To: **Members of the EPA Science Advisory Board**
Re: **Comments on the SAB panel draft report regarding EPA's Framework for Assessing Biogenic CO_2 Emissions from Stationary Sources.**
Date: March 23, 2016

We are 44 individual scientists with expertise in forests, bioenergy, carbon, water and climate change. We write to express concerns about the most recent panel draft report of the EPA's Framework for Assessing Biogenic CO2 Emissions from Stationary Sources (2014) for SAB review. We focus our comments on the large-scale use of forests for bioenergy in stationary sources.

Importance:

Forests and soils currently remove and store annually an amount of carbon dioxide equal to one-quarter of global annual emissions. Augmenting these "negative emissions" by increasing the removal rate and storage capacity of forests, grasslands, wetlands and other ecosystems provides one of the most effective tools available for remaining within the temperature goals agreed to in Paris (1.5^{o} to 2^{o}C). Reducing deforestation and forest and soils degradation has significant potential to further reduce GHG releases to the atmosphere.

Expanding use of forest bioenergy in the U.S. and in Europe threatens these values and has been occurring based on mistaken views that such materials are "carbon neutral" or low carbon. This is based upon a misreading of international carbon accounting procedures that credits uncertain future atmospheric carbon dioxide removal more rapidly than it occurs, ignoring the fact that wood emits more carbon dioxide per MWh than coal, and that large quantities of carbon dioxide remain in the atmosphere for many decades. Wood pellets sourced in the US and burned in Europe are subsidized and treated on the same basis as zero carbon sources, which does not address effects on forest carbon stocks and trans-boundary leakage. Similar questionable accounting is currently being considered within the United States. Other countries would seem likely to follow U.S. policy on carbon accounting with significant consequences for global forests. Incorrect accounting of bioenergy carbon emissions could have severe adverse implications for the world's forests.

The report states that EPA is asking for "general guidance on issues related to the choice of temporal, spatial and production scale for determining Biogenic Assessment Factors (BAFs) in a policy-neutral context."

The draft report does address the temporal aspect of bioenergy emissions, but does not utilize scientific studies that raise serious questions about the implication for climate. It does not address either the spatial or production scale for forest Biogenic Assessment Factors. The panel report also needs to utilize alternative research in its economic analysis. The consequences of these omissions are critical for both future climate and present forest ecosystems and their multiple services.

Implications of timing:

The report provides inconsistent recommendations regarding the time frame for counting emissions. While harvesting wood from forests for energy is likely to increase emissions for many decades and add to atmospheric concentrations, it has the potential to remove a comparable amount, if and when regrowth removes the same amount of carbon that is emitted during harvest, processing, transportation and combustion. In one section, the report encourages judging the consequences of bioenergy use only after 100 years based on the assumption that only cumulative emissions dictate global average temperature change. In effect, this part of the report encourages EPA to treat actions that increase emissions for decades before they are removed by replacement growth as equivalent to actions that would release no CO_2 emissions at all. Because the costs and value of emissions over time should be identical in the bioenergy and broader climate context, this approach would totally disregard methane emissions today because that methane will nearly all disappear in 100 years. If adopted, this approach would validate the near term harvesting of the majority of the world's forests for bioenergy.

Yet this assumption disregards all the irreversible damage to the climate between now and 100 years from now: the continuous uptake of heat and added acidity in the oceans, the melting of glaciers and sea ice, and the feedback releases of methane and carbon dioxide from thawing permafrost. These consequences are not reversed even if carbon dioxide concentrations return to pre-combustion levels. It does not value early removal in reducing risks of crossing climate thresholds, nor the option value provided by early reductions that allow society to adopt more rigorous mitigation if evidence points to this very likely need.

The report also does not discuss the large literature regarding the social cost of carbon. This literature addresses precisely the question of how to value emissions and mitigation over time. The government has adopted social cost of carbon accounting for regulatory purposes and therefore currently factors in the timing value of emissions in this way. The use of discount rates in evaluating future CO_2 removal is part of the SCC analysis.

The analytical approach is also inconsistent with the commitments the U.S. has made as part of the global agreement to reduce emissions by 2030 and 2050, and as part of the Clean Power Plan. The US actually has planned to use pre-2005 US forest sink trajectories to help meet its 2020 goal; this proposal puts that goal at risk by taking credit for actions that would in fact increase warming during this period. In addition, the proposal is counter to international carbon accounting under the UN Framework Convention on Climate Change, which requires the U.S. to report the very real increases in emissions that result from increased wood harvest immediately, rather than to claim reductions based on the expectation that forests will eventually grow back. The report also dismisses concerns about the difficulty of meeting a future anticipated regrowth trajectory because of fires, insects, diseases, drought and land use conversion.

The report also contains contradictory recommendations to base timing considerations on a physical approach that under some circumstances would describe how much carbon is added or removed from the atmosphere but does not address its value. Under this approach, the calculation of bioenergy impacts in a single year would be based on a calculation of how much forest carbon harvesting will add to the atmosphere each year if wood is harvested and burned continuously from different forest tracts to supply bioenergy over decades. Eventually this pattern of harvests could reach an equilibrium state in which bioenergy does not add more carbon to the atmosphere, and the panel recommends focusing on this equilibrium time frame, which in one example is 90 years.

Although the model might correctly estimate these different quantitative impacts on forest carbon over time under specific assumptions, the report confuses two separate questions to be addressed. How much carbon is added to the atmosphere in different years is a separate question from how to value the costs of that added carbon in each year, and therefore the economic value of year-by-year removal. The main recommendation appears to have some discounting effect of valuing later emissions reductions less than earlier reductions. However, the report never explains the rationale for that discounting.

Probably the most direct way to evaluate the temporal aspect of bioenergy is to count emissions in the year in which they occur, and any future offsets by forest regrowth annually in the years in which they actually remove carbon dioxide from the atmosphere. The panel does not explain why it would not choose to follow such a simple approach that most closely approximates the bioenergy carbon cycle.

Implications of spatial and production scale: Spatial and production scale are ignored in the report, and must be considered. Forests are long-lived and carbon can potentially accumulate beyond the timeframe of greenhouse gas reduction targets. Large-scale management of forest carbon should also account for competing ecosystem values and services, and ecosystem sustainability with climate change. Long-term sustained increase of management intensity will result in permanent reduction of forest carbon stocks, which may be accounted for but it needs to be quantified accurately. Although measures taken to increase growth rates (e.g. fertilization) may increase the amount of bioenergy produced over a landscape, it does not necessarily increase the forest carbon stock.

Data from the Energy Information Administration estimate that each 1% increase in forest bioenergy based electricity would require approximately 17% of current US wood harvests to be burned. To produce an additional 3% of the world's energy from wood would require more than doubling the world's commercial tree harvest. Commercially available photovoltaic panels using the same amount of solar energy as a sustainably harvested forest produce approximately 80 times the electricity with zero carbon emissions.

Assessing the physical consequences: Another problem with the report is the method for estimating the physical consequences of bioenergy harvests and regrowth.

The most straightforward way to evaluate the physical consequences of forest harvests for bioenergy is to assume that it results in additional wood harvest, which is the same approach EPA has applied to valuing the benefits of paper recycling.

The panel recommends the use of global economic models to evaluate the consequences of biomass demand without demonstrating that those models are sufficiently empirically verified to be reliable. Increased demand for wood and energy, like increased demand for any products, will surely have economic feedbacks. However, that fact does not mean the tools exist to analyze them with sufficient reliability to justify basing current policy on uncertain outcomes 100 years or more into the future. The modeling called for by the report necessarily requires many economic, political and biophysical parameters that are unknown at this time and must therefore be assumed. Often, faced with this complexity, economic models might claim "benefits" because they assume that certain actions are without carbon cost. (For example, models may claim that diverting wood from other uses in the Southeastern United States has no carbon cost because they ignore the impact on forests of replacing that wood elsewhere or abroad.) If a model is used, all forms of leakage need to be included, both positive and negative, yet the modeling has been is biased towards negative leakage.

What is certain is that forests harvested and burned today put larger amounts of carbon dioxide into the atmosphere than coal per MWh of electricity, and it persists for many decades. What happens in the distant future is unknown and there is no way to assure that forest regrowth commitments are kept or are even possible. This is especially true in the U.S. where a significant fraction of forested land is in fragmented (often unmanaged) private ownership.

Recommendations: Our most important recommendation is to use an accurate accounting of actual bioenergy carbon emissions and removals at the times they occur. Discounting future atmospheric carbon dioxide removals should be done so as to properly weigh benefits of near term removal from the atmosphere.

Biophysical models that identify vulnerability and variability of forests across the country should be used to determine impacts of bioenergy harvest on forest carbon stocks and fluxes to the atmosphere in the face of climate change. These models can assist in determining if a specific area or extraction practice may be suitable for bioenergy sourcing while sustaining forest ecosystem structure and function including atmospheric carbon removal and storage.

Forests and other ecosystems currently remove from the atmosphere an amount of CO_2 equal to about one-fourth of annual anthropogenic emissions. Recent studies suggest that maintaining existing forests and restoring degraded forests and soils has the potential to slow global temperature rise and possibly meet the temperature goals established in Paris. This should be the priority for the role of forests in meeting domestic and international climate goals, and the SAB needs to convey this important point to the EPA.

We urge the SAB to revise the report with alternative expert voices, particularly the addition of ecologists with expertise in the biophysical dimensions of forests.

If the U.S. endorses the approach outlined in this report, countries everywhere will be free to develop their own economic models that justify the widespread cutting of otherwise long-lived forests for bioenergy (either domestically or for exports to the developed world) with serious consequences for the climate and forest ecosystem services. The European carbon accounting error is a disturbing example of flawed carbon accounting policies as it subsidizes clear cutting of natural forests in the U.S. as higher emitting, “zero carbon” replacements for European coal.

We appreciate the opportunity to comment on the draft, and would be pleased to provide useful references and respond to questions that the panel or members of the SAB might have.

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