Testimony

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Committee on Energy and Natural Resources

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Mr. Chairman and Members of the Committee, thank you for the opportunity to testify here today on behalf of my organization, the Environmental and Energy Study Institute (EESI), about the Renewable Fuels Standard, which we view as a very important tool in our mutual efforts to address climate change and energy and economic security. We congratulate you upon the passage of the Energy Independence and Security Act of 2007 (P.L. 110-140) – no small accomplishment. EESI is an independent non-profit organization founded by a bi-partisan Congressional caucus in 1984 to provide policymakers with reliable information on energy and environmental issues, to help develop consensus among a broad base of constituencies and to work for innovative policy solutions. Our Board is interdisciplinary and is drawn from academia as well as the public and private sectors, including Dr. Rosina Bierbaum, Dean, School of Natural Resources and the Environment, University of Michigan, and Amb. Richard Benedick, who was a lead US negotiator of the Montreal Protocol. Our Board is chaired by Richard L. Ottinger of New York, a former chair of the House Energy & Power Subcommittee and the Dean Emeritus of Pace University Law School.

EESI began its Energy & Climate Program in late 1987 to focus on the nexus between energy and global climate change - the most serious challenge facing the world today. Evidence of existing climate change impacts is staggering and alarming new ramifications of global warming are reported weekly. While skepticism about the reality of climate change has waned, agreement on the policy approach, technologies of preference, and time frame are still very much in debate – with no clear consensus yet emerging. We are faced with a very dynamic and exciting opportunity for creating significant change. Energy, both as a security and (now more prominently) as a climate issue, is on top of the national policy agenda. Indeed, we want to especially thank you, Mr. Chairman, for the leadership you have taken on climate issues in the Senate, the holding of many hearings and the introduction and sponsorship of climate legislation in the Senate. We now have candidates for the Presidency who have outlined for voters what they plan to do to address climate change and energy (security and price). More than 780 US mayors have signed a Climate Protection Statement, and numerous Governors of both parties have taken strong leadership positions addressing climate change. As evidence of climate change builds, the pressure to become 'green' or sustainable has become a driving force not only in politics but in the economy. Multinational corporations and many others in the private sector, including many energy companies, have emerged as interested players in renewable energy and energy efficiency (RE/EE) technologies as a way to combat climate change and increase their bottom line. Biomass-to-energy technologies, such as biofuels, clearly have been recognized by the federal and many state governments, corporations and investors as a renewable energy technology that is a critical component of a climate change mitigation strategy.

According to the 4th Assessment Report of the Intergovernmental Panel on Climate Change (IPCC)[1], the increase in concentration of greenhouse gases since the pre-industrial era is due primarily to human activities, especially the extraction and combustion of fossil fuels. The report specifically concludes that the "global net effect of human activities since 1750 has been one of warming".

According to the U.S. Environmental Protection Agency (EPA) inventory of greenhouse gas emissions[2], the U.S. emitted a total of 7,260.4 Tg CO2-eq/yr in 2005, an increase of 16.3% from 1990 emissions. 23% of these emissions (1669.9 Tg CO2-eq/yr) were from petroleum-based transportation fuels.

Renewable biomass energy technologies will be a critical tool in the effort to reduce our national transportation emissions. Renewable fuels are especially attractive as a low- or no-carbon alternative to petroleum-based fuels. The technology is sustainable, rapid to implement, and available across the entire United States. By utilizing the renewable biomass resources from America's farms, forests, and open spaces, we have the potential to lower our greenhouse gas emissions, increase energy security and stimulate economic development in rural communities. Renewable fuels from biomass feedstocks (coupled with increased fuel efficiency, plug-in hybrids, and similar technologies) provide the most immediate means to begin dealing with the 23% of U.S. emissions associated with petroleum transportation fuels.

On December 19, 2007 the President signed the Energy Independence and Security Act which substantially increases the Renewable Fuel Standard, calling for the production by 2022 of 36 billion gallons of renewable fuels — defined as fuels derived from renewable biomass that achieve at least a 20% reduction (for all new facilities) in greenhouse gas emissions relative to gasoline or diesel, as determined by a "cradle-to-grave" life-cycle analysis that includes direct and indirect greenhouse gas emissions. Within the 36 billion gallon mandate, 21 billion gallons must come from advanced biofuels— those derived from biomass other than corn starch that achieve at least a 50% reduction in greenhouse gas emissions. There are further carve-outs within these 21 billion gallons biomass-derived diesel fuels and cellulosic fuels (which must meet a 60% reduction in emissions).

This is an aggressive and ambitious RFS. It is laudable, but it stirs up a lot of difficult issues regarding the sustainability of biofuels in general. Among these issues are some fundamental agriculture issues, including competition for land and natural resource protection. The competition for land is a complicated issue that stems from the perceived differences between growing crops for food, feed, fiber and now fuel. Unquestionably, the production of renewable fuels needs to be done in a way which enhances natural resources, including soils, water supply and native habitats. Production of renewable feedstocks should not be deemed to be in competition with the goals of sustainable agriculture. In fact, the opportunity for renewable energy production to aid conservation efforts and environmental sustainability is much greater compared with conventional agriculture and fossil fuel production and consumption. In addition to these sustainability and agricultural concerns, the indirect emissions of greenhouse gases from deforestation and environmental degradation can negate the emissions savings in using renewable fuels.

EESI strongly supports the existing greenhouse gas screens. After all, without them we have no guarantee that the RFS will be able to accomplish one of its most fundamental purposes – the reduction of climate change-inducing greenhouse gas emissions from transportation fuels.

These emissions screens are not easy to satisfy, but they are certainly possible to meet. One of the biggest factors in whether or not a given renewable fuel will meet the screens is the choice of feedstocks that go into the fuel. A report by the Union of Concerned Scientists (UCS) reinforces the widely-accepted average direct life-cycle emissions reductions (compared to gasoline) of 20% for ethanol from corn starch and 80% for cellulosic ethanol.[3] These statistics immediately suggest two things - A) that the emissions screens in the current RFS can be met and B) that cellulosic fuels have the potential to dramatically reduce our greenhouse emissions compared to either gasoline or corn-starch ethanol.

The importance of cellulosic renewable fuels to the future of the United States has been hailed by many policymakers from across the country, including the President. Cellulosic biofuels can be produced from a highly diverse array of feedstocks, allowing every region of the country to be a potential producer of this fuel. (Cellulose is found in all plant/organic matter.) As a result, support for cellulosic fuels has brought together a broad array of constituents including environmentalists, farmers, national security experts, industry, and religious leaders.

Depending on choice of feedstock and agricultural practices, some cellulosic renewable fuels have the potential to substantially exceed the average 80% emission reduction found by UCS. A 5-yr field study jointly undertaken by the USDA Agricultural Research Service (ARS) and the University of Nebraska found a 94% reduction in direct life-cycle greenhouse emissions from switchgrass-based ethanol compared to gasoline[4]

These numbers only tell part of the story, however, in that they take into account only the direct life-cycle emissions of these fuels: the emissions associated with growing, harvesting, storing, and transporting the feedstock, as well as the emissions associated with producing the fuel itself. Included among these direct emissions are emissions associated with direct land changes – e.g. the clearing of forest or native grassland to grow the feedstock. The RFS explicitly includes 'significant indirect land use emissions' in its GHG screens, however. These are the emissions associated with agricultural expansion in another location (either in the U.S. or abroad) directly resulting from the increased demand for agricultural products caused by shifting domestic farmland from food to fuel production – e.g. Reallocation of vegetable oils from cooking oil to biodiesel that results in the clearing of Indonesian rainforest to make way for palm oil plantations to fill cooking oil demand.

EESI supports the inclusion of indirect land use effects in the definition of 'lifecycle greenhouse gas emissions.' A ton of carbon is a ton of carbon, whether it is produced directly as a result of the production process or indirectly as a result of market effects. If we do not include these effects in the calculation of life-cycle emissions, we cannot know whether the emissions profile of a given renewable fuel is better or worse than an equivalent petroleum-based fuel. Without this information, we cannot be certain that the RFS will succeed in reducing our transportation emissions.

Since it is essential to include indirect greenhouse gas emissions, then, that leaves a very serious problem. It is unclear how to calculate these important numbers. A number of individuals have investigated the problem and the consensus seems to be that data and methods are currently unavailable, but being developed, to estimate these effects with any amount of precision. Problems range from a lack of consistent data on global land use change, to the difficulty of determining which land use changes are attributable to global biofuel production and separating these from changes associated with market globalization and rapid economic development in the developing world.

Despite the lack of hard data, current understanding of the problem suggests that these emissions have the potential to be quite substantial.[5] [6] Until we have the knowledge and the tools to accurately measure these indirect effects, the wisest course of action would be to focus on feedstocks that do not induce land use changes and therefore do not result in indirect greenhouse gas emissions. Fortunately, our nation possesses abundant and readily available feedstocks that satisfy this criterion. These feedstocks include dedicated energy crops, such as algae and some grasses (those that grow on non-agricultural land), as well as an abundant supply of wastes and residues from agriculture, forestry, livestock production, urban wood debris, and clean construction debris.

In order to ensure that feedstock production is pursued sustainably, a national biomass assessment needs to be funded and carried out. The "billion ton study"[7], a joint report issued by the U.S. Department of Energy (DOE) and USDA, was done to determine if "a 30 percent replacement of the current U.S. petroleum consumption with biofuels by 2030.," could be accomplished. Although this is a controversial document and many of its conclusions are disputed, it nonetheless currently provides the most rigorous *national* estimate. In addition to this study, a number of regional biomass assessments have also been, but they are not consistent in scale, content, or methodology. Some of these assessments estimate substantially higher biomass supplies for their state or region than is estimated in the billion ton study.

A national assessment needs to pay specific attention to crop residues, agricultural feedstocks, dedicated energy crops and waste streams. Assessments should be done on a state-by-state basis, and should take into account the specific soil type, climate, precipitation, and nutrient inputs within that state. Furthermore, economic models have to be created and tested to determine and predict feedstock availability and cost. The goal should be to help farmers, foresters, and land managers know which feedstocks are most appropriate to grow where and with as little inputs as possible – this will also help farmers, for example, in making crop decisions.

Agricultural Residues

Current assessments can give us some idea of the vast resources of agricultural residues that are available. [*] The billion ton study[8] estimated that 998 million dry tons of agricultural residues could be removed sustainably from farmlands in this country. This includes corn stover, grain straw, leafy material, and woody biomass produced as agricultural byproducts. The 998 million ton figure does not include the residues that must be left on the land to avoid soil erosion and nutrient loss.

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[*] Availability refers, in general, to material that is physically accessible, cost-effective to remove, and which can be used without incurring any negative environmental or social costs. Methods of defining and estimating availability differ among assessments and reports.

A report published by the Sun Grant Institute at the University of Tennessee- Knoxville calculated that in 2005, 10 mid-western states produced an available 68,744,504 million dry tons of corn stover (excluding highly erodible land and using sustainable removal rates of <45%)[9]

According to a biofuels report by the Oregon Environmental Council[10], the state of Oregon alone could sustainable produce 1.4 million dry tons of wheat residues – enough to produce approximately 84 million gallons of ethanol. Another million gallons could be made from the 250,000 dry tons of seed grass straw that the state could sustainably produce each year.

The Western Governors' Association conducted a regional assessment of the biomass resources in the 23 western states and Pacific holdings[11]. As part of this assessment, they created a series of supply curves to determine the potential supply of agricultural residues at various prices. At an average price of $35/ton of residue, the entire region could yield an estimated 24,537,007 dry tons of agricultural biomass. At $50/ton, this number climbs to 59,588,270 dry tons (see Table 1). In addition, the reported estimated between 516,367 dry tons (at $20/ton) and 49,521,480 dry tons (at $70/ton) of native prairie grasses and 2,706,031 dry tons of woody orchard residues.

Table 1: Estimated supply of various agricultural residues in the Western U.S. at two different prices. Western Governors' Association. 2008.

Feedstock	Supply (dry tons) at $35/ton	Supply (dry tons) at $50/ton
Corn stover	153,018	788,081
Winter wheat straw	2,728,816	3,578, 682
Spring wheat straw	255,864	579,335
Barley/oat/rye straw	21,399,308	54,642,172
Total	24,537,007	59,588,270

Algae

Algae represent another feedstock with great potential for high yields and little or no indirect emissions, because it does not require the use of arable land currently in food production. A report summarizing the DOE Aquatic Species Program estimated that algae could produce up to 15,000 gallons of renewable fuel per acre per year in open ponds[12]. Additionally, closed-loop algaculture systems promise to deliver even higher yields from small areas and can be located on marginal and non-productive lands. These systems, in which algae is cultivated in large plastic bags, have the potential to produce up to 100,000 gallons of algal oil per acre per year. [13]

Woody Biomass

Woody biomass from trees and shrubs is another promising cellulosic feedstock. Although the complex structure of wood fibers makes conversion difficult, technologies to accomplish this at a commercial scale are already gaining in momentum with projects such as the Range Fuels facility in Georgia and the two New York facilities –Catalyst Renewables and Mascoma Corporation.

Woody biomass is an incredibly abundant feedstock. Forests cover approximately one third of the nation's land area and much of that acreage is in need of thinning. Thinning describes a harvest activity in which undesirable growing stock (often saplings and small-diameter trees) are removed to reallocate resources (water, nutrients, sunlight) and growing space to desirable growing stock. There are many reasons why thinning is a valuable silvicultural operation. It is used to improve the vigor and growth of healthy trees for timber production and management for certain elements of wildlife habitat. Thinning is often a core component of restoration forestry, as dense, overstocked stands of stressed trees can be more vulnerable to destruction by fires and insect outbreaks.[14]

Thinning is an expensive operation, however, and the ability to thin is often limited by the lack of widespread markets for small-diameter trees and woody biomass. Without this financial outlet, forest and woodlot owners (private or public) can rarely afford to invest in thinning or other stand improvement activities.

A thriving renewable fuels industry would open up markets for forest biomass and make it possible for land managers to invest in a wider range of management activities, including restoration forestry, habitat management for mid- and late-successional species, recreation management, and more sophisticated forms of timber management. By adding value to forests and forest products, the renewable fuels industry is one tool that can help slow down encroachment by urban sprawl, reduce the threat of forest fires and improve the health of forests, while driving local economic development through the creation of jobs in rural communities.

The use of thinning materials and woody residues does not result in indirect emissions. In fact, expanded markets for these materials could provide an additional revenue stream for forest owners, put better forestry practices within the budget of conscientious landowners, and encourage the production of wood products from sustainably managed forests and woodlands. This in turn would result in a reduced demand for imported wood products, many of which are obtained through environmentally destructive (and often illegal) logging in the developing world. In this way, fuels produced from sustainable woody biomass could actually reduce the amount of **indirect emissions** of greenhouse gases from deforestation.

Given the appropriate markets, the amount of forest biomass that could be sustainably harvested is tremendous. The billion ton report[15] estimates a national supply of 8529.2 million dry tons of forest biomass, of which 108.3 million is available given **current market conditions, technologies, and infrastructure** (see Table 2). Of the 108.3 million dry tons currently available, 40.9 million dry tons could come from logging residues, 7.8 million dry tons could come from unused residues in sawmills and paper mills (the majority of these residues are utilized internally for heat and power), and 59.6 million dry tons could come from fuel reduction thinnings. This is a small fraction of the approximately 8410 million dry tons that could be thinned from the vast forest acreage that has been identified by the National Forest Plan as being at high risk for catastrophic wildfires. Given expanded markets and technological improvements, a much larger percentage of this material could be made available for renewable fuel production in the future. These numbers represent total availability on federal, state, and private lands.

Table 2: Estimated quantity of total and available forest biomass in the United States. U.S. Department of Energy and U.S. Department of Agriculture. 2005.

Feedstock	Total quantity (million dry tons)	Available quantity (million dry tons)
Logging residues	67.1	40.9
Industrial wood residues	52.1	7.8
Hazardous fuels residues	8410	59.6
Total	8529.2	108.3

A number of other assessments provide regional and state estimates of available forest biomass from hazardous fuels reduction, logging residues, and other sources. The Western Governors' Association Report identifies 23 million acres in 12 states that are at high risk from wildfire. Thinning materials from this acreage could provide up to 318 million tons of biomass[16], of which 7.2 tons is immediately accessible and available. According to the Oregon Environmental Council Report, Oregon produces 3 million tons of slash and thinning materials per year, of which 1 million is available for use on a sustainable basis (enough to produce 66 million gallons of ethanol).[17] The California Biomass Collaborative estimated[18] that, in 2005, the state of California possessed more than 86 million dry tons of biomass, of which 34 million dry tons could be sustainably used. Of the total, approximately 31% could come from forestry.

In addition to residues from forest management, considerable quantities of woody biomass can be recovered from urban wood waste. According to the billion ton study, [19] the nation produces 62.3 million dry tons of urban wood waste annually, of which 28.0 million dry tons is available and currently unused (see Table 3).

Table 3: Estimated quantity of total and available urban wood waste in the United States. U.S. Department of Energy and U.S. Department of Agriculture. 2005.

Feedstock	Total quantity (million dry tons)	Available quantity (million dry tons)
Construction debris	11.6	8.6
Demolition debris	27.7	11.7
Yard debris	9.8	1.7
Solid Waste Wood	13.2	6.0
Total	62.3	28.0

Another potential source of woody biomass is disaster debris. Hurricanes, floods, ice damage, and other natural disasters annually destroy significant amounts of urban trees, forest growth, and wooden structures. Very little of this material is recovered and put to a productive use. Instead, it is landfilled, incinerated, or piled and burned in the field (which emits greenhouse gases). Increasing the recovery rate for this material would be beneficial for a number of reasons, including reduced fire hazards, recovery of economic losses, and as a potentially significant feedstock for production of renewable fuels. The availability of this material is difficult to predict, however, as it depends largely on chance events. Infrequent, large-scale disasters (like Hurricane Katrina, for example) have the potential to contribute additional millions of dry tons of wood biomass when they occur.

Suggestions for the RFS

I would like to reiterate my support for the inclusion of the reduction of total GHG emissions in the RFS.

In order to fully accommodate and encourage the use of wastes and residues as feedstocks, it is essential that the definition of 'renewable biomass' in the RFS be flexible enough to include the wide availability of these feedstocks. The current definition includes algae, yard waste, food residues, crop residues, animal byproducts, and several kinds of woody biomass. This last category is not as inclusive as it should be, however. It excludes forest biomass from a number of sources. Although the definition may provide some exclusionary safeguards intended to protect the environment, these safeguards are not based on forest type, stand structure, or any other ecologically-meaningful characteristics, but on arbitrary distinctions of ownership and minor silvicultural details. Unfortunately, these provisions eliminate an opportunity to support hazardous fuels reduction, reduce the number of possible cellulosic feedstocks for production of renewable fuels, and shatter the hopes of many communities that wish to rid themselves of this material while creating job opportunities in rural areas stricken by unemployment.

The most egregious example is the exclusion of federal forest lands from the definition. We acknowledge concerns about sustainability and our public lands and we feel very strongly about enhancing sustainability of this resource. From an ecological perspective, however, there is no fundamental distinction separating federal forests from private forests in the United States. The entire range of forest types, habitats, and structural elements can be found across both ownerships. In the end, both public and private forests can be managed sustainably and both can be managed unsustainably. Soil requirements, silvicultural methods, harvesting systems and other best-management-practices need to be investigated fully for all forest types. Rare habitats, imperiled forest types, endangered species, and important cultural elements need to be preserved wherever they are found. Responsible environmental stewardship should be the order of the day, but the important factors in determining sustainability guidelines are ecological and silvical characteristics, not the name on the deed.

Removing the exclusion of federal forests could make a sizable quantity of additional feedstock available. For instance, 1996 million dry tons of forest biomass could be generated as a result of areas indentified as being in need of hazardous fuels reduction on National Forests alone[20]. This does not include any U.S. Department of Interior forestland, such as that managed by the Bureau of Land Management, Fish and Wildlife Service, or National Park Service – which are also excluded in the current definition. Nor does it include any materials that could be removed as a result of wildlife habitat management, pest mitigation, recreational management, or stand improvement thinnings.

I specifically highlight hazardous fuels reduction as a source of biomass because of the urgency and national importance placed on this activity. Large, catastrophic wildfires destroy property, threaten communities, reduce air quality, and contribute to atmospheric concentrations of greenhouse gases. One study estimates that large, stand-replacing fires can emit over 2 tons of carbon per hectare.[21] With wildfires on the rise and fire fighting budgets stretched to their limits, the National Fire Plan has identified millions of acres in need of hazardous fuels reduction. As I said before, however, the simple fact is that thinning is an expensive undertaking. If private landowners, with a few dozen or a couple hundred acres, cannot afford to invest in stand improvement thinning, then the government certainly cannot afford to treat millions of acres on the public dollar.

We frequently hear the argument made that public costs would be less (on a per acre) basis if funds were allocated for proactive fuels reduction as opposed to reactive fire fighting. In the long run this is probably true, but the transition in strategies will not be an immediate one and catastrophic fires will continue to be a major element of the landscape in the near future. After the expenditures associated with fighting the fires that are burning today, not much is left to begin restoring the vast acreage at risk of burning tomorrow. It is going to be a slow process. In the meanwhile we need to find a commercial outlet for thinning materials if we hope to deal with an issue of this scale and size.

Renewable transportation fuels could provide that commercial outlet, but only if the necessary markets and infrastructure are developed. Under current market conditions, only 11.7 million dry tons are accessible and available out of the total 1996 million dry tons of thinning materials on National Forests.[22] In many circumstances, thinning materials must be treated on site or transported out of the forest to reduce the possibility of wildfires and the spread of insect infestation. Transportation costs and low market value for this material are limiting factors to its removal, so the majority of thinning materials are chipped in the field or burned in open piles. These open fires are still generating renewable energy, but it is energy that is being wasted instead of being put to productive work in vehicle engines.

A number of projects are trying to move forward, such as the Pacific Ethanol Facility, partially funded by DOE, that will be using wood from BLM land to produce cellulosic ethanol for its new 10% scale facility in Oregon. Projects like this are promising, but they are not enough. The RFS could help to provide a solid, nationwide incentive for this important industry.

Federal forests are not evenly distributed across the nation. In total, they encompass about 43% of the national forest resource or approximately 323 million acres. Of these 323 million acres, 78% are concentrated in Alaska (91 million acres), the Rocky Mountain States (108 million acres), and the Pacific Northwest (55 million acres).[23] These are some of the regions that are most threatened by catastrophic wildfire and are most in need of hazardous fuels reduction treatments. By excluding these forests from the RFS, however, the Congress is essentially removing a necessary economic incentive to conduct these treatments. This could effectively make it impossible to reduce wildfire damage in landscapes strongly dominated by federal forests no matter how thoroughly the small private and state land components are treated.

Another possible side effect of excluding federal forest feedstocks from the RFS is that it may indirectly increase the intensity of feedstock production on non-federal forests, increasing the chance that unsustainable and environmentally-degrading management practices may be used on private and state forests. This could lead to soil erosion, reduced productivity, compromised habitat, and reductions in water quality.

In some locations, residues from sawmills and pulp operations that source materials from both federal and non-federal forests may be ineligible to be used towards the RFS if separating residue streams proves difficult or prohibitively expensive. This problem would also exist in biorefineries – where a number of additional biobased products are produced in addition to renewable transportation fuels as well as heat and power. The biorefinery is a desirable industrial model, as utilization of waste from one process as the feedstock for another minimizes waste, increases sustainability and greatly increases economic viability. These facilities would very likely source from a number of different ownerships.

In addition to the exclusion of federal lands, a good deal of biomass from private lands is excluded from the renewable biomass definition. In essence, the definition includes all biomass from **planted** trees and tree plantations, but only slash and pre-commercial thinnings from private forests regenerated from **natural** regeneration or sprouting. This definition results in a very substantial problem. It draws an arbitrary distinction between, for example, the 20" pine that is planted versus the 20" pine that grows from a seed. This detail has no relevance to species composition, forest structure, habitat value, or ecological functioning. Eligibility should be determined by these and other objective, meaningful silvical characteristics.

Additionally, this language unfairly favors industrial forestry and single-species plantations over diverse, mixed woodlands and nonindustrial private forest land. Not only do these forests generally boast higher biodiversity, but the periodic income from selective harvesting on these properties is often the only thing standing between these forests and the very real pressure to sell out to real-estate developers.

As more and more acres of forest land are bulldozed to make way for suburbia or burned in massive conflagrations, more and more environmental organizations are beginning to see the value in sustainable, multiple value forest management for helping to ensure the perpetuation of diverse, vibrant forest ecosystems and the many values that they offer – clean water, wildlife habitat, recreational opportunities, and diverse forest products, including renewable fuels. A number of NGOS, including the Oregon Environmental Council ("*…if renewable fuels are produced sustainably, they can generate substantial reductions in greenhouse gas emissions and improvements in air and water quality…Thinning and removal of biomass from these forests* [at risk from fire] *would improve forest and provide a substantial supply of biomass for energy production. While there are clear environmental benefits to greater utilization of forest biomass, there are also real sustainability concerns."* [24]) and the Pinchot Institute for Conservation ("*…wood energy could help address several longstanding challenges in sustainable forest management: treating hazardous fuels accumulations to minimize future threat of wildfires, creating economic outlets for small-diameter and low-grade wood to reduce forest* *degradation, and strengthening community economic development on the basis of sustainable use of local forest resources."*)[25] have come out with statements identifying the potential value in renewable energy to make possible a better and more sustainable form of forestry.

Both of these organizations have also stressed that without proper sustainability guidelines, a market for woody biomass could have some negative repercussions on forest resources. **Sustainability is Essential**. This can not be stressed enough, but sustainability standards must be based on ecologically-meaningful criteria, not arbitrary exclusions based on ownership and regeneration methods. What is and what is not sustainable depends on local conditions, such as forest type, climate regime, ecosystem function, and other specific location-based characteristics. In locations where it is appropriate, hazardous fuels reduction could provide a huge percentage of available woody feedstocks. In areas where this type of management is not appropriate, woody biomass can be harvested as part of habitat management or stand improvement activities. Biomass harvests must be integrated into comprehensive forest management strategies that aim to satisfy multiple needs and values sustainably. In this lies good forest management. A number of organizations, including EESI and the Pinchot Institute, currently have initiatives under way to investigate how extraction of biomass for renewable energy can be soundly integrated into existing goals and strategies for sustainable management.

In summary, the RFS is a very aggressive mandate, but it is not an impossible one, as long as we do not exclude any of those feedstocks that can be produced sustainably and that meet important direct and indirect emissions screens. With conversion technologies still in the works, we must keep our options open and strive to produce renewable fuels that meet objective and appropriate standards of sustainability.

In closing, I feel that it is important to stress that renewable fuels are one piece of the solution to transportation emissions, but not a complete solution. Renewable fuels will be **ONE** part of a larger strategy, but so will increased vehicle fuel efficiency, expanded public transit, and "smart growth" practices (enabling more transit, biking and walking). In addition, technologies such as E85 engine optimization and plug-in hybrids will allow us to get more out of each gallon of fuel. It would be extremely wasteful try to replace petroleum fuels gallon for gallon with biofuels. This approach would not be effective at reducing total greenhouse gas emissions and, in fact, would probably increase opposition to renewable fuel production. There already is a backlash against substantial increased production of renewable fuels. Concerns over the fuel vs. food debate and ecosystem degradation would be bolstered if the United States were to try to replace the 140 billion gallons of gasoline and 9 billion gallons of diesel used annually. Instead, a vision of integrated low-carbon sustainable renewable fuels production must be combined with other technologies to reduce the amount of transportation fuel needed for a long term solution to climate change.

I would like to thank the committee once again for the opportunity to speak before you. Let me also extend my gratitude for your part in creating and passing this important renewable fuels standard and recognizing the role it plays in our climate protection and national security efforts.

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