

CARBON ACUMEN

September 19, 2022

Cheryl Laskowski
Branch Chief, Low Carbon Fuel Standard Team
California Air Resources Board

Submitted via LCFS Comments Upload Link

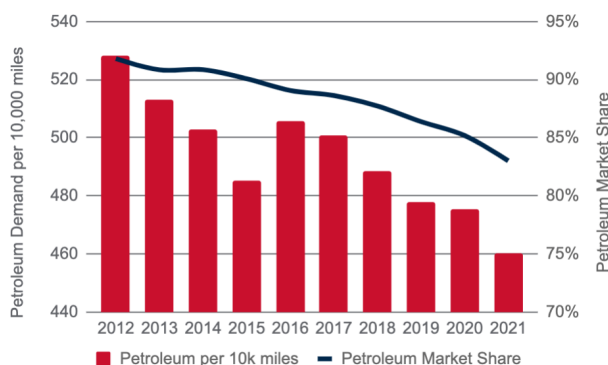
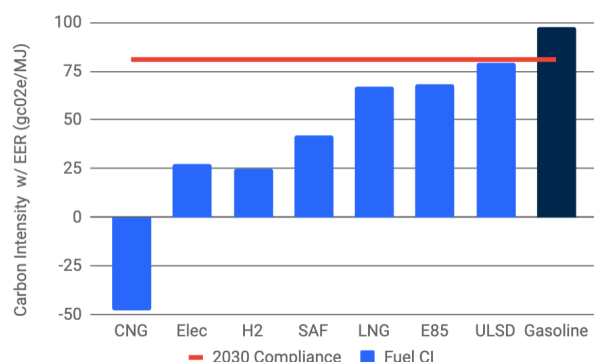
RE: August 18th LCFS Workshop Potential Changes to the Low Carbon Fuel Standard

Dear Dr. Laskowski and the respective Transportation Fuels Branch Staff,

Carbon Acumen appreciates the opportunity to comment on the 2nd public workshop to discuss potential changes to the Low Carbon Fuel Standard (LCFS) during the pre-rulemaking phase held on August 18, 2022.

Progress To Date

The LCFS has been a success in its mission to decrease the carbon intensity of California's transportation fuel pool and to reduce petroleum dependency as every fuel sold in the state outside of gasoline already meets the current 2030 carbon intensity (CI) reduction target of 20% or roughly below 80 gCO₂e/MJ¹. Petroleum market share by volume has steadily dropped to 83% in 2021 while petroleum used per 10,000 vehicle miles traveled (VMT) has also dropped to 460 gallons, a drop of 13% in the past decade².



Low Carbon Fuels Primary Destination = California

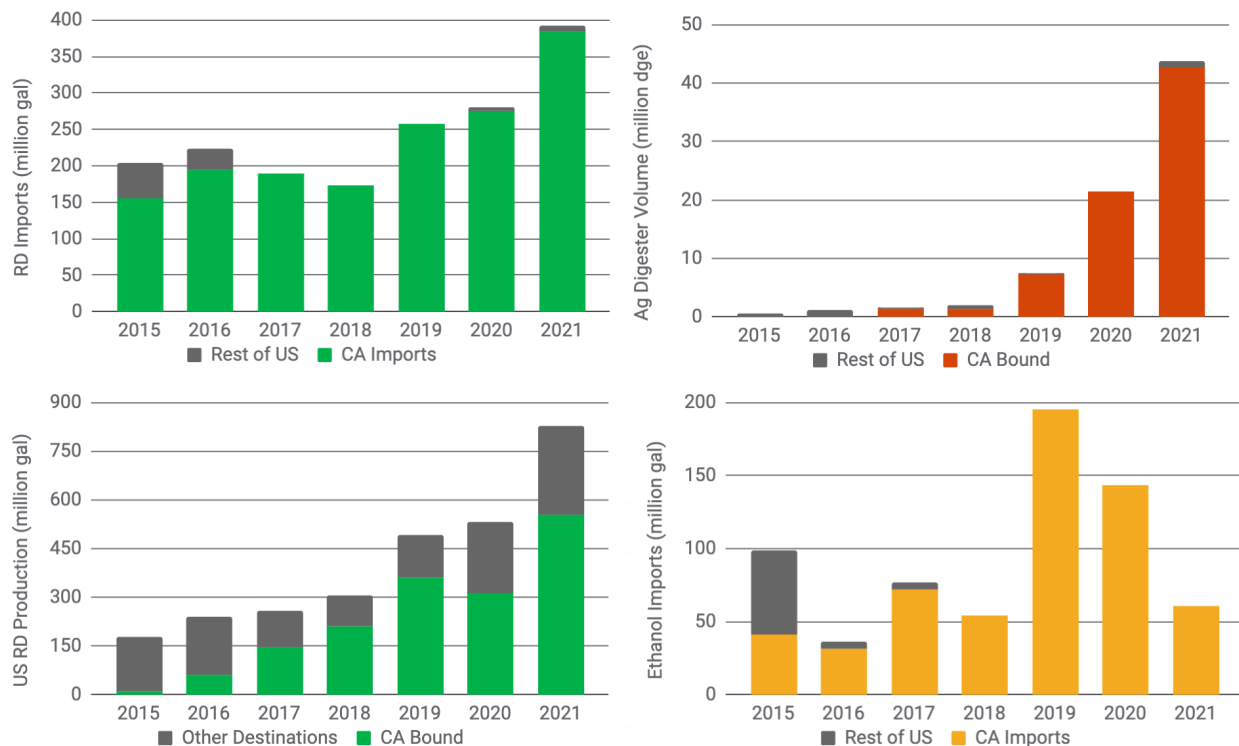
Since the first transfer of LCFS credits in April of 2012, over 390 entities have participated in the LCFS market as cumulative transfer value exceeded \$18 billion in August 2022³. Due to the

¹ CARB LCFS Reporting Tool Quarterly Summaries

² US DOT FWHA, Traffic Volume Trends

³ CARB, Monthly LCFS Credit Transfer Activity Reports

relatively premium value low carbon fuels receive in California versus other markets⁴, not only has nearly all of the renewable diesel (RD) and ethanol imports⁵ have landed in California but also the large majority of domestically produced RD and Ag Digester renewable natural gas (RNG)⁶ have found its way to the state in order to capture LCFS value.



Low Carbon Fuels Domestic Production & Distribution Acceleration

Neste's⁷ and Valero's ability to capture high margin and California diesel market share has led to multiple US refiners to vastly increase investment into renewable diesel production and distribution. Per EPA RIN Generation data, domestic RD production rate is roughly 1.3 billion gallons per year which has a potential LCFS credit generation of over 9 million MT equivalent to 45% of total LCFS credit generation in 2021. The increased domestic RD production has led to retailers offering various high RD blends of 80% to 98% from some of the largest retailers in the state such as 76⁸, ARCO⁹, Chevron¹⁰, and Propel Fuels¹¹ at over 1,200 stations located across the state. Ag Digester RNG production has also increased significantly this year to an annual rate of

⁴ [Valero IR Indicators, Key Commodity Prices \(xls link\)](#)

⁵ [EIA Company Level Imports](#)

⁶ [EPA Renewable Fuel Standard RIN Generation](#)

⁷ [Neste Investor Relations](#)

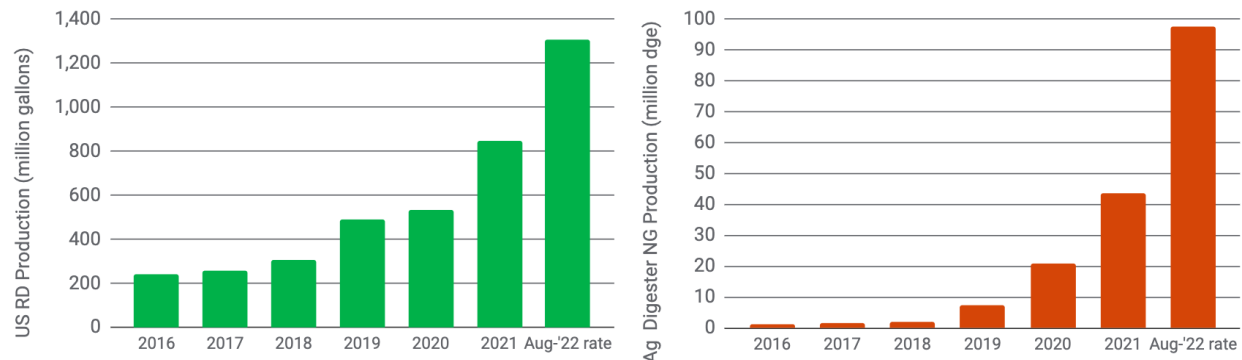
⁸ [76 Renewable Diesel Locations](#)

⁹ [ARCO Renewable Diesel Locations](#)

¹⁰ [Chevron Renewable Diesel Locations](#)

¹¹ [Propel Fuels Diesel HPR Locations](#)

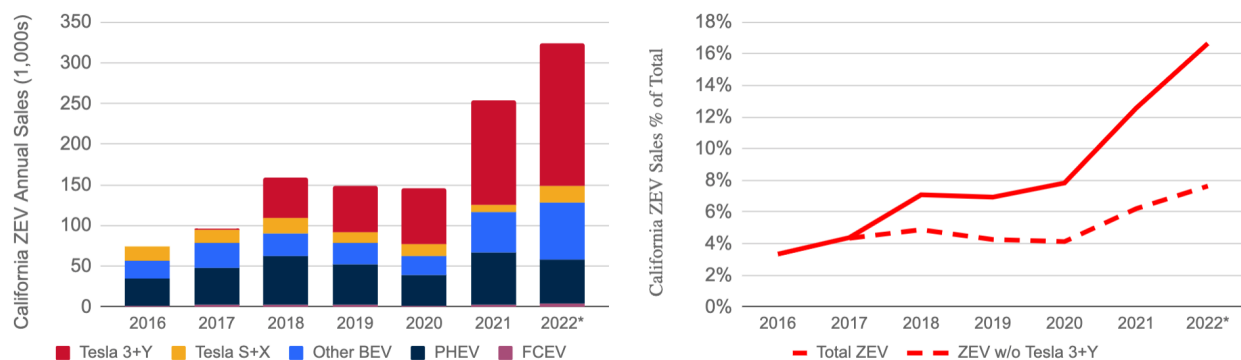
nearly 100 million dge or the equivalent of 4.5 million MT of potential LCFS credits per year in California's roughly 180 million diesel gallon equivalent (dge) natural gas transportation market.



These trends are expected to continue through 2023 and 2024 as domestic RD production is expected to exceed California's 3.8 billion gallon diesel market¹² along with multiple Ag digesters being built throughout the US¹³ and California¹⁴. The growth in these fuels will add to potential LCFS credit generation as LCFS credit generation for RD and Ag Digester RNG is currently 7,000 MT per million gallons and 47,000 MT per million dge, respectively.

Electric Vehicle Adoption and a Cleaner Grid

California receives 38% of battery electric vehicles (BEVs) sold in the US¹⁵ and has the highest adoption rate zero emission vehicles (ZEVs) as 16% of new vehicle sales in 2022 are ZEVs (BEV, PHEV, FCEV)¹⁶. The adoption rate of zero emission vehicles (ZEVs) seem to be on an exponential growth ramp. However if you take out two models (Tesla Model 3, Tesla Model Y) from the sales data, the ZEV adoption growth rate is linear. More BEV models are available but the only non-Tesla vehicle that has sold more than 10,000 vehicles in a year in California is the Chevy Bolt.



¹² EIA US Renewable Diesel Capacity Expansion

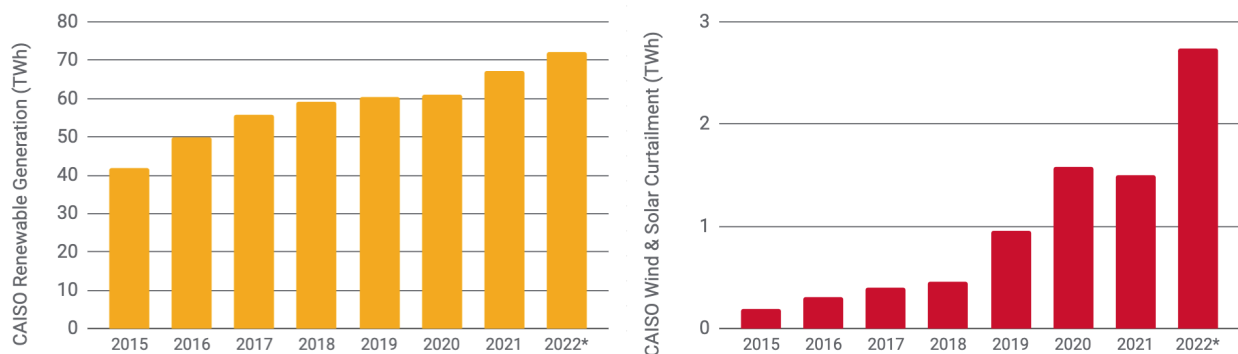
¹³ EPA Livestock Anaerobic Digester Database

¹⁴ CDFA Dairy Digester Research & Development Program

¹⁵ Experian Automotive Market Trends: Q2-2022 (pdf link)

¹⁶ CEC ZEV & Infrastructure Statistics, New ZEV Sales

Renewable generation including wind, solar, small hydro, biomass, and geothermal through July has served over 35% year-to-date of the load within California ISO¹⁷ and is forecasted to generate over 72 TWh in 2022, a 70+% increase since 2015 helping drive GHG emissions to serve CAISO loads down 17% since 2016¹⁸. However nearly 4% of renewable generation or nearly 3 TWh per year is currently curtailed¹⁹ to help balance the load on CAISO between generation and demand throughout the day. Battery storage is expected to help alleviate curtailment to drop the grid avg CI value even further as contracts have also been executed for large-scale battery systems that can generate more than 3,300MW of capacity by the end of 2024²⁰.



Gasoline Vehicles & COVID Impact on LCFS Credit Bank

Even with the spike in EV new sales, Gasoline capable vehicles (gasoline, gasoline hybrid, FFV, PHEV) still make up roughly 96% of the LDV population or nearly 29 million vehicles on the road²¹. Gasoline is the only fuel sold to the public that is a net deficit generating fuel, meanwhile ultra low sulfur diesel (ULSD) has been a net credit generator since 2013 due to high blending of RD and biodiesel as ULSD sold in California is now over 43% biomass based diesel on the aggregate level. A combination of more FFV drivers using E85, more PHEV drivers driving a higher percentage on the battery, and hybrid or full-on work-from-home employers are implementing to keep employees during a tight labor market, has caused gasoline demand to be down 10% versus pre-COVID levels at roughly 14 billion gallons per year²². All this leads to gasoline demand having an outsized impact on the LCFS credit bank versus other fuels as the credit bank is now over 10 million MT versus a projected 4 million MT with the likelihood of the credit bank possibly going to zero or negative within the year if gasoline demand had been at pre-COVID levels for the past 2+ years.

¹⁷ [California ISO, Monthly Renewables Performance Report \(July 2022\)](#)

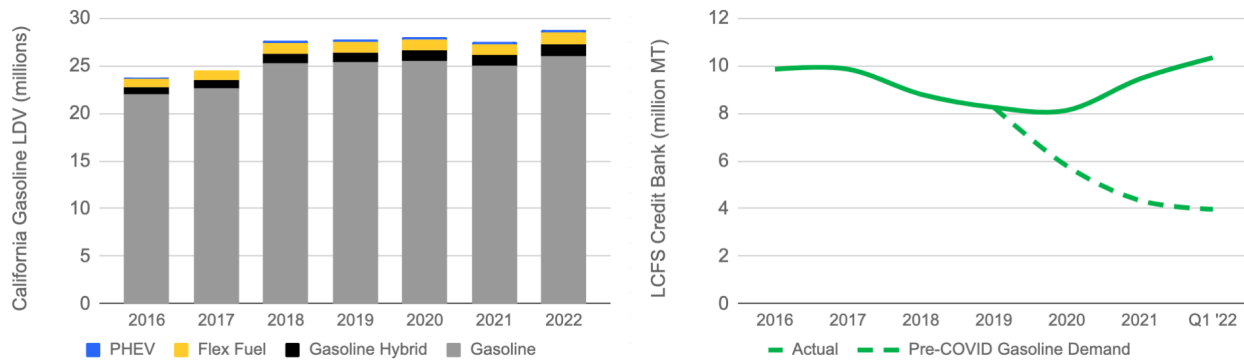
¹⁸ [California ISO, Greenhouse Gas Emission Tracking Report \(pdf link\)](#)

¹⁹ [California ISO, Managing Oversupply](#)

²⁰ [California ISO, "A golden age of energy storage"](#)

²¹ [CEC ZEV & Infrastructure Statistics, LDV Population](#)

²² [CDTFA, Fuel Taxes Statistics & Reports](#)



Inflation Reduction Act Incentivizing Investments for lower CI Products

The Inflation Reduction Act (IRA) of 2022²³ will no doubt supercharge investments across the country which will have a direct impact on the LCFS through tax credits for RD and renewable jet production, electric vehicle purchases, battery storage (residential or commercial) for the expansion of solar, CO₂ direct air capture, and carbon capture sequestration (CCS) for ethanol plants to name a few.

Not only is California the largest ethanol market in the US at 1.4 billion gallons per year, it has the largest flex-fuel vehicle (FFV) fleet in the country at 1.2 million vehicles, and the biggest E85 market which is expected to be near or over 100 million gallons in 2022²⁴, roughly 15% market penetration. According to ICF²⁵ corn ethanol production accounts for 30 gCO₂e/MJ or roughly half its life-cycle emissions. For every drop of 10 gCO₂e/MJ in CI for ethanol, creates an additional 815,000 MT of LCFS credits per 1 billion gallons of ethanol.

Pull Forward Mechanism

With the expansion of RD production and distribution, growth of negative-CI RNG, increased ZEV sales, and declining gasoline demand, CI reduction progress has turned exponential within the past 2-3 years as Q1-2022 already exceeds the 2023 compliance target of 11.25%.



²³ [H.R. 5376: Inflation Reduction Act of 2022](#)

²⁴ [CARB, Alternative Fuels: Annual E85 Volumes](#)

²⁵ [ICF \(Sep, 2018\): A Life-Cycle Analysis of the Greenhouse Gas Emissions from Corn-Based Ethanol](#)

The volume of credit generating fuels is expected to grow in the near-to-medium term along with declining CI values with the intention to supply California to capture the lucrative LCFS value. It is going to be extremely difficult for CARB to accurately set compliance CI through 2030 in order to to not strain the LCFS credit bank if the respective fuel does not show up or to decentivize further investments into low carbon fuel infrastructure if the credit bank gets too high creating a potential massive liquidity issue, therefore I believe a pull-forward mechanism for CI compliance is needed within the regulation.

As pointed out in the letter by CalBioenergy²⁶ and the combined comments from Audi, BTR Energy GM, and Rivian²⁷, there will be ample supply of LCFS credits in the bank to help buffer the system by the end of 2023. This is not the first time this type of mechanism has been mentioned. In a 2019 letter to CARB, WSPA wrote the following pertaining to the potential lack of credits, "...we believe it would be more practical and provide more certainty for the regulated community to initiate a systematic method, including measureable triggers, to adjust CI targets (benchmarks)..."²⁸. Unlike WSPA, I think this type of mechanism needs to happen only one-way, being pulling CI reduction targets forward so that the LCFS can achieve its goals of lowering the CI of the fuel used in the state as well as reducing the dependency on petroleum.

Given that LCFS quarterly data is published in a relatively 'late' fashion, I believe CARB would need to take a staggered approach for a successful implementation of the pull-forward mechanism. For instance, if one to two quarters that reported in 2024 (Q3-23, Q4-23, Q1-24, or Q2-24) exceeded CI reduction target for 2025 (or higher), then the new reduction target for 2025 would be the compliance target that was set for the following year, an "n+1" approach. In this case, the new compliance target for 2025 would be the old 2026 reduction target, 2026 new CI target would be the old 2027 target and so forth.

Calendar Year	2024				2025			
Reporting Quarters	Q3 2023	Q4 2023	Q1 2024	Q2 2024	Q3 2024	Q4 2024	Q1 2025	Q2 2025
Pull Forward Compliance Year	2025				2026			

Thank you for taking your time to read this letter. If you have any questions regarding what I have presented in this letter please reach out to me at will@carbon-acumen.com.

Sincerely,
William Faulkner

²⁶ [California Bioenergy Comments on the July 7, 2022 CARB LCFS Workshop \(pdf link\)](#)

²⁷ [Audi, BTR Energy, GM, and Rivian Comments on the July 7, 2022 CARB LCFS Workshop \(pdf link\)](#)

²⁸ [WSPA Comments on the April 5, 2019 CARB LCFS Workshop \(pdf link\)](#)