



Alternative Energy Revolving Loan Program FY16 Outcomes Report – October 2016

The Alternative Energy Revolving Loan Program (AERLP) was established by the 2001 Legislature (MCA 75-25-101, et seq.) to encourage Montana homeowners and small businesses to use renewable energy. Loans are made for technologies appropriate to Montana at interest rates below the market average. The AERLP is managed by the Montana Department of Environmental Quality (DEQ) Energy Bureau. Loans are processed through a private financial institution. The AERLP is primarily funded by air quality penalties collected by DEQ, however in 2010 the program received a one-time infusion of funding through the federal American Recovery and Reinvestment Act. State and federal funds are tracked and reinvested separately.

This report tracks activities and accomplishments of the AERLP through the end of fiscal year 2016, highlighting the accomplishments of this year. This annual outcomes report is required by statute to address at a minimum:

- 1) Loan loss ratios, which must be kept under 5 percent;
- 2) The types of alternative energy systems that provided the best overall results for residences and for small businesses; and
- 3) The amount of energy that was produced from the alternative energy systems.

The program complies with policies and procedures adopted for outcomes reporting.

I. HIGHLIGHTS

- ✓ Loan volume remained steady at just over \$1 million in new loans.
- ✓ DEQ partnered with Solarize Missoula, a pilot program coordinated by the Montana Renewable Energy Association, aimed at significantly increasing the number of roof-top solar photovoltaic installations in a defined area and time. Solarize Missoula resulted in over 40 installations between January and April, a historically slow time for solar installers. As anticipated, site assessments performed during the program time-frame continue to yield projects for the participating installers. The loan program financed six Solarize projects during the campaign, as well as several projects after the campaign concluded that were initiated by Solarize site assessments.

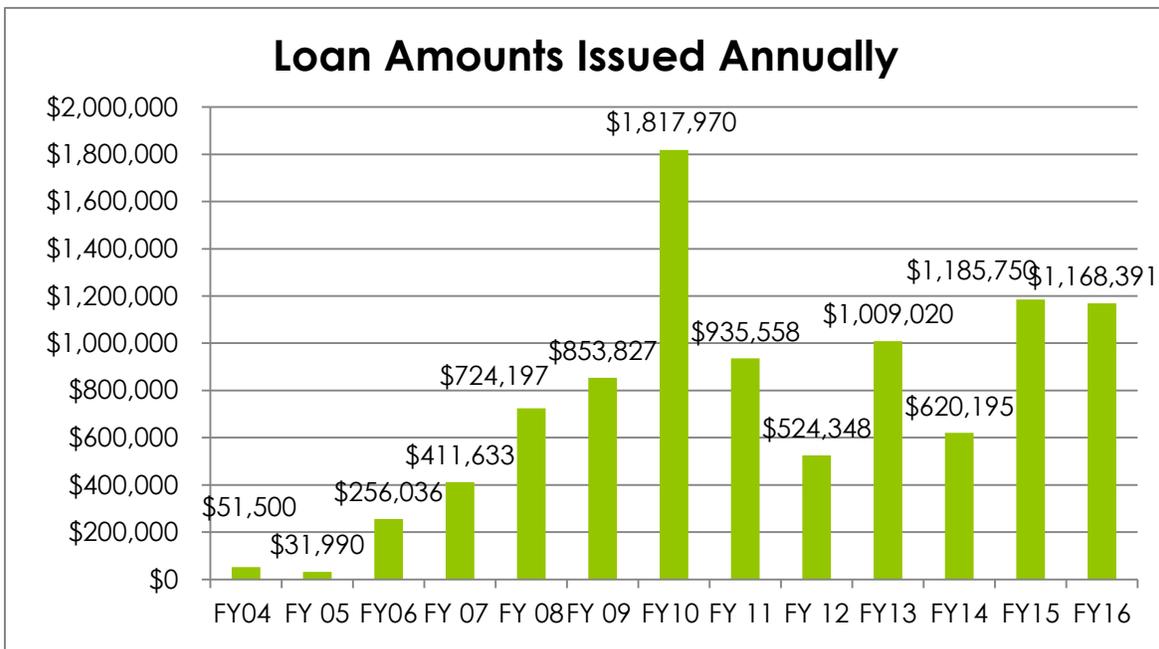
II. APPLICATIONS & LOANS

A total of 49 applications were received and reviewed for technical and financial feasibility in FY16. Forty-eight (48) loans closed for a total of \$1,168,391. Two applications were withdrawn by the applicants and one application was declined on technical merit (the proposed wood-burning appliance did not meet program requirements). The program has loaned \$9,489,161 since the first loan was made in 2004.

	State	Federal	Total
Loans made in FY16	\$1,041,276	\$127,115	\$1,168,391
Loans receivable balance	\$3,256,997	\$742,803	\$3,999,800

Figure 1: FY16 loan amounts by fund. Figures are based on funds processed through DEQ's Office of Financial Services as of June 30, 2016.

The total amount loaned in FY16 was similar to the amount issued in FY15. Both years were higher than all previous years except FY10, AERLP's highest year.



Commercial Loans

As in previous years, the AERLP was primarily used for individual residential projects in FY16, however the program also issued the following five commercial loans:

Property type	Energy Source	Location	System capacity
Brewery	Ground source heat pump	Big Sky	4 tons
Airstrip	Ground source heat pump	Livingston	5 tons
Landscape / Greenhouse	Ground source heat pump	Polson	8 tons
Ranch	Solar electric	Grass Range	17.1 kilowatts
Lodge/Outfitter	Solar electric	Bozeman	20.28 kilowatts

Figure 3: FY16 Commercial loans.

Technologies

The following chart shows the number of renewable energy projects financed in FY16, grouped by technology. Some loans combined financing for more than one system, such as a solar electric and a solar hot water system, so the number of projects is slightly different from the number of loans.

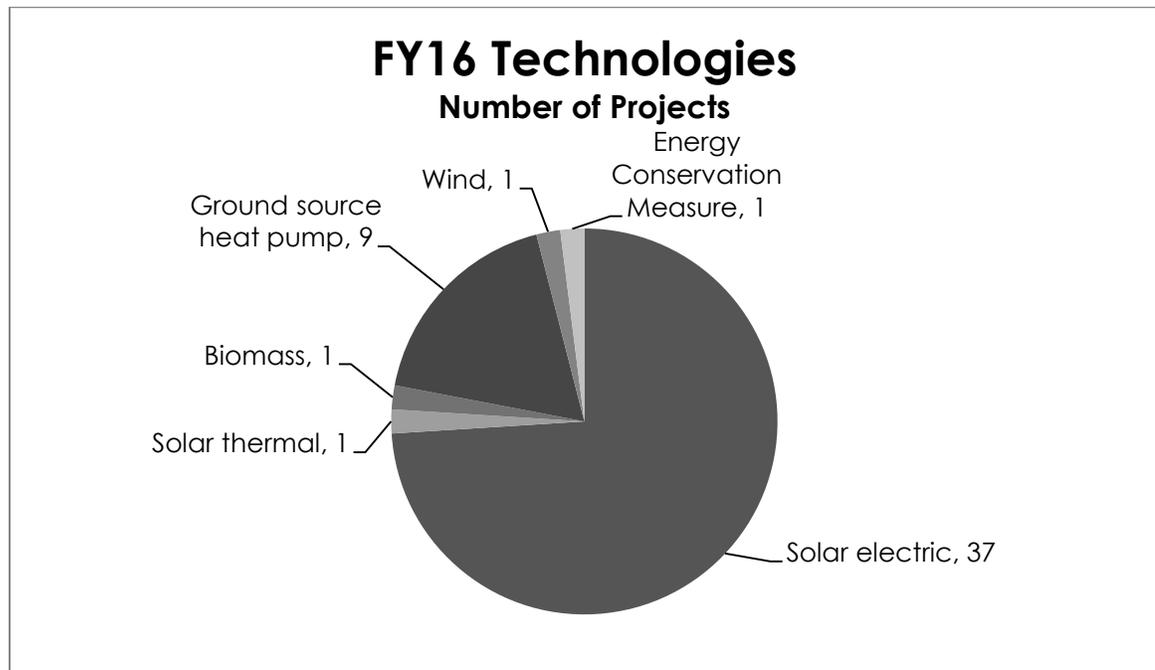


Figure 4: Projects funded by the AERLP in FY16.

Project Locations

In FY16, loans were issued for projects in sixteen counties across Montana. See the map below for a summary of the number of projects in each community.

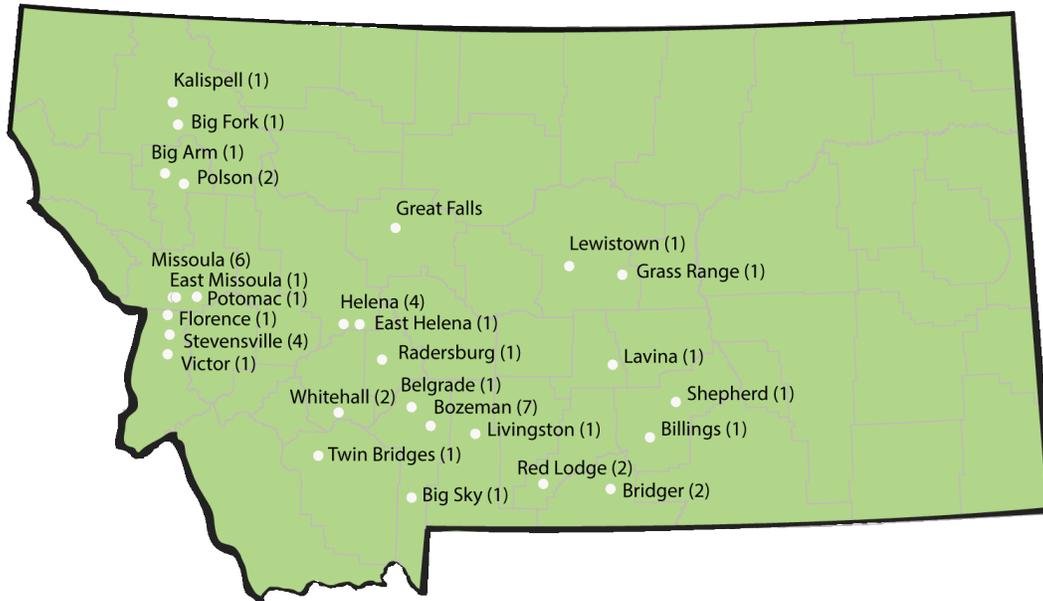


Figure 5: Locations of FY16 AERLP projects.

III. OVERALL RESULTS

The type of alternative energy systems that provide the best overall results for Montana residences and small businesses vary by site and the amount and type of energy used by the building's occupants. Solar electric equipment is robust, requires virtually no maintenance and the price has dropped over the past several years, making solar electric systems very attractive for almost any Montana location. Ground source heat pumps draw heat from the ground or water to effectively heat structures, and can be configured for almost any location, although costs to overcome installation barriers at specific locations can make other renewable technologies more viable. A good site analysis and experienced contractors help home and business owners decide on the best strategy for their site.

Specific benefits of each technology are discussed below.



Figure 6: A residential solar electric array in Bozeman funded by the AERLP in FY16.

Solar electric (photovoltaic, or PV) component costs remain about the same as FY15. Pre-incentive installed costs for systems connected to the utility grid averaged \$3.18/watt, down from \$3.34/watt the year before, and far below the \$8 - \$10/watt cost when the AERLP began. The combination of state and federal tax incentives reduced the average, net installed cost for grid-connected solar electric systems to \$2.07/watt¹ for projects installed through the AERLP in FY16.

Utility incentives have largely been phased out for residential and commercial solar electric systems, however two of the projects installed this year were on houses built through a National Affordable Housing Board program, and received utility incentives still available for low-income and public projects.

Wind turbines continue to spark interest in many parts of the state, and are particularly effective for off-grid applications, when combined with a solar photovoltaic array. The Small Wind Certification Council's turbine certification program offers consumers a third-party review of small wind equipment to inform their choices. Montana's excellent wind resource continues to interest Montana consumers, although the relatively low installed cost and minimal maintenance costs of solar electric systems often makes solar a better choice.

Ground source heat pumps (GSHPs) continue to be a popular choice where electricity or propane (higher-cost heating fuels) are used for heat. Heat pump systems move heat from the ground into buildings, and can provide water heating and air conditioning as well. In many cases the high installation costs can be off-set fairly quickly by the reduced heating costs over the life of the system.

Solar water heating is one of the most cost-effective renewable energy strategies on the market today. It is a particularly good match for car washes, laundries, hotels and other buildings that use large quantities of hot water.

Biomass heating systems are very popular in areas where wood is plentiful. Montana has a large inventory of beetle-killed trees that can be used to heat buildings, and the AERLP can be used to install efficient, low-emission equipment that can take advantage of local biomass resources.²

On the horizon—community solar. As equipment prices have fallen over the past few years, the cost effectiveness of larger solar arrays has improved significantly. Community solar (or wind) projects allow consumers to own shares of a renewable energy project that is not directly attached to their property, earning credits on their utility bills commensurate with their investment in the project.

¹ Assumptions used to calculate net installed solar electric costs: a) Federal tax credits were calculated at 30% of bid; b) Montana tax credits of \$500 per taxpayer noted in application

² Eligible low-emissions wood or biomass combustion devices are defined in MCA 15-232-102(6).

Flathead Electric, Ravalli Electric and Missoula Electric Cooperatives each have built community-owned solar projects, offering their members the opportunity to purchase shares in each project. The program is evaluating the option to allow customers of community solar or wind projects to finance their shares through the AERLP.

IV. ENERGY PRODUCTION

The amount of energy produced annually by AERLP-financed projects is determined based on standard engineering calculations and assumptions. Those calculations are based on the installed generating or production capacity of each technology type, as noted in Figure 7.

Energy Source	Installed capacity
Solar electric	261.68 kW
Wind	2 kW
Biomass	72,400 btu/hour
GSHP	42 tons
Solar thermal	40 sq. ft

Figure 7: FY16 installed generating/production capacity, by technology.

The output of solar electric systems is estimated using the National Renewable Energy Laboratory's "PV Watts" program, with default system parameters, and is based on the average solar radiation in Great Falls. Ground source heat pump estimates are calculated based on the equipment specifications, location and building type. Wind production estimates assume a 25 percent capacity factor, based on equipment specs and tower height. The energy output of each technology has been converted to kilowatt hours (kWh) and millions of British thermal units (MMBTU) per year for comparison purposes.

	Solar electric	Wind	GSHP	Solar thermal
kWh/year	353,482	4,380	292,323	2,194
MMBTU/year	1,206.08	14.69	997.41	7.49

Figure 8: Estimated annual energy production of FY16-financed projects.

V. LOAN LOSSES

Loan losses to date for the AERLP portfolio are 0.75 percent, well under the statutory 5 percent limit. A total of eight loans have defaulted over the program's eleven year history. Loan balances are not written off until all efforts to collect have been exhausted. Three loans have been recorded as losses, three additional loans are in active collection proceedings, and funds were recovered through collection on one loan. The 0.75 percent loan loss rate at the end of FY16 was based on total loans issued (\$9,489,161) and the loan losses written off (\$71,027).

The total amount currently in active collection is \$71,027, and the eighth loan will go to collection in FY17, adding \$3,527 to the potential loan loss total. If no funds are recovered from the loans currently slated for collection proceedings, the loan loss rate would be 1.5 percent, based on total loans issued (\$9,489,161) and the loan loss amount (\$146,969).

VI. SYSTEM VERIFICATION

Installations are verified by photographs provided by the borrower or the installer. In addition, DEQ conducts a minimum of five site visits each year. Staff conducted 8 site visits in FY16.

Site visit locations:

- Billings (2)
- Missoula (4)
- Polson (1)
- Helena (1)

VII. ADMINISTRATIVE COSTS

DEQ administers the loan program and covers staff salaries, travel, printing, promotional materials, and office support for the program. In addition, DEQ contracts with a financial institution to complete credit checks, loan origination, and monthly payment collection. Statute allows the program to use up to 10 percent of the outstanding loan balance for program administration. In FY16, the program could have used up to \$361,747, but used only \$229,335, or 6.34 percent of the loan balance.

VIII. MARKETING AND OUTREACH

The program is marketed through a combination of direct communications and print advertising to the targeted audience of Montana consumers and small businesses that may be interested in renewable energy. A program brochure is available through DEQ and is provided to renewable energy businesses. The Energy Bureau maintains a website at www.energizemontana.com containing information about alternative energy technologies and the AERLP, and links to Montana renewable energy dealers and utility incentive programs. Loan applications can be downloaded from the site.

DEQ participates in many local events that bring awareness about renewable energy technology and opportunities to Montanans. FY16 events included meetings, workshops, agricultural shows, and other events in Baker, Billings, Bozeman, Browning, Butte, Great Falls, Helena, Kalispell, Libby, Livingston, Miles City, Missoula, Ronan and Thompson Falls.

DEQ partners with other organizations to deliver information about renewable energy incentives and finance options. Key partners include: the Montana Renewable Energy Association, comprised of dealers and installers of alternative energy systems; the Alternative Energy Resources Organization, a grass roots non-profit organization that conducts renewable energy and sustainable living

tours across the state; utilities, such as NorthWestern Energy, Montana-Dakota Utilities, and rural electric cooperatives that encourage or provide incentives for renewable energy; and the U.S. Department of Agriculture, which offers grants and loans through the Rural Energy for America Program.