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Submitted via email

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Re: National Alliance of Forest Owners' Comments to the Science Advisory Board Biogenic Carbon Emissions Panel

Dear Dr. Stallworth and Panel Members:

The National Alliance of Forest Owners (NAFO) welcomes the opportunity to submit these comments to the Environmental Protection Agency's (EPA's) Science Advisory Board (SAB) Biogenic Carbon Emissions Panel (Panel), in advance of its March 25, 2015 meeting to discuss EPA's *Framework for Assessing Biogenic CO2 Emissions from Stationary Sources* (Nov. 2014) (*2014 Framework*). NAFO's mission is to protect and enhance the economic and environmental values of private forests through targeted policy advocacy at the national level. At the time of this submission, NAFO's members represent 80 million acres of private forests in 47 states. NAFO was incorporated in February 2008 and has been working aggressively since then to sustain the ecological, economic, and social values of forests and to assure an abundance of healthy and productive forest resources for present and future generations.

NAFO and its members are key stakeholders who contribute to the solutions that private forests and forest biomass bring to lowering greenhouse gas (GHG) emissions and, in turn, are keenly impacted by any controls or regulations on biogenic GHG emissions. NAFO—as the party that filed the Petition for Reconsideration with EPA that led to EPA's *2014 Framework* and the present SAB process—is an acutely interested stakeholder in EPA's reconsideration of the treatment of biogenic CO_2 emissions from stationary sources and the scientific analysis EPA will utilize in making ultimate policy and regulatory decisions on how to treat biogenic CO_2 emissions. NAFO has been an active stakeholder in EPA's ongoing process to develop policies to address the role that biomass energy should play in regulatory programs designed to reduce GHG emissions and, in that capacity, participated fully in the SAB's review of EPA's initial *Accounting Framework for Biogenic CO_2 Emissions from Stationary Sources* (Sept. 2011). NAFO has consistently demonstrated that forest biomass and biomass energy is part of the climate solution and can reduce GHG accumulations in the atmosphere in comparison to fossil fuels.

Introduction

As NAFO and its members have explained in earlier comments and presentations to the Panel and EPA, critical to NAFO's mission in reducing GHG emissions is supporting the use of biomass as a renewable energy supply that offers important climate and energy security benefits. EPA's decision to reconsider its approach to regulating biogenic CO_2 emissions from stationary sources offers an opportunity to encourage the continued development of climate-beneficial biomass energy capacity. It is NAFO's goal that, with the assistance of the Panel's expertise, EPA will develop an approach to biogenic CO_2 emissions that can inform sound policy and regulatory decisions by accurately reflecting the climate benefits offered by biomass, encouraging its continued development, and promoting appropriate distinctions between biomass energy and other types of energy such as fossil fuel combustion. In particular, we urge the EPA and the Panel to endorse an approach that recognizes that combustion of forest biomass for energy will not increase atmospheric CO_2 concentrations as long as nationwide forest carbon stocks remain stable or are increasing. We believe that the Panel can assist EPA in achieving these goals by making recommendations that avoid unnecessary complexity and by using its expertise to apply scientific research to real-world scenarios. While EPA's charge to the Panel was narrowly focused, EPA invited the public to comment more broadly on the *2014*

Framework. 80 Fed. Reg. at 8868.[1] As a result, NAFO's comments extend beyond the specific charge questions and address a number of other critical issues related to the *2014 Framework*.

The *2014 Framework* represents a marked departure from the approach taken by EPA in the *2011 Framework*. Rather than adopting a single approach to account for biogenic CO_2 emissions that can be applied directly in a regulatory or policy context, EPA is instead providing a guidance document that evaluates a range of options for accounting for biogenic CO_2 emissions that it believes are scientifically plausible and then presenting them as a menu of options from which policy makers and regulators can choose at the implementation stage.

NAFO supports EPA's approach, which seeks to distinguish more clearly between scientific issues, which are included in the *2014 Framework* and within the range of the SAB's expertise, and policy determinations, which EPA intends to address separately as it evaluates biogenic CO_2 emissions in the context of specific regulations or projects. While the Panel must avoid opining on policy issues, it plays an important role in reviewing scientific issues related to biogenic CO_2 emissions in the context of the forestry and forest products sectors to ensure that the *Framework* has value for policymakers and regulators. As the Panel reviews the *2014 Framework*, we urge it to recognize that, despite being scientifically valid in a theoretical sense, an accounting option may not be appropriate for policy implementation due to practical concerns. Therefore, we urge the Panel to critically assess the various options presented in the *2014 Framework* in a manner that provides sufficient flexibility for policy makers to consider options that are both scientifically rigorous and capable of effective implementation in light of current forest management practices and the Administration's overall policy objective, outlined in the President's Climate Action Plan and accompanying Natural Resources Agenda, to include biomass energy as a viable tool for reducing overall GHG accumulations in the atmosphere. To that end, we encourage the Panel to consider carefully the "four science fundamentals" that a group of more

[1] Memorandum from Janet G. McCabe, Acting Assistant Administrator, Office of Air and Radiation to Air Division Directors, Regions 1-10 re: Addressing Biogenic Carbon Dioxide Emissions from Stationary Sources 2 (Nov. 19, 2014).

than 100 scientists recently recommended "to policy makers and others seeking to develop a science-based approach to biomass energy production:"

- Fundamental 1: The carbon benefits of sustainable forest biomass energy are well established.
- Fundamental 2: Measuring the carbon benefits of forest biomass energy must consider cumulative carbon emissions over the long term.
- Fundamental 3: An accurate comparison of forest biomass energy carbon impacts with those of other energy sources requires the use of consistent timeframes in the comparison.
- Fundamental 4. Economic factors influence the carbon impacts of forest biomass energy.[2]

NAFO offers several broad, thematic comments on the *2014 Framework* that we hope will help to guide the Panel's work. First, we explain that the *2014 Framework* is too complex and urge the Panel to identify methods to recommend options for streamlining the *Framework* in a manner that is consistent with forest management practices. Second, we urge the Panel to endorse sufficiently broad spatial and temporal scales that are consistent with forest management practices and the market for forest products. Third, we urge the Panel to recognize that, while useful for understanding the broad implications of different policies, an anticipated future baseline is too complicated and uncertain to be implemented and to endorse a reference point baseline instead. Fourth, we urge the Panel to reject the inclusion of a leakage component based on both the uncertainty in calculating leakage and ability to account for increased domestic production through increased productivity and afforestation by adopting appropriate spatial and temporal scales. We will continue reviewing the *2014 Framework* and EPA's charge to the Panel and will submit additional comments as appropriate.

I. Much of the *2014 Framework* Is Too Complex to be Implemented

As NAFO explained in prior comments to the Panel, it is imperative that EPA develop reasonable policies for biogenic CO_2 emissions that avoid unnecessary

[2] Letter from National Association of University Forest Resources Programs to Gina McCarthy, EPA Administrator (Nov. 6, 2016) ("NAUFRP Letter"). (Attachment A)

complexity and are capable of effective implementation.[3] As the SAB acknowledged, biomass energy can provide important climate benefits by displacing fossil fuels. SAB Report at 4. But in order to capture these climate benefits and create proper incentives for the continued growth of the biomass energy sector, EPA ultimately must design a straightforward and pragmatic policy that is capable of efficient and effective implementation and consistent with the realities of biomass energy production. An unnecessarily complex approach with high compliance costs will create market ambivalence for the biomass energy sector and will reduce the sector's ability to produce the climate benefits that it has the capacity to provide. Indeed, if the compliance burdens and costs become too great, a policy intended to promote renewable biomass energy could have the perverse effect of discouraging continued growth of this important industry and the associated environmental benefits.

Unfortunately, the *2014 Framework* exacerbates rather than cures the complexity that was present in the *2011 Framework*. Many of the options identified by EPA in the *2014 Framework*, if included in policies or regulations, would add significant burdens to forest owners and biomass energy facilities and could have a chilling effect on future biomass development. While NAFO agrees that any *Framework* that is ultimately applied in a policy or regulatory context must be scientifically rigorous, it must also be capable of implementation. While the *2014 Framework* is arguably more comprehensive than the *2011 Framework*, it is not clear—and indeed is unlikely—that the added complexity is necessary for evaluating the effects of CO_2 emissions from forest biomass. A streamlined approach that focuses on actual forest management practices rather than hypothetical concerns could eliminate much of the complexity included in the *2014 Framework* and result in an approach that both recognizes and incentivizes the proven climate benefits of biomass energy. While many aspects of the *2014 Framework* could be simplified, NAFO notes the following examples:

- Spatial scale: As EPA recognizes in the *2014 Framework*, adopting a small spatial scale based on individual stands or fuelsheds will necessitate the collection of new data. *2014 Framework, App'x C* at C-5 ("An assessment using

[3] *See, e.g.*, National Alliance of Forest Owners' Comments to the Science Advisory Board Biogenic Carbon Emissions Panel 3-6 (Jan. 25, 2012) ("NAFO January SAB Comments") (Attachment B).

the reference point baseline at these small scales can be challenging because data would need to be collected for every site from which a stationary source procures feedstocks (e.g., feedstock tracking, recordkeeping)."); *id.* at C-6 ("[A]ssessment at small scales like the fuelshed level … necessitates feedstock tracking and other documentation."). In contrast to these costly, data-intensive approaches, adopting a national scale would allow regulators to rely on existing data, such as the U.S. Forest Service's Forest Inventory and Analysis (FIA) database, at little or no additional cost.

- <u>Subcategories for feedstocks</u>: While NAFO agrees that there may be valid reasons to distinguish between forest-, agriculture-, and waste-derived feedstocks, further subcategorization among forest-derived feedstocks is not necessary. This further subcategorization is due in part to the mistaken concern that mature, high-value roundwood from working forests may be used for biomass energy. As NAFO has previously explained, mature, high-value trees will not be used for biomass energy because they are more valuable for other uses.[4] Without the need to account for roundwood in this manner, all forest-derived biomass could likely be evaluated in a single feedstock category, without the need for biomass energy facilities to incur costs associated with monitoring and recordkeeping for multiple feedstock streams.
- <u>Process Attribute Terms</u>: The *2014 Framework* includes two process attribute terms to account for losses due to transportation, storage and process and for biomass that is embedded in other products. *2014 Framework* at 20-21. Inclusion of these terms is intended to allow for mass-balance accounting for all harvested biomass. *Id.* at 21. For biomass energy facilities that source

[4] NAFO, Comments "Deferral for CO2 emissions from Bioenergy and Other Biogenic Sources under the Prevention of Significant Deterioration and Title V Programs: Proposed Rule" 26 (NAFO Deferral Rule Comments) (Attachment C); *see also* Abt, K.L. *et al.*, *Effect of Bioenergy demands and supply response on markets, carbon, and land use*, Forest Science 58: 523-39 (2012) (projecting that price increases associated with biomass energy demand in the southern United States will remain far below prices for saw timber); Forisk Consulting, *Woody Biomass as a Forest Product: Wood Supply and Market Implications* (Oct. 2011) (finding that a 435% increase in biomass energy demand by 2016 would be required to make forest management exclusively for biomass energy as profitable as management for saw timber); Kingsley, E., *Importance of Biomass Energy Markets to Forestry: New England's Two Decades of Biomass Energy Experience* (June 2012) (explaining that biomass energy relies on low-cost, low-grade feedstocks, not high-grade feedstocks that command higher prices in the market).

feedstocks from a wide variety of sources, such a mass-balance approach could be costly and time consuming. However, as NAFO has explained in its prior comments, if a reference point baseline is used, EPA could assign all forest biomass a BAF of zero, using only existing FIA data, as long as U.S. forest carbon stocks are stable or increasing.[5]

As these examples demonstrate, an accounting approach that focuses on practical realities of the forestry and forest products sectors and incorporates appropriate spatial and temporal scales and baselines can inform policy and regulatory programs at little additional cost to agencies and the regulated community. The unnecessary complexity built into the *2014 Framework*, if implemented in a policy or regulation, would increase compliance costs and create disincentives that could impede in the future use of biomass energy.

II. Selection of Spatial and Temporal Scales Must Reflect Practical Realities of the Forestry Industry

It is essential that any policy or regulation addressing biogenic CO_2 emissions from forest biomass be based on spatial and temporal scales that are sufficiently broad to reflect the scales on which forest management decisions are made and on which markets for forest products operate. Selecting an inappropriately narrow spatial scale that is divorced from actual forest management practices would create a significant risk that key factors underpinning the carbon neutrality of forest biomass may be excluded from consideration. Thus, contrary to EPA's assertions in the *2014 Framework*, selection of spatial and temporal scales is not purely a policy decision and certain theoretical options identified by EPA should be explicitly foreclosed as inapplicable to forest biomass.

In the *2014 Framework*, EPA takes a largely agnostic perspective with respect to spatial and temporal scales, identifying a range of options without expressing any opinion on which scales may be appropriate for use in evaluating the climate effect of biogenic CO_2 emissions. With respect to spatial scales, EPA identifies five potential scales for U.S. policies and regulations: national, regional, state, fuelshed, and stand.

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[5] National Alliance of Forest Owners' Comments to the Science Advisory Board Biogenic Carbon Emissions Panel 7, 14-18 (Mar. 16, 2012) ("NAFO March SAB Comments") (Attachment D).

2014 Framework, App'x C at C-5 to 9. While EPA elects to apply a regional scale in its illustrative examples, it ultimately refuses to take any specific position to support or reject any of the potential scales. Instead, EPA asserts that the choice of spatial scales should be policy-driven: "In general, there is no single scientifically correct option or specific method for determining the 'appropriate' spatial scale for all analyses: the appropriate spatial scale differs depending on the specific goals and parameters of a specific policy or program application of the framework." *Id., App'x C* at 2; *see also id.* at 39 ("[T]he choice of spatial scale is largely dependent on specific applications of the framework and related needs or preferences, considering the implications of feedstock and landscape characteristics, statistical precision and uncertainty, indirect effects, or any other parameters."). Likewise, with respect to temporal scales, EPA declines to commit to any particular time scale for evaluating the effect of biogenic CO_2 emissions and instead asserts that "[i]n terms of the science, there is no single correct answer for the choice of a timescale for assessment: different timescales allow for evaluation of different questions and contexts." *Id.* at 34. Further, in recognizing that spatial and temporal scales are interrelated, EPA suggests in some places that spatial and temporal scales can effectively be substituted for each other. *See id., App'x B* at 4 ("In some circumstances, assessing biogenic carbon fluxes at a small spatial scale for a long period of time can result in similar outcomes to those from considering a large spatial scale over a short period of time.").

The lack of specificity or concrete guidance on these issues could be used to support inaccurate and unworkable policies and regulations for CO_2 emissions from forest biomass and we urge the SAB and EPA to state explicitly that, given the long rotation lengths for forest biomass and broad sourcing areas for stationary sources combusting biomass energy, small spatial scales and short time frames will distort the effect of CO_2 emissions from forest biomass on atmospheric CO_2 concentrations.

A. Forest Biomass Must Be Evaluated at a Broad Spatial Scale

To successfully account for CO_2 emissions from forest biomass, any policy or regulation must be supported by science, consistent with actual U.S. forest management practices, and practical to implement. While the ultimate selection of a spatial scale may include some flexibility to apply policy judgments, scientific and technical considerations dictate that a broad spatial scale be used. Because the goal of forest management is to produce a continuous supply of forest products, it is fundamentally inconsistent with forestry practices to isolate a single stand for purposes of evaluating CO_2 emissions. Forest owners and managers do not treat each stand independently, but instead develop broad management plans at a landscape level. These plans are designed to produce diverse age classes and a constant supply of harvestable forest products over an extended period of time. As a result, the processes of CO_2 emission and sequestration occur simultaneously within the landscape.[6] Therefore, as NAFO has previously explained, the emissions associated with harvesting, including combustion for renewable energy, are offset on a continuous basis by regeneration that is occurring on the many other stands that are not harvested and forest stocks remain stable.[7] By focusing on the simultaneous emissions and regeneration, it is also apparent that a broad spatial scale is consistent with the science of the carbon cycle as emissions and regeneration take place in different portions of a single, managed landscape. Thus a broad spatial scale is consistent with both the science of the carbon cycle and domestic forest management practices. In contrast, as EPA acknowledges, "analysis at a small scale (i.e. stand level) may obscure the impacts of a coherent management … regime on a broader landscape." *2014 Framework* at 40. Thus, EPA should state explicitly in the *Framework* that stand-based accounting is not appropriate for assessment of forest biomass.

Further, even among the remaining spatial scales, it is inappropriate for EPA to suggest that the choice between them should be based primarily on policy factors. Instead, EPA should acknowledge that a national scale is clearly superior from a technical standpoint in comparison to other landscape-based spatial scale. First, a national scale responds most closely to the global nature of climate change and EPA's regulatory authority under the Clean Air Act to implement air policies at a national level. In addition, as EPA recognizes, a national scale avoids problems of domestic leakage

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[6] Jim Boyer *et al.*, Carbon 101: Understanding the Carbon Cycle and the Forest Carbon Debate 5-7 (Dovetail Partners, Jan. 2012) (submitted to the Panel, Jan. 27, 2012), *available at* http://www.dovetailinc.org/reportsview/2012/responsible-materials/pjim-bowyerp/carbon-101.
[7] NAFO Deferral Rule Comments at 20.

and transboundary effects that plague sub-national approaches. *See 2014 Framework, App'x C* at 4-5.

Second, a national scale has the advantage of treating all biomass facilities equally and allowing market forces to dictate their location based on considerations such as supply, demand, and market efficiency. The forest products industries—including biomass energy—are integrated at a national level as individual producers also obtain supplies from a vast and ever-changing array of forest owners and suppliers.[8] Moreover, the producers compete with each other in the marketplace making it impossible to isolate impacts on small spatial scales. Indeed, as the Panel noted in its response to the *2011 Framework*, a national or regional scale is necessary to model forestry markets and the economic behavior of landowners. *Report* at 35. Thus, individual forest owners continually respond to market signals that are sent at national or even global scales, and shift their plans in anticipation of and response to new market demands. While geographic constraints may fix the location of forests and biomass energy facilities, the markets that they serve are unconstrained and treat all forest owners and suppliers equally. Thus, both market demands and the response from forest owners are best captured at a national scale. Indeed, this relationship can be readily observed in historical data as forest owners have repeatedly responded to new market demands, increasing national forest carbon stocks in the process.[9] Thus, the nature of forest products markets also requires that biogenic CO_2 emissions be considered on the broadest scale possible.

Third, a national scale will prove the most practical, predictable, and least burdensome approach to implement. As EPA and NAFO have noted, data from the FIA program and other sources are readily available and can be incorporated into a regulatory framework at little cost to EPA or the regulated entities. *2014 Framework, App'x C* at C-11.[10] Thus adopting a national scale would serve the important purpose of

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[8] *See* National Alliance of Forest Owners' Comments on Call for Information: Information on Greenhouse Gas Emissions Associated with Bioenergy and Other Biogenic Sources; 75 Fed. Reg. 41173 (July 15, 2010)" at 24-25 & n.45 (NAFO Call for Information Comments) (Attachment E).
[9] As Bowyer *et al.* (2012) explain, domestic timber production increased by more than 50 percent from 1950 to 2010, while forest carbon stocks also increased. Bowyer *et al.* (2012) at 10.
[10] *See also*, NAFO March SAB Comments at 7, 14-18.

reducing complexity and transaction costs and thereby promote climate-beneficial biomass energy.

In contrast, smaller spatial scales create unnecessary challenges that complicate the evaluation of biogenic CO_2 emissions and risk generating inaccurate data. For example, adopting a facility-based fuelshed approach does not withstand close scrutiny of sound science or pragmatic forest management considerations. As NAFO has previously explained, while a fuelshed-based approach would theoretically allow EPA to treat each biomass facility independently for attribution purposes, such an approach would prove technically and practically infeasible.[11] Applying such an approach at the landscape level would be technically infeasible as individual facilities have overlapping fuelsheds and obtain feedstocks from a vast and constantly changing array of landowners.[12] Thus there is no way to distinguish between facility fuelsheds based on geography. The challenges faced by fuelshed-based approaches diminish as the size of the measurement region increases, with a national scale offering the fewest administrative challenges compared to smaller scales.

B. Forest Biomass Must Be Evaluated at a Broad Temporal Scale

While adoption of a broad spatial scale will reflect the fact that emissions and sequestration are simultaneously balanced over the managed landscape, this does not mean that temporal scales can be selected solely on the basis of policy determinations. Instead, a broad spatial scale must be coupled with a broad temporal scale to ensure that evaluations are consistent with the flexibility with which the forestry and forest products industries operate. As EPA appropriately recognizes, "[d]ifferent feedstocks have different growth and harvest intervals, so the choice in temporal scales could vary depending on what type of feedstock is being evaluated." *2014 Framework* at 35. The SAB agrees with this and, in its 2012 Report, noted that "it is important to consider the turnover times of different biogenic feedstocks in justifying how they are incorporated into the *Framework*." SAB Report at 14. Thus, at a minimum, any policy or regulation must incorporate a temporal scale that includes a full rotation cycle for forest biomass. Adopting a shorter temporal scale is fundamentally inconsistent with the way that

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[11] *Id.* at 8.
[12] NAFO Deferral Rule Comments at 21.

forests are managed and could potentially exclude some of the climate benefits of forest biomass if only a portion of the growth cycle were included in an assessment. As discussed in Section IV, *infra*, adopting a longer temporal scale will also ensure that the investment response of forest managers to growth in biomass energy markets will be accounted for in a policy or regulation.

Further, adopting a broad time scale is consistent with key findings related to climate change mitigation. As the SAB has observed, climate modeling studies have demonstrated that "peak warming in response to greenhouse gas emissions is primarily sensitive to cumulative greenhouse gas emissions over a period of roughly 100 years, and, as long as cumulative emission are held constant, is relatively insensitive to the emissions pathway within that timeframe." *SAB Report* at 14; *see also* NAUFRP Letter (explaining that evaluations of biomass energy should focus on long-term cumulative emissions and recommending a 100-year time scale) ; IPCC, *Climate Change 2013: The physical science basis* 102 (2013) ("[T]aking into account the available information from multiple lines of evidence … the near linear relationship between cumulative CO_2 emissions and peak global mean temperature is well established in the literature and robust for cumulative total CO_2 emissions up to about 2000 PgC [petagrams of carbon]."); Joint Centre of the European Commission, *et al.*, *Workshop Statement* (May 2014) ("Current scientific understanding indicates that peak warming is insensitive to greenhouse gas (GHG) emission trajectories, that is, to the timing of emissions.").[13] Thus adopting a sufficiently broad time scale will allow consideration of the biogenic carbon cycle over time periods that are relevant to the global climate system. Adopting a shorter time scale that fails to appropriately account for the way in which forest resources are managed could have the counterproductive effect of promoting policies that increase long-term GHG emissions based on inaccurate assumptions that are focused on short-term emissions.

Finally, it is critical that a broad temporal scale be coupled with a broad spatial scale and should never be substituted for it. Given the importance that rotation length plays in demonstrating the climate benefits of forest biomass, mismatches between

[13] *Available at* http://www.ieabioenergy-task38.org/publications/CPH_Bioenergy_Workshop_Statement_2014.pdf.

rotation length and temporal scales can significantly influence the assessment of CO_2 emissions from forest biomass, particularly when evaluated over small spatial scales. As EPA recognizes, "if the time frame chosen does not correspond exactly to one full harvest rotation, then the starting point [of the assessment] can impact results." *2014 Framework* at 37. However, these risks can be mitigated by adopting a broader spatial scale. *Id.* ("The choice of when to start an assessment period matters substantially at smaller scales, whereas assessments at larger scales are less sensitive to this aspect of timing …."). As a practical matter, it is virtually impossible to match an assessment period exactly to rotation length. While forest managers set targets for rotation length, final harvest decisions are based on market drivers and minor deviations from those plans are not uncommon. For example, after the recession in 2008, harvests declined in response to reduced demand for building products, resulting in slightly longer rotation lengths. Thus rather than trying to match precisely the rotation length (or fuelshed) for forest biomass, it is essential that both spatial and temporal scales are sufficiently broad to avoid undue influence from short-term or localized disruptions.

III. A Reference Point Baseline Must be Used to Assess CO_2 Emissions From Forest Biomass Because an Anticipated Future Baseline Cannot Be Implemented

In the *2014 Framework*, EPA's discussion of baselines presents the reference point baseline and anticipated future baseline as equally viable alternatives. *2014 Framework* at 27-32. This stands in stark contrast to EPA's determination in the *2011 Framework* that a reference point baseline should be adopted as "a straightforward way to assess an individual stationary source's emissions using existing data." *2011 Framework* at 42. NAFO continues to support a reference point baseline as the only approach that is capable of implementation in a policy or regulatory context. In contrast, despite any theoretical appeal an anticipated future baseline may have, its inherent complexity makes it highly uncertain and inappropriate for application in a policy or regulatory context.

As an initial matter, it is virtually impossible to isolate the impact of biomass energy and determine what would have happened without demand for biomass energy. In reality, biomass energy is a small segment of the forestry sector and is intimately related to other forest products in both time and space. In most cases, biomass is not produced and harvested as a separate product for energy production. Instead, the forestry residues and milling residuals that are combusted for energy represent co-products that are produced alongside more valuable primary products. Indeed, most roundwood used directly for biomass energy is harvested as part of a thinning process that is designed to improve the quality of the remaining trees that will be harvested later for other, more valuable forest products. It is simply not economical to grow and harvest mature trees for energy.[14] Instead, biomass co-products provide incremental economic value to the forest owner producing subtle, yet important, market signals that encourage biomass production and increase forest carbon stocks. As a result of this close relationship between forest products and the long time frames over which forest rotations occur, there is no simple and straightforward way to strip out biomass energy demand and determine what would have happened in its absence.

Further, any attempts to construct both an anticipated future baseline and an alternative future with differing demand for biomass energy is exceptionally complex and uncertain. As the SAB explained in its 2012 Report, "[t]o capture both the market, landscape, and biological responses to increased biomass demand, a bioeconomic modeling approach is needed with sufficient biological detail to capture inventory dynamics of regional species and management differences as well as market resolution that captures economic response at both the intensive (e.g., changing harvest patterns, utilization or management intensity) and extensive margins (e.g., land use changes)." SAB Report at 34. Likewise, EPA acknowledges that estimating a future anticipated baseline is challenging "because it involves generating future projections of the many complex natural systems, anthropogenic activities, and related carbon stocks and fluxes." *2014 Framework* at 31. In light of this uncertainty, there is no reason to suggest that an anticipated future baseline approach can predict future "business as usual" baseline any better than a reference point baseline. In fact, a recent study showed that simply predicting no change in forest carbon stocks (i.e. a reference point baseline) would have been more accurate than U.S. Forest Service RPA projections in

[14] NAFO Deferral Rule Comments at 26 & n.69.

predicting changes in forest carbon stocks over time.[15] As a result, the study authors concluded that "constant reference point baselines might be more appropriate [than anticipated future baselines] for monitoring and regulatory frameworks."[16]

Further, because the anticipated future baseline seeks to determine whether there is "more or less carbon stored in the system over time compared to what could have been stored in the absence of changes in biogenic feedstock use," *id.* at 30, it ignores the primary benefit of biomass energy—the displacement of fossil fuels. In fact, a reduction in the rate of increase in carbon stocks that simultaneously results in a reduction in fossil fuel emissions could produce a net reduction in total GHG emissions to the atmosphere. In other words, the anticipated future baseline described by EPA in the *2014 Framework*, which is already hopelessly complex, must become even more complex in order to accurately reflect the effect that increased demand for biomass energy has on the atmospheric GHG emissions.

Finally, the adoption of an anticipated future baseline would raise significant legal concerns and add uncertainty to the implementation process. By requiring forest owners to continue to increase forest carbon stocks at current rates, applying an anticipated future baseline to stationary source regulations would transform what is a voluntary, climate-friendly practice into a mandatory duty. If such a regulatory program were in place the baseline could also be applied elsewhere, for example in carbon offset programs. If these regulatory programs make carbon sequestration a mandatory duty for forest owners, they could present regulatory takings issues. Thus, the potential legal concerns associated with an anticipated future baseline would add further uncertainty and make implementation even more difficult.

IV. The *2014 Framework Places Undue Emphasis on Leakage and Substitution for Existing Biomass Products*

In the *2014 Framework*, EPA repeatedly expresses concern over the need to account for leakage and potential alternative fates for biogenic feedstocks if not used for biomass energy. *See, e.g., 2014 Framework* at 18-19; *App'x E*. While EPA does not

[15] Thomas Buchholz, *et al.*, *Uncertainty in projecting GHG emissions from bioenergy*, Nature Climate Change 4:1045-47 (2014).
[16] *Id.*

categorically assert that leakage must be accounted for in policies and regulations to evaluate the effect of CO_2 emissions from forestry biomass, EPA nevertheless overstates the potential impact of leakage in this sector, particularly when appropriate spatial and temporal scales are applied. Concerns regarding leakage and the displacement of existing markets for forest biomass are based on fundamental misconceptions about the way forestry markets operate and on their capacity to accommodate new demand within appropriately drawn assessment boundaries..

First, forest owners have historically shown a tremendous ability to increase productivity on existing forest lands in response to new demand for forest products. For example, between 1950 and 2010, the acreage of forested lands remained relatively stable, while the volume of wood increased by more than 50%.[17] In some regions, productivity more than doubled over that time period.[18] In other words, increased demand for wood products was met by increasing the growth rate of forest biomass, not by displacing other forest products or international land use changes. Further, there is no reason to believe that additional gains in productivity cannot be achieved in response to increased demand for biomass energy. For example, a recent study by the Maine Forest Service found that additional investments in site preparation, planning, competition control, and thinning could increase productivity by 88-273% on currently managed lands.[19] Thus, it is not unreasonable to assume that forest owners will respond to increased demand for biomass energy by making investments that will further increase productivity on existing lands. *See* NAUFRP Letter (noting that a failure "to consider the effects of markets and investment on carbon impacts can distort the characterization of carbon impacts from forest biomass energy"). Further, as EPA acknowledges, increased demand for biomass energy can have the further effect of inducing afforestation within the United States, which will further reduce the likelihood of international leakage. *2014 Framework, App'x E* at E-10.

Adopting appropriately broad spatial and temporal scales can account for many of the market responses discussed above and avoid the need to include a complicated

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[17] Bowyer *et al.* (2012) at 10.
[18] Thomas R. Fox., *et al.*, *The Development of Pine Plantation Silviculture in the Southern United States*, Journal of Forestry Vol. 105: 337-347 (2007).
[19] Maine Forest Service, *Maine Forest Service Assessment of Sustainable Biomass Availability* 3 (July 17, 2008).

leakage term in an accounting framework. As EPA notes, the impact of cross-boundary flows is directly related to the size of the assessment area, and "data collection and modeling complexities will increase with the number of regions defined in a geographically divided assessment framework." *2014 Framework, App'x C* at C-4. At the broad national scale, supported by NAFO, cross-boundary flows are minimized. As EPA demonstrates in its sample calculations, increases in productivity within an assessment area can be accounted for in the "grow" term, while changes in afforestation can be addressed in the "grow" and "site TNC" terms. *See id. App'x L*, Table L-1.

Further, any attempt to measure leakage suffers from incurable problems of uncertainty. As discussed in Section III, biomass energy is a small component of the total biomass market and it is difficult to attribute specific changes in overall market dynamics to changes in demand for biomass energy. As a result, it is difficult to predict, *ex ante*, the effect that changes in demand for biomass energy will have on domestic prices and what effect, if any, it will have on international demand through leakage. The SAB recognized this fact and asserted that "[e]mpirically, assessing the magnitude of leakage is fraught with uncertainty." SAB Report at 24. In the face of such uncertainty, it is simply not appropriate to include this factor in an Accounting Framework at this time. Rather than providing insight to policymakers and regulators, including leakage in an assessment of CO_2 emissions from forest biomass will almost certainly lead to perverse effects that will distort the biomass energy market and disrupt the development of climate-beneficial biomass energy facilities.

In sum, there is no reason to suggest that international leakage or the displacement of existing biomass demand will occur in response to increased biomass energy demand. Nor is there any reason to believe that any such leakage could be accurately measured and applied. As a result, it is inappropriate for EPA to suggest that it may be appropriate to include a leakage term in an assessment of CO_2 emissions from forest biomass. Instead, to the extent that a discussion of potential leakage effects is deemed necessary, the *Framework* should explicitly acknowledge the current limitations in assessing leakage and include clear thresholds with respect to uncertainty that must be met before leakage can be included in a policy or regulation assessing the CO_2 effects of forest biomass.

Conclusion

NAFO supports EPA's decision to seek an independent peer review of the *2014 Framework*. We urge the Panel to keep implementation at the forefront as it formulates its recommendations and hope that our comments will assist the Panel in identifying means to simplify its final recommendations to EPA in a manner that is consistent with the forestry and forest product sectors. NAFO is standing by to provide further information or answer any questions that the Panel may have.

Respectfully Submitted,
David P. Tenny
President and CEO
National Alliance of Forest Owners

ATTACHMENT A

NAUFRP

National Association of University Forest Resources Programs

Creating Knowledge–Developing Leaders

November 6, 2014

Gina McCarthy, EPA Administrator
U.S. Environmental Protection Agency
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Dear Administrator McCarthy:

On behalf of the National Association of University Forest Resources Programs representing 80 of the country's universities that have programs devoted to forest resources and who share a common purpose to advance the health, productivity and sustainability of our nation's forests, we are pleased to write you regarding your ongoing efforts on biomass carbon accounting.

As leaders in the science community, we appreciate your consistent emphasis on providing a strong science foundation for agency policy. We also acknowledge and wish to respond to your several requests for current, peer-reviewed science to inform the agency's work.

To that end, we provide the attached summary of science fundamentals, signed by more than 100 university experts in the field, that many in the science community, and the forestry disciplines in particular, strongly believe should underlie the agency's policy considerations for biomass carbon accounting. These fundamentals, which are essential to understanding and benefitting from the low carbon attributes of managed forests and the biomass derived from them, are also addressed in an article appearing in the November issue of the Journal of Forestry.

We appreciate the difficult task the agency faces as it tries to develop reasonable policies consistent with sound, relevant science. We recognize, for example, that in the carbon accounting context the agency must rely on the expertise and judgment of policy makers to establish appropriate baselines, monitoring protocols and other implementation and compliance approaches that apply science in a relatively simple and cost effective way. We believe the fundamentals we provide can support a variety of policy approaches that meet programmatic requirements while addressing the practical needs of both the regulating and regulated community.

We invite the EPA to carefully consider these science fundamentals and look forward to lending our expertise to the agency as it further develops a sound, science-based accounting policy for biomass energy.

Respectfully,

Steve H. Bullard, President
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Science Fundamentals of Forest Biomass Carbon Accounting

Policy makers are increasingly considering the use of forest biomass energy to meet national, regional and state energy and carbon emissions objectives. As they do so, it is imperative that their policy decisions be informed by current peer-reviewed science on the carbon impacts of woody biomass as an energy source. Some studies on the subject offer views with stringent assumptions that may be confusing to decision-makers.

Peer-reviewed literature examining the net emissions from the wide spectrum of forest-based activities reveals a number of important fundamentals policy makers should consider when characterizing the carbon impacts of the increased use of forest biomass for energy.[1] While these fundamentals do not address all of the issues policy makers confront, they help clarify those most directly affecting the potential role forest biomass energy can play in energy and climate policy.

As experts in forest science, we recommend the following four science fundamentals to policy makers and others seeking to develop a science-based approach to biomass energy production.

Fundamental 1: The carbon benefits of sustainable forest biomass energy are well established.

The long-term benefits of forest biomass energy are well-established in science literature. As stated in the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, "In the long term, a sustainable forest management strategy aimed at maintaining or increasing forest carbon stocks, while producing an annual sustained yield of timber, fibre or energy from the forest, will generate the largest sustained mitigation benefit.[2]" Most debates regarding the carbon benefits of forest biomass energy are about the timing of the benefits rather than whether they exist.

Fundamental 2: Measuring the carbon benefits of forest biomass energy must consider cumulative carbon emissions over the long term.

The most effective carbon mitigation measures are those which reduce carbon accumulation in the atmosphere over time. Forest biomass energy yields significant net decreases in overall carbon accumulation in the atmosphere over time compared to fossil fuels. Comparisons between forest biomass emissions

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[1] Miner, R.A., R.C. Abt, J.L. Bowyer, M.A. Buford, R.W. Malmsheimer, J. O'Laughlin, E.E. Oneil, R.A. Sedjo, and K.E. Skog. 2014. Forest Carbon Accounting Considerations in U.S. Bioenergy Policy. *Journal of Forestry* Forthcoming http://www.ingentaconnect.com/content/saf/jof/pre-prints/content-jof14009

[2] p. 543 Nabuurs, G.J., O. Masera, K. Andrasko, P. Benitez-Ponce, R. Boer, M. Dutschke, E. Elsiddig, et al. 2007. Forestry. Chapter 9 in *Climate change 2007: Mitigation*. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, Metz, B., O.R. Davidson, P.R. Bosch, R. Dave, and L.A. Meyer (eds.). Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. P. 541-584.

and fossil fuel emissions at the time of combustion and for short periods thereafter do not account for long term carbon accumulation in the atmosphere and can significantly distort or ignore comparative carbon impacts over time.

Fundamental 3: An accurate comparison of forest biomass energy carbon impacts with those of other energy sources requires the use of consistent timeframes in the comparison.

The most common timeframe for measuring the impacts of greenhouse gases is 100 years, as illustrated by the widespread use of 100-year global warming potentials.[3] This timeframe provides a more accurate accounting of cumulative emissions than shorter intervals. Measuring the net cumulative carbon emissions from forest biomass energy over a 100 year timeframe, as is done for fossil fuels, more accurately captures and more appropriately demonstrates the cumulative carbon benefits of biomass energy compared to fossil fuels.

Fundamental 4. Economic factors influence the carbon impacts of forest biomass energy.

Research demonstrates that demand for wood helps keep land in forest and incentivizes investments in new and more productive forests, all of which have significant carbon benefits. This is particularly true when landowner investments are made in anticipation of future market demand. Likewise wood markets significantly influence both the availability of wood and the kind of wood used for biomass energy. For example, large trees better suited for higher value markets are typically not used for energy. The consideration of landowner response to the marketplace is essential to fully accounting for the long-term carbon impacts of using forest biomass for energy.[4] Failing to consider the effects of markets and investment on carbon impacts can distort the characterization of carbon impacts from forest biomass energy.

Research on the use of forest biomass as an energy source to mitigate GHG emissions dates back to the late 1980's. Changes in technology, forest conditions, and markets and global economics will influence forest biomass utilization now and in the future. A commitment to continuing research on forest biomass utilization is necessary to quantify the risks and benefits associated with its use, encourage dialogue and debate, drive innovation and investment in new technologies and inform policy.

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[3] Forster, P., V. Ramaswamy, P. Artaxo, T. Berntsen, R. Betts, D.W. Fahey, J. Haywood, et al. 2007. Changes in atmospheric constituents and in radiative forcing. Chapter 2 in *Climate Change 2007: The physical science basis*. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor, and H.L. Miller (eds.). Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

[4] Alavalapati, J.R.R., P. Lal, A. Susaeta, R. Abt, and D. Wear. 2013. Forest biomass-based energy pp213-260. A chapter In Southern Forest Future Project edited by D. Wear and J. Griess, U.S. Forest Service General Technical Report SRS-178, 1318 pages.

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ATTACHMENT B

National Alliance of Forest Owners
Investing in the Future of America's Forests

January 25, 2012

Submitted via email

Holly Stallworth, Ph.D.
Designated Federal Officer
EPA Science Advisory Board
United States Environmental Protection Agency
1300 Pennsylvania Avenue, NW
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stallworth.holly@epa.gov

Re: National Alliance of Forest Owners' Comments to the Science Advisory Board Biogenic Carbon Emissions Panel

Dear Dr. Stallworth and Panel Members:

The National Alliance of Forest Owners (NAFO) welcomes the opportunity to submit these comments to the Environmental Protection Agency's (EPA's) Science Advisory Board (SAB) Biogenic Carbon Emissions Panel (Panel), in advance of its January 27, 2012 conference call to discuss the Panel's *Draft Advisory* on EPA's *Accounting Framework for Biogenic CO_2 Emissions from Stationary Sources* (Sept. 2011) (*Accounting Framework*). NAFO and its members are key stakeholders who contribute to the solutions that private forests and forest biomass bring to lowering greenhouse gas (GHG) emissions and, in turn, are keenly impacted by any controls or regulations on biogenic GHG emissions. NAFO – as the party that filed the Petition for Reconsideration with EPA that led to the present SAB process – is an acutely interested stakeholder in EPA's reconsideration of the treatment of biogenic CO_2 emissions from stationary sources and the scientific analysis EPA will utilize in making ultimate policy and regulatory decisions on how to treat biogenic CO_2 emissions. A detailed summary of NAFO's past participation was included in its October 18, 2011 comments to this

Panel.[1] As we have done from the earliest outset of EPA's review of the treatment of biogenic GHG emissions, we remain prepared to provide our significant scientific, technical, and pragmatic expertise and experience and a considerable body of scientific studies and analyses to assist the Panel throughout its review and evaluation of the *Accounting Framework*.

Summary

As NAFO and its members have explained in earlier comments and presentations to the Panel and EPA, critical to NAFO's mission in reducing GHG emissions is supporting the use of biomass as a renewable energy supply that offers important climate and energy security benefits. EPA's decision to reconsider its approach to regulating biogenic CO_2 emissions from stationary sources offers an opportunity to encourage the continued development of climate-beneficial bioenergy capacity. It is NAFO's goal that, with the assistance of the Panel's expertise, EPA will develop a regulatory framework that accurately reflects the climate benefits offered by bioenergy, encourages its continued development, and promotes appropriate distinctions between bioenergy and other types of energy such as fossil fuel combustion.

While NAFO supports the Panel's ongoing efforts in exploring and attempting to quantify the climate benefits of bioenergy, NAFO is concerned that this review process threatens to introduce undue complexity into EPA's regulation of biogenic CO_2 emissions, which in turn would create significant disincentives for the adoption of bioenergy as an alternative to fossil fuel combustion. While significant scientific analyses may be needed to understand the full scope of the climate benefits of bioenergy, unnecessary complexity is counterproductive to the ultimate goal of providing a workable regulatory framework for biogenic CO_2 emissions. Complex scientific analyses that address questions beyond the scope of the pertinent issues at

[1] National Alliance of Forest Owners' Comments to the Science Advisory Board Biogenic Carbon Emissions Panel (Oct. 18, 2011), *available at* http://yosemite.epa.gov/sab/SABPRODUCT.NSF/MeetingCal/D1D833DBF27626A6852578F600610AC5?OpenDocument

hand risk EPA creating, in turn, an overly complicated regulatory framework. This would frustrate the ultimate goal of deploying biomass as a significant means of reducing net GHG emissions and promoting energy independence. Thus, in these comments, NAFO respectfully offers suggestions for ways in which the Panel can use its scientific expertise to clarify and simplify the *Accounting Framework* that EPA has proposed to further the goal of promoting favorable bioenergy as a viable alternative to fossil fuel combustion. In short, NAFO recommends the Panel:

- Use its expertise to simplify EPA's *Accounting Framework* by identifying general principles that can be applied broadly to the bioenergy sector. To do so, the Panel must address the practical realities of private forest management and the spatial and temporal scales on which it operates.

- Limit its recommendations to the scope of its mandate from EPA and avoid incorporating extraneous factors outside of that scope.

- Maintain its focus on the ultimate goal of this review – to provide scientific assistance to policy makers for the development of a reasonable policy for addressing biogenic CO_2 emissions from stationary sources. The Panel must ensure that its recommendations are both science-based and capable of efficient implementation.

- Acknowledge the practical limits of science and pursue a balance between achieving a reasonable degree of scientific certainty and maintaining reasonable compliance processes and costs. In doing so the Panel must ensure that factors included in its recommendation will ultimately promote rather than discourage the development of beneficial bioenergy facilities.

I. The Panel's Scientific Review Should Aim to Aid EPA in Developing a Reasonable Policy for Addressing Biogenic CO_2 Emissions

At present, there is no debate that, when compared to fossil fuels, biomass can provide important climate benefits as an energy feedstock and that those benefits should be accounted for by treating biogenic CO_2 emissions from stationary sources differently than fossil CO_2 emissions. This distinction—and the associated climate benefits— is acknowledged in the Panel's *Draft Analysis* and serves as the basis of EPA's decision to defer regulation of bioenergy facilities and to reconsider whether and/or how to account for biogenic CO_2 emissions. In order to capture these climate benefits and create proper incentives for the continued growth of the bioenergy sector, EPA ultimately must design a straightforward and pragmatic policy that is capable of efficient and effective implementation and consistent with the realities of bioenergy production. An unnecessarily complex approach with high compliance costs will create market ambivalence for the bioenergy sector and reduce the sector's ability to produce the climate benefits that it has the capacity to provide. Indeed, if the compliance burdens and costs become too great, a policy intended to promote renewable bioenergy could have the perverse effect of discouraging continued growth of this important industry and the associated environmental benefits.

NAFO agrees with the Panel's assessment that EPA's *Accounting Framework* presents "daunting technical and implementation challenges" as a result of its complexity and also believes that an alternative approach is warranted. *See Draft Report*, at 38. By ignoring the practical realities of the forestry and bioenergy sectors, the *Accounting Framework* incorporates unnecessarily narrow subcategories – such as a regional spatial scale – that lack scientific justification and would complicate implementation. Similarly, the *Accounting Framework* includes many variables that have little, if any, value in quantifying the climate impacts of bioenergy, but would add significant compliance costs if implemented as a part of a regulatory program. Thus, to achieve the goal of a straightforward regulatory framework, we urge the Panel to seek to remove complexity rather than adding to it and prepare recommendations and conclusions EPA can implement through a straightforward approach that that promotes rather than discourages bioenergy production.

While NAFO supports the Panel's overall assessment of the challenges associated with EPA's *Accounting Framework*, we respectfully submit that many of the specific recommendations included in the *Draft Analysis*, if implemented by EPA in a regulatory scheme, would significantly increase complexity and maintain high transactional costs of compliance while not resulting in benefits that justify such costs. While NAFO addresses some of the specific recommendations offered by the Panel below, on the whole we respectfully believe the Panel would be aided in assessing the appropriate scope of its recommendations by actively engaging the forestry and bioenergy sectors on the practical questions related to implementation. This will allow the Panel to assess fully whether the *Accounting Framework*, or any alternative recommendations from the Panel, can be implemented in an efficient manner and thereby send the proper signals and incentives to encourage climate beneficial bioenergy. In turn, we urge the Panel to not limit itself to an abstract and theoretical analysis of the carbon impacts of the bioenergy sector detached from the pragmatic considerations impacting both the industry and EPA's ultimate policy.

As the *Draft Analysis* correctly notes, case studies are an extremely valuable tool in determining how the *Accounting Framework* or a regulatory program would apply in specific cases. *Draft Analysis* at 33. NAFO agrees that case studies should be based on real-world scenarios and use real rather than illustrative data so that the impacts of alternative approaches can be accurately assessed. *Id.* As the Panel continues to evaluate EPA's *Accounting Framework* and its own *Draft Analysis* and develops recommendations to EPA, we urge the Panel to make use of the case study approach endorsed by the *Draft Analysis* and consider carefully the challenges that arise during implementation.

Specifically, as the Panel continues its review, we urge it to focus on correcting the following examples of unnecessary complexity incorporated into the treatment of biogenic CO_2 emissions from stationary sources leading to significant hurdles and disincentives for pursuing this beneficial form of energy:

- Ignoring the practical realities of the forestry industry and addressing purely hypothetical scenarios that will not occur in practice. For example, there is no need to include parameters that address the harvest of mature trees for energy consumption because their high value for saw timber ensures that they will not be used to produce bioenergy.

- Adding additional detail and complexity that does not affect the final regulatory outcome. Improved accuracy and precision are not ends in themselves and should only be pursued if they produce changes at the relevant policy scale. For example, distinguishing between feedstocks provides no benefit if each sub-category has the same climate impact.

- Incorporating external issues that are beyond the scope of EPA and the Panel's review. For example, economy-wide accounting and Life Cycle Analyses are far beyond the scope of EPA's legal authority under the relevant provisions of the Clean Air Act applicable to the regulation of stationary sources and unnecessary to determine an appropriate policy solution.

- Incorporating complexity to produce marginal gains in accuracy that are exceeded by the high costs of data collection. Calculating climate benefits of bioenergy to the precise levels contemplated in the *Accounting Framework* and *Draft Analysis*, even if feasible, would entail extraordinary and costly requirements with little marginal benefit. The added cost and complexity would have the perverse effect of discouraging bioenergy production.

- Including parameters that cannot be determined to a reasonable degree of certainty. When uncertainty cannot be resolved, the appropriate response is to exclude the parameter and continue to study it until more certainty can be provided. For example the concept of leakage as applied to bioenergy as opposed to more familiar contexts, such as carbon offsets, is unclear and riddled with significant imprecision and should be excluded until it is better defined and understood.

When the Panel identifies unnecessary complexity that will inhibit the development of climate-beneficial bioenergy, we urge it to strive to find ways to eliminate such complexity and promote efficient implementation.

II. The Panel Must Use Both its Scientific Expertise and Knowledge of the Forestry and Bioenergy Sectors to Simplify EPA's *Accounting Framework*

While the Panel is expected to use its considerable scientific expertise and experience to rigorously evaluate the science related to biogenic CO_2 emissions, there is no reason to require analogous complexity in its recommendations. Rather, the Panel should focus on identifying consistent patterns that emerge as it completes its scientific review. As consistent patterns emerge, the Panel will be able to recommend generalized principles that will simplify rather than complicate EPA's *Accounting Framework*. Further, as it searches for such patterns, the Panel must remain mindful of the practical realities of the forestry and bioenergy sectors. By avoiding consideration of hypothetical scenarios that are unlikely to occur in practice, the Panel will be better positioned to discover generally applicable principles that are not evidenced through theoretical *a priori* analyses.

A. An *A Priori* Rejection of a Categorical Exclusion Is Not Warranted

The Panel should strongly resist dismissing out of hand the applicability of a categorical exclusion for biogenic CO_2 emissions even in the event it does not fully adopt the assumption that all biomass combustion is carbon neutral. Rather than making *a priori* judgments, the Panel must engage in a rigorous assessment of the net carbon impact of the bioenergy sector as it actually operates (and is expected to operate in the future). In so doing, NAFO believes the conclusions of the Panel can fairly support a categorical exclusion. For example, it is appropriate for the Panel to become familiar with the processes associated with different feedstocks utilized by bioenergy facilities. At the same time, if the combined carbon emissions of the various feedstocks, when considered at an appropriately broad scale, do not increase net atmospheric CO_2 concentrations, the Panel should recommend that there is no basis to distinguish among feedstocks in an accounting framework. Such a conclusion also provides the Panel a strong basis for recommending a categorical exclusion of biomass from a regulatory regime.

While NAFO believes that a categorical exclusion is appropriate for all applicable feedstocks, the Panel should not consider purely hypothetical feedstocks that have no prospect of being used by the bioenergy sector. At best, such consideration will add complexity to the Panel's review process and, at worst, will insert unnecessary complexity into the regulations themselves. For example, there is no need for the Panel to consider whether there is a unique carbon impact associated with the combustion of whole, mature trees for energy. As the Panel has appropriately recognized, mature forests will not be harvested for energy because they are valued much more highly for other products, such as saw timber. *Draft Analysis* at 29. However, parts of whole trees, (limbs, bark, shavings, and other residues) will likely be used for bioenergy in final harvests as part of an efficient harvest and manufacturing operation. The only roundwood likely to be used directly for bioenergy is immature roundwood from thinning treatments, a practice that typically increases overall carbon sequestration rates of the remaining trees. While the harvest of whole, mature trees for energy has generated much debate and opposition, a careful analysis of the practical realities of the forestry and biomass sectors show that this issue is a red herring. Rather than designing a framework that addresses this abstract and hypothetical situation, the Panel can simplify its analysis and the *Accounting Framework* by focusing on the types of feedstocks that will actually be used for bioenergy.

B. The Panel Must Focus Its Analysis on Appropriate Spatial and Temporal Scales

In the same manner, general trends are likely to be observed if the Panel focuses its analysis on appropriate spatial and temporal scales. Indeed, many of the complications evident in the *Accounting Framework*, the *Draft Analysis*, and comments submitted to EPA and the Panel are based on distinctions that are not relevant when appropriate spatial and temporal scales are adopted. For example if the Panel focuses on spatial scales that are relevant to how the carbon cycle functions (e.g., changes in net overall atmospheric CO_2 concentrations over time) the many concerns related to short-term fluctuations in carbon stocks disappear. It is no accident that the ages of forests tend to be evenly distributed along a continuum. Forests are managed to meet an ongoing demand for goods, services and uses, and this requires a predictable continuation of a productive forest land base. Assessing individual stands outside of the broader context in which they are managed can produce misleading results. For example, concerns over short-term fluctuations in carbon stocks raised by Cherubini *et al.* (2011) and Walker *et al.* (2010) are based on this type of stand-based accounting. While the "snap-shot" approach offered by these methodologies may have value in describing how individual carbon molecules cycle between different carbon pools over time, it creates an arbitrary spatial distinction that is not representative of how the forestry and bioenergy sectors affect the overall forest carbon cycle. Instead, as individual "snap shots" from different stands are aggregated into appropriate spatial scales that represent the carbon flux associated with a forest landscape, the small, short-term fluxes in carbon emissions are balanced and the net changes in CO_2 concentrations attributable to bioenergy approach zero. Using the bank account analogy, when considered at the proper spatial scale, it becomes clear that the entire forestry sector – including bioenergy – maintains a consistent level of carbon capital in the forest and only harvests a portion of the accrued interest.

Similarly, adopting an appropriately broad temporal scale can greatly simplify accounting for biogenic CO_2 emissions. As the Panel has recognized, the global climate system is insensitive to intermediate changes in carbon stocks that occur on timeframes shorter than 100 years. *Draft Analysis* at 11. Yet many of the concerns over the climate impacts of biomass involve changes that occur over much shorter timeframes. Moreover, forests are universally managed on rotation cycles that are shorter than 100 years, meaning that the global climate system is insensitive to changes in carbon stocks that occur during the harvest and regeneration cycle. Thus the Panel is correct when it notes that, even if valid, concepts addressing short-term carbon fluxes such as "carbon debt" are irrelevant due to the time scale on which climate responses occur. *Draft Analysis* at 11.

By recognizing the importance of maintaining a broad temporal scale on the order of 100 years, the Panel can avoid complicating its recommendations through the inclusion of components that address proximate changes in biogenic CO_2 emissions over shorter timeframes. Rather than incorporating short-term models of emissions fluxes such as Cherubini *et al*.'s GWP_{bio} Index and the time path of decay of emissions into an accounting framework, the Panel's recommendations should focus on changes in cumulative biogenic CO_2 emissions over policy-relevant 100-year time frames. Again, assessing short-term carbon fluxes may be a valid part of the Panel's scientific assessment of biogenic CO_2 emissions, but it should not be a part of its final recommendations to EPA.

III. The Panel Should Avoid Incorporating External Factors Outside the Scope of EPA's Regulatory Review

As the Panel has correctly observed, its scientific review and ultimate recommendations are constrained by the scope of the regulatory review that EPA has undertaken. As a legal and policy matter, EPA has chosen to limit its review to an "examination of the science and technical issues associated with biogenic CO_2 emissions from stationary sources." EPA, Deferral for CO2 Emissions from Bioenergy and Other Biogenic Sources Under the Prevention of Significant Deterioration (PSD) and Title V Programs (Deferral Rule), 76 Fed. Reg. 43,490, 43,490-91. While the Panel has correctly noted that EPA has left many important policy issues unanswered in its *Accounting Framework*, the Panel must be responsive to the boundaries of the questions presented by EPA. The purpose of EPA's review is to determine whether biogenic CO_2 emissions from stationary sources have different impacts on atmospheric CO_2 concentrations than fossil CO_2 emissions, meaning that the regulatory framework must allow, to the extent possible, a direct comparison between the climate impacts of biomass and fossil fuels. Incorporating additional factors will not further EPA's policy objectives and, instead, will unnecessarily complicate the *Accounting Framework*.

A. Greenhouse Gases Other than CO_2

Under the Deferral Rule, EPA has limited the scope of this review and its future regulation of bioenergy stationary sources to CO_2 emissions. As EPA stated in the *Accounting Framework*, carbon-based GHGs are unique because carbon can "cycle between different reservoirs in the atmosphere, ocean, land vegetation, soils, and sediments." *Accounting Framework* at 9. While the production of biomass and fossil fuel energy may result in some emissions of other GHGs, EPA has made a policy decision to focus on the carbon cycle and its role in reducing the climate impact of carbon-based GHG emissions from bioenergy facilities. Regardless of whether or not the Panel agrees with this direction, it should not expand the scope of its review or recommendations to incorporate emissions of other GHGs. While including emissions of N_2O and other non-carbon GHGs may be appropriate when quantifying GHG emissions by conducting a lifecycle analysis, EPA has expressly foreclosed this approach. Indeed, as the *Draft Analysis* suggests, including the emissions of other GHGs through a lifecycle analysis would prevent EPA from comparing the climate impacts of biomass and fossil fuels. *Draft Analysis* at 12-13. Recommending factors that have been explicitly excluded by EPA will be counterproductive because they are not responsive to EPA's charge, introduce confusion, and will inevitably be excised from EPA's final regulations.

B. Upstream and Downstream Emissions

Similarly, EPA's review is limited to stationary sources and the Panel should ensure that appropriate comparisons between bioenergy and fossil fuel facilities can be made. While differences between biogenic and fossil carbon dictate inclusion of carbon *sequestration*, there is no basis to include additional upstream and downstream *emissions*, which are not included in the regulation of fossil fuel facilities. For example, the Panel has appropriately recognized that it is inconsistent to account for transportation losses for biomass facilities, while ignoring fugitive emissions from natural gas pipelines. *Draft Analysis* at 26. For the same reason, it would be inconsistent to account for downstream emissions from co-products such as ethanol or paper when comparable emissions are ignored for fossil fuel facilities. While the Panel may prefer a more comprehensive accounting framework associated with the life cycle of all forest products, including those used for bioenergy, it should not go beyond the reach of the questions presented by EPA, which in turn are linked to EPA's regulatory authority.

C. Environmental Co-Benefits

By the same token the Panel must ensure that its recommendations do not inadvertently suggest that policy should require bioenergy facilities or their suppliers to provide unrelated environmental co-benefits as a condition for receiving credit under the PSD and Title V programs for the climate benefits that they provide. Thus the broad suite of environmental benefits addressed by forest certification and forestry best practices programs make them inappropriate proxies for establishing "sustainability" in the context of net atmospheric CO_2 impacts. While NAFO members are committed to third party verification of sustainable practices and recognize the value of these programs, they are designed to produce a variety of environmental benefits, such as biodiversity and clean water, that are outside the scope of the regulatory program where the *Accounting Framework* will be applied. Although production of these environmental benefits is a worthy goal and should be rewarded in an appropriate context, it should not be a precondition for recognition under the PSD and Title V programs.

Similarly, the Panel and EPA should resist the urge to make distinctions among feedstocks based on factors unrelated to climate impacts. In many cases concerns about bioenergy are based on perceived impacts of forestry practices on biodiversity, water quality, or aesthetics. Preferences for older forests and natural landscapes should not play a role in the Panel's review and recommendations unless they are directly related to changes in atmospheric CO_2 concentrations. While forests without question provide many benefits, EPA has limited this review to climate benefits and the Panel must respect the policy decision that EPA has made.

IV. The Panel Should Acknowledge the Limits of Science and Avoid Recommending Parameters that Increase Compliance Costs and Regulatory Uncertainty Without Commensurate Gains in Accuracy and Precision

Finally, as it conducts its scientific review and formulates its recommendations, the Panel must remain cognizant of its ultimate objective, which is to aid EPA's policy-making process. This is particularly important as the Panel considers uncertainty. As a general matter, scientifiic research is designed to reduce uncertainty (and thereby improve accuracy and precision), often through increasingly detailed and complex studies. While detailed analyses can be extremely important in advancing scientific understanding, they do not necessarily improve policy outcomes or the implementation of regulatory programs. Rather than simply pursuing greater detail and developing finer distinctions, we urge the Panel to consider whether its recommendations will allow EPA to create better policies.

In some cases, rigorous and detailed analyses can only be realized through an exponential increase in the cost of collecting detailed data. In instances where data collection is infeasible because compliance costs exceed marginal benefits in accuracy and precision, these marginal improvements become counterproductive from a policy standpoint and should be avoided. While ultimate policy decisions must be made by EPA, the Panel should take into account the pragmatic challenges and costs associated with its recommendations and avoid recommending complex approaches that will result in disproportionate increases in compliance costs. In other cases, the Panel may find that due to the inherent complexity of forestry and the forestry industry, it cannot resolve uncertainty and provide sufficiently accurate measurements for certain paramaters of interest. Rather than seeking complex ways in which to incorporate these uncertain parameters, the Panel must inform EPA that current scientific limitations have been exceeded. EPA can then make an appropriate policy decision of how to proceed in the face of such uncertainty. In some cases, an alternative approach may be taken and in others EPA may simply choose to monitor a parameter of interest in the hope that uncertainty can be resolved as scientific understanding improves.

A. Facility-Based Chain-of-Custody Accounting

As the Panel and many commenters have stated, facility-based chain-of-custody accounting can, in theory, be used to measure the changes in atmospheric CO_2 concentrations attributable to each bioenergy facility. Yet, when the transactional costs associated with collecting the necessary data are considered, it becomes apparant that the costs greatly overwhelm the marginal improvements in measuring changes in atmospheric CO_2 concentrations. Bioenergy facilities procure feedstocks from a vast and constantly changing array of land-owners as well as other entities in the forestry sector. The logistics of precisely tracking feedstocks from harvest to combustion would impose significant new costs on the bioenergy sector and would threaten its cost-effectiveness when compared to fossil fuel combustion. Thus, while a facility-based chain-of-custody accounting approach may, in theory, accurately measure the climate benefits of bioenergy, the costs assosiated with its implementation would prevent those benefits from being realized. Rather than adding cost and comlexity for the sake of marginally improved accuracy, the Panel must consider whether increased accuracy is necessary and worth the transactional costs of compliance. In the case of facility-based chain-of-custody accounting an honest assessment will lead to the conclusion that the high compliance costs simply cannot be justified.

B. “Business As Usual“ Baseline

Complexity is also a critical issue that must be considered as the Panel makes recommendations for the baseline in EPA’s *Accounting Framework*. Errors in baseline measurements pose a significant risk to the success of EPA’s policy as they have the potential to send unintended signals to the marketplace and create perverse incentives that discourage climate-beneficial bioenergy facilities. The “Business as Usual“ (BAU) baseline included in the Panel’s *Draft Analysis* poses exactly this type of risk. The Panel’s recommended approach requires calculating "what would have happened anyway“ without any biomass consumption by the bioenergy sector. *Draft Analysis* at 5. The Panel recognizes that such projections would be uncertain, *id.* at 5, and highlights a number of drivers that will complicate future projections including “economic conditions, domestic and international policy and trade decisions, commodity prices, and climate change impact.“ *Id.* at 25. In addition to these macro-scale variables, exogenous factors such as land use change and natural disturbances including fire and disease will have a significant influence on future carbon stocks, but are difficult to predict *ex ante*. Finally, bioenergy’s role within the forestry sector as a whole is extremely difficult to isolate and remove from future projections. In many cases, other forestry products are co-produced with bioenergy and, in any event, forest productivity investments are made far in advance of harvest as land managers anticipate future market demands.[2] Sedjo (forthcoming). Imposing a BAU baseline requirement may also result in an unintended regulatory taking by requiring that an existing net carbon sequestration trajectory must be maintained going forward, thereby affecting the value of additional carbon for other purposes in the marketplace.

As a result of this inherent complexity, it is difficult to assess with any certainty the precise path that carbon stocks will take in the future, let alone the hypothetical path that would occur in the absense of bioenergy. Rather than allowing EPA to "isolate the incremental or additional impact of the bioenergy facility," *Draft Report* at 24, a projected BAU baseline will simply reintroduce uncertainty based on a host of factors outside of the bioenergy sector's control. Regardless of its incremental impact on atmospheric CO_2 concentrations, a bioenergy facility's regulatory obligations could change simply because EPA's projections of other factors proved incorrect. Even if the Panel is correct in asserting that additionality is an important concept for EPA to consider, it must acknowledge that a projected BAU baseline cannot be accurately measured and will likely produce perverse regulatory results unrelated to the climate impact of bioenergy. In light of this uncertainty, the Panel must provide a thorough assessment of the state of the science related to baselines that will allow EPA to make an informed policy choice.

C. Leakage

Measurement of leakage suffers from the same problems of uncertainty. Although EPA identified leakage as an issue of concern in the *Accounting Framework*, it did not attempt to quantify leakage, due in part to the uncertainty surrounding it. *Accounting Framework* at 41. Instead EPA suggested that leakage could be incorporated at a later date once its impact was better understood. *Id.* The *Draft*

[2] Given the interrelated nature of the forestry sector and the fact that significant investments have already been made in anticipation of bioenergy demand, it would simply be unfair to apply a BAU baseline to the bioenergy sector. Forest owners have been providing significant carbon benefits over time by increasing carbon stocks on the lands they manage. They should not be required to maintain that rate of growth without compensation and only receive credit for "additional" sequestration beyond what they already provide.

Analysis confirms the uncertainty surrounding the measurement of leakage, noting that while non-zero leakage is plausible it could be positive or negative. *Draft Report* at 18. Indeed, it states that "the precision associated with qualitativlty estimating negative leakage may involve huge errors that could be so great as to overwhelm any usefulness of the development of high quality data for other interrelated parts of the assessment." *Id.* at 19. In the face of such uncertainty, it is simply not appropriate to include this factor in an Accounting Framework at this time. If, as the Panel has suggested, there is uncertainty even as the appropriate sign for leakage, its inclusion will almost certainly lead to perverse effects that will distort the bioenergy market and disrupt the development of climate-beneficial bioenergy faciliites. Rather than recommending that EPA incorporate some proxy for leakage based on its best guess as to what may occur, the Panel should cite the existing uncertainty and recommend that EPA exclude leakage until it can be better understood and quantified.

Conclusion

NAFO continues to support EPA's decision to seek an independent peer review of its proposed accounting methodology for biogenic CO_2 emissions and applauds the Panel's efforts to assess this complex field. We urge the Panel keep implementation at the forefront as it formulates its recommendations to EPA and to strive to add clarity rather than complexity to the *Accounting Framework* that EPA has proposed. NAFO is standing by to provide further information or answer any questions that the Panel may have.

Respectfully Submitted,

David P. Tenny
President and CEO
National Alliance of Forest Owners

ATTACHMENT C

National Alliance of Forest Owners
Investing in the Future of America's Forests

May 5, 2011

Submitted via www.regulations.gov

Environmental Protection Agency
EPA Docket Center (EPA/DC)
Mailcode: 28221T
Attention Docket ID No. EPA–HQ–OAR–2011–0083
1200 Pennsylvania Avenue, NW
Washington, DC 20460

Re: National Alliance of Forest Owners' Comments on "Deferral for CO2 emissions from Bioenergy and Other Biogenic Sources under the Prevention of Significant Deterioration and Title V Programs: Proposed Rule", 76 Fed. Reg. 15249 (Mar. 21, 2011) Docket EPA–HQ–OAR–2011–0083

To Whom It May Concern:

The National Alliance of Forest Owners ("NAFO") welcomes the opportunity to submit the following comments in response to the Deferral for CO_2 emissions from Bioenergy and Other Biogenic Sources under the Prevention of Significant Deterioration and Title V Programs: Proposed Rule ("Proposed Deferral"), 76 Fed. Reg. 15249 (Mar. 21, 2011), issued by Environmental Protection Agency ("EPA"). NAFO's mission is to protect and enhance the economic and environmental values of private forests through targeted policy advocacy at the national level. At the time of this submission, NAFO's members represent 79 million acres of private forests in 47 states. NAFO was incorporated in March 2008 and has been working aggressively since then to sustain the ecological, economic, and social values of forests and to assure an abundance of healthy and productive forest resources for present and future generations. NAFO is a solutions-oriented organization and is prepared to answer any questions EPA has regarding biomass combustion and the lifecycle of forest biomass and to assist the agency in developing long-term policy that helps achieve the nation's renewable energy and climate change objectives.

As the organization that requested EPA reconsider its position in the Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule ("Tailoring Rule") regarding the treatment of biomass emissions, NAFO is an acutely interested stakeholder in EPA's finalization of this rule that would defer the regulation of biomass emissions. NAFO applauds the steps EPA is taking to alleviate the disincentives the Tailoring Rule has created for utilizing renewable biomass, and offers comment on three areas of the proposed deferral rule. First, we present clarifying comments regarding the scientific principles, policy choices, and regulatory actions that underlie the deferral rule, which are important for the Agency to improve its further actions and activities regarding biomass emissions. Second, NAFO offers suggestions for how the operative provisions of the deferral rule should be altered to ensure that the deferral fully achieves its goals. Third, NAFO offers preliminary suggestions regarding the shape of the Agency's upcoming inquiry into the appropriate treatment of biomass emissions.

COMMENTS ON THE BACKGROUND OF THE DEFERRAL RULE

EPA's proposed rule would appropriately defer regulating carbon dioxide emissions from biomass combustion under the Prevention of Significant Deterioration ("PSD") and Title V Clean Air Act (CAA) stationary source permitting programs.[1] This deferral results from three primary factors: 1) the science of biomass emissions, known as the carbon cycle; 2) the prior treatment of combustion of biomass at stationary sources; and 3) the administrative infeasibility of regulating biomass emissions through the Clean Air Act's stationary source permitting programs.

I. The Science of Biomass Emissions—the Carbon Cycle.

Biomass is a carbon beneficial alternative to fossil fuels that can reduce greenhouse gas ("GHG") emissions and mitigate the effects of climate change. NAFO has provided significant analysis to EPA on past occasions regarding the distinctions and advantages of utilizing biomass compared to fossil fuels.[2] In brief, biomass can be

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[1] *See* Deferral for CO_2 emissions from Bioenergy and Other Biogenic Sources under the Prevention of Significant Deterioration and Title V Programs: Proposed Rule ("Proposed Deferral"), 76 Fed. Reg. 15249 (Mar. 21, 2011); Letter from Gina McCarthy to Roger Martella (Jan. 12, 2011) granting NAFO's Petition for Reconsideration.

[2] *See*, *e.g.*, National Alliance of Forest Owners' Comments on "Call for Information: Information on Greenhouse Gas Emissions Associated With Bioenergy and Other Biogenic Sources; 75 Fed. Reg. 41173 (July 15, 2010)," Docket ID: EPA-HQ-OAR-2010-0560 (Sept. 13, 2010) (Exhibit A).

an effective tool in reducing U.S. GHG emissions because it is part of the natural carbon cycle and does not add additional carbon to the atmosphere. This is because growing plants absorb carbon dioxide from the atmosphere. All plant materials are ultimately derived from this carbon dioxide drawn from the atmosphere, and so when biomass is burned, the carbon dioxide emitted contains the same carbon that was sequestered by the plant feedstocks, which also would have been emitted if the plant materials were left to decay. Indeed, as EPA has repeatedly reported, if one considers net fluxes of carbon dioxide from the forestry sector as a whole, including growth and parallel combustion, the sector is a net carbon sink. Thus, the combustion of biofuels does not result in net carbon dioxide emissions.

Indeed, the renewable power generated by combustion of biomass actually reduces atmospheric concentrations of carbon dioxide in three respects. First, combustion of biomass displaces combustion of fossil fuels, meaning that combustion of biomass actually means fewer emissions of geologic carbon dioxide than would occur in its absence.[3] Second, biomass energy avoids the biogenic greenhouse gas emissions (mainly methane) of the various alternative disposal fates of biomass residues, replacing them with the lower potency greenhouse gas emissions of energy production.[4] Third, biomass combustion actually promotes further forest growth by providing land owners with an incentive to maintain forests instead of converting to other land use options that sequester less carbon.

This final point—that increased demand for forest products leads to increased forest—is simple commonsense. But there seems to be a misconception falsely perpetuated by some that demand for forest products could lead to decreased forest stocks. This ignores the fact that forests are a renewable resource—as the value of forests increase, forests themselves will multiply.[5] Economic returns to wood production and forest-based manufacturing provide important incentives for private forest

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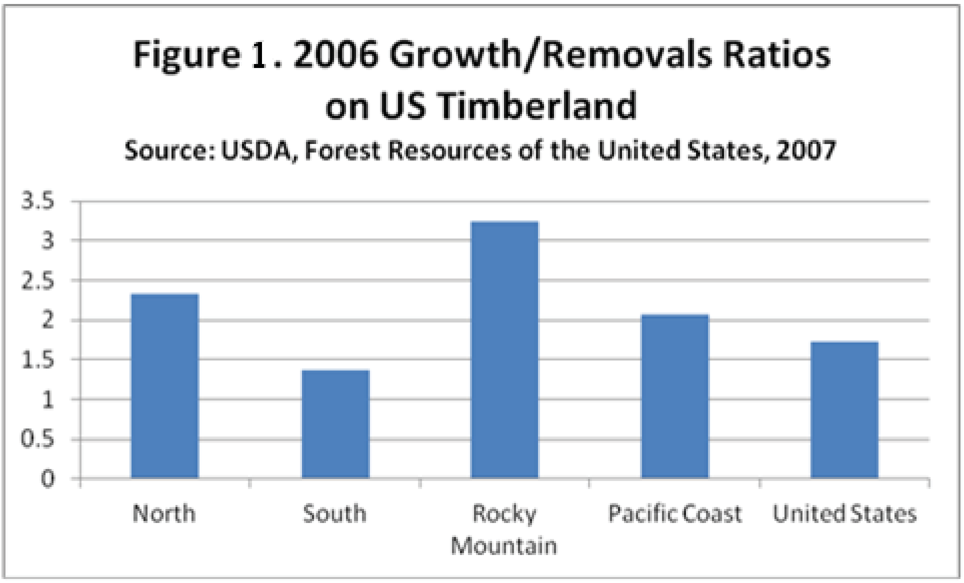
[3] *See* Gregory Morris, Ph.D., Bioenergy and Greenhouse Gasses (2008).

[4] *Id*. at 4.

[5] The notion that restrictions on using forests for biomass combustion *could help preserve forests* is equally misguided. If the government restricts the use of a renewable resource, stocks of that resource will naturally fall. Clutter, M., Abt, R., Greene, W.D., Siry, J., and Mei, R., *A Developing Bioenergy Market and Its Implications on Forests and Forest Products Markets in the United States* (Executive Summary prepared for NAFO) (2010), *available at* http://nafoalliance.org/clutter/.

stewardship in the United States.[6] Absent these incentives, many working forests would be converted to non-forest uses.[7] New markets for bioenergy feedstocks can enhance the economic sustainability of working forests and thus contribute to maintaining or increasing the extent of forests on private lands.

The Forest Inventory and Analysis (FIA) Program of the U.S. Forest Service, *see generally* http://fia.fs.fed.us/, confirms that as biomass production has increased, U.S. forests are stable or increasing. Even in the South, which has experienced an increase in removals since 1980, the ratio of growth to removals was above 1.3 in 2006.



More importantly, estimates of the net flux of CO_2 confirm that forest sequestration is increasing, meaning that the net flux of carbon into forest biomass is greater than the

[6] Wear, D.N. and J.P. Prestemon, "Timber market research, private forests and policy rhetoric," (pages 289-300), in H.M. Raucher and K. Johnsen (eds.) Southern Forest Science: Past, Present, and Future (2004) General Technical Report SRS-75, Southern Research Station, USDA Forest Service. Asheville, NC.

[7] Lubowski, R. N., S. Buchholtz, R. Claassen, M.J. Roberts, J.C. Cooper, A Gueorguieva, and R. Johansson, Environmental Effects of Agricultural Land-Use Change: The Role of Economics and Policy, Economics Research Report No. 25., Economic Research Service. US Department of Agriculture, Washington, D.C.

flux returning to the atmosphere due to respiration, decay, and combustion.[8] This even better-than-neutral balance applies to all forests, both public and private.[9]

For these reasons, as EPA is aware, carbon stocks in United States forests have been increasing, and will continue to increase. EPA, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2008* at 3-10 (April 15, 2010) (EPA 2010 Inventory), *available at* http://www.epa.gov/climatechange/emissions/downloads10/US-GHG-Inventory-2010_Report.pdf. Thus, the generation of bioenergy from forest biomass has massive climate benefits.

II. The Established Regulatory Treatment of Biomass Combustion.

Given the science of the carbon cycle, it is not surprising that, with the sole exception of the final Tailoring Rule, the established domestic and international practice is that carbon dioxide emissions from biomass combustion are not counted toward regulatory thresholds at stationary sources. The Intergovernmental Panel on Climate Change guidance and United Nations Framework Convention on Climate Change reporting protocols both recognize the carbon neutrality of biomass. Similarly, the European Union ("EU") directive on carbon trading specifies "Biomass is considered as CO_2-neutral."[10] Instead, they measure increases in forest stock at the national level, measuring the net sequestration rate by examining forest growth.

American policy and regulation has wisely followed this established and accepted international practice of not counting carbon dioxide emissions from combustion of biomass in the stationary source sector. That is, combustion of biomass is carbon neutral, and increases in forest stock should be measured at the national forest level. As EPA has concluded, there is "[s]cientific consensus . . . that the CO_2 emitted from burning biomass will not increase total atmospheric CO_2 if this consumption is done on a

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[8] Heath, Linda S., *et al*, Managed Forest Carbon Estimates for the U.S. Greenhouse Gas Inventory, 1990-2008, *Journal of Forestry* (April/May 2011) 167.

[9] *See* Haynes, R. W., *The 2005 RPA timber assessment update*, Gen. Tech. Rep. PNW-GTR-699, USDA Forest Service, Pacific Northwest Research Station (2007); Heath, L. V., *Greenhouse Gas and Carbon Profile of the U.S. Forest Products Industry Value Chain*, Environmental Science and Technology (2010).

[10] EU guidelines for the monitoring and reporting of greenhouse gas emissions, Annex I, 4.2.2.1.6, *available at* http://inni.pacinst.org/inni/climate_change/EUGuidelinesGHGJan2004.pdf.

sustainable basis."[11] Consequently, EPA's Mandatory GHG Reporting Rule uses an expansive definition of biomass and does not include biogenic CO_2 in its reporting threshold. Similarly, the Department of Energy's (DOE's) Voluntary Reporting of Greenhouse Gases Program, authorized by Section 1605(b) of the Energy Policy Act of 1992, provides for exclusion of combustion of biomass fuels.[12]

Thus, strong agreement exists supporting the government's practice of **not** counting emissions from combustion of biomass like emissions from combustion of fossil fuels. As explained in NAFO's prior comments on EPA's Call for Information regarding biomass combustion, the carbon neutrality of biomass combustion is also well established in the scientific literature.[13] NAFO's prior comments also explain the flaws in recent studies challenging the carbon neutrality of biomass combustion.[14]

III. The Proposed Deferral Rule and the Administrative Infeasibility of Assessing the Net Impact of Biomass Combustion at Stationary Sources.

The proposed deferral rule is the latest step in EPA's necessary journey back to restoring the established position that carbon dioxide emissions from combustion of biomass do not count toward regulatory thresholds for stationary sources.

A. EPA Proposed Maintaining the Traditional Rule Against Counting Stationary Source Carbon Dioxide Emissions From Combustion of Biomass.

On October 27, 2009, EPA published a proposed rule for greenhouse gas permitting, known as the "Tailoring Rule," that dictated which stationary sources of greenhouse gases would have to obtain permits and meet other requirements under

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[11]Environmental Protection Agency Combined Heat and Power Partnership, *Biomass Combined Heat and Power Catalog of Technologies*, 96 (Sept. 2007), *available at* www.epa.gov/chp/documents/biomass_chp_catalog.pdf.

[12]*See* DOE, *Technical Guidelines: Voluntary Reporting of Greenhouse Gases (1605(b)) Program* at 77 ("Reporters that operate vehicles using pure biofuels within their entity should not add the carbon dioxide emissions from those fuels to their inventory of mobile source emissions because such emissions are considered biogenic and the recycling of the carbon is not credited elsewhere.").

[13] *See* National Alliance of Forest Owners' Response to Call for Information: Information on Greenhouse Gas Emissions Associated With Bioenergy and Other Biogenic Sources; 75 Fed. Reg. 71173 (July 15, 2010) 9-16 (Exhibit A).

[14] *Id.* at 16-19.

EPA's Prevention of Significant Deterioration (PSD) and Title V permitting programs.[15] Specifically, the proposed rule directed that sources should rely on EPA's Inventory of U.S. Greenhouse Gas Emissions and Sinks "to calculate a source's GHG emissions."[16] That inventory does not count carbon dioxide emissions from combustion of biomass at stationary sources; rather, in accordance with settled policy, "[i]t is assumed that the C released during the consumption of biomass is recycled as U.S. forests and crops regenerate, causing no net addition of CO_2 to the atmosphere."[17] EPA did not indicate or suggest that it was proposing a deviation from this policy in the proposed PSD and Title V permitting programs.

Thus, it seems clear that EPA proposed to follow settled government policy and not to count carbon dioxide emissions from combustion of biomass at stationary sources toward the applicability thresholds it proposed for the PSD and Title V permitting programs—and, naturally, this is how stakeholders understood the rule.[18] In the Proposed Deferral preamble, however, EPA suggests that NAFO, along with other stakeholders, "misunderst[oo]d [EPA's] intent," and that its references to the Inventory had not been meant as "an indication, direct or implied, that biomass emissions would be excluded from permitting applicability merely by association with the national inventory."[19] EPA stated that instead, it referred to the Inventory for [Global Warming

[15] Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule, 74 Fed. Reg. 55,292 (Oct. 27, 2009).

[16] *Id*. at 55,351, 55,352, 55,361.

[17] EPA, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-1997 at Energy 3-1–3-2.

[18] *See* National Alliance of Forest Owners' Comments on "Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule," Docket ID: EPA-HQ-OAR-2009-0517 (Dec. 28, 2009) (Exhibit B).

[19] 76 Fed. Reg. at 15,256. We also note that EPA repeatedly misrepresents that commenters requested that EPA "exclude" biogenic carbon dioxide (CO_2) emissions." See 76 Fed. Reg. 23587 (April 27, 2011); 76 Fed. Reg. at 15,256; 75 Fed. Reg. 31514, 31590 (June 3, 2010). NAFO explicitly asked EPA to confirm its proposal to follow the exiting policy separating biogenic emission from fossil fuel emissions, as proposed: "EPA in the final Tailoring Rule should confirm its proposed methodology that would exclude biogenic emissions from triggering prevention of significant deterioration permitting requirements." National Alliance of Forest Owners' Comments on *Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule,* Docket EPA-HQ-OAR-2009-0517 (Dec. 28, 2009) (Exhibit B).

Potential] identification purposes only."[20] This, however, is not true. The proposed Tailoring Rule specifically and repeatedly stated that EPA would use the Inventory not only for determining a pollutant's global warming potential, *but also* "for guidance on how to calculate a source's GHG emissions." 74 Fed. Reg. at 55,351, 55,352, 55,361. Furthermore, whatever EPA's unexpressed intent, the actual rule it proposed was best read as consistent with longstanding government policy of not counting carbon dioxide emissions from combustion of biomass. After all, EPA not only tied its rule to the Inventory; it also gave no indication that it was rejecting the settled policy against counting biomass emissions—much less gave any reason for doing so.

B. The Final Tailoring Rule Inappropriately Counts Emissions From Combustion of Biomass.

Thus it was a sudden and unprecedented reversal when, on June 3, 2010, the final Tailoring Rule provided that carbon dioxide emissions from biomass combustion *would* count toward the rule's applicability thresholds for the PSD and Title V permitting programs.[21] EPA did not offer any explanation for this reversal. Indeed, EPA's short discussion of the issue only suggested reasons not to change course: EPA expressed uncertainty about the propriety of counting biomass emissions, but acknowledged that "many state, federal, and international rules and policies" do not count biomass emissions in the same manner as fossil fuel emissions and that biomass fuel could play a role "in reducing anthropogenic GHG emissions."[22]

On July 30, 2010, NAFO petitioned EPA to reconsider the Tailoring Rule's treatment of biomass combustion, noting that (1) EPA had not offered a reasoned explanation for reversing the established government position that it had followed in the proposed Tailoring Rule, and that (2) EPA's unexpected change-of-course in the final Tailoring Rule was not a logical outgrowth of its proposed Tailoring Rule.[23] NAFO requested that EPA (1) reconsider its decision to count CO_2 emissions from biomass

[20] *Id*.

[21] *See* 75 Fed. Reg. 31,514, 31,590-91 (June 3, 2010).

[22] 75 Fed. Reg. at 31,590–91.

[23] NAFO also petitioned for review of the Tailoring Rule in the United States Court of Appeals for the District of Columbia Circuit. *See NAFO et al., v. EPA*, D.C. Cir. Case No. 10-1209 (filed Aug. 2, 2010) (consolidated with *Southeastern Legal Foundation , Inc. v. EPA,* No. 10-1131, *et al.)*. That case is pending.

combustion toward applicability thresholds for PSD and Title V and (2) stay the application of the PSD and Title V permitting programs to emissions of CO_2 from biomass combustion pending reconsideration.

C. EPA Appropriately Granted Reconsideration of Its Tailoring Rule, and Proposed Deferral.

On January 12, 2011, EPA granted NAFO's petition for reconsideration, and, rather than staying the rule, committed to "complete a rulemaking to defer for three years the application of the pre-construction and Title V permitting requirements to CO_2 emissions from biomass-fired and other biogenic sources" by July 1, 2011.[24] At the same time, EPA also committed to use the three year delay to undertake a scientific and technical study of how to account for "CO_2 emissions from biomass-fired and other biogenic stationary sources . . . in ways that are scientifically sound and also manageable in practice."[25] During the same period, EPA will complete a notice and comment rulemaking to establish "the system for determining applicability of the Clean Air Act's pre-construction permitting requirement to projects that result in CO_2 emissions from biomass fired and other biogenic sources."[26]

EPA's decision to reconsider its Tailoring Rule appropriately was met with broad endorsement by the Obama Administration. In her statement announcing this decision, EPA Administrator Jackson noted: "Renewable, homegrown power sources are essential to our energy future, and an important step to cutting the pollution responsible for climate change."[27] In his statement supporting EPA and pledging to work with EPA,

[24] Letter from Gina McCarthy to Roger Martella (Jan. 12, 2011) granting NAFO's Petition for Reconsideration *available at* http://www.epa.gov/nsr/ghgdocs/McCarthytoMartella.pdf. During the three-year period, EPA will complete a notice and comment rulemaking to establish "the system for determining applicability of the Clean Air Act's pre-construction permitting requirement to projects that result in CO2 emissions from biomass fired and other biogenic sources." *Id*.

[25] EPA also promised to issue guidance to "help permitting authorities establish a basis for concluding that the best available control technology (BACT) for CO2 emissions at such sources is simply combustion of biomass fuels." *Id*. This guidance was released in March. See Guidance For Determining Best Available Control Technology For Reducing Carbon Dioxide Emissions From Bioenergy Production, http://www.epa.gov/nsr/ghgdocs/bioenergyguidance.pdf.

[26] *Id*.

[27] http://www.epa.gov/aging/press/epanews/2011/2011_0112_1.htm.

Secretary of Agriculture Vilsack stated: "EPA's action today will provide the agency with the time it needs to ensure that greenhouse gas policies properly account for the emissions and carbon sequestration associated with biomass. In many cases, energy produced from biomass will provide significant reductions of greenhouse gases relative to fossil fuels."[28]

The Proposed Deferral itself noted another problem with EPA's change of course in the final Tailoring Rule. Accounting for the net carbon dioxide added to the atmosphere by a given biomass combustion facility is hopelessly complex. As EPA stated:

> Establishing an accounting system for the net atmospheric impact of biogenic CO_2 emissions from stationary sources is complex. As mentioned above and below, commenters to the [Call For Information] made suggestions ranging from a categorical exclusion of facility-based emissions to a case-by-case analysis approach. Multiple factors need to be considered to accurately assess the net atmospheric impacts of the use of a particular type of fuel by a stationary source over a specified time period, that extends into the future: Net emissions to the atmosphere (emissions from the facility and sequestration elsewhere) of carbon from the biomass used for bioenergy; the time scale against which net emissions should be measured; delineation of geographic areas for measurement; and leakage.[29]

Consequently, EPA determined that it could rely "on the same rationale as EPA used to justify the Tailoring Rule's phase-in approach"[30]—that is "the 'absurd results' doctrine, which authorizes agencies to apply statutory requirements differently than a literal reading would indicate, as necessary to effectuate congressional intent and avoid absurd results; and (2) the 'administrative necessity' doctrine, which authorizes agencies

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[28] http://www.usda.gov/wps/portal/usda/usdahome?contentidonly=true&contentid=2011/01/0008.xml.

[29] 76 Fed. Reg. at 15,258.

[30] 76 Fed. Reg. at 15,262.

to apply statutory requirements in a way that avoids impossible administrative burdens."[31]

COMMENTS ON THE PROPOSED DEFERRAL'S PROVISIONS

NAFO strongly supports the Proposed Deferral. As described below, EPA has ample legal authority to finalize this rule. Nevertheless, there are also important and necessary areas for improvement. In particular, EPA must remove the automatic sunset date from the final rule. It must also ensure that the states accept EPA's judgment that regulation of biomass is administratively infeasible, and, to be consistent with its broader actions under the Tailoring Rule, must modify any state implementation plans that cannot demonstrate that they have the resources to regulate biomass combustion.

I. EPA Has Clear Legal Authority and Discretion Not to Count Carbon Dioxide Emissions From Combustion of Biomass at Stationary Sources.

The Clean Air Act and supporting caselaw provide EPA clear legal authority to distinguish GHG emissions from biomass combustion versus other sources, and thus to exclude such emissions from Clean Air Act regulatory and permitting regimes. First, EPA has significant authority and discretion not to bring such emissions within the Clean Air Act framework given that GHG emissions from biogenic sources have no adverse impact on human health or the environment. Second, EPA has general authority to distinguish carbon dioxide emissions from combustion of biomass from other carbon dioxide emissions. Third, EPA has historically excluded certain air emissions from the PSD and other CAA programs—even when such emissions are otherwise regulated in some contexts. Fourth, EPA can use its discretion to avoid imposing burdens on permit applicants and permit authorities that, like regulating biomass, would be administratively impossible.

A. <u>The Clean Air Act Does Not Authorize EPA to Regulate Emissions such as Biogenic GHG Emissions Which Do Not Adversely Effect the Environment.</u>

A core principle underlying much of EPA's regulatory authority under the Clean Air Act is that EPA shall regulate only air pollutants that endanger human health or public welfare. Unlike CO_2 emissions from other sources, emissions from the

[31] 76 Fed. Reg. at 15,255.

combustion of biomass will not increase net atmospheric levels of CO_2.[32] This is because net fluxes of CO_2 to the atmosphere from the combustion of biomass in the United States are, at a minimum, "carbon neutral" in that any CO_2 emissions associated with the combustion of biomass are offset by biological processes that remove CO_2 from the atmosphere.

Because biogenic CO_2 emissions have no adverse effect on public health or public welfare and because Congress did not specifically direct EPA to regulate such emissions under the CAA, EPA lacks regulatory authority to address them in the first instance. In the Endangerment Finding, EPA specifically concluded that that the combined emissions of GHGs from new motor vehicles and new motor vehicle engines cause and contribute to air pollution that endangers public health and welfare. EPA based this conclusion on the fact that GHGs associated with these sources (primarily from the combustion of fossil fuels) represented 23 percent of total U.S. emissions of well-mixed GHGs.[33] Because of its "carbon neutral" lifecycle, biogenic CO_2 is fundamentally different from GHGs emitted from sources regulated under section 202(a) of the Clean Air Act. Biogenic CO_2 resulting from combustion, unlike fossil fuel combustion, has no net effect on the atmospheric level of "well-mixed" GHGs. It is not a contributor to climate change and, therefore, does not cause or contribute to the endangerment of public health or welfare. Thus, EPA should properly exclude biogenic CO_2 from the scope of its Clean Air Act regulatory authority based on the lack of any adverse effects.

B. EPA Has Clear Discretion to Distinguish Biogenic CO_2 Emissions From Other GHG Regulations.

In its landmark *Massachusetts v. EPA* decision, the Supreme Court recognized from the outset that EPA has significant discretion regarding the scope of climate change regulations. While the Supreme Court held that EPA has the authority to regulate emissions of GHGs from new motor vehicles based on the Court's finding that GHGs fit within the Clean Air Act's definition of "air pollutant," the Court also made clear that EPA's determination as to when and how such regulation should proceed is within

[32] *See* COMMENTS ON THE BACKGROUND OF THE DEFERRAL RULE § I.

[33] 74 Fed. Reg. at 66540 (Dec. 15, 2009).

the discretion of the Agency.[34] "[A]n agency has broad discretion to choose how best to marshal its limited resources and personnel to carry out its delegated responsibilities."[35] Courts specifically have affirmed EPA's discretion regarding the timing and approach to the regulation of GHGs following the Court's decision in *Massachusetts v. EPA*. For instance, in rejecting a petition to compel the regulation of GHGs after the *Massachusetts* decision, Judge Tatel observed that "nothing in section 202, the Supreme Court's decision in *Massachusetts v. EPA*, or our remand order imposes a specific deadline by which EPA must determine whether a particular air pollutant poses a threat to public health or welfare."[36] In the Tailoring Rule itself, EPA surgically exercised such discretion to limit the scope and reach of GHG regulation by specifically defining the precise "greenhouse gases" that will be "subject to regulation" as set forth in that rulemaking. *See* 75 Fed. Reg. at 31,606. EPA chose to limit its definition of "greenhouse gases" to "the aggregate group of six" chemicals and excluded other chemicals that also have climate impacts. *Id.*

EPA certainly could assert similar discretion to make clear that the PSD permitting program does not include GHG emissions from the combustion of biomass given that, as demonstrated above,[37] any environmental effect of biomass combustion on atmospheric concentrations of carbon dioxide is a beneficial one. EPA has discretion to recognize such readily apparent benefits of substituting a carbon neutral fuel for one that releases carbon which may have been geologically stored for literally millions of years. Such discretion is further supported by past practice; EPA has long differentiated biogenic emissions from fossil fuel emissions in its Inventory of U.S. Greenhouse Gas

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[34] *Massachusetts v. EPA*, 549 U.S. 497, 528-29, 533 (2007).

[35] *Id.* at 527 (citing *Chevron U.S.A. Inc. v. Natural Resources Defense Council, Inc*., 467 U.S. 837, 842-845 (1984)); *see also Am. Coke & Coal Chems. Inst. v. EPA*, 452 F.3d 930, 941-42 (D.C. Cir. 2006) ("The court owes particular deference to EPA when its rulemakings rest upon matters of scientific and statistical judgment within the agency's sphere of special competence and statutory jurisdiction.").

[36] *Massachusetts v. EPA*, Order Denying Petition for Writ of Mandamus, No. 03-1361 (D.C. Cir., June 26, 2008) (Tatel, J., *concurring in part and dissenting in part*). Similarly, the Northern District of California also rejected a an argument that EPA is compelled to regulate all GHGs following *Massachusetts*. *S.F. Chapter of A. Philip Randolph Inst. v. EPA*, 2008 U.S. Dist. LEXIS 27794 at *10-11 (N.D. Cal. Mar. 28, 2008). Consistent with the D.C. Circuit's conclusion, the California court recognized that "[t]he Supreme Court was careful not to place a time limit on the EPA, and indeed did not even reach the question whether an endangerment finding had to be made at all." *Id*.

[37] *See* COMMENTS ON THE BACKGROUND OF THE DEFERRAL RULE § 1.

Emissions and Sinks. Here, EPA can and should exercise its well established discretion in interpreting the Clean Air Act requirements for the PSD permitting program by distinguishing biogenic CO_2 GHG emissions from fossil fuel GHG emissions.

C. EPA Has Limited the Regulatory Reach of the PSD Program in Other Contexts.

There is abundant support for EPA to exclude biogenic CO_2 emissions from the PSD program based on EPA's long standing implementation of the PSD program regarding other pollutants.[38] Differentiating between sources of GHG emissions is consistent with EPA's longstanding exclusion in its PSD regulations of certain volatile organic compounds (VOCs) from the otherwise applicable statutory definition.[39] Specifically, the regulation excludes certain compounds from the definition of VOCs even though they are technically "volatile" and "organic," because such compounds would have negligible environmental impact.[40] A similar approach is warranted for biogenic CO_2 emissions as such emissions will not increase atmospheric levels of CO_2.

EPA has routinely exercised its discretion in implementing other aspects of the PSD program to avoid bringing in air pollutants in certain contexts within the reach of the PSD program. In *Alabama Power Co. v. Costle*, the D.C. Circuit recognized EPA's discretion, in administering the Clean Air Act's provision requiring PSD review for any "modification" of a major emitting facility, "to exempt from PSD review some emission increases on grounds of de minimis or administrative necessity."[41] Consistent with that decision, EPA's regulations have long excluded routine maintenance, repair, and replacement from triggering New Source Review program requirements.[42] Distinguishing biogenic CO_2 from other GHG emissions is similarly warranted based on either a de minimis, or "neutral" impact. In this regard, biomass CO_2 emissions are

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[38] Notably, the regulation of biogenic emissions does not comport with the CAA's stated goals for stationary sources, which are clearly aimed at reducing industrial source emissions through evolving pollution control technologies while minimizing economic harm. *See generally* 42 U.S.C. § 7470.

[39] 40 C.F.R. § 51.100(s); see also 40 C.F.R. §§ 52.21(b)(2)(ii) and 52.21(b)(3).

[40] *See* 40 C.F.R. § 51.100(s); 57 Fed. Reg. 3941, 3943-44 (Feb. 3, 1992) (disagreeing with comment that definition exceeded EPA's statutory authority, asserting that EPA's definition is a "policy choice clearly within the Agency's discretion" and explaining that "it is an administrative necessity and reasonable to define VOC to include all organic compounds except those EPA has determined to be negligibly reactive").

[41] 636 F.2d 323, 400 (D.C. Cir. 1979).

[42] 40 C.F.R. parts 51-52.

clearly below any possible threshold for excluding such emissions as de minimis under the Clean Air Act, given that, as described above, they have a neutral to beneficial impact on public health and public welfare. Thus, NAFO strongly agrees with EPA's recognition in the Proposed Deferral that it has the authority not to count CO_2 emissions from combustion of biomass, just as it does not count other *de minimis* emissions, such as those below significant emissions rates.[43]

D. EPA Has Discretion to Avoid Imposing Unmanageable Burdens on Local Permitting Authorities.

As demonstrated above,[44] any environmental effect of biomass combustion on atmospheric concentrations of carbon dioxide is a beneficial one. Even if some contend that future, complex studies might eventually show that, in certain situations, combustion of certain types of biomass might have some adverse impact on atmospheric carbon dioxide, EPA has correctly determined that placing the burdens of those studies on local permitting authorities that already face permitting backlogs would be unmanageable.

State and local permitting authorities are currently overwhelmed with other tasks, including implementing EPA's new GHG rules. As Illinois's permitting authority recently explained, "[t]he cumulative efforts of Illinois EPA to address the [GHG permitting burdens] is placing an enormous resource drain on our already stressed resources and involves the pulling of personnel from their normal day-to-day activities."[45]

These permitting authorities are facing numerous other burdens, including new National Ambient Air Quality Standards (NAAQS) for both sulfur dioxide and nitrogen dioxide, as well as an anticipated reconsidered ozone NAAQS and Clean Air Interstate and Clean Air Mercury Rules. Even worse, these authorities are coping with reduced federal funding coming at a time of state budget crises that has, in many instances, led to furloughs and reduced staffing. Finally, some of these authorities face a multi-year backlog of pending PSD applications. As EPA's proposed rule appropriately acknowledges, local permitting authorities simply do not have the staffing or resource capabilities necessary to begin complex analyses designed to root out purely hypothetical situations in which it is contended that some types of biomass might not be

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[43] 76 Fed. Reg. at 15,261.

[44] *See* COMMENTS ON THE BACKGROUND OF THE DEFERRAL RULE § 1.

[45] Letter from Illinois EPA to EPA regarding Tailoring Rule (July 29, 2010).

carbon neutral.[46] This bolsters each of the three previous rationales for deferral, and, in the alternative, also supports EPA's administrative necessity and absurd results rationales for the Proposed Deferral.[47]

II. EPA Must Modify the Proposed Deferral To Avoid the Risk of Automatic Application of Its Permitting Requirements to Biomass.

EPA proposes to alter its Tailoring Rule provisions by inserting the words: "For purposes of this paragraph (b)(48)(ii)(a), prior to [DATE 3 YEARS AFTER THE EFFECTIVE DATE OF THE FINAL DEFERRAL RULE], the mass of the greenhouse gas carbon dioxide shall not include carbon dioxide emissions resulting from the combustion or decomposition of [biomass]."[48] EPA must delete the clause that states "prior to [DATE 3 YEARS AFTER THE EFFECTIVE DATE OF THE FINAL DEFERRAL RULE]." This rare EPA sunset clause is inconsistent with EPA's commitment to *reconsider* its decision to apply its permitting program to carbon dioxide emissions from combustion of biomass. If finalized in this form, the Tailoring Rule would provide that carbon dioxide emissions from combustion of biomass would be included in its thresholds at the conclusion of the three year period, whether or not the agency had finished reconsidering this application.

This is not a theoretical concern, as there are always reasons to fear that any agency may not be able to finish a rulemaking on time. EPA is currently struggling to meet deadlines to propose New Source Performance Standards for Electric Utilities and Refineries, and is also implementing new NAAQS for both sulfur dioxide and nitrogen dioxide, reconsidering an existing ozone NAAQS, and responding to the vacatur of its Clean Air Interstate and Clean Air Mercury Rules. At the same time, the Agency is attempting to respond to suits requesting GHG regulation of numerous other sectors.

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[46] 76 Fed. Reg. at 15,262.

[47] *Id*.

[48] 76 Fed. Reg. at 15,265-66. NAFO notes that this provision would appropriately provide that sources that begin construction or obtain a preconstruction permit during the three year deferral would not face PSD permit requirements even after the three-year period expired, regardless of the outcome of EPA's reconsideration. That is, as a *preconstruction* permit requirement, the PSD program would no longer apply to them. Any deviation from this would, of course, completely undercut the deferral—facing the possibility of retroactive application of PSD requirement, the biomass energy sector would be paralyzed by uncertainty, contrary to the expressed policy of the Administration, and the intent of the deferral rule.

The sheer quantity of regulatory actions is already causing even the hardest deadlines to slip. EPA recently was forced to request a 15-month extension of an existing court-ordered deadline to promulgate maximum achievable control technology (MACT) standards for commercial and industrial boilers, and that request was denied on January 21, leaving the Agency even further behind and facing likely reconsideration on many aspects of those standards.[49] This jam-packed schedule is only likely to grow worse as the Agency implements budget reductions for the balance of 2011 and faces the prospect of continued reductions going forward.

Consequently, the automatic sunset provision will create debilitating uncertainty for the biomass sector. If, for any reason, EPA fails to hit the target deadline, biomass combustion will become suddenly subject to regulatory requirements as though there was no distinction at all from fossil fuels. The Agency has already concluded that this approach would be inappropriate.[50] Thus the biomass sector will face the possibility that an approach that has already been rejected as unfairly punitive against biomass may be applied. Moreover, should the rules automatically revert to their pre-deferral content, there would be no guarantee that an appropriate policy is established for addressing PSD permit and Title V applications already in process or issued. The resulting uncertainty could prevent the biomass sector from achieving the benefits that Administrator Jackson and Secretary Vilsack envisioned for it—threatening the sector's ability to "cut[ ] the pollution responsible for climate change."[51]

Thus, it is imperative that EPA keep its commitment to ensuring that its treatment of biomass is reconsidered before biomass is automatically reinstated into its Clean Air Act permitting programs. NAFO, of course, understands and applauds the desire to ensure prompt reconsideration of the appropriate treatment of biomass emissions. But that can be ensured without using an automatic reversion such as the one proposed. Instead, EPA should use the method it has already employed in the Tailoring Rule—adopting an "enforceable commitment" to carrying through the study and rulemaking that

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[49] *See Sierra Club v. Jackson*, No. 01-1537, 2011 WL 181097 (Jan. 20, 2011).

[50] 76 Fed. Reg. at 15,262.

[51] http://www.epa.gov/aging/press/epanews/2011/2011_0112_1.htm; http://www.usda.gov/wps/portal/usda/usdahome?contentidonly=true&contentid=2011/01/0008.xml

EPA has promised to complete in the next three years.[52] That course would utilize an already-existing EPA policy regarding ongoing regulatory review, be more legally consistent with the parallel Tailoring Rule, and would also avoid the uncertainties described above.

III. EPA Should Limit Approval of State Implementation Plans (SIPs) That Are Inconsistent With The Proposed Deferral Rule.

EPA notes that some states have already altered their law to comply with the Tailoring Rule provisions that EPA is now reconsidering, and that it may be difficult to undo these changes. EPA has requested comment on what to do with these States:

> Thus, States that cannot interpret their PSD SIP or Title V requirements to incorporate the three-year deferral are strongly encouraged to submit SIP revisions or Title V program revisions to adopt the three-year deferral. However, EPA recognizes that some States may not have any, or may have only a few, sources that combust biomass, and may have adequate information and resources as to the nature of biogenic emissions from those sources. EPA requests each State to advise EPA by letter, during the comment period for this proposal, as to the number and type of biomass sources in the State and what the State expects to be the number and type of biomass sources over the next three years, and the State's resource constraints, to the extent that information is available. EPA solicits comment on how to treat States in light of this information and any preferences that the States may express.[53]

Fortunately, EPA has already formulated a solution to exactly this problem. After completing the Tailoring Rule, many states still had SIPs that applied to thousands more sources than the Agency believed appropriate. In response, EPA "narrowed its previous approval of those approved PSD SIP programs . . . withdrawing their previous approvals of those programs to the extent" they applied to "emissions below the Tailoring Rule thresholds" without affecting the portions of the SIP that applied above the tailored

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[52] 40 C.F.R. §§ 50.22, 70.12, 71.13, 75 Fed. Reg. at 31,607-08.

[53] 76 Fed. Reg. at 15,263.

thresholds.[54] EPA should employ a consistent approach here, narrowing the approval of states whose SIPs still apply to carbon dioxide emitted from biomass combustion.

As EPA explained in finalizing this limitation of approval, this solution does not affect "permitting obligations under state law."[55] Rather, it only "eliminate[es] the PSD obligations under federal law."[56] Thus, a limitation of approval does not eliminate states' lawful authority to adopt whatever permitting requirements they believe are appropriate. State laws that inappropriately restrict the use of biomass, however, could endanger the "significant reductions of greenhouse gases" attributable to "energy produced from biomass."[57] Consequently, as in the previous limitation of approval, and consistent with the Administration's position on the benefits of biomass combustion, EPA should "strongly encourage[ ] states to eliminate [inconsistent] state law obligations by revising their state law as promptly as possible."[58]

IMPORTANT CONSIDERATIONS FOR STUDY OF TREATMENT OF BIOMASS

The Proposed Deferral also contained a significant discussion of some of the alternative approaches to biomass accounting that have been suggested.[59] For this reason, NAFO offers the following guiding principles as EPA begins to study these possible approaches. At the same time, we urge EPA not to prejudge any issues that will be assessed in the fuller upcoming technical and scientific review process; NAFO and other stakeholders intend to participate fully in that process and provide a record on which these issues can be definitively resolved.

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[54] Limitation of Approval of Prevention of Significant Deterioration Provisions Concerning Greenhouse-Gas-Emitting Sources in State Implementation Plans, 75 Fed. Reg. 82,536, 82,538 (Dec. 30, 2010).

[55] *Id*. at 82,540.

[56] *Id*.

[57] http://www.usda.gov/wps/portal/usda/usdahome?contentidonly=true&contentid=2011/01/0008.xml.

[58] Limitation of Approval of Prevention of Significant Deterioration Provisions Concerning Greenhouse-Gas-Emitting Sources in State Implementation Plans, 75 Fed. Reg. 82,536, 82,540 (Dec. 30, 2010).

[59] 76 Fed. Reg. at 15,259.

I. The Appropriate Treatment of Biomass Raises Both Scientific and Policy Questions, Which Must Be Distinguished From Each Other.

Discussions regarding the impact of biomass combustion on climate change and the issue of carbon neutrality have become clouded by a confusion between science and policy. As EPA further considers issues related to biomass emissions under the Agency's regulatory framework, EPA must distinguish between the science establishing the carbon neutrality of biomass, which is based on the carbon cycle, and the policy preferences used to select accounting principles to measure carbon fluxes. Despite broad consensus with respect to the underlying scientific principles, policy preferences—which are often confused with scientific principles—can influence the perception of the carbon impacts of biomass combustion. EPA must be careful not to treat assumptions and policy arguments as scientific facts. Instead, it should focus on the clearly established science of the carbon cycle and then develop a policy that reflects the realities of U.S. forestry, the forest products sector, and the biomass energy sector and is consistent with the Administration's policy on renewable energy.[60] Such an approach will demonstrate that biomass energy is a carbon neutral energy source with significant carbon benefits.

The science that underpins the carbon neutrality of biomass combustion and distinguishes biomass CO_2 emissions from fossil fuel CO_2 emissions is well-understood and uncontroversial. Wood products—including biomass combusted for energy—are a part of the natural carbon cycle. CO_2 is sequestered in forests through photosynthesis and emitted through decomposition and combustion. The dynamic processes of carbon sequestration and emission occur simultaneously and form an ongoing cycle by which emitted carbon is sequestered and vice versa. The woody biomass derived from forest products is carbon neutral because combustion (or decomposition) releases CO_2 that was recently sequestered from the atmosphere and is replaced by an equivalent amount of CO_2 through regeneration. In contrast, fossil fuels are formed over millennia and carbon emissions associated with the combustion of fossil fuel permanently increase

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[60] Letter from President Barack Obama to Governors John Hoeven and Chet Culver (May 27, 2009), *available at* http://www.governorsbiofuelscoalition.org/assets/files/President%20Obama's%20Response5-27-09.pdf; *see also* President Barack Obama, Memorandum for the Secretary of Agriculture, the Secretary of Energy, and the Administrator of the Environmental Protection Agency, 74 Fed. Reg. 21531-32 (May 5, 2009).

atmospheric carbon dioxide concentrations.[61] As even those who oppose use of biomass admit, "if we were writing a science paper, yes, [biomass] would be carbon neutral."[62] Thus, the disagreements in this controversy concern policy questions.

II. The Forest Carbon Cycle is Best Measured on a National, Long-Term Time Scale.

One important policy question is the appropriate time and geographical scale at which to measure biomass emissions. The forest carbon cycle is a dynamic, global, and ongoing process and accounting at a national scale most closely reflects this reality. Furthermore, forest product streams are interconnected and fluid and not easily subdivided into small geographic units. Forest owners often own properties in diverse locations and the companies and brokers that harvest and market forest products operate over vast and overlapping geographic areas. To further complicate matters, individual biomass combustion facilities purchase feedstocks from a diverse and ever-changing collection of forest owners, logging companies, and brokers. As a result, any attempt to account for CO_2 fluxes at a smaller spatial scale would ignore the realities of the forest products industry and create arbitrary boundaries that distort the forest products market. As it develops its policy with respect to biomass combustion, EPA must select an accounting system that reflects the national scale on which the carbon cycle and forestry industry operate.

It is also critical that EPA select a proper temporal scale that reflects the continuous nature of the carbon cycle. Any attempt to choose a "beginning" for the carbon cycle will be arbitrary, and it is equally arbitrary to suggest that the cycle begins at harvest, creating a carbon debt, or that it begins with regeneration, creating a carbon credit. Instead, once an appropriate spatial scale is applied, it becomes clear that sequestration occurs on a continuous temporal scale and the accounting method selected should reflect this reality. Due to rotational harvesting, forest management activities producing biomass used for energy in a given year only represent a small fraction of the total forested land managed for forest products. The rest of the forests are actively sequestering carbon. As a result, sequestration and emission occur simultaneously and the quantity of carbon emitted during combustion is offset by the

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[61] *See* COMMENTS ON THE BACKGROUND OF THE DEFERRAL RULE § I.

[62] Remarks of Richard Wiles, Senior Strategist at the Partnership for Policy Integrity, April 5 Public Hearing on Proposed Deferral Rule, Transcript of Public Hearing at 60.

quantity of carbon sequestered through the continuous growth of trees on forested land throughout the United States. To capture the continuous nature of the carbon cycle, an accounting system must measure changes in the national carbon stocks at regular intervals to determine net changes in carbon stocks rather than implementing a debit and credit system for individual tracts of land. This would be consistent with national inventory approach applied by the U.S. Forest Service that has demonstrated a net increase in overall forest carbon stocks in the U.S. of nearly 50% over the second half of the 20th Century.[63] Notably, this increase has come during a time of unprecedented increase in demand for forest products for home construction, consumer goods, and energy.

Accounting systems that incorporate large spatial scales and continuous temporal scales consistently demonstrate that biomass provides a carbon neutral energy supply with significant carbon benefits through displaced fossil fuel consumption. These accounting systems are well known in the scientific literature and NAFO has previously brought these studies to EPA's attention.[64] In contrast, recent studies challenging the carbon neutrality of biomass energy have chosen to follow a policy of unnecessarily restricted spatial and temporal scales. For example, the study conducted by the Manomet Center[65] which suggested that biomass combustion produces a "carbon debt" was based on an inappropriate stand-based spatial scale that ignored the reality of rotational harvesting, and arbitrarily "began" the carbon cycle at the time of harvest to emphasize emissions over sequestration. Despite the fact that all of these studies are based on the same scientific principles rooted in the carbon cycle, they reach different results due to the policy preferences that inform the accounting methods. Rather than assuming a lack of scientific consensus, EPA must carefully assess the policy preferences underlying the biomass debate and choose those preferences which reflect

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[63] Society of American Foresters, State of America's Forests (2007).

[64] *See* National Alliance of Forest Owners' Comments on "Call for Information: Information on Greenhouse Gas Emissions Associated with Bioenergy and Other Biogenic Sources; 75 Fed. Reg. 41,173 (July 15, 2010)," at 9-16, Docket ID: EPA-HQ-OAR-2010-0560 (Sept. 13, 2010) (Exhibit A).

[65] Walker, T., *et al*., *Biomass Sustainability and Carbon Policy Study*, Manomet Center for Conservation Sciences, Brunswick, ME (2010).

both sound science and the realities of the forestry industry, and are consistent with the government's renewable energy policy.[66]

III. The Most Appropriate Treatment of Biomass Emissions Is A Categorical Exclusion From Counting These Emissions at Stationary Sources.

In the Proposed Deferral EPA identifies four accounting methodologies that could be applied in regulating CO_2 emissions from biomass combustion: a categorical exclusion, a contingent exclusion, a feedstock-based approach, and a case-by-case analysis. As it assesses the merits of these options and chooses an accounting methodology, EPA must ensure that it is consistent with the policy considerations described above and capable of efficient implementation. As described below, a categorical exclusion is the only option that meets both of these criteria.

Categorical Exclusion

Under a categorical exclusion, all CO_2 emissions from biomass combustion would be excluded when assessing PSD and Title V applicability to stationary sources. This approach is consistent with the policy goals described above because it utilizes a nation-wide spatial scale and recognizes that biomass energy is carbon neutral because emissions from biomass combustion are balanced by sequestration from forest regeneration. Furthermore, a categorical exclusion is straightforward and avoids unnecessary administrative and compliance costs. In fact, EPA already has experience with this accounting method because it is employed in the annual GHG Inventory program.

It is also important to emphasize that such an exclusion merely recognizes that biomass carbon is not appropriately regulated through regulation of *stationary sources*. Forests, of course, are already subject to numerous regulatory initiatives from multiple federal and state agencies. These agencies have particular expertise in assessing net fluxes due to the carbon cycle, and many of these initiatives promote sequestration of carbon.

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[66] Letter from President Barack Obama to Governors John Hoeven and Chet Culver (May 27, 2009), *available at* http://www.governorsbiofuelscoalition.org/assets/files/President%20Obama's%20Response5-27-09.pdf; *see also* President Barack Obama, Memorandum for the Secretary of Agriculture, the Secretary of Energy, and the Administrator of the Environmental Protection Agency, 74 Fed. Reg. 21531-32 (May 5, 2009).

Contingent Exclusion

Under a contingent exclusion, emissions from biomass combustion would be excluded when assessing PSD and Title V applicability unless a built-in contingency is triggered. This approach raises significant concerns regarding both the appropriateness of the method and the ease of implementation. First, it would not be sound as a matter of science or policy to apply PSD and Title V because of carbon fluxes to the atmosphere that would have taken place without biomass combustion. While NAFO's members can ensure that their own forests are managed in a responsible manner, that alone will not ensure that a contingency is not triggered. Natural processes such as forest fires, disease infestations, and powerful storms can have significant effects on short-term carbon fluxes, but are largely beyond the control of private forest owners. In addition, land use changes, including those driven by federal, state, and local policies, can have significant impacts on carbon storage.[67] These events have the potential to trigger a specified contingency, yet are not caused by biomass combustion. Indeed, forest management and biomass combustion can play a crucial role in preventing these fluxes by lowering the risk of forest fires. An approach that wrongly attributed these natural events to biomass combustion will only create uncertainty regarding the long-term applicability of the exclusion and reduce investment in biomass energy. As noted below, this can create a counterproductive feedback loop where the reduction in market demand will reduce investment in forests and further diminish the stock of carbon stored in forests.

Putting aside the inability to control whether a triggering event will occur, a contingent exclusion would also prove difficult to implement. For example, EPA would have to determine the effect of a triggering event on regulated entities. For example, a small reduction in national forest stocks would obviously not warrant treating biomass as *identical* to fossil fuels; instead the Agency would have to provide something less than full credit to emissions from biomass combustion. To do so, EPA would have to quantify and apply the appropriate offset each year under such a program. Finally, EPA would have to determine a way to address the risk that a single catastrophic event could cause a short-term and temporary triggering event. For example, severe forest fires or disease outbreaks could make forests a net source of CO_2 emissions for a single year, despite a

[67] For example, changes in subsidies for ethanol production could cause changes in land use between forests and agricultural land.

general trend of increased forest carbon storage. Rather than penalizing regulated entities for a single instance of triggering a contingency or subjecting them to on-again, off-again regulation, EPA may need to develop an averaging program to account for the noise that may be associated with individual measurements and focus instead on broader trends. These few examples demonstrate that a contingent exclusion would be much harder to develop and implement than a categorical exclusion.

In addition, the application of a contingent exclusion on a smaller scale, such as a state level, would exacerbate the problems. Reducing the spatial scale of the area subject to a contingency makes it more susceptible to episodic triggering of the contingency through events such as forest fires and disease infestations. It would also create a risk of leakage if some parts of the nation operated under an exclusion while others did not. This risk is magnified by the fact that the forestry industry operates across state and other geographic boundaries making implementation and enforcement of partial exclusions difficult. Finally, movement toward regulation of the forestry and biomass industry on a smaller spatial scale creates precedent for future regulation based on ever smaller geographic sub-units which are less representative of the forestry industry and are more susceptible to episodic triggering of contingencies.

Feedstock-Based Approach

When discussing a feedstock-based approach, EPA incorrectly asserts that "[a]n important area of consensus from the commenters was the idea that feedstocks are different, and that the net impact of bioenergy and other biogenic emissions may be traceable to the feedstock that is used."[68] There is no consensus on this issue. NAFO and others have consistently noted in comments to EPA that all woody biomass is carbon neutral and offers the same climate change benefits. Given the lack of consensus among commenters on this issue, EPA should not apply a feedstock-based approach.

All feedstocks are part of the same carbon cycle and, from a scientific standpoint, should be treated equally. For example, there is not a separate carbon cycle applicable to different forest product streams or parts of a tree or forest. Therefore, any attempt to differentiate feedstocks must be based on policy preferences rather than underlying scientific properties. As described above, a proper spatial and temporal scale

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[68] 76 Fed. Reg. 15259 (Mar. 21, 2011).

incorporates continuous sequestration and emissions from all forested land. Such an approach reflects the nature of the forestry industry and the realities of forest management and is simply not consistent with a feedstock-based approach. Any attempt to differentiate the carbon attributes of different species of trees, parts of trees, or specific forests will produce arbitrary results that confuse rather than clarify the nature of the carbon cycle as well as the carbon impact of biomass combustion and the forestry industry as a whole.

To some degree the interest in a feedstock-based approach appears rooted in the irrational fear that "whole trees" will be used for energy production. Such fears are based on a lack of understanding of the role that biomass plays in the forest products sector. Forest products are allocated by market forces and energy production is among the lowest-value products. The average price per green ton of biomass is significantly less that the price of pulpwood or the price of saw timber.[69] In other words, a forest owner would not sell timber for biomass if it can be sold as pulpwood or saw timber. The "whole trees" referred to by opponents of biomass energy are mature trees that can be harvested for saw timber. Without a significant dislocation within the forest products market, it is simply not economical to use whole trees for bioenergy. Rather than using a feedstock-based approach that dictates to forest owners the permissible uses of their products, EPA should treat all biomass equally and allow the markets to distribute it in an efficient manner.

Case-by-Case Analysis

Finally, EPA suggested that a "case-by-case, facility-specific assessment of the net atmospheric impact of the intended biomass fuels" could be employed. First, a case-by-case analysis is unnecessary because, as discussed above, there is no basis for distinguishing among different types or sources of biomass. Any attempt to measure the net atmospheric impact of the combustion of biomass fuels would necessarily include an assessment of sequestration at the harvest site. However, individual facilities obtain biomass from a host of individual forest owners as well as logging companies and brokers who aggregate products from multiple sources. EPA would have to develop and

[69] Timber Mart-South, WoodBiomass Market Report; *see also* Corrected Comments of Weyerhauser Company on "Call for Information: Information on Greenhouse Gas Emissions Associated With Bioenergy and Other Biogenic Sources; 75 Fed. Reg. 41173 (July 15, 2010)," Docket ID: EPA-HQ-OAR-2010-0560 (Sept. 14, 2010) 21 (charting historical prices).

implement a monitoring and reporting program for all forest owners, regardless of their size. Given the sheer number of sources involved in the process, a case-by-case analysis would simply be too costly to implement in terms of both time and resources.

IV. EPA Should Not Employ A "Baseline" or "Business-as-Usual" Approach to Biomass Regulation.

EPA also suggests that it may incorporate a baseline concept into future biomass regulation. Such an approach is unnecessary, particularly if EPA continues in its established course of action and applies a categorical exclusion for CO_2 emissions from biomass combustion. In particular, EPA should avoid approaches such as "Business as Usual" (BAU) that are both arbitrary and difficult to apply in practice. Instead, EPA should choose a baseline that addresses the central question of whether or not biomass is a carbon-neutral energy source.

A BAU model would arbitrarily set a trajectory for the change in forest carbon stocks that must be maintained in perpetuity. In the notice EPA observes that "if sustainable forestry is practiced, then neither gains nor losses from carbon would be expected over time."[70] In reality, forests, whether managed or unmanaged, continue to grow and carbon stocks increase each year with that growth, subject to natural events that may cause a temporary depletion from time to time.[71] This is the carbon cycle and is the basis for carbon neutrality. In contrast to this simple, straightforward, and easy to implement approach, a BAU approach selects a point in time and attempts to determine what would happen without any changes in the factors that influence carbon stocks. The choice in time makes a BAU arbitrary and the need to assess all influencing factors makes it needlessly complicated.

The first problem with a BAU approach is that it assumes that current conditions are indicative of a natural level of sequestration and emissions. Humans have actively managed forests for centuries and the current balance between sequestration and emissions is the product of a complex milieu of government regulations and market forces. It would be virtually impossible to identify and disaggregate the impact of each contributing factor and identify a true BAU that is not the product of human intervention.

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[70] 76 Fed. Reg. 15258 (March 21, 2011).

[71] Ensuring that these carbon stocks do not fall below a minimum level may be what the Agency means by a "baseline," which is a version of a contingent exclusion, and has the shortcomings mentioned above.

Yet, to simply define the BAU trajectory using today or any other day as the starting point would be arbitrary and unfairly create winners and losers. For example, privately owned forests currently act as a sink, removing the equivalent of 131 million metric tons of CO_2 from the atmosphere annually.[72] To set a BAU based on current trajectories would constitute a regulatory taking by requiring private forest owners to continue to sequester that level of CO_2 on an annual basis without providing any compensation for this carbon benefit. EPA must be careful not to set a baseline in a manner that punishes forest owners for past sequestration or mandates sequestration in the future.

A second problem with the BAU approach is the difficulty in using it as a prospective policy tool. EPA suggests that under a BAU approach, "it is necessary to determine the extent to which a policy action or activity increases or reduces CO_2 emissions above or below what would have occurred in comparison with the baseline."[73] As noted above, forests are already subject to myriad policies that cause CO_2 emissions to deviate from a "natural baseline." As a result, the U.S. forest sector is complicated and subject to a wide variety of competing and sometimes countervailing forces and it can be extremely difficult to predict *ex ante* the effects of a policy or regulation. Without a proper understanding of the forestry sector and the forest products industry and their preexisting drivers, there is a significant risk that inaccurate predictions will occur. For example, many previous commenters have suggested that increasing biomass combustion will deplete forest carbon stocks compared to a BAU model and thus have a negative carbon impact. While this may seem plausible on the surface, it ignores the primary driver of privately owned forest stocks – market demand. Policies that promote a strong demand for forest products will increase forest stocks as private owners shift land into forests; policies that discourage demand for forest products decrease forest stocks as private owner shift land into other uses. Thus increased biomass utilization will likely increase rather than decrease forest carbon stocks. Given the many factors that can influence forest carbon fluxes, a BAU approach that depends on predicting changes in carbon fluxes will be inherently inaccurate and unlikely to lead to beneficial policy choices.

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[72] *See* Haynes, R.W., *The 2005 RPA timber assessment update*, Gen. Tech. Rep. PNW-GTR-699, USDA Forest Service, Pacific Northwest Research Station (2007); Heath, L.V. *Greenhouse Gas and Carbon Profile of the U.S. Forest Products Industry Value Chain*, Environmental Science and Technology (2010).

[73] 76 Fed. Reg. 15258 (March 21, 2011).

V. Conclusion

NAFO strongly supports EPA's reconsideration of the appropriate treatment of biomass combustion, and its decision to defer permitting requirements for carbon dioxide emissions from this combustion for the next three years. NAFO strongly urges EPA to strengthen its proposal by removing the automatic reversion after three years, and replacing it with an enforceable commitment that would ensure the Agency conducts a full reconsideration. NAFO looks forward to continuing its work with EPA to meet the nation's environmental, economic, and energy independence goals.

Respectfully Submitted,

David P. Tenny
President and CEO
National Alliance of Forest Owners

ATTACHMENT D

March 16, 2012

Submitted via email

Holly Stallworth, Ph.D.
Designated Federal Officer
EPA Science Advisory Board
United States Environmental Protection Agency
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Re: National Alliance of Forest Owners' Comments to the Science Advisory Board Biogenic Carbon Emissions Panel

Dear Dr. Stallworth and Panel Members:

The National Alliance of Forest Owners (NAFO) welcomes the opportunity to submit these comments to the Environmental Protection Agency's (EPA's) Science Advisory Board (SAB) Biogenic Carbon Emissions Panel (Panel), in advance of its March 20, 2012 conference call to discuss the Panel's revised *Deliberative Draft Report* (*Report*) on EPA's *Accounting Framework for Biogenic CO_2 Emissions from Stationary Sources* (Sept. 2011) (*Framework*). NAFO and its members are key stakeholders who contribute to the solutions that private forests and forest biomass bring to lowering greenhouse gas (GHG) emissions and, in turn, are keenly impacted by any controls or regulations on biogenic GHG emissions. NAFO – as the party that filed the Petition for Reconsideration with EPA that led to the present SAB process – is an acutely interested stakeholder in EPA's reconsideration of the treatment of biogenic CO_2 emissions from stationary sources and the scientific analysis EPA will utilize in making ultimate policy and regulatory decisions on how to treat biogenic CO_2 emissions. A detailed summary of NAFO's past participation was included in its October 18, 2011 comments to this

Panel.[1] As we have done from the earliest outset of EPA's review of the treatment of biogenic GHG emissions, we remain prepared to provide our significant scientific, technical, and pragmatic expertise and experience and a considerable body of scientific studies and analyses to assist the Panel throughout its review and evaluation of the *Framework*.

Introduction

As NAFO and its members have explained in earlier comments and presentations to the Panel and EPA, critical to NAFO's mission in reducing GHG emissions is supporting the use of biomass as a renewable energy supply that offers important climate and energy security benefits. EPA's decision to reconsider its approach to regulating biogenic CO_2 emissions from stationary sources offers an opportunity to encourage the continued development of climate-beneficial bioenergy capacity. It is NAFO's goal that, with the assistance of the Panel's expertise, EPA will develop a regulatory framework that accurately reflects the climate benefits offered by biomass, encourages its continued development, and promotes appropriate distinctions between bioenergy and other types of energy such as fossil fuel combustion. We believe that the Panel can achieve these goals by making recommendations that avoid unnecessary complexity and by using its expertise to apply scientific theories to real-world scenarios.

First, we applaud the Panel's commitment to distinguishing between scientific and policy questions and leaving the latter category to EPA. However, the Panel need not retreat to the consideration of purely abstract and theoretical issues detached from real world considerations relevant to forest management and bioenergy production. It is not enough for the Panel to verify that a particular model or approach to carbon accounting is scientifically valid at an abstract level. Instead, the model's assumptions must be rigorously evaluated to ensure that they are consistent with the way that forests are managed and biomass energy is actually produced in the United States. When the Panel finds that multiple alternatives accurately reflect the forestry and forest products

[1] National Alliance of Forest Owners' Comments to the Science Advisory Board Biogenic Carbon Emissions Panel (Oct. 18, 2011) (NAFO October SAB Panel Comments), *available at* http://yosemite.epa.gov/sab/SABPRODUCT.NSF/MeetingCal/D1D833DBF27626A6852578F600610AC5?OpenDocument.

sectors and are capable of efficient implementation, it is appropriate to include such an assessment in the final report and allow EPA to make an informed policy choice among such alternatives. At the same time, when, as a result of its experience, expertise, and investigation, the Panel finds that a model's assumptions do not accurately reflect real-world domestic forestry practices, it must include that information in the final report, and recommend against adoption of the model. For example, the Panel should make clear that the assumptions underlying stand-based accounting methodologies, as well as other assumptions or methodologies that constrain temporal and spatial scales, are inconsistent with U.S. forest management practices and thus are inappropriate for inclusion in an accounting framework.

Similarly, the Panel should not merely defer consideration to EPA of factors and conclusions that can inform EPA's policy decisions. Again, as a result of its expertise and experience, the Panel is uniquely qualified to assess the costs and benefits of various approaches and determine whether they can be successfully implemented from both a technical and practical perspective. The Panel must bring its experience to bear and inform EPA's decision-making process with sound, objective, and reliable information. It is appropriate, after identifying the pragmatic challenges, costs, and benefits of alternative approaches, to defer a legitimate policy choice for EPA with the benefit of the Panel's analysis of the underlying considerations. It is also appropriate for the Panel to conclude that the benefits of an alternative cannot be achieved without increasing transaction costs to the point that the proposal becomes technically or practically infeasible. These circumstances arise, for example, in facility-based chain-of-custody approaches that require the collection of detailed data from countless landowners and suppliers. In such circumstances, the Panel should inform EPA that the alternative is not viable and recommend against its adoption.

Finally, above all, the Panel must strive to reduce uncertainty and complexity. The Panel's conclusions will serve as the foundation for EPA's regulatory decisions, which, in turn, will have a critical and long-lasting influence on the future of sustainable bioenergy in the United States. As the Panel has noted, the *Framework* proposed by EPA presents "daunting technical challenges" for implementation due to its complexity. *Report*, at 6. Unfortunately, NAFO remains concerned that the Panel's efforts to provide greater scientific precision and accuracy threaten to increase rather than decrease that complexity. In our prior comments, we provided a series of ways in which the Panel could reduce the complexity of the EPA's proposed regulatory program.[2] Those suggestions are summarized below. First, NAFO urges the Panel to limit its analysis to actual rather than hypothetical biomass energy feedstocks in order to develop generally applicable principles that could be applied uniformly to all biomass energy feedstocks without introducing complex analyses into the regulatory framework. Second, we urge the Panel to focus on spatial and temporal scales that are relevant to U.S. forestry practices in order to avoid complex analyses that are simply irrelevant to biomass energy production. Third, we urge the Panel to avoid consideration of factors that are beyond the scope of EPA's regulatory review. Fourth, we urge the Panel to accept the limits of science in resolving uncertainty and avoid recommending impractical data collection processes that produce diminishing returns in improved accuracy. After reviewing the revised *Report*, it is clear that the Panel has addressed some of these suggestions and has made efforts to reduce the complexity in its recommendations. However, on the whole NAFO remains concerned that the recommendations still are so complex that, if adopted, they unfortunately would have the perverse effect of discouraging or foreclosing the development of biomass energy due to the high transaction costs of compliance.

By applying the principles described above and focusing on the pragmatic realities of the forestry and biomass energy sectors, NAFO believes that it is possible to develop a simple and straightforward approach to accounting for biogenic CO_2 emissions from woody biomass that can be efficiently and effectively implemented. As described below, such an approach would be based on three threshold determinations, as informed by scientific theory and an understanding of the forestry and biomass industry sectors: (1) the adoption of a national scale; (2) a reference point baseline; and (3) a 100-year time scale. Once these three principles are adopted, the *Report*'s conclusions will properly inform EPA on appropriate and scientifically sound

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[2] *See* National Alliance of Forest Owners' Comments to the Science Advisory Board Biogenic Carbon Emissions Panel (Jan. 25, 2012) (NAFO January SAB Panel Comments), *available at* http://yosemite.epa.gov/sab/SABPRODUCT.NSF/MeetingCal/1DB6AEA2DF05DE7E8525793B0065B76E?OpenDocument.

alternatives, including the option of a categorical exclusion for biogenic CO_2 emissions. While a conclusion on how to treat biogenic emissions in a regulatory regime ultimately entails some policy choices for EPA, this recommended approach will enable EPA to make sure decisions based on the strongest possible scientific and technical considerations and, for that reason, should be included in the Panel's recommendations to EPA.

A. Biogenic CO_2 Regulations Must Be Based on a National Scale

Before an accounting methodology can be developed, there are a number of threshold issues which must be resolved, including the appropriate spatial scale for regulations. A national scale is the only alternative identified by EPA and the Panel that is supported by science, consistent with actual U.S. forest management practices, and practical to implement. While the ultimate selection of a spatial scale may entail policy considerations, the strong scientific and technical support for a national scale warrants its inclusion in the Panel's recommendations to EPA.

1. A Broad Spatial Scale is Required to Reflect Domestic Forest Management Practices

In order to properly reflect the way in which forests are managed and biomass feedstocks are produced, the Panel must recommend and EPA adopt a broad spatial scale. Because the goal of forest management is to produce a continuous supply of forest products, it is fundamentally inconsistent with forestry practices to isolate a single stand and arbitrarily choose a starting point for the carbon cycle. By choosing to start the carbon cycle at the time of planting or harvest such an approach creates an arbitrary carbon credit or debt.[3] While it is theoretically valid to view the carbon cycle in a linear fashion, tracking the movement of a single carbon atom or the carbon stocks on a single plot of land, this approach is inconsistent with the way that forests are managed in the United States. Thus, even if the stand-based accounting principles included in Walker (2010) and Biomass Energy Resource Center (2012) are scientifically valid in an abstract sense, *see* Report at 11, they should not be incorporated into an accounting

[3] *See* National Alliance of Forest Owners' Comments on "Deferral for CO2 emissions from Bioenergy and Other Biogenic Sources under the Prevention of Significant Deterioration and Title V Programs: Proposed Rule" (May 5, 2011) at 21 (NAFO Deferral Rule Comments) (submitted as Attachment 1 to NAFO October SAB Panel Comments).

framework as their primary assumptions are at odds with the established practices of the forestry sector as a whole.

Forest owners and managers do not treat each stand independently, but instead develop broad management plans at a landscape level. These plans are designed to produce diverse age classes and a constant supply of harvestable forest products over an extended period of time. As a result, the processes of CO_2 emission and sequestration occur simultaneously within the landscape.[4] Therefore, as NAFO has previously explained, the emissions associated with harvesting are offset on a continuous basis by regeneration that is occurring on the many other stands that are not harvested and forest stocks remain stable.[5] By focusing on the simultaneous emissions and regeneration, it is also apparent that a broad spatial scale is consistent with the science of the carbon cycle. While the carbon cycle is often viewed linearly, focusing on the growth, harvest, and regeneration of a single tree or stand, it can also be viewed in a single temporal plane as emissions and regeneration take place in different portions of a single, managed landscape. Thus adopting a broad spatial scale would be consistent with both the science of the carbon cycle and domestic forest management practices.

In the same manner, the forest products industries – including biomass energy – are integrated at a national level as individual producers also obtain supplies from a vast and ever-changing array of forest owners and suppliers.[6] Moreover, the producers compete with each other in the marketplace making it impossible to isolate impacts on small spatial scales. Indeed, as the Panel noted, a national scale is necessary to model forestry markets and the economic behavior of landowners. *Report* at 32-35. Thus, individual forest owners continually respond to market signals that are sent at national or even global scales, and shift their plans in anticipation of and response to new market demands. While geographic constraints may fix the location of forests and biomass energy facilities, the markets that they serve are unconstrained and treat all

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[4] Jim Boyer *et al.*, Carbon 101: Understanding the Carbon Cycle and the Forest Carbon Debate 5-7 (Dovetail Partners, Jan. 2012) (submitted to the Panel, Jan. 27, 2012), *available at* http://www.dovetailinc.org/reportsview/2012/responsible-materials/pjim-bowyerp/carbon-101.
[5] NAFO Deferral Rule Comments at 20.
[6] *See* National Alliance of Forest Owners' Comments on Call for Information: Information on Greenhouse Gas Emissions Associated with Bioenergy and Other Biogenic Sources; 75 Fed. Reg. 41173 (July 15, 2010)" at 24-25 & n.45 (NAFO Call for Information Comments) (submitted as Attachment 2 to NAFO October SAB Panel Comments).

forest owners and suppliers equally. Thus, both market demands and the response from forest owners is best captured at a national scale. Indeed, this relationship can be readily observed in historical data as forest owners have repeatedly responded to new market demands, increasing national forest carbon stocks in the process.[7] Thus, the nature of forest products markets also requires that biogenic CO_2 emissions be considered on the broadest scale possible.

2. A National Scale is the Most Appropriate Choice Among Broad Scales

A national scale is clearly superior from a technical standpoint among other options such as a broad landscape-based spatial scale. First, a national scale responds most closely to the global nature of climate change and EPA's regulatory authority under the Clean Air Act to implement air policies at a national level. Thus, it avoids the problems of scale sensitivity and domestic leakage that plague regional approaches. *See Report* at 6. It also has the advantage of treating all biomass facilities equally and allowing market forces to dictate their location based on considerations such as supply, demand, and market efficiency. Second, a national scale will prove the most practical, predictable, and least burdensome approach to implement. As EPA and NAFO have noted, data from the U.S. Forest Service's Forest Inventory and Analysis (FIA) program and other sources are readily available and can be incorporated into a regulatory framework at little cost to EPA or the regulated entities. *Framework* at 31-32.[8] Thus adopting a national scale would serve the important purpose of reducing complexity and transaction costs and thereby promote climate-beneficial biomass energy.

The application of a national scale is also consistent with the Panel's own recommendations in its discussion of alternatives. The Panel's endorsement of the development of default BAFs for feedstock categories as an alternative to facility-specific BAFs would necessarily be applied at a national level. *Report* at 45. While the necessity of distinguishing among feedstocks is addressed below, the Panel's inclusion of this alternative shows that a national, rather than facility-based, approach to

[7] As Boyer *et al.* (2012) explain, domestic timber production increased by more than 50 percent from 1950 to 2010, while forest carbon stocks also increased. Boyer *et al* (2012) at 10.

[8] *See also*, National Alliance of Forest Owners' Comments to the Science Advisory Board Biogenic Carbon Emissions Panel (Dec. 21, 2011) (NAFO December SAB Panel Comments) at 4, *available at* http://yosemite.epa.gov/sab/SABPRODUCT.NSF/MeetingCal/1DB6AEA2DF05DE7E8525793B0065B76E?OpenDocument..

accounting for biogenic CO_2 emissions is consistent with scientific theory and would be appropriate in practice.

While EPA might consider the alternative of incorporating a broad spatial scale by adopting a facility-based fuelshed approach, this does not withstand close scrutiny of sound science or pragmatic forest management considerations. As NAFO has previously explained, while a facility-based approach would theoretically allow EPA to treat each biomass facility independently for attribution purposes, such an approach would prove technically and practically infeasible. First, applying such an approach at the landscape level would be technically infeasible as individual facilities have overlapping fuelsheds and obtain feedstocks from a vast and constantly changing array of landowners.[9] Thus there is no way to distinguish between facility fuelsheds based on geography. The only alterative would then be a complex stand-based chain-of-custody approach, but such an approach would prove practically infeasible due to the high transaction costs.[10]

While the selection of a spatial scale ultimately entails some policy considerations by EPA, such policy decisions must be supported by reliable, credible, and sound scientific conclusions. Under that standard, it is not a choice where all options are equal. As the Panel recognizes, a national scale offers a number of important benefits that could ensure that the final regulations adopted by EPA can be successfully implemented. Having noted the shortcomings in EPA's proposed regional scale, *Report* at 26-27, the Panel should likewise assess the alternative choices and inform EPA of its conclusions. NAFO is confident that, if the Panel were to do so, a national scale approach would emerge as the only alternative that is fully supported by scientific and technical considerations and capable of efficient implementation.

B. A Reference Point Baseline Must Be Adopted Because No Other Alternative Is Capable of Implementation

One of the most challenging issues related to the development of an accounting framework for biogenic CO_2 emissions is the selection of a baseline. After considering several alternatives, EPA selected a reference point baseline because it provided "a straightforward way to assess an individual stationary source's emissions using existing

[9] NAFO Deferral Rule Comments at 21.
[10] NAFO January SAB Panel Comments at 13-14.

data." *Framework* at 42. NAFO supports this conclusion as a sound policy decision. In contrast, the Panel has proposed an anticipated future baseline that seeks to isolate the positive impact of biomass energy and determine what would have happened in the absence of additional biomass energy demand. Despite its theoretical logic, the Panel's attempt to describe such an approach only confirms the inherent complexity associated with anticipatory future baselines and demonstrates why EPA's straightforward and accurate approach must be applied.

As NAFO has noted in previous comments to the Panel, it is virtually impossible to isolate the impact of biomass energy and determine what would have happened without demand for biomass energy.[11] In reality, biomass energy is a small segment of the forestry sector and is intimately related to other forest products in both time and space. First, in most cases, biomass is not produced and harvested as a separate product for energy production. Instead, the forestry residues and milling residuals that are combusted for energy represent co-products that are produced alongside more valuable primary products. Indeed, even when roundwood is harvested and used directly for biomass energy, it is harvested as part of a thinning process that is designed to improve the quality of the remaining trees that will be harvested later for other, more valuable forest products.[12] It is simply not economical to grow and harvest mature trees for energy.[13] Instead, biomass co-products provide incremental economic value to the forest owner producing subtle, yet important, market signals that encourage biomass production and increase forest carbon stocks. As a result of this close relationship between forest products and the long time frames over which forest rotations occur, there is no simple and straightforward way to strip out biomass energy demand and determine what would have happened in its absence.

As the Panel is well aware, developing an anticipated future baseline is a daunting, although ultimately unnecessary, task. The approach described in the revised *Report*, which seeks to "combine the economic behavior of landowners with the associated dynamics of forest management and growth while allowing for competing uses of land for forestry, agriculture, and other activities," *Report* at 33, is a marked

[11] NAFO January SAB Panel Comments at 14-15.
[12] NAFO January SAB Panel Comments at 8.
[13] NAFO Deferral Rule Comments at 26 & n.69.

improvement over the approach described in the initial report. Importantly, this approach seeks to account for the decision-making processes of forest owners and reflects the anticipatory nature of investments in forests. *Report* at 34-35.[14] By doing so, it moves closer to identifying and attempting to account for all of the factors that can influence forest management decisions and the quantity of forest carbon stocks.

But even the inclusion of anticipatory investments and other market forces is not enough to produce a comprehensive model of the impact of biomass energy. As the *Report* notes elsewhere, the purpose of an accounting methodology is to account for the changes that "the atmosphere sees" as a result of biogenic CO_2 emissions from stationary sources. *E.g.*, *Report* at 15. But as currently formulated, the Panel's anticipated future baseline only considers what the forest sees, as it focuses solely on "changes in forest stocks." *Id.* at 2.3. This ignores the primary climate benefit of biomass energy – the displacement of fossil fuel emissions.[15] Thus, the assertion that "a reduction in the rate of increase of carbon stocks is equivalent to an increase in emissions," *id.* at 4, is incorrect. A reduction in the rate of increase in carbon stocks that results in a reduction in fossil fuel emissions could actually reduce total emissions. In other words, the anticipated future baseline described by the Panel, which is already hopelessly complex, must either become even more complex in order to accurately reflect what "the atmosphere sees" or remain fundamentally flawed for failing to fully capture the carbon cycle associated with forest-based biomass energy.

Further, the adoption of an anticipated future baseline would raise significant legal concerns and add uncertainty to the implementation process. By requiring forest owners to continue to increase forest carbon stocks at current rates, applying an anticipated future baseline to stationary source regulations would transform what is a voluntary, climate-friendly practice into a mandatory duty. If such a regulatory program were in place the baseline could also be applied elsewhere, for example in carbon offset programs. If these regulatory programs make carbon sequestration a mandatory duty for forest owners, they could present regulatory takings issues. Thus, the potential legal

[14] *See also* NAFO January SAB Panel Comments at 14-15.
[15] Boyer *et al.* (2012) at 9; NAFO December SAB Panel Comments at 2-3.

concerns associated with an anticipated future baseline would add further uncertainty and make implementation even more difficult.

In light of this complexity, and ultimately the uncertainty surrounding these future projections, *see Report* at 35-36, it was certainly appropriate for EPA to propose a reference point baseline. While it cannot entirely isolate the impact of biomass energy, a reference point baseline does describe what "the atmosphere sees" as a result of the forestry sector as a whole. As EPA recognized in the *Framework*, as long as forest carbon stocks are stable or increasing, the atmosphere does not see any increase in CO_2 concentrations as a result of the forestry sector. *Framework* at 25-26.[16] Indeed, when fossil fuel displacement and long-term storage in forest products are considered, the atmosphere is likely to see a reduction in CO_2 concentrations when forest carbon stocks remain stable.[17]

This is not to say that the predictive models referenced by the Panel have no purpose, but only that they are too complex, uncertain, unmanageable, and inaccurate in their current form to be included as a part of a regulatory program. Given these concerns over implementation, the Panel should support EPA's conclusion that a reference point baseline is appropriate and instead recommend ways that EPA can use these predictive models to monitor forest carbon stocks and perhaps refine its regulatory approach over time.[18]

C. The Climate Impact of Biogenic CO_2 Emissions Must Be Assessed on a Policy-Relevant 100-Year Time Scale

Finally, as the Panel appropriately recognizes, the selection of a time scale is an important policy decision that will have a significant effect on the final regulations adopted by EPA. But, despite the Panel's clear preference for a 100-year time scale *see Report* at 10-13, it declines to make a recommendation, asserting instead that the choice of time scales is a policy decision that must be resolved by EPA, *Report* at 44.

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[16] *See also* Roger A Sedjo, Carbon Neutrality and Bioenergy: A Zero-Sum Game?, Resources for the Future Discussion Paper 6 (April 2011), *available at* http://www.rff.org/documents/RFF-DP-11-15.pdf.
[17] *See* NAFO Call for Information Comments at 7-8. As NAFO has previously explained, domestic forests have long been considered carbon sinks due to increasing forest carbon stocks and this trend is expected to continue in the future. *See generally*, NAFO Deferral Rule Comments; NAFO Call for Information Comments; National Alliance of Forest Owners Comments on "Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule (NAFO Tailoring Rule Comments) (submitted as Attachment 3 to NAFO October SAB Panel Comments).
[18] *See* NAFO January SAB Panel Comments at 13, 15.

While there are certainly tradeoffs between different time scales, sound science reflecting pragmatic considerations squarely favors a 100-year time scale. While other time scales may also be scientifically correct, *Report* at 11, only a 100-year time scale is consistent with EPA's regulatory goals, domestic forestry practices, and the administration's mandate promoting climate-beneficial renewable energy.

First, a 100-year time scale is consistent with EPA's regulatory goals for biogenic CO_2 emissions. EPA decided to defer regulation of biogenic CO_2 emissions, in part, to "conduct a study of the science surrounding biogenic CO_2 emissions and their role in the carbon cycle." 76 Fed. Reg. 43,490, 43,499 (July 20, 2011). Further, to understand how biogenic CO_2 emissions affect the climate, the time scale must help explain what "the atmosphere sees" as a result biogenic CO_2 emissions. A 100-year time scale can answer these questions. First, as the Panel notes, climate modeling studies have demonstrated that "the peak warming in response to greenhouse gas emissions is primarily sensitive to cumulative greenhouse gas emissions over a period of roughly 100 years, and is relatively insensitive to the emissions pathway within that timeframe." *Report* at 11. Thus adopting a 100-year time scale will allow EPA to consider the biogenic carbon cycle over time periods that are relevant to the global climate system. In contrast, as the Panel notes, shorter time periods such as those relied upon by Walker (2010) and others, focus on irrelevant intermediate time scales and do not provide an appropriate analysis of the biogenic carbon cycle because these intermediate effects prove transient and disappear over longer time scales. *Report* at 11.[19]

Second, a 100-year time scale is consistent with the manner in which forestry is practiced in the United States. As the *Report* notes "it is important to consider the turnover times of different biogenic feedstocks in justifying how they are incorporated into the framework." *Report* at 10. Although, as described above, the forest carbon cycle is best considered spatially on a landscape scale, it is nevertheless instructive to also consider it in a linear fashion for purposes of conducting a thorough scientific review. While in theory it would be possible to adopt a different time scale for each feedstock corresponding to its turnover time, such an approach is unnecessary as few,

[19] *See also* NAFO January SAB Panel Comments at 9.

if any, forests are managed with turnover times longer than 100 years. Thus by adopting a 100 year time scale, EPA would simplify the regulations while ensuring that, for any given feedstock, the landscape would have turned over at least once during the relevant time period and avoid the potential for short-term, transient carbon fluxes that could skew the analysis of the carbon cycle. In contrast, if a shorter time period – on the order of 30 to 50 years – were adopted, some feedstocks may not undergo a complete turnover during the study period. Thus, a 100 year time scale offers a simple, uniform approach to carbon accounting that is consistent with forestry practices.

Third, adoption of a 100-year time scale will provide appropriate incentives for biomass energy that are consistent with the administration's commitment to promoting renewable fuels, such as biomass.[20] As the Panel recognizes, the climate benefits of biomass, as compared to fossil fuels, become more pronounced as time scales increase. *Report* at 13. In other words, as NAFO has explained, the climate benefits of biomass energy continue to grow over time as each successive rotation used for biomass displaces more fossil fuels.[21] While a time scale of 100 years is likely sufficient to create the incentives needed to promote biomass energy, shorter time frames may have the perverse effect of discouraging biomass energy due to the differences in energy produced by equivalent amounts of biomass and fossil fuels. Thus, adopting a shorter time frame that discourages biomass energy produces the wrong kind of tradeoffs as it would lock in the continued combustion of fossil fuels in lieu of biomass, despite the recognized long term benefits biomass offers.

D. Recommendations for a Regulatory Approach to Biogenic CO_2 Emissions

In the event that a national scale, reference point baseline, and 100-year time scale are adopted, EPA can develop a scientifically accurate, predictable, and straightforward regulatory framework for woody biomass. First, within this framework, a categorical exclusion can be implemented as a practical matter because domestic forest management practices and sound science demonstrate that biomass energy will not

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[20] *See, e.g.*, President Barack Obama, *Remarks by the President on America's Energy Security*, March 30, 2011, *available at* http://www.whitehouse.gov/the-press-office/2011/03/30/remarks-president-americas-energy-security; Letter from President Barack Obama to Governors John Hoeven and Chet Culver (May 27, 2009), *available at* *http://governorsbiofuelscoalition.org/?page_id=461*; President Barack Obama, Memorandum for the Secretary of Agriculture, the Secretary of Energy, and the Administrator of the Environmental Protection Agency, 74 Fed. Reg. 21,531-32 (May 5, 2009).

[21] NAFO December SAB Panel Comments at 2-3.

result in a net increase in atmospheric CO_2 concentrations on a policy-relevant spatial or temporal scale. Second, the continued applicability of the categorical exclusion will depend solely on the continued use of sustainable forestry practices, which can be monitored on a continuous basis through the comparison of carbon stocks over time.

1. A Categorical Exclusion is Appropriate as a Practical Matter as Woody Biomass Feedstocks Do Not Increase Net Atmospheric CO_2 Concentrations

When considered in the context of a national spatial scale and 100-year time scale, the scientific conclusions in the *Report* fully support a categorical exclusion for biogenic CO_2 emissions from woody biomass, even if such position cannot be accepted *a priori*. As NAFO noted in its previous comments, the Panel must rigorously test and apply the best science to determine the climate impacts of biogenic CO_2 emissions, but must do so with the goal of producing an accounting framework that is simple to implement and provides reasonable certainty to EPA and stakeholders. As NAFO previously observed, this can be accomplished by using sophisticated scientific models to confirm broadly applicable regulatory approaches.[22] Indeed, the Panel has already started down this path by endorsing feedstock-based BAF values as an alternative to facility-specific BAFs. However, this recommendation does not go far enough. Taken to its logical conclusion, it supports a categorical exclusion for woody biomass as all feedstocks derived from woody biomass would have a BAF of zero.

First, when the carbon cycle is applied on a national spatial scale, a categorical exclusion is warranted because carbon stocks are stable and are expected to remain so for many years to come. Unless and until carbon stocks decline on a national scale, there will be no net biogenic CO_2 emissions from woody biomass because emissions will be balanced by carbon sequestration on a regular and continuous basis.[23] As the Panel is aware, projecting forest carbon stocks far into the future is fraught with uncertainty, but even the most conservative models suggest that domestic forests will

[22] NAFO January SAB Panel Comments at 7-8.

[23] Sedjo (2011) at 6; Jim Boyer *et al*., Life Cycle Impacts of Forest Management and Bioenergy Production 1-13 (Dovetail Partners July 2011), *available at* http://www.dovetailinc.org/files/DovetailCABioenergy0711.pdf; Bruce Lipke, *et al.*, Life cycle impacts of forest management & wood utilization on carbon mitigation: knowns and unknowns, Carbon Management 2(3) 303-333 (2011), *available at* http://www.future-science.com/doi/pdf/10.4155.cmt.11.24.; *see also* NAFO December SAB Panel Comments at 2; NAFO Deferral Rule Comments at 2-5; NAFO Call for Information Comments at 9-10.

remain a net carbon sink for decades into the future.[24] Since the near-term trajectory of forest carbon stocks remains positive, it makes no sense to incorporate complex regulatory processes to address hypothetical concerns about events that may happen decades into the future. A more prudent approach is to incorporate a monitoring program, as described below, so that EPA can , if necessary, modify its regulatory approach in the future.[25]

Second, the Panel's own analyses based on a time path of decay or recovery confirm that biomass energy will not increase net atmospheric CO_2 concentrations over the relevant temporal and spatial scales. As discussed above, peak warming is insensitive to short-term carbon fluxes that occur on time scales shorter than 100 years. *Report* at 10-13. Thus, the question that the Panel, and ultimately EPA must answer is which, if any, biomass feedstocks that are used (or are expected to be used) for biomass energy will increase atmospheric CO_2 concentrations over time scales that exceed 100 years. There are none.

In this *Report* the Panel reverses course and asserts that forestry residues are not "anyway emissions" when combusted for energy because they do not decompose instantaneously. Instead, the Panel asserts that forestry residue emissions must be modeled through a complicated process that estimates a time path of decay. *Report* at 18-20 & App'x A. Even if the Panel's approach were accepted in theory, it is simply irrelevant when considered on an appropriate time scale. Regardless of the type of forestry residue considered, these models show that decomposition would be nearly complete after 100 years. Thus emissions from forestry residues are "anyway emissions" on a 100-year time scale, and there is no net increase in atmospheric CO_2 concentrations as a result of the combustion of these feedstocks. As a result, a categorical exclusion for forestry residues is warranted.

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[24] Further, as NAFO has previously explained, a regulatory approach that promotes biomass energy is likely to increase, rather than decrease forest stocks by creating incentives for individual landowners to maintain or even increase forested acres. NAFO Deferral Rule Comments at 3-4; NAFO December SAB Panel Comments at 2.

[25] Even if domestic forests were to become a net carbon source, the appropriate regulatory response is far from certain. For example, to the extent that the change is attributable to stochastic events such as fires and disease or increased urbanization, EPA may conclude that it need not alter its approach to regulating bioenergy.

By the same token, the scientific models endorsed by the Panel for evaluating the time path of recovery for long-recovery feedstocks confirms that these products will produce no net change in atmospheric CO_2 concentrations on policy-relevant time scales. Here, the Panel relies primarily on Cherubini (2012) and the GTP_{bio} factor.[26] As the Panel notes, under Cherubini's model this factor initially increases after harvest, but for all feedstocks used in biomass energy, it will return to zero within 100 years. *Report* at 11-13. Thus, these models confirm that the biomass feedstocks that are currently used (or expected to be used in the future) will have no affect on peak warming and, on policy relevant time scales, will not alter what "the atmosphere sees." Because there are few, if any, commercial forests managed on time scales longer than 100 years, all woody biomass would have a BAF of zero, meaning that a categorical exclusion would also be warranted for long-recovery feedstocks.

Thus, contrary to the Panel's current recommendations, which would require the application of a time path of decay or recovery for all woody biomass, *Report* at 11, 18-20, 44 a categorical exclusion can be applied instead. This demonstrates a fundamental flaw in the Panel's recommendations, which is not supported by the content of the *Report*. In the *Report*, the Panel appropriately recognizes that the relevance of these time path functions is dependant on the time scale, and that concepts such as carbon debt are not relevant when long time scales are considered. *Report* at 11. Thus, while these concepts, without doubt, are valuable tools for understanding the carbon cycle and the impact of biogenic CO_2 emissions on net atmospheric CO_2 concentrations, there is no *a priori* basis for including them in a final regulatory framework as the Panel suggests. Instead, as NAFO has previously suggested, these models can simply be used to confirm that, under all circumstances and for all feedstocks, biomass energy does not increase atmospheric CO_2 concentrations.[27] While NAFO urges the Panel to replace its current recommendations with a categorical exclusion for woody biomass, the Panel should, at a minimum, note

[26] As the Panel has noted elsewhere, the application of stand-based accounting methodologies – including those proposed by Cherubini *et al.* (2012) – are inconsistent with domestic forestry practices and produce arbitrary results because they ignore the relationship between harvested and regenerating stands in the larger landscape. *See Report* at 11 (criticizing carbon debt concept). Thus, while the concept of carbon debt may be scientifically valid in the abstract, it should not be applied to domestic forestry practices.

[27] NAFO January SAB Panel Comments at 7-8.

that its recommendations to incorporate time paths of decay and recovery are in fact scale dependant and provide alternative recommendations that can be incorporated if EPA chooses to adopt a longer time scale.

2. A Continuous Monitoring Program Can Be Used to Ensure that Forest Carbon Stocks Remain Stable Over Time

While a categorical exclusion is supported by the science included in the Panel's *Report*, it is also based upon the fact that forest carbon stocks are – and will continue to be – stable or increasing.[28] Given the critical role that sustainable forestry practices play in supporting a categorical exclusion, it would be appropriate to include a monitoring component into a regulatory framework to ensure that current trends continue. This is what EPA proposed by requiring short-term comparisons of carbon stocks over time. *Framework* at 25-26.

Contrary to the Panel's assertions, continuous monitoring using, for example, annual FIA data is not inconsistent with the adoption of a 100-year time scale as the two time frames address different issues. The 100-year time scale addresses the relevant time period over which emissions should be considered. But the assumption that there will be no net increase in atmospheric CO_2 concentrations is implicitly dependant on the fact that the forests under consideration will be managed sustainably. Indeed, the Panel recognizes this in its alternative proposal for a certification program based on carbon neutrality and "sustainability" principles. *Report* at 7, 45-47.[29] Thus, even under a 100-year time scale, a monitoring approach is needed to ensure that forestry is practiced sustainably and that harvested stands are regenerated.

While the monitoring approach included in EPA's *Framework* is national in scale and cannot establish stand-based linkages, that is not necessary to demonstrate sustainability over time. A national scale approach that incorporates annual FIA data offers a practical and cost effective method to ensure that forestry is practiced

[28] *See generally*, NAFO Deferral Rule Comments; NAFO Call for Information Comments; NAFO Tailoring Rule Comments.

[29] While the Panel's revised certification proposal appropriately responded to NAFO's concerns, *see* NAFO January SAB Panel Comments at 12, by focusing on carbon neutrality rather than existing certification programs that are focused on other environmental co-benefits, a certification program will still prove complex and difficult to implement. First, a significant portion of private forests are owned by small landowners for whom certification can be prohibitively expensive. Moreover, applying a certification program at the landowner level will create significant administrative and recordkeeping challenges for the biomass energy facilities that will be subject to the regulations.

sustainably *in the aggregate*. While small changes can take place on the stand level as individual owners make management changes, a national scale monitoring system will ensure that, as a whole, forestry is practiced sustainably and that there is no net increase in atmospheric CO_2 concentrations as a result of biogenic emissions from woody biomass. By including such a monitoring system, EPA can implement a categorical exclusion with the assurance that it can take further regulatory action if the factual circumstances supporting a categorical exclusion change.

Conclusion

NAFO continues to support EPA's decision to seek an independent peer review of its proposed accounting methodology for biogenic CO_2 emissions and applauds the Panel's efforts to assess this complex field. We urge the Panel to keep implementation at the forefront as it formulates its recommendations and hope that our comments will assist the Panel in identifying means to simplify its final recommendations to EPA. NAFO is standing by to provide further information or answer any questions that the Panel may have.

Respectfully Submitted,
David P. Tenny
President and CEO
National Alliance of Forest Owners

ATTACHMENT E

September 13, 2010

Submitted via www.regulations.gov and mail
EPA Docket Center
Mail code 2822T
1200 Pennsylvania Avenue, N.W.
Washington, D.C. 20460
Attention: Docket EPA-HQ-OAR–2010–0560

Re: Call for Information: Information on Greenhouse Gas Emissions Associated With Bioenergy and Other Biogenic Sources; 75 Fed. Reg. 41173 (July 15, 2010)

To Whom It May Concern:

The National Alliance of Forest Owners (NAFO) respectfully submits the following comments in response to the Environmental Protection Agency's (EPA's) call for information on greenhouse gas (GHG) emissions associated with bioenergy and other biogenic sources. 75 Fed. Reg. 41173 (July 15, 2010).

NAFO's mission is to protect and enhance the economic and environmental values of private forests through targeted policy advocacy at the national level. At the time of this submission, NAFO's members represent 75 million acres of private forests in 47 states. NAFO was incorporated in March 2008 and has been working aggressively since to sustain the ecological, economic, and social values of forests and to assure an abundance of healthy and productive forest resources for present and future generations. NAFO is a solutions-oriented organization and is prepared to answer any questions EPA has regarding biomass combustion and the lifecycle of forest biomass and to assist the agency in developing a long-term policy that helps achieve the nation's renewable energy and climate change objectives.

In recent years the United States has aggressively sought to reduce its overall energy carbon footprint. The role of forests in supplying renewable feedstock to the ongoing transition to cleaner fuels and energy is of paramount importance and beyond dispute. Unfortunately, recent EPA decisions would—for the first time in any jurisdiction in the world—treat the greenhouse gas profile of renewable forest biomass identical to fossil fuels. While we strongly support fair and ongoing discussion regarding the greenhouse gas impacts of all fuels and energy, this departure from established policy needs to be undone at the earliest opportunity.

The results of well-established life cycle analyses (LCAs) demonstrate that biomass energy provides more than merely a favorable GHG profile when compared to energy produced from the combustion of fossil fuels. Net fluxes of biomass carbon to the atmosphere from the combustion of biomass in the United States are, at a minimum, "carbon neutral" in that any GHG emissions associated with the combustion of biomass are diminished by the significant role domestic forests play as the nation's leading carbon sink. These results, combined with the fact that domestic forest carbon stocks are increasing, fully justify a regulatory distinction between bioenergy and conventional fuels. To count the GHG emissions from biomass on par with coal and other conventional fuels is a sudden and significant departure from the established treatment of biomass emissions that may fundamentally frustrate the renewable energy and low carbon policies established by both Congress and this Administration.

The Clean Air Act (CAA) permitting programs are an inappropriate regulatory mechanism for the government to address biomass emissions. However, to the extent that EPA were to address biomass emissions in these programs, it should assign biomass emissions a net emissions factor of zero because there is a neutral carbon impact of combusting forest biomass for energy.

Finally, while NAFO supports gathering information on the carbon impact of all energy sources, EPA must pursue such inquiry in a manner that will avoid irreparable harm to the nation's renewable energy industry and the customers who rely upon it. To that end, NAFO urges EPA to grant its Petition for Reconsideration of the final Prevention of Significant Deterioration (PSD) and Title V Greenhouse Gas Tailoring Rule (Tailoring Rule) while it considers the responses to the Call for Information and any subsequent actions.

We submit the information below to further the Agency's understanding of this issue. Given the limited comment period provided on EPA's call for information, these comments are an initial response. NAFO will supplement its comments with further information as it becomes available.

I. While Pursuing The Call For Information, EPA Must Restore The Long Established Policy That Carbon Dioxide Emissions From The Combustion Of Biomass Do Not Increase Atmospheric Carbon.

EPA's recent Tailoring Rule is a sudden and unsupportable reversal of the government's precedent and policy regarding biomass emissions. *See* 75 Fed. Reg. 31,514 (Jun. 3, 2010). As described further below, there is no debate that when most fuels are burned for energy, they emit carbon dioxide (CO_2). Yet, regarding biomass, it is equally well established that carbon emitted in the combustion of forest biomass—unlike conventional fossil fuels—comes from CO_2 that was recently sequestered from the air by the forest, thus resulting in a "carbon neutral" cycle. This is the principal reason why governments—both in the United States and globally—historically have not counted emissions of carbon dioxide from combustion of biomass when estimating carbon dioxide emissions. EPA in the final Tailoring Rule to our knowledge became the first government body to depart from this established position, and without any prior fair notice to the public. EPA must restore the status quo as it examines this issue closer to avoid real and irreparable harm to the nation's forest and renewable energy industry in the interim.

A. The United States has consistently excluded CO_2 from combustion of biomass when assessing CO_2 emissions.

EPA, along with other credible domestic and international organizations, has historically recognized and affirmed carbon neutrality in reporting and other contexts. Indeed, biomass CO_2 neutrality has been the foundation of American policy. As the EPA previously has concluded, there is "[s]cientific consensus . . . that the CO_2 emitted from burning biomass will not increase total atmospheric CO_2 if this consumption is done on a sustainable basis."[1] Consistent with this conclusion, in its most recent GHG inventory, EPA did not include emissions from the combustion of wood biomass in its national emissions totals because it "assumed that the carbon . . . released during the consumption of biomass is recycled as U.S. forests and crops regenerate, causing no net addition of CO_2 to the atmosphere. The net impacts of land-use and forestry activities on the [carbon] cycle are accounted for separately within the Land Use, Land-Use Change, and Forestry chapter."[2] In its Climate Leaders program, EPA also does not count biomass CO_2 emissions toward participants' progress toward the program's targets in recognition of the neutrality of the biogenic carbon cycle. Specifically, EPA's guidance states that "biomass CO_2 emissions are not included in the overall CO_2-

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[1]Environmental Protection Agency Combined Heat and Power Partnership, *Biomass Combined Heat and Power Catalog of Technologies*, at 96 (Sept. 2007), *available at* www.epa.gov/chp/documents/biomass_chp_catalog.pdf.

[2] EPA, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2008* at 3-10 (April 15, 2010) (EPA 2010 Inventory), *available at* http://www.epa.gov/climatechange/emissions/downloads10/US-GHG-Inventory-2010_Report.pdf.

equivalent emissions inventory used to track Partners' progress towards their Climate Leaders reduction goal. This is because it is assumed that combustion of biofuels do not contribute to net addition of CO_2 to the atmosphere."[3] Similarly, the Department of Energy's (DOE's) Voluntary Reporting of Greenhouse Gases Program, authorized by Section 1605(b) of the Energy Policy Act of 1992, provides for exclusion of combustion of biomass fuels.[4]

Notably, the government's recent *Draft Federal Greenhouse Gas Accounting and Reporting Guidance,* issued by the Council on Environmental Quality (CEQ), makes clear that biogenic emissions are not subject to agency reduction targets. As part of its rationale, CEQ states that "[t]he CO2 from biogenic sources is assumed to be naturally 'recycled,' since the carbon in the biofuel was in the atmosphere before the plant was grown and would have been released normally through decomposition after the plant died." *See* 75 Fed. Reg. 41452 (July 16, 2010). The conclusion that "biogenic" carbon cycle releases no new carbon dioxide into the atmosphere was also recently emphasized by more than 100 scientists in a letter sent to U.S. Senate and House leaders. The letter states, in part, that "carbon dioxide released from the combustion or decay of woody biomass is part of the global cycle of biogenic carbon and does not increase the amount of carbon in circulation."[5]

The international GHG accounting methods developed by the United Nation's Intergovernmental Panel on Climate Change also recognize that biogenic carbon is inherently part of the natural carbon balance and will not add to atmospheric concentrations of carbon dioxide as long as land-based carbon stocks remain stable.[6]

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[3] EPA, *Climate Leaders Greenhouse Gas Inventory Protocol Core Module Guidance: Direct Emissions from Stationary Combustion Sources*, at 3, EPA430-K-08-003 (May 2008).

[4] *See* DOE, *Technical Guidelines: Voluntary Reporting of Greenhouse Gases (1605(b)) Program* (January 2007) at 77 ("Reporters that operate vehicles using pure biofuels within their entity should not add the carbon dioxide emissions from those fuels to their inventory of mobile source emissions because such emissions are considered biogenic and the recycling of the carbon is not credited elsewhere.").

[5] Letters from 113 Scientists (Lippke, B. et al.) to Sen. Boxer, et al. and Rep. Waxman, et al. (July 20, 2010) (enclosed as Attachment 1).

[6] *See IPCC Guidelines for National Greenhouse Gas Inventories,* Prepared by the National Greenhouse Gas Inventories Programme, Institute for Global Environmental Strategies, Hayama, Kanagawa, Japan: IPCC National Greenhouse Gas Inventories Programme (2006).

Similarly, the European Union directive on carbon trading specifies that biomass is considered to be carbon neutral.[7]

Therefore, a unified consensus exists that treating combustion of biomass as carbon neutral is scientifically sound where carbon stocks are stable or increasing, as they are in the United States. As described further below, because production and combustion of fuels derived from biomass does not increase atmospheric carbon dioxide levels , the greenhouse gases emitted in combustion of such fuels should be excluded from greenhouse gas regulations.

B. The Tailoring Rule's treatment of carbon emissions from biomass combustion departs from established principles without notice or justification and the status quo must be restored as the agency considers further action.

In a stark reversal of established policy and with no advance notice to the public, EPA issued its Tailoring Rule, which for the first time would count CO_2 emissions from combustion of biomass toward the rule's applicability thresholds for the PSD and Title V permitting programs of the CAA. *See* 75 Fed. Reg. 31,514 (Jun. 3, 2010).

The Tailoring Rule is not only contrary to established U.S. and international precedent and policy, it is also a reversal of the *proposed* Tailoring Rule. 74 Fed. Reg. 55292 (Oct. 27, 2009). EPA proposed methodology that would not count carbon dioxide emissions from combustion of biomass when assessing emissions under the Clean Air Act permitting programs. *See* 74 Fed. Reg. at 55351-52 (basing carbon dioxide equivalent calculation on EPA's Inventory of U.S. Greenhouse Gas Emissions and Sinks). In the preamble to the final rule, EPA misconstrued comments by NAFO and others and declared for the first time that it would instead count CO_2 emissions from the combustion of biomass toward the PSD and Title V thresholds.

On July 30, 2010, NAFO petitioned EPA to reconsider and stay the implementation of the Tailoring Rule. As explained in that petition, EPA's final Tailoring Rule is arbitrary and capricious for two reasons. First, EPA has not offered a reasoned explanation for reversing the position it took in the proposed Tailoring Rule, for ignoring

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[7] Commission Decision of 29 January 2004 establishing guidelines for the monitoring and reporting of greenhouse gas emissions pursuant to Directive 2003/87/EC of the European Parliament and of the Council, at Section 4.2.2.1.6, *available at* http://eur-lex.europa.eu/pri/en/oj/dat/2004/l_059/l_05920040226en00010074.pdf.

NAFO's comments that it should maintain that position, or for rejecting the past practice of EPA and other federal agencies regarding CO_2 emissions from the combustion of biomass. Second, EPA's unexpected change-of-course in the final Tailoring Rule is not a logical outgrowth of its proposed Tailoring Rule and thus is a violation of the Administrative Procedure Act. NAFO has also petitioned for review of the rule in the United States Court of Appeals for the District of Columbia Circuit. *See NAFO et al., v. EPA*, D.C. Cir. Case No. 10-1209 (filed Aug. 2, 2010).

EPA must follow the proper procedures before instituting wholesale changes as it did in the final Tailoring Rule. Indeed, although EPA acknowledges that the "Call for Information serves as a *first step* for EPA in considering options for addressing emissions of biogenic CO_2 under the PSD and Title V programs," 75 Fed. Reg. at 41174 (emphasis added), the Tailoring Rule has already reversed long-standing precedent and established CAA requirements for biogenic CO_2, without waiting for the results of this inquiry. As NAFO has urged in its petition to EPA, the agency should reconsider the Tailoring Rule and stay the final rule pending that reconsideration. NAFO reiterates that request here.

II. The Carbon Neutrality Of Biomass Combustion Is Well Documented In Science And Policy.

A. Increasing carbon stocks in the United States establish the carbon neutrality of forest biomass.

Forests reduce the overall GHG concentrations in the atmosphere by sequestering carbon.[8] The process of sequestration and storage is a natural by-product of tree growth. Through photosynthesis, trees remove, or sequester, carbon from the atmosphere, and store it in their biomass. That carbon remains stored even if the tree is used to make much needed wood products, such as homes or furniture. The amount of atmospheric carbon transformed into forest biomass has been estimated at 25 to 30 billion metric tons per year.[9]

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[8] *See generally* Heath, L., V. Maltby, R. Miner, K. Skog, J. Smith, J. Unwin, and B. Upton, *Greenhouse gas and carbon profile of the US forest products industry value chain*, Environmental Science and Technology. 44: 3999-4005 (2010).

[9] Field, C.B., *Primary production for the biosphere: integrating terrestrial and oceanic components,* Science, 281: 237 (1998); Sabine, C.L., Heimann, M., Artaxo, P., Bakker, D.C.E., Chen, C.T.A., Field, C.B., Gruber, N., Le Quéré, C., Prinn, R., Richey, J.E., Lankao, P.R., Sathaye, J.A. and Valentini, R.,

Through sequestration, forests in the United States, nearly 60 percent of which are privately owned,[10] serve as the most significant natural terrestrial sink of greenhouse gases. U.S forests capture about 10%-15% of annual U.S. greenhouse gas emissions through photosynthesis and store it in the forest and in wood products.[11] Notably, private forests in the United States, which supply over 90% of the wood used by the industry, are also a net sink; carbon stocks on private forests are growing at a rate equivalent to removing 131 million metric tons of CO_2 from the atmosphere per year.[12] EPA's most recent Inventory of U.S. Greenhouse Gas Emissions and Sinks found that changes in carbon stocks in U.S. forests and harvested wood were estimated to account for net sequestration of 792 million metric tons of carbon dioxide equivalents in 2008. EPA 2010 Inventory, *supra* at n. 2, at 7-13.

EPA explained that "improved forest management practices, the regeneration of previously cleared forest areas, and timber harvesting and use have resulted in net uptake (i.e., net sequestration) of [carbon] each year from 1990 through 2008." *Id.* In fact, the 2010 Inventory shows that "[n]et CO_2 flux from Land Use, Land-Use Change, and Forestry increased by 30.9 Tg CO_2 Eq. (3 percent) from 1990 through 2008. This increase was primarily due to an increase in the rate of net carbon accumulation in

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Current status and past trends of the carbon cycle, In C.B. Field & M.R. Raupach, The global carbon cycle: integrating humans, climate, and the natural world, at 17–44, Washington, DC, USA, Island Press (2004).

[10] *See* Society of American Foresters, *The State of America's Forests* at 9 (2007), *available at* http://www.sfpa.org/Environmental/StateOfAmericasForests.pdf. "The largest carbon sink in North America (270 Mt C per year) is associated with forests." U.S. Climate Change Science Program and the Subcommittee on Global Change Research, National Oceanic and Atmospheric Administration, *The First State of the Carbon Cycle Report (SOCCR): The North American Carbon Budget and Implications for the Global Carbon Cycle* (King, A.W., L. Dilling, G.P. Zimmerman, D.M. Fairman, R.A. Houghton, G. Marland, A.Z. Rose, and T.J. Wilbanks (eds.) 2007).

[11] Carbon sequestration in forests, trees in urban areas, agricultural soils, and landfilled yard trimmings and food scraps, offset 14.9 percent of total emissions in 2007 and 13.5 percent of total emissions in 2008. *See* U.S. Environmental Protection Agency, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2007 at ES-4 (Apr. 15, 2009) (EPA 2009 Inventory), *available at* http://www.epa.gov/climatechange/emissions/downloads09/GHG2007entire_report-508.pdf; EPA 2010 Inventory at ES-6, 7-13.

[12] *See* Haynes, R. W., *The 2005 RPA timber assessment update*, Gen. Tech. Rep. PNW-GTR-699, USDA Forest Service, Pacific Northwest Research Station (2007); Heath, L. V., *Greenhouse Gas and Carbon Profile of the U.S. Forest Products Industry Value Chain*, Environmental Science and Technology (2010).

forest carbon stocks, particularly in aboveground and belowground tree biomass, and harvested wood pools." *Id.* at ES-9; *see also id.* at Figure 7-3 (enclosed as Attachment 2). In addition, "[b]ecause most of the timber harvested from U.S. forests is used in wood products, and many discarded wood products are disposed of in [solid waste disposal sites] rather than by incineration, significant quantities of [carbon] in harvested wood are transferred to long-term storage pools rather than being released rapidly to the atmosphere." *Id.* at ES-9, *see also id.* at E-12 to E-13. EPA estimates and research on private forestlands have demonstrated the benefits of storing carbon in forest products.[13] Work by the Consortium for Research on Renewable Industrial Materials has also documented how managed forests can produce sustained, overall net GHG emission reductions when carbon is stored in enduring harvested wood products and/or when harvested wood products are substituted for products with higher energy/carbon footprints.[14] As explained below, EPA research and other studies have recognized that the use of biomass as an energy source can reduce overall GHG emissions.

Sequestration also comes from net forest growth*.* EPA found that "on average the volume of annual net growth nationwide is about 32 percent higher than the volume of annual removals." EPA 2010 Inventory, *supra* at n. 2, at 7-13.

For these reasons, and as explained further in Section III.A below, carbon stocks are increasing in the United States, reinforcing that the combustion of forest biomass is carbon neutral. In this manner, biofuels from forest biomass are fundamentally different from conventional fuels. Once coal, natural gas, or oil is extracted and combusted, it cannot be replaced. In contrast, the forest management practiced by the United States forest products industry ensures that there is no temporal imbalance between biogenic CO_2 emissions and CO_2 sequestration and thus no effect on the atmospheric GHG inventory. Indeed, as EPA is aware, carbon stocks in United States forests have been, and continue to, increase. EPA 2010 Inventory, *supra* at n. 2. Thus, the generation of bioenergy from forest biomass is truly carbon neutral.

The remainder of this Section reviews scientific studies that show that the combustion of forest biomass has zero net emissions and reviews the benefits of

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[13] *See* NAFO, Carbon Mitigation Benefits of Working Forests, *available at* http://nafoalliance.org/mitigation-benefits-working-forests/.

[14] *See, e.g.,* Lippke, B., et al., CORRIM: Life-Cycle Environmental Performance of Renewable Building Materials, 54 Forest Prod. J. 8 (2004).

switching from fossil fuel to biomass as demonstrated by numerous LCA studies. Finally, it explains the flaws in certain studies that question the benefits of biomass-derived fuels as compared to fossil fuels.

B. Scientific studies reinforce that the combustion of forest biomass is "carbon neutral."

The prevailing view in the science community is that carbon emissions from forest biomass are offset by the prior absorption of carbon through photosynthesis that created the biomass and, as such, the return of the carbon to the atmosphere will have a neutral effect on atmospheric carbon. In other words, the carbon that enters the atmosphere when forest biomass is combusted was previously absorbed from the atmosphere by the forest biomass. As the cycle is repeated, additional CO_2 will be absorbed when new biomass is grown.[15] As such, where forest biomass is being supplied while maintaining forest carbon stocks over the supply area, the net transfers of biogenic carbon to the atmosphere are "zero" at worst, and may be negative if some of the harvested carbon is being stored in long-lived products. The scientific basis for these conclusions is the biogenic carbon cycle.

This biogenic carbon cycle forms the basis for using a zero emission factor at the point of combustion for biomass-derived fuels (Robinson et al. 2003; Cherubini et al. 2009; Lattimore et al. 2009; Abbasi and Abbasi 2010; Cherubini 2010),[16] and represents

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[15] *See, e.g.,* Miner, R., National Council for Air and Stream Improvement, *Biomass Carbon Neutrality* (Apr. 15, 2010), *available at* http://nafoalliance.org/wp-content/uploads/NCASI-Biomass-carbon-neutrality.pdf.

[16] Robinson, A.L., Rhodes, J.S., and Keith, D.W., *Assessment of potential carbon dioxide reductions due to biomass – Coal cofiring in the United States,* Environmental Science and Technology 37(22):5081-5089; doi:10.1021/es034367q (2003); Cherubini, F., Bird, N.D., Cowie, A., Jungmeier, G., Schlamadinger, B., and Woess-Gallasch, S., *Energy- and greenhouse gas-based LCA of biofuel and bioenergy systems: Key issues, ranges and recommendations*, Resources, Conservation and Recycling 53:434-447; doi:10.1016/j.resconrec.2009.03.013 (2009); Lattimore, B., Smith, C.T., Titus, B.D., Stupak, I., and Egnell, G., *Environmental factors in woodfuel production: Opportunities, risks, and criteria and indicators for sustainable practices*, Biomass and Energy 33:1321-1342; doi:10.1016/j.biombioe.2009.06.005 (2009); Abbasi, T., and Abbasi, S.A., *Biomass energy and the environmental impacts associated with its production and utilization*, Renewable and Sustainable Energy Reviews 14:919-937; doi:10.1016/j.rser.2009.11.006 (2010); Cherubini, F., *GHG balances of bioenergy systems – Overview of key steps in the production chain and methodological concerns*, Renewable Energy 35:1565-1573; doi:10.1016/j.renene.2009.11.035 (2010).

an accepted benefit of using biomass-derived fuels rather than fossil fuels (Schlamadinger et al. 1997; Abbasi and Abbasi 2010; Froese et al. 2010).[17]

For example, Cherubini (2010)[18] advocates a zero CO_2 emission factor for biomass combustion and thus supports a conclusion that the biogenic carbon cycle is carbon neutral. The author states that "[w]hen biomass is combusted the resulting CO_2 is not accounted for as a GHG because C has a biological origin and combustion of biomass releases almost the same amount of CO_2 as was captured by the plant during its growth." The article describes a LCA methodology to compare biomass energy to fossil fuel energy, noting that "almost all studies reveal that consistent GHG emission savings are achieved when electricity and heat from biomass displace electricity and heat produced from fossil sources."

Gower (2003)[19] also supports the conclusion that carbon cycle from the combustion of forest biomass is neutral. That peer-reviewed journal article states: "The CO2 emitted when wood and paper waste is burned is equivalent to the atmospheric CO2 that was sequestered by the tree during growth and transformed into organic carbon compounds; hence there is no net contribution to the atmospheric CO2 concentration, and the material is considered to be C neutral."

Thus, where forest biomass is obtained without depleting carbon stocks across the supply area, these studies and other published research clearly shows large GHG benefits of using forest biomass for energy as compared to fossil fuels.

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[17] Schlamadinger, B., Apps, M., Bohlin, F., Gustavsson, L., Jungmeier, G., Marland, G., Pingoud, K., and Savolainen, I., *Towards a standard methodology for greenhouse gas balances of bioenergy systems in comparison with fossil energy systems*, Biomass and Bioenergy 13(6):359-375 (1997); Abbasi, T., and Abbasi, S.A., *Biomass energy and the environmental impacts associated with its production and utilization*, Renewable and Sustainable Energy Reviews 14:919-937; doi:10.1016/j.rser.2009.11.006p (2010); Froese, R.E., Shonnard, D.R., Miller, C.A., Koers, K.P., and Johnson, D.M., *An evaluation of greenhouse gas mitigation options for coal-fired power plants in the U.S. Great Lakes States*, Biomass and Bioenergy 34:251-262; doi:10.1016/j.biombioe.2009.10.013 (2010).

[18] Cherubini, F., *GHG balances of bioenergy systems – Overview of key steps in the production chain and methodological concerns*, Renewable Energy 35:1565-1573; doi:10.1016/j.renene.2009.11.035 (2010).

[19] Gower, S., *Patterns and mechanisms of the forest carbon cycle.* Annual Review of Environment and Resources 28:169-204 (2003).

C. Lifecycle analysis (LCA) affirms that forest biomass as a fuel source leads to lower GHG lifecycle emissions than conventional fuels.

Wood from forests with stable or increasing carbon stocks also provides a renewable, low-carbon energy source as an alternative to fossil fuels. According to U.S. Energy Information Administration (EIA) data, biomass already supplies over 50% of the nation's renewable energy.[20] Forests can provide ample, sustainable, domestic supplies of biomass to produce liquid transportation fuels, electricity, thermal energy (heat and power for manufacturing and other industrial uses), and synthetic natural gas.[21]

Using forest biomass as a renewable fuel source has significant carbon benefits because it has a more favorable lifecycle analysis than petroleum and other fuels. The DOE has estimated that "[c]ellulosic ethanol use could reduce GHGs by as much as 86%."[22] EPA, in its final rulemaking adopting changes to the Renewable Fuel Standard Program, also recognized the GHG emissions reductions of greater than 60% that would result from the use of cellulosic biofuels compared to petroleum. *See* 75 Fed. Reg. 14,670 (March 26, 2010). Using the "displacement index" approach, EPA determined that every BTU of gasoline replaced by cellulosic ethanol will produce lifecycle GHG emission reductions of 92.7 percent.[23]

In evaluating the GHG emissions associated with fuels, a lifecycle analysis incorporates all steps in a "product system" to evaluate broader environmental impacts of products and processes. Internationally-accepted LCA standards inherently recognize the unique attributes of carbon in biomass fuels by extending the accounting boundaries upstream to the point where "elementary flows" of CO_2 are removed from

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[20] *See* EIA, U. S. Energy Consumption by Energy Source (July 2009), *available at* http://www.eia.doe.gov/cneaf/alternate/page/renew_energy_consump/table1.html.

[21] *See* NAFO, Carbon Neutrality of Energy from Forest Biomass, *available at* http://nafoalliance.org/carbon-neutrality-of-energy-from-forest-biomass/.

[22] *See* DOE, Ethanol Benefits, *available at* http://www.afdc.energy.gov/afdc/ethanol/benefits.html.

[23] *See* EPA, EPA420-D-06-008, *Renewable Fuel Standard Program: Draft Regulatory Impact Analysis* at 191 (September 2006).

the atmosphere.[24] Because biomass carbon accounting in a LCA begins with the uptake of CO_2 from the atmosphere,[25] the return flows to the atmosphere result in a net zero flux to the atmosphere, equivalent to using a zero emission factor for biogenic CO_2 emissions. Where the returns to the atmosphere are less than the amounts removed, the difference represents increases in stocks of stored carbon (net removals from the atmosphere). In cases where stocks of stored biomass carbon are depleted by land use change, these impacts should be included in the analysis but are addressed separately from the accounting of the carbon in the fuel itself.[26]

D. Recent LCAs show that energy derived from biomass has a GHG mitigation benefit when compared to energy derived from fossil fuels.

Recent LCAs of forest biomass energy systems overwhelmingly have demonstrated significant GHG mitigation benefits compared to energy derived from fossil fuels. As explained above, because the carbon in biomass was only recently removed from the atmosphere, returning the carbon to the atmosphere as biogenic CO_2 merely completes a cycle – a cycle that has a net zero impact on the atmosphere as long as it remains in balance. In contrast, transfers of fossil fuel carbon to the atmosphere always result in net increase in atmospheric carbon because these transfers are one-way, not part of a cycle.[27] In this section, NAFO summarizes recent LCAs that demonstrate bioenergy has a more favorably environmental profile than fossil fuel energy. This summary is drawn from the following memorandum, which is included as Attachment 3 to this letter: Upton, B., National Council for Air and Stream Improvement, Inc., Memo to Reid Miner, *Summary of Literature on Life Cycle Assessments (LCA) of Forest-Derived Biomass Energy* (Aug. 27, 2010).

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[24] *See Environmental management - Life cycle assessment - Requirements and guidelines: International Standard ISO 14044,* Geneva: International Organization for Standardization (2006).

[25] In contrast, the LCA accounting for carbon in fossil fuels begins at the point of extraction of the fuel from the ground.

[26] *See* BSI, *Specification for the assessment of the life cycle greenhouse gas emissions of goods and services: PAS 2050:2008,* London: British Standards Institution (2008).

[27] *See* Cherubini, F. N.-G., *Energy- and greenhouse gas-based LCA of biofuel and bioenergy systems: Key issues, ranges and recommendations*, Resources, Conservation and Recycling at 434-47 (2009).

Froese et al. (2010)[28] used LCA to investigate several options to mitigate GHG emissions from electricity generation in the U.S. Great Lakes States region, and found cofiring forestry biomass residuals (with coal reference condition) to be the most attractive option and carbon capture and storage to be the least attractive option. These researchers found that cofiring 20% biomass resulted in a 20% life cycle GHG mitigation benefit. They also noted a large potential for biomass production from underutilized resources, with land resources not a limiting factor, and that additional biomass could be provided for fuel without replacing current commodities grown on cropland or jeopardizing the sustainability of forest resources.

Mann and Spath (2001)[29] conducted an LCA on cofiring wood residuals such as "timber stand improvement" residues, mill residues, urban wood, and other woody materials in a coal-fired power plant and found that cofiring biomass at 15% reduced life cycle GHG emissions by 18.4%. These authors attributed the greater reduction in GHG emissions than the rate of cofiring to avoided methane emissions associated with alternative end of life management for some of the residual feedstock components.

Robinson et al. (2003)[30] demonstrated that displacement of coal by biomass (forestry and agricultural residuals) resulted in a net reduction of carbon emissions "because biomass carbon is in the active carbon cycle and . . . does not accumulate in the atmosphere if the biomass is used sustainably." These researchers found that "fossil energy resources equivalent to less than 5% of the energy content of the biomass are typically consumed in its cultivation and processing" and that "cofiring [biomass with coal] can achieve significant reductions in CO2 emissions in the very near term (less than 5 years)."

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[28] *See* Froese, R.E., Shonnard, D.R., Miller, C.A., Koers, K.P., and Johnson, D.M., *An evaluation of greenhouse gas mitigation options for coal-fired power plants in the U.S. Great Lakes States*, Biomass and Bioenergy 34:251-262; doi:10.1016/j.biombioe.2009.10.013 (2010).

[29] Mann, M.K., and Spath, P.L., *A life cycle assessment of biomass cofiring in a coal-fired power plant,* Clean Production Processes 3:81-91; doi:10.1007/s100980100109 (2001).

[30] Robinson, A.L., Rhodes, J.S., and Keith, D.W., *Assessment of potential carbon dioxide reductions due to biomass – Coal cofiring in the United States*, Environmental Science and Technology 37(22):5081-5089; doi:10.1021/es034367q (2003).

Pehnt (2006)[31] investigated the life cycle impacts of biomass combustion for heat and electricity generation and demonstrated that GHG emissions were extremely low compared with fossil fuel-fired systems. The biomass materials investigated were forest wood, short rotation forestry wood, and “waste wood.” Life cycle GHG emission reduction over an electricity base case ranged from 85 to 95%, and reductions for a heat generation base case ranged from 88 to 93%.

Cherubini et al. (2009)[32] applied LCA methodology to several biomass energy systems and found that for some biomass systems (e.g., forestry residuals to electricity or heat) the entire LCA GHG emissions from bioenergy were 90 to 95% lower than those from fossil fuel based systems.

Zhang et al. (2010)[33] demonstrated that using wood pellets for electricity generation reduced life cycle GHG emissions by 91% relative to a coal reference case and by 78% relative to a natural gas combined cycle (NGCC) reference case. These authors examined dedicated wood harvest for energy production in which land use carbon stock changes were assumed to be zero due to biomass regrowth during the time period of the analysis.

Raymer (2006)[34] found significant life cycle GHG mitigation benefits with several types of wood energy (fuel wood for domestic heating substituting for electricity from coal and from domestic heating oil, sawdust and bark used for drying sawn wood substituting for oil, pellets made from sawdust and chips and briquettes used for building heat substituting for oil, and demolition wood used for district heating substituting for oil). Life cycle reductions in GHG emissions ranged from 81 to 98%

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[31] Pehnt, M., *Dynamic life cycle assessment (LCA) of renewable energy technologies*, Renewable Energy 31:55-71; doi:10.1016/j.renene.2005.03.002 (2006).

[32] Cherubini, F., Bird, N.D., Cowie, A., Jungmeier, G., Schlamadinger, B., and Woess-Gallasch, S., *Energy- and greenhouse gas-based LCA of biofuel and bioenergy systems: Key issues, ranges and recommendations*, Resources, Conservation and Recycling 53:434-447; doi:10.1016/j.resconrec.2009.03.013 (2009).

[33] Zhang, Y., McKechnie, J., Cormier, D., Lyng, R., Mabee, W., Ogino, A., and Maclean, H.L., *Life cycle emissions and cost of producing electricity from coal, natural gas, and wood pellets in Ontario, Canada,* Environmental Science and Technology 44(1):538-544; doi:10.1021/es902555a (2010).

[34] Raymer, A.K.P., *A comparison of avoided greenhouse gas emissions when using different kinds of wood energy*, Biomass and Bioenergy 30:605-617; doi:10.1016/j.biombioe.2006.01.009 (2006).

relative to fossil fuel alternatives. The greatest benefit was found for district heating using demolition wood (substituting for oil) and the least benefit corresponded to fuel wood for home heating (substituting for coal-derived electricity).

Heller et al. (2003, 2004)[35] described an LCA study of production of willow (short rotation woody biomass) and cofiring this biomass with coal to generate electricity. Results included that biomass production had a net energy ratio (biomass energy output divided by fossil energy input) of 55. These researchers found that the upstream energy consumed in growing, processing, and transporting biomass roughly balanced the reduced consumption from mining, processing, and transporting less coal. At a cofiring rate of 10% biomass the system's net global warming potential decreased by 9.9% relative to a baseline of 100% coal firing.

As illustrated by the studies cited above and summarized in the following Table 1,[36] life cycle analyses comparing fossil fuels to forest biomass grown on land where carbon stocks are stable typically illustrate significant GHG mitigation benefits:

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[35] Heller, M.C., Keoleian, G.A., Mann, M.K., and Volk, T.A., *Life cycle energy and environmental benefits of generating electricity from willow biomass*, Renewable Energy 29:1023-1042; doi:10.1016/j.renene.2003.11.018 (2004); Heller, M.C., Keoleian, G.A., and Volk, T.A., *Life cycle assessment of a willow bioenergy cropping system*, Biomass and Bioenergy 25:147-165; doi:10.1016/S0961-9534(02)00190-3 (2003).

[36] The Upton Memorandum (Attachment 3 at 4) also notes two papers that discuss problems with biomass fuel systems' ability to mitigate GHG emissions. Wicke, B., Dornburg, V., Junginger, M., and Faaij, A., *Different palm oil production systems for energy purposes and their greenhouse gas implications,* Biomass and Bioenergy 32:1322 1337; doi:10.1016/j.biombioe.2008.04.001 (2008); Farrell, A.E., Plevin, R.J., Turner, B.T., Jones, A.D., O'Hare, M., and Kammen, D.M., *Ethanol can contribute to energy and environmental goal*, Science 311:506 508; doi:10.1126/science.1121416 (2006). These studies, however, have involved either (a) situations where the biomass was obtained under circumstances that significantly impacted forest carbon stocks (deforestation, *e.g.* Wicke et al. (2008)) or (b) situations where there are large GHG emissions related to production or processing of non-forest biomass feedstocks (for example, early-generation corn ethanol systems, *e.g.* Farrel et al. (2006)).

Table 1. GHG Mitigation Benefit Summary based on LCA Results

Study	Biofuel Type	Fossil Fuel Offset	GHG Mitigation[a]
Froese et al. 2010	Forestry residuals	Coal (cofiring) electricity	100%
Mann and Spath 2001	Wood residuals	Coal (cofiring) electricity	123%[b]
Robinson et al. 2003	Forestry and agriculture residuals	Coal (cofiring) electricity	~95%
Pehnt 2006	Forest wood, woody biomass energy crops, waste wood	Energy mix in Germany for electricity generation and home heating in 2010	85-95%
Cherubini et al. 2009	Forest residuals	Various fossil fuels used for heat and electricity production	70-98%
Zhang et al. 2010	Wood pellets	Electricity from coal	91%
	Wood pellets	Electricity from natural gas combined cycle	78%
Raymer 2006	Fuel wood, sawdust, wood pellets, demolition wood, briquettes, bark	Coal fired electricity, heating oil	81-98%
Heller et al. 2004	Short rotation willow	Coal (cofiring) electricity	99%

[a] percent from base case; for cofire situations the mitigation pertains to the cofire rate (e.g., if 10% fossil fuel is replaced by biomass and emissions decrease by 9%, mitigation of 90% is assigned)
[b] mitigation greater than 100% due to avoided end of life methane emissions

Therefore, LCAs show that using forest biomass fuels in place of fossil fuels in direct combustion applications can yield substantial reductions in greenhouse gas emissions provided that forest carbon stocks are stable.

E. Recent studies questioning the benefits of biomass energy are flawed.

Two recent and well-publicized papers have suggested that reliance on biomass-derived fuels is misplaced and that these fuels have small or no GHG benefits relative to fossil fuels. Since EPA referenced these papers in its Call for Information, we show below why they are an unreliable basis on which to change current government policy.

In the "Manomet study," Walker et al. (2010)[37] produced modeling results that confirm biomass energy systems can help reduce GHG emissions when supported by sustainable forest management. However, the authors framed their analyses and conclusions in a way that casts doubt on the GHG mitigation benefits of biomass energy. The authors suggest that emissions are always greater in the near-term for biomass than for fossil fuels and that net reductions in GHG emissions attributable to bioenergy usually do not become apparent for many years. This "carbon debt" analysis is flawed, however, because it focuses only on emissions associated with stands of trees that are harvested in any given year and ignores sequestration associated with the vast majority of forested acres where the stands are not disturbed by harvesting and continue to grow in a given year.[38] Notably, it is the existence of the entire system (*e.g.*, the long-term fuel supply), that is the basis for investing in the harvest in the first place.

Forest management produces tomorrow's fuel today, removing CO_2 from the atmosphere that offsets the biogenic CO_2 emissions associated with the combustion of biomass removals on one part of the supply area. Indeed, the Manomet study itself showed that carbon stocks within the Massachusetts study area are increasing. By doing the accounting on one plot at a time, the system is improperly being defined as the plot rather than the complete energy supply system. Plot-level analyses are simply insufficient to estimate effects of forest management options on carbon stocks. In fact, active forest management can have a positive affect on carbon stocks.[39] The Manomet

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[37] Walker, T., P. Cardellichio, A. Colnes, J. Gunn, B. Kittler, B. Perschel, C. Recchia, and D. Saah., *Biomass Sustainability and Carbon Policy Study*, Manomet Center for Conservation Sciences, Brunswick, ME (2010).

[38] *See* Lucier, A., *NCASI Review of Manomet Biomass Study*, National Council for Air and Stream Improvement, Inc. (2010), *available at* http://www.mass.gov/Eoeea/docs/doer/renewables/biomass/study-comments/lucier.pdf.

[39] *See, e.g.,* Nechodom, M. PhD, USDA Forest Service, Pacific Southwest Research Station, CEC-500-2009-080, *Biomass To Energy: Forest Management For Wildfire Reduction, Energy Production, And Other Benefits* at 77-83, Prepared for Public Interest Energy Research, California Energy Commission (January 2010) (showing transition from passive to active forest management can occur without creating a "carbon debt" as active management of forests in the study landscape would reduce carbon losses to wildfire), *available at* http://www.energy.ca.gov/2009publications/CEC-500-2009-080/; *see also* Zhang, J., Powers, R. and Skinner, C., *To Manage or Not to Manage: The Role of Silviculture in Sequestering Carbon in the Specter of Climate Change*, USDA Forest Service, Pacific Southwest Research Station (pending publication) (showing active forest management increased carbon sequestration and decreased fires-caused tree mortality).

study's model thus creates a false impression that forest carbon stocks are always depleted by harvesting and that carbon stock depletion is reversed only gradually as the harvested stands are re-grown.[40]

The study also set an arbitrary cut off for the repayment of the "carbon debt" at the year 2050. Yet another aspect of the Manomet study that renders its results questionable is its assumption that whole trees would be harvested for energy, even though some areas have a viable forest products industry and trees are often harvested for wood products first. Finally, in considering the value of the Manomet study, it is important to recognize that its findings have frequently been misconstrued by certain groups and in the press. In fact, to address press coverage that oversimplified the study's results, the Manomet study authors issued a statement of clarification: "One commonly used press headline has been 'wood worse than coal' for GHG emissions or for 'the environment.' *This is an inaccurate interpretation of our findings, which paint a much more complex picture.*"[41]

In the United States, the concept of "carbon debt" is not relevant; because forest carbon stocks are increasing, there is no "carbon debt" to repay. Moreover, in a hypothetical scenario involving a future decline in forest carbon stocks, it is not clear how the concept of "carbon debt" could be applied in a practical accounting system in the context of EPA's permitting programs. Any observed reductions in forest carbon stocks would have multiple causes and it would be problematic at best to attribute a specific fraction of the reductions to use of biomass for energy production at any particular facility or facilities.

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[40] The understanding of the importance of time in carbon stock assessments goes back at least to the early 1990s. *See, e.g.,* Marland, G. and S. Marland, "Should we store carbon in trees?" Water, Air and Soil Pollution (64), 1992: 181-195. As explained above, the analytical framework used in the Manomet study yields results that overstate the length of time needed to experience net benefits from using forest biomass fuels compared to fossil fuels because it improperly assumes that modeling harvested stands in isolation is equivalent to modeling forests comprising a diverse population of stands.

[41] *See* Statement from Manomet on the Biomass Study (June 21, 2010) (emphasis added), *available at* http://www.manomet.org/sites/manomet.org/files/Manomet%20Statement%20062110b.pdf.

Another recent study, Searchinger et. al. (2009),[42] raised important questions about the perverse incentives that can be created by carbon accounting systems used for biomass energy that fail to account for losses of forest carbon. The study suggests that the solution is to use an accounting system that treats biogenic CO_2 emissions and fossil fuel CO_2 emissions equally. The researchers identify two potential issues, neither of which are relevant to a national accounting in the United States.

First, the researchers observe that coverage of the carbon accounting system being used under the Kyoto Protocol is not comprehensive. Countries outside of the Protocol can harvest wood without accounting for the impacts and send the wood to countries inside of the Protocol where the wood can be burned as a substitute for fossil fuels, reducing fossil fuel CO_2 emissions. If the carbon accounting was comprehensive, including both the producing and consuming countries, this problem would not exist because the impacts of burning the biomass would be accounted for in the forest carbon accounting (as called for in IPCC national inventory guidelines). Because carbon accounting in the United States is comprehensive, including the forests that supply the biomass, this problem does not exist at the national scale.

Second, Searchinger et. al. makes the implicit assumption that carbon accounting is the best policy instrument for ensuring that forests are not overharvested, causing the forest carbon cycle to result in net emissions to the atmosphere. This is not the case. While carbon accounting is needed to select and track the effectiveness of policies, these policies can involve many different approaches to ensuring that the forest carbon cycle remains in balance. Indeed, in virtually all developed countries that have limits on CO_2 emissions, an emission factor of zero is used for biogenic CO_2 emissions and a range of national forest monitoring activities and public policies are in place that have the practical effect of ensuring that the emissions of biogenic CO_2 are matched by uptake.

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[42] Searchinger, T., S. Hamburg, J. Melillo, W. Chameides, P. Havlik, D. Kammen, G. Likens, R. Lubowski, M. Obersteiner, M. Oppenheimer, G. Robertson, W. Schlesinger, and G. Tilman*. Fixing a critical climate accounting error*, Science, 326: 527-528 (2009).

III. National-Scale Accounting Approaches Are Appropriate For Assessing The Net Impact Of GHG Emissions From Biogenic Sources, Facilities, Fuels Or Practices.

In its call for information, EPA asks for input on which accounting approach should be used. At the outset, while some accepted accounting approaches for biogenic carbon may vary depending on the objective of the specific analysis, they always differentiate biogenic carbon from fossil fuel carbon. As explained below, in the context of considering regulatory ramifications of biomass combustion in the United States, a national-scale accounting approach focused on maintaining forest carbon stocks nationwide is appropriate for important policy reasons. NAFO believes that the objective of keeping the forest biomass carbon cycle in balance can be achieved with a framework that recognizes zero emissions from biogenic CO_2 combustion while employing a range of tools to ensure that the use of biomass does not cause the forest carbon cycle to cause net emissions of carbon to the atmosphere.

A. Determining net emissions from forest biomass combustion through national-scale forest carbon stocks accounting is appropriate.

In the United States, data demonstrate that forest biomass is being used for a range of purposes while allowing forest carbon stocks to increase. The IPCC employs exactly such a national accounting approach as an appropriate basis for determining the net transfers of biogenic carbon to or from the atmosphere. Applying an IPCC derived national accounting method in the United States reveals that the situation is even more favorable than carbon neutral as forest stocks are increasing in the Untied States.

In the accounting for national inventories of greenhouse gases and sinks, IPCC guidelines account for releases of biogenic CO_2 from combustion through the accounting of forest carbon. Under the IPCC guidelines used by the United States to prepare greenhouse gas inventories, biogenic carbon emissions are not counted in the emissions inventory at the point of combustion but instead are counted in the calculations as equivalent stock changes. In this way, releases of combustion-related biogenic CO_2 are addressed in the context of the overall net fluxes of forest carbon to/from the atmosphere (reflecting both uptake and release).[43] As a result, combustion-

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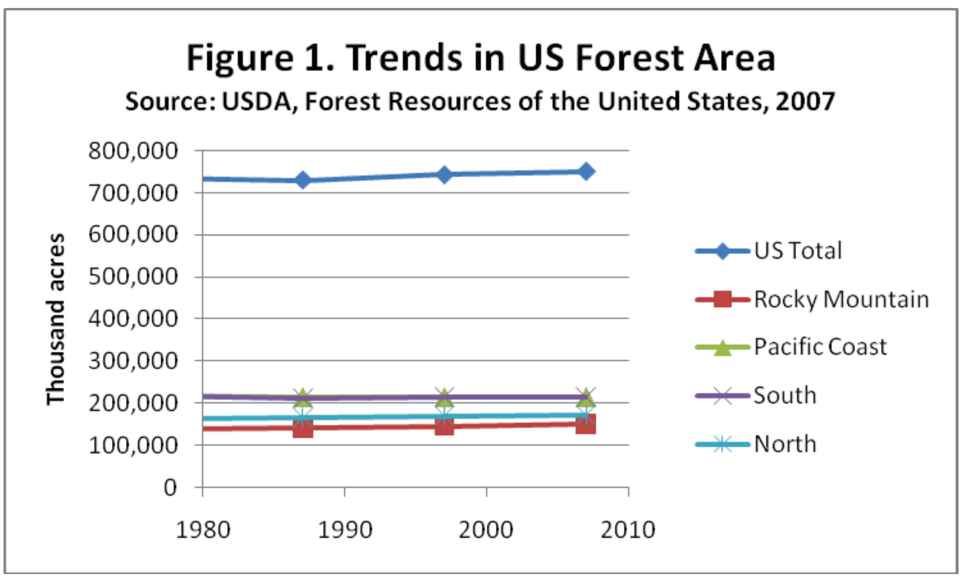
[43] *See IPCC Guidelines for National Greenhouse Gas Inventories,* Prepared by the National Greenhouse Gas Inventories Programme, Institute for Global Environmental Strategies, Hayama, Kanagawa, Japan: IPCC National Greenhouse Gas Inventories Programme (2006).

related emissions of biogenic carbon are not included in emissions totals since this would be double counting. The IPCC thus recognizes an emission factor of zero for biogenic CO_2 (i.e., biogenic CO_2 is not counted at the point of combustion) because biogenic CO_2 emissions are measured as carbon stock changes in the forest.

The situation in the United States is thus clear. As demonstrated by the Forest Inventory and Analysis (FIA) Program of the U.S. Forest Service, *see generally* http://fia.fs.fed.us/, carbon stocks in U.S. forests continue to grow, meaning that the flux of CO_2 into forest biomass is greater than the flux returning to the atmosphere due to respiration, decay and combustion. This better-than-neutral balance is not limited to public forests. *See* Section II.A *supra*. Moreover, the sustainability of current harvest and regeneration practices can be demonstrated using data from the USDA's 2007 report on "Forest Resources of the United States" (Smith 2007).[44] It is clear from Figures 1 and 2, below, that forested area, including the subset of forest that is classified as timberland, has been stable or growing slightly. Removals of wood from U.S. forests have also remained relatively stable since 1980 (see Figure 3.). Even in the South, which has experienced an increase in removals since 1980, the ratio of growth to removals was above 1.3 in 2006 (see Figure 4).



[44] Smith, W., P. Miles, C. Perry, S. Pugh, *Forest Resources of the United States, 2007 - General Technical Report WO-78*, U.S. Department of Agriculture, Forest Service (2007).

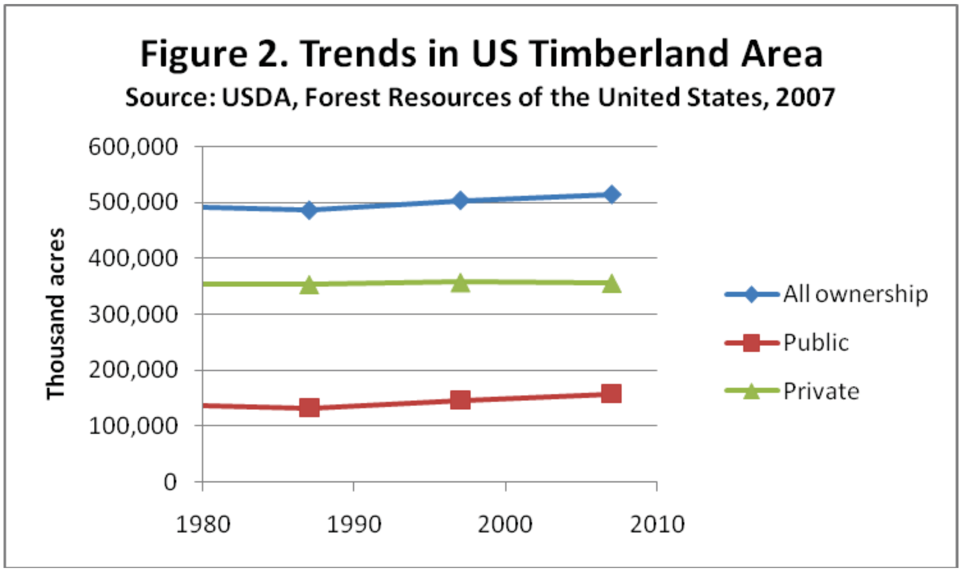


Figure 2. Trends in US Timberland Area
Source: USDA, Forest Resources of the United States, 2007
Thousand acres
600,000
500,000
400,000
300,000
200,000
100,000
0
1980
1990
2000
2010
All ownership
Public
Private

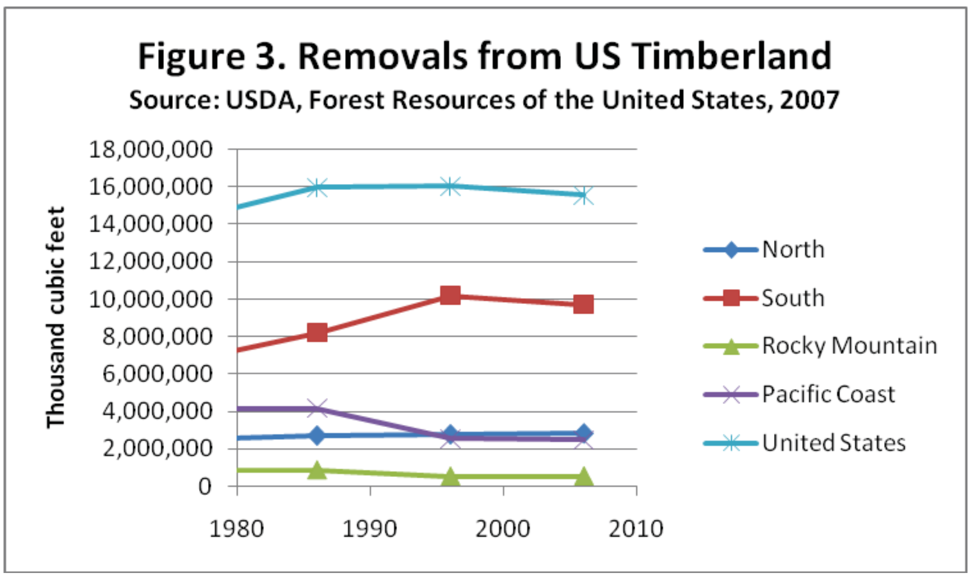
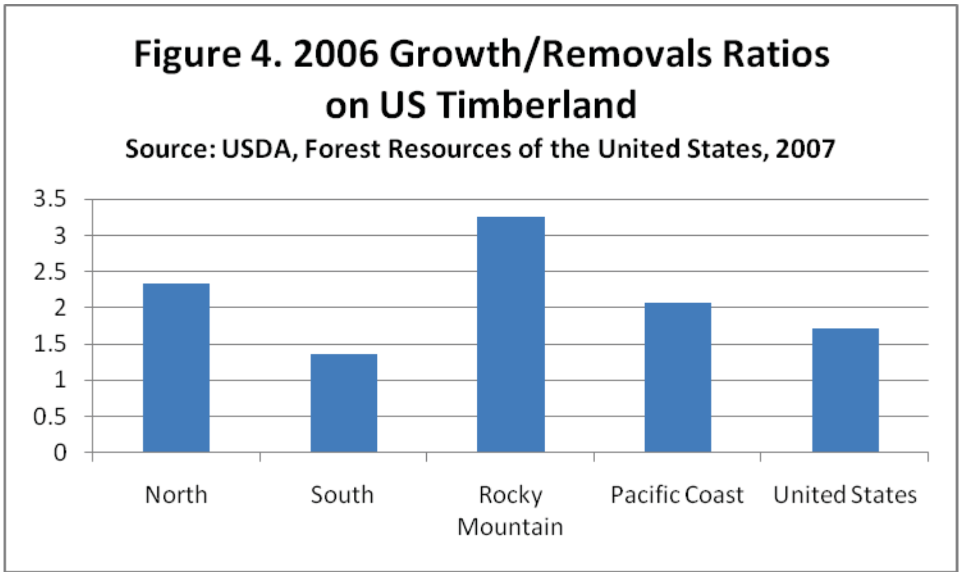


Figure 3. Removals from US Timberland
Source: USDA, Forest Resources of the United States, 2007
Thousand cubic feet
18,000,000
16,000,000
14,000,000
12,000,000
10,000,000
8,000,000
6,000,000
4,000,000
2,000,000
0
1980
1990
2000
2010
North
South
Rocky Mountain
Pacific Coast
United States



The available data on forest carbon stocks, forested land area and growth to removals, therefore suggest that additional wood could be removed from the nation's forests and the net flux of carbon to the atmosphere would still be better-than-neutral.

Notably, in international climate talks over the climate policy known as Reducing Emissions from Deforestation and Forest Degradation (REDD), the United States has endorsed a national-level accounting approach. It would be unfair to enforce a smaller-scale and more difficult accounting regime for forest landowners in the Untied States, where carbon stocks are increasing, than what the international community has accepted for countries where deforestation is an issue.

IPCC national guidelines work well at the national level because the accounting boundaries are clear. All forests within national boundaries are included. They also work well because the United States has invested considerable effort in developing a forest inventory system (the FIA program) that generates good quality data for use in the inventory calculations. As explained in the following section, these two circumstances do not often apply when examining smaller (sub-national) scales.

B. Smaller-scale and alternative accounting approaches should not be used to determine the net impact of CO_2 associated with bioenergy.

EPA has asked for input on the appropriate approach for assessing the net impact (i.e. accounting for both emissions and sequestration) on the atmosphere of GHG emissions from specific biogenic sources, facilities, fuels, or practice. As explained above, NAFO recommends that a national-scale accounting approach be utilized. Smaller-scale and alternative accounting approaches are not appropriate.

Some may suggest using an inventory approach analogous to the IPCC accounting framework, described above, but applied to a sub-national area. Under such an approach, net fluxes of biogenic CO_2 would be determined by following forest carbon stocks, and biogenic CO_2 emissions from combustion would receive an emissions factor of zero. There are several reasons, however, that an IPCC-style approach should not be applied at a sub-national scale. At smaller scales, there are fewer FIA plots available to establish carbon stock estimates and thus there is higher uncertainty. The quality of estimates of carbon stocks decline and become more volatile as the geographic scale at which they are measured gets smaller. The impacts of factors beyond the control of an individual wood user (*e.g.*, natural disturbances, other users, etc.) can have enormous impacts on the accounting results for individual users of wood. Attributing stock changes to these multiple factors is extremely complex, and essentially impossible in many cases. As such, it is extremely difficult to ascertain the significance of any short-term changes in carbon stocks. In the hypothetical situation where monitoring indicated a decline in carbon stocks for a particular sub-national area, it would be impossible to accurately assess whether the combustion of biomass by any facility or facilities was at all relevant to such a decline. Most likely, any decline would be attributable to multiple factors and would not warrant any regulatory response directed at any particular facility or facilities.

The problems would be especially acute if EPA were to attempt to apply the IPCC guidelines to individual combustion facilities. In all but the simplest situations, it is essentially impossible to trace the impacts of a combustion facility back to specific plots of land for which the facility has complete control and responsibility. This means that one must sort out the impacts attributable to one particular entity when there are likely multiple entities using wood from the same area, and also when there are natural factors that will impact carbon stocks. The forest products industry obtains approximately 60% of its wood from non-industrial private landowners.[45] These non-industrial landowners may sell to multiple companies or may sell to wood brokers who sell to multiple companies. Attributing forest carbon stock changes to specific land areas under such a complex wood procurement system is essentially impossible. In

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[45] *See* Haynes, R. W., *The 2005 RPA timber assessment update*, Gen. Tech. Rep. PNW-GTR-699, USDA Forest Service, Pacific Northwest Research Station (2007).

addition, even if it were possible, the forest inventory systems used by companies for planning and scheduling harvests are usually not adequate for detailed carbon accounting, meaning that additional, and likely costly, monitoring would be required, especially on non-industrial timberland.

Using LCA to assess the impact of biogenic emissions from particular facilities or areas would also be severely flawed. While it is possible, via a site-specific LCA, to estimate the net impact on the atmosphere of GHG emissions from specific biogenic sources, this is not something that can be done on a routine basis. While comparative LCAs are useful in measuring the relative GHG emissions of energy technology options, LCA is not an appropriate tool for routine use in a site-specific analysis, such as a best available control technology determination. An LCA considers not only factors that are under the control of the facilities that combust biomass, but also other aspects of the carbon lifecycle that are entirely outside the control of such facilities.

Any attempt to use LCA as the method to evaluate the impacts of biogenic emissions from particular facilities would likely yield inconsistent results. The methods for including land use change impacts in LCA analyses have not yet been standardized.[46] The results of LCA analyses can be heavily influenced by the particular methods, assumptions, and procedures for establishing boundary conditions that are applied by the analyst. It would therefore be extremely difficult to consistently conduct LCAs on a facility-by-facility basis. The results of such LCAs would vary greatly based on the analyst's subjective and arbitrary judgments about what was considered within the scope of the LCA. For example, in an LCA of a wood-burning facility, there is no direct way to measure how that facility's activities affect carbon stocks, and the affect could vary by region. In addition, even if it were possible to trace biomass combustion back to specific impacts on carbon stocks, on a site-by-site basis, which it is not, a rational landowner would not likely incur the cost of doing so. Using forest biomass for energy is currently the lowest-value product from the forest. Such onerous requirements would likely cause forest landowners to look for more profitable uses of

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[46] Standards are now being developed under the auspices of the International Organization for Standardization and the WRI/WBCSD GHG Protocol. The GHG Protocol standard is currently expected to be finalized by the end of 2010. *See* WRI, Companies complete road testing of new global greenhouse gas accounting standards (2010), *available at* http://www.ghgprotocol.org/companies-complete-road-testing-of-new-global-greenhouse-gas-accounting-standards.

their land than producing biomass for energy. It would also likely be prohibitively expensive to routinely conduct LCAs on a facility-by-facility basis.

Finally, the "carbon debt" approach could not be appropriately applied to a facility-level analysis of biogenic emissions. *See also* Section II.E. Even if carbon stocks were to hypothetically decline in the future, it would be impossible to connect any such "debt" to a particular facility or facilities. However, such an approach would be especially unnecessary here because the United States simply does not have a carbon debt. *See* Sections II.A & III.A.

In sum, if the objective is to characterize the actual net transfers of carbon to the atmosphere associated with a given entity or area, the carbon stock inventory approach is the correct analytical framework. As explained above, such an approach is most appropriately applied at the national level.

IV. Recognizing The Carbon Neutrality Of Forest Biomass Combustion For Energy Is Essential To Realizing Our Nation's Renewable Energy And Climate Change Objectives.

As explained previously, forest biomass is an important renewable fuel source leading to lower GHG lifecycle emissions than conventional fuels. As such, forests play an important role in reducing and managing greenhouse gas emissions. President Obama has emphasized that renewable energy derived from feedstocks such as forest biomass holds the key to transitioning the nation to a "sustainable, low carbon energy future."[47] The EPA, in considering approaches to address climate change, has also recognized that responsibly managed forests are considered one of five key "groups of strategies that could substantially reduce emissions between now and 2030." *See* Regulating Greenhouse Gas Emissions Under the CAA, 73 Fed. Reg. 44,354, 44,405 (July 30, 2008). Similarly, the United Nation's Intergovernmental Panel on Climate

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[47] Letter from President Barack Obama to Governors John Hoeven and Chet Culver (May 27, 2009), *available at* http://www.governorsbiofuelscoalition.org/assets/files/President%20Obama's%20Response5-27-09.pdf; *see also* President Barack Obama, *Memorandum for the Secretary of Agriculture, the Secretary of Energy, and the Administrator of the Environmental Protection Agency,* 74 Fed. Reg. 21531-32 (May 5, 2009).

Change (IPCC) report on mitigation technologies highlights forest management as a primary tool to reduce GHG emissions. *Id.* at 44,405-06.[48]

As reflected in the chart in Attachment 4, EIA data demonstrate the importance of biomass energy to the overall renewable energy portfolio. Under a Renewable Electricity Standard, wood and other biomass are projected to account for about one-third of all renewable energy combusted in the United States. *See* Att. 4. Biomass is also distinct from other types of renewable energy in ways that make it particularly valuable as an energy source. For instance, biomass "is unique among renewable energy resources in that it can be converted to carbon-based fuels and chemicals, in addition to electric power."[49] Because biomass can be converted into liquid fuels, it can help reduce the United States' dependence on imported oil.

Some other types of renewable energy, such as solar and wind power, "have variable and uncertain (sometimes referred to as intermittent) output."[50] In contrast, biomass power is "dispatchable." In other words, utilities can count on biomass power being available when it is needed. As the Biomass Power Association has explained, because biomass is not affected by changes in weather or environmental conditions, it is an extremely reliable renewable energy source: "The reliability of biomass power allows local utility companies to easily and efficiently add biomass to their baseload supply to meet growing energy demands. Currently, the biomass industry generates 15 million mega-watt hours of electricity annually."[51]

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[48] *See also* NAFO, Carbon Mitigation Benefits of Working Forests (identifying trading platforms and registries that recognize forest management), *available at* http://nafoalliance.org/mitigation-benefits-working-forests/.

[49] *See* DOE, Energy Efficiency and Renewable Energy, Office of the Biomass Program, *Biomass Multiyear Program Plan* at 1-1 (March 2010) *available at* http://www1.eere.energy.gov/biomass/pdfs/mypp.pdf.

[50] *See* Denholm, P. Ela, E., Kirby, B., and Milligan, M., DOE, National Renewable Energy Laboratory, Technical Report NREL/TP-6A2-47187, *Role of Energy Storage with Renewable Electricity Generation* at 1 (January 2010), *available at* http://nrelpubs.nrel.gov/Webtop/ws/nich/www/anpublic/Record?upp=0&m=2&w=NATIVE('TOPIC+%3D+''ANDER''')&order=native('pubyear%2FDescend').

[51] Biomass Power Association, About Biomass, *available at* http://www.usabiomass.org/pages/facts.php.

Unfortunately, because EPA's Tailoring Rule failed to recognize the carbon neutrality of forest biomass combustion for energy, it is threatening to frustrate industry efforts to develop the use of biomass as renewable energy source. For example, as the senior vice president of The Collins Cos., a Portland-based wood products company, stated, "[m]ost facilities that process forest products burn waste wood and convert that to electricity to offset energy costs . . . . If those facilities are subject to new permits or required to purchase expensive emissions control equipment in the future, . . . job losses could result."[52]

V. EPA Has The Authority And Discretion To Distinguish GHG Emissions Associated With Biogenic Sources.

Treating emissions from combustion of biomass fuels differently than emissions from other sources is supported by sound science and wise policy. Making such appropriate distinctions is also well within EPA's authority and discretion.[53]

EPA already has been exercising its authority and discretion to distinguish GHG emissions associated with biogenic sources from other sources for years in its Inventory of U.S. Greenhouse Gas Emissions and Sinks. In addition, EPA's recent Mandatory Reporting of Greenhouse Gases Rule distinguishes biogenic CO_2 from other emissions. *See generally* 75 Fed. Reg. 56,260 (Oct. 30, 2009). EPA has also claimed to have discretion within the PSD permitting program. For example, in the Tailoring Rule, EPA asserted its authority and discretion to define "greenhouse gasses" that will be "subject to regulation" as set forth in that rulemaking. *See* 75 Fed. Reg. at 31606. This definition limits "greenhouse gases" to "the aggregate group of six" chemicals and no other chemicals that might have climate impacts. *Id.* EPA certainly could assert similar authority and discretion to make clear that the PSD permitting program is limited to non-biogenic CO_2. Notably, the regulation of biomass emissions does not comport with the CAA's stated goals for stationary sources, which are clearly aimed at reducing industrial

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[52] *See* Weinstein, N., *EPA Rule Worries Oregon Timber Industry*, Daily Journal of Commerce (June 23, 2010).

[53] The legislative history shows that Congress did not have "details of regulatory implementation in mind when it imposed PSD requirements on modified sources." *Envtl. Defense v. Duke Energy Corp.*, 127 S. Ct. 1423, 1433-34 (2007).

source emissions through evolving pollution control technologies while minimizing economic harm.[54]

Differentiating between sources of GHG emissions would also be similar to EPA's longstanding regulatory exclusion of certain volatile organic compounds (VOCs) from the otherwise applicable statutory definition. 40 C.F.R. § 51.100(s); s*ee also* 40 C.F.R. §§ 52.21(b)(2)(ii) and 52.21(b)(3). Specifically, EPA's PSD regulations exclude certain compounds from the definition of VOCs even though they are technically "volatile" and "organic," because such compounds would have negligible environmental impact. *See* 40 C.F.R. § 51.100(s). A similar approach is warranted for biomass emissions as such emissions will not increase atmospheric levels of CO_2.

The regulation of biogenic CO_2, as provided in the Tailoring Rule, would lead to unwarranted, and unprecedented cost burdens on biomass power producers that would be more onerous in application than required for fossil fuels. The burden on biomass power producers would be especially great if EPA were to propose requiring sources to certify that emissions are produced from biomass that meets certain criteria (*e.g.* related to sustainability). Such onerous requirements would in many cases create an incentive for energy producers to move from using renewable biomass fuel sources to more BTU efficient and cost-effective fossil fuel sources in order to realize cost savings. To avoid such results, EPA should exercise its discretion and recognize the neutral carbon effects of biogenic emissions as compared to fossil fuel emissions within CAA permitting programs.

VI. Established Tools Enable EPA To Evaluate The Carbon Neutrality Of Forest Biomass Both Now And In The Future.

Existing data clearly demonstrate that the combustion of forest biomass in the United States is carbon neutral at a minimum. Given the trends in carbon stocks in the United States, this is likely to continue into the foreseeable future. This provides EPA a solid basis for restoring the status quo treatment of forest biomass as having zero net emissions.

To the extent EPA may have concerns about the carbon footprint of forest biomass combustion emissions in the future, existing and well utilized tools will enable the Agency and stakeholders to constantly monitor carbon stocks for any change in the

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[54] *See, e.g.,* H. Rep. No. 95-294 at 184-86 (1977).

GHG balance associated with the forest carbon pool. The Forest Inventory and Analysis Program (FIA) administered by the U.S. Forest Service is, perhaps, the most comprehensive forest inventory survey in the world, providing the data used to determine the state of carbon stocks on both public and private lands. FIA data have been used to inform federal agencies and the public on forest extent, growing stock volume, and other key indicators for eight decades. Going forward, this data, along with supplemental data provided either by advanced technologies (e.g. remote sensing), other programs or further investment into FIA, can provide increasingly robust information on changes in forest carbon stocks. This information provides a very empirical basis for maintaining that forest biomass combustion has zero net emissions or pursuing alternative approaches should the nation begin to realize a persistent and significant decline in forest carbon stocks over time.

Through the use of FIA data and other existing analytical tools, NAFO is confident that EPA monitoring would verify the continued stability of forest carbon stocks used to produce biomass energy into the future. Historical data and sophisticated modeling suggest that new markets for forest products, including renewable energy, stimulate increases in forest productivity over time. For example, notwithstanding the nearly four-fold increase in the U.S. population over the past century accompanied by an unprecedented surge in demand for housing and consumer products produced from forests, forest volume and carbon stocks during the past 50 years have continued to increase annually, demonstrating a positive correlation between market demand and forest productivity.

Today many U.S. forestlands are not as productive as they could be, because decreased market demand caused by declining manufacturing capacity and corresponding drops in raw material prices has depressed investment in forest productivity. However, as demonstrated by Clutter, et al. (2010),[55] forest owners can significantly increase forest productivity—particularly in plantations in the Pacific Coast and Southern regions of the United States—when the marketplace signals greater demand for raw materials such as biomass. Intensively managed timberlands can increase productivity by as much as150 percent, while less intensively managed

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[55] Clutter, M., Abt, R., Greene, W.D., Siry, J., and Mei, R., *A Developing Bioenergy Market and Its Implications on Forests and Forest Products Markets in the United States*, Prepared for NAFO (2010), *available at* http://nafoalliance.org/wp-content/uploads/NAFO-Executive-Summary-Clutter-Et-Al-Final.pdf (executive summary).

timberlands can increase productivity by as much as 75 percent. While emerging renewable energy markets may constrain supply in the near term, in the medium and long-run supply catches up with demand resulting in increased forest volume and extent.

Conclusion

To conclude, NAFO appreciates the opportunity to provide input on the treatment of forest biomass carbon emissions in the context of the Title V and PSD programs. For the reasons cited in this document, NAFO maintains that the EPA already has the data, the analytical tools, the established methodologies, and the statutory authority needed to properly account for such emissions. When measured at the appropriate scale, emissions from the combustion of forest biomass will not increase carbon in the atmosphere as the forest carbon pool remains stable or increasing. This convention is recognized internationally, is supported by the prevailing science, and forms an important cornerstone of renewable energy and climate change policy both in the United States and among other developed nations.

EPA should recognize that biomass combustion has an emissions factor of zero and therefore not include biomass in its CAA regulatory framework. Empirical data collection tools already exist that enable ongoing monitoring of carbon stocks to identify changes in carbon flux that could trigger modifications to current approaches, if necessary. NAFO urges the EPA to use the significant information and resources at its disposal, which provide a rational basis for recognizing the full carbon benefits of biomass energy sources and stands ready to assist EPA in finalizing a policy that will enable forest biomass to make a significant and necessary contribution toward meeting our nation's renewable energy goals.

Respectfully Submitted,

David P. Tenny
President and CEO
National Alliance of Forest Owners

<u>Enclosures:</u>

List Of Key References

Attachment 1: Letters from 113 Scientists (Lippke, B. et al.) to Sen. Boxer, et al. and Rep. Waxman, et al. (July 20, 2010).

Attachment 2: Figure 7-3 from EPA, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2008* (April 15, 2010).

Attachment 3: Upton, B., National Council for Air and Stream Improvement, Inc., Memo to Reid Miner, *Summary of Literature on Life Cycle Assessments (LCA) of Forest-Derived Biomass Energy* (Aug. 27, 2010).

Attachment 4: NAFO, Working Forests in National Energy Policy, *Wood Matters – Renewable Electricity Standard* (source: Energy Information Administration).

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Attachment 1

July 20, 2010

The Honorable Barbara Boxer
Senate Environment and Public Works Committee
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The Honorable James Inhofe
Senate Environment and Public Works Committee
Washington, DC

The Honorable Jeff Bingaman
Senate Energy & Natural Resources Committee
Washington, DC

The Honorable Lisa Murkowski
Senate Energy & Natural Resources Committee
Washington, DC

The Honorable Blanche Lincoln
Senate Agriculture Committee
Washington, DC

The Honorable Saxby Chambliss
Senate Agriculture Committee
Washington, DC

Dear Chairmen Boxer, Bingaman, and Lincoln and Ranking Members Inhofe, Murkowski, and Chambliss:

We write to express our concern that equating biogenic carbon emissions with fossil fuel emissions, such as contemplated in the EPA Tailoring Rule and other policies, is not consistent with good science and, if not corrected, could stop the development of new emission reducing biomass energy facilities. It could also encourage existing biomass energy facilities to convert to fossil fuels or cease producing renewable energy. This is counter to our country's renewable energy and climate mitigation goals.

The carbon dioxide released from the combustion or decay of woody biomass is part of the global cycle of biogenic carbon and does not increase the amount of carbon in circulation. In contrast, carbon dioxide released from fossil fuels increases the amount of carbon in the cycle.

The EPA's final Tailoring Rule defines what stationary sources will be subject to greenhouse gas (GHG) emission controls and regulations during a phase-in process beginning on January 2, 2011. In the draft Tailoring Rule, the EPA proposed to calculate GHG emissions relying on the EPA's Inventory of U.S. Greenhouse Gas Emissions and Sinks. In the final rule, EPA ignored its own inventory methods and equated biogenic GHG emissions with fossil fuel emissions, which is incorrect and will impede the development of renewable biomass energy sources.

The carbon released from fossil fuels has been long separated from the global carbon cycle and adds to the total amount of carbon in active circulation between the atmosphere and biosphere. In contrast, the CO_2 released from burning woody biomass was absorbed as part of the "biogenic" carbon cycle where plants absorb CO_2 as they grow (through photosynthesis), and release carbon dioxide as they decay or are burned. This cycle releases no new carbon dioxide into the atmosphere, which is why it is termed "carbon neutral". It is unrelated to the GHG emissions produced from extracting and burning fossil fuels, except insofar as it can be used to offset or avoid the introduction of new carbon dioxide into the atmosphere from fossil fuel sources. Biogenic GHG emissions will occur through tree mortality and decay whether or not the biomass is used as an energy source. Some regions of the United States have rampant wildfires contributing pulses of greenhouse gases to the atmosphere. Capturing the energy value of these materials thereby offsetting fossil fuel emissions generates a net effect from burning biomass that is better than carbon neutral.

In terms of their greenhouse gas properties, there is no difference between biogenic and fossil fuel carbon dioxide. The difference derives from where the carbon was sourced. Burning fossil fuels that are mined from millennia-old deposits of carbon produces an addition to carbon in the atmosphere, whereas burning woody biomass recycles renewable plant growth in a sustainable carbon equilibrium producing carbon neutral energy. Fossil fuels also produce other greenhouse gases and pollutants with more negative environmental impacts than woody biomass.

Though biogenic carbon is part of the natural carbon cycle, to be considered "absolutely carbon neutral" in the short term, biomass must be re-grown at the same rate it is consumed. Because forests and trees are changing constantly, this does not happen everywhere at once. For example, the current bark beetle epidemic in the western United States has killed 17 million acres of forests. This will result in an unavoidable 'pulse' of carbon dioxide over several years and decades unless that material is used for products or energy that can offset the emissions from fossil fuels. Humans can mitigate some natural disturbances, but cannot stop them. As a result, the only way to ensure biomass is being replaced at the rate its removed is through sustainable forest management. The regeneration of the forest along with setting the volume of removals to be no greater than new growth less mortality results in stable levels of carbon in the forest and sustainable removals as a carbon neutral source for energy or other products.

While avoiding deforestation is important in developing countries and is of some concern around urban growth areas in the United States, reforestation, certification systems and programs promoting sustainable management of our working forests have resulted in forest increases exceeding losses. Currently, there are 750 million acres of forest land in the United States and this number is largely stable even as some forest land has been converted for development.[1] Forest growth nationally has exceeded harvest resulting in the average standing volume of wood per acre nation-wide increasing about 50% since 1952; in the eastern United States, average volume per acre has almost doubled. In the southeast, net volume of all trees increased 12% from 1997 to 2007 and forests are reforested and growing well.[2]

Forests are our nation's primary source of renewable materials and second largest source of renewable energy after hydropower. Sustainable development of new and traditional uses of our forests helps reduce GHG emissions[3] and has the important benefit of providing economic incentives for keeping lands in forests and reducing the motivation for land conversion.

A consortium of research institutions has, over the last decade, developed life cycle measures of all inputs and all outputs associated with the ways that we use wood: a thorough environmental footprint of not just managing the forest, but harvesting, transportation, producing products or biofuels, buildings or other products, maintenance and their ultimate disposal.[4] Results of this research are clear. When looking across the carbon life cycle, biomass burning does produce some fossil fuel emissions from harvesting, transportation, feedstock preparation and processing. These impacts, however, are substantially more than offset by eliminating the emissions from using a fossil fuel. Sustainable removals of biomass feedstocks used for energy produce a reduction in carbon emissions year after year through a reduction in fossil fuel emissions far greater than all of the emissions from feedstock collection and processing. When wood removals are used to produce both renewable materials as well as bio-energy, the carbon stored in forest products continues to grow year after year, more than off-setting any processing emissions while at the same time permanently substituting for fossil fuel intensive materials displacing their emissions.

Finally, biomass power facilities generally contribute to a reduction of greenhouse gases beyond just the displacement of fossil fuels. The use of forest fuels in a modern boiler also eliminates the methane (CH_4) emissions from incomplete oxidation following open burning, land filling, or decomposition which occurs in the absence of a higher and better use for this material. Methane is a 25 times more powerful greenhouse gas than CO_2. In contrast, the mining of coal and exploration for oil and gas release significant amounts of methane and other harmful pollutants into the environment. Any modeling to examine the impact of carbon-based fuel sources must account for all of these impacts.

We thank you for the opportunity to share our concern with the EPA's Tailoring Rule and other pending policies.

Sincerely,

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cc: Lisa Jackson, Administrator, Environmental
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July 20, 2010

The Honorable Henry Waxman
House Energy & Commerce Committee
Washington, DC

The Honorable Joe Barton
House Energy & Commerce Committee
Washington, DC

The Honorable Colin Peterson
House Agriculture Committee
Washington, DC

The Honorable Frank Lucas
House Agriculture Committee
Washington, DC

The Honorable Nick Rahall
House Natural Resources Committee
Washington, DC

The Honorable Doc Hastings
House Natural Resources Committee
Washington, DC

Dear Chairmen Waxman, Peterson, and Rahall and Ranking Members Barton, Lucas, and Hastings:

We write to express our concern that equating biogenic carbon emissions with fossil fuel emissions, such as contemplated in the EPA Tailoring Rule and other policies, is not consistent with good science and, if not corrected, could stop the development of new emission reducing biomass energy facilities. It could also encourage existing biomass energy facilities to convert to fossil fuels or cease producing renewable energy. This is counter to our country's renewable energy and climate mitigation goals.

The carbon dioxide released from the combustion or decay of woody biomass is part of the global cycle of biogenic carbon and does not increase the amount of carbon in circulation. In contrast, carbon dioxide released from fossil fuels increases the amount of carbon in the cycle.

The EPA's final Tailoring Rule defines what stationary sources will be subject to greenhouse gas (GHG) emission controls and regulations during a phase-in process beginning on January 2, 2011. In the draft Tailoring Rule, the EPA proposed to calculate GHG emissions relying on the EPA's Inventory of U.S. Greenhouse Gas Emissions and Sinks. In the final rule, EPA ignored its own inventory methods and equated biogenic GHG emissions with fossil fuel emissions, which is incorrect and will impede the development of renewable biomass energy sources.

The carbon released from fossil fuels has been long separated from the global carbon cycle and adds to the total amount of carbon in active circulation between the atmosphere and biosphere. In contrast, the CO_2 released from burning woody biomass was absorbed as part of the "biogenic" carbon cycle where plants absorb CO_2 as they grow (through photosynthesis), and release carbon dioxide as they decay or are burned. This cycle releases no new carbon dioxide into the atmosphere, which is why it is termed "carbon neutral". It is unrelated to the GHG emissions produced from extracting and burning fossil fuels, except insofar as it can be used to offset or avoid the introduction of new carbon dioxide into the atmosphere from fossil fuel sources. Biogenic GHG emissions will occur through tree mortality and decay whether or not the biomass is used as an energy source. Some regions of the United States have rampant wildfires contributing pulses of greenhouse gases to the atmosphere. Capturing the energy value of these materials thereby offsetting fossil fuel emissions generates a net effect from burning biomass that is better than carbon neutral.

In terms of their greenhouse gas properties, there is no difference between biogenic and fossil fuel carbon dioxide. The difference derives from where the carbon was sourced. Burning fossil fuels that are mined from millennia-old deposits of carbon produces an addition to carbon in the atmosphere, whereas burning woody biomass recycles renewable plant growth in a sustainable carbon equilibrium producing carbon neutral energy. Fossil fuels also produce other greenhouse gases and pollutants with more negative environmental impacts than woody biomass.

Though biogenic carbon is part of the natural carbon cycle, to be considered "absolutely carbon neutral" in the short term, biomass must be re-grown at the same rate it is consumed. Because forests and trees are changing constantly, this does not happen everywhere at once. For example, the current bark beetle epidemic in the western United States has killed 17 million acres of forests. This will result in an unavoidable 'pulse' of carbon dioxide over several years and decades unless that material is used for products or energy that can offset the emissions from fossil fuels. Humans can mitigate some natural disturbances, but cannot stop them. As a result, the only way to ensure biomass is being replaced at the rate its removed is through sustainable forest management. The regeneration of the forest along with setting the volume of removals to be no greater than new growth less mortality results in stable levels of carbon in the forest and sustainable removals as a carbon neutral source for energy or other products.

While avoiding deforestation is important in developing countries and is of some concern around urban growth areas in the United States, reforestation, certification systems and programs promoting sustainable management of our working forests have resulted in forest increases exceeding losses. Currently, there are 750 million acres of forest land in the United States and this number is largely stable even as some forest land has been converted for development.[1] Forest growth nationally has exceeded harvest resulting in the average standing volume of wood per acre nation-wide increasing about 50% since 1952; in the eastern United States, average volume per acre has almost doubled. In the southeast, net volume of all trees increased 12% from 1997 to 2007 and forests are reforested and growing well.[2]

Forests are our nation's primary source of renewable materials and second largest source of renewable energy after hydropower. Sustainable development of new and traditional uses of our forests helps reduce GHG emissions[3] and has the important benefit of providing economic incentives for keeping lands in forests and reducing the motivation for land conversion.

A consortium of research institutions has, over the last decade, developed life cycle measures of all inputs and all outputs associated with the ways that we use wood: a thorough environmental footprint of not just managing the forest, but harvesting, transportation, producing products or biofuels, buildings or other products, maintenance and their ultimate disposal.[4] Results of this research are clear. When looking across the carbon life cycle, biomass burning does produce some fossil fuel emissions from harvesting, transportation, feedstock preparation and processing. These impacts, however, are substantially more than offset by eliminating the emissions from using a fossil fuel. Sustainable removals of biomass feedstocks used for energy produce a reduction in carbon emissions year after year through a reduction in fossil fuel emissions far greater than all of the emissions from feedstock collection and processing. When wood removals are used to produce both renewable materials as well as bio-energy, the carbon stored in forest products continues to grow year after year, more than off-setting any processing emissions while at the same time permanently substituting for fossil fuel intensive materials displacing their emissions.

Finally, biomass power facilities generally contribute to a reduction of greenhouse gases beyond just the displacement of fossil fuels. The use of forest fuels in a modern boiler also eliminates the methane (CH_4) emissions from incomplete oxidation following open burning, land filling, or decomposition which occurs in the absence of a higher and better use for this material. Methane is a 25 times more powerful greenhouse gas than CO_2. In contrast, the mining of coal and exploration for oil and gas release significant amounts of methane and other harmful pollutants into the environment. Any modeling to examine the impact of carbon-based fuel sources must account for all of these impacts.

We thank you for the opportunity to share our concern with the EPA's Tailoring Rule and other pending policies.

Sincerely,

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[1] Mila Alvarez, The State of America's Forests (2007), 5.
[2] Smith, W.B., P.D. Miles, C.H. Perry and S.A. Pugh. 2009. Forest Resources of the United States, 2007. General Technical Report WO-78. U.S. Department of Agriculture, Forest Service. Washington, DC.
[3] CORRIM, "Maximizing Forest Contributions to Carbon Mitigation: The Science of Life Cycle Analysis – a Summary of CORRIM's Research Findings." CORRIM Fact Sheets #5, #6, #7 (2009).
[4] IPCC Fourth Assessment Report: Climate Change 2007. Working Group III: Mitigation of Climate Change. Chapter 9. Forestry

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cc: Lisa Jackson, Administrator, Environmental
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Attachment 2

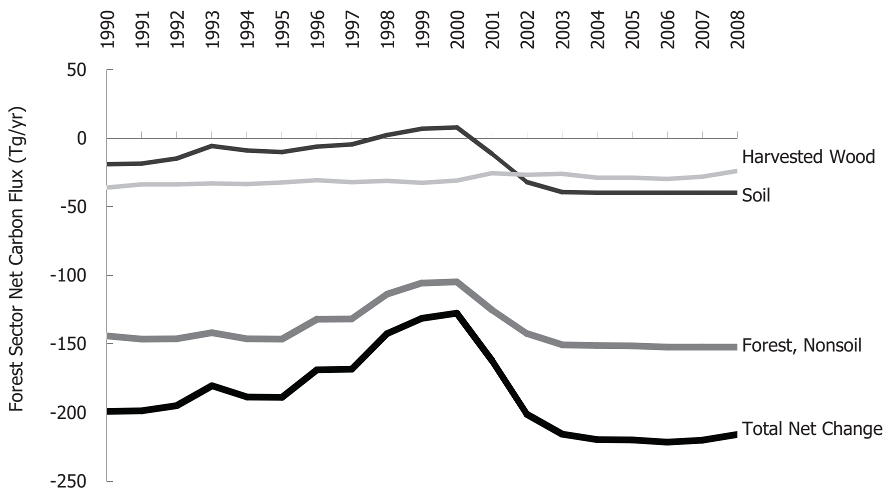

Figure 7-3: Estimates of Net Annual Changes in C Stocks for Major C Pools

Attachment 3

ncasi

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Dr. Brad Upton
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August 27, 2010

MEMO TO: Reid Miner

SUBJECT: Summary of Literature on Life Cycle Assessments (LCA) of Forest-Derived Biomass Energy

FROM: Brad Upton

COPY: Al Lucier, Steve Stratton

You requested a summary of the recently published life cycle assessment (LCA) literature with regard to forest-derived biomass energy. A literature search focusing on research published within the past 15 years addressing energy derived from forest biomass was conducted. The resulting summary is provided below.

The carbon in biomass-derived fuels was only recently removed from the atmosphere, which is an important distinction between biomass carbon and the carbon in fossil fuels. When biomass is burned, decays, or is otherwise oxidized the CO_2 is returned to the atmosphere. This biogenic carbon cycle forms the basis for using a zero emission factor at the point of combustion for biomass-derived fuels (Robinson et al. 2003; Cherubini et al. 2009; Lattimore et al. 2009; Abbasi and Abbasi 2010; Cherubini 2010), and represents an accepted benefit of using biomass-derived fuels rather than fossil fuels (Schlamadinger et al. 1997; Abbasi and Abbasi 2010; Froese et al. 2010).

There is a difference between the LCA impacts (i.e., "footprint") of a biomass fuel and the emission factor (for an emissions inventory) of a biomass fuel. The emission factor of a biomass fuel pertains only to emissions that occur at the point of combustion. LCA impacts include these point of combustion emissions in combination with "upstream" (e.g., land use change, silvicultural/harvesting, transport, processing) and "downstream" (e.g., end of life) emissions (Lattimore et al. 2009; Cherubini 2010; Zhang et al. 2010). It is relevant to note that upstream emissions associated with wood-based biomass fuels (e.g., extraction, processing, transport) are approximately equivalent to those of fossil fuels (Zhang et al. 2010). Because of these upstream, non-combustion emissions, life cycle impacts assigned to biomass fuel use are non-zero even where the release of biogenic CO_2 upon combustion is in balance with carbon uptake via regrowth (Abbasi and Abbasi 2010; Cherubini 2010).

Internationally accepted LCA standards indicate that accounting boundaries should extend upstream to the point where "elementary flows" enter the system from the environment (ISO 2006). This accounting approach inherently recognizes the unique attributes of the carbon in biomass fuels by extending the accounting boundaries upstream to the point where elementary flows of CO_2 are removed from the atmosphere by biomass. By comparison, LCA accounting for carbon in fossil fuels begins at the point of extraction of the fuel from the ground. Because biomass carbon accounting in LCA begins with the uptake of CO_2 from the atmosphere, the return flows to the atmosphere result in a net zero flux to the atmosphere, equivalent to using a zero emission factor for biogenic CO_2 emissions (Cherubini et al. 2009; Zhang et al. 2010). Where returns to the atmosphere are less than amounts removed, the difference represents increases in stocks of stored carbon (net removals from the atmosphere), and where net returns are greater than amounts removed the difference represents depleted stocks of stored carbon. In cases where stored carbon stocks are increased or depleted by land use change, these impacts should be included in the analysis but are addressed separately from the accounting of carbon in the fuel itself (e.g., see BSI 2008; Cherubini et al. 2009; Searchinger et al. 2009).

There are different types of biomass used for energy and different regimes of land use/carbon stock changes associated with them (Cherubini et al. 2009; Cherubini 2010). Biomass fuels obtained from residuals (agricultural, manufacturing, forestry residuals, etc.) are typically not associated with land use/carbon stock changes (Schlamadinger et al. 1997; Mann and Spath 2001; Cherubini 2010). Production of dedicated energy crops (e.g., annuals such as corn or rapeseed, perennial grasses such as switchgrass, or short rotation woody crops such as willow or hybrid poplar), however, may be associated with significant land use change when native or managed forests, agricultural lands, or fallow/underutilized lands are converted from existing uses to growing the energy crop. Some conversions can result in increases in carbon stocks (agricultural or fallow lands to energy crops), whereas some can decrease carbon stocks (native or managed forests to energy crops, or in some cases native forests to managed forests) (Schlamadinger et al. 1997; Cherubini et al. 2009; Cherubini 2010).

Traditional forestry, associated with harvesting trees from native or managed forests accompanied by replanting, supports lumber, panel, and the pulp and paper industries and generates biomass that can be used as fuel. When the carbon removed through harvesting is offset by that captured during tree growth the result is low or zero net carbon losses. For example, if biomass stocks on the land base from which harvest occurs are growing at 2% per year and only 2% of the standing biomass in the land base is harvested in that year (with remaining area not harvested), the net change in carbon stocks during the year is zero because the harvest (negative change) is balanced by the regrowth (positive change) that both occur on the land base. The literature suggests that soil organic matter (and carbon content) is not significantly affected by timber harvesting at intervals exceeding ten years, although short rotation woody crop plantations can sometimes experience soil carbon loss over multiple rotations if the land is not treated with sludge or manure (Lattimore et al. 2009).

In performing a life cycle assessment it is critical to establish appropriate system boundaries (Schlamadinger et al. 1997; Cherubini 2010), and when LCA is applied to biomass energy products these boundaries should include the land base representing the entire area that supplies biomass to the activity (Schlamadinger et al. 1997; Froese et al. 2010). Additionally, carbon stock changes should be integrated over time, considering multiple harvest cycles rather than one harvest event in isolation (Schlamadinger et al. 1997; Johnson 2009).

Recent publications indicate that at both regional and national levels forest carbon growth rates on U.S. forest lands are higher than harvest rates; thus, carbon is accumulating while biomass is extracted for producing material goods and energy (Froese et al. 2010; Heath et al. 2010). At the national level, even industry-owned timberlands are maintaining stable stocks of carbon, a finding consistent with the widespread use of sustainable forest management practices in the U.S. (Heath et al. 2010). Therefore, the benefits of using forest biomass currently grown in the U.S. can be examined within a framework that assumes that combustion-related emissions of biogenic CO_2 are offset by uptake in new growth.

Recent life cycle analyses of forest biomass energy systems, summarized below, typically demonstrate significant greenhouse gas (GHG) mitigation benefits compared to energy derived from fossil fuels.

Froese et al. (2010) used LCA to investigate several options to mitigate GHG emissions from electricity generation in the U.S. Great Lakes States region, and found cofiring forestry biomass residuals (with coal reference condition) to be the most attractive option and carbon capture and storage (CCS) to be the least attractive option. These researchers found that cofiring 20% biomass resulted in a 20% life cycle GHG mitigation benefit. They also noted a large potential for biomass production from underutilized resources, with land resources not a limiting factor, and that additional biomass could be provided for fuel without replacing current commodities grown on cropland or jeopardizing the sustainability of forest resources.

Mann and Spath (2001) conducted an LCA on cofiring wood residuals such as "timber stand improvement" residues, mill residues, urban wood, and so on in a coal-fired power plant and found that cofiring biomass at 15% reduced life cycle GHG emissions by 18.4%. These authors attributed the greater reduction in GHG emissions than the rate of cofiring to avoided methane emissions associated with alternative end of life management for some of the residual feedstock components.

Robinson et al. (2003) demonstrated that displacement of coal by biomass (forestry and agricultural residuals) resulted in a net reduction of carbon emissions "because biomass carbon is in the active carbon cycle and … does not accumulate in the atmosphere if the biomass is used sustainably." These researchers found that "fossil energy resources equivalent to less than 5% of the energy content of the biomass are typically consumed in its cultivation and processing" and that "cofiring [biomass with coal] can achieve significant reductions in CO_2 emissions in the very near term (less than 5 years)."

Pehnt (2006) investigated the life cycle impacts of biomass combustion for heat and electricity generation and demonstrated that GHG emissions were extremely low compared with fossil fuel-fired systems. The biomass materials investigated were forest wood, short rotation forestry wood, and "waste wood." Life cycle GHG emission reduction over an electricity base case ranged from 85 to 95%, and reductions for a heat generation base case ranged from 88 to 93%.

Cherubini et al. (2009) applied LCA methodology to several biomass energy systems and found that for some biomass systems (e.g., forestry residuals to electricity or heat) the entire LCA GHG emissions from bioenergy were 90 to 95% lower than those from fossil fuel based systems.

Zhang et al. (2010) demonstrated that using wood pellets for electricity generation reduced life cycle GHG emissions by 91% relative to a coal reference case and by 78% relative to a natural gas combined cycle (NGCC) reference case. These authors examined dedicated wood harvest for energy production in which land use carbon stock changes were assumed to be zero due to biomass regrowth during the time period of the analysis.

Raymer (2006) found significant life cycle GHG mitigation benefits with several types of wood energy (fuel wood for domestic heating substituting for electricity from coal and from domestic heating oil, sawdust and bark used for drying sawn wood substituting for oil, pellets made from sawdust and chips and briquettes used for building heat substituting for oil, and demolition wood used for district heating substituting for oil). Life cycle reductions in GHG emissions ranged from 81 to 98% relative to fossil fuel alternatives. The greatest benefit was found for district heating using demolition wood (substituting for oil) and the least benefit corresponded to fuel wood for home heating (substituting for coal-derived electricity).

Heller et al. (2003, 2004) described an LCA study of production of willow (short rotation woody biomass) and cofiring this biomass with coal to generate electricity. Results included that biomass production had a net energy ratio (biomass energy output divided by fossil energy input) of 55. These researchers found that the upstream energy consumed in growing, processing, and transporting biomass roughly balanced the reduced consumption from mining, processing, and transporting less coal. At a cofiring rate of 10% biomass the system's net global warming potential decreased by 9.9% relative to a baseline of 100% coal firing.

Studies that have received attention for demonstrating failure of biomass fuel systems to mitigate GHG emissions have, for the most part, fallen into two broad categories: those that focus on biomass systems associated with a significant impact to land use due to deforestation (loss of carbon stocks; e.g., Wicke et al. 2008) and are not representative of the situation in the U.S.; and those in which there are large GHG emissions related to production or processing of non-forest biomass feedstocks (e.g., Farrel et al. 2006). Life cycle analyses comparing fossil fuels to forest biomass grown on land where carbon stocks are stable, on the other hand, typically illustrate significant GHG mitigation benefits, as illustrated by the studies cited above and summarized in Table 1.

Table 1. GHG Mitigation Benefit Summary based on LCA Results

Study	Biofuel Type	Fossil Fuel Offset	GHG Mitigation[a]
Froese et al. 2010	Forestry residuals	Coal (cofiring) electricity	100%
Mann and Spath 2001	Wood residuals	Coal (cofiring) electricity	123%[b]
Robinson et al. 2003	Forestry and agriculture residuals	Coal (cofiring) electricity	~95%
Pehnt 2006	Forest wood, woody biomass energy crops, waste wood	Energy mix in Germany for electricity generation and home heating in 2010	85-95%
Cherubini et al. 2009	Forest residuals	Various fossil fuels used for heat and electricity production	70-98%
Zhang et al. 2010	Wood pellets	Electricity from coal	91%
	Wood pellets	Electricity from natural gas combined cycle	78%
Raymer 2006	Fuel wood, sawdust, wood pellets, demolition wood, briquettes, bark	Coal fired electricity, heating oil	81-98%
Heller et al. 2004	Short rotation willow	Coal (cofiring) electricity	99%

[a] percent from base case; for cofire situations the mitigation pertains to the cofire rate (e.g., if 10% fossil fuel is replaced by biomass and emissions decrease by 9%, mitigation of 90% is assigned)
[b] mitigation greater than 100% due to avoided end of life methane emissions

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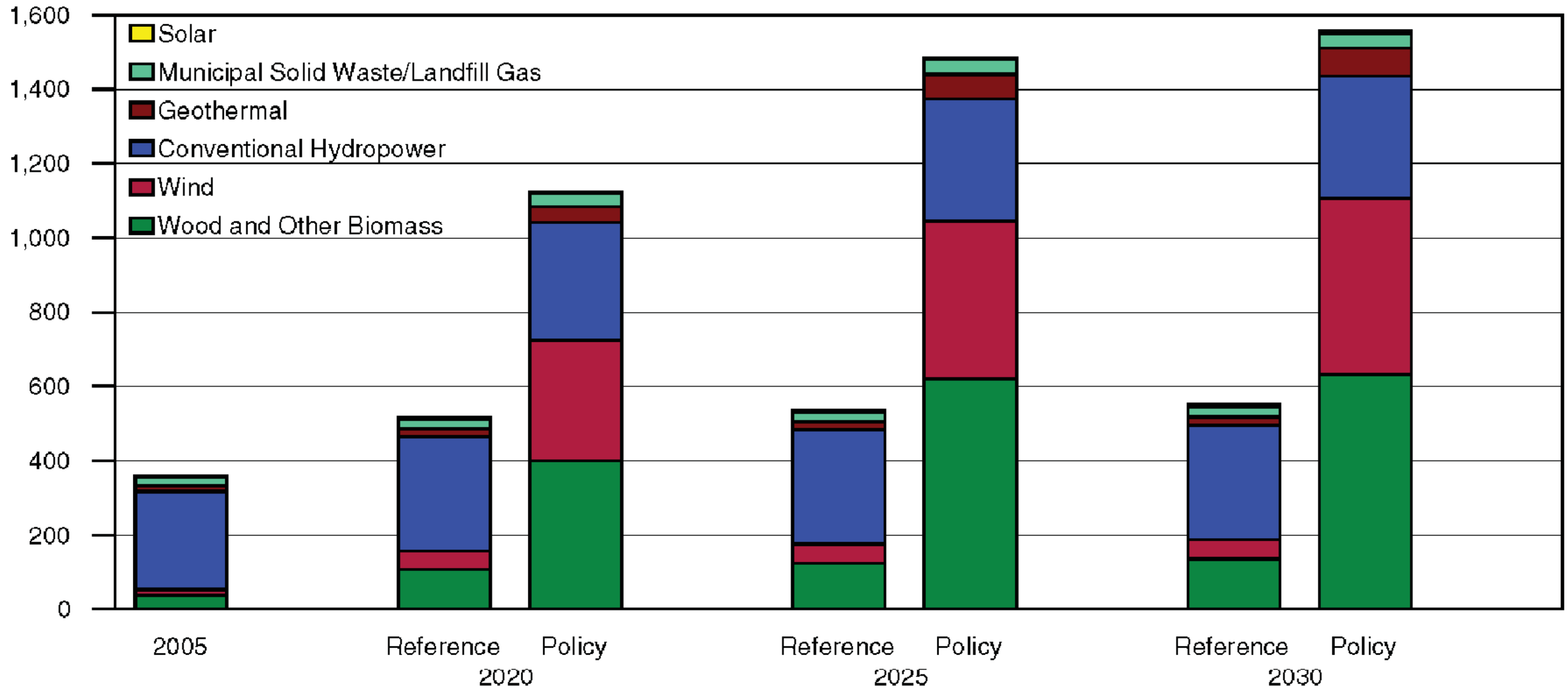
Attachment 4

Working Forests in National Energy Policy

Wood Matters – Renewable Electricity Standard



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