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Feds Seek to Ignite Bioenergy Research

MEGAN DEBRANSKI KELHART

Whether from a desire to reduce dependency on foreign oil, to develop new rural economies, or to reap potential environmental benefits, bioenergy-related research has captured enormous national attention in the last couple of years. In June 2007, the Department of Energy (DOE) announced that it would spend \$375 million over the next five years on three bioenergy research centers in Wisconsin, Tennessee, and California. The centers' mission is to investigate various aspects of bioenergy development, including the conversion of cellulosic biomass to sugars, the biological and chemical processes associated with conversion, and the economic and environmental sustainability of converting biomass to energy.

"The collaborations of academic, corporate, and national laboratory researchers represented by these centers are truly impressive, and I am very encouraged by the potential they hold for advancing America's energy security," said DOE Secretary Samuel W. Bodman.

Tim Donohue, director of the DOE's Wisconsin Bioenergy Initiative, said that the Wisconsin center "will bring forth technologies that are economically viable, environmentally sustainable, and able to improve the quality of life on Earth." The chancellor of the University of Wisconsin–Madison, John D. Wiley, agrees: "We have much to offer in terms of breaking the fossil fuel habit and laying the foundation for sustainable and environmentally sound bioenergy technologies."

But even as the government funnels money and resources into bioenergy production research, several prominent scientists warn that more questions need to be asked—namely, what are the potential environmental, ecological, and economic effects of bioenergy production, and are federal funding agencies considering these effects?

David Pimentel, professor emeritus at Cornell University, worries that "few of the appropriate policy issues"—and "very few of the environmental issues"—are being addressed. Corn-based ethanol production, he says, "causes more soil erosion and uses more nitrogen fertilizer, insecticides, and herbicides than any other crop grown." In November 2006, Pimentel wrote a *BioScience* editorial urging that priority be given to "energy conservation and development of renewable energy sources, such as solar cells and solar-based methanol synthesis."

On 10 October 2007, the National Academies issued *Water Implications of Biofuels Production in the United States*, a report that echoes many of Pimentel's concerns. The report concluded that incorporating more biofuel crops into agricultural practices would affect water quality and quantity. Furthermore, "converting pastures or woodlands into cornfields, for example, may exacerbate problems associated with fertilizer runoff and soil erosion." The report also predicted that if the projected increases in the use of corn for ethanol production occur, the "harm to water quality could be considerable."

Results from a study funded by the Mid-Atlantic Regional Water Program, the Chesapeake Bay Foundation, and the US Department of Agriculture's Agricultural Research Service were released a few months ago. The study, an examination of the potential effects of biofuels on water quality, recommends pursuit of a "diversified portfolio of biofuels" and federal funding "to support research and development of ecologically sustainable perennial grass or tree-based cellulosic ethanol," although it acknowledges that "grain-based ethanol will be dominant for the foreseeable future."

Ecosystem scientists are already ramping up research programs to explore how to create such an environmentally

sustainable biofuel enterprise. Some researchers have suggested that problems with water quality, erosion, and runoff may be mitigated if corn farmers avoid till management, plant cover crops, and use less fertilizer. Moreover, wildlife may even benefit from the use of landscape-appropriate biomass crops. These were among the issues recently explored with policymakers on Capitol Hill at a science briefing on bioenergy sponsored by the Association of Ecosystem Research Centers (AERC).

Clifford Duke, science director for the Ecological Society of America (ESA), attended the AERC briefing and commented, "There is a growing effort on the part of working scientists, agencies, non-governmental organizations, and the NAS [National Academy of Sciences] to ensure that the ecological, environmental, and social implications of bioenergy production are thought through in a systematic way, and that policymakers are adequately informed about those implications."

In an effort to trigger a dialogue between researchers and policymakers, the ESA is convening a national conference on the ecological dimensions of biofuels in March 2008. According to the ESA Web site, the 500 expected attendees will hear presentations on the sustainable development and use of biofuels; social, biogeographic, land-use, and biodiversity considerations; and ecological dimensions of alternatives for crop selection and production, harvest and transport of product to refinery, and refining of liquid fuels and other coproducts.

The hope is that more research and better communications will help lead to a sustainable—and environmentally and economically viable—energy alternative.

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