

U.S. Department of Energy - Energy Efficiency and Renewable Energy
Project Management Center

EERE-PMC News

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April, 2007

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This month PMC-News explores the [Biomass Program](#). Biomass energy is now ahead of hydropower as our largest source of renewable energy, providing 47 percent of total renewable energy in the U.S.

In 2003, biomass provided 2.9 quadrillion Btus (quads) of energy, or about 4 percent of total U.S. energy production ([EIA Monthly Energy Review](#)). Consider the fact that biomass is currently the only available source of alternative liquid transportation fuel and you quickly understand the policy emphasis being placed on biomass-produced energy.

In February, DOE announced an investment of [\\$385 million in six cellulosic ethanol projects](#). This was followed in late March with another announcement of [\\$23 million for five cellulosic conversion projects](#).



Baling corn fodder on a High Plains farm.

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Technical Assistance Project opens door to energy experts

The Technical Assistance Project (TAP) provides state and local officials with quick access to experts at DOE national laboratories for assistance with crosscutting EERE policies and programs. The laboratories include the National Renewable Energy Laboratory (NREL), Oak Ridge National Laboratory (ORNL) and Lawrence Berkeley National Laboratory (LBNL).

TAP helps states with customized, short-term assistance in areas not covered by other DOE programs; examples include:

- System benefit charges or other rate-payer funded utility programs;
- Renewable or efficiency portfolio standards;
- Use of clean energy technologies to help address air emissions;
- Use of renewable energy on state and local public lands;
- Use of EERE technologies for disaster relief and planning, mitigation;
- Other EERE activities supported through DOE's State Energy Program.



NREL researcher studies the applied fluid dynamics.

Projects are limited to approximately \$5,000 or between 30-60 hours of staff time. Funding is used to cover staff time and is not distributed directly to the applicant.

As of March 2007, TAP has responded to 125 requests in 43 states, and has provided more than \$670,000 worth of assistance to state and local officials.

The application process is quick and simple. Many projects begin to receive assistance within a week or two.

For more information or to apply for TAP assistance, contact:

- Jerry Kotas, Golden, (303) 275-4850; jerry.kotas@go.doe.gov
- James M. Ferguson, NETL, (412) 386-6043; james.ferguson@netl.doe.gov

More information is available at the TAP Web site: http://www.eere.energy.gov/wip/technical_assistance.html

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DOE awards \$112 million to weatherize homes

DOE awarded [weatherization grants to 30 states and the Navajo Nation](#) totaling \$112 million on March 29. Weatherization grants are made twice a year, April 1 and July 1, based on the fiscal year of the receiving state. Weatherization grants improve the home energy efficiency of low-income families with elderly members, people with disabilities and children. On average, weatherization improvements reduce energy costs of each home by \$358 per year. Each state, the District of Columbia, the Navajo Nation and the Inter-Tribal Council of Arizona will receive weatherization grants this year.

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Training for energy efficient building management

To assist housing providers in taking advantage of opportunities to reduce energy consumption and ensure the continued affordability of housing, the U.S. Department of Housing and Urban Development (HUD) is offering four [3-hour training modules on energy efficient building management, housing rehabilitation and new construction via](#)

[satellite broadcasts and webcasts.](#)



NREL's Science and Technology Facility, completed in 2006, encompasses the latest in green building techniques and advanced energy efficiency technologies.

HUD's Energy Efficiency Training is intended to provide an introduction to energy efficiency for operators, managers and developers of affordable housing projects, both single-family and multifamily.

Information and technical guidance will be presented by a faculty of nationally recognized experts in building science as well as hands-on construction experts who have practical experience and demonstrated success in reducing energy costs through better design and building practices.

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Green building to skyrocket by 2010 to half of new homes

More than 1,000 housing industry professionals at the 9th annual [National Association of Home Builders' Green Building Conference](#) heard that sustainable building products and techniques are advancing quickly into the mainstream. NAHB is moving aggressively to bring the movement to national prominence.



As energy costs increase, home builders and buyers become more aware of the advantages of energy efficient home design.

Based on a survey of NAHB home builders conducted last year by [McGraw-Hill Construction](#), between 40 percent of the homes built in 2010 are expected to be green, containing at least three of five green building elements. This represents a major jump in green market activity.

Last year, according to McGraw-Hill estimates, about 2 percent, or \$7.4 billion, of the residential construction market was green.

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DOE to provide \$14 million for battery research



Lithium ion batteries offer high energy output and long battery life.

DOE announced on April 5 it will provide up to \$14 million of a \$28-million-cost-shared solicitation for [plug-in hybrid electric vehicle](#) (PHEV) battery development.

The U.S. Advanced Battery Consortium (USABC) has issued the call for proposals. DOE and USABC aim to improve battery performance so vehicles can drive up to 40 miles on electricity before recharging, or the range of most daily roundtrip commutes.

The research will seek to identify battery technologies having the potential to be commercialized and quickly brought to market, in addition to meeting USABC's criteria for performance, weight, life-cycle and cost.

DOE's Office of Energy Efficiency and Renewable Energy's FreedomCAR and Vehicle Technologies Program is working with industry to bring PHEV's to market and advance the President's [Twenty in Ten plan](#), which aims to reduce gasoline usage 20 percent by 2017.

USABC is the industry arm of the partnership, and as a consortium of the U.S. Council for Automotive Research, supports collaborative research among DaimlerChrysler Corporation, Ford Motor Company and General Motors Corporation to develop electrochemical energy storage technologies that support the commercialization of fuel cell, hybrid, and electric vehicles.

The deadline for submission is May 31. See the [DOE press release](#), the USABC's [request for proposals](#), and DOE's [FreedomCAR and Vehicle Technologies Program](#) Web site.

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E85 pump projects move forward in Indiana

Less than a year ago, Indiana governor Mitch Daniels was joined by Lt. governor Becky Skillman, United States Secretary of Energy Samuel Bodman and executives from General Motors and Meijer as they opened Indiana's 30th public E85 pump. Meijer at that time also announced their plans for 19 additional E85 pumps across the state. Today Meijer has completed the project and Hoosier drivers can now fill their flex-fuel vehicles with E85 at Meijer Supercenter gas stations across the state. A total of 82 E85 pumps are now in operation across Indiana.



Indiana is just one state of many scrambling to bring more biofuel pumps online to meet motorists' demand for biodiesel and E85.

To install the E85 pumps, retailers across Indiana partnered with the state through a grant program administered jointly by the Indiana State Department of Agriculture (ISDA) and the Office of Energy & Defense Development

(OED). There are now more than 80 E85 pumps and eight B20 biodiesel pumps operating in 37 counties in Indiana. ([Indiana's E85 and B20 pumps](#))

Biofuels are a key element in Indiana's strategic energy plan. Indiana officials believe they have a bottom line impact on our energy independence, our energy security and economic development in the Hoosier state.

A separate project to bring E85 pumps from Gary, Ind. to Mobile, Ala. is also making headway. The multi-state project, administered by OED provides funding for E85 and B20 stations along the Interstate 65 corridor through Indiana, Kentucky, Tennessee and Alabama. Indiana has four stations in operation, with many more to come. Tennessee should have pumps on line sometime this summer.

The I-65 project received \$1.3 million in funding made available by DOE through the Clean Cities Program in this effort to expand the availability of E85 ethanol fueling stations from the Great Lakes to the Gulf of Mexico.

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Ohio adopts renewable energy portfolio recommendations

In a step forward for renewables, the Ohio Public Utilities Commission recently approved recommendations that address renewable energy portfolio standards, net metering, advanced metering infrastructure and demand response, interconnection and stand-by rates. [Details of the action.](#)

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Missouri Co-op wins Wind Cooperative of the Year Award

DOE's Wind Powering America and the National Rural Electric Cooperative Association presented the Wind Cooperative of the Year Award to Associated Electric Cooperative Incorporated of Springfield, Mo.

The award was presented at the opening session of TechAdvantage 2007 in Las Vegas, Nev., in March, with 600 utility managers, engineers and material procurement staff in attendance.

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29th Symposium on Biotechnology for Fuels and Chemicals

Topics as diverse as Feedstock Genomics and Development and Biorefineries and Advanced System Concepts will be covered at this well-known symposium for scientists, engineers and others working in the biomass energy field.

The meeting will be held April 29--May 2 at Denver's Adams Mark Hotel and sponsored by NREL. Full details and registration information can be found at the [symposium's Web site.](#)

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Accelerating the pace of biomass technology

In 2000, DOE established the [National Bioenergy Center \(NBC\)](#), a virtual center of biomass R&D efforts, to unify EERE's efforts to advance technology for producing fuels, chemicals, materials and power from biomass.

Five DOE laboratories make up the NBC:

- National Renewable Energy Laboratory, the epicenter of the NBC;
- Oak Ridge National Laboratory;
- Idaho National Laboratory;
- Pacific Northwest National Laboratory; and,
- Argonne National Laboratory.



New York state researchers record the growth of hybrid willow trees being grown for biomass.

Each lab also partners with educational institutions, state and local governments and companies across the country.

NREL focuses on perfecting new technologies to convert cellulosic materials into fuel. The idea is to help make cellulosic ethanol as cheap as corn ethanol within the next five years. The long term goal is to make cellulosic ethanol cost competitive with gasoline produced from petroleum by 2030.

NREL: NREL is researching biochemical and thermochemical conversion technologies and renewable diesel technologies. ([NREL biomass program](#))

ORNL: ORNL research involves the collection, storage and transportation of biomass feedstocks. ([ORNL biomass program](#))

INL: INL is focusing its research on biomass harvesting technology, particularly as it relates to wheat straw. ([INL biomass program](#))

PNNL: PNNL's research involves developing and applying novel thermal, chemical and biological processes to convert biomass into industrial and consumer products, fuels, and energy. ([PNNL biomass program](#))

ANL: ANL is researching Life Cycle Analysis, comparing petroleum-based fuels to bio-based fuels. ([ANL biomass program](#))

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Biomass energy experiences rapid growth

Call it the biomass boom. The DOE Biomass program has grown immensely since the beginning of the millennium and shifted from three separate areas of effort — biobased products, biofuels and biopower — into one common program known as biomass.



Biomass resources, such as wood chips, can be converted into industrial and consumer products, fuels and electricity.

Perhaps the most significant change occurred in August 2005, when Congress enacted a law requiring the next round of funding opportunity announcements to advance biomass technologies to the next level, beyond

demonstration projects into viable, commercial operating biorefineries.

The Golden Field Office took the lead for EERE in drafting the funding opportunity announcement and in selecting potential companies that could most likely meet the new requirement, and things had to happen fast to meet this push by Congress.

In just six months, the announcement hit the street, and six months later, 24 proposals were received. Golden conducted merit reviews to recommend six awardees to EERE and the selections were announced Feb. 28.

In the interview that follows, Golden's Gene Petersen, who chaired the merit review effort, describes the significance of the new Congressional requirement, its impact on developing biomass resources and how it's shaping the market for cellulosic ethanol.

Question: What is EAct 2005, Section 932?

Petersen: "EAct 2005 required DOE, within six months of its enactment, to issue a funding opportunity announcement for a series of integrated biorefineries employing cellulose to produce four types of products:

- biofuels,
- biobased products,
- replacements for petrochemical feedstocks and
- heat and power.

"EAct 2005 provisions allow DOE to provide up to \$100 million per plant, require that a defined set of feedstocks be used, and most importantly, defined two selection criteria:

- To demonstrate the project can be profitable without a federal subsidy after initial construction costs are paid; and,
- That the biorefinery can be easily replicated."

Question: What impact does the requirement have on bringing biofuels and bio-based products closer to the marketplace?

Petersen: "It provides a significant kick-start to the emerging bioindustry into the fuels market.

"The commercial ventures in biomass had largely been confined to heat and power, biomass for materials (dimensional lumber and building materials), and a small but significant contribution of biomass being used to make chemicals and other materials.



A truck unloads wood chips that will be sorted then used as a fuel source at the Tracy Biomass Plant in Tracy, Calif.

"The concept of biorefineries acting as commercial operations to produce fuels, chemicals, power and other energy products was considered a whole new approach and embraced by DOE as the strategy to accomplish market penetration.

"The EAct requirement dictated we go beyond demonstrations and into commercial operations. While the

technology remains immature, the funding opportunity announcement requested applications for companies who thought they could make a commercial operation viable."

Question: What pathways from the biomass feedstock sources needed to be identified to help develop commercial, integrated biorefineries?

Petersen: "Several pathways needed to be identified to produce products. Most of them focused on producing feedstock sources from the existing grain processing, oil processing and forest products industries.

"The long range pathways involved emerging biomass feedstocks such as agricultural residues (corn stover, wheat and rice straw), forest residues, dedicated energy crops (switchgrass, hybrid poplar, other such feedstocks).

"All pathways eventually led to an integration of the feedstock processing, conversion process and marketing of products – combined, these constitute a biorefinery."

Question: How has the biomass program evolved in EERE?

Petersen: "In 2002, the current biomass program initiated work in the biorefinery arena. It started with a funding opportunity announcement requesting the demonstration of integrated biorefineries for fuels and biobased products.

"Six projects were selected for this; some have been completed and others are coming to an end this year and next.

"The next set of projects was expected to involve demonstrations of integrated, pre-commercial biorefinery operations. Instead, however, EAct dictated that DOE request commercial biorefineries.

"DOE will also be issuing a new funding opportunity announcement for demonstrations of integrated biorefinery operations as outlined in other sections of the EAct 2005. These will allow for the evaluation of a wider range of feedstocks and even more advanced technologies."

Question: What potential impact will integrated biorefineries have on the ethanol industry if they are successful?

Petersen: "If all of the six selected projects are successful in producing cellulosic derived biofuels, by about 2012 we could see about 100 million gallons of biofuels, largely ethanol, being produced from these sources.

"If the plants are replicated as intended, then by the President's target timetable, a small, but significant portion of the 35 billion gallons of alternative fuels could be comprised of cellulosic ethanol."

Question: How does biomass fit into the President's Advanced Energy Initiative?

Petersen: "Potentially commercial integrated biorefineries will allow for newer technologies to be evaluated with a wider range of feedstocks in helping meet the [2017 "Twenty in Ten "](#) goals set by the President."

Question: What issues/concerns exist about advancing biomass resources?

Petersen: "A lot is being debated about the economies of producing ethanol from typical sources such as corn. In almost every article you read, it's cited that the eventual great opportunity is in developing the technologies to produce cellulosic ethanol -- largely because it avoids the food vs. fuel debate and also because the supply of cellulosic material is diverse and plentiful.

"EERE is trying to reduce the risk of adopting this new technology by being a cost-sharing partner with industry.

The benefits of successfully producing more energy from biomass would mean new jobs and new opportunities for the bioindustry to grow and become an integral part of the economy."

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DOE invests \$385 million in six biorefineries

DOE announced on Feb. 28 that it will invest up to \$385 million in six biorefineries over the next four years.

Once up and running, these biorefineries — located in California, Florida, Georgia, Idaho, Iowa, and Kansas — are expected to produce more than 130 million gallons per year of cellulosic ethanol.



A researcher operates a bioreactor producing hydrogen via the fermentation of lignocellulosic waste biomass.

Combined with the industry cost share, more than \$1.2 billion will be invested in the new biorefineries. This supports President Bush's "Twenty in Ten" Initiative, that aims to increase the use of alternative fuels to 35 billion gallons per year by 2017. See [DOE press release](#).

Four of the companies—[BlueFire Ethanol, Inc.](#), Broin Companies, [Logen Biorefinery Partners](#), and Abengoa Bioenergy—aim to employ processes that free sugars from the biomass and then ferment them into alcohol.

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DOE awards \$23 million to five cellulosic ethanol projects



While a certain percentage of corn stover and small grain straws need to be returned to the soil, a large portion can be collected as biomass feedstock.

DOE announced on March 27 that five projects will receive \$23 million over the next four years to develop fermentative organisms to convert cellulosic biomass into ethanol. Cellulosic biomass includes a variety of non-food plant materials such as agricultural wastes, saw dust, paper pulp and switch grass.

Organisms that can ferment these materials into ethanol are crucial to the success of commercial-scale integrated biorefineries and cellulosic ethanol refining.

DOE selected Cargill Incorporated, Celunol Corporation, DuPont, Mascoma Corporation and Purdue University for the five projects. Total investment in the five projects could total more than \$37 million, with DOE's Biofuels Initiative providing the federal government's share.

The research will further President Bush's goals of making cellulosic ethanol cost-competitive by 2012 and reducing U.S. gasoline consumption by 20 percent in 10 years. See the [DOE press release](#) about the [Biofuels Initiative](#).

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Learn more about biomass energy

A "must-read" for anyone seriously interested in the potential for biomass energy is "[Biomass as Feedstock for a Bioenergy and Bioproducts Industry: the Technical Feasibility of a Billion-Ton Annual Supply.](#)" ([Download Adobe Reader](#)) a joint-publication of USDA and DOE. It gives a clear, comprehensive look at the potential for producing

the biomass feed stocks needed to replace 30 percent of current U.S. petroleum usage with biofuels by 2030.

A related publication, [Roadmap for Agriculture Biomass Feedstock Supply in the United States](#), looks specifically at using agricultural by-products, primarily grain straw and corn fodder. In combination, these publications indirectly give insight into the currently developing debate about fuel vs. food.

If you just want to gain a better understanding of the biomass-produced energy in general, [EERE's Biomass Basics](#) is excellent.

[The Bioenergy Feedstock Information Network](#) Web site run by Oak Ridge National Laboratory is a great clearinghouse for all things biomass.

Another site, [State Energy Alternatives](#), includes state-by-state resource and policy information. It is jointly sponsored by EERE and the National Conference of State Legislatures.

In the future, [integrated biorefineries](#) will foster new industries converting biomass into a wide range of products, including ones that would otherwise be made from petrochemicals. The *New York Times*, for instance, recently reported on the development of a [new bioplastic](#) that, when discarded as waste, can be used as fuel.

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FY '08 biomass budget request up 20 percent

When EERE Assistant Secretary Alexander Karsner testified in front of the Senate Committee on Appropriations' Subcommittee on Energy and Water Development on April 11, he requested more money for biomass and biorefinery systems R&D in FY-08. Here are clips from his testimony:



Soon, commercial biorefineries will use biofeedstocks to produce a large variety of goods and energy.

"The FY 2008 budget request for Biomass and Biorefinery Systems R&D is \$179.3 million, an increase of \$29.6 million, almost 20 percent above the FY 2007 request.

"...The focus of the program is to make cellulosic ethanol cost-competitive by 2012. EERE will continue in FY 2008 to support its cost-share efforts with industry to develop and demonstrate technologies to enable cellulosic biorefineries for the production of transportation fuels and co-products.

"...The FY 2008 funding increase will also support EERE cost-shared projects with industry for enzyme development for producing low cost sugars from biomass and for improved organism development or ethanologen for converting those sugars to ethanol.



Wheelabrator Shasta Energy Company in Shasta, Calif. where steam turbines convert wood residues to electricity.

"...To address biomass resource availability and feedstock infrastructure to reduce the cost and improve the storage of delivered biomass in different geographical areas of the U.S., EERE will continue to support the Regional Feedstock Partnership work with the U.S. Department of Agriculture (USDA) and land grant colleges. These partnerships will help identify the regional biomass supply, growth, and biorefinery development opportunities.

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