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CSG - Comments on the implementation of the Clean Hydrogen Program

Conservation Strategy Group submits comments in relation to implementation of the Clean Hydrogen Program.

Additional submitted attachment is included below.

December 16, 2022

California Energy Commission
715 P Street
Sacramento, California 95814

Rizaldo Aldas
Energy Research & Development Division

Re: Docket #22-ERDD-03, Comments on the implementation of the Clean Hydrogen Program

We support the California Energy Commission's (CEC) efforts to implement the Clean Hydrogen Program and advance in-state demonstration of the production, processing, delivery, storage, and end use of hydrogen. We support the technology-neutral approach currently planned for the smaller distributed scale system. With this letter, we comment on the proposed eligible hydrogen production technologies. **We recommend that the CEC include biomass gasification as an eligible technology and biomass waste as an eligible renewable energy resource, including forest and agricultural waste residues.**

Recent research has shown that California generates over 50 million dry tons of forest, agricultural, and urban waste biomass each year (Figure 1). The residues are typically either field burned, combusted in wildfire, left to decompose, or landfilled, emitting substantial amounts of carbon dioxide (CO2), methane and criteria pollutants, thereby undercutting the state's air quality and net-zero emissions goals. 50 million tons of waste biomass equals to around 91 million tons of CO2, or about 21% of the state's greenhouse gas inventory.[1] This excludes additional CO2 emitted as methane or black carbon – both of which have significantly higher radiative forcing impacts. Without a strategy to manage waste biomass, California risks falling short of its carbon neutrality by 2045 climate targets.

In light of this problem, in 2020 the Joint Institute for Wood Products Innovation (state research institute established via Executive Order B-52-18) performed a literature review of alternative woody biomass utilization options. Biomass utilization provides dual climate benefits in the form of avoided emissions (i.e. avoided decomposition, field burning, etc.) and new emission reductions, such as by displacing fossil fuels. The study found that the most technologically and commercially feasibly utilization option for biomass residues was conversion to liquid and gaseous transportation fuels, notably renewable hydrogen, with gasification and pyrolysis as key technology pathways.

[1] 1 dry ton of biomass contains 50% carbon. Therefore, 50 million dry tons of biomass contains 25 million tons of carbon. To convert carbon to CO2, multiply by 44/12. Therefore, 25*(44/12) = 91 MtCO2 per year.

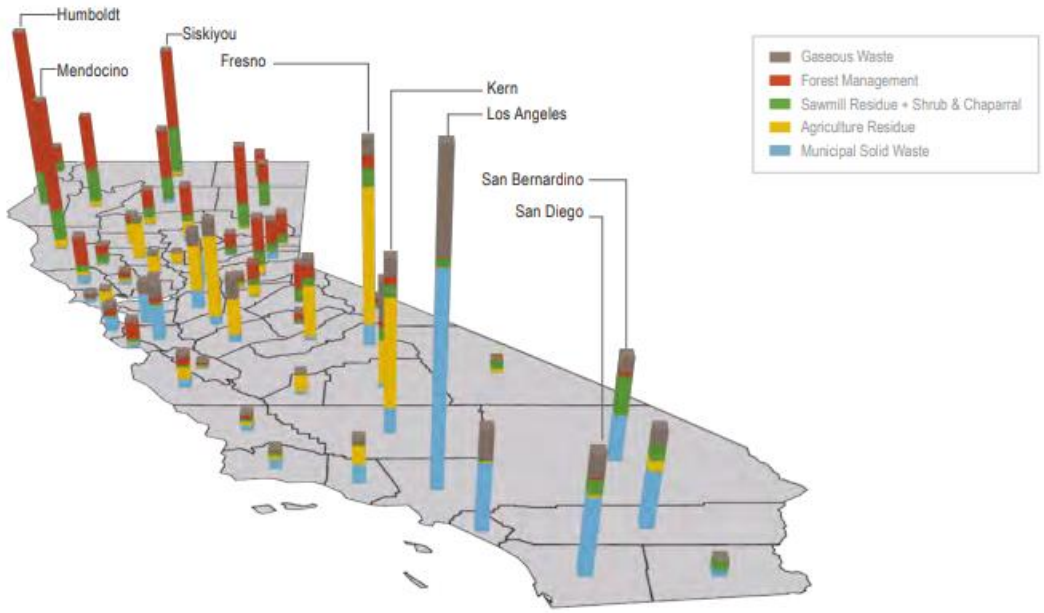

Figure 1. This diagram provides estimates of waste biomass volumes by county. Source: Lawrence Livermore National Laboratory, 2020.

Additionally, there is potential for biomass-derived hydrogen and low-carbon fuels to be carbon negative with the addition of carbon capture and storage (CCS). Recent studies from Lawrence Livermore National Laboratory (LLNL), Princeton University, and the Air Resources Board have shown that large-scale technological carbon dioxide removal (CDR) is necessary for California to achieve net-zero emissions by 2045, notably "BECCS". Biomass gasification-hydrogen was also identified in the 2022 Scoping Plan as a key near-term option for meeting hydrogen demand from the transportation sector. The LLNL and Princeton study highlight the potential for biomass-derived hydrogen with CCS to deliver tens of millions of tons per year of permanent CDR by 2045 at lowest-cost. It should be noted that it is not possible to achieve CDR via natural gas steam methane reforming or electrolysis.

There are a number of ongoing state efforts aimed at advancing biomass waste conversion pathways into low-carbon and carbon-negative fuels, including the Department of Conservation's Forest Biofuels Gasification Program, CAL FIRE's Wood Products Grant Program, the Infrastructure and Economic Development Bank's Climate Catalyst Fund, and the Office of Planning and Research's Feedstock Program. These programs have provided an important signal for in-state project developers, with at least seven projects capable of producing hydrogen sourced from biomass currently in development. [2]

A recent state-supported forest biofuels working group identified a number of public benefits associated with community-scale biofuels facilities, particularly hydrogen facilities sourced from forest biomass residues. These benefits include rural energy security, replacement of fossil fuels in rural and Tribal lands, rural economic and climate resilience, sustainable and family-sustaining job opportunities, and more. That is all to say that biomass waste conversion appears to be a "least regrets" opportunity for

[2] See: Mote, Clean Energy Systems, Yosemite Clean Energy, H Cycle, Raven SR, Aemetis and SG H2 Energy.

California to achieve deep emissions reductions while improving air quality, equity, and workforce benefits. We believe that the Clean Hydrogen Program could play a role in realizing these goals.

We recommend that the CEC include biomass gasification and pyrolysis technologies as eligible technologies, as well as include biomass waste as an eligible renewable energy resource under the Clean Hydrogen Program. As a second point, we recommend the CEC prioritize eligible carbon-negative projects in order to maximize the emissions reduction potential for these hydrogen pathways.

We are thankful to submit these comments in relation to implementation of the Clean Hydrogen Program and hope to engage further.

Respectfully submitted:

Conservation Strategy Group