

Alternative Energy Revolving Loan Program Outcomes Report, Fiscal Year 2017



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I. INTRODUCTION

The Alternative Energy Revolving Loan Program (AERLP) was established in 2001 by the Montana Legislature to provide low-interest loans for the purpose of building alternative energy systems (75-25-101, et seq., Montana Code Annotated (MCA)). Individuals, small businesses, units of local government, units of the university system, and nonprofit organizations are eligible borrowers. In addition to alternative energy systems, capital investments for energy conservation purposes may be financed through the program when those measures are installed in conjunction with an alternative energy system funded by the AERLP.

Loans are limited to a maximum of \$40,000 with a maximum term of ten years (75-25-101 (4), MCA). The interest rate was fixed for calendar years 2016 and 2017 at 3.25%.

The AERLP is managed by the Montana Energy Office at the Department of Environmental Quality (DEQ). Loan underwriting, origination, and servicing are provided by a contracted financial institution, the Montana Business Assistance Connection (MBAC). Pursuant to MCA 75-25-101 (2), the AERLP is capitalized by air quality penalties collected by DEQ. In addition, the program received a one-time grant in 2010 from the U.S. Department of Energy (DOE) through the federal American Recovery and Reinvestment Act (ARRA). State and DOE funds are tracked and reinvested separately.

This report summarizes loan program activity and reports outcome measures of the AERLP in fiscal year 2017 (FY17), which started July 1, 2016 and ended June 30, 2017. DEQ policy EPP-AERLP-04-03 establishes the content of the annual outcome report. DEQ is required by statute to assess the following outcome measures, at a minimum (75-25-103, MCA):

- 1) a loan loss ratio of under 5%;
- 2) the types of alternative energy systems that provided the best overall results for residences and those for small businesses; and
- 3) a determination of the amount of energy that was produced because of participation in the program.

Cover page photos of FY17-funded projects (clockwise from top left): rooftop solar array on construction business in Missoula; rooftop solar array on residence in Helena; ground source heat pump in Florence residence; rooftop solar array on garage in Billings

II. LOAN PROGRAM ACTIVITY & HIGHLIGHTS

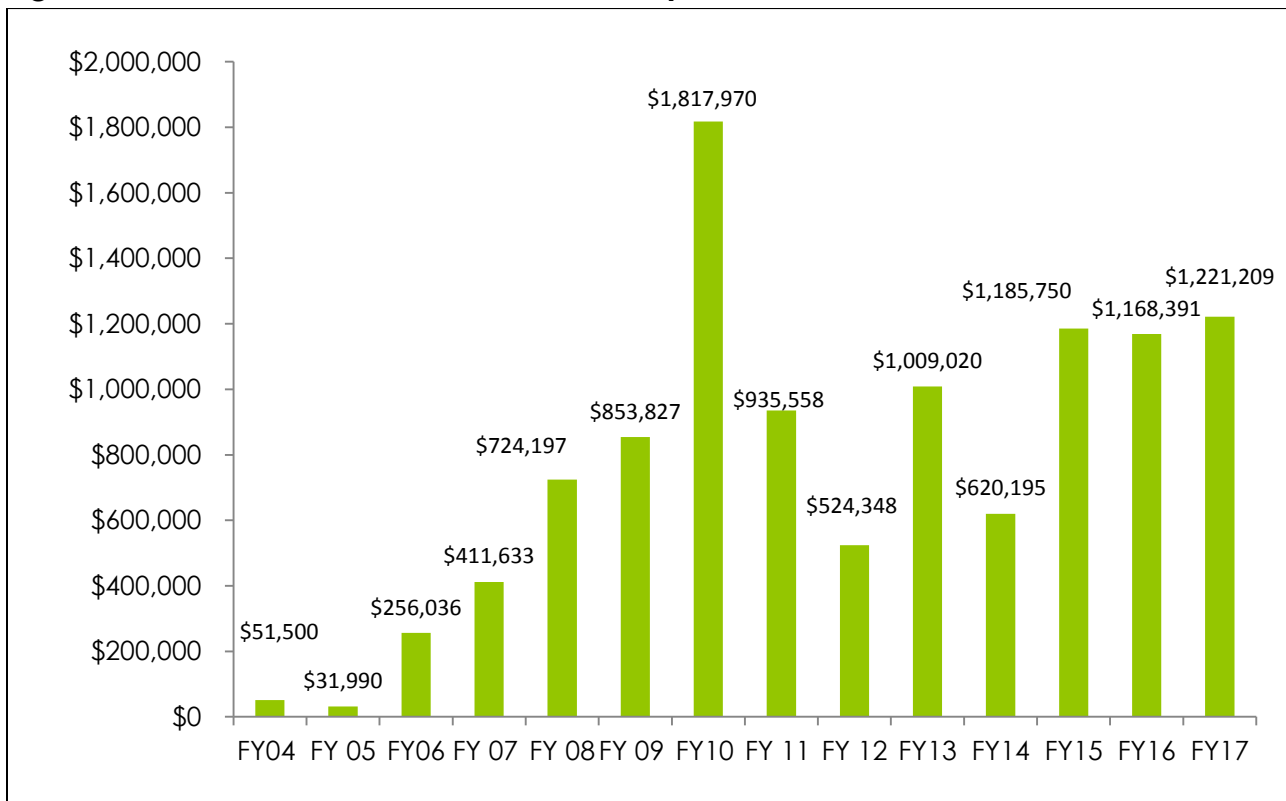
Loan applications and loans issued

A total of fifty-six applications were received and reviewed for technical and financial feasibility in FY17. Fifty-one loans closed for a total of \$1,221,209 (Figure 1), a slightly higher total loan amount than previous years and second only to FY10 when the program issued \$1,817,970 in loans (Figure 2). Four applications submitted in FY17 were withdrawn by applicants and one application was declined on financial merit.

Figure 1: Loans issued in FY17

	Number of loans	Amount of loans
State funds	42	\$1,043,677
DOE funds	9	\$177,532
TOTAL	51	\$1,221,209

Figure 2: Total loan amounts issued annually



Borrowers

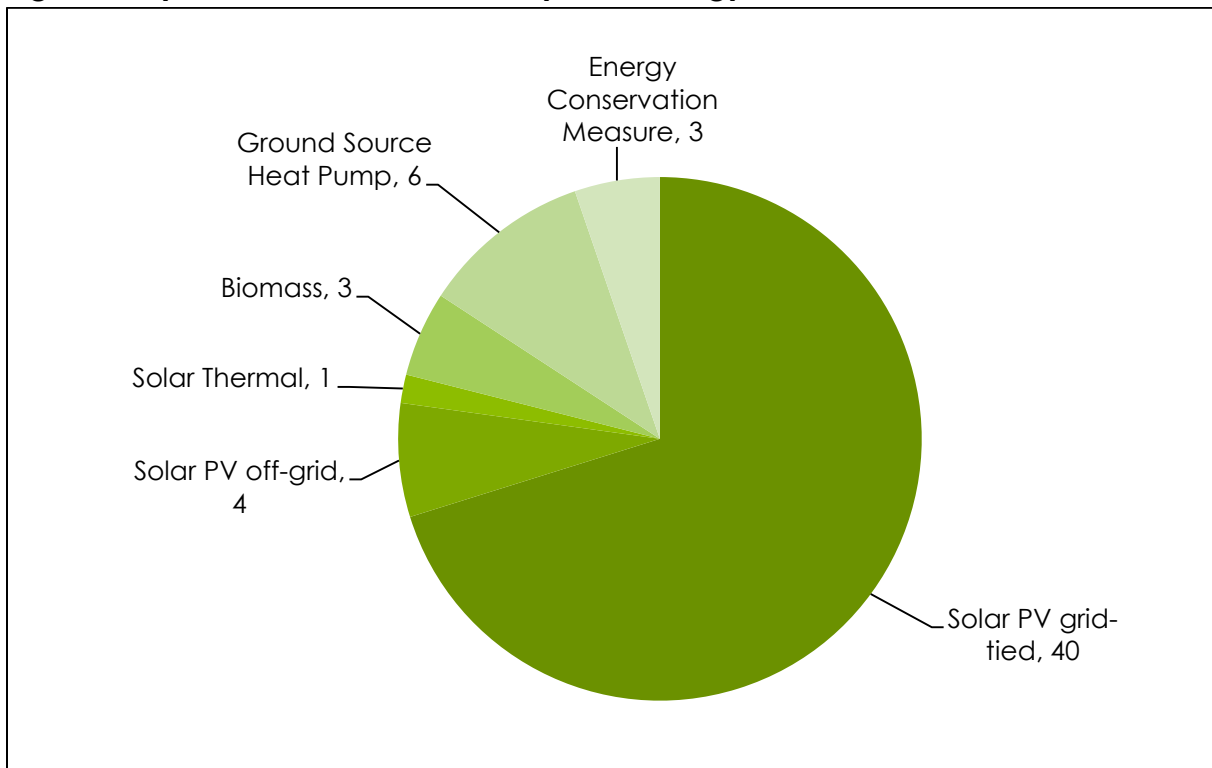
Similar to previous years, the majority of AERLP borrowers in FY17 were individuals (49 loans), followed by businesses (2 loans). There were no applications received

from local governments, units of the university system or non-profit organizations. The commercial loans were for rooftop solar electric systems installed at the headquarters of a Missoula-based construction company and on a professional center in Bozeman.

Technologies funded

The majority of loans issued in FY17 was for grid-tied solar photovoltaic (PV) arrays (40), followed by ground source heat pumps (6), off-grid solar PV arrays (4), woodstoves (3), and solar thermal systems (1). Three loans were issued for energy conservation measures installed in conjunction with one or more alternative energy system(s). One loan was issued for multiple alternative energy systems. Figure 3 charts the number of energy systems funded in FY17. Please note that because several loans were issued for multiple energy systems, and/or energy conservation measures, the count of systems funded exceeds the total number of loans issued.

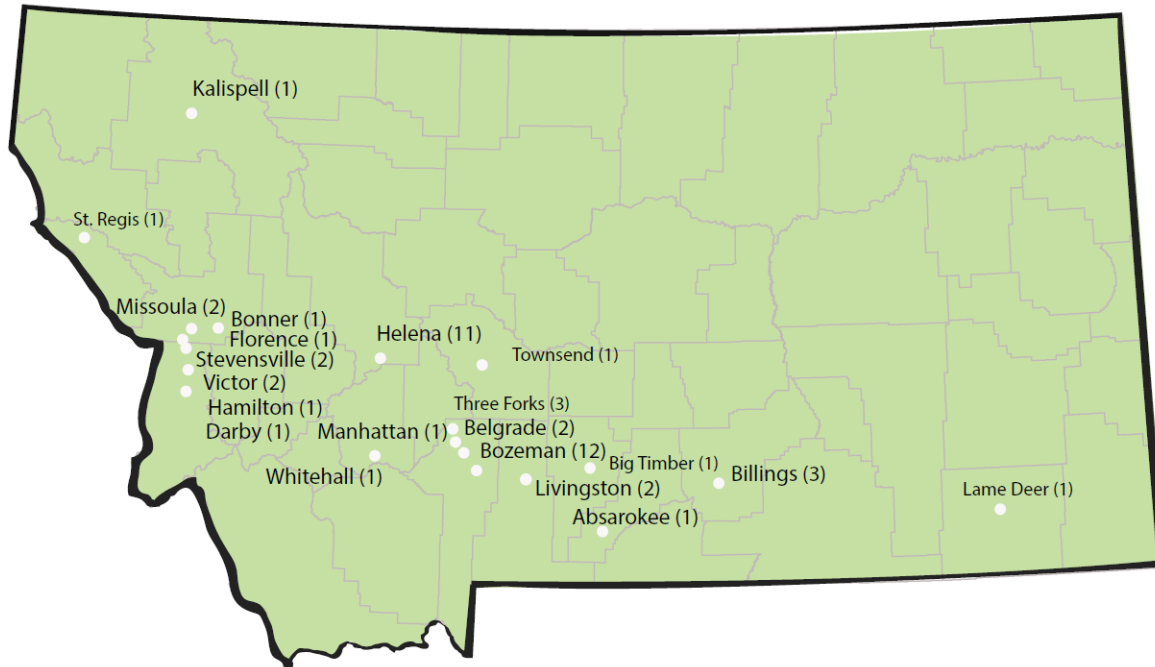
Figure 3: Systems funded in FY17, by technology



Project Locations

In FY17, loans were issued for projects in thirteen counties across Montana, including one project on the Northern Cheyenne reservation. See the map below (Figure 4) for a summary of the number of loans in each community.

Figure 4: Locations of FY17 AERLP projects.



III. LOAN-LOSS RATIO

A total of eight loans have defaulted over the program's history (no loans defaulted in FY17), however loan balances are not written off and considered a loss until all efforts to collect the loan balance and fees have been exhausted. Three loans have been written off as losses, four loans are in active collection proceedings, and funds were recovered through collection on one loan. Statute requires the loan-loss ratio for the program to remain under five percent (75-25-103 (1), MCA). The three loans written off as losses totaled \$71,027, which amounts to a loan-loss ratio of 0.70 percent, well below the statutory guideline. The loan-loss ratio is calculated based on the total amount of loans issued over the life of the program (\$10,133,048).

The combined balance of the four loans currently in collections is \$75,970. Therefore the total potential loss (loans that have been written off plus loans currently in collection) is \$146,997. The total potential loan-loss rate is 1.5 percent, based on total loans issued (\$10,133,048) and the potential loan loss amount (\$146,997).

IV. BEST OVERALL RESULTS

The type of alternative energy system that provides the best overall results for Montana residences and small businesses varies by site and by the amount and type of energy used by the building's occupants. However, the majority of projects funded by the AERLP in FY17 were solar PV arrays, which is likely due to the availability of the technology, recent technology cost reductions, minimal maintenance requirements, long useful life of the equipment (20-30 years), and adaptability of the equipment to a variety of building types and applications. The attributes of solar PV and other technologies funded by the AERLP are discussed below.

Solar electric (photovoltaic, or PV) system installed costs for residential and small commercial PV consumers dropped slightly (3-4%) over the last year, according to national data reported by the National Renewable Energy Laboratory. The pre-incentive installed costs for PV systems connected to the grid and funded by the AERLP averaged \$2.78/watt in FY17, down from \$3.18/watt in FY 16, and far below the \$8 - \$10/watt average when the AERLP was established. Utility incentives have largely been phased out for residential and commercial solar PV systems in Montana, however the combination of state and federal tax incentives results in a simple payback of 10-15 years in many applications.

Wind turbines continue to spark interest in many parts of the state and can be effective for off-grid applications, when combined with a solar photovoltaic array, however high maintenance costs for small-scale wind generators relative to solar PV systems often make solar a better choice at the residential and small business scale for generating electricity. The AERLP received no applications for wind energy systems in FY17.

Ground source heat pumps (GSHPs) continue to be a popular choice for heating systems where the technology can replace higher cost heat sources (electric resistance heat or propane). Heat pump systems move heat from the ground into buildings and can provide water heating and air conditioning as well.

Solar water heating is one of the most cost-effective distributed renewable energy strategies on the market today, however very few businesses in the state offer solar thermal installation services. The technology is a particularly good match for car washes, laundries, hotels and other buildings that use large quantities of hot water.

Biomass heating systems are widely available, as is fuel in forested areas of the state. Low-emission wood or biomass combustion devices (15-32-102 (6), MCA), including pellet stoves and wood stoves certified by the U.S. Environmental Protection Agency, are eligible for funding through the AERLP.

V. ENERGY PRODUCTION

The amount of energy produced by projects financed by the AERLP in FY17 (Figure 5) is determined based on standard engineering calculations and assumptions. The calculations are for projected energy production in the first year of operation, based on the installed generating or energy output capacity of each technology type.

The projected output of all the solar PV systems funded in FY17 is estimated using the National Renewable Energy Laboratory's "PV Watts" program¹, with default system parameters, and is based on the average solar radiation in Great Falls, an area that receives average solar radiation for Montana. Ground source heat pump estimates are calculated based on the equipment specifications, location and building type. Solar thermal output is estimated using the National Renewable Energy Laboratory's System Advisor Model². The annual output of biomass-fueled wood stoves is calculated using the default settings of the Montana State University Extension Heating Fuel Comparison Calculator³ and the efficiency rating of the individual wood stoves financed in FY17. 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.

Figure 5: Projected generating capacity and energy output of FY17 projects

	Solar PV	Biomass	GSHP	Solar thermal	TOTAL
# of systems funded	44	3	6	1	54
Generating capacity	381.59 kW	206,400 Btu/hr	22 tons	120 sq ft	--
kWh/year	543,967	61,547	215,474	4,983	825,971
MMBtu/year	1,856	210	735	17	2,818

¹ National Renewable Energy Laboratory, *PV Watts*. <http://pvwatts.nrel.gov/>

² National Renewable Energy Laboratory, *System Advisor Model*. <https://sam.nrel.gov/>

³ Montana State University Extension, *Heating Fuel Comparison Calculator*. <http://www.msuextension.org/forestry/WB2E/fuelcompcalc.htm>

VI. ADMINISTRATIVE COSTS

Administrative costs for the AERLP include staff and program support salaries, promotional materials and ads, printing, travel, and contracted financial services. Contracted financial services include loan underwriting, origination, and servicing. Montana statute caps administrative costs of the program at 10 percent of the total loans (75-25-102 (3), MCA). DEQ policy EPP-AERLP-01-02 further elaborates that the administrative costs ratio be calculated based on the total loans outstanding at the beginning of the fiscal year. FY17 administrative costs totaled \$267,974, equivalent to 7.77 percent of the total outstanding loan balance (\$3,448,908), which is below the statutory 10 percent cap.



FY17-funded, ground-mounted solar array in Hamilton