April 16, 2018

California Air Resources Board
1001 I Street
Sacramento, CA 95814

Dear Members of the Air Resources Board,

We write on behalf of AJW and Iogen to express our support for the LCFS program and provide specific comments on the proposal presented by your staff. As a direct result of the LCFS, California is leading the world in the effort to establish commercially-viable fuel options that will contribute to lower greenhouse gas (GHG) emissions from transportation. We encourage you to continue the LCFS and strengthen the program in ways that will accelerate investments in this sector for years to come.

Iogen is a leading developer of cellulosic biofuels including cellulosic ethanol, biomethane, and refinery renewable hydrogen. Our cellulosic ethanol technology has been successfully deployed in Brazil in Raizen's Costa Pinto mill, and we are currently one of the top four registered producers of D3 RINs under the EPA's Renewable Fuel Standard Program. We are actively working with California refiners for the implementation of refinery renewable hydrogen, and we are also active with dairy digester projects for the production of ultra-low CI biomethane that will serve the California fuels market. In addition, we have an interest in using carbon capture and storage for some of our projects.

The LCFS continues to be a success due to the flexible, performance basis of the standard and its fuel neutrality. Although early models did not anticipate the mix of fuels that would achieve today's program compliance, the underlying goals of the program are intact: carbon intensity of transportation fuels is dropping while spurring new innovations in the market.

For your consideration, we offer the specific comments below about the program proposal. These comments are offered in the spirit of making the LCFS more robust, and a program worthy of replication in additional jurisdictions.

Refinery Renewable Hydrogen

Refinery renewable hydrogen offers a large scale opportunity to embed renewable content in California's gasoline and diesel fuel, leveraging today's refinery, fueling, and vehicle infrastructure to make lower GHG emissions fuels. We commend and support CARB's proposal to remove the limits on the generation of LCFS credits using refinery renewable hydrogen, to remove the minimum threshold for volume utilized, and to simplify the credit generation formulae. We believe there is tremendous potential for the utilization of RNG to make renewable hydrogen that is ultimately incorporated in California's gasoline and diesel fuel. We are actively working with several California refiners to bring this new pathway to market; however large-scale implementation will be impaired until EPA accepts a renewable hydrogen content pathway

for D3 RIN generation. Iogen looks forward to working with CARB to realize widespread implementation of refinery renewable hydrogen in California.

Dairy Digester Biomethane

Dairy digesters offer the potential for CI values as low as -250g CO_2/MJ and can allow cost effective GHG reductions through existing CNG and refinery infrastructure. A number of proposed changes, together, are particularly detrimental to investors seeking to develop dairy digester projects. The proposed changes of concern include:

- A temporary pathway CI of 0 g CO_2/MJ for dairy and food/green waste to biomethane, whereas dairy-derived biomethane is known to have a much better CI (typically -250g CO_2/MJ, because of its unique methane emissions mitigation.)
- No retroactive credit generation based upon the CI submitted in a qualifying pathway application; rather, the CI of the default pathway (which is artificially high for dairy-derived biomethane) must be used until the provisional CI is approved by CARB. Excess credits would then retroactively added to the buffer account, but not benefit the project.
- Two-quarter limit on book-and-claim accounting (storage) of the biomethane, which will not allow sufficient time for the approval of a provisional CI before RNG must be withdrawn and used for LCFS credit generation.

The net result of these three provisions is that new dairy digester RNG projects will, during the critical initial period, be unable to generate LCFS credits representative of their GHG savings. Consider the following timeline:

- Initial data collection upon start of RNG injection: 3-4 months
- Data analysis and preparation of fuel pathway report: 0.5 -1 month
- Third party validation of fuel pathway report: 0.5 - 1 month
- CARB processing and approval of provisional CI: 2-3 months
- Dispensing the additional “surge” of RNG into CNG vehicles: ~ 6 months

Timeline from first injection until provisional CI approval is 6-9 months, and the clearing of the “surge” into the market will typically take another 6 months. The proposed rules only allow utilization of the -250g CO_2/MJ after CI approval date, however RNG injected in one quarter MUST be used for LCFS credit generation no later than the end of the following quarter (thus the period can be as short as 4 months). These constraints force utilization of the default pathway of 0.0g CO_2/MJ, and severely impair the initial cash flow from projects that have legitimate CIs in the -250g CO2/MJ range.

As a solution, we propose the following additional language to Section 95488.8(i)(2). Book-and-Claim Accounting for Pipeline Injected Biomethane Used as a Vehicle Fuel or to Produce Hydrogen:

- *For the purposes of book-and claim accounting of RNG produced from new projects that have not yet received a CARB-approved provisional or certified CI, for any RNG that is injected into the pipeline prior to such approval, the quantity claimed for LCFS reporting must be matched to natural gas sold in California as RNG no later than the end of the two following calendar quarters after the date of CARB approval of such CI. After that period is over, any unmatched RNG quantities from initial storage expire for the purpose of LCFS reporting.*

Cost Containment Mechanism

Iogen and AJW have long supported ARB's work to develop and integrate a Cost Containment Mechanism (CCM) into the LCFS program. The CCM provides more program stability and certainty in the event of credit market shortages. In 2011, Iogen and AJW supported ARB's work to outline a cost containment mechanism for the LCFS program by leading a subcommittee to develop an initial concept. During the 2015 program re-adoption, many of our suggestions were formally incorporated into the program.

However, today the CCM remains largely untested as credit prices have remained well below $200/ton. Because use of the CCM been fairly limited, it is somewhat difficult to project how it will operate in the event that LCFS credit demand drives prices significantly higher. Having said that, we are concerned that the requirement for repayment after five years of credit "debt" allowed under the CCM could create a programmatic weakness and undermine the purpose and functionality of the CCM. It is not unreasonable to anticipate that regulated parties facing uncertainty regarding how to meet long-term LCFS obligations might decide to either pay a higher LCFC credit price than the CCM price cap to ensure they have needed credits – or worse, choose to limit fuel supplies directed toward California.

External circumstances, like the speculated changes in the federal RFS could lead to significant price hikes of LCFS credit prices well ahead of expectations, in comparison with expected prices with both programs functioning in concert - even with the smoothed LCFS curve.

We believe that, in the event of prolonged market shortages, there will be increasing uncertainty related to possible outcomes of a CCM debt accumulation toward the 5-year window. This could easily translate into LCFS credit prices above $200, thus negating the goal of the price ceiling. In replacement of this 5-year repayment window, we believe ARB could consider removing the 5-year limit completely, or providing a selective option to transfer or extend the term with Cap & Trade credits. If the 5-year repayment window is lifted, obligated parties will still carry the LCFS credit debt with interest and inflation, but they are able to repay when the market allows. We believe industry will not carry this debt longer than needed, and that the investment opportunities (and solutions offered by the market) will be enhanced by avoiding the uncertainty.

Carbon Capture and Storage Protocol

Technologies that utilize carbon capture and storage (CCS) have the potential to be an important tool in the liquid fuel supply chain. Allowing fuel producers to capture and sequester carbon from their own operations is an appropriate means to broaden range of strategies employed to reduce emissions. We support the staff proposal to include credit for direct air capture and sequestration, pursuant to their compliance with the CCS Protocol, and all applicable requirements. CCS keeps in the spirit of the LCFS program's technology neutrality, and will foster new innovations throughout the refining industry.

We believe the 100 year monitoring requirement is long, but may be manage-able. The critical issue is 100 year window on the invalidation of credits upon leakage. We urge CARB to consider a time limit to the window of the invalidation of the LCFS credits, and after a more modest period, the recourse for any leakage is the retirement of credits from buffer account (which receives LCFS credit annual payments akin to leakage insurance). In addition, we believe the accounting of any leakage from EOR operations used for CCS should include

consideration total CO_2 stored underground, so that any invalidation of credits that occurs upon leakage from an EPR operation is calculated using a mass balance method for the CO_2 accounting (i.e. the percent fraction of the total injected CO_2 that is used for LCFS credits is applied to the total quantity leaked for the determination of LCFS credit invalidation.)

Thank you for considering our comments. We commend the Board for your collective leadership and guidance on this landmark regulation.

Sincerely,

Brian Foody
IOGEN CORPORATION
President and CEO

Chris Hessler
AJW, Inc.
Partner