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POLICY INSTITUTE FOR ENERGY, ENVIRONMENT, AND THE ECONOMY

13 December, 2023

Industrial Strategies Division
California Air Resources Board
1001 I St, Sacramento, CA 95814

Comments for application no. B0520

Dear Pathway Certification Team,

Thank you for the opportunity to comment on the proposed Tier 2 pathway to generate LCFS credits from renewable diesel from Argentinian soybean oil by Phillips 66 Company. The University of California, Davis Institute of Transportation Studies (ITS), along with the Policy Institute for Energy, Environment, and the Economy has been engaged in research, analysis, and technical assistance relating to alternative fuel policies for well over a decade. ITS researchers have been at the forefront of the scientific community's evaluation of biofuel and their role in the transportation sector. We appreciate this opportunity to further our mission of helping ensure critical transportation, climate, and energy policy is informed by the best possible scientific research. We emphasize that the following comments are offered as suggestions, to help ensure that the LCFS continues to support California's progress toward its climate goals, and that neither UC Davis nor any related entity makes any request regarding the approval or rejection of any specific pathway. This comment should not be seen as direct endorsement or criticism of this particular pathway or the applicant, but rather a discussion of considerations that arise from the use of a novel source of feedstock - double-cropped Argentinian soybeans - that should inform discussion on this, and future pathways.

Novel Elements in the Proposed Pathway

The use of crop-based biofuels has been an issue of much discussion over the history of the LCFS. Most, if not all, approved pathways in the LCFS at present rely on North American sources for crop-based feedstocks whereas this pathway uses soybean oil imported from Argentina. While there is not necessarily a fundamental difference in the composition of imported agricultural products, or the analysis that would characterize their life cycle GHG impacts compared to domestic ones, the use of imported soybean oil introduces some new considerations to the pathways certification process. For example, the data on agricultural practices in Argentina may not be directly comparable (in terms of temporal or spatial scope, measurement standards, verification, transparency, or existence of a historical baseline) to North American equivalents. Additionally the impacts of cultivated acreage expansion or double-cropping on land use change may be different than they are for North American production, meaning that analytical assumptions commonly used for domestic analysis may not

apply in the same way. It is important to understand these uncertainties in order to ensure pathway CI scores reflect to the extent possible GHG impacts, so that LCFS incentives align with emissions impacts. This is the case for any feedstock, but also important to keep in mind that the aggregate area used for soybean cultivation has expanded considerably recently [1].

Impacts of Double Cropping

While the pathway discusses the potential benefits of double-cropping, e.g. reduced fertilizer use and land use change impacts, default values from CA-GREET (for fertilizer) and Table 6 of the LCFS Regulation Order (for ILUC) were used as a conservative basis for calculating pathway CI. Double-cropping has the potential to reduce life cycle GHG impact from feedstock cultivation, however significant uncertainty exists around attempts to quantify these impacts. Adopting the conservative approach, as reflected in the Staff Report is therefore an appropriate choice until additional analysis can more precisely quantify the benefits of double-cropping.

Depending on the choice of single or double cropping and the sowing schedule for double cropping, the oil concentration of soybean varies, [2] so uncertainties around these need to be addressed to assess the emissions impacts more accurately. In addition, although the reported yield of soybean from double cropping is often lower than the yield from single cropping,[3] a fixed crop yield of 3.0 tonnes/ha has been used without a clear explanation about the yield, and how/whether it might change over time due to continued use was not addressed clearly.

Land Use Change Impacts

The pathway application provides data that indicate no significant expansion of soybean acreage in Argentina over the past decade, during which time the use of double-cropping has increased. While these data help support the claim that double-cropping will reduce ILUC emissions, significant uncertainty exists around ILUC assessment, as well as practices for assessment of land cover.[4] A significant amount of research has been done into land use change effects related to North American biofuel production systems, this work informs the GREET and GTAP modeling that underpins LCFS pathway CI certification. Many elements of the biofuel production cycle vary across geographies, including agronomic practices (e.g. fertilizer application and yield rates) and indirect effects (e.g. how increased demand for feedstock affects grower decisions regarding land clearance). A more thorough assessment of how these factors differ in other jurisdictions is required to reduce the uncertainty around these

[1] https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52019DC0142&from=EN
[2] https://doi.org/10.2134/agronj2011.0019
[3] https://doi.org/10.2134/agronj2018.06.0371
[4] E.g. https://doi.org/10.1016/j.cosust.2019.05.002, https://doi.org/10.3354/cr01574, and https://doi.org/10.3390/rs12213502

impacts. While we would not expect such an assessment to be included in a pathway application, it would ultimately be necessary to provide a level of confidence equivalent to those which rely on more familiar domestic sources of feedstock.

Beyond that underlying uncertainty in land use and agronomic practice data, uncertainty remains around the ILUC impacts of double-cropped feedstock production. Even if land use change in a given jurisdiction has remained static for an extended period of time, that does not necessarily mean ILUC impacts are low. Some double-cropping assumptions were folded into yield elasticity estimates in the regulatory modeling. More granular examination of those patterns and how they are incorporated in the model would be useful in modeling moving forward, meaning that potential benefits from double-cropping may already be considered in ILUC assessments.

More broadly, ILUC modeling examines shifts in overall cropping and land use patterns throughout the global agricultural commodity system; lack of land use change within a given jurisdiction does not mean that changes in demand within that jurisdiction have no impact outside of it (though they do imply that such effects may be limited). Similarly, if rates of land conversion into agricultural production match rates of agricultural land abandonment, one would expect to observe significant land use change emissions but not net change in agricultural land area. Ultimately, more thorough analysis than what could reasonably be expected from a pathway application is needed to better understand land use change dynamics in regions outside of the traditional scope of historical biofuel supply to California.

Other factors support the treatment proposed of the default ILUC value in the absence of further modeling: namely, that South American supply was part of the ILUC-modeled response to the policy, and equitable treatment of new pathways (that is, evaluation under similar background conditions as used for existing pathways). That said, the land use change value derived from GTAP modeling that has been used in the LCFS for many years was modeled in response to a specific policy shock (the RFS). With no legislatively-specified RFS volume obligations after 2022, and previous volume obligations for cellulosic and advanced fuels largely waived, the policy shock modeled by GTAP may not match reality. Continued evolution in the RFS, changes in global agricultural commodity markets, the impact of climate change on agriculture, and other factors mean that the feedstock demand assumed prompted by that policy cannot be expected to hold indefinitely into the future. Substantial increases in volumes and/or area impacted would argue for more comprehensive modeling to support an ILUC value - to be clear, this is true for all biofuel pathways, not just the one described in this application.

In summary, the proposed pathway introduces a number of novel considerations as compared to the many pathways for similar feedstocks in North American production systems. Our comments here are not intended to be seen as criticizing the applicant or this particular pathway, but rather discussing important considerations for pathways that utilize crop-based

feedstock grown in jurisdictions with which CARB and the LCFS analytical community have less experience. Given the significant uncertainty in this space, the conservative decision to apply default feedstock production impacts and ILUC adjustments represents a reasonable, conservative approach to CI score quantification. Additional research is required to better understand whether these default values reflect real-world impacts.

Thank you for the opportunity to provide feedback on this pathway. If we can provide additional information or clarify anything presented here, please feel free to contact us via Colin Murphy, at cwmurphy@ucdavis.edu

Sincerely,

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