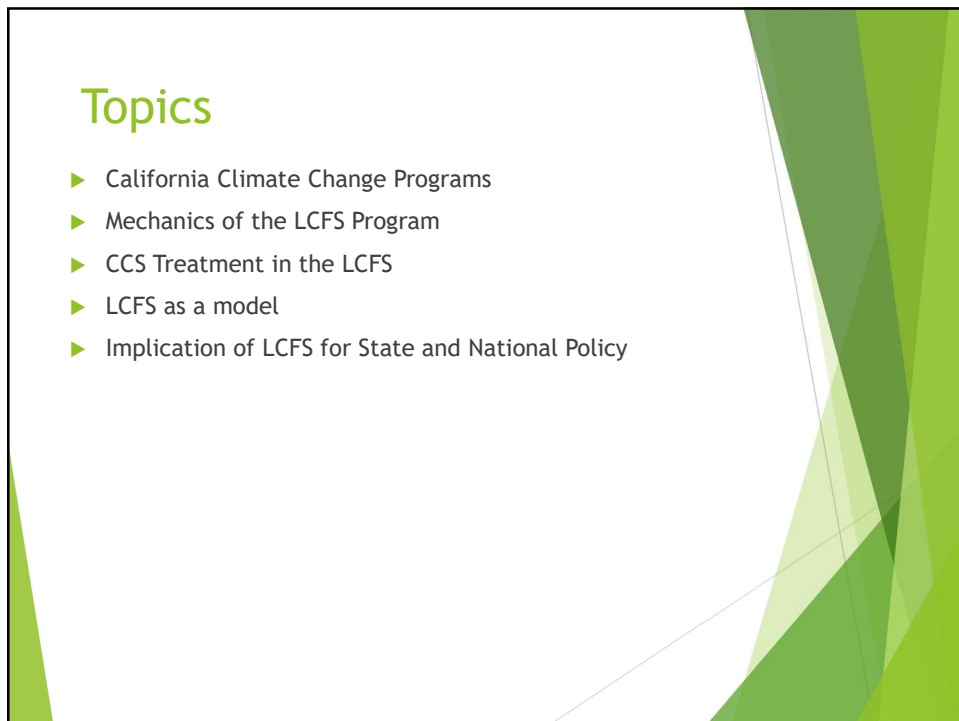


1



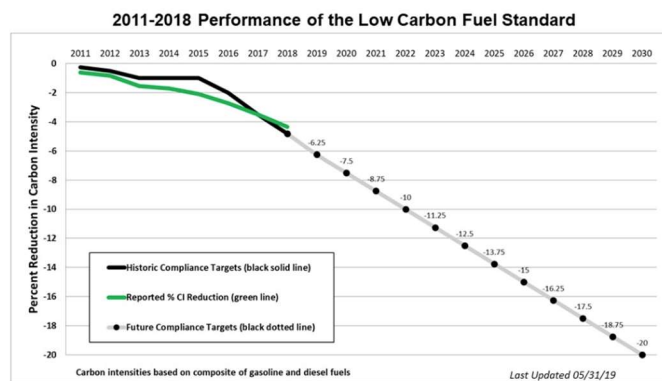
2

CA Climate Change Programs

- ▶ 2005-2007 - AB 32 and series of Executive Orders
 - ▶ Long term reduction goals
 - ▶ Comprehensive coverage
 - ▶ Multi-pronged implementation measures
- ▶ Major Elements in the Scoping Plan
 - ▶ Complementary Policies
 - ▶ LCFS
 - ▶ Cap & Trade
 - ▶ Mandatory GHG Reporting

3

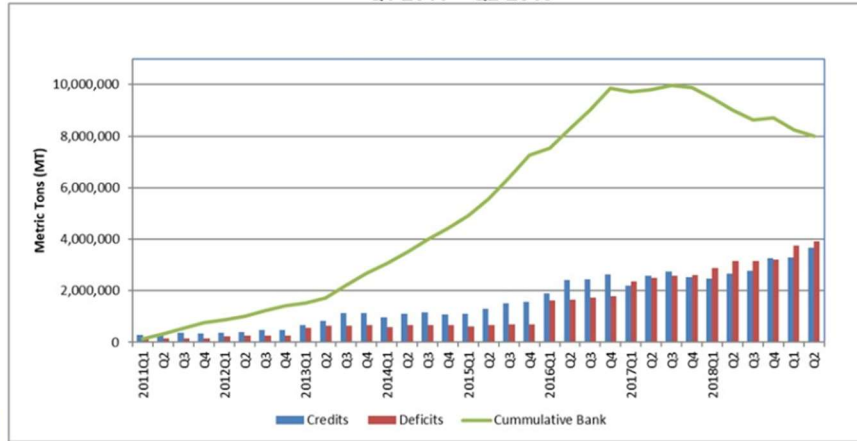
LCFS Uses CI Benchmarks



4

To Generate Credits and Deficits

**Total Credits and Deficits for All Fuels Reported and Cumulative Credit Bank
Q1 2011 – Q2 2019**

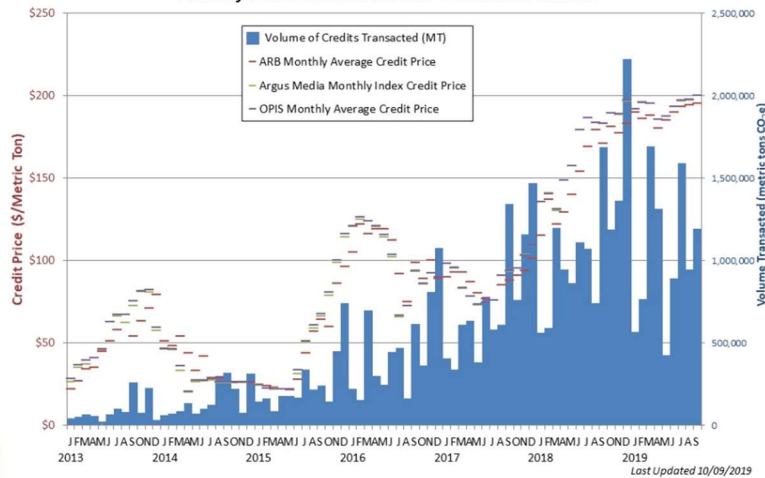


Last Updated 10/31/19

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And Allows Market Reconciliation

Monthly LCFS Credit Price and Transaction Volume



Last Updated 10/09/2019

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In An Active Market

Weekly LCFS Credit Transfer Activity Report [1][2]
21st October 2019 – 27th October 2019

	Date Completed	Date Posted	Price (\$/MT)	Volume (MT)
1	10/25/2019	10/25/2019	200.18	300
2	10/25/2019	10/25/2019	197	20,000
3	10/25/2019	10/25/2019	194.5	20,000
4	10/24/2019	10/23/2019	199	5,000
5	10/24/2019	10/22/2019	205	10,000
6	10/24/2019	10/22/2019	203	10,000
7	10/23/2019	10/23/2019	201	614
8	10/23/2019	10/23/2019	200	2,582
9	10/23/2019	10/21/2019	202	12,000
10	10/22/2019	10/21/2019	201.5	9,750

LCFS Weekly Snapshot	21 st October 2019 – 27 th October 2019
Average Price [3] (\$/MT)	\$199.38
Price Range (\$/MT)	\$194.50 - \$205.00
Total Volume (MT)	90,246
Total Value (\$)	\$17,993,493

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Results Are Meaningful?

- ▶ Increased gas / diesel prices (\$0.09-0.13/gallon)
- ▶ Acceleration of Zero-Emission Vehicle (ZEV) deployment (think negawatt) via point of purchase rebates
- ▶ “Fuel shuffling” is moving low CI fuels to CA with a ripple effect on the national and global transportation fuel markets
- ▶ Demand for CI credits beginning to outpace supply

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Enter CCS

- ▶ 2018 CCS added as a credit generation option
- ▶ Carbon Capture and Sequestration Protocol
 - ▶ Details for CCS Project Permanence
 - ▶ Sequestration Site Certification
 - ▶ CCS Project Certification
 - ▶ Rigorous (think Class VI), considers lifecycle emissions (energy inputs), defines 100 year permanence period, assigns buffer account set aside, requires 3rd party verification
 - ▶ GHG Emission Reductions from CCS Projects counted towards CI of capturer

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CCS Credit Types

Project Type (these entities receive the LCFS credits)	Examples (where the CO ₂ is captured from)
Direct air capture (credits generated by the capturer)	Chemical separation (e.g. absorption, membrane separation) of CO ₂ directly from ambient (atmospheric) air
Tier 2 pathway (credits generated by the alternative fuel producer)	CO ₂ from fermentation during ethanol production
	CO ₂ streams from production of renewable diesel, renewable gasoline, and alternative jet fuel
	CO ₂ produced as part of biogas from anaerobic digestion
Refinery Investment (credits generated by the refinery)	CO ₂ from power plants that produce low-CI electricity supplied for eligible transportation applications such as electric vehicle charging, etc.
	CO ₂ from steam methane reforming at or supplying hydrogen to a refinery
Innovative Crude (credits generated by the crude producer ¹)	CO ₂ from steam generators and/or combined heat and power plants at a refinery
	CO ₂ from steam methane reforming at a bitumen upgrader
	CO ₂ from steam generators or combined heat and power plants that supply steam, heat, or power demand at an oil field

10

After 10 Years Is It A Success?

- ▶ Forbes: How (Almost) Everyone Came To Love Low Carbon Fuels In California by Dan Sperling (October 2018)
- ▶ What is the secret? A big reason is that several key groups that often disagree with each other on policy issues, have become beneficiaries—and, thus, enthusiasts. LCFS created incentives for:
 - ▶ Electric Utilities
 - ▶ Natural Gas Utilities
 - ▶ Automakers
 - ▶ Oil Companies
- ▶ Uses performance base standards
- ▶ Harnesses market forces

<https://www.forbes.com/sites/danielsperling/2018/10/17/how-almost-everyone-came-to-love-low-carbon-fuels-in-california/#748b29975e84>

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LCFS Model Expanding



- California - Adopted LCFS program in 2009 - with infrastructure credits and point-of-purchase rebate provisions
- Oregon - Implemented "Clean Fuels" in 2016 - a program similar to LCFS, without infrastructure credits and point-of-purchase rebate provisions
- Connecticut, Maine, Maryland, Massachusetts, New Jersey, New York, Oregon, Rhode Island, and Vermont - Adopted ZEV mandate
- Canada - Environment Canada released the regulatory design paper for a national "Clean Fuel" program in late 2018
- Washington - Considering implementing program similar to Oregon's "Clean Fuels"
- Colorado - Considering adopting ZEV mandate

Source: <https://www.trinityconsultants.com/news/federal/california-s-low-carbon-fuel-standard-has-far-reaching-impacts>

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And It Keeps Expanding?

- ▶ ACT News: On February 8th, also with the help of the RNGC, Assemblywoman Carrie Woerner (D - Saratoga Springs) introduced Assembly Bill 5262, which would establish a low carbon fuel standard in New York. The new LCFS for New York is intended to reduce the greenhouse gas emissions from the transportation sector by 20% by 2030. [STATUS: Passed Assembly, next stop Governor]
- ▶ ACT News: “Believe it or not,” said Renewable Fuels Association President and CEO Geoff Cooper at the National Ethanol Conference in Orlando on February 12th, “there are conversations starting in the Midwest about a low carbon fuel program similar in nature to what we see on the West Coast. [1]” Under the coordination of the Great Plains Institute, Minnesota, Iowa and South Dakota are some of the states believed to be considering participation in a low carbon fuel program that will be tailored for the needs of Midwestern states.

Source: <https://www.act-news.com/news/california-leads-with-low-carbon-fuel-standard-programs/>

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Implication of LCFS for State and National Policy

- ▶ State Environmental Policies Drive Federal Policies
 - ▶ Acid Rain
 - ▶ Clean Water
 - ▶ Climate
- ▶ California Environmental Initiatives Drive Other State Policies
- ▶ California policy moves to pacific northwest, northeast and mid Atlantic states
 - ▶ Cap & trade
 - ▶ Auto initiatives
 - ▶ Energy efficiency and renewables policy
- ▶ California Initiatives Drive Federal Policy
 - ▶ Cap & Trade
 - ▶ Mileage and GHG standards for personal transport
 - ▶ LCFS?

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