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Written comments for Docket Number 08-ALT-1 Advisory Committee Meeting

Normalization of AB118 and Low Carbon Fuel Standard Full Life Cycle Carbon Intensities

This is a suggestion that CEC and ARB strive for a higher level of normalization (i.e., integration) between the three new categories for low carbon fuels introduced during the January 8, 2009 Advisory Committee meeting for the AB118 Investment Plan and the full life cycle Carbon Intensity ratings resulting from almost 18 months of hard work by the Low Carbon Fuel Standard Working Group.

During the January 8th meeting, CEC introduced three new category names and assigned several standard fuels to these categories for purposes of the AB118 Investment Plan. The summary below of the proposed categories is paraphrased from the presentation material.

Low-Carbon

Support development of natural gas (and propane) engines, support new and refurbished fuel infrastructure, fueling and fuel storage technologies for natural gas (and propane).

Ultra-Low-Carbon

Develop biomethane production and facilitate transition to lower-carbon feedstock ethanol and renewable diesel production.

Super-Ultra-Low-Carbon

Support for fleet and retail hydrogen fueling infrastructure, support for low-cost renewable hydrogen production, support for PHEVs, BEVs and charging infrastructure.

Low Carbon Fuel Standard Carbon Intensity Ratings

The Low Carbon Fuel Standard Working Group has met since September 2007 to develop methods and processes for promulgating a Low Carbon Fuel Standard. Starting January 1, 2010 regulated parties in the vehicle fuel industry in California will be required to reduce the carbon intensity of the fuels they sell by 10% over an eleven year period through December 31, 2020..

A substantial amount of time and effort has been invested in the LCFS effort to develop a clear, science-based process for calculating the full life cycle carbon intensity of various fuels as the LCFS regulations, when promulgated, will carry the force of state law and will likely have a substantial impact on the multi-billion dollar California vehicle fuel industry.

The LCFS Working Group thoroughly reviewed alternative models for calculating the full life cycle carbon intensity of various fuels. The GREET model from Argonne National Labs was chosen as the optimum model to use. Additional time and money has been invested to create an improved and enhanced version of the model called the California-GREET model for use in the LCFS regulations.

ARB personnel have used the GREET model and more recently the California-GREET model to calculate the full life cycle carbon intensity of the various fuels. Each fuel is identified as a Fuel Pathway and the carbon intensity results for each Fuel Pathway is then presented in a document. A table of the current Fuel Pathway documents is at: http://www.arb.ca.gov/fuels/lcfs/lcfs.htm.

A review of any Fuel Pathway document confirms that these calculations are detailed, thorough and very complex. The key result, the full life cycle carbon intensity, shows up in the early pages of each document at the bottom line of column three in Table A. (The page number varies.) The carbon intensity is measured as grams of CO2 equivalent per MegaJoule of energy in the fuel.

A summary table of the fuel carbon intensities, such as the one below, can be assembled by a review of Table A in each LCFS Fuel Pathway document.

Carbon Intensity for Fuel Pathways for the Low Carbon Fuel Standard
Based On Most Recent Calculations Using the California-GREET Model

Fuel Pathway	*Grams of CO2e per MegaJoule*
Biomethane (CNG from LFG)	11
Soybean Biodiesel (Not including CO2 from Land Use Change)	27
CNG (CNG from NG)	68
Corn Ethanol (Average – Not including CO2 from Land Use Change)	69
"Diesel" (ULSD)	95
"Gasoline" (CaRFG fuel including blending components)	98
Electricity	124
Hydrogen	142

Conclusions and Recommendations
The above table, however controversial, is a valuable resource for planning the allocation of AB118 investments.

First, this table is neither "complete" nor "perfectly correct". However, the table is probably one of the better tools we have, *right now*, for making comparisons between fuels for *planning investment amounts and investment timing*.

Second, a review of the table shows that the proposed new "Low-Carbon, Ultra-Low-Carbon, and Super-Ultra-Low-Carbon" categories *do not yet align well with the carbon intensities as calculated by the Low Carbon Fuel Standard California-GREET model*,

The new categories do not have a numerical carbon intensity range. However, if any *presently available fuels* qualify for a Super-Ultra-Low-Carbon category, it seems that Biomethane (at 11 g/MJ) and Soybean Biodiesel (at 27 g/MJ) are the best candidates.

Conversely, the table shows, *at the present time and present state of development,* both Electricity (at 124 g/MJ) and Hydrogen (at 142 g/MJ) have a long distance to go in development years and development dollars before they work their way up the table to the Super-Ultra-Low-Carbon category at the top.

In the effort to achieve maximum timely CO2 reductions, the AB118 investment process can leverage the use of the full life cycle carbon intensity calculations that the LCFS effort has already accomplished.

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