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**September 19, 2022**

**California Air Resources Board**

**Rajinder Sahota**

**Deputy Executive Officer**

**Climate Change and Research, CA Air**

**1001 1 St #2828**

**Sacramento, CA, 95814**

**Re.: Changes to the Low Carbon Fuel Standard regarding biomass, including carbon neutral agricultural wood waste and forest residuals**

**Dear Rajinder Sahota,**

Biomass is a key resource for energy production identified in the scoping plan and its role could be strengthened through the actions outlined in the comments provided by Yosemite Clean Energy (“YCE”) by expediating *Changes to the Low Carbon Fuel Standard.*

Note: the following comments are in large part taken from comments submitted by the Alternative Fuels and Chemicals Coalition (“AFCC”), and the Bioenergy Association of California (“BAC”).

**Executive Summary – Recommended Actions for Changes in the Low Carbon Fuel Standard**

* Hold a workshop on biomass used in energy applications to resolve decade old issues.
* Examine and disclose the energy and GHG balance and underlying assumptions associated with biomass options including the C-BREC model used in the scoping plan.
* Align all California GHG policies with a consistent treatment of biogenic carbon including Cap and Trade, Reporting to EPA, LCFS fuel pathways, LCFS CCS protocol, LCFS grid power, and AB1383 reporting.
* Consider the impact of black carbon from avoided forest fires.
* The LCFS should include a bonus for fuels that reduce SLCP emissions as the most urgent climate measure and the only one that benefits the climate for several decades;
* The LCFS should include a Tier 1 pathway for all forms of renewable hydrogen, including hydrogen from organic waste biomass

**Background**

Yosemite Clean Energy (“YCE”) is a renewable energy developer that uses gasification technology to convert farm and forest wood waste into both carbon negative RNG and carbon negative green hydrogen (“H2”) for California’s transportation sector. Yosemite’s first plant is located in Oroville, CA and will utilize 90,000 bone dry tons per year of forest and farm wood waste from wildfire fuels mitigation and orchard removal to produce 31 tons of RNG per day and 13 tons of H2 per day.

**The Biomass Gap**

The scoping plan addresses a wide range of options but requires additional detail to accommodate evolving energy options related to forestry materials and biomass. The primary approach in biofuel policy is to model biogenic carbon based on a carbon neutral approach. The diversity of approaches to biogenic carbon accounting represents a challenge for incorporating such feedstocks into LCFS programs. 13 years after CARB’s initial report on forest residue to fuel, the accounting for biomass to fuels and process heat has yet to be resolved[[1]](#footnote-1).

To date, CARB has not formally identified an approach to quantifying emissions associated with certain types of biomass residues, including those from wood and nutshells. The lack of such transparent guidance impinges the ability to plan and execute biofuel projects that can deliver alternative biomass residue fates for hard-to-decarbonize sectors such as sustainable aviation fuel. As a result, these types of biomass residues may continue to emit GHG emissions associated with business-as-usual conventional fates, e.g., burning and decomposition, as uncertainty of their treatment in the LCFS increases perceived investor risk.

**Carbon Neutrality from Forest Residuals**

Innovators strive to produce biofuels that are more carbon efficient for both ground and aviation biofuels. In the draft Scoping Plan, CARB announced their plan to increase the short – and long-term ability for the LCFS to achieve carbon neutrality by 2045, which will be a result from reducing reliance on fossil fuels. Carbon neutrality is an important long-term goal; however, it can only be enabled by accurate accounting of carbon from feedstocks. Yosemite is concerned that CARB is not appropriately recognizing the carbon neutrality of forest residuals, and instead is inclined to rely on erroneous reports based on narrowly focused on modeling studies that fail to account for the carbon benefits of diverting forest residuals to use in products, chemicals, and fuels relative to open burning, decay, or other dispositions. We respectfully urge CARB to consider all reports carefully and eliminate considering those which are narrowly focused on predictive modeling and have limited scientific scope.

Most recently and concerningly, the C-BREC Model as described in various reports ([Minimizing emissions from forest residues – Schatz Energy Research Center (schatzcenter.org)](http://schatzcenter.org/cbrec/)), which was developed by Professor Kevin Fingerman at Humboldt State for CA’s biopower program <https://www.energy.ca.gov/publications/2021/california-biopower-impacts-project-climate-and-air-pollution-impacts-generating>, has been recommended for adaptation for the LCFS program. Based on its embedded assumptions and inputs, this model shows forest residue as carbon-positive, even considering avoided wildfire and avoided burn piles. There are multiple concerns with reliance on this model, particularly given other models and well-established reports of the carbon neutrality of forest residuals as feedstocks. For example, the model takes the existence of forestry / thinning residues as a given, and then compares conventional management- which is left to decay in place, and some pile-burned versus biomass removal and bioenergy production yet does not provide transparency on the portions of these alternative fates nor on their relative carbon releases.

The model does not include a lot of intermediate results, so it is difficult to parse. There is an apparent attempt to account for residue decay times and integrating emissions impacts over time, but no half-life studies were reported. The scope is so narrowly focused, and therefore it does not address or quantify the potential benefits from more widespread fuel management in the first place. Furthermore, it is probably no surprise that the results are carbon-positive, since the model does not include any of the factors that could make such a system carbon-negative – reduced wildfire severity from the fuels reduction treatment itself, co-production of wood products, or carbon-negative bioenergy production. YCE recommends a wider, more relevant scope for any predictive modeling from feedstocks to end of life of the biofuel. If we do not consider this wider scope, the actual environmental benefit of these biofuels will not be represented, and the production of these carbon-negative biofuels disincentivized. With regard to calculating these avoided emissions from burning, decomposition, or wood utilization, we urge ARB not to make the perfect the enemy of the good, and to address the avoided emissions, even if exact predictions cannot be calculated.

We believe that there is a wholistic, representative, forest management, wood products, and biofuels model that can be developed, that would be rigorous, defensible, and a benefit to sustainable forest management and biofuels development. We urge CARB to work with our universities, industry associations, and biofuels proponents to determine a reasonable model that could be a first generation approach to the carbon neutrality of our forests and the biofuels sector.

**Biofuel Policies Treat Biomass as Carbon Neutral for Decades**

YCE, along with AFCC, has been working very closely with USDA (Forest Service (FS)) and EPA (Office of Transportation and Air Quality (OTAQ)) regarding areas of risk of wildfire. Based on this work and in keeping with good forest management for wildfire prevention, we recommend and support policies that forest residuals be removed from forest grounds quicky for use by biofuel producers, so that aging and decaying emissions do not become an undue and inaccurate factor in forest predictive modeling studies which are not setup to capture decaying emissions and counterfactual fates accurately. If inaccurate models are used, this will materially change the carbon intensity (CI) calculation for LCFS credits, making them worth far less than what is supported by the best science and the experience. The vast majority of greenhouse gas (GHG) emissions accounting and biofuel policies treat forest residual feedstocks employed for biofuel as carbon neutral, as should CARB under the LCFS. Thereby, we ask CARB to consider adopting the definition for carbon neutrality in the most recently enacted (FY2022) Appropriations bill, in the omnibus House bill, *H.R.2471*, see page 919, referred to as the Carbon Neutrality language, which is shown below. The language is commonly referred to as “Promoting biomass as carbon neutral.”

*POLICIES RELATING TO BIOMASS ENERGY*

*SEC. 432.*

*To support the key role that forests in the United States can play in addressing the energy needs of the United States, the Secretary of Energy, the Secretary of Agriculture, and the Administrator of the Environmental Protection Agency shall, consistent with their missions, jointly—*

*(1) ensure that Federal policy relating to forest*

*bioenergy—*

*(A) is consistent across all Federal departments and agencies; and*

*(B) recognizes the full benefits of the use of forest biomass for energy, conservation, and responsible forest management; and*

*(2) establish clear and simple policies for the use of forest biomass as an energy solution, including policies that—*

*(A) reflect the carbon neutrality of forest bioenergy and recognize biomass as a renewable energy source, provided the use of forest biomass for energy production does not cause conversion of forests to non-forest use;*

*(B) encourage private investment throughout the forest biomass supply chain, including*

*in—*

*(i) working forests;*

*(ii) harvesting operations;*

*(iii) forest improvement operations;*

*(iv) forest bioenergy production;*

*(v) wood products manufacturing; or*

*(vi) paper manufacturing;*

*(C) encourage forest management to improve forest health; and*

*(D) recognize State initiatives to produce and use forest biomass.*

Most federal, state, and international standards such as the EPA RFS, EPA U.S Inventory, CA LCFS Crop Residue 2009, CA LCFS CCS Protocol, CA LCFS Grid Avg Power, CA RPS, and the internationally agreed Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA), consider biomass such as forest residuals as carbon neutral. YCE considers CARB a leader in developing GHG policies and therefore CARB needs to ensure the treatment of carbon accounting is done accurately with the appropriate scientific methodologies and predictive models. YCE requests that CARB treat all forest residuals in risk of wildfire deployed in new fuel technologies are consistent with all fuel policies and pathways.

YCE requests that CARB have a workshop on forest residuals and achieve consensus by all stakeholders on carbon neutrality studies, use of forest biomass feedstock calculator for CA-GREET which estimates emissions from forest residuals and recognizes zero indirect land use change (iLUC) which will be adopted by all states. This, in turn, should lead to an administrative action or rulemaking by CARB to confirm the carbon neutrality of forest residuals and ensure that CARB’s tools reflect that.

**Need to Incentivize SLCP Reductions**

YCE urges the Air Board to adopt additional incentives for fuels that reduce Short-Lived Climate Pollutants, which is the most urgent measure we can take to address climate change and the only one that benefits the climate right away – or for the next several decades. As climate experts have noted, reducing SLCP emissions is “the last lever we have left to avoid catastrophic climate change.”[[2]](#footnote-2)

Adding incentives for fuels that reduce SLCP emissions makes sense for several reasons. First, SB 1383 requires significant reductions in SLCP emissions – a 40 percent reduction in methane and a 50 percent reduction in anthropogenic black carbon - by 2030.[[3]](#footnote-3) Second, climate science is now very clear that reducing SLCP emissions is by far the most urgent step we can take to address climate change as it is one of very few measures that begins to cool the climate right away – or even in the next several decades. As the Air Board’s Short-Lived Climate Pollutant Reduction Strategy states, “The science unequivocally underscores the need to immediately reduce emissions of short-lived climate pollutants (SLCPs).”[[4]](#footnote-4) The Draft 2022 Climate Change Scoping Plan also notes the urgency of reducing SLCPs, stating that “[g]iven the urgency of climate change . . . efforts to reduce short-lived climate pollutants are especially important”[[5]](#footnote-5) and that “efforts to reduce short-lived climate pollutants emissions can provide outsized climate and health benefits.”[[6]](#footnote-6)

SLCP reductions, unlike reductions in carbon dioxide emissions, also provide immediate and significant public health benefits.[[7]](#footnote-7) Black carbon and methane are both air pollutants that impact air quality and public health significantly. As the Draft Scoping Plan notes, every million metric tons of methane reduced saves 1,430 premature deaths.[[8]](#footnote-8) Black carbon, also known as particulate matter, is even worse for public health and also impacts agricultural productivity, forest health, and precipitation patterns. In other words, not only is SLCP reduction more critical for the climate than other carbon reductions, but it also provides more immediate benefits to public health and the economy than carbon dioxide reductions.

YCE urges the Air Board to incentivize low carbon fuels that reduce SLCP emissions to help meet the requirements of SB 1383 and to provide direct benefits to public health. This includes biofuels, hydrogen and electricity generated from organic waste in California, which reduces SLCP emissions from landfills, livestock, agricultural, and forest waste. The Air Board could adopt additional incentives for fuels that cut SLCP emissions to accelerate their production and use. Incentives for fuels that reduce SLCP emissions could include:

* the adoption of a bonus credit or adder
* a guaranteed credit price, as suggested in SB 1383

**Need to Include All Renewable Feedstocks in Tier 1 Hydrogen Pathway**

YCE supports staff’s proposal to create a Tier 1 pathway for renewable hydrogen to enable “integration of low CI sources of hydrogen expeditiously.”[[9]](#footnote-9) That pathway should include all forms of renewable hydrogen, though, including waste biomass as defined in Public Resources Code section 40106, to be consistent with other state laws and policies. Staff’s August 18 presentation only proposed a Tier 1 pathway for electrolytic hydrogen and hydrogen from steam methane reformation of renewable natural gas. This excludes hydrogen from waste biomass such as forest waste, agricultural waste, or urban wood waste that will otherwise go to landfills. Excluding hydrogen from waste biomass contradicts the goals of SB 1383 to reduce anthropogenic black carbon and methane emissions and it also contradicts a number of recent policies to promote hydrogen production from waste biomass, including the state’s 2021 allocation of $50 million to the Department of Conservation for forest waste to advanced biofuels projects including forest waste to hydrogen.[[10]](#footnote-10)

Excluding hydrogen from waste biomass makes no sense when biomass (cellulosic waste) makes up 80 percent of California’s organic waste stream.[[11]](#footnote-11) In addition, many recent studies and analyses have found that hydrogen from waste biomass can be very low carbon or carbon negative. As Lawrence Livermore National Lab’s 2020 report on carbon neutrality found, converting forest, agricultural, and urban wood waste to hydrogen with carbon capture and storage can provide significant carbon negative emissions.[[12]](#footnote-12)

In addition, the conversion process for biomass to hydrogen uses a lower emission process – water gas shift – than the steam methane reformation process. That is why the CPUC has included hydrogen from waste biomass in its Self-Generation Incentive Program, but does not allow hydrogen from RNG (biomethane).[[13]](#footnote-13) The CPUC’s SGIP Decision defines SGIP-eligible renewable hydrogen fuel as hydrogen produced from either a) non-combustion thermal conversion of biomass, or b) electrolysis using 100 percent renewable electricity.[[14]](#footnote-14)

Excluding waste biomass from the Tier 1 pathway would also contradict recent legislation that defines renewable and clean hydrogen to include hydrogen from any RPS eligible resource, which would include biomass as well as biogas (RNG).[[15]](#footnote-15)

* [AB 157](https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202120220AB157) (Budget 2022) section 12100.161 defines “clean hydrogen” for purposes of the federal clean hydrogen hub funding as:

“Clean hydrogen” means hydrogen produced from eligible renewable energy resources, as defined in Section 399.12 of the Public Utilities Code, and otherwise consistent with the standard set forth in Section 16166(b)(1)(B) of Title 42 of the United States Code, or as that standard is revised or supplemented by the State Air Resources Board consistent with the determination made by the Secretary of Energy pursuant to Section 16166(b)(2) of Title 42 of the United States Code.

* [AB 209](https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202120220AB209) (Budget 2022), Article 4, creating Public Resources Code section 25664, which establishes a hydrogen program at the CEC:

For purposes of this article, hydrogen projects that produce, process, deliver, store, or use hydrogen derived from water using eligible renewable energy resources, as defined in Section 399.12 of the Public Utilities Code, or produced from these eligible renewable energy resources, shall be eligible for financial incentives pursuant to this article.

For all these reasons, YCE supports the proposed Tier 1 pathway for renewable hydrogen and urges the Air Board to include hydrogen from all RPS eligible resources including waste biomass. If the Air Board wants to ensure that only low CI hydrogen is included, then it should adopt a CI based performance standard. The Air Board should not categorically exclude renewable feedstocks such as waste biomass that can provide low carbon and carbon negative hydrogen while helping to reduce black carbon and methane emissions from the open burning or landfilling of waste biomass.

**Conclusion**

Yosemite Clean Energy is requesting forest residuals or hazardous fuels to be treated as carbon neutral feedstocks for producers of biofuels. We respectfully ask CARB to have consistency in its regulatory development of standards to that of other states, federal agencies, and international policies, for ease of adoption, and not create market confusion. We ask that CARB hold a stakeholder workshop on forest residuals and its treatment of carbon neutrality, leading to policies, rules, and tools properly reflecting the carbon neutrality of forest residuals as biofuel feedstock.

**Thomas Hobby**

**CEO & Managing Member**

**Yosemite Clean Energy**

1. CARB. (2009). Detailed California-Modified GREET Pathway for Cellulosic Ethanol from Forest Waste. Stationary Source Division, Version 2.1. [↑](#footnote-ref-1)
2. Dr. V. Ramanathan, UC San Diego Scripps Institute, https://bendingthecurve.ucsd.edu/. [↑](#footnote-ref-2)
3. Health and Safety Code section 39730.5. [↑](#footnote-ref-3)
4. *Short-Lived Climate Pollutant Reduction Strategy*, adopted by the California Air Resources Board, March 2017, at page 1. [↑](#footnote-ref-4)
5. Id. at page 22. [↑](#footnote-ref-5)
6. Id. [↑](#footnote-ref-6)
7. Id. [↑](#footnote-ref-7)
8. *Draft 2022 Climate Change Scoping Plan*, page 180. [↑](#footnote-ref-8)
9. LCFS Program Staff Presentation, August 18, 2022, slide 21. [↑](#footnote-ref-9)
10. See, https://www.conservation.ca.gov/cgs/fbp. [↑](#footnote-ref-10)
11. See the CEC’s *2017 Integrated Energy Policy Report*, Table 19, page 263. See, also, Lawrence Livermore National Laboratory, *Getting to Neutral – Options for Negative Carbon Emissions in California*,” January 2020. [↑](#footnote-ref-11)
12. Lawrence Livermore National Laboratory, footnote above. [↑](#footnote-ref-12)
13. CPUC Decision 21-06-005 at page 34. [↑](#footnote-ref-13)
14. Id. [↑](#footnote-ref-14)
15. See the definitions of “clean” and “renewable” hydrogen adopted in AB and AB [↑](#footnote-ref-15)