

State of California
Air Resources Board

Staff Discussion Paper

Hydrogen as a Transportation Fuel

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PURPOSE

This discussion paper provides an overview of how hydrogen used as a transportation fuel is currently treated in the Low Carbon Fuel Standard¹ (LCFS) program and opens the dialogue with stakeholders about initiatives to improve program administration as well as potential future regulatory changes for this fuel type. It is a working document and is expected to evolve over time based on input from stakeholders.

INTRODUCTION AND GENERAL PROGRAM BACKGROUND

The LCFS is a performance standard that requires reductions in the carbon intensity of California's transportation fuels over time. Each fuel's carbon intensity (CI) is calculated based on greenhouse gas (GHG) emissions per unit of fuel energy over the fuel's lifecycle—from raw material or feedstock production through end use.² Lower-CI fuels produce fewer GHGs per energy unit. Higher-CI fuels, such as traditional petroleum-based fossil fuels, produce more GHGs per energy unit.

In order to reduce GHG emissions, LCFS requires a yearly declining average CI for the pool of California's transportation fuels. Fuels that exceed the mandated average CI generate deficits and those that have CIs below the mandated average CI generate credits. The quantity of credits or deficits generated by each fuel is determined by its fuel-specific CI score relative to the declining CI standard and the quantity of the fuel used for transportation in California. Deficits created by fuels that exceed the mandated CI must be offset with credits generated by lower CI fuels.

Hydrogen is one of lower-carbon fuels currently used in California. Providers of hydrogen for transportation purposes, if they choose not to participate in the LCFS program, currently have no obligations under LCFS. However, the LCFS allows hydrogen fuel providers to "opt-in" to the program and generate LCFS credits that they can sell and trade in the California LCFS market.

To facilitate participation in LCFS, several amendments to the current regulation are being considered, including clarifying the point of regulation, expanding the renewable energy sources that qualify to reduce carbon intensity, and adding new Lookup Table pathways. This discussion paper provides background on the current regulation, reviews potential amendments, and provides an introduction to the proposed verification program as it relates to hydrogen providers.

¹ California Code of Regulations, title 17, section 95480 et seq.

² A fuel's lifecycle emissions intensity is also referred to as its "pathway" or "carbon intensity score" in LCFS documentation. These values are usually expressed in units of grams carbon dioxide equivalent per megajoule (g CO₂e/MJ).

Current Parties Eligible to Generate Credits for Hydrogen

For hydrogen used as a transportation fuel, the following table describes the entities eligible to generate LCFS credits and shows the number currently participating in the LCFS:

Eligible party ³	Number of Entities with Approved LCFS Pathways	Number of Entities Generating Credits
Entity who owns the finished hydrogen fuel at the time the finished fuel is created	3	1
Entity who acquires ownership of finished hydrogen fuel	0	0
Hydrogen fuel cell forklift fleet owners	0	0

Hydrogen sales reported by the single producer who has exercised its ability to generate credits represents only 16% of hydrogen used as transportation fuel in California, according to data collected by ARB and the National Renewable Energy Laboratory.

Potential Changes to Parties for Hydrogen

Remove opt-in status

Staff is considering changing the opt-in status of hydrogen and beginning to require reporting of all hydrogen dispensed for transportation purposes, in order to monitor statewide compliance with the greenhouse gas emission and renewable energy resource requirements of California Senate Bill 1505 using the LCFS reporting framework.⁴

Clarifying the point of regulation

The current regulation states that the party eligible to generate credits for hydrogen is the “owner of the finished fuel.” This terminology is vague in cases where the hydrogen is supplied to a refueling station by another party, such as an industrial gas producer. Some stakeholders have interpreted this to mean that the LCFS gives priority to the industrial gas producers. Others have argued that this language prioritizes the fueling facility operator (given that the fueling facility must filter, compress, and cool the gas after delivery and, therefore, the hydrogen should not be considered a “finished fuel” until it is in a form that can be dispensed into a vehicle).

³ LCFS regulation section 95483(f)

⁴ Lowenthal, 2006. Available at: <https://www.arb.ca.gov/msprog/hydprod/hydprod.htm>

To date, only one regulated party has generated credits for hydrogen and that entity produces the hydrogen through on-site electrolysis, prepares the hydrogen for use as a vehicle fuel, and dispenses the fuel; therefore, staff has not yet had to interpret this portion of the rule.

In the interest of providing clarity under the current rule, and ensuring the total quantities of hydrogen dispensed to vehicles in California are reported to the LCFS. Any fuel owner in the supply chain for hydrogen may generate credits, pursuant to the LCFS regulation, provided that no other entity is claiming credit for the same unit of fuel. (With the current low number of hydrogen fuel dispensing stations, staff should be able to ensure that no double counting is occurring.)

Staff may consider clarifying this issue in future regulatory amendment. Such an amendment could potentially clarify that the fueling facility owner would have first right of refusal to generate the credits but could contractually pass the opportunity to generate credits to the upstream producer (from the station to the supplier), who would then become the reporting party and credit generator.

- Staff is seeking feedback on the proposals to designate station operators as first-in-line to generate credits for hydrogen fuel and the proposal to immediately allow fueling facility owners to receive credit for the hydrogen they dispense.

1. LCFS FUEL PATHWAY EVALUATION PROCESS FOR HYDROGEN

Current Pathway Application Process

When an eligible party listed above wishes to generate LCFS credits for hydrogen, the first step they must take is to apply for the use of the appropriate carbon intensity score (or “pathway”).

ARB staff currently evaluates the fuel pathway application, which includes review of submitted information and review of the third-party engineering report required under U.S. EPA’s RFS program, when available. The staff review can range from cursory, for “Lookup Table pathways” such as grid electricity, to extensive for the most complex “Tier 2” pathways.⁵ Hydrogen providers may use the Lookup Table pathway that applies to their process, or may apply for a unique Method 2A/2B pathway.

There are currently five hydrogen pathways in the Lookup Table,⁶ all of which reflect the production of hydrogen via steam methane reforming (SMR) as shown in Table 1. The

⁵ For more information on application requirements and pathway classifications, see *Draft Guidance Document for LCFS New Pathway Applications*. Nov 5, 2015. Available at: <https://www.arb.ca.gov/fuels/lcfs/fuelpathways/newpathway-11052015.pdf>

⁶ See Lookup Table pathways for other fuels in the LCFS regulation section 95488(c)(4)(F). Table 6. Available at: <https://www.arb.ca.gov/regact/2015/lcfs2015/lcfsfinalregorder.pdf>.

five pathways differ depending on whether hydrogen is produced on-site or delivered from a central producer; whether it is liquefied for delivery or remains in gaseous form throughout its life cycle; and whether it uses fossil natural gas or renewable natural gas as the feedstock for steam reforming to hydrogen.⁷

Table 1. Existing Lookup Table Pathways for Hydrogen

Fuel Pathway Code	Pathway Description	Carbon Intensity Values (gCO ₂ e/MJ) ⁸
HYGN001	Compressed H ₂ from central reforming of NG (includes liquefaction and re-gasification steps)	151.01
HYGN002	Liquid H ₂ from central reforming of NG	143.51
HYGN003	Compressed H ₂ from central reforming of NG (no liquefaction and re-gasification steps)	105.65
HYGN004	Compressed H ₂ from on-site reforming of NG	105.13
HYGN005	Compressed H ₂ from on-site reforming with 33% renewable feedstocks	88.33

In addition to these Lookup Table pathways, there are also several user-specific (Method 2A/2B) pathways for hydrogen produced using biomethane from landfill or wastewater sludge as the feedstock for SMR, as well as a pathway using solar-powered electrolysis.

We would like to call stakeholders' attention to a recent change that has been implemented in the system of fuel pathway codes (FPC). Historically, FPCs indicate the fuel type, but do not provide any information about the feedstock. New FPCs that have been issued in 2016 and going forward will indicate both the fuel and feedstock. For example, pathway HYGN001 in Table 1 – where “HYGN” simply indicates the fuel is hydrogen – will change to HYGF, where the F indicates that the feedstock is fossil-based natural gas. Codes for hydrogen made from landfill gas begin with “HYGLF.”

⁷ Refer to the pathway documents for detailed explanation of the CI modeling inputs, assumptions and conditions of these pathways. Detailed California Modified GREET Pathway for Compressed Gaseous Hydrogen from North American Natural Gas. December 14, 2015. Available at: <https://www.arb.ca.gov/fuels/lcfs/121514hydrogen.pdf> or from the searchable table of all LCFS certified pathways (not to be confused with the Lookup Table) at: <https://www.arb.ca.gov/fuels/lcfs/fuelpathways/pathwaytable.htm>

⁸ Note that these CI values are prior to recognition of vehicle efficiency, which varies by hydrogen vehicle type. When used in a light-duty hydrogen fuel cell electric vehicle, the CI values are adjusted to account for vehicle Energy Economy Ratio (EER) relative to the equivalent vehicle using gasoline. For example, the HYGN001 CI of 151.01 gCO₂e/MJ of hydrogen is adjusted to 60.40 gCO₂e/MJ of gasoline displaced. (This is the appropriate value to use when comparing hydrogen's carbon intensity to that of fossil fuels.) See EER values for each vehicle-fuel combination in Table 4. of the LCFS regulation. Available at: <https://www.arb.ca.gov/regact/2015/lcfs2015/lcfsfinalregorder.pdf>

Qualifying Renewable Energy for Hydrogen Production

Under the current regulation renewable energy which is supplied directly to a fuel production facility may qualify for a reduced carbon intensity value. For example, a transit agency using solar panels to supply power to its hydrogen station has been approved to report the quantity of hydrogen generated using solar power with a CI equal to zero. Conditions for this pathway include ARB approval (and ongoing review) of the metering methodology and any utility or other contracts to ensure that the power supplied to the station does not also generate Renewable Energy Certificates (RECs) or other renewable attributes in any other program, with the sole exception of the federal Renewable Fuels Standard (RFS2). However, staff's discussion with this facility during the pathway approval process demonstrated that additional clarity on this issue would be helpful.

Potential Changes for Consideration

New and Revised Lookup Table Pathways for Hydrogen

Staff is considering reviewing, updating, and consolidating the existing pathways for hydrogen produced by SMR, and adding new Lookup Table Pathways for hydrogen produced by electrolysis.

Staff would like to delete two of the pathways shown in Table 1 (HYGN002 and HYGN004), as they are similar in both CI and production to pathways HYGN001 and HYGN003, respectively. An applicant may use a Lookup Table Pathway CI value if the actual pathway is substantially similar to the pathway described, and the CI value is equal or less than the CI determined for the Lookup Table Pathway. Therefore, an on-site producer may use a pathway for delivered hydrogen, as the actual CI would be less than the certified value. If the actual pathway CI value is *substantially*⁹ less than the Lookup Table Pathway, the provider may submit an application for a unique Method 2A/2B pathway.

- *Existing Lookup Table Pathways are not currently being utilized by any hydrogen providers. Staff requests stakeholder feedback on pathway parameters that would make the lookup table more applicable.*

⁹ The substantiality requirements defined in the LCFS regulation section 95488(c)(4)(G)2 include: a source-to-tank CI that is 5.5% lower than the Lookup Table pathway if the proposed pathway source-to-tank CI is greater than 20 gCO₂e/MJ; or a reduction of at least one gCO₂e/MJ if less than 20 gCO₂e/MJ.

Table 2. Potential Lookup Table Pathways for Hydrogen

Pathways for Steam Methane Reformation	Pathways for Electrolysis
Compressed H ₂ from reforming of NG (includes liquefaction and re-gasification steps)	Compressed H ₂ from electrolysis with average California grid electricity (includes liquefaction and re-gasification steps)
Compressed H ₂ from reforming of NG (<u>No</u> liquefaction and re-gasification steps)	Compressed H ₂ from electrolysis with average California grid electricity (<u>No</u> liquefaction and re-gasification steps)
Compressed H ₂ from reforming with NG process energy and 100% biomethane feedstock (includes liquefaction and re-gasification steps)	Compressed H ₂ from electrolysis with 100% renewable solar/wind electricity (includes liquefaction and re-gasification steps)
Compressed H ₂ from reforming with NG process energy and 100% biomethane feedstock (<u>No</u> liquefaction and re-gasification steps)	Compressed H ₂ from electrolysis with 100% renewable solar/wind electricity (<u>No</u> liquefaction and re-gasification steps)

Consideration of Flexibility for Non-co-located Renewable Power

We believe that the current rule terminology—which describes the use of “dedicated (non-grid)” low-CI energy sources, and prohibits “indirect accounting”—can be improved. As part of rule amendments, staff is considering two clear options to recognize a reduced CI for renewable power supplied to hydrogen production facilities. As presented at two LCFS public workshops,¹⁰ our current thinking is that hydrogen produced using renewable electricity would be eligible for an improved carbon intensity score if the renewable electricity:

- (1) is obtained through a program with eligibility requirements that match or are more stringent than the Green Tariff Shared Renewables (GTSR) program under California Public Utilities Code Section 2831-2833,¹¹ or
- (2) meets all of the following criteria:
 - o generated on land owned by the charging station operator and located within the same EDU territory as the charging station;
 - o the renewable generation system is developed expressly for supplying the station’s power demand (meaning the project is developed concurrently or after the station is installed. Existing resources may not be shuffled to meet the station’s demand);

¹⁰ See staff presentations from June 2, 2016 and July 29, 2016 public workshops at: https://www.arb.ca.gov/fuels/lcfs/lcfs_meetings/lcfs_meetings.htm

¹¹ California Public Utilities Code. Chapter 7.6. More information available at: <http://www.cpuc.ca.gov/General.aspx?id=12181>

- meets the renewable eligibility requirements in the California Energy Commission (CEC) Renewables Portfolio Standard Eligibility Guidebook (RPS Guidebook);¹²
- does not produce RECs or other attributes recognized under any program except RFS2.

Pathway application and verification program requirements would include ARB approval and ongoing review of the metering methodology and any utility or other contracts to ensure that the renewable power does not also generate any RECs or other renewable attributes in any other program.

➤ Staff is seeking stakeholder discussion and feedback on this proposal, specifically whether the criteria would meet the objective of ensuring the renewable electricity is traceable and is not double counted in any other program.

➤ In reviewing the applications submitted to the CEC for state funding of hydrogen stations, staff has observed that many plans include the use of RECs to meet the 33% renewable hydrogen requirement of the grant applications. Under the proposal, purchasing RECs to offset energy consumption would not qualify to reduce the CI associated with hydrogen production, nor would the quantity of renewable electricity from RECs be counted as contributing toward the SB 1505 statewide requirement of 33% renewable hydrogen use in vehicles.

Renewable Natural Gas used in Hydrogen Production

For hydrogen produced using SMR, staff seeks to clarify the treatment of renewable natural gas (RNG). Under the current regulation, requirements for RNG differ depending on whether RNG is used for process energy or RNG is used a feedstock for bio-CNG, bio-LNG, or bio-L-CNG. When used as a process energy input, RNG must be supplied directly to a producer; no indirect accounting mechanisms are recognized to reduce the final fuel's CI value. However, when RNG is used as a feedstock for fuel production in place of fossil-based natural gas, renewable attributes are recognized to reduce CI. Because renewable natural gas molecules cannot be tracked through the natural gas pipeline transmission and distribution system, the renewable attribute is considered by ARB to be decoupled from the gas at the injection point and the injected gas is considered to be fossil gas. When fossil gas is withdrawn from the pipeline for final use in California, the renewable attribute is reattached (on an energy-equivalent basis). To justify this accounting, the Reporting Party must provide contracts and invoices documenting the terms of the sale from the biogas producer to a marketer or other purchasing entity, and from that entity to the hydrogen producer or fueling facility owner.

¹² California Energy Commission, *Renewables Portfolio Standard Eligibility*, Eighth Edition, Commission Guidebook, CEC-300-2015-001-ED8-CMF.

In the context of hydrogen, staff suggests the use of RNG as a feedstock in SMR is distinct from RNG used for process energy in other fuel production, and, should therefore qualify for the same treatment used for CNG and LNG. RNG used as a feedstock for hydrogen production would also be subject to the same verification requirements as RNG claimed as a transportation fuel in NG vehicles.¹³

Fueling Facility Operational Data from National Renewable Energy Laboratory (NREL) Data Collection Tool

Hydrogen fueling facilities already report quarterly operational data, including a fuel log and energy use for compression and other station operations, to NREL and the California Energy Commission. To harmonize the LCFS application process with existing practice, staff proposes to accept completed NREL Data Collection Tool spreadsheets¹⁴ as the basis of operational data required for a unique Method 2A/2B application to support the CI determination for station operations.

2. REPORTING REQUIREMENTS

After an entity has been approved to use an LCFS pathway to generate credits for hydrogen as a transportation fuel, they must report the quantity of fuel dispensed to begin to receive credits.

Existing Reporting Requirements¹⁵

As described in the introduction, opting in to the LCFS program is currently voluntary for hydrogen and involves registering with ARB in the LCFS Reporting and Credit Bank & Transfer System (LRT-CBTS) to establish a reporting account. This process is simple and primarily includes providing the organization name, organization address, organization federal employer identification number (FEIN), and account administrator information.

Prior to reporting to generate credits, the fuel production facility and its fuel pathways need to be registered in the Alternative Fuel Portal (AFP).¹⁶ Hydrogen providers that opt into the LCFS are subject to the reporting requirements set forth in section 95491(a)

¹³ Refer to the discussion paper on natural gas and biomethane for considerations for a more detailed discussion on this issue. Staff Discussion Paper on Natural Gas and Renewable Natural Gas. November 18, 2016. Available at: https://www.arb.ca.gov/fuels/lcfs/lcfs_meetings/lcfs_meetings.htm

¹⁴ The NREL Data Collection Tool is available for download from the California Energy Commission's website for GFO-15-605 - Light Duty Vehicle Hydrogen Refueling Infrastructure, Attachment 11: <http://www.energy.ca.gov/contracts/GFO-15-605/>

¹⁵ Refer to the LCFS Regulatory Guidance 16-05 document for more information on how to opt in, register and generate credits. Available at: https://www.arb.ca.gov/fuels/lcfs/guidance/regguidance_16-05.pdf

¹⁶ Entities may not report and generate credits based on transactions that precede the quarter in which they opt in.

and the recordkeeping requirements set forth in section 95491(b) through (e) of the LCFS regulation.

The primary parameters reported quarterly are the amount of hydrogen dispensed (kg), CI value (fuel pathway), and the vehicle type (e.g. light duty/medium duty, heavy duty, and forklift) that determines the EER used for credit calculation. The Reporting Party must report the amount of fuel dispensed at each individual fueling facility for each applicable FPC on a quarterly basis.

The final quarterly reports must be submitted in the LRT-CBTS by the deadlines specified in section 95491(a)(1)(A). An annual compliance report for the prior calendar year must be also submitted in the LRT-CBTS. In order to generate credits, the hydrogen provider must submit quarterly and annual reports.¹⁷

Potential Non-Regulatory Changes for Enhanced Reporting

Staff is considering implementing the following changes for the Q1 2017 reporting cycle.

Register each hydrogen fueling station in the LRT-CBTS

With increased interest in participation from hydrogen stakeholders, it has become important to enhance the registration requirements for fueling facilities to improve the data quality and prevent potential double counting. Further, the clarification about the point of crediting discussed above will hopefully encourage improved reporting at the station level.

To facilitate this process, the registration of fueling facilities will be provided in the LRT-CBTS. Reporting Parties will be able to register all their fueling facilities in LRT-CBTS using a template shown in Appendix A. The list of fueling facilities would then be updated quarterly if there are any changes. Upon the fueling facility registration, the system will generate a unique LCFS fueling facility ID that will be used by Reporting Parties when reporting fuel transactions in LRT-CBTS. An updated template for quarterly reporting of the fuel dispensed at individual fueling facilities for the upload to LRT will be provided in Q1 2017.

Hydrogen Fueling Facility IDs

It is important to have a unique identifier for each hydrogen fueling facility. This unique fueling facility ID could facilitate validation of each new registered fueling facility in LRT-CBTS and would allow staff or verification bodies to match utility records to specific fueling facilities. Staff believes that providing fueling facility specific information will improve data accuracy and prevent double counting of fuel dispensed at individual stations, and ensure that the fuel for which credits were claimed is used for transportation in California.

¹⁷ Note that even if no fuel was provided, a quarterly report with zero amounts must be submitted to remain in good standing in the system.

- Staff is interested in stakeholder feedback to determine whether unique identifiers for each fueling facility should be assigned by ARB, or whether there are existing unique identifiers for individual hydrogen fueling facilities (or sub-portions of the stations such as meters) that should be adopted for reporting and verification purposes.

Reporting Limited to Dispensed Amounts at Fueling Facilities

Staff proposes to eliminate all upstream transaction types for hydrogen (such as Production in California, Import, Purchased/Sold with Obligation, etc), in the LRT-CBTS and, instead, have only one transaction type—“Hydrogen Fueling.” “Hydrogen Fueling” would apply to the quantity of fuel dispensed for transportation use. This change would not affect who is eligible to report or generate credits for a specific volume of fuel, but would ensure that accounting of upstream hydrogen production is linked to the quantity of fuel dispensed at a fueling facility. In other words, it would require the credit generating party to track transfers through the supply chain, and ultimately attest that accurate fuel volumes with the appropriate FPC codes are reported at the fueling facility level. Staff believe this would streamline reporting and verification and ensure that the fuel for which credits are claimed is used for transportation in California.

Potential Regulatory Amendments to Reporting Requirements

Staff is considering the following hydrogen quantity reporting amendments for the rulemaking.

Third-party Aggregator

The current LCFS regulation designates certain entities to be eligible to generate credits under hydrogen categories. Historically, many of these entities have not opted into the LCFS program to generate credits due to limited resources and low financial incentive for the small amount of hydrogen fuel provided.

To enhance participation and provide flexibility, staff is considering providing greater clarity about how credit generators can, at their option, contractually designate a third-party to manage LCFS credit generation for them. These third parties would be referred to as “aggregators”.

An entity that chooses to act as an aggregator would become a Regulated Party and could act on behalf of parties that are not yet registered in LCFS as well as entities that are already Reporting Parties in LRT-CBTS. In either case, the aggregator would likely need to have a written contract between both parties for each reported fueling facility and these agreements would likely need to be provided to ARB. The enhanced registration requirement for individual facilities would also apply to aggregators.

Update EER Values and Add New Vehicle Categories

Staff proposes to evaluate the most recent studies and data concerning hydrogen vehicle fuel economy and update EER values if deemed appropriate. Staff proposes to develop a specific EER category for hydrogen fuel cell buses, separating it from the current generic category of heavy duty fuel cell vehicles.

- Staff is seeking feedback from stakeholders to update existing EER values and develop a specific EER for buses.

Allow post-2010 Hydrogen Fuel Cell Forklifts to Use Regular Credit Calculation

Under the current regulation, the LCFS credit formulas for all hydrogen forklifts do not include enhanced credits due to the EER term, which substantially reduces the number of credits these hydrogen applications can generate. Staff proposes to allow hydrogen fuel cell forklifts to earn LCFS credits using the regular credit formula¹⁸ that includes the EER term.

3. VERIFICATION

A successful GHG reduction program requires a system to monitor, report, and verify GHG emissions to aid implementation and tracking of the effectiveness of emission reduction strategies. Historically the LCFS has relied upon a robust reporting program built around ARB staff evaluation of fuel CI through the fuel pathway application process and conducting spot-checks on the reporting of quarterly fuel volumes.^{19,20}

ARB is now considering supplementing the work of ARB staff with a verification system conducted by independent third-parties engaged by entities reporting to ARB under the LCFS. Conceptually, these verifiers would perform GHG accounting checks in a role similar to the independent, objective evaluations of organizations' financial reports by financial auditors. ARB has extensive experience with an analogous system under the Mandatory Reporting (MRR) of Greenhouse Gas Emissions pursuant to the California Global Warming Solutions Act of 2006 (AB 32) and through the verification of GHG compliance offset projects under ARB's Cap-and-Trade Program.^{21,22}

¹⁸ Refer to the credit calculation formula given in the LCFS regulation section 95486(b)(3). Note that most hydrogen fuel cell forklifts were introduced into the California market after the 2010 LCFS baseline year.

¹⁹ LCFS Fuel Pathways: <https://www.arb.ca.gov/fuels/lcfs/fuelpathways/fuelpathways.htm>

²⁰ LCFS Data Management System: <https://www.arb.ca.gov/fuels/lcfs/reporting%20tool/datamanagementsystem.htm%23lrt-cbts>

²¹ AB 32 explicitly supported verification calling for ARB to "adopt regulations to require the reporting and verification of statewide greenhouse gas emissions and to monitor and enforce compliance..." Health and Safety Code (H&SC) section 38530(a). Program information on MRR verification is available here:

<https://www.arb.ca.gov/cc/reporting/ghg-ver/ghg-ver.htm>

²² Offset Verification Program: <https://www.arb.ca.gov/cc/capandtrade/offsets/verification/verification.htm>

Existing Verification Provisions

Existing verification provisions were added in the 2015 LCFS re-adoption. These provisions are currently being used to support ARB compliance audits and enforcements activities.

Section 95491(d) Verification of Pathway, CI, Report

“All data and calculations submitted by a regulated party for demonstrating compliance or claiming credit are subject to verification by the Executive Officer or a third party approved by the Executive Officer.”

Section 95491(e) Access to Records

“Pursuant to H&S section 41510, the Executive Officer has the right of entry to any premises used, leased, or controlled by a regulated party, a reporting party, a verifier, or an applicant, in order to inspect and copy records relevant to the determination of compliance. Scheduling of access shall be arranged in advance where feasible and must not unreasonably disturb normal operations, provided, however, that access shall not be unreasonably delayed.”

Proposed Amendments to Verification

Staff’s verification white paper²³ provides the framework for the development of an LCFS verification program and overarching considerations that will inform potential amendments to the LCFS regulation.

ARB staff is considering mandatory verification of various program aspects including, but not limited to:

- fuel pathway carbon intensities,
- reported fuel quantities (for both high and low carbon fuels), and
- chain-of-custody information (for some feedstocks and finished products).

The objective of such a verification program is to ensure integrity in the LCFS credit market through assurance of GHG reduction claims in the LCFS. In pursuit of this objective, the guiding principles when designing a verification program must include:

- (1) ARB retention of sole authority over the LCFS program, including verification requirements, as bestowed through the State’s legislative and regulatory process;
- (2) Continual improvement in the detection, prevention, and correction of errors or fraud;

²³ Staff White Paper: Framework for Development of a Low Carbon Fuel Standard Verification Program: https://www.arb.ca.gov/fuels/lcfs/lcfs_meetings/verification_whitepaper_102116.pdf

- (3) Identification and implementation of cost reducing strategies, while maintaining verification rigor;
- (4) Policy consistency with other ARB verification programs; and
- (5) Consideration of the unique attributes of fuel carbon intensities and fuels marketing structure.

The degree of ARB oversight, verifier competency and training, and conflict of interest requirements are expected to be consistent with ARB's Regulation for the Mandatory Reporting of Greenhouse Gas Emissions (MRR) and Compliance Offset verification programs, while seeking to harmonize, where possible, with existing verification and certification programs, most notably U.S. EPA's RFS Quality Assurance Program (QAP).

Currently, no hydrogen producers are generating RINs under the U.S. EPA RFS program. Some hydrogen producers report under MRR and are subject to verification. Staff will seek to minimize duplication in cases where these producers may also report under LCFS.

- Staff is not currently aware of hydrogen credit generators participating in existing verification or certification programs and seeks information from stakeholders.

Considerations for the Verification of Hydrogen

A hydrogen provider who opts into, or is required to participate in, the LCFS program would become a Regulated Party and could be subject to initial validation and ongoing verifications. However, hydrogen is a new entry to the transportation fuel market and generates a small quantity of credits currently. Staff is considering cost-reducing verification strategies while achieving reasonable assurance of credit validity.

Staff's preferred approach is to exempt hydrogen as a transportation fuel from third-party verification by an ARB-accredited third-party verification bodies. LCFS verification and all proposed verification requirements could instead be conducted by ARB staff at no cost to the reporting entity beyond making information available to ARB.

Staff proposes verification of Lookup Table Pathways for hydrogen to be focused primarily on ensuring accuracy of the amounts of hydrogen (kg) reported each year, energy use, and renewable energy and feedstock production/purchases. Proposed LCFS verification by ARB staff will likely include a desk audit to review supporting documentation such as product transfer documents (PTDs), receipts and invoices, contracts, and bills of lading along the entire supply chain. Periodic site visits to upstream facilities and fueling facilities will generally be necessary to review on-site data management systems, inspect meters, confirm the geographical locations and physical configurations of the facilities, confirm that a facility is properly equipped to produce the certified fuel and that any process changes that may affect CI have been properly reported to ARB.

The table in Appendix C will be populated with verification points in advance of the second webinar. Aside from the review of upstream hydrogen production, staff anticipates many similarities between hydrogen and electricity verifications.

- Staff is seeking stakeholder feedback on exempting small hydrogen fuel providers and reporting parties from third-party verification. Would a threshold based on annual credit generation be preferable? Would an exemption for single location reporters be preferable? Exempt entities would be audited by ARB.
- If hydrogen producers report under both MRR and LCFS, should they be required to have their LCFS data verified? Staff envision this can be accomplished by the hydrogen producer's MRR verification body with LCFS-specific ARB guidance or training.
- Staff seeks to identify other solutions that can mitigate costs while still providing data quality assurance.

APPENDIX A

LRT FORM FOR HYDROGEN FUELING FACILITY REGISTRATION

Company Name ⁽¹⁾	FEIN ⁽²⁾	Fueling Facility Name ⁽³⁾	Street Number & Name ⁽⁴⁾	City ⁽⁴⁾	Zip Code ⁽⁴⁾	Meter # ⁽⁵⁾	Fuel Type ⁽⁶⁾	FPC ⁽⁷⁾	Longitude ⁽⁸⁾	Latitude ⁽⁸⁾

Notes:

- (1) The organization name of the reporting party registered in LCFS.
- (2) The Federal Employer Identification Number (FEIN) of the Reporting Party.
- (3) The name of the fueling facility.
- (4) The address of the fueling station, including street number and name, city, and zip code.
- (5) The Meter ID of the hydrogen fueling facility
- (6) The fuel type should be Hydrogen.
- (7) The Fuel Pathway Code (FPC) associated with this fueling facility.
- (8) Report Latitude and Longitude in units of Decimal Degrees, carried to a minimum of 6 decimal places after the decimal point. West Longitude and south Latitude should be written with a negative sign. Use either Google Earth or GPS meter.

APPENDIX B

Summary of Hydrogen Use, Credit Generation, and Reporting Requirements³

Type of Use	Party Eligible to Generate Credits	Reporting Requirements ⁴
1. Private access fueling	1. Facility owner 2. Third-party hydrogen producer or provider 3. Provider if facility owner with written acknowledgement that it will <u>not</u> generate credits	1. Amount of fuel dispensed (kg) by vehicle type 2. CI of hydrogen or blendstocks used to produce hydrogen blend 3. Production Company ID and Facility ID
2. Public access filling	1. Fueling facility operator 2. Third-party producer or provider 3. Provider if fueling facility operator supplies written acknowledgement that it will <u>not</u> generate credits	4. <i>Additional reporting requirements for hydrogen pathways with renewable energy inputs:</i> Quantity of renewable feedstock or process energy used to produce renewable hydrogen
2. Hydrogen fuel cell forklifts	1. Fleet operator 2. Third-party producer or provider 3. Provider if fleet operator with written acknowledgement that it will <u>not</u> generate credits	1. Amount of fuel dispensed (kg) 2. CI of hydrogen or blendstocks used to produce hydrogen blend

³ Section 95483(f) Regulated parties for hydrogen and hydrogen blends. Preliminary Draft Regulation Order, p26.

⁴ Quarterly reporting requirements pursuant to section 95491(a)(3)(E). p148