SOLAR POWER

Utility-scale solar photovoltaic (PV) generating systems are an emerging energy supply in Montana, but still represent a small slice of Montana's generating mix. Distributed utility customer-sited PV systems have been gradually installed in Montana over the past decade. Utility-scale solar farms developed to sell power directly into the grid have only come online in the last five years. The combined output from solar PV systems in Montana represents about 0.04 percent of statewide electricity sales. That puts Montana ahead of neighboring Wyoming, North Dakota and South Dakota on the basis of energy supplied from solar, but behind Idaho. By comparison, states with the highest levels of solar energy development in the country are currently supplying 3 to 13 percent of their electricity from solar PV installations (Table 1.8).

Table 1.8 Solar Market Penetration Summary.[31]

	Montana	Idaho	Wyoming	North Dakota	South Dakota	California	North Carolina	Arizona	Hawaii
Number of Customers (2015)	605,057	835,429	336,471	450,869	461,994	14,832,166	5,012,181	3,011,728	489,694
2016 Peak Demand (MW)	4,348	3,935	1,256	8,032	3,558	66,775	42,637	19,560	1,659
Solar Capacity (MW)	28	359.3	3	0.3	0.4	18,920	3,288	3,151	748
Solar Capacity as % of Peak Demand	0.64%	9.13%	0.24%	0.00%	0.01%	28.33%	7.71%	16.11%	45.12%
2015 Retail Electric Sales (MWh)	11,485,015	23,058,814	16,924,762	18,128,948	12,101,979	181,586,115	133,847,523	77,295,498	9,503,226
% Electricity from Solar	0.04%	0.61%	0.01%	0.00%	0.00%	13.39%	3.25%	5.11%	7.01%

Table Summary: This table lists the penetration of solar power in Montana and in neighboring states.

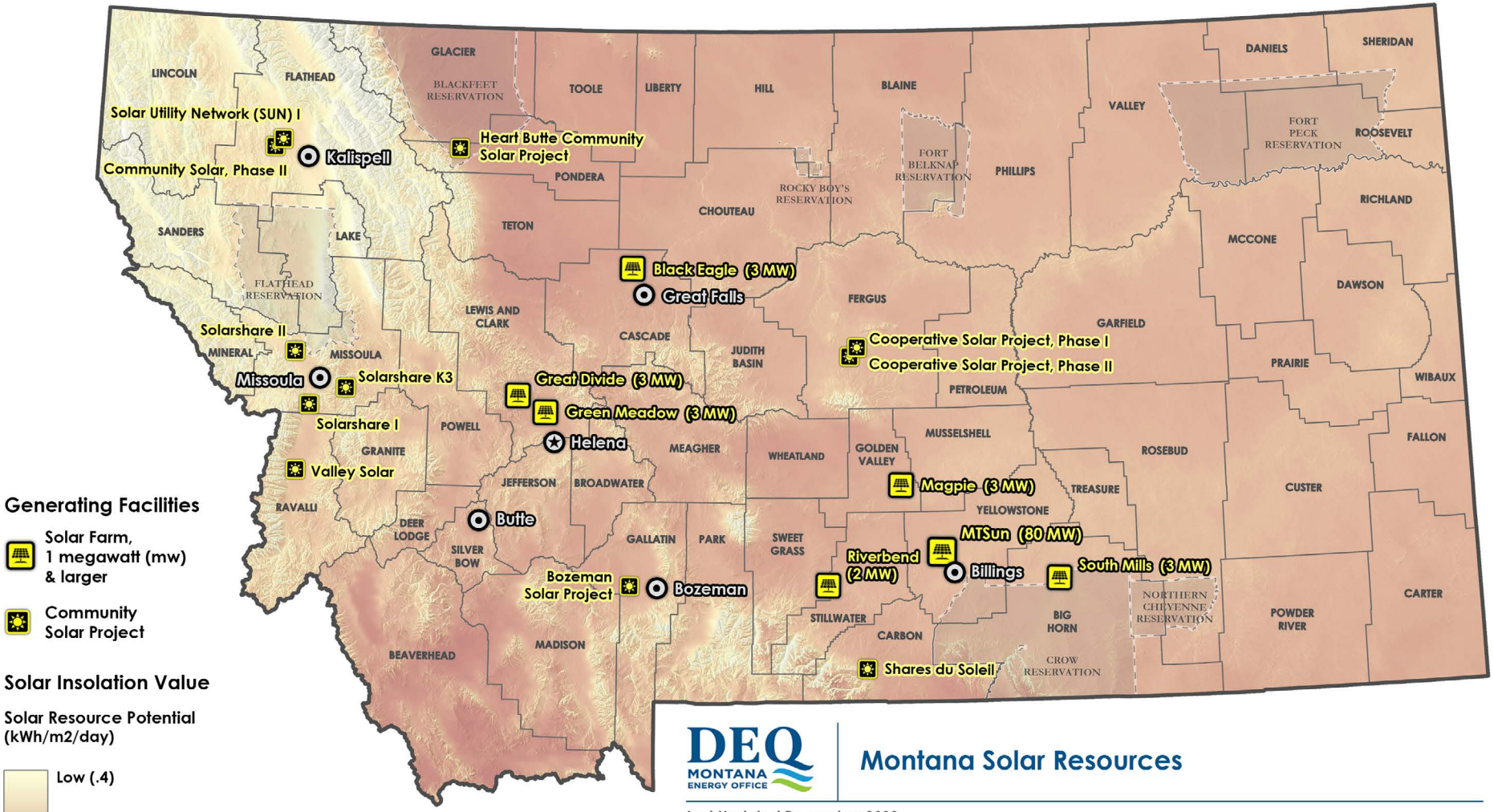
31 *Montana Department of Environmental Quality. (2017). Montana Solar Market Assessment. Retrieved from: http://deq.mt.gov/Portals/112/Energy/Documents/Montana%20Solar%20Market%20Assessment%20-%20Final.pdf?ver=2017-09-15-114156-387, pg. 11.*

MONTANA'S SOLAR RESOURCE

Being a northern state, Montana does not have the solar energy resources found in the desert Southwest states of California, Nevada, Arizona, and New Mexico, which have seen sustained increases in solar energy in recent years, including the installation of large, utility-scale solar energy facilities. Nevertheless, Montana has respectable solar energy potential as compared to other U.S. cities.

The combination of a high number of sunny or partly sunny days with a more temperate summer climate, which reduces efficiency losses that occur with PV systems as temperatures increase, help to make up for the northern latitude of the state. The strongest solar potential within Montana can be found in areas across the southern tier of the state, with the weakest in the northwest Map 1.5.

Map 1.5 Montana Solar Resources



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Montana Solar Resources

Last Updated December 2022

Facility Data Source: U.S. Energy Information Administration (EIA), 2020; Montana Department of Environmental Quality, 2021

Solar Insolation Data Source: Global Solar Atlas, 2022

Source: U.S. Department of Energy, National Renewable Energy Laboratory. (2007). Global Solar Radiation at Latitude Tilt-Annual, Montana.

OPERATIONAL UTILITY-SCALE SOLAR PROJECTS

There are six operational, utility-scale solar projects in Montana (See Solar Resources Map and Table 2), each with a generating capacity of 2 to 3 MW.[32] All of the projects have been built on private land and are approximately 30 to 40 acres in size. The projects consist of many rows of solar modules (panels) mounted on single-axis trackers (mechanical equipment that rotates the modules from east to west over the course of the day to follow the sun).

Table 1.9 Utility-Scale Solar PV Facilities[33]

Facility Name	Company Name	County	Initial Operation Date	Generator Nameplate (MW-AC)
Green Meadow Solar, LLC	Adapture Renewables	Lewis & Clark	2017	3
River Bend Solar, LLC	Adapture Renewables	Sweet Grass	2017	2
South Mills Solar, LLC	Adapture Renewables	Big Horn	2017	3
Great Divide Solar, LLC	Adapture reneewables	Lewis & Clark	2017	3
Magpie Solar, LLC	Adapture Renewables	Golden Valley	2017	3
Black Eagle Solar, LLC	Adapture Renewables	Cascade	2017	3
			TOTAL	17

Table Summary: This table lists the solar power farms in Montana.

32 The generating capacity of PV systems in this section is reported in megawatts of alternating current (AC) however the capacity from PV systems may be measured in either AC or direct current (DC). PV modules produce DC voltage which is converted by inverters to AC voltage in order for the output to be compatible with the transmission and distribution grid. Due to inefficiencies in the conversion from DC to AC, the DC rating of a PV system is always higher than then AC rating. For example, a 3 MW-AC array would have a DC rating of approximately 4.8 MW-DC. Residential and small-commercial PV systems are typically described by their DC rating, however utility scale generators and power plants (wind, gas, coal, etc.) are rated by their AC output.

33 Cypress Creek Renewables.