

# Alternative Energy Revolving Loan Program Outcomes Report, Fiscal Year 2021



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## I. INTRODUCTION

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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 year 2020 and 2021 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 2021 (FY21), which started July 1, 2020 and ended June 30, 2021. 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.

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*Cover page photos of FY21-funded projects (clockwise from top left): ground mount solar array in Conrad; air to water heat pump in Bozeman; charge controller and battery bank in Great Falls; rooftop solar array in Bozeman.*

## II. LOAN PROGRAM ACTIVITY & HIGHLIGHTS

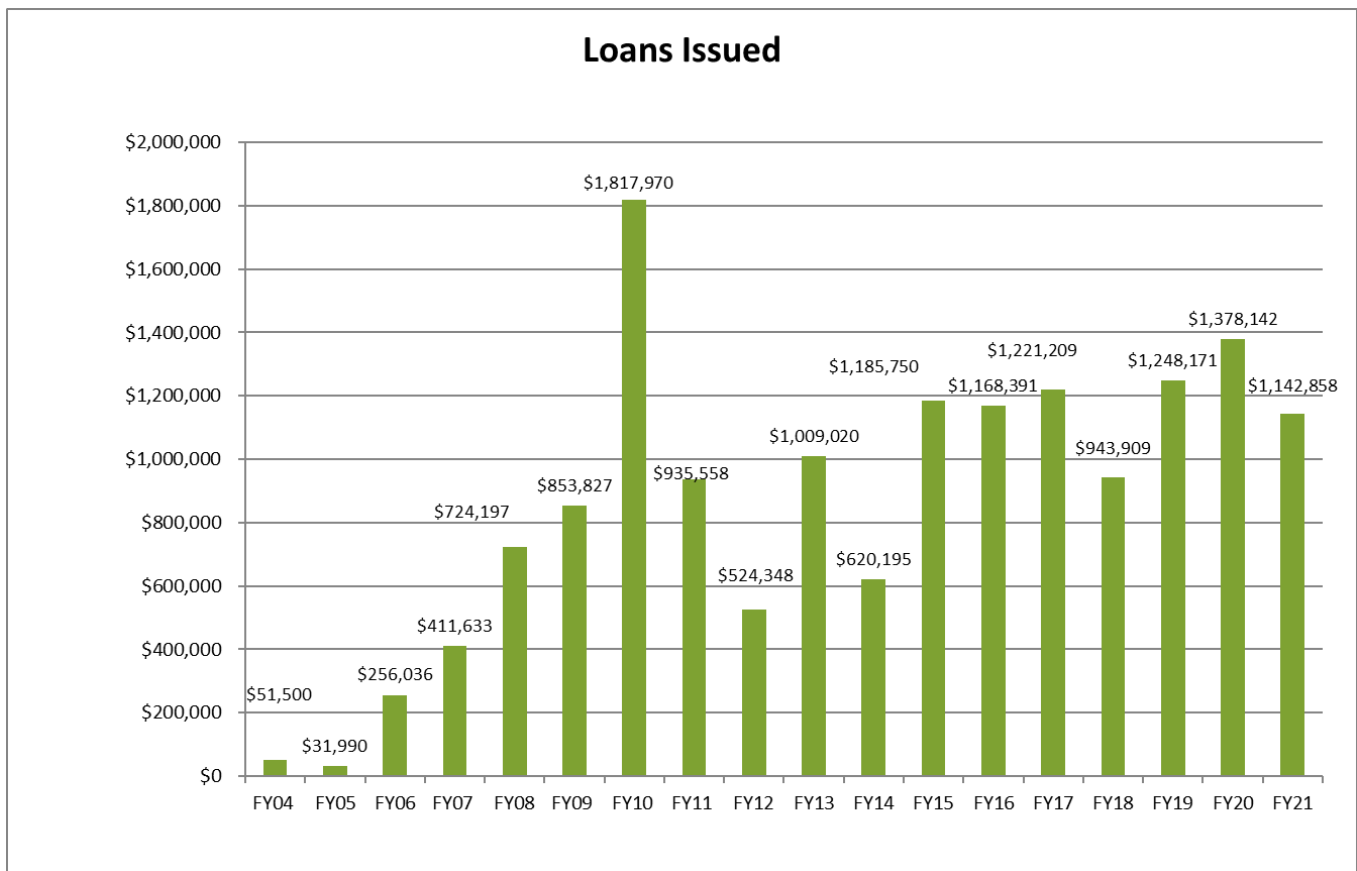
### Loan applications and loans issued

A total of forty-eight applications were received and reviewed for technical and financial feasibility in FY21. Two applications were withdrawn by the applicant and zero applications were declined on financial merit. Forty-nine loans closed for a total of \$1,142,858 (Figure 1), including three loans received and reviewed in FY20, and one loan where funds were disbursed, but the project was not built.

**Figure 1: Loans issued in FY21**

	Number of loans	Amount of loans
<b>State funds</b>	46	\$1,091,596
<b>DOE funds</b>	3	\$51,262
<b>TOTAL</b>	<b>49</b>	<b>\$1,142,858</b>

**Figure 2: Total loan amounts issued by fiscal year**



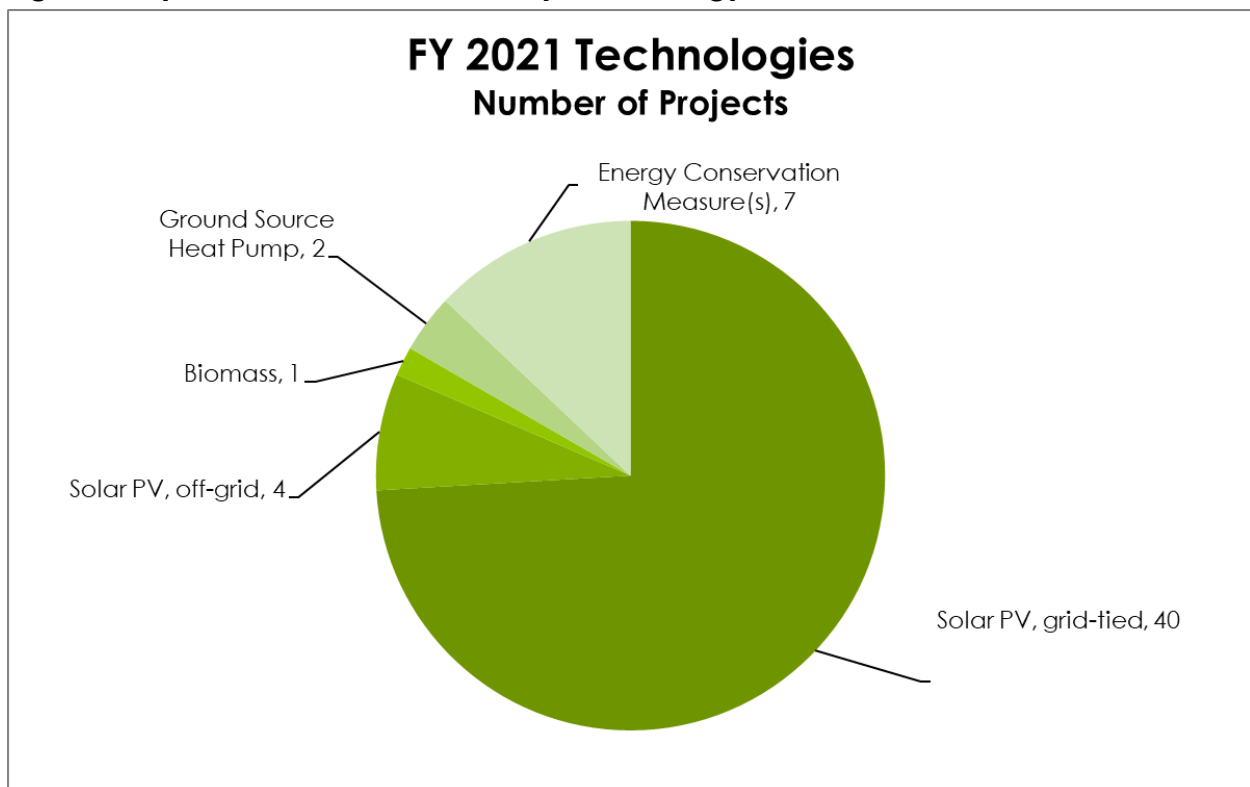
## Borrowers

In FY21 all AERLP borrowers were individuals. There was one business loan that was reviewed and funded, but the project was not built. This project is captured in the number of loans reviewed and issued, but will not be captured in the technologies funded or project location sections.

## Technologies funded

Most of the loans issued in FY21 were for grid-tied solar photovoltaic (PV) arrays (40), followed by off-grid solar PV arrays (4), ground source heat pumps (2), and one woodstove. Four loans were issued for energy conservation measures installed in conjunction with one or more alternative energy systems. Figure 3 charts the number of energy systems funded in FY21. 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 FY21, by technology**



## Project Locations

In FY21, loans were issued for projects in fifteen counties across Montana. See the table below (Figure 4) for a summary of the number of loans in each community.

**Figure 4: Locations of FY21 AERLP projects by county and city**

County	City	Number of loans
<b>Broadwater</b>	Winston	1
<b>Cascade</b>	Great Falls	1
<b>Deer Lodge</b>	Anaconda	2
<b>Flathead</b>	Kalispell	1
<b>Gallatin</b>	Belgrade	1
	Bozeman	14
<b>Jefferson</b>	Clancy	1
<b>Lewis &amp; Clark</b>	Augusta	1
	Helena	9
<b>Madison</b>	Harrison	1
	Norris	1

County	City	Number of loans
<b>Missoula</b>	Condon	1
	Missoula	4
<b>Park</b>	Emigrant	1
	Livingston	2
<b>Pondera</b>	Conrad	1
<b>Ravalli</b>	Corvallis	1
	Victor	1
<b>Sanders</b>	Paradise	1
	Thompson Falls	1
<b>Valley</b>	Glasgow	1
<b>Yellowstone</b>	Billings	1

## III. LOAN-LOSS RATIO

A total of nine loans have defaulted over the program's history with one loan defaulting in FY21. However, loan balances are not written off and considered a loss until all efforts to collect the loan balance and fees have been exhausted. Seven loans have been written off as losses, one of these has been written off as a partial loss and is in active collection proceedings. Funds have been recovered through collection on three loans. Statute requires the loan-loss ratio for the program to remain under five percent (75-25-103(1), MCA). The total amount of funds written off as losses is \$152,183, which amounts to a loan-loss ratio of 1.00 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 (\$15,389,793).

The balance of the loan currently in collections is \$6,993. Therefore, the total potential loss (loans that have been written off plus loans currently in collections) is \$159,176. The total potential loan-loss rate is 1.03 percent, based on total loans issued (\$15,389,793) and the potential loan loss amount (\$159,176).

#### **IV. BEST OVERALL RESULTS**

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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 FY21 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 PV consumers dropped 4.8% from 2019 to 2020, the largest decrease since 2017 according to data sourced by the National Renewable Energy Laboratory (NREL) from five major PV markets (Arizona, California, Connecticut, Massachusetts, and New York) not including Montana<sup>1</sup>. The NREL data show pricing averages of \$3.78/watt for systems 2.5 kW to 10 kW, and \$3.25/watt for systems 10 kW to 100 kW. By contrast, the pre-incentive installed costs for PV systems connected to the grid and funded by the AERLP averaged \$2.40/watt in FY21, down slightly from \$2.76/watt in FY20, and far below the \$8 - \$10/watt average when the AERLP was established. The systems included in the FY21 solar PV cost analysis were all grid-tied, and ranged in size from 2.96 kW to 18.9 kW, with a median size of 8.96 kW. Two systems also included battery back up systems, but for the purposes of calculating the \$/watt the cost of the battery system was not included. 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 8-15 years in many applications.

**Wind turbines** continue to spark interest in some parts of the state and can be effective for off-grid applications, when combined with a solar photovoltaic

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<sup>1</sup> National Renewable Energy Laboratory. 2021. *H1 2021 Solar Industry Update*. Accessed September 23, 2021 at [H1 2021 Solar Industry Update \(nrel.gov\)](https://www.nrel.gov/news/solar/2021/09/23/h1-2021-solar-industry-update)

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 FY21.

**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), and in electric service territory where volumetric electric rates are low. Heat pump systems move heat from the ground into buildings and can provide water heating and air conditioning as well.

**Solar water heating** can be a cost-effective energy supply, 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

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The amount of energy produced by projects financed by the AERLP in FY21 (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 FY21 is estimated using the National Renewable Energy Laboratory's "PV Watts" program<sup>2</sup>, 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 Model<sup>3</sup>. The annual output of

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<sup>2</sup> National Renewable Energy Laboratory, *PV Watts*. <http://pvwatts.nrel.gov/>

<sup>3</sup> National Renewable Energy Laboratory, *System Advisor Model*. <https://sam.nrel.gov/>



biomass-fueled wood stoves is calculated based on the efficiency rating of the individual wood stoves financed in FY21, projected fuel usage in cords as reported by the borrower in the loan application, and energy content per cord of lodgepole pine, a typical firewood in Montana. 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 FY21 projects**

	<b>Solar PV</b>	<b>Biomass</b>	<b>GSHP</b>	<b>TOTAL</b>
<b># of systems funded</b>	44	1	2	<b>47</b>
<b>Generating capacity</b>	387.54 kW	67,090 Btu/hr.	7.5 tons	--
<b>kWh/year</b>	511,974	9,153	43,140	<b>564,267</b>
<b>MMBtu/year</b>	1,747	31.23	147.2	<b>1,925.43</b>

## 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. FY21 administrative costs totaled \$264,597, equivalent to 5.44 percent of the total outstanding loan balance (\$4,861,291), which is below the statutory 10 percent cap.

