

**Testimony on the Biomass Research and Development Act of 1999 (H.R. 2819)
and the National Sustainable Fuels and Chemicals Act of 1999 (H.R. 2827)**

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Mr. Chairman and members of the Subcommittee,

Thank you for the opportunity to appear today on behalf of the Union of Concerned Scientists (UCS). UCS is dedicated to advancing responsible public policies in areas where science and technology play a critical role. Established in 1969, UCS is an independent nonprofit alliance between many of the nation's leading scientists and thousands of committed citizens. UCS works to ensure that all people have clean air and energy, as well as safe and sufficient food.

I received a B.A. in Political Science and History from Gustavus Adolphus College in St. Peter, Minnesota and a M.S. in Energy Analysis and Policy from the Institute for Environmental Studies at the University of Wisconsin-Madison. For the past nine years, I have worked as an energy analyst for UCS and the state energy office in Wisconsin. During this time, I have completed research assessing the economic and environmental impacts of increasing renewable energy use, including biopower and ethanol, at both the national and state levels. I have also examined the economic, environmental and policy issues related to growing, harvesting and using biomass for power, heat and fuel.

I would like to commend Representative Ewing and Representative Udall for their leadership in introducing bipartisan legislation to support increased biomass use. As I testified on Senator Lugar's bill, UCS strongly supports this legislation for two main reasons. First, additional research and development is needed along with other policies to lower the cost and support the commercialization of new energy crops and advanced technologies to produce power, heat, fuel and chemicals. Second, the federal government has an important role to play in continuing to facilitate and expand bioenergy commercialization efforts to capture the potentially large economic, national energy security, environmental and public health benefits of increased

biomass use. This forward-looking legislation will help create a future in which a ton of biomass is used to produce a variety of value-added products much like a barrel of oil.

Reasons to support increased Biomass Research, Development and Commercialization

There are a number of compelling reasons to support increased biomass research, development and commercialization:

Federal R&D investments have substantially reduced the cost of biomass technologies and energy crops. Over the last two decades, the cost of many biomass technologies has dropped substantially while the conversion efficiency has dramatically improved due to technological breakthroughs realized through public-private partnerships. For example, it costs about one-third as much to produce a gallon of ethanol today as it did in 1980.¹ The cost of energy crops has also fallen as R&D efforts have developed plants that produce higher yields and require fewer energy and chemical inputs. A joint study by the Department of Energy and the Electric Power Research Institute (the research arm of the electricity industry) cites continued federal R&D as a key driver in lowering the cost of generating electricity from biomass gasification to a level roughly competitive with new coal and natural gas plants by 2020.²

Commercialization of biomass technologies and crops will increase national energy security and keep more energy dollars at home. In 1997, over \$60 billion flowed out of the US economy to purchase imported oil, according to the Energy Information Administration.³ By 2020, EIA projects this energy dollar drain to more than double to \$135 billion (in 1997 dollars), as oil imports rise from half to nearly two-thirds of US oil consumption. During the same period, OPEC is projected to increase its market share of total global oil production from 40% to 51%. Many leading experts, including oil industry forecasters and former CIA Director James Woolsey, anticipate another serious oil crisis sometime in the next decade. By increasing our reliance on domestic biomass and other renewable energy resources, a large portion of this money could remain in the economy, creating jobs for Americans, reducing US dependence on unstable foreign fuel imports, and insulating the economy from fossil fuel price shocks and supply shortages.

Biomass has enormous potential to diversify our energy mix. By 2010, biomass has the technical potential to supply up to half of the nation's electricity compared to about 2% today, or up to two-thirds of the nation's motor fuel needs compared to less than 1% today, without irrigation and without competing with food crops.⁴ In January, a UCS study found that under a scenario in which non-hydropower renewable energy sources receive the policy support to grow to 10% of the nation's power by 2010 and 20% by 2020, biomass could provide about one-third

¹ US Department of Energy National Laboratory Directors, *Technology Opportunities to Reduce US Greenhouse Gas Emissions*, November 1997.

² Electric Power Research Institute and US Department of Energy, *Renewable Energy Technology Characterizations*, EPRI TR-109496, December 1997.

³ Energy Information Administration, *Annual Energy Outlook 1999: With Projections to 2020*, DOE/EIA-0383(99), December 1998.

⁴ Biomass potential is from Paul Jefferiss, Union of Concerned Scientists, *Biomass for Energy* factsheet. Biomass contribution to existing and future energy needs from EIA, *Annual Energy Outlook 1999*.

of the renewable power.⁵ We also found that achieving this level would increase electricity bills for the typical residential customer by only 56 cents (1.5%) per month in 2010 and \$1.33 (4%) per month in 2020 than without the policy. But with the policy, electricity prices would still be 9% lower in 2010 and 14% lower in 2020 than they were in 1998.

Domestic commercial success for biomass technologies will create jobs. As biomass becomes increasingly cost-competitive, the industry will experience more rapid economic growth, creating thousands of new jobs -- many of them in manufacturing and rural areas. In 1992, over 66,000 people were directly or indirectly employed in the US biopower industry, generating over \$1.8 billion in income and \$460 million in state taxes. DOE estimates that a concerted effort to develop dedicated energy crops could create 120,000 new jobs over the next 15 years.⁶ A 1993 US Department of Agriculture study found that producing 5 billion gallons of ethanol per year or about 3% of current motor fuel use would create 108,000 new jobs in the US, with more than half of these in the agricultural sector.⁷ A study I completed in 1994 for Wisconsin found that using biomass to provide about 5% of the state's electricity and motor fuel needs would create 2,225 new jobs, \$44 million in income and \$166 million in additional economic activity each year.⁸

New jobs from increased biomass use would also help replace the decline in jobs in the oil and coal industries. Since the end of 1997, the oil industry has lost 55,000 jobs as domestic crude oil production has continued to fall, according to the American Petroleum Institute. The coal industry has lost 171,000 jobs since 1981 despite increased coal production, due to productivity improvements and increased mechanization.⁹

Biomass R&D will also help US companies compete in the multi-billion dollar export market for renewable energy technologies. At least one-third of the world's population -- over 2 billion people -- do not have access to reliable electricity. Many developing countries are turning to small-scale, clean renewable technologies to fill this need. As nations race to gain the technological edge to become the supplier of choice to these countries, the US is falling behind. Continued federal investments will help finish building the foundation for biomass to flourish in the market, place the US as a global leader on sustainable economic development, and lead to further high-paid jobs.

Biomass can have significant environmental benefits. Currently, electricity generation and transportation in the US are responsible for producing two-thirds of carbon emissions and over three-quarters of nitrogen oxide emissions, which lead to smog formation. Electricity generation

⁵ Steven L. Clemmer, Alan Noguee, Michael C. Brower and Paul Jefferiss, *A Powerful Opportunity: Making Renewable Electricity the Standard*, Union of Concerned Scientists, January 1999. The scenario is based on Senator Jeffords proposed renewables portfolio standard in *The Clean Energy Act of 1999 (S. 1369)*.

⁶ National Renewable Energy Laboratory, US Department of Energy, *Dollars and Sense: The Economic Benefits of Renewable Energy*, DOE/GO-10097-261, September 1997.

⁷ M. Petrusis, J. Sommer, and F. Hines, US Department of Agriculture, *Ethanol Production and Employment*, Agricultural Information Bulletin Number 678, 1993.

⁸ Steve Clemmer and Don Wichert, Wisconsin Energy Bureau, *The Economic Impacts of Renewable Energy Use in Wisconsin*, 1994.

⁹ Based on data from the US Department of Commerce, Bureau of Labor Statistics.

is also responsible for two-thirds of sulfur dioxide emissions, half of nuclear waste, and a substantial amount of airborne particulates and toxic mercury. In a deregulated environment, and the ensuing race to produce the cheapest electricity, these problems could become even worse.

By contrast, biomass that is grown and harvested in a sustainable manner and used in advanced technologies produces essentially no sulfur, mercury and other toxic emissions, the same or lower nitrogen oxide emissions, and near zero net carbon emissions. Therefore, increased biomass use can provide a hedge against increasing costs from potential greenhouse gas reduction targets, and can help meet national and regional air quality goals.

While increases in biofuels for transportation can help reduce greenhouse gas emissions, UCS recognizes the potential for adverse impacts on air quality, air toxics and water quality if there are inadequate evaluation and safeguards. We support increased ethanol use in transportation where it can be demonstrated that there will not be an adverse impact on public health and the environment. We support full evaluation of the impacts of biofuels as compared to the likely alternatives, especially compounds that potentially would replace MTBE in the California and federal reformulated gasoline programs. In addition, using high ethanol blends in advanced engines, such as those found in hybrid electric vehicles, could achieve substantial air quality benefits.

Growing cellulosic grasses and trees can also provide environmental benefits compared to producing biomass from conventional row crops like corn, especially when grown on marginal or degraded lands. Perennial grasses require relatively few chemical inputs to promote growth, providing benefits to both soil and water. Erosion is reduced by up to 99%, the organic content of the soil is increased, and there is improved aeration and water penetration. Fertilizer and pesticide use is reduced by 80-90%, and grasses serve as chemical and physical filters to absorb run-off and erosion from elsewhere. Planted near waterways, they can also provide flood control and shade to reduce water temperature and biological oxygen demand, thereby reducing eutrophication and turbidity.

Energy crops also offer significant habitat improvements over annual row crops. They provide habitat diversity, can augment natural habitat, and can be harvested to avoid critical nesting and breeding seasons. Of course, increased biomass use would also reduce the environmental impacts of coal mining, and oil and natural gas drilling, spills and pipeline leaks, which contaminates land and water and harms wildlife and human health.

Despite these potential environmental benefits, biomass production could have negative impacts if it is not grown and harvested sustainably or if energy crops replace natural habitats. In addition, the inappropriate use of genetically engineered crops should be avoided, especially in light of recent scientific evidence showing severe adverse effects on monarch butterfly caterpillars that were fed pollen from genetically modified Bt corn. Developing energy crops that follow the principles of sustainable agriculture should help mitigate negative environmental impacts.

We were pleased to see language included in both bills requiring biofuels to be produced in ways that enhance overall environmental quality and use sound land-use management practices to protect wildlife habitat and biological diversity concerns.

Recommendations

We have three recommendations for strengthening this legislation. First, we recommend combining the strengths of both bills into a single piece of legislation. One possible approach would be to incorporate the best ideas from Representative Udall's bill into Representative Ewing's bill, which is virtually identical to the bill introduced by Senator Lugar. In particular, we would suggest using language from Representative Udall's bill that would place greater emphasis on studying the environmental impacts of increased biomass use; place greater emphasis on funding development and demonstration projects under uses of grants; exclude incineration of unsegregated municipal solid waste and contaminated biomass wastes as being eligible for funding; and establish and require the use of a set of criteria to assess the economic and environmental impacts of increased biomass use under reporting requirements. We also believe that all projects that receive funding under this legislation should be treated the same. The section "Authorization of Appropriations for Ethanol Research Pilot Plant" in the Ewing bill does not contain any information about the merits of funding such a project.

Second, under the section "Uses of Grants, Contracts and Financial Assistance," we would support additional research on the positive and negative environmental impacts of increased biomass use. In particular, this could include an evaluation of air and water quality issues related to using different ethanol blends in both conventional and advanced vehicles and in reformulated gasoline (RFG), as well as identify ways to mitigate any negative impacts. The RFG study could also examine ethanol fuels that meet the RFG specifications as compared to the little understood replacements (e.g. alkylates, toluene, etc). Research could also evaluate the potential impacts of using particular genetically modified crops. The bill could also require grant proposals to include an evaluation of environmental impacts as part of the criteria for selecting eligible projects.

Third, under the section "Uses of Grants, Contracts and Financial Assistance," we would also support additional research, development and demonstration projects that would identify and create long-term sustainable markets for biomass use. Energy crops and advanced technologies will continue to have difficulty reaching commercialization without a guaranteed and stable market. These projects could identify promising areas for increased market penetration and mechanisms to reduce financial risks for farmers and developers. The Chariton Valley project in Iowa and the Salix Consortium in New York are good examples of successful public-private partnerships to create a market for generating electricity from energy crops. Allowing biomass to be co-fired with coal in existing utility boilers has provided a market for biomass fuels that will help researchers develop the most cost-effective and efficient ways to grow energy crops from willows and switchgrass. These crops could ultimately be used in more advanced technologies, such as biomass gasification or fuel cells, when they become fully commercialized.

Conclusion

For every taxpayer dollar spent on biomass R&D, the federal government is providing America with rural economic revitalization, development of high-technology industries, increased national energy security, and environmental benefits. Furthermore, biomass technologies and crops -- once commercialized -- can help hold down the overall cost to taxpayers of preserving

the environment and protecting public health. For these reasons, we strongly support this legislation.

Finally, while this legislation will make an important contribution to lowering the cost and supporting the development of new crops and advanced technologies, other policies will also be necessary to create a vibrant and sustainable market for biomass. First, UCS supports proposals to create minimum renewable energy content or portfolio standards that would require a growing share of US electricity and transportation fuels to include renewable resources over time. Second, UCS also supports extending the tax credits for biomass and wind power, which expired at the end of June and is now being considered in the tax extender bills, and expanding the definition of biomass beyond dedicated energy crops to include other clean biomass resources. These policies are needed to capture the public benefits of biomass and other renewables, which are not included in energy prices, and that place renewables at an economic disadvantage. They will also help create a stable long-term market for biomass and reduce investment risks, as the US develops the biomass feedstock supply infrastructure and advanced technologies.

Again, thank you for this opportunity to provide the views of Union of Concerned Scientists and our members on this important legislation.