

February 20, 2024

Liane M. Randolph
Chair, California Air Resources Board
1001 I Street
Sacramento, CA 95814

Subject: Letter of Comment on Temporary Fuel Pathway Code for Ethanol with CCS for Proposed Amendments to the LCFS, posted December 19, 2023

Dear Chair Randolph:

Life Cycle Associates would like to take this opportunity to provide our comments on the Proposed Amendments to the Low Carbon Fuel Standard Regulation, posted on December 19, 2023. This letter is focused on the development of a Temporary Fuel Pathway Code for Ethanol with Carbon Capture and Sequestration (CCS) technology.

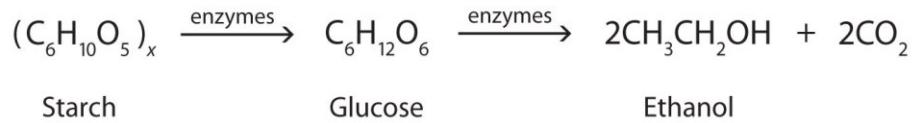
LCFS regulation text defines the CCS technology as follows: *“Carbon capture and sequestration (CCS) project” means a project that captures CO₂ by an eligible entity specified in section 95490(a) of this subarticle, transports the captured CO₂ to an injection site, and injects and permanently sequesters the captured CO₂ pursuant to the Carbon Capture and Sequestration Protocol and as specified by section 95490 of this subarticle.*

CCS is an emerging technology in the U.S. ethanol industry. We believe that CCS technology, combined with existing and newly developing alternative fuel production facilities, offers significant environmental benefits while supporting the overall goals of the California Air Resources Board (CARB). Numerous production plants, many of which already have certified fuel ethanol pathways under LCFS for corn, corn fiber, and sorghum feedstocks, have signed agreements to develop and utilize the technology. The production facilities are pursuing CCS technology in part to further reduce their GHG emissions and meet the increasingly stringent carbon intensity (CI) reduction targets under the LCFS.

The current certification process for a CCS pathway takes multiple years, resulting in a considerable loss of potential credits during the certification period even after beginning to sequester CO₂. We understand the necessity for a thorough evaluation and approval process to ensure compliance with regulatory standards, but the extended duration can hinder the timely realization of the benefits associated with such projects.

With the expectation that CCS will become commonplace for ethanol, and potentially many other fuel production technologies destined for the California market, we ask CARB to consider developing a temporary fuel pathway code for ethanol with CCS. The LCFS program already offers multiple temporary pathways to allow alternative fuel producers to generate a limited value from their low-CI fuel. A temporary pathway for CCS with ethanol would further encourage ethanol producers to develop CCS technology and supply even lower CI ethanol to California.

The amount of CO₂ captured and sequestered at an ethanol facility can be easily calculated due to a strong stoichiometric basis as demonstrated by the equation below.




Each molecule of ethanol produced via fermentation process also co-produces one molecule of CO₂, which is roughly equivalent to about 30 g CO₂/MJ reduction in the ethanol CI. However, the addition of CCS adds a marginal electricity usage for compression and transport of CO₂. This stoichiometric relationship can be utilized by CARB to determine a conservative CI for the requested temporary pathway(s), subject to verification. Following the temporary pathway, the applicant will be required to measure and monitor the quantity of CO₂ captured and sequestered as required per the provisions of the LCFS and CCS protocol. Our expectation is that this will expedite compliance with the LCFS regulation and set a standard for the industry.

We firmly believe that creation of such a temporary pathway for ethanol with CCS would contribute to meeting CARB's emissions reduction targets and serves as a model for encouraging and fostering technological advancements in the CCS technology itself. We are committed to working closely with CARB throughout the process and are ready to provide any additional information or clarification that may be required.

Thank you for your consideration in reviewing our comments and incorporating them into the final regulation. If you have any questions, please reach out to me directly.

Sincerely,



Stefan Unnasch
Managing Director
Life Cycle Associates, LLC



Love Goyal
Sustainability Project Manager
Life Cycle Associates, LLC