Statutes of 2002)

² SB X1-2 (Simitian, Chapter 1, Statutes of 2011)

³ Solar power being an obvious exception to this observation.

⁴ Tim Newcomb, “Scientists Built a Linear Generator That Switches Between All Types of Fuel,” *Popular Mechanics*, April 13, 2023.

⁵ *Ibid.*

⁶ CEC-500-2021-017, “Linear Generation for combined Heat and Power Final Project Report,” March 2021; <https://www.energy.ca.gov/sites/default/files/2021-05/CEC-500-2021-017.pdf>

COMMENTS:

- 1) *Author's Statement.* According to the author, "California continues to lead the way on ambitious climate goals. If we are to meet our 2030 and 2045 targets, it's imperative that we use every technology at our disposal. AB 1921 gives us another tool in the toolbox. This bill would include linear generators using renewable fuels in the list of "renewable electrical generation facilities." Linear generators play a vital role in providing clean, renewable back-up power generation and they need to be a part of our portfolio in order to meet our climate goals and ensure technology parity."
- 2) *Are you in or are you out?* Currently, "linear generators" are not among the listed resource types directly prescribed in Public Resources Code § 25741 as RPS-eligible facilities. However, that is true for any resource that is dependent upon fuel to generate electricity, as RPS statute includes eligibility for both specific electrical facilities and specific types of fuel. The consequence is that many fuel-to-power facilities are not explicitly named in statute, but nevertheless are still RPS-eligible; such as a combustion power plant running solely on digester gas. Given this, "linear generators using renewable fuels," which this measure seeks to add to RPS statute, should *already* be RPS-eligible.

The author and supporters of this measure have cited examples where linear generators using RPS-eligible fuels were denied funding due to the uncertainty of their RPS status. However, the examples cited were non-RPS programs such as the National Electric Vehicle Infrastructure program, for which the CEC established statewide rules that specifically excluded distributed resources that use biogas.⁷ As such, it is unclear how this measure would solve the identified problem. Nevertheless, providing clarity in the RPS-statute to ensure all eligible technologies are being appropriately valued may be worthwhile, especially as our ambitious statewide goals increase.

- 3) *New Fuels Welcome?* This bill seeks to include linear generators into the RPS, and provides a definition for the linear generator that would be eligible under the measure. However, that definition of "linear generator" likewise includes a definition of "renewable fuels" as inclusive of, but not limited to, "hydrogen, ammonia, and biogas." While specified biogas is currently an RPS-eligible fuel source, hydrogen and ammonia are not.⁸ Moreover, the inclusion of these fuel types is added without clarification, seemingly permitting fuels derived from fossil resources into the RPS.^{9,10}

⁷ CEC, GFO-23-601, "California's National Electric Vehicle Infrastructure Formula Program Questions and Answers," December 21, 2023.

⁸ With the exception of hydrogen used in fuel cells, which the CEC defined and permitted without explicit statutory inclusion.

⁹ Office of Energy Efficiency and Renewable Energy; "Hydrogen Resources"; <https://www.energy.gov/eere/fuelcells/hydrogen-resources>

There has been multi-year legislative efforts to include hydrogen – either a specific definition or undefined – as an eligible fuel for the RPS. While hydrogen can be made using feedstocks that are already eligible under the RPS (and actually receive LCFS credit under such a scenario), it is not clear what types of hydrogen could be eligible for the RPS when used to repower electric power plants. This bill, in seeking to add linear generators to the RPS goes a step further and invites a number of fuels alongside. The author has stated this is not the intent of the measure. *Given this, the committee may wish to preserve the author’s intention of clarifying existing RPS-eligibility but remove the addition of new fuel types into the RPS, by deleting the definition of “linear generator” in subdivision 25741 (b) and adding additional clarity.*

4) *Related Legislation.*

SB 1420 (Caballero), among its provisions, adds renewable hydrogen, as specified, to the types of renewable energy a facility may use to qualify as a renewable electrical generation facility. The introduced version of the measure included “linear generators using renewable fuels” in the category of eligible renewable electrical generation facilities; this provision has since been removed. Status: *set for hearing on April 3rd* in the Senate Committee on Environmental Quality.

5) *Prior Legislation.*

AB 1550 (Bennett, 2023) required, on and after January 1, 2045, all hydrogen produced and used in California for either the generation of electricity or the fueling of vehicles be “renewable hydrogen of biological origin” or “renewable hydrogen of nonbiological origin.” Also made a facility that generates electricity using these two specified categories of hydrogen an eligible renewable energy resource under the RPS, and specifically included linear generators using these fuels as eligible under the RPS. Status: *Died* – Assembly Third Reading.

SB 663 (Archuleta, 2023) defined renewable hydrogen and added renewable hydrogen as a renewable energy resource under RPS. This bill also establishes criteria for renewable hydrogen acquired from a dedicated or on-site pipeline to meet RPS standards. Status: *Died* – Senate Inactive File.

- 6) *Double referral.* This bill is double-referred; upon passage in this Committee, this bill will be referred to the Assembly Committee on Natural Resources.

REGISTERED SUPPORT / OPPOSITION:

Support

¹⁰ International Energy Agency; “Ammonia Technology Roadmap”; <https://www.iea.org/reports/ammonia-technology-roadmap/executive-summary>.

Bioenergy Association of California
Electrochaea Corporation
Green Hydrogen Coalition
Microgrid Resources Coalition
Prologis Management, LLC
Silicon Valley Leadership Group
Southern California Gas Company
Tss Consultants

Opposition

None on file.

Analysis Prepared by: Laura Shybut / U. & E. / (916) 319-2083