September 9, 2020

The Honorable Richard Corey, Executive Officer
California Air Resources Board
1001 I Street
Sacramento, CA 95814

Re: Comments on Draft E3 Report on Carbon Neutrality

Dear Mr. Corey:

The Bioenergy Association of California (BAC) submits these comments on E3's draft report on carbon neutrality, presented at ARB's public workshop on August 19. BAC strongly supports the goal of carbon neutrality by mid-century and agrees with many of the conclusions and recommendations in the Draft Report, particularly the findings that there is no silver bullet for climate change and that we need to pursue all low carbon and carbon negative options. We are concerned, however, about several of the assumptions and omissions that understate the importance of bioenergy, waste reduction, and wildfire reduction in helping the state to achieve carbon neutrality. As described more fully below, our biggest concerns are:

- E3 continues to rely on an unscientific, "population weighted share" of national biomass potential to calculate California's organic waste supply when far more accurate, actual assessments of California's organic waste exist.
- The Draft Report largely ignores climate emissions from wildfire, including the emissions caused by electricity generation and infrastructure.
- The Draft Report largely ignores black carbon emissions even though SB 1383 requires a 50 percent reduction in anthropogenic black carbon by 2030.
- E3 proposes to eliminate biomethane in the transportation sector, yet projects significant continued use of internal combustion engines and diesel fuel for heavy duty vehicles.
- Several assumptions and conclusions are unsupported by the data in the report or contradict state law.

BAC represents more than 75 local governments, public agencies, private companies, utilities, environmental and community groups, research and academic institutions, and others working to convert California's organic waste to sustainable bioenergy. BAC's public agency members include cities and counties, wastewater treatment facilities, local air districts, environmental and waste agencies, research labs, universities, publicly owned utilities, and non-profit organizations. BAC's private sector members

include energy technology companies, project developers, utilities, investors, waste industry, food processing, and many other businesses.

BAC strongly supports the goals of the Draft Report, but urges E3 to correct or provide verification of several critical assumptions and conclusions. The most important of which are described below.

1. **The Draft Report Relies on an Unscientific Assessment of California's Bioenergy Potential.**

Inexplicably, E3 continues to rely on an unscientific method of determining California's biomass and biogas potential, when peer-reviewed on-the-ground quantifications exist. The impact is significant because E3's unsupported assessment of biomass potential is 40 percent lower than scientific assessments and skews the Draft Report's findings and conclusions. In the Draft Report, E3 relies on a population weighted share of the national biomass potential calculated by the U.S. Department of Energy. This makes absolutely no sense as biomass potential is only partially related to population. In California, two of the largest sources of biomass – forest waste and agricultural waste – are totally unrelated to population. In addition, food processing waste, dairy manure, and many other sources of organic waste are largely or entirely unrelated to population.

E3 should not continue to use this unscientific and inaccurate view of California's organic waste potential, especially when peer-reviewed and California-specific assessments exist. Most recently, Lawrence Livermore National Lab included a detailed and peer-reviewed assessment of California's biomass (organic waste) potential,[1] which is 40 percent higher than the unscientific approach that E3 has taken. LLNL's assessment is very similar to assessments done by UC Davis, with the exception of the forest biomass category which is much larger in the LLNL assessment since LLNL also included shrub and grass removal for wildfire mitigation (now required by SB 901 and other state policies) as well as sawmill residues.

LLNL found that -- based on actual California data -- California's organic waste potential is 56 million Bone Dry Tons (BDT) per year. E3, using a population weighted share of national data, found that California's biomass potential is only 40 million BDT per year. This is a very significant difference and skews much of E3's analysis despite being indefensible from a scientific standpoint.

BAC urges E3 to stop relying on a population weighted share of national biomass potential, which is not defensible scientifically. E3 should instead rely on peer-reviewed assessments of California's organic waste, such as the LLNL report released in January. E3's underestimation of California's organic waste (biomass and biogas) potential seriously skews many of the report's findings and recommendations, including the many statements about how limited California's biomass potential is.

[1] Lawrence Livermore National Laboratory, *Getting to Neutral – Options for Negative Carbon Emissions in California*, January 2020, at page 29, Table CS-3.

2. The Draft Report Fails to Address the Connections Between Energy and Wildfire.

It is hard to overstate the role of wildfire emissions in California's climate plans, yet the Draft Report does not address those emissions at all. Wildfire is the largest source, by far, of black carbon emissions, which are among the most damaging of all climate pollutants. According to the *California Short-Lived Climate Pollutant Reduction Strategy,* wildfire causes more than two-thirds of California's black carbon emissions and those emissions have a 20-year Global Warming Potential that is 3,200 times more damaging to the climate than carbon dioxide.[2] The *California Forest Carbon Plan* also found that California cannot achieve its climate goals without significantly reducing emissions from wildfire and increasing carbon sequestration in California's forests.[3] And both the *SLCP Strategy* and the *Forest Carbon Plan* were adopted by state agencies before the two most catastrophic wildfire seasons in California history (2018 and 2020).

BAC appreciates that the Draft Report is focused primarily on the energy sector, but there is a direct relationship between energy use and wildfire. In fact, there are several important connections, which the Draft Report utterly ignores.

First, electricity infrastructure and operations cause a large number of catastrophic wildfires, but the Draft Report ignores the emissions from electricity caused wildfires, even when the fires are the result of negligence or worse (not strict liability). This makes no more sense than ignoring methane leaks from gas pipelines and storage tanks which are – correctly – attributed to the gas sector. Emissions from electricity caused wildfires should be attributed to the electricity sector and included as electricity sector emissions and included in lifecycle carbon analyses of electricity generation, just as methane leakage is included in lifecycle analyses of gas usage.

Second, the Draft Report ignores the role that bioenergy can play in reducing emissions from wildfire and controlled burns. According to the *Forest Carbon Plan*, bioenergy can cut black carbon and methane emissions by 98 percent compared to pile and burn of forest waste or wildfire.[4] These are enormous reductions and can be even greater when combined with biochar production,[5] which is also completely omitted from the report. The *Forest Carbon Plan* also found that the lack of bioenergy infrastructure is a major impediment to meeting California's forest carbon goals and that California needs

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[2] *Short-Lived Climate Pollution Reduction Strategy,* adopted by the California Air Resources Board in March 2017, at page 40, Table 5.

[3] *California Forest Carbon Plan – Managing Our Forest Landscapes in a Changing Climate,* adopted by the California Environmental Protection Agency, California Natural Resources Agency and CalFire in May 2018, at 2.

[4] *California Forest Carbon Plan*, above, Figure 19, page 135.

[5] Lawrence Livermore National Laboratory, *Getting to Neutral – Options for Negative Carbon Emissions in California*, January 2020, at pages 22-23.

to accelerate the development of new small-scale bioenergy facilities to reduce emissions from both wildfire and controlled burns.

Third, the Draft Report fails to address the increasing emissions from diesel backup generators deployed to protect against Public Safety Power Shutoffs, which are necessary to avoid electricity caused wildfires. Emissions from diesel backup generators are significant sources of both air and climate pollution and the CPUC has opened several proceedings to address diesel alternatives, none of which is mentioned in the Draft Report.

All of these emissions sources and solutions – which are increasingly significant in California – are ignored in the Draft Report. At a minimum, BAC urges E3 to identify these issues and to include them in the list of areas that require additional research and policy development. In particular, BAC urges E3 to include the following in the final report:

- Emissions from electricity caused wildfires and how they affect the lifecycle carbon emissions from the electricity sector. This is critical to include in any report on carbon neutrality.
- Emissions from diesel and natural gas backup generation – especially when it's used to provide power during Public Safety Power Shutoff events that are intended to avoid electricity caused wildfires.
- Quantification of the emissions reductions from wildfire and controlled burns if forest biomass and other vegetation removed for wildfire mitigation are converted to bioenergy with biochar production or carbon capture and storage instead.

3. The Draft Report Largely Ignores Anthropogenic Black Carbon.

As with wildfire emissions, the Draft Report largely ignores the other major sources of anthropogenic black carbon, including emissions from open burning of agricultural waste, emissions from diesel fueled vehicles and backup generators, emissions from wood stoves, and other anthropogenic black carbon sources. This is a significant omission in a report focused on achieving carbon neutrality, especially since anthropogenic black carbon is one of the fastest growing sources of climate pollution in California. For example, the San Joaquin Valley Air District has found that open burning of agricultural waste has increased 400 percent over the past five years, mostly due to the shut-down of half of the large biomass facilities in the Valley. Open burning of agricultural waste is a significant source of anthropogenic black carbon emission and other air and climate pollutants.

SB 1383 (Lara, 2016) requires California to reduce anthropogenic black carbon emissions 50 percent by 2030, yet the Draft Report does not even address this requirement or how it relates to energy supplies and carbon neutrality.

The Draft Report also ignores the potential for bioenergy to reduce anthropogenic black carbon emissions. As with forest waste, bioenergy can cut black carbon and methane emissions from open burning of agricultural waste by 98 to 99 percent and can cut other air and climate pollutants as well.[6]

The report also largely ignores the urgent need to reduce black carbon and smog-forming emissions from diesel fueled heavy duty vehicles. Diesel trucks are the largest source of air pollution in the San Joaquin Valley and South Coast Air Districts, and they are also a significant source of black carbon emissions. Biogas from organic waste can virtually eliminate black carbon from diesel and can cut lifecycle carbon emissions by 100 percent or more. Yet, the Draft Report assumes that some amount of new diesel fueled trucks will continue to be sold in California through 2040 at least.[7] This is simply unacceptable from a climate and an air quality standpoint.

The Draft Report fails to address the urgent need to reduce black carbon and other Short-Lived Climate Pollutant emissions, focusing mostly on fossil fuel reductions instead. California needs to do both and, to the extent that we need to prioritize, it is far more urgent to reduce SLCP emissions, especially anthropogenic black carbon that is so many times more damaging to the climate than carbon dioxide and the reduction of which benefits the climate right away (which carbon dioxide reductions do not).

BAC urges E3 to expand the Draft Report to include a section on Short-Lived Climate Pollutant reductions in the energy sector and to prioritize the elimination of diesel and the reduction of open burning of agricultural waste, all of which can be done by converting organic waste to energy and fuels.

4. The Draft Report Should Not Rely on Continued Diesel Use for the Next Several Decades When Lower Carbon Alternatives Exist Now.

The Draft Report makes several disturbing assumptions about the future of medium- and heavy-duty vehicles in California. First, it assumes that biomethane and natural gas use in vehicles will be phased out by 2035.[8] At the same time, the Draft Report assumes that Californians will continue to purchase medium- and heavy-duty vehicles powered by internal combustion engines until 2035 and will continue to have some diesel powered vehicles in 2045 and beyond. Specifically, the Draft Report projects that:

- Nearly half of medium-duty vehicles, and more than half of heavy-duty vehicles, on the road in 2035 will be internal combustion engine vehicles;
- 15-20% of heavy-duty vehicles on the road in 2040 will be internal combustion engines; and

[6] See, California *Forest Carbon Plan*, above, and CAPCOA Biomass Policy Statement at page 1.

[7] *Achieving Carbon Neutrality in California,* Draft Report by E3, released August 2020, at pages 39 and 40 [hereinafter "Draft Report"].

[8] Draft Report at page 40.

- 7 percent of heavy-duty vehicles will still be powered by diesel in 2040.[9]

These assumptions make no sense when 90 percent cleaner alternatives that can run on carbon negative biogas exist now. By ARB's own analysis, near-zero emission natural gas trucks that run on biogas can cut NOx by 90 percent compared to diesel and can cut carbon emissions by 100-300% depending on the biogas source. Why not phase out diesel more quickly and encourage continued use of biomethane in near-zero emission trucks until truly commercial ZEV alternatives are available?

If the Draft Report is assuming that biomethane and natural gas will be phased out of the transportation sector, but 15-20 percent of heavy duty vehicles will still rely on internal combustion engines in 2040, then how is it possible that only 7 percent will be powered by diesel? More importantly, why would California plan to have any diesel fueled vehicles in 2040, or even 2030, when diesel powered heavy-duty vehicles are the largest source of air pollution in the two most polluted air districts in the country, the South Coast and San Joaquin Valley Air Districts.

Eliminating the use of diesel should be one of California's top priorities for both climate change and air quality since diesel emissions contain black carbon and toxic air contaminants and are a major source of smog-forming pollution. In fact, Governor Newsom has called for the end of diesel-powered vehicles by 2030.[10]

The projections in the Draft Report appear to be inconsistent regarding the percentages of medium- and heavy-duty vehicles, the elimination of biomethane, and the continued use of diesel. BAC urges E3 to prioritize the elimination of diesel powered vehicles as quickly as possible, and certainly by 2030 as Governor Newsom has called for, and to substitute near-zero emission natural gas vehicles powered by biomethane for medium- and heavy-duty vehicles that rely on internal combustion engines. This pathway will provide the greatest reductions in lifecycle carbon emissions and air pollution.

5. Several of the Report's Findings are Unsupported by the Data or Contradict State Law.

There are several areas of the Draft Report that present cost data, emissions reductions conclusions, or other information without any supporting documentation. In a few cases, the information presented directly contradicts state law or the scientific consensus. BAC urges E3 to correct, or provide background data and analysis to support, at least the following:

a. The Draft Report incorrectly assumes no carbon reductions from the waste sector.

[9] Draft Report at pages 43-44.

[10] Gavin Newsom's campaign platform for Governor stated his goal to "Set California on the Fast Track to Zero Diesel Pollution by 2030."

Figure 22 on page 61 of the Draft Report indicates that the waste sector will not cut carbon emissions appreciably between now and 2045. This contradicts the requirements of SB 1383 (Lara, 2016) to cut methane emissions 40 percent by 2030 and to divert 75 percent of organic landfill waste to energy or compost by 2025. According to CalRecycle analysis, the landfill diversion alone will reduce emissions by 85 to 90 million metric tons of CO_2e.[11] When converted to energy, diverted organic waste can provide carbon negative emissions on a lifecycle basis since they reduce fugitive methane emissions from landfills and flaring of landfill gas, in addition to displacing fossil fuel combustion. Figure 22 should be corrected to include carbon reductions in the waste sector.

b. The Draft Report asserts that BECCS is risky, costs likely to remain high, and ignores biochar as an option for carbon sequestration.

The Draft Report makes a number of statements about BECCS that are incomplete or unsupported. In particular, the Draft Report asserts that BECCS is risky, costs are likely to remain high, and that geologic carbon storage is expensive and risky. The Draft Report fails to compare the costs per ton of carbon reduction from bioenergy, which can be quite cost-effective since it often produces carbon negative fuels and power. Comparing bioenergy costs to intermittent renewables is a false comparison, since intermittent renewables require backup generation and/or storage. E3's own analysis, presented to the CPUC earlier this year, found that the marginal costs of batteries will start to go up and ultimately end up several times more expensive than bioenergy.

In comparing costs of energy or carbon reductions, the analysis is overly simplistic. First of all, the same biogas or syngas or renewable hydrogen molecule can provide a double benefit to the energy sector, both as a form of energy storage and then as a baseload or flexible generation fuel. Both of these attributes are becoming increasingly valuable, yet the report does not separate out these two very beneficial attributes. The Draft Report also assumes little to no reductions in costs over time, which contradicts the experience of every other renewable technology sector and fuel, all of which have bent the cost curve as they have become more commercially accepted and deployed.

The discussion of BECCS also ignores the potential to generate biochar as a byproduct that has economic value (thereby reducing the cost of bioenergy production by providing an additional revenue stream). The Draft Report also ignores the proven role of biochar to sequester carbon, incorrectly assuming that the only method of carbon sequestration and storage is geologic storage. Instead, the Draft Report asserts that the potential for BECCS is "limited by the potential for geologic carbon sequestration in California."[12] The scientific consensus is that biochar can provide at least 100 years of carbon sequestration, which is enough to be classified as "permanent" sequestration[13] and should be included as a way to sequester carbon, increase revenues, and reduce the lifecycle carbon intensity of biomass to energy projects.

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[11] California's Climate Strategy: Waste Sector Goals (4/18/2019).

[12] Draft Report at pages 63-64.

[13] Lawrence Livermore National Lab report, footnote 5 above, at page 28.

Several state agencies and multiple national research labs have conducted extensive research on biochar, which should be included in any discussion of biomass conversion or carbon sequestration.

c. The Draft Report makes several assumptions about cost of technologies that contradict actual data on the ground and peer reviewed studies.

Figure 25 on page 73 shows the costs per ton of carbon reduction for many different technologies, with no real explanation or citation for most of the data presented in the graph. Several of the data points directly contradict the costs of carbon abatement under the Low Carbon Fuel Standard and findings of other reports, including several recent reports by the California Legislative Analyst's Office on the cost-effectiveness of different transportation climate programs.

BAC is particularly concerned about the assertion that electrification of medium- and heavy-duty vehicles would have negative costs per ton of carbon reduction. This is not explained or supported in the Draft Report itself and it flatly contradicts the findings of the LAO's reports, reports conducted for the Los Angeles Metropolitan Transit Agency, and ARB's own analysis under the Clean Transportation Program.

The cost data presented in Figure 25 also contradicts the cost analysis provided in Lawrence Livermore National Lab's peer-reviewed report on carbon neutrality. That report found that biomass conversion to energy can cut carbon emissions for an average cost of $64 per ton.

The final report should correct or verify the cost data in this graph and explain the basis for finding that vehicle electrification can provide negative cost carbon reductions.

d. The Draft Report concludes, without explanation or data, that converting biomethane to hydrogen will not displace fossil fuels.

The Draft Report asserts that converting biomethane to hydrogen will not displace fossil fuels.[14] There is no explanation for this statement, which contradicts other reports and real world experience where hydrogen derived from biomethane is being used to displace fossil fuels, including on UC campuses, at wastewater treatment facilities, and elsewhere.

e. The Draft Report incorrectly states that SB 100 requires zero carbon resources by 2045.

On page 15, the Draft Report incorrectly summarizes the goal of SB 100 by stating that the bill requires 100 percent carbon free power by 2045.[15] SB 100 sets a goal of 100

[14] Draft Report at page 71.

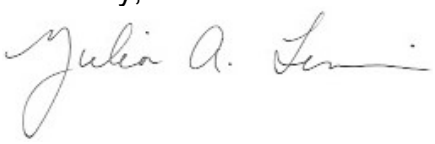
[15] The Draft Report states, incorrectly, that SB 100 requires "zero-carbon retail and state electricity sales by 2045." (p. 15).

percent of California's power coming from RPS eligible resources and carbon free resources." Resources do not have to be both RPS eligible and carbon free. This is significant because some forms of bioenergy, while providing a significant reduction in carbon emissions compared to the alternative fates of burning or landfilling organic waste, may not be zero carbon on a lifecycle basis. This is especially true of biogas from landfills and wastewater treatment facilities. According to ARB's lifecycle analysis under the Low Carbon Fuel Standard, biogas from landfills and wastewater treatment plants is low carbon, but not zero carbon. Using that biogas for bioenergy provides a net carbon benefit, however, compared to venting or flaring the biogas, which will be generated no matter what. These are just two examples of RPS eligible fuels that are not zero carbon but still provide a significant carbon benefit compared to the alternative fate of the fuel. In addition, solar and wind power are not zero carbon on a lifecycle basis when including raw materials, manufacturing, transport, construction, and operation of solar and wind power.

The statement about SB 100 on page 15 of the Draft Report should be corrected in the final report to state that SB 100 sets a goal of 100 percent RPS eligible resources and zero carbon resources by 2045.

Thank you for your consideration of these comments and corrections.

Sincerely,



Julia A. Levin
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