

LCFS Scorecard

The recent amendments to California’s low carbon fuel standard program were adopted to improve the program. After seven years under the program, it seems to be a good time for a look at how the program is meeting its original goals.

LCFS Program Performance

Figure 1 below shows that California’s transportation pool CI has decreased every year from 2011 through 2018. We estimate the transportation fuel CI reduction for 2018 is 4.1%. Comparing this to the 2018 CI target of 5.0% explains why 2018 is the first year that the bank of credits began decreasing. The same figure shows the historic (black), the 2016 (black dotted) and now the new 2019 compliance targets (red dotted). Though legal challenges froze the compliance target from 2013 through 2015, the banked credits continued to build-up. The 2016 amended regulations included carbon fuel standards through 2020, while the latest amended regulations (2019) extend the carbon intensity fuel standards through 2030.

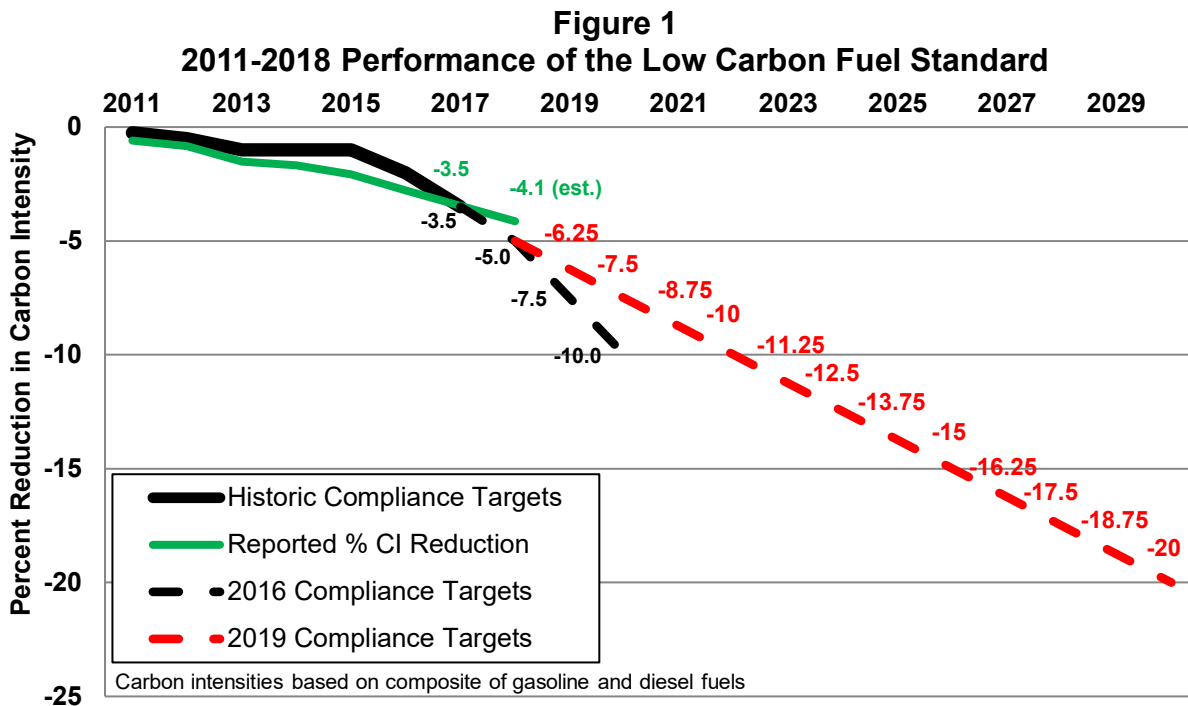
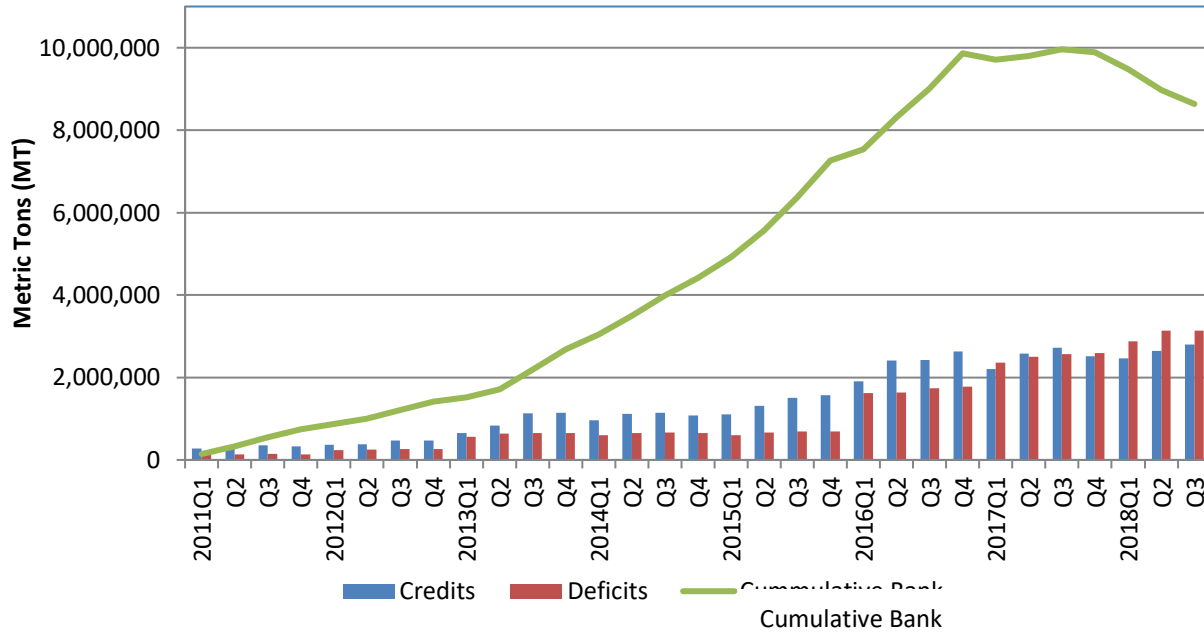


Figure 2 below shows the LCFS credit inventory, and the generation and requirement for reduction to meet the targets labelled deficit in the graph. The units of measure are metric tons of CO₂ equivalent emissions. The inventory of LCFS credits steadily grew since the program was instituted in 2011 until just recently in the fourth quarter of 2017. The recent plateauing of the credit inventory and subsequent downturn is due to the tightening of the reduction requirement and insufficient credit generation to meet the target. The system must now use credits rather than building inventory. This creates the LCFS pricing described in the next

section.

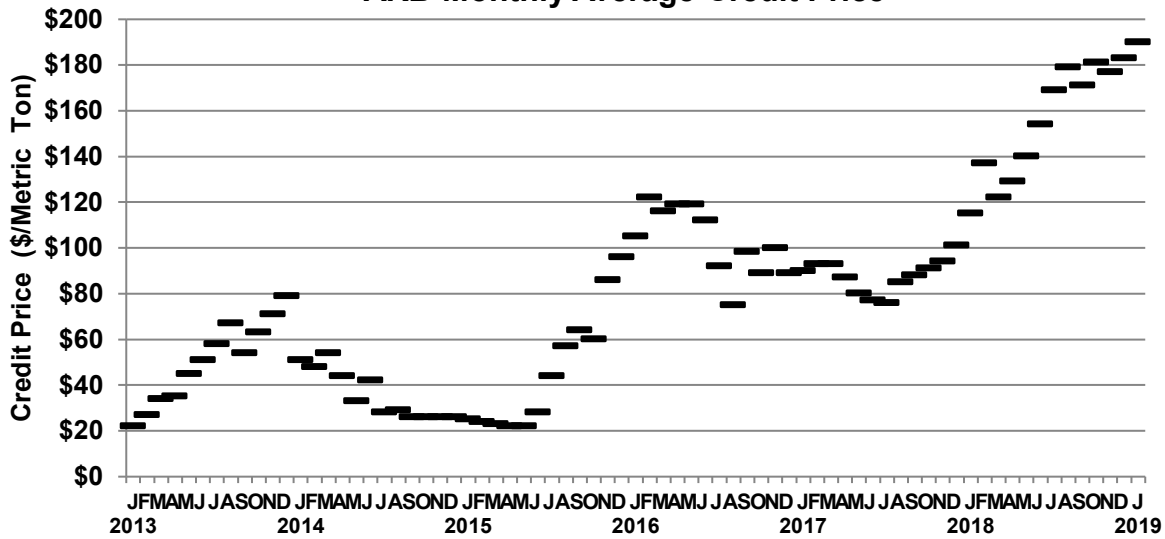
Figure 2
LCFS Credit Inventory, Generation and Deficit



LCFS Credit Price

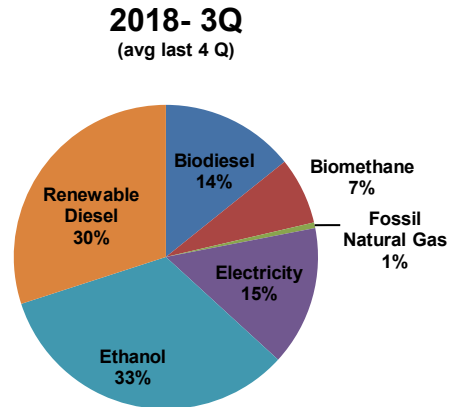
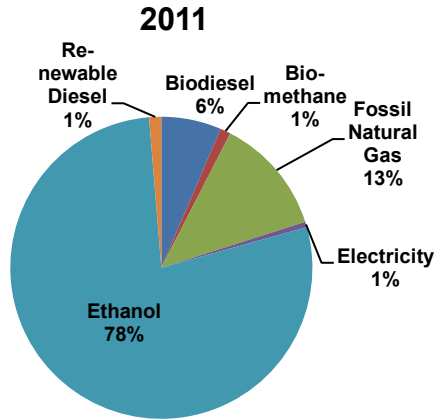
Figure 3 shows the LCFS average credit price. The credit-pricing generally reflects several phases in the program. In 2013, the program appeared to be headed for a shortage of credits and the credit price increased based on the shortfall expectation. The slow fall in credit prices reflected signals from California that they would first freeze the program at an achievable reduction and modify the program to put it back on a sustainable track. In mid-2015, the market price again began to increase as it became clear that the program amendments would still require more credits than were expected to be available. The targets set in the 2016 amendments gave some credit price relief as the market perceived that although the program in the later years was still probably unachievable; in the near term, the targets would allow the credit inventory to grow. There has been a steady increase in credit price starting in 2017. The market currently is showing an expectation that the program will continue. The last few months have shown a steady increase as the credit price approaches what is considered to be the high-end benchmark, the *Credit Clearance Market (CCM) price cap*. The maximum price for CCM is set by the regulations to be \$200/credit of metric tons of carbon dioxide equivalent (MTCO_{2e}) in 2016 and adjusted annually by the rate of inflation. The CCM provision of the LCFS program aims to match LCFS credit holders with Regulated Entities (REs) who have insufficient credits to meet their obligation at the end of the compliance year.

**Figure 3
ARB Monthly Average Credit Price**



Transportation Pool Composition 2011 vs 2018

The California transportation fuel pool composition is changing as well as which fuels are generating LCFS credits. The two pie charts below show how credit generation has transitioned since the start of the program. In 2011, ethanol made up the majority of the credits at 78% followed by fossil natural gas at 13%. In contrast, the latest available data, 3rd quarter 2018 (last 4 quarter average), shows ethanol and fossil natural gas credits at 33% and 1% respectively even though the amount of ethanol in California gasoline including E15 and flex fuel is still at 10%. Renewable diesel and biodiesel which directly replace the diesel pool now account for 44% of the credits versus only 7% in 2011. Renewable diesel in particular made extraordinary gains, increasing from 1% in 2011 to 30% in 2018. Electricity and biomethane at a combined 22% of credit generation in 2018 are also much higher than the combined contribution of only about 2% in 2011. Biomethane includes bio-LNG and bio-CNG, mostly from landfills. Electricity started including off-road sources in 2016 which now contributes to 30% of the electricity credits. Currently, electric forklifts are the main source of off-road electricity credits. Credits generated from electric forklift charging can be claimed by either the Electrical Distribution Utility (EDU), or the electric forklift operators.



Upcoming Projects that will Impact LCFS Credit Generation

There are numerous renewable diesel projects with significant volume in the U.S. with a planned 2021 to 2023 startup. Renewable diesel with its particular attractiveness as a drop in fuel seems to be where the market is headed. The very large incentives in the California LCFS program are likely to draw any new renewable diesel production in the United States back into the California market. Biodiesel expansions and new plants are also in the planning stage but at a fraction of the capacity of the renewable diesel projects.

The renewable diesel and biodiesel projects are detailed in our semiannual **CRUDE AND REFINED PRODUCTS OUTLOOK** (the last edition of which was issued late February). Contact us at 214-754-0898 or email Elizabeth Hilbourn at ehilbourn@turnermason.com if you have any questions on the myriad fuels regulatory programs.