The draft regulatory amendment language in this document reflects CARB staff's ongoing preliminary development of concepts under consideration for a potential LCFS amendment package proposal. It is provided as a supplement to the preliminary draft posted in conjunction with the LCFS public workshop held on September 22, 2017.

New regulatory text is shown in underlined font to indicate additions to, and in ~~strikeout to show deletions from,~~ existing text that was adopted in 2015.

Excerpts are provided to assist in focusing on the updates since September 22, 2017 on which staff is seeking feedback. All portions of existing and draft proposed text that is not included in this document is omitted, as indicated by the symbol "* * * * *" for reference.

Stakeholder feedback on these concepts is appreciated by December 4, 2017.

§ 95481. Definitions and Acronyms.

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"Contract Description Code" means the alphanumeric code assigned by an exchange to a particular exchange product that differentiates the product from others traded on the exchange.

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"Expected Termination Date" is a date specified in a transaction agreement on which all requirements in the transaction agreement are expected to be completed, exclusive of any contingencies specified in the agreement.

* * * * *

"Over-the-Counter" means the trading of LCFS credits or contracts not executed or entered for clearing on any exchange.

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§ 95483.1. Opt-In ~~Parties~~ Entities.

(a) *Eligibility.*

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(3) *Clearing Service Provider.* An entity providing clearing services in which it takes only temporary possession of LCFS credits for the purpose of clearing transactions between two entities with registered accounts in

LRT-CBTS. A qualified entity must be a derivatives clearing organization as defined in the Commodities Exchange Act (7 U.S.C § 1a(9)) that is registered with the U.S. Commodity Futures Trading Commission pursuant to the Commodities Exchange Act (7 U.S.C. § 7a-1(a)). A clearing service provider cannot own credits but can hold LCFS credits up to 5 days for clearing purposes only.

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§ 95483.2. LCFS Data Management System.

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(b) *LCFS Reporting Tool and Credit Bank & Transfer System (LRT-CBTS).*

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(3) *Requirements to Establish an Account in LRT-CBTS.*

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(G) *Clearing Service Providers.* In addition to requirements specified in 95483.2(b)(3)(A) through (E), a clearing service provider requesting to an LRT-CBTS account must provide documents demonstrating their eligibility pursuant to section 95483.1(a)(3).

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§ 95484. ~~Average~~ Annual Carbon Intensity ~~Requirements~~ Benchmarks.

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(b) *~~Requirements~~ Benchmarks for Gasoline and Fuels used as a Substitute for Gasoline.*

Table 1. LCFS ~~Compliance Schedule~~ Carbon Intensity Benchmarks for 2011 to ~~2020~~ 2030 for Gasoline and Fuels Used as a Substitute for Gasoline.

Year	***Average Carbon Intensity (gCO_2e/MJ)***	***Year***	***Average Carbon Intensity (gCO_2e/MJ)***
2010	Reporting Only		
2011*	95.61	2021	90.23
2012	95.37	2022	90.23
2013**	97.96	2023	89.23
2014	97.96	2024	88.23
2015	97.96	2025	87.23
2016***	96.50	2026	86.22
2017	95.02	2027	85.22
2018	93.55	2028	84.22
2019****	~~91.08~~ 92.74	2029	83.22
2020 ~~and subsequent years~~	~~88.62~~ 90.23	2030 and subsequent years	82.21

* The ~~average carbon intensity requirements~~ benchmarks for years 2011 and 2012 reflect reductions from base year (2010) CI values for CaRFG (95.85) calculated using the CI for crude oil supplied to California refineries in 2006.
** The ~~average carbon intensity requirements~~ benchmarks for years 2013 to 2015 reflect reductions from revised base year (2010) CI values for CaRFG (98.95) calculated using the CI for crude oil supplied to California refineries in 2010.
*** ~~In 2015 the LCFS was readopted and the CI modeling updated.~~ The ~~average carbon intensity requirements~~ benchmarks for years 2016 to 2020 reflect reductions from revised base year (2010) CI values for CaRFG (98.47).
**** The benchmarks for years 2019 to 2030 reflect reductions from revised base year (2010) CI values for CaRFG (100.26).

(c) *~~Requirements~~ Benchmarks for Diesel Fuel and Fuels used as a Substitute for Diesel Fuel.*

Table 2. LCFS ~~Compliance Schedule~~ Carbon Intensity Benchmarks for 2011 to ~~2020~~ 2030 for Diesel Fuel and Fuels Used as a Substitute for Diesel Fuel.

Year	*Average Carbon Intensity (gCO_2e/MJ)*	*Year*	*Average Carbon Intensity (gCO_2e/MJ)*
2010	Reporting Only		
2011*	94.47	2021	90.95
2012	94.24	2022	90.95
2013**	97.05	2023	89.93
2014	97.05	2024	88.92
2015	97.05	2025	87.91
2016***	99.97	2026	86.90
2017	98.44	2027	85.89
2018	96.91	2028	84.88
2019	~~94.36~~ 93.47	2029	83.87
2020 ~~and subsequent years~~	~~91.81~~ 90.95	2030 and subsequent years	82.86

* The ~~average carbon intensity requirements~~ benchmarks for years 2011 and 2012 reflect reductions from base year (2010) CI values for ULSD (94.71) calculated using the CI for crude oil supplied to California refineries in 2006.
** The ~~average carbon intensity requirements~~ benchmarks for years 2013 to 2015 reflect reductions from revised base year (2010) CI values for ULSD (98.03) calculated using the CI for crude oil supplied to California refineries in 2010.
*** ~~In 2015 the LCFS was readopted and the CI modeling updated.~~ The ~~average carbon intensity requirements~~ benchmarks for years 2016 to 2020 reflect reductions from revised base year (2010) CI values for ULSD (102.01).
**** The benchmarks for years 2019 to 2030 reflect reductions from revised base year (2010) CI values for ULSD (101.05).

(d) *Benchmarks for Fuels used as a Substitute for Conventional Jet Fuel.*

Table 3. LCFS Carbon Intensity Benchmarks for 2019 to 2030 for Fuels Used as a Substitute for Conventional Jet Fuel.

Year	*Average Carbon Intensity (gCO_2e/MJ)*
2019	82.73
2020	80.50

Year	*Average Carbon Intensity (gCO_2e/MJ)*
2021	80.50
2022	80.50
2023	79.60
2024	78.71
2025	77.81
2026	76.92
2027	76.02
2028	75.13
2029	74.24
2030 and subsequent years	73.34

* The benchmarks reflect reductions from base year (2010) CI values for conventional jet fuel (89.44).

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§ 95486. Generating and Calculating Credits and Deficits.

(a) *Generation and Acquisition of Transferrable Credits.*

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(3) *Buffer Account.* The Executive Officer may create a LRT-CBTS account under the control of the Executive Officer. In this account, the Executive Officer may place:

(A) An equivalent number of credits for any LCFS credits that could have been claimed (or deficits that could have been eliminated) if reported timely, if not for the prohibition on retroactive credit claims in subsection 95486(a)(2).

(B) An equivalent number of credits representing the difference between the reported CI and the verified operational CI from annual fuel pathway reports for each fuel pathway code reported with transaction types “Production in California”, “Production for Import”, and “Import” during a compliance year. These credits will be placed in the buffer account after August 31st for the prior compliance year and will be calculated according to the following equation:

$$Credits^{FPC}_{CI\,difference}(MT) = \left(Credits^{FPC}_{verified\,opertaional\,CI}(MT) - Credits^{FPC}_{reported\,CI}(MT)\right)$$

If $Credits^{FPC}_{CI\,difference} > 0$

where,

$CI^{FPC}_{CI\,difference}$ is the number of credits representing the difference between the reported CI and verified operational CI for each fuel pathway code;

$CI^{FPC}_{verified\,opertaional\,CI}$ is the number of credits calculated using $CI^{XD}_{verified\,opertional}$ instead of $CI^{XD}_{reported}$ in equation in section 95486(b)(3)(A) CI. $CI^{XD}_{verified\,opertional}$ is determined in the annual fuel pathway reports pursuant to section 95488.9 for each fuel pathway code; and

$CI^{FPC}_{reported\,CI}$ is the number of credits calculated using equation in section 95486(b)(3)(A) with for each fuel pathway code;

(C) X% of total credits from a CCS project at the time of issuance.

(D) All net credits remaining in any deactivated LRT-CBTS accounts.

(E) The Executive Officer may retire credits in the Buffer Account to make the LCFS program whole following the invalidation of credits, pursuant to 95495, including invalidation of credits due to reversals of CCS projects, if the person responsible for the reversal or credit invalidity of the invalidated credits no longer exists or is otherwise unavailable to reimburse the program.

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(b) *Calculation of Credits and Deficits Generated.*

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(1) All LCFS fuel quantities used for credit calculation must be in energy units of megajoules (MJ).

Fuel quantities denominated in other units, such as those shown in Table ~~3~~4, must be converted to MJ in the LRT-CBTS by multiplying by the corresponding energy density:

Energy density values for Alternative Jet Fuels and Propane, including renewable propane, are added to Table 4 to be used in converting amounts of fuel that is metered in other units, such as gallons, to megajoules (MJ).

Table ~~3~~4. Energy Densities of LCFS Fuels and Blendstocks.

Fuel (units)	***Energy Density***
CARBOB (gal)	119.53 (MJ/gal)
CaRFG (gal)	115.83 (MJ/gal)
Diesel fuel (gal)	134.47 (MJ/gal)
~~Pure Methane (ft^3)~~	~~1.02 (MJ/ft^3)~~
Natural Gas ~~(ft^3)~~ (scf)	~~1.04~~ 0.98 (MJ/~~ft^3~~scf)
LNG (gal)	78.83 (MJ/gal)
Electricity (KWh)	3.60 (MJ/KWh)
Hydrogen (kg)	120.00 (MJ/kg)
Undenatured Anhydrous Ethanol	80.53 (MJ/gal)
Denatured Ethanol (gal)	81.51 (MJ/gal)
FAME Biodiesel (gal)	126.13 (MJ/gal)
Renewable Diesel (gal)	129.65 (MJ/gal)
Alternative Jet Fuel (gal)	126.37 (MJ/gal)
Propane (gal)	88.89 (MJ/gal)

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Energy Economy Ratios (EER) for Aviation applications, Propane, Electric Motorbikes and Electric Transport Refrigeration Units, are added to Table 5 to be used in credit/deficit calculations.

Table ~~4~~5. EER Values for Fuels Used in Light- and Medium-Duty, ~~and~~ Heavy-Duty On/Off-Road Vehicle and Aviation Applications.

Light/Medium-Duty Applications (Fuels used as gasoline replacement)		***Heavy-Duty/Off-Road Applications (Fuels used as diesel replacement)***		***Aviation Applications (Fuels used as jet fuel replacement)***	
Fuel/Vehicle Combination	***EER Values Relative to Gasoline***	***Fuel/Vehicle Combination***	***EER Values Relative to Diesel***	***Fuel/Vehicle Combination***	***EER Values Relative to Conventional jet***
Gasoline (incl. E6 and E10) or E85 (and other ethanol blends)	1	Diesel fuel or Biomass-based diesel blends	1	Jet fuel or Biomass-based jet fuel blends	1
CNG/ICEV	1	CNG or LNG (Spark-Ignition Engines)	0.9		
		CNG or LNG (Compression-Ignition Engines)	1		
Electricity/BEV, or PHEV	3.4	Electricity/BEV, or PHEV* ~~Truck~~ ~~Electricity/BEV or PHEV* Bus~~	~~2.7~~ ~~4.2~~ 5.0		
		Electricity/Fixed Guideway, Heavy Rail	4.6		
		Electricity/Fixed Guideway, Light Rail	3.3		
Electric Motorbikes	4.4	Electricity/Trolley Bus, Cable Car, Street Car	3.1		
Electric Airplanes	X.X	Electricity Forklifts	3.8		
		Electric TRU	3.4		
H2/FCV	2.5	H2/FCV H2 Fuel Cell Forklifts	1.9 2.1		
Propane	X.X	Propane	X.X		

§ 95487. Credit Transactions.

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95487(c)(1)(A) through (C)

(A) General *Requirements for Credit Transfers.* The Seller may transfer credits provided the number of credits to be transferred by the Seller does not exceed the number of total credits in the Seller's credit account defined as follows:

~~$Total\ Credits = Credits^{Gen} + Credits^{Aquired} - Sum\ of\,(Credits^{Retired} + Credits^{OnHold} + Credits^{Sold} + Credits^{Exported})$~~

$$Total\ Credits = Credits^{Gen} + Credits^{Aquired} - Sum\ of\,(Credits^{Retired} + Credits^{OnHold} + Credits^{Sold} + Credits^{Exported} + Credits^{CCMPledge})$$

where:

$Credits^{Gen}$, $Credits^{Aquired}$, $Credits^{Retired}$, $Credits^{OnHold}$, $Credits^{Sold}$, ~~and~~ $Credits^{Exported}$, and $Credits^{CCMPledge}$ have the same meaning as those in section 95485(b).

(B) The credit transfer request must identify the type of transaction agreement for which the transfer request is being submitted, selecting one of the following types:

1. Over-the-counter agreement for the sale or transfer of LCFS credits for which delivery will take place no more than 10 days from the date of the transaction agreement.

2. Over-the-counter agreement for the sale or transfer of LCFS credits for which delivery is to take place more than 10 days from the date of transaction agreement or that involve multiple transfers of LCFS credits over time.

3. Exchange agreements for the sale of LCFS credits through any contract arranged through an exchange or a clearing service provider.

(C)~~(B)~~ *Credit Seller Requirements.* ~~When a credit transfer agreement has been reached~~ From the date of transaction agreement, within ~~10 business~~ 5 days the Seller must initiate the documentation by completing and posting for the Buyer's review an online Credit

Transfer Form (CTF) provided in the LRT-CBTS. The CTF shall contain the following fields:

1. *Date of transaction agreement:* The date on which the Buyer and Seller reached the transaction agreement;

2. Names of the Seller and Buyer Companies as registered in the LRT-CBTS;

3. The Federal Employer Identification Numbers (FEIN) of the Seller and Buyer Companies as registered in the LRT-CBTS;

4. First Name, ~~and~~ Last Name and contact information of the person who performed the transaction on behalf of the Seller ~~Company~~;

~~5. Contact information of the person who performed the transaction on behalf of the Seller Company;~~

~~6~~5. First Name, ~~and~~ Last Name and contact information of the person who is anticipated to perform~~ed~~ the transaction on behalf of the Buyer ~~Company~~;

~~7. Contact information of the person who performed the transaction on behalf of the Buyer Company;~~

~~8~~6. The number of credits proposed to be transferred and any credit identification numbers assigned to the credits by the Executive Officer; and

~~9~~7. The price or equivalent value of the consideration (in U.S. dollars) to be paid per credit proposed for transfer, excluding any fees. If the transaction agreement does not specify the price for LCFS credits, the seller may select one of the following options:

   a. The proposed transfer is to reflect an adjustment in CI value of fuel transacted between Seller and Buyer;

   b. The proposed transfer incorporates a credit trade along with the sale or purchase of other product, and does not specify a price or cost basis for the sale of the credits alone. In such cases, Seller should provide a brief description of the pricing method;

c. If the pricing terms are not covered by the transfer types listed in subsections a. and b. above then the seller must provide the basis for pricing terms using the comment section in the CTF and upload a copy of transaction agreement that includes the terms of credit transfer.

8. *Expected Termination Date of the Agreement*. If the last term of the transfer agreement is completed when the credit transfer request process is completed, then the date the transfer request is submitted should be entered as the Expected Termination Date. If there is financial reconciliation, contingency, or other terms not settled prior to the completion of the credit transfer request, the parties are required to state the date the terms are expected to be settled as the Expected Termination Date. If the transfer agreement does not specify a date for the settlement of financial reconciliation, contingency, or other terms after the transfer request is completed, the entity may enter the Expected Termination Date as "Not Specified".

9. Whether the transaction agreement provides for future credit transfers after the current transfer request is completed.

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95487(c)(2)

(2) *Credit Transfer for an Exchange Agreement.* A transfer request submitted for an Exchange Agreement must provide the following information:

(A) Identify the exchange where the transaction is conducted.

(B) Identify the contract description code assigned by the exchange to the contract.

(C) Date of close of trading for the contract.

(D) Price at close of trading for the contract.

(E) Date of delivery of LCFS credits covered by the contract.

~~(2)~~(3) *Facilitation of Credit Transfer*.

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§ 95488.4. Lookup Table Fuel Pathway Application Requirements and Certification Process.

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Table 7. Lookup Table for Gasoline and Diesel and Fuels that Substitute for Gasoline and Diesel.

Fuel	Fuel Pathway Identifier	Fuel Pathway Description	Carbon Intensity Values (gCO_2e/MJ)
CARBOB[1]	CBOB	CARBOB - based on the average crude oil supplied to California refineries and average California refinery efficiencies	101.69
Diesel[1]	ULSD	ULSD - based on the average crude oil supplied to California refineries and average California refinery efficiencies	101.05
Compressed Natural Gas	CNGF	Compressed Natural Gas – Pipeline Average North American Fossil Natural Gas	80.21
Propane	PRPF	Fossil LPG from crude oil refining and natural gas processing used as a transport fuel	82.14
Electricity	ELCG	California average grid electricity supplied to electric vehicles	98.49 (and subject to annual updates)
	ELCR	Electricity that is generated from 100 percent solar or wind supplied to electric vehicles in California	0
Hydrogen	HYGF1	Compressed H2 produced in California from central reforming of North American fossil-based NG	125.56
	HYGF2	Liquefied H2 produced in California from central reforming of North American fossil-based NG	173.42
	HYGRB1	Compressed H2 produced in California from central reforming of biomethane (renewable feedstock) from North American landfills	100.78
	HYGRB2	Liquefied H2 produced in California from central reforming of biomethane (renewable feedstock) from North American landfills	149.19
	HYGFE	Compressed H2 produced in California from electrolysis using California average grid electricity	165.21

Fuel	Fuel Pathway Identifier	Fuel Pathway Description	Carbon Intensity Values (gCO_2e/MJ)
	HYGRE	Compressed H2 produced in California from electrolysis using solar- or wind-generated electricity	11.01

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§ 95488.7. Fuel Pathway Application Requirements Applying to All Classifications

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(k) *Monitoring Plan for Entities Responsible for Verification under the LCFS*. Each entity responsible for validation or verification under this subarticle must complete and retain for review by a verifier, or the Executive Officer, a written Monitoring Plan.

(1) The monitoring plan must contain the following general items and associated references to more detailed information:

(A) Information to allow CARB and the verification team to develop a general understanding of boundaries and operations relevant to the entity, facility, or project, including participation in other markets and other third-party audit programs;

(B) Reference to management policies or practices applicable to reporting pursuant to this subarticle, including recordkeeping;

(C) Explanation of the processes and methods used to collect necessary data for reporting pursuant to this subarticle, including identification of changes made after January 1, 2019;

(D) Explanations and queries of source data to compile summary reports of intermediate and final data necessary for reporting pursuant to this subarticle;

(E) Reference to one or more simplified block diagrams that provide a clear visual representation of the relative locations and positions of measurement devices and sampling locations, as applicable, required for calculating reported data (e.g. temperature, total pressure, LHV or HHV, fuel consumption); the diagram(s) must include storage tanks for raw material, intermediate products, and finished products, fuel sources, combustion units, and production processes, as applicable;

(F) Clear identification of all measurement devices supplying data necessary for reporting pursuant to this subarticle, including identification of low flow cutoffs as applicable, with descriptions of how data from measurement devices are incorporated into the submitted report;

(G) Descriptions of measurement devices used to report LCFS data and how acceptable accuracy is demonstrated, e.g., installation, maintenance, and calibration method and frequency for internal meters or how the criteria in MRR section 95103(k)(7) are met to demonstrate meters are financial transaction meters such that the accuracy is acceptable;

(H) Description of the procedures and methods that are used for quality assurance, maintenance, and repair of all continuous monitoring systems, flow meters, and other instrumentation used to provide data for LCFS reports;

(I) Original equipment manufacturer (OEM) documentation or other documentation that identifies instrument accuracy and required maintenance and calibration requirements for all measurement devices used to collect necessary data for reporting pursuant to this subarticle;

(J) The dates of measurement device calibration or inspection, and the dates of the next required calibration or inspection;

(K) Records of the most recent orifice plate inspection performed according to the requirements of ISO 5167-2 (2003), section 5, or AGA Report No 3 (2003) Part 2, which are hereby incorporated by reference;

(L) Requests for postponement of calibrations or inspections of internal meters and subsequent approvals by the Executive Officer. The entity must demonstrate that the accuracy of the measured data will be maintained pursuant to the measurement accuracy requirements of 95488.7(j)

(M) A listing of the equation(s) used to calculate flows in mass, volume, or energy units of measurement, and equations from which any non-measured parameters are obtained, including meter software;

(N) Identification of job titles and training practices for key personnel involved in LCFS data acquisition, monitoring, reporting, and report attestation, including reference to documented training procedures and training materials;

(O) Records of corrective and subsequent preventative actions taken to address verifier and CARB findings of past nonconformance and material misstatements;

(P) Log of modifications to fuel pathway report conducted after attestation in response to review by third-party verifier or CARB staff;

(Q) Written description of an internal audit program that includes data report review and documents ongoing efforts to improve the entity's LCFS reporting practices and procedures, if such an internal audit program exists.

(2) The monitoring plan must also include the following elements specific to fuel pathway carbon intensity calculations and produced quantities of fuels per FPC, as applicable:

(A) Explanation of the processes and methods used to collect necessary data for fuel pathway application and fuel pathway reports and all site-specific CA-GREET3.0 inputs, as well as references to source data;

(B) Description of steps taken and calculations made to aggregate data into reporting categories, for example aggregation of quarterly fuel transactions per FPC;

(C) Methodology for assigning fuel volumes by FPC, if not using a method prescribed/suggested by CARB. If using a CARB suggested methodology, the methodology should be referenced;

(D) Methodologies for testing conformance to specifications for feedstocks and produced fuels, particularly describing physical testing standards and processes;

(E) Description of procedure taken to ensure measurement devices are performing in accordance with the measurement accuracy requirements of 95488.7(j);

(F) Methodology for monitoring and calculating weighted average feedstock transport distance and modes, including the specific documentation records that will be collected and retained on an ongoing basis;

(G) Methodology for monitoring and calculating fuel transport distance and modes, including the specific documentation records that will be collected and retained on an ongoing basis;

(H) References to contracts and accounting records that confirm fuel quantities were delivered into California for transportation use in CI determination, and confirm feedstock and finished fuel transportation distance;

(I) All documentation required pursuant to 95488.7(g)(1)(B) for specified source feedstocks, defined in 95488.7(g)(1)(A);

(3) The monitoring plan must also include the following elements specific to quarterly fuel transactions reports for importers, exporters and producers of alternative fuels, gasoline and diesel, as well as quarterly reports of crude oil information, as applicable:

(A) Documentation that can be used to justify transaction types reported for fuel in the LRT-CBTS must be referenced in the monitoring plan. This can pertain to the production amount, sale/purchase agreements and final fuel dispensing records.

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§ 95488.8. Special Circumstances for Fuel Pathway Applications

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Table 8. Temporary FPCs for Fuels with Indeterminate CIs

Fuel	Feedstock	Process Energy	CI (gCO_2e/MJ)
Ethanol	Corn	Grid electricity, natural gas, and/or renewables	~~75.97~~ 90
	Sorghum	Grid electricity, natural gas, and/or renewables	~~83.49~~ 95
	Any Sugar ~~Cane and molasses~~ Feedstock	Bagasse and straw only; no grid electricity	~~56.66~~ 60
	~~Any starch or sugar feedstock~~	~~Any another~~	~~98.47~~

Fuel	Feedstock	Process Energy	CI (gCO_2e/MJ)
	~~Corn Stover~~ Any Cellulosic Biomass	~~As specified in CA-GREET 2.0~~ Grid electricity, natural gas, and/or renewables	~~41.05~~ 40
~~Biodiesel~~ Biomass-based Diesel	~~Any feedstock derived from animal fats~~ Fats/Oils/Grease Residues	Grid electricity, natural gas, and/or renewables	~~37.54~~ 45
	Any feedstock derived from plant oils, excluding palm oil	Grid electricity, natural gas, and/or renewables	~~56.95~~ 65
	Any other feedstock	~~Any other~~ Grid electricity, natural gas, and/or renewables	~~102.01~~ Baseline (2010) CI value for ULSD
~~Renewable Diesel (UOP process)~~	~~Any feedstock derived from animal fats~~	~~Grid electricity, natural gas, and/or renewables~~	~~32.26~~
	~~Any feedstock derived from plant oils~~	~~Grid electricity, natural gas, and/or renewables~~	~~53.21~~
	~~Any feedstock~~	~~Any other~~	~~102.01~~
~~Fossil CNG~~	~~Petroleum Natural Gas~~	~~N/A~~	~~78.37~~
Fossil LNG	Petroleum Natural Gas	N/A	~~94.42~~ 95
Fossil L-CNG	Petroleum Natural Gas	N/A	~~97.33~~ 100
Biomethane CNG	Landfill or digester gas	Grid electricity, natural gas, and/or parasitic load	~~46.42~~ 70
Biomethane LNG	Landfill or digester gas	Grid electricity, natural gas, and/or parasitic load	~~64.63~~ 80
Biomethane L-CNG	Landfill or digester gas	Grid electricity, natural gas, and/or parasitic load	~~67.18~~ 75
Biomethane CNG	Municipal Wastewater sludge	Grid electricity, natural gas, and/or parasitic load	35
Biomethane LNG	Municipal Wastewater sludge	Grid electricity, natural gas, and/or parasitic load	50
Biomethane L-CNG	Municipal Wastewater sludge	Grid electricity, natural gas, and/or parasitic load	55
Biomethane CNG	Dairy or Food/Green Waste	Grid electricity, natural gas, and/or parasitic load	0

Fuel	Feedstock	Process Energy	CI (gCO_2e/MJ)
Biomethane LNG	Dairy or Food/Green Waste	Grid electricity, natural gas, and/or parasitic load	0
Biomethane L-CNG	Dairy or Food/Green Waste	Grid electricity, natural gas, and/or parasitic load	0
Hydrogen	Fossil LNG (from centralized reforming)	Any	~~176.58~~ 185
~~Hydrogen~~	~~Centralized reforming of fossil L-CNG~~	~~Any~~	~~191.25~~
	~~Centralized reforming of fossil CNG~~		~~113.38~~
	~~On-site reforming of fossil NG~~		~~112.48~~
	~~On-site reforming of NG with renewable feedstocks~~		~~98.05~~
Any gasoline substitute feedstock-fuel combination not included above	Any	Any	~~98.47~~ Baseline (2010) CI value for CaRFG
Any diesel substitute feedstock-fuel combination not included above	Any	Any	~~102.01~~ Baseline (2010) CI value for ULSD

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§ 95489. Provisions for Petroleum-Based Fuels.

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(e) *Low-Complexity/Low-Energy-Use Refinery Credit.* A refinery may receive credit for being a low-complexity- and low-energy-use refinery.

(1) To be eligible for the credit calculation in section 95489(e)(3) and the refinery-specific incremental deficit calculation in section 95489(e)(4), a Low-Complexity/Low-Energy-Use Refinery must meet the criteria in section 95481(a)(54) using the following equations:

(A) Modified Nelson Complexity Score

$$Modified\ Nelson\ Complexity\ Score = \sum_{i}^{n} (index_i)\left(\frac{Capacity_i}{Capacity_{dist}}\right)$$

where:

$index_i$ is the 2012 Nelson Complexity Index listed in Table ~~9~~10;

$Capacity_i$ is the capacity of each unit listed in Table ~~9~~10 in barrels per day unless otherwise indicated;

$Capacity_{dist}$ is the capacity of the distillation unit in barrels per day;

i is the process unit; and

n is the total number of process units.

Table ~~9~~10. Nelson Complexity Indices.

Process Unit	***Index Value***
Atmospheric Distillation	1.00
Vacuum Distillation	1.30
Thermal Processes	2.75
Delayed and Fluid Coking	7.50
Catalytic Cracking	6.00
Catalytic Reforming	5.00
Catalytic Hydrocracking	8.00
Catalytic Hydrorefining/Hydrotreating	2.50
Alkylation	10.00
Polymerization	10.00
Aromatics	20.00
Isomerization	3.00
Oxygenates	10.00
Hydrogen (MMcfd)	1.00

Process Unit	***Index Value***
Sulfur Extraction (Metric Tons per day)	240.00

* * * * *

95489(f)(1), (2), and (5)

(f) *Refinery Investment Credit Pilot Program*. A refinery may receive credit for reducing greenhouse gas emissions from its facility. Any such credits ~~shall~~ must be based on fuel volumes sold, supplied, or offered for sale in California as set forth below.

(1) *General Requirements*.

(A) The application for a refinery investment credit must be submitted during or after the year 2016 and must be approved pursuant to this section before the refinery can receive credit. A project is eligible if the project completion date is on January 1, 2016 or later~~. authority-to-construct permit was approved after January 1, 2016.~~

(B) The refinery investment credit project must occur within the boundaries of the refinery, unless it involves carbon capture from hydrogen production. Sequestration sites for CCS do not need to be on-site at the refinery.

(C) The refinery investment credit project must achieve ~~carbon intensity reduction~~ GHG reduction equivalent to at least 1% of pre-project refinery-wide GHG emissions (baseline) ~~from the comparison baseline of at least 0.1 gCO_2e/MJ~~.

(D) The applicant must demonstrate that any net increases in criteria air pollutant or toxic air contaminant emissions from the refinery investment credit project are mitigated in accordance with all local, state, and national environmental and health and safety regulations.

(E) The following project types are eligible for the refinery investment project credits.

1. CO_2 capture at refineries, or at hydrogen production facilities that supply hydrogen to refineries, and subsequent geologic sequestration;

2. On-site renewable electricity production or offsite renewable electricity supplied directly to the refinery;

3. Process fossil fuels replacement by renewable fuels

4. Electrification at refineries that involves substitution of high carbon fossil energy input with grid electricity;

~~(E) Projects whose primary objectives are refinery equipment shutdowns, reductions in refinery or equipment throughput and refinery maintenance shall not be eligible for section 95489(f).~~

(F) Credits ~~created~~generated pursuant to section 95489(f) may not be sold or transferred to any other party.

(G) Credits ~~shall~~ will be pro-rated for years where the units within the project system boundary ~~refinery, or directly affected or potentially indirectly affected refinery units~~ were non-operational. This pro-rating shall consider the calendar days of operation vs non-operation.

(H) Credits ~~shall~~ must be pro-rated if the hydrogen production facility that captures CO_2 does not supply all of its hydrogen to the applicant refinery.

~~(G)~~(I) Credits generated pursuant to section 95489(f) are subject to limitations set forth in section 95485(d).

~~(I)~~(J) Projects that utilize carbon capture and sequestration are subject to the provisions of section 95490.

(2) *Calculation of Credits.*

(A) For carbon capture and sequestration projects, determine the credit in accordance with the CCS protocol.

(B) For other refinery investment credit projects, determine the credit as follows.

1. Establish a project system boundary. The project system boundary should include direct impacts and at least first order indirect impacts;

2. Determine the credit for the refinery investment credit project by estimating pre-project GHG emissions and project GHG emissions within the project system boundary;

$$Credit_{RIP} = (GHG_{pre-project} - GHG_{post-project}) \times \frac{Volume^{XD}}{Volume^{Total}}$$

where:

$Credit_{RIP}$ is the annual credit for the refinery investment credit project in metric tons per year;

$GHG_{pre-project}$ is the annual lifecycle GHG emissions from the use of fuels, electricity, steam/heat and hydrogen in the project system boundary prior to project implementation in metric tons per year;

$GHG_{post-project}$ is the annual lifecycle GHG emissions from the use of fuels, electricity, steam/heat and hydrogen in the project system boundary due to project implementation in metric tons per year;

$Volume^{XD}$ is the volume of CARBOB and diesel in gallons per year sold, supplied, or offered for sale in California by the refinery involved in the *Refinery Investment Credit Pilot Program*;

$Volume^{Total}$ is the total volume of CARBOB and diesel in gallons produced per year; and

~~(A) Determine total refinery emissions pre-project and post-project as follows:~~

~~$CO_2e_i = (CO_2) + (CH_4)(25) + (N_2O)(298) + electricity + thermal + hydrogen$~~

~~where:~~

~~CO_2e_i is the total emissions for data year i in metric tons;~~

~~CO_2 is as reported in CCR, title 17, sections 95100 through 95158;~~

~~CH_4 is as reported in CCR, title 17, sections 95100 through 95158;~~

~~N_2O is as reported in CCR, title 17, sections 95100 through 95158;~~

~~$electricity$ is imported electricity minus exported electricity per year converted to tons CO_2e by using 0.431~~ metric ~~tons CO_2e/MWh;~~

~~$thermal$ is imported thermal energy minus exported thermal energy per year converted to metric tons CO_2e by using 0.0663 tons CO_2e/MMBtu;~~

~~$hydrogen$ is purchased hydrogen multiplied by 10.8 metric tons/ metric ton hydrogen; and~~

~~i is the data year pre-project completion or i is the first full data year post-project completion.~~

~~(B) Determine the amount of emissions apportioned to each refinery product pre-project and post-project as follows:~~

$$\cancel{AE_i^{XD} = \left(\frac{Volume_i^{XD}}{Volume_i^{Total}}\right)(CO_2e_i)}$$

~~where:~~

~~AE_i^{XD} is the amount of emissions apportioned to each product XD output of refinery for data year i in metric tons of either CARBOB (XD = "CARBOB") or diesel (XD = "diesel");~~

~~CO_2e_i is the total emissions for data year i in metric tons;~~

~~i is the data year prior to project completion or i is the first full data year after the project is completed;~~

~~$Volume_i^{XD}$ is the volume of individual product output for data year i in barrels (bbl) of either CARBOB (XD = "CARBOB") or diesel (XD = "diesel"); and~~

~~$Volume_i^{Total}$ is the total volume of CARBOB and diesel for data year i in bbl.~~

~~(C) Determine the total energy for each refinery product output pre-project and post-project as follows:~~

$$\cancel{EC_i^{XD} = (Volume_i^{XD})(D^{XD})\left(42\left(\frac{gal}{bbl}\right)\right)}$$

~~where:~~

~~EC_i^{XD} is the total energy for each product output for data year i in MJ of either CARBOB (XD = "CARBOB") or diesel (XD = "diesel");~~

~~i is the data year prior to project completion or i is the first full data year after the project is completed;~~

~~$Volume_i^{XD}$ is the volume of individual product output in barrels (bbl) of either CARBOB (XD = “CARBOB”) or diesel (XD = “diesel”); and~~

~~D^{XD} is the energy density listed in Table 34 in MJ/gal of either CARBOB (XD = “CARBOB”) or diesel (XD = “diesel”).~~

~~(D) Determine the carbon intensity of each refinery product pre-project post-project as follows:~~

$$\cancel{CI_i^{XD} = \left[\frac{AE_i^{XD}}{EC_i^{XD}}\right]\left(\frac{10^6\ g}{metric\ tons}\right)}$$

~~where:~~

~~CI_i^{XD} is the carbon intensity of each refinery product for data year i in gCO_2e/MJ of either CARBOB (XD = “CARBOB”) or diesel (XD = “diesel”);~~

~~AE_i^{XD} = amount of emissions apportioned to each product XD output of refinery in metric tons for data year i;~~

~~EC_i^{XD} is the total energy for each product output for data year i in MJ of either CARBOB (XD = “CARBOB”) or diesel (XD = “diesel”); and~~

~~i is the data year prior to project completion or i is the first full data year after the project is completed.~~

~~(E) Determine the reduction in carbon intensity associated with the refinery investment credit project as compared to the refinery without the refinery investment credit project as follows:~~

$$\cancel{\Delta CI_{RIC}^{XD} = CI_{pre}^{XD} - CI_{post}^{XD}}$$

~~where:~~

~~ΔCI_{RIC}^{XD} is the reduction in carbon intensity (a positive value), in gCO_2e/MJ, associated with the refinery investment credit project as compared to the refinery without the refinery investment credit project;~~

~~CI_{pre}^{XD} is the carbon intensity of each refinery petroleum product pre-project in gCO_2e/MJ of either CARBOB (XD = "CARBOB") or diesel (XD = "diesel"); and~~

~~CI_{post}^{XD} is the carbon intensity of each refinery petroleum product post-project in gCO_2e/MJ of either CARBOB (XD = "CARBOB") or diesel (XD = "diesel").~~

~~(F) Determine the credit for the refinery investment credit project:~~

$$\cancel{Credits_{RIC}^{XD} = (\Delta CI_{RIC}^{XD} \times D^{XD} \times V^{XD} \times C)}$$

~~where:~~

~~$Credits_{RIC}^{XD}$ is the credit for the refinery investment credit project in metric tons;~~

~~ΔCI_{RIC}^{XD} is the reduction in carbon intensity (a positive value), in gCO_2e/MJ, associated with the refinery investment credit project as compared to the refinery without the refinery investment credit project;~~

~~D^{XD} is the energy density listed in Table 3~~4 ~~in MJ/gal of either CARBOB (XD = "CARBOB") or diesel (XD = "diesel");~~

~~V^{XD} is the volume of either CARBOB (XD = "CARBOB") or diesel (XD = "diesel") in gallons; and~~

$$\cancel{C = 1.0 \times 10^{-6} \frac{MT}{gCO_2e}}.$$

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(5) *Credit Review and Issuance*. Each refinery that has an approved refinery investment credit must undergo annual monitoring and verification to verify the credit. ~~solicit Executive Officer review and re-approval of the credit every three years.~~

(A) Refineries ~~shall~~ must submit process and emissions data to the Executive Officer for review and approval that confirm the greenhouse gas emission reductions estimated in the original submittal pursuant to the process in sections 95489(f)(3) and (4). Failure to submit data ~~for~~ annually ~~review every three years~~ will result in automatic revocation of the refinery investment credit henceforth.

(C) When the Executive Officer determines that the GHG reduction ~~carbon intensity reduction~~ from the refinery investment project has decreased from the original reduction, the refinery investment credit ~~shall~~ will be adjusted to reflect the new credit henceforth. If a revised GHG reduction drops below 1% ~~0.1 gCO_2e/MJ~~ compared to the refinery's baseline without the refinery investment credit project, the refinery investment credit ~~shall~~ will be canceled henceforth.

(C) Credits generated under this provision will be issued annually after the emissions data required under (A) above has been confirmed to be accurate and a final calculation of credits calculated as required in section 95489(f)(2) using the data under (A) above has been completed.

§ 95491. Fuel Transactions and Compliance Reporting ~~and Recordkeeping.~~

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(d) *Specific Reporting Requirements for Quarterly Fuel Transactions Reports.*

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(1) *Specific Quarterly Reporting Parameters for Liquid Alternative Fuels, Gasoline, Diesel and Diesel Fuel Blends.*

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(B) *Temperature Correction*. All liquid fuel ~~volumes~~ amounts reported in the LRT-CBTS must be adjusted to standard temperature conditions of 60°F as follows:

1. For ethanol, the following formula must be used:

$$V_{s,e} = V_{a,e} \times (-0.0006301 \times T + 1.0378)$$

where:

$V_{s,e}$ is the standardized volume of ethanol at 60 °F, in gallons;

$V_{a,e}$ is the actual volume of ethanol, in gallons; and

T is the actual temperature of the batch, in °F.

2. For biodiesel, one of the following two methodologies must be used:

a. $V_{s,b} = V_{a,b} \times (-0.00045767 \times T + 1.02746025)$

where:

$V_{s,b}$ is the standardized volume of biodiesel at 60 °F, in gallons;

$V_{a,b}$ is the actual volume of biodiesel, in gallons; and

T is the actual temperature of the batch, in °F.

b. The standardized volume of biodiesel at 60 °F, in gallons, as calculated from the use of the American Petroleum Institute Refined Products Table 6B, as referenced in ASTM D1250, which is hereby incorporated by reference, or by comparable means that can be demonstrated to a verifier or the Executive Officer to be consistent with these standard methods.

3. For other liquid fuels, the volume correction to standard conditions must be calculated by the methods described in the American Petroleum Institute (API) Manual of Petroleum Measurement Standards Chapter 11 - Physical Properties Data (May 2004), the ASTM Standard Guide for Use of the Petroleum Measurement Tables, ASTM D1250-08 (Reapproved 2013), or the API Technical Data Book - Petroleum Refining (Sixth Edition, April 1997), all three of which are hereby incorporated by reference, or by comparable means that can be demonstrated to a verifier or the Executive Officer to be consistent with these standard methods.