

The following is a brief summary of a 31-page report by UMass Clean Energy Extension students Myah Shostek and Jessica Podesta

Community Overview

This is a Solar Resource and Infrastructure Assessment for the Town of Monterey, with a year-round population of 1,095 residents and 354 households. Second homeowners bring the town's population to approximately 3,000 residents and 883 housing units. Monterey has a land area of about 26.5 square miles with a population density of 36 people per square mile. Much of Monterey's land is dedicated to conservation and preservation. Monterey features two major lakes: Lake Garfield and Lake Buel. The town is also home to Arthur Wharton Swann State Forest, which is protected conservation land. Based on Mass GIS data, Monterey has approximately 46 acres of bare land, 5,360 acres of evergreen forests and 10,103 acres of deciduous forests. Much forestland is located within Beartown State Forest, a publicly owned forest with biking and walking trails, and an array of animal and plant species. Also, there are about 351 acres of paved land and 343 acres of developed open space.

Community Energy Use & Needs

The "hosting capacity" of an electric power line identifies its ability to incorporate distributed generation electricity sources, such as wind and solar. In most places, including those served by single-phase distribution lines, small solar systems of up to 50 kW can be incorporated without adverse impacts on the grid's reliability. In areas served by three-phase power lines, solar systems of up to 200 kW can typically be interconnected without significant challenges. However, for larger systems, it is necessary to ensure there is sufficient capacity available on the distribution line before these facilities can be built and interconnected. Otherwise, power lines or substations may require upgrades before additional distributed generation sources can be interconnected without compromising reliability. In western Massachusetts, where many towns are served by one or a few low-voltage feeder circuits, the local grid can quickly become "saturated," such that there is not sufficient hosting capacity to incorporate additional medium to large solar arrays.

If circuits are currently saturated, it does not mean that no more distributed generation systems can be added to the circuit, but does suggest that upgrades are needed before additional large projects can be interconnected. Upgrades may involve significant costs, which the energy facility developer is typically

expected to pay for, as a condition of interconnection. Even if areas currently appear saturated on the map, they may not remain so. Large, profitable solar projects may be able and willing to support significant upgrades to these circuits. New upgrades may then open up new hosting capacity.

Since Monterey is served by only one three-phase distribution line, if that line becomes saturated through distributed energy generation projects, no additional large distributed generation energy facilities can be added without significant grid infrastructure upgrades. However, most areas with three-phase lines could likely accommodate additional small-to-medium-scale projects (under 300 kW), and most single-phase lines could likely accommodate additional projects under 50 kW in size.

This describes the existing local grid infrastructure. Planning for future development could include recommendations for areas of grid infrastructure improvement to allow siting of distributed generation in preferred locations. Future scenarios may also include "non-wires alternatives" (e.g., energy storage, energy efficiency, demand-response, and grid software), which can reduce the need for grid upgrades, and additional power lines.

Energy Storage Sites

Energy storage systems help to balance differences between electricity demand and generation and are valuable components for intermittent energy sources like wind and solar, which may not be producing during times of peak demand.

Energy storage systems may allow larger solar facilities to be built in areas where interconnecting them could otherwise exceed the ability of the local distribution lines to accommodate additional renewable energy. At present, such systems typically require loads larger than residential scale to be cost-effective, but these systems can provide energy during outages, which means that they also provide additional value in terms of public health and safety.

Monterey's Municipal Vulnerability Plan notes that there are currently no places in town that can provide overnight shelter after a severe storm. Short-term heating and cooling are limited by lack of back-up generators. Locating battery energy storage at the Town Hall or Fire Station could be beneficial in case of extended power outages. There are also opportunities to locate electric vehicle (EV) charging stations in town center parking lots.

Existing Grid Infrastructure

Monterey is served primarily via a 115kV transmission line which also runs through parts of Sheffield, Southfield, and Great Barrington. The initial 115kV transmission line is stepped down to 23.71 kV at the "RISINGDALE9" substation, located in Great Barrington. From the western border of town, the three-phase distribution line runs along all of Main Road. The line also runs 0.16 miles north along Fox Hill Road; 0.59 miles south along New Marlboro Road; 1.08 miles along Hupi Road; 0.75 miles along Beartown Road. The rest of town is served by single-phase distribution lines on the same circuit.



Major three-phase distribution lines are in red. Single-phase lines are pink. Source: National Grid Hosting Map

Technical Solar Potential

This table summarizes our estimates of the *technical potential* for solar development of different resource types that exist in Monterey. These values are based on a desktop analysis, incorporating publicly-available geospatial data layers available from MASGIS, MA DOER, National Grid Hosting Capacity, and Google Maps. It is important to recognize that this is an assessment of technical potential. It likely represents an over-estimate of the solar PV that can be safely and economically developed in these types of locations, because it is not feasible to connect solar arrays to electric lines at all locations, some roofs may not have the structural integrity necessary to support solar panels, some topography may not support solar, and it is not cost-effective to install panels in locations where the available space is small. Nevertheless, this assessment provides a starting point for understanding Monterey solar resources.

RESOURCE TYPE	AVAILABLE RESOURCES	ESTIMATED TECHNICAL POTENTIAL
Residential-Scale Solar	Estimated 2,110,955 sf of small building roof space suitable for solar Estimated 267 year-round residential properties (75.4%) could support some solar Total of 354 year-round residential households Average size of a residential solar array (under 25 kw) is 8.36 kW	2.3 MW assuming that 75.4% of year-round households can install a roof or ground-mounted system; this number would more than double if summer households are included. 8.2 MW if all small building roofs were developed.
Medium to Large Scale Roofs	Monterey has 23 buildings with roofs over 5,000 sf, totaling 183,803 sf of roof space. Estimated 90,063 sf of medium-large building roof spaces are suitable for solar	Technical potential on medium- to large-scale roofs is 1.3MW. (This is the <i>technical</i> resource available, and does not reflect structural or financial considerations.)
Parking Lots & Impervious Surfaces	Sites with parking lot or paved area: Monterey Transfer Station (1.02 acres), Monterey Town Hall (0.42 acres), Monterey Fire Department (0.15 acres), Hume New England Christian Camp (1.00 acres).	Technical estimates are based on a packing density of 263 kW per acre. Our estimate of total technical potential on the listed parking lots is 0.7 MW.
Landfills and Brownfields	There are no quarries or MassDEP-identified brownfields in Monterey. The town landfill was closed in 1982.	The potential solar capacity of the landfill is 3.2 MW.
Agricultural Resources	There are 5 active farms with potential for solar projects, 2 with large barn roofs. There are an estimated 1,729 acres in agricultural production.	Estimated 133 kW on barn roofs and ground-mounted projects such as solar greenhouses, farm equipment canopies, agrivoltaic arrays, and solar arrays at field margins.
Undeveloped Land	There are 207 large land parcels of at least 5 acres located near three-phase power that are not permanently protected, and are not wetlands, totaling 3,555 acres. There are also 114 parcels of least 5 acres located near three-phase power that are not permanently protected, not wetlands, and not located on properties that are more than 50% BioMap2 habitat, totaling 1,397 acres.	At approximately 1 MW per 5 acres: 3,555 acres = 711 MW 1,397 acres = 279 MW It is not expected that all undeveloped land available would be built out for solar development.

Planning for Solar Development & Conservation

Monterey's zoning bylaw was updated on August 30, 2022. The solar section of the bylaw outlines the placement, design, operation, standards, and impacts of new solar development, and is compatible with Massachusetts General Law c40A 3, which does not prohibit the installation of solar energy systems except where necessary to protect the health and safety of residents.

The Monterey bylaw provides the following definitions:

Small-scale Solar Photovoltaic System (SSPS): A solar photovoltaic system that may be either roof-mounted or ground-mounted on less than 1/8 acre, with a maximum generating capacity of 30 kW.

Large-Scale Ground-Mounted Solar Photovoltaic System (LGSPS): A solar system that is structurally mounted on the ground and has a minimum nameplate capacity greater than 30 kW and less than one megawatt or occupies more than 1/8 acre of land.

Utility-Scale Industrial Ground-Mounted Solar Photovoltaic System (UGSPS): A solar system with a capacity of one megawatt or more, regardless of the land area occupied by the facility.

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Prime farmland in Monterey is located primarily in the southern portions of town around Lake Buel and south of, or adjacent to, Route 23. Much of this farmland is permanently protected under Agricultural Preservation Restrictions.

On a farm, roof-mounted PV systems, solar canopies protecting farm equipment, and continued use of the land underneath panels for agriculture may be appropriate. Solar energy grants may be available through the Massachusetts Department of Agricultural Resources.

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Based on a Mass Audubon analysis, the total area of natural land in Monterey is 16,205 acres, which is 91% of the town's area. Monterey has 984 acres of open land (6%), and 264 acres of developed land (2%). According to Mass Audubon, 22 acres were developed between 2012 and 2017, and Monterey ranks 266th out of 351 towns in Massachusetts regarding pace of development. Monterey has 7,564 acres of permanently conserved land, ranking 45th in the state. Also, 127 acres were conserved in Monterey between 2012 and 2017, of which 14

acres are BioMap2 Core Habitat, 72 acres are BioMap2 Critical Natural Landscape, and 4 acres are classified by The Nature Conservancy as "resilient."

In Monterey, property of appropriate size for commercial-scale solar development is most likely to be undeveloped land. It is important to consider what areas **may not be suitable** for solar development because they are legally protected from such use, or because they may be important areas for recreation or wildlife conservation. In Monterey's (now expired) OSRP (Open Space Recreation Plan), the town aims to preserve its rural character by not changing or damaging scenic roads, or agricultural, conservation, and recreational areas.

There are several large, permanently protected properties in Monterey that are not available for development. According to Monterey's OSRP, 36 properties are protected under Monterey's Preservation Land Trust; 14 of these allow public access, including Green Park (2.5 acres), Bidwell Park (1.65 acres), Town Beach (1.2 acres), Beartown State Forest (4,794 acres), and Appalachian Trail Lands (11.5 acres). There are several smaller, privately-owned properties permanently protected through Conservation Restrictions.

The town also has large areas of valuable habitat for wildlife (BioMap2). Solar development is not prohibited in these areas but may require review by the state Natural Heritage and Endangered Species Program. These areas are not currently eligible for state incentives for solar development, due to their value as open land in its natural condition. BioMap2 habitats are primarily located in Beartown State Forest and Arthur Wharton Swann Forest.

Our analysis of potential sites for commercial-scale solar development considers properties with a minimum lot size of 5 acres (equivalent to approximately 1 MW of solar power) located within 2,000 feet of an existing three-phase distribution line. Of 231 parcels that meet these criteria, 14 are largely comprised of permanently protected land. This leaves 217 parcels totaling some 3,959 acres. Excluding wetlands leaves approximately 3,555 acres available for development across 207 properties. Current state solar programs do not provide incentives for solar development on land identified as important habitat conservation land, or for development on parcels on which more than half of the property has this designation. Excluding these parcels, as well as the BioMap2 habitat on otherwise developable parcels, 114 properties remain with potential for large-scale solar development, totaling roughly 1,397 acres. This estimate does not account for current land use in the parcel, which may include single-family homes and residential yards.

All solar installations at greater than residential scale are subject to review by the Zoning Board of Appeals.

