Environmental and Energy Study Institute

Issue Brief

Renewable Biomass Can Help Reduce U.S. Petroleum Dependence: Farm Bill Energy Programs Are Key

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Renewable biomass has a significant potential to improve U.S. energy security, advance rural economic development and energy security, protect and restore water quality and other environmental resources, and help mitigate and adapt to the effects of climate change. The 2008 Farm Bill energy programs were designed to help address these issues, and they are just beginning to make a difference. A relatively small public investment (less than $2 billion over five years) has gone a long way, and it has been multiplied many-fold by other matching public and private investments.

Perennial and short-rotation biomass energy crops are now being established across thousands of acres of marginal lands from Oregon to Pennsylvania and across the South, and these project areas will soon be supplying biomass-to-energy conversion facilities nearby to produce biofuels, heat, power, and bio-based products. The production of advanced biofuels and bio-based alternatives to petroleum are at the cusp of ramping up to commercial scale. And, hundreds of agricultural producers, rural businesses, communities, and institutions are developing local renewable biomass energy resources for heat and power in place of much more expensive heating oil, propane, and electricity.

All of this has been stimulated by federal research and development, educational agricultural extension, grants, low-cost loans, loan guarantees, and production tax credits provided in the 2008 Farm Bill. However, another five years of support is critically needed—so that the full public benefits of these initial investments can be realized, and so that rural America can begin to fulfill its tremendous potential to address these pressing national challenges.

U.S. Petroleum Dependence

In 2006, President George W. Bush declared that "America is addicted to oil" and announced accelerated initiatives to develop "cutting-edge methods of producing ethanol, not just from corn but from wood chips, stalks, or switch grass." President Barack Obama has pursued this priority as well. But nonetheless, the United States still remains highly dependent on oil. In 2011, oil provided 36 percent of total U.S. primary energy consumption. About 71 percent was used for transportation, 23 percent for industrial feedstocks, and about five percent for residential and commercial space heating. Petroleum accounted for 93 percent of the fuel used by the transportation system.[1]

This dependence comes at a high price. The price of petroleum has been extremely volatile in recent years. Since 2010, prices (European Brent spot market) have spiked from below $70 per barrel in May 2010 to over $128 in March 2012. Just four years earlier, in 2008, spot prices spiked to more than $140 before plunging down below

$35 by the end of the year.[2] Ross DeVol of the Milken Institute estimates that a $10 dollar per barrel increase in the global price of oil from $95 to $105 could shave about 0.2 percent off the U.S. economic growth rate and increase unemployment by 0.1 percent.[3] In 2011, the United States spent more than $331 billion on petroleum imports, up more than 31 percent over 2010.[4]

The long-term trend in global petroleum prices is assuredly up as global demand outpaces new discoveries, as new petroleum becomes increasingly expensive to produce, and as tensions remain high in the Persian Gulf and other oil-producing regions. Continued petroleum dependence will increasingly wreak havoc with household budgets, drain money out of the nation's economy, and undermine U.S. national security. As long as the United States remains dependent on oil from anywhere, the well-being of American consumers and the U.S. economy will depend on global factors largely beyond U.S. control that will affect global oil markets.

The United States cannot control the global price of petroleum as it once did. However, the nation *can* reduce its vulnerability to petroleum price shocks by reducing domestic oil demand. There are many ways to do this, including reducing fuel use, expanding public and alternative transit, improving vehicle fuel efficiency, and developing more affordable electric/hybrid vehicles. Shifting to biofuels can help significantly, too. Scientists at the DOE-funded Energy Biosciences Institute at the University of California, Berkeley, recently estimated[5] that biofuels could provide as much as 30 percent of total U.S. transportation fuel by 2037—compared to roughly four percent today.

The *Renewable Fuel Standard* (RFS), enacted by Congress in 2007 as part of the *Energy Independence and Security Act*, which calls for 36 billion gallons of biofuel production by 2022, allows up to 15 billion gallons of ethanol to be made from cornstarch. In 2011, the industry produced about 13.9 billion gallons of ethanol,[6] the equivalent of about ten percent of U.S. gasoline consumption by volume.[7] This reduced demand for petroleum and put downward pressure on prices for all fuel consumers. Du and Hayes[8] estimate that the price of gasoline at the pump was reduced by as much as $0.89 per gallon on average below what the price would have been. In addition, biodiesel production increased dramatically in 2011, displacing 967 million gallons,[9] further reducing U.S. petroleum demand. The RFS requires at least one billion gallons of renewable diesel to be blended into the fuel supply by 2022.

Today, the corn ethanol and biodiesel industries directly support more than one hundred thousand domestic jobs, mostly across rural America, and indirectly support hundreds of thousands of additional jobs throughout the U.S. economy. These industries recycle energy dollars in communities here at home within the U.S. economy rather than exporting those dollars to other oil-producing nations.[10]

The RFS also calls for producing 20 billion gallons of more environmentally sustainable, advanced biofuels (made from almost anything except cornstarch) by 2022. However, various effects of the economic recession have slowed progress toward deploying this next generation of biofuels. Domestic demand for liquid fuels is down overall, and the market for ethanol is saturated; agricultural producers and foresters are only just beginning to produce the large quantities of cheap biomass that advanced biorefineries will need; and private financing has been difficult to find for building the first commercial scale biorefineries for this brand new industry.

Farm Bill Energy Programs Can Help

The 2008 Farm Bill established a number of programs to help expand the biofuels industry and reduce U.S. oil dependence.[11] You can see what kinds of projects have occurred in your area by going to the USDA Energy Investments Map on USDA's website.[12]

The **Biomass Crop Assistance Program** (BCAP) provides payments to biomass producers to establish energy crops on marginal lands within project areas near biomass energy conversion facilities, such as biorefineries or biopower plants. So far, 11 project areas have been established, covering tens of thousands of acres, in Arkansas, California, Kansas, Missouri, Montana, North Carolina, Ohio, Oklahoma, Oregon, New York, Pennsylvania, and Washington. However, this is just a drop in the bucket compared to what will be needed to meet the RFS challenge by 2022. The USDA[13] estimates that 27 million acres of pasture and other marginal lands may be needed for energy crops (in addition to dramatically increasing the use of residues from agriculture and forestry activities from other land).

The types of energy crops being established in these project areas include camelina, hybrid poplar trees, shrub willow, miscanthus (two sterile varieties), switchgrass, and mixed poly-cultures of native grasses and forbs. It will take anywhere from two to seven years for most of these perennial crops to become established. The BCAP payments help producers cover a portion of their costs and the foregone revenue from their land during the years while the crops are being established. When mature, these crops will produce from three to 15 tons of biomass per acre per year, depending on the plant variety, local soils, and weather. An advanced biorefinery or biopower plant may need 500,000 to 600,000 dry tons of biomass each year to produce 40 million gallons of biofuel.

The **Biorefinery Assistance Program** provides loan guarantees for the development, construction, and retrofitting of advanced biorefineries. The USDA[14] estimates (USDA, 2010) that to produce 20 billion gallons of advanced biofuels by 2022, the United States will need to build about 527 new biorefineries, each producing about 40 million gallons of biofuel per year. Each will need to develop sustainable local biomass supply chains to collect, harvest, transport, store, and process the large volumes of biomass. Building all of these biorefineries is projected to cost about $168 billion.

Loan guarantees are critical for this start-up industry—until several successful commercial-scale plants are up and running profitably. Risk-adverse investors in today's uncertain economic and policy environment are hesitant to put up that kind of cash for relatively new and unproven technologies. Only a couple commercial-scale, advanced biorefineries are operating as of now. Several others are under development or construction. Most of these have received loan guarantees or grants under this or other federal programs.

The **Bioenergy Program for Advanced Biofuels** provides grants to eligible agricultural and forestry producers to encourage production of a wide range of biofuels, including wood pellets. Locally produced, biomass pellets and clean, state-of-the-art, high-efficiency wood burning stoves provide an economical alternative to oil and propane space heating across rural America.

The **Biobased Market Program** addresses the other 23 percent of the barrel of oil not used for transportation. This program promotes the development of markets for biobased products by facilitating federal agency procurement of biobased products and developing and managing a voluntary labeling program to identify and encourage the use of biobased products.

The **Biomass Research and Development Initiative** provides competitive grants for research, development, and demonstration projects to help advance all aspects of the commercial-scale production of biofuels and biobased products. These activities are critical to reducing the technological uncertainties involved in producing advanced biofuels.

The **Rural Energy for America Program** (in part), **Community Wood Energy Program,** and the **Forest for Biomass Energy Program** focus on developing local renewable energy markets and technologies to better utilize local biomass for heat and power for rural businesses, agricultural producers, and rural communities. This often can reduce dependence on locally imported heating oil or propane, reduce energy costs, and create local jobs.

Conclusion

Supporting a strong energy title in the Farm Bill, with mandatory funding, is key to reducing the nation's dangerous dependence on petroleum fuels and feedstocks and to building a strong, vital, renewable energy industry based upon America's working lands. Continuing investment in rural energy efficiency, sustainable bioenergy, and other forms of renewable energy is a win-win for energy security; rural economic development; creating jobs; and protecting the environment.

Domestically-produced biofuels, biomass heating, and bio-based chemicals and products will help American consumers and businesses avoid future runaway costs for petroleum-based fuels and feedstocks. Domestic bioenergy and bio-products industries will recycle hard-earned energy dollars here at home, stimulating more investment and job creation, while reducing the nation's unsustainable trade deficit. The supply chain for these industries can help put America back to work producing renewable biomass, building biorefineries and infrastructure, reducing energy costs for rural producers, businesses, and households, and sustaining U.S. global leadership in clean, sustainable, renewable energy technologies.

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This issue brief is available electronically (with hyperlinks) at *www.eesi.org/papers*.

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[14] Ibid.