

SUMMARY OF DRAFT COMMUNITY SOLAR ACTION PLAN FOR THE TOWN OF MONTAGUE

DRAFT PREPARED BY

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AND
UMASS CLEAN ENERGY EXTENSION

(IN COORDINATION WITH MONTAGUE SOLAR PLANNING COMMITTEE)

INTENT OF PLAN

To help guide future solar development within the Town of Montague by providing specific actions town residents, committee/board members and officials can take:

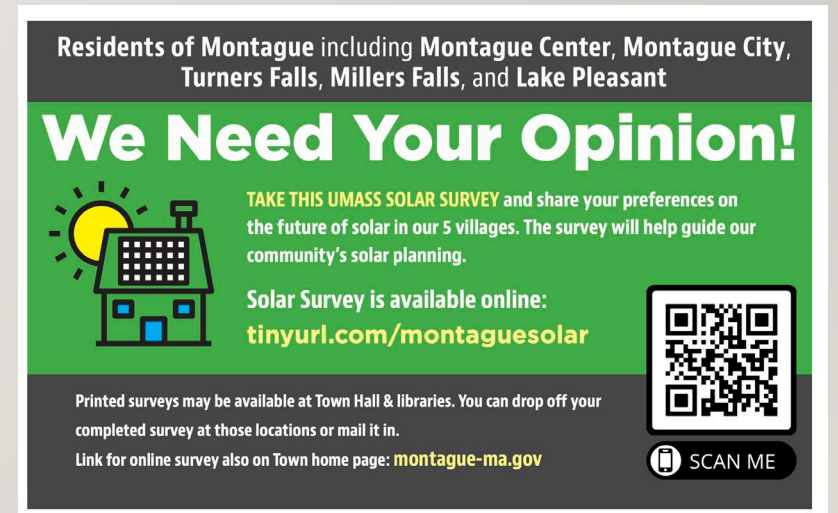
- To develop solar on municipal properties
- Promote solar on residential and commercial properties
- Encourage solar development on locations preferred by the community
- Adopt bylaw amendments & permitting processes in line with residents' preferences

SOME SOLAR PREFERENCES IDENTIFIED BY RESPONDENTS TO UMASS COMMUNITY SOLAR SURVEY

Town residents surveyed about opinions, attitudes & preferences on the future of solar in Montague

- UMass mailed over 600 surveys to residents across town
- Survey promoted to wide range of organizations and at local stores on fliers with link & to survey
- Hard copies available at Town Hall, libraries, and Senior Center
- Posted on Town website home page
- Posted on Town email/text alerts to residents

249 Montague residents responded to the survey



Residents of Montague including Montague Center, Montague City, Turners Falls, Millers Falls, and Lake Pleasant


We Need Your Opinion!

TAKE THIS UMASS SOLAR SURVEY and share your preferences on the future of solar in our 5 villages. The survey will help guide our community's solar planning.

Solar Survey is available online:
tinyurl.com/montaguesolar

Printed surveys may be available at Town Hall & libraries. You can drop off your completed survey at those locations or mail it in.

Link for online survey also on Town home page: montague-ma.gov



SCAN ME

SUMMARY OF COMMUNITY SOLAR SURVEY RESULTS

- Highly supportive of solar development on previously disturbed and developed sites such as rooftops, gravel pits, parking lots, for larger solar arrays
- Prefer little or no development of ag land & natural, undeveloped spaces (70-93% opposed to solar on these lands)
 - Want less than 20% of solar on natural or ag land
 - About 50% support agrivoltaics allowing farming under solar panels & along edges of farmland
- Strong support for solar on municipal properties & commercial rooftops & parking lots
- Residents want opportunity to be part owner of a project (e.g. community solar)

WHAT'S IN THE COMMUNITY SOLAR PLAN?

Lots of info to help the Town plan the future of solar, informed by community preferences

- Grid capacity for solar across town
- How much solar needed to meet town's clean energy needs
- IDs potential municipal & commercial sites for larger solar arrays
- Estimates solar capacity across variety of sites
- Next steps for planning for solar
- Tables with action items, start year, responsible parties

TABLE OF PUBLICALLY OWNED PROPERTY WITH LARGE ROOFTOPS GOOD FOR SOLAR

Structure/Ownership Status	Street Address	Total Roof Area (sf)	Estimated Technical Solar Potential (kW)
Franklin County Technical School	82 Industrial Blvd	154,104	1,511
Turners Falls High School	222 Turnpike Rd	93,048	913
Foreclosed Property (owned by Town of Montague)	20 Canal Rd	49,589	486
Sheffield Elementary School	40 Crocker Avenue	45,506	446
Hillcrest Elementary School	30 Griswold St	34,544	339
Department of Public Works	128 Turners Falls Rd	28,804	282
Shea Theater/Crocker Cutlery Apartments	61 Third St	27,254	267
Turners Falls Water Department	226 Millers Falls Rd	26,310	258
Public Safety Complex	178 Turnpike Rd	22,971	167
Turners Falls Airport	36 Industrial Blvd	14,592	106
DPW Garage	500 Avenue A	12,722	93
Town Hall	1 Avenue A	11,881	87
Turners Falls Airport	Millers Falls Rd	9,369	68
Water Treatment Facility? (Town of Montague)	34 Greenfield Rd	8,714	63
Sheffield Elementary School	35 Crocker Ave	8,081	59
Fire Station	28 Old Sunderland Rd	8,065	59
Turners Falls Airport	36 Industrial Blvd	6,939	51
Warehouse (Town of Montague)	20 Canal Rd	6,742	49
Water Treatment Facility? (Town of Montague)	92 Green Pond Rd	6,025	44

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

SUGGESTIONS FOR UPDATING SOLAR BYLAWS

With review by Town Counsel, the town may wish to consider the following updates to the solar bylaw: (See Section 7 in draft plan)

- Clarify solar parking canopies bylaws
 - Include them explicitly in the building-mounted solar category, or to add a separate category for these systems, allowing them by right with a building permit in all districts (while perhaps requiring Site Plan Review for systems over a certain size).
- Clarify the definition of accessory solar
- Consider introducing medium-scale solar by right or up to a certain size/area
- Expand zoning for large scale solar, while simultaneously imposing additional restrictions related to placement on forest, wildlife habitat, & ag lands

SUGGESTIONS FOR UPDATING SOLAR BYLAWS (CONTINUED)

Forest clearing:

- More clearly define forest clearing.
- Bylaw could be altered to allow for tree clearing with off-site compensatory mitigation.
- A “mature tree” does not appear to be defined in the bylaw.
- Consider establishing a “lookback” period for tree removal.
 - If no “lookback” in bylaws, property owner could log the majority of a forested property and then sell or lease the property to a solar developer in the subsequent year, without violating the provisions of the bylaw or allowing for town oversight.
 - This has happened in other towns!

SUGGESTIONS FOR UPDATING SOLAR BYLAWS (CONTINUED)

Pesticide use bylaw:

- The restriction in the town's current bylaw on herbicide use may conflict with MA Dept. of Agricultural Resources (MDAR) authority over pesticide use.
- The town may wish to check with Town Counsel.

ENCOURAGE PLANNING BOARD TO REVIEW PLAN, ESP. SECTION 7 ON MUNICIPAL ZONING, BYLAWS & PERMITTING

Thank you for taking time in your packed agenda to start this conversation about the solar planning in our town!



Community Solar Action Plan

for

the Town of Montague



Photo Credit: *Town of Montague*

July 27, 2023

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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 intent of this *Community Solar Action Plan* is to help guide future solar development within the Town of Montague 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>).

The Town of Montague has been impressively proactive in pursuing solar development on municipal properties, including working with a developer to install solar on several former landfill properties and exploring opportunities for a microgrid. There are additional steps the town can take to continue to expand these efforts on developed or disturbed sites owned by the town.

Montague residents are highly supportive of solar development on previously disturbed and developed sites, while supporting little or no development of agricultural land and natural, undeveloped spaces. This Action Plan is based around a goal of achieving community self-sufficiency from solar, which would require roughly 150 MW of solar capacity, as well as exploring additional solar development to help meet state goals (160 MW). Community self-sufficiency could partially be accomplished through development of previously disturbed and developed spaces, although some limited development of undeveloped land would be required to meet this goal. Major solar assets include large rooftops and parking lots owned by businesses, institutions, and farms, many of which are located near three-phase lines in downtown Turners Falls and could safely connect to the grid. Residential rooftops and yards could also contribute a significant fraction (as much as one-quarter) of the town's future electricity needs. This Action Plan calls for outreach to residents, businesses, institutions, and farms to encourage solar development on these locations.

Montague has several gravel pits, as well as large sections of electricity transmission ROW which could be explored for solar development. There is also some potential for development along major roads or near existing development. This Action Plan recommends bylaw updates to expand the potential for large solar development on these types of sites, while also imposing more specific restrictions on solar on agricultural or natural lands. While residents are open to agrivoltaic systems or solar arrays deployed between farm fields, most agricultural areas are located away from three-phase lines and could not support solar development. Some natural areas near three-phase lines could be at risk of solar development, and conservation options could be considered in these areas.

Terms, Abbreviations, and Acronyms used in the Plan

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 kilovolts (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.

Microgrids are local electricity networks with a local source of supply (e.g., solar PV) and/or storage, and are typically attached to the larger electric grid but are also able to function independently.

Abbreviations & Acronyms

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

sf - square feet

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1. INTRODUCTION

1.1 Purpose

The intent of this *Community Solar Action Plan* is to help guide future solar development, municipal bylaw amendments, and solar permitting decisions within the Town of Montague. 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.

1.2 Planning Process

This draft *Community Solar Action Plan* was composed for the Town of Montague by UMass students Victoria Haskins and Caroline Williams 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 draft *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 Solar Planning Committee 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 is expected to occur in late summer or early fall 2023.

Because Montague 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

Montague residents in general are strongly motivated to combat climate change and supportive of solar development. Based on the *Community Solar Survey*, 91% of residents are “extremely” or “moderately” concerned about climate change, and 90% reported they have a “positive” or “very positive” attitude towards solar development.

Montague residents are most supportive of solar development on already developed spaces like roofs and parking lots. A majority indicated support for developing all available gravel pits and quarries (60%), parking lots (82%), large rooftops (84%) and landfills and brownfields (86%). A majority of residents were also supportive (69%) or neutral (16%) regarding a goal of solar development sufficient to meet community needs. There was also significant support for solar development to meet anticipated regional (67%) or state (57%) needs. Montague residents are also concerned about conservation of undeveloped natural and agricultural lands within town and showed little support for developing these landscapes for solar – a majority indicated they would like to see no agricultural or natural lands developed for solar. On average, 9% of natural lands and 14% of agricultural lands were preferred to be 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 state goals for solar development. Based on our analysis, community self-sufficiency might ultimately require approximately 150 MW of solar development in Montague, 8.5x 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 475-675 acres of undeveloped land. To help support state electricity needs, Montague would need to develop slightly more solar – roughly 4% of its land area, or about 525-800 acres. This would equate to 160 MW of solar, 9x Montague’s current solar capacity. *[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 regularly.]*

Meeting a goal of community self-sufficiency or supporting state 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.

2. MUNICIPAL SOLAR

This section addresses solar on municipal building rooftops, municipal parking lots, and municipal properties, including public schools located within the community.

2.1 Current Status

Existing Infrastructure & Electricity Use

Montague has 12 municipal facilities which are currently listed in the town's Green Communities report. The largest electricity users, from highest to lowest, are the Drinking Water & Wastewater Treatment Plant, Sheffield Elementary School, the DPW Garage, the Town Hall, Hillcrest Elementary, Colle Opera House, Shea Theater, the Carnegie Library, the Airport Office, the Millers Falls Library, the Montague Center Library, and the Parks and Recreation Fieldhouse. Additional municipal locations that use small amounts of electricity are street and traffic lights.

The town utilizes 1,486 MWh per year of electricity to supply these municipal facilities. A solar capacity of 1,143 kW (1.1 MW) would be required to generate an equivalent amount of electricity annually.

Other public buildings are shared with other municipalities or managed by special districts, and their energy use is not included above:

Great Falls Middle School and Turners Falls High School are located in Montague, but these regional schools are shared with the Town of Gill. Montague is partially responsible for the energy consumption by these buildings. In addition, the Franklin County Technical School is also located in Montague, accepting students from most towns in the county.

The following buildings are managed by special districts on behalf of the community. These include:

- The Turners Falls Fire Station is owned by the Turners Falls Fire District.
- The Montague Center Fire Department is owned by the Montague Center Fire District.
- The Turners Falls Water Department Buildings are owned by the Turners Falls Fire District.

In Montague, the town has several solar arrays located on municipal land. There are three solar arrays on a former dump site south of Turnpike Road, near Sandy Lane. The first two to be built have a combined capacity of 6.0 MW and came completely on-line in 2018. The other is a 2.72 MW system that came online in 2021. In addition, there is a 306 kW solar canopy system that also came on-line in 2021. All three systems are owned by a third party, but the town has offtaker agreements to purchase electricity from the arrays. The town purchases 24% of the power generated by the largest array, equating to about 60% of the town's electricity usage. The rest of the power from that facility is purchased by West Springfield. In addition, there are other power purchase agreements. The potential for additional solar in the vicinity of the landfill site was noted in a newspaper article in 2021. The town also owns a 32 kW system which came on-line in 2020. Solar facilities currently generate about 85% of the town's electricity usage. There is no current energy storage on town property.

Current Regulatory Status

In Montague, rooftop solar is considered a building-mounted system, it can be any size and is allowed by right in all zoning districts. The wording of the town bylaw is somewhat confusing. The building-mounted definition states:

*A solar energy installation that is permanently affixed to a building, as defined by the building code. **This definition is inclusive of canopy structures.** [emphasis added]*

It is not clear if this includes solar canopies over parking lots, or is intended to describe canopies extending out from the building. If solar canopies are not included in this category, they would fall under the “accessory ground-mounted” category (if serving primarily on-site load) and would require a Special Permit in all districts, based on their anticipated size.

Community Perspectives

Montague residents showed strong support for solar development on municipal buildings and properties. In the *Community Solar Survey*, 86% 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, depending on certain factors. Some of the factors cited include where the panels would be located and how much it would cost. Respondents were concerned that the town would not have enough money to finance these projects.

In addition, 76% of residents were supportive of town investment in solar projects to support community electricity needs, with an additional 18% supportive dependent on certain factors, similar to those listed above.

Additional results relevant for municipal solar considerations:

- Most *Solar Survey* respondents are very likely (54%) or likely (35%) to support solar projects that provide back-up power for schools and emergency shelters.
- Most *Solar Survey* respondents support (26%) or strongly support (61%) development on former landfills.

2.2 Future Potential

Future Electricity Use

Based on current fossil fuel use (heating oil, natural gas) to heat town buildings, we estimate roughly 986 MWh of electricity would be needed to heat municipal buildings with air-source heat pumps. In addition, if all municipal vehicles were to be converted to electric, an additional 470 MWh is estimated to be needed as an alternative to gas and diesel. Under this scenario, municipal electricity use would roughly double to 2,942 MWh, necessitating 2,263 MWh (2.3 MW) of total solar capacity to meet municipal needs.

These totals do not include electricity use by Great Falls Middle School, Turners Falls High School, the Gill-Montague special education facility, Franklin County Technical School, Turners Falls Fire Station, Montague Center Fire Department, or Turners Falls Water Department Buildings. 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

Montague's Public Safety Complex (180 Turnpike Road) in Turners Falls houses the town's Police and Fire Department Headquarters. It was the subject of a recent study to determine the feasibility of constructing a microgrid, powered with solar electricity. This building has generators, but they only cover the basic needs of the building (light and heat). It would be advantageous to add a solar plus energy storage facility, to provide an additional source of back-up power to ensure emergency services are functional during an outage. The current DPW Garage is located just down the road from this building, although construction of a new DPW Garage next to the Public Safety Complex has been considered. There has also been discussion of connecting a Public Safety Complex microgrid to Turners Falls High School, located just 0.4 miles away on the same street.

Turners Falls High School (222 Turnpike Road) serves as a regional emergency shelter. It also houses radio equipment for communication during an emergency. The building has natural gas heat, a back-up oil system, and generators. However, according to the town's MVP Plan, Montague would be among the first locations to be cut off during times of insufficient natural gas supply. In addition, the High School boiler loses gas pressure during very cold weather and cannot operate. The backup oil system can only run for one day. With this in mind, connection to a Public Safety microgrid, or incorporation of a separate solar plus energy storage facility, would be of great value to the town and community in the event of an emergency.

Other Potential Emergency Shelter Sites. Given that Montague is a large town, it might be advantageous to the community to have emergency shelter locations in other villages within town. While much of Montague's municipal infrastructure is located in Turners Falls, there are libraries located in two other villages– the Millers Falls Library (23 Bridge Street) and Montague Center Library (17 Center Street). These or other municipal facilities could be considered as potential energy storage sites, serving as more localized emergency shelters. Energy storage can also reduce electricity costs at buildings with relatively high electricity use.

Drinking Water & Wastewater Treatment Plant. This plant provides vital services to the town. While it has back-up power, a solar plus energy storage facility would provide additional resiliency during a power outage.

Municipal Rooftops

The largest roofs on public buildings are Franklin County Technical School, Turners Falls High School and a foreclosed property now owned by the Town of Montague (**Table 1**). The only rooftop that is solar ready is the Department of Public Works building, which was built within the last five years.

Structure/Ownership Status	Street Address	Total Roof Area (sf)	Estimated Technical Solar Potential (kW)
Franklin County Technical School	82 Industrial Blvd	154,104	1,511
Turners Falls High School	222 Turnpike Rd	93,048	913
Foreclosed Property (owned by Town of Montague)	20 Canal Rd	49,589	486
Sheffield Elementary School	40 Crocker Avenue	45,506	446
Hillcrest Elementary School	30 Griswold St	34,544	339
Department of Public Works	128 Turners Falls Rd	28,804	282
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Warehouse (Town of Montague)	20 Canal Rd	6,742	49
Water Treatment Facility? (Town of Montague)	92 Green Pond Rd	6,025	44

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

Other town buildings with roofs over 5,000 sf in area include the two elementary schools (Sheffield and Hillcrest), the Shea Theater, water treatment facilities, Turners Falls Airport buildings, the DPW Garage, the Town Hall, and one of the town’s fire stations. Colle Opera House, the three libraries (Carnegie, Millers Falls, and Montague Center), and the Parks & Recreation Fieldhouse all have roofs smaller than 5,000 sf. These sites may not be economically viable for solar production but could still be considered in an on-site evaluation of municipal buildings.

Our estimate of solar potential on municipal roofs over 5,000 sf is 5,348 kW (5.3 MW). This is the technical potential, and does not take into account roof condition or shading. All of these locations would require on-site evaluations to understand actual solar potential.

Solar arrays over 50 kW in size often must connect to three-phase electricity distribution lines to interconnect to the electricity grid safely. All of the large municipal rooftops which could accommodate an array over 50 kW in size are located near three-phase lines.

Municipal Parking Lots

A number of municipal locations also have paved areas which could be appropriate for solar. The locations with the largest parking lots include several schools - Turners Falls High School, Franklin County Technical School, Sheffield Elementary, and Hillcrest Elementary. These all have large parking lots. The airport also has large, paved areas (aside from the runway), but it is possible glare could be an issue if solar were put at this facility.

Parking lots can have a packing density of approximately 263 kW per acre; the estimates of technical potential provided below are based on this figure.

Location/Ownership Status	Approximate Area (sf)	Estimated Solar Technical Potential (kW)
Turners Falls High School	4.00	1,052
Franklin County Technical School	3.00	789
Sheffield Elementary School	2.75	723
Turners Falls Airport	2.30	605
Town Hall	1.32	347
Montague Community Television	1.19	313
Public Safety Complex	1.00	263
Hillcrest Elementary School	1.00	263
Unity Park Parking Lot	0.91	224
Transfer Station/Recycling Center	0.50	132

Table 2. Publicly owned properties with large areas of roof available for solar.

Our estimate of total technical potential on municipal parking lots is 4,711 kW (4.7 MW). However, this is the technical potential. This estimate does not take into account 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 to interconnect to the electricity grid safely. All the parking lots in **Table 2** which could accommodate a solar array are located near three-phase lines.

Ground-Mounted Solar

The town has former landfill and burn dump areas south of Turnpike Road, near Sandy Lane. Portions of these sites have already been developed for solar, but additional development in this vicinity is possible. The site is adjacent to three-phase power.

The town has also been exploring siting a battery storage system placed in the Canal District - specifically on the former Strathmore/Indeck properties at the north end of the island within the canal. This site is a 3-acre parcel owned by the town and is located adjacent to three-phase power. Solar at this site is also likely feasible.

According to the Massachusetts Department of Environmental Protection (MassDEP), there are also four brownfield locations in Montague that are all town-owned. Montague's brownfields are listed in **Table 3** below. In total there are 4.5 acres of identified brownfields located in Montague. If found in town, additional previously developed areas contaminated by hazardous materials could also qualify as brownfields. In total, these areas represent roughly 900 kW (0.90 MW) of potential solar development.

Former use	Current use	Address	Approximate Area (acres)
Paper mill	Town-owned, seeking re-development	20 Canal Street	1.90
Residence	Residence	34 East Main Street	1.73
Vacant lot	Vacant lot	2 Third Street	0.45
Commercial	Unlisted	Second/Third Street	0.42

Table 3. Brownfields located in Montague, as identified by MassDEP.

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 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.

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>).

2.3 Next Steps & Action Items

Potential next steps for municipal solar development include:

- Start planning for a solar installation on the Department of Public Works roof because this roof is already solar-ready.
- Conduct on-site evaluations of solar potential on municipal rooftops with the assistance of a solar installer. At minimum, the following sites should be included: Franklin County Technical School, Turners Falls High School and Great Falls Middle School, the two elementary schools (Sheffield, Hillcrest), the Turners Falls Water Department, the Public Safety Complex, the Town Hall, Millers Falls Library, and Montague Center Library. Evaluations should include rough quotes for installation cost and identify potential obstacles to development (e.g., roof warranties, roof structure, interconnection). The evaluations at the Turners Falls High School and Great Falls Middle School, the Turners Falls Water Department, the Public Safety Complex, and the libraries should include energy storage options to support emergency shelters or back-up power at the facilities.
- As part of on-site evaluations, include assessments of parking lot canopies at the schools, Town Hall, and Public Safety Complex.
- Determine if additional municipal roofs or parking lots should be included in the priority list noted above.
- Determine whether alternative local shelter sites would be preferable to the libraries, in villages outside of Turners Falls.
- Conduct an on-site evaluation to determine how much more of the former landfill site on Turnpike Road could be developed for solar.
- Conduct an evaluation of solar potential at the Canal District site. This should include an assessment of battery storage opportunities.
- Determine whether brownfields in Montague should be considered for re-development.
- Set up a Mass Energy Insight (MEI) account for Montague to facilitate tracking of town energy use data.
- Work with school staff to compile and analyze energy usage at Turners Falls High School and Great Falls Middle School in MEI.
- Work with school staff to compile and analyze energy usage at Franklin County Technical School.
- Continue exploration of the microgrid opportunity at the Public Safety Complex, with possible extension to the High School.
- Explore potential options to support solar development aside from direct use of town funds (e.g., ARPA funds, MVP grants, solar loans).
- 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 the elementary schools, Great Falls Middle School, and Turners Falls High School.

Action Items

Action	Lead Entity (or Entities)	Supporting Entities	Start Year/ Annually?
Forward plans for solar installation on the DPW Building	Montague Energy Committee	Finance Committee, Select Board	
Conduct on-site solar evaluations	Montague Energy Committee	Solar Installer	
Explore microgrid opportunities	Montague Energy Committee	MassCEC	
Set up an MEI account for Montague	Montague Energy Committee	FRCOG, Green Communities Program, municipal staff	
Review energy usage data for regional middle and high schools and set up MEI account	Montague Energy Committee, Gill Energy Committee	School staff, FRCOG, Green Communities Program, school committee	
Review energy usage data for Franklin County Technical School and set up MEI account	FRCOG, school staff	Franklin County Energy Committees, Green Communities Program, school committee	
Continue exploration of microgrid opportunity	Montague Energy Committee	MassCEC	
Explore solar funding options for municipal projects	Montague Energy Committee	Finance Committee, FRCOG	
Carry out financial analyses	UMass Clean Energy Extension	Energy Committee, Finance Committee	
Create a timeline for future municipal solar development	Montague Energy Committee	Finance Committee, Select Board	

Explore opportunities for electric bus use & charging needs at Elementary Schools	Montague Energy Committee, School Committee	school staff, EPA, MassCEC, bus companies	
Explore opportunities for electric bus use & charging needs at regional Middle and High Schools	Montague Energy Committee, Gill Energy Committee	School Committee, Superintendent's Office staff 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, Montague has about 290 small-scale solar systems representing a total of 2,034 kW of solar capacity. Most are residential systems, which have an average size of 7.26 kW in Montague. Roughly 8% of households have a residential solar system.

In Montague, residential systems fall under the category of building-mounted or accessory ground-mounted solar installations in the town's bylaw. Roof-mounted systems can be any size. Ground-mounted systems always require a special permit in Neighborhood Business, Central Business, and Recreation-Education. In the Residential 1 (RS-1) zoning district they require a special permit if the panel surface area exceeds 150 sf. In all other districts, a special permit is required if exceeding 500 sf. Because 150 sf of panels is roughly equivalent to 2.25 kW and 500 sf of panels is roughly equivalent to 7.5 kW, it is likely that all residential systems in the RS-1 district would require a Special Permit, and many in other districts would as well.

Community Perspectives

In the *Community Solar Survey*, Montague residents indicated strong support for residential solar development, with a large majority indicating that they felt "positive" or "very positive" about solar panels on residential roofs (88%) and in residential yards (78%). Only 6-8% felt negative about these types of systems.

Major reasons residents cited for not already having a system installed were upfront cost (45%), not owning the property (23%), the property being too shaded (21%), or not knowing enough about their options (18%). Other reasons cited included taking away from the house appearance/value, having a slate roof, or lacking a south-facing roof.

Of residents who did not currently have a solar array installed at their home, a large percentage were open to the possibility. A majority (53%) of respondents said they were interested in having solar panels installed at their home, 24% were not sure, and only 23% were not interested.

3.2 Future Potential

Solar Potential on Residential Rooftops & Yards

Potential residential solar capacity in Montague can be estimated through several different methods. If solar were installed on all small building roofs in town, the total technical potential would be 24 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 68% of residential properties in Montague 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 Montague is 7.26 kW). If 68% of homes were to install a solar PV system of this size, it could provide about 18.5 MW of solar electricity generation capacity. This would be equivalent to about 12% of the 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 Montague is 623 kWh, which is similar to the state average. The average size of a household solar PV system in Montague is 7.26 kW (rough average generation of 787 kWh per month), which suggests current solar systems in town are located on houses with higher-than-average electricity use or are designed to meet more than current electricity needs.

As personal vehicles and home heating systems are converted to electricity-based systems, we predict average household electricity use in Montague could increase by roughly 2.5x, necessitating a system of roughly 14.4 kW to offset future household electricity demand. Ultimately, if 68% of households were to install a 14.4 kW system to meet future electricity needs, residential systems could contribute 36.8 MW of solar. This is equivalent to 24% of the estimated 150 MW of solar capacity needed to offset Montagues anticipated future electricity demand.

Montague has many multi-family housing units, which would be particularly good locations for solar, since they tend to have larger roofs. As a historic farming community, there are also some residential properties with large barns. These locations are detailed in Appendix B of the *Solar Resource & Infrastructure Report*, and would be a good target for outreach efforts.

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 Montague 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 Montague. 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 an 7.26 kW system priced at \$3.59/kW (the Franklin 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 (\$180-\$450 per year), but the net value is positive due to avoided electricity costs (\$35,000 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 Montague 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, 2) financial concerns, 3) logistical challenges with locating solar PV systems on some shaded residential properties, and 4) lack of participation in solar programs by landlords.

Public Information Sessions

In order to overcome general hesitancy, address concerns, and increase resident knowledge, Montague 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. 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), opportunities for neighbors to coordinate on solar installations, and, importantly, information for landlords and renters.

Financial analysis of residential systems. CEE is happy to work with Montague 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.

Opportunities to Share Solar

Forested residential properties, as are common in Montague, 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. In addition, Montague has many renters whose landlords may not be interested in installing solar on their properties. Creative approaches are necessary to provide residents of shaded properties and renters the benefits of solar. Solutions to give these residents 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-third of residential properties in Montague cannot host solar, there is likely to be appetite for community solar for people who own shaded properties. In addition, there may be renters who plan to stay in the area long-term, but don't have a property on which they can install solar. 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 town Energy Committee 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.
- 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 in each neighborhood around town which could be potential sites for community-shared solar facilities, possibly incorporating battery storage, so as to allow for an emergency shelter site in each neighborhood during an outage.
- Conduct a residential solar campaign once every # years, with a goal of recruiting # households per campaign.
- Reach out to owners of multi-unit housing to explore possibilities to grant renters the benefits of solar electricity.

Action Items

Action	Lead Entity (or Entities)	Supporting Entities	Start Year/Annually?
Organize and hold a community solar forum	Montague Energy Committee	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			
Reach out to owners of multi-family housing			

4. SOLAR FOR BUSINESSES AND INSTITUTIONS

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

4.1 Current Status

Existing Infrastructure

The majority of smaller solar facilities in Montague are residential, not commercial or institutional. There are five medium-scale (greater than 25 kW to 500 kW) solar facilities in Montague, totaling 498 kW.

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* below).

Current Regulatory Status

In Montague, rooftop solar is considered a building-mounted system, it can be any size and is allowed by right in all zoning districts. The wording of the town bylaw is somewhat confusing. The building-mounted definition states:

*A solar energy installation that is permanently affixed to a building, as defined by the building code. **This definition is inclusive of canopy structures.** [emphasis added]*

It is not clear if this includes solar canopies over parking lots, or is intended to describe canopies extending out from the building. If solar canopies are not included in this category, they would fall under the “accessory ground-mounted” category (if serving primarily on-site load) and would require a Special Permit in all districts, based on their anticipated size. If not serving primarily on-site load, they could be subject to general restrictions on solar energy facilities, and only allowed by Special Permit in the Industrial and Historical-Industrial districts with a Special Permit.

Community Perspectives

Residents expressed strong support for development on developed spaces generally. A majority supported 100% of large roofs and parking lots being developed. Residents were also asked if a business using solar energy would affect their attitude toward the organization: 65% of residents answered that it would make them feel more positive towards the organization, and 29% said it would make them more likely to purchase goods or services from the organization. Less than 1% of people said it would make them feel negatively towards the organization. Overall, people felt very positive towards solar panels on businesses and institutions.

4.2 Future Potential

We identified a number of 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.

Commercial & Institutional Rooftops

Rooftops can provide roughly 1.5 kW of solar per 100 sf of suitable roof space. On medium roofs (5,000-25,000 sf), about 49% of the roof area is suitable for solar; on larger roofs (25,000+ sf) about 66% of the roof area is suitable for solar.

There are 71 commercial and institutional rooftops in Montague with areas over 5,000 sf, totaling 1.5 million sf in area and 13.6 MW of technical solar potential. The largest rooftops in Montague (over 10,000 sf) are shown in **Table 4**. All commercial and institutional roofs over 5,000 sf are listed in Appendix A.

Structure/Ownership Status	Street Address	Total Roof Area (sf)	Estimated Technical Solar Potential (kW)
Judd Wire	124 Turnpike Rd	253,121	2,483
Heat Fab	130 Industrial Blvd	141,198	1,385
New England Extrusion, Inc.	Industrial Blvd	101,873	999
Hillside Plastics	262 Millers Falls Rd	71,516	701
Mayhew Steel Products	199 Industrial Blvd	70,105	688
Walgreens	250 Avenue A	65,877	646
LightLife Foods	Rear LightLife Way	59,366	582
Montague Machine Co.	15 Rastallis St	55,830	548
Atlantic Golf & Turf	27 Industrial Blvd	52,367	514
Paperlogic	36 Canal Rd	49,771	488
Franklin County Home Care	330 Montague City Rd	46,654	458
253 Farmacy Recreational Weed Dispensary	253 Millers Falls Rd	29,947	294
JaDuke Center - Performing Arts	110 Industrial Blvd	21,087	154
FirstLight Hydro Facility	15 Cabot St	19,725	144
Turbosteam Manufacturing	161 Industrial Blvd	17,908	130
Business Complex	320 Avenue A	16,883	123
Pioneer Aviation Building (Airport)	40 Industrial Blvd	14,696	107
Rubin's Auto Service	194 Millers Falls Rd	14,612	106
US Geological Survey (Government Building)	1 Migratory Wy	14,251	104
Sirum Equipment Co Inc.	310 Federal St	13,692	100
US Geological Survey (Government Building)	1 Migratory Wy	13,522	98
Office	282 Avenue A	12,397	90
Business Complex	123 Avenue A	12,224	89
Montague Housing Authority Maintenance	41 Sunrise Terrace	12,068	88
Office	241 Millers Fall Rd.	11,696	85
Baystate Health Hospital	8 Burnham St	11,147	81
Office	42A Canal Rd.	10,421	76
Millers Falls Rod & Gun Club	210 Turners Falls Rd.	10,351	75

Table 4 The 28 largest roofs owned by businesses or private institutions with large areas potentially suitable for solar. All commercial and institutional roofs over 5,000 sf are included in Appendix A.

Almost all of these locations are in or near downtown Turners Falls and in close proximity to three-phase lines. The only exceptions are the buildings on Federal Street and Turners Falls Road.

Commercial & Institutional Parking Lots

Potential sites for solar canopies on parking lots owned by businesses or institutions are summarized in **Table 5**. Parking lots can have a packing density of approximately 263 kW per acre¹, but because the paved areas noted here in some cases include driveways,

estimates of technical potential based purely on acreage are likely to be overestimated. All of these locations would require on-site evaluations to understand use patterns, available space, and actual solar potential.

Location/Ownership Status	Approximate Area	Estimated Solar Technical Potential (kW)
Montague Machine Co.	2.03	534
Food City, Salvation Army	1.80	473
Unity Park Community Garden	1.73	455
Kelter Ronald A Nursing Home	1.63	429
Montague Elks Lodge	1.60	421
Shady Glen	0.85	158
Our Lady of Peace Church	0.63	166
Montague Housing Authority Maintenance	0.60	158
Basketball Court	0.53	139
Highland School Apartments	0.53	139

Table 5 Privately owned properties with large areas of parking lots suitable for solar.

Solar arrays over 50 kW in size often must connect to three-phase electricity distribution lines to interconnect to the electricity grid safely. All of the parking lots in **Table 5** are located near three-phase lines.

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 for solar development on at businesses and institutions include:

- Conduct outreach to the businesses and institutions in town with the largest roofs and parking lots (Tables 4 and 5) to assess their interest in solar or solar plus energy storage on roofs or over parking lots. Stress solar survey results indicating local support for businesses that use solar energy.
- Turners Falls has many businesses with significant space on rooftops and parking lots. Conduct a door-to-door campaign to provide on-site solar evaluations and educational resources to businesses in this village. Consider whether a similar campaign might also be feasible in Millers Falls.
- If using town libraries as local emergency shelter sites (outside of Turners Falls) is not feasible, reach out to religious institutions, social halls, or nonprofit organizations in other villages to assess their interest in serving as local emergency shelters and the feasibility of solar plus battery storage at these locations.
- Assist interested businesses with estimation of costs and rebates.
- As noted above, reach out to owners of multi-family housing regarding solar on long-term rental properties.

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?

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

Montague has many active farms and significant acreage in agricultural production. Based on Mass GIS Land Cover data, the town has roughly 631 acres in cultivation and 553 acres in pasture or hay production. 965 acres of agricultural land are protected in perpetuity through an Agricultural Preservation Restriction. In addition, at least 57 properties totaling 722 acres participate in the Chapter 61A program for the purposes of agricultural production (not including productive woodlots).

Farms and agricultural businesses in Montague include:

- Big Foot Food Forest: 16 Hatchery Road
- Boulder Top Farm: 8 Richardson Road
- Brook's Bend Farm: 119 Old Sunderland Road
- Falls Farm CSA: 202 Old Sunderland Rd
- Great Falls Aquaculture: 1 Australia Way
- Great Falls Harvest: 50 3rd Street
- Little Song Farm: 119 Old Sunderland Road
- Our Family Legacy Farm: 442 Turners Falls Road
- Ox and Robin: 131 Chestnut Hill Loop
- Red Fire Farm: 184 Meadow Road
- Ripley Farm: 11 W Chestnut Hill Road
- Sugarbush Farm: 47 Davis Road
- They Keep Bees: 258 Greenfield Road
- Waidlich Farm: East Mineral Road
- Xenophon Farm: 80 Sunderland Road

Many of these farms are clustered along the Connecticut River.

There are many roofs on barns, farm buildings, and greenhouses which could be suitable for solar (see *Future Potential*).

There is some existing solar on Montague farms; Red Fire Farm (184 Meadow Rd) has one solar-powered greenhouse, featuring 9,461 sf of solar panels on its roof, with a solar energy capacity of 66 kW.

Current Regulatory Status

Solar arrays on the roofs of barns and other agricultural structures (likely including greenhouses) would be considered building-mounted systems; as stated previously, these are allowed by right in all zoning districts.

Ground-mounted systems serving on-site load would fall under the "accessory ground-mounted" category and would require a Special Permit in all districts, based on their

anticipated size. Standalone solar energy facilities are only allowed in the Industrial and Historical-Industrial districts under the current town bylaw, and hence likely could not be built on agricultural land.

Community Perspectives

Montague residents were generally not supportive of widespread ground-mounted solar development on farmland. In fact, a slim majority of respondents indicated that they wanted no agricultural land developed for solar; the average percentage was 15%.

However, residents did respond more favorably to certain types of solar facilities installed on farms. These included:

- Solar panels raised above agriculture land to allow farming to continue beneath (50% support/26% neutral)
- The edges of active agricultural land converted to solar (47% support/28% neutral)

Residents expressed strong opposition to traditional solar development on land currently in vegetable production (87% oppose) or hayfields/pasture (71% oppose). There was somewhat less opposition to development of fallow farmland not currently in production (51% oppose/20% neutral/29% support).

5.2 Future Potential

Rooftops and Greenhouses

There are approximately 131,200 sf of roofs over 5,000 sf on barns and other agricultural buildings which could be suitable for solar. In addition, there are approximately 26,500 sf of existing greenhouses in Montague. These total at least 1,130 kW (1.1 MW) of solar potential.

Locations with the greatest potential for roof-mounted solar on farm rooftops are summarized in **Table 6**. All of these roofs would require on-site evaluations 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.

Note that we identified no large parking lots associated with agricultural businesses.

Structure/Ownership Status	Street Address	Total Roof Area (sf)	Estimated Technical Solar Potential (kW)
Great Falls Aquaculture	1 Australia Wy	69,300	680
Greenhouse - Red Fire Farm	184 Meadow Rd	9,461	TBD
Greenhouse - Red Fire Farm	184 Meadow Rd	9,105	TBD
Barn - Agricultural	South Ferry Rd	8,846	64
Greenhouse - Red Fire Farm	184 Meadow Rd	7,986	TBD
Barn - Agricultural	Old Greenfield Rd	7,324	53
Barn - Agricultural	Meadow Rd	5,982	44
Barn - Agricultural	Meadow Rd	5,973	43
Barn - Agricultural	8 Wills Ferry Rd	5,838	43
Barn - Agricultural	Meadow Rd	5,791	42
Barn - Agricultural	Meadow Rd	5,704	42
Barn - Agricultural	157 East Mineral Rd	5,532	40
Barn - Agricultural	310 Federal St	5,477	40
Barn - Red Fire Farm	172 Meadow Rd	5,415	39

Table 6. Agricultural buildings with large roofs suitable for solar.

The largest three agricultural rooftops in Montague could potentially host a solar array over 50 kW in size. The largest two, on Australia Way and South Ferry Road, are both located near three-phase lines. The site at Old Greenfield Road is not near three-phase lines, but given that it is only 53 kW, it would not be unduly limited in capacity by the presence of single-phase lines. Solar arrays under 50 kW in size can typically safely connect to single-phase or three-phase electricity distribution lines.

In addition to rooftops, Montague has a number of large greenhouses which could be converted to solar greenhouses. Farmers could all consider opportunities to install new solar greenhouses or solar canopies used to shelter vehicles.

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

Montague residents were generally not supportive of ground-mounted solar development on farmland, but did respond more favorably to agrivoltaic facilities and installations on the edges of agricultural fields.

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>).

Conventional Projects

Residents expressed strong opposition to traditional solar development on land currently in agricultural production. However, residents were open to smaller projects installed in the margins of farm fields, and had mixed feelings towards solar arrays installed on fallow farmland.

Locations for Ground-Mounted Systems

Small solar projects (under 50 kW) 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** below, Montague has an extensive network of three-phase lines, but many of these are concentrated in the northern part of town, away from large areas of open land. Large sections of the town are permanently protected from development, and there are only a few locations where cultivated land, hayfield, or pasture is located near three-phase lines. Given the limited distribution of unprotected, agricultural land in Montague, development of large-scale solar projects on or adjacent to agricultural land may not be a widely applicable option in the community.

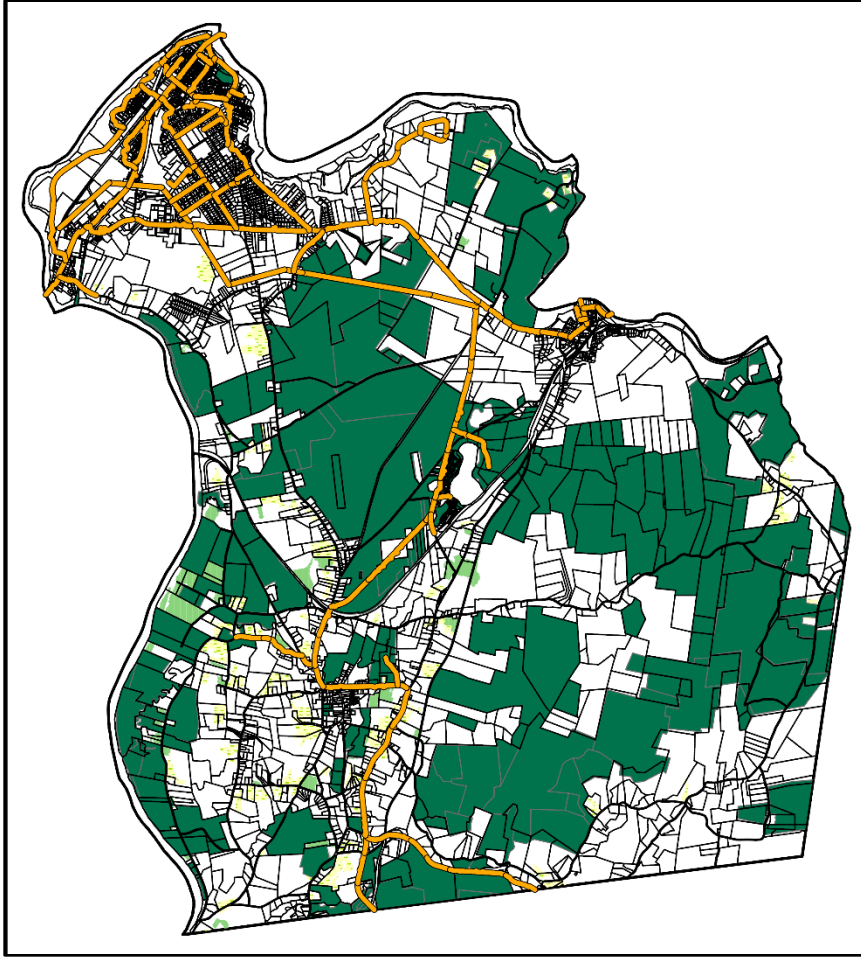


Figure 1. Map showing Montague, with three-phase lines in orange, hayfield and pasture in light yellow, cultivated land in light green, and permanently protected land in dark green.

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 $\$/\text{kWh}$ 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.

Agrioltaic 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

- Conduct outreach to Red Fire Farm to assess their interest in roof-mounted solar and additional solar greenhouses to support farm needs or sell electricity to neighbors.
- Conduct outreach to Great Falls Aquaculture and owners of other properties with large barns roofs (Table 6) to assess their interest in roof-mounted solar.
- Consider outreach to other farm owners/operators noted in *Existing Infrastructure* to assess their interest in small-scale roof, canopy, or ground-mounted solar.
- Assist interested farms with evaluating and applying to grant opportunities for agricultural energy projects, as well as evaluating costs and benefits of other financing structures.

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?
	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, right-of-ways, 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

Current Land Use

According to Mass Audubon's *Losing Ground* report, Montague ranks 40th in the state in terms of the total amount of protected land, with 7,915 acres (39%) of the town under permanent protection. One-tenth of the land area of Montague is currently developed for housing, businesses, or other purposes.

Despite having a large 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.

Solar Infrastructure

Montague has **three** large-scale facilities (greater than 500 kW) totaling about 14 MW. Two of the large-scale ground-mounted solar arrays were addressed in the municipal section and are located on an old town landfill.

A third solar facility is a 23-acre facility between Lake Pleasant Road, Lake Pleasant Access Road, and Millers Falls Road. It has a design capacity of 4.2 MW (4,176 kW) and was authorized to interconnect to the grid in 2018.

Grid Infrastructure

Montague has an extensive network of three-phase lines, primarily concentrated, as noted previously, in the northern sections of town.

The following areas of town have three-phase power:

- Northern portions of Montague, especially downtown Turners' Falls and Montague City, which are both served by multiple three-phase power lines.
- Three-phase lines extend northeast from Turners Falls to the Turners Falls Airport on Millers Falls Road and Industrial Blvd.
- One three-phase line enters Millers Falls via Millers Falls Road, serving Crescent Street, South Prospect Street, and Newton Street.
- One three-phase line extends south along Lake Pleasant Road, serving Lake Pleasant, as well as Turners Falls Road south from Swamp Road to Center Street and Route 63. Meadow Road is also served by an off-shoot of this line.
- This line continues south along Route 63 to Montague's southern border, also providing service to North Leverett Road.

The remainder of town is largely served by single-phase lines.

Current Regulatory Status

Large ground-mounted solar (exceeding 2,000 sf of panel surface area) is prohibited in all districts except for the Industrial and Historical Industrial Districts, where it is permitted by Special Permit with Site Plan Review. These districts cover areas on the margins of Turners Falls, as well as between Turners Falls and Millers Falls.

Community Perspectives

In the *Community Solar Survey*, Montague residents expressed support for solar development on some types of previously disturbed lands. Residents indicated a strong preference for large, ground-mounted solar development on former landfills and brownfields (87% support/9% neutral), former sand/gravel extraction sites (85% support/11% neutral) and electricity transmission line right of ways (78% support, 15% neutral).

For all other types of forested and open natural habitats, 70-93% of residents expressed opposition to development. These habitats included meadows, shrublands, and large and small patches of new growth or mature forest, as well as priority wildlife habitat. A majority of residents wanted to see no natural lands developed for solar, and the average percentage of preferred development was 9%. (Some development of undeveloped land would be needed to meet solar goals of community self-sufficiency or help meet state goals – both options support by residents - but it would be equivalent to 4% or less of agricultural and natural lands.)

In another portion of the survey, residents did indicate support for development along major roads (64% support/17% neutral), which in Montague could include Routes 63 and 47.

6.2 Future Potential

Constraints on Large, Ground-Mounted Solar Development

Development of large, ground-mounted solar on large private properties in Montague 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 39% of Montague's land area is under permanent protection and ineligible for solar development. Additionally, at least 2,121 acres (10.5%) are 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, according to state law.

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 be developed, couched within the context of these constraints.

Disturbed Sites

There are a number of previously developed and disturbed sites in Montague, in addition to the municipal landfill sites and brownfields discussed previously.

Sand and Gravel Operations. Tax parcel data identifies two properties with sand-and-gravel operations along Federal Street, and one other mining/quarrying operation, located at 9 Woodland Drive. Little disturbance is evident at 9 Woodland Drive, although it could be associated with the larger operation on an adjacent property along Federal Street. That property currently has roughly 4-5 acres of land disturbed as part of the sand and gravel operation, out of a total of 17.5 acres. If that site becomes inactive, developing the current 4-5 acres could yield 1 MW of solar capacity. Developing the full property for solar would support roughly 3.5 MW of solar capacity. The other sand-and-gravel site is on the western side of Federal Street near the southern border of town. This site has roughly 1.6 acres of disturbed land. The full lot is roughly 15 acres. This site, if it became inactive, could support 0.3 MW of development on the disturbed area, or 3.0 MW on the full lot.

Other Disturbed Areas. We also looked at land identified as “bare land” using MassGIS land cover data in order to identify any additional disturbed sites. There are some areas of bare soil around the Hillside Plastics building on Millers Falls Road, but these appear to be used as storage areas for large shipping containers and hence are likely not suitable for

solar. On Turnpike Road there are roughly 5 acres (1 MW potential) of disturbed land near Demers Landscaping. Some of this area is being used as a storage site for materials, but some could likely be developed for solar – or the entire site could, if it became inactive for its present use.

Rights-of-Way

There are three electricity transmission right-of-ways (ROWs) that run through Montague (**Figure 2**). One cuts in a zig zag through the central part of Montague. It is 5.3 miles long and roughly 180 feet wide. The total area is 115 acres. A second transmission line runs down the south-east corner of Montague. It is 4.5 miles long and 180 feet wide. This has a total area of 100 acres. A third transmission line runs from the southern end of Montague to the substation on the north-west side of Montague. This is 8.7 miles long and roughly 150 feet wide. This has a total area of 160 acres.

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.

ROWs are located immediately under transmission lines, but solar arrays are more typically connected to distribution lines or directly to substations. In Montague, the second ROW (in the northeast corner) is far from any three-phase lines, and runs through large areas of protected land. However, the other two ROWs are criss-crossed by three-phase lines in several locations, and the third transmission ROW described runs directly to the Montague Cabot substation.

A major challenge in developing ROWs is that there is not a common practice of developing electricity transmission ROWs for solar. Utility companies typically prefer to keep these areas clear to allow for easy maintenance of transmission lines as well as underlying vegetation. However, this land area represents a potentially untapped resource for solar across Massachusetts. In the *Community Solar Survey*, residents were strongly supportive of solar development in transmission right-of-ways.

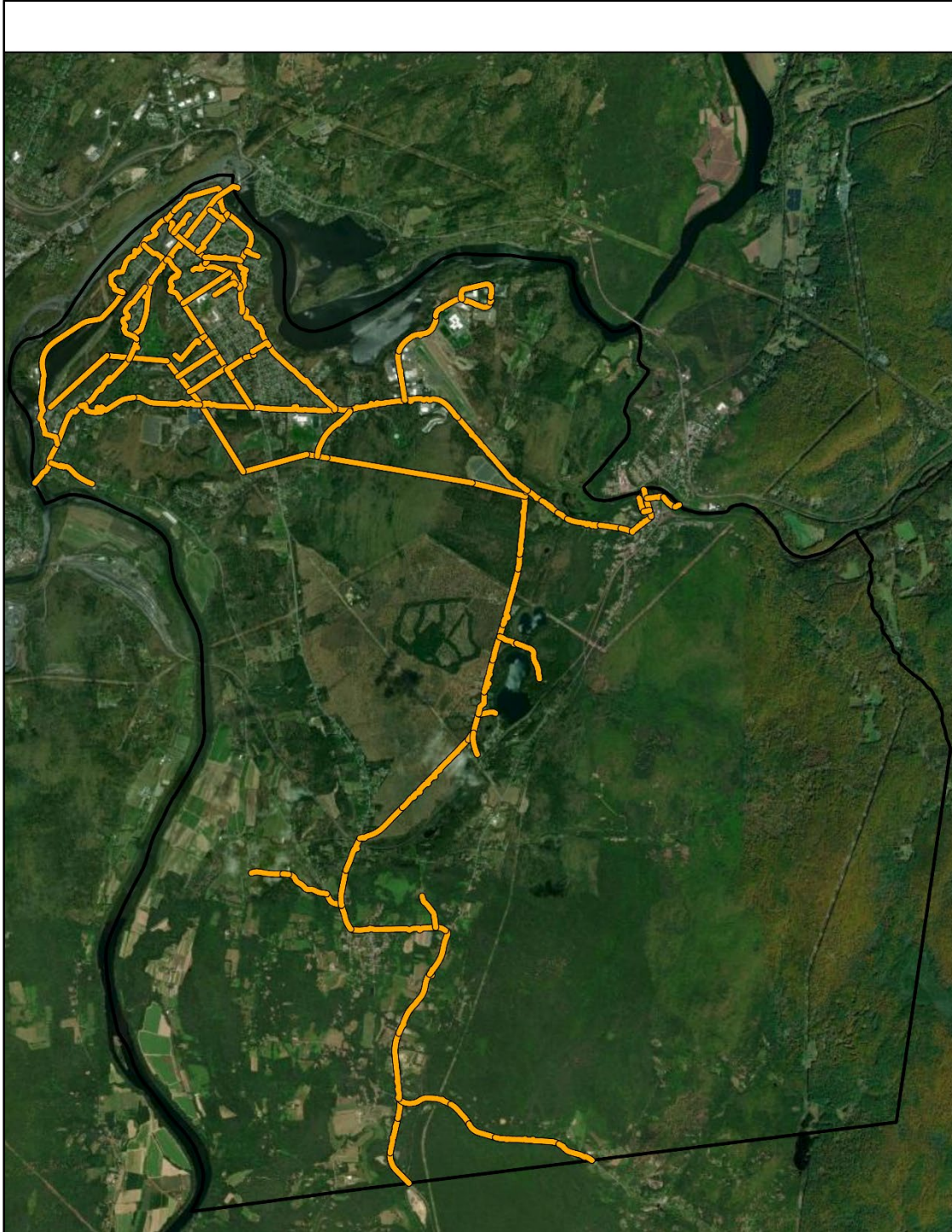


Figure 2. Map showing transmission ROWs running through Montague. Town borders are shown in black, three-phase lines are shown in orange; the ROW appears in satellite imagery as a pale, tan lines against green forest and other land uses.

Parcels Adjacent to Major Roads

Community Solar Survey results showed that residents were generally opposed to development of undeveloped land, but supported solar development in parcels along major

roads. Routes 47 and 63 run through portions of Montague, but only Route 63 has three-phase power along a portion of its length, south of Center Street to the town's southern border. As shown in **Figure 3**, much of this southern portion of Route 63 runs through areas that are permanently protected and/or mapped as important wildlife habitat. Just north of North Leverett Road, there are some properties, particularly on the east side of Route 63, that are not mapped as important habitat and not currently protected.

If three-phase power were to be extended up Route 63 towards Millers Falls, there are additional areas through the central portion of Montague and again just outside of Millers Falls along Route 63 that are not protected and not mapped as priority habitat.

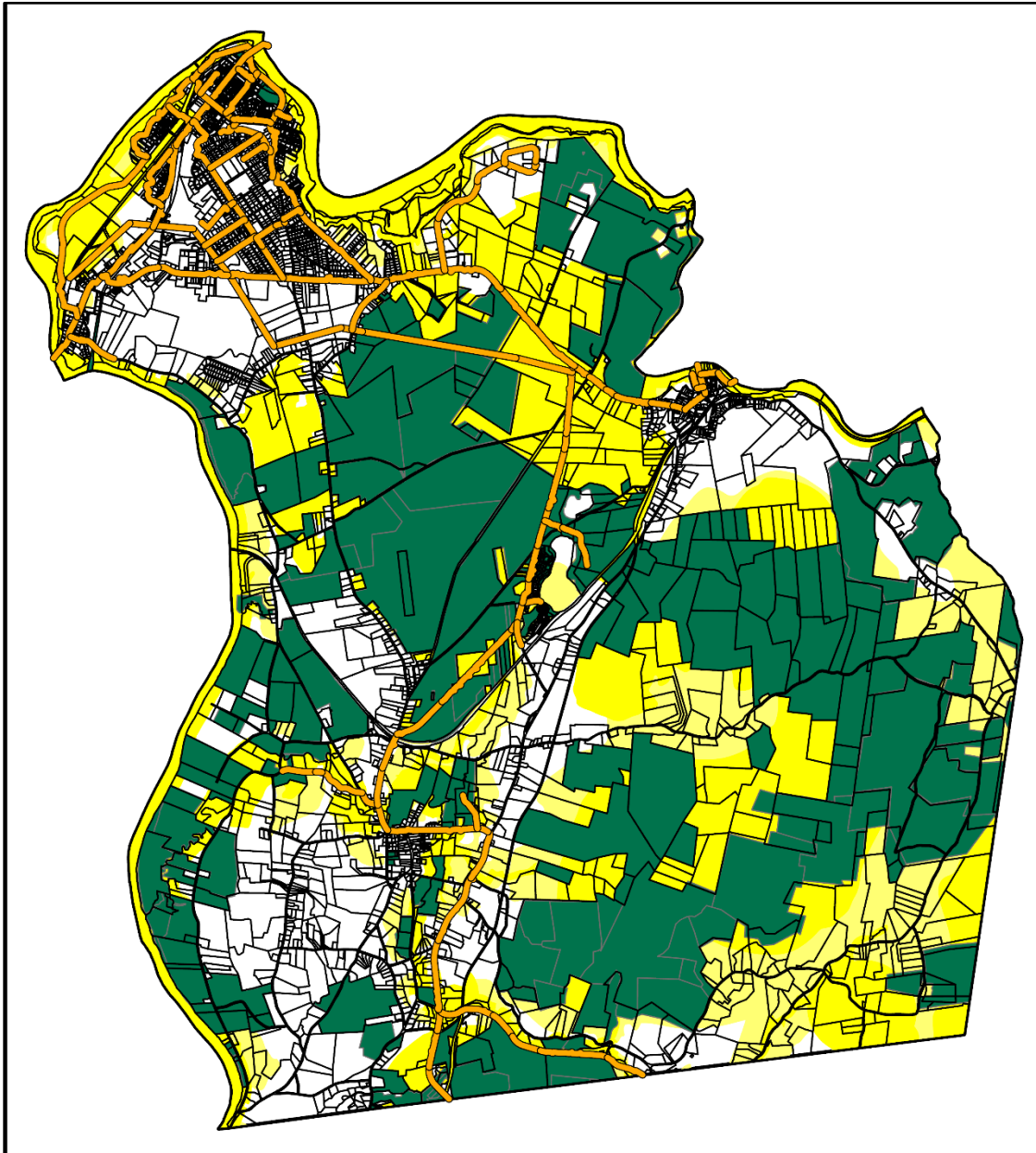


Figure 3. Map showing Montague, with three-phase lines in orange, BioMap2 core habitat and critical natural landscapes in dark and light yellow respectively, and permanently protected land in green.

Other Locations

Because Montague has so much land that is mapped as important habitat or is permanently protected, it is difficult to identify large parcels appropriate for large-scale solar development. However, it is worth noting several locations:

- Sections of Taylor Hill Road are not mapped as priority habitat for wildlife. These areas are not served by three-phase power currently, but could be of interest for solar development if the grid was built out in this area.
- Solar development south of Turnpike Road in Montague City could be expanded.
- East of Millers Falls and Lake Pleasant are some large areas not mapped as important wildlife habitat, which back up to an ROW. Three-phase power would only need to be extended about 0.25 miles to serve this area.

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, and financing. 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).

6.3 Next Steps & Action Items

- Reach out to the owners of disturbed sites identified in this section to consider whether solar development might be a possibility.
- Reach out to Eversource (with CEE assistance) regarding community interest in development of ROWs.
- Reach out to owners of large parcels along southern Route 63 that are not mapped as priority wildlife habitat to explore their interest in large-scale solar development.
- Reach out to owners of large parcels east of Millers Falls not mapped as priority wildlife habitat to explore their interest in large-scale solar development.
- Reach out to owners of parcels south of Turnpike Road in Montague City to assess the possibility of expanding solar facilities in this vicinity.
- Reach out to Eversource regarding the potential extension of three-phase power north along Route 63 and east of Millers Falls to support additional solar development.
- Work with Franklin Land Trust or other land conservation organizations to identify at-risk parcels near three-phase lines of high conservation and recreation value and preserve them.
- Implement bylaw updates in line with resident preferences around development (see next section).

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?

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 Bylaws

Montague’s zoning bylaw was updated in February 2019. The solar bylaw is intended to encourage solar energy installations and facilities with minimal environmental impact which are located on roofs, over parking lots, and on degraded sites.

The bylaw categorizes installations by location, size, and purpose.

- Building-mounted solar energy installations are permanently affixed to a building and appear to be permitted by right in all zoning districts with a building permit. Canopies are included in this category, although not clearly defined.
- Accessory ground-mounted solar energy installations are mounted on the ground or on a non-building structure (supports) and the energy collected is primarily used on-site. These types of systems often require a Special Permit, dependent on size (see **Table 7**).

Zoning District	Requirement
Neighborhood Business, Central Business, and Recreation-Education	Special Permit Required
RS-1	Special Permit Required if exceeding 150 square feet of panel surface area (roughly 2.25 kW)
All other districts	Special Permit Required if exceeding 500 square feet of panel surface area (roughly 7.5 kW)

Table 7. Requirements for ground-mounted solar energy installations by Zoning District.

- “Solar energy installations” are mounted on the ground, occupy more than 2,000 sf (about 30 kW capacity), and primarily serve off-site load. These types of systems are only allowed in Industrial and Historical-Industrial districts with Site Plan Review and a Special Permit.

Solar energy installations require submittal of detailed Site Plans and are subject to numerous requirements regarding lighting, signage, vegetation management, tree removal, and other environmental and aesthetic concerns.

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:

- 67% of residents believe that the development of large, ground mounted solar energy should be allowed and promoted in appropriate circumstances and an additional 17% believe it should be encouraged and promoted generally.
- Residents are interested in having community involvement in planning for large-scale solar energy projects. A majority of respondents want to have information shared at public meetings, and they want to be able to review and comment on the siting and design. They also want to be involved in deciding the best place in town for the solar project and believe voters should have the right to vote on solar projects before they have been approved. Residents want communication with the solar developer, including being able to express concerns directly to the developer. Finally, residents want the opportunity to be a part-owner of the project.
- Residents were especially interested in supporting solar projects when there were certain community benefits attached. These included reduced electricity rates for residents and reduced property taxes. It also helped if a solar installation could provide jobs for residents or back-up power to a school, emergency shelter, or senior housing.
- Residents expressed that they did not know about the process of solar permitting and development. In fact, 56% said they were not sure and/or not aware of the process. However, they did express interest in being more involved in the process and learning more.

7.2 Next Steps & Action Items

As noted above, a majority of residents are unsure or unaware of the solar permitting process in Montague. 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.

Montague’s bylaw aligns well with resident preferences in multiple respects, including the streamlining of permitting for rooftop solar, permitting of solar to serve on-site loads, and limitations on large, ground-mounted development. 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 state law, as well as with community preferences as identified in the *Community Solar Survey*, including resident support for a solar goal of community self-sufficiency.

With review by Town Counsel, the town may wish to consider the following updates to the solar bylaw:

Solar Canopies. As noted in Section 2, solar canopies over parking lots may be included in the definition of building-mounted structures, but the language in the bylaw is not clear. Given residents' support for these types of structures, it would be advantageous to clearly include them in the building-mounted solar category, or to add a separate category for these systems, allowing them by right with a building permit in all districts (while perhaps requiring Site Plan Review for systems over a certain size).

Accessory Solar Definition. Accessory ground-mounted solar installations could be better defined. There is no limit on the size of these systems as included in the definition, but the subsequent definition (solar energy facilities) states that it applies to projects over 2,000 sf – perhaps implying that accessory systems are intended to be limited to no more than 2,000 sf. In addition, these systems are intended to “primarily” support on-site electricity needs, but this term could also be better defined – what fraction of the energy must be used on-site? If a business owns multiple properties around town and net-meters energy from the solar facility to another nearby property, could that also be considered accessory use?

The limit on the size of these systems allowed by right is at most 500 sf, and is 0 sf or 150 sf in some districts. Given that residents are supportive of small-scale ground-mounted systems, we recommend allowing these systems by right in all districts, at least up to the largest size needed for residential systems, which would be roughly 1,700 sf or 25 kW.

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 supported by residents, the town may wish to develop a category for “medium-scale” solar. Many communities allow “medium-scale” solar by right in all districts with Site Plan Review, up to a specified size or area (for example, 250 or 500 kW, or 1 or 2 acres).

Expand Zoning for Large-Scale Solar Installations. Currently, the bylaw suggests that any ground-mounted solar facility over 2,000 sf (30 kW) is prohibited outside of Industrial and Historical Industrial districts. Even if the town introduces a medium-scale solar definition (for projects up to 250 or 500 kW), we still recommend considering expansion of the locations that larger systems (500 kW and above) could be located. The Industrial and Historical Industrial districts take up a relatively small portion of the municipality, and it is possible that this restriction is in conflict with state law. In addition, these districts do not include large areas of electricity transmission ROW, some areas of low conservation value along major roads, and other disturbed sites where survey respondents indicated they would support solar development. If large-scale installations were allowed in most zoning districts, the town would simultaneously want to impose additional restrictions related to placement on forest, wildlife habitat, and agricultural lands – the language of these restrictions could be determined in consultation with UMass, Mass Audubon, local land trusts, and other relevant conservation organizations.

Forest Clearing. The provision that limits clearing of mature trees could be more clearly defined and could be altered to allow for tree clearing with off-site compensatory mitigation. A “mature tree” does not appear to be defined in the bylaw. Requiring

maintaining one mature tree on-site for every tree that is cleared for a solar facility does limit the extent of forest clearing on a particular parcel. However, it does not necessarily succeed in meeting environmental goals of limiting habitat fragmentation and reducing encroachment on mature forest. For example, at a previously disturbed site or forested area adjacent to developed areas, it may be better from an environmental perspective to develop the whole site, rather than retain low-quality forest and develop a second facility elsewhere, which could be sited on higher-quality habitat. Rather than require that half of the mature trees on any individual parcel be retained, the town could allow for off-site compensatory mitigation through preservation of higher-quality forest habitat in other parts of the town (e.g., through a conservation restriction).

Whatever the details of the forest clearing provision, the town may also wish to consider establishing a “lookback” period for tree removal. If no “lookback” is established, a property owner could easily log the majority of a forested property and then sell or lease the property to a solar developer in the subsequent year, without violating the provisions of the bylaw or allowing for town oversight.

Pesticide Use. The restriction in the town’s current bylaw on herbicide use may conflict with Massachusetts Department of Agricultural Resources (MDAR) authority over pesticide use. The town may wish to check with Town Counsel.

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 Energy Committee 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.

Appendix A

Table of institutional and commercial roofs over 5,000 sf in area.

Structure/Ownership Status	Street Address	Total Roof Area (sf)	Estimated Technical Solar Potential (kW)
Judd Wire	124 Turnpike Rd	253,121	2,483
Heat Fab	130 Industrial Blvd	141,198	1,385
New England Extrusion, Inc.	Industrial Blvd	101,873	999
Hillside Plastics	262 Millers Falls Rd	71,516	701
Mayhew Steel Products	199 Industrial Blvd	70,105	688
Walgreens	250 Avenue A	65,877	646
LightLife Foods	Rear LightLife Way	59,366	582
Montague Machine Co.	15 Rastallis St	55,830	548
Atlantic Golf & Turf	27 Industrial Blvd	52,367	514
Paperlogic	36 Canal Rd	49,771	488
Franklin County Home Care	330 Montague City Rd	46,654	458
253 Farmacy Recreational Weed Dispensary	253 Millers Falls Rd	29,947	294
JaDuke Center - Performing Arts	110 Industrial Blvd	21,087	154
FirstLight Hydro Facility	15 Cabot St	19,725	144
Turbosteam Manufacturing	161 Industrial Blvd	17,908	130
Business Complex	320 Avenue A	16,883	123
Pioneer Aviation Building (Airport)	40 Industrial Blvd	14,696	107
Rubin's Auto Service	194 Millers Falls Rd	14,612	106
US Geological Survey (Government Building)	1 Migratory Wy	14,251	104
Sirum Equipment Co Inc.	310 Federal St	13,692	100
US Geological Survey (Government Building)	1 Migratory Wy	13,522	98
Office	282 Avenue A	12,397	90
Business Complex	123 Avenue A	12,224	89
Montague Housing Authority Maintenance	41 Sunrise Terrace	12,068	88
Office	241 Millers Fall Rd.	11,696	85
Baystate Health Hospital	8 Burnham St	11,147	81
Office	42A Canal Rd.	10,421	76
Millers Falls Rod & Gun Club	210 Turners Falls Rd.	10,351	75
Business - Manufacturing	26 North Leverett Rd	9,590	70
Firstlight Electricity Generation Facility	26 Power St	9,522	69
Franklin Survival Center	96 4th St	9,079	66
Business - Manufacturing	15 Rod Shop Rd	8,958	65
Business - Manufacturing	10 Industrial Blvd	8,645	63
Business Complex - Restaurants	33 East Main St	8,612	63

JaDuke Theater	110 Industrial Blvd	8,485	62
United Arc	294 Avenue A	8,353	61
Business Complex	107 Avenue A	8,192	60
Kustom AutoBody Garage	48 Randall Rd	8,082	59
Business Complex	76 Avenue A	7,727	56
Business	400 Avenue A	7,720	56
Catholic Church	80 Seventh St	7,555	55
FastLights Lighting	47 J St	7,529	55
Marks Rentals Garage	484 Federal St	7,522	55
Business - Manufacturing	10 Industrial Blvd	7,168	52
Industrial - Firstlight Electricity Generation	0 Avenue A	7,154	52
Church	148 L St	7,134	52
Warehouse - Commercial	7 Rod Shop Rd	7,031	51
Great Falls Discovery Center	2 Avenue A	6,926	50
Medical Offices	Rear Burnham St	6,788	49
Business Complex	104 Avenue A	6,656	48
Office Complex	176 Ripley Rd	6,636	48
Business Complex	161 Avenue A	6,616	48
Shanahan Construction	298 Avenue A	6,575	48
Business Complex	82 Third St	6,486	47
Element Brewing Company	16 Bridge St	6,473	47
Business Complex	Unity St	6,353	46
Church	19 Bridge St	6,107	44
Barn - State DFG	W Chestnut Hill Rd	6,002	44
Barn - Commercial	Rear Montague City Rd	5,991	44
Offices of Dolan & Dolan	170 Avenue A	5,852	43
Social Hall	197 Avenue A	5,713	42
Offices	15 Power St	5,488	40
Business Complex	52 Avenue A	5,442	40
Jarvis Pools & Spas	72 Unity St	5,329	39
Business - Funeral Home	1 Kostanski Sq	5,308	39
Warehouse - Commercial	314 Montague City Rd	5,272	38
Social Hall	1 Elks Ave	5,224	38
Brick & Feather Brewery	320 Avenue A	5,158	38
Church	4 North St	5,148	37
Business - Closed	5 Millers Falls Rd	5,140	37
Country Club/Golf Course	29 Country Club Ln	5,121	37

Community Solar Survey Results Summary

for
the Town of Montague



Photo Credit: Town of Montague

July 4, 2023

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

UMassAmherst | Clean Energy Extension

Background

Purpose

Residents in the town of Montague were surveyed regarding their opinions, attitudes, and preferences regarding solar photovoltaic installations, as part of solar planning efforts conducted through the *Community Planning for Solar* process. The survey will inform development of a *Community Solar Action Plan* to guide future solar development in town.

Methodology

A paper version of the survey was distributed via mail to a representative subsample of 640 households (17% of town households). In addition, paper surveys were made available at drop-box locations at all town libraries and the Town Hall. Paper copies at dropboxes and an electronic version of the survey were made available to all residents. A link to an electronic version of the survey was advertised by posting on Next-door, Facebook, the town website, and information was distributed via phone. There was also an article written about it in the *Montague Recorder*.

The electronic survey went live on March 8th, 2023, and was accepting responses until June 12th, 2023. The surveys were sent out by mail the week of April 10th; returned surveys were accepted through June 8th.

Survey Responses

Responses Received

A total of 249 responses were received and analyzed, including 196 electronic responses and 53 paper surveys.

Demographics & Respondent Characteristics

Below is a comparison between the demographics of the town of Montague as a whole (as estimated by the 2020 U.S. Census) and survey respondents. This analysis is important for understanding whether survey responses are representative of town residents as a group.

Age

Age	Percentage of Eligible Survey Takers	Survey Respondents
18-24 years	8%	1%
25-39 years	23%	16%
40-54 years	26%	29%
55-64 years	19%	23%
65-74 years	14%	22%
75-84 years	6%	10%
85+ years	4%	1%

Younger residents (aged 18-39) were somewhat underrepresented in the survey, comprising 31% of adult residents but only 17% of survey respondents. Residents aged 65-84 were overrepresented, comprising 32% of survey respondents, but only 20% of adult town residents.

Gender

Gender	Percentage of Eligible Survey Takers	Survey Respondents
Male	46%	41%
Female	54%	55%
Non-binary	N/A	4%

The gender breakdown of survey respondents matched fairly closely with the town overall, but men were slightly underrepresented. Note that the census does not include a non-binary option.

Race

Race	Percentage of Eligible Survey Takers	Survey Respondents
White alone	92%	93%
Black or African-American alone	<1%	<1%
American Indian and Alaska Native alone	<1%	<1%
Asian alone	1%	0%
Native Hawaiian and Pacific Islander alone	0%	0%
Some other race alone	2%	1%
Two or more races	4%	4%

The race of survey respondents was representative of the town as a whole. In addition to the categories listed above, 2% of survey participants indicated that they were of Hispanic or Latino origin, compared to 6% of the town overall.

Income

Household Income	Percentage of Eligible Survey Takers	Survey Respondents
Less than \$15,000	9%	5%
\$15,000-\$24,999	9%	8%
\$25,000-\$34,999	10%	5%
\$35,000-\$49,999	12%	9%
\$50,000-\$74,999	16%	27%
\$75,000-\$99,999	12%	16%
\$100,000-\$149,999	23%	18%
\$150,000-\$199,999	7%	8%
\$200,000 or more	1%	4%

The household incomes of survey participants matched fairly closely with the town overall, although the \$50,000-\$74,999 demographic was somewhat overrepresented, at the expense of lower-income households.

Employment Status

67% of Montague's working-age population is estimated to be employed, compared to only 55% of survey participants. 29% of survey respondents were retired; retirees have more time to participate in surveys, and so are often overrepresented.

Solar Ownership

Montague has 3,757 households and there are currently 290 residential solar arrays. This means that roughly 7% of households in Montague have solar arrays. However, in the survey 28% of respondents had solar installed on their homes. This suggests that people who have solar installed on their home tend to be more interested in solar and therefore are more likely to fill out this survey.

Summary

Overall, this suggests that older, retired adults were somewhat more likely to answer the survey, which is not particularly surprising, given that they may be more likely to have time available to do so. Those with solar installed, and therefore likely a more positive view of solar, were also more likely to answer the survey. In general, those who feel strongly about solar, whether positively or negatively, were probably more likely to respond to a survey about solar. However, this means that the survey may show stronger viewpoints than residents in the Town of Montague have overall.

It is important to note, therefore, that the findings summarized below may not be entirely representative of the opinions of Montague residents as a whole. (However, those with more time may be more likely to participate in town government, and those with stronger opinions, positive or negative, may be more likely to participate in specific permitting, planning, or zoning processes related to solar – so it is possible that the survey represents well the perspectives of those most likely to participate in solar planning.)

Survey Results

Overview/General Findings

Montague residents in general are strongly motivated to combat climate change and supportive of solar development. Based on the *Community Solar Survey*, 91% of residents are “extremely” or “moderately” concerned about climate change, and 90% reported they have a “positive” or “very positive” attitude towards solar development.

Montague residents are most supportive of solar development on already developed spaces like roofs and parking lots. A majority indicated support for developing all available gravel pits and quarries (59%), parking lots (62%), large rooftops (64%) and landfills and brownfields (70%). A majority of residents were also supportive (69%) or neutral (16%) regarding a goal of solar development sufficient to meet community needs. There was also significant support for solar development to meet anticipated regional (67%) or state (57%) needs. Montague residents are also concerned about conservation of undeveloped natural and agricultural lands within town and showed little support for developing these landscapes for solar – 68% indicated they would prefer to see 10% or less of natural lands developed for solar, and 50% indicated they would prefer to see 10% or less of agricultural land developed for solar.

Municipal Solar

Montague residents showed strong support for solar development on municipal buildings and properties. In the *Community Solar Survey*, 86% 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, depending on certain factors. Some of the factors cited include where the panels would be located and how much it would cost. Respondents were concerned that the town would not have enough money to finance these projects.

In addition, 76% of residents were supportive of town investment in solar projects to support community electricity needs, with an additional 18% supportive dependent on certain factors, similar to those listed above.

Additional results relevant for municipal solar considerations:

- Most *Solar Survey* respondents are very likely (54%) or likely (35%) to support solar projects that provide back-up power for schools and emergency shelters.
- Most *Solar Survey* respondents support (26%) or strongly support (61%) development on former landfills.

Residential Solar

In the *Community Solar Survey*, Montague residents indicated strong support for residential solar development, with a large majority indicating that they felt “positive” or “very positive” about solar panels on residential roofs (88%) and in residential yards (78%). Only 6-8% felt negative about these types of systems.

Major reasons residents cited for not already having a system installed were upfront cost (45%), not owning the property (23%), the property being too shaded (21%), or not knowing enough about their options (18%). Other reasons cited included taking away from the house appearance/value, having a slate roof, or lacking a south-facing roof.

Of residents who did not currently have a solar array installed at their home, a large percentage were open to the possibility. A majority (53%) of respondents said they were interested in having solar panels installed at their home, 24% were not sure, and only 23% were not interested.

Business/Institutional Solar

Residents expressed strong support for development on developed spaces generally: a majority supported 100% of large roofs and parking lots being developed. Residents were also asked if a business using solar energy would affect their attitude toward the organization: 65% of residents answered that it would make them feel more positive towards the organization, and 29% said it would make them more likely to purchase goods or services from the organization. Less than 1% of people said it would make them feel negatively towards the organization. Overall, people felt very positive towards solar panels on businesses and institutions.

Solar on Farms

Montague residents were generally not supportive of widespread ground-mounted solar development on farmland. In fact, a majority of respondents indicated that they wanted less than 20% of natural or agricultural land developed for solar.

However, they did respond more favorably to certain types of solar facilities installed on farms. These included:

- Solar panels raised above agriculture land to allow farming to continue beneath (50% support/26% neutral)
- The edges of active agricultural land converted to solar (47% support/28% neutral)

Residents expressed strong opposition to traditional solar development on land currently in vegetable production (87% oppose) or hayfields/pasture (71% oppose). There was somewhat less opposition to development of fallow farmland not currently in production (51% oppose/20% neutral/29% support).

Large, Ground-Mounted Solar Development on Private Land

In the *Community Solar Survey*, Montague residents expressed support for solar development on some types of previously disturbed lands. Residents indicated a strong preference for large, ground-mounted solar development on former landfills and brownfields (87% support/9% neutral), former sand/gravel extraction sites (85% support/11% neutral) and electricity transmission line right of ways (78% support, 15% neutral).

For all other types of forested and open natural habitats, 70-93% of residents expressed opposition to development. These habitats included meadows, shrublands, and large and small patches of new growth or mature forest, as well as priority wildlife habitat.

In another portion of the survey, residents did indicate support for development along major roads (64% support/17% neutral), which in Montague could include Routes 63 and 47.

Municipal Bylaw and Permitting Processes

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

- 67% of residents believe that the development of large, ground mounted solar energy should be allowed and promoted in appropriate circumstances and an additional 17% believe it should be encouraged and promoted generally.
- Residents are interested in having community involvement in planning for large-scale solar energy projects. A majority of respondents want to have information shared at public meetings, and they want to be able to review and comment on the siting and design. They also want to be involved in deciding the best place in town for the solar project and believe voters should have the right to vote on solar projects before they have been approved. Residents want communication with the solar developer, including being able to express concerns directly to the developer. Finally, residents want the opportunity to be a part-owner of the project.
- Residents were especially interested in supporting solar projects when there were certain community benefits attached. These included reduced electricity rates for residents and reduced property taxes. It also helped if a solar installation could provide jobs for residents or back-up power to a school, emergency shelter, or senior housing.
- Residents expressed that they did not know about the process of solar development. In fact, 56% said they were not sure and/or not aware of the process. However, they did express interest in being more involved in the process and learning more.

Perspectives of Under-Represented Demographics

While a complete analysis of the perspectives of underrepresented demographics is outside the scope of this summary, a few general highlights are noted.

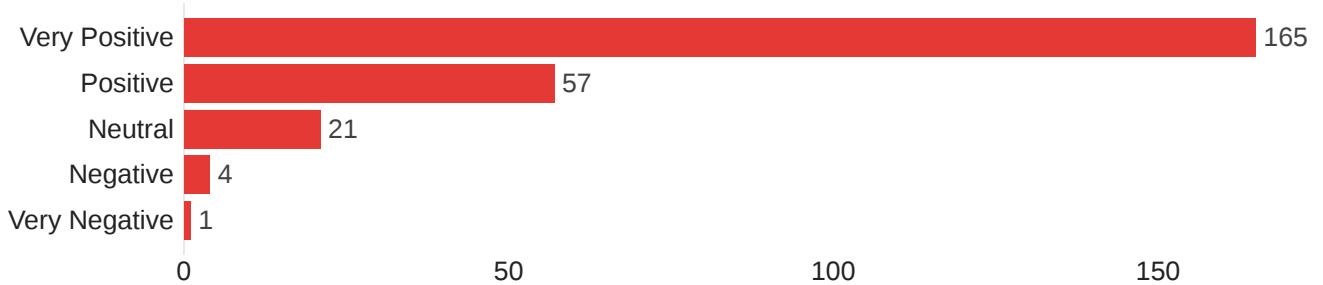
- The groups that were under-represented included men and younger age-groups.
- Men appeared to be a bit more skeptical of solar. For example, when asked the question about their general attitude toward solar energy, 62% of men said very positive, whereas 71% of females answered very positive.
- However, for most of the questions the male and female responses remained similar. Overall, women tended to choose the strongly agree option more, while men tended to have more in support and neutral (although this was not always the case).
- Younger respondents (ages 18-39) had fewer uncertainties about solar. In fact, all respondents under age 35 had a positive view of solar. Throughout, younger respondents rarely choose “negative” or “very negative” regarding solar energy options. Since this age group was underrepresented, it may mean that there was a higher percentage of people choosing negative/very negative options than the general population would choose.

Underrepresented groups show some of the limitations of the survey. Although this is often unavoidable when doing research, it is important to consider.

Appendix A: Complete Survey Results

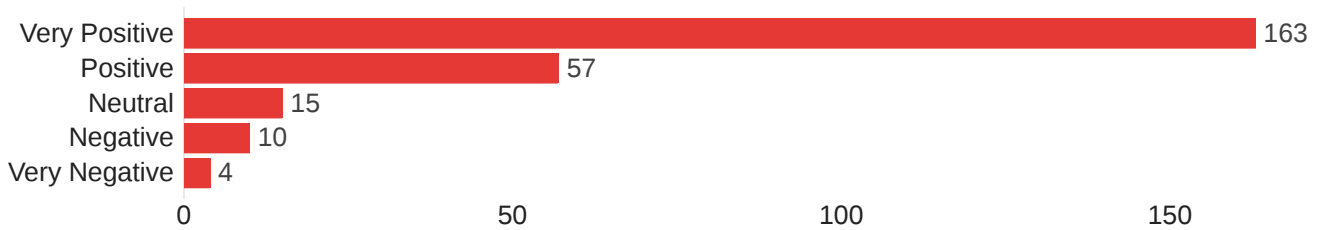
Detailed Survey Responses

Q1 - What is your general attitude toward solar energy?

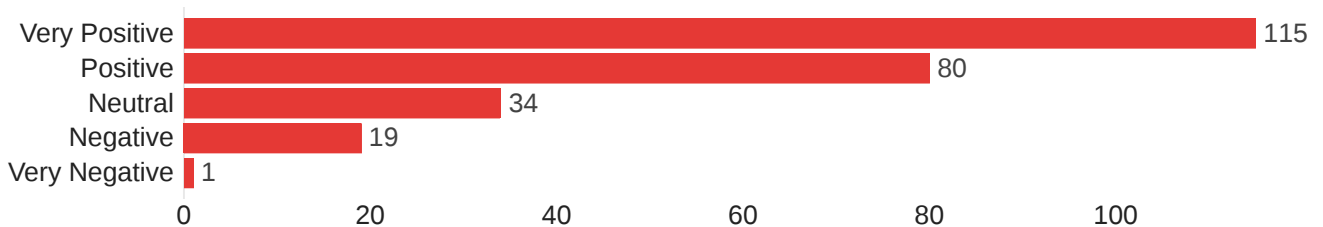


RESIDENTIAL SOLAR

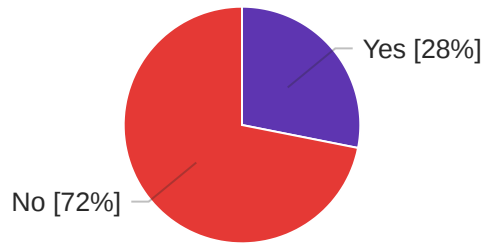
Q2 - What is your attitude toward solar energy that is installed on house rooftops?



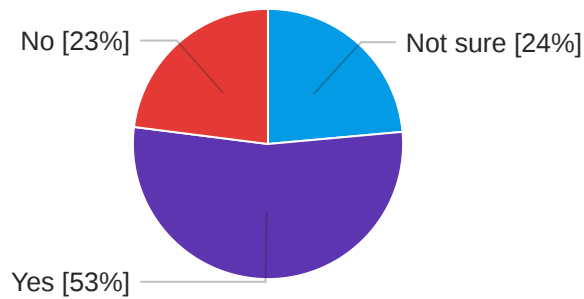
Q3 - What is your attitude toward solar energy that is installed in a residential yard to serve that household's electricity needs?



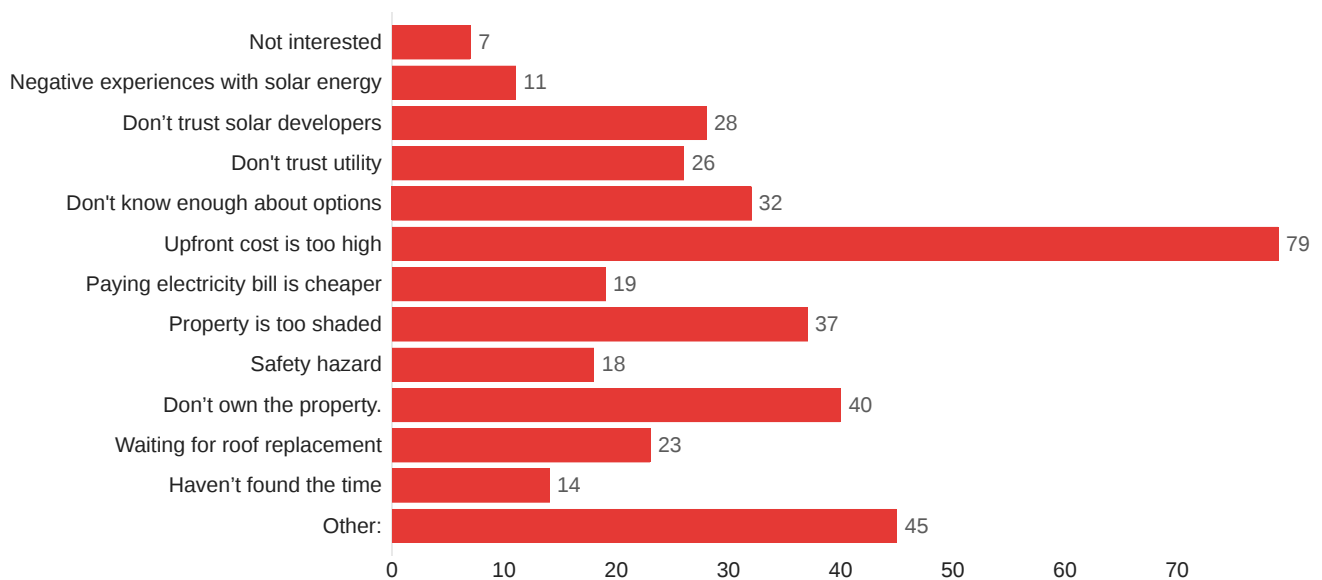
Q4 - Do you have solar panels installed at your home?



Q5 - Are you interested in installing solar at your home?



Q6 - Please indicate the reason(s) you do not have solar installed at your home.



"Other" Responses:

concerns about productions/recycling of panels

condo can't install, condo association would have to agree

I tried - my roof isn't suitable for current solar

was told not enough sun

We have had multiple roof evaluations and we were told that our 250-yr-old roof can't support the panels. We were told our lot is not large enough (as per local ordinances) for a ground array.

Concerned about recyclability of solar panels for the future.

Detracts from the appearance of property.

Don't want panels on our roofs; don't want to give up much yard space

Have a contract to install now

I am beginning to investigate installing panels.

I am in a condo and it's complicated.

I am interested, but need a full roof replacement from slate to asphalt. Upfront costs are too much at this time.

I do not want extra holes drilled into my roof. Ugly conduit out side of house. Ugly outside electric panels and transfer switches. Plus I use a minimal affordable purchased electric power.

I don't like the way that solar panels look on the roof or in the yard. I'm also concerned about the upkeep and what happens when the roof needs to be replaced.

I have a slate roof and heat by heat pump. Need approximately 50 panels to break even.

I have a slate roof on my home, but would be happy to consider the feasibility of panels on the HRA building.

I have a slate roof, and there is a paper road that prevents me from installing ground mount.

I have the perfect south facing house, elderly, up to next owner to make decision

I keep waiting for the technology to get less "clunky"

I live in a condo and can't put solar on the roof

I rent, but if I did own, I would.

I rent.

I think the utility will charge me money for an upgrade to the grid.

Like many houses in Montague, I have a slate roof, which I've been told are not compatible with solar panels.

My roof design may not economically support solar to the degree I want or need.

My roof is not well suited in shape and orientation for solar, ground mounted solar is not permitted. No viable options for solar currently without constructing a new building.

our roof is very high and dangerous

Property is almost totally shaded.

Property is too small for solar on the lawn and I wouldn't ruin my roof with panels.

Roof would need help to hold solar

Rooftop is not aesthetic. Yard has to be placed in the right setting.

Se would have to install a new roof and don't want to. Roof is in good shape. We also are planning on moving in a few years.

slate roof

Slate roof

Take away from house!!!

To the question before, they said " If I owned a home, my answer would be "yes"

Unattractive.

Very confusing to evaluate cost-benefit. Negativism re-leased solar made it hard to evaluate

We have a difficult roof shape that minimizes productive area. Likewise a minimal "urban" yard for ground install.

We've been told the direction of our roof plus tree shade means we can't have solar. Hopefully someday better solar options that work with our house will be available.

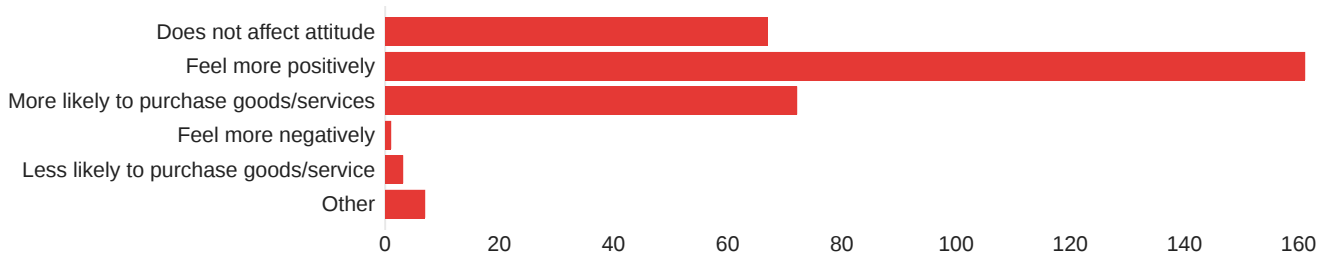
What happens when solar needs to be replaced?

when bad solar panels can be recycled without worry that their components will not pollute the environment AND

when generating these panels and components get to a net zero state, I will then be happy to install but I ask the question, "What do I do with defective panels?" throw them in the dump, how does old ones get recycled? what happens?

BUSINESS/INSTITUTION SOLAR

Q7 - Does knowing a business or institution uses solar energy affect your attitude towards that organization?



"OTHER" Responses:

Because cheer and use that vendor if at all possible!

How long before replacement is necessary??

I have to guess that solar is an important next step for humans. I believe there is only ONE appropriate place for solar - on already existing development - rooftops, parking lots, etc. To destroy more of our natural planet for energy use seems short sighted if not disastrous. So, my opinion of businesses using solar is either very positive and increases my desire to purchase items and services from them if installed on already existing development, or my opinion is worse of the business if they clear land for an installment, and I would actively stop supporting them.

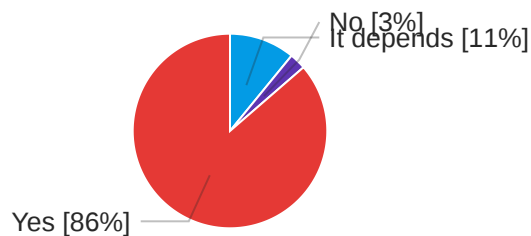
I may ask them , what they do with defective solar panels?

My business has 42 panels on its roof

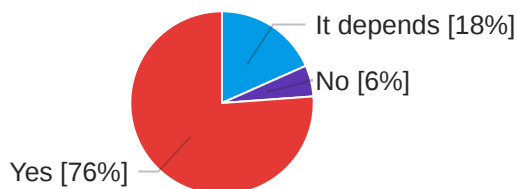
Solar is often used as greenwashing, because businesses ignore the "net" - claiming they use 100% solar while of course actually using natural gas generated electricity at night or on cloudy days.

MUNICIPAL SOLAR

Q22 - I think our town should invest in solar projects on municipal buildings or parking lots to meet municipal electricity needs.



Q23 - I think our town should invest in solar projects to meet community resident electricity needs.



"It Depends" Responses:

Q22:

a cost-benefit analysis, including a payback projection date is in order
COST

Do not want to give up any parking.

How long for the payoff

I also support selling power to support the town budget

I am not able to increase my monthly electric bill; we will end up homeless.

I don't have enough info to answer this.

I think our town should invest in public safety! And stop this solar agenda

If it doesn't increase resident cost

if residents get a break on town bills

location

Only if it's cost effective in the short term.

the town does not have the ability to finance and manage a project of that scope

Who pays for this? Property owners? Not if it increases Taxes.

Q23:

A question was asked earlier about paying more for solar on town buildings. I can barely afford electricity now, and thought solar was supposed to lower energy costs as well as help climate change? Doesn't solar also raise the surrounding temperature though?

Can't we do both?

COST

Depends on size and locations of such solar installations.

How much and how long for payoff

I am not able to increase my monthly electric bill; we will end up homeless.

location

Meeting the other criterion suggested above, yes.

Not in forest or open land near houses

not on farmland or forest, in scenic areas etc.

Only if my taxes do not go up for the project

the town does not have the ability to finance or manage a project of that scope

We don't have the municipal capacity at the moment to manage this - but I'm not opposed to the idea.

We need something. We pay so much in taxes and get nothing. Solar to help with electricity costs would be nice and I'd be willing to pay a tad more in taxes if solar could be available to landowners of Montague

What would happen to residents who already have panels.

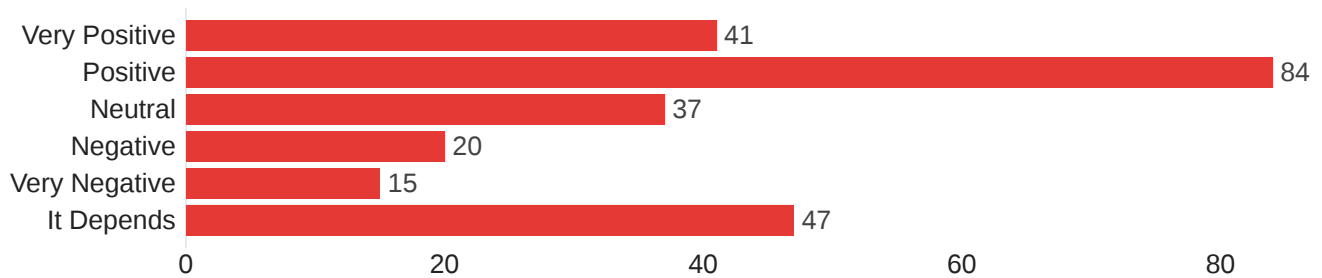
where are panels located?

Who's paying for it?

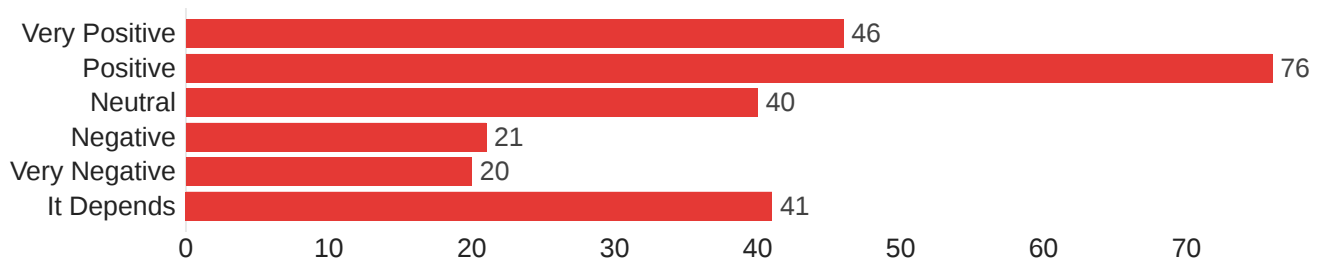
Yes, if sited on disturbed or developed sites, rooftops, etc.

LARGE, GROUND-MOUNTED SOLAR

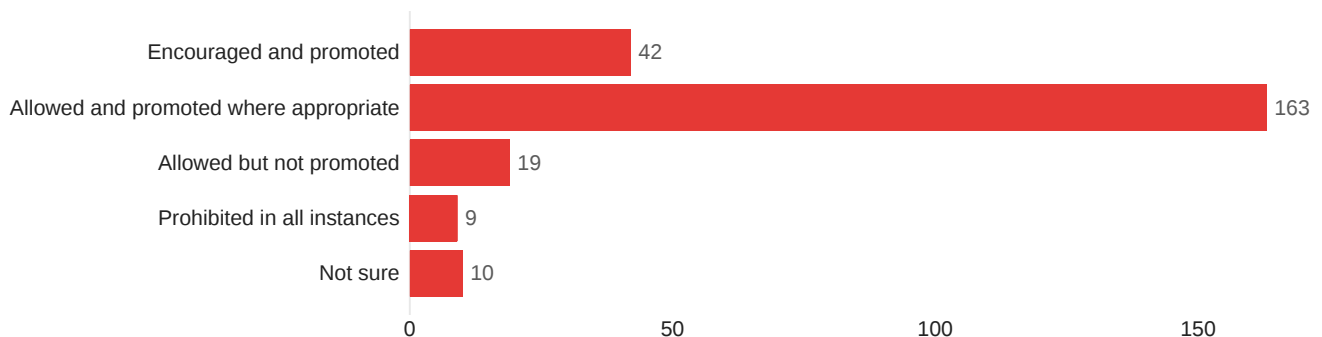
Q8 - What is your attitude toward large, ground-mounted solar energy in general?



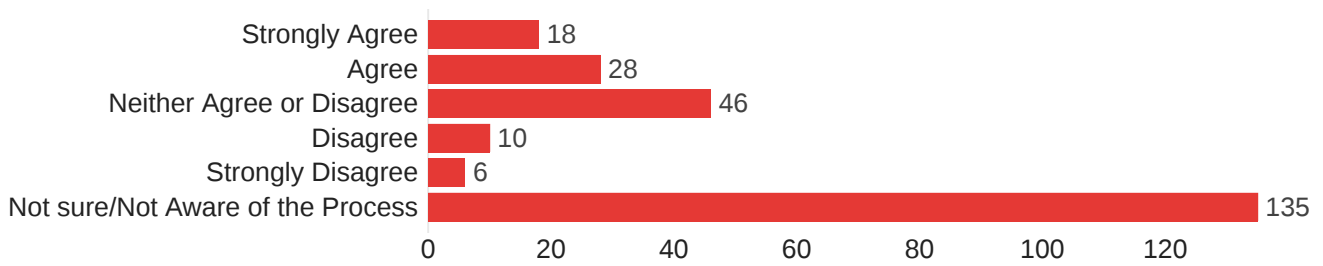
Q9 - What is your attitude toward large, ground-mounted solar energy in your town?



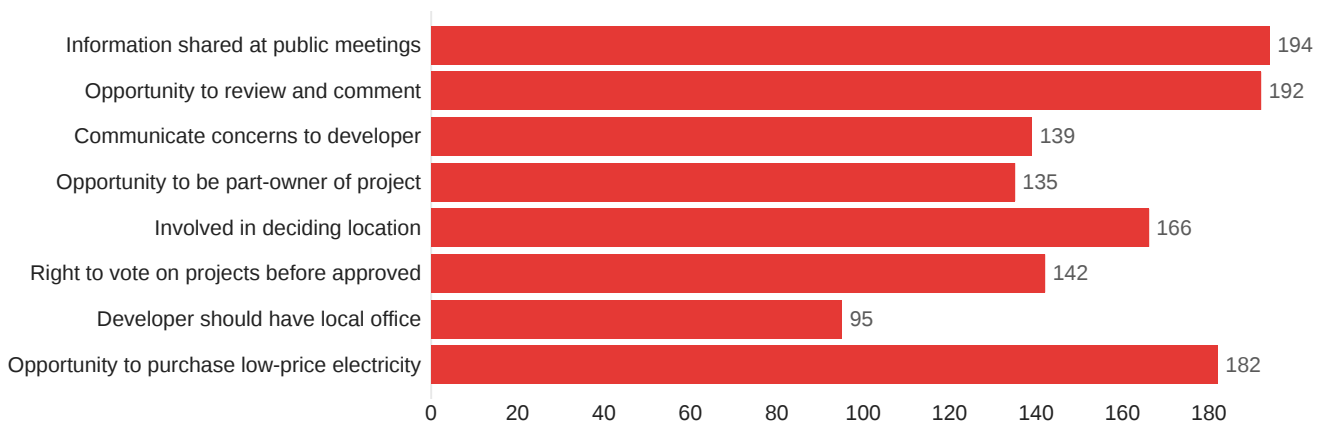
Q10 - In general, do you believe development of large, ground-mounted solar energy should be:



Q11 - To what extent do you agree or disagree that the process of large, ground-mounted solar energy development in your town has been fair?



Q12 - Which of the following types of community involvement would you like to see if a large-scale solar energy project was being planned in your town?



FUTURE SOLAR CAPACITY

Solar Capacity Options

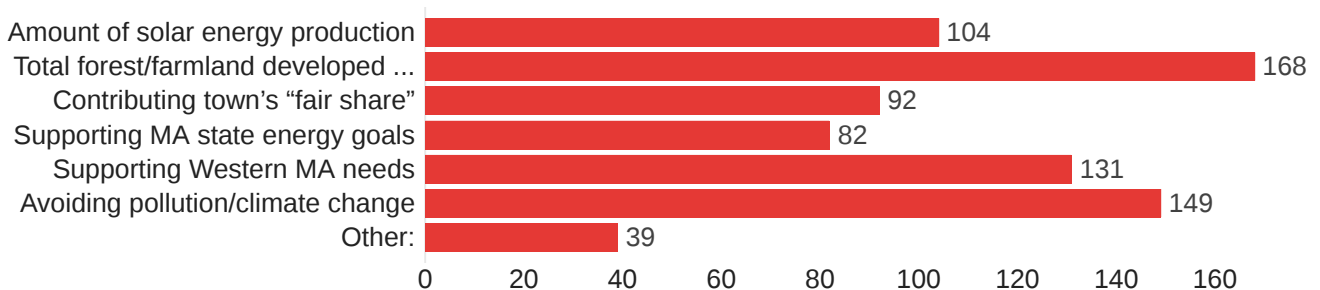
Here are some different options for how much solar development could be planned for your town in the future.

- Status Quo: “Ad-hoc” development, town does not plan for an increase in solar; individual landowners may choose to develop solar.
- Developed Spaces: Moderate increase: roofs, parking lots and disturbed land would be developed.
- Community Self-Sufficiency: Town generates 100% of community energy needs from solar.
- Regional Energy Goal: All Western MA municipalities develop 1.25% of their land area for solar to meet the four-county regional energy needs.
- Statewide Energy Goal: All MA municipalities develop 4% of their land area for solar to meet statewide solar energy goals.

Q14 - What is your attitude towards the capacity options described above?

Field	Very Positive	Positive	Neutral	Negative	Very Negative
Status Quo	34	32	66	56	24
Developed Spaces	99	64	36	10	4
Community Self-Sufficiency	76	72	35	19	11
Regional Energy Goal	65	79	36	20	14
Statewide Energy Goal	55	68	40	33	20

Q15 - Which attributes were most important in considering your attitude towards each solar capacity option?



"OTHER" Responses:

prioritize roofs, parking lots, already disturbed or developed land

Any project that cut down forest or disturbed natural habitat should be a total no go. However, allowing solar on pasture or cool weather crop fields can improve returns for farmers and could be encouraged. I think there should be

greater distinction made between these two totally different options for large scale solar. Further, MA could be 100% plus self sufficient from offshore wind and this is also not reflected in this survey. Because these distinctions are unclear it is difficult for me to answer the questions below. But I did my best.

concern over eastern mass treating us like lungs, water sources and solar sources without doing any of the work to produce their own resources

Concern that we not develop solar at the expense of other land available/most suitable for economic development.

With substantial amounts of land under some form of preservation restriction, our seemingly abundant land is actually quite limited. I would prefer not to see more large scale solar in developable location that are served by or in close proximity to full utilities, as we will need this for housing and commercial development.

contributes to the investment in transmission and grid coordination needed to have a truly renewable system.

Do not want to see forests cut or agricultural production lands used.

focusing on developed sites!

meadow limited to along highways and similar sites

how much prime farmland is unusable due to panels in fields

I do not support solar

I have seen solar projects fail in other states because they are not well cited or well regulated. I am very hesitant to clear forested land when so much developed and disturbed land is available and rooftops (especially of large buildings) provide opportunities.

If we don't do it 100% ASAP, our world as we know it won't exist.

I'm in favor of as much solar as possible but NEVER on agricultura or wooded land. We are going to need to grow more of our own food on that land, instead.

In general, I support 100% of solar and wind (not Northfield Mountain - ecological disaster for fish) but minimize on forest and agricultural land, unless compatible with agriculture.

land mounted solar panels coexisting with agriculture (eg cattle graze underneath) is positie. Covering parking areas is positive.

minimal disturbance of existing farms and wildlife habitat

Montague already produces more sustainably produced energy than it needs, and most of that energy is sold to other municipalities. We are already more than self-sufficient and it is absurd that we pay so much for energy. If we build as much solar capacity as we already have hydro capacity, I have no reason to expect that this would actually reduce our electricity costs. I would support a local energy co-op, not having a business come and sell a renewable resource back to me at extortionate rates.

My support depends on how and where the projects are placed. For example, I would not support destruction of our forests/ fields etc but would support installations in parking lots, bldgs, and certain land areas.

No undeveloped farm land will be used for solar.

Instead it should be implemented on businesses, in parking lots and in already developed land.

Statewide - " Western Ma should not have to sacrificed more undeveloped farm land to meet Bostons energy needs. Instead develop solar on businesses/buildings/parking lots in already developed areas.

Not converting productive agricultural land or forest to solar production. Parking lots, roofs, along roadways, railyards, under power lines

Not doing more harm than good; for example, ensuring that production and life cycle of the facility promotes sustainability over the long term.

not sure I understand

Not using agricultural land or forests those areas being covered over does NOT help the climate issues. over my head

Preserving forested and undeveloped land, and land for agricultural use

Protecting TREES and minimizing herbicide use. . .

Should only be installed on rooftop, parking lot development, etc. It seems the above graph is saying that 'development refers to forest or farm land still, maybe which is cleared of trees, but not paved in some manner.

Supporting the town residents who are, otherwise unable to participate in Status Quo option.

There are other forms of renewables and storage that should be deployed. PV is not the only answer. In addition, not all

Ag siting is equal, and you make no allowance for combined ag/solar use.

There is no "one size fits all" here. I don't think that the towns can all agree on one solution

This amount of forestry, along with Eversource's land clearing to protect their precious wires - we will have no trees. Just because some new wave of business is attractive doesn't make it right

This survey is misleading in that it presents solar as if it were the only clean energy option. If it were, we should of course devote forest and farmland to avert climate catastrophe. But it isn't. We have the option of building one nuclear power plant on one small set of industrial acres and leaving 100% of natural spaces intact. Wind, geothermal, and transmission from offshore wind or other nuclear/geothermal/hydro plants are also options. The merits and downsides of solar can only sensibly and should only ever be considered in direct comparison to actual alternatives.

Type of land developed.

Use of already developed sites.

We need more production, but I don't know that 'fair share' is an appropriate way to think about it. We need a holistic approach that recognizes different land use patterns throughout the state and differing regional energy needs (and support regional resilience, load balancing etc, not just bulk energy need). For example, putting solar in place of healthy forest to meet a town's 'fair share' when another town has miles of big box store roof and parking lots is poor planning and poor carbon accounting. We need to be considering as best we can the climate change impacts of land use patterns and soil health in addition to solar.

We need to be looking at energy conservation in addition to generation. Using farm/forest land should be a last resort after energy needs have been minimized to the fullest extent (efficiency and conservation).

we should be getting more of our energy needs from the hydroelectric in town!

While I am strongly opposed to clearcutting, after seeing the 4% figure, that seemed to lessen my concern... though I do believe that already developed/disturbed sites should be prioritized.

Would be very positive toward regional, state goals IF primarily built on developed or disturbed land, rooftops, parking lots

Q16 - Indicate the percentage (of the maximum possible) solar energy you would choose to be installed on various sites in your town, the technical potential is listed.

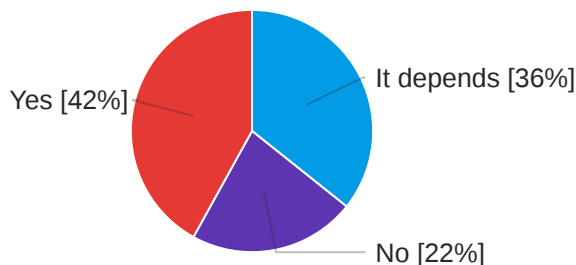
Field	Min	Max	Mean	Median	Responses
Residential roofs and yards (up to 18.5 MW)	0	100	71	80	202
Large rooftops (barns, schools, businesses) (up to 21 MW)	0	100	84	100	209
Parking lots (up to 8 MW)	0	100	82	100	199
Landfills & Brownfields* (up to 1 MW) [Note that a brownfield is a previously disturbed site which has been contaminated with a hazardous substance or other pollutant.]	0	100	86	100	205
Gravel Pits & Quarries (up to 6.5 MW)	0	100	79	100	188
Agricultural land (up to 240 MW)	0	100	23	15	126
Natural lands (forests, meadow) (up to 750 MW)	0	100	17	10	102

ECONOMIC QUESTIONS

Q13 - How likely would you be to support large, ground mounted solar energy in your town if the project provided the following benefits to your community?

Field	Very Likely	Somewhat Likely	Not Very Likely	Not Likely at All
Reduced electricity rates for residents	139	81	18	4
Reduced electricity rates for low-income residents	140	68	22	11
Direct payments that reduced property taxes	113	88	26	9
Direct payments that supported town budget needs (e.g. school funding, fire or police vehicles)	106	83	33	14
Jobs for local residents	121	80	28	7
Back-up power to the school, emergency shelter, or senior housing in case of power outage	127	84	20	6
Offered local ownership for residents who can't put it on their houses	116	86	23	11

Q20 - Would you be willing to pay more on your monthly electricity bill for solar energy projects located on roofs, parking lots, and landfills/brownfields rather than on farmland and forests?



"It Depends" Responses:

more than I pay now or more than I would pay if generated on [illegible]
on why farmland can't be used

only if the cost of electricity is not as expensive as it has been

1st choice is agrivoltaics in situations where the crops/livestock/pollinators using the land are the best fit for the partial shade and added complexity. Then parking lots, municipal buildings, etc., then power line corridors, then brownfields/landfills. The health of those installing and maintaining is important. Maybe a more thorough assessment leaves them out. I would rather use as little forest and meadow as feasible.

Again this is a stupid comparison. I would gladly pay more to both solve climate change and avoid clearing forests or farmlands. But that isn't the tradeoff we face. We could pay (probably, once scaled) less total and also avoid both of the above if we chose a mix of a small amount of solar with mostly nuclear, geothermal, and offshore wind power for New England.

as long as no one is getting rich off of it

Can I afford it?

Depends how much it goes up

Depends on HOW much more. Electricity is already a big expense.

Depends on increase

Do not understand

How much more?

I would if it were guaranteed that the money would go back into the town instead of some company.

I'd have to know more about why the costs are more, besides what is listed above. Generally I would, but I would also want to have the details of why the cost is higher. For instance, is there a monopoly on the service? This should be a project developed and owned by the state and staffed/maintained by union workers. If I knew this was union work, I would gladly pay more. But if it's just profiteering, I'd be much more skeptical.

If it's not for the purpose of increasing shareholder profits for utilities and developers, then ok... but it's not uncommon for the "savings" associated with ag-land developments and clear-cut forest developments to actually not be passed on to rate payers.

In other words, we're almost guaranteed to pay more in the future anyway. We should not be sacrificing farmland and forested land so developers can get rich.

If there can be a reduction in Electric costs for low-income families

In another record year, Eversource Energy reported \$1.4 billion in profits in 2022, an increase of about 15 percent from 2021 and the third consecutive year the multistate-energy company has reported revenues of more than \$1.2

billion.

The company has faced renewed scrutiny as the cost of electric supply it offers its customers doubled in January. Eversource passes through the cost of electric supply to its customers, so it doesn't make or lose money from that spiking price.

Why should the customer absorb the price of solar??

Isn't the whole point of solar energy to decrease monthly cost as well as protecting the environment. I don't think this survey is even viable if it doesn't at least lower costs.

It's very difficult to have solar on farmlands when we also need food, and removing the ability to farm is shortsighted. I worry about solar being placed on contaminated land and posing potential harm to those who would service the installations.

more than now? I thought this was to reduce our elec. bills. Are you talking about rates after solar is up + running or what it costs NOW?

Needs farm and forest equality scale, ie impact on food production, habitat etc

No no. No!

on how much more, and what the scale of disturbance/trade off with agriculture is

On location

only a few bucks a month would be ok but no more that

Our future depends on protecting our agricultural and forests.

Technically yes, but it is absurd that I'm being asked to pay more for a renewable resource whether it's on brownfield or greenfield

this is an embarrassingly shit question.

This last fact (about solar energy being cheaper to install on undeveloped land) is new to me, and MIGHT make me change previous answers. It seems like important info to make public. Even knowing this info, my priority would be to develop solar on already developed land like parking lots, rooftops, schools/barns, under power lines, etc.

Up to and no more than a 30% increase of the final bill amount.

We have our own solar panels. The price per kilowatt is very high for what we don't produce. Still, we can afford to pay more for leaving our farmlands and forests alone. But many others cannot.

We need to be taking a holistic view of the health of our lands and climate. We should be paying the real social and environmental cost of energy. If we did, fossil fuel energy would be much more expensive, and I believe electricity that removed farm and forest from ecological and recreational use would be as well. So yes, I'm willing to pay more for preferably sited projects, but I think the pricing signals are off. That makes for problematic tradeoffs for people with fewer financial resources. There are other ways to do this.

We need to figure out how to use less energy. If energy is expensive we'll develop technologies to be more efficient and conservative in our use. Otherwise we'll just keep growing our use.

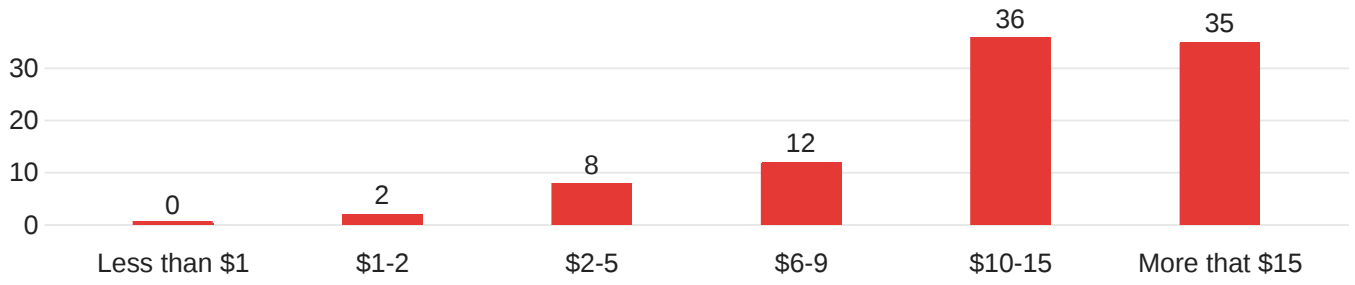
Why would it have to cost more?

why would it have to cost more? Solar is supposed to save money

Why wouldn't I pay more on my taxes and not on my electric bill? You can sneak in another town's charges on me. I might be OK with my taxes being raised but not my electric bill.

Yes, but low income residents should not pay more

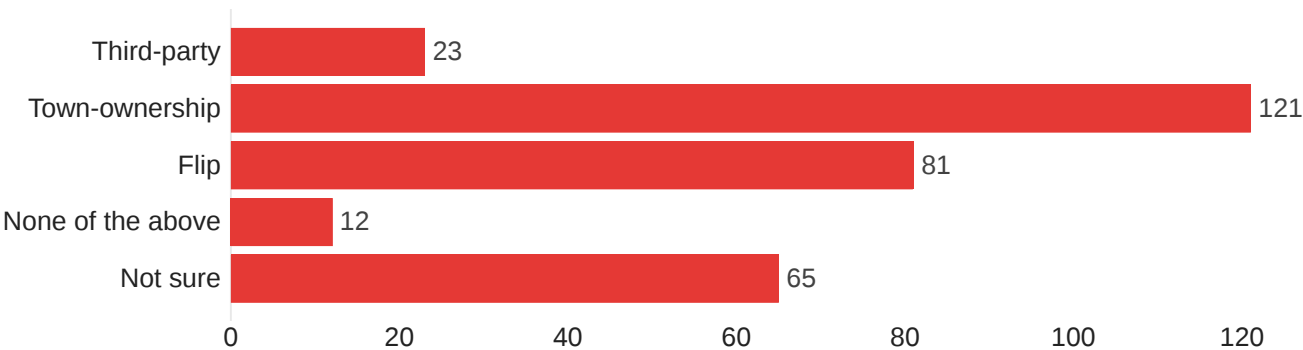
Q22 - How much more would you be willing to pay per month on your electricity bill?



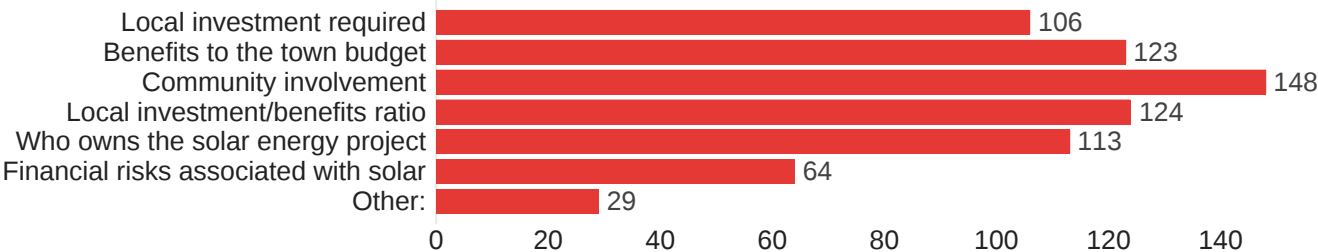
Q24 - Which ownership approaches to large, ground-mounted solar do you think could be appropriate for your community?

There are different levels of financial involvement and ownership that towns can consider taking in large, ground-mounted solar energy projects. Each has its own set of economic benefits and risks.

- **In the third-party development approach** an out-of-town company finances, develops, and owns the project for its entire lifespan. All investments, risks, and maintenance are the responsibility of this developer. The local community receives some revenue in the form of PILOT payments to the town and lease payments to the landowner but most revenue (90%) flows to the developer. This approach is simple for the town but involves relatively little community involvement in decision-making.
- **In the town-ownership approach** the town finances, develops, and owns the project for the entire 30 years. The town must invest significant funds (at least \$1.5 million) to install the project. All investments, risks, and ongoing costs are the responsibility of the town. 100% of project revenues flow to the town, roughly equal to double the investment (\$3 million). Decision-making is local.
- **In the "flip" model approach** an out-of-town company finances, develops, and owns the project for the first 6 years. The town then purchases the project at fair market value (at least \$500,000). Responsibility for any costs and risks switches from the developer to the town at the time of sale. Local revenues are approximately \$2 million. There is a greater role for the community in decision-making.



Q25 - Which attributes were most important in considering your attitude towards solar ownership approaches?



"Other" Responses:

establish an oversight committee (town)

Ability of citizens to protect trees and other natural features.

Again, recycle end of life panels and next generation system.

concerns about agricultural and natural land

Direct (negative) environmental and biodiversity impact

Disposal of Panels!

I do not believe energy production should ever be owned by corporations

I hate thinking about some big-name third-party developer making money that doesn't go to our community, but I don't want to put our community in the position of managing something unless we have the capacity to manage it, and that is an unknown to me.

I wanted to check most but it would not let me choose more than one.

I would be open to third-party development if they were regional and worker-owned.

LARGE solar projects are not needed for town municipal electric needs

Location of solar project development

Long term financials and life of solar equip

Loss of local autonomy.

Need more time to decide how I feel about this

no solar on quality farm land!

No town owned solar

Not in favor of any approach that uses agricultural or wooded land.

opportunities for local / community ownership

siting concerns are paramount

Sub regional municipal partnerships

Taxes and cost to residents

the town does not have the ability to manage a project of this scope, pretending otherwise will leave it open to exploitation by either the state acting for private interests or private interests directly

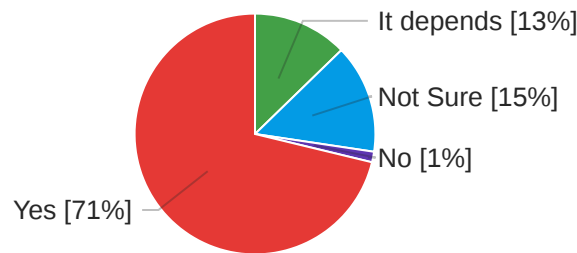
Town ownership is ideal, Flip CAN be good or a poor deal depending on process & outcomes, which led to my 'not sure' response. Creating some kind of state level revolving loan fund (green bank?) where towns could have help with upfront costs and risk management could ensure more projects get built in ways that keeps more of decisionmaking and revenue within the town

Very important to not lose anymore farmland and natural forests /watersheds/meadowa

Whether it actually reduces emissions or is simply feel-good greenwashing

ENERGY STORAGE

Q26 - In an earlier section, you indicated your preferences for siting solar energy projects in various places in your community, including previously disturbed land, undeveloped land, parking areas, agricultural land, etc. When considering the siting of large energy storage projects (1 acre or more in size), are your preferences for location similar to the preferences you identified regarding locations of large solar energy facilities?



● It depends ● Not Sure ● No ● Yes

"It Depends" Responses:

on what the storage infrastructure looks like + needs. We can picture a large, ground-mounted array, but cannot visualize a storage facility.

Are there noise issues with cooling the batteries?

I favor small distributed energy storage

I imagine the storage facilities are much smaller, if there was significant cost savings that outweighed land lost, I would be in favor.

If it catches on fire, how hard is it to put out? Is there lithium involved?

It should NOT take up farm land or much recreational land. I don't know enough about battery size, potential toxicity, longevity, pollution potentials, and locations.

Neighborhood sited battery storage an option

probably

safety of energy-dense facilities

Storage of this kind, sort of like volatile liquids should not be stored in residential areas

Such facilities should only be located in previously developed locations, zoned for industrial use

What are safety considerations for locating storage?

Yes, except where siting makes a difference for possibilities of micro-grid and load balancing that improve local/regional resilience and energy/climate impacts. Then I'd be willing to consider more flexibility re: siting if needed.

Q27 - What questions, concerns, or preferences do you have about

energy storage that you would like your local and state representatives to know?

I would not be upset if the local farmer or landowner agreed to a large solar array on their property, but would want it to benefit not only the landowner, but also the local community. However, I would always prefer arrays like the UMASS covered parking lots, school rooftops, + other large, already developed or disturbed lands

I think we need more incentives for commercial rooftops

like to keep local if generated locally

understand communities financial position, [illegible] of projects, commitment to clean energy available community properties

would folks be able to purchase/ install solar at any point after moving to Montague or is it only at the initial stage? It would be helpful to have an idea of the dynamics of solar for the future needs.

Aesthetics, noise

all about recycling. And I don't mean taking bad panels to the recycle station. What actually happens to them? Are they shipped off to India to pollute their land and water, is there a viable reuse plan for the materials, etc.

All of what I noted above as well as reducing our military budget to help pay for these needed public projects that our small towns can afford, yet we pay excessively into the military budget with no say on their spending or activities.

Am concerned with 1) who gets the \$ benefits of peak shaving, 2) how we can be sure to avoid further environmental racism in siting

Are the materials used safe; is there any possibility of soil and water contamination?

Are there any safety concerns with having storage close to homes and businesses?

Are there benefits of battery storage compared to the pumped water reservoir energy storage facility in Northfield?

As land lords we own properties that would be better suited to solar than our primary residence but the incentives only are for the primary residence. Can we change that?

As per above. Preference is to bring more storage into the mix where helpful from an energy and/or resilience perspective. And consider creative ways to expand storage (electric school bus 2-way grid connection, etc?)

Battery technologies, ability to shift battery tech if needed, wondering about water and sand energy reserve systems in concert with more traditional Li-ion, nicad, iron based battery tech.

Can "mini" neighborhood grids of roof top and ground mounted panels linked with storage work in village / urbanized cores?

Can the storage be setup right under the solar panels as to not require additional space?

Consider using Tesla

cost

Dangers of fire, releasing chemicals. Batteries should not be near rivers.

Don't know

Don't make deals with Tesla. Elon Musk is a union buster and a fraud.

Don't think that current forms of energy storage can balance solar's year-long intermittency and unpredictability.

Backup baseload power is always needed and until we mass-deploy nuclear and/or geothermal, we will be stuck on natural gas power plants.

Effective longevity of batteries.

Eversource delivery charges are way too expensive!!

Fire safety and security

For Eversource install solar to homes free. No cost to the homeowner.

General storage. Distribution. Costs.

High priority for me is to avoid disturbing prime agricultural land, wildlife habitat, natural recreation spaces, and other undeveloped and minimally disturbed land.

how can we promote residence energy storage solutions?

How do we decide between investing in existing technology vs waiting for new technology.

I

I agree using solar energy is beneficial. I do not agree with using large areas lands for these projects. I would rather see panels in places that are already being used for something else such as roofs or parking lots.

I am all for it- needs to happen- and we need to find a way to make it happen.

I am concerned about the danger batteries pose to health. Many people, especially with chronic health problems, cannot be close to batteries.

I am concerned about the disposal of these units after their useful lifespan is complete.

I am especially concerned about the disturbance of the Connecticut River by the Northfield Water Storage, and I would like to see more investment in so-called "smart grid" technologies being proposed such as allowing owners of electric vehicles to use the EV batteries to store energy for use in power outages, and to even out demand.

I am for solar energy storage. I am opposed to Northfield Mountain as a storage solution.

I am more concerned about affordable housing than installing solar, by far.

I am concerned about the impact on wildlife that large ground mounted solar can have. I want more research and public education about habitat disturbance and the impact on air quality that deforestation and installation would have.

I don't have enough info about implications of energy storage - how would it affect the surrounding environment, what are the alternatives, maintenance costs, etc

I don't know anything about energy storage to have an opinion about its placement

I really don't know anything about energy storage facilities and would need to learn more before forming an opinion

I support small homeowner storage systems

I would like more information about storage: what it is and what it entails

I would want legally required full disclosure of battery types, materials used, and potential environmental and safety hazards, as well as support for municipal emergency services to handle disasters at these facilities.

I'm concerned about battery leakage, and the ability of regional fire fighting forces to manage any disasters with batteries

Increases to property taxes

Is there ANY NOISE associated with energy storage sites? I don't want these facilities near residences if there is NOISE associated with them.

Less familiar with storage issues

Life-span and disposal of the panels is a concern. Where do the panels go and are they safe to go there when they no longer operate?

Like solar generation, I am concerned about the quantity of what in the future may be hazardous waste we are installing

Long term impacts on environment

Montague needs to rewrite their solar bylaws, as it cost the homeowner lots more money or the contractor will not build in Montague. A small driveway pv system is no longer affordable because of these bylaws that may be in violation of state energy mandated.

More incentives for off peak usage could help communities lower the storage needs

My concern is disturbing natural habitats for solar development. I think we should be using areas that are already concrete areas that have already been previously developed on and could not be farmed, or optimal habitats for wildlife

my only concern would be potential safety risks for nearby structures and forest lands.

NIMBY

No fossil fuels, less hydro, more solar is best

No to Northfield Mt pumped storage. Or any other wasteful, environmentally destructive methods.

NONE

None-do it

Not ANYWHERE near water, nor in community centers. Small battery storage for home sites should be allowed/supported.

Over ALL Cost and taxed increases without benefits

Please don't put blinders on just because the earth needs renewable resources. Removing trees growing forest is counterproductive. I can't say that enough destroying our forest is counter productive. We will destroy our planet just as much if we stay with our energy sources currently.

Possible soil/water contamination, as well as disposal of old or damaged batteries requiring bonds to pay for removal of obsolete or nonfunctioning solar equipment? since its a new technology, safety, environmental risks and aging is a concern Sound or other polluting considerations.

Start by getting storage and solar for emergency facilities throughout town.

the best "energy storage" for buildings is insulation/weatherization AND solar thermal domestic hot water systems
 " LOWER our energy loads FIRST!

The cutting of the forested areas. Where does the timber that was felled go. The horrible "selecting" cut in the plains is ugly-perfect placement. If you are concerned about the wild life conservation area, no need, all the equipment used to mow those thousands of trees down scared it all away. I used to have bear and deer wandering in our backyard.

there needs i be a coordinated, at national and regional levels, reform of ISO NE in order to actually build a renewable electrical grid. town and even county scale planning is a scam and will ultimately result in a waste of money and, more importantly, time.

There needs to be a discussion about batteries used for storage in smaller systems, and the availability of recycling them locally.

There should be more financing options available to small businesses. PACE loans do not meet the needs mom+pop businesses when they have \$2mil minimums.

They would be best in industrial areas.

This needs to benefit the citizens!!!

transmission lines and switching stations, poles and the infrastructure are really ugly. Every effort should be made to ensure that these projects do not affect the visual aesthetic of our town.

unsure what energy STORAGE means

Ways to mitigate the visual ugliness of electric infrastructure, i.e., switching stations, utility poles & lines, etc.

What are the downsides to large energy storage? (i.e damage to area, noise, distance from neighbors)

What is the lifespan of these solar panels? What happens to them at the end of their service life? How do these facilities affect the operation of the electric grid?

Where is storage equipment mined and manufactured?

Where is storage facility located? we should not sacrifice forest or farmland for solar energy

Who is manufacturing the batteries? Are these guaranteed? Are the storage facilities safe?

ADDITIONAL COMMENTS

Q28 - Are there any additional questions, concerns, or preferences about solar energy that you would like your local and state representatives to know?

(1) Solar panels, batteries &c (those already made as well as those to come) need to be 100% recyclable so they do not end up in landfills and become toxic. (2) Likewise, the manufacture of solar panels and batteries should be without harmful chemicals, toxic metals &c that are harmful to the land where they are mined and the people who work with them. This should be true for any energy source we use.

Don't want to turn Western MA into generator for all of MA at our expense

Have community involvement with meeting (educational discussion) panels, pro + con, debate, Timed when working folks can attend, local community TV coverage for elderly + disabled folk, public voting on projects

please don't make solar go through new/different permitting or review process if the project is a private development on private property

Solar energy needs more development before being considered for either residential or commercial. Properties with solar are either deficient to [illegible] or developers will have issues with roof issues, never [illegible], after have rental attached to them creating a burden for new homebuyers. I find more progress needs to be made before the [illegible] are to be considered

Absolutely do not put solar panels on undisturbed or wild land, or on agricultural land. There is no going back once panels are installed and farm land is diminishing.

Adamantly opposed to siting solar in forests, meadows, farmland UNTIL ALL appropriate buildings, parking lots, brownfields and disrupted lands have solar.

Again, I cannot stress enough that destroying our forest is not the solution

Bonus, benefits, tax advantages, something monetary for towns, cities that do at least or better than their fair share. Every pot on its own bottom. Every town, city and state should meet their own electric needs.

Farmland is so important to this area that I would not want to support a project that was going to the livelihoods of the farmers. I feel like I don't know enough about the potential tradeoffs needed to meet everyone's needs and I would support some sort of compromise.

Forcing people to pay for one more thing is NOT the way to go.

From my limited knowledge, it sounds like solar panels have a shelf life. Once they are no longer usable, what is done with them? Is there a sustainable way to dispose of them?

I am concerned that the rise in renewable energy has done nothing to decrease energy prices. I am concerned that municipalities absorb the negative externalities of energy development even as local residents do not see meaningful reductions in energy cost.

I am concerned that there is so little emphasis on solar hot water systems which could dramatically reduce the energy needed for water heating. heating

I am still waiting for my heat pump hot water & whole house heat pumps rebates.

I am vehemently opposed to construction of solar fields in woodlands and other natural areas. Parking lots and rooftops should be used to the maximum allowed

I didn't see much about how the average homeowner, renter benefits by this process.

I don't think the energy grid should be owned by and maximized for for profit entities.. We should shift to 100% renewable energy as soon as possible.

I have grave concerns about Western Mass being asked to shoulder the burdens of using land to generate solar (as we do with fresh air and water) with an unfair PILOT program. Boston must not get cheap water, energy and clean air while Western Mass is underrepresented in government and bears a greater tax burden.

I think the hydro power generated in town should be considered when looking at amount of alternative energy

generated in town. The hydropower has impacts on our river, riverbanks, fisheries etc. that most other towns do not have to deal with.

I would have already installed ground mounted solar at my home if zoning allowed for it.

I would like any tax credits/subsidies to go only to small scale projects, and not to the benefit of large landowners.

I would like free solar installed in houses owned by anyone over 60, low income households and any new house would be required to install solar as part of the overall design unless they have less than 40% sunlight 60% of the year

I would love to add micro-community solar along the roadside of my property but current rules make it a poor financial decision. I'd love to see rules changed so that small and midsized community solar is supported, rather than benefits going to only home-scale or large commercial scale. I also am curious if there are ways to allow grid-disconnect for operation of a grid-tied residential system if the power goes down (for example, storage right now is too expensive for me, but if I could disconnect when the grid was down I could at least power the refrigerator/freezer and water pump when the sun was out w/o turning to a diesel generator.

I would love to see more off-shore wind as well. :)

If there is any way to install grid to battery power on each installation

I'm extremely concerned about the need to address our climate crisis, which includes protecting and nourishing our trees, green spaces, and wild places! Accordingly, I find chart about Solar Capacity Options confusing as to why Community Self-Sufficiency requires so much more development of land than does a Regional Energy Goal?? Also my responses to the previous chart regarding possible benefits to our town would all depend on potential LOCATIONS of solar installations.

I'm particularly concerned with solar being incentivized for ag land that has been protected for ag use with public dollars! (And similar for protected forest)

keep it off farm, forest and meadow land

Large scale solar should not be allowed in rare & endangered species habitat.

No parking lot should be without solar panels

NOT ANY MORE. ALL GONE DUE TO THE FORESTS BEING CLEARCUT!!

Please no solar installations on agricultural, pasture, nor forest land!

please offer free solar for residents to put on their homes

Price of electricity is already going up. All electric is not feasible for retired persons. Certainly can not afford an electric car. To work, electricity needs to be affordable to low income also.

put solar panels on school and hospital roofs. They can be used for back-up power

Questions about rebates/tax breaks for adding solar to my residence

Right to veto a project.

So many things that are currently unknown and that I don't know to ask about.

solar projects on forest and agricultural land is counterproductive to dealing with climate change

Solar should go in roofs and parking lots only

S-RECS (Solar, renewable energy credits) should be continued as a way for homeowners to spread the cost of their initial investment. How do we make solar more equitable? Low income households need options too

That solar panels go on already built areas not unbuilt land

The fundamental science and reasons why conversion to solar is be promoted and subsidized by taxpayers

The only way this works and is equitable, is if the utilities are actually accountable. The utilities should be publicly owned, not shareholder owned.

The projections for necessary acreage for self sufficiency are untenable, in that they would cause irreparable damage to local food production, biodiversity, water quality, heat island effect, etc. For a proposal like this to make any sense, we need to radically reduce electricity needs (by 10x-100x). This means public transit, electric bikes, retrofit/green build, and a big shift in behavior. You can't discuss or plan for this stuff in isolation.

These must be union jobs

They should be non-profit.

Use of rooftops first. Town-owned is preferred. Don't developed agricultural and conservation. Don't cut down forests and woodlots. Use the Rt. 63 corridor where open. Hide poles and infrastructure

We must stop building solar, housing, or commercial buildings on agricultural or wooded lands. We need these lands for

growing food and preserving the climate. Please bring in lots of solar but on rooftops and disturbed land only.

We need to be investing and researching efficiency and conservation techniques as heavily as renewable energy. This is so important!

We should FIRST be looking at factor 10 reductions in energy use/increases in energy efficiency. It's STUPID to invest in renewables without reducing demand first. We should also prepare for other class 1 renewables, especially in the long term.

What are the safety and security concerns for residents? How will this affect wildlife?

What happens to the solar panels once they wear out or are broken? As of now, there's no real plan or way to recycle. The panels contain chemicals that leach out of them? How hazardous are they and will they contaminate the land? We can't destroy good farm land.

What measure are being taken to address the future recycling of solar projects?

Where are the solar panels manufactured

Where will the waste go when these assets age out. Does the state have a plan for support disposal of decommissioned equipment

While the idea is good, government implementation would need to be good/well researched and maintained

Work hard and work fast to get transitioning to green energy as fast as you can

Would love to see solar become an affordable option! As a non-homeowner, not really something I currently have access to. So solar at a town level sounds great.

Q29 - Are there solar energy topics that you would like to see your town learn more about?

Benefits to community

Questions to be anymore would be - who is responsible for repair/replacement of panels and equipment? My understanding is that when a residential property has a problem to the repair/replace the homeowner pays to have the replacement, then pays to have it reinstalled. Are often not experienced,

Aesthetic impact for our lovely town.

Agriculture is poorly understood by most folks; would be useful to have a seminar on that.

All the pros and cons. The best solutions for the least amount of sacrifice to taxpayers

Battery storage and off-grid options for all homes

Community solar with tax benefits for residents

Cost

education on residential options that are cost efficient. I do not trust the companies selling and pushing their products without education

Efficiency and conservation incentives

equity issues

everything you have mentioned in this survey

Help building owners understand solar incentives and how to tap them.

I don't believe the space usage for the energy generated is an efficient use of the land

I feel like I am not completely educated enough on the options and tradeoffs. I do want to act to fight climate change, and want to learn more about what that needs to look like. Thanks!

I think large scale is a important topic, but this survey focuses too much on it and ignores other big issues and obstacles.

I want a cradle to grave roadmap for the solar panel, batter storage, etc published.

I would like government to provide incentive monetarily, for towns, cities across the state of Massachusetts to utilize abandoned building lots for solar farms. Depending on where they are, of course, but please consider this before,

considering trying more of our forest, our wildlife. Our birds in our lives, depend on what the trees provide to the planet and put a human, thank you

I would like the town to look beyond solar, to wind and small scale hydro.

I'm sure that each and every resident has concerns about costs, distribution, advantages, safety.

I'd like a clearinghouse for solar contractors organized and supported by the state for residents to access. I don't know where to begin or who to trust.

If community solar is available, is community battery available?

If solar panels are installed on municipal buildings could the town qualify for a volume discount? (multiple buildings mean multiple solar panels)

Installation of rooftop solar that looks like a regular roof as opposed to panels - if it even exists.

Integrated approaches taking into consideration closed-loop/circular economy and living systems/regenerative approaches.

is there possibility of locating solar along or over the canal?

Large subsidies for home owners to purchase home solar and storage batteries.

Local funded, locally owned solar that benefits the community. I would hate to see the town allow a third party to come disrupt the local landscape, to make profit selling power outside the community, with no ongoing direct benefit for residents

Local ownership of renewable resources

long term impact on farmland viability, habitat, etc, and opportunities for community ownership, etc

Maintenance and Repairs costs- who pays????

Maintenance of solar projects for the future.

more about our current solar farms; how they are doing and how the electricity they generate is used.

Neighborhood battery storage for mini grids during power disruption

neighborhood solar cooperatives

Other options for localized electric generation. How much energy is lost through conversion and transmission?

Please come up with a way to take a picture of a home's heat loss, as mice ect. eat the insulation. I should be able to do a no cost for energy at my home.

Programs that provide grants to private homeowners to install their own solar array, like many other towns in the Valley have done. (What's one example).

read above

Recycling of used solar equipment. Hazardous waste run off from panels.

resident incentives

Smart Grid and potential distributed battery storage such as using EVs when they are not being driven.

Solar panel manufacturing and waste disposal

Solar shingles

Stop solar, preserve our wild life habitat

Storing community solar energy generated to benefit residential customers

Thank you for this survey!!

The town should have the full financial info presented in a clear and concise way-solar companies can be confusing. Town residents should understand clearly what is going on

Trade offs, esp. forest vs. solar arrays

We should be group buying renewable energy for residents like Greenfield is doing.

What are the current thoughts, what is this survey designed to determine?

Q30 - Use this space to share additional comments or questions.

'- I am glad that the Town of Montague is looking at and considering these issues. - Let's do this in the smartest way

possible without destroying our beautiful natural surroundings. [Note for analysts: this was a paper survey entered into Qualtrics]

I support the goal of our state achieving 100% energy through renewable (solar and wind) and efficiency. Hydro has many negative impacts to river systems. I support the state requiring all new construction to be oriented for solar panels, that all commercial centers have parking areas with overhead solar panels, and the roofs of commercial buildings if flat, be retrofitted with solar. I support offshore wind energy development akin to Denmark. Interstate highways have immense land bordering them which can be used to site solar and wind.

(was going to ask to see the survey results, but I see you will already publicize them when they are ready)

Development of solar arrays doesn't HAVE to be so ugly if its situated correctly. The town should approach the owners of the old Sirum Equipment on Rte. 63- marqinal soils, already open, not suited for agriculture. On Question 16: for agricultural land said bad move and natural land said do not do that. Then for question 17 for areas hidden by forest or other low elevation sites not visible, she said: This would be site specific case-by-case reviews enough said.

If I were not "old" and probably not able to remain in my home (cost of maintenance) If I have already taken advantage of current enticements (insulation, etc.) If I am dubious about state supported plans and the reliability of companies associated with them. If I could afford to purchase my own panels AND I would wait for next generation of panels that appear to have significant improved appearance, productivity, etc. Good luck! This took some time and thought. The people who do not respond will scream the loudest when plans are put forward. Reference mascot change a couple of years ago

It would be helpful to offer incentives. we have a meadow on our land, rooftop (barns and house), but can't afford to install with personal funds, Question 21 - willing to pay \$15 more

This survey had zero introduction. Who is collecting this information and for what purpose? obviously, I want to contribute, but a little orientation WOULD have been nice. Also did not understand Question 16

(1) Solar should not be considered alone. Montague, for example, has considerable water power. (2) Destroying land for solar is not better than destroying it for fossil fuels. The Connecticut River Valley, for example, has some of the richest agricultural land on the planet. Disturbing that releases carbon. In the face of climate change we also need all the good local agricultral land we can keep. "Undeveloped" land is land in its natural state, which is what we need to protect and increase. (3) Likewise, we need more trees, not fewer. Cutting down trees to build solar panels will intensify climate change as well as destroying our remaining bits of natural habitat. (4) Solar power cannot be simply a replacement for fossil fuels. We need to eliminate waste everywhere in the system " to use less energy overall and more efficiently. (5) Decisions about the survival of life on earth cannot be based on monetary cost. If only the rich can afford the solutions, then we will fail. Consider the example of Ithaca, New York, which appropriated a large amount of money to subsidizing energy-saving appliances like solar panels, induction cookers, EVs &c so that everyone could get them with the goal of making the whole city net-zero by 2030 I believe. Communities too small should band together, or the state should act communally. (6) Developers should have no control over the situation as their primary motive is profit not the general well-being.

(Note to data analyst: This is a paper survey)

[Public]

As noted several times earlier, this survey is misleading and narrowminded. See two comments on earlier questions.

Do we have a plan for reuse and recycling of solar panels and associated hardware in 25 years or however long these items will last?

Efficiency, Efficiency, Efficiency! Use it up, wear it out, fix it or do without. REDUCED demand is key to making wise choices in RE deployment/scale.

Energy efficiency and conservation should be our highest priority.

feel free to contact me anytime about this survey @ jrpeters25r7@gmail.com. I have lived in Montague all my 60+ years.

<https://www.theguardian.com/us-news/2023/may/21/solar-farms-energy-power-california-mojave-desert> "There are so many other places we should be putting solar," says Clarke, of the National Parks Conservation Association, from homes to warehouses to parking lots and industrial zones. He describes the current model of large-scale, centralised power generation, hundreds of miles from where the power is actually needed, as "a 20th-century business plan for a 21st-century problem". "The conversion of intact wildlife habitat should be the absolute last resort, but it's

become our first resort " just because it's the easy fix."

I am disturbed when I see solar arrays on agricultural land or when folks talk about cutting down forests. There are many sites that could hold these arrays without destroying our natural spaces.

I see solar becoming another platform for corporate greed. This survey, I hope, helps solar energy help all, rather than just the few money hungry.

I would install on my roof, but it is slate. I was told they can't install on slate. Is that as true?

Is geothermal energy a possibility locally?

I've had thoughts about installing solar at my property in Turners Falls. Each time I send an inquiry to a website I get bombarded with emails, texts, phone calls. And not one of these companies can even give a guess about costs unless they come to the property and take a half day of our time and then we never hear from them again. Everyone seems to be able to go on line and get as much info as they need when it comes to buying or selling something related to any property. So the process needs to be easier for the average homeowner. Similar to replacing a roof, I would think.

Keep in mind that the visual aspects of any installation are of prime importance.

My main issue is that the whole debate over leasing versus purchase has ignored people who may not be able to purchase. The solar community is so hostile to leasing (and the leasing companies aggressive and often dishonest) It is hard to evaluate the options. Also solar is VERY COMPLEX and hard to figure out if you have TENANTS.

Our town needs to focus more on public safety and less in solar. We have high crime and under staffed police fire and EMS.

Politicians need to extract themselves from the politics of climate change and understand the science of climate change. This science is not settled. Read Koonan's book Unsettled.

questions 27-30: I think solar installed in parking lots in general is great. No problem w/ roofs or individual's yards. Stay out of the forest + leave recreation views clear from site of solar installations.

Regarding large solar installations near various community features, I would oppose these in "areas hidden by forests" if this means taking down trees in any section of the forest!

Some of the general questions did not offer enough nuances in the answers for preferences to be clearly made. For example, How likely would you be to support large, ground mounted solar energy in your town if the project provided the following benefits to your town? I'd strongly support solar that reduces low-income electricity rates IF it is located on developed/disturbed land or rooftops. Also, I wonder how you came up with the total electricity demands projected for MA and related questions about how much space for solar will be needed.

Thank you for doing this

Thank you for doing this, I hope that you consider creative win-win-win ways to bring more solar to our town, region, state.

Thank you for giving us this opportunity.

Thank you for putting together this thorough survey!

Thank you for the survey! it got long but contained alot of good info and good questions. I wonder if there could be a shorter version for people who might not have the time or energy to go thru all these questions.

Thank you.

thanks for a comprehensive survey

Thanks for asking

Thanks for the opportunity to participate. Your site crashed on me twice while I was filling it out.

This survey was too long. What is the most efficient way to run air source heat pumps?

Until we change to municipal owned power and distributed renewable energy and storage " we can't make the change with Private for Profit Monopolies whose sole purpose is profit! Also (after question 21), my house generates all the electricity I need for all energy needs (all Electric house). So " is it fair that I don't have an electric bill??

paper survey

We are not big communities, and have very limited coffers as it stands. How will all of this be able to happen? At what cost monetarily, socially, physically, and any others ways that may be a current blindspot in the name of 'progress'?

We can't put all of our eggs in the solar energy basket! We need more hydro, natural gas, atomic energy also! Where do all the panels go? How much energy, environmental destruction, etc. per megawatt? Backup storage needed for the big hurricane as we rely more on solar. Priority should be on upgrading the infrastructure + distribution of the grid!!! [PAPER

SURVEY COPY]

What about wind power? Have we given up on wind power & if so why?

Why aren't we using the hydro power we generate ourselves, rather than selling it? Solar is great and I think we should invest in some but has anyone done a recent cost/benefit and environmental impact survey between solar and another hydro generator? (Is there space for another hydro generator?)

You may not have wanted to give me an extra comment back. Again, stop destroying our forest and our tree not just a quart or treat that enough ever source is destroying acres in acres of trees for the precious line because God for bid the human feet go a day or two or seven without electricity in the event of power outages.

LOCATIONS

Q17 - To what extent do you support or oppose large, ground-mounted solar energy near various types of community features?

Field	Strongly Support	Support	Neutral	Oppose	Strongly Oppose
Alongside waterbodies – streams, rivers, ponds, lakes, wetlands (e.g., the Millers River, Lake Pleasant)	11	22	45	69	69
Adjacent to public recreation areas	33	60	57	36	32
Adjacent to the town center	33	67	49	38	28
Adjacent to historic buildings or properties	15	41	54	64	41
Adjacent to residences	29	68	59	28	30
Along rural roads	20	67	59	42	28
Along major roads (e.g., Route 63)	48	88	37	19	22
Areas visible from scenic vistas or other high elevation locations	14	40	62	50	52
Areas hidden by forest or other low elevation sites not visible	41	75	52	20	26

Q18 - To what extent do you support or oppose large, ground-mounted solar energy projects in these various configurations on agricultural land?

Field	Strongly Support	Support	Neutral	Oppose	Strongly Oppose
Active hayfields or pastureland converted to solar	7	16	39	75	80
Agricultural land currently used for vegetable or fruit production converted to solar	5	0	23	82	107
Solar panels raised above agriculture land to allow farming to continue beneath (sometimes called "agrivoltaics")	41	70	58	20	31
The edges of active agricultural land converted to solar	35	68	62	22	32
Agricultural land not currently being farmed converted to solar	20	43	43	59	52

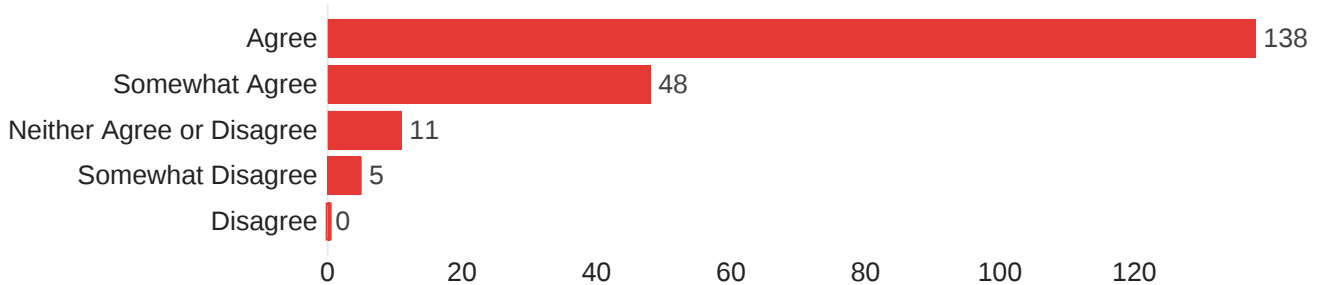
Q19 - To what extent do you support or oppose large, ground-mounted solar energy projects on various types of non-agricultural land?

Field	Strongly Support	Support	Neutral	Oppose	Strongly Oppose
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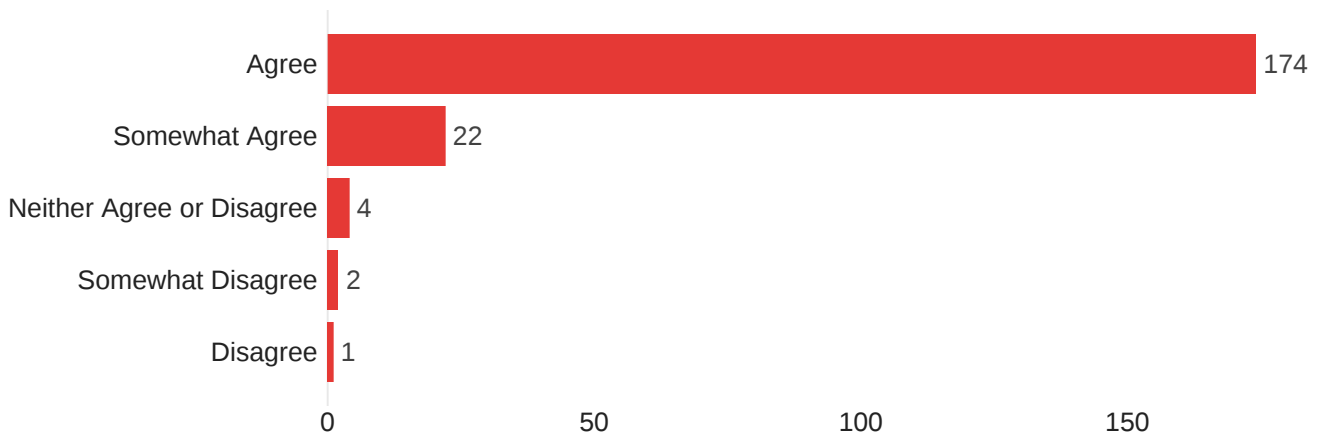
Former landfills and brownfields	136	58	20	5	3
Former sand/gravel extraction sites and quarries	124	63	24	8	2
Priority wildlife habitat	3	0	19	48	148
Large tracts of mature forest	3	4	9	50	152
Large tracts of forest regularly harvested for timber	5	21	29	75	88
Small patches of mature forest	2	14	26	53	123
Small patches of new growth forest, small trees and saplings	4	19	36	71	88
Meadows or Shrublands	3	24	37	64	89
Electricity transmission line corridors/powerline right-of-ways	103	70	34	9	5

GENERAL OPINION/DEMOGRAPHIC QUESTIONS

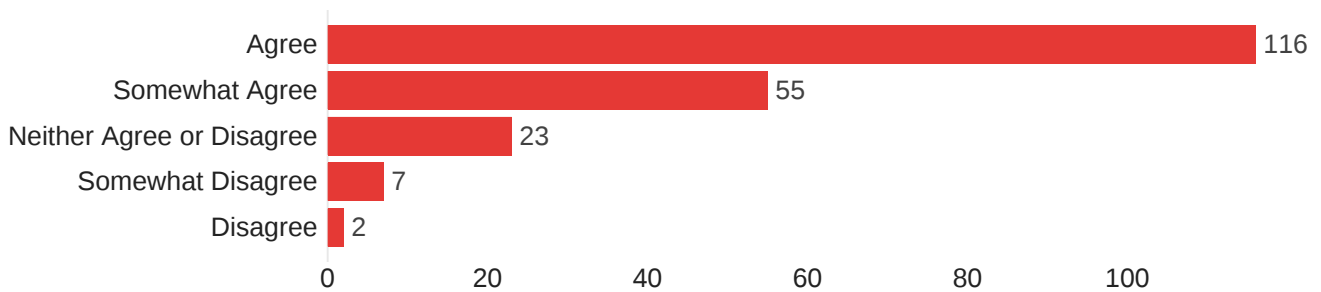
Q35 - I feel attached to my town



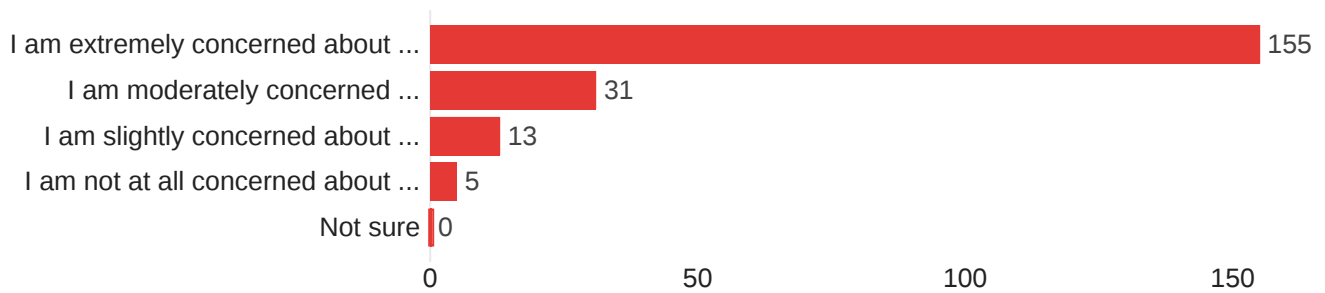
Q36 - I feel attached to Western Massachusetts.



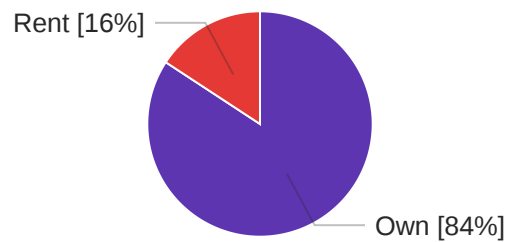
Q37 - I feel attached to the Commonwealth of Massachusetts.



Q38 - What is your personal level of concern about climate change?



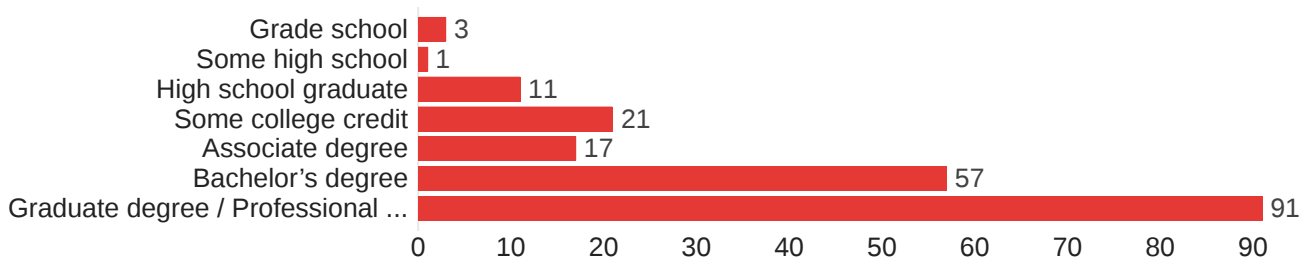
Q39 - Do you rent or own your current residence?



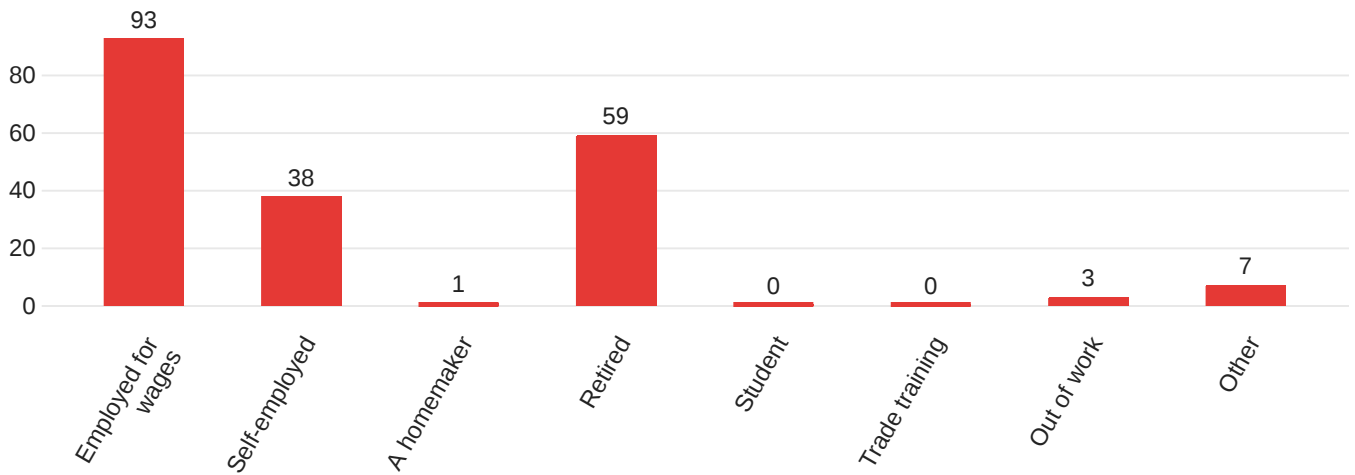
Q40 - What is your age?

Field	Min	Max	Mean	Median	Standard Deviation	Responses
What is your age?	22	90	55	57	15	200

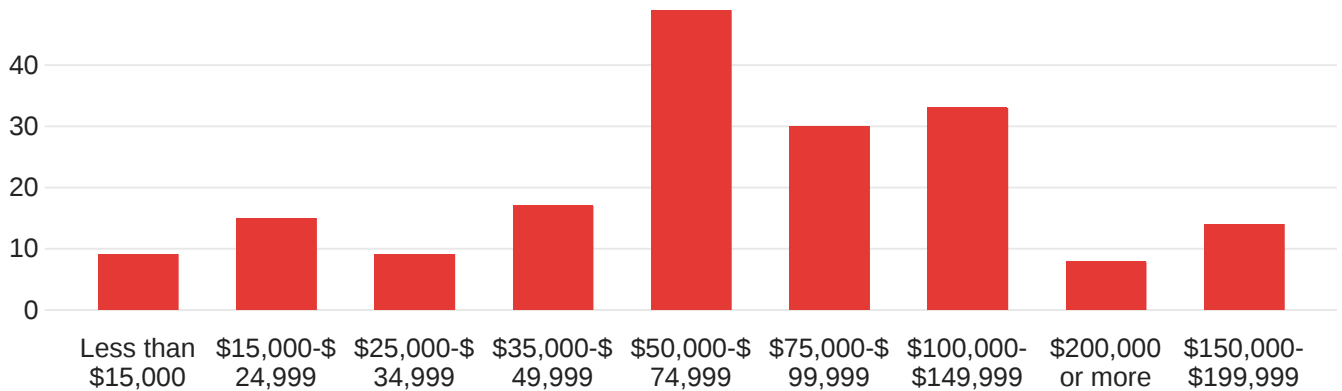
Q42 - What is the highest degree or level of school that you have completed?



Q43 - What is your current employment status?



Q44 - Which category best describes your household income (before taxes) in 2022?



Field	Choice Count
Less than \$15,000	9
\$15,000-\$24,999	15
\$25,000-\$34,999	9
\$35,000-\$49,999	17
\$50,000-\$74,999	49
\$75,000-\$99,999	30
\$100,000-\$149,999	33
\$200,000 or more	8
\$150,000-\$199,999	14

Q45 - What is your race/origin? Check as many as apply. - Selected Choice

