A new sustainable economy is slowly emerging, an economy which will rely increasingly on renewable sources of energy such as wind, solar, geothermal and biomass. Farmers can be at the forefront of this revolution; utilizing the commodities they grow, and even the waste streams they now must dispose of, in innovative new ways to produce power, transportation fuels, and a new generation of biobased products and chemicals. Linking agriculture and renewable energy is key to diversifying our energy market, protecting our environment, and revitalizing rural America — truly a “win-win-win” opportunity that is good for American farmers and good for the country.

Increasingly, we rely on imported oil to produce the fuels that power our nation, including our farms. Currently the United States imports more than 50 percent of its oil, which accounted for approximately one quarter of the 2000 trade deficit at over $100 billion. At this level of dependence, we have little control over oil prices, which consumers have seen fluctuate unpredictably in recent years. World production of oil is predicted to peak between 2010-2020, which will lead to sharp price increases in years to come. Yet if the full environmental and social costs were factored into the market price, oil would be considerably more expensive.

Agriculture can be an important part of the solution to meeting our nation’s energy needs, mitigating global climate changes and revitalizing our rural communities. How bioproducts and biomass can be vital parts of the solution to meet our nation’s energy needs, mitigating global climate changes and revitalizing our rural communities.

Jeremy Ames and Carol Werner

2002 FARM BILL
REVITALIZING THE FARM ECONOMY VIA RENEWABLE ENERGY DEVELOPMENT

How bioproducts and biomass can be vital parts of the solution to meet our nation’s energy needs, mitigating global climate changes and revitalizing our rural communities. The benefits of bioenergy were recognized in title III of the Agricultural Risk Protection Act of 2000 and Executive Order 13134 which set the goal of tripling the use of biofuels and biobased products by 2010. By utilizing the renewable resources on America’s farmland, we can generate electricity, fuel our vehicles, and create a variety of products, all of which can provide new revenue streams to farmers. Tremendous untapped renewable resources exist throughout the country. Biomass, defined as any organic matter available on a renewable basis, is one such resource. Burdensome waste streams can be converted into revenue streams, including crop residues, animal manure, forestry residues, and segregated organic municipal wastes. Over one billion tons of waste are produced annually by the farming sector. Another method of biopower production is the anaerobic digestion of animal manures. Animal wastes, particularly in large-scale livestock operations, are usually stored in “lagoons,” which often leak and contaminate groundwater, and release vast amounts of methane, a natural by-product of decay and a very potent greenhouse gas (GHG). Anaerobic digesters are a viable alternative, wherein the manure is stored in an enclosed tank to facilitate its partial digestion by anaerobic bacteria. The methane emitted is captured and burned to produce on-farm heat, and in larger scale operations, electricity that can be sold on the grid. The solid by-products of anaerobic digestion are ideal for fertilizer or for the production of biobased products.

BIOFUELS AND BIOBASED PRODUCTS

As explained in an accompanying article in this section on renewable energy, biofuels — such as ethanol and biodiesel — can be mixed with petroleum fuels in smaller percentages and used in standard engines, or be used in higher percentages as stand-alone fuels in modified engines. Research is being conducted to bring down the costs of utilizing cellulose, a complex molecule found in the cell walls of all plants, to produce ethanol. This would allow conversion of crop residues, forestry residues, segregated organic municipal wastes, and energy crops into ethanol. According to the Argonne National Laboratory, cellulosic ethanol could achieve over a 100 percent reduction in GHG emissions compared to petroleum, because less energy is needed to produce the feedstock (little or no cultivation and few inputs) and the CO2 emitted is reabsorbed by plants, making the process a closed carbon cycle. Cellulosic ethanol could be produced throughout the country, creating new revenue streams for...
Burdensome waste streams can be converted into revenue streams, including crop residues, animal manure, forestry residues, and segregated organic municipal wastes.

The Environmental and Energy Study Institute (EESI) in Washington, D.C. provided policy recommendations for the 2002 Farm Bill in a report issued in early September. The following are some of those recommendations for existing programs:

**Conservation Reserve Program** — CRP is the largest of the Farm Bill conservation programs, with a current enrollment cap of 36.4 million acres (equivalent in size to the state of Iowa). Its mission is to preserve land vital for soil conservation, water quality protection, and wildlife habitat. EESI recommends adding renewable energy production to those goals that would: Permit the growing of biomass crops, and the harvesting of biomass, for the production of biopower, biofuels, and biobased products, on CRP lands with an appropriate reduction in rental payments. The rental reduction should not be so high as to cancel any incentive for a farmer to undertake a biomass project.

**Natural Resource Conservation Service** — NRCS manages most of USDA's conservation programs, and provides farmers with technical assistance to better manage their natural resources. EESI recommends that NRCS give a higher priority in awarding Environmental Quality Incentives Program (EQIP) contracts to producers who propose to convert animal waste operations over to anaerobic digestion systems for the capture and burning of biogas to produce heat and electricity.

**Rural Business-Cooperative Service** — RBS provides financial and technical assistance to establish and sustain agricultural cooperatives. EESI recommends that the mission of RBS should explicitly state that farmer owned cooperatives are a crucial component of renewable energy development and that it provide grants and loan guarantees to establish cooperatives or expand existing cooperatives to undertake wind, biopower, biofuel, and bioproduct development projects; and Give priority funding to proposals that aim to produce several marketable products in the same integrated facility, such as a biorefinery.

**Biomass Research and Development Initiative** — A multiagency effort to coordinate and accelerate all Federal biobased products and bioenergy research and development, as outlined in the Biomass Research and Development Act of 2000 and Executive Order 13134. EESI recommends that the Farm Bill fully fund the Biomass Research and Development initiative at its authorized level of $49 million a year, as authorized in the Biomass Research and Development Act; and Extend the initiative from 2005 to 2010, conducting a review in 2005 to determine which areas of research have proved the most promising.

**Land-Grant Universities** — These public institutions should expand the mission of the Cooperative Extension Service (CES) for the development of renewable energy resources on America's farmland. The universities should provide funding to CES for education and technical assistance to farmers...
and farmer-owned co-ops for development and marketing of renewable energy resources, including biomass, wind, solar and geothermal. The CES should also conduct outreach to the general public on the societal benefits of developing these resources.

The proposed Sun Grant Initiative would create a network of regional centers at the Land Grant Universities to coordinate and fund research and outreach for the development of biopower, biofuels and biobased products.

The CES should work in close collaboration with the Regional Biomass Programs, sponsored by the Department of Energy. Together, the organizations should provide assistance to farmers for growing, handling, and processing energy crops and waste streams for the production of biopower, biofuels and biobased products. Where possible, the two organizations should share resources, staff and expertise.

**NEW PROGRAMS**

EESI also recommends that some new programs related to renewable energy be developed as part of the 2002 Farm Bill. These include:

**Renewable Resource Assessment** — Provide grants within the Fund for Rural America or other programs to state and local governments, universities, or the CES to do renewable resource assessments on agricultural lands. Farmers, cooperatives, and economic development agencies cannot develop their renewable energy resources without first identifying the kind, extent, and economic value of those resources. Using national assessment data conducted by the National Labs as a guide, state and local governments can inventory their regional renewable energy resources. These should include wind, solar, geothermal, and biomass, including waste streams. The information should be available to the public. Funding should also be provided to do the necessary environmental assessment before developing an identified resource.

**Renewable Portfolio Standard** — Establish a national Renewable Portfolio Standard that will require 20 percent of power generated in the United States by the year 2020 to be derived from nonhydro renewable energy sources. This ensures a market for renewable power, critical to the development and use of renewable energy across the country and on America’s farms.

**Renewable Fuels Standard** — Establish a national Renewable Fuels Standard that would require an increasing percentage of transportation fuel sold in the United States to be renewable biofuels, such as ethanol and biodiesel. The RFS should contain a credit trading system to allow refiners, blenders, and retailers to buy and sell credits from each other to meet their content goals. The RFS should also contain an incentive to expand the production of cellulosic ethanol.

**Carbon Sequestration Pilot Projects** — Atmospheric carbon can be sequestered in...