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Submitted Via CARB Comments Submittal Form

March 15, 2023

Dr. Cheryl Laskowski California Air Resources Board 1001 I Street Sacramento, CA

RE: Comments from iogen on the proposed LCFS amendments: Workshop on February 22, 2023.

Dear Dr. Laskowski:

On behalf of Iogen Corporation ("iogen"), we would like to thank California's Air Resource Board (ARB) for the opportunity to comment on the February 22, 2023 workshop on proposed LCFS amendments.

We are one of the world's leading firms in the field of low carbon 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. Seven more facilities are being developed using iogen's technology. We are also very active in the deployment of biogas-derived fuels in the US and around the world. We are currently using about 30 million gallons per year (ethanol equivalent) of renewable natural gas to make fuel serving diverse markets including California. We see a future where hydrogen made from biomethane is an important contributor to the energy transition, serving a broad suite of applications including hydrogen fuels, refinery hydrogen, and the manufacture of other low-carbon fuels serving difficult-to-decarbonize sectors like aviation, heavy-duty transport, and marine. We have exciting new technology to use crop residues to make carbon negative biomethane, which will allow a massive scale-up of the available biomethane for hydrogen and other uses.

Comments on CARB's LCFS Workshop

1. CARB is rightly incorporating a guiding principle that biomethane as a hydrogen feedstock will remain important in the LCFS (slide 31).

Renewable hydrogen is poised to make large contributions toward achieving California's decarbonization goals. In the near-term, renewable hydrogen can support decarbonizing conventional refineries. Longer-term, renewable hydrogen is a critical contributor to an evolving, and diversifying fuel mix and essential for decarbonizing land, sea, and air transportation.

CARB should incentivize renewable hydrogen as a feedstock enabling it to find its way into fuels used now with the ultimate aim of fully decarbonizing SAF and other hard-to-abate sectors. CARB's pathway and crediting methodologies should fully and appropriately account for the decarbonization created when biomethane-derived hydrogen is used as a feedstock to make fuels of all types. This includes the ability to use the Specified Source Feedstock provisions of § 95488.8(g) for fuel pathways using renewable hydrogen, and biogas-derived fuels under the Renewable Hydrogen Refinery Credit Program of § 95489(f), allowing the targeting of fuels made from those specified feedstocks to serve the California markets.

2. CARB's proposed adoption of the Tier 1 Simplified Calculator for hydrogen (slide 63) has well-designed criteria for book-and-claim eligibility that should be applied broadly.

We support the proposed calculation of a "maximum matchable quantity" of RNG available for book-and-claim accounting. This maximum is appropriately related to the maximum amount that could be deemed as "feedstock" (i.e. the maximum of the natural gas input (MJ) or the hydrogen output (MJ)), which is an important factor in the eligibility for book-andclaim treatment. This maximum should apply when natural gas is the only feedstock; in cases where there are other additional feedstocks (such as refinery gasses), the same capping principle should apply, and the maximum MJ of feedstock permitted should be limited by the quantity of hydrogen produced from pipeline-delivered methane.

We believe the principle of "maximum matchable quantity" for use of hydrogen as a feedstock should apply to the Renewable Hydrogen Refinery Credit Program § 95489(f) eligibility, because the credit generation right is based upon the "production of CARBOB or diesel that is partially or wholly derived from renewable hydrogen." In addition, we believe the right to use RNG as a feedstock to generate such credits should fully apply to the portion of fuels used in California (i.e. consistent with the Specified Source Feedstock provisions of 95488.8(g)), and not be subject to the current formula factoring credit availability based upon the fraction of fuels produced that are used in California. There should however be a limit of credits available tied to the amount of fuels used in California. We have in comment 3 below provided a proposed formula that meets these criteria.

3. CARB should adopt a revised credit formula under § 95489(f)(2)(A) to enact expanded crediting eligibility under the Renewable Hydrogen Refinery Credit Program (Slide 68).

We believe it appropriate to expand the use of the Renewable Hydrogen Refinery Credit Program to include non-refinery production of hydrogen, where the hydrogen is fed to refineries. This will lead to expansion of the utilization of renewable hydrogen in refineries, which is a key opportunity for decarbonization. As noted above, in the case of biomethane used as a feedstock to make hydrogen for refinery use, we believe the principles of Specified Source Feedstocks should apply to the fuels produced where biomethane is a feedstock, and that there should be a cap to credit eligibility based upon the amount of refined fuels used in California. These modifications will achieve the program objectives of expanding the use of hydrogen as refinery feedstocks and align with treatment of other fuels and feedstocks under the LCFS.

We believe CARB should consider adopting the following formula for the calculations of credits under 95489(f)(2)(A):

Credits $_{RIC}^{H} = (CI_{NG} - CI_{RNG}) \times (E_{RNG}) \times C$

where the definition of E_{RNG} is changed from the current provision to the following:

- E_{RNG} is the amount of renewable natural gas in MJ delivered to a steam methane reforming unit per quarter or per year, where such amount is no greater than the amount of hydrogen in MJ made from pipeline-delivered methane supplied from the steam methane reforming unit to a refinery multiplied by (*Volume^{XD}*/*Volume^{Total}*)
- All other defined terms, including CI_{NG} , CI_{RNG} , C, $Volume^{XD}$, and $Volume^{Total}$ remain the same as per the current regulation § 95489(f)(2)(A).

This recommended formula update achieves several appropriate changes:

- 1. It expands the permissible use of RNG to third party steam methane reformers serving refineries (previously E_{RNG} was defined as the quantity "delivered to a refinery.")
- 2. It incorporates the principle of a "maximum matchable quantity" as embodied in the proposed Tier 1 hydrogen calculator by capping the maximum available book-and claim quantity at the amount of hydrogen derived from pipeline-supplied methane fed to the refinery, and
- 3. It incorporates a cap on the number of credits that can be generated by creating a limit set by the fraction of a refinery's fuel sold in California, which is consistent with the principles of Specified Source Feedstock provisions that permit direction of fuels made from such feedstocks for California credit generation. This cap is more appropriate than the prior "export haircut", which was inconsistent with the principles of the Specified Source Feedstock provisions.

4. CARB should enable book-and-claim treatment of biomethane-derived hydrogen without limits on the CI of the hydrogen (slide 61)

Book and claim accounting of low-CI hydrogen is appropriate where hydrogen is used as a fuel or a feedstock to make fuel, and where the low-CI hydrogen is injected into a connected distribution system carrying fossil derived hydrogen. Book-and-claim treatment enables the more efficient distribution of the low CI material while ensuring the integrity of the GHG benefits. CARB is appropriately adopting this change.

Restrictions on CI for eligibility of hydrogen book-and-claim is neither necessary nor appropriate for biomethane-derived hydrogen; the program creates sufficient incentive to reduce CI, and a threshold for eligibility is contrary to the program objectives. The IRA is an independent piece of incentives and putting in restrictions to align the LCFS will only serve to restrict the implementation of potential decarbonizing solutions in California.

Any permitted use of book-and-claim hydrogen should also apply to the biomethane-derived hydrogen fed to refineries under the Renewable Hydrogen Refinery Credit Program § 95489(f), as this is a key approach to using low CI hydrogen in transportation.

5. CARB should not plan to phase out the Renewable Hydrogen Refinery Credit Program by 2040 for biomethane-derived hydrogen used in refining (slides 42-43)

CARB identified that renewable hydrogen to refineries was a part of project based crediting system, however the use of biomethane is not a "project" like the other capital-based opportunities for refinery decarbonization. Biomethane involves an ongoing purchase commitment that deserves to be treated differently from capital projects.

CARB excludes CCS from the planned phase-out, and should also exclude biomethanederived hydrogen use as a feedstock. CARB's scoping plan for biomethane (slide 30) shows a significant contribution of biomethane in petroleum refining in 2045, and this ought to include the use of biomethane as a renewable hydrogen. Planning to eliminate this provision will undermine achievement of the scoping plan goals.

We at iogen appreciate the opportunity to provide feedback at this critical stage of the LCFS amendment development. Should you have any questions, please do not hesitate to contact me at 613-355-2181 or via e-mail at <u>pat.foody@iogen.com</u>.

Sincerely Patri k J. Foody Chief Developm ent Officer