Low Carbon Fuel Standard

Public Workshop: Potential Changes to the Low Carbon Fuel Standard

JULY 7, 2022

CALIFORNIA
AIR RESOURCES BOARD

Purpose

Discuss options for utilizing LCFS to accelerate transportation decarbonization

- Present current LCFS status and trends
- Identify considerations for carbon intensity target updates
- Identify options for improving alignment between LCFS and incentives needed for infrastructure and fueling
- Discuss concerns raised about LCFS and crop-based feedstocks
- Solicit stakeholder feedback, including opportunities to support equity

Note: This workshop does not include a full list of potential changes staff are considering

Workshop Logistics

- Workshop materials and online docket available on the LCFS Meetings and Workshops page: https://ww2.arb.ca.gov/our-work/programs/low-carbon-fuel-standard/lcfs-meetings-and-workshops
- Written feedback may be submitted to the online docket
  - Online docket open July 7 to August 8 (5 pm Pacific)
- Q&A during the workshop
  - 1) Use the "Raise Hand" function in the GoToWebinar toolbar, which should be located to the right of your screen as shown
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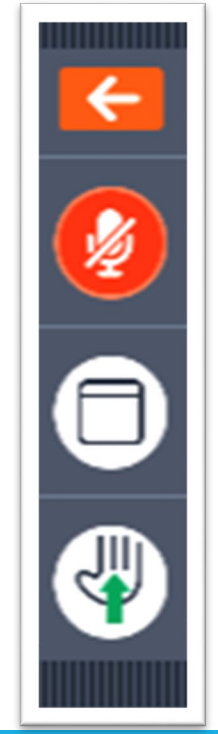


LCFS as part of State climate policy

2022 Scoping Plan: Path to Carbon Neutrality

- May 2022 – Draft Plan
- June 2022 – Board Hearing 1
- Late 2022 – Board Hearing 2 (final proposed plan)

Scoping Plan Webpage: https://ww2.arb.ca.gov/our-work/programs/ab-32-climate-change-scoping-plan

Broad policies and path to meet climate goals

LCFS Pre-Rulemaking

- Informal Workshops
  - Evaluate LCFS trends
  - Discuss alignment with Scoping Plan signals
  - Solicit public input on additional changes for consideration

Potential changes while the Scoping Plan is finalized

LCFS Formal Rulemaking (major steps)

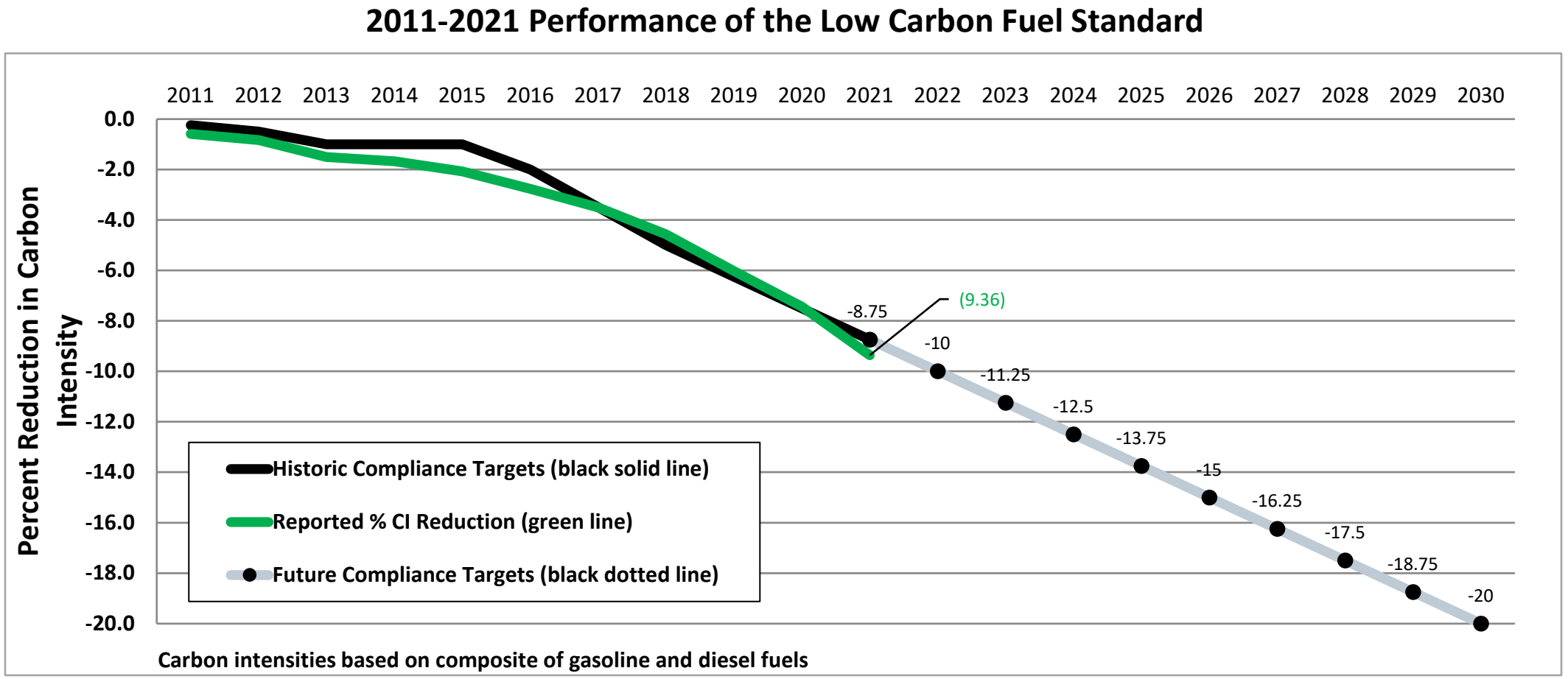
- Issue public Notice of Preparation (NOP)
- Develop language and economic analysis
- Dept of Finance review
- Initial Statement of Reasons (ISOR) and public comment period
- Board Hearing 1
- Respond to comments
- Board Hearing 2 (adoption)
- Office of Administrative Law review
- Implementation begins

Formal process with specific timelines

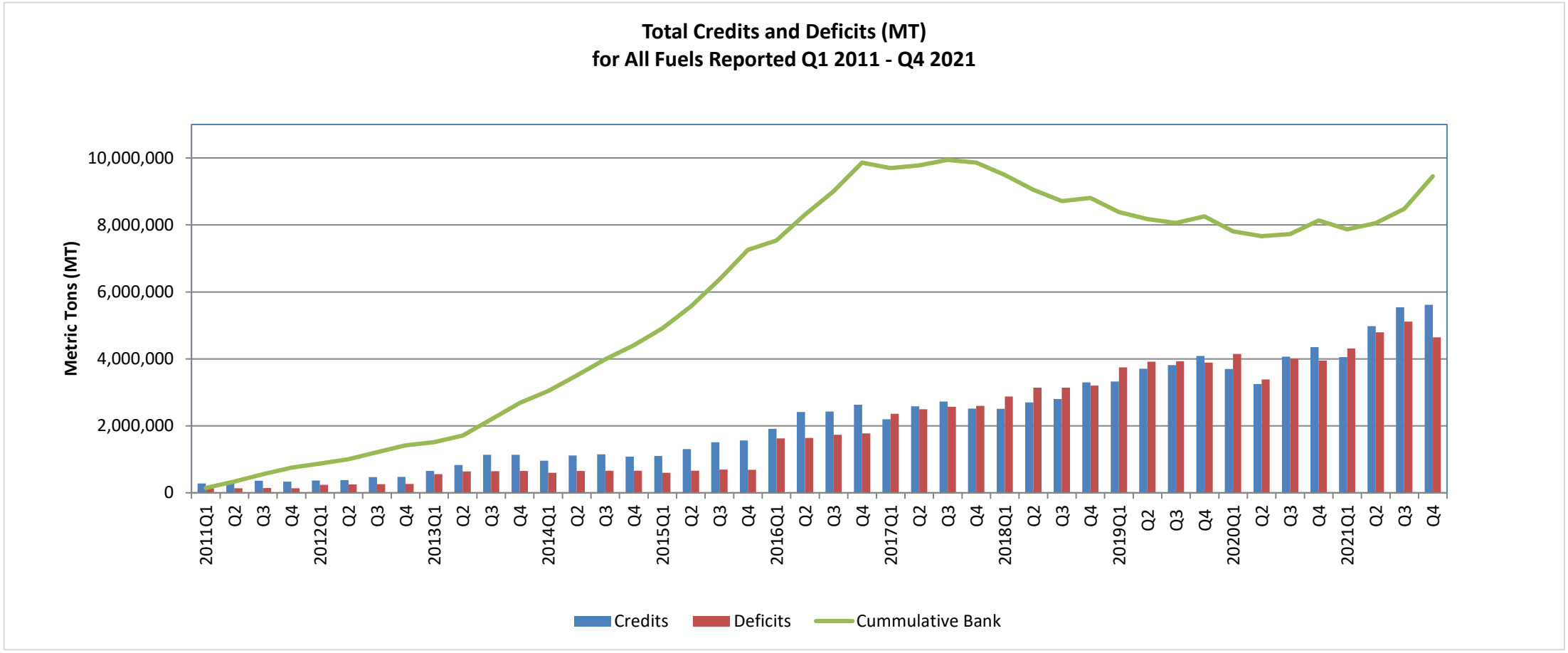
* One year timeline to complete once ISOR is published

LCFS Status and Trends

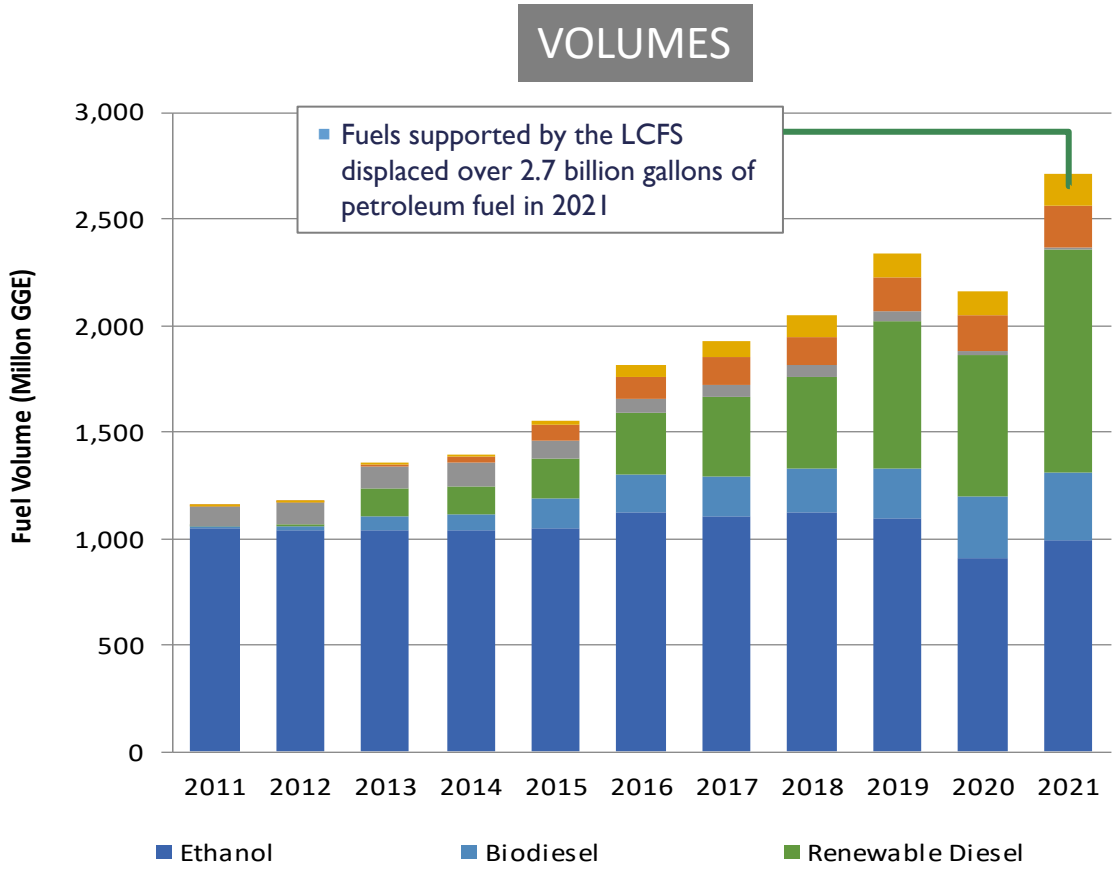
LCFS is Over-Performing

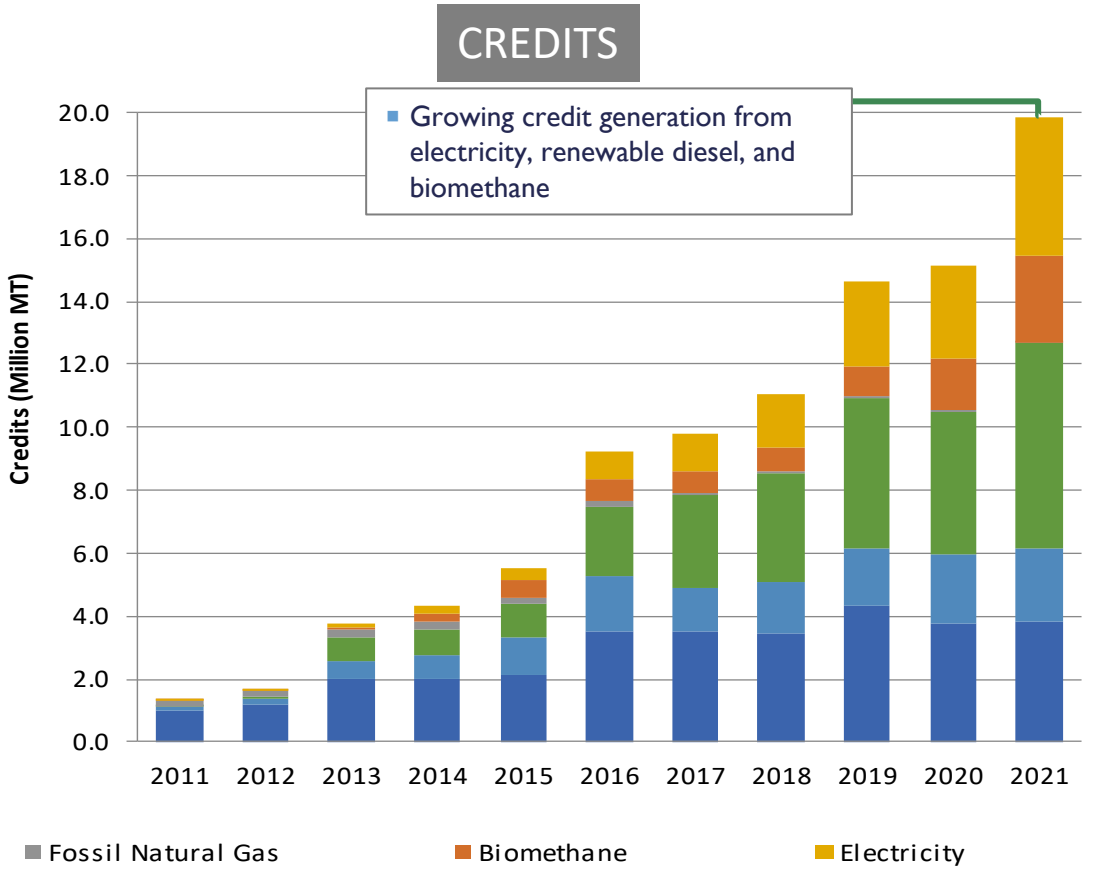


Credit and Deficit Balances



LCFS Continues to Increase Diversity and Volume of Low-Carbon Fuels





LCFS is a Critical Part of California's Climate Portfolio

Significant reductions in transportation emissions are needed to reach carbon neutrality and improve air quality

LCFS is a key mechanism that supports:

- Reducing and replacing fossil fuels
- Accelerating investment in low-carbon fuel production and the associated infrastructure buildout
- Providing long-term price signals needed to support transition to ZEVs and decarbonizing remaining liquid fuel demand

Decarbonization Accelerating

ZEV targets and low-carbon fuels (EO N-79-20)

Biofuel production capacity expansions (renewable diesel, alt jet)

Regulations requiring use of low-carbon fuels

Unprecedented spending on climate mitigation in recent State budgets

Considerations for 2030 CI Adjustments

- Supply and demand for alternative fuels
- Carbon intensity trends of alternative fuels
- Clean fuels programs in other jurisdictions
- Alignment with transportation and equity objectives

Options for 2030 CI Adjustments

	2030 CI Reduction Target
Current Target	20%
Scenario A	25%
Scenario B	30%

Target scenarios are for public discussion purposes only

Considerations for Post-2030 CI Targets

- Alignment with EO N-79-20, including 100% truck fleet turnover to ZEVs by 2045 where feasible
- Regulations with post-2030 milestones (Advanced Clean Trucks/Proposed Advanced Clean Fleets, Advanced Clean Cars II, etc)
- Diverse fuel mix to decarbonize off-road equipment and heavy-duty vehicle fleets
- Balance long-term market signal with uncertainty in modeling inputs
- Staff soliciting feedback on other data, studies that should be considered

Public Feedback Requested on Post-2030 CI Targets

- Do we need five-year interim CI targets between 2030 and 2045?
- What are the risks and benefits associated with setting a 2045 CI target this far in advance?
- What is an appropriate timeframe for which to set a target in advance?

Next Steps on CI Targets

- Materials presented at this workshop are just the first step
- Review and incorporate additional data, studies, and stakeholder feedback
- Workshop in Fall 2022 to evaluate supply and demand of alternative fuels in California and feasibility of various CI targets
- Staff will present preliminary modeling and solicit alternatives

Opportunities in the LCFS to advance transportation policy

Aligning LCFS Incentives

- LCFS program sends market signal to diversify transportation fuel pool and displace fossil fuels
- Program must utilize targeted market signals to incentivize projects needed for long-term decarbonization
- Limited available credits should be targeted for actions in need of additional support to displace fossil fuel consumption

Policy Alignment: 2018 Amendments

Regulation updated in 2018 to align with policy drivers at the time, including the following new opportunities:

Fuel Pathways

- Alternative Jet Fuel
- Crediting periods for avoided methane
- Book & Claim accounting for low-CI electricity

Project-based Crediting

- Carbon Capture & Sequestration
- Direct Air Capture

ZEV Infrastructure Crediting, LDVs

- Hydrogen Refueling Infrastructure (HRI)
- Fast Charging Infrastructure (FCI)

Principles for Alignment

- Further incentivize private investment in transportation decarbonization
- Phase out incentives for mature low-carbon technologies
- Accelerate deployment of ZEV refueling infrastructure
- Holistic approach to considering and promoting equity
- Support exportability of the program to other regions
- Reflect changes in technologies, data and stakeholder feedback

Electric Forklifts

- Electric forklifts were added to the LCFS in the 2015 readoption
- Total cost of ownership is lower than other ZE applications even without LCFS benefit
- The forklift fleet population is mostly electric
  - Over 50% of forklift fleets (class 1-5) are electrified
- Credits issued to electric forklifts have grown substantially
  - In 2021 27% of electricity credits came from electric forklifts

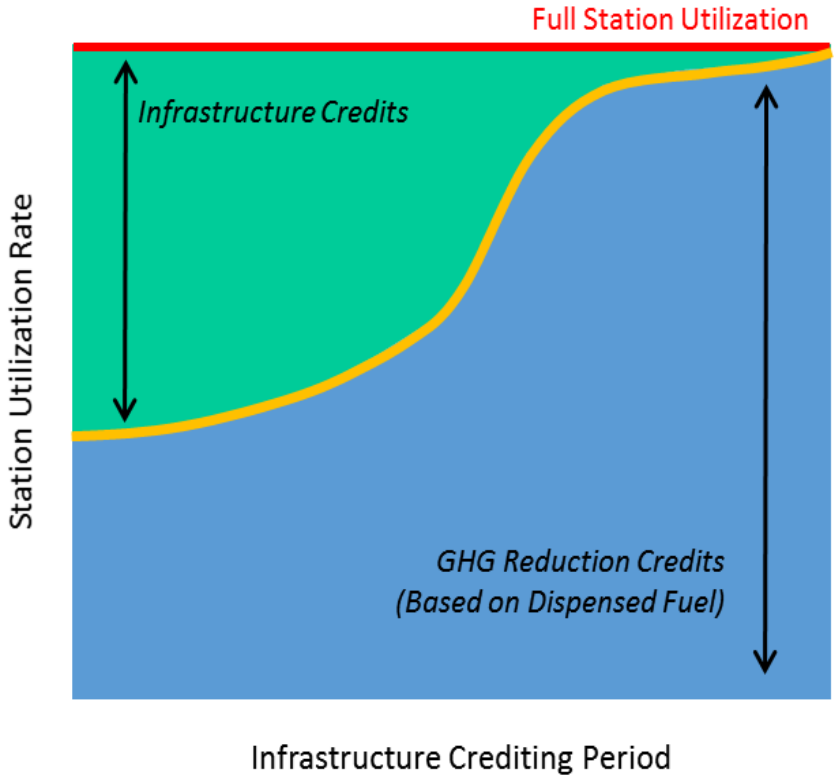
Opportunities for Credit Phase-Outs?

- California is successfully transitioning forklifts
  - N-79-20 calls for 100% transition to ZE off-road equipment
  - Zero-Emissions Forklift Regulation[1] would require purchases after 2025 be ZE
- Staff is soliciting feedback on phase-out of credits for electric forklifts
- Staff also seeks public feedback on other crediting opportunities or equipment that should be phased out

[1]Potential proposed amendments to CCR Sections 3000-3005

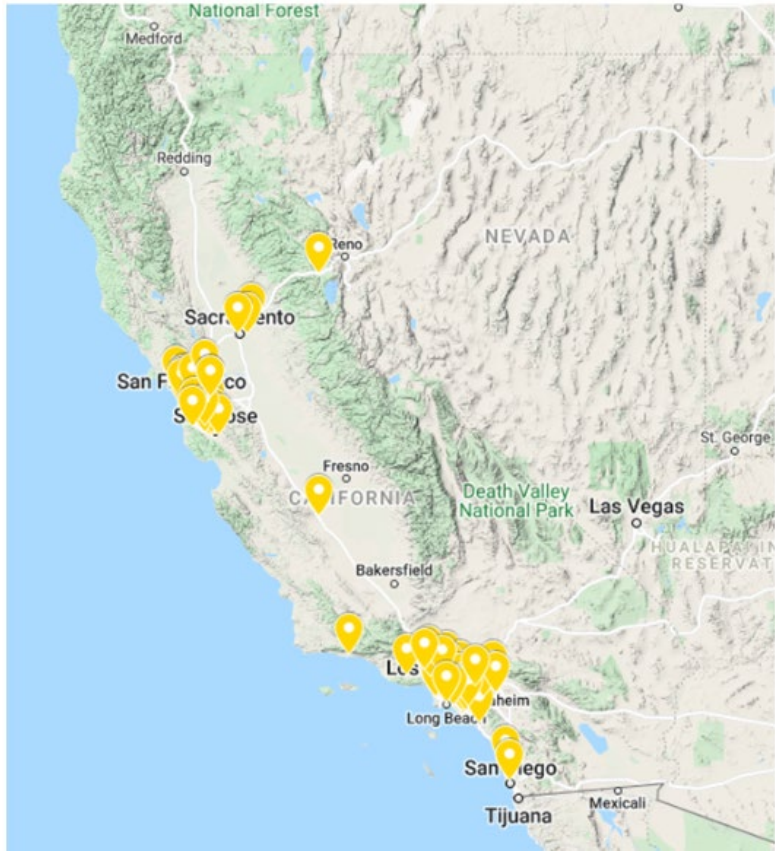
Infrastructure Crediting in LCFS

- Goal: Support buildout and operation of ZEV refueling infrastructure while vehicle deployment increases
- Concept: Credit hydrogen stations and DC Fast Chargers (DCFC) based on fueling capacity minus any dispensed fuel
- Infrastructure credits decline over time as more vehicles are deployed



LCFS Support for ZEV Refueling Infrastructure, Light-Duty Vehicles

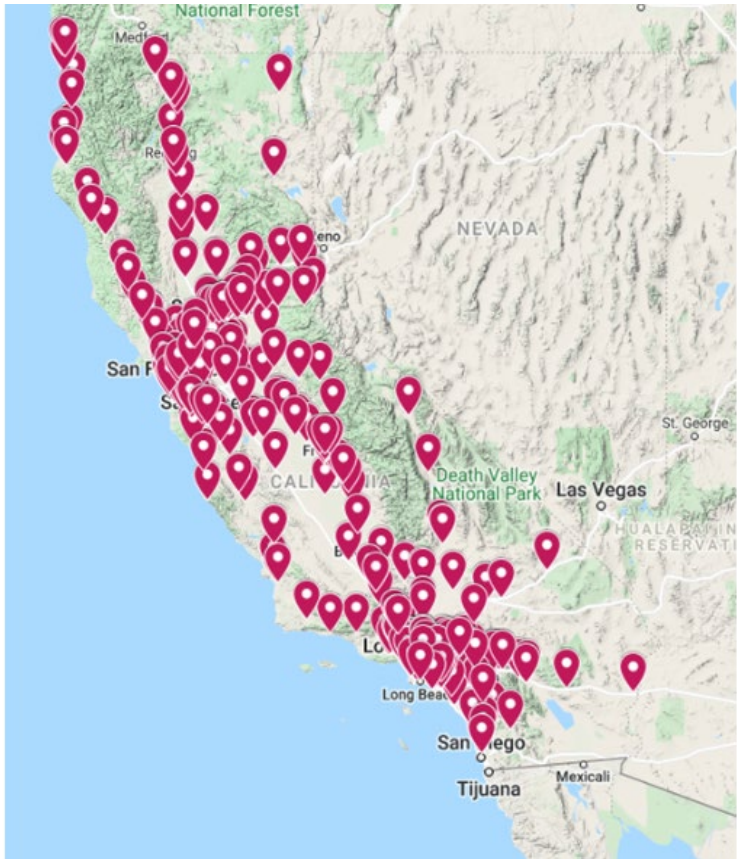
Approved hydrogen stations in HRI provision



66 Hydrogen Stations

2,690 DC Fast Chargers at 410 sites

Approved fast charger sites in FCI provision



New Opportunities: Medium- and Heavy-Duty (MHD) ZEV Refueling Infrastructure

- Executive Order N-79-20 directs a transition to ZEVs
- Both battery-electric and H2 fuel cell technologies in MHD vehicle sector needed
- Advanced Clean Trucks and proposed Advanced Clean Fleets show substantial need for public retail charging and refueling
- Opportunity to support MHD/HHD refueling infrastructure, similar to existing HRI and FCI LD provision

* https://www.arb.ca.gov/lists/com-attach/10-lcfs-wkshp-dec21-ws-WzNTMVULUGsKflc+.pdf

Important Factors to Consider for Infrastructure Crediting

- **Eligibility:** what role should LCFS credits play in building out infrastructure? Dedicated fleet refueling or public refueling?
- **Level of support**
  - **Total Credits:** How many possible HRI/FCI credits should be available?
  - **Crediting Period:** What is appropriate crediting period for incentivizing long-term investment and operation?
  - **Max Station Capacity:** How large should stations be in initial network of stations, relative to refueling demand?

MHD HRI: Design Considerations

Design Elements	MHD HRI
Eligibility	• Located in California • Publicly accessible • Primarily serves MHD vehicles
Total Credits	• 2.5% of previous quarter deficits
Crediting Periods	• 15 years or when total HRI revenue exceeds capital expenses for the station, whichever is earlier
Max Station Capacity (kg H2/day)	• 3000 kg/day, and would credit based on 50% of the nameplate capacity

MHD HRI: Public Feedback Requested

- What are the mechanisms to track station availability for quarterly reporting?
- How can eligibility requirements be designed to best support behavior of MHD ZEVs utilizing public refueling infrastructure?
- Should we incorporate requirements for sites to be capable for both LD and MHD vehicle refueling?
- What are some of the expected capital and operational expenses to MHD stations?

MHD FCI: Design Considerations

Design Elements	MHD FCI
Eligibility	• Located in California • Publicly accessible • Primarily serves MHD vehicles (connector types to support?)
Total Credits	• 2.5% of previous quarter deficits
Crediting Periods	• 5 years or when total FCI revenue exceeds capital expenses for the station, whichever is earlier • Expected CapEx costs for stations?
Max Station Capacity	• TBD: At what size nameplate power is too small to be useful for truck charging?

MHD FCI: Desired Feedback

- Location recommendations and Network affects: Should there be location and/or network requirements associated with an MHD FCI program? If so, what should the requirements be?
- Recommendations for treatment of sites capable of both LD and MHD vehicle charging
- Expected capital and operational expenses to MHD stations
- Is MHD charging equipment life different from LD, based on increased use rates?

Fuels and Vehicle Applications [1 of 2]

- The LCFS may consider new fuels subject to the regulation in pursuing its goal to diversify and decarbonize California's transportation fuel
- Staff is considering including or excluding certain fuel types and application
  - In 2025 hydrogen will likely surpass the low volume exemption threshold, making hydrogen a required reportable fuel
  - Jet fuel is a significant transportation GHG contributor for California and difficult to decarbonize. Staff is considering requiring intrastate fossil jet fuel in the LCFS

Fuels and Vehicle Applications [2 of 2]

- Staff is also considering the inclusion of other fuels as opt-in for novel applications
  - E.g., dimethyl ether, methanol, ammonia
  - Zero-emissions applications for rail, agricultural equipment, commercial harbor craft and airport ground support equipment under Tier 2 EER-adjusted CI pathways
- Staff requests stakeholder feedback as to how the LCFS could best support the decarbonization of these sectors and support novel technologies

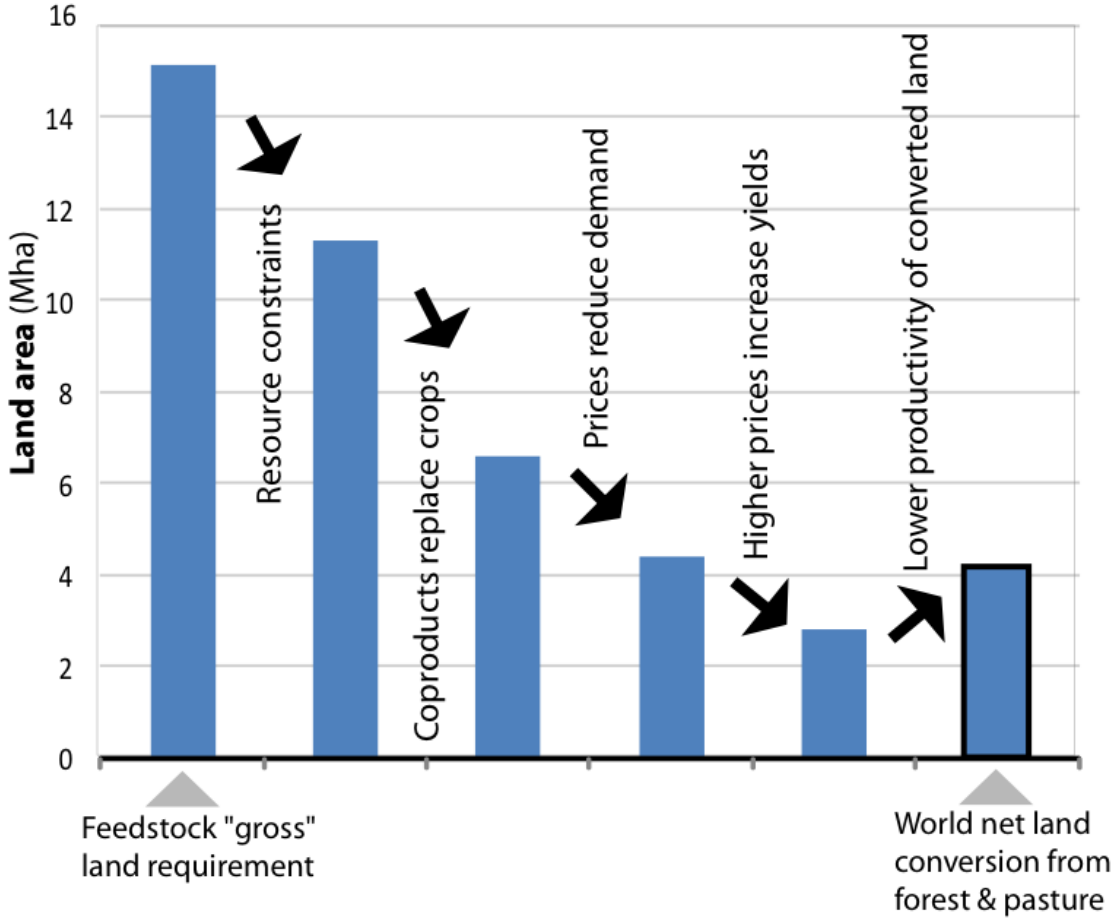
Areas of Further Consideration

Crop-based Feedstocks for Biofuel Production

- Feedback received:
  - Increasing lipid-based feedstock for biofuels may result in food v fuel conflicts
  - Recommended that CARB set an upper limit on biofuel volumes from lipid-based feedstocks
- Staff evaluating need for adjustments to avoid deforestation, land conversion, and adverse food supply impacts

Treatment of Land Use Change in LCFS

- LCFS accounts for life cycle GHG emissions from crop-based fuels
- Land use change (LUC) analysis quantifies indirect effects of using crop-based biofuels
- Extensive modeling in 2015 readoption to establish LUC CI values, with uncertainty analysis
- LUC emissions incorporated into final certified fuel pathway CIs when utilizing crop-based feedstock



Treatment of Crop-based Biofuels in other Jurisdictions

- The European Union limits biofuels produced from food and feed crops to 1% above baseline use in that member state in 2020 or a maximum of 7%. EU further limits the use of biofuels with “high ILUC risk” to 2019 levels and declining to zero by 2030
- Renewable Transport Fuel Obligation in the UK puts a cap of 3.83% for crop-based fuels which declines to 2% by 2032
- The Federal Renewable Fuel Standard (RFS2) limits various types of biofuels when setting annual renewable fuel volume obligations
- Some Clean Fuels Programs use mechanisms such as sustainability to potentially limit crop-based biofuels

Fat and Oil Feedstock Trends in the LCFS

- The share of vegetable oil feedstocks has increased in California and nationally in recent years
- Clean fuels programs in Oregon, Washington, Canada, Brazil and EU will likely increase global demand for crop-based fuels

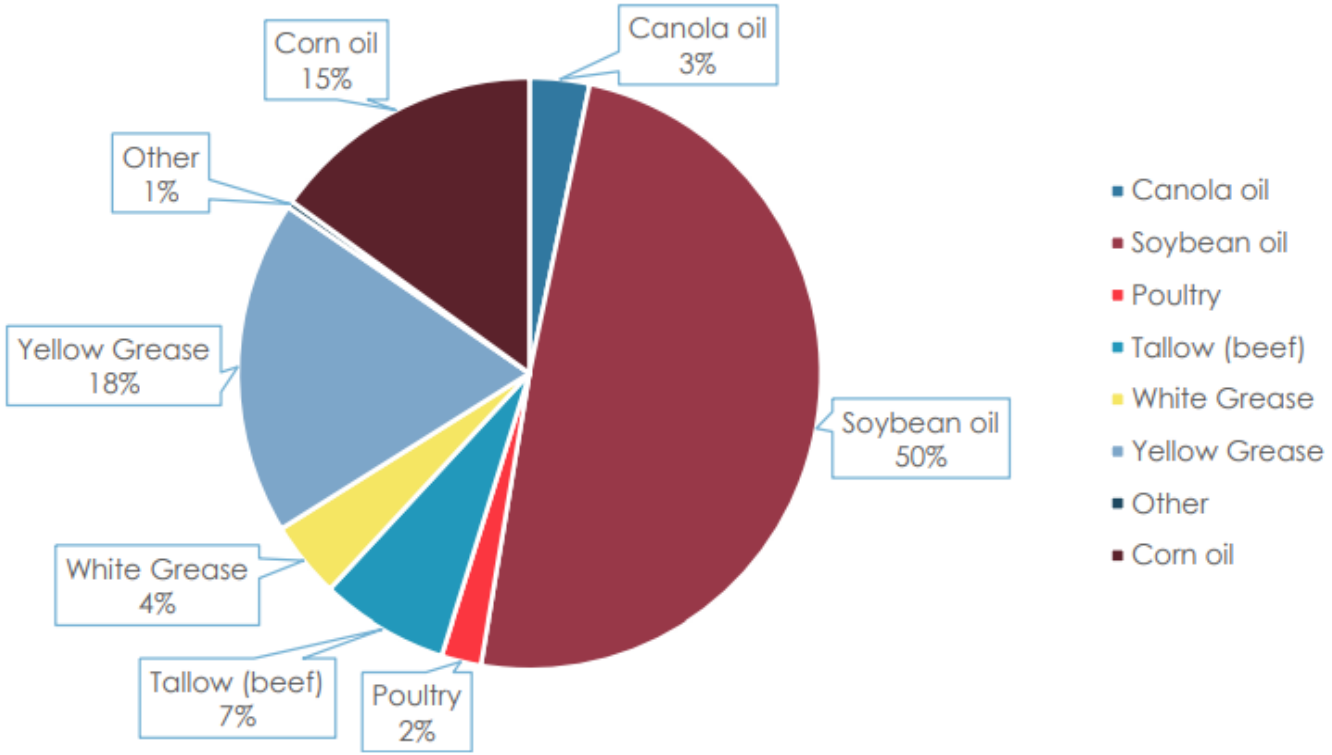


Figure 14. Feedstock mix for oil- and fat-based biofuels in the U.S., January to July 2021

Source: U.S. EIA (2021b)

Public Feedback Requested on Crop-based Biofuels

- What are the potential risks of increased use of crop-based biofuels?
- What data sources or studies should staff review to evaluate potential impacts of future growth in crop-based biofuels?
- Should staff consider a cap on crop-based biofuels?
- If so, what mechanisms could staff consider or implement as part of the upcoming rulemaking?

Supporting Equity in the LCFS

- LCFS is part of California's strategy for a technologically feasible, cost effective and equity-focused transition to a carbon neutral economy
- LCFS requires utilities to invest credit proceeds in transportation electrification projects for low-income and disadvantaged communities and rural areas.
  - Projects include new and used vehicle rebates, charging infrastructure, electrification of trucks and buses, and outreach
  - Investment requirements begin in 2022 and increase to 50% over time
  - Utilities must report annually on their projects and expenditures

Public Feedback Requested on Equity in the LCFS

- Staff are evaluating a holistic approach to equity – how to leverage programs and policies to support successful long-term transition to zero emission vehicles
- What additional support is needed for achieving the holistic goal?
- What should be the role of LCFS in supporting the various aspects of a holistic goal?

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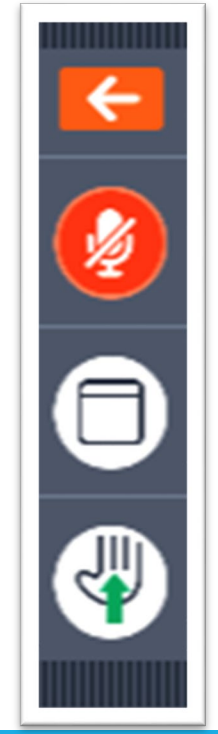

Next Steps

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- Further pre-rulemaking workshops in summer 2022