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Subcommittee on Forests & Forest Health

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Witness Statement

TESTIMONY
OF
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OF
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BIOMASS ENERGY

FOR FOREST FIRE FUEL REDUCTION

Introduction

Mr. Chairman and distinguished members of the subcommittee, thank you for allowing me this opportunity to testify on behalf of the members of the American BioEnergy Association, of which I am Director. The United States is at a critical time for the development of alternative energy sources, both for transportation and electricity. Our dependence on foreign oil has put our economy and national security at great risk. At the same time, catastrophic forest fires have reached historic proportions in the Western U.S. These two issues - increased energy demand and the need for forest fire abatement - has put us at a crossroads today where creating a win-win situation is more than just possible. However, any plan regarding removal of large amounts of small-diameter forest material must include a market strategy for ridding of this low-value biomass. While many small-scale solutions are being considered within rural communities throughout the West, a large-scale solution must be adapted for the more extensive rural/urban interfaces. After considerable analysis by the Western Biomass Consortium, a group funded in the past by the U.S. Departments of Energy and Agriculture, this solution appears to be the selective mechanical thinning of small-diameter material in our over-stocked forests coupled to producing domestically based, renewable, and environmentally friendly energy and chemicals, using biomass as feedstock.

Background

What is biomass? Biomass is any matter composed of three components: cellulose (a 6-carbon sugar chain, or polymer), hemicellulose (a polymer of mostly 5-carbon sugars) and lignin (the "glue" holding these sugar chains together). Roughly speaking, biomass is composed of 50% cellulose, 25%hemicellulose, and 25% lignin, which is the precursor to coal. The lignin component has the same energy content as a medium- to high-BTU grade coal, but without the ensuing pollutants of sulfur and nitrogen, and is capable of supplying

a biomass power plant with additional energy feedstock, or an entire biomass ethanol plant with all of its electricity needs. Examples of biomass include wood waste, agriculture residues, fast-growing grasses and trees, and the paper component of municipal solid waste.

The U.S.' ever-increasing dependency on petroleum (or hydrocarbons) has put us in a precarious position both with respect to our economy and national security, as energy is the lifeblood of this great country. If we could begin to phase-down our hydrocarbon use and phase-in our biomass, or carbohydrate, use, the impact would be tremendous. We would start down a critical path of true energy security, while helping to stabilize our economy overall, increasing jobs around the U.S. for many put out of work in rural areas where the majority of biomass is grown.

Low-value biomass can be converted to several high-value products, such as electricity, ethanol for transportation, and chemicals. Markets will determine which of these three is the highest-value in that particular situation, and industry will adapt these" bio-refineries" accordingly. Below is a brief review of each technology.

Biomass Power

Biomass is currently being used for conversion to electric power through conventional combustion technology. The current biomass power industry is composed of approximately 350 plants with combined capacity of approximately 7,800 megawatts (MW), employing 66,000 people. Of those plants, 45 recently lay idle for various reasons, with 655 MW of unrealized capacity going to waste. The dormancy of these plants is largely due to the past low-cost of competing energy sources. However, with recent escalation of electricity prices, some plant are coming back on-line. But more of these biopower plants could be built throughout the U.S., particularly the West, where biomass is abundant as a forest residue and electricity is badly needed.

Currently, there are a small number of utility-size biomass gasification plants at different phases of construction which will act as test facilities and pilot plants for the future industry. The major pilot plants include:

· *Burlington, Vermont, Gasifier Project*--Burlington Electric Department's McNeil Generating Plant has been producing wood-fired biomass power at its 50 MW per year plant, but has recently integrated a new gasification technology to add more capacity. DOE, along with the technology licensee Future Energy Resource Corporation (FERCO), has added a 15 MW per year gasifier as a pilot plant, and successfully attained full operation in August 2000 using FERCO's SilvaGas™ technology, producing electric power directly from biomass in a conventional gas turbine.

· *Chariton Valley Resource Conservation and Development (RC&D) Project*--This Iowa project encompasses a public/private partnership between U.S. Department of Energy, U.S. Department of Agriculture, and the Chariton Valley RC&D Area, under DOE/USDA's Biomass Power for Rural Development initiative. Approximately 500 local farmers and landowners are aligned with the combined research and investment power of 14 organizations. The project will be growing switchgrass on 30,000 to 40,000 acres of underutilized, marginal cropland.

In addition to the above technologies, there is growing interest amongst the coal industry and utilities to co-fire biomass with coal, reducing some pollutants such as sulfur and nitrogen oxide. The TVA and the Northern Indiana Public Service Company (NIPSCO) are just a few that are investigating biomass co-firing

with coal.

Biomass Ethanol

The current corn-based ethanol industry converts to ethanol only part of the available sugar in the corn plant, i.e., the starch inside the corn kernel itself. The remainder of the kernel is converted to products such as animal feed, corn oil and syrup. While the USDA recently determined that today's ethanol plants have increased production efficiencies to reflect a net energy gain of 25%, DOE's new highly efficient technology for biomass conversion to ethanol (or bioethanol) could increase efficiencies for corn ethanol plants even further, through conversion of corn fiber and stover. Predicted efficiency improvements from these additional conversions would allow some of these corn ethanol plants in increase their outputs on the upwards of 15% from the current capacity. Conservative estimates for energy efficiencies for a stand-alone biomass ethanol plant is 4:1, that is, four energy units in output compared to energy used during production. One of the predominant reasons for this difference between starch and cellulose conversion to ethanol is use of the lignin contained in the biomass itself. The high-energy content of lignin allows a stand-alone biomass ethanol plant to be self-sufficient, that is, to not require an outside energy source, instead combusting the lignin in a standard boiler for energy use. In addition, some circumstances may even allow these bioethanol plants to sell excess power to the electrical grid. In locations such as California, this would be another obvious benefit. Because of its efficiencies, bioethanol will only require the ethanol incentive for a short period of time, with goals to compete effectively with gasoline prices by 2010 or sooner.

The world's first biomass ethanol plant will be located in Jennings, Louisiana, and will use sugar cane bagasse as its feedstock. BC International (BCI) has a patented technology that it hopes to use in the future on wood waste and rice hulls at this plant as well. BCI is currently coming to financial closure on its plant, with expected start-up in 2002.

Using waste feedstock such as forest and agriculture residues helps to make these first bioethanol plants that more profitable. Other plants under development include:

· *City of Gridley* - In California, BCI will use its technology on waste from rice in the form of rice straw, alleviating open-field burning. This plant may use forest residues as well, co-locating with an existing biomass power facility.

· *Collins Pine* - The Collins Pine Companies, a family-owned private timber firm out of Portland, Oregon, with a facility in Chester, California, is planning to build a plant fed by small-diameter forest material. The plant will be sited by an existing sawmill operation, also using mill residues. This project is well into a feasibility study showing very positive results, and will use biomass from both private and public lands, deriving some feedstock from the Quincy Library Group's project.

· *Masada Resources Group* - In Middletown, NY, Masada will use its technology to convert the cellulose stream of municipal solid waste to ethanol, garnering a tipping fee to help make the plant more profitable.

Biomass Chemicals

A rapidly expanding area in biomass utilization which may provide the largest market potential in the future, is the area of biomass conversion to chemicals. Large companies such as Dow Chemical and Dupont are currently looking at high-value chemicals from biomass. One such chemical is polylactic acid, or PLA. Cargill Dow LLC is currently constructing such a plant in Blair, Nebraska, with start-up operation slated for

November of this year. From PLA "beads", Cargill Dow and its business associates will be able to produce such products as carpets, clothing, and plastic cups which are all biodegradable and renewable. The significance of this technology in decreasing our dependency on imported oil is great, as many products now used in the U.S. are derived from petroleum-based feedstocks. Using biomass instead of petroleum for such products would allow us to save our precious oil for higher-value markets, stretching out our dwindling supply of oil. While the Cargill Dow plant will use corn starch short-term, it will soon use cellulosic biomass as well.

The Bio-Refinery Concept

The bio-refinery is a relatively new concept developed largely by the U.S. Department of Energy. It essentially mimics a petroleum refinery in that it would produce many different products from one plant. For instance, many oil refineries produce multiple products, such as gasoline, natural gas and chemicals. At a bio-refinery, industry could produce ethanol, electricity and chemicals as well. In the end, the highest valued product would most likely be produced in the largest amounts, through a simple "flip of a switch" in these flexible plants.

Benefits

The benefits of biomass conversion are numerous and great. Of most interest to this subcommittee, forest fires stemming from immense fuel loading have severely threatened human life and property, particularly in the Western U.S. The Department of Energy's National Renewable Energy Laboratory (NREL), located in Golden, Colorado, has been working closely with the timber industry and local communities to investigate the potential for conversion of sawmill and forest residues to biomass ethanol and power; results from the composition analysis of mill samples sent to NREL from different locations around the U.S. are very promising. Co-locating a biomass ethanol plant to an existing lumber/saw mill or biomass power plant makes the economics of the bioethanol that much more attractive through shared capital expenses, such as boilers and wastewater treatment facilities. In addition, not only does this technology have the potential to create jobs in rural communities, but it will also help keep our forests safe and healthy by creating a market for the small-diameter trees and brush which are fueling these fires.

Feedstocks such as agricultural and municipal solid waste, many of which are troublesome to the environment and communities nationwide, can also be used. For example, many areas of the United States have become extremely burdened with solid waste disposal, causing landfills to turn away waste only to find there are few other disposal options. In California, even simple refuse such as yard trimmings is piling up at a high rate of speed; this debris could also be converted into energy or chemicals. And one extreme example: New York state has an enormous pile of old wooden pallets just outside of Manhattan which could supply enough feedstock to support a 100 million gallons per year ethanol plant. This is a tremendous figure, considering the total ethanol production of the U.S. currently stands at 1.5 billion gallons a year.

Agriculture residues have also increased the burden on landfill sites. For example, in 1990, California's legislature mandated the phase-out of rice straw burning by farmers at a rate of 10% reduction per year with the phase-down now complete, leaving the farmers no choice but to plow the straw under. This is costly and greatly increases the risk of disease while reducing rice yields. California also has legislation in place disallowing 50% of municipalities' solid waste going to landfill sites. As a result, the rice farmers have been forced to find an alternative disposal system for their crop residue that is being turned away from landfills. The California legislature appointed a Committee on Alternatives to Rice Straw Burning which determined conversion of rice straw to ethanol as one of the few viable options. Other agriculture residues such as

orchard trimmings and pecan shells are being turned away from landfill sites as well. Although this refuse is a detriment today, it may in the future actually acquire value, increasing farm income.

Congress will begin deliberating agriculture issues this year in preparation of Farm Bill reauthorization. Diversification of farm crops is critical for latter year production on farms. Eventually, crops like fast growing trees (e.g., poplars) and tall grasses (e.g., switchgrass) will encourage both sustainable agriculture and clean energy production for the United States. There is also significant effect on global warming. For example, production of dedicated energy crops and use of bioethanol reduces the net release of carbon dioxide by 90% or more, helping to reduce greenhouse gas emissions significantly. Few other options are available to the transportation sector to achieve this reduction.

Recommendations to the Subcommittee

Department of Energy Biomass Authorization -- The ABA applauds the Lugar/Udall "Biomass Research and Development Act of 2000", which did much to promote the concept of biomass in the Congress and within the USDA and DOE. We appreciate the efforts of its sponsors and hope to continue working with Congress to advance the use of biomass in the U.S. The ABA would like to recommend two areas to help carry out what we believe is the true intention of this statute:

1) the USDA's requests for proposals (RFPs) that were used to fulfill the biomass authorization directive only allowed for starch-based crops and long-term cellulosic crops, therefore no short-term cellulosic biomass plants, such as those using agriculture or forestry residues, were recipients of the allocation; **we would like to recommend an expansion of the biomass definition to include these residues in any future solicitations at the USDA.**

2) the DOE biomass programs were not authorized under this bill, which includes research and development allocations for power, fuels and chemicals. If the United States' goal is to achieve a tripling of biomass utilization by 2010 as has been suggested, this will require significant increases to these DOE biomass budgets, which totaled approximately $110 million in FY01. **An increase of at least 20% per year is recommended for DOE biomass programs**. It is imperative that both research and commercialization efforts be funded to the greatest possible level to avoid the technological "Valley of Death", an end many government-funded technologies have met in the past.

Funding for Biomass Energy Pilot Plants at USFS -- The aforementioned DOE biomass authorization will allow for monies for both biomass research and support of ongoing biomass energy pilot plants. However, there is currently no line item in its appropriations bill for supporting these plants at the Forest Service. While the National Fire Plan of last year allowed for very limited solicitations for these types of projects, the allocation was not enough to make an impact on future forest fire abatement. Region 5 alone received $40 million worth of solicitation responses from hundreds of applicants facing the threat of fire, only to be able to fund approximately $1.2 million in the end. It is astonishing that of the $1.8 billion Congress allocated in Emergency Supplemental appropriation monies last year for the Fire Plan, only this small amount was set aside for large-scale pilot facilities. This lack of resources will not serve in finding a solution to the immense problems facing forest fire abatement tactics using fuel treatment and disposal. DOE is currently burdened with funding all of these pilot plants, several of which are addressing the forest fire issue. **Therefore, ABA would recommend new monies to be authorized and appropriated for FY02 starting at $10 million, and increasing an additional $10 million each year thereafter.** In addition, we would recommend long-term funding of the National Fire Plan overall.

Long-Term Feedstock Contracts -- There is a dire need for reliable, long-term biomass feedstock contracts for biomass energy plants, particularly ones using forest thinnings. While long-term contracts have had a tumultuous history, there has been no greater need for these contracts than today. To be succinct, **if long-term, reliable feedstock contracts (at least five to ten years) are not put in place, biomass energy plants will not multiply anytime in the near future in great numbers, that is, enough to make a difference in a forest fire abatement plan**. Financial institutions are very unlikely to back a project, particularly a new technology such as bioethanol, unless there is a guarantee for long-term feedstock contracts. While ABA understands that this is a lot to ask of a Congress that works on a year-to-year basis on many issues, it is imperative in helping support a robust fledgling biomass industry. ABA cannot stress this point enough.

Tax Incentives -- There are several types of tax incentives which would help support both existing and new biomass facilities:

1) Open-Loop Biomass Tax Credit -- Tax incentives for biopower plants are essential for their existence under the current restructuring of electricity markets. Currently, existing biomass power plants cannot capture the 1.5 c/kWh production tax incentive because the biomass must be dedicated for the use of producing energy, or "closed-loop" biomass plants; no such plants exist today. **ABA recommends that the definition of allowable biomass for this tax credit be opened up to include "open-loop" biomass plants, such as ones using wood and agriculture residues throughout the U.S.**

2) Biomass Co-Firing with Coal Tax Credit -- Many coal plants as well as utilities in the U.S. are becoming more interested in co-firing biomass with coal to help back out their pollutants. States having both coal plants and excess biomass find this idea particularly attractive. **ABA recommends that co-firing biomass with coal be given a 1.0 c/kWh production tax credit for that portion of electricity generation which is derived from biomass.** Most co-firing facilities will co-fire between 5% and 15%of biomass with coal.

3) Incentive for Pro-active Fuels Reduction - **Private forest landowners should receive incentives for pro-actively thinning their forest stands for biomass use in a biopower or bioethanol plant.** This tactic would also help aid overall forest fire abatement. While most of the timber controversy surrounds public lands, these forests should not be overlooked. For example, a California state law provides a $10 per ton incentive directly to the biomass energy plants for material coming from fuels reduction projects. Any incentive that would help off-set the very expensive practice of mechanical thinning of biomass and transportation to a biomass facility would greatly help the biomass industry.

Conclusion

As you can see, conversion of biomass to energy and chemicals is a win-win situation all around, having both short- and long-term implications. Here are just a few examples of the benefits:

-- helps control forest fires and improve forest health by alleviating fuel loading in our forests.

- -creates new bio-based industries which are environmentally sound.
- -produces new energy for the electrical grid for our current and future energy needs, helping abate future energy crises.
- -helps stabilize the U.S. economy, creating jobs in both the forestry and agricultural communities.
- -helps energy security by decreasing our dependency on foreign oil

- -rids of burdensome waste materials normally going to overstocked landfills.

- helps clean up our air through reduction of emissions.

-- helps the farmer through sustainable agriculture and energy crop production, providing an alternative to reliance on agriculture subsidies.

-- helps initiate a carbohydrate-based (versus hydrocarbon) economy with major economic and job creating multipliers.

And most importantly:

-- helps wean the United States from its foreign oil dependency and strengthen our nation's competitive edge by producing a domestic fuel from our own resources.

Thank you, Mr. Chairman and members of this subcommittee, for allowing me to speak on the many benefits of biomass conversion to energy and chemicals for a cleaner and stronger nation for future generations to come.

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