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## **ALABAMA**

### **\*Renewable Fuels/Biomass Program\***

**Program Description:** The Renewable Fuels/Biomass Program (RF/BP) was activated in the summer of 1986 to provide incentive to increase the use of waste wood as an alternative energy source. In addition to creating energy, the program also removed a certain amount of wood waste from the waste stream, providing an environmental benefit as well. The primary audience, the state's forest products industry, has been able to achieve greater profitability by using wood waste in the generation of process heat, process steam and/or electricity. Program participation is open to commercial, industrial, institutional or agricultural property owners, as well as city, county, or state facilities or entities.

**Funding Source/Eligibility:** The RF/BP, funded through the Science, Technology and Energy (STE) Division, maintains funding at about \$300,000. Eligible facilities may receive up to \$75,000 per year in interest costs incurred on loans used to finance approved projects. Approved biomass projects may include equipment for producing steam, hot air, equipment controls, co-generation, building modifications and more. Other renewable fuels, such as solar and landfill gas, may also qualify for subsidy. Interest costs are paid directly to the facility on a reimbursement basis. The University of Alabama in Huntsville is a partner in the program and provides technical reviews of biomass projects.

**Results:** This program results in an estimated 256,000 tons of biomass residue consumption per year. Associated fuel-cost savings exceed \$9,000,000 annually.

### **\*Biomass Exchange Directory\***

**Program Description:** The Biomass Exchange Directory is a direct product of the Renewable Fuels/Biomass Program (RF/BP). An annual mailing is used to attract RF/BP clients. After several years of receiving responses that sought information on markets to sell excess production waste, the program initiated plans to develop an on-line database for producers and consumers of biomass wood waste in 1998. The Biomass Exchange Directory is the link that brings producer and consumer markets together. Operational since November 2000, companies register on-line and post their waste wood entries or needs. Anyone can search posted entries for the product(s) that best suit their requirements. Entries can be searched using moisture content, wood species, size, etc., or by geographic area or zip code. The Biomass Exchange Directory is located at [www.biomass.state.al.us](http://www.biomass.state.al.us). Funding for this project was made available through the Southeastern Regional Biomass Energy Program (SERBEP). The project steering committee members included the STE Renewable Fuels program manager, the Alabama Forestry Commission, University of Alabama in Huntsville, and Southern States Energy Board (SSEB).

### **\*Switchgrass Co-firing Project\***

**Program Description:** The "Switchgrass Co-firing with Coal in Electric Utility Boilers" project was designed to evaluate the co-firing of switchgrass with coal in electric utility boilers. This project included innovative harvesting methods to minimize the delivered costs of the switchgrass; an evaluation of the co-milling of the harvested switchgrass to permit introduction of the switchgrass into utility boilers in the same stream as pulverized coal; and co-firing tests to study slagging and emissions properties of the blended fuels. After pilot-scale trials at the Southern Company/Southern Research Institute Combustion Research Facility in Birmingham, technical feasibility of this co-firing approach was demonstrated at Alabama Power Company's

Gadsden Steam Plant.

**Funding Source/Eligibility:** The project proposal, accepted in June 1998, had a total projected value of \$2.14 million, with 55% coming from private sector cost-sharing and 45% from government funding. The STE Division, through its Southeastern Regional Biomass Energy Program (SERBEP) provided \$30,000 in start-up funding toward this effort. Partners included Southern Research Institute, Southern Company Services, Agtec Development, Auburn University, and the Electric Power Institute.

**Results:** At times when as much as 10 percent of the plant's power was produced from switchgrass, the plant's emission of sulfur dioxide and mercury dropped by 10 percent. This means that while being burned, it releases the same amount of carbon dioxide it absorbs while growing, and doesn't contribute to global warming. This is referred to as carbon dioxide neutral.

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## CALIFORNIA

### **\*Dairy Power Production Program\***

**Program Description:** The Commission's Dairy Power Production Program was created in 2001 to implement the State's Legislative mandate with \$10 million in State General Funds. The program offers grant incentives for the installation of biogas digesters to convert dairy wastes into electricity for on-site use by California dairies. The program goal is to install up to 7 megawatt of biogas to electricity generating capacity in California dairies.

**Program Audience:** All dairy farms

**Funding Source and Level:** The program currently offers \$10 million in state funded (SB 5X Conservation Funds) grant incentives. These funds are available through 10/03.

**Eligibility Criteria:** The Dairy Power Production Program is available to all California dairy farms who present a cost-effective technically viable biogas digester project.

**Results and Leverage:** The program has contracted to date over 1.5 megawatts of electricity peak load reduction. The program will soon offer a new solicitation to attract more potential biogas digester installations. Total program funds represent no more than 50% of total project costs.

### **\*Biomass program\***

**Program Description:** The Commission's Biomass program funds RD&D projects. These projects are helping to maximize value provided by biomass, lowering the cost of energy supplied by biomass, expanding applications of biomass in California's electricity system, and pursuing breakthrough opportunities. Current agricultural projects include biogas to energy production from waste-water effluent in food processing facilities as well as the development of cost effective biomass to ethanol production systems.

**Program Audience:** All California residents

**Funding Source and Level:** The program administers \$18 million to fund biomass RD&D projects.

**Eligibility Criteria:** The Biomass program is available to all California residents.

### **\*Carbon Sequestration in Agricultural and Forested Lands in California\***

**Program Description:** The Commission and the California Department of Forestry are sponsoring research to develop a baseline for carbon sources and sinks in California lands. Through field studies and modeling, this project will identify major broad opportunities for enhancing carbon storage and/or reducing carbon emissions in the state in terrestrial ecosystems.

The first phase of this project will include two measurement studies and the development of monitoring and verification protocols for these case studies. A second phase of this project will include detailed analyses for one or two counties in California and additional case studies. The Commission, the Kearney Foundation, and the California Department of Food and Agriculture will soon start funding a research project designed to estimate the amount of carbon that could be stored in agricultural soils. There is a large potential for carbon storage in California's agricultural soils because the practice of double and triple cropping for over 60 years without organic additions has significantly reduced the amount of carbon in these soils. This particular study will provide information about the amount of carbon that could be sequestered under different management practices and their impacts on the quality and quantity of crops. This project includes field studies, model evaluations, and the application of a

validated model(s) to estimate the amount that could be sequestered in at least two counties in the state.

**Program Audience:** Farmers, foresters, greenhouse gas (GHG) registries, policy makers, and researchers

**Funding Source and Level:** The existing level of funding available from the Commission through the Public Interest Energy (PIER) program is about \$ 1 million. Funds are available through 2004. Additional funds may be available after 2004.

**Eligibility Criteria:** The program is available to research institutions, consultants, and others with adequate technical qualifications.

**Results and Leverage:** The program started in the middle part of 2002. No preliminary results are available at this time. Total program funds represent no more than 50% of total project costs. The rest of the funds are provided by the co-funding agencies.

### **\*Energy in Agriculture\***

**Program Description:** The Energy Commission's Energy in Agriculture Program was first created in 1987 to implement the State's Legislative mandate with \$5 million in Petroleum Violation Escrow Account funds. The program continues to have access to PVEA funds as well as other State General Funds (Peak Load Reduction Program) and electricity rate payer collected funds (Public Interest Energy Research Program).

The program offers grants and loans for efficiency technologies to reduce, optimize and peak-load shifting the use of electricity in agricultural production and food processing. Educational materials are developed to disseminate knowledge about new and emerging technologies. The program also sponsors training courses to improve pump-testing procedures, irrigation practices, and steam systems operation. The program however, does not have an audit segment.

Current projects include improved water management practices using emerging irrigation scheduling systems, precision tillage practices, dairy manure lagoon management, new applications to ozone technology in agricultural produce sanitation, and flexible irrigation district water delivery systems. The program will soon be announcing a new grant solicitation to fund RD&D electricity conservation and efficiency technologies in the food processing industry. The program, however does not have resources to address non-electricity based energy efficiency projects in agriculture, thus unable to promote efficiency improvements in fuel based energy consumption in both food production (diesel fuel) and food processing (natural gas, propane).

**Program Audience:** All food and fiber production farms, poultry, dairy and greenhouses, irrigation districts and food processors. The program resources are available to over 250 agricultural water agencies, 70,000 food and fiber production farms, 2,000 dairy farms, 3,000 food-processing companies, as well as several hundred greenhouses, cold storage facilities and other agriculture-related energy users.

**Funding Source and Level:** The program currently offers \$20 million in state funded (SB 5X Conservation Funds) grant incentives for the reduction or shifting of electricity demand to off-peak hours and a cost-share grant for agricultural pump testing and pump repairs. These funds are available through 12/31/04.

The program also offers electricity ratepayer funded grants (PIER Program) to fund research, development and demonstration projects. The program administers \$5 million in current contracts good through 12/04. An additional \$3 million will be offered in November 2002 to fund

RD&D projects in the food processing industry. These funds are secured through 12/06. In addition, the program has a \$500,000 revolving loan fund (DOE, PVEA) to finance the purchase of proven energy efficient emerging technologies. These funds will be available after loan payment collections due 12/31/05.

**Eligibility Criteria:** The Peak Load Reduction Program is available to all California agricultural farms and food processors able to reduce electricity loads during the peak period of June through September, between 12:00 Noon to 6:00 PM.

The PIER program funds are available for research, development and demonstration projects that advance energy efficiency electricity-based technologies. PVEA funds are available to fund demonstration projects to reduce energy consumption in agriculture.

**Results and Leverage:** The program has contracted over 110 megawatts of electricity peak load reduction. Over 80 demonstration projects have been funded, 25 research and development projects funded, over 45 training courses offered, published training manuals and textbooks. Total program funds represent no more than 40% of total project costs.

### **\*Renewable Energy Program\***

**Program Description:** Program funds are disbursed through five separate “accounts” to address differing needs within the renewables industry. On the supply side, existing and new renewable generating facilities receive production-based incentives capped at 1.5 cents per kilowatt hour. These funds are paid through the Existing and New Renewable Resources Accounts.

On the demand side, customers who purchase small renewable systems for on-site generation can receive capital-cost rebates of \$4,500 per kilowatt or 50 percent of system cost, whichever is less, from the Emerging Renewables Buydown Program, while customers who purchase renewable energy through a registered renewable electric service provider can receive up to \$1.5 cents per kilowatt hour credits through the Customer Credit Sub-account.

Finally, the Consumer Education Sub account increases public awareness of renewable energy options and the benefits of renewable energy, and encourages purchases of renewable energy.

**Program Audience:** Existing renewable generating facilities are those operational before 9/26/96, while new facilities are defined as those beginning operation after that date. For customers installing on-site renewable generation, the proposed site of the system must be within the electric utility service area of Pacific Gas and Electric, San Diego Gas & Electric, Southern California Edison, or Bear Valley Electric Company. Customer credits are paid to customers who purchase renewable energy through the direct access market.

**Funding Source and Level:** Funds are collected through a surcharge on the bills of ratepayers of the state’s investor-owned utilities (Public Goods Charge). Assembly Bill 1890 provides for the collection of \$540 million over four years to support renewables in California. Senate Bill 90 further defines the distribution of those funds as \$243 million for existing renewables; \$162 million for new renewables; \$54 million for emerging renewables; \$75.6 million for customer credits; and \$5.4 million for consumer education.

**Eligibility Criteria:** Eligibility criteria vary by program segment. Existing facilities must be located in-state and must not be receiving fixed energy payments from a utility contract. New facilities must meet eligibility requirements in each solicitation to award production incentives. On-site generation systems must be photovoltaic, solar thermal electric, small wind (10 kW or less), or fuel cells using a renewable fuel; in addition, the system's electricity production cannot exceed 200 percent of the site's historical or current electricity needs, systems or components must meet national standards, and retailers must provide a minimum five-year warranty. To

receive customer credits, customers must purchase renewable energy through a registered renewable electric service provider in the direct access market. Eligibility for consumer education funds vary by solicitation.

**Results:**

- The Existing Account supports 274 suppliers representing approximately 4,400 MW of existing renewable energy capacity. In response to California's energy crisis, 200 MW of existing wind capacity was re-powered, and over 100 MW of biomass generation returned to service. By March 31, 2002, the Energy Commission had paid more than \$151 million in production incentives to existing projects.
- Of the 73 active projects that won funding awards in the three New Account auctions, 37 are now on-line and producing energy. These projects are currently contributing 244.2 MW of new renewable generating capacity to California's energy supply, with over 1.3 GW represented from all funded projects. \$18 million has been paid to projects on line, and over \$233 million has been encumbered for planned new renewable projects.
- The Emerging Renewables Account has paid \$50 million in rebates for 2,500 completed systems totaling 13 MW of capacity. Another 1,300 systems totaling 7.4 MW of capacity are in various stages of construction.
- In May 2000, the number of customers receiving customer credits peaked at over 216,000 customers. At the end of December 2001, there were 81,280 customers still participating in the program. Funds paid from the Customer Credit Sub account total over \$58 million.
- The Consumer Education Sub account has awarded grants totaling approximately \$1 million for projects to support consumer education and outreach activities for the renewable energy market. Contracts for \$3.3 million have resulted in targeted campaigns in communities throughout the state.

**\*Drip Irrigation at Munger-Poonian Land and Farming, Co.  
Energy & Water Efficiency Program\***

**Program Description:** The installation on a 178 acre pistachio orchard in 1994 with the aid of a loan from the California Energy Commission has demonstrated significant water and energy savings, with increasing yields. The project demonstrated a decrease in water use of 26%, a decrease in energy use of 45%, and an increase in yield of 78%.

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## **COLORADO**

### **\*Methane to Energy\***

**Program Description:** A hog farm in SE Colorado has a digester which the energy office, the farmer and OEMC, are testing a micro turbine side-by-side, real time with a modified natural gas genset using the same gas stream. The thought is that the MT can cost effectively produce electricity with lessened emissions, more quietly, with a smaller footprint and less maintenance. We also have a feasibility study underway (with EPA) to look at the viability and feasibility of using a fuel cell to generate power either from a digester or a gasifier.

### **\*Forest Thinnings to Energy and Increased Product Lines\***

**Program Description:** Our DOE IOF program is looking at taking the forest thinnings gathered from the fire reduction effort to create new and/or stronger industries including construction products, compost bulking material, ethanol, combustion for power, cement kiln firing, etc. The possibilities will provide numerous follow on opportunities for demonstrations, implementations, pilot projects, and workshops.

### **\*Composting Animal Project\***

**Program Description:** OEMC and the State are looking at ways to alleviate the problem of dead animals no longer having sufficient rendering value. We have held two demonstration projects on composting deads and have begun to hold composting classes. We look to spread this knowledge and acceptance of the practice as widely as possible. The compost has value as a commodity for landscaping and field application.

### **\*Energy Services Contracts for Farms\***

**Program Description:** Colorado is conducting energy audits of successful farmers to understand ways of decreasing energy use and hope to influence energy service companies to do performance contracting on farms to put in digesters, help set up composting operations, install distributed generators, etc.

### **\*Wind Development on Farm Land\***

**Program Description:** We will be holding a wind generation workshop in the spring of next year to educate and influence farmers (and others) to use their land (where appropriate wind parameters exist) to put up windmills through utility programs. We are also planning a workshop with utility companies and farmers to bring on more distributed generation devices. We want the utility companies to provide incentives (net metering, green programs, etc.) and to establish some assurances for appropriately priced interconnections. We want the farmers to understand the practicality and the advantages of putting in digesters.

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## FLORIDA

### **\*Florida Energy Extension Service\***

**Program Description:** The Florida Energy Extension Service in Gainesville, Florida has an anaerobic digester in Hague, Florida. The leading dairy producer in the United States is California. In California, cows create daily the waste equivalent of a city with 21 million inhabitants, operating without a sewage system. The process on the dairy farms includes hosing down the animals and their lots, and taking away the resulting slurry to be spread on fields close by. This is feasible for small dairies, well scattered and distant from residential areas. However, on today's mega-farms with their huge dairy and swine populations, the problems of polluted water, and rancid air as well as the problems associated with E-coli bacteria, are causing a plethora of problems with air quality and animal wastes. These problems are being addressed with anaerobic digesters and the methane produced can be used to produce energy to operate the dairy machinery.

### **\*Three Rivers Hydroponic Greenhouse\***

**Program Description:** Three Rivers Resource Conservation & Development Council in Milton, Florida, developed a hydroponic, solar assisted greenhouse farm that developed a technique to grow sea oats and other vegetables rapidly. Sea oats are a critical part of Florida's ecosystem, they function as natural sand traps and anchors for constructing the sand dunes. The sand dunes are critical because they provide protection to beach areas during hurricanes and other storms. Sea oats are protected by law, and the usual growth time is three to five years before they reach maturity. 3 Rivers RC&D is able to produce up to 100,000 sea plants ready for transplanting a on a beach within ten weeks. In addition, the Santa Rosa Sweet onion is produced in the same green houses. These onions are pesticide free, sweet, no-tears, and have four harvesting crops each year. A solar water-heating unit has been placed with the solar panels located in a reflecting tin-roofed, free standing, clear span, and pole structure. The solar heating system is connected in line with the LP gas heated hydroponic culture tank. Solution temperature is adjusted to 80 degrees Fahrenheit and plant growth rate, ion uptake, dry weight and shoot numbers is noted. Crayfish are grown in the heated hydroponic solutions, below the plant crop; a two-celled, subsurface flow, constructed wetland adjacent to the greenhouses placed to purify hydroponic solutions fouled by crayfish metabolic wastes. The crayfish culture is being evaluated as a possible intercropping system in the solar heated solution. The liquid propane gas water heaters are placed on-line with a 4,000-gallon flow-through hydroponic culture tank. The LP gas system augments solar heating of hydroponic solutions when needed, during days of reduced solar visibility. Four growth cycles are completed using sea oats and other valuable coastal plants.

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## GEORGIA

### **\*Energy Efficient Application of Agricultural Pesticides and Fertilizer\***

**Program Description:** More efficient application and use of pesticides saves energy in both the manufacturing and application sectors and will lessen environmental impacts due to over application of these chemicals. During the past year educational meetings and applicator spray clinics were conducted. A total of 448 growers and industry persons attended these meetings. In addition to the training meetings, credit card sized sprayer calibration cards were developed and distributed to growers. And, five airplanes and 24 ground fertilizer application trucks were evaluated and adjusted. The equipment calibrated is expected to cover 190,000 acres per year, with estimated savings for the ground application equipment alone at \$46,000 annually.

### **\*Variable-Speed Motors on Dairies\***

**Program Description:** Vacuum pump variable-speed drives have been demonstrated at two dairies in Georgia and have proven to be cost-effective, saving from \$4000 to \$7000 annually in electrical costs. The data from these tests have been presented at several statewide and area meetings. As a result, variable-speed drives have been installed on approximately 20 dairies in Georgia.

### **\*Reducing Electricity Usage in Tunnel-Ventilated Broiler Houses\***

**Program Description:** With growing heating fuel costs, poultry companies are very interested in ways that they can reduce their fuel usage. Recent test in Georgia demonstrated that the installation of small circulation fans in poultry houses not only increased floor air temperatures as much as five degrees but reduced fuel usage by 30 percent. In addition, another demonstration to tighten the poultry houses has shown a decrease in fuel usage of 20 percent. Georgia is supporting education programs for poultry growers to brief them on the importance of tightening houses, proper ventilation, and the use of mixing fans to reduce energy use.

### **\*Cotton Tillage\***

**Program Description:** Each year Georgia's farmers plant 1.5 million acres of cotton. The normal wide row cotton production practices require several tillage operations including disking twice, ripping, and bedding, and bed conditioning. These operations consume 4.7 gallons of fuel per acre. Production practices, which reduce tillage and sustain yields (strip-till, skip row, and ultra narrow row planting) are being demonstrated to cotton producers at different locations. Ultra narrow row (UNR) verses conservation tilled cotton skip-row spacing were planted at the Sunbelt Exposition Farm in Georgia. Research shows that skip-row cotton may yield as much as narrow row while reducing the amount of input per acre, including tillage. UNR cotton reduces the need for pre-planting tillage, which requires 4.7 gallons of fuel per acre. The UNR cotton yielded 727 pounds per acre and the strip-till cotton yielded 470 pounds per acre. These low-input, normal yield results show that UNR cotton may be a feasible alternative in Georgia.

### **\*Conserving Energy Through Agriculture\***

**Program Description:** The University of Georgia College of Agricultural and Environmental Sciences, in partnership with GEFA, is providing education, demonstration, and general information on new, more efficient technology available to the state of Georgia's agricultural population. From more efficient irrigation to more efficient poultry house operations, the College is transforming the agricultural population into more efficient energy consumers.

### **\*Commercial Crop Irrigation\***

**Program Description:** Over \$40 million is spent each year on energy to irrigate commercial crops in Georgia. Through the use of irrigation system calibration kits and demonstrations at farmer meetings, the College is educating the agricultural population on the energy advantages of more efficient irrigation packages, such as the center-pivot sprinkler system.

### **\*Residential Water Usage\***

**Program Description:** Through an urban water auditing computer program developed by the College, residents are becoming more educated on more efficient uses of water to irrigate lawns and urban landscapes. Results indicate that nearly 10 percent of the water used for residential irrigation could be saved if proper irrigation techniques and updated irrigation products were adopted. Outdoor water use is a major component of a city/municipal water supply. This, coupled with a statewide drought, makes this program attractive to Georgia cities, especially the smaller cities that have limited or small capacity water supplies.

### **\*Poultry House Operation\***

#### **Program Descriptions:**

**Ventilation:** This program is measuring the energy usage and air flow in tunnel ventilated houses to demonstrate methods poultry producers can use to reduce energy usage and maximize bird cooling. The focus is on increased energy efficiency through more efficient fans and proper fan maintenance. The College is conducting field comparisons of the new fans as they come on the market and distributing information to growers and poultry company personnel.

**Heating/Cooling:** Another program involves educating growers and poultry company personnel about more efficient heating equipment and operating procedures during wintertime brooding.

**Lighting:** The College of Agricultural and Environmental Sciences is also introducing poultry growers to new dimmable fluorescent lighting technology. Although fluorescent lighting has proven to significantly reduce lighting costs in poultry houses, many growers do not use them because they are not aware of the new dimmable fluorescent lighting technology.

### **\*Pesticides Application\***

**Program Description:** This program demonstrates to growers and commercial applicators an easy method to calibrate agricultural pesticide sprayers and reduce pesticide drift. The College is conducting aerial applicator fly-in clinics to determine and improve upon aircraft spray patterns, thus promoting agricultural chemical and energy efficiency. Orchard air-blast clinics are being held to determine sprayer patterns and ways to adjust them. Data collected at these clinics on the errors that occur during actual application demonstrate an average \$2.62 per acre is typically wasted in energy costs for applying agricultural pesticides. The estimated energy impact to Georgia agriculture through this calibration program is \$571, 500 annually.

### **\*Peanut Curing\***

**Program Description:** This program demonstrates more efficient methods for transporting and curing peanuts by increasing the size and efficiency of the drying units. Field demonstrations

are being conducted to show safety advantages and energy savings in transportation and curing in semi trailer lots compared to traditional farm trailer lots.

### **\*Precision Farming\***

**Program Description:** This program assists farmers in making basic decisions that reduce the amount of energy, time and money used to provide inputs on non-profitable or unused areas of a field. Inherent to these decisions are reducing energy costs by such factors as conservation tillage, reduction in water use, and reduction in fertilizer and pesticide application.

### **\*Residential Structures\***

**Program Description:** In a collaborative effort with the College of Family and Consumer Sciences, the College of Agricultural and Environmental Sciences is promoting residential energy conservation practices among farmers and rural residents of the state. It incorporates energy assessment guides and tools to help rural households manage their energy and water. Tools are being developed in both English and Spanish.

The program is also promoting energy conservation and efficiency in migrant housing settings and educating migrant labor on energy saving practices. The two colleges are preparing publications for target audiences and developing an assessment tool to demonstrate energy efficient practices.

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## HAWAII

### **\*State Hydrogen Program\***

**Program Description:** U.S. Department of Energy (DOE) has awarded \$150,000 to Hawaii for a State Energy Program (SEP) Special Project. The award is for Phase 1A of the three-year, three-phase Hydrogen Power Park project, designed to accelerate development of a hydrogen energy infrastructure in Hawaii, and to advance the objectives of the DOE's Hydrogen Program.

An additional award of \$300,000 is anticipated for Phase 1B from federal FY 2003 funds. The entire project cost is estimated to be \$3 million, of which at least fifty percent (50%) will be cost shared by project partners. Phases 2 and 3 of the project are contingent on available federal funding.

Additionally, through the state's energy office, a hydrogen public-private partnership has been established with national experts to advance key projects for deployment and demonstration of hydrogen-related technologies in Hawaii.

We are interested in determining whether biomass resources can be used to produce hydrogen through gasification and catalytic conversion of syngas, or other means.

**Program audience:** State and national hydrogen research and industry

**Funding level:** State Partnership \$200,000; Hydrogen Power Park project \$150,000 DOE FY02, 50% cost share

**Eligibility Criteria:** N/A

**Results/Leverage:** N/A

### **\*Alternate Fuel Education Program\***

**Program Description:** The state energy office develops and maintains comprehensive biofuels information on its website and in customized training and educational materials, and actively participates in partnerships and community outreach activities funded through the DOE's Clean Cities Program, State Energy Program, and Pacific Regional Biomass Energy Program.

**Program audience** – Government agencies and the public

**Funding level** – Various, continuing through DOE's Clean Cities Program and SEP

**Eligibility Criteria** – N/A

**Results/Leverage** – State and county incentives established; increased public and fleet manager awareness of alternative fuels; biodiesel plants in operation; ethanol plants in planning.

### **\*Pacific Regional Biomass Energy Program\***

**Program Description:** Program activities include establishment and maintenance of a state bioenergy information network, co-sponsorship of three bioenergy workshops and conferences, and a statewide biomass resource assessment that will be leveraged to develop projects toward greater use of bioenergy. Under the program, federal biomass-related funding opportunities, newsletters, and technical resource information are distributed statewide on a regular basis. The program works with the agriculture industry to facilitate and leverage the use of federal program resources for current projects including facilities and resource assessments, and research and development.

**Program audience** – Industry, government, research, community

**Funding level** -- \$30,000 FY 2001, \$30,000 FY 200

**Eligibility Criteria** – N/A

**Results/Leverage** – N/A

**\*Renewable Resources Research Laboratory\***

**Program Description:** The Renewable Resources Research Laboratory (R3Lab) at the University of Hawaii's Hawaii Natural Energy Institute is a center for the development of innovative technologies and processes to convert biomass into fuels, high-value chemicals, and other products. Biocarbons are the current focus of R3Lab researchers, who are demonstrating a commercial-scale process that converts biomass into charcoal by flash carbonization and creating new applications for this widely used material. Other work involves supercritical gasification for the production of hydrogen, fuels, and chemicals.

In the Energy Conversion Laboratory, researchers are conducting a bioenergy assessment for the Hawaii state government, performing bench-scale gasification tests in support of a high-temperature alkali sensor development program, and developing bench-scale hydrogen production and purification capabilities to be integrated with the Hawaii Fuel Cell Test Facility.

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## IDAHO

### **\*Stage One Anaerobic Digestion\***

**Program Description:** Renewable Resources Research Laboratory Over the past several years the number of dairies in Idaho has increased substantially. While this growth has established the dairy industry as an important aspect of Idaho's economy, it has also increased the scope of public awareness and scrutiny of the industry. As a result, there has been pressure from an array of sources calling for improved management regulations on Idaho's dairies. Through this grant, the Idaho Department of Water Resources Energy Division will act as lead in the creation of an Idaho Livestock Industry Anaerobic Digestion Initiative that seeks to install a unique anaerobic digestion process that holds the greatest promise towards resolving the dairy waste issue. The long-range goal of this initiative is the installation of five anaerobic digestion facilities at Idaho dairies by 2005.

Tasks performed under this grant will constitute the first phase of this goal. Strategies for developing this phase of the initiative include: 1) outreach and education, 2) establishment of a state, federal and local agency and livestock industry oversight committee, 3) design of a prototype dairy anaerobic digestion facility and, 4) a complete feasibility analysis of the prototype dairy anaerobic digestion system.

The project has a one-year timeline. Partners will include Aurora Power and Design, Cyclus EnviroSystems, the Environmental Protection Agency, Idaho Department of Agriculture, Idaho Division of Environmental Quality, IdaCorp, University of Idaho, U.S. Department of Agriculture, and the U.S. Natural Resources Conservation Service.

**Amount Requested:** \$ 40,000

**Cost Share** \$ 42,120

**Planned Completion:** June 30, 2001 – Follow-On Grant Awarded (Below)

**Congressional District:** 1 & 2

**Need And Benefits:** The dairy industry in Idaho is thriving. In 1998, it employed about 15,000 people; its 281,683 cows produced 655 million gallons of milk. Idaho is the third largest milk-producing state in the west and ranks sixth nationally. Its 978 dairy operations generate \$810 million in on-farm cash receipts. Of the dairy farm operations in the state, roughly half are in the Magic Valley. These 423 dairy farms have more than 192,500 cows. (Source: Idaho Dairy Facts – 1998, a fact sheet produced by the U.S. Department of Agriculture, Agricultural Statistics Service, Boise; Idaho Department of Agriculture, Bureau of Dairy; University of Idaho, Moscow, Dairy Extension, and the United Dairymen of Idaho.) The increasing number of dairy farms in the Magic Valley has caused a corresponding increase in public concern for odors and for water quality in the Snake River and several of its tributaries. Nutrient enrichment, in particular, is degrading the surface waters and the groundwater upon which many Idahoans depend.

The Pacific Northwest and Alaska Regional Bioenergy Program has vigorously worked on anaerobic digestion technologies since its inception. Six years ago the Regional Program began working with an exciting new anaerobic digestion process developed by Cyclus EnviroSystems Inc. Through the support of the Regional Program this process, called anoxic gas flotation (AGF), has proven itself to significantly outperform all other anaerobic digestion processes. It holds promise to revolutionize waste management and dairy waste management in particular. The AGF process minimizes disposal, odors and management costs while maximizing the recovery of nutrient and energy resources present in the waste. With this process dairymen can

respond to the growing objections towards their operations by converting their waste to valuable products.

Dairy farmers are interested in cost-effective methods of cleaning up existing dairy pollution sources, preventing pollutants from entering either groundwater or the surface water and in treating and converting animal wastes into marketable products. The number of calls from dairymen, legislators and concerned citizens to the Energy Division seeking information or technical assistance on the anaerobic digestion process has increased substantially over the past few years. Other anaerobic digestion technology providers are soliciting sizable investments from the dairymen and yet, their technologies do not address central concerns such as nutrient management.

The AGF process utilized in the proposal will provide a variety of economic and environmental benefits to the dairy and the community. AGF will reduce waste disposal and other operating expenses as well as produce new sources of revenue for dairies. High quality methane gas free of hydrogen sulfide is produced. The process will provide 'green power' by using methane to produce electricity. The dairy can reduce or eliminate its electrical expenses by implementing net metering with the local electrical utility (IdaCorp) or by using all the electricity on-site. The dairy will also produce waste heat from the power generation that can be used to heat water used in the dairy parlor and displace propane or electricity. The waste heat can also be used to heat homes, shops or offices at the dairy and displace fuel oil, propane, or electricity.

The AGF process will generate compost and struvite which can be sold as organic fertilizers. Struvite is a magnesium ammonium phosphate compound that is unique to the AGF process compared to other digester processes. The new revenue sources will diversify revenue sources which will improve the profitability of the dairy industry. Property values in the community will be enhanced or preserved by reducing and controlling waste, nutrients, and odors. Surface and ground water quality will be improved as well. The livability of the community will be enhanced. The threat of violating governmental regulations will be reduced by reducing odor, surface and ground water pollution, nitrogen and phosphate pollution and bacterial pollution, specifically E-coli and coliform bacteria. Promoting the good will of the neighbors cannot be measured or assigned a cost, but will clearly have long-term benefits. As a result, dairymen can turn the waste materials from their operations into assets and make a liability into a revenue source.

### **Goals And Objectives**

Over the next five years the Energy Division will facilitate an active program to educate the livestock industry on the most technically advanced and cost-effective anaerobic digestion processes and help them incorporate these technologies into their operations. The long-range goal of this initiative is the installation of five anaerobic digestion facilities at Idaho dairies by 2005. Under this grant, Phase I, the Energy Division will establish the foundation of that effort. Program objectives for this phase of the program will include:

- outreach and education of those in the Idaho livestock industry, particularly dairymen, on the treatment of livestock wastes with anaerobic digestion and the subsequent value of the by products, including energy recovery, compost, and struvite,
- establish and facilitate a partnership of state, federal and local agencies, the livestock industry and the technology providers through the formation of anaerobic digestion oversight committee,
- develop the design of a prototype dairy AGF anaerobic digestion facility with energy recovery and use system that can be replicated throughout the livestock industry in the Magic Valley and beyond,
- develop a thorough feasibility analysis of the system and,

- promote program results via press releases and media interviews.

### **Tasks**

The following tasks will be performed to reach the objectives stated above. A project schedule is attached.

Task 1 - Develop Responsibilities and project design specifications

-Conduct meeting(s) with the project advisory group to develop the direction and design specifications for the project and a project timeline for all deliverables.

- Submit DOE Special Projects Proposal and other funding proposals for Phase II

Task 2 – Outreach and education

-Arrange an information seminar and advertise with press releases

-Conduct information seminar

-Transform advisory group into an oversight committee that includes interested dairymen, the hog industry representatives and other interested parties.

Task 3 – Oversight committee activities

-Create specification list for the system design

-Select prototype dairy

-Make preparations for Phase II (prototype construction)

Task 4 – Conduct Feasibility Analysis

-Conduct preliminary market and resource assessment

-Prepare capital budget.

-Develop anaerobic digestion products marketing plan.

-Develop pro forma profit and loss statement.

-Management needs assessment.

Task 5 - Design project

-Execute Energy Division/Cyclus contract

-Execute MOUs with other technology providers

-Preliminary design & cost estimate

-Final design

1. Waste Management Plan
2. Anaerobic digestion design
3. Energy use design
4. Compost and struvite marketing plan

### **Task 6 – Phase I completion**

-Press release and media interviews on project results

-Final Report Submittal to DOE

### **\*Renewable Energy Resources\***

**Program Description:** The Energy Division is Idaho's contact for information on alternative fuels, alternative-fueled vehicles, and state policy. Staff maintains a working relationship with various governmental agencies and fuel providers involved with alternative fuels.

PV4U is a working group with members from the Energy Division, other state and local agencies, utilities, photovoltaic (PV) and other solar dealers, focusing on promoting the use of PV in Idaho. One workshop is planned for this program year, which will focus exclusively on PVs. Most of the workshop planning, marketing, agenda setting, facilitation and coordination are done by the Energy Division.

The Idaho Solar Initiative (ISI) is sponsored by the PV4U Solar Working Group. The ISI supports the national Million Solar Roofs Initiative by bringing together federal, state, and local resources to assist consumers looking for economical and environmentally sound solar power

systems and to aid and grow the Idaho solar industry. As part of the ISI, the Energy Division will work with the Northwest Solar Alliance in organizing a Northwest Solar Awareness Week. Energy Division staff will provide support for other renewable-related programs/projects, such as Ethanol Outreach and the Aquanol Project that are part of the Bioenergy Program.

The Idaho Energy Division launched a Wind Energy Initiative in 2001 to spur development of wind energy projects in Idaho. This program supports the national Wind Powering America Initiative to encourage the use of wind resources. The National Renewable Energy Laboratory has identified Idaho, including Native American lands, to have very excellent wind energy resources. However, at present, no commercial wind development has occurred in Idaho. Wind projects in Idaho could provide rural economic development opportunities and help meet the growing need for clean energy.

The Idaho Wind Energy Initiative has started an Idaho Wind Resource Confirmation Project. Verification of wind resources at specific sites identified through the latest wind resource maps and other documents is an important step in successful wind energy development. Using \$10,000 obtained from the USDOE, the Energy Division obtained five anemometers equipped with data loggers being installed in promising sites in cooperation with various partners. Additional funds will be sought from various sources to increase the number of anemometers. The Energy Division worked closely with the National Wind Technology Center, NREL, to train Energy Division staff in wind siting techniques and provide additional technical assistance as necessary. The Energy Division is also working with INEEL to provide assistance in wind data analyses.

In addition the Energy Division facilitates state and local partnerships and educate Idaho citizens on the development and use of wind energy. The Energy Division hosts planning a fall workshop and co-sponsors a Wind Energy Development Workshop, in cooperation with several partners, including NREL and INEEL.

**Target Audience(s):** General public, Utility personnel, State and local governments, Architects, engineers

**Services Provided:** Technical assistance, workshops, site assessments

**Program Time Period and Budget:** 7-1-2002 through 6-30-2003 SEP Grant \$45,627, PVE Funds \$6050.

#### **\*Wheat Straw Utilization\***

**Public Abstract:** Agricultural crop residues are a valuable renewable biomass resource. Producers, including the National Association of Wheat Growers and the Idaho Wheat Commission, have long recognized the potential economic and environmental benefits in producing bioenergy and bioproducts from excess wheat straw residue. More importantly, industry has also recognized the potential value of the estimated 51 million tons of utilizable wheat straw that go to waste in the U.S. each fall. Straw utilization for bioenergy, biomaterials, and for fuels and chemicals has been limited because of the silica, alkali minerals, lignin, and hemicellulose contents of the straw, and because of the waxy cuticle that coats the straw.

Thus, not all the parts of the straw residue are equally valuable. For cost-efficient utilization of the straw, the undesirable components must be removed. The current paradigm for straw utilization includes the necessity to transport all the components of the straw to the point of utilization; there is no cost-efficient way to remove the undesirable straw components before transporting it. This is expensive not only because of the low bulk density of straw, but also because it brings the less valuable components to the manufacturer's gate and creates economic and environmental liabilities. We believe that through a distributed low-capital, low-

labor system, we can separate out the undesirable parts of the straw residue and leave them in the field where they can do the most good, by building organic matter and maintaining soil nutrient levels.

We will accomplish this separation using a two-step process. The first step is a physical separation to separate the desirable straw stems from the undesirable leaves, sheaths, and nodes, since the fibrous straw stem contains much less silica and waxy cuticle layer than do the leaves and sheaths. The leaves and sheaths contain higher nutrient levels, so they would be better utilized as organic matter for soil conservation. This separation will allow straw stem utilization in existing boilers for bioenergy productions. The second step is a limited degradation of the cuticle, lignin, and hemicellulose in the straw by naturally occurring fungi. This step will take place in a low-capital, low-labor composting system that can be easily operated over a wide range of scales, from very small to very large. The fungal degradation will allow utilization of the straw for production of straw-thermoplastic composites. In each step, the separation will take place locally, using existing harvesting, forage, and straw handling equipment. The distributed straw separation process promotes the use of straw residue to replace conventional feedstocks for energy (coal), and makes the straw a better feedstock for production of new straw-thermoplastic composites that can replace petroleum-based plastics.

In addition, the separated straw could also serve as a feedstock in applications not specifically targeted by this proposal—fuels (ethanol), chemicals (lactic acid, glycerol, etc.), linerboard, and straw particleboard production—since the barriers to utilization of straw for these products are much the same as for bioenergy and thermoplastic composites. In short, the distributed straw separation system is a win-win scenario for all involved. It generates a new revenue stream for wheat producers, provides an incentive to reduce air pollution caused by field burning, and accomplishes soil conservation goals. It decreases the need to burn coal for energy, thereby reducing air pollution and net emissions of greenhouse gases. It allows reduced petroleum consumption by providing a superior feedstock for fuels, chemicals, and plastics. It relieves pressure on our dwindling forest resources by providing a feedstock suitable for paper and building materials. Finally, through use as durable goods, it provides a reservoir for carbon dioxide, over time reducing the atmospheric levels of this greenhouse gas.

**Status:** The project is ongoing. It is a three-year project, we are in the second year. Funding is approximately \$990,000.00 USDOE and \$380,000.00 local match.

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## INDIANA

### **\*Dairy Farm Biogas Study\***

**Program Description:** The Great Lakes Regional Biomass program has provisionally awarded \$40,000 to Anergex to conduct a pilot plant biogas study at the Jones Dairy Farm in Star City, IN. The project is estimated to use about one ton of manure per day to generate 394,000-kilowatt hours per year.

### **\*Development of Small Gasification Unit\***

**Program Description:** The Indiana energy office is currently involved with two projects with Stwalley & Stwalley Engineering. This company is attempting to develop a small, modular gasification unit to generate electricity at remote sites using a variety of agricultural wastes (such as wood chips, stover, chaff, and manure). The company has been awarded a U.S. Department of Energy Special Project grant of \$40,000 to develop and test processes for gasifying poultry litter. They also have received a \$20,000 grant from the Energy Office to develop a gas storage system to allow for continued power generation when the gasification unit is not operating.

### **\*Distributed Generation Grant Program (DGGP)\***

**Program Description:** This program is designed to enable businesses and institutions to install and study alternatives to central generation such as fuel cells, micro turbines, cogeneration, combined heat & power and renewable energy sources.

The program offers grants of up to \$30,000 or 30% of equipment costs, whichever is less, for projects that employ high efficiency distributed generation technologies such as fuel cells and cogeneration, or renewable energy technologies such as solar, wind and biomass. Applications are accepted on a rolling basis.

**Year of Program:** The program was launched in November 2001.

**Program Audience:** Businesses, non-profit institutions and units of local government (including public schools) are eligible to apply for grants. Eligibility for this grant program is limited to companies and organizations that operate in the state of Indiana or will operate in the state as a result of this project. Project budgets may include funding from third party sources, but the applicant itself must directly contribute at least 20% of the project's total budget.

**Funding Source and Level:** This program is funded by the State Energy Program (SEP) grant funding.

**Eligibility Criteria:** All projects must occur in Indiana, be technically feasible for full-scale operation, and comply with all applicable environmental, safety and legal regulations. Commercially proven projects are preferred. Eligible projects are those that demonstrate measurable energy savings in kWh, Btu or other units of measurement.

To be considered for funding, a project must provide baseload power of at least 20 kW for the facility at which it is located and should have a thermal efficiency of 50% or greater, involved fuel cells, or take advantage of a renewable energy source. Co-generation projects that provide more than just electricity are preferred. Photovoltaic, wind turbine, biomass, landfill and digester gas projects are considered to be Renewable Energy.

**Results and Leverage:** The program has already approved three projects, each for grants of \$30,000. The total amount of industry contribution to these three projects is \$5.4 million.

**Success Stories:** Fair Oaks Dairy farm is building a facility to convert cow manure into electricity. It is receiving a \$95,723 Special Project grant from the U.S. Department of Energy and a \$30,000 DGGP grant from the Indiana Department of Commerce, Energy Policy Division.

Fair Oaks operates four separate dairy operations. This project will convert the manure from one 3,000-cow facility into methane gas using anaerobic digestion, a speeded-up version of the natural decay process. The methane gas – the same gas that is in natural gas - will fuel specially modified engines and generators to produce electricity for use at the dairy and sale to the local utility.

The anaerobic digestion process will greatly reduce the volume of solid animal wastes generated by the dairy. The nutrient-rich solids produced during the anaerobic digestion process – which have much less odor than regular animal waste – will be used as crops are planted. The entire project, including the digester, generation equipment and waste treatment equipment, will cost over \$2 million. The Fair Oaks facility will have three 250-kilowatt electric generators that are expected to meet the needs of the dairy and still be able to supply more than 3.5 million kilowatt hours of electricity a year to the local utility, enough to power approximately 350 houses.

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## IOWA

### **\*Chariton Valley Biomass\***

**Project Description:** This project is a demonstration of the production and use of switchgrass as a biomass energy crop. The goals of the project are to a) demonstrate the co-firing of switchgrass with coal and to b) generate a sustainable supply of switchgrass for 35 mws of electric power. The sustainable supply for 35 mws requires an annual harvest of 200,00 tons of switchgrass from 50,000 acres of land.

The project began in the winter of 1995 as southern Iowa farmers started efforts to establish markets for energy crops. The goal of the project was set to generate enough switchgrass to generate 35 mws of power by co-firing with coal at the Ottumwa Generating Station (35 mws is 5% of the power plant's 700 mw capacity).

The use of switchgrass as an energy fuel creates a number of benefits for Iowa a) farmers can convert CRP land into a productive use, b) more energy cost dollars stay in Iowa, c) soil erosion is reduced, d) water conservation is improved and e) CO<sub>2</sub> emissions are reduced. The full demonstration project at 35 mw of switchgrass will reduce CO<sub>2</sub> by approximately 114,000 tons/year.

### **\*Butler County Integrated Crop Management Project\***

**Project Description:** Fertilizers and pesticides account for about 55% of annual variable costs for corn production and 35% of total costs. In Iowa, for continuous corn these inputs may reach 70% of variable costs. Many farmers are locked into fixed costs, for land and machinery. To save money, they have to examine and reduce their variable costs. Between 1985 and 1991, as a result of education and demonstration programs, Iowa farmers reduced their total nitrogen fertilizer use by more than 1.3 billion pounds, with no decline in yields. These reductions equal energy savings of more than 200 million gallons of diesel equivalent and cost savings of more than \$200 million. Through integrated crop and pest management systems, farmers have also reduced applications of potassium and phosphorus as well as pesticides. In one Iowa Energy Office test county, 48 farmers increased their net return by more than \$500,000 per year—an average of \$20 per acre using the Iowa approach.

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## Kentucky

### **\*Biomass Heated Chicken Houses\***

**Project Description:** Hundreds of poultry farmers in Kentucky were devastated during the winter of 1999-2000 by a combination of severe weather and high gas prices for heating their chicken houses. In response, 46 Western Kentucky poultry farmers banded together in a cooperative to address these issues by developing an innovative hot water heating system for the special environment found within poultry houses. By using biomass as an energy source to produce hot water, along with improved insulation of these huge buildings, the energy cost of heating an 8-house complex can be reduced by an estimated 70%.

Previous work with the poultry cooperative by Kentucky Enrichment, Inc. (KEI), demonstrated the effectiveness of a new hot water radiator system designed to keep the chicks spread out along the feed and water lines, rather than crammed together near the heat source as occurs with a conventional open flame brood heater. They are thus able to get feed or water whenever they need it without having to leave the source of heat, and they can also regulate their own temperature without being crowded into a less than optimum position. The new design was tested, using natural gas as the fuel source, over the 2001-02 winter season with four flocks of chicks, and yielded a 10% decrease in mortality and a 10% increase in feed utilization, both of which are highly significant for the producers' economics.

The next proposed phase in the research and development program is to test the system during the 2002-03 heating season using biomass as the fuel source. Kentucky has abundant renewable resources of green sawdust from the sawmill industry as well as corn stover and rice straw. The estimated 2,000,000 tons of biomass produced each year provides an opportunity for renewable resources to replace propane and natural gas.

Economic projections indicate that the return on investment would be favorable - a 3.5 year simple payback period - but the major obstacle is the inability of the growers to obtain financing for a system that is still considered experimental. The participants hope to demonstrate the economic advantages of the new design, enabling local banks to finance similar installations in chicken houses throughout the region. In addition, the large poultry corporations such as Tyson and Cagle need to have any changes demonstrated before they will allow growers to institute new methods. This gives rise to a chicken-and-egg type of situation, so to speak.

KEI will select a biomass boiler and identify a farmer within the cooperative willing to have the system installed on a test/demonstration basis. KEI and its subcontractors will install the biomass system, including a computerized control system to facilitate the use of a variety of fuels, arrange for delivery of locally available biomass fuels, and begin testing the system, first without, and then with, live chicks. KEI will collect data on energy costs, chick mortality, and feed utilization rate for comparison to conventional chicken houses. After the heating season ends, KEI will assess economic feasibility and write a final report describing the project results in enough detail to enable other participating co-op members to obtain financing and adapt the biomass energy system to their operations.

**Year of Program:** 2002-03

**Program Audience:** Poultry farmers

**Funding Source and Level:** DOE's Southeastern Regional Biomass Energy Program, \$25,970 in federal funds  
Cost Share (in-kind): \$48,275.

**Results:** Project is ongoing.

**\*Manipulation of Product Formation by a Novel Thermophilic Host Microorganism\***

**Project Description:** Ethanol production now occurs in a two-step process, one at low temperature and one at higher temperature. If these could be combined in a single step, the process could be speeded up and made more efficient. The approach is to select one or more species of bacteria with the ability to thrive at relatively high temperatures, with oxygen and ethanol present, and then use genetic engineering to enable it to produce more ethanol instead of competing metabolic products. Several promising species of bacteria were isolated from goat dung, and testing has started.

**Year of Program:** 2002-03

**Program Audience:** General

**Funding Source and Level:** ORNL's State Partnerships Program, \$50,000 federal.

Cost Share (in-kind): \$69,000.

**Results:** Project is ongoing.

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## MICHIGAN

### **\*Biomass Energy Program\***

**Program Description:** The goal of the Michigan Biomass Energy Program is to encourage increased production and use of energy derived from Michigan's biomass resources through program policies, public and private partnerships, information dissemination, and state project grants. Biomass is any organic matter, which is available on a renewable basis through natural processes or as a by-product of human activity. Biomass includes: agricultural crops and wastes, wood and wood waste, and municipal solid waste. The type of energy obtained from biomass can include heat, electricity, and liquid fuels.

Some of our recent program activities include:

- Completion of an energy crop discussion paper, which provides basic energy crop information, explores opportunities and constraints for the development and use of energy crops, and discusses what crops could be grown in Michigan.
- Investigating the potential for development of on-farm anaerobic digestion systems in Michigan. Our program completed a report a few years ago, which examined the history of digesters in our state and found that although there had been six digesters operating in the past, there is currently only one digester in Sturgis still operational. Since this report was released we have had renewed interest in anaerobic digestion and are considering providing some funding specifically for digestion projects in Michigan.
- Participation in the Michigan Ethanol Working Group. The Ethanol Working Group is involved with promotion of increased ethanol production and use in Michigan and is a coalition of universities, private and non-profit organizations, and local and state government agencies. Our office assists with coordinating meetings, distributing the monthly EWG newsletter, and maintaining a website page for the group on our website.

**Program Description:** Our program provides funding for State bioenergy projects on an annual basis. Maximum grant awards range from \$5,000-\$30,000. Funding categories typically include biofuels/bioenergy education, biofuels infrastructure, and biomass technology development/demonstrations. The source of the funds is U.S. Dept. Of Energy through the regional biomass energy program and state energy program.

Current projects include:

- The City of Grand Rapids producing biodiesel from waste vegetable cooking oil, which will be used in city vehicles.
- The Michigan Association of Conservation Districts educating Michigan teachers and students about biomass energy.
- The University of Michigan conducting emissions testing on small engines using E-10 and E-85.

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## MISSOURI

### **\*Stream Protection Using Solar Water Pumps for Rotational Grazing\***

**Program Description:** This project is funded through the Section 319 Non-Point Source Water Pollution Control Program. Its purpose is to use photovoltaic electric panels to power water pumps in remote pastures to allow landowners to develop rotational grazing systems while fencing cattle out of streams that are listed on Missouri's 303(d) list. Benefits of this project include improved water quality through decreased stream bank erosion, potential increases in riparian woodland cover and productivity, and increased farm income as a result of improved stocking rates of up to 25 percent with minimal investment in fencing and water distribution systems.

### **\*Developing Biopower Decision Tools for America's Rural Electric Cooperatives\***

This project is funded through the Department of Energy Office of Biopower and Hydropower Technologies and will develop computer-modeling tools that will allow rural electric cooperatives to analyze and compare the financial and technical viability of various biopower technologies. Deliverables include:

- A linear programming model to assess biomass feedstock supply options;
- A computerized technology assessment program to assess and compare various bioenergy technologies including technology data sheets for commercially available bioenergy technologies,
- An economic impact program to assess the macro-economic impact on a cooperative's service territory associated with the implementation of bioenergy systems, which includes output options to display results of system optimization calculations;
- A manual with detailed instruction for the use of the above models; and
- A generic business plan for implementing bioenergy systems.

Energy savings from this project will be the result of rural electric cooperatives using the models to implement bioenergy projects in their respective service areas. These projects are expected to be from several kW to 80 to 100 MW in size. Three case studies will be analyzed during the development and calibration of the models. It is expected that at least one project will be built as a result of these case studies. The development of these models will increase the market for bioenergy technologies by allowing an affordable analysis of these options to be undertaken by electric cooperatives nationwide.

Due to the wide variety of feedstock mixes available across the country a wide variety of technologies will need to be developed, tested and proven. Results of such demand will be an increased number of markets for raw biomass resources, greater energy independence for rural America and increased economic viability for both farmers and rural communities.

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# Nebraska

## \*Agriculture Loans\*

**Program Description.** The Nebraska *Dollar and Energy Saving Loan Program* is a five percent (5%) revolving loan program. The Loan Program, operated in conjunction with the state's lending institutions, was created to provide low-cost financial incentives to help Nebraskans make energy efficiency improvements. Loans are available in five sectors including agriculture. **Year of the Program.** The Loan Program was established in 1990 and continues to finance energy efficiency improvements throughout the state on farms and ranches as well as the other sectors.

**Program Audience.** The program audience is Nebraska residents. A legal resident is a Nebraska taxpayer, a Nebraska-chartered corporation or a person who has maintained a permanent residence or has lived in the state for more than six months.

**Funding Source and Level:** The funding source for all sectors of the Loan Program is \$24.4 million of Nebraska Oil Overcharge Funds which leverage private dollars through the state's lenders. The total loan pool has revolved nearly four times to finance the cost of all eligible energy conservation measures at over \$153.6 million. The agriculture sector loans are part of the overall Loan Program and are funded from the general loan pool when applications meeting all eligibility criteria are received through participating lenders.

**Leverage:** Private funds leveraged through local lenders for all sectors exceeded \$76.3 million through June 30, 2002. A total of \$4,889,000 was leveraged through lenders for the agriculture sector.

### Eligibility Criteria:

- Borrowers seeking loans on farms and ranches must produce at least \$1,000 of agricultural products during a calendar year to be eligible.
- Borrowers wishing to make improvements on Nebraska farms and ranches seek loans through local lenders of their choice which are participating in the program. Participating lenders are available at more than 600 locations across the state.
- All energy improvement costs can be financed with a loan. The borrower maximum for farms and ranches is \$75,000.
- If the required energy efficiency standards are not already on the pre-approved improvement list, an energy audit must be performed. Generally, agriculture projects require an energy audit that proves a 15-year payback. Farm and ranch improvements to building envelopes and heating, ventilation and air conditioning systems must meet a 10-year payback and are normally on the pre-approved improvement list.

**Results:** The Nebraska Energy Office financed 547 agricultural energy efficiency projects through June 30, 2002. The total cost of all improvements on farms and ranches has exceeded \$10 million. The types of projects financed are grain dryers, low pressure pivot irrigation systems, no-till agriculture equipment and irrigation pump, well and motor replacements.

During the summer of 2000, the agency expedited new loans for agricultural irrigation systems and related improvements in 39 counties of Nebraska's 93 counties where severe drought conditions were prevalent and caused hardships for Nebraska farmers and ranchers.

The *Dollar and Energy Saving Loan Program* proves that efficiently managed funds dedicated to revolving loan programs can meet rural needs, help farms and ranches to significantly reduce energy costs, increase production and protect the environment.

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## NEVADA

### **\*Nevada Land Use Summit\***

**Program Description:** The Land Use Summit was created to bring opposing groups together to discuss issues in a non-adversarial venue to determine a common ground to address the issues. This was the third year the summit was held. The theme was “Disarming Disagreement-Cultivating Common Ground”. Four topics were selected for the two- day event with an additional half day to discuss wind and biomass as an energy opportunity for rural entities. The four topics discussed were “Water Rights/Transfer/Change of Use”, “Off Highway Vehicle Use of Public Lands”, “Urban Interface/Access to Public Lands” and “Renewable/Alternative Energy Development”. The renewable energy sessions also discussed irrigation efficiencies and how to reduce electrical loads. Luncheon speakers presented the status of previously addressed issues. These issues were Noxious Weeds, Sage Grouse population, Wildland Fires and Wilderness progress. There were over 200 in attendance during the initial two days and over 50 for the additional half-day. The result of the energy discussions was a Rural Outreach group. Action groups for wind and biomass were created.

**Program Audience:** Ranchers, Farmers, City, County, State & Federal officials

**Funding Level:** \$20,000

**Funding Source:** Private donations, \$6,200 Office of Energy

**Eligibility Requirement:** Energy Outreach to Farmers & Ranchers

**Results/Leverage:** The summit was dedicated to rural economic revival and controversial rural issues. The out come of the various group meetings was a better focus on issues to be resolved by the legislature that will meet in Feb. 2003 and a better knowledge of energy, what renewables are and how the rural community may benefit from activities in this area. Of prime importance to the attendees was how to mitigate rising power costs. Motor efficiency, pump parameters and sprinkler head training will be conducted in the future.

### **\*Rural Energy Outreach\***

**Program Description:** The rural energy outreach group has been created as a mechanism to overcome barriers that might arise from various sectors within and outside the state that could impede development of energy projects in the rural areas. Energy is looked at as a viable means of improving the economic well-being of our rural areas. Of the 17 counties in Nevada, 14 are considered rural and have been suffering economic hardship. The group also provides input to the Governor’s Energy Taskforce and acts as an umbrella organization for the energy working groups.

**Program Audience:** Representatives include Governor’s Office, Lt. Governor’s Office, State Office of Energy, BLM, USDA, State Agriculture, Nevada Association of Counties, University System, Environmental groups, Consumer Advocates Office, Public Utilities Commission, Utilities, Extension Services, Nevada Mining Association, State Commission on Economic Development, Energy Consultants, Small Business Development Center, Farmers & Ranchers.

**Funding Level:** no funding specifically dedicated to the group

**Funding Source:** Time involvement from each participant.

**Eligibility Requirement:** Interest in energy efficiency and renewable energy.

**Results/leverage:** Identifies energy projects within the state with emphasis on rural activities that will improve economic viability of the rural sector. Matches project needs with sources of information and funding.

#### **\*Wind Working Group\***

**Program Description:** The wind-working group is composed of individuals and groups interested in developing the wind resources of the state. This group is the hands on, grass roots, advocates of wind and will identify and follow wind projects of small, intermediate and large magnitude. The anemometer loan program will provide data to substantiate the wind mapping project. The anemometers (20 meter towers) of the anemometer loan program will be integrated with the 50 meter towers available through the Desert Research Institute (DRI) and the tall tower program of the Western Region Climate Center (WRCC)(wind instrumentation will be placed on existing towers).

**Program Audience:** Individuals and equipment suppliers interested in wind development

**Funding Level:** \$35,000 plus other funding from WRCC and DRI

**Funding Source:** \$15,000 WAPA, \$20,000 DOE, In-kind matches from WRCC & DRI

**Eligibility:** **Dedication To Wind Resources**

**Results/leverage:** Started anemometer loan program. Held conferences and summits for education of individuals, government officials and the public on the advantages and barriers involving renewable resources and energy. Training of eleven people in anemometer installation was performed in cooperation with the local utility, Office of Energy and NREL. This was done in support of the anemometer loan program.

#### **\*Solar Working Group\***

**Program Description:** This group performs the same functions for solar resources as the wind-working group does for wind. The solar working group in conjunction with Sunrise Sustainable Resource Group (which serves as the Nevada chapter of the American Solar Energy Society, ASES) hosted the annual national ASES conference in Reno, Nevada in June of 2002. There were 1093 in attendance, which broke the record for an ASES conference held outside of Washington, D.C. Individuals put on workshops and display booths for the public the Saturday and Sunday prior to the conference. This outreach activity brought an improved level of understanding of solar energy to the locals.

**Program Audience:** Individuals and equipment suppliers, Sunrise Sustainable Resources Group ASES members and affiliates.

**Funding Level:** \$48,500

**Funding Source:** State Office of Energy \$8,500, Remainder from local groups and a percentage of the ASES profits.

**Eligibility:** Interest in solar energy progress. Support of national ASES conference in NV

**Results/leverage:** Excellent profits for ASES and Sunrise plus an added solar outreach & education for the community. The activity was followed by a Sunrise solar home tour that was well publicized and attended.

#### **\*Native American Summit\***

**Program Description:** The purpose of the activity was to introduce alternative/renewable energy as a viable economic resource for the native Americans. The education segment was beneficial to those in attendance. The State Indian Commission sponsored the event with support from the Office of Energy. Follow up meetings with the Inter-tribal Council and other Indian groups indicate that the meeting was beneficial. Some of the tribal heritage issues have been addressed and working on renewable energy is not as repulsive to them as before.

**Program Audience:** 29 Nevada Tribes

**Funding Level:** \$10,000

**Funding Source:** State Energy Office (DOE)

**Eligibility:** Tribal affiliation

**Results/leverage:** 11 Tribes were represented along with 29 suppliers/consultants. One tribe signed a geothermal contract with an energy developer and three others are negotiating with power developers.

#### **\*Geothermal Working Group\***

**Program Description:** This working group has been in existence longer than any of the other groups. They were instrumental in bringing the national geothermal conference to Nevada. The geothermal resources in the state are documented and activities to provide a computerized data-base are underway at the University of Nevada Reno. Additional geothermal outreach and development support is being done by the Nevada Division of Minerals

**Program Audience:** Those with geothermal resources and developers

**Funding Level:** \$215,000

**Funding Source:** State Energy Office (DOE)

**Eligibility Criteria:** University of Nevada Reno mines & geology; Nevada Division of Minerals

**Results/leverage:** Geopowering the West workshop was hosted. The data-base of geothermal resources in the state will be available on a web site. Outreach activity is available for development support.

#### **\*Biomass Working Group\***

**Program Description:** The biomass working-group was introduced at the Land Use Summit and has developed interest in some sectors such as ethanol production and forest waste disposal. There is much interest in using forest waste as a source of electricity and possibly ethanol. Land-fill gas and solid waste utilization for the generation of electricity and waste heat are also of high interest.

**Program Audience:** Those with biomass resources and developers

**Funding Level:** \$630,000

**Funding Source:** Western Regional Biomass Program, Tricounty Development Authority, State Office of Energy, The Nevada Fire Safe Council, Nevada Commission on Economic Development.

**Eligibility Criteria:** Interest in biomass

**Results/leverage:** A biomass resource assessment was initially performed in the early 90's. The resource assessment for forest waste and Pinion Juniper waste has been slow in completion due to Native American resistance and the reluctance of BLM and the Forest Service to allow long term contracts or the thinning of these items.

### **\*Renewable Energy and Energy Efficiency Taskforce\***

**Program Description:** Renewable Energy and Energy Efficiency Taskforce created by the legislature in 2001 is to encourage the development of the renewable resources and support the Renewable Portfolio Standard (RPS) that will reach 15% in 2013.

**Program Audience:** All in the state interested in energy independence. The taskforce includes a representative from gaming, mining, utilities, environmental groups, consumers, wind, geothermal, biomass, and solar. Members were appointed by the governor (2), state senate majority (2) and minority leader (1), state assembly majority (2) and minority leader (1) and consumer advocate (1). Taskforce members work on a voluntary basis.

**Funding Level:** \$250,000

**Funding Source:** State general fund

**Eligibility Requirement:** Projects must utilize renewable resources and support the RPS.

**Results/leverage:** Setting up a process to provide seed funding for energy outreach. The working groups give input to the taskforce and support taskforce requests. The Office of Energy will implement task force requests.

### **\*Wind Map of Nevada\***

**Program Description:** Develop a comprehensive Wind Map of Nevada. As the basic premise in developing the wind resources of the state, an assessment of the resource was required. When completed this will be part of the wind mapping of the West and will be available to individuals and wind developers alike on the Office of Energy web page. Individuals and rural groups are looking forward to the new map.

**Program Audience:** Individuals and companies that want to utilize wind resources

**Funding Level:** \$50,000

**Funding Source:** State Office of Energy (PVEA) 50% and NREL 50%

**Eligibility:** Need for information

**Results/leverage:** The Office of Energy teamed with NREL and TrueWind to develop the map. The Western Regional Climate Center, Nevada Department of Transportation, the engineering department at the University of Nevada Las Vegas and the Desert Research Institute are cooperating with data sharing. The anemometer loan program will verify the mapped resources.

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## NEW YORK

### **\*Farm Energy Audits\***

**Program Description:** These audits evaluate energy use and recommend features like variable-speed drives on vacuum and mild pump motors, energy-efficient lighting, plate-heat exchangers to pre-cool milk with well water, and heat-recovery units on refrigeration compressors to preheat water. These measures reduced dairy electric consumption to less than 600kWh/cow-year, from the typical 800 to 1,200kWh/cow-year.

For example, following fire damage at one dairy barn, a new heifer barn, mild house, and milking parlor were constructed including variable speed drive motors and energy efficiency cooling. These improvements are producing \$3,990 in annual electrical energy savings. And, at a hydroponic lettuce producer's facility, energy saving recommendations such as new heaters, controls, and thermal curtains are delivering \$11,185 in annual energy savings.

### **\*New York Energy Smart Performance Program\***

**Program Description:** This program delivers performance-based incentives for installing variable-speed drives on milking and vacuum pumps at 150 farms. Annual cost savings are averaging \$2,600 for each dairy.

### **\*R&D Manure and Waste Management Projects\***

**Program Description:** New York designed RD&D projects are intended to raise farm profitability by improving energy efficiency and increase the value of byproducts. More than a dozen projects seek reduced disposal costs by using manure for fuel or converting it to marketable compost. Several projects examine the cost-effectiveness of community systems for multiple farms.

### **\*Innovation in Agriculture Helps New York Farms\***

**Program Description:** Agriculture makes a multibillion-dollar contribution to New York State's economy. To remain competitive, New York farmers continue to seek new ways to cut energy costs, improve productivity, and manage wastes.

Through its agricultural program, the New York State Energy Research and Development Authority (NYSERDA) offers cost-sharing and low-interest financing programs to help farms throughout the State save energy, develop new products and increase profits.

NYSERDA has provided over \$12.9 million in funding for energy projects that total \$26.5 million to help over 850 farmers:

1. lower on-farm energy costs,
2. use more environmentally friendly manure-management methods,
3. improve profitability through value-added products, and
4. generate their own electricity.

## **\*Research, Development, and Demonstration Program\***

**Program Description:** NYSERDA seeks innovative ideas for farm management through competitive, open solicitations. These periodic announcements are opportunities to submit innovative ideas and have them developed or demonstrated under a NYSERDA contract. For example, on-farm power generation that maximizes fuel efficiency by beneficially using heat produced may qualify for funding under NYSERDA's distributed power/combined heat and power solicitations.

Currently, \$10.3 million in NYSERDA support is helping 69 R&D contractor teams across the State. With co-funding, more than \$21.8 million in R&D projects are underway. These projects hold promise for:

- Improving manure and agricultural waste management in an energy-efficient manner.
- Improving agricultural processes and productivity through energy efficiency.
- Expanding farm profitability by developing new value-added products and systems for renewable energy and biotechnology.

Manure and waste management projects are designed to raise farm profitability by improving energy efficiency and increasing the value of byproducts. More than a dozen projects seek reduced disposal costs by using manure for fuel or converting it to marketable compost. Several projects examine the cost-effectiveness of community systems for multiple farms.

Example: A fixed-film, anaerobic digester was installed at a farm in the Catskills to treat manure liquids from some 100 milking cows. Anaerobic digesters reduce manure odors and produce methane fuel. With less odor, manure liquids can be spread when nutrients are more readily used by crops and less susceptible to runoff. The Watershed Agricultural Council is cosponsoring the project to demonstrate this method of preserving watershed water quality. Developing higher-value farm products can increase farm profitability. Several NYSERDA projects promote indoor hydroponic growth of high-value vegetable crops and production of tilapia fish by aquaculture. Collaborative projects examine the production of "meadow-raised" meat, and peeled and cut squash. Other projects address alternative products: one is constructing a prototype wool scouring facility that will produce a wool horticultural mat for weed suppression while using the wastewater to grow greenhouse plants; another has built a prototype that converts apple cider pressing residues (pomace) into a stable high -protein feed supplement.

Engineering an energy-efficient hog farm that maximizes efficiency and profits while minimizing wastes and costs is underway. This conceptual design study could introduce new livestock business methods in New York.

Farm productivity can be improved through the efficient use of energy. The use of controlled lighting to increase milk production and the economic benefits of artificial lighting on hydroponic tomato production are being studied as part of NYSERDA's effort to foster technological improvements.

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## **NORTH CAROLINA**

### **\*Anaerobic Digestion of Hog Waste\***

**Program Description:** Barham Farms Covered Anaerobic Digester. Barham Farms is a 4000 sow farrow-to-wean hog facility located in Johnston County, NC. In 1996, Barham Farms partnered with the DOE/EPA/USDA AgStar program to install a covered in-ground anaerobic digester that supplies biogas to a gas engine/generator set. This system has decreased reliance on outside purchased energy and, at the same time, reduced farm-based emissions. Barham Farms is currently producing and using on average 15 million Btu/day of biogas. This translates to an average electrical output of approximately 45kW. Waste heat from the engine is used to heat water, which in turn is used in the hog farrowing operation, and could be used to heat and humidify two 28,000 square foot greenhouses in which tomatoes are being grown. The tomatoes are fertilized with a portion of the effluent stream from the digester and there are plans to pipe some of the CO<sub>2</sub>-laden exhaust gas from the engine into the greenhouse to enhance the growth rate of the tomatoes.

### **\*NCSU Solar Center Programs\***

**Program Description:** North Carolina has significant animal waste resources, particularly swine waste. North Carolina's swine industry has, in the last 30 years, grown to become the second largest in the U.S. and is the state's largest single source of agricultural income. Environmental problems caused by swine operations have become a major problem in North Carolina in recent years. Anaerobic digestion would greatly reduce the pathogenicity of effluent from hog operations and generate electricity in the process. It is estimated that 50 MW of electricity could be generated if all the hog waste on farms >2000 head were utilized in an anaerobic digestion process. The NC Solar Center, through its Director, Dr. Alex Hobbs, has worked closely with Barham Farms in the implementation and operation of its digester, and is working on acquisition of funding for the following projects:

- Operation of a microturbine and/or fuel cell on biogas from an anaerobic digester, with reciprocating engine as the control
- Emissions testing on a reciprocating engine running on biogas from an anaerobic digester
- Design of a turnkey package for North Carolina hog farmers, with design guidelines based solely on the number of hogs in the operation and the type of operation
- Development of an appropriately sized, economically viable gas cleanup/treatment system for a farm-scale anaerobic digestion system

### **\*Landfill Gas Used For Greenhouse And Aquaculture Operations\***

**Program Description:** EnergyXchange Renewable Energy Center. The mission of EnergyXchange is to demonstrate the responsible use of landfill gas as an energy source for small enterprise in craft and horticulture, and to meet local energy needs. EnergyXchange, Inc. was formed in 1999 as an organization focused on development and operation of the EnergyXchange Renewable Energy Center. This center is a "campus" of high energy demand facilities adjacent to the Yancey-Mitchell landfill, fueled by the landfill methane gas being generated by decomposing garbage in the 6-acre landfill. EnergyXchange is located at the foot of the Black Mountain Range in Western North Carolina. The site includes two craft studios (one

for pottery one for glass blowing), three greenhouses, three cold frames, a public gallery, and a visitor center. An aquaculture operation using heat from the combustion of the landfill gas is under construction.

**\*NC Solar Center Programs\***

**Program Description:** The Landfill Methane Outreach Program (LMOP), a U.S. EPA program, lists 123 landfills in North Carolina in their Landfill and Gas Utilization Project Database. Of these, only 12 have operational landfill gas projects. The NCSU Solar Center, through its Director, Dr. Alex Hobbs, has consulted on the utilization of landfill gas by the EnergyXchange. As an LMOP partner, the Solar Center will continue to look for agricultural applications for landfill gas.

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## **OHIO**

### **\*Ohio Biomass Task Force\***

Background Information: Governor Taft Announces New Interagency Task Force

**Columbus** -- Governor Bob Taft announced in April 2002 the formation of an interagency task force charged with investigating the benefits of recovering methane from livestock operations and other biomass resources.

The Biomass Task Force (BTF) is comprised of the Ohio Departments of Agriculture and Development, Ohio Air Quality Development Authority, Ohio Environmental Protection Agency, Ohio Water Development Authority, Ohio Farm Bureau, Public Utilities Commission of Ohio-Biomass Energy Program and the U.S. Department of Agriculture-Rural Development. Since April 2002 the BTF began the process of developing a better understanding of the issues associated with the recovery of methane and subsequent production of energy; and identifying possible first steps to use methane produced from biomass as an energy source in Ohio. The BTF continues to investigate benefits, obstacles, and issues related to recovering methane from biomass resources for the purpose of producing energy and reducing organic waste. The development of clean distributed generation systems in Ohio is extremely critical to reducing energy costs and reliance on the electric grid in times of crisis.

The BTF is supportive of effective utilization of renewable resources to expand the production and use of ethanol, biodiesel and other bio based fuels.

The BTF serves as a point of entry allowing industry to receive technical, permitting, and regulatory assistance and financing options for potential projects.

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## OREGON

### **\*Craven Farms: Dairy anaerobic digester operation\***

**Program description and audience:** Dairy farmers in Oregon are under financial and regulatory pressure to manage the manure their cows produce. Although the waste management systems farmers commonly use reduce the amount of manure in runoff, they do not remove harmful bacteria from the manure. Neither do they provide farmers with ways to offset farm costs. Anaerobic digestion of manure is an effective method of making manure less environmentally harmful while providing farmers with economic benefits.

Craven Farms, a family-owned-and-operated dairy for generations in Tillamook County, completed construction of an anaerobic digester at its main farm site in January 1997. In addition to reducing bacteria in the farm's manure, the digester system provided income to the dairy from electricity sold to the local public utility district and fiber solids sold as animal bedding.

**Funding source and level:** The Craven Farms project received a U.S. Department of Energy grant from the Pacific Northwest and Alaska Regional Biomass Energy Program. In 1994, the energy program issued a competitive solicitation for demonstration projects and selected the Craven Farms project for a grant of \$77,850.

The potential value of the project's outputs — electricity, space heat and fiber product — was estimated to be about \$42,400 per year. Subtracting estimated operation costs, the project was expected to have net annual revenue of \$33,660. From these estimates, Craven Farms anticipated a simple payback period for its investment of 4.6 years, even without government grant assistance for the project.

The project qualified for loan financing through the Oregon Office of Energy's Loan Program. The loan program issues low-interest, long-term loans to qualified borrowers for Oregon projects that produce energy from renewable resources or conserve energy resources.

**Results and leverage:** Anaerobic digestion is a manure management option that can make cow manure a source of farm income and farm-cost offsets. Digesters modeled after the Craven Farms project offer dairy operators a simple system, practical to operate and maintain, that can generate a return on investment while greatly reducing manure management problems. The system effectively eliminates the problem of bacterial pollution from the dairy operation. Although each dairy has unique characteristics that must be considered in estimating project costs, the Craven Farms dairy demonstrated that this technology is suitable to dairies in Oregon. The potential revenues from electricity and fiber sales, combined with the savings on hot water and heating bills, make a manure digester a wise investment. It is an investment that can be both financially sound and environmentally smart.

Most of the Craven Farms project goals were achieved. Even though the system did not operate at full capacity, the system produced revenues from electricity sales, fiber sales and dairy cost offsets. A heat loop to provide hot water for the washhouse could have produced further cost savings.

The Craven Farms digester operated successfully for more than two years beginning in January 1997. The facility produced electricity, heat energy and revenue for the dairy. Due to financial problems unrelated to the digester operation, the dairy ceased operations in 1999, and the farm

was sold. The new owner has not restarted the digester.

**Eligibility criteria:** The Oregon Office of Energy has an Energy Loan Program for any Oregon business that invests in energy conservation, recycling, renewable energy resources and less-polluting transportation fuels and qualifies for a loan. The Craven Farms project qualified for loan financing through the Energy Loan Program. The loan program issues low-interest, long-term loans to qualified borrowers for Oregon projects that produce energy from renewable resources or conserve energy resources.

#### **\*Renewable Energy – Small Scale Hydro\***

**Program description and audience:** The Oregon Office of Energy encourages Oregon farmers to invest in renewable energy sources. The advantages of small-scale hydropower projects are that they are essentially non-polluting, release no heat and have little environmental impact.

Crown Hill Farm in McMinnville is a third-generation farm and retail outlet established in 1920. The farm operations raise cattle, sheep, hogs, chickens, and harvest timber. The retail outlet specializes in wood, pellet and gas stoves, inserts and accessories. Mother and son, Juliette and Lucian Gunderman, run Crown Hill Farms. The father was killed in a 1979 tractor accident. In 2000 the McMinnville Junior Chamber of Commerce named Lucian as Outstanding Young Farmer of the Year.

Lucian Gunderman applied for a hydroelectric permit to divert water from springs and rain runoff into two reservoirs, tributary to Baker Creek for the purpose of power generation. They are both non-fish bearing tributaries. The project diverts 4.0 cubic feet per second and has a gross head of 170 feet to develop an estimated 56.81 horsepower. He wants to use the power, sell excess power to benefit the general public and control run-off.

**Results and leverage:** The hydro-electric generation system is expected to generate 96,360 kWh of electricity per year. This will be sold directly to the electric utility company, McMinnville Power and Light, under Oregon's net metering law.

**Funding source and level:** The cost of the hydro-electric generation system was \$80,000 including two turbines and one generator. The payback period is estimated to be 18.5 years. Crown Farms has applied for a Business Energy Tax Credit that will return a tax credit equal to 35 percent of the eligible project costs. The tax credit should be approximately \$22,764.

**Eligibility criteria:** The state of Oregon provides a tax credit for any Oregon business that invests in energy conservation, recycling, renewable energy resources and less-polluting transportation fuels. Hydroelectric generating systems qualify. The tax credit is 35 percent of eligible project costs — the incremental cost of the system or equipment that's beyond standard practice. Business owners take the tax credit over five years: 10 percent in the first and second years and 5 percent each year thereafter.

#### **\*Hotchkiss Ranches: A fragile ecosystem\***

**Program description and audience:** Before Mark and Susan Doverspike installed a photovoltaic (PV) system, thousands of remote arid acres went under-used at Hotchkiss Ranches, their fourth-generation ranch in Burns in rural Eastern Oregon. The problem was too little accessible water for 500 head of cattle, despite a wetland spring in the area. The spring had been fenced off because cattle overused the wetland when they came to drink. The

Doverspikes wanted to pump water from the spring to cattle troughs in a less sensitive area three-quarters of a mile away (and 40 feet higher in elevation).

Extending a power line six miles to the spring would cost about \$60,000 up-front and \$500 in annual maintenance. The 160-watt PV system they installed instead cost only \$2,800. Maintenance costs are less with the PV system, too, and there are no electricity bills. Gas and diesel generators also would have been more expensive over the equipment's lifetime than a PV system.

**Results and leverage:** The PV system at the Doverspikes' ranch is designed for a maximum pumping rate of 3.5 gallons per minute. Floats on the troughs monitor water level, keeping them from overflowing. The Doverspikes worried that vandals might use their solar panels for target practice, but no problems have occurred. Even if someone had shot the panels, the Doverspikes chose a model designed to withstand such vandalism.

The system provided an added bonus beyond cost savings and habitat protection: The PV pumping system provides a water source for elk and other wildlife that also drink from the troughs.

**Funding source and level:** Because this was a demonstration project, most of the materials and labor were donated by the Oregon Office of Energy, Oregon Department of Environmental Quality, Oregon Department of Forestry and Oregon State University Extension Service.

### **PV System Costs**

**Installed costs:** \$2,800

**Equipment life:** 20 years

**Annual costs:**

Maintenance: \$25

Energy cost: \$0

Total operating cost: \$25

**PV System Savings and Payback** (compared with gas)

Additional cost of PV system \$1,500

**Oregon Office of Energy limited-time rebate:** \$100

**35% state Business Energy Tax Credit:** \$490\*

Additional cost after rebate and tax credit: \$910

Yearly cost savings on maintenance and fuel \$295

**Simple payback (\$910/\$295)** 3 years

\*Typical tax credit for a project with an incremental cost of \$1,500. Hotchkiss Ranches did not receive a tax credit or state rebate because the Oregon Office of Energy paid for the PV system as a demonstration project.

**Eligibility criteria:** The state of Oregon provides a tax credit for any Oregon business that invests in energy conservation, recycling, renewable energy resources and less-polluting transportation fuels. PV water pumping systems and irrigation efficiency improvements qualify. The tax credit is 35 percent of eligible project costs — the incremental cost of the system or equipment that's beyond standard practice. Business owners take the tax credit over five years: 10 percent in the first and second years and 5 percent each year thereafter.

## **\*Skinner Ranch: Photovoltaic Water Pumping System\***

**Program description and audience:** The Oregon Office of Energy helps Oregon ranchers afford solar photovoltaic (PV) water pumping systems with a 35-percent Business Energy Tax Credit toward added equipment and installation costs.

PV systems, which use silicon panels to convert sunlight into electricity, have proven cost-effective in remote locations where it's expensive to run power lines. They also are reliable and environmentally friendly. Besides saving fossil fuels, PV water pumping systems help protect the health of riparian zones — areas alongside streams. When cattle are free to drink in streams, fragile soil and vegetation are destroyed and streambeds are damaged. Water temperatures rise — endangering fish — and the water becomes polluted with manure and silt. By pumping water from streams or wells into storage tanks away from streams, ranchers can protect riparian zones while providing water for their cattle.

In the fall of 1990, Skinner Ranches Inc. asked Idaho Power to examine alternatives for supplying power to a well used for watering cattle. With the ranch 80 miles south of Ontario on the Oregon-Idaho border, the estimate for running a power line to the well was \$40,000 to \$45,000. Idaho Power conducted a feasibility study on a solar PV system for the ranch. Not only was it determined to be technically feasible, but with a price tag of \$34,000, it was significantly cheaper than the power line. Based on the estimated life of the systems analyzed, the PV system also would cost less than a diesel generator. The Skinners decided to go with the PV system, and by the summer of 1991, their solar-powered system began pumping water. The PV system on the Skinner Ranch is designed to pump up to 10,000 gallons of water per day during the summer months for 600 to 800 head of livestock. The pump can deliver up to 18 gallons per minute on a full day of sunshine. The electricity powers the pump and charges batteries, which supply power to the pump when the sun isn't shining. When there's not much sun and the batteries are depleted, a sensor calls for the backup propane generator to take over pumping. A low-water alarm can be installed as a precautionary measure in case of sensor or pump failure. Water is pumped into a 60,000-gallon holding pond, sized to ensure ample water supply for the herd. The holding pond is surrounded by a 9-foot chain link fence to keep out cattle and other animals. The water flows by gravity to watering troughs.

**Results and leverage:** For the Skinners, the PV system has proven cheaper and more reliable than other water pumping systems. It also has reduced environmental impacts and resulted in more efficient use of resources. Any overflow from the holding tank is channeled outside the fence to a pond for wildlife.

While the initial cost of the Skinners' PV pumping system was much lower than that of a power line, it was higher than the initial cost of a diesel generator. However, because PV pumps require little maintenance and use no fuel, they are far less expensive to operate than diesel-powered systems. In fact, over their lifespan, PV systems cost as much as 50 percent less than diesel systems. The table below compares the costs of a power line extension, a diesel generator and a PV system for the Skinners. It also shows how the Business Energy Tax Credit reduced the costs and payback for the PV system.

**Eligibility criteria:** The state of Oregon provides a tax credit for any Oregon business that invests in energy conservation, recycling, renewable energy resources and less-polluting transportation fuels. PV water pumping systems and irrigation efficiency improvements qualify.

The tax credit is 35 percent of eligible project costs — the incremental cost of the system or equipment that's beyond standard practice. Business owners take the tax credit over five years: 10 percent in the first and second years and 5 percent each year thereafter.

**Funding source and level:**

**PV system savings and payback** (compared with diesel):

Added cost of PV system    \$19,000  
**35% Business Energy Tax Credit:** \$6,600\*  
**Yearly cost savings:**    \$2,400  
**Additional cost after tax credit:** \$12,400  
**Simple payback with tax credit**    5.2 years

\*Typical tax credit for a project with an incremental cost of \$19,000. The actual tax credit for the Skinner Ranch project was higher. Because the Skinners' PV water pumping system was a state demonstration project, they received a tax credit on the entire cost of the system — not just the added cost.

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## SOUTH CAROLINA

### **\*Demonstration of a Low-Cost Anaerobic Digester\***

**Program Description:** Under the 2002 State Energy Program Special Projects entitled “Development of the Energy/air Concept: Phase I, Demonstration of a Low-Cost Anaerobic Digester” was awarded to the SCEO and Clemson University. The energy farm concept will focus on the design, testing, and demonstration of a lower cost method of constructing an on-farm anaerobic digester for methane production.

**Project period** running from 11-1-02 through 10-31-04.

(This project evolved from the 1997-1998 SERBEP funded project - “On-Farm Biogas Production and Utilization for SC Livestock and Poultry Operations.” with Clemson University.)

**Program Audience:** Agricultural Community/Swine/Poultry/Livestock/Utilities

**Funding Source and Level:**

DOE	Clemson University	Ten Cate Nicolon, USA	Total
\$91,308	\$93,881	\$20,000	\$205,189

**Eligibility Criteria:** Met the requirements for the National DOE 2002 State Energy Program Special Projects - 6.64 Power technologies: Biofuel Power Generation section

**Results and Leverage:** Pending

### **\*Feasibility Study for Biodiesel Production\***

**Program Description:** Under the SERBEP 2002/2003 funding was awarded for the project entitled “Feasibility Study for Biodiesel Production in South Carolina”, to the SCEO and the SC Soybean Board. The study is to determine the viability of establishing a biodiesel production plant near the Carolina Soya facility in Still, South Carolina. At present, Carolina Soya is utilizing locally grown soy beans to produce soybean meal, and the by-product is soy oil, which is sold to Car gill. Carolina Soya would like to see a biodiesel market established for the soy oil. This project will be beneficial to South Carolina and the region since the only source for biodiesel fuel at present is located in Kentucky.

The production of biodiesel in South Carolina offers many benefits at first glance:

- The soybean oil is readily available in the SERBEP region
- The crushing facility is in an area that struggles economically and the development of a biodiesel plant would increase economic activity in the area
- The facility is located on the Georgia/South Carolina border near export facilities
- The use of biodiesel will help to offset the United State’s dependency on foreign oil
- The Energy Policy Act recognizes B20 (20% biodiesel mixed with 80% petroleum diesel) as an alternative fuel and the use of the product can apply to EPACT credits
- Biodiesel can be used in any diesel engine without modification to the engine

Project-Phase I: Economic Feasibility Study

- Estimation of Biodiesel Demand within South Carolina (targeting urban areas), including a limited economic analysis of state and municipal fleet use,
- Quantification of Co-Product Market Opportunities
- Determination of Best Available Technology for Biodiesel Production, given regional conditions, and

- Analysis of Plant Size and Overall Economic Viability

**Program Audience:** Agricultural/Transportation Community/Soybean Growers

**Funding Source and Level:**

Budget: ERBEP \$31,500; SC Soybean Board \$2,500; Total \$34,000

**Eligibility Criteria:** Met the requirements for the Southeastern Regional Biomass Energy Program/SSEB program's emphasis on biomass-to-energy benefits.

**Results and Leverage:** Pending

**\*Market Assessment\***

**Program Description:** 1999-2000 SCEO "Animal Manure and Related Feedstock Market Assessment and Preliminary Feasibility Study for Papermill Site Biomass/CoGen Facility", at Linpac Paper in Cowpens, SC. To provide for a detailed feasibility study for an animal manure and biomass feedstock assessment for a biopower energy facility, utilizing the proposed anaerobic digestion BTA technology, CoGen, and related biopower ventures that pertains to the implementation of a viable BTA/CoGen plant near or at the Linpac facility. If proven feasible, the model energy facility developed utilizing animal/wood waste-based Biomass/CoGen renewable energy would be suitable for many energy intensive industries such as pulp and paper, food processing and others.

To include the following tasks:

- Summary of Relevant Regional and Renewable Energy Information
- State of South Carolina Industry Standards Review
- Animal Manure and Secondary Feedstock Generation Survey
- Description of Animal Manure and Waste Management Infrastructure
- Conceptual Facility Design and Preliminary Requirements
- Review and Description of Site Specific Facility Permitting Requirements
- Regional Energy Market Preliminary Assessment
- Facility Return on Investment, Business Planning and Incentives Packages
- Analysis of Results, Preliminary Review and Draft Report
- Final Report

**Program Audience:** Agricultural/Food Processing/Pulp and Paper Communities

**Funding Source and Level:**

SERBEP	SCEO	In-Kind	Total
\$49,500	\$40,000	\$56,000	\$145,500

**Eligibility Criteria:** Met the solicitation requirements for SERBEP funding.

**Results and Leverage:** The study showed that there is sufficient feedstock in the LINPAC region to support multiple 5 Mw systems at a cost of \$30 million each. The biorefinery would be able to produce methane gas for electricity, process steam and to assist in the production of ethanol.

**\*No-Till and Deep Tillage\***

**Program Description:** 1997 - Clemson University, Dept. Of Ag. And Biological Engineering, to provide technical assistance to farmers in the use of the three no-till planters and the deep

tillage tool with trailer purchased under the 42001 grant for interseeding crops to save energy, and maintenance and repair of the equipment. The contract supported the continued use of the equipment with cost limited to time spent on maintenance, technical assistance and supplies for maintenance.

**Program Audience:** Agricultural, Ag. Extension Agents

**Funding Source and Level:**

Amount: \$10,000 SCEO Oil overcharge funding

**Eligibility Criteria:** Meet the Energy Office grants needs.

**Results and Leverage:** Three interseeding drills were transferred to Edisto Research and Education Center from Darlington and Sumter County. Hydraulic systems were replaced on all drills to increase planting efficiency. Row spacing was set for soybean on two drills and for cotton on another drill. Spaces between coulters and seeder units were adjusted. Following repair work the equipment was transferred back to Sumter and Marlboro County. Drills were adjusted in the field. Interseeded cotton and soybeans were planted in about 300 acres. Also, no till soybeans were planted in wheat stubble in fields after harvesting wheat. Staff was involved in planting the crops and advising the growers. Tillage demonstration plots (10 to 20 acres) were established in five farmers field in four other counties. Conservation tillage filed days were conducted in Marlboro and Dillon Counties.

**\*Soy Diesel Fueled Truck Demonstration\***

**Program Description:** 9/94-10/95 - "Soy Diesel Fueled Truck Demonstration" The SCEO, in conjunction with SERBEP and the SC Soybean Board, funded a project with Clemson University to determine if soybean diesel would be a viable alternative fuel for industrial and/or commercial use in SC. Soybeans are currently the number one crop in SC in terms of acres planted and crop production averaging 80 million dollars per year. Therefore, this project was designed with two purposes in mind; first, to purchase a heavy-duty truck which would be fueled by a "soydiesel" mixture (80% diesel-20% soydiesel).

**Program Audience:** Agricultural/Transportation

**Funding Source and Level:**

SERBEP	Clemson/SC Soy Bean Bd.	Total
\$9,413	\$14,329	\$23,742

**Eligibility Criteria:** Met the solicitation requirements for SERBEP funding.

**Results and Leverage:** The truck was utilized to haul equipment to and from three soybean research sites throughout SC. The research has proven beneficial to the SC soybean industry and has kept it competitive with other areas of the country. Second, the truck is being used to publicize and demonstrate the effectiveness of soydiesel as an alternative fuel for vehicles, with records of fuel usage etc. being monitored. The project has proven compatible with the goals of both SC and the nation, as each attempts to move toward utilization of renewable sources of transportation fuels to provide for a more sustainable future. The truck has been received well by the target audience. Despite the relatively high cost of the soydiesel mixture, it has proven attractive because it is clean burning and can be used without requiring any modifications to the engine.

**\*Pressurized Ozone Membrane Ultrafiltration Methodology for Total Dissolved Solids Removal in Paper Mill Process Water for Energy Savings, Production Efficiency, and Environmental Benefits\***

**Program Description:** 2000 – 2003 To demonstrate “Pressurized Ozone Membrane Ultrafiltration Methodology for Total Dissolved Solids Removal in Paper Mill Process Water for Energy Savings, Production Efficiency, and Environmental Benefits.”

The project will demonstrate the commercialization of a unique full-scale, commercial pressurized ozone membrane ultrafiltration system unit for total dissolved solids removal in paper mill process water. The LINPAC mill is a linerboard mill that uses 100 percent recovered wastepaper as their raw material, and feedstock, and operate with zero effluent discharge in a 100 percent closed loop manner. They use a state-of-the-art recycled fiber-based mini-mill that produces 500 tons per day of premium linerboard and medium for use in the packaging industry. The LINPAC mill is thus the perfect site to implement this new technology’s production scale commercial demonstration. LINPAC will work with project partners Resource Recycling Systems, Inc. (RRSI), Koch, Aquatex/Hydroflo, and Western Michigan University (WMU) to accomplish the following project tasks.

Task	Milestone Title	Completion Date	Responsible Organization
1	Project Planning	1 month after start	LINPAC, RRSI
2	Equipment Procurement	1 month after start	LINPAC, RRSI
3	Design Engineering	3 months after start	RRSI
4	System Installation	5 months after start	LINPAC
5	System Startup and Verification	6 months after project start	LINPAC, RRSI
6	Commercial Demonstration	ongoing from 6 to 12 months after start	LINPAC
7	Data Compilation and Analysis	ongoing each month from 6 to 12 months	RRSI, LINPAC, WMU
8	Operational Changes/Upgrade	ongoing as required from 6 to 12 months	LINPAC, LINPAC's Consultant
9	Project Status Reports	Ongoing for 4 quarters after project start	RRSI
10	Preliminary Draft Report and Review	12 months after project start	RRSI, WMU
	<b>GO/NO GO DECISION</b>	12 Months after project start	LINPAC, RRSI, SCEO
11	Commercialization Sales Planning	12 months after project start	LINPAC
12	Facility Tours and Outreach	ongoing 6 months from 6 to 12 months	LINPAC, RRSI
13	Submit Final Report	3 months after project completion	LINPAC, RRSI
14	Commercialization Activity	annually 10 years after project completion	RRSI using available data from Koch and Aquatex/Hydroflo

**Program Audience: Pulp and Paper/Any one who has to treat discharged process water.**

**Funding Source and Level:**

DOE/NICE3	LINPAC	Total
\$500,000	\$688,400	\$1,188,400

**Eligibility Criteria:** U.S. Department of Energy/NICE<sup>3</sup> 2000 Solicitation.

**Results and Leverage:** The program is on-going at this time the results have been exceptional, noting that the process being developed is applicable to most waste water treatment facilities.

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## VERMONT

### **\*Methane Program Description\***

**Program Description:** The Vermont Department of Public Service (DPS) and the Vermont Department of Agriculture (AGR) have received a total of \$695,000 from appropriations from the federal budget over the past several years to promote the use of methane recovery technology on Vermont dairy farms. This technology has the potential to help farmers with their nutrient management plans and at the same time provide additional on-farm income. The goal of this program is to identify and help overcome key strategic hurdles to widespread adoption of methane recovery technologies by Vermont farmers.

The program was designed to consider methane recovery in a broad context, taking into account its potential benefits as a component of a comprehensive nutrient management system, as a renewable energy source and as a strategy for greenhouse gas reduction. The implementation plan calls for using one third of the money for program administration and outreach, one third toward research and development and one third to be used for cost share of installations.

The program activities include

- experimenting with methods to reduce costs and increase the efficiency of methane recovery technologies and use;
- developing partnerships with experts in manure management and water quality protection;
- assessing the potential of dairy manure and other organic wastes in Vermont that could be digested on farms to produce methane and electricity;
- establishing sites to demonstrate the viability of the technology; and
- publicizing the progress of the program to stimulate demand.

**Status:** Below is the current status of program activities:

- The program has conducted experiments on reducing retention time of manure in an anaerobic digester. If the retention time is reduced, a smaller digester vessel can be used which would reduce initial capital costs.
- Research has been completed on the available organic resources in Vermont that could be digested to produce methane. This research suggests that dairy manure is by far the largest source of organic material that is available for methane recovery and that trucking other materials to an on-farm digester will only be cost-effective in limited circumstances.
- The program has completed preliminary feasibility analyses on fifteen Vermont farms that have expressed interest in this technology. Several of these farms show a positive cash flow. We will proceed with engineering analysis and site design for farmers who think anaerobic digestion may be beneficial to them. For farms that choose to install methane recovery, the program has some cost share monies available.
- The program has established a research and demonstration facility on a working dairy farm that has 15 years of experience with methane recovery. We will be performing several experiments at this facility and will use it as a demonstration site to show Vermont farmers and others how this technology works.

Once we have completed our work with individual farmers, we will begin to explore ways to

educate the rest of the farming community about the costs and benefits of methane recovery. We will establish links with the various compost efforts in the state; we will explore the feasibility of fueling micro-turbines or fuel cells with methane; and we want to think about the applicability of what we are learning here about methane recovery and electrical generation to other situations locally and internationally.

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## **WEST VIRGINIA**

### **\*Biomass Fuels\***

**Program Description:** Direct use of biomass as a fuel is limited by its low energy density and its generally high moisture content. Researchers at West Virginia University (WVU) have developed a patent-pending process for direct conversion of biomass to liquid fuels and chemicals.

West Virginia generates over 3.2 million tons of forest residue and poultry litter annually. Both are suitable substrates for the direct conversion process developed by WVU. Packaging the technology such that it could be used to convert this amount of biomass to fuel would provide 10 percent of the energy consumed by the state. In the context of individuals adopting the technology, the average West Virginia poultry producer could fill two tanker trucks with liquid fuel per month from poultry litter. The wood product participants could produce 1,500 and 3,000 tons of liquid fuel per month. Overall, the WV project would eliminate economic and environmental liabilities and replace them with a value-added product. West Virginia is currently seeking cost-share funds to conduct further analysis and pilot-scale design and demonstration of this technology.

### **West Virginia Contact Information**

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## WISCONSIN

### **\*Tinedale Farm Anaerobic Digestion Energy System\***

**Program Description:** Tinedale Farm is one of the largest dairy farms in Wisconsin housing nearly 2,500 animals. These animals produce approximately 60,000 gallons of manure per day. Until recently this manure was discharged into lagoons with a capacity of 17 million gallons with final disposal by land application.

Tinedale Farm with assistance from the State of Wisconsin has developed a new manure management system-the anaerobic digestion energy system. The system consists of a temperature phased anaerobic digestion (TPAD) system, which produces biogas. The biogas fuels a pair of industrial internal combustion engines, which drive a pair of 375-kilowatt generators.

The electricity produced is sold into the grid as renewable electricity for about \$60 per megawatt hour. Wisconsin has a growing market for renewable electricity due to utilities seeking sources of renewable electricity to meet Wisconsin's renewable portfolio standards and newly instituted "green" pricing programs where customers pay a premium price for electricity generated from renewable sources such as manure.

The Tinedale Farm project began operation June 2001. Currently an additional 10-farm digester systems are either under construction or in permitting in Wisconsin. They are projected to produce 150 KW to 1.5 MW per application. The primary benefit of the anaerobic digestion energy system is a more cost-effective manure management system to meet environmental and odor requirements, especially for large dairy farms. Also the system reduces greenhouse emission by a) eliminating 1,250 tons/year of methane emissions from waste lagoons and b) replacing 0.75 MWs of coal fueled electric generation with 0.75 MWs of biogas fueled generation.

**\*Focus on Energy - [www.focusonenergy.com](http://www.focusonenergy.com)\***

Focus on Energy is a statewide, state-sponsored public benefits initiative with a portfolio of energy efficiency and renewable energy programs. Three programs directly target agricultural energy efficiency or biobased products and energy.

**Program Description:** The Agriculture program assists farmers interested in improving the energy efficiency of their operations. The program provides farmers with educational materials, energy use assessments, energy efficiency improvement recommendations, and incentives to install equipment. The program also partners with farm service providers to encourage them to supply high efficiency equipment.

**Funding Level:** Total program funding for state fiscal year 2003 (July 1, 2002 to June 30, 2003) is about \$1.2 million.

**Eligibility Criteria:** The farmer's electric provider must be participating in the Focus on Energy program.

**Results/Leverage:** In the program's first year (FY02), 167 projects were identified and about 434 megawatt hours of energy were saved. Partnerships were created with 110 farm service providers.

**Program Description:** The Wisconsin Renewable Energy Network provides farms, businesses and all Focus on Energy programs with renewable energy solutions. The program provides educational materials, training, renewable energy assessments, recommendations, marketing and incentives to spur renewable energy projects. The program aims to create demand for and supply of services in amounts that will lead to a renewable energy market transformation.

**Funding Level:** Total program funding for state fiscal year 2003 (July 1, 2002 to June 30, 2003) is about \$3 million.

**Eligibility Criteria:** The electric provider of the retail customer must be participating in the Focus on Energy program.

**Results/Leverage:** In the program's abbreviated first year (FY02), two \$15K grant applications were approved for business and marketing and technical feasibility and demonstration projects. Business training scholarships were developed, and 13 renewable project grant applications were approved.

#### **\*Biobased Products and Energy program\***

**Program Description:** The Biobased Products and Energy program is patterned after the US DOE's Industries of the Future program. This program is in its organizational phase. The program will forward the biorefinery concept by bringing together targeted industries, university researchers, state and federal government and innovators to pilot, demonstrate and commercialize new biobased technologies. Target industries are other Wisconsin Industries of the Future clusters: Forest Products, Food Processing, Water/Wastewater Systems and Plastics & Chemicals.

**Funding Level:** Total program funding for state fiscal year 2003 (July 1, 2002 to June 30, 2003) is about \$400,000.

**Eligibility Criteria:** None

**Results/Leverage:** A draft roadmap has been constructed that identified priority needs and opportunities, in the targeted industry clusters, that may have biobased solutions. The roadmap will also identify existing technologies available for pilot or demonstration purposes that can address a priority need. A biobased research consortium is being formed at the University of Wisconsin, which will identify relevant research either underway or completed. Project teams will be formed as priority needs are matched with available technologies.

#### **Wisconsin Contact Person**

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