CENTER *for* BIOLOGICAL DIVERSITY

August 5, 2013

Comments of the Center for Biological Diversity
on the 2013 AB 32 Scoping Plan Update

The Center for Biological Diversity ("Center") offers the following preliminary comments on the California Air Resources Board's (CARB's) update to the AB 32 Scoping Plan. We greatly appreciate the opportunity offered by CARB to provide comments while the draft updated plan is still under development. We look forward to providing further comments on the update when it becomes available.

At this stage, the Center would like to direct CARB's attention to a significant greenhouse gas emissions accounting error in the 2008 Scoping Plan—an error that could undermine California's ability to achieve AB 32's emissions reduction goals. The error stems from the Scoping Plan's treatment of *all* electricity generated under the 33% Renewables Portfolio Standard (RPS) as if it reduces greenhouse gas emissions by an amount equivalent to the emissions associated with in-state natural gas generation. (Scoping Plan at 46 and App. I, I-23, I-29.) In effect, the Scoping Plan treats all RPS-compliant generation as if it produces no greenhouse gas emissions at all.

This treatment is plainly incorrect with respect to electricity generated from biomass.[1] As discussed in the attached document,[2] biomass produces roughly three times as much CO_2 at the stack per unit of energy generated as natural gas, and is even more carbon-intensive than coal. Even considering both the "net" lifecycle emissions associated with biomass and the displacement of fossil-fired generation, biomass energy can result in a significant net increase in atmospheric CO_2 concentrations for decades, centuries, or even permanently depending on the feedstock—meaning that any purported carbon benefit of biomass energy generation from most feedstocks will only occur, if at all, far beyond AB 32's 2020 time frame. In the meantime, these increased emissions will hinder rather than help California meet AB 32's emissions reduction requirements.

In an appendix to the 2008 Scoping Plan, CARB acknowledged that "[f]urther study is needed to determine which renewable technologies and fuel sources (e.g., solar, biomass, etc.) provide the greatest GHG benefits." (Scoping Plan App. C, C-129.) Since

[1] We recognize that biomass is considered a "renewable" energy source for purposes of the RPS. (Pub. Util. Code § 399.12(e); Pub. Res. Code § 25741(a)(1).) AB 32, however, imposes an independent obligation upon CARB to ensure that the state as a whole meets the statute's mandatory emissions reduction goals. (Health & Saf. Code § 38550.)
[2] Ctr. for Biological Diversity, Frequently Asked Questions About Biomass Energy (Aug. 2013) (attached).

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2008, a great deal of further study has occurred, much of it in the pages of peer-reviewed scientific journals. The overwhelming conclusion, discussed in detail in the attached document, is that most biomass energy generation does not provide GHG benefits on a time scale relevant to compliance with AB 32's 2020 emissions reduction goals.

The Center therefore strongly urges CARB to remove biomass energy generation from the set of RPS-compliant electricity generation technologies treated as if they do not produce any greenhouse gas emissions for purposes of AB 32 (Measure E-3 in the 2008 Scoping Plan, Appendix I). The Center further recommends that CARB reconsider its decision to exempt most biomass combustion from any compliance obligation under the AB 32 cap-and-trade system.[3] Because electricity generation from many biomass feedstocks will increase greenhouse gas emissions through 2020, such emissions cannot be assumed away, but rather must be accounted for and regulated in accordance with AB 32's overall emission reduction requirements.

Thank you very much for your consideration of these preliminary comments. We would be happy to provide any further information that would assist CARB staff in addressing the above-referenced issues. We look forward to reviewing the draft Scoping Plan update and to providing further comments at the appropriate juncture.

Sincerely,

Kevin P. Bundy
Senior Attorney

Attachment: Frequently Asked Questions About Biomass Energy (August 2013)

[3] Cal. Code Regs., tit. 17, § 95852.2.

Frequently Asked Questions About Biomass Energy

Center for Biological Diversity

August 2013

Q: Doesn't renewable energy, including biomass, reduce fossil fuel emissions?
A: "Renewable" doesn't mean "low-carbon." In fact, burning wood for electricity releases more CO_2 per megawatt of energy than burning coal, and far more CO_2 than burning natural gas. This is because wood is less energy-dense, and contains more moisture, than fossil fuels. Measured at the smokestack, replacing fossil fuels with biomass actually *increases* CO_2 emissions.[1]

Q: But isn't biomass combustion "carbon neutral"?
A: No. The climate can't tell the difference between "biogenic" and fossil CO_2.[2] And CO_2 from combustion of trees remains in the atmosphere—and warms the climate—for decades or even centuries, even if the trees eventually grow back. Multiple studies have shown that it can take a very long time for new biomass growth to recapture the carbon emitted by combustion, even where fossil fuel displacement is assumed, and even where "waste" materials like timber harvest residuals are used for fuel.[3] This is known as the "carbon debt" of bioenergy.

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[1] Typical CO_2 emission rates for facilities:

Gas combined cycle	883 lb CO_2/MWh
Gas steam turbine	1,218 lb CO_2/MWh
Coal steam turbine	2,086 lb/CO_2/MWh
Biomass steam turbine	3,029 lb CO_2/MWh

Sources: EIA, Electric Power Annual, 2009: Carbon Dioxide Uncontrolled Emission Factors. Efficiency values used to calculate emissions from fossil fuel facilities calculated using EIA heat rate data. (http://www.eia.gov/cneaf/electricity/epa/epat5p4.html); biopower efficiency value is 24%, a standard industry value.

[2] *Center for Biological Diversity, et al. v. EPA*, __ F.3d __, No. 11-1101 (D.C. Cir. July 12, 2013), slip op. at 7 ("In layman's terms, the atmosphere makes no distinction between carbon dioxide emitted by biogenic and fossil-fuel sources"); Science Advisory Board Review of EPA's Accounting Framework for Biogenic CO_2 Emissions from Stationary Sources 7 (Sept. 28, 2012) (hereafter "SAB Panel Report").

[3] *See, e.g.*, Stephen R. Mitchell, et al., *Carbon debt and carbon sequestration parity in forest bioenergy production*, Global Change Biology Bioenergy (2012), doi: 10.1111/j.1757-1707.2012.01173.x; Ernst-Detlef Schulze, et al., *Large-scale bioenergy from additional harvest of forest biomass is neither sustainable nor greenhouse gas neutral*, Global Change Biology Bioenergy (2012), doi: 10.1111/j.1757-1707.2012.01169.x at 1-2; Jon McKechnie, et al., *Forest Bioenergy or Forest Carbon? Assessing Trade-Offs in Greenhouse Gas Mitigation with Wood-Based Fuels*, 45 Environ. Sci. Technol. 789 (2011); Anna Repo, et al., *Indirect Carbon Dioxide Emissions from Producing Bioenergy from Forest Harvest Residues*, Global Change Biology Bioenergy (2010), doi: 10.1111/j.1757-1707.2010.01065.x; Manomet Center for Conservation Sciences, Massachusetts Biomass Sustainability and Carbon Policy Study: Report to the Commonwealth of Massachusetts Department of Energy Resources (2010); Giuliana

Climate scientists agree we need to reduce emissions dramatically in the short term and keep them down. Global greenhouse gas emissions must peak within the next few years and drop sharply thereafter in order to preserve a likely chance of keeping aggregate global warming below 2°C—a level at which serious impacts will still occur.[4] Yet the science shows this is precisely the time period during which bioenergy emissions released today may increase atmospheric CO_2 levels.

Policymakers cannot simply assume that "biogenic" CO_2 emissions have no effect on the climate. Rather, a full and scrupulously accurate life-cycle analysis is essential to understanding the greenhouse gas implications of burning biomass for energy.[5]

Q: Isn't biomass combustion carbon neutral so long as growth rates exceed harvest in the forest?

A: No. Some biomass proponents claim that emissions from harvest and combustion of trees are negated if the forest is growing at a faster rate than it is being harvested; put another way, the claim is that emissions need not be counted if the forest serves as a net carbon sink at the landscape level. The claim is inaccurate for two reasons. First, it ignores the effect of present logging on future carbon stocks. Second, any conclusions of carbon neutrality depend entirely—and even arbitrarily—on the forest area selected for analysis.

Harvest of live trees from the forest doesn't just reduce current standing carbon stocks. It also reduces the forest's future rate of carbon sequestration, and its future carbon storage capacity, by removing trees that otherwise would have continued to grow and remove CO_2 from the atmosphere.[6] Even if harvested biomass is substituted for fossil fuels, it can be decades or centuries before the harvested forest achieves the same CO_2 reductions that

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Zanchi et al., The Upfront Carbon Debt of Bioenergy (Joanneum Research May 2010); M. O'Hare et al, *Proper Accounting for Time Increases Crop-Based Biofuels' Greenhouse Gas Deficit Versus Petroleum*, Envtl. Res. Lett. (2009), doi:10.1088/1748-9326/4/2/024001.

[4] Joeri Rogelj, et al., *Emission Pathways Consistent with a 2° Global Temperature Limit*, 1 Nature Climate Change 413 (2011).

[5] *See generally* Timothy D. Searchinger, et al., *Fixing a Critical Climate Accounting Error*, 326 Science 527 (2009); see also Mitchell 2012, supra note 3 at 9 (concluding that management of forests for maximum carbon sequestration provides straightforward and predictable benefits, while managing forests for bioenergy production requires careful consideration to avoid a net release of carbon to the atmosphere).

[6] Bjart Holtsmark, *The outcome is in the assumptions: analyzing the effects on atmospheric CO_2 levels of increased use of bioenergy from forest biomass*, Global Change Biology Bioenergy (2012), doi: 10.1111/gcbb.12015 ("Taking into account that harvest usually takes place in stands that are still growing, the baseline scenario becomes important. . . . [T]he harvest scenario should be measured against a baseline scenario (with no harvest) in which the trees are still growing, thus capturing CO_2 from the atmosphere.").

could be achieved by leaving the forest unharvested (depending on harvest intensity, frequency, and forest characteristics).[7]

Moreover, because this approach depends entirely on the landscape scale chosen for analysis—that is, what forested "region" is assessed to determine whether it is growing more quickly than it is being cut—its results can be arbitrary, misleading, and easily manipulated. EPA proposed using this approach in its recent draft framework for biomass carbon accounting, but EPA's own case studies showed that the exact same biomass facility could be found to have entirely different atmospheric CO_2 impacts solely as a result of differences in the landscape scale chosen for analysis.[8] Recognizing the potential for arbitrary results and the need to evaluate the relationship between biomass facilities and surrounding forest landscapes in a more sophisticated manner, EPA's science advisors criticized this approach as a "central weakness" of the EPA framework—one lacking a sound scientific basis.[9]

Q: Don't the Intergovernmental Panel on Climate Change (IPCC), EPA, and California Air Resources Board all treat biomass as carbon neutral?
A: No. And declaring something neutral doesn't make it so.

Biomass proponents often assert that IPCC carbon accounting rules treat biomass emissions as carbon neutral, and that EPA has adopted this approach. This assertion is founded on a fundamental misinterpretation of IPCC carbon accounting guidelines.[10] The IPCC guidelines are intended to aid countries in preparing overall national emissions inventories. The guidelines divide each nation's economy into sectors, emissions from which are counted and reported accordingly. Unlike other emissions, bioenergy emissions could show up in either or both of two sectors—in the land use and forestry sector, where harvest takes place, or in the energy sector, where combustion takes place. In order to avoid double-counting these emissions, the IPCC guidelines simply assign them to the land use and forestry sector, and do not count them in the energy sector. But this does not

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[7] *See, e.g.*, Mitchell 2012, *supra* note 3; John L. Campbell, et al., *Can fuel-reduction treatments really increase forest carbon storage in the western US by reducing future fire emissions?* Front. Ecol. Env't (2011), doi:10.1890/110057; Tara Hudiburg, et al., *Regional carbon dioxide implications of forest bioenergy production*, Nature Climate Change (2011), doi: 10.1038/NCLIMATE1264; Searchinger 2009, *supra* note 5 at 528.
[8] EPA concluded that a wood-fired biomass energy facility in New Hampshire would be found to increase atmospheric CO_2 levels based on an assessment of New Hampshire's forests, but would be found to have no net effect on CO_2 levels based on an assessment of forests throughout the Northeast. U.S. EPA, Accounting Framework for Biogenic CO_2 Emissions from Stationary Sources 75 (Sept. 2011).
[9] *See* SAB Panel Report, supra note 2 at 2, 5-6, 17, 20, 27-29, 40.
[10] The scientific literature has repeatedly identified this error in interpreting IPCC guidance. *See, e.g.*, Miguel Brandão , et al., *Key issues and options in accounting for carbon sequestration and temporary storage in life cycle assessment and carbon footprinting*, 18 Int'l J. Life Cycle Assess. 230 (2013), doi:10.1007/s11367-012-0451-6; Repo 2010, *supra* note 3; Searchinger 2009, *supra* note 5.

mean the IPCC regards biomass combustion as carbon neutral. In fact, the IPCC's website specifically explains this is *not* the case.[11]

Nor does EPA share the view that the IPCC guidelines mandate treatment of biomass combustion as carbon neutral. Although statements to this effect appeared in some older versions of EPA's annual greenhouse gas inventory, those statements were removed beginning in 2011. EPA's draft biomass accounting framework, released in September 2011, explains in detail that the IPCC's guidance does not mean that biomass emissions are carbon neutral.[12] EPA's Science Advisory Panel agreed that "[a]pplication of the IPCC accounting approach is not conducive to considering the incremental effect of bioenergy on carbon emissions."[13] And even EPA's recent rule exempting biomass CO_2 emissions from Clean Air Act permitting requirements acknowledges that biogenic CO_2 may not be carbon neutral in all instances.[14] It is, therefore, entirely false to claim that EPA treats biomass as carbon neutral.

The California Air Resources Board ("CARB") has exempted emitters of biogenic CO_2 from compliance obligations under the state's cap-and-trade program for greenhouse gases.[15] CARB's rationale for the exemption seems to have been a preconceived notion—unsupported by any actual analysis—that biomass combustion is preferable to fossil fuels combustion.[16] If CARB does in fact believe that biomass combustion is automatically carbon neutral, its belief contradicts the published scientific literature, the IPCC's guidance, and current thinking at the EPA.

Q: Don't bioenergy power plants reduce greenhouse gases by displacing fossil-fired power plants?
A: Not necessarily. Policymakers often assume "renewable" energy facilities displace fossil fuel facilities on a one-to-one basis. However, studies show this isn't always the case. New "renewable" facilities often just add capacity to the system rather than displacing fossil-fired generation.[17] And although there's some debate in the scientific

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[11] IPCC, Frequently Asked Questions Q1-4-5 and Q1-4-6, at http://www.ipcc-nggip.iges.or.jp/faq/faq.html (last visited February 14, 2013).
[12] U.S. EPA 2011, *supra* note 8 at 11-12 ("The IPCC also eschewed any statements indicating that its decision to account for biomass CO_2 emissions in the Land-Use Sector rather than the Energy Sector was intended to signal that bioenergy truly has no impact on atmospheric CO_2 concentrations.")
[13] SAB Panel Report, *supra* note 9 at 3; see also id. at 4.
[14] Deferral for CO_2 Emissions from Bioenergy and Other Biogenic Sources Under the Prevention of Significant Deterioration (PSD) and Title V Programs, 76 Fed. Reg. 43,490, 43,498 (July 20, 2011).
[15] Cal. Code Regs., tit. 17, § 95852.2(a).
[16] Cal. Air Res. Bd., California's Cap-and-Trade Program: Final Statement of Reasons 416 (Oct. 2011).
[17] Richard York, *Do alternative energy sources displace fossil fuels?* 2 Nature Climate Change 441 (2012) (finding that non-hydropower renewables, including biomass, typically add capacity rather than displace fossil fuels).

literature about the appropriate "displacement factor" to use in evaluating bioenergy greenhouse gas emissions, an assumption of one-to-one displacement is most likely inaccurate.[18]

Q: What about burning waste wood for energy? Isn't that carbon neutral?
A: No. Calling wood "waste" doesn't tell you what effect burning it has on the atmosphere. "Waste" has no stable definition, and in practice is used to mean anything from slash left over from logging operations, to wood from urban demolition projects, to live, growing trees someone decided should be cut down for some reason.

Determining the atmospheric effect of burning any woody material—including so-called "waste"—requires figuring out what would have happened to the material otherwise. For example, slash and residual wood left over from a logging operation will eventually decompose, releasing at least some of the stored carbon to the atmosphere (though some fraction of the carbon may remain stored for a longer period in the forest soil). Different sizes and kinds of wood decompose at different rates; while smaller branches and stems may decompose in a few years, stumps and other large pieces of wood can take decades to break down.[19] Bioenergy production, in contrast, results in an immediate emission of CO_2 to the atmosphere. Accordingly, even burning this "waste" material incurs a carbon debt for at least the period of time that would have been required for the material to decompose naturally.[20]

Finally, treating all "waste" materials as if they are automatically carbon neutral creates a perverse incentive to categorize additional kinds of materials as "waste," and to use more of the "waste" already out there. This can also affect the carbon balance of bioenergy. Studies have shown that changes in forest management practices, including the increased use of harvest residues for bioenergy, can reduce overall terrestrial carbon storage.[21]

Q: Doesn't forest thinning reduce greenhouse gas emissions by preventing catastrophic forest fires, especially when the thinnings are burned for energy?
A: No. Two recently published studies of forests in the western United States suggest that emissions from removal and combustion of forest fuels may exceed emissions from even high-intensity fires, at least for some period of time.

The first study, led by John L. Campbell of Oregon State University, found "little credible evidence" that fuel reduction projects increased forest carbon stock. [22] Campbell

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[18] Kim Pingoud, et al., *Global warming potential factors and warming payback time as climate indicators of forest biomass use*, Mitig. Adapt. Strateg. Glob. Change (2011), doi:0.1007/s11027-011-9331-9.
[19] Repo 2010, supra note 3.
[20] The SAB Panel Report highlighted the need for consideration of this delay in natural decomposition when accounting for emissions from burning forest-derived "waste" materials. SAB Panel Report, supra note 9 at 5.
[21] See Pingoud 2011, supra note 18 at 2.
[22] Campbell 2011, supra note 7.

identified several reasons for this. For example, the amount of carbon lost through fuels reduction projects tends to exceed the amount of carbon those fuel removal projects prevent from being emitted during a fire. This is partly because most fire-related emissions are associated with combustion of fine materials like branches and needles; because these materials tend to burn no matter how hot the fire, the difference in emissions between a high-intensity fire in an untreated stand and a low-intensity fire in a treated stand is not that great. It is not practical to "thin" branches and needles without also removing the trees to which they are attached. Campbell thus concluded that even in a fire-suppressed ponderosa pine forest, protecting one unit of carbon from combustion in a fire required removing three units of carbon in fuels. Moreover, because the probability of a fire on any given acre of forest is relatively low, forest managers must treat many more acres than will actually burn in order to get much of a benefit—again resulting in an increase in carbon removed relative to avoided combustion. Campbell also found that over a succession of disturbance cycles, models predicting forest growth, mortality, decomposition and combustion showed more carbon storage in a low-frequency, high-intensity fire regime than in a high-frequency, low-intensity fire regime. Only where disturbances caused a permanent change in forest productivity did Campbell find fuel treatments to have a profound influence on carbon storage.

Another Oregon State University researcher, Tara Hudiburg, led an investigation of forest carbon responses to three different levels of fuel reduction treatments in 19 West Coast ecoregions containing 80 different forest types and different fire regimes.[23] Hudiburg found that in nearly all forest types, intensive harvest for bioenergy production resulted in net carbon emissions to the atmosphere, at least over the 20-year time frame of the study. Only in forest ecoregions currently functioning as net carbon sources did bioenergy production result in decreased emissions. The positive carbon emissions of bioenergy persisted even in a lighter-touch fire prevention scenario in most ecoregions. The study acknowledged that if forests currently serving as carbon sinks were to become sources in the future, the effect of bioenergy production might be different—but at present, across a wide range of ecosystems, forest bioenergy increases carbon dioxide concentrations, at least in the short term.

Both papers recognize that forest managers may have important reasons for wanting to do certain thinning projects. Both papers also make clear, however, that these projects—whatever their merits from a forest management perspective—may have climatic consequences that should be taken into account.

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[23] Hudiburg 2011, supra note 7.