



Biofuels and Biobased Products in the United States

December 2011

To Our Readers: We, the Office of Agricultural Affairs U.S. Embassy France, would appreciate you informing us of your upcoming visits to the United States, as we can provide assistance with administrative procedures and organizing meetings. Please do not hesitate to share your comments with us, as we are here to facilitate these exchanges.

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1. U.S. Policy

November 2011 – Department of Energy Biomass Multi-Year Program¹

The Biomass Program is one of the nine technology development programs within the Office of Energy Efficiency and Renewable Energy (EERE) at the U.S. Department of Energy (DOE). This Multi-Year Program Plan (MYPP) sets forth the goals and structure of the Biomass Program. It identifies the research, development, demonstration, and deployment (RDD&D) activities the Program will focus on over the next five years and outlines why these activities are important to meeting the energy and sustainability challenges facing the nation. This MYPP is intended for use as an operational guide to help the Biomass Program (the Program) manage and coordinate its activities, as well as a resource to help articulate the Program’s mission and goals to management and the public.

The mission of the Program is to develop and transform our renewable biomass resources into commercially viable, high- performance biofuels, bioproducts, and biopower through targeted research, development, demonstration, and deployment supported through public and private partnerships. The goals of the Program are to develop sustainable, commercially viable biomass utilization technologies to:

- Enable the production of biofuels nationwide and reduce dependence on oil through the creation of a new domestic bioenergy industry supporting the Energy Independence and Security Act of 2007 (EISA) goal of 36 billion gallons per year (bgy) of renewable transportation fuels by 2022
- Increase biopower’s contribution to national renewable energy goals through increasing biopower generating capacity.

The Biomass Program’s MYPP is designed to allow the Program to progressively enable the deployment of increasing amounts of biofuels, bioproducts, and biopower across the nation from a widening array of feedstocks. This approach will not only have a significant impact on oil displacement at the earliest, but will also facilitate the shift to renewable, sustainable bioenergy technologies in the long term.

November 2011 - Bill Gates Editorial in Science Magazine: The Energy Research Imperative²

“As someone now working fulltime in global health and development, I see firsthand how the U.S. government’s support for scientific research has improved people’s lives. That support is vital in another area — affordable, clean energy. I believe it is imperative that the government commit to clean energy innovation at a level similar to its research investments in health and defense.

In a time of economic crisis, asking policymakers in Washington, DC, to spend more money might not be the most popular position. But it’s essential to protect America's national interests and ensure that the United States plays a leading role in the fast-growing global clean energy industry.

History has repeatedly proven that federal investments in research return huge payoffs, with incredible associated benefits for U.S. industries and the economy. Yet over the past three decades, U.S. government investment in

¹ http://www1.eere.energy.gov/biomass/pdfs/mypp_november_2011.pdf

² <http://www.thegatesnotes.com/Topics/Energy/The-Energy-Research-Imperative>

energy innovation has dropped by more than 75%. In 2008, the United States spent less on energy R&D as a percentage of gross domestic product than China, France, Japan, or Canada.”

July 2011 – Congressional Research Service Report: Biofuels Incentives: A Summary of Federal Programs³

With recent high energy prices, the passage of major energy legislation in 2005 (P.L. 109-58) and 2007 (P.L. 110-140), and the passage of a farm bill in 2008 (P.L. 110-246), there is ongoing congressional interest in promoting alternatives to petroleum fuels. Biofuels—transportation fuels produced from plants and other organic materials—are of particular interest.

Ethanol and biodiesel, the two most widely used biofuels, receive significant government support under federal law in the form of mandated fuel use, tax incentives, loan and grant programs, and certain regulatory requirements. The 2008 farm bill amended or established various biofuels incentives, including lowering the value of the ethanol excise tax credit, establishing a tax credit for cellulosic biofuel production, extending import duties on fuel ethanol, and establishing several new grant and loan programs.

Several key biofuels incentives had expired or were set to expire (e.g., a tariff on ethanol imported from most countries, as well as tax credits for biodiesel, renewable diesel, and ethanol) before the passage of the Tax Relief, Unemployment Insurance Reauthorization, and Job Creation Act of 2010 (P.L. 111-312). The incentives included in that law have been extended through the end of 2011. However, it should be noted that support for extending some or all of these tax incentives beyond 2011 may be limited.

This report outlines federal programs that provide direct or indirect incentives for biofuels. For each program described, the report provides details including administering agency, authorizing statute(s), annual funding, and expiration date.

July 2011 - White House Energy Policy, Environment and Climate Change⁴

The President has taken unprecedented action to build the foundation for a clean energy economy, tackle the issue of climate change, and protect our environment. On July 29, President Obama announced the next phase in the Administration’s program to increase fuel efficiency and reduce greenhouse gas pollution for all new cars and trucks sold in the United States. These new standards will cover cars and light trucks for Model Years 2017-2025, requiring performance equivalent to 54.5 mpg in 2025 while reducing greenhouse gas emissions to 163 grams per mile. Taken together, the standards established under this Administration span Model Years 2011 to 2025. They will save consumers money, reduce our dependence on oil, and protect the environment.

³ <http://fpc.state.gov/documents/organization/168094.pdf>

⁴ <http://www.whitehouse.gov/energy>

June 2011 - Agriculture Secretary Vilsack Highlights USDA's Efforts to Expand Aviation Biofuels at the Paris Air Show⁵

The Secretary spoke at the Alternative Aviation Fuels Showcase to a crowd of about 75 aviation business leaders about how USDA is among the forefront of U.S. federal efforts to support the development of bio-based fuels. USDA has established memoranda of understanding with several government and aviation-related agencies, including the [Department of Energy](#), the Air Transport Association, the [Federal Aviation Administration](#), and the [U.S. Navy](#), on efforts to research and develop renewable energy and the infrastructure to support it.

The Secretary also highlighted USDA's commitment to the development of alternative fuels to improve economic opportunities across rural America, decrease dependence on foreign oil, and increase environmental benefits of flying. The Secretary said that for aviation biofuels to really take off, the government needs to support the private sector in the form of loan guarantees and research and development (R&D) grants to mitigate risk.

May 2011 - USDA Announces Project to Encourage Development of Next-Generation Biofuels⁶

Agriculture Secretary Tom Vilsack announced the establishment of the first Biomass Crop Assistance Program (BCAP) Project Area to promote the production of dedicated feedstocks for bioenergy. This project will help spur the development of next-generation biofuels and is part of Obama Administration efforts to protect Americans from rising gas prices by breaking the nation's dependence on foreign oil. BCAP, created in the 2008 Farm Bill, is a primary component of the strategy to reduce U.S. reliance on foreign oil, improve domestic energy security, reduce pollution, and spur rural economic development and job creation. BCAP provides incentives to interested farmers, ranchers and forest landowners for the establishment and cultivation of biomass for heat, power, bio-based products and biofuels.

The first BCAP Project Area proposes the enrollment of up to 50,000 acres for establishing a dedicated energy crop of native grasses and herbaceous plants (forbs) for energy purposes. Producers in the area will plant mixes of perennial native plants, such as switchgrass, for the manufacture of biomass pellet fuels and other biomass products to be used for power and heat generation. The proposed crops also will provide long term resource conserving vegetative cover.

The program provides an opportunity for teams of crop producers and bioenergy facilities to submit proposals to USDA to be selected as a BCAP project area. If selected, crop producers will be eligible for reimbursements of up to 75 percent of the cost of establishing a bioenergy perennial crop, and can receive up to five years of annual payments for grassy crops (annual or perennial), and up to 15 years of annual payments for woody crops (annual or perennial). Bioenergy facilities are those facilities that produce heat, power, biobased products, or advanced biofuels from biomass feedstocks.

⁵ <http://blogs.usda.gov/2011/06/27/agriculture-secretary-vilsack-highlights-usda%E2%80%99s-efforts-to-expand-aviation-biofuels-at-the-paris-air-show/#more-33691>

⁶ http://www.usda.gov/wps/portal/usda/usdahome?contentid=2011/05/0201.xml&navid=NEWS_RELEASE&navtype=RT&parentnav=LATEST_RELEASEASES&edeployment_action=retrievecontent

March 2011 - White House BluePrint for a Secure Energy Future⁷

The *Blueprint for a Secure Energy Future* outlines a three-part strategy:

- **Develop and Secure America's Energy Supplies:** deploy American assets, innovation, and technology to safely and responsibly develop more energy in the United States and be a leader in the global energy economy.
- **Provide Consumers With Choices to Reduce Costs and Save Energy:** Volatile gasoline prices reinforce the need for innovation that will make it easier and more affordable for consumers to buy more advanced and fuel-efficient vehicles, use alternative means of transportation, weatherize their homes and workplaces, and in doing so, save money and protect the environment. These measures help families' pocketbooks, reduce dependence on finite energy sources and help create jobs here in the United States.
- **Innovate our Way to a Clean Energy Future:** Leading the world in clean energy is critical to strengthening the American economy and winning the future. We can get there by creating markets for innovative clean technologies that are ready to deploy, and by funding cutting-edge research to produce the next generation of technologies. And as new, better, and more efficient technologies hit the market, the Federal government needs to put words into action and lead by example.

⁷ http://www.whitehouse.gov/sites/default/files/blueprint_secure_energy_future.pdf

2. Economics

November 2011: Iowa State University Report: Development of a Purchasing Managers' Index for Biobased Products CIRAS Pilot Project Report⁸

This project explores the feasibility of developing a composite economic indicator to evaluate the expected performance of the biobased product sector. Biobased products are defined as those composed either in whole or in significant part of renewable agricultural or forestry materials, and they include commercial and industrial products as well as intermediate ingredients or feedstocks. USDA-sponsored research has provided a foundation for more detailed analysis of potential barriers to growth in biobased products industries.

This study first discusses various types of composite indicators and their appropriateness for describing trends in the overall biobased products sector. Next, the feasibility of using purchasing managers' expectations to discern various characteristics of sector performance is tested. Finally, several methodological and administrative issues involved in moving from a pilot study to a full-scale biobased products purchasing managers' survey are considered.

November 2011 – Study of Harvard University's Energy Technology Innovation Policy (ETIP) Research Group: Transforming U.S. Energy Innovation⁹

This report offers analysis and recommendations designed to accelerate the pace at which better energy technologies are discovered, developed, and deployed, and is focused in four key areas:

- Designing an expanded portfolio of federal investments in energy research, development, demonstration (ERD&D), and complementary policies to catalyze the deployment of novel energy technologies;
- Increasing incentives for private-sector innovation and strengthening federal-private energy innovation partnerships;
- Improving the management of energy innovation institutions to maximize the results of federal investments; and
- Expanding and coordinating international energy innovation cooperation to bring ideas and resources together across the globe to address these global challenges.

The report recommends that US federal government increase its annual investment in Energy Research, Development, Demonstration & Deployment (ERD3) to \$10.0 billion, a 92% increase over the FY 2009 appropriations. This includes about \$5 billion annually for seven technology areas considered in detail: four energy supply technology areas (nuclear energy, bio-energy, fossil energy with and without carbon capture and sequestration, and solar photovoltaic (PV) energy); one enabling technology area (utility-scale energy storage); and two key areas of energy efficiency (buildings and vehicles).

⁸ <http://www.usda.gov/oce/reports/energy/CIRAS%20Pilot%20Project%20Report-October%202011.pdf>

⁹ http://belfercenter.ksg.harvard.edu/publication/21528/transforming_us_energy_innovation.html

May 2011 – USDA/Agricultural Research Service (ARS) Study: Energy Life-Cycle Assessment of Soybean Biodiesel Revisited¹⁰

An important consideration is the amount of energy a fuel releases relative to the amount of fossil fuel energy required for its production. This ratio of output to input is termed the Fossil Energy Ratio, or FER. The FER for petroleum diesel fuel itself has been previously calculated to be 0.83, meaning that it yields less energy than is required in its production. A 1998 calculation of the FER for biodiesel produced from soybean oil yielded a value of 3.2. The purpose of the present study was to assess the impact on this value of recent changes in agriculture and biodiesel production technologies.

By applying contemporary process modeling approaches ARS researchers estimated fossil energy input requirements for the production of soybeans, their transport to a processing facility, extraction of their oil, its conversion to biodiesel, and transport of the biodiesel to sites of use. Especially due to recent advances in agricultural and chemical process efficiencies it was calculated that the FER for soybean-based biodiesel has risen to 4.5, a substantial increase. An accounting for the energy used in construction of agricultural production machinery and biodiesel production facilities, terms not factored into the original analysis, reduced the FER only slightly to 4.4. As agricultural and chemical-industry technology become increasingly efficient in the future further increases in the FER for soy-based biodiesel production are likely. It was calculated that the FER will reach 4.69 in 2015, an increase of 4.2%. Further increases can be expected as the agricultural sector and the biodiesel industry continue to make energy efficiency gains.

November 2011 – Kansas State University Study Using CRP Land for Biomass Feedstock Production¹¹

[Kansas State University](#) researchers are studying the feasibility of using land that had been enrolled in the [U.S. Department of Agriculture's Conservation Reserve Program](#) to grow plants for the biomass market. Kansas is one of six states involved in the study, and the 18-acre CRP site near Hays is the only site in Kansas. Other states in the study are Montana, North Dakota, Oklahoma, Missouri and Georgia. The research, sponsored by the [U.S. Department of Energy](#) and [Sun Grant Initiative](#), examines different management strategies, including using no nitrogen fertilizer, applying 50 pounds of N per acre and applying 100 pounds of N per acre. The dominant grasses on the acreage are sideoats grama, indiangrass, little bluestem, switchgrass and big bluestem. A significant amount of yellow sweetclover is also present. As part of the study, the researchers are tracking plant populations and plant composition to see how they've changed over time due to harvest management and nitrogen treatments. After the-10 year contract expires on CRP program acres, producers have often had the option to re-enroll in CRP or to plant back to row crops, he said. Since the study began, thousands of Kansas CRP acres have been planted back to grain crops, but thousands of CRP acres have also been re-enrolled with new contracts.

¹⁰ http://www.ars.usda.gov/research/publications/publications.htm?seq_no_115=251740

¹¹ http://www.ksre.ksu.edu/news//story/CRP_land111611.aspx

August 2011 – Department of Energy Report: U.S. Billion-Ton Update: Biomass Supply for a Bioenergy and Bioproducts Industry¹²

The report, *Biomass as Feedstock for a Bioenergy and Bioproducts Industry: The Technical Feasibility of a Billion-Ton Annual Supply* (generally referred to as the *Billion-Ton Study* or *2005 BTS*), was an estimate of “potential” biomass within the contiguous United States based on numerous assumptions about current and future inventory and production capacity, availability, and technology. In the 2005 *BTS*, a strategic analysis was undertaken to determine if U.S. agriculture and forest resources have the capability to potentially produce at least one billion dry tons of biomass annually, in a sustainable manner—enough to displace approximately 30% of the country’s present petroleum consumption. To ensure reasonable confidence in the study results, an effort was made to use relatively conservative assumptions. However, for both agriculture and forestry, the resource potential was not restricted by price. That is, all identified biomass was potentially available, even though some potential feedstock would more than likely be too expensive to actually be economically available. In addition to updating the 2005 study, this report attempts to address a number of its shortcomings.

June 2011 - FAPRI Report: U.S. Biofuels Baseline and Impact of Extending the \$0.45 Ethanol Blenders Credit¹³

Earlier this year, the Food and Agricultural Policy Research Institute at the University of Missouri (FAPRI-MU) released baseline projections for agricultural and biofuel markets (see http://www.fapri.missouri.edu/outreach/publications/2011/FAPRI_MU_Report_02_11.pdf). That baseline assumed current biofuel policy, including provisions of the Renewable Fuel Standard (RFS2). Consistent with the law at that time, the \$0.45 per gallon ethanol tax credit, the \$0.54 specific tariff on ethanol imports, and the \$1.00 per gallon credit for biodiesel were all assumed to expire at the end of 2011, and the additional credit for cellulosic biofuels was assumed to expire at the end of 2012.

This report compares a slightly modified version of that baseline to an alternative scenario where the \$0.45 per gallon ethanol tax credit and the \$0.54 per gallon tariff are both extended indefinitely.

A number of conclusions can be drawn from the analysis:

- Extending the \$0.45 ethanol tax credit and ethanol tariff expands domestic ethanol production and increases corn prices.
- Increased demand for corn as an ethanol feedstock expands corn acreage and increases area competition.
- Ethanol rack prices rise and retail ethanol equivalent prices fall with extension of the blenders credit.
- Extension of the import tariff increases the advanced and cellulosic RIN prices and the cost of meeting the advanced biofuel portion of the EISA mandate.
- The response of cellulosic biofuel producers has an important effect on ethanol prices and significant effect on the costs to consumers associated with extension of the blenders credits.
- Biodiesel market effects are modest.
- These results are sensitive to the market context.
- The majority of advanced fuel beyond the cellulosic and biodiesel sub-mandates, comes from imported sugarcane ethanol.

¹² http://www1.eere.energy.gov/biomass/pdfs/billion_ton_update.pdf

¹³ http://www.fapri.missouri.edu/outreach/publications/2011/FAPRI_MU_Report_07_11.pdf

- Mandate compliance costs shown are only one portion of consumer costs or savings from changes in biofuels policy.
- The EPA is assumed to waive the total and advanced mandate by the same amount as the cellulosic mandate is reduced.

3. Science

November 2011 - USDA Announces Funding to Convert Biomass to Energy¹⁴

USDA is funding a series of projects to convert biomass to energy through USDA's Rural Energy for America program. (REAP). Announcements made on November 17 concluded 2011 biomass project funding assistance for a total of 52 projects with just over \$31 million in grant and loan note guarantees through the REAP. This support helped to leverage a total of \$154.5 million of biomass project development in 26 states which will help produce clean, renewable heat and power for farms and small businesses in rural America.

USDA funding is contingent on the recipient meeting the conditions of the grant or loan agreement. REAP grants can finance up to 25 percent of a project's cost, up to \$500,000 for renewable energy systems and \$250,000 for energy efficiency improvements.

November 2011 - Iowa State University Scientists Genetically Increase Algae Biomass by More than 50 Percent¹⁵

The breakthrough comes from expressing certain genes in algae that increase the amount of photosynthesis in the plant, which leads to more biomass. In environments that have relatively low levels of carbon dioxide (CO₂), such as air in earth's atmosphere, two genes in algae, LCIA and LCIB, are expressed - or turned on - to help capture and then channel more carbon dioxide from the air into the cells to keep the algae alive and growing. However, when algae are in environments with high carbon dioxide levels, such as in soil near plant roots that are expiring carbon dioxide, the two relevant genes shut down because the plant is getting enough carbon dioxide. The two genes are expressed - essentially keeping algae's foot on the gas - even when they are in a carbon dioxide-rich environment and don't need additional carbon dioxide.

This research was funded in part by grants from the Department of Agriculture's National Institute of Food and Agriculture and the Department of Energy, Advanced Research Projects Agency - Energy.

September 2011 - NIFA Small Business Grants Support i6 Green Challenge Investment to Promote Clean Energy Innovation and Job Creation¹⁶

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http://www.usda.gov/wps/portal/usda/usdahome?contentid=2011/11/0488.xml&navid=NEWS_AUSUMS&navtype=RT&parentnav=ENERGY&deployment_action=retrievecontent

¹⁵ <http://www.news.iastate.edu/news/2011/nov/spaldingdario>

¹⁶ http://www.nifa.usda.gov/newsroom/news/2011news/09261_nifa_supports_i6.html

The Obama Administration has announced the six winners of the i6 Green Challenge, an initiative to drive technology commercialization and entrepreneurship in support of a green innovation economy, increased U.S. competitiveness and new jobs. Projects in Florida, Iowa, Louisiana, Michigan, New England and Washington will each receive up to \$1 million from the U.S. Commerce Department's Economic Development Administration (EDA) and up to \$6 million in additional funding and technical assistance from the U.S. Department of Agriculture's National Institute of Food and Agriculture (NIFA), the U.S. Department of Energy, the U.S. Environmental Protection Agency, the National Science Foundation, and Commerce's National Institute of Standards and Technology and United States Patent and Trademark Office.

Winning i6 Green applicants will support emerging technology-based businesses as they mature and demonstrate their market potential, making them more attractive to investors and helping entrepreneurs turn their ideas and innovations into businesses. NIFA will provide \$100,000 each in Small Business Innovation Research (SBIR) Phase II grants to two current USDA SBIR Phase II grantees in Florida that are cooperating with the Igniting Innovation Cleantech Acceleration Network.

First announced at the White House launch of Startup America in January, i6 Green Challenge focuses on promoting Proof of Concept Centers methodologies. These methodologies support all aspects of the entrepreneurship process, from assisting with technology feasibility and business plan development, to providing access to early-stage capital and mentors that can offer critical guidance to innovators.

September 2011 - USDA Announces Major Investments to Spur Innovation and Job Creation in Research, Development and Production of Next Generation Biofuels¹⁷

USDA announced five major agricultural research projects aimed at developing regional, renewable energy markets, generating rural jobs, and decreasing America's dependence on foreign oil. Altogether, the five-year program will deliver more than \$136 million in research and development grants to public and private sector partners in 22 states. University partners from the states of Washington, Louisiana, Tennessee, and Iowa will lead the projects, which focus in part on developing aviation biofuels from tall grasses, crop residues and forest resources. Vilsack made the announcement with partners from private industry, research institutions, and the biofuels industry at the Seattle-Tacoma International Airport.

The grants announced came through USDA's National Institute of Food and Agriculture (NIFA). The projects will address needs across regional supply chains and will complement existing bioenergy efforts across government, academia, and the private sector. USDA made these awards through its Agriculture and Food Research Initiative (AFRI). AFRI's sustainable bioenergy challenge area targets the development of regional systems for the sustainable production of bioenergy and biobased products that contribute significantly to reducing dependence on foreign oil; have net positive social, environmental, and rural economic impacts; and are compatible with existing agricultural systems. All grants are awarded over a period of five years, with continued funding contingent on annual project success.

¹⁷ http://www.nifa.usda.gov/newsroom/news/2011news/09281_biofuel_production.html

September 2011 - USDA Scientists Use Commercial Enzyme to Improve Grain Ethanol Production¹⁸

A commercial enzyme could reduce overall costs linked with producing ethanol from grain, and also reduce associated emissions of greenhouse gases, according to a study by USDA scientists and colleagues. The researchers found that the enzyme helps extract water from an ethanol byproduct used to make dried distillers grains with solubles (DDGS), which can be used as feed supplements for cattle, swine and poultry. This could significantly reduce the amount of electricity, natural gas, energy and water needed for production of grain ethanol and its marketable byproducts. Results from this study were published in the scientific journal [*Industrial Biotechnology*](#).

August 2011 - USDA, Departments of Energy and Navy Seek Input from Industry to Advance Biofuels for Military and Commercial Transportation¹⁹

Secretary of Agriculture Tom Vilsack, Secretary of Energy Steven Chu, and Secretary of the Navy Ray Mabus announced the next step in the creation of a public-private partnership to develop drop-in advanced biofuels. The Secretaries issued a Request for Information (RFI) laying out the Administration's goals, assumptions, and tools and requesting from industry specific ideas for how to leverage private capital markets to establish a commercially viable drop-in biofuels industry. The critical information gathered through this process will help accelerate the development and use of these biofuels, reduce the Nation's demand for foreign oil, and strengthen rural America. The RFI can be viewed [here](#).

On August 16, 2011, the three Departments announced an investment in the private sector of up to \$510 million during the next three years to produce advanced drop-in aviation and marine biofuels to power military and commercial transportation. The initiative responds to a directive from President Obama issued in March as part of his Blueprint for a Secure Energy Future, the Administration's framework for reducing dependence on foreign oil. Drop-in biofuels serve as direct replacements or supplements to existing gasoline, diesel and jet fuels, without any changes to existing fuel distribution networks or engines.

The main objective of this government-industry partnership is the construction or retrofit of several domestic commercial or pre-commercial scale advanced drop-in biofuel refineries. These facilities will produce drop-in advanced biofuels meeting military specifications, will be located in geographically diverse locations for ready market access, and will have no significant impact on the supply of agricultural commodities for the production of food.

August 2011 – USDA Study: A Quick Way to Grade Grasses for Ethanol Yields²⁰

A team of researchers in USDA/Agricultural Research Service (ARS) has developed an inexpensive way to grade the ethanol potential of perennial grasses at the biorefinery's loading dock. The researchers developed the first use of near-infrared sensing (NIRS) to measure 20 components in switchgrass biomass that determine its potential value to biorefiners. These components include cell wall sugars, soluble sugars and lignin. With this information, 13 traits

¹⁸ <http://www.ars.usda.gov/is/pr/2011/110912.htm>

¹⁹

http://www.usda.gov/wps/portal/usda/usdahome?contentid=2011/08/0385.xml&navid=NEWS_AUSUMS&navtype=RT&parentnav=ENERGY&deployment_action=retrievecontent

²⁰ <http://www.ars.usda.gov/is/pr/2011/110818.htm>

can be determined, including the efficiency of the conversion from sugars to ethanol. This is the first use of NIRS to predict maximum and actual ethanol yields of grasses from a basic conversion process. This capability already exists for corn grain using NIRS.

Predictions of actual ethanol yields were based on hexoses, or six-carbon sugars, in the plant cell wall and as soluble sugars. Since additional ethanol could be produced from pentose or five-carbon sugars as conversion technology improves, the NIRS method can be used to estimate what the total potential yield of ethanol or other biofuels would be if all sugars in the plant were converted. The scientists tested switchgrass varieties and experimental lines adapted to the Midwest with the NIRS analyses and found significant differences for actual and potential ethanol yield per ton and per acre.

August 2011 – USDA Study: Making Tomorrow's Bioenergy Yeasts Strong²¹

Cornstalks, wheat straw, and other rough, fibrous, harvest-time leftovers may soon be less expensive to convert into cellulosic ethanol, thanks to USDA/Agricultural Research Service (ARS) scientists' studies of a promising new biorefinery yeast.

The yeast—*Saccharomyces cerevisiae* strain NRRL Y-50049—successfully ferments plant sugars into cellulosic ethanol despite the stressful interference by problematic compounds such as furfural (2-furaldehyde) and HMF (5-hydroxymethyl-2-furaldehyde) in fermenters. The troublesome compounds, created during dilute acid pre-treatment of the crop leftovers, inhibit yeast growth and reduce ethanol yields. In particular, they damage yeast cell walls and membranes, disrupt yeast genetic material such as DNA and RNA, and interfere with yeast enzymes' fermentation abilities.

The scientists are discovering more about the genes and the multiple networks of genes that are likely responsible for the notable tolerance that this yeast has shown in laboratory tests with a 2-liter fermenter. Their research suggests that, of the nearly 7,000 genes in the *S. cerevisiae* genome, more than 350 may be involved in counteracting stress.

August 2011 - USDA and DOE Fund 10 Research Projects to Accelerate Bioenergy Crop Production and Spur Economic Impact²²

The Departments of Agriculture (USDA) and Energy (DOE) have awarded 10 grants totaling \$12.2 million to spur research into improving the efficiency and cost-effectiveness of growing biofuel and bioenergy crops. The grants are part of a broader effort by the Obama administration to develop domestic renewable energy and advanced biofuels, providing a more secure future for America's energy needs and creating new opportunities for the American farming industry.

Overall, the USDA and DOE projects are designed to improve special crops to be grown for biofuels—including selected trees and grasses—by increasing their yield, quality and ability to adapt to extreme environments. Researchers will rely on the most advanced techniques of modern genomics to develop breeding and other strategies to improve the crops. The research will be conducted on switchgrass, poplar, Miscanthus and Brachypodium, among other plants.

²¹ <http://www.ars.usda.gov/is/pr/2011/110825.htm>

²² http://www.nifa.usda.gov/newsroom/news/2011news/08111_plant_genomics_bioenergy.html

This is the sixth year of the joint USDA and DOE funding program. DOE's Office of Science will provide \$10.2 million in funding for eight projects, while USDA's National Institute of Food and Agriculture (NIFA) will award \$2 million to fund two projects. Initial funding will support research projects for up to three years.

June 2011 - Department of Energy Announces up to \$36 Million to Support the Development of Drop-In Biofuels and Bioproducts²³

DOE announced up to \$36 million to fund six small-scale projects in California, Michigan, North Carolina, Texas, and Wisconsin, that will advance the technology improvements and process integration needed to produce drop-in (that can be used without major investment in infrastructure) advanced biofuels and other valuable bio-based chemicals. The projects aim to improve the economics and efficiency of biological and chemical processes that convert non-food biomass feedstocks into replacements for petroleum-based feedstocks, products, and fuels. These selections further the Obama Administration's strategy for accelerating research and development that will lead the way toward affordable, clean alternatives to fossil fuels and diversify our nation's energy portfolio.

The funding announced will help diversify DOE's Biomass Program portfolio to include a breadth of fuels and chemicals beyond cellulosic ethanol and ensure that the Department's research and development on biofuels remains integrated and strategic.

June 2011 - USDA Awards Grants to Help Agriculture Producers Adapt to Global Climate Change Effects²⁴

The U.S. Department of Agriculture's (USDA) National Institute of Food and Agriculture (NIFA) has awarded 13 grants to research possibilities for agriculture and forestry producers to adapt to climate change and to best take advantage of variable climate patterns. These grants were awarded through USDA's highly competitive Agriculture and Food Research Initiative (AFRI) and administered through NIFA. AFRI supports work in six priority areas: plant health and production and plant products; animal health and production and animal products; food safety, nutrition and health; renewable energy, natural resources and environment; agriculture systems and technology; and agriculture economics and rural communities. AFRI is NIFA's flagship competitive grant program and was established under the 2008 Farm Bill.

This announcement represents an investment of more than \$53 million to study how climate patterns and variability affect agricultural production. The long-term goal of these USDA-sponsored projects is to help prepare the nation's agricultural and forestry sectors for unpredictable global climate effects, while helping agricultural and forest production systems play a valuable role in addressing the global challenge of climate change by reducing greenhouse gas emissions and increasing carbon sequestration.

Fiscal Year 2010 projects were funded in Arkansas, Arizona, California, Colorado, Delaware, Florida, Indiana, Michigan, Minnesota, Nebraska, New York, North Carolina, Oregon, Texas, Washington and Wyoming. A full list of awardees can be found online at: www.nifa.usda.gov/newsroom/news/2011news/climate_change_awards.html

²³ http://www1.eere.energy.gov/biomass/news_detail.html?news_id=17443

²⁴ http://www.nifa.usda.gov/newsroom/news/2011news/06301_climate_awards.html

4. Upcoming Events

January 23-26, 2012 - 3rd Next Generation Bio-Based Chemicals Summit in San Diego, California:
<http://www.infocastinc.com/index.php/conference/596>

February 5-8, 2012: National Biodiesel Conference and Expo in Orlando, Florida
<http://www.biodieselconference.org/2012/default.aspx?AspxAutoDetectCookieSupport=1>

February 7-8, 2012: 2nd Annual Municipal Waste to Biofuels Summit in Chicago, Illinois
<http://www.renewable-waste.com/biofuels/index.shtml>

February 23-24, 2012: USDA Agricultural Outlook Forum in Arlington, Virginia
<http://www.usda.gov/oce/forum/>

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