



**THE NATIONAL ASSOCIATION OF RESOURCE
CONSERVATION & DEVELOPMENT COUNCILS
BIOMASS AND ENERGY
FACT SHEET**

GROWING YOUR LOCAL ECONOMY WITH BIO-ENERGY #2

What Can Councils do to stimulate renewable energy efforts in your local area?

Council's can help retain or grow jobs, improve the environment, and make energy supplies more reliable and price-stable in their local RC&D area. So, what is bio-energy; and why could it be important to improving community well being? This fact sheet addresses those questions, suggesting ideas based on past successes.

Background for Energy Policy:

There have been several upsets of imported petroleum markets affecting prices. Electrical energy distribution has been subject to some disruptions, physical and financial, perhaps in part resulting from the efforts to increase competition through deregulation. As the need for energy continues to grow in our nation and the world we need to focus on answering environmental questions such as; sustainability, meeting local energy needs, and using local resources. These are examples of opportunities where Councils can make change in their local community.

People add *value* by using and converting resources to meet their own requirements and the needs of others. In the past, necessities were grown, processed, and obtained nearby. Money moved within the community, providing jobs for people at all levels of society. Over time the sources of even our most basic needs including water, nourishment and shelter became consolidated with increasingly less obtained from local producers. Nationally we increasingly depend on suppliers across the country or the ocean for food, building products and energy. Bio-energy is in effect stored energy. Whether in the form of plants, animal wastes or landfill gas, there is value, and business opportunity trapped inside. The value comes in solving environmental problems and meeting energy needs at lower cost, employing local residents.

According to Ferriter Scobbo and Rodephele, PC the United States is currently seeing a rising demand for energy at 1.8 percent per year. In addition, they state that our Nations transmission and distribution infrastructure has a 30 percent annual investment shortfall. Therefore Councils must look toward alternative energy sources to fuel their respective areas. There are currently a host of new technologies and techniques that are available for alternative energy, which Congress is currently reviewing.

These include:

Renewable Energy: Wind, Solar, Bio-Mass, Hydroelectric, Geothermal

Alternative Energy: Fuel Cells, Micro Turbines, Methane, Gasification

New Techniques: Combined Heat and Power, Energy Management, Storage

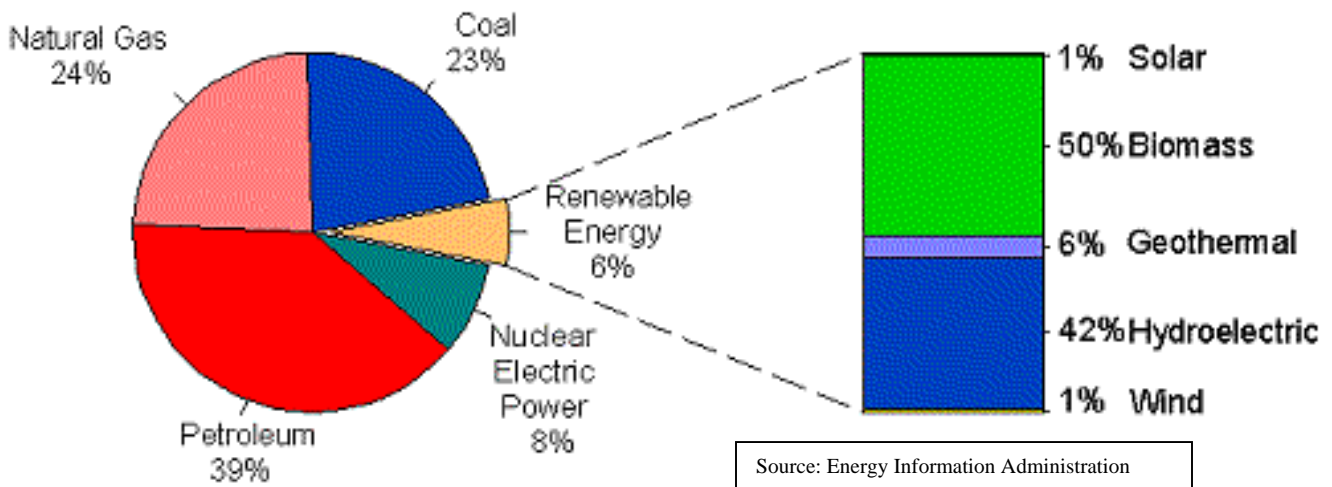
Enabling New Societal Paradigms: Distributed Generation and Green Power

How much renewable Energy does the United States Utilize?

Energy Uses and Sources

Total = 96.935 Quadrillion Btu

Total = 5.668 Quadrillion Btu



Media reports sometimes make it easy to confuse the uses and types of energy with the sources from which they are converted. The differences are important to understanding our national situation, and how bio-energy businesses can help. Energy is a tool for making people comfortable, able to move about, and accomplish tasks at work and home.

The cost of manufactured goods using oil or natural gas as their key constituents, from fertilizers for agriculture to plastics has increased over the past decade. It is important for our Councils to look at other methods to ensure sustainability of their energy resources. In addition, it is imperative that Councils support existing renewable resources facilities now in operation.

What can your Council do?

So, what types of local opportunities might your council think about supporting? For example, an industrial plant located in a forested part of the country needs steam in its process; the technology exists today for conversion to wood fuels. The sourcing would be local logging crews, and with proper forestry planning, the timber stands would be improved. For example, a school or hospital is about to be built or renovated; it might be appropriate to urge specification of a wood combustion boiler with/or without a chiller.

In both these examples it might be possible to serve multiple buildings using as an “area energy” system. It might also be possible to include electrical energy production as part of the planned process.

Below are a few selected success stories from Councils whom have effectively worked on the issue of Biomass:

Small Diameter and Under Utilized Wood

Name of Council: Trinity RC&D Council, Inc.
State: California
Name of Project: **Industrial Space Heat Demonstration Project - Utilizing Bio-mass from Wildfire Fuel Reduction Projects**

Brief Description: The project provided funding to fabricate and install a commercial bio-furnace for industrial space heating and kiln drying of wood at the Trinity County, Wood Products Buenos Incubator. The bio-furnace was designed to utilize wood chips from neighborhood fuel reduction projects and waste wood from the business incubator, as a value added fuel for industrial use. The anchor tenant, at the Business Incubator, Jefferson State Forest Products, specializes in the value added manufacturing of local California hardwoods and small diameter materials.

Sources of Funding: \$75,000 - US Forest Service, Community Assistance Program and National Fire Plan

Benefits: The project will demonstrate the value added use of biomass as industrial fuel. Further the project will highlight the air quality benefits of efficient controlled combustion vs. open air burning of forest slash and waste. In addition, the project will promote the use of small-scale commercial bio-furnaces and control systems.

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Name of Council: Panhandle Lakes RC&D
State: Idaho
Name of Project: **Fuels For Schools**

Brief Description: A partnership between Idaho Department of Lands and the USDA Forest Service, Regions 1 & 4, to use small diameter trees removed in fire hazard reduction projects to heat local public schools.

The Panhandle Lakes RC&D Council's role is to administer grant funds, and then enter into a contractual agreement with a consultant that will introduce the program in Idaho.

Phase 1 of the project is to identify interested Idaho schools and then to evaluate the feasibility of developing a demonstration site.

Funding Source: USDA Forest Service

Benefits:

1. To reduce fire danger near communities in the wildland urban interface.
2. Use material to fuel efficient, clean biomass heating systems in schools.

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Name of Council: Central Sacramento Valley RC&D Area
State: California
Name of Project: **Utilizing Biomass as a raw Material for Energy and/or Energy Products**

Brief Description: The Central Sacramento Valley RC&D Area, and surrounding counties, is a part of California that is rich in agriculture production and national forest lands. This richness results in

tremendous production of vegetative waste that must be disposed of in ecologically acceptable ways.

Since the early 1970's, in response to growing public discontent with air quality, the State of California has been increasingly regulating the amount and timing of burning of agricultural and forestland waste material. As a result, foresters and agriculturalists alike are being forced to find alternative methods of treating waste streams in an economic and environmentally acceptable manner. Unfortunately, technology has not been able to keep pace with the increasing physical and economic burdens borne by the land manager. In an effort to aid it's citizenry to deal the vegetative waste streams (biomass), the Central Sacramento Valley Resource Conservation and Development Council (CSV RC&D) procured a grant for FY 2001 and FY 2002 to study the opportunities of utilizing the biomass as a raw material for conversion to energy and/or energy products and thus benefit the communities of Tehama, Glenn, and Colusa Counties (CSV RC&D Area) and four adjacent counties. Early resource quantification studies revealed there were insufficient sustainable resources available from the adjacent national forest lands to plan for a conventional steam boiler energy conversion facility. However, there were plentiful quantities of annually available orchard waste and rice straw. The annually available biomass was found to equal 270,000 tons of "woody" and 347,000 tons of rice straw.

The study concluded the two most promising technologies for converting biomass appear to be either anaerobic enzymatic digestion or gasification (pyrolysis). The enzymatic digestion seems to be well suited for utilization of rice straw. The gasification process, although being well developed for conversion of woody biomass, is currently being tested in pilot plant scale, for conversion of rice straw and shows great promise. Both processes, being closed loop, are considered environmentally safe and produce, as a waste product, material, which can easily be used as a soil amendment.

Sources of Funding: In an effort to aid it's citizenry to deal the vegetative waste streams (biomass), the Central Sacramento Valley Resource Conservation and Development Council (CSV RC&D) procured a grant for FY 2001 and FY 2002 to study the opportunities of utilizing the biomass as a raw material for conversion to energy and/or energy products and thus benefit the communities of Tehama, Glenn, and Colusa Counties (CSV RC&D Area) and four adjacent counties.

Benefits: The CSV RC&D is actively positioning itself as the vehicle by which to build coalitions and provide leadership for near and long-term promotion and development of an economic biomass-based

energy industry in the region. Several larger businesses within the region have expressed great interest in alternative energy development to reduce their dependency on existing, traditional energy sources.

The CSV RC&D is currently seeking additional grants to identify promising sites for placement of smaller biomass co-generation facilities within the Area and establish the best technologies to employ at these sites.

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Name of Council: WesMin RC&D Council
State: Minnesota
Name of Project: **Wood Energy Scale Up Project**

Brief Description: The Minnesota Wood Energy Scale-up Project was started in 1994. Approximately 1,800 acres of privately owned farmland within 50 miles of Alexandria, MN, was put into the Federal Conservation Reserve Program (CRP) and hybrid poplars were planted between 1994 and 1995. Each year the MN Department of Natural Resources and WesMin RC&D measure yield plots that are permanently established on this CRP land and their annual yield is calculated at Oak Ridge National Laboratory by the Biofuels Feedstock Development Program. This information is combined with the economic data that is collected each year (such as cost to fertilize, cost to control noxious weeds, etc). The result of this project will be a report for individual landowners and others interested in growing hybrid poplar feasibility of growing hybrid poplar as an alternative agriculture crop for energy.

RELATIONSHIP TO ECONOMIC, SOCIAL and ENVIRONMENTAL DEVELOPMENT: At harvest, all project partners will have a thorough understanding of what it costs to produce nearly 2000 acres of hybrid poplar on Conservation Reserve Program land. Partners will also have a detailed understanding of the actual annual growth increment from 1994 through harvest. Finally, an analysis of the real economic costs of production, range of soil types, method of measurement, commercial clones produced, estimate of growth per site, and the final market price will assist future producers and consumers of

hybrid poplar of the potential viability of hybrid poplar for different end-use markets. This project could lead to a biomass energy plant with a 150,000,000 infusion in the community and may keep the wood and fiber industry intact.

The Wood Energy Scale up Project has just completed Phase VIII. The year has brought many exciting biomass events. A presentation was given to the Department of Energy Subcontractors about the project in Tennessee, three tours were taken of the plantations this past summer, and many other events filled the calendar during the year. Due to the restructuring of the Department of Energy the funding for this project has been eliminated with two or three years left of this project. Goal – to find additional funding sources so that the study may be completed and that individuals and companies depending on the study will be provided accurate information.

LESSONS LEARNED:

WesMin RC&D and its partners have learned many valuable lessons because of this project. These lessons include:

- Hybrid Poplar needs adequate maintenance including proper ground preparation and weed control for the first three years.
- How to maintain – What works and doesn't work (mechanical & chemical weed control)
- Production varies drastically based on land management, clones and different soil types
- Hybrid poplars produce between 2 ½ to 5 tons per year, in our project which are poorer soil types.
- Cottonwood Leaf Beetles infested certain plantations – research is needed to find the best solution for controlling these and other insects.
- Marketing Hybrid Poplars depends on Location, Location, Location!!! Try to develop a local market.
- Cooperatives can play an important role by educating landowners, and collective bargaining and pooling of smaller acreages of poplar plantations.
- The study was originally designed for energy, but poplars work well in the paper and pulp industry and may bring a better economic return for producers.

Sources of Funding: Minnesota Agro-Forestry Cooperative (MAFC), International Paper and other Paper Companies, Landowners, Department of Energy (DOE) -Oak Ridge National Laboratory, and others interested in growing and harvesting hybrid poplars.

Benefits: Hybrid poplars can be used in a variety of situations to gain significant environmental benefits. The benefits are based on both their fast growth and great capacity to capture elements from both

the air and water. Fast growth is significant in that poplars can deliver substantial benefits quickly, allowing them to be targeted to immediate problems. But their great benefit comes from their capacity to cycle air and water and capture and convert elements like carbon and solid, even toxic waste.

Hybrid poplars have long been used in bioremediation facilities. They remove polluted water from the environment more effectively than standard crops, reducing the amount of land necessary to set aside for this use and the scale of the infrastructure required. They can be planted and maintained at a fraction of the cost of a conventional facility. The potential of hybrid poplar for carbon sequestration is very high. They add large amounts of biomass every year, which is a key element in removing carbon.

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Biodigesters and Methane Capture

Name of Council: Northern Rocky Mountain RC&D
State: Montana
Name of Project: **Methane Recovery from Dairy Waste**
Brief Description: This project is intended to develop a simplified, technically and economically feasible anaerobic digester system for small dairy operations commonly found in the region. Using technology developed at Utah State University, the Council is partnering with Montana State University's College of Agriculture, the Gallatin Conservation District, Agriculture Extension Agent, NRCS, and the dairy community to develop and construct a digester system to demonstrate an alternative manure management method for the \$40 million dairy industry in Montana.

Sources of Funding: Montana Department of Natural Resources and Conservation Grant, applying for assistance through the Western Sustainable Agriculture Research and Education grant program, and potential funding through Northwestern Energy's Universal Systems Benefits program and the NRCS Environmental Quality Incentives Program.

Benefits: This project's goal is to increase profitability of family owned dairies in the region while protecting water quality and natural resources. It is estimated that over \$25,000 in energy savings, through the use of methane to generate electricity, will occur per year for participants of the Project. The anaerobic digestion of dairy wastes will also greatly reduce odors, conserve nutrients within the digested sludge for use as fertilizer, manage nutrient runoff, and provide a benchmark for the future of Montana's dairy industry.

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Name of Council: Onanegozie RC&D Council
State: Minnesota
Name of Project: **Haubenschild Family Farms Anaerobic Methane Digester**
Project Description: The project was designed with five goals: 1) create an added value to manure, 2) reduce manure odor, 3) evaluate the economic viability of the digester, 4) produce enough electricity and hot water to sustain the farm, and 4) act in an environmentally and socially responsible manner.

Benefits: The Anaerobic Methane Digester has gone through two winters and has produced enough electricity to provide for all the electrical needs of the farm. The excess electricity is marketed to the local electric cooperative, enough to provide power for at least 78 hours. The system also provides all the hot water needs of the farm, including the milking area, heating several buildings and the floor of a 450 cow loafing area. The success of the project has prompted the Minnesota Department of commerce to plan to demonstrate biogas recovery on three Minnesota operations, including a hog operation, a poultry raising facility and a food processing facility. In addition, the project has also reduced the possibility of contamination of land and water by manure in the groundwater, through surface water runoff, and through accidental spill during storage and transportation.

Sources of Funding: Private

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Name of Council: Glacierland RC&D Council
State: Wisconsin
Name of Project: **Methane Gas Production**
Brief Description: This study was conducted to determine the amount economic and personal feasibility for the use of a cooperative anaerobic digestion (CAD) facility located in the Glacierland RC & D geographic area. Glacierland RC & D's geographic area includes nine counties in Northeastern Wisconsin (Brown, Calumet, Door, Fond du Lac, Kewaunee, Manitowoc, Outagamie, Sheboygan, and Winnebago).

Anaerobic digestion is a manure management option which is capable of converting dairy manure into two useful products: biogas (which can be used to power electrical generators), and byproducts (which can be used as bedding, fertilizer, and several other materials). This method of manure management helps to reduce the environmental impacts (water runoff, methane pollution, and farm odors) commonly encountered with traditional manure management. In the process of CAD, participating farmers transport manure to a central facility. Costs and benefits are shared amongst participating farmers.

To determine if a CAD facility would be successful in the Glacierland study area, farmers residing in the area were randomly selected and issued a survey requesting information on farming practice, manure management, and motivation to participate in a CAD project. Manure production within the nine county study was also estimated in order to determine if enough "recoverable" manure was produced within the nine county study area.

Regarding manure production, it was found that a considerable amount of recoverable manure (approximately 316,995,200 gallons/year) was produced within the nine county study area indicating a great resource for a potential CAD facility. Regarding motivation to participate, farmers that indicated they were most "Motivated to participate" resided in Manitowoc, Calumet, and Kewaunee counties. Statistical tests demonstrated that a significant relationship existed between motivation level and the level of anaerobic digestion knowledge a farmer held. Also, statistical tests demonstrated that farmers operating larger (< 200 milk cows) farms were more motivated to participate in a CAD then those operating smaller farms (0-50 cows).

Economically, it was determined that the costs (capital and operation) are extremely dependent upon the interest rate provided by the bank and the use (or non-use) of state and federal

government incentives. The study determined that a worthwhile project could be achieved with an interest rate of 2% or lower. The application of a federal Wind and Biomass Credit (\$0.015/kWh for the first ten years of operation) increased the level of economic benefit.

Sources of Funding: Wisconsin Focus on Energy Grant (\$14,000)

Benefits: There are many different social, economical, and technical aspects to consider regarding CAD system potential in Northeastern Wisconsin. The information gathered in this study will be valuable to farmers and researchers who investigate the use of CAD for the area in future years. Knowledge gained in this study can be referred to and used to help identify costs and benefits in addition to important personal information that can influence CAD potential. Also, the creation of a geographic information systems map displaying farmers identified as moderately, highly, and very highly motivated to participate in a CAD will help land use planners to determine the most suitable geographic location for a future CAD facility in Northeastern Wisconsin.

If a CAD facility were to be installed within the future, partially as a result of the findings of this study numerous environmental and economic benefits would be possible. Environmental benefits including methane emission, water runoff, and odor reductions would be observed (exact amounts would be dependent upon size of digester and quantity of manure digested). Since biogas is a renewable energy resource, there would also be a reduction in the demand for fossil fuel use. Economically, it was predicted (from study results) that farmers would benefit from a CAD if and ideal interest rate was obtained or government incentive was implemented.

The idea of CAD has just recently become introduced into the Northeastern Wisconsin area. Already, it has inspired great interest from farmers, agricultural agents, educators, and the general public. Cooperative systems have the potential to use manure as a source of energy, help to reduce environmental drawbacks associated with traditional manure management, while limiting the risk to farmers through cooperative set-up and the pooling of resources.

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BIOFUELS

Name of Council: Chestatee-Chattahoochee RC&D Council
State: Georgia
Name of Project: **Conserving Energy in North East Georgia**
Brief Description: With grants from the Georgia Environmental Facilities Authority (GEFA), technical assistance through the Natural Resources Conservation Service (NRCS), local support, the dedication of the Stephens County Soil and Water Conservation District and the Chestatee-Chattahoochee RC&D Council, Northeast Georgia has its first strawbale building. The Willard Kimsey Strawbale Facility will not only be used to demonstration the use of straw bale construction as a means of conserving energy in this region, but it will also serve as an environmental education center in Stephens County.

The Stephens County Soil and Water Conservation District is planning to relocate their office on site to ensure a physical presence at the center at all times. The location of the thirteen-acre site donated by Stephens County lends itself perfectly to outdoor classrooms, interpretative areas, wildlife food plots, water quality monitoring sites, and wetland restoration demonstration sites. The District along with NRCS plans to utilize the site to its fullest. To date, the building is under construction, the wetland area has been constructed along with a boardwalk that was installed through the volunteer efforts of the Stephens County High School Students. The facility plans to open Spring of 2003.

Sources of Funding: The total project value is approximately \$300,000
Federal RC&D Funds: \$20,000
Leverage Project Value/Federal RC&D Funds 15%

Benefits: Conservation education
Promotion of energy conservation
Improve collaborative partnerships

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Name of Council: Penn's Corner RC&D Council
State: Pennsylvania
Name of Project: **Switchgrass For Energy**
Project Description: The Switchgrass for Energy project will entail the Penn's Corner RC&D Council working with producers of land enrolled in the CRP. The project will work with USDA Agencies, State Agencies, the University of Pittsburgh, machinery manufacturers, producer groups and others to establish up to 50,000 acres of Switchgrass. Currently, USDA-ARS has contributed \$50,000 for field research and Pennsylvania Game Commission has contributed an additional \$10,000 for wildlife habitat studies associated with the project.

Benefits: The project will foster the establishment of Switchgrass on CRP land and use the product for energy production. Thus far, one power plant has agreed to do a test burn.

Sources of Funding: CRP

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Name of Council: Central Sacramento Valley RC&D Area
State: California

Name of Project: **Biomass Feasibility And Utilization Study Within the Northern Sacramento Valley**

Project Description: The Central Sacramento Valley RC&D Area, and surrounding counties, is a part of California that is rich in agriculture production and national forest lands. This richness results in tremendous production of vegetative waste that must be disposed of in ecologically acceptable ways.

Since the early 1970's, in response to growing public discontent with air quality, the State of California has been increasingly regulating the amount and timing of burning of agricultural and forestland waste material. As a result, foresters and agriculturalists alike are being forced to find alternative methods of treating waste streams in an economic and environmentally acceptable manner. Unfortunately, technology has not been able to keep pace with the increasing physical and economic burdens borne by the land manager. In an effort to aid it's citizenry to deal the vegetative waste streams (biomass), the Central Sacramento Valley Resource Conservation and Development Council (CSV RC&D) procured a grant for FY 2001 and FY 2002 to study the opportunities of utilizing the biomass as a raw material for conversion to energy and/or energy products and thus benefit the communities of Tehama, Glenn, and Colusa Counties (CSV RC&D Area) and four adjacent counties. Early resource quantification studies revealed there were insufficient sustainable resources available from the adjacent national forest lands to plan for a conventional steam boiler energy conversion facility. However, there were plentiful quantities of annually available orchard waste and rice straw. The annually available biomass was found to equal 270,000 tons of "woody" and 347,000 tons of rice straw.

Source of Funding: The study of biomass availability and potential technologies was supported by a grant from the US Forest Service and the County of Glenn. The CSV RC&D is currently seeking additional grants to identify promising sites for placement of smaller biomass co-generation facilities within the Area and establish the best technologies to employ at these sites.

Benefits: The study concluded the two most promising technologies for converting biomass appear to be either anaerobic enzymatic digestion or gasification (pyrolysis). The enzymatic digestion seems to be well suited for utilization of rice straw. The gasification process, although being well developed for conversion of woody biomass, is currently being tested in pilot plant scale, for conversion of rice straw and shows great promise. Both processes, being closed loop, are considered environmentally safe and produce, as a waste product, material, which can easily be used as a soil amendment.

The study results are available to any interested party. Several larger businesses within the region have expressed great interest in alternative energy development to reduce their dependency on existing, traditional energy sources. Consultants involved in the co-generation field are using and sharing the findings with their client base.

The CSV RC&D is actively positioning itself as the vehicle by which to build coalitions and provide leadership for near and long-term promotion and development of an economic biomass-based energy industry in the region.

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Name of Council: Central New York RC&D Project, Inc.
State: New York
Name of Project: **Willow Biomass Project**
Brief description: The project is researching the commercialization of willow bio-energy crops as a locally grown, renewable feedstock for bio-products and bio-energy. Since 1998 the Salix Consortium has planted 500 acres of willow on leased private land. NRG's Dunkirk Steam Station (electric power plant) is the intended primary market for the willow bio-energy crop. This project is expected to extend to other markets including heating plants, pellet manufacturers, and smaller niche markets. In addition, the willow biomass will be used for gasification tests, and for research on the fabrication of new bio-based materials and chemicals as alternatives to products currently derived from non-renewable fossil fuels.

Benefits: There is a potential creation of 20-40 jobs for every 4,000 acres of willow planted. 4,000 acres would generate 5 megawatts of electric power, enough to power 5,000 homes. In addition, willow biomass provides a virtually carbon dioxide neutral fuel for electric generation. The growing of crops absorb the CO2 emissions from crop production, transportation, power plant construction, and conversion to energy at the power plant. Finally, co-firing 10% woody biomass with coal also reduces sulfur emissions by 10% and nitrogen emissions by 5-15%.

Sources of Funding: U.S. Department of Energy, and the New York State Energy Research and Development Authority.

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How can your Council help?

Creating the market means creating the supply and jobs. Every gallon of oil not used for heat is fuel displaced helping reduce greenhouse gas emissions. Improved forest health means less wildfires and better growth of valuable trees.

For more information on where to find additional information please see the NARC&DC WWW Internet Directory.

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