August 8, 2022

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Air Resources Board
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RE: July 7, 2022 Potential Changes to the LCFS requested feedback.

The Brazilian Sugarcane and Bioenergy Industry Association (UNICA) appreciates the opportunity to submit feedback on the questions presented to stakeholders during the workshop of July 7, 2022.

The transport sector is responsible for about 25 percent of global greenhouse gas emissions (GHG) worldwide. In California, according to the state's Energy Commission, the transport sector accounts for about 50 per cent of the state's GHG emissions, nearly 80 percent of nitrogen oxide pollution, and 90 percent of diesel particulate matter pollution.[1] In order for California to achieve its goal of carbon neutrality by 2045 or earlier and to think about increasing post-2030 carbon intensity (CI) goals, policymakers must use every tool available now because there is no single solution.

Californian politicians and policymakers need to be open to complementary measures and have an all-of-the-above kind of mentality. Leading this fight is no small task, and California can count of the support of stakeholders like the members of UNICA. Biofuels produced in Brazil and exported to California are abundant, sustainable, cost effective, promote health benefits, and directly avoid carbon emissions.

We are part of the solution, and we encourage CARB to continue to improve its methodologies of the Low Carbon Fuel Standard (LCFS) to score the carbon intensity of Brazilian biofuels.

UNICA is the leading trade association for the sugar, ethanol, and bioelectricity industries in Brazil, representing 50% of the country's sugarcane production and processing, 60% of its ethanol, from sugarcane and sequential cropping corn, and nearly 70% of the bioelectricity that feeds into the national grid. During the last 2021/2022 harvest, Brazil produced approximately 576 million tons of sugarcane, 35 MMT of sugar, nearly 8 billion gallons of ethanol, of which near 1 billon gallons from corn, and 20.2 TWh of bioelectricity. Our sector generates more than 700,000 direct jobs and nearly 2.1 million jobs when taken into consideration the indirect jobs associated with our production chain.

Please find below the feedback requested on the items of most relevance to our sector:

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[1] Fuels and Transportation Division (ca.gov)

Post 2030 Carbon Intensity (CI) goals

• Do we need five-year interim CI targets between 2030 and 2045?
• What are the risks and benefits associated with setting a 2045 CI target this far in advance?
• What is an appropriate timeframe for which to set a target in advance?

The benefit in setting ambitious carbon intensity goals in advance is to put in the market the signals needed to foster investment and the development of advanced fuels and products that will continue to promote the reduction of GHG emissions. Investors, producers, and consumers need to plan to act. These market signals are vital for an industry like sugarcane ethanol, given that sugarcane is a semi-perennial plant that needs replanting every 6 years on average. We need time and planning to grow. Producers need to know the opportunities so they can invest in and develop better production processes and consequently better products. Early target settings can help create demand for better, lower carbon products, consequently impacting ways fuels are produced, and giving technologies time to mature and prices to lower.

In terms of risks, there are a few to be considered. Long term goal setting requires ample and transparent opportunities to discuss ideas and suggestions. One should not rush into setting long term goals without planning for ample opportunities for this exchange. Another important risk factor to consider is not to elect one technology as the silver bullet, as the only way to achieve carbon intensity goals. CARB needs to give all low carbon fuels the support and incentive to be part of the solution to de-carbonize California's transport sector. Also, it is important to set goals that are achievable to avoid retrocession that will hurt all stakeholders. Setting a too strict goal, and relying on one or two technologies can backfire. The advanced biofuels sector is a good example of this point, so much was planned around the use of cellulosic fuels, but no clear and firm policy actions were put in place. Targets were allowed to be filled by less efficient fuels, waivers were given without much criteria, investors did not put the money into developing this technology with fear that policymakers would continue to make exceptions. As result, very few companies were able to make the investment to develop this technology, and we need to ensure that those who did it are rewarded for their efforts, by ensuring a stable and fair market for their product.

CARB needs to allow for plenty of opportunities to discuss and exchange ideas, not chose winners and losers, and use the best science and data available to score carbon intensities that are a true reflection of their production processes, and once it has all this information in hand, set targets that are ambitious but achievable.

Novel technologies

Staff is also considering the inclusion of other fuels as opt-in for novel applications • E.g., dimethyl ether, methanol, ammonia
• Zero-emissions applications for rail, agricultural equipment, commercial harbor craft and airport ground support equipment under Tier 2 EER-adjusted CI pathways
• Staff requests stakeholder feedback as to how the LCFS could best support the de-carbonization of these sectors and support novel technologies

The LCFS should support novel technologies by continuing to allow for several pathways for different feedstocks and incentivize those with best lifecycle performance. In Brazil there are several fuels that can be produced from our existing energy platform, like biomethane, green hydrogen, and sustainable aviation fuels. Brazil is also advancing in Bioenergy Carbon Capture and Storage from fermentation, which has

high CO2 concentration, lower costs and can lead to permanent CO2 removals from the atmosphere[2]. CARB should continue to incentivize technological advancements in new renewable fuel development from renewable sources and, as much as possible, improve the performance of the existing renewable fuels. The program should be open to innovation and should not benefit one technology in detriment of another. The focus should be on creating a policy framework that incentivizes fuels based on their GHG performance. CARB has been a world leader in that, including in the evaluating on land use change[3]. CARB should not avoid the discussion around indirect land use change (ILUC), making it a non-scientific barrier for new technologies to enter the Californian market. CARB needs a clear and transparent strategy regarding ILUC, bringing stakeholders together to exchange information, data, and coming up with solutions that will benefit California by introducing new technologies, and not barriers. According to the Sixth Assessment Report (AR6) of the Intergovernmental Panel on Climate Change (IPCC) sustainable biofuels can offer mitigation benefits in land-based transport in the short and medium term, and mitigation of CO2 emissions from shipping and aviation but require production process improvement and cost reduction.[4] The LCFS can contribute by sending the right signals to the market to support these technologies and help accelerate them. In this subject, we would also recommend CARB to increase collaboration and exchange on aviation and maritime fuels pathways with the International Civil Aviation Organization (ICAO)/ CORSIA discussions as well as with the International Maritime Organization (IMO).

Crop-Based Biofuels

- What are the potential risks of increased use of crop-based biofuels?
- What data sources or studies should staff review to evaluate potential impacts of future growth in crop-based biofuels?
- Should staff consider a cap on crop-based biofuels?
- If so, what mechanisms could staff consider or implement as part of the upcoming rulemaking?

To achieve California's ambitious and aggressive decarbonization goals, CARB should not consider a cap on crop-based biofuels. In the United States there is already a ceiling in place for blending biofuels into gasoline, the blend wall of 10% of ethanol in gasoline used in passenger cars. Unfortunately, policymakers and fuel producers have not yet achieved a successful solution to increase the blend of ethanol in US gasoline. California should not add to that burden, instead California should use the best data and science available to fairly score biofuels for their full lifecycle profile, as result decreasing their carbon intensity and helping California to get closer to its GHG emissions goals.

Biofuels should continue to be an important tool for policymakers in California to achieve carbon neutrality. According to the International Renewable Energy Agency (IRENA) to achieve the energy transformation, the global demand for biofuels must increase from about 36 billion gallons in 2019 to nearly 100 BG in 2030 and 172 BG per year in 2050. [5] Biofuels, like Brazilian ethanol, are a proven solution to curb GHG

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[2] Moreira et al, 2016 https://doi.org/10.1016/j.apenergy.2016.06.044

[3] IEA Bioenergy: Task 39 pg.6

[4] IPCC_AR6_WGIII_SPM.pdf pg.36

[5] IRENA, Global Renewable Outlook: Energy Transformation 2050. 2020

emissions from fossil fuel in light duty vehicles and will also serve as a feedstock to biofuels used to decarbonize aviation and maritime transport.

We recognize that different biofuels have different sustainability profiles, but we need to recognize good practices and good fuels. According to IPCC Special Report on Climate change and Land (IPCC, 2019)[6]:

“Applied on a limited share of total land, land-based mitigation measures that displace other land uses have fewer adverse side effects and can have positive co-benefits for adaptation, desertification, land degradation or food security. (High confidence)”. Condemning all biofuel types, putting them all in the same basket (based on the worst kind possible biofuels source) would be an irresponsible decision, that can make the world a worse place to live. Promoting good practices with leading policies is what the global community expects from CARB.

The sustainability credentials of Brazilian sugarcane ethanol directly contribute to the aforementioned goal on climate change and land use. No other bioenergy source is as complete and efficient as sugarcane ethanol. Sugarcane is a semi-perennial crop, with one of the highest energy yields per hectare (Souza et al, 2015[7]). Occupying around 1% of the national territory[8] and far from deforestation hotspots, such as the Amazon biome, the sugarcane sector supplies about 50% of the energy consumed in the light fleet in Brazil[9], while managing to be the top sugar producer and exporter in the world.

Productivity gains and mechanization harvesting makes sugarcane the commercial technology with the highest energy yield per occupied area, and the sector is entering a new era that focuses on using energy from the whole sugarcane, which makes it possible to multiply production without the need for additional land. Contrary to what CARB assumes, mechanized harvesting in center-south Brazil for sugarcane is greater than 95%,[10] which not only reduces GHG emission of the current and future fuels by the greater use of residues that are transformed into energy, but also significantly increases the stock of carbon in the soil (that are currently not accounted for in CARB evaluation). Scientific and technical literature shows soil health is maintained with partial removal of such residues from the field[11]. CARB should recognize these environmental gains of sugarcane ethanol production in Brazil and include these updates and changes in this rule making process.

According to the EU-Joint Research Center study[12], there is very low correlation between indirect land use change (ILUC) and sugarcane expansion, making it a low-risk biofuel.The Brazilian Forest Code has contributed to increase the forest area inside sugarcane proprieties in Brazil, once it requires sugarcane producers to protect 20% of

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[6] IPCC_AR6_WGIII_SPM.pdf pg.36

[7] G. M. Souza, R. L. Victoria, C. A. Joly, and L. M. Verdade, Bioenergy & Sustainability: bridging the gaps, Scope; FAP. São Paulo, 2015

[8] MAPBIOMAS v.6

[9] BEN-EPE 2021

[10] Conab: Boletim Safra 21/22

[11] Cervi et al., 2019

[12] https://publications.jrc.ec.europa.eu/repository/handle/JRC117364

native vegetations in the Mata Atlantica region and 30% in the Cerrado, as well as the areas bordering rivers and springs. The low risk of sugarcane is additionally sustained through Brazil's national biofuel policy, RenovaBio, which was inspired by the LCFS and introduced to serve parts of Brazil's Nationally Determined Contributions under the Paris Climate Agreement. The goal is to reduce the carbon intensity of the Brazilian transport matrix by expanding the use of biofuels and creating a carbon credit market to offset fossil fuel GHG emissions. RenovaBio requires effective and verifiable agricultural data. Under the program, biofuel producers can emit carbon bonds (Cbios) based on a life-cycle assessment methodology with a strong scientific basis and internationally standardized by ISO 14040 and 14044. In Renovabio, our mills must demonstrate zero deforestation since 2017, even when deforestation is authorized under the scope of the Brazilian Forest Code[13].

With adequate market signals, the industry will continue to improve its production systems. We already produce 2nd generation ethanol, biogas, and electricity. In the future, our ethanol will be used to produce low-carbon aviation fuels (our member companies is already partnering with Embraer[14]) and will also be the best way to transport low-carbon hydrogen. We also see significant opportunities for ethanol to be used as a stable energy storage, helping to diversify low CI sources of hydrogen, or used in bio-electric low-carbon hybrid or fuel cell vehicles. As mentioned before, this would help alleviate the deleterious impact of EV batteries on the environment and the inevitable pressure on electric grid[15][16][17].

As previously mentioned, instead of limiting the space for crop-based fuels in the LCFS, CARB should use this opportunity to meaningfully engage and exchange with stakeholders to access the best information and data available to improve CARB's CI scoring methodology. for that purpose, we would like to reintroduce and request that CARB reviews the January 07, 2022, letter[18] UNICA submitted (access link in the footnotes), and provides us an opportunity to engage in discussion of updates and corrections to CARB's CI calculator to be included in this rule making process. These corrections are critical to give Brazilian sugarcane ethanol a fair treatment in the LCFS, and we respectfully request that staff review them and include them in this rule making process.

We would also like to submit updated data of ethanol production and processing in Brazil that was used as basis for the RenovaBio program. Because of the RenovaBio

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[13] IEA Bioenergy: Task 39 pg.102

[14] https://biomassmagazine.com/articles/19160/embraer-raizen-partnership-stimulates-production-of-saf

[15] https://www.nature.com/articles/s41598-021-82042-5

[16] S. Bellocchi, K. Klöckner, M. Manno, M. Noussan, and M. Vellini, "On the role of electric vehicles towards low-carbon energy systems: Italy and Germany in comparison," Appl. Energy, vol. 255, no. May, p. 113848, 2019, doi: 10.1016/j.apenergy.2019.113848.

[17] D. Wu et al., "Regional Heterogeneity in the Emissions Benefits of Electrified and Lightweighted Light-Duty Vehicles," Environ. Sci. Technol., vol. 53, no. 18, pp. 10560–10570, 2019, doi: 10.1021/acs.est.9b00648.

[18] CARB Comments 120721 Workshop - Final Draft

program our mills made great efforts to recover primary data of feedstock production, including the use of fertilizes soil correction, energy use and sources, harvesting and management practices, land use expansion patterns, efficiencies and other relevant LCA inputs. All this information is verified by 3rd part certifying companies. Currently about 95% of sugarcane is certified with a database of thousands of rural proprieties. However, Brazilian ethanol sector demonstrates very high control on its chain of custody, making it unique in terms of reliability. We believe this is the largest database about sugarcane practices in the world and we intend to share this with CARB. We look forward to discussing with CARB staff the best way to share this data.

We believe that with these corrections and the use of the provided new data CARB will score sugarcane ethanol as fairly as it should, and increase the opportunity to offer diversified and complimentary solutions to the immediate threats of climate change.

Equity

Staff are evaluating a holistic approach to equity – how to leverage programs and policies to support successful long-term transition to zero emission vehicles
- What additional support is needed for achieving the holistic goal?
- What should be the role of LCFS in supporting the various aspects of a holistic goal

While California and the Air Resources Board have many programs and incentives in place to help diminish the effects of climate change in disadvantaged communities and communities of color in the State, inequity persists. To have a holistic approach, California must use all possible solutions to curb GHG emissions, not only focus on one answer or technology, especially in vulnerable communities, where air pollution is high and air quality is low.

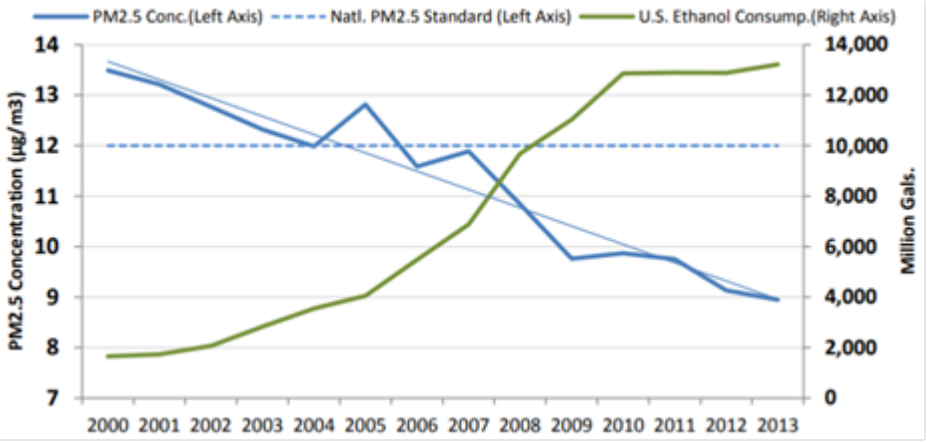
Renewable biofuels are a readily available, powerful, and an effective tool that California can and should continue to incentivize and support. Fuels like Brazilian sugarcane ethanol have a proven impact on GHG reductions and air quality improvement. Since 2003, the use of ethanol in Brazil has prevented the emissions of 570 million tons of CO2eq. into the atmosphere, helped Sao Paulo, Brazil's largest and most populous city, reduce the levels of ultra-fine particles in its atmosphere by 33%.[19] Sugarcane ethanol has 50% less air pollutants than compared to gasoline and 90% less sulfur oxide and other toxic substances when compared to gasoline and diesel. The use of ethanol in replacement of gasoline in Sao Paulo also prevents more than 12,000 hospital admissions and 875 deaths per year[20], which is a health benefit but also a significant monetary saving for the city, given the high cost associated with hospitalizations. Bringing results closer to home, according to a study conducted by the Uni-

[19] F. Salvo, A.; Artaxo, P.; Geiger, "Reduced ultrafine particle levels in São Paulo´s atmosphere during shifts from gasoline to ethanol use."

[20] N. J. Castro, R. Brandão, and G. de A. Dantas, "Etanol e bioeletricidade: a cana-de-açúcar no futuro da matriz elétrica," Etanol e Bioeletricidade, vol. 1, pp. 140–153, 2010.

versity of Chicago's Energy Resources Center[21], for every 1% increase in volume of ethanol and reduction of aromatics, $2,35 Billion are saved. Biofuel substitution through widespread flex fuels (FFV) adoption would reduce hospitalizations and reduce deaths by 4,470 while bringing about $40 billion in savings to the public sector in the US, by reducing exposure to PM2.5. Data from US EPA also shows that the concentration of fine particles has decreased in the country between 2000 and 2013 while the consumption of ethanol has increased.

Ratio of ethanol consumption to fine particulate matter (PM 2.5) concentration in the U.S.



Source: RFA (2014)[22]

Numbers and data show us that biofuels like Brazilian ethanol are a viable, cost effective and ready solution to combat climate change. The LCFS should continue to incentivize and support such fuels, as they are already being used without need for infrastructure changes or upgrades. The LCFS should support the increased use of low CI ethanol by putting in place policies that incentivize the use of higher blends, like E-85, in the state. The US already have a significant FFV fleet and minimal investment would be needed to increase the consumption of E85. According to the US Department of Energy, there are only 274 fueling stations in California offering E85. By comparison, the State of Minnesota has 425 stations and Iowa has 336 stations. In Brazil, every fueling station must, by law, offer at least one pump of E100. The LCFS can and should give consumers of all socio-economic background choices at the pump. Ethanol can continue to help California achieve its climate change goals, internal combustion engines are not going to disappear, and should for the foreseeable future be a less costly option for consumers, so the LCFS should continue to support the use of ethanol as a way to reduce GHG emissions of these vehicles that will continue to be on the road. As California continue to move towards electric vehicles, CARB should support the development of fuel cell technologies that use ethanol to power cars. We encourage state universities in California to reach out to Brazilian

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[21] S. Mueller, "Avoided Mortalities from the Substitution of Ethanol for Aromatics in Gasoline with a Focus on Secondary Particulate Formation Steffen Mueller , PhD Principal Economist , University of Illinois at

Chicago Energy Resources Center," vol. 12, no. 2013, pp. 1–7, 2019.

[22] S. Mueller, "Avoided Mortalities from the Substitution of Ethanol for Aromatics in Gasoline with a Focus on Secondary Particulate Formation Steffen Mueller , PhD Principal Economist , University of Illinois at Chicago Energy Resources Center," vol. 12, no. 2013, pp. 1–7, 2019.

universities who are researching these technologies and find ways to cooperate. Ethanol can help decrease the need for mining (and disposal) of battery materials and the social and environmental costs attached to that[23], while offering a clean source that has an infrastructure of production and distribution already in place. Biofuels production plays a huge role in developing countries in terms of generating jobs and income for hundreds of thousands of people. By supporting bioenergy, CARB is not only supporting equity in California, but also supporting it on a global level.

We appreciate the opportunity to submit this feedback and we look forward to engaging with CARB staff to discuss the necessary changes and improvements to the scoring methodology in this rule making process.

Count on our continued support and engagement.

Sincerely,

Leticia Phillips

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[23] IPCC_AR6_WGIII_SPM.pdf – Chapter 2