



The Next Step for Biomass Energy Development in Clallam County

A report by Northwest Sustainable Energy for Economic Development, the Institute for Washington's Future, and the Northwest Cooperative Development Center, Funded by the Washington State Department of Ecology

Table of Contents

Biomass as a Renewable Energy Source	2
Biomass Efforts in Clallam County/Olympic Peninsula	2
Deciding on a Wood Biomass Project	4
Wood Biomass Technologies	6
Marketing	9
Opportunities for locally-owned business development (co-op-owned enterprises)	11
USDA Funding Opportunities	13
References	15

Biomass as a Renewable Energy Source

Biomass energy, or bioenergy, is not a new source of energy. Organic matter, like wood, has been burned to generate heat ever since humans learned how to make fire. Today, new technologies allow us to harness the energy in animal and plant biomass to generate electricity and fuel vehicles. When the biomass resources, such as wood, are grown and harvested sustainably, the energy derived from them is considered renewable. Typically biomass energy production is divided into the categories of **biopower** (for electricity generation) and **biofuels** (for petroleum substitutes).

The most common way to produce energy from biomass is through combustion. In the Pacific Northwest, the majority of biomass energy is used by the wood products and pulp and paper industries. These industries burn waste wood products to provide heat and electricity for their manufacturing processes. New technologies and improvements to old technologies are increasing the opportunities for biomass energy all the time.

The use of this abundant resource in a sustainable manner can provide

- Electricity generation,
- Heat,
- Revitalization of forest products industry, and
- Job growth.

Biomass Efforts in Clallam County/Olympic Peninsula

Forest residues

The Olympic Peninsula hosts some of the richest biomass resources in the country. Clallam County alone harvests over 1.8 million tons of wood annually. A conservative estimate of the recoverable forest residues places the available wood waste in Clallam County alone at 477,000 to 761,000 dry tons annually (Chen, WSU, 2006).

Mill Waste

Currently 9 cedar mills operate in Clallam County. Two recently moved to the Quinault Indian Reservation. The waste from these two mills could be an additional source of woody biomass for the future.

A 2005 Olympic Region Clean Air Agency (ORCAA) notice asking saw mills to comply with regulations prohibiting the open burning of mill waste prompted several groups—including Clallam networks, the Rural Technology Initiative (RTI), and the Olympic Natural Resources Center (ONRC)—to sponsor studies and conferences on alternative waste disposal methods. These studies resulted in the following:

1. Siemens Group Biomass to Energy Feasibility study recommending a 3 or 4 MW CHP plant.

2. RTI study: “Options for Cedar Mill Waste Utilization and Disposal in Western Clallam and Jefferson Counties” (June 2005) recommending, among other things, a Fuels for Schools program.
3. 2006 RTI Coastal Bio-energy Forum held in Forks, WA. The conference website is http://www.ruraltech.org/video/2006/bioenergy_forum/.

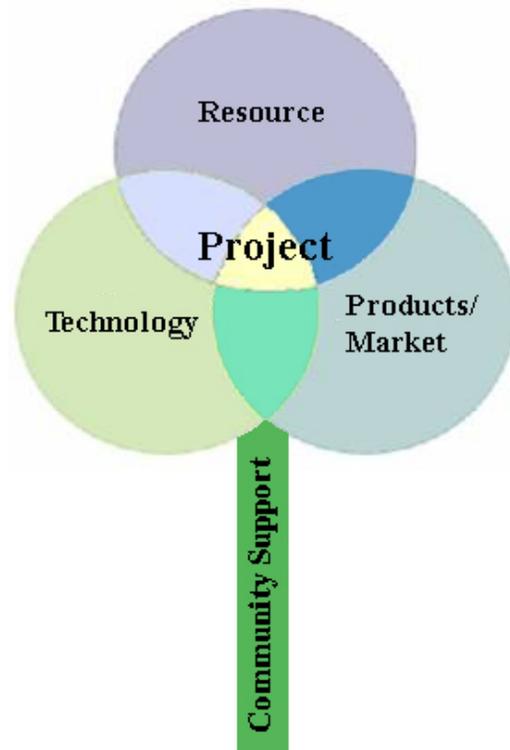
Biomass Energy Projects

Currently Clallam netWorks and the ONRC are pursuing two biomass energy projects

1. Fuels for Schools – A wood-fired boiler is planned for the Quileute Valley School District. The project is funded and a request for qualifications for engineering is due out shortly. This project will demonstrate the efficacy of wood-fired boilers for school and will hopefully be replicated throughout the region.
2. 3-5 MW CHP in Forks Industrial Park – This CHP plant is based on a study by Siemens and would use fuel from the PorTac planer mill at the Forks Industrial Park.

Deciding on a Wood Biomass Project

When beginning the development of a biomass project, there are three key elements to consider before moving forward. They are: Resources, Technology, and Products and Markets. These elements are interrelated, so a decision making process may be represented as a closed loop with several feedback loops – the flower of a daisy as opposed to a tree. This means that the decision process can be approached from any point in the main loop. We could start with a product – for example, we want to produce electricity. Our starting question is how best do we produce electricity from the wood resources available to us? Or, we could start with our resource and say we have 100,000 tons of excess sawdust a year, how can we best use it to produce energy? Our daisy also increases the complexity of the decision making and makes key choices much more project specific. For example, different technologies work best for different quantities and qualities of the resource. Fluctuations in the availability of sawdust could make one technology great one year and a dud the next. Finally, community support is essential to any successful project. Involving local businesses and residents in the project from the outset will result in more economic benefits to the community, and with local support, potentially a faster approval process.



These elements of wood biomass projects say three key things about conducting the decision making process:

- A detailed risk analysis is essential, beyond the cost benefit analysis.
- Because flexibility is important, combinations of technologies and products need to be considered.
- The best antidote to the confusion brought on by the complexity of the process is to maintain focus on the priorities of the project, such as job creation.

The three elements or petals of the model offer entry points for considering priorities. Project development must assess all three points in order to develop a solid foundation for moving the project forward. Depending on the entry point, the project should assess each point counter-clockwise. If the project starts with known resource, it should move to technologies that work with that resource, and then products and markets associated with the outputs of that technology. Similarly, if the project has desired outputs, then it needs to define the resources that have that potential and the technologies to produce them, and so on.

1. *Resources.* Wood biomass may be available with a variety of characteristics. These forms affect both the technologies that can be used to process the biomass and the products that can be made from it. Useable wood biomass is far different than the gross amount of wood waste available and is ultimately defined in the context of the project in which it is going to be used. This quality/availability factor is reinforced by a cost/availability factor. The recovery, preparation and transportation of wood biomass have to be paid for by its processing into energy. What can be and is paid by the processing is determined by its cost/benefit structure. Even though the biomass may be physically present, a rising price for it may make it unavailable to certain technologies for the production of given products. The analysis of the availability of wood biomass to a given project must account for these factors, as well as possible competition for the biomass.
2. *Technologies.* There are many technologies to process wood into energy. These technologies have distinctive profiles which make them more or less effective in differing situations. These differing profiles can make them useful in combination with one another. These factors call upon the decision making process to “test” differing technology scenarios before making a decision. The present state of the art in wood biomass energy technology rewards both careful evaluation and inventiveness in determining the technology best suited for a project.
3. *Products and Markets.* Wood biomass to energy processing can generate different primary energy products and non energy by-products. The by-products are a very important determinant in the cost/benefit analysis of any project. Just as important, various products are counter cyclical in revenue production and/or serve as balancing agents to important costs. In deciding on a product mix attention needs to be paid to insuring the stability as well as the productivity of its possible income streams. The availability of markets for possible products is very much like the availability of resources. Markets for various products may exist but are practically unreachable. The barriers to market availability include transportation and its costs, storability, competition from intervening sources and quantity/quality disconnects. As transportation and transmission costs rise, the accessibility that local markets provide becomes more valuable. New “social” markets such as potential carbon credits or current energy credits are becoming increasingly important. These factors, along with dollar value, must be considered when evaluating products and markets.

Overall, the key to deciding on a wood biomass to energy project is to treat the opportunity as a problem in how to manage the landscape and process the whole of what is taken from it. The process is a series of “sorts,” beginning with what is to be harvested and what is to be left on the land. The basic goal at every stage is to avoid waste. We avoid waste by sorting out as much as can be possibly used from highest to lowest value. By adding energy production to the forest product system we create a new way to use what is presently wasted or underutilized. The challenge is to conceive of an energy production system that can be applied throughout the forest management system to enhance the productivity of the system. If energy production can be used to support forest restoration work and enhance forest health and productivity that is a major consideration in what is the best use of the resource and the most appropriate technology. The best decisions on wood waste to energy will focus on the long term management of the resource.

Wood Biomass Technologies

This analysis seeks to define three general types of wood biomass to energy conversion technologies: Biomass-fired boilers with steam turbines, here referred to as combustion, gasification, and pyrolysis. It intends to give a broad overview of the differences in order to further the discussion of biomass utilization.

Combustion

Mechanics:

- The most basic and widely used technology is a steam turbine technology
- Heat is captured to produce steam that powers the turbine and produces electricity
- Residual heat can be harnessed for other heating needs (e.g. wood drying, district heating)

Benefits:

- New utility-scale combustion systems have electrical efficiencies of nearly 40%
- New combustion systems have thermal efficiencies of over 70%
- So, state-of-the-art combustion systems can have an overall efficiency of over 80%, although a small system will have an efficiency of closer to 60%
- The combination of electricity and use of thermal energy provides strong incentive for this technology, even in regions with low electricity costs
- Combustion tends to be less expensive than other energy-related uses for woody biomass.

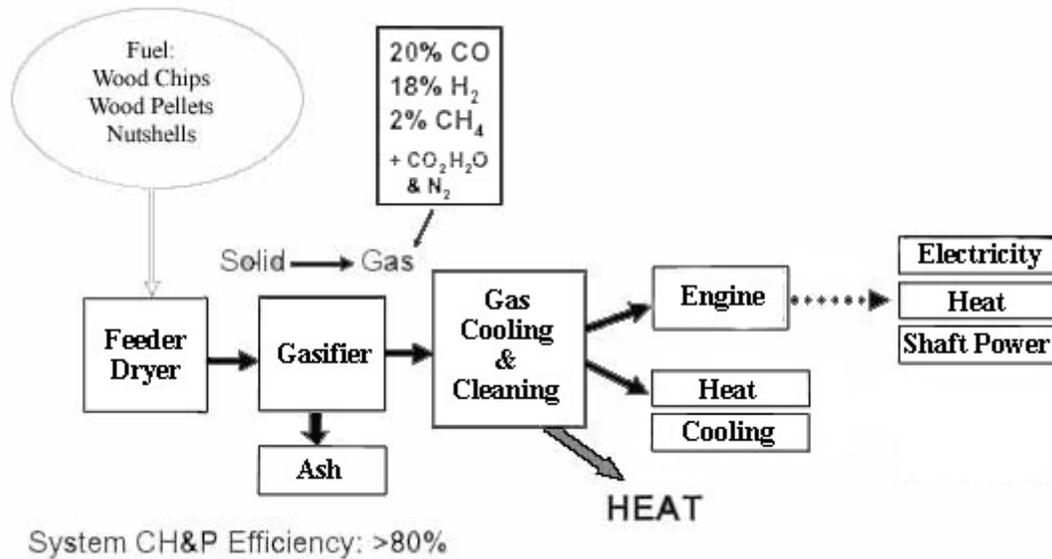
Available Technology:

- Widely available
- Relatively scalable and can be modularly combined to increase energy production capacity.
- The cost-effectiveness often rests on the sale or offset cost of capturing the usable heat for other purposes. So, the smaller the system, the less heat is available – and less economical – for additional uses.

Gasification

Mechanics:

- Biomass is heated in the absence of the amounts of oxygen that fully combusts fuels
- Process takes place between 1200 and 1400 degrees Fahrenheit
- Without the ability to combust fully, the biomass breaks down to synthesis gas, or syngas



Benefits:

- Syngas is a more efficient fuel than the solid biomass because it mixes more easily with oxygen than a solid.
- Syngas can be burned in a boiler or finance to offset natural gas or propane use, can be combusted in an internal combustion engine or a turbine to produce electricity, or mixed with chemical catalysts to be converted into other products (U.S. DOE).
- The by-products of a gasification process are heat, ash and char. Capturing the heat will increase the energy conversion value of these technologies.

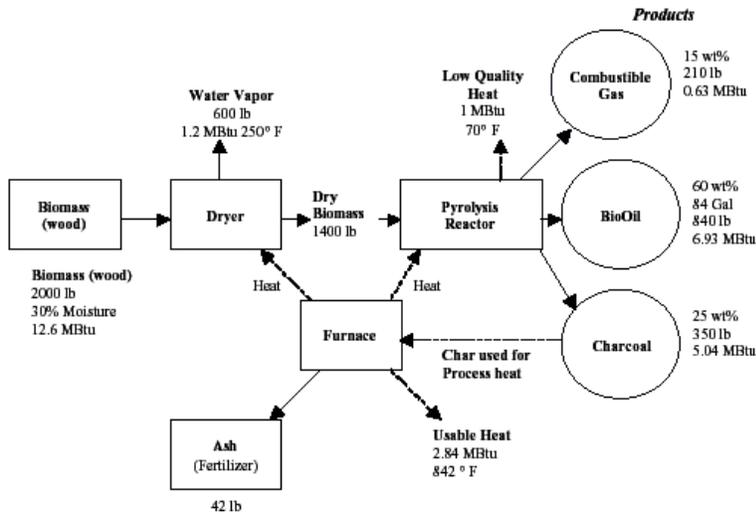
Available Technology:

- There are several successful demonstration projects currently in operations with power generation ranging from 1 MW to 6 MW with larger projects in the planning phases. (Roos, 2008)
- As demonstration projects are completed, more units are becoming commercially available.

Fast Pyrolysis

Mechanics:

- Wood is rapidly heated in a chamber absent of oxygen.
- Particles (lignin and cellulose) separate into gases, then cool rapidly to form the products.
- There are three products: bio-oil fuel, char, and non-condensable gases.



ROI Material and Energy Balance for Biomass (wood) at 30% Moisture

Benefits:

- *Bio-Oil* - Burns clean, roughly equal to the combustion of natural gas. CO₂ emission is low, much less than diesel fuel and equivalent to natural gas. The fuel has very low SO₂ (sulfur dioxide). Its combustion, compared to #2 fuel oil, has equivalent NO_x emissions (Dynamotive Burn Test, Natural Resources Canada, CANMET).
- *Char* - Has high heat value compared to forest residues, ranging from 12,000-13,000 BTU per pound. Burns similarly to wood, but releases fewer particulates and no SO₂. However, since it contains all the ash of the entire wood feedstock, it proportionately leaves more ash than the same weight of wood. The char can be burned either in its powder form or it can be compacted and molded into briquettes. Char can also be used for filtration or soil amendment.

Available Technology:

- This technology is currently in the demonstration phase.
- As demonstration projects are completed, units will become commercially available.

Marketing

Marketing of Products:

The technologies discussed in the previous section result in the products as demonstrated in the table below.

	Combustion	Pyrolysis	Gasification	Advanced Gasification
Direct Heat	✓	✓	✓	✓
Electricity	✓	✓	✓	✓
Bio-Oil		✓		
Fuels				✓
Char		✓	✓	✓
Fly Ash				✓

Heat

All three basic technologies considered in this workshop produce heat. Finding a market for the heat is important for all three, and the problems associated with “marketing” heat are the same. In marketing the heat, the differing economies of scale for each technology is the biggest difference. The more heat produced the greater the marketing problem because there are fewer co-location possibilities and heat itself is not valuable enough to provide great support for either transferring the heat to other places or transporting feedstock to a given location. That being said, a facility interested in purchasing the heat will greatly improve the economics of a project.

Electricity

Electricity can be produced by all of these technologies. Finding a partner for electricity will most likely not be a problem on the Olympic Peninsula. Renewable energy is at a premium. Almost every utility in Washington and Oregon is seeking to purchase it. The key is to methodically survey the field and select the best partner. In electricity, the key is a long-term contract, which does not contain penalties. Negotiating a clear, straightforward contract will be a challenge. The marketing strategy for electricity is a pre production strategy based on the fact that electricity produced in Clallam County has double premium values. First, there is the premium renewable energy value. Presently, this adds about \$0.02 /kWh to the base value of electricity. Then there is the value of creating an alternative to the very substantial cost of

transmission lines to convey the energy to meet new demand in the area. This premium value should translate into an agreement to share in the capital costs of new electrical generation facilities. The value of such support is indeterminable, but should at least equal the renewable energy value.

Biofuels

The bio-fuels that can be produced through gasification are all recognized products with established markets. Only gasification products can presently be converted to fuels suitable for use in cars and other vehicles. There is a large and established market for these fuels, assuming that the fuels are produced to industry standards. There are no significant large technical problems for doing so.

The greatest barrier to marketing gasification produced fuels is cost. The capitalization to gallon produced presently required by gasification technology is too high to allow these fuels to be cost competitive. However, promising new gasification technologies would dramatically affect this formula.

Char

Presently, the market for char is anecdotal, it has a known use (soil rehabilitation), but there is not a market on which to judge a value. However, there is a known amount of carbon “stored” as char, and if the char were to be used for soil rehabilitation, there is a value for the carbon sequestered into the soil.

Bio-oil

As a petroleum heating fuel replacement, bio-oil could provide many benefits. It would be environmentally safe, support local industries and natural resources, and help improve the self-sufficiency of the area it serves. Dynamotive Energy is currently testing the viability of its bio-oil in the commercial market. If these commercial tests are positive, it could be strategically developed to capture the unique opportunity present on the Olympic Peninsula, bio-oil will have a strong role to play in both the near- and long-term future.

Additionally, continuing research is developing methods for converting bio-oil to transportation fuel to power vehicles. Because of the low pH level of the fuel, engines need a significant retrofit to use the present fuel. However, creating a fuel-grade bio-oil is clearly within the realm of technical possibility. It is possible to gasify the fuel to create a synthetic fuel that would not require any retrofitting of the vehicles. At present, these refining technologies are not affordable for a small-scale project.

Opportunities for locally-owned business development (co-op-owned enterprises)

Jefferson and Clallam County offer distinct opportunities to develop businesses which utilize woody biomass for fuel and power. The region is geographically isolated and therefore economically isolated from a power project development perspective. Additionally, the Peninsula is endowed by being among premier timber industry and forest products growing regions on the planet.

The intent is to maximize the retention of the economic surplus generated from possible energy development. If even a portion of the money spent on fuels and energy can be captured locally, there would be enormous economic benefit to Jefferson and Clallam County.

Producers' Co-op

A co-op of agricultural commodity producers, e.g. potato producers, is a business designed exclusively to serve and pass on benefits to the member-owners. The members would own, control and utilize the business. For example, if forest owners could enter into business to “add value to their forest products” then the benefits conferred to members would be measured in quantities of board feet, biomass utilized, etc.

Co-op business models typically involve aggregation of similar producers with goals of maximizing their mutual interests. Through growing an economy of scale, co-ops achieve increased purchasing or bargaining power or integrated supply-chain processes, such as transportation and processing.

Regarding co-op renewable energy development, this model could be implemented in at least a couple different ways, from a group of farmers forming a co-op to start-up a single project (e.g. dairy farmers launching a digester) or as bargaining association (e.g. Perennial Ryegrass Bargain Assn.).

Forest owner co-ops seek to organize timber producing landowners to collaborate on a variety of fronts as the following examples will illustrate. Models are being developed around the U.S. to respond to changing industry dynamics ranging from declining profitability of forest commodities to industry divestiture of domestic land holdings. Co-ops, as a business model, seek to leverage control and value to producers, e.g. small forest landowners.

Forest workers/contractors Co-op

Forest contractors, processors, etc. further up the supply-chain from forest owners are more closely involved in biomass aggregation. These are the businesses already on the ground (from chipping, logging, hauling to small diameter consumers) and in this role for the broader forest products industry. Perhaps, there is an opportunity for these entities to economically collaborate.

A co-op of independent businesses, like a producer co-op, is designed exclusively to serve and pass on benefits to the member-owners. The members would own, control and utilize the business. Again, if forest contractors entered into business to “add value to their forest products” then the benefits conferred to members would be measured in increased value realized.

Forest contractors could potentially seek to organize a co-op of independent business to collaborate on a variety of fronts as the following examples will illustrate.

Consumer Co-ops

At the top of the supply-chain for biomass utilization is the end consumer. Perhaps, there is an opportunity for these entities to economically collaborate. Be it hog fuel, pellets or potentially bio-oil, if biomass is going to be utilized for energy or fuel, somebody is going to have to be the end consumer of the product.

Consumers have a long history of aggregating into co-ops to develop markets, supply and control costs in a variety of industries and services, often those most critical the economy; such as but not limited to:

- Health care
- Energy
- Housing
- Food

There is absolutely no reason large purchasers (such as industry, schools, etc.) couldn't do the same to create market demand for bio-oil, pellets, hog fuel, etc. Furthermore with our volatile energy prices, stories are emerging around the country of consumers saving money by chambers of commerce bulk buying electricity on contract and neighborhood associations bulk purchasing home heating oil.

Limited Liability Company

Ethanol Producer Magazine publishes a list of primarily corn ethanol facilities that are currently being built or under consideration in its monthly publication which includes the type of corporate structure of the facility. Except for a very small and declining number of cooperatives, most of the new corn ethanol facilities are being built by a Limited Liability Company (LLC).

An LLC combines the tax flexibility of a partnership with the limited liability of a corporation. Individuals form LLCs more often than corporations, typically to protect their personal assets and avoid the "double taxation" of a corporation on shareholder dividends. Each member (owner) of an LLC reports their share of profit and loss in the company on their individual tax return.

USDA Funding Opportunities				
	VAPG	REAP (9007)	9008	RCDG
Name of Program	Value Added Producers Grant	Rural Energy for America Program	Biomass Research and Development Initiative	Rural Cooperative Development Grant
Website	http://www.rurdev.usda.gov/bs/coops/vadg.htm	http://www.rurdev.usda.gov/rd/farm/bill/9006resources.html	http://www.rurdev.usda.gov/RBS/BUSP/9008.htm	http://www.rurdev.usda.gov/bs/coops/rodg/rodg.htm
Purpose	This program, Section 6401 of the Federal Farm Bill, offers grants for business planning, feasibility studies and working capital related to value-added agricultural activity.	This program, Section 9006 of the Federal Farm Bill, provides grants for purchases of renewable energy systems and energy improvements for agricultural producers and rural small businesses.	DOE and USDA, Rural Development jointly solicit applications for financial assistance addressing research and development of biomass based products, bioenergy, biofuels and related processes.	Rural cooperative development grants will be used to facilitate the creation or retention of jobs in rural areas through the development of new rural cooperatives, Value-Added processing and rural businesses.
Type of funding	Grant	Grant & Loan Guarantee	Grant	Grant
Funding Max.	\$100,000 (planning), \$300,000 (wkg capital)	\$500,000 (25% of project costs) - grant, \$10,000,000 (50% of project costs) - loan guarantee	\$1,000,000	\$200,000
Eligibility	Independent producers, Agricultural producer groups, Farmer or Rancher cooperatives and Majority-Controlled Producer-Based Business Ventures, are eligible for grants under this subpart.	The applicant or borrower must be an agricultural producer or rural small business (in which case the business headquarters and the project to be funded must both be in a rural area).	Eligible applicants include institutions of higher education, national laboratories, federal and state research agencies, non-profits, and private sector entities.	Grants may be made to nonprofit corporations and institutions of higher education. Grants may not be made to Public bodies. No grants can be made to cities or states under his program.
Use of Funds	Grant funds may be used to pay up to 50% of the costs for carrying out relevant projects. (a) Planning Grants - Grants to facilitate the development of a defined program of economic activities to determine the viability of a potential Value-Added venture, including feasibility studies, marketing strategies, business plans and legal evaluations. (b) Working Capital Grants - Grants to provide funds to operate ventures and pay the normal expenses of the venture that are eligible uses of grant funds.	Grant funds can be used for both hard (equipment, construction) and soft (studies, fees) costs. The grant request must not exceed 25% of the eligible project costs. 1) The project must be for the purchase of a renewable energy system or to make energy efficiency improvements. 2) The project must be for a pre-commercial or commercially available and replicable technology. 3) The project must be technically feasible. 4) The project must be located in a rural area. 5) The applicant must be the owner of the system and control the operation and maintenance of the proposed project. 6) All projects must be based on satisfactory sources of revenues in an amount sufficient to provide for the O&M of the system or project.	There are four research and development technical topic areas considered eligible for Section 9008 funding. These include: 1) Feedstock Production 2) Overcoming Recalcitrance of Cellulosic Biomass 3) Product Diversification 4) Analysis that provides strategic guidance for the application of biomass technologies in accordance with realization of improved sustainability and environmental quality, cost effectiveness, security, and rural economic development, usually featuring system-wide approaches.	Grant funds may be used for 75% of the cost to establish and operate centers for rural cooperative development. (a) Applied research, feasibility, environmental and other studies that may be useful for the purpose of cooperative development. (b) Grant funds cannot be used for basic or academic research, or for research and development. (c) Collection, interpretation and dissemination of principles, facts, technical knowledge, or other information for the purpose of cooperative development. (d) Providing training and instruction for the purpose of cooperative development. (e) Providing loans and grants for the purpose of cooperative development in accordance with the subpart. (f) Providing technical assistance, research services and advisory services for the purpose of cooperative development.
Match	Matching funds must be at least equal to the grant amount. Cash and/or in-kind.	75% match (65% cash, 10% in-kind)	At least 20% of project funding must be non-federal	25% match, cash and/or in-kind

USDA					
	RBOG	B&I	IRP	RBEG	RUS
Name of Program	Rural Business Opportunity Grants	Business/Industry Guaranteed Loan Program	Intermediary Relending Program	Rural Business Enterprise Grants	Renewable Energy Program of the Rural Utilities Service
Website	http://www.rurdev.usda.gov/rbs/busp/rbog.htm	http://www.rurdev.usda.gov/rbs/busp/b&i_gar.htm	http://www.rurdev.usda.gov/rbs/busp/irp.htm	http://www.rurdev.usda.gov/rbs/busp/rbeg.htm	http://www.usda.gov/rus/electriloans.htm
Purpose	Grant funds for strategic technical assistance, training, and planning activities promoting "best practices" in sustainable economic development for rural communities with exceptional needs.	The Business and Industry (B&I) Guaranteed Loan Program provides guarantees on loans to improve, develop or finance business, industry, and employment, and to improve the economic and environmental climate in rural communities.	The IRP program provides low-interest loans to capitalize revolving loan funds (RLF's) that will finance smaller and emerging businesses, enterprises, and community development projects in rural areas.	Rural Business Enterprise Grants are for providing technical assistance, training and other activities that support the development of small business enterprises in rural areas.	RUS is an entity of USDA's Office of Rural Development that gives loans to maintain, upgrade and expand generation, transmission and distribution in rural areas. Funds can be used to finance renewable energy systems.
Type of funding	Grant	Loan guarantees	Subsidized loans	Grant	Loan
Funding Max.	\$50,000	80% max guarantee on loans up to \$5 million 70% max guarantee on loans from \$5 to \$10 million	\$750,000 to RLF operator and \$250,000 to loan recipient	Established by state, annually.	No Maximum.
Eligibility	Grants may be made to public bodies, nonprofit corporations, Indian tribes on Federal or State reservations and other Federally recognized tribal groups, and cooperatives with members that are primarily rural residents and that conduct activities for the mutual benefit of the members.	The lender can be any federal or state chartered bank, credit union, savings and loan association, or Farm Credit Bank. The borrower can be any legal entity including a cooperative, corporation, or partnership organized and operated on a profit or non profit basis, Indian Tribe, public body or individual.	Intermediaries may be private non-profit corporations, public agencies, Indian groups, or cooperatives. Loan recipients may be any of the above, plus private businesses.	The RBEG program is for nonprofits, public bodies, and tribes to assist small and emerging businesses in rural areas. Small business must have ≤50 employees and ≤\$1 million in gross profit.	Loans may be made to Municipalities, public utility districts, subdivisions, states, rural electric cooperatives, as well as non-profit, limited dividend and mutual associations that provide retail electric service needs to rural areas or supply the power needs of distribution borrowers in rural areas.
Use of Funds	Authorized purposes are: Technical assistance - for analyzing and identifying business opportunities; for developing feasibility studies and business plans; for the creation of new businesses using rural resources; for export market opportunities Training - for existing or prospective rural entrepreneurs and managers; for rural leadership development Planning - for local or multi-county economic development Business support centers - for the creation of new businesses; for training in technology and trade development Fees - for reasonable fees for professional services necessary to conduct the above activities	Eligible loan purposes can include machinery and equipment, buildings and real estate, permanent working capital, certain types of debt refinancing, loan fees and costs (including B&I guarantee fee), professional services, and feasibility study costs. Interest rates are negotiated between borrower and lender and may be variable or fixed. The maximum loan term for working capital is 7 years, for equipment 15 years, and for real estate 30 years.	This program offers subsidized loans to qualified intermediaries to establish revolving loan funds to be used for business development and expansion or other community development projects. Projects funded by the loans must be in rural areas and can be used for real estate, buildings, leasold improvements, equipment, inventory, working capital, some refinancing, and fees. Loans can finance up to 75% of the total cost of the project.	Uses of funds include: technical assistance (providing assistance on complete marketing studies, business plans, training, etc.), workforce training, revolving loan funds (RLF's), and capital items for the benefit of "small enterprises". RLF's and capital expenditures should be undertaken very carefully due to restrictions on the funds/capital items for use by "small enterprises" for the life of the fund or capital item.	The loan funds may be used to maintain, upgrade and expand generation, transmission and distribution in rural areas. Although there are no renewable energy-specific elements to the loan application process, the RUS Administrator has set aside \$200 million per year to be used for renewable projects. See the web link above for details on loan terms, interest rates, etc.
Match	No match required, but higher leveraging applications receive preference		Loan recipients must find alternate funding for 25% of project costs.	No match requirements, but 1:1 matching is essential for an application to be competitive.	No match required.

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