Community Solar Action Plan

proposed for

the Town of Monterey

Photo Credit: *Town of Monterey*

July 28, 2023

Prepared by

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Completed using the *Community Planning for Solar* Toolkit available at https://ag.umass.edu/solarplanning

UMassAmherst | Clean Energy Extension

Executive Summary

The purpose of this *Community Solar Action Plan* is to help guide future solar development within the Town of Monterey by providing specific actions town residents and officials can take to develop solar on municipal properties, promote solar on residential and commercial properties, encourage solar development on locations preferred by the community, and adopt bylaw amendments and permitting processes in line with resident preferences. This Action Plan is a result of a thorough planning process, which included an assessment of community solar resources and infrastructure, distribution of a community solar survey, and based on these activities, development of this Plan. This process followed the steps outlined in the *Community Planning for Solar* Toolkit which is available on the UMass Clean Energy Extension website (http://ag.umass.edu/solarplanning).

As a rural community with little commercial or institutional infrastructure, Monterey has relatively few areas to deploy solar on previously developed sites, despite resident support for these types of solar development. However, the community also has relatively low energy needs, and could meet a goal of community self-sufficiency with 10 MW of solar development. This goal is largely achievable through development of residential and other small-scale solar projects on roofs, parking lots, and adjacent to buildings, as well as larger projects on disturbed areas including those on and adjacent to the former town landfill. Residents are open to limited development on agricultural land, particularly if projects are developed as agrivoltaic operations; some pasture and hayfields are located near three-phase lines and could be considered for solar development. Residents are generally opposed to solar development of large areas of natural land, but there is openness to development along major roads and in shrubby meadows or fields.

This Action Plan calls for outreach to residents, businesses, institutions, and farms to encourage solar development on rooftops and parking areas, as well as bylaw updates to facilitate development of medium-scale solar, solar canopies, and solar development on disturbed sites. The town is currently investigating rooftop solar development on Fire Company property near the town center, as well as on the municipally owned Highway Garage and Salt Shed. Deployment of solar on these locations as well as other municipal locations could provide energy savings. In addition, a solar plus energy storage facility at the Town Hall could allow for more effective emergency operations and a shelter site with battery back-up in case of a power outage. Additional bylaw updates could introduce further restrictions on solar development on agricultural land and wildlife habitat, in line with residents' preferences.

Terms, Abbreviations, and Acronyms used in the Plan

The following terms, abbreviations, and acronyms are used in this report.

Terms

Photovoltaic, or "PV," systems are solar arrays composed of panels that generate electricity from sunlight. These panels are a different type of technology than the types of panels used in "solar hot water" or "solar thermal" systems.

Voltage of an electric power line can be thought of as the equivalent of pressure in a water line. The voltage of transmission and distribution power lines is typically measured in kilo-volts (kV). One kilo-volt is equivalent to 1000 volts (V). In residential use in the United States, electrical wires within a household carry electricity at 120 V.

Capacity of a solar array is a description of the instantaneous power output of the panels at top production (i.e, in full sun). It is typically measured in kilowatts (kW) or megawatts (MW). A residential-size solar system is typically 5-10 kW in capacity. Commercial-scale solar arrays are typically 1 MW or greater in size. An average 1 MW array would cover approximately 4-5 acres of land.

Annual generation of a solar array is a measure of the yearly energy output produced by the panels. It is typically measured in kilowatt-hours (kWh) or megawatt-hours (MWh). In New England, annual generation is approximately equal to the array's capacity (in DC) *14% * 8760 hours per year.

DC is the abbreviation for direct current, the type of electricity produced by solar panels. The DC capacity of a solar array is a good indication of its size, and footprint on the landscape.

AC is the abbreviation for alternating current, the type of electricity flowing into the grid from a solar array, after it has gone through a transformer. In the absence of energy storage, a typical DC to AC ratio for solar array capacity is about 1.25:1. However, with energy storage, that ratio can be significantly higher (close to 2:1), since excess electricity can be stored in batteries during the day, and released into the grid during the night, when the panels are not generating electricity.

SMART is the abbreviation for the current state solar energy incentive program (the Solar Massachusetts Renewable Target program). This program replaced earlier solar incentive programs, commonly known as "SREC" programs, in November of 2018, and was further updated through an emergency regulation in April 2020. The SMART regulation includes incentives for projects up to 5 MW AC in size. Additional incentives are available for projects located on buildings, parking lot canopies, landfills, brownfields, and "dual-use" solar and agriculture projects, as well as certain types of projects that benefit public entities, like municipalities. The updated regulation places restrictions on what types of large, ground-mounted projects can receive incentives, if they are sited on undeveloped land designated as BioMap2 Critical Natural Landscapes or Core Habitat, by the state MassWildlife Natural Heritage and Endangered Species Program.

Abbreviations & Acronyms

BRPC – Berkshire Regional Planning Commission
CEE - UMass Clean Energy Extension
DOER - Massachusetts Department of Energy Resources
FRCOG - Franklin County Regional Council of Governments, the regional planning authority for Franklin County, MA
kV - kilo-volt
kW - kilowatt
kWh - kilowatt-hour
MDAR - Massachusetts Department of Agricultural Resources
MVP - Municipal Vulnerability Preparedness plan, a municipal planning document
MW - megawatt
MWh - megawatt-hour
OSRP - Open Space and Recreation Plan, a municipal planning document
PV – photovoltaic, the type of solar panels that generate electricity from sunlight
PVPC - Pioneer Valley Planning Commission, the regional planning authority for Hampden and Hampshire Counties, MA
REWG – Renewable Energy Working Group, Monterey's municipal committee focused on renewable energy in town
sf - square feet

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1. INTRODUCTION

1.1 Purpose

The purpose of this *Community Solar Action Plan* is to help guide future solar development, municipal bylaw amendments, and solar permitting decisions within the Town of Monterey. This plan also includes recommendations regarding specific activities to develop solar on municipal properties, campaigns to promote solar on residential or commercial properties, and next steps to encourage solar development on locations preferred by the community, including municipal properties.

1.2 Planning Process

This proposed *Community Solar Action Plan* was developed for the Town of Monterey by UMass student Myah Shostek and UMass Clean Energy Extension staff, as part of a two-semester, service-learning class at the University of Massachusetts Amherst, in which UMass undergraduates partnered with local communities to conduct a proactive, community-oriented solar planning process. The local community partner in this project was the town of Monterey's Renewable Energy Working Group (REWG).

The proposed *Community Solar Action Plan* developed through this project is the result of a thorough planning process, which included 1) an assessment of community solar resources and infrastructure, 2) development of town-specific alternative solar development alternatives, 3) distribution of a community solar survey and analysis of survey results, and finally, based on these activities, 4) development of this draft *Community Solar Action Plan*. This process followed the steps outlined in the *Community Planning for Solar* Toolkit which is available on the UMass Clean Energy Extension website (http://ag.umass.edu/solarplanning).

Before the *Community Solar Action Plan* is finalized, it will undergo review by municipal representatives involved in the project through the Renewable Energy Working Group and members of other relevant municipal boards (e.g., Select Board, Planning Board, Conservation Commission). It will be presented to community residents at a community forum, with the opportunity for residents to provide feedback. These review processes are expected to result in revisions which will improve the clarity, content, and implementation of the plan. The planning process was initiated in September 2022, the community survey was conducted in March-May 2023, and the community forum will occur in August 2023.

Because Monterey is one of the first towns to complete this planning process via collaboration with UMass students and staff, **we welcome and encourage comments not only on the town-specific content contained within this draft *Community Solar Action Plan*, but also on the scope, organization, and readability of information contained within this plan**. This more general feedback will help us to develop final deliverables and examples that provide greater clarity and utility for municipal representatives and community residents in towns across the state.

1.3 Community Goals & Plan Structure

Monterey residents are motivated to combat climate change, and most residents are supportive of solar development. Based on the *Community Solar Survey*, 90% of residents are "extremely" or "moderately" concerned about climate change, and 90% reported they have a "positive" or "very positive" attitude towards solar energy.

87% of respondents indicated that they would support expanding solar capacity to reach a goal of community self-sufficiency, and 80% supported meeting the regional energy goal. A majority (67%) also supported development sufficient to help support a statewide energy goal.

Monterey residents are most supportive of solar development on already developed spaces, including roofs, parking lots, and former landfills or brownfields. Residents were open to some, albeit limited, development on agricultural and natural lands. On average, residents were interested in seeing up to 35% of agricultural lands and 30% of natural lands developed for solar.

With these results in mind, this Plan focuses on strategies and actions designed to aid in development of currently developed spaces and disturbed lands for solar, as well as exploring additional ground-mounted solar development which would be necessary to meet a goal of community self-sufficiency or to support regional and state goals for solar development. Based on our analysis, community self-sufficiency might ultimately require approximately 10 MW of solar development in Monterey, 29x the current amount of solar installed. This estimate is based on future projections of energy use by 2050, including a transition from fossil fuel-powered vehicles to electric cars, and from traditional heating sources to renewable sources. Our estimates suggest this might require development of 10-35 acres of undeveloped land. To help support electricity needs for the 4-county Western Mass region (Franklin, Hampshire, Hampden, and Berkshire counties), Monterey would need to develop roughly 1.25% of its land area, or about 200 acres. This would equate to 44 MW of solar. Meeting state goals would require about 4% of Monterey's land area, or 140 MW covering roughly 700 acres of currently undeveloped land. *Note that these are estimates based on rough projections of future electricity needs and electricity sources. Future technological advances, land use decisions, and changes in population, community infrastructure, or energy use can be expected to lead to modifications to these estimates. It is anticipated that this plan and the calculations included herein will be revisited and updated according to the timeline described in the final Action Plan.*

Meeting a goal of community self-sufficiency or supporting regional electricity needs will require active efforts to deploy solar on developed spaces, disturbed lands, and other sites acceptable to the community. This plan is designed to help guide these efforts.

Discussions of solar development options are divided into five categories – residential, municipal, local business/institution, on-farm, and large, ground-mounted solar on private land. Within each category, we discuss the current status of existing solar capacity, community perspectives, the future potential for solar development, potential next steps, and specific action items.

Following the sections addressing solar development options is a section addressing the existing solar bylaw and how the bylaw and permitting processes could be updated to better reflect community attitudes expressed in the solar survey.

Finally, the plan concludes with a summary of action items and the anticipated timeline for when this plan will be revisited and revised.

1.4 Planning Process Documents

The final *Community Solar Action Plan* will be made available as an example on the UMass Clean Energy Extension website.

The *Community Solar Action Plan* will also be made available on the town website. Additional documents developed as part of the planning process (e.g. the *Solar Resource & Infrastructure Assessment*, the *Community Solar Survey Results Summary*) will also be made available on the town website.

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2. MUNICIPAL SOLAR

This section addresses solar on municipal building rooftops, municipal parking lots, and municipal properties, including public schools located elsewhere in the district. This section also addresses properties owned by entities which provide other public services (i.e. the Monterey Fire Company and Monterey Water Company).

2.1 Current Status

Existing Infrastructure & Electricity Use

Monterey has six municipal electricity accounts. The largest electricity users, from highest to lowest, are the Town Hall, Highway Garage, Library, Transfer Station, and Community Center. Additional municipal locations that use small amounts of electricity are streetlights and the cemetery.

There are several additional buildings which provide public services to the town and consume electricity. The Fire Station and Ice Skating Pavilion in the center of town are owned by the nonprofit Fire Company, which provides fire protection, emergency response, and firefighting services to all community members. The Monterey Water Company is a privately owned cooperative that provides drinking water to roughly 40 households in the community and has a building located on .

Monterey uses an average of 140,400 kWh (140 MWh) of electricity per year to supply these municipal and public services buildings. A solar capacity of 108 kW would be required to generate this amount of electricity annually.

In Monterey, there are currently no municipally owned solar facilities. However, Monterey is in the process of reviewing some sites for municipal solar.

Monterey is part of the Southern Berkshire Regional School district, which serves the towns of Alford, Egremont, New Marlborough, Monterey, and Sheffield. Students attend elementary school at New Marlborough Central School (in New Marlborough) and high school at Mount Everett Regional in Sheffield. Monterey shares responsibility for these schools, but they are not included as part of the energy data provided above.

Current Regulatory Status

Solar projects on municipal roofs in Monterey would be regulated as “small-scale” solar and allowed by right in all zoning districts under Monterey’s current bylaw. Solar canopies over town parking lots would take up more than 1/8 acre of land, and hence would be regulated as large ground-mounted arrays, subject to a Site Plan Review and a Special Permit process. Ground-mounted solar projects, as discussed in Section 2.2, would be considered as “large-scale” solar or “utility-scale” solar, depending on size (less than or greater than 1 MW). In general, these systems would be subject to Site Plan Review and require a Special Permit. However, the site of the former golf course, a 10.7-acre parcel north of the Fire Station, currently comprises the town’s sole Large Solar Overlay District (LSOD). Within the LSOD, a system of at least 250 kW is required, but would be allowed by right with Site Plan Review.

Community Perspectives

Monterey residents showed strong support for solar development on municipal buildings and properties. In the *Community Solar Survey*, 82% of residents indicated they felt the town should invest in solar development on municipal buildings and parking lots to meet municipal needs. An additional 11% of residents were supportive of municipal development, dependent on certain factors. Some of the factors cited included aesthetic concerns regarding solar arrays, a desire not to cut down forests to develop solar, and the availability of grants or other incentives to avoid municipal solar projects leading to increased taxes. In addition, 80% were supportive of municipal investment in projects to support community electricity needs.

2.2 Future Potential

Future Electricity Use

The town does not currently keep track of fossil fuel use for heating or municipal vehicles in a central location. Therefore, we cannot utilize existing data to estimate future electricity use for Monterey. However, we estimate that the community's electricity use will roughly double in the future as heating systems and vehicles are electrified, which suggests that municipal electricity use may also roughly double. Currently, the average electricity use is 104 MWh annually, so the future use could be roughly 208 MWh, necessitating 160 kW of solar to supply future town electricity needs.

These totals do not include electricity use by New Marlborough Central School and Mount Everett Regional. Also not included is potential future electricity use by school buses, which are currently run on fossil fuels and owned and operated by a private company. Both the state (https://www.masscec.com/program/notice-intent-accelerating-clean-transportation-school-bus-actbus) and federal government (https://www.epa.gov/cleanschoolbus) have recently begun providing competitive funding and/or technical support for the deployment of electric school buses.

Potential Energy Storage Locations

Monterey's MVP Plan states that there are currently no areas in town with the capacity to serve as an overnight shelter after a severe storm or in case of another emergency. The town can only provide short-term heating and cooling during a power outage, because there are only a few back-up generator systems located at town buildings. Currently, the Community Center is the designated shelter, and the Library is listed as back-up. Generators are located at the Library, Town Hall/Police Department, Fire Station, and Highway Department/Transfer Station.

In addition to the currently designated community shelter sites, energy storage at the Town Hall/Police Department could also be useful to support emergency response and municipal operations during an outage.

The Monterey Water Company primarily functions based via gravity feed and hence may not require energy to function during a power outage. However, the cooperative does use some electricity, so it is worth discussing with the organization whether energy storage would be beneficial in an emergency situation to provide safe drinking water to residents.

Municipal Rooftops & Parking Lots

As shown in **Table 1**, the largest roofs on public services and municipal buildings are located on the Fire Station/Ice Pavilion and Highway Garage/Transfer Station.

Structure	**Street Address**	**Total Roof Area** (sf)	**Estimated Rooftop Technical Solar Potential** (kW)
Fire Station/Ice Skating Pavilion (includes 2 roofs) (owned by the Fire Company)	411 Main Rd	15,038	109
Transfer Station/Highway Garage (includes 2 roofs)	40 Gould Rd	11,834	72
Town Hall/Police Station	435 Main Rd	4,084	16
Library	452 Main Rd	2,191	9

Table 1. Municipal properties with large areas of roof available for solar.

The Community Center at 468 Main Road is too small for rooftop solar to be economical.

A number of locations also have paved areas which could be appropriate for solar, including the Transfer Station, Town Hall, and Fire Department. Parking lots can have a packing density of approximately 263 kW per acre; the estimates of technical potential provided below are based on this value.

Location	**Street Address**	**Approximate Area** (acres)	**Estimated Solar Technical Potential** (kW)
Transfer Station	40 Gould Rd	1.02	268
Town Hall/Police Station	435 Main Rd	0.42	110
Fire Station/Ice Skating Pavilion (owned by the Fire Company)	411 Main Rd	0.15	39

Table 2. Municipal properties with large, paved areas available for solar.

Our estimate of total technical potential on these roofs (206 kW) and parking lots (417 kW) is roughly 623 kW. However, this is the technical potential. This estimate does not take into account roof condition, driveways, logistics, economic considerations, or other considerations, and hence is likely a significant overestimate of actual potential. All of these locations would require on-site evaluations to understand use patterns, available space, and actual solar potential.

Solar arrays over 50 kW in size often must connect to three-phase electricity distribution lines in order to interconnect to the electricity grid safely. The large rooftops and parking

lots on Main Road are located adjacent to three-phase lines, but the Transfer Station on Gould Road is about 0.5 miles from a three-phase lines. For large rooftops and parking lots not located near three-phase lines, the size of the system may be limited to less than 50 kW by local grid infrastructure, or local infrastructure may need to be upgraded to accommodate larger projects.

Ground-Mounted Solar

Additional sites identified as of interest for ground-mounted solar development are the former town landfill as well as adjacent disturbed land, both located near the Transfer Station.

Former Town Landfill – The closed landfill appears to cover roughly 3.2 acres (0.6 MW solar capacity).

Community Center – Given the small roof on the community center, if it is preferred as a shelter site, it might be helpful to consider a small ground-mounted system adjacent to it with energy storage to supply energy during an outage.

Disturbed Land near Transfer Station - The area of previously disturbed land behind the transfer station is about 13.5 acres. This area is currently privately owned by Gould Farm but is located adjacent to town-owned land. The potential solar capacity for the disturbed land is about 2.7 MW. The land site is approximately 0.5 miles away from the main three-phase power line that runs throughout Monterey.

Golf Course – The former golf course site currently constitutes the town's Large Solar Overlay District (LSOD), suggesting that the site was previously identified by the town as a potential site for solar. Based on an initial REWG review of the site, there are several challenges that would stand in the way of municipal solar development, including aesthetics (it is visible from many locations near the town center) and ownership (it is currently owned by the nonprofit Fire Company, rather than the town).

Financial Considerations

Development of solar on municipal buildings and land can be simpler in some ways than development on private land because town boards have the greatest control over determining whether these projects proceed. However, towns do not always have funding available to pay for large solar projects.

Financial costs and benefits of municipal solar are dependent on many factors, including system size, system cost, electricity rates, solar incentives, federal and state tax credits, loan amount, and loan terms (interest rate, term). All of these items are site-dependent, and subject to change over time. Historically, municipal governments were unable to receive federal or state tax credits for solar development, which could make these projects more challenging from a financial perspective. However, with the recent passage of the federal Inflation Reduction Act, organizations and individuals that do not owe taxes now are eligible for a "direct payment" option, which can cover 30% of the costs of a new solar installation. This change will make small to medium-size municipally owned solar projects more financially viable. Depending on the size, location, and type of system, new solar arrays may also be eligible for solar incentives through the state SMART program on a fixed

$/kWh basis; this program has a specific additional incentive for "public" projects owned, operated, or benefitting the municipality. Alternatively, the town can earn Renewable Energy Credits for each MWh of solar energy that is generated. Some financial institutions offer loans which can be applied to solar projects or may offer specific solar loans designed to cover the costs of new solar arrays. UMass CEE can assist the town with calculations of the costs and savings associated with specific municipal solar projects.

2.3 Next Steps & Action Items

Current Actions

Monterey's REWG has already secured two grants to explore solar development in the Town.

- The REWG's current focus is on development of a community-shared solar site on top of the Town's landfill. Through a META grant from the Commonwealth, the Town has a contract with Beacon Integrated Solutions to develop an RFP and pursue development of a proposal to bring to Town Meeting. This contract also includes exploration of the potential for rooftop solar on the Highway Garage and Salt Shed.
- Through a separate grant under the Federal ARPA program, the Fire House and Pavilion are being investigated for rooftop solar installation. As these buildings are owned by the Monterey Fire Company, pursuit of this project is dependent on the Fire Company's interest and participation in the project.

Potential Next Steps

Potential next steps for municipal solar development include:

- Conduct on-site evaluations of solar potential on rooftops and over paved areas at the Town Hall/Police Station and Library, with the assistance of a solar installer. Evaluations should include rough quotes for installation cost and identify potential obstacles to development (e.g., roof warranties, roof structure, interconnection). The evaluation should also include potential for energy storage options at the Town Hall.
- Consider whether the Community Center should remain the primary shelter site, or whether it could be moved to the Town Hall. If the Community Center is the best place for a shelter, it would be useful to consider the potential for a small solar plus energy storage system at the site.
- Consider a microgrid for the Town Hall/Police Station connected to the Library and/or Fire Company property. Review relevant studies conducted in Montague and other Massachusetts towns. Contact MassCEC staff familiar with microgrids to understand what resources are available. https://www.masscec.com/program/community-microgrids
- Coordinate with the owner of the disturbed site on property adjacent to the town's capped landfill to conduct an on-site solar assessment and determine whether development of the two properties at the same time could be beneficial.
- Explore potential options to support solar development aside from direct use of town funds (e.g., MVP grants, solar loans, Green Communities designation grant).
- Set up a Mass Energy Insight (MEI) account for Monterey to facilitate tracking of town energy use data.

- Work with school staff to compile and analyze energy usage at New Marlborough Central School and Mount Everett Regional in MEI.
- Carry out financial analyses to understand costs and benefits of specific solar options (UMass CEE can assist).
- Complete a table to plan for future development, e.g.:

Building/ Location	Address	Solar Potential	Rough Cost ($)	Roof Warranty Information	Roof Structural Needs/ Cost	Energy Storage Needs?	Funding Sources ?	Anticipated Year for Development?

- Explore potential for electric buses and associated charging needs for New Marlborough Central School and Mount Everett Regional.
- Discuss potential for extension of three-phase power 0.5 miles along Gould Road with National Grid, to support solar development at the Transfer Station, capped landfill, and adjacent disturbed lands. (Note that this is likely to be included as part of the RFP developed by Beacon listed under *Current Actions* above.)

Action Items

Action	Lead Entity (or Entities)	Supporting Entities	Start Year/ Annually?
Conduct on-site solar evaluations at Transfer Station and adjacent disturbed lands	Renewable Energy Working Group	Solar developer	2023
Complete ongoing investigation of solar at Fire Department and DPW buildings.	Renewable Energy Working Group	Beacon Integrated Solutions	TBD based on Fire Company participation
Conduct on-site solar evaluations at other town buildings	Renewable Energy Working Group	Solar installer	2024
Reach out to National Grid regarding potential for extension of three-phase lines along Gould Road to the Transfer Station	Renewable Energy Working Group	UMass CEE	2024
Explore microgrid opportunities	Renewable Energy Working Group	MassCEC	
Establish MEI account to track municipal energy use	Renewable Energy Working Group	Municipal staff, Green Communities Program, BRPC	

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Compile, analyze, and review energy usage data for schools	BRPC, Renewable Energy Working Group, school staff	Energy Committees for other participating towns; Green Communities Program	
Explore solar funding options for municipal projects	Renewable Energy Working Group	Finance Committee, BRPC	
Carry out financial analyses	UMass Clean Energy Extension	Renewable Energy Working Group, Finance Committee	
Create a timeline for future municipal solar development	Renewable Energy Working Group	Finance Committee, Select Board	
Explore opportunities for electric bus use & charging needs schools	Renewable Energy Working Group, other participating Energy Committees, School Committee	school staff, EPA, MassCEC, bus companies	

3. RESIDENTIAL SOLAR

This section addresses solar on residential properties, including solar on house rooftops or in residential yards.

3.1 Current Status

Existing Infrastructure & Regulatory Status

Currently, Monterey has about 43 residential solar systems, with an average size of 8.16 kW, and representing a total of 351 kW of solar capacity. Roughly 5% of households have a residential solar system.

In Monterey, residential systems fall under the category of small-scale systems in the town's bylaw. Roof-mounted systems of any size, as well as ground-mounted systems up to 30 kW (or 1/8 acre of land) are allowed by right in all zoning districts.

Community Perspectives

In the *Community Solar Survey*, Monterey residents indicated support for solar development on residential roofs and in residential yards – 74% felt "positive" or "very positive" about solar installed in these locations, although 11% felt negative about these types of systems, largely due to aesthetics and safety concerns.

Of residents who did not currently have a solar array installed at their home, a large percentage were open to the possibility: 45% of respondents said they were interested in having solar panels installed at their home, 39% were not sure, and only 16% were not interested. The sizeable percentage of respondents who said they didn't know enough about their options or weren't sure if they wanted to install solar panels indicates that outreach is important to increase knowledge of residential solar.

Major reasons residents cited for not already having a system installed were high upfront costs (37%), distrust of solar developers (37%), not knowing enough about their options (32%), and having a shaded property (27%).

3.2 Future Potential

Solar Potential on Residential Rooftops & Yards

Potential residential solar capacity in Monterey can be estimated through several different methods. If solar were installed on all small building roofs in town, the total technical potential would be 8.2 MW. However, installing solar on many roofs may not be technically or economically feasible, due to shading, roof structures, and economies of scale (i.e., installing scattered, small systems on very small roofs may not make financial sense). Based on estimates of shading on residential properties, it may be more reasonable to assume about 75% of residential properties in Monterey have roofs or unshaded yard space available for solar (see *Solar Infrastructure and Resource Assessment* for more details). Currently, the average size of a residential solar PV system in Monterey is 8.2 kW. If 75% of year-round homes were to install a solar PV system of this size, it could provide about 2.2 MW of electricity generation capacity; including summer homes would increase this number to 5.4 MW. This would be equivalent to 22% or 54% (respectively) of the

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electricity generation capacity anticipated to be needed in the future to support 100% of the community's electricity needs with solar power.

Residential solar PV systems are typically sized to generate enough electricity to cover current household electricity needs. A 5.5 kW residential solar PV system can generate what works out to an average of 600 kWh of electricity per month (the average household monthly electricity use in Massachusetts), with higher solar generation occurring in summer months and lower generation during the winter. Average monthly electricity use in Monterey is 778 kWh, which is higher than the state average. The average size of a household solar PV system in Monterey is 8.2 kW (average of roughly 888 kW of generation per month), which suggests current solar systems in town are located on houses with somewhat higher-than-average electricity use or are designed to meet more than current electricity needs.

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As personal vehicles and home heating systems are converted to electricity-based systems, we predict average household electricity use in Monterey could nearly double, necessitating a system of roughly 14.4 kW to offset future household electricity demand. Ultimately, if 75% of year-round households were to install a 14.4 kW system to meet future electricity needs, residential systems could contribute 3.8 MW of solar, or 9.5 MW if summer homes were also included. This is equivalent to 38% or 95% of the estimated 10 MW of solar capacity needed to offset anticipated future electricity demand in Monterey.

Financial Considerations

Financial costs and benefits of a residential solar are dependent on a number of factors, including the system size, system cost, electricity rates, solar incentives, federal and state tax credits, loan amount, and loan terms (interest rate, term). All of these items are site-dependent, and subject to change over time. Despite high interest rates and minimal solar incentives, our estimates suggest that residential solar systems are nevertheless currently a financially feasible option for Monterey residents, because the cost of a monthly electricity bill is at this time higher than the cost of a solar loan payment, so a resident with a new solar system installed could pay less per month for electricity than one without, and after the loan is repaid, the solar system will continue to generate free electricity.

For example, UMass Five College Credit Union currently offers solar loans at a rate of 7.24% for 10 years or 7.49% for 15 years. Currently, there is a federal tax credit rebate of 30% of the cost of an installed solar system, in addition to a $1,000 tax credit available for Massachusetts state taxes. Solar incentives through the state SMART program have dropped to $0 for residential systems (<25 kW) in Monterey. However, as an alternative to the SMART program, residents can earn Renewable Energy Credits for each MWh of solar energy that is generated; RECs currently can be sold for about $34 per REC, although that number is expected to decrease over time, and our estimates use an average value of $22 per REC. With federal tax credits, state tax credits, and solar incentive payments, the monthly payment on a 15-year loan on the remaining balance for a 7.2 kW system priced at $3.65/kW (the Berkshire County average according to MassCEC) is below the monthly cost of electricity generated by a system of that size that would appear on an Eversource electricity bill. For a 10-year loan, there is significant cost to the customer over the first 10 years ($225-$475 per year), but the net value is positive due to avoided electricity costs

($34,000 over 25 years, not adjusted for the opportunity cost of not investing the money elsewhere). The resident would likely need to replace the inverter for the system after about 10-12 years, but would still make money over the course of the PV system lifespan.

The financial balance could be more challenging for low-income residents. However, there are some potentially feasible options available. The nonprofit Capitol Good Fund last year began offering "DoubleGreen" solar loans at a fixed rate of 3.1%-4.2% for 25-year terms for low-income ratepayers in Rhode Island, which if offered in Massachusetts could make solar PV systems economical for low-income residents here. Through the passage of the federal Inflation Reduction Act, low-income residents who do not owe taxes are now eligible for a direct payment equal to 30% of the installed cost of a new residential solar system. In addition, low-income residents are currently eligible for an approximately $0.009 per kWh state solar incentive, or the REC payment of $34/MWh described above. Affording a solar loan might still be challenging for some low income (R-2) customers, who are eligible for reduced electricity rates to begin with, and therefore might have difficulty obtaining a monthly loan payment that is lower than their reduced electricity bill. UMass CEE can assist in estimating the specific financial costs and benefits for Monterey residents.

3.3 Next Steps & Action Items

Potential Next Steps

Since there is strong interest and support for residential solar, there is potential for a large increase in solar capacity on residential roofs and in residential yards. The major barriers to overcome appear to be 1) lack of knowledge of options and safety regarding solar PV systems, 2) financial concerns, 3) distrust of solar developers, and 4) logistical challenges with locating solar PV systems on some shaded residential properties.

Public Information Sessions

In order to overcome general hesitancy, address concerns, and increase resident knowledge, Monterey residents could benefit from annual or semi-annual public information sessions about residential solar, highlighting state and federal incentives and solar loan options, addressing safety concerns, and elucidating the range of options available. Some recommendations regarding these sessions include:

Speakers and content. Given some residents' lack of trust of the utility or solar companies, it would be preferable to have the majority of information presented by a neutral party rather than a company with a vested interest in solar development. It would be helpful to include participation by town residents who have had solar installed, and who could speak to the benefits and any challenges associated with installing a residential solar array. This session could include specific financial information (see below), as well as opportunities for neighbors to coordinate on solar installations.

Financial analysis of residential systems. CEE is happy to work with Monterey to provide a simple calculator to help residents at a public forum estimate the costs and benefits of a solar system that meets their needs and specifications.

Specific solar loan programs available through financial institutions. CEE plans to compile a list of institutions involved in solar financing around the state, and specific

solar loan programs, which could be addressed included the public forum. The state's Mass Solar Loan program is no longer active. If revived, it would be helpful to include information about this program as well.

Handouts and Factsheets

In addition to information sessions, factsheets/handouts with content similar to that provided at Public Information Sessions could be distributed at annual Town Meeting or other local events, as well as made available at the Library and Transfer Station.

Assisting Residents with Shaded Properties

Forested residential properties, as are common in Monterey, may not be appropriate for solar. Residents may in some cases choose to cut some trees to provide an opening for solar, but this is not always possible or preferred. Creative approaches are necessary to provide residents of shaded properties the benefits of solar. Solutions to give residents living on shaded properties access to solar include:

Neighbors helping neighbors. Residents with properties that could host solar have the opportunity to install a larger system that meets more than their current needs. There are not clear financial models available at present to have neighbors jointly own a small array and share in tax credit benefits. However, there are straightforward pathways for net metering agreements between community residents to share in the benefits of solar generation. In this situation, a resident with a large roof might install and own a system larger than that necessary to meet their own needs, then net-meter electricity credits over to a different community member's account through a form known as a Schedule Z. It is possible (and common) to establish a legal contract which could guarantee the price per net metering credit - providing the project host/owner a known income each year - and such an agreement could include a commitment to pay a portion of upfront installation costs.

Community solar array. If about one-quarter of residential properties in Monterey cannot host solar, there is likely to be appetite for community solar for people who own shaded properties. It is worth considering whether there are properties where a community-owned project on public or private land could be owned by a group of local residents.

Residential Solar Campaign

The Renewable Energy Working Group or a committed group of residents could conduct a Solarize Mass-style campaign to encourage multiple households to install residential solar PV systems at the same time. The Solarize Mass program is no longer active, but the campaign tools developed as part of the program are still available. The benefits of such a campaign include neighbor support in the purchasing of a solar array and the opportunity to work through challenges together, as well as the feeling of participation in a collective, community effort. In addition, residential solar campaigns can lead to lower installation costs, due to economies of scale associated with the solar installer working on multiple projects in one location.

Specific Next Steps

Based on the above, specific potential next steps for residential solar development include:

- Organize and hold a community solar forum once annually to discuss options for residential solar development. Hold the forum during the summer, when more property owners are likely to be in town.
- Design and distribute flyers/handouts to explain residential solar development options, highlighting their financial feasibility, and including a description of how to arrange a net metering agreement with a neighbor to share solar electricity generation.
- Research sites around town which could be potential sites for community-shared solar facilities.
- Conduct a residential solar campaign every other year, with a goal of recruiting 20 households per campaign. Conduct this campaign during the summer months.
- Take into consideration the needs for full-time residents vs. second homeowners. Their finances, opinions on solar, heating and cooling needs, and ability to purchase solar systems, battery storage, or electric vehicles, may differ.

Action Items

Action	**Lead Entity (or Entities)**	**Supporting Entities**	**Start Year/Annually?**
Organize and hold a community solar forum	Monterey Renewable Energy Working Group	CEE, Solar Installers, Financial Institutions	
Design and distribute a residential solar handout			
Research sites around town which could support community-shared solar facilities			
Conduct a residential solar campaign			

4. SOLAR FOR BUSINESSES AND INSTITUTIONS

This section addresses solar on commercial and institutional buildings and parking lots.

4.1 Current Status

Existing Infrastructure

We did not identify any solar arrays in Monterey currently that are owned by businesses or institutions.

There are a number of large buildings and large paved areas on commercial and institutional properties which might be suitable for solar (see *Future Potential*).

Current Regulatory Status

In Monterey, roof-mounted systems on commercial and institutional roofs fall under the category of small-scale systems in the town's bylaw and are allowed by right in all zoning districts. Systems installed on parking lots would typically be classified as large-scale ground-mounted systems (30 kW to 1 MW, more than 1/8 acre of land) and would require Site Plan Review and a Special Permit in all zoning districts.

Community Perspectives

Residents expressed support for businesses that utilize solar energy: 62% of respondents said that they would feel more positively towards an organization that uses solar power, and 15% of respondents indicated that they are more likely to purchase goods from that organization. 32% of respondents indicated that their views were not affected. A large majority of respondents wanted to see all large roofs and parking lots developed for solar.

4.2 Future Potential

Commercial and Institutional Locations

We identified several businesses and institutions which could be approached regarding their interest in installing solar arrays on commercial rooftops or as solar canopies over existing parking lots.

- There are a total of five medium and large roofs owned by businesses or institutions in Monterey, which total roughly 54,000 sf of roof space and 639 kW of technical solar potential.
    - Kutscher's Sports Academy/Gymnastics Sports Academy (25 Deerwood Park Drive) has two rooftops totaling 33,400 sf and approximately 243 kW of solar potential. This location is about 0.28 miles from three-phase lines.
    - The William J. Gould Therapeutic Community (100 Gould Road) has three rooftops totaling 20,600 sf and approximately 150 kW of solar potential. This site is about 1 mile from three-phase lines.
- The Hume New England Christian Camp has a 1-acre parking lot with a solar technical potential of 263 kW. This site is very close (0.04 miles) to three-phase lines.

Solar arrays over 50 kW in size often must connect to three-phase electricity distribution lines in order to interconnect to the electricity grid safely. The size of systems not

connected to three-phase be limited to less than 50 kW by local grid infrastructure, or grid upgrades may be needed before the system can interconnect.

Financial Considerations

Financial costs and benefits of commercial and institutional solar are dependent on many factors, including system size, system cost, electricity rates, solar incentives, federal and state tax credits, loan amount, and loan terms (interest rate, term). All of these items are site-dependent, and subject to change over time. Currently, there is a federal tax credit of 30% of the cost of an installed solar system, in addition to a $1,000 tax credit available for Massachusetts state taxes. Through the passage of the federal Inflation Reduction Act, non-profit organizations who do not owe taxes are now eligible for a direct payment equal to 30% of the installed cost of a new solar system. Depending on the size, location, and type of system, new solar arrays may also be eligible for solar incentives through the state SMART program on a fixed $/kWh basis; alternatively, businesses and institutions can earn Renewable Energy Credits for each MWh of solar energy that is generated.

Some financial institutions offer business loans which can be applied to solar projects or may offer specific solar loans designed to cover the costs of new solar arrays. For example, UMass Five College Credit Union currently offers solar loans for up to a 10-year term. More information about financing and other aspects of solar for businesses and institutions can be found at: https://www.masscec.com/resources/commercial-solar-information-hub.

4.3 Next Steps & Action Items

Potential Next Steps

Potential next steps for solar development on at businesses and institutions include:

- Conduct outreach to the businesses and institutions with large roofs or paved areas (summarized above) to determine their interest in roof-mounted or parking canopy solar systems.
- Reach out to other businesses and institutions active in town to determine their interest in small-scale roof-mounted or parking canopy solar systems. Some *Community Solar Survey* respondents noted the Country Store, Art Gallery at Old Mechanic Shop, and the old Leeside Lodge could potentially benefit from solar development.
- Reach out to National Grid regarding extension of three-phase lines along Gould Road (also see Section 2) and Deerwood Park Drive.
- Assist interested businesses with estimation of costs and rebates.

Action Items

[To be filled out based on what Renewable Energy Working Group and other municipal boards want to take on in the next 3-5 years.]

Action	Lead Entity (or Entities)	Supporting Entities	Start Year/ Annually?

5. ON-FARM SOLAR

This section addresses solar on farms, including solar arrays on farm buildings and greenhouses, solar canopies designed to shelter parked farm vehicles, and ground-mounted solar development on land owned by farm businesses or actively farmed.

5.1 Current Status

Existing Infrastructure

Monterey has a number of active farms and significant acreage in agricultural production. Based on Mass GIS Land Cover data, the town has roughly 251 acres in cultivation and 1,478 acres in pasture or hay production. 456 acres of agricultural land are protected in perpetuity through an Agricultural Preservation Restriction. In addition, at least nine properties totaling 322 acres participate in the Chapter 61A program for the purposes of agricultural production (not including productive woodlots).

Farms and agricultural businesses in Monterey include:

- Gould Farm – 100 Gould Rd (note that this farm serves multiple purposes, see Section 4)
- Low Land Farm – 129 New Marlborough Rd
- Bracken Brae Farm Stand – 518 Main Rd
- Solstice Farm – 26 Mt Hunger Rd
- Rawson Brook Farm – 185 New Marlborough Rd

There are several roofs on agricultural buildings which could be suitable for solar (see *Future Potential*).

We could not identify any existing solar arrays on Monterey farms.

Current Regulatory Status

Solar projects on barn or other agricultural roofs in Monterey would be regulated as "small-scale" solar and allowed by right in all zoning districts under the town's current bylaw. Ground-mounted solar projects on agricultural land would be considered as "large-scale" solar or "utility-scale" solar, depending on size (less than or greater than 1 MW). In general, these systems would be subject to Site Plan Review and require a Special Permit.

Community Perspectives

Monterey residents were somewhat opposed but had mixed opinions regarding traditional ground-mounted solar development on pastureland (48% oppose/20% neutral/33% support) and opposed more strongly ground-mounted development on land used for fruit or vegetable production (70% oppose/10% neutral/20% support). They did respond more favorably to certain types of solar facilities installed on farmland. A large majority (73%) supported converting agricultural land that is not currently being farmed into solar. Two types of agricultural land were accidentally left off of the electronic version of the survey, but residents who turned in paper surveys also supported agrivoltaic projects (65% support) and solar on the margins of farm fields (64% support).

5.2 Future Potential

Rooftops, Greenhouses, and Parking Canopies

In addition to the roofs identified on the Gould Farm property in Section 4, we identified one agricultural barn roof over 5,000 sf on property in the Chapter 61A program. This roof, located on Gould Road, has an area of 6,710 sf and a technical potential of 49 kW. This roof would require an on-site evaluation to review the underlying roof structure, identify any shading concerns from adjacent vegetation, identify roof-mounted equipment that could interfere with the placement of solar panels, and determine actual solar potential.

Ground-Mounted Solar: Agrivoltaic & Conventional Ground-Mounted Systems

Agrivoltaic Projects

All farms, but particularly those which graze livestock (including dairy cows) or carry out hay production, might be interested in pursuing an agrivoltaic project.

"Agrivoltaic" refers to agricultural production and electricity production from solar PV panels occurring together on the same piece of land. These facilities may also be referred to as agrisolar, "dual-use," or co-location of solar and agriculture. Rows of solar panels in these systems are generally placed further apart and raised higher above the ground to allow agricultural activities to continue to be conducted beneath them, ensure crops receive appropriate sunlight, and make it possible for farm vehicles to easily access all areas in agricultural production.

Agrivoltaic systems are still relatively new, and their economic potential in the temperate Northeast is still being explored. There is currently a lack of robust research and information on (1) the agricultural productivity of these systems, (2) the economic impacts of dual-use systems on farms and farmers, and (3) the effect of these systems on the broader agricultural economy. In general, agronomists are relatively comfortable with the idea that pasture and hay fields can be anticipated to produce reasonable yield of hay or forage, but less is known about the appropriateness of these systems for fruit and vegetable production. UMass Extension is currently working with project partners to better study and understand the agricultural yield and economic aspects of these systems (see https://ag.umass.edu/clean-energy/research-initiatives/dual-use-solar-agriculture/researching-agricultural-economic-impacts-of-dual-use-solar).

Locations for Ground-Mounted Systems

Smaller agrivoltaic or conventional solar projects could be interconnected to the grid anywhere in town where distribution lines are present. Currently, larger projects (>50 kW) are likely only feasible in areas serviced by three-phase distribution lines, or areas within roughly ½ mile of those lines. As apparent in **Figure 1**, Monterey has significant areas of permanently protected land, but there are a number of properties with pasture or hayfield located along existing three-phase lines, which could be used for conventional or, more in line with resident preferences, for agrivoltaic development.

Figure 1. Map showing south and central Monterey, with three-phase lines in orange, hayfield and pasture in light green, and permanently protected land in dark green.

Financial Considerations

Financial costs and benefits of rooftop, greenhouse, or parking canopy solar projects on farms are dependent on many factors, including system size, system cost, electricity rates, solar incentives, federal and state tax credits, loan amount, and loan terms (interest rate, term). All of these items are site-dependent, and subject to change over time. Agricultural projects are eligible for the same federal and state tax credits as other types of systems. These types of projects are also likely to be eligible for SMART solar incentives (on a fixed #/kWh basis) or Renewable Energy Credits (for each MWh of solar energy generated, RECs are sold at auction). Grants to develop solar PV projects that support on-farm energy needs may be available through the state's Agricultural Energy Grant Program.

Agrivoltaic projects may be eligible for an Agricultural adder through the SMART program. In order to qualify for incentives, these projects must be 25 kW in size or larger. To be economical, these projects are often much larger – the average size of standalone dual-use agricultural projects currently in the state program is roughly 3.2 MW DC (~15 acres), although one Agricultural project of 25 kW (~1 acre) has been constructed.

Conventional, ground-mounted solar projects may also be eligible for SMART solar incentives or RECs. Current SMART program regulations place some restrictions on solar development on agricultural land – some large, conventional developments on recently active agricultural land may not be eligible for incentives.

5.3 Next Steps & Action Items

Potential next steps for solar development on farms include:

- Conduct outreach to farm owners/operators to assess their interest in roof-mounted solar PV systems to support farm needs or sell electricity to neighbors. Gould Farm could be a particular target, as noted in Section 4.

- With interested farms, explore options for small to medium ground-mounted solar arrays deployed between fields.
- Assist farms with evaluating and applying to grant opportunities for agricultural energy projects, as well as evaluating costs and benefits of other financing structures.
- Near three-phase lines (see map) on existing pastureland or hayfield, explore landowner and farm operator interest in establishing an agrivoltaic operation.
- Discuss potential for extension of three-phase power along Gould Road with National Grid, to support development of a large agrivoltaic development at Gould Farms, if farm owners are interested.

Action Items

[To be filled out based on what Renewable Energy Working Group and other municipal boards want to take on in the next 3-5 years.]

Action	**Lead Entity (or Entities)**	**Supporting Entities**	**Start Year/Annually?**
	Agricultural Commission		

6. LARGE, GROUND-MOUNTED SOLAR ON PRIVATE LAND

This section addresses large, ground-mounted solar development on private land, including solar projects sited on previously disturbed sites (e.g. gravel pits, quarries, rights-of-way, private landfills, brownfields) and those sited on undeveloped land (e.g. forest, meadow, shrubland) not addressed under On-Farm Solar.

6.1 Current Status

Existing Infrastructure

According to Mass Audubon's *Losing Ground* report, Monterey ranks 45th in the state in terms of the total amount of protected land, with 7,564 acres (43%) of the town under permanent protection. Only 2% (264 acres) of the land area of Monterey is currently developed for housing, businesses, or other purposes.

Despite having a high percentage of conserved land, the town also has a significant acreage of privately owned forest and other natural habitat that is not conserved, which means the potential for large, ground-mounted solar development on undeveloped land remains.

There are no quarries, or MassDEP-identified brownfields in Monterey, but one disturbed site mentioned in Section 2 is further addressed under *Future Potential*.

Currently, there are no large-scale solar arrays in Monterey.

Current Regulatory Status

Large, ground-mounted solar projects would be considered as "large-scale" solar (30 kW to 1 MW) or "utility-scale" solar (greater than 1 MW). In general, these systems would be subject to Site Plan Review and require a Special Permit.

Section 7.8.9 of the bylaws indicates specific design and performance standards for these systems, including requirements related to lighting, signage, utility connections, and access roads. Large ground-mounted arrays require property line setbacks of 75 feet on all sides, can be no more than 15 feet high, and require a minimum lot size of 1/8 acre. Utility-scale projects require 150-foot setbacks.

Large and utility-scale systems may not be located within the habitat of any State-listed Rare or Endangered Wildlife or Rare Plant Species, within 500 feet horizontally from any Historic District or property listed or eligible to be listed on the state or federal Register of Historic Places, or within 500 feet horizontally from any known archaeological site. There are no special stipulations regarding solar development on disturbed sites in Monterey.

Community Perspectives

In the *Community Solar Survey*, Monterey residents expressed support for large ground-mounted solar in their town: 71% felt "positive" or "very positive" towards the development of large ground-mounted solar in general, and 65% felt positive about development in Monterey specifically. There was strong majority support for development to support local needs (87%) and regional needs (80%), which would necessitate limited development of ground-mounted solar, including some development on undeveloped land.

In terms of where ground-mounted projects should be located, residents indicated a strong preference for siting on electricity transmission line corridors/powerline right-of-ways (84% support) and former landfills and brownfields (89%). Residents had mixed views on development in forest regularly harvested for timber (33% support/42% neutral/26% opposed) and meadowlands or shrublands (36% support/29% neutral/36% opposed). For all other types of forested habitats, 60% or more of respondents voiced opposition to development.

In another portion of the survey, residents also indicated support for development along major roads (50% support, 24% neutral), which in Monterey would presumably focus along Route 23. Nearly three-quarters of respondents (73%) also favored solar projects in low elevation areas or otherwise hidden by trees.

6.2 Future Potential

Constraints on Large, Ground-Mounted Solar Development

Development of large, ground-mounted solar on large private properties in Monterey is likely to be constrained by a number of factors. For all sites, these factors include 1) opportunities for interconnection to the electricity grid, 2) the locations of property owners willing to lease or sell their land for solar development, 3) potential project scale, and 4) eligibility for state solar incentives. For undeveloped lands, 5) existing conservation restrictions and 6) wetlands protections are also an important factor. While factor 2 cannot be determined without direct consultations with specific landowners, factors 1, 3, 4, 5, and 6 can be assessed in some detail.

Interconnection Opportunities. Large solar facilities require three-phase power lines in order to interconnect to the grid, so in the near-term, large facilities are most likely to be proposed in areas of town served by or adjacent to three-phase power. Areas currently served by three-phase power are described in the *Grid Infrastructure* section above.

Existing Conservation Restrictions. As noted above, roughly 43% of Monterey land area is under permanent protection and ineligible for solar development. Additional acreage is in temporary protection due to participation in the Chapter 61, 61A, or 61B programs. Participation in these programs does not exclude the possibility of solar development but could make development economically unfavorable if back-taxes are required to remove the land from the program or may allow the town right-of-first refusal on any property lease or sale.

Wetlands Restrictions. The presence of wetlands on a property may also limit the extent of development, since solar development is prohibited on wetlands, and buffers around a protected wetland are often required. Solar development is regulated within 100 ft of most wetlands and water bodies, and within 200 ft of most perennial streams and rivers. Several large bodies of water and rivers are located in Monterey. These include the Konkapot River, Rawson Brook, Lake Garfield, Lake Bruel, Stevens Pond, Palmer Pond, and Benedict Pond.

Eligibility for State Solar Incentives. In addition to the need for interconnection to three-phase lines, in order for solar development to be economically feasible, large-

scale projects may need or desire to qualify for state solar incentives. At present, with limited exceptions, the current state solar program (SMART) does not provide incentives for solar facilities sited on land mapped as BioMap2 habitat or for parcels on which more than 50% of the habitat is mapped as BioMap2.

Project Scale. An important aspect of economic viability for solar projects is project scale. Because interconnection costs are high and often fixed, as well as due to economies of scale, the larger the solar project, the more financially feasible it tends to be. With this in mind, the larger the area available for development, the more likely it is to be attractive to solar developers. Large parcels of land (e.g., 5-10 acres or more) are likely to be of greater interest for development, especially if few or no protected land resources are present (e.g., wetlands, water bodies, BioMap2 habitat).

The following sections describe different types of locations where large, ground-mounted solar could potentially be developed, couched within the context of these constraints.

Disturbed Sites

As discussed in Section 2, there is one large gravel pit located adjacent to the town's former landfill site. This disturbed site is part of 100 Gould Road, a property owned by the William J. Gould Therapeutic Association (Gould Farm). Based on REWG discussions with the property owner, active use of the gravel pit is winding down, and the owner is open to consideration of joint solar development along with the adjacent town-owned property. The currently cleared area is about 13.5 acres (2.7 MW), and the full lot is 250 acres. As noted previously, three-phase power would need to be extended to allow easy interconnection of a large solar array at this site.

Rights-of-Way

One transmission line runs through the northeast corner of Monterey (see Figure 2). It is 1.6 miles long and roughly 100 ft wide, with a total area in Monterey of 19.4 acres. The technical potential of this land is 4 MW.

It is likely that much of this area would not be suitable for solar, due to steep slopes, viewshed considerations in high-elevation portions of the ROW, and bordering trees providing too much shade on the edges of the ROW. The ROW is located immediately under transmission lines, but solar arrays are more typically connected to distribution lines or directly to substations. In Monterey, no portions of the ROW are located adjacent to three-phase distribution lines. The three-phase power line runs through central parts of town, whereas the ROW runs through a small corner located in the northeast section of Monterey. Therefore, this site is not a realistic location for solar development at present, even though development of these kinds of areas is supported by Monterey residents.

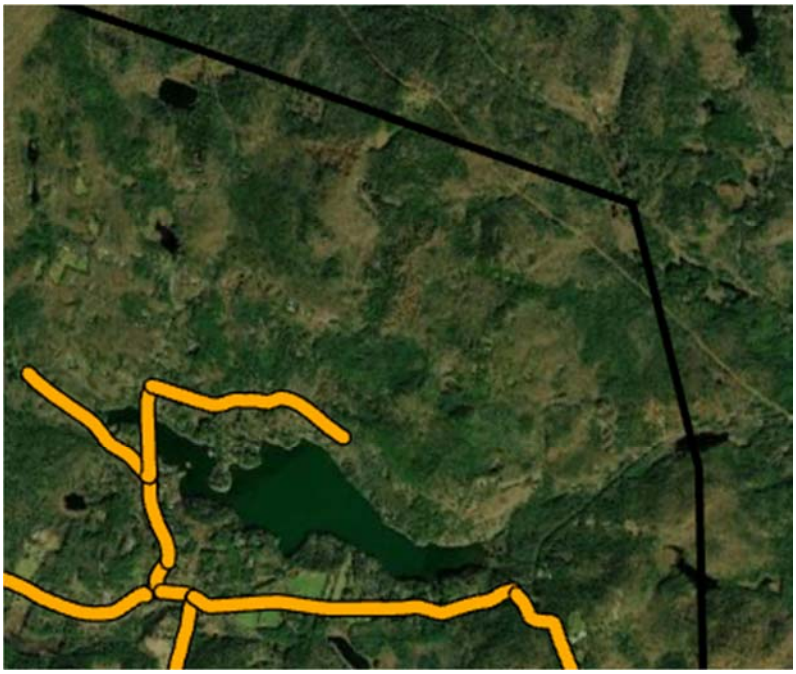

Figure 2. Map showing the transmission ROW running through the northeastern corner of Monterey. Town borders are shown in black, three-phase lines are shown in orange; the ROW appears in satellite imagery as a pale southeast-northwest line.

Major Roads

Community Solar Survey results showed that residents were generally opposed to widespread development of undeveloped land, but a majority supported solar development in parcels along major roads. Route 23, the main road that runs through town, is served by three-phase power along much of its length, except for the very eastern portion of town. Route 183, which runs near the western border of Monterey, also is served by three-phase power. As apparent in **Figure 3**, the large majority of Monterey is permanently protected and/or mapped as land of conservation value. However, there are some parcels, large and small, near three-phase lines and alongside major roads, which could be suitable for solar. These include areas on both sides of Route 23 in the western portions of town and a small area near the town center, as well as parcels on the north side of Route 183.

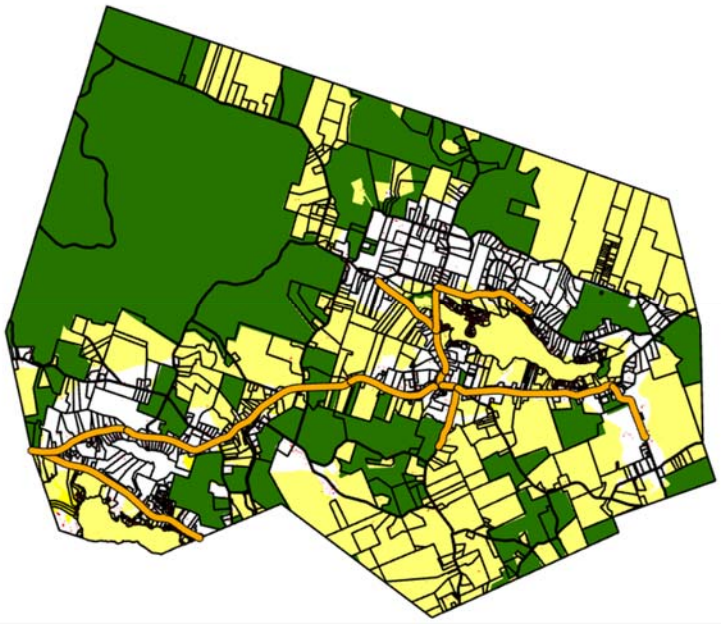

Figure 3. Map showing Monterey, with three-phase lines in orange, BioMap2 core habitat and critical natural landscapes in dark and light yellow respectively, and permanently protected land in green.

Financial Considerations

Financial costs and benefits of solar projects on disturbed sites are dependent on many factors, including system size, system cost, electricity rates, solar incentives, federal and state tax credits, ownership structure, financing, and, importantly, any environmental or liability concerns associated with development of a site with potentially hazardous materials. All of these items are site-dependent and may be subject to change over time. Solar projects on previously disturbed sites are eligible for the same federal and state tax credits as other types of systems. These types of projects are also likely to be eligible for SMART solar incentives (on a fixed #/kWh basis) or Renewable Energy Credits (for each MWh of solar energy generated, RECs are sold at auction).

The Commonwealth of Massachusetts is strongly supportive of solar development on former landfill sites. Projects on former landfills and brownfield sites are eligible for additional SMART incentive "adders" over and above base compensation rates, on the order of 3-4 cents per kWh. The Massachusetts Department of Environmental Protection (MassDEP) also has a website and set of guidance documents related to development of former landfill sites (https://www.mass.gov/siting-clean-energy-at-closed-landfills).

6.3 Next Steps & Action Items

Potential next steps regarding large, ground-mounted solar development include:

- Work with Gould Farms to assess the potential for solar on the disturbed site adjacent to the Transfer Station.
- Work with a local land trust to identify at-risk parcels of high conservation and recreation value along Routes 23 and 183 and preserve them.
- Reach out to owners of large parcels along Routes 23 and 183 that are not mapped as priority wildlife habitat to explore their interest in large-scale solar development.
- Implement bylaw updates in line with resident preferences around development (see next section).

Action Items

[To be filled out based on what Renewable Energy Working Group and other municipal boards want to take on in the next 3-5 years.]

Action	Lead Entity (or Entities)	Supporting Entities	Start Year/ Annually?

7. MUNICIPAL ZONING, BYLAWS, & PERMITTING

7.1 Current Status

State Law regarding Solar Zoning Bylaws

Local zoning laws are regulated by Massachusetts General Law Chapter 40A Section 3. The section relevant to solar zoning states that "*No zoning ordinance or by-law shall prohibit or unreasonably regulate the installation of solar energy systems or the building of structures that facilitate the collection of solar energy, except where necessary to protect the public health, safety or welfare*." There has been much debate over what constitutes regulations that are necessary to protect public welfare, and whether this might include restrictions imposed to protect environmental or agricultural resources of value to the general public. In a recent case, *Tracer Lane II Realty, LLC v. City of Waltham*, the Massachusetts Supreme Judicial Court ruled that the City of Waltham could not impose a restriction that effectively limited large-scale solar development to no more than 2% of the municipality's area. However, it did not address what would be an area reasonable to exclude from large-scale solar development would be. This limitation on local zoning is important to keep in mind when reviewing or updating the town's bylaw. Law firms that commonly work with municipalities recommend basing updates on extensive planning efforts (such as this one) and ensuring that any restriction is grounded in an easily articulated reason related to public health, safety, or welfare. Always check with Town Counsel before implementing any changes.

Municipal Bylaw

Monterey's solar bylaw was updated in 2013, with amendments to the Solar Overlay Districts instituted in 2019. The purpose of the solar section of the zoning bylaws is to outline the placement, specific designs, operation, standards, and impacts of new solar developments. Monterey's zoning bylaw is intended to be compatible with Massachusetts General Law Chapter 40A Section 3, which does not prohibit the installation of solar energy systems unless where necessary to protect health and safety of residents.

Monterey defines three types of solar installations:

Small-scale Solar Photovoltaic Systems (SSPS) include roof-mounted systems of any size or ground-mounted systems taking up less than 1/8 acre with a maximum generating capacity of 30 kW. These systems are allowed by right in all zoning districts.

Large-Scale Ground-Mounted Solar Photovoltaic Systems (LGSPS) include ground-mounted solar systems that occupy more than 1/8 acre of land or greater than 30 kW capacity, up to 1 MW capacity. **Utility-Scale Industrial Ground-Mounted Solar Photovoltaic Systems** (UGSPS) include ground-mounted solar systems greater than 1 MW in capacity. Both of these types of systems generally require Site Plan Review and a Special Permit in all zoning districts.

The town's bylaw includes two solar overlay districts. The first, the Solar Photovoltaic Overlay District (SPOD), covers the entire town, and hence is not discussed further – its provisions are noted above. The Large Solar Overlay District (LSOD) applies to only one town-owned parcel (108 034), located north of the Fire Station, a former golf course site.

On this parcel, a solar system must have a minimum rated nameplate capacity of 250 kW and occupy an acre or more of land and is allowed by right with Site Plan Review.

Section 7.8.9 of the zoning bylaws indicates specific design and performance standards for large and utility-scale solar systems, including requirements related to lighting, signage, utility connections, and access roads. Large ground-mounted arrays require property line setbacks of 75 feet on all sides, can be no more than 15 feet high, and require a minimum lot size of 1/8 acre. Utility-scale projects require a 150-foot setback.

Large and utility-scale systems may not be located within the habitat of any State-listed Rare or Endangered Wildlife or Rare Plant Species, within 500 feet horizontally from any Historic District or property listed or eligible to be listed on the state or federal Register of Historic Places; or within 500 feet horizontally from any known archaeological site.

Community Perspectives

Based on the *Community Solar Survey*, residents provided the following information regarding their preferences for town permitting policies and processes relative to solar:

- Residents are interested in having a voice in permitting decisions regarding large solar development projects. 85% stated that they wanted information on new solar development to be discussed at town meetings, with 79% saying that residents should have the opportunity to review and comment on the site and design. At minimum, preparation for these projects could include a high level of advertising prior to public hearings regarding specific solar projects as well as proposed solar bylaw changes so that all interested residents are able to attend and participate in the discussion.
- Residents prefer that large solar projects provide economic value to the community. Economic benefits of interest could include favorable PILOT agreements that provide revenue to town coffers, displacing residential property taxes, or projects that provide reduced electricity rates for residents. Each of these options garnered upwards of 85% support from survey respondents. The survey did not address what the property tax or electricity rate reduction would need to be for residents to be supportive of a particular project.
- Although we are not aware of an existing precedent for this kind of permitting mechanism, 65% of residents expressed interest in having an ability to vote on proposed large solar projects regarding whether they should or should not proceed. Even if non-binding, proposed projects could be included as warrant articles at town meeting.

7.2 Next Steps & Action Items

Nearly two-thirds of Monterey residents reported they are unsure or unaware of the solar permitting process. It would be beneficial to provide information on the town's website and distribute information about the permitting process, perhaps as a part of sharing information about this solar planning process.

Residents are interested in having a voice in permitting decisions regarding large solar development projects. At minimum, preparation for these projects could include a high level of advertising prior to public hearings regarding specific solar projects as well as

proposed solar bylaw changes so that all interested residents are able to attend and participate in the discussion.

Monterey's bylaw aligns well with resident preferences in multiple respects, including the streamlining of permitting for residential solar and a municipal project at the golf course, as well as considerations and recommendations regarding historical and environmental sites. The town's permitting process, in conforming to state Opening Meeting Law, meets residents' desires for information-sharing at public meetings and an opportunity to comment on siting and design of large solar arrays. However, there are some aspects of the bylaw which could be updated to better align with community preferences as identified in the *Community Solar Survey*. **REWG is currently in discussion with the Planning Board on appropriate amendments to the Town Bylaws to permit development of the former landfill site. With review by Town Counsel, the town may also wish to consider the following updates to the solar bylaw:**

Introduce "Medium-Scale" Solar. To allow for easier installation of medium-scale ground-mounted systems in the margins of farm fields, adjacent to buildings, along major roads, as solar canopies over parking lots, and in other configurations acceptable to residents, the town may wish to develop a category for "medium-scale" solar. Many communities allow "medium-scale" solar by right with Site Plan Review, up to a specified size or area (for example, 250 or 500 kW, or 1 or 2 acres). This would also be helpful to allow for small municipal or business solar developments near the town center, which might be located withing 500 feet of a historic building.

Height Restrictions. Monterey residents are highly supportive of solar on parking lots. The height restriction for ground-mounted solar could conflict with development of solar canopies over parking lots. The town may wish to develop a separate category for solar canopies (allowed by right with a Building Permit, for example), or indicate that height restrictions can be waived in the case of solar parking canopies.

Siting Restrictions - Wildlife. The town's restriction on solar development in habitat for rare plant or wildlife species is in line with community preferences, based on the solar survey. However, the town may wish to more clearly define this stipulation – for example, reference could be made to MA NHESP Priority Habitat (https://www.mass.gov/service-details/regulatory-maps-priority-estimated-habitats). Alternatively, this definition could be expanded to include BioMap Core Habitat, which includes Priority Habitat and some additional lands, and covers about 25% of the town. Given that the large majority of town is mapped as BioMap Core Habitat or Critical Natural Landscapes, it is not recommended to expand the definition to include all BioMap habitat, since this might conflict with state law regarding local solar zoning. The exact language for identifying a limited subset of important natural habitats for restrictions could also be honed through discussions with Mass Audubon, local land trusts, and UMass.

Agriculture – Residents are open to some development of agricultural lands, particularly as agrivoltaics, but strongly oppose conventional solar development on cultivated land (e.g., used for vegetables or fruit). The town could consider additional restrictions or requirements for solar development on land in agricultural production – for example, requiring preservation of farmland of equal or greater quality elsewhere in town if solar

development is to occur on active agricultural land. Some towns have required this for parcels that were enrolled in a Chapter 61 program within the previous three years.

Overlay along Major Roads. Because Monterey has very few disturbed or previously developed areas, there are not many locations where the town is likely to want to streamline large-scale solar development. However, residents were supportive of development along major roads, and there are some parcels along Route 23 that are not permanently protected or located in BioMap habitat. The town could consider streamlining permitting in these areas – for example, by allowing large-scale solar by right with Site Plan Review in non-BioMap habitat adjacent to Route 23.

Energy Storage. The town may wish to adopt bylaw language specifically addressing energy storage systems, which are often associated with solar arrays.

Potential Next Steps

- Review bylaw recommendations.
- Propose bylaw amendments at a subsequent town meeting. *[Note that REWG has already initiated this process to allow for development at the former town landfill.]*
- Provide accessible information on the town's website about the solar planning process and how large solar projects are reviewed and permitted.
- Compile a list of standard practices to 1) advertise public hearings regarding large solar projects widely, 2) advertise public hearings regarding proposed solar bylaw amendments widely, 3) identify resident interest in reduced electricity rates to solar project proponents, and 4) negotiate appropriate PILOT payments.

Action Items

[To be filled out based on what Energy Committee and other municipal boards want to take on in the next 3-5 years.]

Action	Lead Entity (or Entities)	Supporting Entities	Start Year/ Annually?
Review bylaw recommendations, propose bylaw amendments	REWG, Planning Board		2023

8. SUMMARY

8.1 Summary

This section provides a summary of the Action Items noted throughout this Plan.

8.2 Plan Review

This plan will be reviewed and updated in [5?] years by the Renewable Energy Working Group in consultation with the Planning Board, Conservation Commission, and Select Board. Updates will consider progress made since the original plan was developed, and

may require revisiting steps of the *Community Planning for Solar* process, including the *Solar Resource & Infrastructure Assessment* and *Community Solar Survey*.

8.3 Action Items

This section will provide a table of Action Items, summarizing briefly each item, indicating which municipal board, committee, or group of residents is responsible for taking the lead on next steps, and indicating the projected timeline (calendar dates). The table will also include the anticipated timeline for action plan review and revision.

Commented [ZD8]: This timeline is up to the town to decide upon. For guidance in determining an appropriate timeline and revision steps, see the CEE factsheet *Monitoring, Evaluating, and Updating your Community Solar Action Plan* on the Solar Planning toolkit website.

Commented [ZD9]: This list will be drawn from the Next Steps identified above, but town boards and committees will have to identify the timeline over which they want to take it on.