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July 5th, 2017

Transportation Fuels Branch
Industrial Strategies Division
California Air Resources Board

Re: Comments in relation to the Workshop on Co-processing of Biogenic Feedstocks in Refineries, June 2nd, 2017

INTRODUCTION

Iogen Corporation (“Iogen”) would like to thank California’s Air Resource Board (ARB) for the opportunity to comment on the June 2017 workshop on co-processing of biogenic feedstocks in refineries.

Iogen is one of the world’s leading firms in the field of cellulosic biofuels. We have been in the cellulosic biofuel business for over 30 years, invested roughly \$500 million in research, development and demonstration and have more than 300 issued and pending patents. We have implemented our cellulosic ethanol production technology in Brazil at Raizen Energia’s 10 million gallon per year Costa Pinto Facility, which is now producing cellulosic ethanol from bagasse. We are also very active in the deployment of biogas-based cellulosic biofuels in the United States. We are currently distributing about 17 million gallons per year (ethanol equivalent) of biogas-based cellulosic biofuel to Compressed Natural Gas (CNG) and Liquefied Natural Gas (LNG) locations in the United States, and are planning more than 100 million gallons per year of biogas-based production in the next three years.

We are excited about the potential for cellulosic biofuels in America and specifically California. There is an abundance of feedstock, an abundance of fuel demand, and current laws that recognize the unique value and potential of cellulosic biofuels. In particular, we believe there is tremendous short term potential for the use of biogas-derived renewable hydrogen by California refiners to make “renewable hydrogen content” (RHC) in California fuels. Under the current Renewable Hydrogen Refinery Credit Pilot Program (RHRCPP), the generation and refinery use of renewable hydrogen is eligible for the generation of LCFS credits. We applaud California’s forward thinking approach in adopting these regulations.

We estimate that the potential GHG reduction to be achieved using biogas for refinery incorporation of renewable hydrogen in fuels is about 3 million tonnes of CO₂ per year. This reduction would be a direct result of avoiding the extraction and use of fossil natural gas that ends up as refinery-produced transportation fuel used in California.

US EPA approval of RHC in gasoline and diesel for RIN generation under the federal Renewable Fuel Standard (RFS) will unlock this new and economical means for GHG reduction in the California fuel pool. Until such time, we believe the commercial adoption of biogas use under the RHRCPP Program will remain limited. The economic incentive or RINs that can be

generated outside California far exceeds the value of LCFS credits that can be generated within California (RIN value is more than 5X the LCFS credit value in CNG). Currently, EPA has not made approval of a pathway for RIN generation with RHC a priority. We believe the support of California-based refiners and ARB could help accelerate adoption. We welcome ARB's support in this respect.

We have divided our comments into the following three areas:

- 1) Comments on the treatment of renewable hydrogen under the Renewable Hydrogen Credit Pilot Program
- 2) Comments on the proposed amendment to the Renewable Hydrogen Credit Pilot Program
- 3) Comments on the current limit on generation and trading of LCFS credits under the Renewable Hydrogen Credit Pilot Program

COMMENTS ON THE TREATMENT OF RENEWABLE HYDROGEN UNDER THE RENEWABLE HYDROGEN CREDIT PILOT PROGRAM

In the comments on the February 2017 workshop, Iogen proposed that it would be more appropriate to address renewable hydrogen under the existing *Renewable Hydrogen Credit Pilot Program*, and not include it as part of the co-processing discussions. In the June 2017 workshop, ARB staff stated that it agreed with Iogen and other stakeholders and would not consider renewable hydrogen under the co-processing pathway applications. Staff indicated that renewable hydrogen would be addressed under the *Renewable Hydrogen Credit Pilot Program*. Iogen supports this decision and is looking forward to working with ARB staff on the submission of a renewable hydrogen pathway application.

COMMENTS ON THE PROPOSED AMENDMENT TO THE RENEWABLE HYDROGEN CREDIT PILOT PROGRAM

In the response to the February 2017 workshop, Iogen had provided comments to ARB staff on the formulas within the *Renewable Hydrogen Credit Pilot Program* that are used to calculate LCFS credits. To calculate the LCFS credits generated for fuels derived from renewable hydrogen, the proposed formulas compared the CI of renewable hydrogen as produced at a refinery to the CI of an ARB reference hydrogen pathway (HYGN003). This reference pathway has assumptions for the efficiency of the hydrogen production facility, and also includes emissions for the transportation and compression of the hydrogen for use in a fuel cell vehicle. As the existing credit calculation included HYGN003 as a baseline, the individual hydrogen plant's energy efficiency would impact the credit generation, and it was unclear how to treat emissions incurred after hydrogen production. This misaligned the calculated credits with actual GHG savings achieved, and did not seem to reflect the intent of the LCFS. Iogen had suggested that the reference value which is used for renewable hydrogen credit calculation be changed to reflect the actual GHG savings being achieved. In the June 2017 workshop, ARB staff stated that they are considering replacing the content of section 954889 (g) (2) of the current *Renewable Hydrogen Credit Pilot Program* with the following text:

Calculation of Credits:

(A) For CARBOB or diesel fuel that is partially or wholly derived from renewable hydrogen produced from renewable natural gas (RNG) and which displaces fossil natural gas in a steam methane reforming (SMR) unit, the calculation of credits shall be as follows:

$$Credits_{RIC}^H = (CI_{NG} - CI_{RNG}) \times E_{RNG} \times C \quad \text{Equation 6}$$

where:

$Credits_{RIC}^H$ is the amount of LCFS credits generated (a zero or positive value), in metric tons, by renewable hydrogen;

CI_{NG} is the carbon intensity of North American CNG with a value of 78.37 gCO₂e/MJ. This carbon intensity score will be subject to updates;

CI_{RNG} is the carbon intensity of the renewable natural gas in gCO₂e/MJ delivered to a refinery and is estimated using the CA-GREET model. The process for obtaining CI_{RNG} will be similar to regular fuel pathway applications. The value of CI_{RNG} primarily

depends on the type of biogenic feedstock, method of production, and transportation distance;

E_{RNG} is the amount energy of RNG in MJ delivered to a refinery; and

$$C = 1.0 \times 10^{-6} \frac{MT}{gCO_2e}$$

Iogen supports these proposed changes as they more accurately reflect the GHG benefits achieved with the use of renewable hydrogen. In addition, they are simpler to practice.

COMMENTS ON THE CURRENT LIMIT ON GENERATION AND TRADING OF LCFS CREDITS UNDER THE RENEWABLE HYDROGEN CREDIT PILOT PROGRAM

Within Section §95485(d) “Limitations on the Use of Credits produced pursuant to Sections §95489 (f) and (g)”, it is stated that “a regulated party may use credits created pursuant to Section §95489 (g) to meet no more than 10 percent of its annual obligation”. Within Section §95489 (g), it is stated that “credits created pursuant to §Section 95489(g) may not be sold or transferred”.

After the February 2017 workshop on co-processing, Iogen had submitted comments regarding the restriction on generation and trading of LCFS credits under the *Renewable Hydrogen Credit Pilot Program*. For reference, those comments are listed below

- Given the goal of the LCFS is to have a technology-neutral platform for decarbonizing the California fuel pool; we believe limiting the adoption of individual solutions (such as fuels that contain renewable hydrogen) is not consistent with this goal.
- We believe there is a certain amount of overhead associated with the adoption of refinery use of renewable hydrogen, and there should not be a restriction on one refiner's ability to transfer LCFS credit to another refinery. The transferability of LCFS credits is a feature that contributes to market efficiency that is in the interest of California consumers.
- We recognize CARB's interest in proving the viability of the refinery renewable hydrogen pathway before opening up broad adoption. We look forward to working with CARB to address concerns with this pathway.

Since Iogen submitted these comments, we have been made aware of another impact of these limits on refiners. Many refiners have supply agreements with other refiners, where one refiner produces transportation fuel but a second refiner purchases and markets that transportation fuel. When that second refiner purchases the transportation fuel from the first refiner, the transportation fuel is "purchased with obligation", which means that the transportation fuel was purchased with the compliance obligation from a reporting party. These terms are defined as part of the LCFS within Section §95481 of the Final Regulation Order. Both refiners report their obligation and their obligation after transfers. For refiners who have a large imbalance between their production and their marketing sales, there is a large difference between their obligation and their obligation after transfers. For a refiner who produces more transportation fuel than their marketing sales, they will reach a limit of 10 percent of their obligation (after transfers) much sooner than a limit of 10 percent of their obligation (before transfers). For a refiner who produces less transportation fuel than their marketing sales, they will potentially not have the refining capacity to reach a limit of 10 percent of their obligation (after transfers). In both cases, if the percent limit is based on obligations after transfers, this will limit the adoption of RHC in California.

- Iogen herein reiterates two of our previous comments on the 10 percent limit and on the limit on transferring credits. These limits will hinder a successful roll out of fuels derived from renewable hydrogen in California when EPA approval is granted. We recognize that this is a pilot program and ARB staff may want to limit the adoption of the proposed solutions on an interim basis, however we urge ARB to continue to permit the most efficient GHG reductions for consumers. Iogen suggests that using a higher value for the annual percent limit, such as 20 percent, would provide additional flexibility. This is the same limit as the other pilot program (Refinery Investment Credit). Iogen suggests removing the limitation that credits may not be sold or transferred; limits on transferability reduce market efficiency, and ultimately increase the cost to consumers.

- If a percent limit of annual obligation is to be part of the regulation, Iogen is suggesting that the term “obligation” in section § 95485(d) be clarified to read “obligation prior to transfers”. This would align any percent limit of annual obligation to actual refinery production (and not marketing sales), which would align incentives for the adoption of fuels derived from renewable hydrogen with the capacity for doing so.

CONCLUSION

Refinery incorporation of renewable hydrogen in fossil fuels is a large opportunity for reduction of GHG emissions from California transportation fuels. The current regulations are workable, and we look forward to cooperating and discussing with CARB on implementation.

As identified herein, we believe that the regulations can be further developed, clarified and improved.

Should CARB have any questions, require any information, or be interested in assistance in understanding our analyses or positions, we welcome further discussion and review.

Sincerely,



Patrick J. Foody
Executive Vice President and Chief Operating Officer
Iogen Biogas Corporation