

Low Carbon Fuel Standard Re-Adoption

March 11, 2014

Agenda

- Overview
- Current LCFS Status
- New Concepts Being Considered
- LCFS Amendments from 2013
- Next Steps

Overview

- LCFS adopted in 2009
- LCFS amendments approved December 2011 and effective November 2012
- Planned to go to the Board with additional amendments in 2013
 - Proposed amendments were workshopped in 2013
 - Court decision on LCFS lawsuit put amendments on hold

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Court Ruling on LCFS Lawsuit

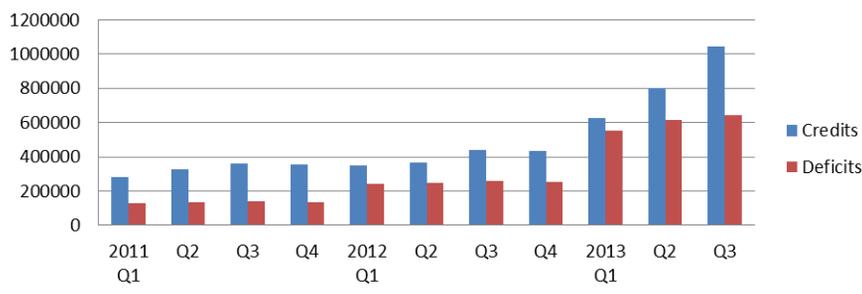
- Fifth Circuit Court of Appeals ruled that LCFS would remain in effect
- ARB can continue to implement and enforce 2013 standards
- ARB required to address CEQA and APA issues
- Staff will present for Board's consideration a revised LCFS regulation in 2014, including 2013 amendments and new concepts

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LCFS Status To Date

Fig. 1. Total Credits and Deficits (All Fuels) Reported, Q1 2011 -- Q3 2013

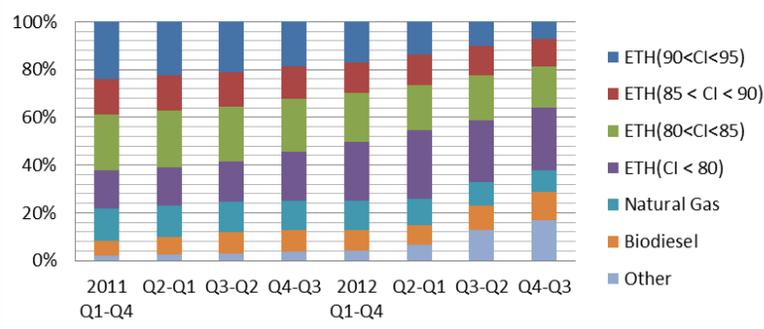


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LCFS Status To Date (cont'd)

Fig 3. Credit Percentage by Fuel, Q1 2011 - Q3 2013



- Larger portion of low CI ethanol
- Continued contribution of alternative fuel (e.g., natural gas)
- Non-ethanol fuels make up over 35 percent credits

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LCFS Credit Transfers Update

- Increased credit trading activity in 2013 and that trend continues in 2014
 - 271 credit transfers processed so far (45 transfers completed through the first two months of 2014)
 - 1.15 million credits have been traded; the average credit price reported thus far is \$50
- The online credit transfer platform has been functioning well, easing the processing of transactions
- Monthly credit trading activity reports published

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Rationale of Amendments

- Board directed staff in Resolutions 09-31 and 11-39 to consider specific amendments
- Staff solicited and encouraged stakeholder feedback throughout the implementation of LCFS
- Staff conducted internal reviews of lessons learned since the implementation of LCFS began

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New Concepts Being Considered

1. GHG Emissions Reductions at Refineries
2. Modification of Compliance Curves for Gasoline and Diesel Standards
3. Refinery-specific Crude Oil Incremental Deficit Accounting
4. Fuel Pathways and Producer Facility Registration

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GHG Emissions Reductions at Refineries

- Why?
 - Consistent with life cycle analyses
- How?
 - Refineries will submit projects for approval
 - Delta between refinery's baseline transportation fuel CI and new transportation fuel CI will be determined
 - Credits will be applied to refinery
- Review
 - Each refinery with approved Refinery Investment credits will have their transportation fuel CIs reviewed periodically
 - Changes in the CIs could result in an increase, decrease, or elimination of the credit in future years

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<http://www.arb.ca.gov/fuels/lcfs/lcfs.htm>

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LCFS Compliance Schedules

- LCFS compliance limits frozen at 2013 levels until LCFS re-adoption; expected to occur in 2015
- No proposal to change the average carbon intensity target of 10 percent by 2020
- Staff believes that some post-2015 “curve-smoothing” may be appropriate

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LCFS Compliance Schedules Post-2020

- In accordance with the draft Scoping Plan Update staff will consider revising the LCFS compliance schedule with post 2020 targets that call for CI reductions greater than 10 percent.
- Additional analysis for post-2020 compliance schedule will include:
 - potential revisions to the calculation of ILUC values;
 - refinery credit provisions;
 - electricity credits for off-road applications ;
 - cost containment provision.

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LCFS Compliance Schedules Methodology

- Create Low-CI fuel projections through 2030
 - Take into account effect of petroleum prices on biofuels
 - Low, medium, and high projections
- Identify which fuels are likely to come to CA based on demand-pull incentive structure of LCFS

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Refinery-specific Incremental Deficit Option

- Small refineries can be affected by a California Average incremental deficit but cannot affect the Annual Crude Average CI
- Staff recommends offering option to small refiners
 - Incorporate option into Low Energy Use/Low Complexity refinery provision
 - Large refineries will continue to follow the California Average approach

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Basic Provisions for Participating Refineries

- One-time option for interested refineries
- Incremental deficit assessed if refinery Annual Average CI exceeds refinery 2010 Baseline Average CI
- Participating refineries must:
 - Work with ARB staff to properly characterize California-produced crudes supplied to the refinery
 - Provide descriptions, sources and volumes of major intermediate refinery feedstocks and blendstocks
 - Provide sources and volumes of finished products supplied by outside refineries

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Fuel Pathways

- Staff proposes to restructure the fuel pathway certification and registration process
- The goals would be to:
 - Reduce the number of pathways available to only one producer
 - Streamline, consolidate and simplify the process
 - Focus our efforts on next-generation fuel pathways
- Proposal: create a two-tiered pathway process
 - Tier 1: Register first-gen fuels into CI bins
 - Tier 2: Approve next-gen fuels through a revised Method 2 process

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Tier One Pathways

- Tier One fuels include conventionally produced
 - Starch- and sugar-based ethanol
 - Biodiesel
 - Renewable diesel
 - Natural gas
 - Electricity
- Staff would develop a series of mutually exclusive CI bins for each first-generation fuel
- Each tier 1 fuel producer would be registered into the bin into which its CI falls
- All fuels in a given bin would have the same CI: the midpoint of that bin's CI range
- Tier 1 CIs would be integers, and would not be producer-specific

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Tier One Pathways (cont'd)

Tier-One Application Process

- First time applicants and applicants seeking to move to a new bin would use the same streamlined version of the existing Method 2 process
- This single, unified process would replace the existing Methods 1, 2A, and 2B process for tier-one pathways
- Tier one fuels could apply to move into tier two

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Tier Two Pathways

- Next-generation fuels:
 - Cellulosic alcohols
 - Biomethane
 - Hydrogen
 - Drop-in fuels
 - Etc. (including fuels as yet unknown to us)
- First-generation fuels produced using a qualifying innovative method:
 - Low-CI process energy (e.g., biogas)
 - Waste or residual feedstock
 - Dedicated renewable electricity source
 - Carbon Capture and Sequestration

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Tier Two Pathways (cont'd)

- Tier-two application process: enhanced version of existing Method 2 process
- Enhancements needed because
 - We won't be as familiar with next-gen pathways
 - Some life cycle inventory data for next-gen pathways won't be available
- Higher data quantity and quality standards
 - More 3rd-party validation
 - Certifications and audits
 - Data sets from data-logging systems
 - Mass and energy balances
 - Process modeling (e.g., Aspen)

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Life Cycle CI Calculation

- Staff proposes to replace CA-GREET 1.8b
- Would base the replacement on either
 - Argonne's latest spreadsheet-based GREET, or
 - Argonne's non-spreadsheet GREET.net application
- Existing CIs would be recalculated using the new CA-GREET model

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LCFS Amendments from 2013

1. **Cost Containment Provision**
2. Revised iLUC Values
3. Electricity Provisions
4. Low-Energy-Use Refinery Provisions
5. Innovative Technologies for Crude Oil Production
6. OPGEE Revisions and Crude Lookup Table Revisions
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Cost Containment Provision

- Purpose: Ensure that the LCFS achieves maximum GHG emissions reductions within a reasonable and predictable range of costs
- Goals:
 - Provides additional compliance options
 - Strengthens incentives to invest in low-CI fuels
 - Increases certainty regarding the maximum cost of compliance

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Cost Containment Provision

- Option 1: Credit Clearance
 - Regulated parties can carry deficits after purchasing their *pro rata* share of credits
- Process:
 - Credit clearance periods would occur at the end of a compliance year
 - Regulated parties with excess credits pledge credits they would like to sell at or below a pre-determined price
 - Parties with a deficit purchase their pro-rata share from that pledged-credit pool
 - Remaining deficits add to a cumulative compliance obligation and incur interest to be repaid later

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Cost Containment Provision

- **Option 2: Credit Window**
Regulated parties can purchase and retire compliance-only credits
- **Process:**
 - ARB would offer credits for sale at a pre-determined price
 - Regulated parties purchase credits needed for that year's compliance
 - Funds collected from the sale of compliance credits would be distributed to low-CI fuel producers to further incentivize production

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Cost Containment Provision

Next Steps:

- **Establish Working Group**
Friday, March 28, 2014 (tentative)
- **Select an Option**
A credit clearance process is currently the preferred option
- **Price cap for LCFS credits**
- **Price floor for LCFS credits**

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iLUC Analysis: 2009-2014

- Approved by Board in 2009/2010
 - 30 g/MJ for corn ethanol
 - 46 g/MJ for sugarcane ethanol
 - 62 g/MJ for soy biodiesel
- Expert Working Group provided recommendations to Board in 2010

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iLUC Analysis: 2009-2014 (cont'd)

Current Analysis March 2014

- Developed separate carbon emissions factor model
- Evaluated different aspects of the GTAP model (parameters, structure, etc.)
- Draft updates for iLUC values for corn ethanol, sugarcane ethanol and soy biodiesel
- Draft iLUC values for canola biodiesel and sorghum ethanol
- Evaluation of uncertainty in iLUC analysis

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Overview of Electricity Provisions

- Electricity use in fixed guideway transportation and forklifts
 - Board direction to consider off-road sources of electricity
 - Consideration of two methods to incorporate these sources into the regulation
 - Overview of staff proposal
- Modification of requirement to provide metered electricity data for residential charging

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Fixed Guideway Transportation and Forklifts Board Direction

- Only on-road vehicles currently qualify for credit generation
- Board directed staff (Res. 09-31 & 11-39) to:
 - Evaluate the feasibility of issuing credits for non-road electricity-based transportation sources, including mass transit, and
 - Propose amendments, if appropriate, to the regulation
- Staff is proposing to add fixed guideway transportation and electric forklifts as eligible to opt-in

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Fixed Guideway Transportation and Forklifts Consideration of Two Methods

Original staff concept

- Allow these sources to opt into LCFS
- Use modified electricity credit calculation
 - EVs receive credit for low-CI fuel used *and* emissions avoided by conventional vehicle *not* purchased
 - Fixed guideway transportation and forklifts not as directly linked to diesel fuel displacement
 - Therefore, credit calculation should *not* include additional credit for diesel fuel displacement

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Fixed Guideway Transportation and Forklifts Consideration of Two Methods (cont'd)

Baseline approach

- Consideration requested by stakeholders
- Incorporate 2010 electricity and natural gas fuel use into diesel baseline
- Modify annual standards based on new diesel baseline
- Allow credit generation from additional future transportation technologies using electricity

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Fixed Guideway Transportation and Forklifts Consideration of Two Methods (cont'd)

Staff does *not* recommend baseline approach

- Affects all regulated parties
 - Increases annual CARB diesel deficits
 - Reduces annual credit generation under diesel standard for lower-CI fuels
- Credits for fixed guideway transportation and forklifts will likely not *all* be realized (not all regulated parties will opt-in and report)

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Fixed Guideway Transportation and Forklifts Consideration of Two Methods (cont'd)

Staff recommends original concept

- Maintains current baseline
- No change in obligations for diesel regulated parties due to inclusion of these sources
- Number of off-road sources that qualify for credit generation is known and fuel use is quantifiable

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Fixed Guideway Transportation and Forklifts Overview of Staff Proposal

Fixed Guideway Transportation

Definition: A fixed guideway system is a system of public transit electric vehicles that can operate only on its own guideway constructed specifically for that purpose, such as light rail or heavy rail, exclusive right-of-way bus operations, and trolley coaches

Fixed Guideway Transportation and Forklifts Overview of Staff Proposal (cont'd)

Fixed Guideway Transportation

- Transit agencies would be eligible to opt in to generate credits, with utilities as back-up
- Credit calculation would not include credit for diesel fuel displacement
- New system extensions may be eligible for full credit calculation if fuel use can be quantified

Fixed Guideway Transportation and Forklifts Overview of Staff Proposal (cont'd)

Electric forklifts

- Utilities would be eligible to include this electricity use
- Fuel use estimated based on forklift shipments, battery size, operating hours, and load factor
- Credit calculation would not include credit for diesel fuel displacement

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Modification of Requirement for Metering of Residential Electricity

- Section 95484(b) requires regulated parties for residential charging to be based on direct metering starting January 1, 2015
- Direct metering means use of a utility meter or submeter in the charging equipment
- Utilities estimate <50% of residential EVs are metered
- Staff proposes to modify the requirement so that an approved estimation method may be used for EVs not using a direct meter

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Low-Complexity and Low-Energy-Use Refinery Provisions

- Resolution 11-39
 - “...investigate the feasibility of developing into regulatory language for future rulemaking(s)....
 - Accounting for lifecycle carbon intensity associated with low-energy refineries”*
- Status: Planning to include in the 2014 re-adoption of the LCFS

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Low-Complexity and Low-Energy-Use Refinery Provisions (cont'd)

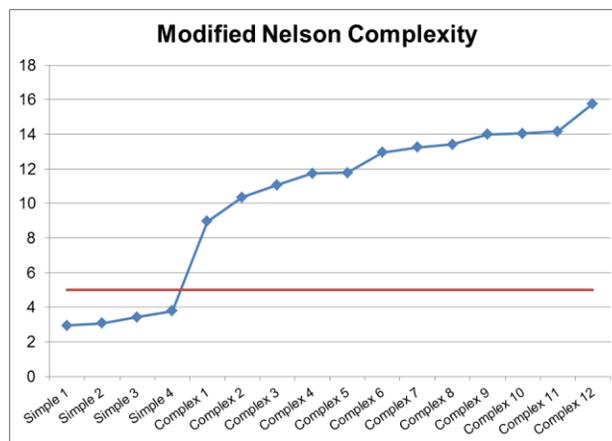
Conceptual Metric for Applicability

- Modified Nelson Complexity: Less than 5

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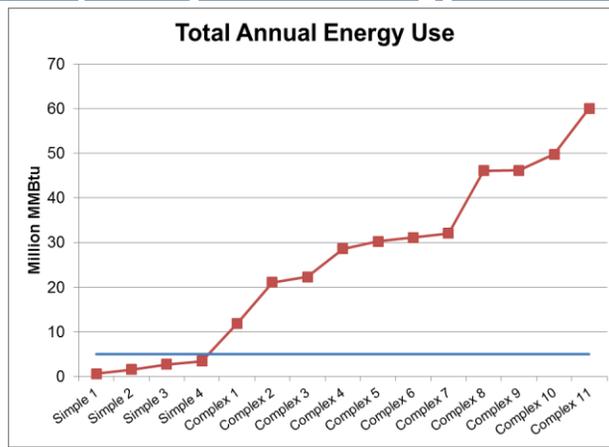
- Total energy use of refinery: Less than 5 million MMBtu consumption per year

Defining a Low-Complexity/Low-Energy-Use Refinery



Modified Nelson Complexity: Less than or equal to 5

Defining a Low-Complexity/Low-Energy-Use Refinery



Total Annual Energy Use: Less than or equal to 5 million MMBtu per year

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Low-Complexity/Low-Energy-Use Refinery

- Staff has been working to quantify the difference in transportation fuel carbon intensities between Low-Complexity/Low-Energy-Use refineries and the complex refineries.
- Staff is proposing to recognize this CI difference within the LRT.

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Crude Oil Provisions

- Innovative crude production method provision
- OPGEE revisions and Crude Lookup Table

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Innovative Crude Method Provision

Considering amendments to:

- Allow the crude producer to opt-in as a regulated party and earn credits based on innovative crude volume supplied to California refineries
- Include solar, wind, and biomass based power generation and biomass based steam generation as allowable innovative methods
- Remove the 1 g/MJ threshold for CI reduction

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Simplified Application and Default Credit

- Simplify the application and default credit calculation for solar steam and solar/wind power
- Solar steam displaces natural gas fired OTSG
 - Default credit of 0.02855 MTCO₂ per barrel solar steam
- Solar and wind based electricity
 - Default credit of 0.6 MTCO₂ per MW-hr electricity

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Potential Benefits of Innovative Provision

- White paper to be released soon
- Assessed potential benefits of widespread adoption of solar steam and solar or wind-based electricity at California oil production facilities
- Similar benefits could be achieved by out-of-state oil producers

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OPGEE Revisions and Crude CI's

- Minor revisions to OPGEE v1.1 since last year
 - OPGEE v1.1 Draft B and documentation posted to workshop webpage
 - Revisions discussed in Appendix E of documentation
- Draft CI values for Crude Lookup Table (Table 8) will be posted for feedback this spring
 - Over 100 internationally and nationally marketed crudes
 - Nearly 200 California oil fields
 - Limited number of default carbon intensity values

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OPGEE Revisions and Crude CI's

- Expect slight increases to most draft CI values presented in March 2013
- Three year cycle for OPGEE and Table 8 revisions
- Executive Officer approval of OPGEE and Table 8 revisions

Feedback Due March 25

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Enhancements to Reporting Requirements

1. Improve traceability of fuels
 - Chain of custody reporting
 - Require reporting of all Transaction Types in the LCFS Reporting Tool (LRT)
2. Modified registration procedure for LCFS Reporting Tool (LRT)
3. Streamline the Opt-in/Opt-out process
4. Require all pending credit transfers completed *prior to* submission of annual report
5. Add terminology and calculations from LRT for clarity

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Enhancements to Recordkeeping Requirements

- Modification to the Production Transfer Documents
 - Include biofuel facility information
 - Provide clarification for LCFS fuels that are sold without obligation
 - Other minor clarifications
- Clarify physical pathway demonstration process for natural gas
- Align record retention period with Cap & Trade regulation

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Enhancements to LCFS Credit Provisions

- Require use of Credit Bank & Transfer System (CBTS)
 - Automated credit transfer process
 - Voluntary posting of credits for sale
- Clarify requirements for credit brokers
- Specify default credit retirement hierarchy

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Enhancements to LCFS Credit Provisions (cont'd)

- Clarify provisions related to LCFS credit Retroactivity
- Credits to be calculated in the LRT-CBTS
- “Credits on Hold” pending physical pathway demonstration
- Multiple parties claiming credits
 - Clarify the procedure
 - Executive authority to revoke/retire invalid credits

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LCFS Enforcement Provisions

- Health and Safety code
- Considerations
- Executive Officer Authority

Guiding Principle: Noncompliance always cost more than compliance

LCFS Enforcement Provisions

- Must Meet Annual Compliance Obligation
 - Retire credits equal to compliance obligation
 - Deficits can be carried to next compliance year under certain conditions
- H&S Code Part 5, section 43027
 - Up to \$35,000 per day for Strict liability;
 - Up to \$50,000 per day negligence; and
 - Up to \$250,000 per day for willful and intentional violations

LCFS Enforcement Provisions

Examples of Types of Violations

- Late or inaccurate reports = per day penalty
- Failure to retire credits to match deficits for the annual period = Entire calendar year*

*Scale of any shortfall would be a chief consideration in setting penalty

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LCFS Enforcement Provisions

Penalty Considerations (Health & Safety Code 43031)

1. Extent of harm
2. Nature and persistence of the violation including the magnitude of the excess emissions
3. Compliance history
4. Any preventive efforts
5. Effort to comply
6. Cooperation of the defendant
7. Financial burden

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LCFS Enforcement Provisions

When a regulated part has violated the LCFS, the Executive Officer has the authority to:

- Suspend an account
- Revoke credits
- Limit or prohibit transfers of credits

Additional LCFS Considerations

- Downstream CI obligation for diesel
- LCNG initial regulated party
- Others

Next Steps

- Feedback due March 28, 2014
- Submit via email to Katrina Sideco at ksideco@arb.ca.gov
- Additional public workshops
- Individual meetings with stakeholders
- Board Hearing – Fall 2014
- Staff report – Summer 2014

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