

**\*\*PRELIMINARY DRAFT OF POTENTIAL REGULATORY AMENDMENTS AND AMENDMENT CONCEPTS\*\***

**LEGAL DISCLAIMER & USER'S NOTICE**

**PRELIMINARY DISCUSSION DRAFT of  
Potential Regulatory Amendments to the  
Low Carbon Fuel Standard and Potential Amendment Concepts**

Discussion Draft

This document is a preliminary discussion draft of potential regulatory amendments to the Low Carbon Fuel Standard regulation<sup>1</sup> codified at title 17, California Code of Regulations (CCR), sections 95480-95503, and potential amendment concepts. The language and concepts in this discussion draft was developed by the California Air Resources Board (CARB) staff for the purpose of soliciting stakeholder feedback on potential regulatory amendments. This preliminary discussion draft is intended to help inform the development of an upcoming rulemaking proposal, but all draft potential amendments and concepts included in the document continue to be subject to discussion and development consideration, and accordingly may not reflect what is ultimately included in an eventual rulemaking proposal.

**Note:** CARB staff is using underline-strikeout formatting to show proposed changes. The pre-existing regulation text is set forth below in normal type. The potential revisions are shown in underline to indicate additions and strikethrough to indicate deletions. “\* \* \* \*” indicates omission in this draft document of sections of regulation not excerpted for discussion. This preliminary discussion draft is also not exhaustive of all potential changes being considered for a future rulemaking. For many code sections, staff have included concept boxes to identify potential revisions rather than specific potential regulatory amendment language. Staff welcome feedback on both the underline-strikeout text as well as the conceptual descriptions of revisions include herein.

Stakeholder feedback on these concepts is appreciated by March 15, 2023.

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<sup>1</sup> An unofficial copy of the current LCFS regulation can be found at:  
[https://ww2.arb.ca.gov/sites/default/files/2020-07/2020\\_lcfs\\_fro\\_oal-approved\\_unofficial\\_06302020.pdf](https://ww2.arb.ca.gov/sites/default/files/2020-07/2020_lcfs_fro_oal-approved_unofficial_06302020.pdf)

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**LOW CARBON FUEL STANDARD**

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\* \* \* \* \*

**§ 95482. Fuels Subject to Regulation.**

\* \* \* \* \*

**Additional Regulatory Text Concept for sections 95482 and 95483(a)  
Including Intrastate Fossil Jet Fuel**

CARB staff is exploring inclusion of intrastate fossil jet fuel as a required fuel in the LCFS program. Intrastate jet fuel use is fuel consumed during any flight that takes off and lands within California. CARB staff is evaluating the contribution intrastate jet fuel makes to overall State GHG emissions and the estimated number of deficits generated by intrastate jet fuel. While producers and importers remain the first reporters for alternative jet fuel, assigning airlines as the first fuel reporters could assist in delineating intrastate jet fuel use.

\* \* \* \* \*

**§ 95483. Fuel Reporting Entities.**

The purpose of this section is to identify the first fuel reporting entities, subsequent fuel reporting entities, and the credit or deficit generator for each type of transportation fuel. The first fuel reporting entity is responsible for initiating reporting within the LRT-CBTS for a given amount of fuel and, by default, also holds the status as initial credit or deficit generator for the reported fuel quantity. The fuel reporting entities identified in this section are subject to the reporting requirements pursuant to section 95491 and to any other requirement applicable to a fuel reporting entity and credit or deficit generator under this subarticle.

\* \* \* \* \*

(c) For Electricity Used as a Transportation Fuel.

\* \* \* \* \*

(4) *Electric Forklifts.*

(A) For transportation fuel supplied to electric forklifts, the owner of the equipment capable of metering electricity to electric forklifts is the fuel reporting entity and the credit generator. ~~the fleet owner is the~~

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~~fuel reporting entity and the credit generator for electricity supplied to a specified fleet.~~

- (B) Subsection (A) above notwithstanding, the electric forklift fleet owner may elect not to be the credit generator and instead designate another entity to be the credit generator, if the two entities agree by written contract that:
1. The electric forklift fleet owner will not generate credits and will instead provide the electricity data to the designated entity for LCFS reporting pursuant to sections 95483.2(b)(8), 95491 and 95491.1.
  2. The designated entity accepts all LCFS responsibilities as the fuel reporting entity and credit generator.
  3. ~~The EDU can generate credits for electricity supplied to electric forklift fleet in its service territory during a reporting period if not claimed by any other entity under paragraphs 1. and 2., above. The EDU must meet the requirements in section 95491(d)(3)(A), paragraphs 3. through 5.~~
- (C) An entity that generates credits for electric forklifts must meet the requirements set forth in paragraphs 2. through 7. in section 95491(d)(3)(A), as applicable.

\* \* \* \* \*

**§ 95484. Annual Carbon Intensity Benchmarks.**

\* \* \* \* \*

**Additional Regulatory Text Concept for section 95484, LCFS Carbon Intensity Benchmarks**

CARB staff will be revising the LCFS carbon intensity benchmarks and are considering requiring 25%, 30% or 35% carbon intensity reduction by 2030, relative to a 2010 baseline. The update would also include declining carbon intensity benchmarks after 2030, and could potentially reach a 90% reduction by 2045. The tables will be populated with annual values after further feedback on compliance targets has been received and evaluated and staff make a final recommendation.

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\* \* \* \* \*

**§ 95486.1. Generating and Calculating Credits and Deficits Using Fuel Pathways.**

(a) General Calculation of Credits and Deficits Using Fuel Pathways. LCFS credits or deficits for each fuel or blendstock for which a fuel reporting entity is the credit or deficit generator will be calculated according to the following equations:

$$(1) \quad Credits_i^{XD} / Deficits_i^{XD} (MT) = (CI_{standard}^{XD} - CI_{reported}^{XD}) \times E_{displaced}^{XD} \times C$$

where:

$Credits_i^{XD} / Deficits_i^{XD} (MT)$  is either the number of LCFS credits generated (a zero or positive value), or deficits incurred (a negative value), in metric tons, by a fuel or blendstock under the average carbon intensity requirement for gasoline ( $XD = \text{"gasoline"}$ ), diesel ( $XD = \text{"diesel"}$ ), or jet fuel ( $XD = \text{"jet"}$ );

$CI_{standard}^{XD}$  is the average carbon intensity requirement of either gasoline ( $XD = \text{"gasoline"}$ ), diesel ( $XD = \text{"diesel"}$ ), or jet fuel ( $XD = \text{"jet"}$ ) for a given year as provided in sections 95484(b), (c) and (d), respectively;

$CI_{reported}^{XD}$  is the adjusted carbon intensity value of a fuel or blendstock, in gCO<sub>2</sub>e/MJ, calculated pursuant to section 95486.1(a)(2);

$E_{displaced}^{XD}$  is the total quantity of gasoline ( $XD = \text{"gasoline"}$ ), diesel ( $XD = \text{"diesel"}$ ), or jet ( $XD = \text{"jet"}$ ) fuel energy displaced, in MJ, by the use of an alternative fuel, calculated pursuant to section 95486.1(a)(3); and

$C$  is a factor used to convert credits to units of metric tons from gCO<sub>2</sub>e and has the value of:

$$C = 1.0 \times 10^{-6} \frac{(MT)}{(gCO_2e)}$$

$$(2) \quad CI_{reported}^{XD} = \frac{CI_i}{EER^{XD}}$$

where:

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$CI_i$  is the carbon intensity of the fuel or blendstock, measured in gCO<sub>2</sub>e/MJ, determined by a CA-GREET pathway or a custom pathway and incorporates a land use modifier (if applicable); and

$EER^{XD}$  is the dimensionless Energy Economy Ratio (EER) relative to gasoline ( $XD = \text{"gasoline"}$ ), diesel ( $XD = \text{"diesel"}$ ), or jet fuel ( $XD = \text{"jet"}$ ) as listed in Table 5. For a vehicle-fuel combination not listed in Table 5,  $EER^{XD} = 1$  must be used unless an applicant is granted certification of an EER-adjusted CI value pursuant to section 95488.7(a)(3).

(3)  $E_{displaced}^{XD} = E_i \times EER^{XD}$

where:

$E_i$  is the energy of the fuel or blendstock, in MJ, determined from the energy density conversion factors in Table 4, except as noted in subsection (4) below.

(4) For Fixed Guideway Systems and Forklifts:

$$E_{displaced}^{XD} = E_i$$

where:

$E_i$  is the energy of the fuel used to propel fixed guideway systems, ~~electric forklifts, and hydrogen fuel cell forklifts.~~ For fixed guideway system expansion beyond 2010, ~~and for electric and hydrogen fuel cell forklifts with model year 2011 or later,~~ the formula for displaced energy in section 95486.1(a)(3) may be used with Executive Officer approval.

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**Table 5. EER Values for Fuels Used in Light- and Medium-Duty, and Heavy-Duty Applications.**

<b>Light/Medium-Duty Applications (Fuels used as gasoline replacement)</b>		<b>Heavy-Duty/Off-Road Applications (Fuels used as diesel replacement)</b>		<b>Aviation Applications (Fuels used as jet fuel replacement)</b>	
<b>Fuel/Vehicle Combination</b>	<b>EER Values Relative to Gasoline</b>	<b>Fuel/Vehicle Combination</b>	<b>EER Values Relative to Diesel</b>	<b>Fuel/Vehicle Combination</b>	<b>EER Values Relative to Conventional Jet</b>
Gasoline (incl. E6 and E10) Or E85 (and other ethanol blends)	1	Diesel fuel Or Biomass-based diesel blends	1	Alternative Jet Fuel	1
CNG/ICEV	1	CNG or LNG (Spark-Ignition Engines)  CNG or LNG (Compression-Ignition Engines)	0.9  1		
Electricity/BEV, or PHEV	3.4	Electricity/BEV or PHEV* Truck or Bus  Electricity/Fixed Guideway, Heavy Rail  Electricity/Fixed Guideway, Light Rail	5.0  4.6  3.3		
On-Road Electric Motorcycle	4.4	Electricity/Trolley Bus, Cable Car, Street Car  <u>Electricity Forklifts with lift capacity &lt;12,000 lbs.</u>	3.1  <u>1.9</u>		

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		Electricity Forklifts with lift capacity >12,000 lbs.	<u>3.8</u>	
		eTRU	3.4	
		eCHE	2.7	
		eOGV	2.6	
H2/FCV	2.5	H2/FCV	1.9	
		H2 Fuel Cell Forklifts with lift capacity <12,000 lbs.	<u>1.1</u>	
		H2 Fuel Cell Forklifts with lift capacity >12,000 lbs.	<u>2.1</u>	
Propane	1.0	Propane	0.9	

\*BEV = battery electric vehicle, PHEV= plug-in hybrid electric vehicle, FCV = fuel cell vehicle, ICEV = internal combustion engine vehicle.

\* \* \* \* \*

**§ 95486.3. Generating and Calculating Credits for Medium- and Heavy-Duty ZEV Fueling Infrastructure Pathways.**

**(a) Medium- and Heavy-Duty Hydrogen Refueling Infrastructure (MHD-HRI) Pathways.**

**(1) MHD-HRI Pathway Eligibility.** A medium- and heavy-duty hydrogen station owner or its designee may submit an application to certify an MHD-HRI pathway subject to the following eligibility conditions:

- (A)** The proposed MHD-HRI station must be open to vehicles with a gross vehicle weight rating 8,501 lbs and greater.
- (B)** The proposed MHD-HRI station must be located in California within one mile of a Federal Highway Administration Alternative Fuel Corridor.
- (C)** The MHD-HRI pathway application must be received on or before December 31, 2029.



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- (D) An applicant is not eligible to submit additional applications once the estimated potential MHD-HRI credits for that applicant's approved sites exceed X percent of the deficits in the most recent quarter for which data is available.
- (E) The following stations are not eligible for MHD-HRI crediting:
  - 1. Any station receiving or spending funds pursuant to any settlement related to any California or Federal regulation enforcement; or
  - 2. Any station built as a required mitigation measure pursuant to the California Environmental Quality Act.
- (2) MHD-HRI Application Requirements. For each medium- and heavy-duty hydrogen refueling station, the station owner must submit an application the LRT-CBTS containing the following information:
  - (A) Name and address of the owner of the proposed station.
  - (B) Contact person for the owner entity.
    - 1. Name
    - 2. Title or position
    - 3. Phone number
    - 4. Mobile phone number
    - 5. Email address
  - (C) Name, street address, latitude, longitude and a location description for the proposed station.
  - (D) Expected daily permitted hours of operation for the station. If the daily permitted hours are less than 24 hours, the applicant must provide documentation from a permitting authority demonstrating that daily permitted hours for the station are limited.
  - (E) The station nameplate refueling capacity for the permitted hours of operation calculated using the most recent HySCapE model or an equivalent model or capacity estimation methodology approved by the Executive Officer. The applicant must submit a completed model with the application.
  - (F) The MHD-HRI refueling capacity for the station calculated using the following equation:

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$$Cap_{HRI}^i = 0.5 \times RF_{HRI}^i$$

where:

Cap<sub>HRI</sub><sup>i</sup> is the HRI refueling capacity (kg/day) for the FSE I; and

RF<sub>HRI</sub><sup>i</sup> is the nameplate refueling capacity for the FSE or 6,000 kg/day, whichever is less.

- (G) The number of dispensing units at the station.
- (H) Expected source(s) of hydrogen, CI value(s), and method(s) used for delivery.
- (I) Expected date that the station will be operational.
- (K) A signed attestation letter from the applicant attesting to the veracity of the information in the application packet. The attestation letter must be submitted as an electronic copy, be on company letterhead, be signed by an officer of the applicant with authority to attest to the veracity of the information in the application and to sign on behalf of the applicant, be from the applicant and not from an entity representing the applicant (such as a consultant or legal counsel), and include the following attestation:

I, an authorized representative of \_\_\_\_\_ (applicant entity), attest to the veracity of the information submitted as part of the Medium- and Heavy Duty Hydrogen Refueling Infrastructure (MHD-HRI) application, attest that the proposed FSE is not receiving funds pursuant to any enforcement settlement related to any California or Federal regulation, and declare that the information submitted accurately represents the anticipated and intended design and operation of the hydrogen refueling station. Further, I understand and agree to each of the statements in the attached application. I am a duly authorized officer with authority to attest to the veracity of the information in the application and to sign on behalf of the respective applicant.

I understand that the following information in the MHD-HRI application will be made available on the LCFS web site: Name of the Applicant Entity, Station Name, Station Address, Number of Dispensing Units, HRI Refueling Capacity, and Effective Date Range for HRI Crediting.

By submitting this application, \_\_\_\_\_ (applicant entity) accepts responsibility for the information herein provided to CARB. I certify under penalty of perjury under the laws of the State of California that I have personally examined, and am familiar with, the statements and information submitted in this document. I certify that the statements and information submitted to CARB are true, accurate, and complete.

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Signature \_\_\_\_\_ Print Name & Title \_\_\_\_\_ Date \_\_\_\_\_

- (L) CBI must be designated pursuant to the requirements described in section 95488.8(c).

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(M) An application and supporting documents must be submitted electronically via the LRT-CBTS unless the Executive Officer has approved or requested in writing another format.

(3) Application Approval Process.

(A) The MHD-HRI application must be approved by the Executive Officer before the station owner may generate hydrogen refueling infrastructure credits. If estimated potential MHD-HRI credits from all approved stations exceed X percent of deficits in the most recent quarter for which data is available, the Executive Officer will not approve additional MHD-HRI pathways and will not accept additional applications until estimated potential HRI credits are less than X percent of deficits. MHD-HRI applications will be evaluated for approval on a first come, first served basis.

Estimated potential MHD-HRI credits will be calculated using the following equation:

$$\text{Credits}_{\text{HRI}}^{\text{Potential}} = \text{Credits}_{\text{HRI}}^{\text{PriorQ}} \times \frac{\text{Cap}_{\text{HRI}}^{\text{Approved}}}{\text{Cap}_{\text{HRI}}^{\text{Operation}}}$$

where:

$\text{Credits}_{\text{HRI}}^{\text{Potential}}$  means the estimated potential HRI credits from all approved HRI stations;

$\text{Credits}_{\text{HRI}}^{\text{PriorQ}}$  means the total HRI credits generated by operational stations in the the most recent quarter for which data is available;

$\text{Cap}_{\text{HRI}}^{\text{Approved}}$  means the total HRI capacity of stations that were operation in the the most recent quarter for which data is available; and

$\text{Cap}_{\text{HRI}}^{\text{Operation}}$  means the total HRI capacity of all approved stations, both operational and nonoperational.

(B) After receipt of an application designated by the applicant as ready for formal evaluation, the Executive Officer will advise the applicant in writing either that:

1. The application is complete, or

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2. The application is incomplete, in which case the Executive Officer will identify which requirements of section 95486.2(a)(2) have not been met.
    - a. The applicant may submit additional information to correct deficiencies identified by the Executive Officer.
    - b. If the applicant is unable to achieve a complete application at the end of the quarter of the Executive Officer's receipt of the original application, the application will be denied on that basis, and the applicant will be informed in writing.
  3. At any point during the application evaluation process, the Executive Officer may request in writing additional information or clarification from the applicant.
- (C) The Executive Officer will not approve an application if the Executive Officer determines, based upon the information submitted in the application and any other available information, that the application does not meet requirements in subsections 95486.3(a)(1) and (a)(2). If the Executive Officer does not approve the application, the applicant will be notified in writing and the basis for the disapproval shall be identified.
- (D) If the Executive Officer determines that the applicant and application have met all requirements for approval pursuant to subsections 95486.3(a)(1) and (a)(2), the Executive Officer will approve the application and provide an approval summary on the LCFS website including the station location and assigned identifier, number of dispensing units, MHD-HRI refueling capacity, and effective date range for HRI pathway crediting.
- (E) *Crediting Period.* MHD-HRI crediting is limited to 10 years starting with the quarter following Executive Officer approval of the application.
- (4) *Requirements to Generate MHD-HRI Credits.* To generate credits using HRI pathways the station must meet the following conditions. The station owner must maintain, and submit to CARB upon request, records demonstrating adherence to these conditions.

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- (A) The station owner must update the HRI refueling capacity if different from the design HRI refueling capacity provided in the application. Any station design or operational information that deviates from the original application must be declared to the Executive Officer, and a new attestation must be submitted pursuant to 95486.2(a)(2).
- (B) The station must be open to at least two different trucking companies, meaning that no obstructions or obstacles exist to preclude these vehicles from entering the station premises, and no formal or registered station training shall be required for individuals to use the hydrogen refueling station.
- (C) If the FSE charges a fee for service the FSE must be capable of supporting a public point-of-sale method that accepts all major fuel, credit and debit cards.
- (D) The station is connected to the Station Operational Status System (SOSS), is listed open for retail, and:
  - 1. The station passed final inspection by the appropriate authority having jurisdiction and has a permit to operate.
  - 2. The station owner has fully commissioned the station, and has declared it fit to service retail FCV drivers. This includes the station owner's declaration that the station meets an appropriate SAE fueling protocol.
  - 3. At least three OEMs have confirmed that the station meets protocol expectations, and their customers can fuel at the station.
  - 4. All dispensers installed in the hydrogen refueling station have undergone type evaluation according to the California Type Evaluation Program (CTEP) administered by the California Department of Food and Agriculture/Division of Measurement Standards (CDFA/DMS) and have either a Temporary Use Permit or a type approval Certificate of Approval issued by CDFA/DMS.
- (E) The FSE registration must be completed pursuant to section 95483.2(b)(8) and the quantity of dispensed hydrogen must be reported as required in section 95491.
- (F) Dispensed hydrogen meets the following CI and renewable content requirements on a company-wide, weighted average basis. The

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Executive Officer will consider all the stations registered by an entity with a unique FEIN in the LRT-CBTS for calculating the company-wide weighted average CI and renewable content.

1. CI of 150 gCO<sub>2</sub>e/MJ or less before December 31, 2029, and X thereafter, and
2. Renewable content of 40 percent or greater before December 31, 2029, and X percent thereafter.

(G) If the applicant fails to demonstrate FSE operability within 24 months of approval and if estimated potential HRI credits from all approved FSEs exceed X percent of deficits in the the most recent quarter for which data is available, the application will be canceled.

(H) The estimated cumulative value of MHD-HRI credits generated for the station in the most recent quarter for which data is available must be less than the difference between the initial eligible capital expenditure reported pursuant to section 95486.3(a)(6)(C)1. and the total grant revenue or other funding reporting pursuant to sections 95486.3(a)(6)(B)5. and 95486.3(a)(6)(B)6. in the the most recent quarter for which data is available.

1. The estimated value of MHD-HRI credits, for the purpose of this determination, shall be calculated using the number of MHD-HRI credits generated for the station in the quarter and the average LCFS credit price for that quarter published on the LCFS website.
2. The estimated value calculated under this provision will be made available only to the respective reporting entity in LRT-CBTS and will not be published on the LCFS website.
3. This will not affect the reporting entity's ability to generate LCFS credits for the electricity dispensed at the station.

(5) Calculation of MHD-HRI Credits. MHD-HRI credits will be calculated using the following equation:

$$\text{Credits}(MT) = \frac{CI_{standard}^{XD} \times EER - CI_{HRI}}{E_{H2}} \times (Cap_{HRI} \times N \times UT - H2_{disp}) \times C$$

where:

$CI_{standard}^{XD}$  is the average carbon intensity requirement of diesel (XD = "diesel") for a given year as provided in sections 95484(b);

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$EER$  is the dimensionless Energy Economy Ratio for H2/FCV relative to gasoline diesel as listed in Table 5;

$CI_{HRI}$  is the carbon intensity used for HRI crediting. Company-wide weighted average CI for dispensed hydrogen during the quarter or 0 g/MJ, whichever is greater;

$E_{H2}$  is the energy density for hydrogen in MJ/kg as listed in Table 4;

$Cap_{HRI}$  is the HRI refueling capacity for the station (kg/day);

$UT$  is the the uptime multiplier which is the percentage of time that the station is available as reported to SOSS during the quarter;

$H2_{disp}$  is the quantity of hydrogen dispensed during the quarter (kg);

$N$  is the number of days during the quarter;

$C$  is a factor used to convert credits to units of metric tons from gCO<sub>2</sub>e and has the value of:

$$C = 1.0 \times 10^{-6} \frac{(MT)}{(gCO_2e)}$$

(6) *Reporting and Recordkeeping Requirements.* The following must be reported to the Executive Officer each quarter as set forth in section 95491 before credits will be issued to the LRT account associated with an approved HRI pathway.

(A) Station availability. This is the percentage of hours the station is available for fueling during the quarter relative to the permitted hours of operation for the station, as reported to the SOSS. Any period of time that SOSS reports that a portion of the station capacity is not available will count as a pro-rated amount of station availability, proportional to the percentage of the station capacity that remains available for fueling for this period of time.

(B) Company-wide, weighted average renewable content (percent) for dispensed hydrogen.

(C) Cost and Revenue Data. Provide an annual account of the following costs borne and revenues received by the station owner per station in the annual report.

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1. Initial eligible capital expenditures (\$) prior to the first quarter of operation. Eligible capital expenditures include equipment, material and labor costs associated with the site's fueling, and storage. Land, electrical generation, and hydrogen production by steam methane reforming are ineligible.
2. Total capital expenditures (\$)
3. Total delivered cost (\$) of hydrogen and average delivered cost (\$/kg) for hydrogen
4. Total maintenance costs (\$)
5. Total land rental cost (\$)
6. Total grant revenue or other external funding received towards capital expenditures (\$)
7. Total grant revenue or other external funding received towards operational and maintenance expenditures (\$)
8. Total revenue (\$) received from sale of hydrogen and average retail price (\$/kg) for hydrogen sold
9. Other operational expenditures (\$)

(b) *Medium- and Heavy-Duty DC Fast Charging Infrastructure (MHD-FCI) Pathways.*

(1) *MHD-FCI Pathway Eligibility.* An FSE owner or its designee may submit an application to receive an MHD-FCI pathway subject to the following eligibility conditions:

- (A) The proposed FSE must be open to vehicles with a gross vehicle weight rating 8,501 lbs and greater for charging.
- (B) The proposed FSE must be located in California within one mile of a Federal Highway Administration Alternative Fuel Corridor.
- (C) The proposed FSE must support an open international standard fast charging connector protocol, such as: CHAdeMO, SAE CCS, NACS, and/or MCS;
- (D) An applicant is not eligible to submit additional applications once the estimated potential MHD-FCI credits for that applicant's approved sites exceed X percent of the deficits in the most recent quarter for which data is available.
- (E) The FCI pathway application must be received on or before December 31, 2029.



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(F) The following FSE are not eligible for FCI crediting:

1. Any FSE receiving or spending funds pursuant to any settlement related to any California or Federal regulation enforcement; or
2. Any FSE built as a required mitigation measure pursuant to the California Environmental Quality Act.

(G) Each FSE must have a minimum nameplate power rating of X kW.

(H) Each FSE must be networked and capable of monitoring and reporting its availability for charging.

(2) MHD-FCI Application Requirements. The applicant must submit an application in the LRT-CBTS containing the following information:

(A) Name and address of the owner of the proposed FSE.

(B) Contact person for the owner entity.

1. Name
2. Title or position
3. Phone number
4. Mobile phone number
5. Email address

(C) Name, street address, latitude, longitude and a location description for each proposed FSE site.

(D) The number of FSEs. The total number of FSEs claiming MHD-FCI credit at a single site under this provision cannot exceed X. FSEs claiming FCI credits owned by the applicant on site property or adjoining properties are included in this count.

(E) The nameplate power rating (kW), connector type(s), and model for each FSE. The total nameplate power rating for all FSE claiming MHD-FCI credit at a single site under this provision cannot exceed X MW. FSEs claiming FCI credits owned by the applicant on site property or adjoining properties are included in this count.

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(F) Total site power. Total power available to an MHD-FCI site must be equal to or greater than the sum of the nameplate power ratings of all FSEs at the site.

(G) The MHD-FCI charging capacity for each FSE calculated using the following equation:

$$Cap_{FCI}^i = 0.2 \times 24 \times P_{FCI}^i$$

where:

Cap<sub>FCI</sub><sup>i</sup> is the FCI charging capacity (kWh/day) for the FSE i; and

P<sub>FCI</sub><sup>i</sup> is the nameplate power rating for the FSE.

(H) Expected date that the FSE will be operational.

(I) Expected daily permitted hours of operation for the site. If the daily permitted hours are less than 24 hours, the applicant must provide documentation from a permitting authority demonstrating that daily permitted hours for the FSE are limited.

(J) A signed attestation letter from the applicant attesting to the veracity of the information in the application packet. The attestation letter must be submitted as an electronic copy, be on company letterhead, be signed by an officer of the applicant with authority to attest to the veracity of the information in the application and to sign on behalf of the applicant, be from the applicant and not from an entity representing the applicant (such as a consultant or legal counsel), and include the following attestation:

I, an authorized representative of \_\_\_\_\_ (proposed FSE owner entity), attest to the veracity of the information submitted as part of the DC Fast Charging Infrastructure (FCI) application, attest that the proposed FSE is not receiving funds pursuant to any enforcement settlement related to any California or Federal regulation, and declare that the information submitted accurately represents the anticipated and intended design and operation of the charging infrastructure. Further, I understand and agree to each of the statements in the attached application. I am a duly authorized officer with authority to attest to the veracity of the information in the application and to sign on behalf of the respective applicant.

I understand that the following information in the FCI application will be made available on the LCFS web site: Name of the Applicant Entity, Site Name, Site Address, Number and Type of Charging Units, Nameplate and Effective Simultaneous Power Rating for Each Unit, and Effective Date Range for FCI Crediting

By submitting this application, \_\_\_\_\_ (applicant entity) accepts responsibility for the information herein provided to CARB. I certify under penalty of perjury under the laws of the State of California that I have personally examined, and am familiar with, the statements and information submitted in this document. I certify that the statements and information submitted to CARB are true, accurate, and complete.

Signature \_\_\_\_\_

Print Name & Title \_\_\_\_\_

Date \_\_\_\_\_

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(K) CBI must be designated pursuant to the requirements described in section 95488.8(c).

(L) An application and supporting documents must be submitted electronically via the LRT-CBTS unless the Executive Officer has approved or requested in writing another format.

(3) MHD-FCI Application Approval Process.

(A) The MHD-FCI application must be approved by the Executive Officer before the applicant may generate MHD-FCI credits. If estimated potential FCI credits from all approved FSEs exceed X percent of deficits in the most recent quarter for which data is available, the Executive Officer will not approve additional FCI pathways and will not accept additional applications until FCI credits are less than X percent of deficits. MHD-FCI applications will be evaluated for approval on a first come, first served basis. Estimated potential MHD-FCI credits will be calculated using the following equation:

$$Credits_{FCI}^{Potential} = Credits_{FCI}^{PriorQ} \times \frac{Cap_{FCI}^{Approved}}{Cap_{FCI}^{Operation}}$$

where:

$Credits_{FCI}^{Potential}$  means the estimated potential FCI credits from all approved FCI stations;

$Credits_{FCI}^{PriorQ}$  means the total FCI credits generated by operational FSEs in the most recent quarter for which data is available;

$Cap_{FCI}^{Approved}$  means the total FCI charging capacity of FSEs that were operational in the most recent quarter for which data is available; and

$Cap_{FCI}^{Operation}$  means the total FCI charging capacity of all approved FSEs, both operational and nonoperational.

(B) The estimated potential FCI credits for an individual applicant will be calculated using the same equation as in subsection (A) above, where:

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$Credits_{FCI}^{Potential}$  means the estimated potential FCI credits from the applicant's approved FSEs;

$Credits_{FCI}^{PriorQ}$  means the total FCI credits generated by the applicant for operational FSEs in the most recent quarter for which data is available;

$Cap_{FCI}^{Approved}$  means the total FCI charging capacity of all of the applicant's approved FSEs, both operational and nonoperational.

$Cap_{FCI}^{Operation}$  means the total FCI capacity of all approved stations, both operational and nonoperational.

(C) After receipt of an application designated by the applicant as ready for formal evaluation, the Executive Officer shall advise the applicant in writing either that:

1. The application is complete, or
2. The application is incomplete, in which case the Executive Officer will identify which requirements of section 95486.2(b)(2) have not been met.
  - a. The applicant may submit additional information to correct deficiencies identified by the Executive Officer.
  - b. If the applicant is unable to achieve a complete application at the end of the quarter of the Executive Officer's receipt of the original application, the application will be denied on that basis, and the applicant will be informed in writing.
3. At any point during the application evaluation process, the Executive Officer may request in writing additional information or clarification from the applicant.

(D) The Executive Officer shall not approve an application if the Executive Officer determines, based upon the information submitted in the application and any other available information, that the application does not meet requirements in subsections 95486.3(b)(1) and (b)(2). If the Executive Officer does not approve

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the application, the applicant will be notified in writing and the basis for the disapproval shall be identified.

(E) If the Executive Officer determines the application has met all requirements for approval pursuant to subsections 95486.2(b)(1) and (b)(2), the Executive Officer will approve the application and provide an approval summary on the LCFS website including the site location and FSE ID, number and type of FSE, nameplate and effective simultaneous power rating for each FSE, and effective date range for MHD-FCI pathway crediting.

(F) Crediting Period. MHD-FCI crediting is limited to 10 years starting with the quarter following Executive Officer approval of the application.

(4) Requirements to Generate FCI Credits. To generate credits using FCI pathways the following conditions must be met. The applicant must maintain, and submit to CARB upon request, records demonstrating adherence to these conditions.

(A) The applicant must update the nameplate and effective simultaneous power rating of FSE if different from the power rating provided in the application. Any FSE design or operational information that deviates from the original application must be declared to the Executive Officer, and a new attestation must be submitted using the language in section 95486.3(b)(2).

(B) The FSE must be open to vehicles with gross vehicle weight 8,501 lbs and greater, meaning that no obstructions or obstacles exist to preclude these vehicles from entering the FSE premises, and no formal or registered equipment training shall be required for individuals to use the FSE.

(C) If the FSE charges a fee for service the FSE must be capable of supporting a public point-of-sale method that accepts all major fuel, credit and debit cards.

(D) The FSE passed final inspection by the appropriate authority having jurisdiction and has a permit to operate.

(E) The FSE owner has fully commissioned the FSE, and has declared it fit to service medium- and heavy-duty vehicles.

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- (F) The FSE registration must be completed pursuant to section 95483.2(b)(8) and the quantity of dispensed electricity must be reported as required in section 95491.
- (G) If the applicant fails to demonstrate FSE operability within 24 months of approval and if estimated potential FCI credits from all approved FSEs exceed X percent of deficits in the most recent quarter for which data is available, then the application will be canceled.
- (H) The estimated cumulative value of MHD-FCI credits generated for the FSE in the most recent quarter for which data is available must be less than the difference between the initial eligible capital expenditure reported pursuant to section 95486.3(b)(6)(C)1. and the initial total grant revenue or other funding reported pursuant to section 95486.2(b)(6)(B)5 and 95486.3(b)(6)(B)6. in the most recent quarter for which data is available.
  - 1. The estimated value of FCI credits, for the purpose of this determination, shall be calculated using the number of MHD-FCI credits generated for the FSE in the quarter and the average LCFS credit price for that quarter published on the LCFS website.
  - 2. The estimated value calculated under this provision will be made available only to the respective reporting entity in LRT-CBTS and will not be published on the LCFS website.
  - 3. This will not affect the reporting entity's ability to generate non-FCI LCFS credits for the electricity dispensed at the FSE.

(5) Calculation of MHD-FCI Credits. FCI credits will be calculated using the following equation for each FSE approved under this provision:

$$Credits_{FCI}(MT) = \frac{(CI_{standard}^{XD} \times EER - CI_{FCI}) \times C_{Elec} \times (Cap_{FCI}^i \times N \times UT - Elec_{disp}) \times C}{}$$

where

$CI_{standard}^{XD}$  is the average carbon intensity requirement of diesel (XD = "diesel") for a given year as provided in section 95484(b);

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EER is the dimensionless Energy Economy Ratio for Electricity/BEV or PHEV relative to gasoline as listed in Table 5;

CI<sub>FCI</sub> is the California average grid electricity carbon intensity as listed in Table 7-1;

C<sub>Elec</sub> is the conversion factor for electricity as listed in Table 4;

Cap<sub>FCI</sub><sup>i</sup> is the FCI charging capacity (kWh/day) for the FSE;

N is the number of days during the quarter;

UT is the uptime multiplier which is the fraction of time that the FSE is available for charging during the quarter;

Elec<sub>disp</sub> is the quantity of electricity dispensed during the quarter (kWh);

C is a factor used to convert credits to units of metric tons from gCO<sub>2e</sub> and has the value of:

$$C = 1.0 \times 10^{-6} \frac{(MT)}{(gCO_2e)}$$

(6) Reporting and Recordkeeping Requirements. The following must be reported to the Executive Officer each quarter as set forth in section 95491 before credits will be issued to the LRT account associated with an approved MHD-FCI pathway.

(A) FSE availability. This is the percentage of hours the FSE is available for charging during the quarter relative to the permitted hours of operation for the site.

(B) Cost and Revenue Data. Provide an annual account of the following costs borne and revenues received by the FSE owner up through the most recent reporting quarter per site.

1. Initial eligible capital expenditures (\$) prior to the first quarter of operation. Eligible capital expenses include equipment, material, and labor costs associated with the site's chargers and battery energy storage systems. Land and electrical generation are ineligible capital expenses.
2. Total capital expenditures (\$)
3. Total delivered cost (\$) of electricity, including demand charges, and average delivered cost (\$/kWh) for electricity

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4. Total maintenance costs (\$)
5. Total land rental cost (\$)
6. Total grant revenue or other external funding received towards capital expenditures (\$)
7. Total grant revenue or other external funding received towards operational and maintenance expenditures (\$)
8. Total revenue (\$) received from sale of electricity and average retail price (\$/kWh) for electricity sold
9. Other operational expenditures (\$)

\* \* \* \* \*

**§ 95488.5. Lookup Table Fuel Pathway Application Requirements and Certification Process.**

\* \* \* \* \*

**Additional Regulatory Text Concept for section 95488.5  
95488.5(e) and (f): Updates to Lookup Table Values in Tables 7-1 and 7-2**

CARB staff is working to update emission factors used to calculate Lookup Table CI values. Staff is considering proposing to update the Lookup Table CI values for the following fuel pathways:

- CARBOB
- ULSD
- CaRFG
- Compressed natural gas
- Propane
- California Grid Electricity.

Staff is developing a Tier 1 calculator for hydrogen, which would replace the existing hydrogen Lookup Table pathways in Table 7-1.

\* \* \* \* \*



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**§ 95488.6. Tier 1 Fuel Pathway Application Requirements and Certification Process.**

\* \* \* \* \*

**Additional Regulatory Text Concept for section 95488.6**

CARB staff is working to update Tier 1 Simplified Calculators to reflect updated science, emission factors, and other adjustments for the following Tier 1 Calculators:

- Starch and Fiber Ethanol
- Sugarcane-derived Ethanol
- Biodiesel and Renewable Diesel
- Biomethane from North American Landfills
- Biomethane from Anaerobic Digestion of Wastewater Sludge
- Biomethane from Anaerobic Digestion of Organic Waste
- Anaerobic Digestion of Dairy and Swine Manure

CARB staff is working to add a new Tier 1 Simplified Calculator for Hydrogen

\* \* \* \* \*

**§ 95488.8. Fuel Pathway Application Requirements Applying to All Classifications.**

\* \* \* \* \*

(i) *Indirect Accounting for Renewable or Low-CI Electricity and Biomethane.*

\* \* \* \* \*

(2) *Book-and-Claim Accounting for Pipeline-Injected Biomethane Used as a Transportation Fuel or to Produce Hydrogen.* Indirect accounting may be used for RNG used as a transportation fuel or to produce hydrogen for transportation purposes (including hydrogen that is used in the production of a transportation fuel), provided the conditions set forth below are met:

(A) On or before December 31, XXXX, RNG injected into the common carrier pipeline in North America (and thus comingled with fossil natural gas) can be reported as dispensed as bio-CNG, bio-LNG, or

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bio-L-CNG, or as an input to hydrogen production, without regards to physical traceability. Entities may report natural gas as RNG within only a three-quarter time span. If a quantity of RNG (and all associated environmental attributes, including a beneficial CI) is pipeline-injected in the first calendar quarter, the quantity claimed for LCFS reporting must be matched to natural gas sold in California as RNG no later than the end of the third calendar quarter. After that period is over, any unmatched RNG quantities expire for the purpose of LCFS reporting.

(B) Starting January 1, XXXX, biomethane injected into the common carrier pipeline must meet the following deliverability requirements:

\* \* \* \* \*

**Additional Regulatory Text Concept for section 95488.8(i)  
Deliverability Requirements for Indirect Accounting of Biomethane**

CARB staff is considering aligning the deliverability requirements for biomethane with current requirements for indirect accounting of low-CI electricity. Deliverability helps ensure California can decarbonize its natural gas use and achieve carbon neutrality and emissions reductions required by AB 1279. Staff's concept is to align with the deliverability requirements of biomethane used as a vehicle fuel with similar provisions in the Renewables Portfolio Standard and CPUC 1440 program (CPUC section 651(b)(3)). Specifically, biomethane delivered to California for use as a primary fuel through common carrier pipeline must physically flow within California or toward the end user in California for which biomethane was produced. Eligible pipelines must flow toward California 50% of a given year, consistent with RPS eligibility rules. Biomethane used to produce hydrogen is not subject to the deliverability requirement and can continue to be sourced indirectly from projects in North America

\* \* \* \* \*

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**Additional Regulatory Text Concept for section 95488.8(i)  
Book-and-Claim for Low-CI Hydrogen**

CARB staff is exploring how the LCFS can most effectively support increased production and delivery of low-CI hydrogen. One option would be to allow indirect accounting for low-CI hydrogen injected into the pipeline network. Staff believes that book-and-claim (indirect accounting) could provide important flexibility to low-CI hydrogen producers in facility siting and supply logistics. CARB staff is looking to align LCFS indirect accounting provisions with the Inflation Reduction Act incentives by considering well-to-wheel thresholds of less than or equal to 55 g/MJ for gaseous hydrogen or less than or equal to liquid hydrogen. Staff is considering proposing to exclude hydrogen derived from fossil gas from book-and-claim eligibility.

\* \* \* \* \*

**§ 95488.9. Special Circumstances for Fuel Pathway Applications.**

\* \* \* \* \*

- (f) *Carbon Intensities that Reflect Avoided Methane Emissions from Dairy and Swine Manure or Organic Waste Diverted from Landfill Disposal.*

\* \* \* \* \*

- (3) Carbon intensities that reflect avoided methane emissions from dairy and swine manure or organic waste projects are subject to the following requirements for credit generation:

- (A) *Crediting Periods.* Avoided methane crediting for dairy and swine manure pathways as described in (f)(1) above, and for landfill-diversion pathways as described in (f)(2) above, is limited to three consecutive 10 years crediting periods, counting from the quarter following Executive Officer approval of the application, until December 31, XXXX. The pathway holder must formally request each subsequent crediting period for the project through the LRT-CBTS. Applications certified or re-certified on or before December 31, XXXX, as described in (f)(3) above, will receive avoided methane crediting for the full 10-year crediting period.
- (B) Notwithstanding (A) above, in the event that any law, regulation, or legally binding mandate requiring either greenhouse gas emission reductions from manure methane emissions from livestock and

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dairy projects or diversion of organic material from landfill disposal, comes into effect in California during a project's crediting period, then the project is only eligible to continue to receive LCFS credits for those greenhouse gas emission reductions for the remainder of the project's current crediting period. The project may not request any subsequent crediting periods.

- (C) Notwithstanding (A) above, projects that have generated CARB Compliance Offset Credits under the market-based compliance mechanism set forth in title 17, California Code of Regulations Chapter 1, Subchapter 10, article 5 (commencing with section 95800) may apply to receive credits under the LCFS. However, the LCFS crediting period for such projects is aligned with the crediting period for Compliance Offset Credits, and does not reset when the project is certified under the LCFS.

\* \* \* \* \*

**§ 95489. Provisions for Petroleum-Based Fuels.**

**Additional Regulatory Text Concept for section 95489  
Phase-Out Crediting of Petroleum Projects**

CARB staff is considering to propose to phase out crediting of petroleum projects by 2040, with carbon capture and sequestration projects excluded.

This concept would signal that the program will continue to support projects in the near-term with a defined future phase out, aligns with the state goals on decarbonization, and is consistent with the analysis and recommendations contained in the 2022 Scoping Plan regarding phasing down oil and gas supply in line with the reduction in demand for in-state on-road petroleum fuels.

\* \* \* \* \*

- (b) *Addition of Incremental Deficits that Result from Increases in the Carbon Intensity of Crude Oil to a Fuel Reporting Entity's Compliance Obligation.*

\* \* \* \* \*

- (3) *Process for Calculating the Annual Crude Average Carbon Intensity Value.*

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\* \* \* \* \*

- (C) Revisions to the OPGEE model, addition of crudes to Table 9, and updates to all carbon intensity values listed in Table 9 will be considered on a three-year cycle through proposed amendments of the Low Carbon Fuel Standard regulation.

**Table 9. Carbon Intensity Lookup Table for Crude Oil Production and Transport**

<u>Country of Origin</u>	<u>Crude Identifier</u>	<u>Carbon Intensity (gCO<sub>2</sub>e/MJ)</u>
<u>Baseline Crude Average*</u>	<u>California Baseline Crude Average applicable to crudes supplied during 2023 and subsequent years</u>	<u>12.61</u>
	<u>California Baseline Crude Average applicable to crudes supplied during 2021 and 2022</u>	<u>11.78</u>
<u>Annual Crude Average</u>	<u>Volume-weighted California average CI for crudes supplied during 2021</u>	<u>12.80</u>
<u>Annual Crude Average</u>	<u>Volume-weighted California average CI for crudes supplied during 2022</u>	<u>TBD</u>
<u>Algeria</u>	<u>Saharan</u>	<u>17.16</u>
<u>Angola</u>	<u>Cabinda</u>	<u>12.24</u>
	<u>Clov</u>	<u>9.11</u>
	<u>Dalia</u>	<u>9.92</u>
	<u>Gimboa</u>	<u>9.90</u>
	<u>Girassol</u>	<u>11.87</u>
	<u>Greater Plutonio</u>	<u>11.76</u>
	<u>Hungo</u>	<u>10.01</u>
	<u>Kissanje</u>	<u>11.75</u>
	<u>Mondo</u>	<u>9.92</u>
	<u>Nemba</u>	<u>12.21</u>
	<u>Pazflor</u>	<u>9.84</u>
	<u>Sangos</u>	<u>8.04</u>
<u>Argentina</u>	<u>Canadon Seco</u>	<u>15.30</u>
	<u>Escalante</u>	<u>13.81</u>
	<u>Hydra</u>	<u>11.88</u>
	<u>Medanito</u>	<u>15.44</u>
<u>Australia</u>	<u>Enfield</u>	<u>10.15</u>
	<u>Pyrenees</u>	<u>10.11</u>

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	<u>Stybarrow</u>	<u>10.46</u>
	<u>Van Gogh</u>	<u>10.15</u>
	<u>Vincent</u>	<u>10.24</u>
<u>Azerbaijan</u>	<u>Azeri</u>	<u>11.09</u>
<u>Belize</u>	<u>Belize Light</u>	<u>10.98</u>
<u>Brazil</u>	<u>Albacora Leste</u>	<u>6.79</u>
	<u>Atlanta</u>	<u>7.61</u>
	<u>Atapu</u>	<u>8.22</u>
	<u>Bijupira-Salema</u>	<u>7.15</u>
	<u>Buzios</u>	<u>7.08</u>
	<u>Frade</u>	<u>6.95</u>
	<u>Iracema</u>	<u>6.88</u>
	<u>Jubarte</u>	<u>8.11</u>
	<u>Lapa</u>	<u>7.99</u>
	<u>Lula</u>	<u>7.55</u>
	<u>Marlim</u>	<u>8.35</u>
	<u>Marlim Sul</u>	<u>8.56</u>
	<u>Mero</u>	<u>7.89</u>
	<u>Ostra</u>	<u>8.01</u>
	<u>Papa Terra</u>	<u>5.86</u>
	<u>Peregrino</u>	<u>7.60</u>
	<u>Polvo</u>	<u>7.70</u>
	<u>Roncador</u>	<u>7.19</u>
	<u>Roncador Heavy</u>	<u>7.21</u>
	<u>Sapinhua</u>	<u>8.75</u>
	<u>Tubarao Azul</u>	<u>8.16</u>
	<u>Tubarao Martelo</u>	<u>9.60</u>
<u>Brunei</u>	<u>SLEB</u>	<u>9.88</u>
<u>Cameroon</u>	<u>Lokele</u>	<u>25.56</u>
<u>Canada</u>	<u>Access Western Blend</u>	<u>15.57</u>
	<u>Albian Heavy Synthetic (all grades)</u>	<u>24.45</u>
	<u>BC Light</u>	<u>10.68</u>
	<u>Bonnie Glen</u>	<u>10.68</u>
	<u>Borealis Heavy Blend</u>	<u>16.36</u>
	<u>Boundary Lake</u>	<u>10.68</u>
	<u>Bow River</u>	<u>10.37</u>
	<u>Cardium</u>	<u>10.68</u>
	<u>Christina Dilbit Blend</u>	<u>14.06</u>
	<u>Christina Synbit</u>	<u>18.26</u>
	<u>Cold Lake</u>	<u>19.92</u>

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	<u>Conventional Heavy</u>	<u>10.37</u>
	<u>CNRL Light Sweet Synthetic</u>	<u>22.71</u>
	<u>Federated</u>	<u>10.68</u>
	<u>Fosterton</u>	<u>10.37</u>
	<u>Fort Hills Dilbit</u>	<u>12.35</u>
	<u>Gibson Light Sweet</u>	<u>10.68</u>
	<u>Halkirk</u>	<u>10.68</u>
	<u>Hardisty Light</u>	<u>10.68</u>
	<u>Herbon</u>	<u>7.48</u>
	<u>Hibernia</u>	<u>10.31</u>
	<u>Joarcam</u>	<u>10.68</u>
	<u>Kearl Lake</u>	<u>12.35</u>
	<u>Kerrobot Sweet</u>	<u>10.68</u>
	<u>Koch Alberta</u>	<u>10.68</u>
	<u>Leismer Dilbit</u>	<u>20.25</u>
	<u>Light Sour Blend</u>	<u>10.68</u>
	<u>Light Sweet</u>	<u>10.68</u>
	<u>Lloyd Blend</u>	<u>10.37</u>
	<u>Lloyd Kerrobot</u>	<u>10.37</u>
	<u>Lloydminster</u>	<u>10.37</u>
	<u>Long Lake Heavy</u>	<u>25.56</u>
	<u>Long Lake Light Synthetic</u>	<u>34.16</u>
	<u>Medium Gibson Sour</u>	<u>10.68</u>
	<u>Medium Sour Blend</u>	<u>10.68</u>
	<u>Midale</u>	<u>10.68</u>
	<u>Mixed Sour Blend</u>	<u>10.68</u>
	<u>Mixed Sweet</u>	<u>10.68</u>
	<u>Moose Jaw Tops</u>	<u>10.68</u>
	<u>Peace</u>	<u>10.68</u>
	<u>Peace Pipe Sour</u>	<u>10.68</u>
	<u>Peace River Heavy</u>	<u>22.50</u>
	<u>Peace River Sour</u>	<u>10.68</u>
	<u>Pembina</u>	<u>10.68</u>
	<u>Pembina Light Sour</u>	<u>10.68</u>
	<u>Premium Albian Synthetic</u>	<u>26.12</u>
	<u>Premium Conventional Heavy</u>	<u>10.37</u>
	<u>Premium Synthetic</u>	<u>26.12</u>
	<u>Rainbow</u>	<u>10.68</u>
	<u>Rangeland Sweet</u>	<u>10.68</u>
	<u>Redwater</u>	<u>10.68</u>

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	<u>Seal Heavy</u>	<u>10.37</u>
	<u>Shell Synthetic (all grades)</u>	<u>26.12</u>
	<u>Smiley-Coleville</u>	<u>10.37</u>
	<u>Sour High Edmonton</u>	<u>10.68</u>
	<u>Sour Light Edmonton</u>	<u>10.68</u>
	<u>Suncor Synthetic (all grades)</u>	<u>25.82</u>
	<u>Surmont Heavy Blend</u>	<u>22.72</u>
	<u>Surmont Heavy Dilbit</u>	<u>17.45</u>
	<u>Syncrude Synthetic (all grades)</u>	<u>28.74</u>
	<u>Synthetic Sweet Blend</u>	<u>27.28</u>
	<u>Tundra Sweet</u>	<u>10.68</u>
	<u>Western Canadian Blend</u>	<u>10.37</u>
	<u>Western Canadian Select</u>	<u>21.01</u>
	<u>Default Dilbit</u>	<u>17.78</u>
	<u>Default Synthetic Crude Oil</u>	<u>26.33</u>
	<u>Default Synbit</u>	<u>22.52</u>
<u>Chad</u>	<u>Doba</u>	<u>9.77</u>
<u>Colombia</u>	<u>Acordionero</u>	<u>10.22</u>
	<u>Cano Limon</u>	<u>10.68</u>
	<u>Chaza</u>	<u>10.00</u>
	<u>Castilla</u>	<u>12.77</u>
	<u>Cusiana</u>	<u>13.81</u>
	<u>Magdalena</u>	<u>19.82</u>
	<u>Mares Blend</u>	<u>13.67</u>
	<u>Rubiales</u>	<u>11.44</u>
	<u>South Blend</u>	<u>10.80</u>
	<u>Vasconia</u>	<u>11.16</u>
<u>Congo</u>	<u>Azurite</u>	<u>13.76</u>
	<u>Djeno</u>	<u>14.25</u>
<u>Ecuador</u>	<u>Napo</u>	<u>11.06</u>
	<u>Oriente</u>	<u>11.73</u>
<u>Equatorial Guinea</u>	<u>Ceiba</u>	<u>8.03</u>
	<u>Zafiro</u>	<u>20.20</u>
<u>Ghana</u>	<u>Ten Blend</u>	<u>9.17</u>
<u>Guyana</u>	<u>Liza</u>	<u>9.12</u>
<u>Iran</u>	<u>Dorood</u>	<u>19.01</u>
	<u>Forozan</u>	<u>23.67</u>
	<u>Iran Heavy</u>	<u>17.07</u>
	<u>Iran Light</u>	<u>18.03</u>
	<u>Lavan</u>	<u>15.99</u>



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	<u>Nowruz-Soroosh</u>	<u>14.28</u>
	<u>Sirri</u>	<u>15.64</u>
<u>Iraq</u>	<u>Basra Light</u>	<u>14.01</u>
	<u>Basra Medium</u>	<u>13.97</u>
	<u>Basra Heavy</u>	<u>13.95</u>
<u>Kuwait</u>	<u>Kuwait</u>	<u>12.93</u>
<u>Libya</u>	<u>Amna</u>	<u>15.58</u>
	<u>Es Sider</u>	<u>16.03</u>
	<u>Zueitina</u>	<u>16.04</u>
<u>Malaysia</u>	<u>Tapis</u>	<u>18.22</u>
<u>Mauritania</u>	<u>Chinquetti</u>	<u>7.60</u>
<u>Mexico</u>	<u>Isthmus</u>	<u>14.56</u>
	<u>Isthmus Topped</u>	<u>17.56</u>
	<u>Maya</u>	<u>10.50</u>
<u>Neutral Zone</u>	<u>Eocene</u>	<u>9.36</u>
	<u>Khafji</u>	<u>10.43</u>
	<u>Ratawi</u>	<u>10.61</u>
<u>Nigeria</u>	<u>Agbami</u>	<u>11.71</u>
	<u>Amenam</u>	<u>11.71</u>
	<u>Antan</u>	<u>11.71</u>
	<u>Bonga</u>	<u>11.71</u>
	<u>Bonny</u>	<u>11.71</u>
	<u>Brass</u>	<u>11.71</u>
	<u>EA</u>	<u>11.71</u>
	<u>Erha</u>	<u>11.71</u>
	<u>Escravos</u>	<u>11.71</u>
	<u>Forcados</u>	<u>11.71</u>
	<u>Okono</u>	<u>11.71</u>
	<u>OKWB</u>	<u>11.71</u>
	<u>Pennington</u>	<u>11.71</u>
	<u>Qua Iboe</u>	<u>11.71</u>
	<u>Yoho</u>	<u>11.71</u>
<u>Oman</u>	<u>Oman</u>	<u>16.24</u>
<u>Peru</u>	<u>Bretana</u>	<u>8.63</u>
	<u>Loreto</u>	<u>12.40</u>
	<u>Mayna</u>	<u>12.79</u>
	<u>Pirana</u>	<u>11.30</u>
	<u>RPS</u>	<u>12.40</u>
	<u>Talara</u>	<u>11.81</u>
<u>Russia</u>	<u>CPC</u>	<u>13.60</u>

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	<u>ESPO</u>	<u>14.93</u>
	<u>M100</u>	<u>19.77</u>
	<u>Sokol</u>	<u>8.78</u>
	<u>Vityaz</u>	<u>12.50</u>
<u>Saudi Arabia</u>	<u>Arab Extra Light</u>	<u>12.04</u>
	<u>Arab Light</u>	<u>11.97</u>
	<u>Arab Medium</u>	<u>11.48</u>
	<u>Arab Heavy</u>	<u>10.50</u>
<u>Thailand</u>	<u>Bualuang</u>	<u>5.75</u>
<u>Trinidad</u>	<u>Calypso</u>	<u>7.31</u>
	<u>Molo</u>	<u>15.59</u>
	<u>Galeota</u>	<u>13.31</u>
<u>UAE</u>	<u>Murban</u>	<u>12.77</u>
	<u>Upper Zakum</u>	<u>10.61</u>
<u>United Kingdom</u>	<u>North Sea Kraken</u>	<u>8.76</u>
<u>Venezuela</u>	<u>Bachaquero</u>	<u>30.58</u>
	<u>Boscan</u>	<u>20.64</u>
	<u>Hamaca</u>	<u>34.28</u>
	<u>Hamaca DCO</u>	<u>16.73</u>
	<u>Laguna</u>	<u>30.58</u>
	<u>Mesa 30</u>	<u>20.85</u>
	<u>Petrozuata (all synthetic grades)</u>	<u>34.33</u>
	<u>Santa Barbara</u>	<u>25.48</u>
	<u>Zuata (all synthetic grades)</u>	<u>34.28</u>
<u>US Alaska</u>	<u>Alaska North Slope</u>	<u>12.28</u>
<u>US Colorado</u>	<u>Niobrara</u>	<u>9.08</u>
<u>US New Mexico</u>	<u>Four Corners</u>	<u>10.03</u>
	<u>New Mexico Intermediate</u>	<u>10.03</u>
	<u>New Mexico Sour</u>	<u>10.03</u>
	<u>New Mexican Sweet</u>	<u>10.03</u>
<u>US North Dakota</u>	<u>Bakken</u>	<u>12.62</u>
	<u>North Dakota Sweet</u>	<u>12.62</u>
	<u>Williston Basin Sweet</u>	<u>12.62</u>
<u>US Oklahoma</u>	<u>Oklahoma Sour</u>	<u>12.53</u>
	<u>Oklahoma Sweet</u>	<u>12.53</u>
<u>US Texas</u>	<u>Eagle Ford Shale</u>	<u>12.53</u>
	<u>East Texas</u>	<u>12.53</u>
	<u>North Texas Sweet</u>	<u>12.53</u>
	<u>South Texas Sweet</u>	<u>12.53</u>
	<u>West Texas Intermediate</u>	<u>12.53</u>

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	<u>West Texas Sour</u>	<u>12.53</u>
<u>US Utah</u>	<u>Covenant</u>	<u>10.50</u>
	<u>Grand Cane</u>	<u>10.50</u>
	<u>Utah Black Wax</u>	<u>10.50</u>
	<u>Utah Sweet</u>	<u>10.50</u>
<u>US Wyoming</u>	<u>Wyoming Sweet</u>	<u>13.58</u>
<u>US California Fields</u>	<u>Aliso Canyon</u>	<u>6.70</u>
	<u>Ant Hill</u>	<u>10.68</u>
	<u>Antelope Hills</u>	<u>3.14</u>
	<u>Antelope Hills, North</u>	<u>19.96</u>
	<u>Arroyo Grande</u>	<u>43.73</u>
	<u>Asphalto</u>	<u>10.84</u>
	<u>Bandini</u>	<u>1.96</u>
	<u>Bardsdale</u>	<u>6.20</u>
	<u>Barham Ranch</u>	<u>6.21</u>
	<u>Beer Nose</u>	<u>4.35</u>
	<u>Belgian Anticline</u>	<u>7.40</u>
	<u>Bellevue</u>	<u>5.99</u>
	<u>Bellevue, West</u>	<u>3.28</u>
	<u>Belmont, Offshore</u>	<u>5.51</u>
	<u>Belridge, North</u>	<u>6.20</u>
	<u>Belridge, South</u>	<u>20.10</u>
	<u>Beverly Hills</u>	<u>6.29</u>
	<u>Big Mountain</u>	<u>7.38</u>
	<u>Blackwells Corner</u>	<u>2.60</u>
	<u>Brea-Olinda</u>	<u>4.40</u>
	<u>Brentwood</u>	<u>3.02</u>
	<u>Buena Vista</u>	<u>9.61</u>
	<u>Burrel</u>	<u>13.37</u>
	<u>Cabrillo</u>	<u>7.49</u>
	<u>Canal</u>	<u>6.91</u>
	<u>Canfield Ranch</u>	<u>4.99</u>
	<u>Carneros Creek</u>	<u>4.63</u>
	<u>Cascade</u>	<u>4.46</u>
	<u>Casmalia</u>	<u>9.35</u>
	<u>Castaic Hills</u>	<u>2.50</u>
	<u>Cat Canyon</u>	<u>19.71</u>
	<u>Cheviot Hills</u>	<u>4.68</u>
	<u>Chico-Martinez</u>	<u>67.28</u>
	<u>Cienaga Canyon</u>	<u>10.75</u>

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<u>Coalinga</u>	<u>34.89</u>
<u>Coles Levee, N</u>	<u>5.36</u>
<u>Coles Levee, S</u>	<u>9.04</u>
<u>Comanche Point</u>	<u>4.63</u>
<u>Coyote, East</u>	<u>4.43</u>
<u>Cuyama, South</u>	<u>13.26</u>
<u>Cymric</u>	<u>18.78</u>
<u>Deer Creek</u>	<u>4.42</u>
<u>Del Valle</u>	<u>5.24</u>
<u>Devils Den</u>	<u>3.90</u>
<u>Dominguez</u>	<u>4.47</u>
<u>Edison</u>	<u>18.61</u>
<u>El Segundo</u>	<u>3.96</u>
<u>Elk Hills</u>	<u>12.06</u>
<u>Fruitvale</u>	<u>4.81</u>
<u>Greeley</u>	<u>8.21</u>
<u>Hasley Canyon</u>	<u>3.40</u>
<u>Helm</u>	<u>3.00</u>
<u>Holser</u>	<u>6.10</u>
<u>Honor Rancho</u>	<u>2.72</u>
<u>Huntington Beach</u>	<u>5.63</u>
<u>Hyperion</u>	<u>1.62</u>
<u>Inglewood</u>	<u>10.58</u>
<u>Jacalitos</u>	<u>3.82</u>
<u>Jasmin</u>	<u>15.87</u>
<u>Kern Bluff</u>	<u>7.41</u>
<u>Kern Front</u>	<u>33.38</u>
<u>Kern River</u>	<u>15.17</u>
<u>Kettleman Middle Dome</u>	<u>5.77</u>
<u>Kettleman North Dome</u>	<u>7.48</u>
<u>Landslide</u>	<u>11.51</u>
<u>Las Cienegas</u>	<u>5.00</u>
<u>Livermore</u>	<u>2.84</u>
<u>Lompoc</u>	<u>20.61</u>
<u>Long Beach</u>	<u>5.27</u>
<u>Long Beach Airport</u>	<u>4.38</u>
<u>Los Angeles Downtown</u>	<u>4.99</u>
<u>Lost Hills</u>	<u>16.02</u>
<u>Lost Hills, Northwest</u>	<u>18.85</u>
<u>Lynch Canyon</u>	<u>34.75</u>

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	<u>Mahala</u>	<u>10.54</u>
	<u>McCool Ranch</u>	<u>15.65</u>
	<u>McDonald Anticline</u>	<u>2.80</u>
	<u>McKittrick</u>	<u>28.52</u>
	<u>Midway-Sunset</u>	<u>36.59</u>
	<u>Monroe Swell</u>	<u>1.47</u>
	<u>Montalvo, West</u>	<u>4.18</u>
	<u>Montebello</u>	<u>12.95</u>
	<u>Monument Junction</u>	<u>6.86</u>
	<u>Mount Poso</u>	<u>3.63</u>
	<u>Mountain View</u>	<u>5.03</u>
	<u>Newhall-Potrero</u>	<u>5.25</u>
	<u>Newport, West</u>	<u>8.90</u>
	<u>Oak Canyon</u>	<u>3.49</u>
	<u>Oak Park</u>	<u>5.04</u>
	<u>Oakridge</u>	<u>5.01</u>
	<u>Oat Mountain</u>	<u>4.10</u>
	<u>Ojai</u>	<u>7.95</u>
	<u>Olive</u>	<u>2.35</u>
	<u>Orcutt</u>	<u>23.32</u>
	<u>Oxnard</u>	<u>8.99</u>
	<u>Paloma</u>	<u>10.13</u>
	<u>Placerita</u>	<u>58.44</u>
	<u>Playa Del Rey</u>	<u>4.93</u>
	<u>Pleito</u>	<u>3.50</u>
	<u>Poso Creek</u>	<u>23.70</u>
	<u>Pyramid Hills</u>	<u>6.28</u>
	<u>Railroad Gap</u>	<u>9.22</u>
	<u>Raisin City</u>	<u>28.32</u>
	<u>Ramona</u>	<u>7.81</u>
	<u>Richfield</u>	<u>3.55</u>
	<u>Rincon</u>	<u>6.26</u>
	<u>Rio Bravo</u>	<u>10.44</u>
	<u>Rio Viejo</u>	<u>2.57</u>
	<u>Riverdale</u>	<u>4.07</u>
	<u>Rose</u>	<u>3.32</u>
	<u>Rosecrans</u>	<u>7.66</u>
	<u>Rosecrans, South</u>	<u>6.36</u>
	<u>Rosedale</u>	<u>1.85</u>
	<u>Rosedale Ranch</u>	<u>9.56</u>

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	<u>Round Mountain</u>	<u>25.21</u>
	<u>Russell Ranch</u>	<u>9.86</u>
	<u>Salt Lake</u>	<u>4.35</u>
	<u>Salt Lake, South</u>	<u>5.12</u>
	<u>San Ardo</u>	<u>23.72</u>
	<u>San Emidio Nose</u>	<u>3.13</u>
	<u>San Miguelito</u>	<u>6.85</u>
	<u>San Vicente</u>	<u>4.16</u>
	<u>Sansinena</u>	<u>4.49</u>
	<u>Santa Clara Avenue</u>	<u>4.26</u>
	<u>Santa Fe Springs</u>	<u>7.75</u>
	<u>Santa Maria Valley</u>	<u>8.39</u>
	<u>Santa Susana</u>	<u>9.86</u>
	<u>Sargent</u>	<u>6.83</u>
	<u>Saticoy</u>	<u>5.45</u>
	<u>Sawtelle</u>	<u>4.79</u>
	<u>Seal Beach</u>	<u>6.06</u>
	<u>Semitropic</u>	<u>6.43</u>
	<u>Sespe</u>	<u>7.18</u>
	<u>Shafter, North</u>	<u>4.14</u>
	<u>Shiells Canyon</u>	<u>9.13</u>
	<u>South Mountain</u>	<u>6.40</u>
	<u>Stockdale</u>	<u>2.42</u>
	<u>Tapia</u>	<u>3.76</u>
	<u>Tapo Canyon, South</u>	<u>5.24</u>
	<u>Tejon</u>	<u>9.59</u>
	<u>Tejon Hills</u>	<u>7.90</u>
	<u>Tejon, North</u>	<u>8.01</u>
	<u>Temescal</u>	<u>3.43</u>
	<u>Ten Section</u>	<u>7.50</u>
	<u>Timber Canyon</u>	<u>8.68</u>
	<u>Torrance</u>	<u>4.02</u>
	<u>Torrey Canyon</u>	<u>6.55</u>
	<u>Union Avenue</u>	<u>5.55</u>
	<u>Vallecitos</u>	<u>5.41</u>
	<u>Ventura</u>	<u>7.72</u>
	<u>Wayside Canyon</u>	<u>6.09</u>
	<u>West Mountain</u>	<u>6.33</u>
	<u>Wheeler Ridge</u>	<u>4.86</u>
	<u>White Wolf</u>	<u>2.96</u>

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	<u>Whittier</u>	<u>4.90</u>
	<u>Wilmington</u>	<u>16.17</u>
	<u>Yowlumne</u>	<u>7.45</u>
	<u>Zaca</u>	<u>6.43</u>
<u>US Federal OCS</u>	<u>Beta</u>	<u>3.77</u>
	<u>Carpinteria</u>	<u>6.78</u>
	<u>Dos Cuadras</u>	<u>6.90</u>
	<u>Hueneme</u>	<u>5.80</u>
	<u>Point Pedernales</u>	<u>6.49</u>
	<u>Santa Clara</u>	<u>5.15</u>
<u>Default</u>		<u>12.61</u>

\* Based on production and transport of the crude oil supplied to the indicated California refinery(ies) during the baseline calendar year, 2010.

<b>Country of Origin</b>	<b>Crude Identifier</b>	<b>Carbon Intensity (gCO<sub>2</sub>e/MJ)</b>
<del>Baseline Crude Average*</del>	<del>California Baseline Crude Average applicable to crudes supplied during 2018 and subsequent years</del>	<del>11.78</del>
	<del>California Baseline Crude Average applicable to crudes supplied in 2016 and 2017</del>	<del>11.98</del>
<del>Annual Crude Average</del>	<del>Volume-weighted California average CI for crudes supplied during 2016</del>	<del>12.14</del>
<del>Annual Crude Average</del>	<del>Volume-weighted California average CI for crudes supplied during 2017</del>	<del>11.93</del>
Algeria	Saharan	14.77
Angola	Cabinda	8.99
	Clov	7.31
	Dalia	8.90
	Gimbea	8.86
	Girassol	9.95
	Greater Plutonie	8.72
	Hunge	8.23
	Kissanje	8.66
	Mondo	8.98
	Nemba	9.08
	Pazflor	8.02
	Sanges	7.06
Argentina	Canadon Seco	10.16

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<b>Country of Origin</b>	<b>Crude Identifier</b>	<b>Carbon Intensity (gCO<sub>2</sub>e/MJ)</b>
	Escalante	10.15
	Hydra	7.77
	Medanite	10.78
Australia	Enfield	6.84
	Pyrenees	8.24
	Stybarrow	7.84
	Van Gogh	8.46
	Vincent	6.83
Azerbaijan	Azeri	6.40
Belize	Belize Light	9.70
Brazil	Albacora Leste	5.99
	Bijupira-Salema	7.18
	Frade	5.63
	Iracema	5.54
	Jubarte	6.28
	Lula	6.24
	Marlim	6.76
	Marlim-Sul	7.78
	Ostra	5.65
	Papa-Terra	4.29
	Peregrino	4.16
	Polvo	4.31
	Roncador	6.77
	Roncador Heavy	6.45
	Sapinha	6.00
	Tubarao-Azul	5.45
	Tubarao-Martelo	5.37
Cameroon	Lokele	19.27
Canada	Access Western Blend	15.15
	Albian Heavy Synthetic (all grades)	23.68
	BC Light	8.11
	Bonnie Glen	8.11
	Borealis Heavy Blend	15.41



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<b>Country of Origin</b>	<b>Crude Identifier</b>	<b>Carbon Intensity (gCO<sub>2</sub>e/MJ)</b>
	Boundary Lake	8.11
	Bow River	9.42
	Cardium	8.11
	Christina Dilbit Blend	12.71
	Christina Synbit	18.66
	Cold Lake	17.87
	Conventional Heavy	9.42
	CNRL Light Sweet Synthetic	25.27
	Federated	8.11
	Fosterton	9.42
	Gibson Light Sweet	8.11
	Halkirk	8.11
	Hardisty Light	8.11
	Hardisty Synthetic	36.39
	Husky Synthetic	32.66
	Joarcam	8.11
	Kearl Lake	12.89
	Kerrobert Sweet	8.11
	Koch Alberta	8.11
	Light Sour Blend	8.11
	Light Sweet	8.11
	Lloyd Blend	9.42
	Lloyd Kerrobert	9.42
	Lloydminster	9.42
	Long Lake Heavy	30.54
	Long Lake Light Synthetic	40.12
	Mackay Heavy Blend	20.43
	Medium Gibson Sour	8.11
	Medium Sour Blend	8.11
	Midale	8.11
	Mixed Sour Blend	8.11
	Mixed Sweet	8.11
	Moose Jaw Tops	8.11

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<b>Country of Origin</b>	<b>Crude Identifier</b>	<b>Carbon Intensity (gCO<sub>2</sub>e/MJ)</b>
	Peace	8.11
	Peace Pipe Sour	8.11
	Peace River Heavy	19.21
	Peace River Sour	8.11
	Pembina	8.11
	Pembina Light Sour	8.11
	Premium Albian Synthetic	29.49
	Premium Conventional Heavy	9.42
	Premium Synthetic	27.38
	Rainbow	8.11
	Rangeland Sweet	8.11
	Redwater	8.11
	Seal Heavy	9.42
	Shell Synthetic (all grades)	29.49
	Smiley Coleville	9.42
	Sour High Edmonton	8.11
	Sour Light Edmonton	8.11
	Statoil Cheecham Dilbit	16.41
	Statoil Cheecham Synbit	21.08
	Suncor Synthetic (all grades)	27.09
	Surmont Heavy Blend	22.48
	Synbit Blend	22.64
	Syncrude Synthetic (all grades)	31.62
	Synthetic Sweet Blend	29.36
	Tundra Sweet	8.11
	Wabasca	6.88
	Western Canadian Blend	9.42
	Western Canadian Select	19.04
Chad	Doba	11.42
Colombia	Acordionero	6.96
	Cano Limon	9.29
	Castilla	10.55
	Cusiana	9.99

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<b>Country of Origin</b>	<b>Crude Identifier</b>	<b>Carbon Intensity (gCO<sub>2</sub>e/MJ)</b>
	Magdalena	22.28
	Rubiales	9.79
	South Blend	9.25
	Vasconia	9.62
Gengo	Azurite	10.25
	Djene	10.73
Ecuador	Nape	8.31
	Oriente	10.07
Equatorial Guinea	Ceiba	7.82
	Zafiro	20.56
Ghana	Ten Blend	8.08
Iran	Derood	12.65
	Forozan	21.97
	Iran Heavy	13.25
	Iran Light	14.35
	Lavan	11.11
	Nowruz-Soroosh	10.53
	Sirri	10.15
Iraq	Basra Light	13.45
	Basra Heavy	10.69
Kuwait	Kuwait	10.56
Libya	Amna	15.82
Malaysia	Tapis	12.73
Mauritania	Chinquetti	13.74
Mexico	Isthmus	11.31
	Isthmus-Topped	14.31
	Maya	7.85
Neutral Zone	Eocene	7.85
	Khafji	7.84
	Ratawi	9.42
Nigeria	Agbami	12.04
	Amenam	10.65
	Antan	21.98

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<b>Country of Origin</b>	<b>Crude Identifier</b>	<b>Carbon Intensity (gCO<sub>2</sub>e/MJ)</b>
	Bonga	5.06
	Bonny	9.91
	Brass	14.27
	EA	6.66
	Erha	10.91
	Escravos	12.00
	Forcados	8.97
	Okene	8.67
	OKWB	22.76
	Pennington	11.18
	Qua Iboe	11.45
	Yoho	11.45
Oman	Oman	13.32
Peru	Loreto	9.86
	Mayna	11.07
	Pirana	8.43
Russia	ESPO	11.55
	M100	17.35
	Sokol	6.94
	Vityaz	9.60
Saudi Arabia	Arab-Extra Light	9.41
	Arab-Light	9.23
	Arab-Medium	8.72
	Arab-Heavy	7.92
Thailand	Bualuang	4.07
Trinidad	Calypso	7.41
	Galeota	11.41
UAE	Murban	10.01
	Upper-Zakum	7.96
Venezuela	Bachaquero	28.75
	Boscan	13.91
	Hamaca	23.04
	Hamaca-DCO	10.02

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<b>Country of Origin</b>	<b>Crude Identifier</b>	<b>Carbon Intensity (gCO<sub>2</sub>e/MJ)</b>
	Laguna	28.75
	Mesa 30	12.49
	Petrozuata (all synthetic grades)	23.09
	Santa Barbara	17.32
	Zuata (all synthetic grades)	23.04
US Alaska	Alaska North Slope	15.94
US Colorado	Niobrara	6.81
US Gulf of Mexico	Mars	6.62
US Louisiana	GCA	8.72
US New Mexico	Four Corners	11.11
	New Mexico Intermediate	11.11
	New Mexico Sour	11.11
	New Mexican Sweet	11.11
US North Dakota	Bakken	9.73
	North Dakota Sweet	9.73
	Williston Basin Sweet	9.73
US Oklahoma	Oklahoma Sour	11.93
	Oklahoma Sweet	11.93
US Texas	Eagle Ford Shale	11.93
	East Texas	11.93
	North Texas Sweet	11.93
	South Texas Sweet	11.93
	West Texas Intermediate	11.93
	West Texas Sour	11.93
US Utah	Covenant	4.43
	Grand Cane	6.92
	Utah Black Wax	5.85
	Utah Sweet	6.92
US Wyoming	Wyoming Sweet	10.98
US California Fields	Aliso Canyon	4.94
	Ant Hill	20.84
	Antelope Hills	2.84
	Antelope Hills, North	24.75

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<b>Country of Origin</b>	<b>Crude Identifier</b>	<b>Carbon Intensity (gCO<sub>2</sub>e/MJ)</b>
	<del>Arroyo Grande</del>	<del>31.11</del>
	<del>Asphalte</del>	<del>8.01</del>
	<del>Bandini</del>	<del>3.09</del>
	<del>Bardsdale</del>	<del>3.47</del>
	<del>Barham Ranch</del>	<del>4.15</del>
	<del>Beer Nose</del>	<del>3.98</del>
	<del>Belgian Anticline</del>	<del>5.01</del>
	<del>Bellevue</del>	<del>5.95</del>
	<del>Bellevue, West</del>	<del>6.60</del>
	<del>Belmont, Offshore</del>	<del>5.12</del>
	<del>Belridge, North</del>	<del>4.11</del>
	<del>Belridge, South</del>	<del>17.09</del>
	<del>Beverly Hills</del>	<del>5.41</del>
	<del>Big Mountain</del>	<del>4.65</del>
	<del>Blackwells Corner</del>	<del>3.07</del>
	<del>Brea Olinda</del>	<del>3.59</del>
	<del>Buena Vista</del>	<del>7.44</del>
	<del>Burrel</del>	<del>29.43</del>
	<del>Cabrillo</del>	<del>4.14</del>
	<del>Canal</del>	<del>4.40</del>
	<del>Canfield Ranch</del>	<del>4.53</del>
	<del>Carneros Creek</del>	<del>4.06</del>
	<del>Cascade</del>	<del>3.00</del>
	<del>Casmalia</del>	<del>10.26</del>
	<del>Castaic Hills</del>	<del>2.68</del>
	<del>Cat Canyon</del>	<del>7.83</del>
	<del>Cheviot Hills</del>	<del>3.49</del>
	<del>Chico-Martinez</del>	<del>48.13</del>
	<del>Cienaga Canyon</del>	<del>5.78</del>
	<del>Coalinga</del>	<del>25.81</del>
	<del>Coles Levee, N</del>	<del>4.09</del>
	<del>Coles Levee, S</del>	<del>5.87</del>
	<del>Comanche Point</del>	<del>5.03</del>

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<b>Country of Origin</b>	<b>Crude Identifier</b>	<b>Carbon Intensity (gCO<sub>2</sub>e/MJ)</b>
	Coyote, East	5.96
	Cuyama, South	14.70
	Cymric	15.69
	Deer Creek	11.51
	Del Valle	5.78
	Devils Den	7.51
	Dominguez	3.57
	Edison	14.53
	El Segundo	4.38
	Elk Hills	8.02
	Elwood, S., Offshore	3.52
	Fruitvale	3.75
	Greeley	7.91
	Hasley Canyon	2.25
	Helm	3.99
	Holser	3.80
	Honor Rancho	3.43
	Huntington Beach	6.62
	Hyperion	1.90
	Inglewood	10.06
	Jacalitos	2.72
	Jasmin	16.59
	Kern Bluff	12.54
	Kern Front	35.68
	Kern River	15.09
	Kettleman Middle Dome	3.93
	Kettleman North Dome	3.42
	Landslide	12.53
	Las Cienegas	4.96
	Livermore	2.66
	Lompoc	28.45
	Long Beach	5.48
	Long Beach Airport	4.92

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<b>Country of Origin</b>	<b>Crude Identifier</b>	<b>Carbon Intensity (gCO<sub>2</sub>e/MJ)</b>
	Los Angeles Downtown	5.89
	Los Angeles, East	14.74
	Lost Hills	12.99
	Lost Hills, Northwest	5.36
	Lynch Canyon	23.10
	Mahala	4.99
	McCool Ranch	9.59
	McDonald Anticline	4.33
	McKittrick	25.34
	Midway Sunset	29.33
	Montalvo, West	2.65
	Montebello	17.03
	Monument Junction	4.95
	Mount Pose	3.71
	Mountain View	3.97
	Newhall Potrero	3.66
	Newport, West	5.21
	Oak Canyon	4.04
	Oak Park	3.01
	Oakridge	3.46
	Oat Mountain	3.17
	Ojai	4.94
	Olive	1.82
	Orcutt	11.76
	Oxnard	5.39
	Paloma	4.88
	Placerita	32.78
	Playa Del Rey	6.87
	Pleito	2.09
	Poso Creek	21.96
	Pyramid Hills	3.36
	Railroad Gap	7.08
	Raisin City	9.13



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<b>Country of Origin</b>	<b>Crude Identifier</b>	<b>Carbon Intensity (gCO<sub>2</sub>e/MJ)</b>
	Ramona	4.47
	Richfield	4.75
	Rincon	4.88
	Rio Bravo	6.98
	Rio Viejo	2.74
	Riverdale	3.80
	Rose	2.91
	Rosecrans	5.76
	Rosecrans, South	3.54
	Rosedale	2.35
	Rosedale Ranch	8.32
	Round Mountain	24.04
	Russell Ranch	8.58
	Salt Lake	3.18
	Salt Lake, South	6.34
	San Ardo	26.42
	San Miguelito	5.25
	San Vicente	3.22
	Sansinena	3.21
	Santa Clara Avenue	3.53
	Santa Fe Springs	12.53
	Santa Maria Valley	4.80
	Santa Susana	5.29
	Sargent	4.00
	Saticoy	3.68
	Sawtelle	2.56
	Seal Beach	5.19
	Semitropic	4.30
	Sespe	3.98
	Shafter, North	3.32
	Shiells Canyon	5.07
	South Mountain	3.58
	Stockdale	2.18

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<b>Country of Origin</b>	<b>Crude Identifier</b>	<b>Carbon Intensity (gCO<sub>2</sub>e/MJ)</b>
	Tapia	6.92
	Tapo Canyon, South	3.08
	Tejon	13.77
	Tejon Hills	9.39
	Tejon, North	5.63
	Temescal	3.40
	Ten Section	7.50
	Timber Canyon	4.74
	Torrance	3.99
	Torrey Canyon	3.52
	Union Avenue	5.58
	Vallecitos	4.53
	Ventura	4.54
	Wayside Canyon	2.36
	West Mountain	3.53
	Wheeler Ridge	2.80
	White Wolf	1.92
	Whittier	3.71
	Wilmington	8.31
	Yowlumne	13.90
	Zaca	9.53
US Federal OCS	Beta	1.59
	Carpinteria	3.28
	Des Cuadras	4.57
	Hondo	5.93
	Hueneme	4.67
	Pescado	7.07
	Point Arguello	14.07
	Point Pedernales	8.26
	Sacate	4.77
	Santa Clara	2.46
	Seckey	13.09
Default		11.78

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\* \* \* \* \*

**Additional Regulatory Text Concept for section 95489(c)  
Innovative Crude Projects  
Quarterly and Annual Submission of Reports and  
Updates to the Displacement Emission Factor**

CARB staff may propose to streamline reporting requirements to allow for both quarterly and annual submission of innovative crude projects, which would align with the current approach for other projects. [§95489(c)(4) and §95489(c)(5)]

Staff proposes to update the displacement emission factor (EF) for innovative crude projects using solar electricity to align with the updated eGRID EF for California grid electricity. [§95489(c)(1)(F)]

**Additional Regulatory Text Concept for section 95489  
95489(c), 95489(e), and 95489(f): Third-Party Validation of  
Project-Based Crediting Applications**

CARB staff is considering proposing to require third-party validation of project-based crediting applications prior to CARB approval to strengthen safeguards against potential double counting of emission reductions, and to improve the confidence and accuracy of the approved projects for credit generation. Such third-party validation would be similar to the validation requirements for the fuel pathway certification.

**Additional Regulatory Text Concept for section 95489  
95489(e) and 95489(f): Crediting Opportunities for Renewable Hydrogen**

CARB staff proposes to expand crediting eligibility for hydrogen production under the Refinery Investment Credit and Renewable Hydrogen Refinery Credit provisions. This consideration is aimed to support increased technology deployment and resulting increased production of renewable hydrogen.

\* \* \* \* \*

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**§ 95490. Provisions for Fuels Produced Using Carbon Capture and Sequestration.**

**Additional Regulatory Text Concept for section 95490  
Limiting Crediting of Direct Air Capture (DAC) to Projects in the United States**

CARB staff may propose to limit crediting of Direct Air Capture (DAC) projects to only those located in the United States.

Limitations under consideration will not apply to DAC-to-fuel projects submitted as Tier 2 alternative fuel pathways, as such fuels must be supplied to California to be eligible for LCFS crediting.

\* \* \* \* \*

**§ 95491. Fuel Transactions and Compliance Reporting.**

A fuel reporting entity must submit to the Executive Officer Quarterly Fuel Transactions Reports and Annual Compliance Reports, as specified in this section.

\* \* \* \* \*

(d) *Specific Reporting Requirements for Quarterly Fuel Transactions Reports.* In addition to all requirements specified in section 95491(c), for each of its transportation fuels, a fuel reporting entity must submit a quarterly fuel transactions report that contains the information specified below and summarized in Table 11:

\* \* \* \* \*

(3) *Specific Quarterly Reporting Parameters for Electricity used as a Transportation Fuel.*

\* \* \* \* \*

(E) *For Electric Forklifts.* The quantity of electricity used (in kWh) must be reported per FSE, as set forth in section 95483.2(b), with a certified FPC and with transaction type "EV-Forklifts Electricity Fueling." ~~The quantity of electricity used in electric forklifts may be determined as follows:~~

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- ~~1. Quantity of electricity used during a reporting period, as measured per FSE, as set forth in section 95483.2(b), and with transaction type "Forklift Electricity Fueling," in the case of an electric forklift fleet owner or its designee generating credits; or~~
- ~~2. Quantity of electricity estimated using CARB approved methodology. The reporting entity must provide the number of electric forklifts in the fleet for generating credits; or~~
- ~~3. When electric forklift credits are claimed by an EDU, CARB staff will calculate the quantity of electricity supplied to electric forklifts in the EDUs service territory during a reporting period for the generation of credits. This reporting parameter is exempt from the quarterly reporting deadlines set forth in section 95491(b).~~

\* \* \* \* \*

**§ 95491.1. Recordkeeping and Auditing.**

- (a) *Record Retention.* Any record required to be maintained under this subarticle shall be retained for ten years. All data and calculations submitted by a regulated entity for demonstrating compliance, or generating credits or deficits are subject to inspection by the Executive Officer or a verification body accredited by the Executive Officer pursuant to section 95502, and must be made available within 20 days upon request of the Executive Officer.
  - (1) *Record Retention for Fuel Reporting Entities.* Fuel reporting entities must maintain all records and calculations relied upon for data reported in the LRT-CBTS. These records include, but are not limited to:
    - (A) Product transfer documents;
    - (B) Copies of all data reports submitted to the Executive Officer;
    - (C) Records related to each fuel transaction;
    - (D) Records used for each credit transaction;
    - (E) Records related to FSE registration, including but not limited to copies of monthly utility bills, Bills of Lading, Division of Measurement Standards' certificates, and any other document used as a proof at the time of FSE registration pursuant to this subarticle;
    - (F) Chain of custody evidence for produced fuel imported into California;

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- (G) Attestations regarding environmental attributes associated with book-and-claim accounting for biomethane pursuant to 95488.8(i)(2)(~~CE~~); and
  - (H) Records used for compliance or credit and deficit calculations.
- (2) *Record Retention for Fuel Pathway Holders and Applicants.* Fuel pathway holders and applicants must maintain all records relied upon in producing fuel pathway applications and annual Fuel Pathway Reports. The retained documents, including CI input source data and supplemental documentation, must be sufficient to allow for verification of each CI calculation. These records include but are not limited to:

\* \* \* \* \*

- (H) Attestations regarding environmental attributes associated with book-and-claim accounting for biomethane pursuant to 95488.8(i)(2)(~~CE~~).

\* \* \* \* \*

**§ 95500. Requirements for Validation of Fuel Pathway Applications; and Verification of Annual Fuel Pathway Reports, Quarterly Fuel Transaction Reports, Crude Oil Quarterly and Annual Volumes Reports, Project Reports, and Low-Complexity/Low-Energy-Use Refinery Reports.**

\* \* \* \* \*

**Additional Regulatory Text Concept for section 95500  
95500(b)(2)(B): Deferred Verification**

Staff is considering proposing to exempt joint applicants from eligibility for deferred verification.

\* \* \* \* \*

- (c) *Verification of Quarterly Fuel Transactions Reports*
  - (1) *Applicability.* Entities submitting Quarterly Fuel Transactions Reports under this subarticle that include the following transaction types must obtain the services of a verification body accredited by the Executive Officer for purposes of conducting verification services, including required site visit(s). The scope of verification services would be limited to the

**\*\*PRELIMINARY DRAFT OF POTENTIAL REGULATORY AMENDMENTS AND AMENDMENT CONCEPTS\*\***

Legal Disclaimer: This is a *preliminary discussion draft* of potential underline-strikeout text amendments to the Low Carbon Fuel Standard regulations, provided to solicit stakeholder discussion and feedback.

following transaction types, including associated corrections submitted in annual reports under this subarticle.

- (A) For all liquid fuels:
  - 1. Production in California;
  - 2. Production for Import;
  - 3. Import;
  - 4. Export;
  - 5. Gain of Inventory;
  - 6. Loss of Inventory; and
  - 7. Not Used for Transportation.
  
- (B) NGV Fueling;
  
- (C) Propane Fueling; ~~and~~
  
- (D) FCV Fueling for hydrogen produced from biomethane supplied using book-and-claim accounting pursuant to section 95488.8(i)(2); and
  
- (E) For the following electricity- and hydrogen-based transaction types:
  - 1. EV charging except as specified under 95491(d)(3)(A);
  - 2. eTRU Fueling;
  - 3. eCHE Fueling;
  - 4. eOGV Fueling;
  - 5. Fixed Guideway Electricity Fueling;
  - 6. Forklift Electricity Fueling;
  - 7. Forklift Hydrogen Fueling;
  - 8. Fuel Cell Vehicle (FCV) Fueling; and
  - 9. FCV Fueling transaction not specified in section 95500(c)(1)(D).

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