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America's Ethanol Supporters

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September 21, 2018

Cory-Ann Wind
Natural Resource Specialist
Oregon Department of Environmental Quality
700 NE Multnomah
Portland, OR 97204-1390

Dear Ms. Wind:

Growth Energy represents 100 ethanol producers, 89 businesses associated with ethanol production, and tens of thousands of ethanol supporters across the country. We appreciate this opportunity to comment on the 2018 proposed amendments to the Oregon Clean Fuels Program (CFP). Because of the biofuels industry's tremendous contribution to the reduction of greenhouse gas emissions, we have been actively engaged on low-carbon and clean fuel programs in California, Canada, and around the world. Specifically, we have been engaged with the California Air Resources Board (CARB) on its 2018 amendments to the Low Carbon Fuel Standard (LCFS) regulations including the CA-GREET 3.0 and energy economy ratio amendments that the Department of Environmental Quality is proposing to incorporate into the CFP.

We submitted extensive comments on the proposed LCFS amendments that were proposed in March and have been revised throughout the year. While CARB has not finalized these changes, they have responded to some of our concerns on the errors in the CA-GREET 3.0 model, the energy economy ratios, and other issues including approval of E15 in California. Many of these issues are under consideration by the Department as part of the CFP, so we have provided a few of those key points for your consideration as well. Additionally, we request that DEQ provide timely access to the OR-GREET3.0 model, as well as, an opportunity to review and provide input on the model before adopting the proposed amendments. Finally, we strongly request that DEQ incorporate the use of E15, a federally approved fuel that reduces greenhouse gas emissions, and is available for 4-10 cents less per gallon in 30 states into the CFP to achieve further GHG reductions in Oregon.

Sincerely

Chris Bliley
Vice President of Regulatory Affairs

1. *OR-GREET 3.0 Model*

We would request that DEQ make the final OR-GREET 3.0 model available for review and comment. To the extent that the OR-GREET 3.0 does incorporate updates included in California's CA-GREET 3.0 model, we would highlight the following concerns, as specifically outlined in our comments to CARB (attached):

- CA-GREET 3.0 erroneously excludes a distillers' grains methane credit, which was included in the 2016 GREET model developed by Argonne National Lab.
- CA-GREET 3.0 erroneously includes values for energy use per ton-mile for medium-duty trucks that are lower than those for heavy-duty trucks.
- CA-GREET 3.0 overstates transportation emissions because it: (a) presumes the load size for heavy duty trucks is 15 tons, which is too low by approximately 5 tons; and (b) uses the same energy per ton-mile for delivery as the return trip (backhaul), even though the load on return trips is reduced by approximately 50 percent.

CA-GREET 3.0 understates the carbon intensity ("CI") of sugarcane ethanol because (a) the quantity of nitrogen in sugarcane in aboveground residue is higher than that reflected in the model; (b) the model excludes nitrogen in the roots of sugarcane; and (c) the model underestimates nitrogen levels in synthetic fertilizers. The cumulative impact of these errors is underestimation of the CI of sugarcane ethanol by almost 5 g/MJ.

It appears that CARB may have corrected certain aspects of the CA-GREET 3.0 model in response to Growth Energy's comments (*e.g.*, treatment of haul and backhaul emissions, medium- and heavy-duty truck emissions, and nitrogen content for sugarcane ethanol). However, it is not clear whether CARB intends to make additional updates to its model, and whether DEQ intends to incorporate these late-breaking changes to the CA-GREET 3.0 model into the OR-GREET 3.0 model. We strongly recommend that DEQ implement all of Growth Energy's suggested modifications to the California model in the OR-GREET 3.0 model.

Additionally, we commend DEQ for its continued inclusion of Argonne National Laboratory's indirect land use change value, as opposed to that developed by CARB, as the Argonne value is better supported by science, and we understand that CARB may revisit its indirect land use change values soon.

2. *Energy Economy Ratios*

DEQ's proposed CFP amendments intend to adopt energy economy ratios based on the analysis carried out by CARB for their 2018 rulemaking. We reiterate the need for correction expressed in our comments on the 2018 LCFS amendments, including:

- The electric vehicle EER is too high because during the dynamometer tests temperature conditions did not reflect real-world conditions and all accessories were turned off. Similarly, test cycles for LPG buses and trucks and electric motorcycles, trucks, and buses did not reflect real-world driving conditions, resulting in an overestimated energy economy ratio.

- The energy economy ratio for fuel cell vehicles, transport refrigeration units, and CNG and propane engines are all overstated.

- The efficiency of conventional gasoline and diesel engines that form the baseline for the comparison or developing energy economy ratios are understated.

We request that DEQ give these concerns adequate independent consideration in promulgating the CFP's energy economy ratios.

3. *E15 is a Viable Option to Achieve Meaningful Reductions in the Carbon Intensity of Oregon Transportation Fuel and Should Be Included in the Clean Fuels Program.*

DEQ requested comment "on whether to consider other options for achieving the rules' substantive goals while reducing the rules' negative economic impact on businesses." Substantial GHG benefits associated with increasing ethanol in Oregon's transportation fuel could be realized through the immediate step of incorporating E15 into the CFP. In 2010 and again in 2011, EPA approved the use of E15 in 2001 and newer light-duty trucks and passenger vehicles and all flexible fuel vehicles after extensive research programs by the U.S. Department of Energy, automobile and oil industry research programs, and other government and industry research efforts. E15 is a less GHG intensive, lower cost, higher-octane fuel option offered in hundreds of locations across 30 states alongside regular and premium gasoline. More than 90% of vehicles on the road today can safely use E15. Encouraging E15 as a choice at the pump and including it as a regulated fuel within the CFP would further enhance Oregon's ability to achieve the CFP's carbon intensity reduction goals while giving effect to the Legislature's instruction to "allow [] the use of *all types of low carbon fuels* to meet the low carbon fuel standards." O.R.S. § 468A.266 (2)(c).

We understand that DEQ may interpret an Oregon statute as prohibiting E15; however, for the reasons set forth below, we respectfully disagree: the existing statutory language and implementing regulations do not prohibit E15 and afford DEQ discretion to include E15 in the CFP. The relevant statute provides that gasoline may not be sold "unless the gasoline contains 10 percent denatured fuel ethanol by volume." O.R.S. § 646.913. By its plain language, that provision requires gasoline in Oregon to contain ten percent ethanol; a blend that contains more than ten percent ethanol, such as E15, still "contains 10 percent denatured fuel ethanol by volume," as the statute requires. If the legislature had intended to limit ethanol content to a *maximum* of 10 percent ethanol, it could have stated that gasoline-ethanol blends contain "no more than" 10 percent ethanol.[1] Similarly, the Oregon Department of Agriculture Weights and Measures regulations provide that gasoline must "contain[] ten percent ethanol by volume," and clarify that "[g]asoline-ethanol blends **shall contain not less than** 9.2 percent by volume of agriculturally derived ethanol." OAR 603-027-0420 (3)(b), (d).

Accordingly, DEQ can and should incorporate E15 as a regulated fuel in the Clean Fuels Program. Retailers may choose to offer E15 and consumers may choose to purchase it with no negative impact on

[1] To be sure, the legislature provided a range slightly *below* ten percent ethanol that it identified as complying with the statutory 10 percent requirement to ensure parties were not unfairly penalized for failing to blend adequate ethanol, but that range below 10 percent need not be construed as a cap on ethanol content as the Department of Agriculture's implementing regulations make clear. *See* O.R.S. § 646.913 ("Gasoline that contains anhydrous ethanol in concentrations between 9.2 percent and 10 percent by volume complies with the requirement set forth in this subsection."); OAR 603-027-0420 (discussed *infra*).

businesses or consumers. *See* O.R.S. § 468A.266 (5)(c) (requiring DEQ to consider "[f]lexible implementation approaches to minimize compliance costs"). To the extent the agency disagrees with the analysis above and/or believes that additional regulatory clarification is needed to allow access to E15 in Oregon, the Legislature has empowered DEQ to promulgate regulations pertaining to the "standards, specifications, testing requirements and other measures as needed to ensure the quality of fuels produced in accordance with the low carbon fuel standards, including but not limited to the requirements of ORS 646.910 to 646.923 and administrative rules adopted by the State Department of Agriculture for motor fuel quality." O.R.S. § 468A.266 (2)(e). In sum, we recommend that DEQ work expeditiously to incorporate E15 into the CFP and afford Oregon consumers a lower carbon fuel choice.

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July 5, 2018

By Electronic Mail
Clerk of the Board
California Air Resources Board
1001 I Street, 23rd Floor
Sacramento, California 95812

Re: Proposed Amendments to the June 20, 2018, Notice of Public Availability of Modified Text and Availability of Additional Documents and Information for the California Low Carbon Fuel Standard Regulation and to the Regulation on Commercialization of Alternative Diesel Fuels

Dear Madam:

Growth Energy, an association of the nation's leading ethanol manufacturers and other companies who serve the nature's need for alternative fuels, is submitting to you the enclosed materials in response to proposed amendments to the June 20, 2018, Notice of Public Availability of Modified Text and Availability of Additional Documents and Information for the California Low-Carbon Fuel Standard Regulation and the Regulation on the Commercialization of Alternative Diesel Fuels. These materials also include environmental comments being submitted to the Air Resources Board and the Executive Officer pursuant to the California Environmental Quality Act and the Board's implementing regulations.

Growth Energy may file additional materials in one or both rulemaking files for consideration in connection with this agenda item at a later time, as permitted by the California Government Code and the Public Resources Code.

If there are logistical questions concerning these submittals, please contact Mr. John P. Kinsey of Wanger Jones Helsley PC at 559-233-4800.

Thank you for your consideration and assistance.

Sincerely

Chris Bliley
Vice President of Regulatory Affairs
Growth Energy

STATE OF CALIFORNIA

AIR RESOURCES BOARD

PROPOSED AMENDMENTS TO THE LOW CARBON FUEL STANDARD REGULATION AND TO THE REGULATION ON COMMERCIALIZATION OF ALTERNATIVE DIESEL FUELS

GROWTH ENERGY'S RESPONSE
TO THE NOTICE OF PUBLIC AVAILABILITY OF MODIFIED TEXT AND AVAILABILITY OF ADDITIONAL DOCUMENTS AND INFORMATION DATED JUNE 20, 2018

JULY 5, 2018

For further information contact:
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Comments of Growth Energy on the Proposed Amendments to the June 20, 2018, Notice of Public Availability of Modified Text and Availability of Additional Documents and Information for the Low Carbon Fuel Standard Regulation and to the Regulation on Commercialization of Alternative Diesel Fuels

Growth Energy respectfully submits these comments on the June 20, 2018, Notice of Public Availability of Modified Text and Availability of Additional Documents and Information (the "15-Day Notice") for the rulemaking on the proposed amendments to the low carbon fuel standard ("LCFS") regulation and the regulation on commercialization of alternative diesel fuels ("ADF"). Collectively, the proposed amendments to the LCFS and ADF regulations are referred to in these comments as the "Proposed Amendments," while the proposed modifications to the LCFS and the ADF regulations identified in the 15-Day Notice are referred to as the "Proposed Modifications." These comments are also accompanied by expert reports submitted by (i) Thomas Darlington of Air Improvement Resource Inc. and Donald O'Connor of $(S\&T)^2$ Consultants Inc.; (ii) Jim Lyons of Trinity Consultants; and (iii) H-D Systems, which are enclosed as Exhibits "A" through "C."

Growth Energy has several concerns regarding the Proposed Modifications, and believes several changes could be made to enhance the regulation. For example, to ensure the Proposed Amendments are based on "the best available economic and scientific information" available to CARB, (Health & Saf. Code, § 38562, subd. (e)), Growth Energy recommends that CARB modify its calculation of the direct and indirect emissions of corn and cane ethanol, and use updated versions of CA GREET and GTAP. Similarly, CARB should revise the EERs for various electricity pathways to ensure they are supported by the evidence.

Growth Energy is also concerned that the Proposed Modifications seek to treat hydrogen and electricity differently than other lower CI alternative fuels, and strongly suggests that CARB take a different approach that would achieve real and quantifiable greenhouse gas emissions. As such, Part II, Section A of these comments explains that, to the extent CARB issues credits for electricity and hydrogen capacity, CARB should also provide credits for capacity generated for other lower CI alternative fuels.

Part II, Section B of these comments explains why the Proposed Amendments and Proposed Modifications should receive additional input from the public. Specifically, since 2009, the LCFS has been based on a system under which regulated parties would receive credits based on carbon intensity ("CI") and actual reductions in greenhouse gas emissions. The Proposed Modifications depart from the longstanding function and intent of the LCFS regulation, and propose to provide credits for the development of hydrogen and electricity charging infrastructure and unused capacity; in order words, credits would no longer be tethered to direct reductions in emissions. CARB staff itself has acknowledged these modifications are "certainly a philosophical departure from what the program has been about in the past . . . ." (Exhibit "D.") In light of this significant change in both philosophy and function, a 15-day review process is insufficient under the Government Code. The Proposed Modifications are not "sufficiently related" to the original text, and therefore a 45-day review period is required under the California Administrative Procedure Act, Govt. Code, § 11350, *et seq.* (the "APA"). In addition, to comply with the California Environmental Quality Act, Pub. Resources Code, § 21000, *et seq.* ("CEQA"), the Environmental Assessment ("EA") should be revised and recirculated based both on the significant change in the nature of the "project," and the potentially significant environmental effects resulting from the implementation of the Proposed Modifications.

Part II, Section C urges CARB not to consider the Proposed Modifications on the basis that they would not "achieve the maximum technologically feasible and cost-effective reductions in greenhouse gas emissions from those sources or categories of sources, in furtherance of achieving the statewide greenhouse gas emissions limit," as required under AB 32. (Health & Saf. Code, § 38560.5, subd. (c).)

Part II, Section D explains that, unlike the Proposed Modifications, Growth Energy's E15 Alternative would result in actual reductions of greenhouse gas emissions; thus, CARB should fully evaluate the incorporation of E15 into the LCFS as an alternative. Part III, Section E, in turn, explains that the Standardized Regulatory Impact Assessment ("SRIA") prepared under Section 11346.3 of the Government Code should be revised to address the dilution of credits and credit values caused by the issuance of credits for unused capacity at hydrogen and DC fast charging stations.

Part III, Section A of these comments explains that, pursuant to Section 57004(b) of the Health and Safety Code, CARB should undertake a peer review to evaluate the "scientific portions" of the Proposed Modifications. Part III, Section B explains that CARB should revise the LCFS and ADF to address comments previously raised by Growth Energy.

I. The CI Values for Corn Ethanol, Cane Ethanol, and Electricity should be Based on the Best Available Economic and Scientific Information

AB 32 requires that, in adopting amendments to the LCFS regulation, CARB establish "the maximum technologically feasible and cost-effective" method of reducing greenhouse gas emissions. (Health & Saf. Code, § 38561, subd. (a).) CARB must also use "the best available economic and scientific information . . . ." (Health & Saf. Code, § 38562, subd. (e).)

As an initial matter, Growth Energy asks that CARB define what it contends the term "best available scientific information" means. This is important so that a reviewing court can

assess whether CARB is reasonably construing the term for purposes of its development of the Proposed Amendments. This is of particular concern here because CARB appears to be relying on little scientific information in its efforts to provide credits for unused infrastructure, while at the same time declining to give adequate consideration to new data and findings concerning the direct emissions of various fuels and indirect land use change impacts.

Under any interpretation, the Proposed Amendments do not meet the standards set forth in Sections 38561(a) and 38562(e), as they continue to include inaccurate CI values for corn ethanol, cane ethanol, and electricity. (See Exhibit "A.") If a CI sends the wrong "signal" to downstream regulated parties, then the LCFS regulation will result in the use of pathways that may increase GHG emissions above the levels that would result if the best possible CI values had been assigned to various renewable-fuel pathways in the regulation. (See Exhibit "A.") While a small number of these issues were resolved through the Proposed Modifications, a review of the 15-Day Notice has revealed additional concerns with respect to the CI values proposed by CARB staff, which likewise would send the wrong "signals" and result in the greater use of higher CI fuels.

A. Calculation of Direct Emissions from Corn Ethanol & Sugarcane Ethanol [CA-GREET 3.0]

Growth Energy has reviewed CARB's calculation of direct emissions for corn ethanol, which continue to be overstated. First, for its rail energy use, CARB has added the same amount of energy as backhaul energy for rail movement. This overstates rail emissions because the energy use for rail already includes backhaul energy. (See Exhibit "A" at 2.) Rail emissions are also overstated because they erroneously include the same energy use for both loaded and empty cars. (*Id.*)

Road emissions for corn ethanol are likewise overstated. The new version of CA GREET has changed the load size and fuel economy of vehicles in a manner unsupported by the evidence. For example, the energy use contemplated for certain heavy duty unloaded vehicles is 79.3% of the loaded vehicles, while U.S. DOE studies show the same loaded vehicles are three times the weight of unloaded vehicles (meaning that the energy use of unloaded vehicles should be closer to approximate 33% of a loaded vehicle). (See Exhibit "A" at 2.) U.S. DOE data likewise shows that backhaul (unloaded) energy use for medium duty vehicles is approximately 50-66% of loaded energy (compared to 79.3%). (*Id.*)

Moreover, despite the extensive comments previously provided for cane ethanol, which demonstrated the CI for cane was understated by approximately 5.5 g/MJ, the Proposed Modifications contain no revisions to correct this erroneous CI value. (*Cf.* April 27, 2018, Comments at 12-15.)

B. Calculation of Indirect Land Use Emissions to Reflect Current GTAP

Growth Energy also notes the Proposed Modifications do not include many of the revisions requested in its April 27, 2018, comments relating to indirect land use emissions. Such revisions are particularly important with respect to CARB's continued use of an outdated GTAP model. Specifically, researchers at Purdue University updated the GTAP model in 2017, and those updates were reported in the peer review literature in July 2017. That model has been available to the public and CARB for an entire year, and includes many updates that correct known errors and inaccuracies in the prior model. (See Exhibit "A" at 1.) By failing to update its indirect land use change values to reflect the current version of the GTAP, the Proposed Amendments are not based on the "best available scientific information," (Health & Saf. Code, § 38562, subd. (e)), and also fail to achieve the "maximum technologically feasible and cost-

effective reductions in greenhouse gas emissions." (See Health & Saf. Code, § 38560.5, subd. (c).)

C. Treatment of Electricity under the LCFS Regulation

The LCFS uses an "Energy Economy Ratio" ("EER") to account for differences in energy efficiency among different types of fuels and vehicles, which is "defined as the ratio of the number of miles driven per unit energy consumed for a fuel of interest to the miles driven per unit energy for a reference fuel." (2009 ISOR at ES-18.) Following a review of the new information regarding the EERs in the 15-Day Notice, and the Proposed Modifications, Growth Energy has determined that several additional issues should be corrected:

- The 15-Day Notice states the estimated average efficiency for cargo handling equipment is 38%, but this is unrealistic and unsupported by the record. Indeed, the maximum efficiency (the highest possible percentage) for diesel engines is 41-42%. (See Exhibit "C" at 2.)

- The hours of operation by equipment type for cargo handling vehicles is unclear. Table 1 of Appendix D lists the hours of operation by vehicle type, and includes "hours" ranging from 1,900 to 401,633. The Table does not state annual use rate, and it is unclear what these values refer to. (See *id.*)

- The EER for Ocean Going Vessels ("OGV") presumes all California ports will rely upon the local utility, without accounting for the fact that some ports generate their own electricity. (See *id.*)

- The EER for OGVs at berth does not account for the generation of electricity from boilers. (See *id.*)

- The EER of 2.6 for OGVs is not supported by substantial evidence in the record, as this figure does not appear to be based on any computation of electrical power generated by OGVs. (See *id.* at 3.)

To ensure the CI values assigned to electricity are based on the "best available economic and scientific information," and reliable data and methodologies, CARB should correct these issues before adopting the Proposed Amendments.

II. Treatment of Infrastructure Capacity Credits

A. If CARB Issues Credits for Electricity and Hydrogen Capacity, it should also Issue Credits for Biofuel Infrastructure

As explained below, CARB should not consider the Proposed Modifications, as AB 32 and SB 32 do not authorize credits for underutilized capacity that is not tied to actual greenhouse gas emissions reductions. (See *infra* at § II.C.) In the event CARB does consider the Proposed Modifications, however, CARB should include infrastructure capacity credits for ***all*** low CI alternative fuels.

CARB has no rational basis to treat electricity and hydrogen in a manner different from other alternative fuels. While electricity and hydrogen have relatively low CI values, and CARB has stated a need to increase infrastructure associated with the delivery of those fuels to end-users, the same can be said for a wide-range of other fuels. Indeed, numerous alternatives fuels have a similar or lower CI value than electricity and hydrogen (even when EERs are included), while the use of those fuels is likewise limited by infrastructure. There is no lawful basis articulated in the record for this differential treatment of alternative fuels across the LCFS regulation, much less a rational basis.

As such, to the extent CARB considers providing credits for generating capacity for electricity and hydrogen, it should do the same for all low-CI alternative fuels.

B. The Proposed Amendments and the EA Should Receive Additional Public Comment

1. The Proposed Modifications Are Not Sufficiently Related to the Original Text of the Proposed Amendments

California law provides that "[n]o state agency may adopt, amend or repeal a regulation which has been changed from that which was originally made available to the public . . . unless the change is . . . ***sufficiently related*** to the original text that the public was adequately placed on

notice that the change could result from the originally proposed regulatory action." (Govt. Code, § 11346.8(c) [emphasis added].) To be "sufficiently related," changes must be such that "a reasonable member of the directly affected public could have determined from the [original text of the] notice that these changes to the regulation could have resulted." (1 C.C.R., § 42.)

Growth Energy is concerned the Proposed Modifications do not satisfy this standard, as it appears that "a reasonable member of the directly affected public could [***not***] have determined from the [original text of the] notice that these changes to the regulation could have resulted." (1 C.C.R., § 42.) Until the Proposed Modifications were released, the LCFS previously focused exclusively on provisions that seek to achieve ***actual*** greenhouse gas emissions reductions. The proposed Zero Fueling Infrastructure Crediting Provisions, however, abandon this approach, and seek instead to award credits for capacity, regardless of whether actual greenhouse gas reductions are achieved. As a result, CARB staff has acknowledged these modifications are "certainly a philosophical departure from what the program has been about in the past . . . ." (Exhibit "D"; see also June 11, 2018 CARB Workshop [statements by CARB Staff] [recognizing the Proposed Modifications reflect a "departure from fuel neutrality," and "go above and beyond what [CARB has] issued credits for in the past"].) Other commenting parties have observed that these changes represent a "paradigm shift" and a "clear departure from the concept that a ton [of emissions] is a ton [of emissions]." (June 11, 2018 CARB Workshop [statements by commenters in attendance].)

No "reasonable member of the directly affected public" could have anticipated the Proposed Modifications following a review of the original text of the March 6, 2018 Notice of Proposed Amendments to the LCFS ("Notice"). (1 C.C.R., § 42.) The Notice states:

> Staff believes that the lack of fuel pathways that combine zero carbon electricity and ZEV fueling technology is due to the small geographic

> footprint of ZEV infrastructure—which is often located in dense urban areas—making it difficult to co-locate renewable power generations with fueling stations. To address this issue, staff proposes to allow renewable power generated in the same balancing authority as the ZEV load to be used in EV charging and H2 production . . . . Additionally, staff is proposing an option to recognize and reward the GHG benefits of shifting EV charging and electrolytic hydrogen load to the periods of time when intermittent renewable electricity might otherwise be wasted (curtailed) . . . . These amendments are intended to promote the expansion of zero-emission vehicle infrastructure through the Low Carbon Fuel Standard Program as directed by Executive Order B-48-18.

(March 6, 2018 Notice of Proposed Amendments at 6-7.)

There is nothing in the original Notice that could reasonably apprise the interested public that CARB would be departing from a paradigm under which the LCFS provides credits for actual GHG emissions reductions. (1 C.C.R., § 42.) The Notice suggested that CARB would be promoting infrastructure by (i) "allow[ing] renewable power generated in the same balancing authority as the ZEV load to be used in EV charging and H2 production," and (ii) recognizing and rewarding regulated parties that shifted "EV charging and electrolytic hydrogen load to the periods of time when intermittent renewable electricity might otherwise be wasted (curtailed) . . . ." (*Id.*) Plainly, both of these measures were based on providing credits for ***actual usage***.

Now, in contrast, CARB seeks to untether credits from actual emissions reductions, and instead award credits for unused capacity. This is not only fundamentally different than the measures identified in the original Notice to promote infrastructure, but represents a wholesale change in the way the LCFS has been structured since its original promulgation in 2009. As CARB staff acknowledged at the workshop regarding the Proposed Modifications, the changes represent a "departure from the framework and philosophy of the program historically." (June 11, 2018 CARB Workshop [statements by CARB staff].) Because the Proposed Modifications represent a paradigmatic change in the LCFS, and there was no mention in the original Notice of

the issuance of credits for unused infrastructure capacity, "a reasonable member of the directly affected public could [***not***] have determined from the [original text of the] notice that these changes to the regulation could have resulted." (1 C.C.R., § 42.) As such, the Proposed Modifications are not "sufficiently related to the original text," (Govt. Code, § 11346.8(c)), and the Proposed Modifications should be circulated for a full 45-day review period.[1]

This is consistent with related federal case law interpreting parallel provisions in the federal Administrative Procedure Act. (See California Practice Guide, Administrative Law: Rulemaking and Open Government, at 23-58.) For example, in *Chocolate Manufacturers Association of United States v. Block* (4th Cir. 1985) 755 F.2d 1098, the Fourth Circuit held that the Department of Agriculture's proposed rulemaking did not provide adequate notice that elimination of flavored milk from the Special Supplemental Food Program for Women, Infants and Children ("WIC Program") would be considered in the rulemaking procedure.

As the Fourth Circuit explained, "[t]he requirement of notice and a fair opportunity to be heard is basic to administrative law." (*Id.* at 1102.) "The notice-and-comment procedure encourages public participation in the administrative process and educates the agency, thereby helping to ensure informed agency decisionmaking." (*Id.* at 1103 [quoting *National Tour Brokers Ass'n v. United States* (D.C. Cir. 1978) 591 F.2d 896, 902] [internal citations omitted].) Thus, "[a]lthough an agency, in its notice of proposed rulemaking, need not identify precisely every potential regulatory change, the notice must be sufficiently descriptive to provide interested parties with a fair opportunity to comment and to participate in the rulemaking." (*Id.*

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[1] Such a dramatic shift in the operation of the LCFS regulation deserves robust public input. Despite this, CARB published the 15-day notice on June 20, 2018, ensured the deadline for comments on the Proposed Amendments would fall on July 5, 2018, immediately after the July 4th holiday, and inclusive of two weekends. Consequently, the regulated public's ability to contribute to the rulemaking process on this issue was severely truncated.

at 1104 [internal citations omitted].) Accordingly, notice is adequate if the changes "are ***in character with the original scheme***" and the final rule is a "***logical outgrowth***" of the notice. (*Id.* [emphasis added].)

In finding the notice was inadequate, the Fourth Circuit emphasized that, "for many years the Department of Agriculture has permitted the use of chocolate in some form in the food distribution programs that it administers," and that in all of the proposed rulemaking documents "the Department never suggested that flavored milk [might] be removed from the WIC Program." (*Id.* at 1106.) Based on these facts, the Fourth Circuit concluded that "it cannot be said that the ultimate changes in the proposed rule were in character with the original scheme or a logical outgrowth of the notice." (*Id.* at 1107.)

Here, as in *Chocolate Manufacturers*, the final rule included a provision that has reversed a long-standing policy of the agency concerning its regulatory program. As with the Department of Agriculture's policy of permitting the use of chocolate in its food distribution programs, CARB's long-standing policy of offering credits only for actual GHG emissions reductions meant that the public could not anticipate a contrary course of action absent specific notice of the agency's intent. Yet here, as in *Chocolate Manufacturers*, CARB "never suggested" in its rulemaking notice that the agency might propose offering credits for infrastructure capacity. Consequently, CARB's inclusion of regulations providing capacity credits for ZEV infrastructure is neither "in character with the original [LCFS] scheme" nor a "logical outgrowth" of the rulemaking notice. (*Id.* at 1104.) And, to make matters worse, CARB issued the 15-day notice on June 20, 2018, ensuring the comment deadline was the day after the Fourth of July holiday (and, in addition, would include two weekends), severely limiting the ability of the public to review and comment on the proposed change.

CARB's decision to proceed with a 15-day notice for the Proposed Modifications is not only unfair to the regulated public, but also detrimental to the efficiency and integrity of the rulemaking process. To ensure interested parties are provided sufficient time to understand the implications, both intended and unintended, of CARB's proposal, and to provide thoughtful and intelligent comments on the proposal, CARB should instead issue a second 45-day notice that specifically puts the public on notice of the agency's intent to offer credits for infrastructure capacity.

2. The Proposed Modifications Constitute "Significant New Information" and Render the Project Description Unstable

a. The Proposed Modifications Constitute "Significant New Information" under Section 15088.5 of the CEQA Guidelines

California law requires a lead agency to recirculate an environmental document when "significant new information" is added after the original public comment period, "but before certification." (CEQA Guidelines, § 15088.5(a); see also Pub. Resources Code, § 21092.1.)

When a lead agency adds "significant new information," the agency must pursue an additional round of consultation. (*Laurel Heights Improvement Assn. v. Regents of University of California* (1993) 6 Cal.4th 1112, 1130 ["*Laurel Heights II*"].) The purpose of requiring recirculation is to encourage meaningful public comment. (*Mountain Lion Coalition v. Fish & Game Commission* (1989) 214 Cal.App.3d 1043, 1053.) As the Supreme Court explained, "new information that demonstrates that an EIR commented upon by the public was so fundamentally and basically inadequate or conclusory in nature that public comment was in effect meaningless triggers recirculation." (*Laurel Heights II*, *supra*, 6 Cal.4th at 1130.)

"'To facilitate CEQA's informational role, the EIR must contain facts and analysis, not just the agency's bare conclusions or opinions.' [Citations.] An EIR must include detail

sufficient to enable those who did not participate in its preparation to understand and to consider meaningfully the issues raised by the proposed project." (*Laurel Heights Improvement Assn. v. Regents of University of California* (1988) 47 Cal.3d 376, 404-405 ["*Laurel Heights I*"].) If an agency adds significant new information, the agency must recirculate a revised EIR, "so that the public is not denied an opportunity to test, assess, and evaluate the data and make an informed judgment as to the validity of the conclusions to be drawn therefrom." (*Save Our Peninsula Committee v. Monterey County Bd. of Supervisors* (2001) 87 Cal.App.4th 99, 131.)

While new information is not "significant" when it "merely clarifies or amplifies or makes insignificant modifications in an adequate" environmental document, CEQA requires recirculation when the environmental analysis will be "changed in a way that deprives the public of a meaningful opportunity to comment upon a substantial adverse environmental effect of the project or a feasible way to mitigate or avoid such an effect . . . ." (CEQA Guidelines, § 15088.5(a).) Section 15088.5 enumerates several examples of what constitutes "significant new information," but that list is not intended to be exhaustive. For instance, Section 15088.5 requires recirculation where (i) the new information discloses a new environmental effect or a substantial increase in the severity of a previously-recognized environmental effect, (see *id.*, subds. (a)(1), (a)(2)); (ii) mitigation measures or alternatives "considerably different" from those previously analyzed would lessen a project's environmental effects, but the proponent declines to adopt such measures/alternatives, (see *id.*, subd. (a)(3)); and (iii) the environmental document is "so fundamentally and basically inadequate and conclusory in nature that meaningful public review and comment were precluded." (*Id.*, subd. (a)(4).)

In this case, the 15-Day Notice reveals that CARB is seeking to change fundamental aspects of the "project" under CEQA. Specifically, since 2009, the LCFS been focused on

providing credits for actual greenhouse gas emissions reductions. The proposed Zero Fueling Infrastructure Crediting Provisions, however, would provide credits for mere capacity rather than actual use. Providing credits for unused capacity will not achieve the same greenhouse gas or criteria pollutant emissions benefits as the existing LCFS.

This change in the LCFS warrants recirculation for several reasons. First, with respect to the discussion of a project that includes credits for capacity for electric and hydrogen infrastructure, the environmental analysis is currently silent; there is simply no discussion in the environmental document about this new and fundamentally changed aspect of the project. As such, Growth Energy is concerned that CARB's discussion of the issuance of credits for capacity for electric and hydrogen infrastructure may be "so fundamentally and basically inadequate and conclusory in nature that meaningful public review and comment were precluded." (CEQA Guidelines, § 15088.5, subd. (a)(4).)

Moreover, CARB's new proposal has the potential to result in new environmental effects or a substantial increase in the severity of a previously-recognized environmental effect. (See CEQA Guidelines, § 15088.5, subds. (a)(1), (a)(2).) First, the entire purpose of the Proposed Modifications is to increase the number of hydrogen and DC fast charging stations that are constructed in California. CARB has previously admitted in its existing EA for the Proposed Amendments that the potential environmental effects associated with the construction of ***other*** facilities – *i.e.*, new or modified facilities to ***produce*** alternative fuels – constitutes a significant and unavoidable environmental effect. (See EA at 101-02.) Although it is not the public's burden to demonstrate a project would have potential environmental effects, (*Sundstrom v. County of Mendocino* (1988) 202 Cal.App.3d 296, 311 ["CEQA places the burden of environmental investigation on government rather than the public," and a lead agency "should

not be allowed to hide behind its own failure to gather data."]), the evidence shows new hydrogen and DC fast charging stations could lead to potentially significant environmental effects (including, inter alia, aesthetics, air quality, biological resources, cultural resources, geology and soil, hydrologic resources, noise, and traffic and transportation). (See Exhibit "C" at 2.) Indeed, the Draft EA expressly notes that the construction of hydrogen and DC fast charging stations – which were not directly incented under the original proposal – would have potentially significant impacts:

> Generally, it is expected that during the construction phase for any facilities, criteria air pollutants and toxic air contaminants (TACs) could be generated from a variety of activities and emission sources. These emissions would be temporary and occur intermittently depending on the intensity of construction on a given day. Site grading and excavation activities would generate fugitive particulate matter (PM) dust emissions, which is the primary pollutant of concern during construction. Fugitive PM dust emissions (e.g., respirable particulate matter [PM10] and fine particulate matter [PM2.5]) vary as a function of several parameters, such as soil silt content and moisture, wind speed, acreage of disturbance area, and the intensity of activity performed with construction equipment. Exhaust emissions from off-road construction equipment, material delivery trips, and construction worker-commute trips could also contribute to short-term increases in PM emissions, but to a lesser extent. Exhaust emissions from construction-related mobile sources could also result in short-term increases in CO, CO2, hydrocarbons, PM, reactive organic gases (ROG), and nitrogen oxides (NOx). These emission types and associated levels fluctuate greatly depending on the particular type, number, and duration of usage for the varying equipment.

(EA at 128.) In other words, the Proposed Modifications would result in new or increased significant effects that CARB has previously conceded would occur. (See CEQA Guidelines, § 15088.5, subds. (a)(1), (a)(2).)

In addition, as explained in Growth Energy's April 27, 2018, comments on the Proposed Amendments, it is critically important that CARB use scientifically defensible CI values that will result in actual emissions reductions, based on the "signals" to downstream regulated parties. If CARB sends the wrong signals, and incentivizes the use of higher CI fuels, greenhouse gas

emissions would be higher. Here, by providing credits for infrastructure and capacity, CARB is lessening the value of credits for other lower CI fuels, and increasing the value of credits for electrical generation and hydrogen. By sending these inaccurate signals, and untethering credits from actual emissions reductions, any greenhouse gas benefits associated with the LCFS will be substantially less than contemplated in the EA. Likewise, the Proposed Modifications have the potential to displace lower CI fuels with alternative fuels with higher CI values, and bring into question whether CARB can meet the emissions reductions contemplated under SB 32.

Growth Energy is unaware of any analysis CARB has performed with respect to how many tons per year of greenhouse gas emissions would be lost as a result of the generation of credits for electricity and hydrogen capacity. However, using CARB's own Illustrative Compliance Scenario, Growth Energy's experts have found that capacity credits equal to 5% of deficits could result in "potential lost benefits for calendar year 2020 alone to amount to approximately 820,000 metric tons" of greenhouse gas emissions. (Exhibit "B" at 1.)

Further, the Proposed Modifications amend the sunset date for NOx mitigation in a manner that could have potentially significant environmental effects. In the EA, CARB analyzed the Proposed Amendments, which originally contemplated an extension of the sunset date for NOx mitigation until such time that at least 90% of the hours of operation of diesel fueled engines were accumulated by so-called "New Technology Diesel Engines" (NTDEs). (EA at 24; ISOR at EX-7, -13.) The Proposed Modifications change the phase-out provisions significantly, contemplating separate sunset dates for the biodiesel NOx mitigation requirements for on-road and non-road diesel vehicles and engines. (15-Day Notice at 23.) Yet the EA was not modified to address this issue.

The EA should be augmented. First, as explained in prior comments, CARB's assumption that there is no increase in NOx emissions from NTDEs is not supported by substantial evidence. Thus, shortening the end of the mitigation period for on-road diesel vehicles would increase NOx emissions. (See Exhibit "C" at 5.) In addition, there is nothing in either the Proposed Amendments or the Proposed Modifications that, following the sunset date for one category of vehicles, would prohibit biodiesel without mitigation to be introduced into the other category of vehicles or engines that have not yet reached the sunset date. (*Id.* at 5.) This introduction of non-mitigated biodiesel into non-NTDE engines would increase NOx emissions. This is of even greater concern because "the reporting requirements of the ADF regulation do not make any distinction between bio-diesel blends intended for use as on-highway or non-road fuels and there is no explicit prohibition or enforcement mechanism in the ADF regulation against introducing non-mitigated on-highway diesel fuel into any non-road engine." (*Id.*) Thus, by disaggregating the sunset dates, the Proposed Modifications would have potentially significant environmental effects as to NOx emissions.

In short, because the EA does not address the fundamental shift in the regulatory approach taken with respect to the generation of credits embodied by the Proposed Modifications, and because the construction of new and modified infrastructure for electric and hydrogen fuel stations has the potential to result in new environmental effects or a substantial increase in the severity of a previously-recognized environmental effects, the EA should be revised to include the Proposed Modifications as part of the "project," and recirculated for public review.[2] (See CEQA Guidelines, § 15088.5, subds. (a)(1), (a)(2).)

[2] The environmental document should also be recirculated because members of the public, including Growth Energy, proposed numerous alternatives and mitigation measures "considerably different" from those previously analyzed that would lessen the significant

b. The Project Description is Unstable Because the EA Evaluates a Different Project than what is now Being Proposed

A lead agency's environmental document under CEQA must include a clear and comprehensive description of the proposed project; this is critical for the agency to perform an accurate analysis of impacts and meaningful public review. (*County of Inyo v. City of Los Angeles* (1977) 71 Cal.App.3d 185, 193 ("*Inyo II*"). As explained in *Inyo II*:

> A curtailed or distorted project description may stultify the objections of the reporting process. Only through an accurate view of the project may affected outsiders and public decision-makers balance the proposal's benefit against its environmental cost, consider mitigation measures, assess the advantage of terminating the proposal (*i.e.*, the "no project" alternative) and weigh other alternatives in the balance.

(*Id.* at 192-93.) "A curtailed, enigmatic or unstable project description draws a red herring across the path of public input." (*Id.* at 197-98; see also *San Joaquin Raptor Rescue Center v. County of Merced* (2007) 149 Cal.App.4th at 655-57 [invalidating an EIR for misleading project description].)

Although CARB has introduced Proposed Modifications that represent a significant "departure from the framework and philosophy of the program historically," (June 11, 2018 ARB Workshop [statements by CARB Staff]; see also Exhibit "D"), CARB did not modify the EA or otherwise discuss the potential environmental effects of the Proposed Modifications. Thus, in its current state, the EA addresses a different "project" under CEQA than what is being proposed and considered by CARB. As such, the project description is neither complete nor accurate. To ensure compliance with CEQA, CARB should modify its environmental analysis to

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environmental effects of the Proposed Amendments; however, CARB has declined to adopt those mitigation measures and project alternatives. (CEQA Guidelines, § 15088.5(a)(3).)

incorporate the "project" under consideration, and recirculate the EA for public review, prior to its consideration of the Proposed Modifications.

C. The Proposed Modifications are Inconsistent with CARB's Defined Project Objectives, AB 32, and SB 32

The LCFS regulation is an "implementation measure" adopted under the color of AB 32 and SB 32. As such, the LCFS must "achieve the maximum technologically feasible and cost-effective reductions in greenhouse gas emissions from those sources or categories of sources, in furtherance of achieving the statewide greenhouse gas emissions limit." (Health & Saf. Code, § 38560.5, subd. (c); see also *id.* § 38562, subd. (a) [including similar language].) SB 32 likewise references CARB's mandate to adopt "rules and regulations to achieve the maximum technologically feasible and cost-effective greenhouse gas emissions reductions . . . ." (Health & Saf. Code, § 38566.)

The Proposed Modifications are inconsistent with these objectives. The Proposed Modifications would "effectively decrease the actual GHG reductions associated with the LCFS program by up to 5%." (Exhibit "B" at 1.) Thus, assuming the LCFS actually reduces greenhouse gas emissions,[3] it is unclear how the Proposed Modifications can be reconciled with the Legislature's mandate that the LCFS "achieve the maximum technologically feasible and cost-effective reductions in greenhouse gas emissions . . . ." (Health & Saf. Code, § 38560.5, subd. (c); see also *id.* § 38562, subd. (a) [including similar language].) To the extent the Proposed Modifications are not consistent with the Legislature's mandate, their adoption constitutes an *ultra vires* act.

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[3] Growth Energy notes that, as explained previously, the phenomenon of fuel-shuffling reduces, if not eliminates, the greenhouse gas emissions benefits associated with the LCFS. (April 27, 2018, Comments of Growth Energy at 48-49.)

There is likewise no practical need for the LCFS to provide credits for unused infrastructure, as any such efforts would be largely duplicative of concurrent state efforts to subsidize hydrogen station construction and the deployment of DC fasting charging stations. (See Exhibit "B" at 3-4.) In essence, the provision of credits for hydrogen and electric charging infrastructure would amount to little more than providing entities credits for infrastructure that is already being largely funded by the State. (*Cf.* Government Code § 11342.2 ["[N]o regulation adopted is valid or effective unless consistent and not in conflict with the statute and reasonably necessary to effectuate the purpose of the statute."].)

Growth Energy understands CARB may claim the Proposed Modifications are required under Executive Order B-48-18. While Executive Order B-48-18 arguably directs CARB to "[r]ecommend ways to expand zero-emission vehicle infrastructure through the Low Carbon Fuel Standard Program," the executive order does not require the generation of credits for infrastructure based on unused capacity as opposed to actual utilization. And even if Executive Order B-48-18 could be read as mandating the issuance of credits for capacity regardless of actual utilization, the executive order would be contrary to AB 32 and SB 32, as explained above.

The Proposed Modifications are also inconsistent with CARB's articulated project objectives. While the EA states that the goal of the Proposed Amendments is to "strengthen the CI reduction targets through 2030" to comply with SB 32, and to "reduce the CI of transportation fuels in the California market," the Proposed Amendments bear no direct relation to any reduction in CI; rather, they are based solely on capacity without respect to actual utilization. (*Cf.* EA at 15.) Moreover, while CARB has stated that one of its project objectives is to "provide greater innovation and development of cleaner fuels," (*cf. id.*) – and has specifically rejected

alternatives on this basis in the past, (see Exhibit "B" at 3-4) – the Proposed Modifications seek to provide uneven benefits to certain existing technologies, while at the same time ignoring infrastructure needs for other low-CI alternative fuels. Thus, the Proposed Modifications appear to undermine CARB's own stated objectives.[4]

Because the Proposed Modifications are inconsistent with AB 32 and SB 32, as well as the project objectives, CARB should decline to consider the Proposed Modifications.[5]

D. CARB Should Adopt the E15 Alternative Instead of the Proposed Modifications

In its April 27, 2018, comments, Growth Energy proposed an "E15 Alternative," under which CARB would concurrently adopt fuel specifications for E15, and incorporate E15 into the LCFS. Because E15 is a low CI fuel and is actively being used in at least 28 states, using a greater percentage of ethanol would help reduce greenhouse gas emissions "to at least 40 percent below the statewide greenhouse gas emissions limit no later than December 31, 2030," in a manner that is both technologically feasible and cost-effective. (Health & Saf. Code, § 38566; see generally April 27, 2018, Comments of Growth Energy at 23-24, 57-58.)

As explained in the expert materials submitted herewith, "it is easy to assess the potential GHG reduction benefits from allowing E15 to be sold in California." (Exhibit "B" at 3.) For example, using "CARB's LD/High ZEV/20% scenario for calendar year 2020, and assuming that

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[4] CARB has previously declined to consider alternatives to the LCFS regulation because they do not meet CARB's project objective of "provid[ing] greater innovation and development of cleaner fuels." (*Cf.* EA at 15.) Based on the fact that the Proposed Modifications would undermine this project objective, CARB should (i) remove fostering innovation as a project objective, and/or (ii) fully consider each of the project alternatives that CARB has previously rejected on the basis that those alternatives would allegedly not foster innovation to the same as the LCFS regulation.

[5] Notably, the 15-Day Notice makes no reference to the project objectives articulated in the ISOR or the EA; much less any analysis of whether the Proposed Modifications meet the project objectives.

the credits generated only by starch ethanol increase by 50% (given that the volume of ethanol used will increase by 50% going from E10 to E15), the resulting reduction in GHG emissions would equal 1,126,000 metric tons of GHG emissions from increased use of ethanol plus a further reduction of another 760,000 metric tons of GHG emissions due to reduced use of petroleum based gasoline blendstocks."[6] (See Exhibit "B" at 3-4.) The Proposed Modifications, in contrast, would ***increase*** greenhouse gas emissions compared to the original Proposed Amendments. Thus, in addition to being a "more effective and less burdensome" alternative that (i) meets the legislative objective of reducing greenhouse gases, (see Govt. Code, § 11346.9, subd. (a)(4)), and (ii) avoids the LCFS's potentially significant environmental effects, (see generally Pub. Resources Code, § 21001), the adoption of the E15 alternative would further – and not undermine – CARB's statutory mandate.

As a result of the foregoing, CARB should incorporate the E15 Alternative as a project alternative under CEQA, and approve the E15 alternative instead of the Proposed Amendments. (See Govt. Code, § 11346.9, subd. (a)(4); Pub. Resources Code, § 21001; CEQA Guidelines, §§ 15043.)

E. The SRIA Should Be Augmented to Address Impacts Associated with The Proposed Modifications' Dilution of the Value of Credits

The APA requires that state agencies proposing to "adopt, amend, or repeal any administrative regulation" must perform an assessment of "the potential for adverse economic impact on California business enterprises and individuals." (Govt. Code, § 11346.3, subd. (a).) The APA requires, *inter alia*, that CARB prepare a SRIA analyzing "the potential adverse

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[6] In addition to reducing the greenhouse gas emissions benefits associated with the Proposed Amendments, the Proposed Modifications would also reduce the alleged criteria pollutant emissions benefits of the ADF regulation – including NOx emissions. (See Exhibit "B" at 4.) The EA, however, does not address this issue.

economic impact on California business and individuals of a proposed regulation," (Govt. Code, § 11346.3), and declare in the notice of proposed action any initial determination that the action will not have a significant statewide adverse economic impact directly affecting business. (Govt. Code, § 11346.5, subd. (a)(8); *WSPA v. Board of Equalization* (2013) 57 Cal.4th 401, 428.)

The SRIA should be revised to include impacts associated with the Proposed Modifications. Specifically, the economic impact of providing credits for unused fuel capacity at hydrogen and DC fast charge stations must be considered. As noted by Growth Energy's experts, using a very conservative (*e.g.*, low) assumed value of $100 per LCFS credit, the value of LCFS credits awarded for unused capacity at hydrogen and DC fast charge could amount to as much as $82 million in a single year (2020), and the cumulative value of all credits awarded over period allowed under the Proposed Amendments by CARB is likely to much greater. Further, by providing credits for unused infrastructure, the Proposed Amendments "will decrease the value of LCFS credits generated by other means that do in fact result in actual reductions in GHG emissions." (Exhibit "B" at 2.) This is because "the 'capacity' credit provisions will artificially increase the supply of LCFS credits for which there is a finite demand which in turn will decrease the value of all LCFS credits" relative to what it would have otherwise been. (*Id.*) This devaluing of credits will impact credit holders, and decrease the alleged benefits identified in the Proposed Amendments.

To avoid these impacts, the Proposed Modifications should not be adopted. But if they are, CARB should first revise the SRIA and accurately assess the economic impacts of the Proposed Modifications.

III. CARB Should Continue to Review the Proposed Amendments

A. CARB Staff Should Undertake a Peer Review to Evaluate the "Scientific Portions" of the Proposed Modifications (Health & Saf. Code, § 57004(b))

Section 57004(d) of the Health and Safety Code states that CARB shall not "take any action to adopt the final version of a rule unless" it undertakes a peer review to evaluate the "scientific portions" of the rule. (Health & Saf. Code, § 57004(d).) However, none of the rulemaking materials submitted with the 15-Day Notice show that CARB retained a peer reviewer to evaluate the Proposed Modifications (or the Proposed Amendments).

Peer review of the Proposed Modifications is required, as the new text is premised upon, or derived from, empirical data or other scientific findings, conclusions, or assumptions establishing a regulatory level, standard, or other requirement for the protection of public health or the environment." (*Id.*, subd. (a)(2).) These "scientific portions" include, but are not limited to:

- The extent to which new hydrogen and DC fast charging stations receiving credits under the LCFS would be utilized;
- Whether the issuance of credits for unused capacity would result in direct decreases in greenhouse gas emissions;
- Whether the issuance of credits for unused capacity would decrease the greenhouse gas and criteria pollutant emissions benefits of the LCFS;
- The extent to which the development of new hydrogen and DC fast charging stations would result in environmental effects;
- Whether NTDE engines, in fact, result in no increase in NOx emissions when operated on biodiesel;
- Whether disaggregating the sunset dates for mitigation of NOx increases from biodiesel used in non-road and on-road diesel engines would increase NOx emissions;
- CARB's decision to provide credits for hydrogen and electric charging infrastructure, but not infrastructure for other low carbon fuels;

- The use of an updated GTAP to calculate indirect land use change;
- The energy use attributed to transport of corn ethanol by rail;
- The energy use attributed to transport of corn ethanol by road;
- The EER for cargo handling vehicles;
- The EER for ocean going vessels; and
- Whether the issuance of credits for capacity would dilute the value of shares for actual greenhouse gas emissions reductions.

B. CARB Should Address the Issues Previously Raised by Growth Energy

Growth Energy previously submitted comments on the Proposed Amendments on April 27, 2018. Growth Energy, however, has noted that very few of the issues raised in the April 27, 2018, comments have been corrected. While Growth Energy understands CARB must "summarize and respond to the comments" before "taking final action on" the proposal, (17 Cal. Code Regs., § 60007(a)), Growth Energy believes nearly all of the comments warranted corrections that should be incorporated into the final version of the Proposed Amendments. As a result, Growth Energy requests that CARB revise the Proposed Amendments and/or the EA to address the issues previously raised in the April 27, 2018, comment letter. These issues include:

- **CA-GREET 3.0**
  - The most current version of the GREET model includes a distillers' grains (DDG) methane avoidance credit, which equals 2.1 g/MJ, and is not incorporated into CA GREET 3.0 under the Proposed Modifications.
  - Although the ISOR estimates that the CI for corn ethanol will drop from approximately 70 g/MJ to 45 g/MJ, it is unclear what evidence the Executive Officer relied upon to determine corn ethanol facilities would install CCS systems at a rate necessary to reduce their CI to 45 g/MJ. As a result, Growth Energy urges CARB to swiftly consider the approval of the proposed pathways for such fuel to help provide evidentiary support for CARB's 45 g/MJ estimate.

- The CI for corn starch ethanol under CA GREET 3.0 contains a value for the electricity that is used in transportation and distribution with an emission factor developed using US average power, even though most such emissions are likely to be in California.

- The CI for sugarcane is understated because the nitrogen content of biomass and fertilizer for sugarcane are far higher than estimated by CARB.

- CA GREET 3.0 uses the same emission factor for truck transport in Brazil and California, even though Brazil should be higher.

- CA GREET 3.0 uses simplified calculators for corn ethanol and sugarcane ethanol that contain several errors. Unless corrected, the CI for sugarcane ethanol will be understated, and the CI for corn will be overstated.

- **Calculation of Indirect Land Use Emissions ("ILUC")**

  - Using CARB's AEZ-EF model in conjunction with GTAP to estimate emissions associated with the various land use changes, researchers have determined that the ILUC for corn starch ethanol should be reduced from 19.8 g/MJ to 10.3 g/MJ.

  - The current ILUC for corn starch ethanol is based on 2011 conditions, which correspond to a drought year in the U.S. that negatively impacted corn yields. When a three-year average is used, the ILUC should be reduced significantly.

- **Energy Economy Ratio ("EER")**

  - The EER for electricity is far too high because the estimates were generated based on testing performed with accessory modes off.

  - The EER for electricity is also too high because it is based on optimal temperature (75°-80°) for battery efficiency, and not real world conditions.

  - The EERs for numerous vehicles are overstated.

- **Treatment of Renewable Electricity for Fuel Pathways**

  - The Proposed Amendments do not allow CI reduction for dedicated renewable electricity unless the generation facilities are co-located with the fuel production facility, removing incentives for fuel producers to develop renewable sources for process energy.

  - The proposed Zero Fueling Infrastructure Crediting Provisions provide credits for capacity rather than actual use. Providing credits for capacity will not achieve the same GHG or criteria pollutant benefits as the existing LCFS.

- **Analysis of Alternatives Under the Government Code**

  - CARB should consider the WSPA Alternative which contemplates that GHG emissions currently attributable to the LCFS program would "instead be achieved by the Assembly Bill (AB) 32 Cap and Trade Program in the most cost-effective manner to address GHG emissions."

  - CARB should consider the E15 Alternative under which CARB would concurrently adopt fuel specifications for E15 and incorporate E15 into the LCFS.

- **Adequacy of Economic Analysis in the SRIA**

  - The current SRIA does not meet the applicable standards under the APA. The ISOR's discussion of the "elimination of existing businesses" and "the competitive . . . disadvantages" does not fully address or take into account that the LCFS regulation is projected to increase the price of gasoline.

- **External Peer Review**

  - It is unclear whether CARB sought external peer review for:

    - The accuracy of each of the components of CA-GREET 3.0, and the effect on the CI for corn ethanol and sugarcane ethanol;

    - The ILUC for corn ethanol;

    - The EER for electricity;

    - The efficacy of NTDEs to reduce NOx emissions from biodiesel;

    - The accuracy of CARB's compliance scenario, including but not limited to the adaptation of alternative jet fuels, solar steam projects, and renewable diesel; and

    - The potential impacts associated with CARB's compliance scenarios, particular with respect to alternative jet fuels, solar steam projects, and renewable diesel.

- **Noncompliance with AB 32**

  - The LCFS regulation has resulted in increased and unmitigated NOx emissions from biodiesel since its inception. There is nothing in the Proposed Modifications that suggests these emissions would be mitigated through the payment of funds to local air districts for NOx mitigation projects.

- The proposed mitigation to continuing NOx emissions is not consistent with CEQA. The ISOR's conclusions are based on assumptions concerning industry's use of renewable diesel and alternative jet fuel, and the development of solar steam projects, none of which are required to occur, and all of which are speculative.

- The LCFS will result in the construction of new or modified facilities for alternative fuels incentivized by the regulation.

- The LCFS regulation will continue to result in fuel shuffling, which increases emissions.

- **Requirements of Transparency**

  - CARB must maintain a full and complete rulemaking file:

    - The rulemaking file must include external communications submitted to the staff, the Executive Officer or the Board prior to the date when the rulemaking file is formally opened. If those communications are not included, it should be explained why.

    - Growth Energy urges CARB to take all necessary measures to ensure all external submittals (not within the scope of section 11347.3(b)(7)) concerning this regulatory process have been included in the rulemaking file.

    - Growth Energy also urges CARB to ensure all factual information relied upon by CARB staff in connection with the consideration of the Proposed Amendments is included in the rulemaking file.

IV. Conclusion

Thank you for the opportunity to participate in this rulemaking, and your anticipated consideration of the above comments. Growth Energy strongly believes corn ethanol can help CARB in meeting its greenhouse gas reduction targets; however, the regulations CARB considers should be objective in nature and not favor one industry or technology over another. In this regard, the Proposed Modifications exacerbate the existing shortcomings of the LCFS and ADF regulations. As such, CARB should fully address and consider meaningful alternatives to the LCFS regulation (including the WSPA Alternative and the E15 Alternative), and should decline to incorporate the Proposed Modifications into the Proposed Amendments. In the event

CARB considers the Proposed Modifications, CARB should expand capacity credits to all low carbon fuels.

Exhibit “A”

Comments on 15-Day Notice

July 5, 2018

By Thomas Darlington, Air Improvement Resource Inc.
Donald O'Connor, (S&T)^2 Consultants Inc.

The 15-day notice fails to address our 45-day comments on the need to update indirect land use emissions in these current LCFS amendments, and the significant impacts of doing so.

ARB uses the Purdue University GTAP model to evaluate indirect land use emissions. Our comments point out that the current GTAP model which addresses many issues with indirect land use emissions raised over the last few years was developed by Purdue, and reported in the peer reviewed literature in July 2017. The literature indicates that the indirect land use change emissions for corn would have dropped from ARB's current estimate of 19.8 g/MJ to around 10 g/MJ. This model has been available from Purdue for use by ARB since July 2017 (the model is available to the public), and using ARB's previous 30 sensitivity cases for the various input elasticities, it could have generated new indirect land use estimates for all biofuel feedstocks in a few weeks, certainly by September of 2017. The regulatory calendar for the LCFS regulation allowed ample time to use the new, correct GTAP values. Because the Proposed Amendments do not use indirect land use change values from the current GTAP model, the Proposed Amendments are not based on the best available scientific information.

Updates to the GREET Model for Corn and Sugarcane

Corn Ethanol

Effects of Distillers Grains on Enteric Fermentation

The modifications proposed in the 15-day notice do not include any revisions addressing our prior comments on distillers' grains reducing enteric fermentation. This is a factor that is included in the GREET2016 model, from which the CA GREET3.0 is derived. The GREET2016 model DG enteric fermentation credit for corn ethanol is estimated at 2,260 g CO2e/mmBTU of ethanol (2.1 gCO2e/MJ). As we pointed out in our prior comments dated April 23, 2018, ARB's main reason for not including this factor appears to be that the animals consuming the DGS rations are not currently in the LCFS LCA ethanol system boundary. However, we previously noted that ARB has made exceptions to boundary conditions for other pathways, and we further pointed out that ARB's position on this is also inconsistent with ISO lifecycle assessment standards. To be consistent with the best available scientific information, the LCFS should be updated to include this DG credit at this time.

Transport Emissions

Rail

For rail energy use, ARB has added the same amount of energy as backhaul energy for rail movement. This is not necessary as the energy use for rail is calculated by taking the total fuel used for class 1 railroads and dividing that by the ton-miles of freight moved by those railways. This calculation automatically includes the energy used for back hauls; thus, it is not necessary to double the value. However, even if the backhaul energy was not already included, it would not be the same value as the energy for a loaded car. There is really no justification given for adding the backhaul energy in Attachment C.

The ORNL Transportation Energy Data Book Edition 36 reports (Table 9.8) that the total freight moved in 2015 was 1.744 million ton-miles and the energy used by the railroads was 516.4 trillion BTU for a total energy use of 294 BTU/ton-mile which would include the movement of empty cars.[1] CA GREET 3.0 has 274 BTU/ton-mile for loaded and the same energy for unloaded movements. This is not correct and the back haul energy for rail should be removed from the model. The methodology is reported in section 6.2 of Appendix A.

Road

The road energy use in GREET is calculated by taking the vehicle fuel consumption and load and from that calculating the BTU/ton-mile. There is no equivalent data set as exists for the railways where the total fuel used and the total freight moved is available, so the approach in GREET is reasonable. In this version of CA GREET 3.0, however, CARB has changed the load size and the fuel economy without explanation. As a result of the changes, the energy use for a HD truck for corn has been reduced from 3231 BTU/ton-mile to 1574 BTU/ton-mile and the energy use for the back haul is 79.3% of the loaded energy use. This is not accurate. The US DOE reported that a loaded class 8 truck typically weighs three times the unloaded vehicle weight.[2] As a result, back haul energy use should be closer to the ratio of the weight of unloaded vehicle to the fully loaded vehicle that is 33%. There is no explanation for, or evidence to support, the new fuel economy values used by CARB.

While the energy use for the heavy-duty trucks decreased, the values for the medium duty trucks increased from 3088 BTU/ton-mile to 6231 BTU/ton-mile. The primary reason for this is that the load size was cut almost in half along with a reduction in the miles per gallon. No source for the data is provided and the back haul energy is the same 79.3% of the loaded energy, which is again too high a value. Specifically, the DOE reports that the medium-sized trucks (truck classes 3-6) have payload capacity shares between 50% and

[1] https://info.ornl.gov/sites/publications/Files/Pub104063.pdf

[2] https://www.energy.gov/eere/vehicles/fact-621-may-3-2010-gross-vehicle-weight-vs-empty-vehicle-weight.

100% of the unloaded weight, which suggests that the back haul energy use should be 50% to 66% of the loaded energy use.

Sugarcane Ethanol Emissions

We made a number of comments on the carbon intensity of the sugarcane pathway, which were not adopted in the 15-day notice. Implementation of these suggestions would have increased the CI of sugarcane ethanol by about 5.5 g/MJ. To ensure the Proposed Amendments are based on the best available scientific information, our suggested changes should be implemented.

Summary of 15-day Modifications for EV and HV

In the 15-day notice, ARB proposes to greatly expand the credits for EV and HEV vehicle refueling infrastructure. In the original proposal, credit is given for fuel used by these vehicles. But in the 15-day notice, ARB proposes to give credits to infrastructure built to refill EVs and HEVs based on refueling capacity, rather than fuel use. ARB proposes some limits on the size of these credits in any one-quarter of a year, and also the life of these credits. But such "capacity" credits achieve no GHG emission reductions, like the actual fuel use.

The proposal appears to be hurriedly developed, and there is not sufficient time available for the public to comment on the concerns that this raises. It is not clear why ARB did not propose this at an earlier date. Accordingly, additional time for public comment should be permitted.

To the extent ARB continues to propose capacity credits for HEVs and EVs, ARB should provide capacity credits for other low-CI alternative fuels, including E15. Notably, there are no capacity credits for E15 refueling facilities for flexible fuel vehicles (FFVs) under the proposed amendments, which could likewise increase the use of low GHG biofuels.

Curriculum Vitae

For

Thomas Darlington

And

Donald O'Connor

Thomas L. Darlington
President, Air Improvement Resource Inc.

Profile

Thomas L. Darlington is President of Air Improvement Resource, a company formed in 1994 specializing in mobile source emission modeling. He is an internationally recognized expert in mobile source emissions modeling, lifecycle analysis, and land use modeling.

Professional Experience

1994-Present	President, Air Improvement Resource
1993-1994	Director, Mobile Source Programs, Systems Application International
1989-1994	Senior Engineer, General Motors Corporation, Environmental Activities
1988-1989	Senior Project Engineer, Detroit Diesel Corporation
1979-1988	Project Manager, U.S. EPA, Ann Arbor, Michigan

Recent Major Projects

- Provided numerous OMEGA outputs to The Alliance for their review of the 2022-2025 GHG standards
- Participating on behalf of Growth Energy in EPA's MOVES model development stakeholder meetings
- Creating a new California emissions model for offroad equipment
- Published a Society of Automotive Engineers paper at SAE World Congress in 2017 (April 2017) on modeling GHG emission reductions with a high octane, low carbon biofuel (Minnesota Corn Growers and others)
- Published an SAE paper at the 2016 World Congress on our review of EPA's EPAct fuels testing and modeling (Growth Energy)
- Developed Life Cycle reports and complete applications for 8 plants for the California Low Carbon Fuel Standard
- Participated in and provided written comments on California's three 2014 Indirect Land Use (iLUC) workshops (Growth Energy)
- With Purdue University, conducted study of iLUC emissions of rapeseed and other oilseeds in 2013 utilizing an updated version of GTAP (European Biodiesel Board)
- Reviewed EPA's palm oil iLUC emissions in 2013 (NESTE)
- Submitted comments on ARB's new GREET2.0 model
- Reviewed CARB's land use emissions for soybean biodiesel
- Reviewed the land use impacts of the RFS2 from EPA, including the notice of Proposed Rule, Regulatory Impact Analysis, and approximately one hundred documents in the rulemaking docket.

- Completed a land use study for Renewable Fuels Association and reviewed California Air Resource Board's Initial Statement of Reasons for the Low Carbon Fuel Standard
- Represented three stakeholders in the recent development of the ARB Predictive Model for reformulated gasoline in California (Alliance of Automobile Manufacturers, Renewable Fuels Association and Western States Petroleum Association)
- Represented two stakeholders in EPA's development of the MOVES on-highway emissions model (Alliance of Automobile Manufacturers and Engine Manufacturers Association)
- Developed the effects of ethanol permeation on on-highway and off-highway mobile sources in California and other states for the American Petroleum Institute
- Studied gasoline and diesel fuel options for Southeast Michigan (for SEMCOG, API and Alliance of Automobile Manufacturers)

Recent Publications

Darlington, T., Herwick, G., Kahlbaum, D., and Drake, D., "Modeling the Impact of Reducing Vehicle Greenhouse Gas Emissions with High Compression Engines and High Octane Low Carbon Fuels," SAE 2017-01-0906, 2017, doi: 10.4271/2017-01-0906.

Darlington, T., Kahlbaum, D., Van Hulzen, S., and Furey, R., "Analysis of EPAct Emission Data Using T70 as an Additional Predictor of PM Emissions from Tier 2 Gasoline Vehicles", SAE Technical Paper 2016-01-0996, 2016, doi: 10.4271/2016-01-0996.

"Study of Transportation Fuel Life Cycle Analysis: Review of Economic Models Used to Assess Land Use Effects", CRC-E-88-3, July 2014.

"Land Use Change Greenhouse Gas Emissions of European Biofuel Policies Utilizing the Global Trade Analysis Project Model", Darlington, Kahlbaum, O'Connor, and Mueller, August 30, 2013.

"A Comparison of Corn Ethanol Lifecycle Analyses: California Low Carbon Fuels Standard (LCFS) Versus Renewable Fuels Standard (RFS2)", June 14, 2010. Renewable Fuels Association and Nebraska Corn Board. This study compared and contrasted the corn ethanol lifecycle analyses performed by both CARB (as a part of the LCFS) and the EPA (as a part of RFS2).

"Review of EPA's RFS2 Lifecycle Emissions Analysis for Corn Ethanol", September 25, 2009. Conducted for Renewable Fuels Association. This study reviewed EPA's land use GHG emissions assessment for corn ethanol, including the FASOM and FAPRI models and Winrock land-use types converted and emission factors by ecosystem type. The study made many recommendations for improving the land-use and emissions modeling.

"Review of CARB's Low Carbon Fuel Standard Proposal", April 15, 2009. Conducted for Renewable Fuels Association. This study reviewed CARB's analysis of land use emissions using GTAP6 and CARB's overall lifecycle emissions for corn ethanol. This study made many recommendations for improving the land use and lifecycle emissions of corn ethanol.

"Emission Benefits of a National Clean Gasoline", August 2008. Conducted for the Alliance of Automobile Manufacturers. This study evaluated the nationwide criteria pollutant emission reductions of a national clean gasoline standard.

"Land Use Effects of Corn-Based Ethanol", February 25, 2009. Conducted for Renewable Fuels Association. This study evaluates possible land use changes and GHG emissions associated with these land use changes as a result of the renewable fuel standard mandated 15 billion gallons of corn ethanol required by calendar year 2015. The study utilized projections of land use in the US and rest of world performed by Informa Economics, LLC, as well as newer estimates of the land use credits of co-products produced by ethanol plants to evaluate possible land use changes.

"On-Road NOx Emission Rates From 1994-2003 Heavy-Duty Trucks", SAE2008-01-1299, conducted for the Engine Manufacturers Association. This study examined manufacturers consent decree emissions data to determine on-road NOx emission rates, and deterioration in emissions from heavy-duty vehicles. (Peer reviewed publication)

"Evaluation of California Greenhouse Gas Standards and Federal Energy Independence and Security Act - Part 2: CO2 and GHG Impacts", SAE2008-01-1853, conducted for the Alliance of Automobile Manufacturers. This paper evaluated the comparison of greenhouse gases from cars and light trucks in the US under both the Federal and California GHG policies. (Peer reviewed publication)

"Effectiveness of the California Light Duty Vehicle Regulations as Compared to Federal Regulations", June 15, 2007. Conducted with NERA Economic Consulting and Sierra Research for The Alliance of Automobile Manufacturers. This study compares the emission benefits of the California and Federal light duty vehicle regulations for HC, CO, NOx, PM, SOx, and Toxics taking into account the difference in emission standards, new vehicle costs and its effect on fleet turnover, new vehicle fuel economy and its effect on vehicle miles traveled, and other factors. Both the EPA MOBILE6 and ARB EMFAC on-road emissions models were used to estimate changes in emissions inventories.

"The Case for a Dual Tech 4 Model Within the California Predictive Model", May 20, 2007. Conducted with ICF International and Transportation Fuels Consulting for the Renewable Fuels Association (RFA). This study developed separate emissions vs fuel property models for lower and higher Tech 4 (1986-1995) vehicles, and showed that utilizing this alternative Predictive Model would result in a higher compliance margin for fuels containing higher volumes of ethanol. It was thought that this could lead to higher ethanol concentrations in the state, but even if the dual model is not used, it is a better representation of the 2015 inventory than the ARB single model.

"Updated Final Report, Effects of Gasoline Ethanol Blends on Permeation Emissions Contribution to VOC Inventory From On-Road and Off-Road Sources, Inclusion of E-65 Phase 3 Data and Other Updates", June 20, 2007. Conducted for the American Petroleum Institute. This report updates the earlier March 3, 2005 report for API utilizing data collected by CRC and others since of the time of the earlier report.

Final Report, Development of Technical Information for a Regional Fuels Strategy, February 28, 2006. Conducted for the Lake Air Directors Consortium (LADCO). This report provided guidance to the LADCO states (Midwestern states) concerning how to model different types of fuel control programs (in particular) using EPA mobile source models, and how to set up the baseline input files so that results are consistent between the different states.

"Emission Reductions from Changes to Gasoline and Diesel Specifications and Diesel Engine Retrofits in the Southeast Michigan Area", February 23, 2005. Conducted for the Southeast Michigan Council of Governments (SEMCOG), the Alliance of Automobile Manufacturers, and the American Petroleum Institute. This study examined the on-road and off-road emission benefits of many different possible gasoline and diesel fuel specifications that the state could adopt to help meet the 8-hour ozone standards. This study formed the basis for the state's move to lower RVP summer gasoline.

"Examination of Temperature and RVP Effects on CO Emissions in EPA's Certification Database, Final Report", CRC Project No. E-74a, April 11, 2005. Conducted for the Coordinating Research Council. This study compared CO vs temperature results from the MOBILE6 model to the certification data, and recommended further testing, which is being conducted by the CRC at this time.

"Effects of Gasoline Ethanol Blends on Permeation Emissions Contribution to VOC Inventory From On-Road and Off-Road Sources" March 3, 2005. Conducted for the American Petroleum Institute (API). Using data from the CRC-E-65 program, and data collected by the California EPA and Federal EPA, this study estimated the impacts of ethanol use on increasing permeation VOC emissions from on-road vehicles, off-road equipment and vehicles, and from portable containers. Emission inventory estimates were made for a number of geographical areas including the state of California, and results showed that the permeation effect increases anthropogenic VOC inventories by 2-4%.

Review of EPA Report "A Comprehensive Analysis of Biodiesel Impacts on Exhaust Emissions", February 11, 2003. Conducted for the American Petroleum Institute. This study critically examined the methods that EPA used to develop the impacts of biodiesel fuels on HC, CO, NOx, and PM emissions.

"Well-To Wheels Analysis of Advanced Fuel/Vehicle Systems – A North American Study of Energy Use, Greenhouse Gas Emissions, and Criteria Pollutant Emissions", May 2005. Conducted for General Motors Corporation, with Argonne National Labs. This study examined many different well to wheels pathways for various fuels, and their impacts on GHG and criteria pollutant emissions.

"Potential Delaware Air Emission Impacts of Switching From MTBE to Ethanol in the Reformulated Gasoline Program", May 26, 2005. Conducted for Lyondell Chemical Company. This study examined the HC, CO, and NOx impacts of switching from MTBE to ethanol.

"Potential Massachusetts Air Emission Impacts of Switching From MTBE to Ethanol in the Reformulated Gasoline Program" June 17, 2005. Conducted for Lyondell Chemical Company. This study is similar to the Delaware study above.

"Potential Maryland Air Emission Impacts of a Ban on MTBE in the Reformulated Gasoline Program", October 18, 2005. Conducted for Lyondell Chemical Company. This study is similar to the Delaware study above.

"MOBILE6.2C with Ethanol Permeation and Ethanol NOx Effects", February 8, 2005. Conducted for Health Canada. This study modified the MOBILE6.2C model for ethanol permeation VOC and ethanol NOx effects.

Education

B. Sc., (Materials and Metallurgical Engineering), University of Michigan, Ann Arbor, 1979
Post Graduate Courses (Business Administration), University of Michigan, Ann Arbor, 1982

Donald Victor O'Connor, P. Eng.

Summary

An innovative, achievement oriented business leader with over 40 years experience with energy and environmental issues in Canada. Successfully developed and commercialized environmentally sound energy alternatives.
Background includes:

- Development of the GHGenius life cycle assessment model for energy systems.
- Developing Canada's largest alternative fuel retailing program.
- Establishment of the ethanol industry in Western Canada, from manufacturing to retailing. Extensive experience with production of biofuels.
- Detailed knowledge of fuels and the fuels industry. Technical expertise regarding the utilization of methanol, ethanol, natural gas, propane, hydrogen, gasoline and diesel fuels.
- Developing objectives, strategy and tactics in highly competitive manufacturing and retail industries.

Professional Experience

$(S\&T)^2$ Consultants Inc. (1998-2018)

President

The firm specializes in energy and environment issues. $(S\&T)^2$ helps corporations with business development strategies concerning new energy markets and products and it helps governments understand the business, energy and environmental issues of new energy pathways.
Mr. O'Connor has recently provided strategic advice on fuels, transportation issues, and greenhouse gas emissions to a number of Provincial governments, several Canadian Federal Government departments, and international agencies and governments. Mr. O'Connor has also consulted for a number of companies developing new technologies for alternative fuelled vehicles and companies developing new transportation fuel processes and facilities.

Projects have included:

- Development of the GHGenius life cycle assessment model
- Development of the Ontario Ethanol Growth Fund. Led to the establishment of 50% of the Canadian ethanol production capacity.
- Analysis of the US EPA RFS program for the National Biodiesel Board. Resulted in soybean biodiesel passing the GHG emission threshold established by the US Congress.
- Establishment of the qualifying criteria for biofuels under the Alberta RFS program.
- Proposed and participated in the development of a novel, patented process for the production of ethanol from woody lignocellulosic feedstock. Five patents granted.
- Provided guidance and recommendations for the establishment of a biofuels program for the Government of Peru.
- Provided project development services for the development and construction of western Canada's largest fuel ethanol plant.

Mohawk Canada Limited (1981 – 1998)

Mohawk was Western Canada's largest independent automotive fuel retailer offering environmentally responsible fuels and lubricants through 300 retail and bulk facilities. Mohawk also manufactures re-refined lubricants from used oil, and ethanol, distillers' grains and Fibrotein from grain.

President, COO, and Director, Mohawk Products Ltd. (1997 – 1998)
President, COO, and Director, Mohawk Lubricants Ltd. (1992 – 1998)
Vice President, Supply and Manufacturing (1989 – 1998)
Various positions in R&D, manufacturing and supply (1981-1989)

Donald Victor O'Connor, P. Eng.

Responsibilities:

- Led and managed three business units simultaneously. These units manufactured lubricants from used oil, processed grain into ethanol and human and animal foods, and the corporate supply function covering all aspects of fuels' development, supply and distribution, and core supplier relationships for convenience goods and corporate services. Recommended objectives, strategy and tactics consistent with the organization's values to achieve corporate vision.

Accomplishments:

- Contributed to the development of a vision and unique corporate positioning that allowed the company to increase its market share by 50% over five years;
- Initiated and led the successful introduction of several new or differentiated alternative fuels to the market (Natural Gas, M85, Ethanol blends (Regular Plus and Premium Plus), and premium diesel fuels (Diesel with ECA and Diesel Max);
- Led the turnaround of used oil re-refining business by doubling production and sales over a four-year period. Increased bottom line by 500% and made the operation the most profitable of its kind in the world.
- Introduced a strategic sourcing program throughout the organization.

Additional Professional Activities

- Advisory Committee. ILUC Quantification Study of EU Biofuels. GLOBIOM Model ILUC project.
- Canadian expert on GHG emissions and indirect effects to ISO TC 248 developing ISO 13065.
- Expert Working Group on Indirect Effects. California Air Resources Board. 2010
- Canadian Biomass Innovation Network. External Advisory Panel. 2005-2010.
- Director, B.C. Buildings Corporation. 2000-2002
- Co-Chair 1999-2001. Member, Executive Committee on Cleaner Technology Vehicles (Minister's Committee, B.C. Environment) (1995 - 2001)
- Director, Pound-Maker Adventures (1990 - 1998) An integrated ethanol plant cattle feeding operation in Saskatchewan.
- Director, Canadian Renewable Fuels Association (1990 – 1998, 2000-2002)
- Member, Environment Advisory Committee, Vancouver Foundation (2001-2003)
- Member, Ethanol BC Board (2000-2010)
- Member, Bio-based Products R&D Advisory Council, BIOCAP Canada, (2002-2003)
- Member, National Advisory Committee on Bioenergy (1984 - 1990)
- Member, Efficiency and Alternative Energy Committee, Minister's National Advisory Council to CANMET (1990 - 1994)
- Chair, Ethanol Program Advisory Committee, Agriculture and Agrifood Canada (1992 - 1997)
- Canadian Petroleum Products Institute, Western Division Management Committee (1996 - 1998)
- Numerous presentations on alternative fuels at National and International conferences.

Employment

- Manager, Energy and Environmental Technology, B.H. Levelton & Associates Ltd. Consulting Engineers (1974 - 1981)
- Air Engineer, Province of British Columbia, Pollution Control Branch (1973 - 1974)

Patents

- Mazza; Giuseppe, Gao; Lei, Oomah; B. Dave, O'Connor; Donald, Crowe; Brian. "Functional, water-soluble protein-fibre products from grains". 07/19/2001. U.S. Patent No. 6,261,629.
- Hallberg; Christer, O'Connor; Donald, Rushton; Michael, Pye; Edward Kendall, Gjennestad; Gordon, Berlin; Alex, MacLachlan; John Ross. "Continuous counter-current organosolv processing of lignocellulosic feedstocks," 12/16/08, U.S. Patent No. 7,465,791.
- Berlin; Alex, Pye; Edward Kendall, O'Connor; Donald, "Concurrent saccharification and fermentation of fibrous biomass," 11/15/11, U.S. Patent No. 8,058,041.

- Hallberg; Christer, O'Connor; Donald, Rushton; Michael, Pye; Edward Kendall, Gjennstad; Gordon, Berlin; Alex, MacLachlan; John Ross, Ma; Raymond. Continuous counter-current organosolv processing of lignocellulosic feedstocks. 6/05/12, U.S. Patent No. 8,193,324.
- Hallberg; Christer, O'Connor; Donald, Rushton; Michael, Pye; Edward Kendall, Gjennstad; Gordon, Berlin; Alex, MacLachlan; John Ross, Ma. Continuous counter-current organosolv processing of lignocellulosic feedstocks. 7/24/12, U.S. Patent No. 8,227,004.
- Hallberg; Christer, O'Connor; Donald, Rushton; Michael, Pye; Edward Kendall, Gjennstad; Gordon, Berlin; Alex, MacLachlan; John Ross, Ma. Modular system for organosolv fractionation of lignocellulosic feedstock. 10/09/2013. U.S. Patent 8,528,463.
- Hallberg; Christer, O'Connor; Donald, Rushton; Michael, Pye; Edward Kendall, Gjennstad; Gordon, Berlin; Alex, MacLachlan; John Ross, Ma. Continuous counter-current organosolv processing of lignocellulosic feedstocks. US Patent 8,772,427.

Peer Reviewed Papers

- Vuksan, V., Jenkins, D. J., Vidgen, E., Ransom, T. P., Ng, M. K., Culhane, C. T., & O'Connor, D. 1999. A novel source of wheat fiber and protein: effects on fecal bulk and serum lipids–. The American journal of clinical nutrition, 69(2), 226-230.
- O'Connor, D., Esteghlalian, A.R., Gregg, D.J. and Saddler, J.N. 2003. Carbon Balance of Ethanol from Wood: The effect of Feedstock Source in Canada. The Role of Boreal Forests and Forestry in the Global Carbon Budget. pp. 289-296 (Proceedings of the International Science Conference, Edm. Alta. May 2000).
- Hünerberg, M., Little, S.M., Beauchemin, K.A., McGinn, S.M., O'Connor, D., Okine, E.K., Harstad, O.M., Kröbel, R. and McAllister, T.A., 2014. Feeding high concentrations of corn dried distillers' grains decreases methane, but increases nitrous oxide emissions from beef cattle production. *Agricultural Systems*, *127*, pp.19-27.
- Chen, R., Qin, Z., Han, J., Wang, M., Taheripour, F., Tyner, W., O'Connor, D. and Duffield, J., 2018. Life cycle energy and greenhouse gas emission effects of biodiesel in the United States with induced land use change impacts. *Bioresource technology*, *251*, pp.249-258.

Education

- Bachelor of Applied Science, Mechanical Engineering, University of British Columbia (1973)

Professional Memberships

- Association of Professional Engineers and Geoscientists of British Columbia
- Association of Professional Engineers of Ontario
- Society of Automotive Engineers

Awards

- Canadian Renewable Fuels Association. Outstanding Dedication to the Advancement of Renewable Fuels in Canada. 2007.

Exhibit “B”

Comments on Notice of Public Availability of Modified Text and Availability of Additional Documents and Information Dated June 20, 2018

Prepared by Jim Lyons, Trinity Consultants
July 5, 2018

CARB's Proposal to Provide "Capacity" Credits for Electric and Fuel Cell Vehicle Infrastructure is Inappropriate and Should Be Eliminated

As part of the 15-day notice, CARB proposes to add a new section, 95486.2 to Title 17, California Code of Regulations. The sole purpose of this section is to provide LCFS credits to hydrogen stations and direct current (DC) fast charging stations for the difference in the installed capacity to deliver hydrogen and electricity in addition to the LCFS credits provided for the "fuel" that is actually delivered to and used by vehicles. In more simple terms, what CARB is proposing is to provide LCFS credits to the owners of hydrogen and DC fast charging stations for taking actions that, in and of themselves, do not result in any actual reduction in greenhouse gas (GHG) emissions or in the carbon intensity (CI) of transportation fuels sold in California. Further, CARB staff is proposing to award these LCFS credits that do not result in any reduction in GHG emissions or CI at levels of up to or perhaps slightly beyond 5%[1] of the GHG emissions associated with the use of deficit generating fuels including conventional gasoline and diesel fuel. As is stated on pages 6 and 7 of Appendix F to the 15-day notice, the purpose of these "capacity" credits for hydrogen and DC fast charging stations is not to reduce actual GHG emissions or lowering the CI level of California transportation fuels, but rather "to support the expansions of such infrastructure as directed by Governor's Executive Order B-48-18." It is inappropriate for CARB to allow what are essentially LCFS credits based on the imagined but unverified use of electricity and hydrogen as transportation fuels that will result in no verifiable environmental benefits and which will effectively decrease the actual GHG reductions associated with the LCFS program by up to 5% depending on the year in question and the degree to which applicants request capacity credits.

Further, CARB has not provided any quantification regarding the magnitude of the potential GHG reductions that could be lost through the capacity credits. The question of the potential magnitude of these lost reductions can be easily addressed using CARB's Illustrative Compliance Scenario.[2] Assuming for purposes of illustration that capacity credits equal to 5% of deficits are distributed in calendar year 2020 and using the other assumptions of CARB's "LD/High ZEV/20%", the potential lost benefits for calendar year

[1] More specifically, up to or slightly more than 2.5% would be allowed for both hydrogen and DC fast charging stations for a total of up to or slightly more than 5% if both options are fully subscribed.

[2] Available at https://www.arb.ca.gov/fuels/lcfs/rulemakingdocs.htm

2020 alone to amount to approximately 820,000 metric tons of GHG emissions[3] which at an LCFS credit price of $100 per metric ton translates into a transfer of roughly $82,000,000 to owners of hydrogen and DC fast charging stations – again just during calendar year 2020. The potential cumulative value of the transfer of money to owners of hydrogen and DC fast charging stations given the parameters of CARB's proposed "capacity" credit provisions is clearly much larger than $82 million.

It should also be noted that the generation of LCFS credits from actions that do not result in direct reductions in GHG emissions through the proposed "capacity" provisions, will decrease the value of LCFS credits generated by other means that do in fact result in actual reductions in GHG emissions. In order to see that this is the case, one only has to recognize that the "capacity" credit provisions will artificially increase the supply of LCFS credits for which there is a finite demand which in turn will decrease the value of all LCFS credits.

In addition to proposing these capacity credits which do not result in any verifiable environmental benefit, CARB has not performed any analysis of the degree to which they will increase the number of hydrogen and DC fast charging stations that are constructed in California and has failed to update the draft Environmental Analysis (EA) to consider those impacts, to date. The construction or modification of new facility will plainly lead to potentially significant environmental effects. This conclusion is recognized, for example, in Table 1-1 of the draft EA, which indicates that the construction or modification of various facilities can lead to "potentially significant and unavoidable" adverse environmental impacts related to:

- Aesthetics;
- Air Quality;
- Biological Resources;
- Cultural Resources;
- Geology and Soil;
- Hydrologic Resources;
- Noise; and
- Traffic and Transportation.

With respect to air quality, the Draft EA provides the following assessment of the impacts that will results from construction of new facilities including hydrogen and DC fast charging stations:

> *Generally, it is expected that during the construction phase for any facilities, criteria air pollutants and toxic air contaminants (TACs) could be generated from a variety of activities and emission sources. These emissions would be temporary and occur intermittently depending on the intensity of construction on a given day. Site grading and excavation activities would*

[3] Gasoline deficits for 2020 under this scenario 13.6 million metric tons and diesel deficits are 2.79 million metric tons.

> *generate fugitive particulate matter (PM) dust emissions, which is the primary pollutant of concern during construction. Fugitive PM dust emissions (e.g., respirable particulate matter [PM10] and fine particulate matter [PM2.5]) vary as a function of several parameters, such as soil silt content and moisture, wind speed, acreage of disturbance area, and the intensity of activity performed with construction equipment. Exhaust emissions from off-road construction equipment, material delivery trips, and construction worker-commute trips could also contribute to short-term increases in PM emissions, but to a lesser extent. Exhaust emissions from construction-related mobile sources could also result in short-term increases in CO, CO2, hydrocarbons, PM, reactive organic gases (ROG), and nitrogen oxides (NOx). These emission types and associated levels fluctuate greatly depending on the particular type, number, and duration of usage for the varying equipment.*

Further, CARB provides no assessment of how those impacts could or should be mitigated.

Just as the EA has not been revised to address the environmental impacts of "capacity" credit provisions, the economic analysis presented in the ISOR has not been modified to account for the decreases in LCFS credit prices resulting from capacity credits and the associated economic impacts on low CI fuel producers.

As noted above, the potential magnitude of the value of capacity credits could be on the order of tens of millions of dollars per year. Despite this, there is no evidence in the 15-Day Notice justifying the need for creating LCFS credits that provide no reductions in GHG emissions for incentivizing construction of hydrogen and DC fast charging stations. The failure to justify the need for capacity credits is particularly disconcerting in light of the fact that the California Energy Commission (CEC) has spent, and continues to spend, millions of dollars to subsidize hydrogen station construction[4] as well as the deployment of DC fast charging stations and other electric vehicle infrastructure.[5] Given this, the appropriate mechanism for increasing the number of hydrogen and DC fast charging stations is to continue to provide grant funding through the CEC's ARFVT program[6] not paying owners of hydrogen and DC fast charging stations through the issuance of LCFS credits that provide no verifiable reductions in GHG emissions. However, in the event that CARB does provide capacity credits, then the agency should provide similar "capacity" credits for all types of low CI biofuel infrastructure including E85 refueling facilities.

Given that CARB is proposing a completely new regulatory element in a 15-day notice[7], it should also be noted that there are alternatives that CARB has failed to consider that would

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[4] See http://www.energy.ca.gov/2017publications/CEC-600-2017-011/CEC-600-2017-011.pdf

[5] See http://www.energy.ca.gov/transportation/tour/ev_infrastructure/

[6] See http://www.energy.ca.gov/altfuels/

[7] CARB refers to "capacity" credits as "unprecedented and novel" and they are discussed nowhere in the Initial Statement of Reasons for the proposed LCFS amendments.

generate substantial additional amounts of LCFS credits tied to real reductions in GHG emissions and the CI of California transportation fuels. One such alternative would be to allow the sale of E15 in California. Again it is easy to assess the potential GHG reduction benefits from allowing E15 to be sold in California. Using the same example provided above, e.g. CARB's LD/High ZEV/20% scenario for calendar year 2020, and assuming that the credits generated only by starch ethanol increase by 50% (given that the volume of ethanol used will increase by 50% going from E10 to E15), the resulting reduction in GHG emissions would equal 1,126,000 metric tons of GHG emissions from increased use of ethanol plus a further reduction of another 760,000 metric tons of GHG emissions due to reduce use of petroleum based gasoline blendstocks. Again, it is completely unclear why CARB is forgoing the opportunity to generate significant reductions in GHG emissions through allowing the use of E15 while at the same time providing large amounts of LCFS credits to hydrogen and DC fast charging station operators that do not involve a reduction in GHG emissions. Nor has CARB articulated any environmental basis for making these edits in its 15-Day Notice.

CARB's New Proposal for Separate "Sunset" Dates for Biodiesel Mitigation Requirements under the Alternative Diesel Fuel (ADF) Regulation May Lead to Increases in NOx Emissions that Are Not Accounted for in the EA

One element of the CARB staff proposal as documented in the Initial Statement of Reasons[8] was an extension of the sunset date for the biodiesel NOx mitigation requirements of the ADF regulation found in section 2293.6, Title 17 California Code of Regulations until such time that at least 90% of the hours of operation of diesel fueled non-road engines in the state were accumulated by so called "new technology diesel engines" (NTDEs) which CARB claims erroneously (as documented in detail in Growth Energy's comments on the staff's original proposal) do not experience increases in NOx emissions from the use of biodiesel.

In the 15-day notice, CARB modifies its original proposal to provide for separate sunset dates for the biodiesel NOx mitigation requirements for on-road and non-road diesel vehicles and engines. In addition, Attachment F to the 15-day notice indicates that this change will likely eliminate mitigation requirements for on-road diesel vehicles by calendar year 2023 and for non-road vehicles and engines by 2030. CARB's original proposal would have left the NOx mitigation requirements in place for all biodiesel sold in California until 2030. Despite this major change to the NOx mitigation requirements proposed in the 15-day notice, CARB has provided no analysis of the potential of this change to increase NOx emissions nor any modifications to the draft EA or other regulatory documents (in particular Appendix G to the ISOR) that allows one to determine the potential significance of the change with respect to adverse environmental impacts or even to discern the relative increases in NOx emissions that CARB staff has estimated to result from the use of biodiesel in on-road and non-road vehicles and engines.

[8] See page III-172 of the ISOR for example.

Despite CARB's failure to analyze the environmental impacts of the proposed change in the NOx mitigation sunset date, it is clear that the change has the potential to increase NOx emissions. First, as noted above, CARB's assumption that there is no increase in NOx emissions from NTDEs is not supported by the available data as documented in detail in Growth Energy's previous comments on the proposed LCFS regulation. Therefore, the shortening of the end of the mitigation period for on-road diesel vehicles from 2030 to 2023 will result in increases in NOx emissions from these vehicles during calendar years 2023 to 2029.

Second, CARB has not proposed any mechanism by which non-mitigated on-road diesel fuel containing biodiesel will be prohibited from introduction into non-road vehicles or engines that do not meet CARB's NTDE definition – a circumstance under which even CARB agrees there would be increases in NOx emissions. For example, the reporting requirements of the ADF regulation do not make any distinction between bio-diesel blends intended for use as on-highway or non-road fuels and there is no explicit prohibition or enforcement mechanism in the ADF regulation against introducing non-mitigated on-highway diesel fuel into any non-road engine. Although dyed non-road diesel fuel is exempt from some state taxes, and is currently less expensive than on-road diesel fuel, some fleets that operate both on- and non-road diesel vehicles and engines may elect to use on-road in all of their vehicles to avoid the need for separate storage and dispensing infrastructure leading to use of non-mitigated biodiesel blends in non-road engines.

Given the above, if CARB truly seeks to impose separate sunset dates, substantial additional modifications to the ADF regulation are required to explicitly protect against the use of non-mitigated on-road fuel in non-road vehicles and engines.

Curriculum Vitae

For

Jim Lyons

James Lyons

***Principal Consultant* — Sacramento Office**

Trinity Consultants

AREAS OF SPECIALIZATION

- New Vehicle and Engine Certification
- Development and Assessment of Mobile Source Emission Control Strategies
- Development and Assessment of Strategies for Reduction of Criteria Pollutant and GHG Emissions Related to Transportation Fuels – Including Alternative Fuels and Fuel Additives
- Design and Implementation of Vehicle Testing Programs and Data Analysis
- Enforcement and Litigation Support Related to Mobile Sources and Transportation Fuels
- Intellectual Property Disputes Involving Engine and Emission Control System Design, Function, and Novelty
- Tracking and Reporting of California Air Resources Board Activities Related to the Regulation of Mobile Source Emissions and Transportation Fuels
- Emission Inventories and Quantification

EDUCATION

M.S., Chemical Engineering, University of California, Los Angeles

B.S., Cum Laude, Chemistry, University of California, Irving

AFFILIATIONS

Society of Automotive Engineers
American Chemical Society

SUMMARY OF EXPERIENCE

A Principal Consultant and head of Trinity's Mobile Source and Fuels team, Mr. Lyons has extensive experience related to fuels issues and emissions, including the emission impacts of changes in gasoline and diesel fuel composition and substitution of alternative fuels for petroleum-based fuels. Specific projects have required work on issues related to the emissions impacts of changes in gasoline and diesel fuel as well as compliance with California Air Resources Board (CARB) and U.S. EPA regulations related to gasoline and diesel fuel properties and specifications, assessment of costs and benefits of alternative fuels and alternatively fueled vehicles, and direct involvement in analyses of issues related to CARB and EPA fuels regulations, including the Renewable Fuel Standards (RFS) and Low Carbon Fuel Standards. He has also provided expert services in fuels-related litigations.

Additional responsibilities include oversight and execution of complex analyses of the emission benefits, costs, and cost-effectiveness of mobile source air pollution control measures. Mr. Lyons has developed particular expertise with respect to the assessment of control measures involving accelerated vehicle/engine retirement programs; the deployment of advanced emission control systems, including electric fuel cell and hybrid technologies for on- and non-road gasoline- and diesel-powered vehicles and engines, as well as on-vehicle evaporative and refueling emission control systems. Other duties include assessments of the activities of federal, state, and local regulatory agencies with respect to motor vehicle emissions and reports to clients regarding those activities. Mr. Lyons has extensive litigation experience related to air quality and fuels including gasoline property and renewable fuels regulations, product liability, and intellectual property issues.

TECHNICAL EXPERTISE

Fuels Regulations. Managed numerous projects related to assessments of Low Carbon Fuel Standard (LCFS) regulations adopted or being prepared by California and a number of other jurisdictions. Has also been involved in the review of reformulated gasoline and diesel fuel regulations, including the federal RFS 1, RFS 2, and Tier 3 regulations.

Mobile Source Emissions Control. Participated in the design and evaluation of mobile source emission control measures and emission control systems; development of mobile source emissions modeling software; development of mobile source emission inventories; design and management of supporting field and laboratory studies; and the design and evaluation of vehicle emissions inspection and maintenance programs. Mobile source categories include on- and off-road vehicles, locomotives, marine vessels, and aircraft. Directly involved in assessing changes in vehicle technology required to comply

with federal, California, and Mexican new-vehicle greenhouse gas and fuel economy standards for light-duty vehicles.

New Vehicle and Engine Certification. Directly participated in and managed efforts related to obtaining U.S. EPA and California Air Resources Board certification for new engines and vehicles, including activities related to agency enforcement actions and on-going compliance requirements.

Air Quality Planning and Strategy Development. Has been involved in the development and critical assessment of mobile source and transportation fuels elements of State Implementation Plans.

Emission Control System Design and Evaluation. Provided support for the design and assessment of alternative emission control techniques, and for troubleshooting control system issues. Issues assessed have include VOC, CO, NOx, SOx, and PM control systems in various applications.

Expert Witness Services. Presented testimony and served as an expert or consulting expert on numerous cases in federal and state courts involving issues related to government regulations affecting mobile source certifications, in-use emissions issues, fuel regulations, intellectual property issues related to emission controls and fuels, and product liability.

EMPLOYMENT HISTORY

2014 – Present Trinity Consultants
1991 – 2014 Sierra Research
1985 – 1991 California Air Resources Board

SELECTED PUBLICATIONS (AUTHOR OR CO-AUTHOR)

"Follow-On Study of Transportation Fuel Life Cycle Analysis: Review of Current CARB and EPA Estimates of Land Use Change (LUC) Impacts," Sierra Research Report No. SR2016-08-01, prepared for the Coordinating Research Council, CRC Project No. E-88-3b, August 2016.

"Review of EPA's MOVES2014 Model," Sierra Research Report No. SR2016-07-01, prepared for the Coordinating Research Council, CRC Project No. E-101, July 2016.

"Development of Vehicle Attribute Forecasts for the '2015 Integrated Energy Policy Report,'" prepared for the California Energy Commission, February 5, 2016.

"Sensitivity Analysis of Key Assumptions on Energy and Environmental Economics (E3) 'California Pathways GHG Scenario Results' as They Pertain to the Light-Duty Vehicle Sector," prepared for the Alliance of Automobile Manufacturers, October 2015.

"Review of Energy and Environmental Economics (E3) "California Pathways GHG Scenario Results" as They Pertain to the Light-Duty Vehicle Sector," prepared for the Alliance of Automobile Manufacturers, October 2015.

"International Light-Duty Vehicle Fuel Economy and Greenhouse Gas Standards Analysis," prepared for the Alliance of Automobile Manufacturers, July 2015.

"Quantifying Aircraft Lead Emissions at Airports," prepared for the Transportation Research Board, Airport Cooperative Research Program, October 2014.

"Best Practices Guidebook for Preparing Lead (Pb) Emission Inventories from Piston-Powered Aircraft," prepared for the Transportation Research Board, Airport Cooperative Research Program, October 2014.

"Development of Vehicle Attribute Forecasts for 2013 IEPR," Sierra Research Report No. SR2014-01-01, prepared for the California Energy Commission, January 2014.

"Assessment of the Emission Benefits of U.S. EPA's Proposed Tier 3 Motor Vehicle Emission and Fuel Standards," Sierra Research Report No. SR2013-06-01, prepared for the American Petroleum Institute, June 2013.

"Development of Inventory and Speciation Inputs for Ethanol Blends," Sierra Research Report No. SR2012-05-01, prepared for the Coordinating Research Council, Inc. (CRC), May 2012.

"Review of CARB Staff Analysis of 'Illustrative' Low Carbon Fuel Standard (LCFS) Compliance Scenarios," Sierra Research Report No. SR2012-02-01, prepared for the Western States Petroleum Association, February 20, 2012.

"Review of CARB On-Road Heavy-Duty Diesel Emissions Inventory," Sierra Research Report No. SR2010-11-01, prepared for The Ad Hoc Working Group, November 2010.

"Identification and Review of State/Federal Legislative and Regulatory Changes Required for the Introduction of New Transportation Fuels," Sierra Research Report No. SR2010-08-01, prepared for the American Petroleum Institute, August 2010.

"Technical Review of EPA Renewable Fuel Standard Program (RFS2) Regulatory Impact Analysis for Non-GHG Pollutants," Sierra Research Report No. SR2010-05-01, prepared for the American Petroleum Institute, May 2010.

"Effects of Gas Composition on Emissions from Heavy-Duty Natural Gas Engines," Sierra Research Report No. SR2010-02-01, prepared for the Southern California Gas Company, February 2010.

"Effects of Gas Composition on Emissions from a Light-Duty Natural Gas Vehicle," Sierra Research Report No. SR2009-11-01, prepared for the Southern California Gas Company, November 2009.

"Technical Review of 2009 EPA Draft Regulatory Impact Analysis for Non-GHG Pollutants Due to Changes to the Renewable Fuel Standard," Sierra Research Report No. SR2009-09-01, prepared for the American Petroleum Institute, September 2009.

"Effects of Vapor Pressure, Oxygen Content, and Temperature on CO Exhaust Emissions," Sierra Research Report No. 2009-05-03, prepared for the Coordinating Research Council, May 2009.

"Technical Review of 2007 EPA Regulatory Impact Analysis Methodology for the Renewable Fuels Standard," Sierra Research Report No. 2008-09-02, prepared for the American Petroleum Institute, September 2008.

"Impacts of MMT Use in Unleaded Gasoline on Engines, Emission Control Systems, and Emissions," Sierra Research Report No. 2008-08-01, prepared for McMillan Binch Mendelsohn LLP, Canadian Vehicle Manufacturers' Association, and Association of International Automobile Manufacturers of Canada, August 2008.

"Attachment to Comments Regarding the NHTSA Proposal for Average Fuel Economy Standards Passenger Cars and Light Trucks Model Years 2011-2015, Docket No. NHTSA-2008-0089," Sierra Research Report No. SR2008-06-01, prepared for the Alliance of Automobile Manufacturers, June 2008.

"Evaluation of California Greenhouse Gas Standards and Federal Energy Independence and Security Act – Part 1: Impacts on New Vehicle Fuel Economy," SAE Paper No. 2008-01-1852, Society of Automotive Engineers, 2008.

"Basic Analysis of the Cost and Long-Term Impact of the Energy Independence and Security Act Fuel Economy Standards," Sierra Research Report No. SR 2008-04-01, April 2008.

"The Benefits of Reducing Fuel Consumption and Greenhouse Gas Emissions from Light-Duty Vehicles," SAE Paper No. 2008-01-0684, Society of Automotive Engineers, 2008.

"Assessment of the Need for Long-Term Reduction in Consumer Product Emissions in South Coast Air Basin," Sierra Research Report No. 2007-09-03, prepared for the Consumer Specialty Products Association, September 2007.

"Summary of Federal and California Subsidies for Alternative Fuels," Sierra Research Report No. SR2007-04-02, prepared for the Western States Petroleum Association, April 2007.

"Analysis of IRTA Report on Water-Based Automotive Products," Sierra Research Report No. SR2006-08-02, prepared for the Consumer Specialty Projects Association and Automotive Specialty Products Alliance, August 2006.

"Evaluation of Pennsylvania's Implementation of California's Greenhouse Gas Regulations on Criteria Pollutants and Precursor Emissions," Sierra Research Report No. SR2006-04-01, prepared for Alliance of Automobile Manufacturers, April 12, 2006.

"Evaluation of New Jersey's Adoption of California's Greenhouse Gas Regulations on Criteria Pollutants and Precursor Emissions," Sierra Research Report No. SR2005-09-03, prepared for the Alliance of Automobile Manufacturers, September 30, 2005.

"Evaluation of Vermont's Adoption of California's Greenhouse Gas Regulations on Criteria Pollutants and Precursor Emissions," Sierra Research Report No. SR2005-09-02, prepared for the Alliance of Automobile Manufacturers, September 19, 2005.

"Assessment of the Cost-Effectiveness of Compliance Strategies for Selected Eight-Hour Ozone NAAQS Nonattainment Areas," Sierra Research Report No. SR2005-08-04, prepared for the American Petroleum Institute, August 30, 2005.

"Evaluation of Connecticut's Adoption of California's Greenhouse Gas Regulations on Criteria Pollutants and Precursor Emissions," Sierra Research Report No. SR2005-08-03, prepared for the Alliance of Automobile Manufacturers, August 26, 2005.

"Evaluation of New York's Adoption of California's Greenhouse Gas Regulations On Criteria Pollutants and Precursor Emissions," Sierra Research Report No. SR2005-07-04, prepared for the Alliance of Automobile Manufacturers, July 14, 2005.

"Review of MOVES2004," Sierra Research Report No. SR2005-07-01, prepared for the Alliance of Automobile Manufacturers, July 11, 2005.

"Review of Mobile Source Air Toxics (MSAT) Emissions from On-Highway Vehicles: Literature Review, Database, Development, and Recommendations for Future Studies," Sierra Research Report No. SR2005-03-01, prepared for the American Petroleum Institute, March 4, 2005.

"The Contribution of Diesel Engines to Emissions of ROG, NOx, and PM2.5 in California: Past, Present, and Future," Sierra Research Report No. SR2005-02-01, prepared for Diesel Technology Forum, February 2005.

"Fuel Effects on Highway Mobile Source Air Toxics (MSAT) Emissions," Sierra Research Report No. SR2004-12-01, prepared for the American Petroleum Institute, December 23, 2004.

"Review of the August 2004 Proposed CARB Regulations to Control Greenhouse Gas Emissions from Motor Vehicles: Cost Effectiveness for the Vehicle Owner or Operator – Appendix C to the Comments of The Alliance of Automobile Manufacturers," Sierra Research Report No. SR2004-09-04, prepared for the Alliance of Automobile Manufacturers, September 2004.

"Emission and Economic Impacts of an Electric Forklift Mandate," Sierra Research Report No. SR2003-12-01, prepared for National Propane Gas Association,
December 12, 2003.

"Reducing California's Energy Dependence," Sierra Research Report No. SR2003-11-03, prepared for Alliance of Automobile Manufacturers, November 25, 2003.

"Evaluation of Fuel Effects on Nonroad Mobile Source Air Toxics (MSAT) Emissions: Literature Review, Database Development, and Recommendations for Future Studies," Sierra Research Report No. SR2003-10-01, prepared for American Petroleum Institute, October 3, 2003.

"Review of Current and Future CO Emissions from On-Road Vehicles in Selected Western Areas," Sierra Research Report No. SR03-01-01, prepared for the Western States Petroleum Association, January 2003.

"Review of CO Compliance Status in Selected Western Areas," Sierra Research Report No. SR02-09-04, prepared for the Western States Petroleum Association, September 2002.

"Impacts Associated With the Use of MMT as an Octane Enhancing Additive in Gasoline – A Critical Review", Sierra Research Report No. SR02-07-01, prepared for Canadian Vehicle Manufacturers Association and Association of International Automobile Manufacturers of Canada, July 24, 2002.

"Critical Review of 'Safety Oversight for Mexico-Domiciled Commercial Motor Carriers, Final Programmatic Environmental Assessment', Prepared by John A Volpe Transportation Systems Center, January 2002," Sierra Research Report No. SR02-04-01, April 16, 2002.

"Critical Review of the Method Used by the South Coast Air Quality Management District to Establish the Emissions Equivalency of Heavy-Duty Diesel- and Alternatively Fueled Engines", Sierra Research Report No. SR01-12-03, prepared for Western States Petroleum Association, December 21, 2001.

"Review of U.S. EPA's Diesel Fuel Impact Model", Sierra Research Report No. SR01-10-01, prepared for American Trucking Associations, Inc., October 25, 2001.

"Operation of a Pilot Program for Voluntary Accelerated Retirement of Light-Duty Vehicles in the South Coast Air Basin," Sierra Research Report No. SR01-05-02, prepared for California Air Resources Board, May 2001.

"Comparison of Emission Characteristics of Advanced Heavy-Duty Diesel and CNG Engines," Sierra Report No. SR01-05-01, prepared for Western States Petroleum Association, May 2001.

"Analysis of Southwest Research Institute Test Data on Inboard and Sterndrive Marine Engines," Sierra Report No. SR01-01-01, prepared for National Marine Manufacturers Association, January 2001.

"Institutional Support Programs for Alternative Fuels and Alternative Fuel Vehicles in Arizona: 2000 Update," Sierra Report No. SR00-12-04, prepared for Western States Petroleum Association, December 2000.

"Real-Time Evaporative Emissions Measurement: Mid-Morning Commute and Partial Diurnal Events," SAE Paper No. 2000-01-2959, October 2000.

"Evaporative Emissions from Late-Model In-Use Vehicles," SAE Paper No. 2000-01-2958, October 2000.

"A Comparative Analysis of the Feasibility and Cost of Compliance with Potential Future Emission Standards for Heavy-Duty Vehicles Using Diesel or Natural Gas," Sierra Research Report No. SR00-02-02, prepared for Californians For a Sound Fuel Strategy, February 2000.

"Critical Review of the Report Entitled 'Economic Impacts of On Board Diagnostic Regulations (OBD II)' Prepared by Spectrum Economics," Sierra Research Report No. SR00-01-02, prepared for the Alliance of Automobile Manufacturers, January 2000.

"Potential Evaporative Emission Impacts Associated with the Introduction of Ethanol-Gasoline Blends in California," Sierra Research Report No. SR00-01-01, prepared for the American Methanol Institute, January 2000.

"Evaporative Emissions from Late-Model In-Use Vehicles," Sierra Research Report No. SR99-10-03, prepared for the Coordinating Research Council, October 1999.

"Investigation of Sulfur Sensitivity and Reversibility in Late-Model Vehicles," SAE Paper No. 1999-01-3676, August 1999.

"Future Diesel-Fueled Engine Emission Control Technologies and Their Implications for Diesel Fuel Properties," Sierra Research Report No. SR99-08-01, prepared for the American Petroleum Institute, August 1999.

"Analysis of Compliance Feasibility under Proposed Tier 2 Emission Standards for Passenger Cars and Light Trucks," Sierra Research Report No. SR99-07-02, July 1999.

"Comparison of the Properties of Jet A and Diesel Fuel," Sierra Research Report No. SR99-02-01, prepared for Pillsbury Madison and Sutro, February 1999.

"Investigation of Sulfur Sensitivity and Reversibility in Late-Model Vehicles," Sierra Research Report No. SR98-12-02, prepared for the American Petroleum Institute, December 1998.

"Analysis of New Motor Vehicle Issues in the Canadian Government's Foundation Paper on Climate Change – Transportation Sector," Sierra Research Report No. SR98-12-01, prepared for the Canadian Vehicle Manufacturers Association, December 1998.

"Investigation of the Relative Emission Sensitivities of LEV Vehicles to Gasoline Sulfur Content - Emission Control System Design and Cost Differences," Sierra Research Report No. SR98-06-01, prepared for the American Petroleum Institute, June 1998.

"Costs, Benefits, and Cost-Effectiveness of CARB's Proposed Tier 2 Regulations for Handheld Equipment Engines and a PPEMA Alternative Regulatory Proposal," Sierra Research Report No. SR98-03-03, prepared for the Portable Power Equipment Manufacturers Association, March 1998.

"Analysis of Diesel Fuel Quality Issues in Maricopa County, Arizona," Sierra Research Report No. SR97-12-03, prepared for the Western States Petroleum Association, December 1997.

"Potential Impact of Sulfur in Gasoline on Motor Vehicle Pollution Control and Monitoring Technologies," prepared for Environment Canada, July 1997.

"Analysis of Mid- and Long-Term Ozone Control Measures for Maricopa County," Sierra Research Report No. SR96-09-02, prepared for the Western States Petroleum Association, September 9, 1996.

"Technical and Policy Issues Associated with the Evaluation of Selected Mobile Source Emission Control Measures in Nevada," Sierra Research Report No. SR96-03-01, prepared for the Western States Petroleum Association, March 1996.

"Cost-Effectiveness of Stage II Vapor Recovery Systems in the Lower Fraser Valley," Sierra Research Report No. SR95-10-05, prepared for the Province of British Columbia Ministry of Environment Lands and Parks and the Greater Vancouver Regional District, October 1995.

"Cost of Stage II Vapor Recovery Systems in the Lower Fraser Valley," Sierra Research Report No. SR95-10-04, prepared for the Province of British Columbia Ministry of Environment Lands and Parks and the Greater Vancouver Regional District, October 1995.

"A Comparative Characterization of Gasoline Dispensing Facilities With and Without Vapor Recovery Systems," Sierra Research Report No. SR95-10-01, prepared for the Province of British Columbia Ministry of Environment Lands and Parks, October 1995.

"Potential Air Quality Impacts from Changes in Gasoline Composition in Arizona," Sierra Research Report No. SR95-04-01, prepared for Mobil Corporation, April 1995.

"Vehicle Scrappage: An Alternative to More Stringent New Vehicle Standards in California," Sierra Research Report No. SR95-03-02, prepared for Texaco, Inc., March 1995.

"Evaluation of CARB SIP Mobile Source Measures," Sierra Research Report No. SR94-11-02, prepared for Western States Petroleum Association, November 1994.

"Reformulated Gasoline Study," prepared by Turner, Mason & Company, DRI/McGraw-Hill, Inc., and Sierra Research, Inc., for the New York State Energy Research and Development Authority, Energy Authority Report No. 94-18, October 1994.

"Phase II Feasibility Study: Heavy-Duty Vehicle Emissions Inspection Program in the Lower Fraser Valley," Sierra Research Report No. SR94-09-02, prepared for the Greater Vancouver Regional District, September 1994.

"Cost-Effectiveness of Mobile Source Emission Controls from Accelerated Scrappage to Zero Emission Vehicles," Paper No. 94-TP53.05, presented at the 87th Annual Meeting of the Air and Waste Management Association, Cincinnati, OH, June 1994.

"Investigation of MOBILE5a Emission Factors, Assessment of I/M Program and LEV Program Emission Benefits," Sierra Research Report No. SR94-06-05, prepared for American Petroleum Institute, June 1994.

"Cost-Effectiveness of the California Low Emission Vehicle Standards," SAE Paper No. 940471, 1994.

"Meeting ZEV Emission Limits Without ZEVs," Sierra Research Report No. SR94-05-06, prepared for Western States Petroleum Association, May 1994.

"Evaluating the Benefits of Air Pollution Control - Method Development and Application to Refueling and Evaporative Emissions Control," Sierra Research Report No. SR94-03-01, prepared for the American Automobile Manufacturers Association, March 1994.

"The Cost-Effectiveness of Further Regulating Mobile Source Emissions," Sierra Research Report No. SR94-02-04, prepared for the American Automobile Manufacturers Association, February 1994.

"Searles Valley Air Quality Study (SVAQS) Final Report," Sierra Research Report No. SR94-02-01, prepared for North American Chemical Company, February 1994.

"A Comparative Study of the Effectiveness of Stage II Refueling Controls and Onboard Refueling Vapor Recovery," Sierra Research Report No. SR93-10-01, prepared for the American Automobile Manufacturers Association, October 1993.

"Evaluation of the Impact of the Proposed Pole Line Road Overcrossing on Ambient Levels of Selected Pollutants at the Calgene Facilities," Sierra Research Report No. SR93-09-01, prepared for the City of Davis, September 1993.

"Leveling the Playing Field for Hybrid Electric Vehicles: Proposed Modifications to CARB's LEV Regulations," Sierra Research Report No. SR93-06-01, prepared for the Hybrid Vehicle Coalition, June 1993.

"Size Distributions of Trace Metals in the Los Angeles Atmosphere," *Atmospheric Environment*, Vol. 27B, No. 2, pp. 237-249, 1993.

"Preliminary Feasibility Study for a Heavy-Duty Vehicle Emissions Inspection Program in the Lower Fraser Valley Area," Sierra Research Report No. 92-10-01, prepared for the Greater Vancouver Regional District, October 1992.

"Development of Mechanic Qualification Requirements for a Centralized I/M Program," SAE Paper No. 911670, 1991.

"Cost-Effectiveness Analysis of CARB's Proposed Phase 2 Gasoline Regulations," Sierra Research Report No. SR91-11-01, prepared for the Western States Petroleum Association, November 1991.

"Origins and Control of Particulate Air Toxics: Beyond Gas Cleaning," in Proceedings of the Twelfth Conference on Cooperative Advances in Chemical Science and Technology, Washington, D.C., October 1990.

"The Effect of Gasoline Aromatics on Exhaust Emissions: A Cooperative Test Program," SAE Paper No. 902073, 1990.

"Estimation of the Impact of Motor Vehicles on Ambient Asbestos Levels in the South Coast Air Basin," Paper No. 89-34B.7, presented at the 82nd Annual Meeting of the Air and Waste Management Association, Anaheim, CA, June 1989.

"Benzene/Aromatic Measurements and Exhaust Emissions from Gasoline Vehicles," Paper No. 89-34B.4, presented at the 82nd Annual Meeting of the Air and Waste Management Association, Anaheim, CA, June 1989.

"The Impact of Diesel Vehicles on Air Pollution," presented at the 12th North American Motor Vehicle Emissions Control Conference, Louisville, KY, April 1988.

"Exhaust Benzene Emissions from Three-Way Catalyst-Equipped Light-Duty Vehicles," Paper No. 87-1.3, presented at the 80th Annual Meeting of the Air Pollution Control Association, New York, NY, June 1987.

"Trends in Emissions Control Technologies for 1983-1987 Model-Year California-Certified Light-Duty Vehicles," SAE Paper No. 872164, 1987.

Exhibit “C”

COMMENTS ON THE JUNE 20, 2016 PROPOSED MODIFICATIONS

Prepared by:
H-D Systems
Washington, D.C.
July 3, 2018

OVERVIEW

The Energy Efficiency ratio (EER) is the ratio of energy use by the alternative fuel vehicle to the energy used by a similar conventional vehicle per unit travel distance. The ARB has documented the EER values for several alternative fuel vehicle types in Appendix H of the 2018 Initial Statement of Reasons (ISOR) for amendments to the LCFS. H-D Systems had submitted a report which examined the EER values in Appendix H of the ISOR to assess its reasonableness using both an engineering analysis and an assessment of the similarity of vehicle types and tests used to generate the data underlying the EER. The ARB has published modifications to the ISOR in its recent June 20th proposed 15-day modifications to the original proposal detailed in the ISOR. Unfortunately, the ARB's proposed modifications have largely retained the original EER values or changed them in a directionally incorrect way, and the ARB does not appear to have reviewed the H-D Systems' report submitted in response to the ISOR. In addition, new EER values have been proposed for cargo handling vehicles at ports, and the EER for auxiliary engines in ocean-going vessels while docked at port.

SUMMARY OF EARLIER RECOMMENDATIONS

Our earlier report had provided analyses that suggested that reducing many of the EER values contained in the ISOR. The main reasons for these suggested reductions are

- The EER values for CNG vehicles do not account for the bulky tanks to carry CNG which reduce the energy efficiency of the vehicles and reduce payload capacity for cargo vehicles.
- The EER values for battery electric vehicles do not account for the significant energy loss under cold ambient conditions and for the loss of payload capacity due to the weight of the batteries.
- The EER values for many passenger vehicles, both light and heavy duty, do not account for the heating, ventilation and air conditioning loads that can have much more serious impacts on electric vehicle efficiency relative to conventional gasoline and diesel vehicles
- There are inconsistencies in the proposed EER for some of the vehicle types when comparing the proposed values in relation to diesel versus gasoline vehicles.
- The EER values for fuel cell vehicles are not consistent with vehicle fuel economy certification data.

The earlier results are summarized in the table below from the H-D Systems report to which the values published in Table 1, Appendix A of the June 20th document have been added. As can be seen, some of the newer values have been increased rather than decreased from those published in the ISOR. ARB has not provided any rationale for the changes and has not addressed any of the issues raised in the H-D Systems report.

Vehicle Type	EER published in ARB ISOR	EER in Appendix A of the June 20th ARB Proposal	Suggested Correction in H-D System Report
Battery Electric Cars (LDV)	3.0	3.4	2.7, could be reduced by 10 to 15% in summer and winter
Battery Electric Light Duty Trucks (LDT)	3.0	3.4	2.7, plus payload reduction in cargo trucks
Hydrogen Fuel Cell LDV	2.3	2.5	About 2.0, weather effects unknown
CNG LDV/LDT	1.0	1.0	0.9 for aftermarket conversions
LPG Bus	0.9	0.9	0.74 at urban speeds (<20 mph)
Electric TRU	3.4	3.4	ARB data too variable for conclusion
Electric Motorcycles	4.4	4.4	Probably closer to 3.5, need data
Electric Bus	4.8 at urban speed	5.0?	About 3 as an all-season average
Parcel and Drayage Trucks	4 to 5.5	5.0?	Payload loss, seasonal effects and diesel idle shutoff not accounted for.

The revisions made by ARB to the EER values in the table above are not documented in any of the appendices to the June 20th Proposed Modifications.

ADDITIONAL CATEGORIES WITH EER VALUES

Attachment D to the June 20th Proposed Modifications lists EER values for Cargo Handling Equipment and Ocean-going Vessels. Limited documentation is provided for the EER values derived in Attachment D.

Cargo Handling Equipment

The derivation of EER values for cargo-handling equipment is based on a modeled relationship between engine efficiency and load factor. The average load factor for different cargo handling equipment is based on load factors used for emission inventories and from recent work for the Port of Los Angeles. The documentation states that CARB's EER calculation methods assume no losses of energy during battery charging or conversion of energy to useful work. To be consistent with prior calculation methods, staff assumed no losses for electrical non-yard truck equipment, i.e. the efficiency is 100%. Therefore, the inverse of diesel engine efficiency is used to estimate EERs for the ratio of electrical equipment to diesel equipment.

ARB utilizes a model to estimate the efficiency of a diesel engine as a function of the load factor imposed on the engine. While the modeled relationship between diesel engine efficiency and load factor is consistent with engineering principles, there is little documentation on the load factors listed by equipment type in Appendix D. Table 1 of Appendix D also lists an "hours of operation" by equipment type that is footnoted but the footnote itself is missing. It is unclear what the hours of operation refers to as it varies by equipment type from 1900 to 401,633 so it is clearly not the annual use rate.

The load factors span the range from 0.2 to 0.59 but the derived EER is 2.6. Since the EER is the inverse of engine efficiency, the estimated average efficiency is 1/ 2.6 or 38.5%. The peak efficiency (the highest value) for a diesel engine, which typically occurs at load factors of 0.85 to 0.9, is 41% to 42% so that an operating average efficiency so close to the maximum value seems unreasonably high. Appendix D also states that diesels operate at average efficiency between 30 and 35%, so that the EER is inconsistent with ARB's own findings.

It is unclear why the ARB assumes no losses of energy during battery charging or conversion of energy to useful work for electric equipment, as these losses are about 20 to 25% of total energy use (about 5% to 8% in battery charge-discharge and 15 to 18% in motor and controller losses). The high average efficiency of the diesel engine indicated by the EER is also of concern and both assumptions should be reviewed.

Ocean Going Vessels (OGV)

When OGVs are "at-berth," or docked in a harbor, an auxiliary diesel engine(s) provides electrical power for equipment used while the vessel is at rest. Power needs while at-berth

include support for on-board electronics, lighting, ballast pumps, ventilation systems, and air-conditioning. The ARB analysis quantifies an aggregated EER value for a wide range of auxiliary engines on all types of ships that call California ports (but does not include/pertain to boilers that are used in some vessels instead of diesel engines). The recommended EER quantifies the increased energy efficiency of using shore power instead of using the conventional on-board auxiliary diesel engine. The analysis assumes all of the electric energy would be provided by the local utility even though some California ports are able to generate a portion of their own electricity. The potential differences in carbon intensity between power self-generated by the port and power from the grid is ignored in the EER calculation. For consistency with prior EER calculations, ARB staff also assumed that shore power is 100% energy efficient. Hence, the EER is simply the inverse of auxiliary engine efficiency, similar to the methodology used for cargo handling equipment.

Not surprisingly, the EER computed by ARB is 2.6 for OGV, which is identical to the one for cargo handling equipment. The EER estimate is based on data from a consultants' report[1] on the emissions from vessels at the Port of Long Beach, and this report lists both emissions and electric power generated by the vessels while docked. In this report, the electric power generated by ships was computed from assumptions about hoteling loads and the CO2 emission estimates were derived by using estimates of fuel consumption versus load for the auxiliary engines. Since both fuel consumption and electric power are not based on measured values but are estimated values using an assumed efficiency, the EER calculation performed by ARB uses these estimates to simply reproduce the original assumption of engine efficiency made by the consultants.

In the case of OGV, the auxiliary engine provides electric power which is replaced by power from the grid, so that the ARB methodology of using of the inverse of engine efficiency for EER is defensible for OGV auxiliary power. However, the data from which the EER is estimated by ARB are not based on actual measurements but on a set of assumptions employed by the consultants to the Port of Long Beach. The ARB methodology should rely on actual data from auxiliary engine tests or actual measurements of power output and fuel consumption by OGV auxiliary engines.

[1] Starcrest Consulting Group, Port of Long Beach 2016 Air Emissions Inventory, July 2017

Curriculum Vitae

For

K.G. Duleep

K.G. Duleep

President, H-D Systems

EDUCATION

M.B.A., Finance, Wharton School, University of Pennsylvania, Philadelphia, PA, 1989

Doctoral Candidate, Aerospace Engineering – Combustion, University of Michigan, Ann Arbor, MI, 1976

M.S., Aerospace Engineering/Computer Information and Control Engineering, University of Michigan, Ann Arbor, MI, 1975

Bachelor of Technology, Aerospace Engineering, Indian Institute of Technology, Madras, India 1972

EXPERIENCE OVERVIEW

K.G. Duleep is President of H-D Systems, a new consulting firm which is a spin-off of the EEA automotive technology group, in the Washington, DC metropolitan area. His extensive work on vehicle energy use, cost and performance of fuels and engine technology and manufacturing costs have been widely cited around the world. Through his work, he meets periodically with the technical staffs of most of the world's largest auto-manufacturers to discuss new technology and has obtained key insights on vehicle development through this process. He is well known for his work on vehicle fuel economy technology and his CAFE forecasts under alternative scenarios have been the basis for many regulatory and policy discussions in Congress. In 2008/9, he directed analyses as a support contractor to the National Academy of Sciences Committee on Fuel Economy Standards, and he is currently involved in the new CAFE standards for the post-2016 time frame. He has also performed studies on life cycle energy use and the energy use in vehicle manufacturing. He was the developer of the fuel economy forecasting algorithm embedded in NEMS, which he and his group has updated periodically.

PROJECT EXPERIENCE

Fuel Economy Modeling and Forecasting, EIA and CEC, 1990 –Present. Developed detailed forecasting models of light and heavy vehicle fuel economy that are modules within the NEMS model and the CALCARS models. Models were periodically updated by Mr. Duleep over the last 20 years.

Automotive Technology Cost Analysis, Department of Energy, ongoing. Direct multi-year task order contract with DOE'S Policy Office to evaluate costs and benefits of new automotive technologies. Also serve as technical lead on advanced engine technology analysis. Coordinate efforts of two major subcontractors. Most recent project in 2014-15 covered engine technology potential from use of 98 octane E25 (25% ethanol) blends.

Technology Planning, U.S. Oil Refiners, Japanese Auto manufacturers, 1996–Present. Provides technology planning and emissions compliance support to oil refiners and import auto manufacturers. The work involves detailed assessment of new technology for vehicles and estimation of their impact on vehicle fuel economy, cost, drivability and reliability. Forecast of technology penetration in different markets and segments of the fleet are also part of the services provided.

Alternative Fuels Outlook, Califoria Energy Commission, Led the study of alternative fuel vehicles as a means of reaching California's GHG reduction goals. Reported on the current state of vehicles and forecasted the economic viability of alternative fuels in the state considering potential roadblocks such as higher costs and increased weight. Estimated the required capital requirements for any incremental infrastructure that may be necessary. Provided strategic recommendations on investment priorities and mechanisms to accelerate commercialization of alternative fuels and technologies.

Analaysis of Fuel Cell/ Hydrogen Power in Non-Automotive Markets, US DOE, 2009-2010. Examined the potential for PEM fuel cells in diverse markets like stand-by power, fork lift trucks, and combined residential heat and power for the US. Work was a follow-on to a market penetration analysis for fuel cells in automotive markets.

An overview of Electric Vehicles and Plug-in Hybrid Electric Vehicles, European Commission Directorate-General Environment. Provided consultation to the EU concerning the impacts of an attributes-based standard such as weight-based standards on fuel economy and GHG emissions. Created a simple model that could verify the results of a very complex model with hundreds of inputs.

Analysis of Light Duty Vehicle Weight Reduction Potential, Department of Energy, Directed a large scope of study focusing on weight reduction technologies as capable of significant fuel economy improvement at potentially low costs. Utilized the staff capabilities developed in this area as a result of weight reduction analysis for the US EPA, California Air Resources Board (ARB) and other clients. Conducted high level meetings with weight reduction experts through his extensive contacts in the auto-industry and the Tier I supplier base.

PUBLICATIONS AND REPORTS

Mr. Duleep has over 50 publications in technical society and peer reviewed journals and has authored over 200 reports to clients. He also has authored two encyclopedia articles on Internal Combustion engine efficiency.

AWARDS/HONORS

SAE Award for Contribution to Public Policy Analysis, 2011

Directors List (First Rank), Wharton School, 1989

Merit Scholarship, University of Michigan, 1974

First Prize Winner, University Science Fair, India, 1971

PROFESSIONAL AFFILIATIONS

Tau Beta Pi (Engineering Honor Society)

Society of Automotive Engineers

LANGUAGES

English, Hindi and Tamil

EMPLOYMENT HISTORY

ICF International	Managing Director	2007-2011
Energy and Environmental Analysis, Inc.	Managing Director	1997-2007
Energy and Environmental Analysis, Inc.	Director	1988-1997
Energy and Environmental Analysis, Inc.	Senior Consultant	1979-1988
Bendix Electronics and Engine Control Systems Group	Senior Engineer	1976-1978
Aeronautical Development Establishment (India)	Junior Scientific Officer	1972-1973

Exhibit “D”

[redacted]

Subject: FW: BIOFUELS UPDATE: ***CARB Seeking Feedback in 15-Day Comment Period for LCFS Proposals

From: alertsadmin@opisnet.com <alertsadmin@opisnet.com>
Sent: Monday, June 25, 2018 4:54 PM
To: [redacted]
Subject: BIOFUELS UPDATE: ***CARB Seeking Feedback in 15-Day Comment Period for LCFS Proposals

2018-06-25 04:54:04 EDT
***CARB Seeking Feedback in 15-Day Comment Period for LCFS Proposals

The California Air Resources Board (CARB) late last week released its proposed 2018 Low Carbon Fuel Standard (LCFS) rule-making that included several key modifications and amendments.

Publication of the proposed regulation on the agency's website on Thursday launched a 15-day comment period that will close July 5. CARB is hoping to make the changes effective in January.

The first and only comment posted to CARB's website as of Monday afternoon was from Occidental Petroleum, which focused on the carbon capture and sequestration protocol under the LCFS. Multiple sources on Monday indicated plans to submit comments, likely by the end of this week or before the July Fourth holiday.

"There are plenty of moving parts in the proposal -- people are somewhat concerned by a few aspects of the changes they're trying to make," one stakeholder source said Monday. "But I'm confident those concerns will be voiced in the comment period, and hopefully, CARB will be willing to listen."

The proposed rule is largely in line with what agency staff presented at a June 11 workshop, where several of the planned proposals were met with questions and occasional pushback from stakeholders, particularly language that would allow hydrogen fueling stations and fast-charging electric vehicle stations to generate LCFS credits on the basis of capacity rather than actual fuel used.

At the workshop, CARB discussed how it envisions its LCFS zero-emissions vehicles (ZEV) Infrastructure crediting provisions to work. California Gov. Jerry Brown in an April executive order directed all state entities to work with the private sector to spur the construction and installation of 200 hydrogen fueling stations and 250,000 ZEV chargers, including 10,000 direct current (DC) fast chargers, by 2025.

Under the plan, CARB proposed to allow both types of fuel dispensing installations to generate LCFS credits up to a certain level to support infrastructure growth. CARB said it intends to stop approving applications for DC chargers or hydrogen refueling stations if infrastructure credits exceed 2.5% of deficits generated in the previous quarter. As hydrogen and electricity utilization goes up, the infrastructure credits will automatically decrease.

"It's certainly a philosophical departure from what the program has been about in the past on fuel neutrality," CARB Transportation Fuels Manager Sam Wade said. "We acknowledge that these credits do not represent actual greenhouse gas emissions reductions. We will be explicit and will be able to quantify how many of these credits we have issued and when making claims about the reductions the program has accomplished, we will remove those credits."

Wade said the CARB board told his group to move expeditiously on the ZEV infrastructure crediting rollout.

CARB also discussed its plans to end the state's Alternative Diesel Fuel (ADF) regulations. The agency said it is proposing to bifurcate the sunset provisions for on-road applications -- likely 2023 -- and off-road -- likely 2030 or later -- which will occur when 90% of that sector is equipped with New Technology Diesel Engines (NTDEs). It's a departure from CARB's original proposal, which lumped both on- and off-road applications together, and envisioned closing out the ADF regs when both applications reached the 90% NTDE level.

CARB also discussed modifications to its third-part verification proposal, including adding requirements to allow verifier quarterly review of submitted data as part of the annual verification services as well as clarifying language for potential conflicts of interest.

CARB further said it wants to allow for the contracting for future delivery of LCFS credits for forward and future trading, adding that when a trade is agreed to, it should be reported in the LCFS Reporting Tool (LRT). This is not a change in philosophy, CARB noted. The Intercontinental Exchange (ICE) launched LCFS futures trading based on OPIS settlements on May 21, and there have been roughly a dozen trades in the first month of trading.

CARB also provided updates to the Carbon Capture and Sequestration (CCS) program, technical updates to the CA-GREET 3.0 model for carbon intensity (CI) values alongside new Tier 1 simplified CI calculators.

--Jordan Godwin, jgodwin@opisnet.com

STATE OF CALIFORNIA

AIR RESOURCES BOARD

PROPOSED AMENDMENTS TO THE LOW CARBON FUEL STANDARD REGULATION AND TO THE REGULATION ON COMMERCIALIZATION OF ALTERNATIVE DIESEL FUELS

GROWTH ENERGY'S RESPONSE
TO THE "SECOND NOTICE OF PUBLIC AVAILABILITY OF MODIFIED TEXT AND AVAILABILITY OF ADDITIONAL DOCUMENTS AND INFORMATION," DATED AUGUST 13, 2018, AND AUGUST 15, 2018, ERRATA

AUGUST 30, 2018

For further information contact:
Mr. Chris Bliley
Vice President of Regulatory Affairs
Growth Energy
CBliley@growthenergy.org
202-545-4000

Comments of Growth Energy on the "Second Notice of Public Availability of Modified Text and Availability of Additional Documents and Information" Concerning the Proposed Amendments to the Low Carbon Fuel Standard Regulation and to the Regulation on Commercialization or Alternative Diesel Fuels, and Related Errata

Growth Energy respectfully submits these comments on the August 13, 2018, Second Notice of Public Availability of Modified Text and Availability of Additional Documents and Information, and the August 15, 2018, Errata (collectively, the "Second 15-Day Notice") related to the California Air Resources Board's ("CARB") proposed amendments to the Low Carbon Fuel Standard Regulation (the "LCFS") and the proposed amendments to the Regulation on Commercialization or Alternative Diesel Fuels (the "ADF"). Collectively, the proposed amendments to the LCFS and ADF regulations are referred to in these comments as the "Proposed Amendments," while the proposed modifications to the LCFS and the ADF regulations identified in the Second 15-Day Notice are referred to as the "Proposed Modifications." These comments are also accompanied by expert reports prepared by (i) Thomas Darlington of Air Improvement Resource Inc., and (ii) Jim Lyons of Trinity Consultants, which are enclosed as Exhibits "A" and "B," respectively.

Modifications to the GREET Model. As an initial matter, Growth Energy appreciates CARB staff's recommended modifications to the GREET model. Among other things, CARB has clarified its treatment of haul and backhaul emissions, corrected issues concerning medium and heavy-duty truck emissions, and corrected its calculation of the nitrogen content for sugarcane ethanol.

That said, there are still several issues with the GREET model that should be modified to ensure the LCFS is based on "the best available economic and scientific information." (Health & Saf. Code, § 38562, subd. (e).) In addition to the unresolved issues raised previously by Growth

Energy, GREET should be revised to include a distillers grains enteric fermentation credit for corn ethanol, and ensure that the credit is based on conditions in the United States (in contrast to Hünerberg, *et al.*). (See Exhibit "A"). As we have urged in the past, CARB should also incorporate the latest indirect land use change values from the GTAP model into GREET. (*Id.*)

Capacity Credits for Electric/Fuel Cell Infrastructure. In addition, Growth Energy continues to have concerns regarding the proposal to provide capacity credits for electric and fuel cell vehicle infrastructure. As demonstrated in Exhibit "B," the alleged GHG benefits of the LCFS regulation would decrease significantly if the Proposed Modifications are adopted. Specifically, assuming the LCFS does not result in fuel shuffling, "the annual amount of GHG reductions that would not be realized by the LCFS program due to the proposed infrastructure crediting provisions would range from about 0.8 to 1.6 $MMTCO_2eq$ per year and the cumulative loss in GHG emissions from 2019 to 2030 could amount to 14.0 $MMTCO_2eq$." (Exhibit "B" at 1.) This result is inconsistent with AB 32 and SB 32. (See Health & Saf. Code, §§ 38560.5, subd. (c); 38562, subd. (a); 38566.)

The Proposed Modifications would also result in a substantial amount of windfall revenue to operators and owners of DC fast charge and hydrogen stations which could total $150 to $300 million per year. (Exhibit "B" at 1.) These benefits will in turn reduce the incentives for alternative fuel providers to sell low CI fuel in the aggregate amount of $150 to $300 million per year, contrary to the purpose and intent of the LCFS program.

CARB Should Consider Alternatives to the LCFS. Rather than trying to convert the LCFS regulation into something it was never intended to be, CARB should look to reasonable alternatives to the LCFS that would achieve the same purposes and results, but without its significant unintended consequences. Specifically, CARB should consider the alternatives Growth Energy

raised in its April 27, 2018 and July 5, 2018 comments, which include the "WSPA Alternative" (AB 32 Cap and Trade program) and the "E15 Alternative," as well as the proposal described in Exhibit "B" at pages 2-3, which advocates for the use of surplus funds from the point of purchase rebate program provided to EDUs for residential EV charging as a source of funding to support underutilized DC fast charging and hydrogen stations. These alternatives would each lessen the "significant and unavoidable" effects of the Proposed Amendments, and the LCFS regulation generally, (Pub. Res. Code, § 21002), and help reduce greenhouse gas emissions "to at least 40 percent below the statewide greenhouse gas emissions limit no later than December 31, 2030," in a manner that is both technologically feasible and cost-effective. (Health & Saf. Code, § 38566.)

Verification of Fuel Pathways. Growth Energy also has concerns regarding CARB's proposal to require verification of all fuel provider pathways. This proposed process is unnecessary because it would be duplicative of the work already performed as part of the pathway approval, and would add significant expense by requiring fuel providers to retain verifiers. This is of significant concern because CARB's proposed conflict of interest (COI) requirements are exceedingly stringent, and would dramatically limit the number of qualified third-party verifiers competent to serve as verifiers. Before considering the Proposed Amendments for adoption, CARB should survey the range of potential consultants available to serve as verifiers, and confirm the work is capable of being performed in a timely and cost-effective manner by existing competent professionals. Moreover, instead of requiring all alternative fuel producers to be subject to verification, CARB should instead impose random third-party verification for a small subset of alternative fuel producers each year (*i.e.*, 5%). Random verification would be equally effective in ensuring compliance, but without the significant expense associated with *requiring* continuing verification for all alternative fuels. (See Exhibit "B" at 6.)

Thank you again for the opportunity to participate in this rulemaking, and your anticipated consideration of the above comments.

GROWTH ENERGY'S RESPONSE TO THE "SECOND NOTICE OF PUBLIC AVAILABILITY OF MODIFIED TEXT AND AVAILABILITY OF ADDITIONAL DOCUMENTS AND INFORMATION," DATED AUGUST 13, 2018, AND AUGUST 15, 2018, ERRATA

EXHIBIT "A"

Comments on CARB's Second15-day Notice
August 30, 2018
Thomas Darlington, Air Improvement Resource Inc.

This document summarizes my comments on CARB's Second 15-day Notice materials.

Indirect Land use Changes

In its second 15-Day Modifications, CARB did not address our comments on CARB's First 15-Day Notice, submitted on behalf of Growth Energy, on utilizing a more recent version of the GTAP model. The LCFS should be modified to address each of these concerns.

Direct Emissions of Corn Ethanol, Corn Oil, and Sugarcane Ethanol

Distillers Grains Enteric Fermentation Credit for Corn Ethanol

In this latest version of the Proposed Modifications to the LCFS, CARB still did not include a distillers grains enteric fermentation credit for corn ethanol. CARB, however, in their Errata document listed a new reference:

> Feeding high concentrations of corn-dried distillers' grains decreases methane, but increases nitrous oxide emissions from beef cattle production, Agricultural Systems 127 (2014): 19-27. Hünerberg, M., Little, S.M., et al., Available at: https://www.sciencedirect.com/science/article/pii/S0308521X14000146?via%3Dihub..

This reference was included presumably to counter our prior comment about reduced methane from cattle fed dried distillers grains (DDGs). As the title indicates, the article is presenting evidence that N_2O emissions increase with cattle fed DDG, and that this increase in N_2O emissions negates the reduced methane emissions (i.e., enteric fermentation credit). The increase is due to higher emissions of N_2O from cattle manure when fed either corn DDGs or wheat DDGs. The article indicates:

> Using high-fat distillers grains in the diet of feedlot cattle may decrease enteric CH_4 emissions, but *at high dietary levels* it increases N excretion and results in a net increase in GHG emissions *(emphasis added).*

However, in reviewing the article, it is apparent that the evidence presented is not applicable to the U.S. Specifically, the evidence is based on cattle fed with 40% DDGs, which does not reflect U.S. conditions. This is also inconsistent with the assumptions in Argonne's GREET model, which assumes a DDG dietary inclusion

rate of 22-23%, about half of the amount used in a case study described in this article.[1] The inclusion rate would have a direct effect on N_2O emissions. Using a much lower DDG inclusion rate than 40% would result in no increase in N_2O emissions from cattle fed DDGs. Thus, because the experiment conducted in this research is not applicable to the inclusion rates in the U.S., CARB should include the enteric fermentation credit in CaGREET2.0.

Rail and Barge Transport

Thank you for considering our comments concerning the removal of backhaul emissions, and clarifying that the energy intensities CARB is using are for the haul and backhaul combined.

Medium and Heavy-Duty Truck Emissions

Thank you for considering Growth Energy's prior comments concerning medium and heavy-duty truck emissions, and in particular, recognizing that the fuel economy of both vehicle classes were too low and that the fuel economy for the backhauls should be better than the haul.

Sugarcane Ethanol

Nitrogen Content of Sugarcane Straw

Thank you for considering Growth Energy's comments on the nitrogen content of sugarcane straw and increasing this value from 0.37% to 0.53%, based on the average value from several literature sources, instead of just the lowest value.

Summary

We appreciate the fact that CARB has incorporated some of our prior comments on the GREET model. However, in order to be consistent with the best available scientific data, the GREET should be further modified to incorporate all of our prior comments. In summary, the latest version of the GREET model should be modified to include the DG enteric fermentation credit for corn ethanol. In addition, as I have indicated in previous comments, CARB should revise estimates of emissions related to indirect land-use changes using the latest version of GTAP.

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[1] *Update of Distillers Grains Displacement Ratios for Corn Ethanol Life-Cycle Analysis,* Arora, S., Wu, M., and Wang, M., Energy Systems Division, Argonne National Laboratory, September 2008, ANL/ESD/11-1. See Table 11 of this report for dietary inclusion rates in the U.S.

Attachment 1

Biodiesel CIs from CaGREET2.0 Versions

Mar-18	**Corn Oil from DGS of Dry Mill Ethanol to Biodiesel**									
	g/MMBtu	Corn oil Extraction	Corn Oil Transport	Corn oil Debit	BD production	BD T&D	Total CI	Tank-to-Wheel	LUC	Final CI, g/MJ
	VOC	0.36	0.19		2.40	0.96	3.90			3.90
	CO	1.46	0.62		5.75	3.15	10.98			10.98
	CH4	6.35	1.28		37.07	3.62	48.32			48.32
	N2O	0.06	0.00		0.18	0.03	0.27			0.27
	CO2	2982.07	552.48		11148.76	1619.74	16303.05			16303.05
	Subtotal gCO_2e/MJ	**3.00**	**0.56**	**11.17**	**11.51**	**1.64**	**27.87**	**0.76**	**0.00**	28.63
	Adjustment	**2.84**	**0.53**	**10.59**	**10.92**	**1.64**	26.52	**0.76**	**0.00**	27.28
Jul-18	**Corn Oil from DGS of Dry Mill Ethanol to Biodiesel**									
	g/MMBtu	Corn oil Extraction	Corn Oil Transport	Corn oil Debit	BD production	BD T&D	Total CI	Tank-to-Wheel	LUC	Final CI, g/MJ
	VOC	0.36	0.19		2.40	0.96	3.90			3.90
	CO	1.46	0.62		5.75	3.15	10.98			10.98
	CH4	6.35	1.28		37.07	3.62	48.32			48.32
	N2O	0.06	0.00		0.18	0.03	0.27			0.27
	CO2	2982.07	552.48		11148.76	1619.74	16303.05			16303.05
	Subtotal gCO_2e/MJ	**3.00**	**0.56**	**11.17**	**11.51**	**1.64**	**27.87**	**0.76**	**0.00**	28.63
	Adjustment	**2.84**	**0.53**	**10.59**	**10.92**	**1.64**	26.52	**0.76**	**0.00**	27.28
Aug-18	**Distiller's Corn/Sorghum Oil from DGS of Dry Mill Ethanol to Biodiesel**									
	g/MMBtu	Distiller's oil Extraction	Distiller's Oil Transport	Distiller's oil Debit	BD production	BD T&D	Total CI	Tank-to-Wheel	LUC	Final CI, g/MJ
	VOC	0.36	0.20		2.39	0.96	3.91			3.91
	CO	1.46	0.68		5.73	3.16	11.02			11.02
	CH4	6.34	1.09		37.02	3.32	47.77			47.77
	N2O	0.06	0.00		0.18	0.03	0.27			0.27
	CO2	2980.62	452.10		11124.00	1472.30	16029.02			16029.02
	Subtotal gCO_2e/MJ	**3.00**	**0.46**	**11.26**	**11.49**	**1.49**	**27.69**	**0.76**	**0.00**	28.45
	Adjustment	**2.84**	**0.43**	**10.68**	**10.89**	**1.49**	26.34	**0.76**	**0.00**	27.10

GROWTH ENERGY'S RESPONSE
TO THE "SECOND NOTICE OF PUBLIC AVAILABILITY OF MODIFIED TEXT AND AVAILABILITY OF ADDITIONAL DOCUMENTS AND INFORMATION," DATED AUGUST 13, 2018, AND AUGUST 15, 2018, ERRATA

EXHIBIT "B"

Comments on Second Notice of Public Availability of Modified Text and Availability of Additional Documents and Information and Errata Dated August 13, and August 15, 2018

Prepared by Jim Lyons, Trinity Consultants
August 30, 2018

CARB's Proposal to Provide "Capacity" Credits for Electric and Fuel Cell Vehicle Infrastructure is Contrary to the Purpose of the LCFS and Should Not Be Included

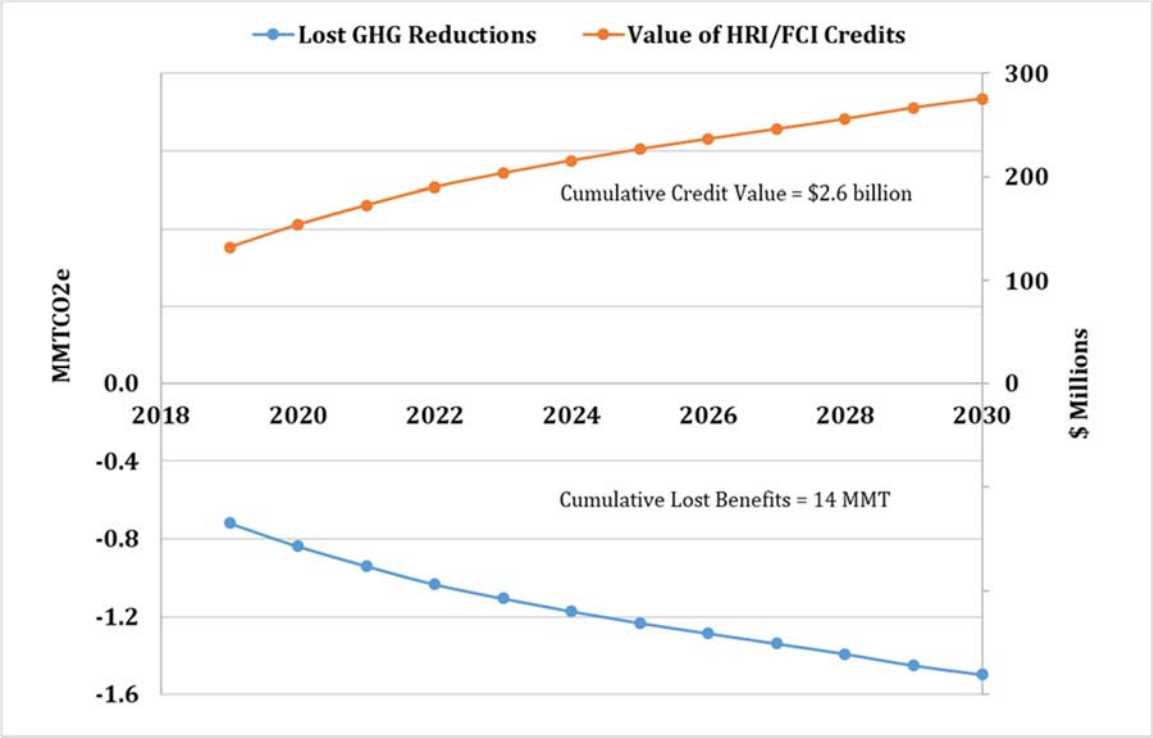
As part of the second 15-day notice, CARB has made a number of modifications to the proposed new section of the low carbon fuel standard regulation ("LCFS"), 95486.2 to Title 17, California Code of Regulations, which is intended to provide LCFS credits to hydrogen stations and direct current (DC) fast charging stations based on the installed capacity to deliver hydrogen and electricity in addition to the LCFS credits provided for the "fuel" that is actually delivered to and used by electric (EV) and fuel-cell (FCV) vehicles. However, none of these proposed changes address the fundamental issues raised by the public and Growth Energy during comments on the first 15-day notice. Rather, Section 95486.2 continues to contemplate that LCFS credits would be provided to owners and operators of DC fast charging and hydrogen stations for not actually selling low-CI fuel, but for the theoretical sales they could have if their stations were utilized to their full capacity. The direct result of this process is a loss in the GHG reductions that would result from the proposed LCFS, and windfall revenue for the station operators.

In order to put the potential magnitude of these issues into perspective, Figure 1 shows the estimated maximum amount of GHG reductions that could be lost due to the implementation of Section 95486.2 and the estimated maximum amount of windfall revenue that owners and operators of DC fast charging and hydrogen stations could realize based on the deficit values projected in the August 15, 2018 version of the Illustrative Compliance Scenario Calculator posted on CARB's website[1] as configured for the "Low Demand" and "Project/LD/Low ZEV/20%/infra" cases. The data in the figure assume that 5% of total deficits each year from 2019 to 2030 are provided as infrastructure credits and that the value of each LCFS credit received is $184 – the average LCFS credit price for Q2, 2018. As shown, the annual amount of GHG reductions that would not be realized by the LCFS program due to the proposed infrastructure crediting provisions would range from about 0.8 to 1.6 $MMTCO_2eq$ per year and the cumulative loss in GHG emissions from 2019 to 2030 could amount to 14.0 $MMTCO_2eq$. Similarly, windfall revenue received by operators and owners of DC fast charge and hydrogen stations could amount to about $150 to $300 million per year with the potential cumulative value being about $2.6 billion. Under CARB's high fuel demand scenarios, lost GHG benefits and windfall revenues would be even greater. It should also be noted that CARB staff acknowledges in Attachment G to the 2nd 15 day notice that accounting for infrastructure credits for hydrogen and DC fast charges is one of the factors that lead to a reduction in the cumulative

[1] See https://www.arb.ca.gov/fuels/lcfs/rulemakingdocs.htm

GHG benefits claimed for the LCFS program from 117 to 97 MMTCO$_2$eq (a loss of 17%) compared to the current conditions baseline and from 70 to 63 MMTCO$_2$eq (a loss of 10%) compared to the business-as-usual scenario.

Figure 1. Potential Loss in GHG Reductions and Windfall Revenue Transferred Under CARB's Proposed Infrastructure "Capacity" Program



In addition to continuing to propose new Section 95486.2, CARB staff has failed to provide any meaningful analysis of the potential environmental impacts associated with the infrastructure crediting provision that were highlighted in comments submitted on the first 15-day notice or any explanation of why the new Section 95486.2 results in the potential reduction in the GHG benefits of the LCFS program.

CARB Has a Viable Alternative to the Proposal to Provide "Capacity" Credits for Electric and Fuel Cell Vehicle Infrastructure that would Achieve the Same Result without Sacrificing GHG Reduction Benefits of the LCFS Program

As part of the second 15-day notice CARB is proposing changes to Title 17, CCR, section 95483(c)(1)(A), which would "*require an opt-in electrical distribution utility (EDU) or its designee, generating base credits for residential EV charging to participate in a statewide point of purchase rebate program funded exclusively by LCFS credit proceeds, if such a program is established.*"

The proposed required contribution of all LCFS credits generated from residential EV charging vary depending on the type of EDU. This is shown in Table 1 below, which is

taken from the draft regulatory text published as part of the Second 15-day notice. Table 1 shows the required contribution for all electrical distribution utility (EDU) types to the point of purchase rebate program is substantially less than 100%.

Table 1. Proposed EDU Contributions of LCFS Credit Proceeds to a Statewide Point of Purchase Rebate Program

EDU category	% Contribution in years 2019 through 2022	% Contribution in years 2023 and subsequent years
Investor-owned Utilities	67%	67%
Large Publicly-owned Utilities	35%	45%
Medium Publicly-owned Utilities	20%	25%
Small Publicly-owned Utilities	0%	2%

In addition, CARB is proposing changes to Title 17, CCR, section 95491(d)(3)(A)2 that concern unmetered residential EV recharging and are intended to *"clarify that an LSE generating credits must use all credit proceeds to benefit the current or future EV drivers across California and not just within its service territory. This would allow opt-in utilities to use base credits proceeds for a statewide point of purchase rebate."*

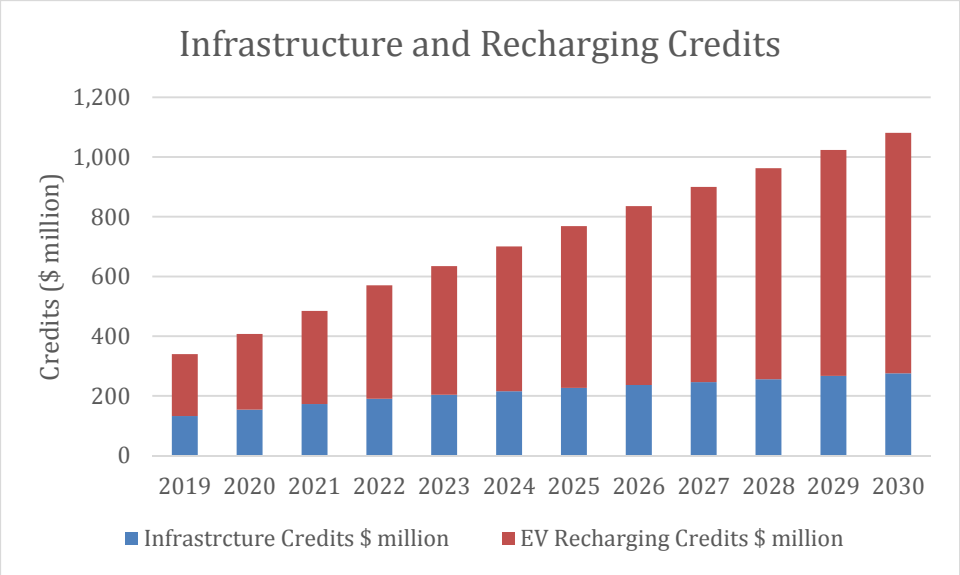
As has been indicated in previous comments, the LCFS credits generated from unmetered residential charging are at best estimates. These credits are not based on actual fuel delivery, as is required for all other fuels under the LCFS. As a result, residential metering or verification of fuel use by other means should be required. While LCFS credits from EV recharging at least have some basis in terms of actual GHG reductions, the LCFS credits CARB is proposing to give to underutilized DC fast charging and hydrogen stations do not result in any such reductions.

As shown above, not all of the value of LCFS credits associated with EV charging are being required to be provided for use in the statewide point of purchase rebate program. Thus, the value of the remaining LCFS credits is based, at least to some degree, on actual reductions in GHG emissions. As such, even if CARB has been directed to provide "capacity" credits for hydrogen and DC fast charging stations "to support the expansions of such infrastructure as directed by Governor's Executive Order B-48-18", as stated on pages 6 and 7 of Appendix F to the first 15-day notice, CARB could use the remaining value of the residential EV charging credits to provide funding for underutilized DC fast charging and hydrogen stations rather than creating fictitious LCFS credits that are not based on actual GHG reductions.

It appears that there should be ample funding available for EV/FCV infrastructure. Figure 2 compares the maximum values of the LCFS credits proposed by CARB staff for

infrastructure, to the total value of credits from recharging of light-duty EVs as documented in the August 15, 2018 version of the Illustrative Compliance Scenario Calculator for the "Low Demand" and "Project/LD/Low ZEV/20%/infra" cases. As shown in Figure 2, the magnitude of the value of the infrastructure credits proposed by CARB is small compared to the value of the credits that EDUs receive from residential EV recharging. Although availability of DC fast charging to the extent that such capacity is actually needed could "*benefit the current or future EV drivers across California,"* CARB would simply have to change EV to "Zero Emission Vehicle (ZEV)" to allow for the use of funds from EV recharging to also support hydrogen station infrastructure, which could obviously benefit current or future FCV drivers across California.

Figure 2. Comparison of Revenue Associated with CARB Proposed Infrastructure Credits with Available Revenue from Recharging of Light-Duty EVs.



Based on the above, CARB should abandon its proposal to create LCFS credits that are not based on actual GHG emission reductions to support DC fast charging and hydrogen stations. Instead, CARB should simply require that the surplus credit value generated by the EDUs beyond those needed for the point of purchase rebate program be used to provide funding for underutilized DC fast charging and hydrogen stations. In addition, CARB should use these surplus funds to promote the development of infrastructure for other low-CI fuels such as E85, as use of E85 in California is dramatically limited by the lack of a widespread distribution and dispensing infrastructure.

CARB Should Decline to Require Verification of all Fuel Provider Pathways, and Should Instead Implement Random Third-Party Verification of a Small Proportion of Pathways

As has been extensively noted in the public comments, the proposed requirements for verification of fuel producer pathways and annual pathway reports by accredited third parties will impose substantial burdens on producers of low-CI fuels, including ethanol.

First and foremost of these burdens is the cost of paying the verifier for the same work that in-house compliance teams and/or consultancies have already completed, as accredited verifiers will essentially be duplicating work performed as part of LCFS pathway application and reporting purposes. The second is a potential lack of verifiers to choose from given the proposed requirements related to conflicts of interest.

In order to become CARB-accredited, potential verifiers must submit an application to CARB including a self-evaluation of potential conflict of interest (COI) that may exist between them and the fuel provider (e.g. regulated entity or party) that they will be performing verification services for during the "look back period, which is 5 years prior to the start of verification. Any potential COI is also required to be monitored during the year of verification as well as one year after verification services are completed. If "high" conflicts of interest are found to be present, verifiers may be disqualified from providing verification services to specific fuel providers.

The following are some of the services identified in the proposed regulation as posing high potential for conflicts of interest:

1. Regulated party shares any management staff that have been employed by the verification body or vice versa.
2. Verifier or its company has previously provided the following services:
    - Designing, developing, implementing or maintaining data for CARB's Mandatory Reporting Regulation MRR reporting;
    - Developing CI or fuel transaction data or other GHG engineering analysis;
    - Providing consultative engineering or technical services related to fuel production facility that explicitly identify GHG reductions as a benefit;
    - Conducting internal audit or maintaining a GHG reduction offset project as defined per Cap-and-Trade regulation, or a project to receive LCFS-based credits;
    - Preparing LCFS fuel pathway applications or LCFS reporting manuals;
    - Managing health, environment or safety functions of the entity;
    - Services related to the development of information systems or consulting on the development of environmental management systems except for accounting management systems.
    - Reporting or uploading data on behalf of entity;
    - Owning, buying, selling, trading or retiring LCFS credits;
    - Dealing, brokering or promoting credits on behalf of entity;
    - Appraisal services of GHG liabilities or assets;

- Internal audits related to internal accounting controls or financials;
- Any legal services; and
- Expert services to an entity or its trade group related to litigation or regulatory investigation.

3. The verification body cannot provide any monetary or non-monetary incentives to secure contract.

Based on the above, many qualified companies would not be able to receive CARB verifier accreditation creating an issue for regulated parties as there likely to be a very limited number of verifiers to choose from. Another problem is that the COI requirements make it difficult for large, reputable consulting firms to become accredited verifiers due to their corporate associations. These companies generally provide a large range of environmental consulting services on a disaggregated bases from separately-managed offices and locations.

Although the second 15-day notice provides some limited relief related to the issue of third-party verification, it does not address the fundamental problems identified above.

As an alternative to the current CARB proposal, Growth Energy strongly suggests eliminating the applicability of verification requirements to all of the subject regulated entities. CARB should instead require random third-party verification of only a small fraction regulated parties; for example, 5% of regulated entities each year. Clearly, having all regulated entities potentially being subject to a random verification will be close to, if not as effective, as mandatory verification in ensuring compliance but will impose a much smaller financial burden on fuel providers.