

# Community Solar Action Plan

for  
the Town of Ashfield



Photo Credit: *Greenfield Recorder*

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## Terms, Abbreviations, and Acronyms used in the Plan

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

### *Terms*

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

**Voltage** of an electric power line can be thought of as the equivalent of pressure in a water line. The voltage of transmission and distribution power lines is typically measured in 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.

**Three-phase power lines** are distribution lines designed to serve large commercial or industrial buildings that use large amounts of electricity or have sensitive equipment that requires high power quality and consistency.

**Single-phase power lines** are smaller distribution lines suitable for residential-scale lighting and heating electricity loads.

**SMART** is the abbreviation for the current state solar energy incentive program (the Solar Massachusetts Renewable Target program). This program replaced earlier solar incentive programs, commonly known as “SREC” programs, in November of 2018, and was further updated through an emergency regulation in April 2020. The SMART regulation includes incentives for projects up to 5 MW AC in size. Additional incentives are available for projects located on buildings, parking lot canopies, landfills, brownfields, and “dual-use” solar and agriculture projects, as well as certain types of projects that benefit public

entities, like municipalities. The updated regulation places restrictions on what types of large, ground-mounted projects can receive incentives, if they are sited on undeveloped land designated as BioMap2 Critical Natural Landscapes or Core Habitat, by the state MassWildlife Natural Heritage and Endangered Species Program.

### ***Abbreviations & Acronyms***

**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 Ashfield. 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 Ashfield by UMass student Grace Theberge 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 Energy 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 Ashfield 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

Ashfield residents are strongly supportive of solar development. Based on the *Community Solar Survey*, 91% of residents are “extremely” or “moderately” concerned about climate change, and 94% reported they have a “positive” or “very positive” attitude towards solar energy.

Ashfield residents are most supportive of solar development on already developed spaces like roofs and parking lots: 74% indicated support for a community goal of developing all available roofs, parking lots, and previously disturbed lands for solar. Most residents were also supportive (69%) regarding a goal of solar development sufficient to meet municipal needs. There was majority support for solar development to meet anticipated regional (57%) energy goals and slightly less (44%) support for meeting state energy goals. Residents are also concerned about conservation of undeveloped natural and agricultural lands within town and showed little support for developing large portions of these landscapes for solar: More than half of respondents indicated that they would prefer to see no more than 10% of undeveloped natural and agricultural lands developed for solar. Developing less than 10% of the town's area for solar is nevertheless compatible with helping support regional or state solar capacity goals.

**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 solar development necessary to meet a goal of community self-sufficiency or aid in meeting regional solar energy goals.** Based on our analysis, community self-sufficiency might ultimately require 15 MW of solar development in Ashfield, which represents approximately 12 times 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 15-50 acres of undeveloped land. To help support electricity needs for the 4-county Western Mass region (Franklin, Hampshire, Hampden, and Berkshire counties), Ashfield would need to develop roughly 1.25% of its land area, or about 325 acres. This would equate to 65 MW of solar, 50X Ashfield'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 regional electricity needs will require active efforts to deploy solar on developed spaces, disturbed lands, and other sites acceptable to the community. This plan is designed to help guide these efforts.

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

Following the sections addressing solar development options is a section addressing Ashfield's existing solar bylaw, as well as 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 *Ashfield Community Solar Action Plan* will be made available on the UMass Clean Energy Extension website.

The *Ashfield 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* and the *Community Solar Survey Results Summary*) will also be made available on the town website.

**Commented [ZD1]:** This is a question for the town - will the plan be made available on the town's website? If so, a URL can be added.

**Commented [ZD2]:** Again, this is up to the town to decide.

## 2. MUNICIPAL SOLAR

*This section addresses solar on municipal building rooftops, municipal parking lots, and municipal properties.*

### 2.1 Current Status

#### *Existing Infrastructure & Electricity Use*

Ashfield has five municipal buildings which are currently listed in the town's Mass Energy Insight (MEI) account. The largest electricity users, from highest to lowest, are the Wastewater Treatment Plant, Library, Town Hall, Town Garage, and Fire Station. Streetlights also use small amounts of municipal electricity.

Ashfield uses, on average, 158,450 kWh of electricity per year for municipal buildings. A total of 122 kW of solar capacity would be needed to supply this amount of electricity.

Sanderson Academy is located in Ashfield but this regional elementary school is shared with the Town of Plainfield. Ashfield is partially responsible for the energy consumption by this building, but it is not included in municipal MEI data. In addition, Ashfield students attend Mohawk Regional High School. Energy use for this school is also not included or available through Ashfield's town MEI account. The School Committee for Mohawk recently voted to approve installation of solar panels on the school's roof. These will be owned by a third party but provide discounted electricity to the school.

#### *Current Regulatory Status*

There are no special restrictions regarding solar development on municipal properties in Ashfield. Subsequent sections of this Action Plan describe Ashfield's zoning bylaw requirements for roof-mounted and ground-mounted solar systems.

#### *Community Perspectives*

Ashfield residents showed strong support for solar development on municipal buildings and properties. In the *Community Solar Survey*, 69% of residents indicated they felt the town should invest in solar development on municipal buildings and parking lots to meet municipal needs. In addition, 57% of *Solar Survey* respondents indicated support for town investment in solar projects to meet community resident electricity needs. For both questions, a number of respondents (25% and 33% respectively) also indicated support that depended on a number of factors. The most common important attributes mentioned were maintaining the natural beauty of Ashfield, leaving natural lands intact, and potential impacts on the town budget or taxes.

Additional results relevant for municipal solar considerations:

- Most *Solar Survey* respondents are very likely (62%) or likely (32%) to support solar projects that provide back-up power for schools and emergency shelters, like Sanderson Academy.
- Most *Solar Survey* respondents support (33%) or strongly support (54%) development on former landfills, like the Ashfield Transfer station.

- Most *Solar Survey* respondents strongly support (19%), support (26%), or are neutral to (25%) solar development near the Town Center, where the Fire Station and other municipal buildings are located.

## 2.2 Future Potential

### *Future Electricity Use*

Based on current fossil fuel use (heating oil, propane) to heat town buildings, we estimate roughly 109 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 207 MWh are estimated to be needed as an alternative to gas and diesel. Under this scenario, municipal electricity use would roughly triple to 475 MWh per year, necessitating 365 kW of total solar capacity to meet municipal needs.

These totals do not include electricity use by Sanderson Academy or Mohawk Regional High School. 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*

**Sanderson Academy.** The Ashfield MVP plan outlines that Sanderson Academy serves as an emergency shelter for the town, making it critical infrastructure that would benefit from on-site energy storage.

**Ashfield Fire Department.** The Fire Department is a good candidate for energy storage, as it would increase the resilience of the town’s emergency response system. It is also right next door to the Town Hall and Police Station, which would also benefit.

**Wastewater Treatment Plant.** The Wastewater Treatment Plant has a high electricity demand and provides critical services to the Town. Energy storage could therefore be useful at this facility as well.

### *Municipal Rooftops & Parking Lots*

Solar potential of public building rooftops in Ashfield is detailed in **Table 1** below.

Structure	Street Address	Total Roof Area (sq ft)	Estimated Rooftop Technical Solar Potential (kW)
Fire Station	420 Main St	2,585	10
Belding Memorial Library	344 Main St	3,400	13
Town Hall	420 Main St	4,440	17
Wastewater Treatment Plant	705 Conway Rd	7,524	55
Town Garage	896 Cape St	13,349	97
Sanderson Academy	808 Cape St	40,404	294

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

Some concerns have been raised by the town regarding the structural status of several of these rooftops. Each of these buildings would need to be evaluated for specific project viability before development can begin.

In addition to rooftops, the Town Garage also has a paved area which could be appropriate for solar, although the need to allow for easy movement of town vehicles through the site might limit development. The paved area is 0.81 acres, which represents an estimated technical potential of 213 kW.

Our estimate of total technical potential on these roofs (446 kW) and parking lots (213 kW) is roughly 659 kW (0.66 MW). However, this is the technical potential. This estimate does not take into account roof condition, driveways, logistics, economic considerations, or other considerations, and hence is likely a significant overestimate of actual potential. All of these locations would require on-site evaluations to understand use patterns, available space, and actual solar potential.

Solar arrays over 50 kW in size often must connect to three-phase electricity distribution lines in order to interconnect to the electricity grid safely. Out of the large rooftops listed above which could accommodate an array of over 50 kW, only the Wastewater Treatment Plant is located near a three-phase line. The Town Garage and Sanderson Academy are located roughly 1.5 miles from a three-phase line, which runs west along Main Street, but terminates at the intersection with Route 112. For large rooftops and parking lots not located near three-phase lines, the size of the system may be limited to less than 50 kW by local grid infrastructure, or local infrastructure may need to be upgraded to accommodate larger projects. Alternatively, integration of an energy storage system with the solar array may allow a larger solar array to be interconnected to the grid.

#### ***Ground-Mounted Solar***

Additional municipal sites identified as of interest for ground-mounted solar development include the following:

**Ashfield Transfer Station.** The Transfer Station, located at 776 Ashfield Mountain Road, includes 0.66 acres of formerly disturbed land that might be developed, representing a technical potential of 0.1 MW. The land is already cleared, but considerations will need to be made for residents to continue trash and recycling disposal activities. This site is 0.8 miles from a three-phase distribution line, which could limit the size of the facility that could be built. A 50 kW system could likely be interconnected to the single-phase line that serves this area, and there is potential for a slightly larger system (e.g., the 100 kW possible at the site), if a battery storage system could be incorporated.

**Town Center Recreation Site.** The Town Center Recreation Site (a.k.a. “the Field”) is the former site of Sanderson Academy, located on Buckland Road. This area is now used for recreation. Half of the cleared area is empty and was recommended by the Energy Committee as a potential site for solar. The empty part of the site is about 1 acre in area, which could support about 0.2 MW of solar development. This site is also in close proximity to a three-phase distribution line. Considerations would have to be made to ensure both recreation activities and a solar array could co-exist in the area.

### ***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:

- Conduct on-site evaluations of solar potential on rooftops and over paved areas at the Fire Station, Town Hall, Belding Memorial Library, Town Garage, Wastewater Treatment Plant, and Sanderson Academy. Energy storage options should be included in the evaluations at the Fire Station, Wastewater Treatment Plant, and Sanderson Academy.
- Conduct analysis of energy usage at Sanderson Academy to evaluate current and future electricity needs. (Note that Sanderson Academy was not included in the town’s MEI account, due to its joint ownership with Plainfield. However, the town could be granted access to set up and oversee the school’s account.)
- Conduct analysis of energy usage at Mohawk Regional High School to evaluate current and future electricity needs.

- Conduct an on-site evaluation of the potential for ground-mounted solar at the Transfer Station and Town Center Recreation Site.
- 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 Sanderson Academy and Mohawk Trail Regional High School.
- Discuss potential for extension of three-phase power south along 112 with Eversource, to support solar development and energy storage at the Elementary School and Highway Garage

**Action Items**

Action	Lead Entity (or Entities)	Supporting Entities	Start Year/ Annually?
Conduct on-site solar evaluations	Ashfield Energy Committee	Solar Installer	
Compile and analyze energy usage data for Sanderson Academy	Ashfield Energy Committee	Plainfield Energy Committee; Green Communities Program	
Explore solar funding options for municipal projects	Ashfield 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	Ashfield Energy Committee	Finance Committee, Select Board	
Explore opportunities for electric bus use & charging needs at Sanderson Academy	Ashfield Energy Committee, Plainfield Energy Committee, School Committee	school staff, EPA, MassCEC, bus companies	
Explore opportunities for electric bus use & charging needs at	Energy Committees of 9 participating towns; School Committee	Superintendent's Office staff;	

**Commented [ZD3]:** This table is to be filled out by the Energy Committee and other town boards/committees, depending on the tasks and timeline they want to take on. This table is partially filled out, as an example. Subsequent tables are blank but can be filled out based on Next Steps. CEE can help the town with this process if desired - but doesn't want to dictate a timeline or priority action items.

Mohawk Regional High School		MassCEC, bus companies	
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### 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, Ashfield has about 157 residential solar systems, with an average size of 7.8 kW, and representing a total of 1,231 kW of solar capacity. Roughly 17% of households have a residential solar system.

In Ashfield, roof-mounted solar arrays are not specifically addressed in the town's zoning bylaw, but require a building permit. Small, ground-mounted residential systems fall under the category of Small-Scale Ground Mounted Photovoltaic Facilities (SSGMPVF) in the town's bylaw. These systems can be no larger than 40 kW. Development of a residential system requires that developers comply with all local, state and federal laws, obtain a building permit, and minimize visual impact on abutters. The facility must also follow dimensional and setback requirements based on size and location.

##### *Community Perspectives*

In the *Community Solar Survey*, Ashfield residents indicated strong support for solar development on residential roofs and in residential yards. Out of all respondents, 87% felt "positive" or "very positive" about solar installed on residences, and 77% felt "positive" or "very positive" about solar in residential yards.

At total of 54% of residents that did not currently have solar installed at their residences were interested in doing so; an additional 31% were not sure. Major reasons residents cited for not already having a system installed were upfront cost (46%), having a shaded property (35%), not knowing enough about their options (28%), and distrust of solar developers (19%). Several respondents that chose "other" cited concerns about aesthetics or the historic value of their home.

#### 3.2 Future Potential

##### *Solar Potential on Residential Rooftops & Yards*

Potential residential solar capacity in Ashfield can be estimated through several different methods. If solar were installed on all small building roofs in town, the total technical potential would be about 9.7 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 76% of residential properties in Ashfield 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 Ashfield is 7.8 kW. If 76% of homes were to install a solar PV system of this size, it could provide about 5.2 MW of electricity generation capacity. This would be equivalent to about 35% 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 Ashfield is 632 kWh, only slightly higher than the state average. The average size of a household solar PV system in Ashfield is 7.8 kW, 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 Ashfield could increase by roughly 2.5x, necessitating an average system of roughly 14.5 kW to offset future household electricity demand. Ultimately, if 76% of households were to install a 14.5 kW system to meet future electricity needs, residential systems could contribute 9.7 MW of solar. This is equivalent to 65% of the estimated 15 MW of solar capacity needed to offset anticipated future electricity demand in Ashfield.

### ***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 Ashfield 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 Ashfield. 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 7.8 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 (\$200-\$500 per year), but the net value is positive due to avoided electricity costs (\$36,000 net savings 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 Ashfield residents.

### 3.3 Next Steps & Action Items

#### *Potential Next Steps*

Since there is strong interest in 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 regarding solar PV systems, 2) financial concerns, and 3) logistical challenges with locating solar PV systems on some shaded residential properties.

#### **Public Information Sessions**

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

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

**Financial analysis of residential systems.** CEE is happy to work with Ashfield 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, the Fall Festival, or other local events.

#### **Assisting Residents with Shaded Properties**

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

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

**Community solar array.** If about one-quarter of residential properties in Ashfield cannot host solar, there is likely to be appetite for community solar for people who own shaded properties. It is worth considering whether there are properties where a community-owned project on public or private land could be owned by a group of local residents. The town could work to identify locations where a small community solar array could be sited in different parts of town.

#### **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.

**Action Items**

<b>Action</b>	<b>Lead Entity (or Entities)</b>	<b>Supporting Entities</b>	<b>Start Year/Annually?</b>
Organize and hold a community solar forum	Ashfield 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			

## 4. SOLAR FOR BUSINESSES AND INSTITUTIONS

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

### 4.1 Current Status

#### *Existing Infrastructure*

There are a number of large buildings on commercial and institutional properties which might be suitable for solar (see *Future Potential* below). To the best of our knowledge, none of these properties have solar currently, except for one farm, which is detailed in Section 5.

#### *Current Regulatory Status*

As noted in Section 3, roof-mounted and small-scale ground-mounted solar systems require a building permit and must meet other basic requirements. Medium- and large-scale solar arrays are addressed in Section 5, but are not relevant to the roof-mounted solar arrays discussed in the context of this section.

#### *Community Perspectives*

Out of all survey respondents, 51% indicated that knowing an organization or business uses solar energy makes them feel more positively towards that organization and 23% said it makes them more likely to purchase goods from that organization. No respondents said that it makes them feel more negatively about an organization.

Three-quarters of survey respondents indicated support for solar development of 80-100% of large rooftop space, like those on businesses and farms, to be developed for solar.

A large majority of survey respondents (74%) felt “positive” or “very positive” about a community goal of solar development on all already developed spaces.

### 4.2 Future Potential

#### *Commercial & Institutional Rooftops*

There are four large roofs owned by businesses or institutions in Ashfield. These roofs total 31,529 sf in area and 229 MW of technical solar potential. Rooftops can provide roughly 1.5 kW of solar per 100 sf of suitable roof space. On roofs in the range of 5,000-25,000 sf, about 49% of the roof area is suitable for solar.

Locations with the greatest potential for roof-mounted solar on businesses or institutions are summarized in Table 2. 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.

<b>Organization</b>	<b>Street Address</b>	<b>Total Roof Area (sf)</b>	<b>Estimated Technical Solar Potential (kW)</b>
First Congregational Church	429 Main St.	5,266	38
Harris Gray Excavating & Concrete Contractors	21-41 Main St.	5,748	42

Repair Garage	215 Main St.	8,444	61
Roberts Brothers Lumber Co.	1450 Spruce Corner Rd.	12,071	88

**Table 2** The four largest privately owned roofs, with large areas potentially suitable for solar.

The rooftops at the Repair Garage and Roberts Brothers Lumber Co. could each potentially host a solar array over 50 kW in size. Solar arrays over 50 kW in size often must connect to three-phase electricity distribution lines in order to interconnect to the electricity grid safely. The Repair Garage (215 Main St.) is located near a three-phase line. However, the Roberts Brothers building is located miles away from any three-phase line. The size of a system at this location may therefore be limited to less than 50 kW by local grid infrastructure. Alternatively, integration of an energy storage system with the solar array may allow a larger solar array to be interconnected to the grid. Solar arrays under 50 kW in size can typically safely connect to either single-phase or three-phase electricity distribution 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, organizations that do not have a tax liability 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 businesses and institutions in Ashfield to determine their interest in roof-mounted or parking canopy solar systems. Offer follow-up with more information about the process and financial models for entities that are interested. A particular focus should be on those organizations with large roofs (see Table 2).

#### **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.]

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

## 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*

Ashfield has a number of active farms and significant acreage in agricultural production. Based on Mass GIS Land Cover data, the town has roughly 250 acres in cultivation and 1,500 acres in pasture or hay production. Fourteen properties are protected in perpetuity through an Agricultural Preservation Restriction. In addition, at least 31 properties totaling over 2,200 acres participate in the Chapter 61A program for the purposes of agricultural production (not including productive woodlots).

There are approximately 30,000 sf of roofs on barns and other farm buildings which could be suitable for solar.

Of the farms active in Ashfield, Clark Brothers Orchard is the only one which currently owns a solar system. This array has a nameplate capacity of 40kW.

#### *Current Regulatory Status*

Ashfield's bylaws put forth specific requirements for Medium and Large facilities. Medium-Scale (40-300 kW) Ground Mounted Photovoltaic Facilities (MSGMPVF) must complete an Expanded Building Permit Application. Large-Scale (>250 kW) Ground Mounted Photovoltaic Facilities (LSGMPVF) must complete an application for and receive a Special Permit. Both sizes must follow town bylaws regarding amounts of noise and light released, environmental impacts, property line setbacks and hazardous materials, among other details. All of Ashfield is a rural residential and agricultural district, neither of which prohibit or restrict solar development.

There are no special restrictions regarding solar development on farmland.

#### *Community Perspectives*

Ashfield residents were generally not supportive of ground-mounted solar development on farmland, but did respond more favorably to certain types of solar facilities installed on farms. These included:

- Agrivoltaics, or solar projects that are raised above agricultural land to allow farming to continue beneath (20% strongly support/38% support/24% neutral).
- Installations located on the margins of agricultural fields (19% strongly support/40% support/21% neutral).

Residents expressed strong opposition to traditional solar development on land currently in vegetable production (43% strongly oppose/36% oppose) or pasture (35% strongly oppose/32% oppose). There was somewhat less opposition to development of fallow farmland not currently in production (34% support/26% neutral/40% oppose).

## 5.2 Future Potential

### *Rooftops, Greenhouses, and Parking Canopies*

There are three large roofs owned by farms, orchards, or other agricultural businesses in Ashfield. These roofs total 32,387 sf in area and 0.24 MW of technical solar potential. Rooftops can provide roughly 1.5 kW of solar per 100 sf of suitable roof space. On roofs of this size (5,000-25,000 sf), about 49% of the roof area is suitable for solar.

As shown in Table 2, Clark Brothers Orchard and Steady Lane Farm have the greatest potential for solar development on farm rooftops. Note that Clark Brothers already has a 40 kW solar system installed at one location.

Business	Street Address	Total Roof Area (sf)	Estimated Technical Solar Potential (kW)
		9,221	67
Clark Brothers Orchard	42A Clark Rd	12,983	95
Steady Lane Farm	144 Steady Lane	10,183	74

**Table 3** The largest three on-farm roofs, with large areas potentially suitable for solar.

The largest three rooftops in Ashfield could potentially host solar arrays over 50 kW in size. Solar arrays over 50 kW in size often must connect to three-phase electricity distribution lines in order to interconnect to the electricity grid safely. Clark Brothers Orchard is not located within reasonable distance of a three-phase line, which could explain why the system it already has installed is only 40 kW (electricity needs or roof limitations may also be at play). Steady Lane Farm is located 0.3 miles from a three-phase line. Where large rooftops are not located near three-phase lines, the size of the system may be limited to less than 50 kW by local grid infrastructure, or local infrastructure may need to be upgraded to accommodate larger projects. Alternatively, integration of an energy storage system with the solar array may allow a larger solar array to be interconnected to the grid. Regardless of interconnection opportunities, 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.

Ashfield has a number of other farms, orchards, and other agricultural businesses with smaller buildings and outbuildings. These include the following:

- Bear Swamp Orchard & Cidery, 1209 Hawley Rd
- Brook Farm Orchard, 947 Apple Valley Rd
- Bug Hill Farm, 502 Bug Hill Rd
- Cozie Nook Homestead Farm, 12 Stroheker Rd
- Cranston's Tree Farm, 372 Baptist Corner Rd
- Heart Beet Gardens, 230 South St
- Hillside Nursery, 4 Norman Rd
- Paddy Flat Farm, 314 Norton Hill Rd

- Porter Family Farm, 93 Steady Lane Rd
- Sidehill Farm, 343 Main St
- Sweethaven Farm & Flowers, 12 Liliput Rd
- Townsley Farm, 435 Apple Valley Rd
- Whitney Acres Farm, 535 Conway Rd

Outreach could be conducted to all of these businesses to determine their interest in pursuing roof-mounted projects, solar greenhouses, or parking canopies over paved areas or farm equipment storage locations.

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

Ashfield 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.

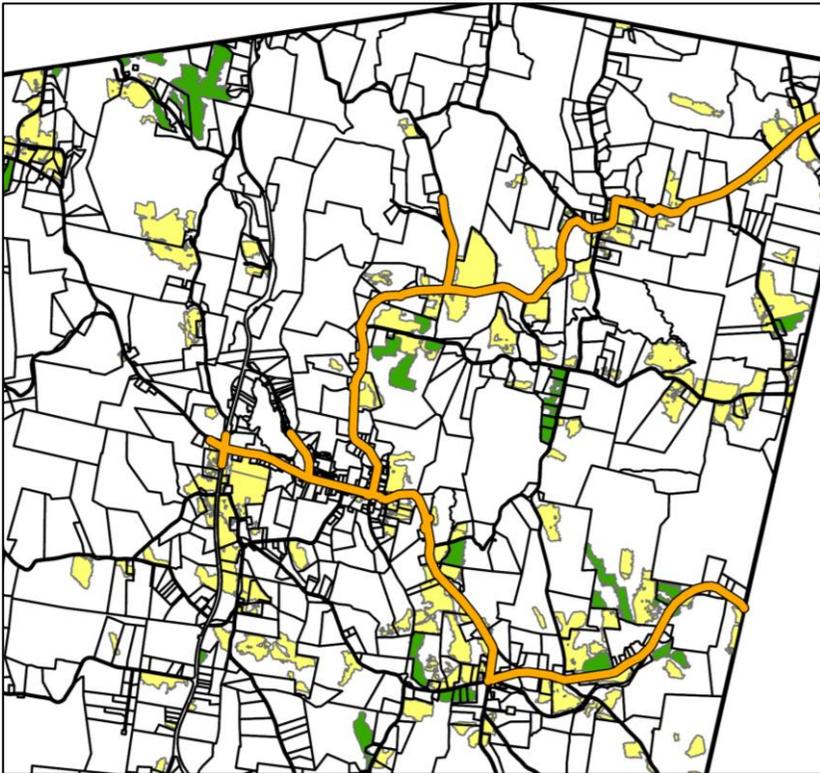
Agrivoltaic systems are still relatively new, and their economic potential in the temperate Northeast is still being explored. There is currently a lack of robust research and information on (1) the agricultural productivity of these systems, (2) the economic impacts of dual-use systems on farms and 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. Ashfield is served by a three-phase power line that runs from the town's eastern border along Route 116 to its intersection with Route 112, as well as from the northeastern corner of the town along Baptist Corner Rd to its intersection with Route 116. There are large areas of pasture or hayfield, and some areas of cultivation, along these routes, which could be of interest for solar development. Owners or managers of these parcels could be approached regarding their interest in agrivoltaic operations or small projects located in field margins. These properties could also be at risk of large-scale conventional solar development. For some sites, the town may be interested in working with the Franklin Land Trust to determine whether these lands could be prioritized for protection to avoid future solar development. Figure 1 shows the northeast corner of town, where pasture, hayfields, and cultivated lands are in some cases close to three-phase lines.



**Figure 1.** Map showing the northeast corner of Ashfield, with three-phase lines in orange, hayfield and pasture in light yellow, and cultivated land in green.

### *Financial Considerations*

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

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

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

### **5.3 Next Steps & Action Items**

Potential next steps for solar development on farms include:

- Conduct outreach to Clark Brothers Orchard and Steady Lane Farm to assess their interest in roof-mounted solar on large building roofs.
- Consider outreach to other farm owners/operators to assess their interest in small-scale roof or ground-mounted solar.
- With interested farms, explore options for small to medium ground-mounted solar arrays deployed between fields.
- Near three-phase lines (see map) on existing pastureland or hayfield, explore landowner and farm operator interest in establishing an agrivoltaic operation.
- 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.
- Work with Franklin Land Trust to identify at-risk farmland parcels of high agricultural or cultural value in the northeast corner of town and consider options to preserve them.

### *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.]

<b>Action</b>	<b>Lead Entity (or Entities)</b>	<b>Supporting Entities</b>	<b>Start Year/Annually?</b>
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## 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, Ashfield ranks 101st in the state in terms of the total amount of protected land, with 4,769 acres (18%) of the town under permanent protection. Only 2% of the land area of Ashfield is currently developed for housing, businesses, or other purposes.

The town 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. The town also has some previously disturbed sites, as detailed under *Future Potential*.

##### **Grid Infrastructure**

As described in Section 5, Ashfield is served by a three-phase power line that runs from the town's eastern border along Route 116 to its intersection with Route 112, as well as from the northeastern corner of the town along Baptist Corner Rd to its intersection with Route 116. The current hosting capacity of this three-phase line is 0.2 MW, which may limit the size of projects that could be interconnected without upgrading the grid infrastructure.

#### *Current Regulatory Status*

See Section 5 for a description of the regulation of medium- and large-scale solar systems. There are no special restrictions regarding solar development on disturbed sites or on forestland in Ashfield. However, many forested portions of Ashfield are designated as Critical Natural Landscapes or Core Habitat by the Massachusetts NHESP, and large-scale development within 100 feet of these areas is prohibited by the town's bylaw.

#### *Community Perspectives*

In the *Community Solar Survey*, Ashfield residents expressed very little support for solar development on undeveloped land. As noted in the introduction, a majority of respondents indicated they would prefer to see no more than 10% of undeveloped lands developed for solar.

However, there was also strong majority support (80%) for development to support local needs and majority support (58%) for development to support regional needs, which would necessitate limited development of ground-mounted solar, including some development on undeveloped land.

In addition to the preferences regarding solar development on agricultural land discussed above, residents indicated a strong preference for large, ground-mounted solar development on former sand & gravel extraction sites, quarries, and other disturbed sites

(56% strongly support/34% support) and powerline right-of-ways (ROWS) (56% strongly support/30% support). For all other types of forested and open natural habitats, 50-80% of residents expressed opposition to development. Among these habitat types, the least opposition expressed was to development of forests undergoing regular harvests (54% opposition) and meadows or shrublands (60% opposition). In another portion of the survey, residents also indicated majority support (26% strongly support/37% support/17% neutral) for solar development along major roads, which in Ashfield would presumably focus along Routes 112 and 116.

## 6.2 Future Potential

### *Constraints on Large, Ground-Mounted Solar Development*

Development of large, ground-mounted solar on large private properties in Ashfield 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 18% of Ashfield's land area is under permanent protection and ineligible for solar development. Additionally, at least 5,782 acres (22%) 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). In Ashfield, projects over 10 acres are currently prohibited, which could place constraints on financial feasibility for some projects.

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**

Previously disturbed sites identified in Ashfield are shown in Table 4. The sites are a mix of active and inactive gravel/extraction operations. Active sites would not be suitable for solar development until after operations ceased at the site. However, it would not be unreasonable to proactively reach out to the landowners or operators at these locations to consider potential solar development at these sites once they become inactive.

Location Name (if applicable)	Street Address	Total Disturbed Area (acres)	Estimated Technical Solar Potential (kW)	Proximity to Three-Phase Lines (miles)
Pantermehl Land Clearing, Material Storage Site	1427 Bug Hill Rd	3.73	746	2.3
Ashfield Stone LLC, Gravel Pit	Off of Hawley Rd, between #1797 and intersection with Brown Rd W	2.72	544	2.6
Townsley Farm, Small Gravel Pit	435 Apple Valley Rd, near intersection with Smith Branch Rd	2.5	500	1.1
Vacant Residential, Gravel Pit	Intersection of N/S Warger Rd and Baptist Corner Rd	9.85	1,970	0.32

**Table 4** Previously disturbed sites with some potential suitability for solar.

Solar arrays over 50 kW in size often must connect to three-phase electricity distribution lines in order to interconnect to the electricity grid safely. Only the Baptist Corner Rd/Warger Rd. property shown in Table 4 is located near a three-phase line. For large properties not located near three-phase lines, the size of the system may be limited to less than 50 kW by local grid infrastructure, or local infrastructure may need to be upgraded to accommodate larger projects.

**Rights-of-Way**

A 345 kV transmission line bisects the northern part of Ashfield from east to west (see Figure 2). It crosses Route 112 near the intersection with Buckland Rd. This right-of-way (ROW) is maintained as a clear area with a length of 7 miles, estimated width of 165 ft, totaling 134 acres. This represents a technical potential for 26.8 MW of solar.

It is likely that much of this area would not be suitable for solar, due to steep slopes, viewshed considerations in high-elevation portions of the ROW, and bordering trees providing too much shade on the edges of the ROW. The ROW is located immediately under transmission lines, but solar arrays are more typically connected to distribution lines or directly to substations. In Ashfield, portions of the ROW are located adjacent to three-phase distribution lines. There is a three-phase distribution line along Baptist Corner Road where the transmission line intersects it. The Ashfield substation is located at this intersection, which could provide opportunity for connection of a solar array.



**Figure 2.** Map showing the transmission ROW running through the northern portion of Ashfield. Town borders are shown in black, three-phase lines are shown in orange; the ROW appears in satellite imagery as a pale east-west line.

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.

#### ***Undeveloped Land – Major Roads and Wetlands***

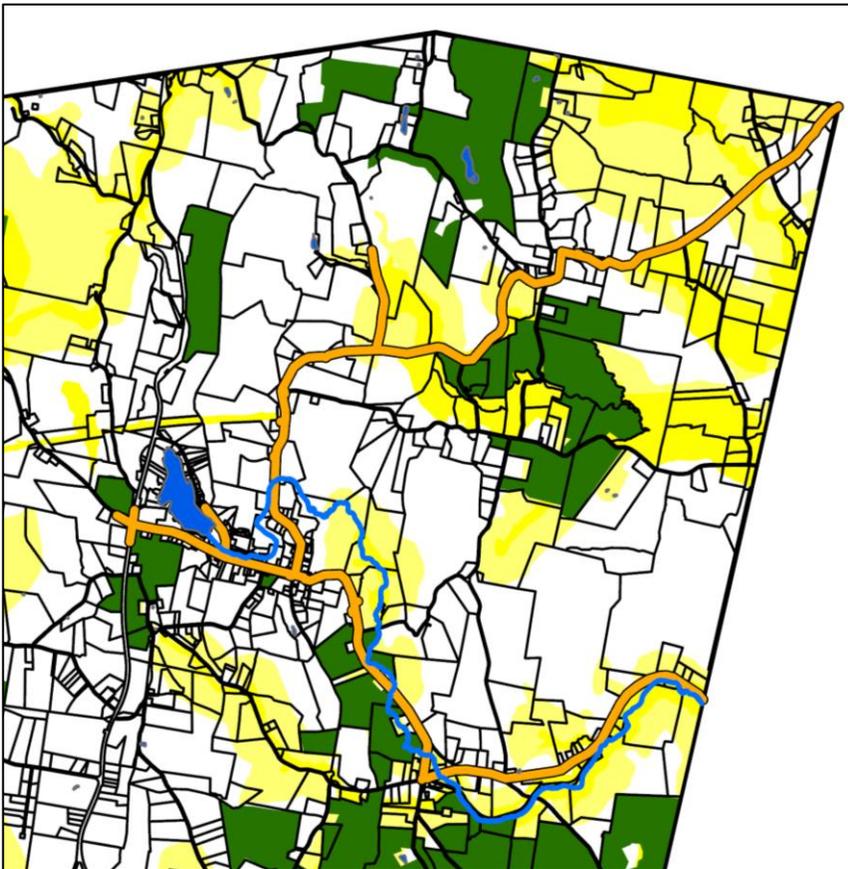
*Community Solar Survey* results showed that residents were generally opposed to development of undeveloped land, but supported solar development in parcels along major roads. The following sections of major roads in Ashfield are in close proximity to three-phase power lines:

**Route 116.** 4.2 miles of three-phase power lines run along Route 116 from the Eastern border of town to its intersection with Route 112.

**Route 112.** There is only one-tenth of a mile of three-phase line along Route 112 near where it intersects with Route 116.

Residents were also opposed to solar development adjacent to wetlands and waterbodies. The South River crosses three-phase powerline at several instances where it follows along Route 116 in the eastern part of the town. It eventually flows into Ashfield Lake, which is also adjacent to three-phase lines.

**Figure 3** shows parcels adjacent to three-phase lines along Routes 116 and 112. The South River and Ashfield Lake are also shown in this figure, although smaller wetlands and streams are not pictured, for simplicity. Note that there are some large parcels on the northern side of Route 116 not adjacent to the South River, not permanently protected, and not mapped as important habitat for wildlife.



**Figure 3.** Map showing the northeast corner of Ashfield, with three-phase lines in orange, BioMap2 core habitat and critical natural landscapes in dark and light yellow respectively, permanently protected land in green, and the South River and Ashfield Lake shown in blue.

**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 or operators of the gravel pit along Baptist Corner Road to consider whether solar development might be an option once the site is no longer active.
- Consider outreach to other owners of lands that are currently disturbed (from Table 4), particularly if three-phase power is extended towards any of these areas.
- Work with Franklin Land Trust to identify at-risk parcels of high conservation and recreation value near three-phase lines and preserve them. The Trustees of Reservations may also be interested in participating in this process.
- Reach out to owners of large parcels along Route 116 that are not mapped as priority wildlife habitat to explore their interest in large-scale solar development.
- Reach out to Eversource (with CEE assistance) regarding community interest in development of ROWs.
- Reach out to Eversource regarding potential for extension of three-phase lines north on Route 112 to Smith Branch Road, which could allow for interconnection of solar at the Transfer Station and the Townsley Farm owned gravel pit.
- Organize and hold a community forum regarding any large projects that are being considered in town. *Community Solar Survey* results show residents highly value the chance to have their input heard regarding large solar development in town.
- 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 narrowly 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 error. 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.

#### *Current Municipal Bylaw*

Ashfield’s solar zoning bylaw was updated in 2011. Revisions to the bylaw were approved at Town Meeting in August 2022, but still appear to be awaiting review from the Attorney General’s Office. This discussion references the 2022 version of the bylaw.

**Purpose:** The purpose of the bylaw is to facilitate and appropriately regulate the responsible development of Ground-Mounted Photovoltaic Facilities (GMPVFs) in the Town of Ashfield by providing minimum standards for the placement, design, construction, operation, monitoring, modification and removal of such GMPVFs that support the goal of the Commonwealth of Massachusetts; to generate clean energy and reduce carbon emissions while also addressing the responsibility of the Town of Ashfield to protect public health and safety; to protect and preserve the scenic, natural and historic resources of Ashfield; to minimize undesirable impacts on abutting residential property and neighborhoods; and to provide assurance of adequate financial resources for the eventual decommissioning of such systems.

**Definitions:** Solar facilities within Ashfield are regulated based on their capacity and total panel area:

- **Roof-Mounted Photovoltaic Facilities** are not addressed in the bylaw specifically.
- **Small-Scale Ground Mounted Photovoltaic Facilities** (SSGMPVF) may be up to 40 kW DC.
- **Medium-Scale Ground Mounted Photovoltaic Facilities** (MSGMPVF) are more than 40 kW DC and less than 250 kW DC or occupy less than 1.5 acres.

**Commented [ZD4]:** Please confirm whether this is the current status. I couldn't find an opinion on the AGO's website.

- **Large-Scale Ground Mounted Photovoltaic Facilities (LSGMPVF)** are more than 250 kW DC or occupy more than 1.5 acres and less than 10 acres.

**Districts & Applicability:** The entire Town of Ashfield is a rural residential and agricultural district.

Development of a Small-Scale Ground Mounted Photovoltaic Facility (SSGMPVF) requires that developers comply with all local, state and federal laws, obtain a building permit, and minimize visual impact on abutters. The facility must also follow dimensional and setback requirements based on size and location.

Medium-Scale Ground Mounted Photovoltaic Facilities (MSGMPVF) must complete an Expanded Building Permit Application. Large-Scale Ground Mounted Photovoltaic Facilities (LSGMPVF) must complete an application for and receive a Special Permit. Both types of facilities must follow town bylaws regarding amounts of noise and light released, environmental impacts, and hazardous materials, among other requirements. LSGMPVF sites shall not exceed a 10% grade prior to or subsequent to any grading, filling, or other re-contouring.

Site plans for LSGMPVF must be approved by the Town’s Conservation Commission and obtain any relevant approvals from MassWildlife. They may not be located in or within 100 feet of Priority Habitat Areas, Estimated Habitats of Rare Wildlife, and Natural Communities; or Priority Habitat, Core Habitat or Critical Natural Landscape, as defined by the Natural Heritage & Endangered Species Program (NHESP) and BioMap 2, or its current successor. There are also requirements for Land Clearing, Control of Vegetation, Open Areas, and Top Soil. LSGMPVF must not be constructed within a quarter mile of a Historical Site.

### *Community Perspectives*

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

- A majority (64%) of residents believe solar should be allowed and promoted in appropriate circumstances.
- A majority (56%) of residents are unsure or unaware of the solar development process in Ashfield so far.
- Residents voiced an interest in having a say in permitting decisions regarding large solar development projects. This could take a few forms that were favorable amongst respondents:
  - Information should be shared at public meetings. (89% interest)
  - Community members should have the opportunity to review and comment on the siting and design. (85% interest)
  - Community members should have the opportunity to purchase reduced-price electricity from a solar project. (75% interest)
  - Community members should be involved in deciding where the best place in town is for a solar project. (69% interest)

- Community benefits of solar development favored by a majority of residents included:
  - Reduced electricity rates for all residents, or low-income residents.
  - Direct payments that reduce property taxes or support town budget needs.
  - Backup power to emergency shelters, schools, and senior housing.
  - Local ownership options for residents who can't put solar on their homes.

### *Alignment with Community Perspectives*

The town's bylaw aligns well with resident perspectives in certain respects:

**Residential and small-scale solar** – The town's bylaw allows small-scale ground-mounted solar and rooftop solar by right with a building permit, in line with residents' strong support for these development types.

**Vegetation screening** – The town's bylaw stipulates thorough vegetation screening of large-scale solar arrays, in line with community preferences.

**Permitting process** – 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.

**Wildlife habitat** – The town's bylaw prevents solar development in priority wildlife habitat, in line with community preferences. (However, see caveat below.)

### **7.2 Next Steps & Action Items**

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

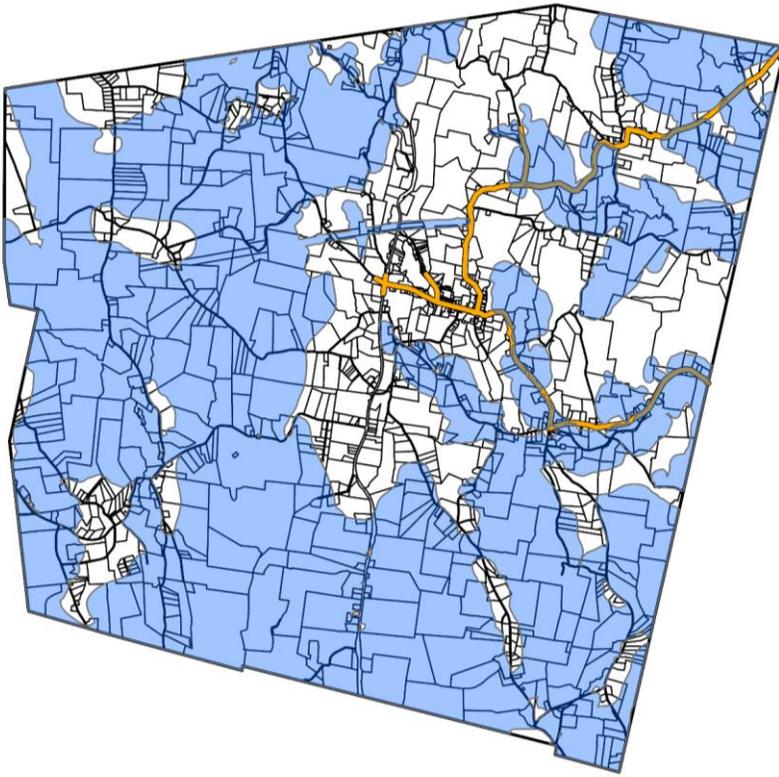
With review by Town Counsel, the town may wish to consider the following updates to the town solar bylaw, to align well with community interests as identified in the *Community Solar Survey*:

**Project Size.** The town's current bylaw limits solar facilities to no more than 10 acres, or roughly 2-3 MW DC, while large-scale facilities are often somewhat larger (up to 10 MW DC) to be economical. It would be worth discussing this issue with Town Counsel and considering introducing more flexibility for larger projects deemed to meet community objectives. Phased development of large sites could be required to reduce the risk of erosion and stormwater runoff during construction.

**Siting Restrictions - Agricultural.** The town may wish to consider siting restrictions for large (not medium) solar projects on agricultural land, given residents' opposition to large-scale solar development on active farmland. The town could consider requiring agrivoltaic projects if large-scale solar is being developed on active farmland.

**Siting Restrictions – Wildlife.** The town's ban on large-scale development within 100 ft of "Priority Habitat Areas, Estimated Habitats of Rare Wildlife, and Natural Communities, or

Priority Habitat, Core Habitat or Critical Natural Landscape,” effectively prohibits large solar development in two-thirds (67%) of town (see Figure 4). The town may wish to discuss with Town Counsel whether this is consistent with state law given recent court precedent.



**Figure 4.** Map showing the portions of Ashfield where large-scale solar development is effectively prohibited by the town’s bylaw, due to proximity or presence of NHESP-identified wildlife habitat. Three-phase lines are shown in orange, BioMap2 core habitat and critical natural landscapes in dark and light yellow respectively, permanently protected land in green, and the South River and Ashfield Lake shown in blue.

**Wetlands.** The town may wish to increase buffers around wetlands and bodies of water (e.g. Ashfield Lake, South River) to restrict solar development or to restrict development more generally via a wetlands bylaw. *Community Solar Survey* results indicate residents oppose development near waterbodies.

**Streamlined Permitting at Preferred Sites.** The town should consider creation of a solar overlay district or definition for large ground-mounted solar on disturbed sites that includes the town Transfer Station and parcels noted in Table 4, as well as transmission line ROWs, and allows development of these sites by right with Site Plan Review (rather than by

Special Permit). These areas represent an important resource which could help the town meet community and regional solar goals without developing undisturbed natural areas. The town could consider whether sites along Routes 112 and 116 should be added to this district. If the general prohibition on projects larger than 10 acres is maintained, the maximum size of projects on disturbed lands should be increased.

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

**Next Steps**

- Review bylaw recommendations; potentially proposing bylaw amendments at a subsequent town meeting.
- Provide accessible information on the town’s website about the solar planning process and how large solar projects are reviewed and permitted.
- Compile a list of standard practices to 1) advertise public hearings regarding large solar projects widely, 2) advertise public hearings regarding proposed solar bylaw amendments widely, 3) identify resident interest in reduced electricity rates to solar project proponents, and 4) negotiate appropriate PILOT payments.

**Action Items**

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

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

**8. SUMMARY**

**8.1 Summary**

Ashfield residents are most supportive of solar development on previously disturbed and developed sites, but also support sufficient ground-mounted solar development to meet community self-sufficiency goals and help address Western Mass region electricity needs. This action plan calls for outreach to residents, businesses, and institutions to encourage solar development on rooftops, parking areas, and inactive gravel pits in the community. This plan also calls for exploration of the potential for larger-scale solar development along Route 116, including exploring conventional development on land not designated as priority wildlife habitat and located away from the South River, agrivoltaic options on hayfields or pastureland, and prioritizing conservation of properties of value to wildlife that might be at risk from solar development. Considering bylaw amendments to allow for expanded solar development on sites favored by the community is also recommended. Finally, expansion of three-phase power could allow for development of larger solar or

solar + storage facilities at municipal sites and on disturbed lands in Ashfield, with benefits for the town and community.

### 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.*

**Commented [ZD5]:** This timeline is up to the town to decide upon. For guidance in determining an appropriate timeline and revision steps, see the CEE factsheet *Monitoring, Evaluating, and Updating your Community Solar Action Plan* on the Solar Planning toolkit website.

**Commented [ZD6]:** This list will be drawn from the Next Steps identified above, but town boards and committees will have to identify the timeline over which they want to take it on.