

APPENDIX C

HYDROGEN REFUELING STATION REQUIREMENTS

Advanced Technology Demonstration and Pilot Projects

Mobile Source Control Division
California Air Resources Board
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I. MINIMUM TECHNICAL REQUIREMENTS

To be eligible under this Solicitation, applications that include a hydrogen refueling station to be funded as part of the project must, at a minimum, meet each of the following technical requirements. The California Air Resources Board (CARB) will only process applications that include hydrogen refueling infrastructure projects where the project is proposed to be sited where similar infrastructure already exists (e.g., installing a hydrogen refueling station at an existing fueling station or a commercial or industrial facility). Applications including the use of an existing hydrogen station for refueling project vehicles must provide assurances that the station can meet all refueling needs of the project vehicles and equipment in terms of refueling pressure, storage vessel capacities, hydrogen quality, safe refueling, and other requirements described herein.

A. Station Access

Access to hydrogen refueling stations funded as part of the project must be limited to vehicles and devices approved by the station owner/operator for use. Applications must describe how station access will be controlled and, if non-project vehicles are granted access for refueling, what steps will be taken to ensure safe refueling. Stations that allow public access must satisfy the accessibility requirements of California Code of Regulations (CCR) Title 24: California Building Code, Part 2, Volume 1, Chapter 11B, Accessibility to Public Buildings, Public Accommodations, Commercial Buildings and Public Housing.

B. Hydrogen Quality

Hydrogen dispensed at the station shall meet the requirements adopted by the Department of Food and Agriculture Division of Measurement Standards, and found in Title 4, Division 9, Chapter 6, Article 8 of CCR, Automotive Products Specifications. The regulation adopts by reference the Society of Automotive Engineers (SAE) International J2719: "Hydrogen Fuel Quality for Fuel Cell Vehicles," most recent version (https://www.sae.org/standards/content/j2719_202003/). Hydrogen dispensed at the station shall also comply with Compressed Gas Association (CGA) G-5.3-2017 specification guidelines for gaseous and liquid hydrogen for fuel cell applications developed by the Compressed Gas Association. A hydrogen refueling station must undergo and pass the hydrogen purity test under all of the following circumstances: before being considered operational; every six months thereafter; and when the hydrogen lines are potentially exposed to contamination due to maintenance or other activity. The applicant must employ and provide a narrative of the best practices that ensure continued adherence to hydrogen purity standards.

C. Fueling Protocols

The station/dispenser(s) shall meet the appropriate SAE International standards for the vehicles or equipment being fueled, including SAE J2601/2, "Fueling Protocol for Gaseous Hydrogen Powered Heavy Duty Vehicles," most recent version (www.sae.org). The applicant must describe how the fueling protocol and equipment at the station match project vehicle requirements and equipment. Where applicable, the applicant may propose to use a different fueling protocol or combination of established protocols in provide complete safe fills that are compatible with the hydrogen storage system of the project vehicles and equipment. In such a case, the applicant must thoroughly describe their proposed fueling approach, how it will meet the needs of the project vehicles and equipment in terms of tank capacity and fueling pressure, and all relevant and applicable fueling and safety procedures and protocols that will be applied and followed to ensure safe, reliable, and complete fills. Applications that include hydrogen station access by non-project light duty vehicles and refueling of light-duty passenger vehicles, shall meet SAE Standard J2601, "Fueling Protocols for Light Duty Gaseous Hydrogen Surface Vehicles" (www.sae.org).

D. Fire and Safety Awareness, Prioritization, and Adherence

To the extent practicable and with consideration of local ordinances, applicants should meet the requirements of the following California Fire Code sections: Chapter 23 – Hydrogen Motor Fuel Dispensing and Generation Facilities; Chapter 53, Section 5301.1 – Compressed Gasses; and Chapter 58, Section 5801.1 – Flammable Gasses and Flammable Cryogenic Fluids, all of which incorporate by reference National Fire Protection Association (NFPA) 2: Hydrogen Technologies Code: most recent edition, <https://www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codes-and-standards/detail?code=2> as a guideline for hydrogen refueling station design.

E. Dispenser Pressure

For the hydrogen refueling station identified for the project that dispenses gaseous hydrogen into storage tanks of heavy duty vehicles and equipment, the applicant shall indicate what fueling pressure will be used to refuel the project vehicles (350, 700 bar, other), the size in kilograms of the storage systems, and the fueling protocols to be used (i.e., SAE J2601, SAE J2601/2, JPEC S0003, etc.).

F. Hydrogen Dispensing for Sale (if applicable)

For applications including a hydrogen station that intends to sell gaseous hydrogen by the kilogram, the applicant must:

1. Demonstrate that the hydrogen dispensers conform to the specifications and tolerances specified in CCR Title 4, Division 9 Measurement Standards,

Chapter 1 Tolerances and Specifications for Commercial Weighing and Measuring Devices, Article 1 National Uniformity Exceptions and Additions, Sections 4002.9 Hydrogen Gas Measuring Devices (3.39), and;

2. Satisfy the technical requirements of U.S. Department of Commerce/National Institute of Standards and Technology (NIST), specifications Tolerances, and Other Technical Requirements for Weighing and Measuring Devices as adopted by the 102nd National Conference on Weights and Measures 2017, NIST Handbook 44, 2018.

In addition, for a hydrogen station that intends to sell hydrogen by the kilogram, the application must describe how payment will be accepted at the point of sale, acceptable payment methods, and how sales transactions will be recorded.

Applications with hydrogen stations that do not intend to sell gaseous or liquid hydrogen by the kilogram must explain how they will quantify hydrogen fuel dispensed and the estimated degree of accuracy. Hydrogen stations funded through this Solicitation will be required to quantify hydrogen dispensed on a quarterly basis.

G. Hydrogen Dispensers

The station/dispenser(s) shall be capable of meeting or exceeding the National Fire Protection Association (NFPA) 2: Hydrogen Technologies Code, most recent edition, www.nfpa.org. Hydrogen connectors, nozzles and receptacles must meet all requirements of SAE J2600: Compressed Hydrogen Surface Vehicle Fueling Connection Devices and pass all J2600 testing to be considered SAE J2600 compliant.

Except for temporary or mobile hydrogen refueling equipment, station/dispenser(s) shall be equipped with communications hardware and communications protocol described in SAE J2799, "Hydrogen Surface to Vehicle to Station Communications Hardware and Software."

H. Station Design Requirements

Hydrogen refueling stations must have a plan in place for continued refueling of project vehicles in the event that the existing station goes off-line. The applicant must provide a detailed plan, equipment list, and performance specifications to show they are able to obtain and contract for temporary fueling from an experienced supplier. Hydrogen stations for light-duty vehicles, trucks, and SUVs up to 14,000 lbs. must comply with CSA HGV 4.9 Hydrogen Fueling Station standards, which specify design, installation, operation and maintenance of brick-and-mortar and modular gaseous hydrogen fueling stations for light-duty vehicles.

I. Release Reporting

Hydrogen stations shall comply with the hazardous materials release reporting requirements contained in California Health and Safety Code Section 25510(a).

J. Renewable Hydrogen

Applications must demonstrate compliance with the minimum Renewable Hydrogen Requirements and the data collection requirements detailed in Section II of this Appendix. This compliance may be met considering all stations and fuel dispensed included in the application for which the applicant is applying for funding under this Solicitation.

II. RENEWABLE HYDROGEN REQUIREMENTS

Applications that request funding for proposed hydrogen refueling station(s) must provide a plan for ensuring that dispensed hydrogen is generated using at least 33 percent eligible renewable resources (i.e. feedstocks or electricity) as detailed below. This plan must detail the process used to generate the hydrogen, the location where the hydrogen will be generated (i.e., at the proposed hydrogen station site or at an off-site production facility), the eligible renewable resources used to generate the hydrogen, and how the applicant will track and provide verifiable evidence that the dispensed hydrogen is generated from at least 33 percent eligible renewable resources.

A. Eligible Renewable Feedstocks

Eligible renewable feedstocks include:

- Biomethane or biogas such as: biomass, digester gas, landfill gas, sewer gas, or municipal solid waste gas.
- Other feedstocks may be eligible if the Application demonstrates that the proposed feedstock is sustainably produced, reduces greenhouse gas emissions compared to the petroleum baseline, and achieves the Sustainability Goals of the Alternative and Renewable Fuel and Vehicle Technology Program Regulations (20 CCR 3101.5).
- Certified Renewable Natural Gas obtained pursuant to Section II.D.3.

B. Eligible Renewable Electricity Sources

Eligible renewable electricity sources include facilities that use the following:

- Fuel cells using renewable fuels.
- Geothermal
- Small hydroelectric (30 megawatts or less)

- Ocean wave
- Ocean thermal
- Tidal current
- Photovoltaic (PV)
- Solar Thermal
- Wind
- Biomass digester gas
- Municipal solid waste conversion (non-combustion thermal process)
- Landfill gas
- Required Information

For hydrogen produced directly from eligible renewable feedstocks, applications must include information about the source of the feedstock(s); how the feedstocks will be processed into fuel; and how the fuel will be transported, stored, and ultimately dispensed at the proposed station(s). For hydrogen generated from electricity (e.g., electrolysis), applicants must describe source(s) of eligible renewable electricity that satisfy the conditions outlined below in Appendix C, Section II, D.

Once a project hydrogen station is operational, the Grantee will be responsible for ensuring that data is provided to CARB on a quarterly basis regarding hydrogen production, delivery, and dispensing for the purposes of carrying out the demonstration. Data collection will include but not be limited to:

- For all stations – performance data including quantity of fuel dispensed in kilograms (kg), energy used for hydrogen storage, cooling, compression, and dispensing, cost of fuel from supplier, fueling times including estimated quantities of fuel delivered for each refueling, station down time, servicing and maintenance information, and driver/operator feedback on refueling.
- For a station generating hydrogen onsite from electrolysis – documentation of quantity of fuel produced in kg, electricity and water used for hydrogen generation, power generated from on-site sources and attributed to onsite hydrogen production, and if applicable, power obtained through other eligible sources.
- For a station producing hydrogen onsite from eligible renewable feedstocks – quantity of fuel produced in kg, amount of biogas or other renewable feedstock (in mega joules), total amount of fossil natural gas from the pipeline (in mega joules), and other fuel used for hydrogen generation and steam production, and total electricity and water usage for hydrogen generation, storage, compression, and dispensing.

All data will be recorded on the NREL Data Collection Tool¹, or another format as specified by CARB.

C. Renewable Electricity Requirements

Renewable electricity used for hydrogen generation may be:

- 1) Generated from one or more eligible electricity sources (listed above in Appendix C. Section II.B) that meet the requirements under California Public Utilities Code section 399.12, and are co-located with the refueling station site or located on property owned by the hydrogen producer, and produce no additional renewable attributes such as renewable energy certificates; or
- 2) Obtained through a program with eligibility requirements that match or are more stringent than the Green Tariff Shared Renewables program under the California Public Utilities Code sections 2831-2833.

D. Biogas Requirements

Biogas or biomethane used for hydrogen generation may be:

- 1) Physically supplied directly to the hydrogen production facility; or
- 2) Injected as certified Renewable Natural Gas (RNG) into a common carrier pipeline in North America (and thus comingled with fossil natural gas) and reported as an input to hydrogen production, provided the following conditions are met:
 - a. The quantity of RNG (and all associated environmental attributes) injected into the pipeline must be accompanied by documents linking the environmental attributes of the injected RNG to the corresponding quantities of natural gas withdrawn for hydrogen production. Documents include monthly invoices showing quantities of RNG sourced and the contracted price per unit, and the contract by which the hydrogen producer obtained the environmental attributes.
 - b. The quantity of RNG (and all associated environmental attributes) injected into pipeline in one calendar quarter must match the quantity of pipeline natural gas sold as RNG for hydrogen production no later than the following calendar quarter.

¹ The NREL Data Collection Tool is Attachment 11 of GFO-15-605 – Light Duty Vehicle Hydrogen Refueling Infrastructure located on the California Energy Commissions Contracts webpage. <http://www.energy.ca.gov/contracts/GFO-15-605/>.

E. Verification

CARB will verify, based on the information provided in the application including the identification of a Low Carbon Fuel Standard (LCFS) fuel pathway or other documentation, whether the renewable hydrogen requirement is met. Further verification, once the project has started, will be tracked through the (LCFS) reporting system.

F. SB 1505 Disclaimer

The 33 percent Renewable Hydrogen Content requirement is a condition to participate in this Solicitation. This is separate and distinct from CARB's sole authority to regulate the renewable hydrogen content requirements for hydrogen refueling stations under Health and Safety Code, Section 43869 (commonly referred to as Senate Bill 1505 or SB 1505). Fulfilling the 33 percent Renewable Hydrogen Content requirement in this Solicitation does not guarantee or warranty in any way that hydrogen refueling stations funded under this Solicitation will meet any standards or regulations that CARB may adopt in the future for hydrogen refueling stations pursuant to the authority in SB 1505. The applicant will be solely responsible for complying with such standards and regulations as applicable, including funding its compliance with them.

G. Greenhouse Gas Requirements

Applicants must use the "well-to-wheel" calculation methodology for the greenhouse gas emission calculations that includes the feedstock(s) and energy used to produce hydrogen, the process, combustion, and fugitive emissions that occur during production of the hydrogen, and the fuel transport and final use of the hydrogen. See Appendix D for the emission reduction and cost-effectiveness methodology.