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Low Carbon Fuel Standard

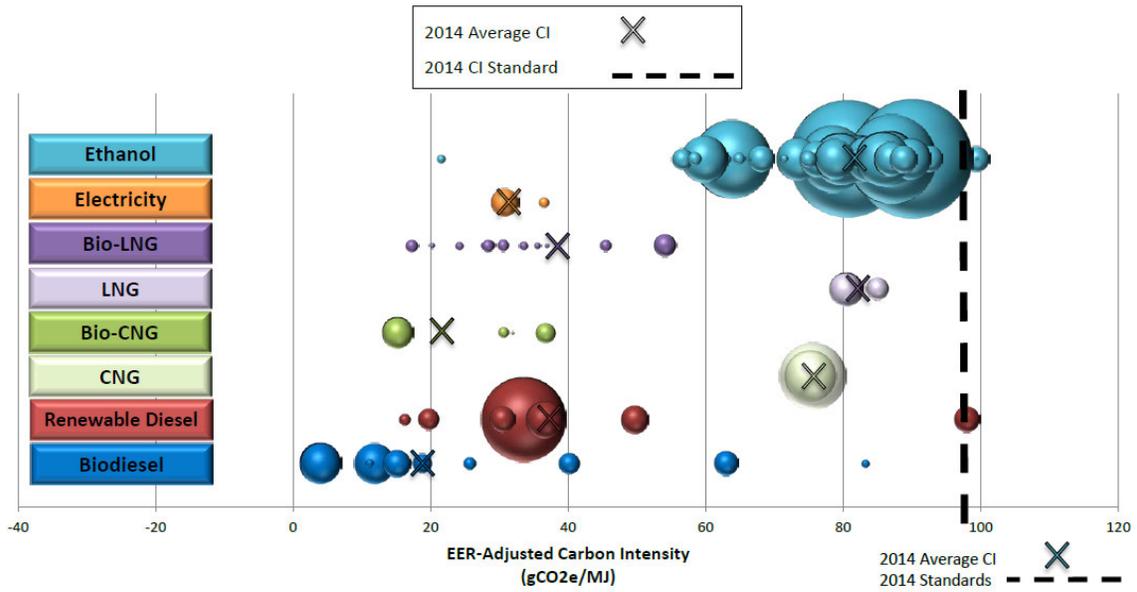
Discussion Paper under Transportation Sector

For background information: “Executive Order S-1-07, the Low Carbon Fuel Standard (LCFS) (issued on January 18, 2007), calls for a reduction of at least 10 percent in the carbon intensity of California's transportation fuels by 2020. It instructed the California Environmental Protection Agency to coordinate activities between the University of California, the California Energy Commission and other state agencies to develop and propose a draft compliance schedule to meet the 2020 target. Furthermore, it directed ARB to consider initiating a regulatory proceedings to establish and implement the LCFS. In response, ARB approved the LCFS in 2009 and implemented in 2010 as a discrete early action measure under AB 32 with requirements to reduce the carbon intensity (CI) of gasoline and diesel fuels by at least 10 percent by 2020 with a 2010 baseline. In addition, ARB subsequently approved amendments to the LCFS in December 2011, which began implementation on January 1, 2013. As the result of a court ruling that found procedural issues related to the original adoption of the LCFS, ARB re-adopted the LCFS regulation in September 2015, and the changes went into effect on January 1, 2016. The program establishes a strong framework to promote the low carbon fuel adoption necessary to achieve the Governor's 2030 and 2050 greenhouse gas goals.”

The following two figures show some of the current information about the Carbon Intensity (CI) of various fuels in relation to the current level needed to satisfy the LCFS. The target level is decreasing annually and carbon credits are being purchased by gasoline and diesel providers from the lower CI fuel providers. The current price is \$38 per ton of CO₂e but this price has varied greatly each year and been as low as \$3 per ton and was recently up to \$125 per ton since the program began in 2013.

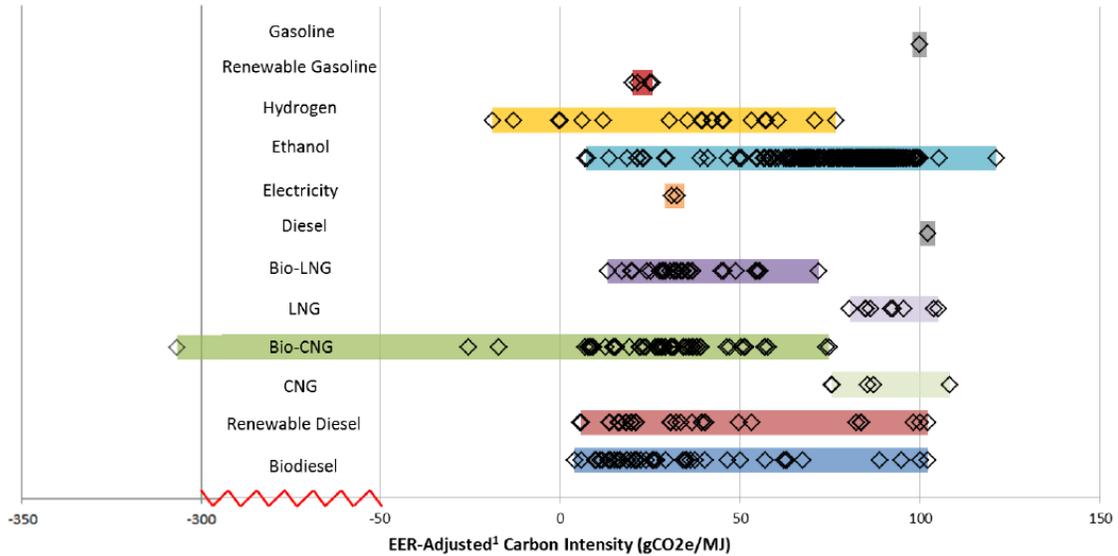
What follows these two figures is a general discussion of the program.

**Proposed Dashboard Figure
2014 Volume-Weighted Average Carbon Intensity by Fuel Type**



¹ CI values are adjusted using the vehicle-fuel Energy Economy Ratio (EER) to an equivalent MJ of conventional fuel basis $\left(\frac{CI_{\text{alternative fuel}}}{EER}\right)$.

**Proposed Dashboard Figure
Carbon Intensity Values of All Certified Pathways (2011-2015).**



¹ The alternative fuel's CI value is divided by its Energy Economy Ratio (EER) in order to obtain the EER-adjusted CI value, representing the emissions which occur from the alternative fuel per MJ of conventional fuel displaced. EER values for all vehicle-fuel combinations are provided in Table 4 of the Final Regulation Order (2015).

The following issues may be of concern to the EJAC and lead to recommendations for the program.

1. The current mandate of a 10% reduction in the carbon intensity of transportation fuels will be met easily by the 2020 deadline.

It is apparent that the credit trading system within the LCFS is working at this time. But, there are currently a large surplus of credits. A lot of these are coming from natural gas and electricity being increasingly used as a transportation fuel. Bio-diesel is also increasingly used for trucks and buses.

It is obviously time to push for an increase in the LCFS mandate. An increase from the current 10% to 25% by 2030 should be put in place. The EJAC should make this recommendation.

2. A full, well to wheels, Life Cycle Analysis (LCA) must be done for each fuel type under the LCFS in order to calculate a realistic carbon intensity (CI) for that fuel. This analysis includes land use changes that may happen due to pressures to grow more corn for ethanol or removal of rain forests to grow more palm oil. It is a limited study in that some effects of producing bio-fuels from food crops may affect food prices world wide. That economic effect is not required to be in the analysis. The paragraph below describes what should be included.

“Life cycle greenhouse gas emissions” means the aggregate quantity of greenhouse gas emissions (including direct emissions and significant indirect emissions, such as significant emissions from land use changes), as determined by the Executive Officer, related to the full fuel life cycle, including all stages of fuel and feedstock production and distribution, from feedstock generation or extraction through the distribution and delivery and use of the finished fuel to the ultimate consumer, where the mass values for all greenhouse gases are adjusted to account for their relative global warming potential.”

The EJAC should recommend that bio-fuel production effects on world wide commodity prices should be part of the LCA for each fuel under the LCFS. Once these effects are noted, CARB should consider whether or not a particular fuel type should qualify for any carbon credits under the LCFS. One way to do this would be for an economic cost to be applied to each unit of a particular fuel including indirect costs. If the total cost is too high that particular fuel pathway may become ineligible under the LCFS.

3. In the case of methane, which is collected at dairies and then designated as a transportation fuel under the LCFS there is a large problem. An applicant (four dairies in Kern County) has claimed a CI of approximately negative 307 for fuel of this type. This makes the collection of methane a very lucrative enterprise under the LCFS system of credit trading. A tiny fraction of this methane can offset a huge amount of gasoline or diesel which has a carbon intensity of approximately 100 without credits and need to reduce ultimately to around 90 by 2020 through the purchase of credits.

These dairies failed to perform a LCA in their application, yet they were approved by CARB for this low CI. The assumption is that the methane existson its own and that nothing has gone into its production. The facts are different. As soon as these dairies begin to collect this methane and sell it at a profit they are in the fuel business and are producing methane for sale. They do not have to produce this methane if they would handle their manure differently. Because of the extreme negative CI for their product they will actually begin to maximize their methane production. The feed given to their cows is part of the production of this methane. The LCA should consider what goes into feeding these cows in terms of producing this product. Another issue is the methane produced by these cows which is not collected. This escaped methane should be counted against the methane collected so that only the surplus collected over what escapes has any value as a low carbon fuel.

The EJAC should recommend that until a complete and realistic LCA has been performed on methane production at dairies, and until all uncaptured methane at these dairies is accounted for, this type of methane should not qualify as a transportation fuel under the LCFS.