



**Statement of David P. Tenny,
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Senate Committee on Agriculture, Nutrition, and Forestry
Hearing on Overview of Farm Bill Energy Title Programs
July 21, 2010**

I. Introduction

The National Alliance of Forest Owners (NAFO) is pleased to submit testimony to the Senate Committee on Agriculture, Nutrition, and Forestry on energy programs in the Farm Bill. NAFO is an organization of private forest owners committed to promoting Federal policies that protect the economic and environmental values of privately-owned forests at the national level. NAFO membership encompasses more than 75 million acres of private forestland 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's members are the nation's leaders in sustainable forest stewardship and recognize the fundamental role they play in achieving the nation's renewable energy goals. They are well positioned to help our nation provide a domestic source of sustainable and carbon beneficial renewable energy.

**II. Renewable Biomass Energy is Essential to Achieve Our Nation's
Renewable Energy Goals**

Our nation is at a critical juncture in the development of a long-term renewable energy policy. In order to meet our future renewable energy needs, we must optimize the potential of each viable renewable energy source as well as the potential of each region of the country to produce renewable energy. Working forests are well positioned

to play a substantial role in helping our country achieve its renewable energy potential, particularly in regions where renewable energy sources such as wind and solar energy, are less viable. Forest biomass is a plentiful renewable energy feedstock in most areas of the country. If placed on a level playing field with other renewable energy sources, forest biomass will account for as much as one-third of the renewable energy contemplated in various renewable electricity standards pending before Congress. The continued development of commercially viable methods to produce cellulosic ethanol from woody biomass also promises to make significant contributions to America's transportation energy independence under the Renewable Fuels Standard.

Whether for the production of electricity, heat, transportation fuels or other energy applications, working forests are fundamental to our overall renewable energy policy. Our policy must be clear both in how it defines the role forest biomass will play and how it recognizes the economic and environmental benefits derived from using forest biomass.

A. Congress and the Administration must send clear signals to the marketplace encouraging the production of renewable biomass energy.

Congress and the Administration must send clear signals to the marketplace that renewable forest biomass energy will play a significant role in meeting our nation's renewable energy goals. These signals must promote biomass utilization through an inclusive definition of eligible biomass and appropriate accounting for biomass carbon emissions, establish a level playing field for biomass compared to other renewable energy sources, and encourage investments in key technologies and projects that utilize biomass. Historically, market opportunities for forest-derived biomass have been limited. Strong signals from policy makers will stimulate investment in the supply chain supporting biomass energy and help build infrastructure that is presently underdeveloped or fragmented compared to its potential. If given the right signals, the marketplace can develop this critical infrastructure, build jobs in rural communities, and

position our nation to produce more renewable energy in a sustainable and cost-effective manner.

B. Recent policy signals to the marketplace have created market confusion and must be corrected

Recent actions by Congress and the Environmental Protection Agency (EPA) have sent confusing signals to the marketplace that have discouraged investment in forest biomass energy and chilled the prospects for forest biomass in our national policy. The biomass definition contained in the Energy Investment and Security Act of 2007 (EISA) has foreclosed the use of significant amounts of biomass on up to 90% of private forestlands in the U.S. This definition has further softened the market outlook for investment in biofuels from forest biomass at a time when critical investments are needed in the commercialization of breakthrough conversion technologies. The EISA definition also creates confusion with respect to other biomass definitions, such as the definition of renewable biomass contained in the 2008 Farm Bill, which promote the utilization of forest biomass without arbitrary constraints.

Similarly, the EPA's sudden shift in the treatment of biomass energy carbon emissions under the Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule (Tailoring Rule) has created significant confusion regarding the carbon benefits of biomass energy compared to fossil fuels. EPA's apparent ambivalence concerning the proper accounting of carbon from forest biomass combustion contrasts with already settled international conventions, U.S. greenhouse gas inventory data, and EPA's own statements recognizing that energy produced from forest biomass in countries, like the United States, where forests are a net carbon sink, does not increase carbon in the atmosphere. At the urging of Congress EPA has taken administrative action in its recent "Call for Information seeking input from the public on the appropriate accounting for carbon emissions from forest biomass combustion. This modest action has no clear connection to rulemaking, and it does not appear that it will resolve the matter before the rule takes effect on January 2, 2011. The uncertainty of both EPA's

position and the uncertain timeframe for revisiting that position is chilling investment in biomass energy production at the moment when such investment is needed in anticipation of Congressional action on renewable energy.

NAFO applauds the leadership and support of the Chair, Ranking member and other members of this Committee for their support for renewable biomass and its carbon benefits in their recent letter to Administrator Jackson regarding EPA's position in the Tailoring Rule.

NAFO also appreciates statements made by Secretary of Agriculture, Tom Vilsack with respect to the role that USDA will play in the review of the Tailoring Rule. NAFO looks forward to full USDA engagement with EPA and Congress to establish a strong record supporting the appropriate recognition of forest biomass energy emissions in the U.S. as carbon neutral under the Clean Air Act so long as national forest carbon stocks are stable or increasing.

III. Farm Bill Energy Programs have the Potential to Make a Significant Contribution to Achieving Our Nation's Renewable Energy Goals

A. The Farm Bill should continue research in breakthrough technologies and processes and invest in project development.

Advancements in renewable energy production, particularly biofuels production, begins with the development and commercialization of breakthrough technologies. Biomass research and development, such as the joint programs currently administered by USDA and DOE under the Energy Title of the Farm Bill, are essential to future commercialization efforts. The Forest Service's Forest Products Lab (FPL) is developing specialized capability at new state-of-the-art facilities to identify and test pathways for breakthrough technologies to move from bench to commercial scale. The FPL is positioned to make a significant contribution to the Department's renewable

energy research mission and should be utilized as a primary resource in technology development using all appropriate funding sources for research available to USDA.

The Energy Title is also an important resource in the development of our nation's renewable energy production infrastructure. During this period of soft financial markets, project developers often lack the capital needed to invest in commercial scale facilities. This capital shortage adds to the difficulty already experienced trying to meet the myriad other requirements for citing, permitting and sourcing biofuels facilities. Loan guarantee programs for project development and advanced biofuels production, such as provided under Sections 9003 and 9005 of the Energy Title, can provide timely assistance to project developers that can stimulate further private sector investment. Care should be given to ensure these programs are fully accessible to potential applicants within sound fiscal parameters.

B. Appropriate implementation of the Biomass Crop Assistance Program (BCAP), can support biomass production and infrastructure development in the biomass energy supply chain.

The forest biomass supply chain is relatively undeveloped and fragmented compared to its potential. Because forest biomass consists of heterogeneous material (e.g., branches, defective or broken logs, tops, and inferior trees) that typically must be collected from the woods and further processed by grinding or chipping, it is difficult and expensive to collect, process and transport. Historically, there have been limited market opportunities for forest-derived biomass. As a result, formal investments in supply chain operations and research supporting biomass have advanced extremely slowly¹. The Biomass Crop Assistance Program's (BCAP) investment in the biomass supply chain through the Collection, Harvest, Storage, and Transportation (CHST) Matching Payment Program can be a valuable tool to help establish the infrastructure and associated jobs that will enable the biomass supply chain to mature and support the growing renewable energy sector.

NAFO members that participated in the 2009 CHST Program report that the program has in many instances helped accelerate the development of critical infrastructure and jobs in the biomass supply chain, thereby improving the ability of eligible material owners to produce and deliver forest biomass to conversion facilities. Based on these experiences, NAFO finds that by focusing on the portion of the supply chain nearest to the forest, CHST and crop assistance matching payments can achieve the purposes of the BCAP program and thereby make a valuable contribution to national renewable energy objectives. The manner by which USDA finalizes and implements the BCAP regulations will be critical to whether these goals ultimately are achieved.

The crop assistance portions of the BCAP Program should also encourage participate from a full spectrum of forest owners without differentiating the eligibility of forest owners to participate in the program based upon size or business model. This will stimulate bioenergy feedstock production where there is demand and encourage sustainable forest management. This approach will also foster innovations that may produce multiple feedstocks from forest lands while stimulating investments that increase long-term forest health and productivity.

IV. Congress Must Act for Renewable Forest Biomass to Make Its Full Contribution to Our Nation's Renewable Energy Goals

Notwithstanding the potential of Farm Bill programs to help private forests make significant contributions toward achieving our nation's renewable energy goals, policy must be fashioned that enables forest to achieve their full energy potential. Chief among these are establishing an inclusive definition of forest biomass and appropriately accounting for the carbon benefits of forest biomass energy. The result of inaction on these policies will be a loss of renewable energy potential and the loss of private forests to more economically competitive land uses. In order for renewable forest biomass energy to realize its full potential, the issues of what biomass qualifies as a renewable energy source and whether or not its GHG emissions will be regulated under the Clean

Air Act must be resolved. Alternatively, confusion and uncertainty will continue to frustrate the marketplace as forest owners, facility owners, and project developers curtail investments until market signals become clear. This will, in turn, forestall biomass energy development to the detriment of our energy security and environmental health.

A. Ensure the definition of biomass is inclusive and consistent across programs to capture the full benefit of biomass energy

Congress has had some difficulty achieving a consistent approach with respect to defining biomass. From the forest owner perspective, complicated definitions that increase the costs and complexity associated with producing a low value product like biomass impede the flow of biomass from the forest to the facility in direct contravention of renewable energy policy objectives. The 2008 Farm Bill has established the most straight-forward definition of biomass. According to Secretary of Agriculture, Tom Vilsack, a broad definition for renewable biomass, such as the Farm Bill definition, is a common sense and practical approach that enables biomass participation in emerging markets and provides economic options to help preserve working farms and forests on the landscape and the many public benefits they provide.

NAFO strongly supports this view and urges that, consistent with the expert opinion of USDA, Congress follow the lead of the 2008 Farm Bill and, with a few adjustments, establish one inclusive definition of biomass for use in all renewable energy and climate programs. The biomass definition must not impose restrictions that would foreclose market opportunities or introduce new federal regulation of private forest lands that overlays or is redundant of the existing legal framework or that creates new legal exposure.

Included for the record is a letter from Secretary Vilsack supporting the 2008 Farm Bill definition for qualifying renewable forest biomass. The sections that follow provide policy support for this approach.

i. A broad definition of qualifying biomass conserves working forests

Private, working forests depend upon reliable markets for continued viability. Over the past century, the U.S. has experienced sustained growth in its forest resources in concert with an ever-increasing demand for renewable forest products. This is attributable at its core to the fact that viable markets for forest products keep forestland economic compared to other uses, spurring investment in forest management and limiting forest conversion to other land uses that realize a greater economic return.² As numerous studies have shown, however, where the economic return for converting the land to development or other land uses exceeds the value for forest products, forest land is lost. It is essential that renewable energy policies help maintain the economic value of forest land and thus encourage forest maintenance and expansion.

Viable markets for biomass from forests not only help conserve forests as forests, but help improve overall forest health. Markets for forest thinnings help landowners fund silvicultural treatments to improve the health of their forests. These treatments can be ecologically beneficial because they, “typically reduce wildfire hazard, improve wildlife habitat, and/or increase forest resistance to pests and drought.”³

ii. Definitions of qualifying biomass that prevent market access for biomass should be corrected

In contrast to the 2008 Farm Bill, the definition of qualifying renewable forest biomass in the EISA places confusing land use restrictions on significant acreages of private forestlands. These restrictions, including limits on naturally growing and regenerating forests, which make up more than 90 percent of our nation’s non-federal forests, unnecessarily constrain the ability of forest biomass to contribute to achieving the ambitious Renewable Fuel Standard (RFS) mandate to produce 36 billion gallons of renewable fuels annually by 2022.⁴

Definitions of qualifying renewable energy feedstocks should provide a level playing field for market access across all feedstock sources and encompass the full range of forest biomass, including trees and other plants, forest residues (e.g., tops, branches, bark, etc.), interplantings of bioenergy crops, and byproducts of manufacturing. NAFO continues to recommend that the law be changed to allow for an inclusive definition of eligible feedstock from forests. The 2008 Farm Bill definition, which is similar to the House passed Waxman – Markey bill language, is an example of such a definition.

iii. Supply of biomass materials will meet the growing demand

Important to understanding the relationship between markets and sustainability is understanding how private landowners respond to new markets, such as bioenergy. A recent study by the Warnell School of Forestry at the University of Georgia, addresses this relationship. In *A Developing Bioenergy Market and its Implications on Forests and Forest Products Markets in the United States: Economic Considerations*. Forest economists document the relationship between decreased capacity and prices for pulp and paper and stumpage for other forest products and the corresponding reductions in investments in silvicultural treatments on private forestlands resulting in reduced forest productivity. In contrast, using economic modeling to predict landowner behavior in response to new bioenergy markets, the study concludes the following impact on supply:

Given the right market incentives, forest owners can significantly increase forest productivity – particularly in plantations in the Pacific Coast and Southern regions of the United States. Intensively managed timberlands can increase productivity [growth] by 150 percent, while less intensively managed timberlands could increase productivity by 75 percent⁵.

The Warnell study is significant in that it addresses a key economic concept frequently missed in analyses of the impacts of policies promoting increased biomass

utilization for energy – that supply responds to demand and that over time new market demand results in an abundance of supply. This has been the consistent experience of the forest products industry for over a century and accounts for why increased demand over time has produced significant growth in overall tree volume in the U.S.

Just as important as understanding landowner responses to market demand is an understanding of how market demand will develop. Experts at Forisk Consulting developed a screening methodology to predict likely capacity of biomass markets to produce energy based on publicly available information for announced facilities. Looking at the U.S. South as of June 2010, of the 136 wood-consuming, announced projects representing the potential for an additional 56.4 million tons/year of wood use by 2020, projects representing approximately 20.8 million tons/year are likely to be operational by 2020.⁶ This provides a realistic projection of demand so that policy makers and forest owners can more accurately predict the impacts of projected new biomass energy capacity on the resource and other markets. It also further addresses the concerns of some that biomass markets will develop too quickly and ultimately outpace supply.

iv. Sustainable forestry in the U.S. is effectively achieved through an existing framework of laws, regulations, and agreements to ensure sound forest practices.

NAFO's members are committed to sustaining ecological, economic and social values over the long term by acting responsibly to assure an abundance of healthy and productive forest resources for present and future generations. Private forest landowners demonstrate sustainable forest management through a variety of established methods, including reforestation of harvested sites to maintain the forest cycle and use of best management practices ("BMPs") defined through voluntary and regulatory forestry programs and forest certification standards.⁷

There is considerable evidence that this complex framework of regulatory and non-regulatory requirements has substantially improved the environmental outcomes of forest management, and will continue to do so in the future. Because working forests are an important potential source of renewable biomass, some have expressed concerns that increased demand for biomass might result in adverse environmental effects. However, while it is difficult to speculate beyond broad generalizations, the removal of additional biomass from working forests is not likely to have negative environmental impacts and, in many instances, will be beneficial.⁸ A robust yet flexible array of tools, in the form of federal, state and local laws, regulations, programs and best management practices (BMPs) have measurably improved the environmental performance of forest operations in the United States, and can be expected to continue to do so going forward.⁹

v. Mechanisms to review the performance of energy programs in meeting our nation's goals and maintaining sustainable forest management across the landscape are appropriate.

NAFO seeks to ensure that taxpayer dollars are invested wisely and appropriately, and periodic reviews of federal programs help ensure that goal is met. Performance measures and reviews of the effectiveness of federal renewable energy programs should rely on existing tools and data, such as the Forest Inventory Analysis, and should recognize the effectiveness of the existing framework of laws, regulations, and agreements in conserving forests and their environmental benefits. New and redundant review and compliance programs applied on top of the existing compliance framework will become too burdensome and costly and will discourage participation in renewable energy programs. In many cases they will hasten the loss of forest land to competing, more economic uses, thereby frustrating sustainability objectives in federal policy.

B. Proper accounting for the carbon benefits of biomass energy in legislation and other federal policy

Federal and international policies have long recognized the carbon benefits of combusting wood biomass for energy in countries where net forest resources are stable or increasing. This recognition has given rise to the treatment of biomass energy in such countries as “carbon neutral” with respect to its impact on total carbon in the atmosphere.

Recent challenges to the conventional carbon accounting practices used throughout the world have raised questions in U.S. policy that require swift attention by Congress and the Administration. Understanding the nature of the forest carbon cycle and the importance of accounting for that cycle in an appropriate manner is necessary for policy makers to determine the carbon benefits of forest biomass energy in U.S. renewable energy policy.

i. EPA’s sudden change in the treatment of biomass energy emissions in the Tailoring Rule ignores both U.S. and international conventions and must be corrected.

EPA recently broke from its long-standing policy, based on its own science, that biomass energy does not increase carbon in the atmosphere if harvested sustainably.¹⁰ The EPA’s final Tailoring Rule unexpectedly treated GHG emissions from the combustion of biomass the same as such emissions from the combustion of fossil fuels. EPA’s action was a sudden shift in direction that appeared to ignore the treatment of biomass energy cited in the draft rule. It was surprising that EPA would place renewable biomass, which plays such a fundamental role in moving our nation toward a more reliable supply of domestic, low carbon renewable energy, in the same category as coal, oil and other non-renewable, high carbon fuel sources.

The confusion created by the EPA's Tailoring Rule is a significant and unnecessary step backward and puts the biomass community at risk of erroneously being cast as part of the carbon problem rather than part of the solution. While EPA last week issued a "Call for Information" on this issue, an administrative action with no connection to rulemaking, it is unclear whether the agency will move quickly enough to resolve the matter before the rule takes effect in January. The EPA must act promptly so the biomass community can resume forward progress rather than unnecessarily spinning its wheels over an already settled area of policy. Included for the record is a letter sent from 163 organizations to EPA Administrator Jackson urging EPA to not regulate biogenic carbon emissions under the Clean Air Act.

As stated previously, NAFO appreciates the attention this committee has already given to EPA's position in the Tailoring Rule. NAFO also appreciates the attention of the Department of Agriculture to the EPA's actions and the commitment of Secretary of Agriculture, Tom Vilsack, to "ensure that rules designed to reduce the buildup of greenhouse gases in the atmosphere also encourage the development and utilization of biomass energy resources and avoid unnecessary regulatory impediments and permitting requirements."

The sections that follow explain the elements of the forest carbon cycle and its relationship to renewable energy to assist policy makers in crafting sound policy founded on established scientific principles.

ii. The forest carbon cycle is ongoing with no definable beginning or end

Photosynthesis is the ongoing process of converting radiant energy from the sun and CO₂ from the air into the chemical energy of plant tissue.¹¹ Through photosynthesis, carbon in atmospheric CO₂ becomes carbon in plant tissue. When biomass is burned or otherwise oxidized, the chemical energy is released and the CO₂ is placed back into the atmosphere, completing a natural carbon cycle. As long as this cycle is in balance, the cycle has a net zero impact on the carbon in the atmosphere. As this is an ongoing

natural process, there is no basis to define a beginning or end; the process continues and the measurement that should be considered is the overall balance at regular intervals.

This biomass carbon cycle differentiates the carbon in biomass from the carbon in fossil fuels. Fossil fuels contain carbon that has been out of the atmosphere for millions of years. When fossil fuels are burned, therefore, they put carbon in the atmosphere that is in addition to what has been cycling between the atmosphere and the earth, causing the amounts of CO₂ in the atmosphere to increase. Indeed, the primary source of increased CO₂ in the atmosphere since pre-industrial times is fossil fuel combustion.¹²

ii. Net carbon emissions from combusting forest biomass for energy must be measured at the appropriate scale.

A critical element in establishing appropriate policies for the use of renewable energy is assessing the ongoing biomass carbon cycle at the appropriate scale. For example, assessing the biomass carbon cycle at the individual plot level ignores the removal of carbon from the atmosphere by trees growing on other plots that will be harvested in future years. By ignoring the ongoing landscape-scale dynamics of the carbon cycle, a plot scale analysis imposes unnatural, and unnecessary, constrictions on the assessment.

If wood-producing land is being re-grown to pre-harvest carbon stocks before it is harvested again, then year-after-year the atmosphere sees a net carbon “emission” of zero across the wood-producing region because the “emissions” from plots harvested this year are offset by the uptake occurring in new growth on other plots that will be harvested in the future. Assessment limited to a single plot results in a large emission occurring at the time of harvest with slow removal of the emitted carbon from the atmosphere over time as the trees re-grow on the plot. This distorts the forest carbon

cycle by focusing at a scale that is too narrow and that ignores forest dynamics across the landscape.

iii. The total forested area in the U.S. is stable and forest carbon stocks are increasing.

There are currently 755 million acres of forestland in the United States, nearly 90 percent is naturally regenerated and 57 percent is privately-owned. 38 percent of the land area is owned by non-industrial, private landowners and 20 percent is owned by corporate landowners. Over the past 100 years forest acreage in the United States has remained relatively stable, and over the past 50 years total growing stock has risen 49 percent and growth consistently exceeds removals.¹³ There is every expectation that improved forest management will result in improved growth rates.

As forest carbon stocks in the U.S. continue to grow, the biomass carbon cycle in the U.S. is continuing to accomplish net removals of CO₂ from the atmosphere.¹⁴ Carbon stocks on industry-owned timberland, for example, are stable, reflecting the effects of regeneration and re-growth that occurs under sustainable forest management practices.¹⁵ The data clearly indicate that in the United States, the biomass carbon cycle is accomplishing net removals of carbon from the atmosphere. In other words, the U.S. forest biomass carbon cycle is in surplus and not contributing to increased atmospheric carbon.

In the real world, carbon stock status is governed by rates of harvesting, growth and mortality at the larger spatial scale. Carbon stock depletions as a result of harvesting specific plots are offset by carbon accumulation on stands that are not disturbed. Thus as noted previously, the carbon stocks represented by forest land in the United States are increasing while supporting ongoing harvesting.

iv. The U.S. is a world leader in sustainable forest practices.

As explained previously, private forestry operations are governed by a complex set of laws, regulations, and non-regulatory policies at the federal, state and local level in addition to voluntary, third-party certifications. The resulting framework has developed over many years and is now mature and adapted to resources conditions and needs of individual jurisdictions.¹⁶ The effectiveness of this framework has made the United States a world leader in sustainable forest practices.

Private working forests depend upon reliable markets for continued viability. The U.S. has experienced sustained growth in its forest resources in concert with an ever-increasing demand for renewable forest products. This is attributable at its core to the fact that viable markets for forest products keep forestland economic compared to other uses, spurring investment in forest management and limiting forest conversion to other land uses that realize a greater economic return.¹⁷ When existing markets for their products are strong, or when new markets like energy emerge, forest owners are able to keep their land forested by investing in tree planting and forest health treatments which in turn keeps their forests economically competitive with other uses.

v. Using forest biomass to produce renewable fuel has significant carbon benefits.

In evaluating the GHG emissions associated with fuels, a lifecycle analysis (“LCA”) incorporates all steps in a “product system” to evaluate broader environmental impacts of products and processes. Work by the Consortium for Research on Renewable Industrial Materials, for example, has 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.¹⁸ Similarly, the U.S. Department of Energy recognizes the GHG emissions reductions that would result from

the use of cellulosic biofuels, stating that, “Cellulosic ethanol use could reduce GHGs by as much as 86%.”¹⁹

EPA has also recognized the beneficial use of biomass to create energy that does not increase carbon in the atmosphere when it is used sustainably.²⁰ International organizations have also recognized this principle, most notably the Intergovernmental Panel on Climate Change²¹.

V. Conclusion

Energy from renewable forest biomass is sustainable, carbon beneficial, domestic, and necessary for the U.S. to reach its renewable energy goals. While existing Farm Bill programs, if appropriately administered, can be effective in promoting biomass energy from private forests, the intent of these programs can only be accomplished if federal policy includes an inclusive definition of qualifying forest biomass and appropriately recognizes the carbon benefits of forest biomass energy. This will require decisive action by Congress and the cooperation of the EPA, the USDA and other federal policy makers.

Absent decisive action on the part of Congress and/or the Administration, the marketplace for forest biomass energy will stagnate as producers and project developers wait for clear market signals. This stagnation will, in turn, reduce overall renewable energy capacity, force more forest land into alternative land uses that are more economically competitive, and frustrate the federal policy of sustainably producing a reliable supply of renewable energy to meet our growing needs.

Congress and/or the Administration must act quickly and decisively to establish an inclusive definition of qualifying forest biomass across energy and climate change policies and to appropriately recognize the carbon benefits of forest biomass energy. By doing so, they will significantly increase our overall renewable energy supply, help

sustain working forests across the landscape, and contribute to economic revitalization and job growth in rural America.

Respectfully Submitted,

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¹ [Wood Biomass Energy](#). Forest2Market. 2009.

² [Environmental Effects of Agricultural Land-Use Change: The Role of Economics and Policy](#). Ruben Lubowski, Shawn Bucholtz, Roger Claasen, Michael J. Roberts, Joseph C. Cooper, Anna Gueorguieva, and Robert Johansson. USDA Economic Research Service. Economic Research Service Report Number 25. August 2006.

³ *Id.*

⁴ [Ecological and Economic Implications for the U.S. Forest Sector of New Regulations for the National Renewable Fuel Standards Program](#). Dr. Alan Lucier. National Council for Air and Stream Improvement. February 2010.

⁵ [A Developing Bioenergy Market and its Implications on Forests and Forest Products Markets in the United States: Economic Considerations](#). Clutter, Abt, Greene, and Siry. National Alliance of Forest Owners. April 2010.

⁶ [A Practical Guide for Tracking Wood-Using Bioenergy Markets](#). Brooks Mendell and Amanda Hamsley Lang. Forisk Consulting. March 2010.

⁷ [Environmental Regulation of Private Forests](#). National Alliance of Forest Owners. 2009.

⁸ [Wood Biomass Energy](#). Forest2Market. 2009.

⁹ [State of America's Forests](#). Society of American Foresters. 2007.

¹⁰ U. S. Environmental Protection Agency Combined Heat and Power Partnership. [Biomass Combined Heat and Power Catalog of Technologies](#), 96. September 2007.

¹¹ Hall, D. A., *Photosynthesis*, Sixth Ed. Cambridge University Press (1999).

¹² Denman, K. G., *Couplings Between Changes in the Climate System and Biogeochemistry*. 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*. Cambridge, United Kingdom and New York, NY, USA: Cambridge University Press (2007).

¹³ State of America's Forests, Society of American Foresters (2007); *A Developing Bioenergy Market and its Implications on Forests and Forest Products Markets in the United States: Economic Considerations*, Clutter, Abt, Greene, and Siry, National Alliance of Forest Owners (April 2010).

¹⁴ *Inventory of greenhouse gas emissions and sinks: 1990-2008*. Washington, DC: United States Environmental Protection Agency (2010).

¹⁵ Heath, L. S., "Greenhouse Gas and Carbon Profile of the U.S. Forest Products Industry Value Chain," *Environmental Science and Technology* (2010).

¹⁶ More information is available at <http://nafoalliance.org/environmental-regulation-of-private-forests/>.

¹⁷ *Environmental Effects of Agricultural Land-Use Change: The Role of Economics and Policy*, Ruben Lubowski, Shawn Bucholtz, Roger Claasen, Michael J. Roberts, Joseph C. Cooper, Anna Gueorguieva, and Robert Johansson, USDA Economic Research Service. Economic Research Service Report Number 25 (August 2006).

¹⁸ See Bruce Lipke et al., CORRIM: Life-Cycle Environmental Performance of Renewable Building Materials, 54 *Forest Prod. J.* 8 (2004).

¹⁹ U.S. Department of Energy. Ethanol Benefits. Retrieved from the Internet on February 8, 2010 at www.afdc.energy.gov/afdc/ethanol/benefits.html.

²⁰ U. S. Environmental Protection Agency Combined Heat and Power Partnership. Biomass Combined Heat and Power Catalog of Technologies, 96. September 2007. www.epa.gov/chp/documents/biomass_chp_catalog.pdf; *Inventory of greenhouse gas emissions and sinks: 1990-2008*. Washington, DC: United States Environmental Protection Agency (2010).

²¹ *2006 IPCC Guidelines for National Greenhouse Gas Inventories*. Hayama, Kanagawa, Japan: IPCC, c/o Institute for Global Environmental Strategies (2006).