



Renewable Energy Farm Walk Series

Seattle Tilth & Northwest SEED



Caldwell/Davis/Bassetti Farm (CDB Farm)

Wind Energy on the Farm

Monday, April 4, 2016



This program is sponsored through an Environmental Justice Grant from the U.S. Environmental Protection Agency.



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Caldwell/Davis/Bassetti Farm (CDB Farm)

845 Saxton-Bane Road,
Goldendale, WA 98620

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Section 1 – About the Farm

The Caldwell/Davis/Bassetti (CDB) Farm dates back to 1975 when Gwen and Theo Caldwell bought 240 acres of land that had been long abandoned in Goldendale, WA. Over the next decade, together with their large family, they rehabilitated the farm and built the house and barns there today. The Caldwell Davis Farm, as it was originally known, raised registered Columbia Sheep, which gained them a national reputation. The farm also grew French shallots and marketed them to restaurants and specialty shops. Hay was also grown and continues to be grown today.



Theo's sudden, untimely death in 1986 brought inevitable changes for Gwen and their family. Soon after Ted and Carla Wilkins came aboard, moving onto the farm and taking over management. The shallot production was sold and they gradually reduced the sheep operation. Ted added his amazing landscaping skills resulting in the wonderful stonework and plantings that you see today.



With her youngest child in college and Ted on board, Gwen returned to Seattle to a business she had been involved with years before. Together with a friend, and later some of her children, in 1989 Gwen founded the Grand Central Bakery, which now operates in both Seattle and Portland. Shortly after her move to Seattle Gwen married Seattle architect, Fred Bassetti. They escaped their busy professional lives by returning to the farm on weekends and holidays. Goldendale became a retreat for them as well for their growing families, now with grandchildren. A vegetable garden, chickens, a couple of pigs each year and some bummer lambs kept them feeling like farmers!



Over the years Fred had been grafting apple trees from a tree behind his childhood home in Tukwila. It was clearly a heritage apple that produced a unique and very large flavorful apple. With encouragement from an orchardist friend, Gwen and Fred gathered scions from the old tree and sent them to Wenatchee to be professionally grafted. The family then gathered in the spring of 1992 to plant 100 young trees in what had been the shallot field.

Today the mature orchard provides several bins every year for all manner of apple treats at the Bakeries, and most of the remainder end up as cider. Only recently has it been determined that the apple is a Spokane Beauty. The apples are grown with organic practices though the farm is not certified. Like many older varieties it is a biannual producer alternating heavy yields with light.



A horse or two were always part of the farm, and now are just about the only livestock you will see there today. The stable behind the shop in the

big barn was originally the lambing barn for the sheep. A few feeders and a sorting chute are all that remain from the busy sheep days. About 15 years ago Gwen took up the sport Carriage Driving, and she continues to drive and compete in the sport. She has bred a couple of generations of her Haflinger driving horses as well as a few Warmblood sport horses.

Fred Bassetti passed away in 2013. He was 96 and active to the end. Gwen is now retired and since Fred's death divides her time between Goldendale and Underwood, 40 miles away in the Gorge. Two of her children are in the Gorge and two are in Portland. She enjoys a granddaughter's equestrian adventures along with her own, manages two households, continues to manage the sale of the apples harvested from the farm and manages the preservation of the CDB Farm and its memories for the next generations.

Wind Energy on the Farm







Photo credit: Ian Woofenden



United States
Environmental Protection
Agency



About Northwest SEED



Technical Assistance


Education

Policy Advocacy

Practical Implementation

Outline

- Wind technology
- Wind energy economics
- Wind turbine tour

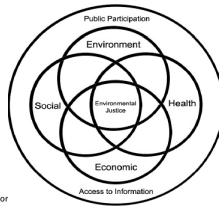


Caldwell-Davis-Bassetti Farm



Environmental Justice

- Environmental justice will be achieved when everyone enjoys the **same degree of protection** from environmental and health hazards and **equal access** to the decision-making process to have a healthy environment in which to live, learn, and work.



EPA United States Environmental Protection Agency

Climate Change, Variability and Risk

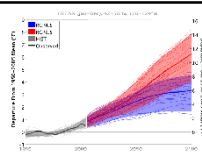
1. Climate change will affect Pacific Northwest agriculture.
2. PNW agriculture is in relatively good shape with respect to projected climate change impacts...
3. ...but there are reasons to believe that could change, so it behooves us to pay attention.
4. Agriculture is already a dynamic managed system, and therefore has a capacity for adaptation and mitigation.



Photo: Dennis Behm under CC BY-NC-ND 2.0

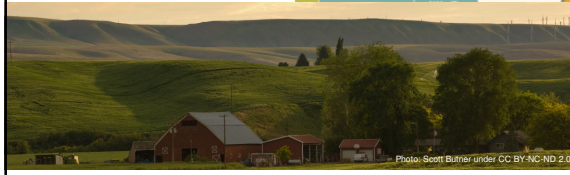
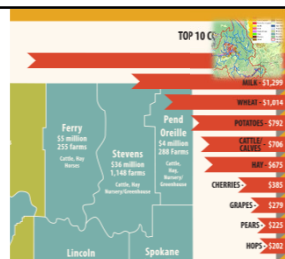
Climate change in the Pacific Northwest is projected to lead to:

- Increases in annual temperature
- Small changes in annual precipitation
- Wetter springs/winters and drier summers



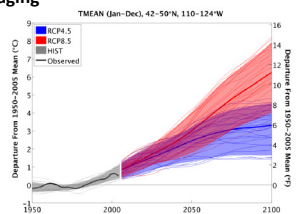
PNW agriculture is in *relatively* good shape with respect to climate change impacts because:

- It is already a dynamic, variable system
- It is at high latitude
- It is dominated by C3 crops, which respond to CO₂ fertilization



PNW agriculture is in *relatively* good shape with respect to climate change impacts *but* there are reasons to believe that could change, such as:

- Emissions might be at the top of the range or worse
- Uncertainties remain:
 - Impact of pests and pathogens
 - Impact of model averaging
 - Impact of model assumptions
 - Conditions with no historical analogs






There are reasons for hope, combining adaptation and mitigation.



Photo: Oregon Department of Agriculture under CC BY-NC-SA 2.0



Adaptation:
farmer investment in conservation




Figure 1. Patterns of wheat senescence due to landscape and soil controls over soil water.

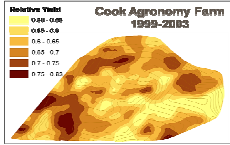


Fig. 2. Relative yield of winter wheat at the WSU Cook Agronomy Farm.

Qiu, et al. 2011

	Conventional Tillage	No-till w/ residues		Potential Yield Increase (bushels/ ac) for No-till
	Snow depth (cm) CT	Snow depth (cm) NT	Soil moisture (mm) increase over CT	
South Slope	18	28	+29	+6
Ridge top	11	23	+60	+13
Valley	28	33	+13	+3



Mitigation:
Anaerobic Digestion



Benefits of Renewable Energy

- No air or water pollution
- No water consumption
- Efficient transmission
- Energy independence
- Reduced/stable utility bills
- Diversify farm revenue
- Marketing opportunities
- Supports local economy



Solar Photovoltaics (PV)



Solar Hot Water



Solar Hot Air



Micro Hydro



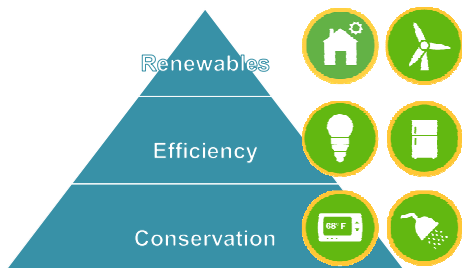
Wind Energy



Methane Digesters

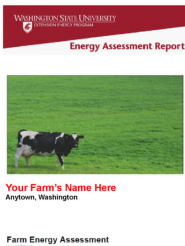


Renewables are *part* of the solution



Energy Audit Resources

- WSU Energy Office
Karen Messmer, Farm Energy Program
messmerk@energy.wsu.edu
360-956-2090
- NRCS, Goldendale Service Center
1107 S Columbus Ave, Goldendale
(509) 773-5822
- Klickitat PUD
www.klickitatpud.com
509.773.5891



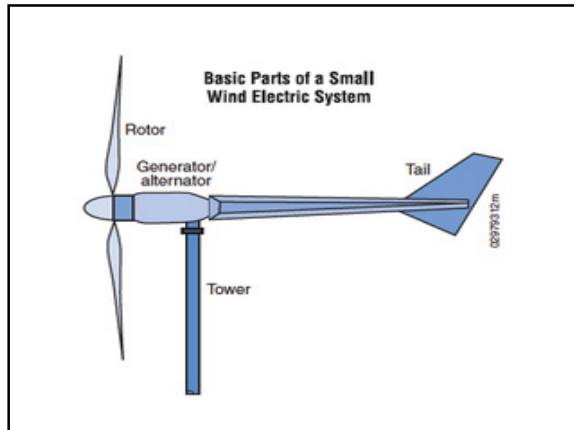


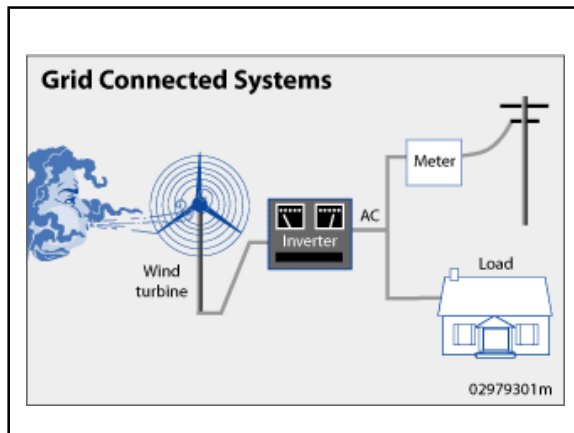
Electrifying the Gorge since 1935, Hire Electric added Seraphim Energy in 2009 to focus on solar and small wind installations. Seraphim started doing wind projects in Goldendale in 2003. The combined company serves all of eastern Oregon and Washington with over 2MW of installation experience.

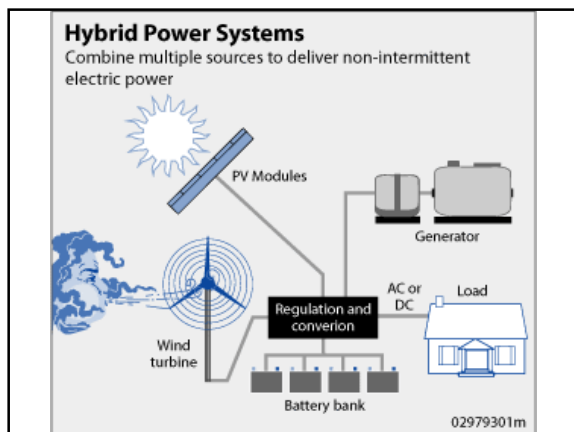
Terminology

- Watt (W) = instantaneous measure of power
 - ▣ Like your speedometer
 - ▣ Kilowatt (kW) = 1000 W
- Kilowatt-hour (kWh) = amount of energy produced
 - ▣ Like your odometer
 - ▣ 1 kW used or produced for 1 hour = 1 kWh
- 1 kW of wind capacity = 1,200 to 1,800 kWh/year

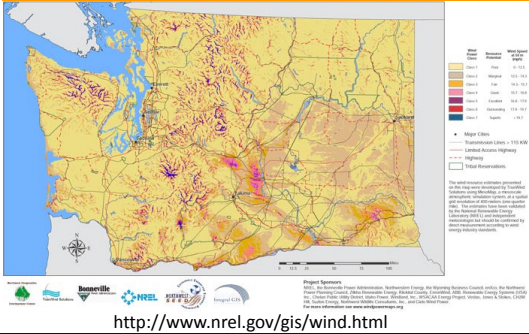








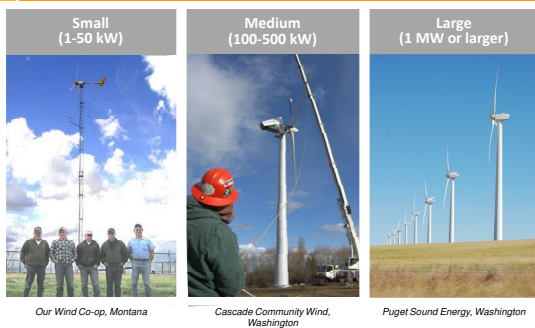
How windy is my site?

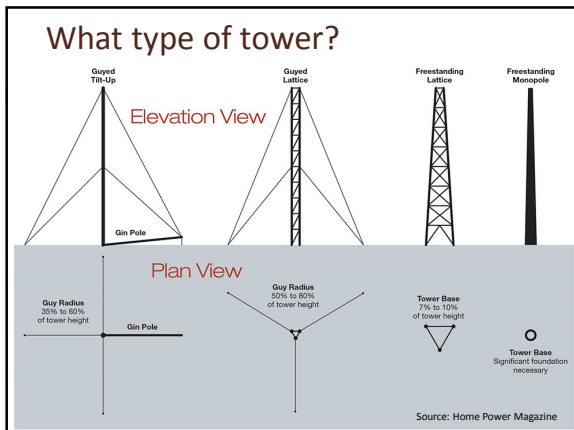


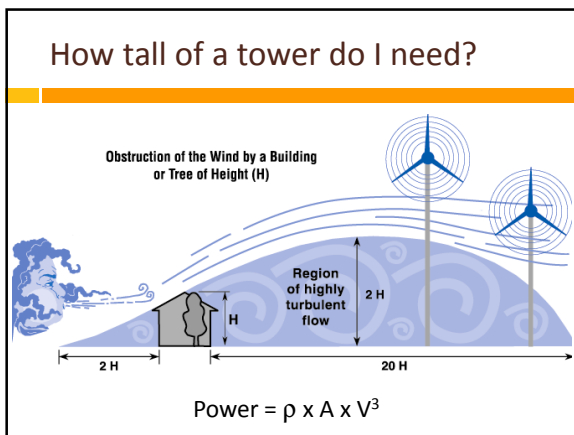
How windy is my site?

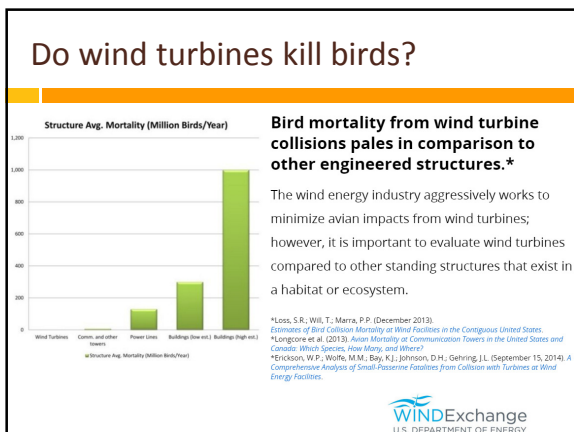


What size wind turbine do I need?

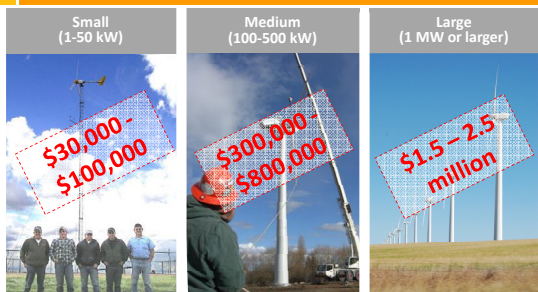








How much does it cost?



Note: The costs shown are approximate; actual costs for your situation will depend on a number of factors and will be determined after a site visit.

Cost Variables

- Electric service
- Wire run distance
- Tower type & height
- Data monitoring system
- Local permitting requirements



Photo credit: Portland Business Journal

Buyer Beware

Honeywell 1.5 kW

Energy Ball 2.5 kW

Small Wind Certification Council Certified Small Wind Turbine

Manufacturer/Model
Sample Windpower Company
SWT, 240V, 60Hz

Rated Annual Energy
Estimated annual energy production assuming an annual average wind speed of 5 m/s (11.2 mph), a Rayleigh wind speed distribution and 100% availability. Actual production will vary depending on site conditions.

12,345 kWh/year

Rated Sound Level
The sound level that will not be exceeded 95% of the time, assuming an average wind speed of 5 m/s (11.2 mph), a Rayleigh wind speed distribution, 100% availability, and an observer location 60 m (200 ft.) from the rotor center.

55 dB(A)

Rated Power
The wind turbine power output at 11 m/s (24.6 mph) at standard sea-level conditions.

9.5 kW

Certified to be in Conformance with:
AWEA S.1 - 2009

For a summary report visit www.smallwindcertification.org

Bergey Excel Turbine 10 kW

Tangier 10kW

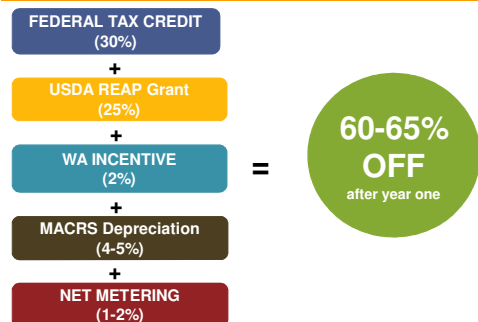
Incentives

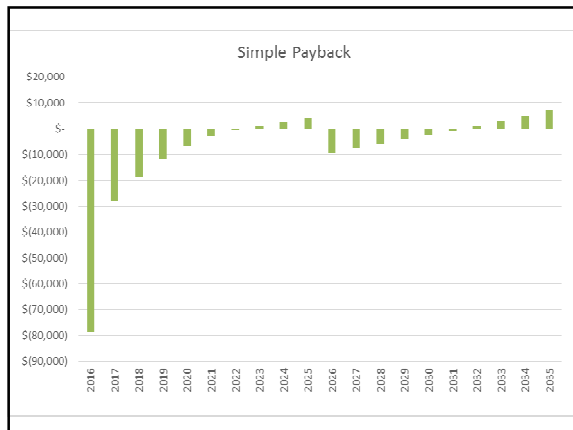
- Federal Tax Credit = 30% of project cost
 - ▣ Expires Dec 31, 2016 for residential
 - ▣ Reduces to 24% in 2017 for commercial
- Washington Solar Production Incentive
 - ▣ \$0.12/kWh until June 2020
 - ▣ Pending legislation = \$0.13/kWh for 10 years
- Net Metering – avoided purchase of power
- MACRS depreciation for businesses

USDA Rural Energy for America Program

- Funding available for clean energy projects
 - ▣ Grant = 25%
 - ▣ Loan Guarantee = 75%
 - ▣ Feasibility study grant = 25%
- Who Qualifies?
 - ▣ Rural small businesses
 - ▣ Agricultural producers
- Deadlines: May 2, 2016 or Nov 2, 2016
- Contact: Roni Baer, 509-454-5743,
veronica.baer@wa.usda.gov

The bottom line





Payback Example - Assumptions

- 10 kW system
- Installed cost = \$8.00/Watt
- 13,000 kWh/year production
- Installed by Dec 31, 2016
- Maintenance/ repair cost of \$15,000 in Year 10
- \$0.09/kWh utility rate with 3% annual escalation
- Owner is eligible for 30% tax credit, received in 2017
- Owner is eligible for and uses MACRS depreciation
- Owner's federal tax bracket rate is 30%
- \$0.12/kWh state production incentive until June 2020
- Owner receives USDA REAP grant reimbursement of 25%

Umpqua Bank

- Greenstreet Lending
 - ▢ Unsecured consumer loan – up to \$50,000
 - ▢ Home equity line of credit – up to \$150,000
- No origination fees, no prepayment penalties
- Low, preferred interest rates
- Umpqua Bank Contacts:
 - Casey Neher
caseyneher@umpquabank.com
 - Barbara Cosner
barbaracosner@umpquabank.com
 - 509-773-7500
 - www.greenstreetloan.com



Next steps

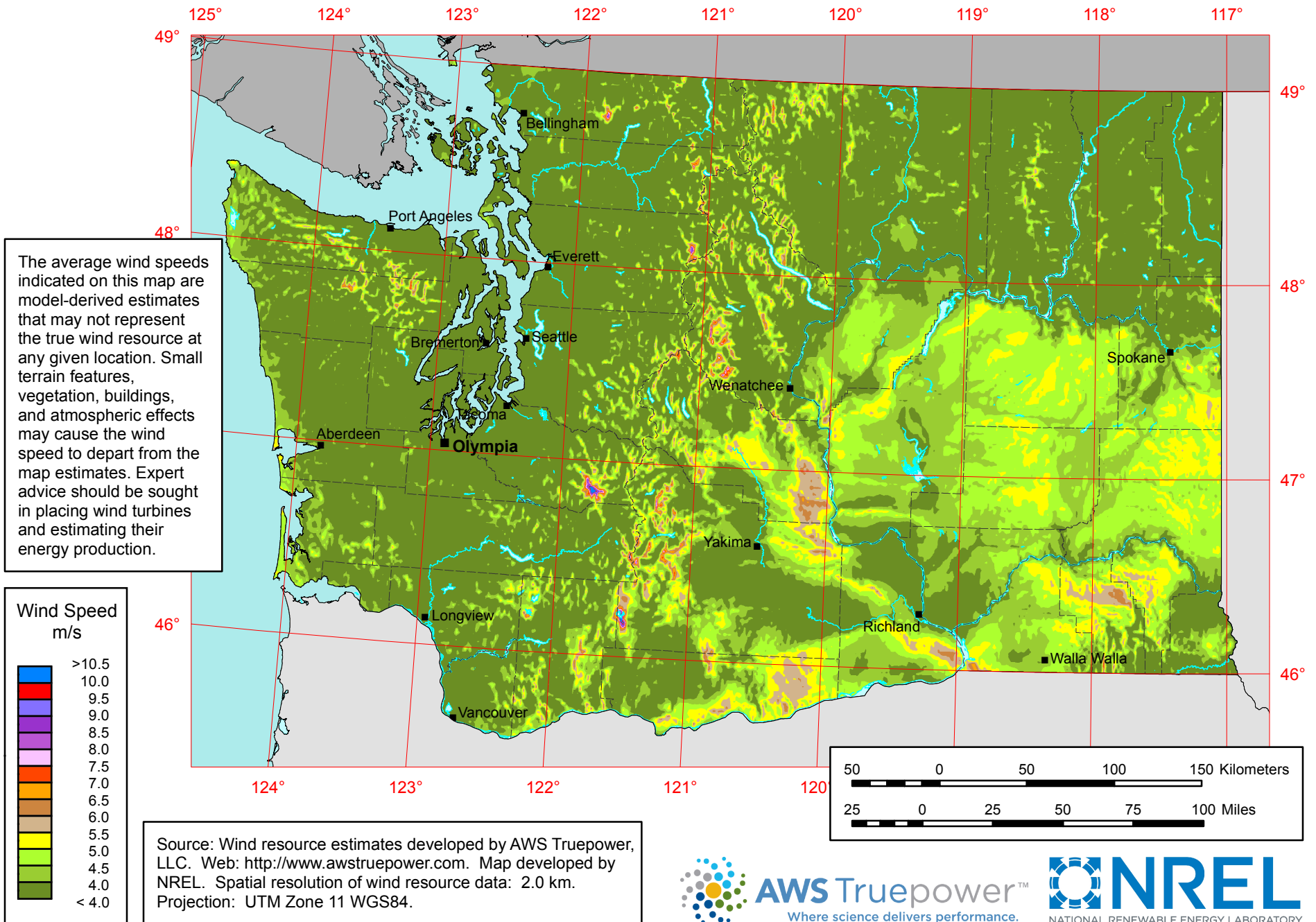
- 1 • Contact contractors for bids
- 2 • Receive your site assessments
- 3 • Compare bids and choose
- 4 • Apply for grants and financing
- 5 • Get Wind!

Questions?

□ Mia Devine
Northwest SEED
mia@nwseed.org
206-755-1233



Washington - Annual Average Wind Speed at 30 m



Gwen Bassetti: Locally-Grown Clean Energy

A Distributed Wind Case Study

A Wind Powered Home and Business

In Seattle, Gwen Bassetti is known as the "godmother of good bread." Her title stems from 1972 when she founded one of the Northwest's best known bakeries, Grand Central Baking Company. However, back at her ranch home in Goldendale, Washington, Gwen is also known for her wind turbine, which is a local landmark for community-inspired energy solutions. The 10 kW wind turbine generates about 12,000 kWh annually with average wind speeds around 10 miles per hour. A portion of that energy is used to irrigate over 100 Spokane apple trees on the property, offspring of a tree from a childhood home. In a good season, Gwen may take up to two tons of these apples to inspire her Grand Central Bakery kitchens.

Neighborhood Inspiration

In 2003, Gwen was inspired to pursue wind energy options when she witnessed their neighbor, Ed Kennell, raise a 10 kW wind turbine next door. Kennell, an engineer who had been involved with the small wind industry since the 1970s, had moved to Goldendale to build his ideal retirement home integrated with renewable energy technology. Gwen decided that she too wanted to offset her electricity costs using the strong, steady winds of Klickitat County. Gwen stopped by the Northwest Sustainable Energy for Economic Development office near her bakery in Seattle's Pioneer Square, and discovered that they had just formed Our Wind Cooperative, a unique business model that allowed landowners to pool their resources to secure funding and discounts. Gwen quickly joined.

A Home-Grown Renewable Energy Business

Jonathan Lewis was also a neighbor of Ed and Gwen who had recently moved with his family to Goldendale and started a small electrical contractor business. Entirely by chance, Lewis heard about Kennell's wind turbine project and was inspired to lend a hand as a licensed electrician. Kennell's wind turbine was Lewis' first renewable energy project, Gwen's would soon become his second project, and Jonathan's company would go on to install over 60 solar and wind systems before becoming a part of Hire Electric Inc in 2009. Since then, Hire Electric's renewable energy division has installed over 1.4 MW of renewable energy and now employs five full-time staff and four part-time staff who are trained in solar electric and small wind systems.



The 10 kW Bergey wind turbine provides about 30% of the farm and ranch's annual electricity needs.

Photo source: NWSEED

"This whole experience was invaluable in launching my business and career in renewable energy."

- Jonathan Lewis

Hire Electric, Renewable Energy Division

A New Tower in Klickitat County

The Bassetti wind turbine was installed in September 2004. However, before their wind turbine could become a reality, the Bassetti's had to navigate a permitting process that took almost 8 months. Challenges included recording the official wind speed on the property, receiving both aviary and archaeological surveys, and going through the county's conditional use permitting process that included public hearings.

Klickitat County has now implemented an Energy Overlay Zone to simplify the permitting process. Within the zone, small wind systems under 100 kW are permitted outright if they satisfy certain height and setback criteria; only an electrical permit is required.

Gwen's son and several local Goldendale contractors helped erect the tower by completing the necessary concrete, trenching, fencing, wiring, and crane work. These cost savings measures resulted in a total installed cost of about \$40,000. The turbine was funded through multiple sources, including program support from Northwest SEED, a grant from the US Department of Agriculture, pre-purchased green tags from the Bonneville Environmental Foundation, and the Bassetti family themselves.

In addition to reduced utility bills, the Bassetti's benefit from Washington State's renewable energy production incentive program, which reimburses the Bassetti's 12 cents per kWh generated, or about \$1,500 per year, until the program ends in 2020.



The wind turbine stands 120 feet tall as a monument to community-inspired energy solutions.

Photo source: NWSEED

Recommitting to Wind Power

After nearly a decade of continuous performance, the wind turbine was showing signs of wear and was in need of repair. Hire Electric's diagnosis included a failed inverter, damaged furling cable, and minor blade wear that would cost about \$10,000 to repair, including the cost of a crane to lower the turbine to the ground. After receiving the first irrigation electric bills of the season, Gwen was motivated to move forward with the repair and get the turbine spinning again. She estimated that with the utility bill savings and state production incentive, the wind turbine would earn back this new investment plus \$5,000 over the next six years. The wind turbine landmark is now back on the horizon, quietly and reliably harnessing the local clean energy resource.

The Northwest Wind Resource & Action Center provides timely, accurate information on wind energy issues in the Pacific Northwest. It is supported in part with funding from the U.S. Department of Energy and managed by Renewable Northwest, Oregon Department of Energy, and Northwest SEED. www.nwwindcenter.org.



Northwest Wind
RESOURCE & ACTION CENTER



Is Wind Energy Right for You?

A Consumer's Guide Checklist for Small Wind Electric Systems

Before investing in a wind turbine for your home, farm, or business, make sure that you can confidently answer "yes" to each of the following questions. For more information see http://en.openei.org/wiki/Small_Wind_Guidebook.

1. Do you have enough wind?

Wind is the fuel for your wind electric system and has a huge effect on energy output. Your site should have at least a 10 mph annual average wind speed at the top of your tower. Ask for a written wind resource and performance estimate based on Department of Energy wind maps or a trusted wind resource consultancy.

Yes ☐ No ☐

2. Do you have enough space?

Wind turbines are typically best suited for rural properties of at least 1 acre or more in size, depending on the topography and size of wind turbine. Industry best practices recommend that a small wind turbine be placed at least one tower height away from property lines or neighboring homes.

Yes ☐ No ☐

3. Is your tower tall enough?

Putting a wind turbine on too short a tower is akin to putting a solar panel in the shade. Wind turbine rotors must be placed above the turbulent flow of wind caused by obstructions, typically on towers 80 to 140 feet tall.

Yes ☐ No ☐

4. Is your energy estimate realistic?

Wind turbine performance can be difficult to predict. As a general guideline, a small wind turbine will generate 1300 to 2200 kWh annually per rated kW at a site with average annual hub height wind speeds of 12 to 14 mph. Be conservative and compare estimates against the manufacturer's certified energy performance tests.

Yes ☐ No ☐

5. Is your wind turbine model certified?

It is important to choose a wind turbine design that offers a proven history in safety, performance, and functionality, and a sufficient warranty to meet your needs. Your turbine model should be certified to national standards (American Wind Energy Association standard AWEA9.1-2009). Some incentive programs require this certification.

Yes ☐ No ☐

6. Do you have a maintenance plan?

A well-designed turbine can last 20 years or more; however, like your car, it requires occasional inspection and maintenance to run smoothly. Check the owner's manual for recommended routine maintenance and set aside a maintenance and repair budget. Identify a local maintenance contractor.

Yes ☐ No ☐

7. Have you explored all financing and incentives available?

State, federal, or utility incentives may be available in your area. Consult the Database of State Incentives for Renewables and Efficiency (dsireusa.org) for the latest. In addition, a growing number of lenders offer low-interest loans for renewable energy projects.

Yes ☐ No ☐

8. Does your project satisfy local requirements?

Your city or county's permitting process will legally determine whether or not you will be able to build your proposed wind electric system, while the zoning ordinances will determine how it will be built (maximum height, required setbacks from property lines, etc). In addition, utilities have requirements for connecting a wind electric system to the grid. Check your local requirements, which may impact the project cost and development timeline.

Yes ☐ No ☐

9. Are your neighbors supportive of the project?

Conditional Use Permits may require public comment before your proposed project is given the legal go-ahead. Even if not required, it is helpful to include your neighbors and address any concerns early on in the process.

Yes ☐ No ☐

10. Do you have an experienced installation contractor?

The turbine manufacturer may have a list of recommended installers in your area. A credible installer will be able to complete all permitting and interconnection approvals and will offer a workmanship warranty. Check the Better Business Bureau for complaints, and ask for customer references and a list of similar projects completed.

Yes ☐ No ☐

Small Wind Electric Systems

Most Common Mistakes and How to Avoid Them

Mistake #1. Choosing a Tower that is Too Short

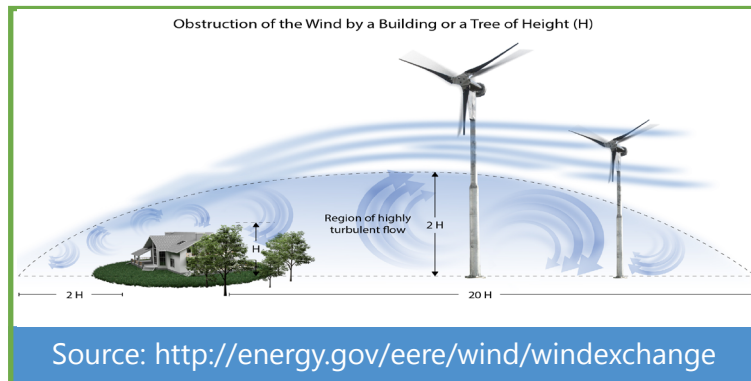
A well-designed wind turbine is useless without the fuel. A wind turbine that doesn't have access to smooth, steady winds is comparable to a well-designed automobile stuck with an empty gas tank.

Problem: Obstructions & Turbulence

Even on a site with a good wind resource, physical obstructions can cause turbulence that spoils the aerodynamic performance of the turbine blades, reducing power output, and causing excessive wear.

Solution: Tall Tower Height

To access smooth winds, the turbine rotor must be placed at a height above the turbulent flow of wind. Industry best practices recommend a tower height of at least 30 feet above the tallest obstacle within 500-feet, including the future height of surrounding trees or new buildings.



Mistake # 2. Installing an Unproven Wind Turbine Design

There are a lot of different wind turbine models on the market, and hundreds that have come and gone. It can be hard for consumers to figure out which ones will produce meaningful amounts of electricity.

Problem: Short-sighted savings

Consumers invest in an unproven, but often cheaper, wind turbine model in order to lower the upfront cost of their system. The turbine fails to deliver the promised energy or fails altogether.

Solution: Certification

Independent, accredited turbine certification provides a simple and reliable way for consumers to find a turbine model that meets safety, performance, and functionality standards.

Which Wind Turbine Models are Certified?

Check ratings and certification status here:

Small Wind Certification Council

www.smallwindcertification.org

Interstate Turbine Advisory Council

www.cesa.org/projects/ITAC/itac-unified-list-of-wind-turbines

Intertek

www.intertek.com/wind/small/directory

Mistake #3. Setting Unrealistic Expectations

If an offer seems too good to be true, it usually is. Small wind turbines are not right for everyone and it is important to do your homework and make sure it is right for you.

Problem: Unrealistic Marketing Claims

Consumers are lured by glossy brochures claiming "maintenance-free" or "low-wind speed" or "silent operation" wind turbines that are not field proven and may not reflect reality.

Solution: Do Your Homework

Plan a budget and schedule for maintenance, ensure that your site has high enough wind speeds to generate power, verify sales claims with an independent source, and talk with customer references.



The Northwest Wind Resource & Action Center provides timely, accurate information on wind energy issues in the Pacific Northwest. It is supported in part with funding from the U.S. Department of Energy and managed by Renewable Northwest, Oregon Department of Energy, and Northwest SEED. Learn more at www.nwwindcenter.org.



Choosing a Wind Energy Contractor

This worksheet will help you interview contractors and compare quotes.

Contractor A:	Contractor B:	Contractor C:
Contact:	Contact:	Contact:
Phone:	Phone:	Phone:

Experience	A	B	C
How long has your company been installing wind turbines?			
How many installations have you done in my city or county?			
Have you worked with my utility before?			
What are the qualifications of the person who will be designing my system? Do they have any certifications? What was the last training they attended?			
Do you use any subcontractors for electrical or other work? Who will work on my installation and what are their qualifications?			
What is your General and Electrical Contractor License Numbers? What are the License Numbers of any subcontractors?			
Can you provide references for customers who have the same equipment you are proposing for my system?			
Design and Installation	A	B	C
How do you decide whether a site is suitable for wind energy or not?			
How do you decide which equipment is best for my situation? What are the pros and cons of the wind turbine model you are proposing? Is the turbine model certified?			
When you calculate the return on investment, how do you take into account the specific wind resource, turbine efficiency, energy losses due to blade soiling or weather conditions, and incentive payments?			
What other fees may be charged that are not included in the bid price?			
Where will the turbine go on my property and how big of a footprint will the foundation occupy? Where will the wiring go? Where will the inverter and electric meters go?			
How will you make the installation aesthetically appealing?			
When will my installation begin? How long will it take? What are your final testing and sign-off procedures?			
How long will the permitting process take? How much will permitting cost?			
How will you minimize disruption and disturbance of neighbors, landscaping, and structures during preparation, installation, and clean up?			

What are the terms of payment?			
Will you complete and submit any paperwork for incentives, or provide me information to complete incentive paperwork?			
Warranties and Maintenance	A	B	C
What are the warranties on the equipment that you're proposing? What happens if there is a warranty claim? Do you charge a fee for troubleshooting? What costs will I incur and what costs are covered by the warranty? How long will it take to replace the equipment? Will I be compensated for lost energy production during that time?			
How long is your workmanship warranty? What is covered under your workmanship warranty?			
What is your typical response time if something is not working? What hours are you available for customer service calls?			
Do you offer an energy production guarantee? How do I know that your energy estimate is reasonable?			
What do you recommend for maintenance of my system?			
Do you provide any maintenance services such as annual inspections or blade cleaning?			
Is a data monitoring system included with my system? Will the data be available online? Will the contractor or the equipment manufacturer be monitoring the data and be able to notify me if something is wrong?			
What training or support will you provide after the installation? Will I get an owner's manual?			

Other Tips

- Always get multiple bids before you sign. Be wary of high-pressure sales techniques.
- Look up companies on the Better Business Bureau and other websites. Check if your utility has a contractor qualification program, and what the requirements of that program are.
- Investigate your ability to receive tax credits and other incentives before you sign a contract. Find more information here at <http://dsireusa.org/>
- Find more information on hiring a contractor here at the WA Department of Labor & Industries: <http://www.lni.wa.gov/tradeslicensing/contractors/hirecon/>

Comparing Quotes

Use this table to compare the pricing between different contractor bids.

	Contractor A	Contractor B	Contractor C
a. System size (kW)			
b. System size (Watts) Watts = kW x 1000			
c. Energy Production (kWh/year)			
d. Price (before incentives)			
e. Price per Watt (d.) ÷ (b.)			
f. Price per kWh (d.) ÷ (c. x 20 years)			
g. Estimated Payback			



Farm Energy Success Stories

Good for Farm Income, Good for Rural Economic
Development and Good for Our Environment

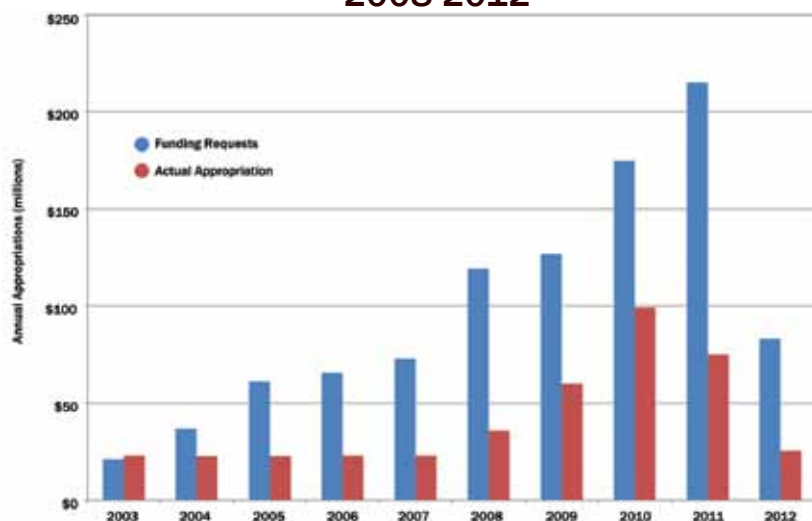


ENVIRONMENTAL LAW & POLICY CENTER

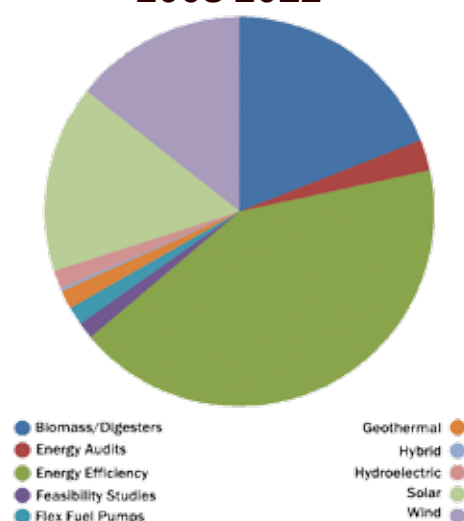


Overview: Rural Energy for America Program (REAP)

**REAP Popularity & Funding
2008-2012**



**Total REAP Awards
2008-2012**



Rural Energy for America

American agriculture has abundant renewable resources that can be used to produce electric power, heat and fuel through a wide range of emerging and market-ready modern technologies. Increasingly, farmers and ranchers produce renewable energy along with food.

The Rural Energy for America Program — REAP — uniquely accelerates development of a broad range of renewable energy and energy efficiency technologies that serve every state and all of agriculture. REAP provides competitive grants and loan guarantees to cover a portion of project costs. REAP was created in the 2003 Farm Bill and renewed and expanded in the 2008 Farm Bill. REAP has sparked a renaissance in renewable energy production across the country benefitting farms, rural economies and the entire nation.

Under REAP, farm energy development and innovation surged in many ways. For example, REAP sparked impressive growth in farm digesters that convert manure to energy and other products while reducing waste. More farmers now harvest the winds blowing over their fields, and many

even own a stake in the turbines on their land. Farmers always harvested solar power in the form of food crops and now they are increasingly tapping the sun for thermal and electric energy. Energy efficiency helps farmers save money by cutting energy waste and pollution with modern technologies and conservation strategies.

REAP is a popular program with applications from farmers, ranchers and rural small businesses regularly exceeding appropriations because it encompasses a wide range of technologies, including energy efficiency, wind turbines, solar panels, thermal solar, geothermal, anaerobic digesters, biomass energy and biofuels. The 2008 Farm Bill added tidal, wave, ocean thermal and small hydroelectric technologies. The broad technology support opens doors of opportunity widely to all agricultural sectors in all states.

REAP Means Stronger Profits for Agriculture & Jobs for Rural Economies

REAP energy efficiency and renewable energy projects increase farm income by cutting energy bills and increasing and diversifying farm income. Small renewable energy

systems cut energy bills while larger systems produce new and diversified income from energy and byproduct sales. Rural small businesses have used REAP to cut their operating costs, helping many to stay in business and compete.

An added benefit of REAP is that it helps to attract a new and younger generation of farmers that embraces the opportunities presented by REAP to modernize farm operations, cut costs, increase revenues and provide renewable energy to society.

REAP Means More Jobs & Energy Security

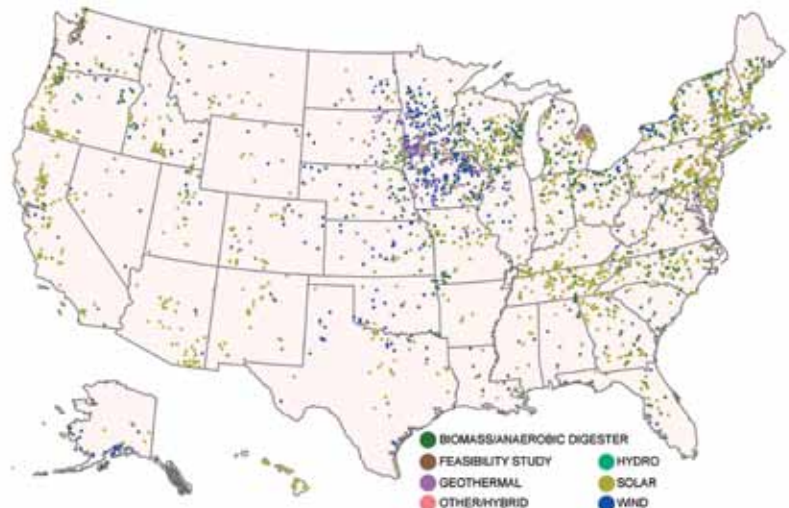
REAP addresses multiple policy goals in several areas — jobs and economic development, energy security and environmental stewardship. REAP investments foster new jobs, expand business opportunities and create new markets.

REAP improves local economies through a variety of new jobs, including system design and development, installation, operation and maintenance. REAP creates jobs at a relatively strong rate: 18.5 jobs per million dollars invested. REAP leverages modest public cost-sharing to spark greater private investment in rural communities: the USDA estimates over \$1 billion in private investment in REAP projects from 2008 to 2012, creating or saving over 18,000 jobs.

REAP provides environmental and public health benefits with reduced fossil energy production and consumption, reduced water consumption for energy production, and less air and water pollution. While markets alone do not reward environmental benefits from clean energy development, REAP program investments reflect those benefits, while generating economic development.

REAP increases our energy and national security through

REAP Renewable Energy Projects 2008-2013



REAP Energy Efficiency Projects 2008-2013



development of homegrown renewable resources. Distributed renewable energy production is inherently more resilient to supply interruption.

REAP delivers broad value to agriculture, rural communities and our nation far beyond its cost. It has been a successful program that has served the entire nation and should be renewed and well funded.

Farm Energy Success Stories

FROM THE MIDWEST

Hundreds of renewable energy and energy efficiency projects crop up every year in the heart of the country. REAP has advanced locally owned wind farms, manure digesters, solar power and thermal systems. From 2008 to 2013, over 2,400 grants were awarded to Midwestern farmers and small businesses, with most of those for energy efficiency investments that increase farm income. The projects included more than 300 solar projects, 130 wind projects and 100 geothermal projects. Michigan was the regional leader in solar, adding nearly 100 new systems to harvest the sun for heat and power.

Beebe Community Wind Farm, LLC

Ithaca, MI

Wind

Grant: \$50,000

Technology: Wind



Mark Hull put his background in farming and engineering to work by building a wind farm in his community, with the help of REAP. He began in 2007 by holding neighborhood meetings, speaking with developers and experts, and organizing a community trip to a wind farm in a neighboring county. He dedicated himself to getting the community educated and excited about the project.

In 2009, Hull secured a \$50,000 REAP grant covering 25% of a feasibility study. That information increased the reliability of wind speed data and made the project more attractive to developers. Today, the 34-turbine, 81-MW wind farm is commercially viable and exceeding production expectations.

Hull says he saw the wind farm as a way to revive the local economy. “The main reason [I pursued the project] was to help my neighbors out,” he said. Hull focused on his community throughout the project’s development, from using local labor for construction to working with the landowners to develop a “farmer-friendly lease.”

Hull highlights benefits to farmers and the local community through turbine lease payments. Hull said many of the landowners are confident this will help to pass viable family farms on to the next generation. “We’re going to see these turbines here forever now,” he said. “I feel like I’m leaving a legacy in the community. It’s all good. It’s all positive.”

Farm Energy Success Stories

FROM THE PLAINS



The prairies and croplands of the Plains are known as the country's wind corridor, boasting the highest number of REAP-funded clean energy projects from 2008 to 2013, including nearly 200 wind projects. The region also added the highest number of geothermal projects: 110. During this period, more than 2,700 projects were funded in the Plains, though the average grant was just over \$23,000, the lowest average for any region. Farmers and rural small businesses in the resource-rich Plains are making investments that help their individual operations, but also benefit their communities and country. In North Dakota and South Dakota, the seed was laid for future project developments with cost-share feasibility study grants for wind power and biomass. Iowans pursued more than 1,500 projects that utilized diverse technologies, including anaerobic digesters, energy efficiency, geothermal, solar and wind. Kansas farmers and rural small businesses also used REAP for diverse projects, such as energy efficiency, solar, geothermal and wind.



FlagShooter, LLC

Garretson, SD

Wind &
Solar

Grant: \$38,638

Technology:
Wind & Solar

Paul Carrette founded his company, FlagShooter LLC, in rural Garretson, SD, based on an invention that saves time and energy for companies that identify buried utilities. The FlagShooter is a device that secures marking flags into the ground — a task usually done by hand. Carrette said many of their customers seek to reduce their carbon footprint. This, among other reasons, encouraged him to explore tapping

renewable energy. He decided to install a 20 kWh hybrid wind and solar project in 2012, with the help of a \$36,000 REAP grant that reduced project costs by about 22%.

Carrette brought the same “can-do” spirit that built his company to building renewable power. He said installing a renewable energy system was a sensible long-term investment that, with the availability of REAP funding,

continued...

FROM THE PLAINS

would help FlagShooter stay cost competitive despite rising electricity rates.

"I've always thought that renewable energy was unique, but out of reach," he said. "But with the grant money, that put [the project] in reach and was a major factor in moving forward ... It's great to be able to see that my electric bills have gone down substantially even though my business is expanding."

Carrette said the solar panels and wind turbine are both producing more electricity than expected. Many days, FlagShooter operates completely independent of the grid, producing 100% of its own electricity. He estimates this has

saved the company 60-70% on their electricity bills.

"Renewable energy is no longer a novelty for people; today it actually makes good business sense," he said. "The payback gets better every year." He chose a hybrid wind and solar approach to get the benefits of both. To keep up with the company's growing demand and because their first project was so successful, FlagShooter plans to install another set of solar panels within the next 5 years.

Luther College Wind Energy Project, LLC

Decorah, IA

Grant: \$500,000

Loan Guarantee:
\$1,300,000

Technology: Wind



If you happen to drive through northeastern Iowa, you will know when you've arrived at Luther College by the spinning wind turbine overlooking campus. Luther is a small liberal arts institution that has made sustainability central to their campus experience.

In 2005, the college created Luther College Wind Energy Project LLC (LCWEP), a for-profit subsidiary of Luther College, which is the project's sole investor. The new LLC focused on sustainability projects and qualified for state and

federal clean energy incentives, including REAP.

REAP awarded LCWEP a \$500,000 grant and a \$1.3 million loan guarantee in 2009. They purchased a 1.6 MW turbine, which is currently generating around 4 million kWh per year, providing nearly 30% of the college's electricity consumption.

"We got very serious about our project as soon as we got the REAP grant," said Jim Martin-Schramm, a professor of religion at the college who worked closely on the project.



Rural Energy for America Program (REAP)

Renewable Energy Systems and Energy Efficiency Improvements Assistance

Purpose: To provide financial assistance in the form of grants and guaranteed loans to agricultural producers and rural small businesses for purchasing and installing renewable energy systems and making energy efficiency improvements.

Eligible Applicants

- Agricultural Producer – Individual or entity directly engaged in agricultural production whereby 50% or greater of its gross income is derived from agricultural production.
- Rural Small Business – An entity or utility that meets the Small Business Administration's (SBA) Small Business Size Standards by the North American Industry Classification System (NAICS) found in 13 Code of Federal Regulations (CFR) Part 121. A private entity may consist of a sole proprietorship, partnership, corporation, cooperative, or electric utility (including governmental utility).

Eligible Projects

- The Rural Small Business project must be located in an eligible rural area, which is any area other than a city or town of greater than 50,000 inhabitants and its contiguous urbanized area, based on the latest decennial census. This restriction does not apply to agricultural producers if the proposed renewable energy system or energy efficiency improvement will benefit an agricultural production facility.
- Renewable energy systems that provide energy from the following list of renewable resources or hydrogen derived from these renewable resources:
 - * Wind
 - * Solar
 - * Renewable biomass (including anaerobic digester)
 - * Small hydro-electric
 - * Ocean
 - * Geothermal
- Energy efficiency improvements to a facility or building
- Technology must be commercially available
- Projects must be technically feasible and have technical merit

Eligible Project Costs

- Post-application purchase and installation of new or refurbished renewable energy system
- Energy efficiency improvements identified in the Energy Assessment or Energy Audit
- Post-application construction, retrofitting, replacement and improvements
- Professional service fees for qualified consultants, contractors, installers, and/or third-party services related to the project
- Replacement of an existing facility if an energy audit shows it would be more energy efficient than improving the existing facility.
- Applicable to guaranteed loans only and subject to limitations:
 - * Land acquisition
 - * Working capital
 - * Energy audit and assessments (except those audits funded by a Federal grant)
 - * Debt refinancing under guaranteed loans

Ineligible Project Costs

- Agricultural tillage equipment
- Used equipment
- Vehicles
- Residential improvements
- Application preparation
- Lease payments
- Guarantee of other Federal loans
- Subordinated owner debt
- Guarantee of tax exempt obligations

Carlotta Donisi, USDA Rural Development
360-704-7724 or email
carlotta.donisi@wa.usda.gov

www.rd.usda.gov/wa

Click on Renewable Energy for America

Amount of Assistance

Applicants may qualify for a grant of up to 25 percent of eligible project costs, a guaranteed loan up to 75 percent of eligible project costs, or a combination of grant and guaranteed loan up to 75 percent of eligible project costs., The grant portion of a combined application cannot exceed 25 percent of the eligible project costs, limited to the grant maximums.

- Renewable Energy Systems:
 - * Maximum Grant \$500,000
 - * Minimum Grant \$2,500
 - * Maximum Guaranteed Loan \$25 million
 - * Minimum Guaranteed Loan \$5,000
- Energy Efficiency Improvements:
 - * Maximum Grant \$250,000
 - * Minimum Grant \$1,500
 - * Maximum Guaranteed Loan \$25 million
 - * Minimum Guaranteed Loan \$5,000

Guaranteed Loan Terms

- Interest rate and terms negotiated between lender and borrower (must be within USDA maximum allowed terms):
 - * Real estate – 30 years
 - * Equipment – 15 years or useful life, whichever is less
 - * Combined real estate and equipment – 30 years
 - * Working capital – 7 years
- Maximum percentage of guarantee on loans:
 - * \$600,000 or less – 85 percent
 - * Greater than \$600,000 but equal to or less than \$5 million – 80 percent
 - * Greater than \$5 million but equal to or less than \$10 million – 70 percent
 - * Greater than \$10 million – 60 percent

Reporting Requirements

- Renewable Energy Systems – Three (3) years after completion of construction and installation
- Energy Efficiency Improvements – Two (2) years after completion of construction and installation

Section 3 – Additional Resources

GENERAL INFORMATION

- **Northwest Sustainable Energy for Economic Development (Northwest SEED)**
Free technical assistance and grant-writing assistance for farmers and rural small businesses in Washington that are interested in renewable energy technologies.
mia@nwseed.org | 206-267-2213 | www.nwseed.org
- **Seattle Tilth:** www.seattletilth.org
Tilth Producers of Washington: www.tilthproducers.org
- **U.S. Environmental Protection Agency, Environmental Justice Program:** www.epa.gov/environmentaljustice
- **WSU Center for Sustaining Agriculture and Natural Resources:** www.csanr.wsu.edu
- **WSDA Organic Food Program:** <http://agr.wa.gov/FoodAnimal/Organic/>

WIND ENERGY EDUCATION

- **Small Wind Guidebook:** http://en.openei.org/wiki/Small_Wind_Guidebook
- **Home Power Magazine:** www.homepower.com
- **Distributed Wind Energy Association:** www.distributedwind.org

WIND CONTRACTORS

- **Hire Electric (The Dalles):** jlewis@hireelectric.com, 541-296-5574, www.hireelectric.com
- **Central Wind & Solar (Ellensburg):** centralwind@hotmail.com, 509-607-2200
- **Northwest Wind & Solar (Seattle):** info@nwwindandsolar.com, 206-587-6527

ENERGY EFFICIENCY

- **WSU Energy Office:** www.energy.wsu.edu, 360-956-2090
- **Natural Resources Conservation Service:** www.nrcs.usda.gov, 509-773-5822
- **Klickitat Public Utility District (PUD):** www.klickitatpud.com, 509-773-5891
- **USDA Rural Energy for America Program:** www.rd.usda.gov/wa
Roni Baer: veronica.baer@wa.usda.gov | 509-454-5743
- **Database of State Incentives for Renewable Energy:** www.dsireusa.org

LOW-INTEREST RENEWABLE ENERGY LOANS

- **Puget Sound Cooperative Credit Union – EnergySmart Loans:**

Low-interest loans up to \$35,000. Terms up to 15 years. No prepayment costs, loan origination costs or fees. Online loan application with streamlined loan approval process.

www.pscu.org | 425-462-3811

- **Umpqua Bank – Greenstreet Lending:**

Unsecured consumer loan or home equity line of credit. No prepayment costs, loan origination costs or fees. 201 West Main St, 1st Floor, Goldendale | barbaracosner@umpquabank.com | 509-773-5733

www.umpquabank.com/GreenStreet

- **Generations Credit Union – Solar Cash Flow Loan:**

No home equity needed. Online application form. Interest as low as 4.49%.

929 Eastside St., Olympia | 425-330-9650 | kaylyn@generationscreditunion.com

