Community Planning for Solar: Toolkit Overview

Dwayne Breger,[1] Zara Dowling,[1] River Strong,[1] and Alison Bates[2]

1 UMass Clean Energy Extension
2 Colby College

NREL Technical Monitor: Sara Farrar

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Guide

Community Planning for Solar - Toolkit Overview

Community Planning for Solar

UMassAmherst

Clean Energy Extension

Development of this guide was funded by the U.S. Department of Energy through the National Renewable Energy Laboratory's Solar Energy Innovation Network cohort program for Solar in Rural Communities, as part of a multi-stakeholder team project to develop a community-informed proactive solar siting and financing model.

The *Community Planning for Solar* project team included UMass Clean Energy Extension (CEE), the UMass Department of Environmental Conservation, Colby College Department of Environmental Studies, the Massachusetts Department of Energy Resources (DOER), the Massachusetts Department of Agricultural Resources (MDAR), the Pioneer Valley Planning Commission (PVPC), the Franklin Regional Council of Governments (FRCOG), the Western Massachusetts Community Choice Energy Task Force, UMassFive College Credit Union, Northeast Solar, PV Squared, Co-op Power, and the Massachusetts towns of Blandford, Wendell and Westhampton.

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The outline below summarizes the *Community Planning for Solar* steps and associated documents. For more information, please visit our website at ag.umass.edu/solarplanning.

Community Planning for Solar: Toolkit Steps and Documents

1. Gather your planning team and set goals

a. Guide: Community Planning for Solar - Toolkit Overview

You Are Here

b. Fact Sheet: Forming a Collaborative Community Solar Planning Team

2. Conduct a solar resource and infrastructure assessment

a. Fact Sheet: The Electric Grid, Distributed Generation, and Grid Interconnection

b. Guide: Conducting a Solar Resource and Infrastructure Assessment

c. Template: Solar Resource and Infrastructure Summary

d. Example: Solar Resource and Infrastructure Report

3. Evaluate solar financing and ownership options

a. Guide: Understanding and Evaluating Solar Financing and Ownership Options

b. Fact Sheet: Solar Financing and Ownership Options

c. Financial Tool: Solar Financing and Ownership Options: Cash Flow Model

4. Assess community preferences regarding solar development and financing

a. Guide: Defining Realistic Solar Development Options

b. Example: Realistic Solar Development Options

c. Fact Sheet: Assessing Community Preferences Regarding Solar Development

d. Guide: Conducting Focus Groups for Solar Planning

e. Guide: Conducting a Community Solar Survey

f. Template: Community Solar Survey

5. Develop a *Community Solar Action Plan* to guide solar decision-making and development

a. Guide: Compiling a Community Solar Action Plan

b. Example: Community Solar Action Plan

6. Keep your *Community Solar Action Plan* current

a. Fact Sheet: Monitoring, Evaluating, and Updating Your Community Solar Action Plan

TERM	MEANING
Photovoltaic (PV)	Photovoltaic (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.
Capacity	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. Large, ground-mounted solar arrays in Massachusetts are often 1 MW or greater in size.
Annual Generation or Annual Energy Production	The annual generation or annual energy production (AEP) of a solar array is a measure of the yearly electricity 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% * 8,760 hours per year.
Voltage	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 kilovolt is equivalent to 1000 volts (V). In residential use in the United States, electrical wires within a household carry electricity at 120 V.
Three-Phase vs. Single-Phase Power Lines	Distribution lines are either three-phase lines or single-phase lines; the "phase" describes the distribution of power across them. Single-phase lines typically have one line that carries power and one neutral line. Three-phase lines have three wires which are all carrying power out of phase with each other, exactly 120 degrees apart; in some configurations, there is also a fourth neutral and line and ground. The practical implication is that three-phase lines provide a more consistent source of electricity and are better able to handle higher electricity loads. They typically are used to serve commercial and industrial buildings and can power large industrial electric motors. Single-phase lines are suitable for serving residential lighting and heating loads. Three-phase lines can also accommodate larger inputs of energy from distributed electricity generation facilities (such as solar arrays) than single-phase lines.
Abbreviations & Acronyms	
AC	AC is the abbreviation for *alternating current*, the type of electricity flowing into the grid from a solar array, after it has gone through an inverter.
CEE	UMass Clean Energy Extension
DC	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.
DOER	Massachusetts Department of Energy Resources
kV	kilovolt, a standard unit of voltage
kW	kilowatt, a standard unit of solar PV capacity
kWh	kilowatt-hour, a standard unit of electricity production or consumption
MDAR	Massachusetts Department of Agricultural Resources
MVP	Municipal Vulnerability Preparedness plan, a municipal planning document
MW	megawatt, a standard unit of solar PV capacity, equal to 1000 kw
MWh	megawatt-hour, a standard unit of electricity production or consumption, equivalent to 1000 kwh
NREL	National Renewable Energy Laboratory
OSRP	Open Space and Recreation Plan, a municipal planning document
SEIN	Solar Energy Innovation Network, a program of the National Renewable Energy Laboratory, funded by the U.S. Department of Energy's Solar Energy Technologies Office
sf	square feet

Table of Contents

Introduction

Proactive and inclusive community planning for the siting and financing of solar photovoltaics (PV) can help to facilitate community-preferred solar PV projects while balancing other community priorities and maximizing community benefits. Good planning can also:

- Reduce time and workload commitments for municipal officials involved in the solar permitting process
- Minimize conflicts among solar stakeholders
- Reduce solar development costs

UMass Clean Energy Extension (CEE) and its partners have designed the *Community Planning for Solar* Toolkit to help municipalities in Massachusetts and throughout the Northeast proactively plan for solar PV development in their communities. The tools and processes are designed with rural and suburban communities in mind, though some of the tools may also apply to urban settings.

Community Planning for Solar empowers community residents and officials to take the lead in solar development by providing communities with the resources that can help them to:

- Identify and prioritize locations in the community for solar development
- Evaluate various solar financing options and provide guidance on community benefits that best match community goals and needs
- Assess their community's unique resources, solar development options, goals, and preferences regarding solar development
- Develop a Community Solar Action Plan with clear steps for:
    - Community outreach and education
    - Engaging with potential solar developers and financiers
    - Updating town bylaws related to solar development to align with community preferences

How to Use This Guide

This Guide outlines the Toolkit documents and the six steps of the *Community Planning for Solar* process. For communities with no history of solar planning or those wishing to start with a clean slate, these materials are designed to be completed in a step-by-step progression. However, many communities will have some history with solar planning, some or all of which they will want to retain. For these communities, we recommend reviewing all of the Toolkit documents, evaluating which are relevant to your unique situation, and assessing which can help you meet your solar planning goals.

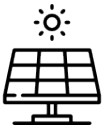
The Toolkit Documents and Process Steps

These process steps and the downloadable supporting guidance documents are listed below. The documents contain information that can be useful no matter where a community is in its solar planning process: readers should feel free to browse, download, and utilize the documents in any order according to their needs. However, when undertaking a comprehensive *Community Planning for Solar* process, we recommend that you become familiar with the process and documents below – and then follow the steps in this order:

1. Gather your planning team and set goals

- This step involves:
  - Familiarizing yourself with the *Community Planning for Solar* toolkit and process
  - Securing municipal government support for the planning process
  - Identifying Solar Planning Team members and stakeholders
  - Identifying key solar planning stakeholders
  - Establishing the planning process goals, roles, timeline, budget, and other important factors
- Resources: (ag.umass.edu/solarplanning1)
  - Guide: *Community Planning for Solar – Toolkit Overview*
  - Fact Sheet: *Forming a Collaborative Community Solar Planning Team*

2. Conduct a solar resource and infrastructure assessment



- This step involves:
  - Identifying relevant state and federal solar development regulations and incentives
  - Reviewing existing town bylaws, zoning requirements, and community planning resources
  - Characterizing town energy needs, relevant infrastructure, and solar resources
- Resources: (ag.umass.edu/solarplanning2)
  - Fact Sheet: *The Electric Grid, Distributed Generation, and Grid Interconnection*
  - Guide: *Conducting a Solar Resource and Infrastructure Assessment*
  - Template: *Solar Resource and Infrastructure Summary*
  - Example: *Solar Resource and Infrastructure Report*

3. Evaluate solar financing and ownership options

- This step involves:
  - Learning about the different ways that solar developments can be owned and financed
  - Evaluating how different solar financing scenarios will impact s local economic benefits, risk, and capital needs
  - Modeling financing and cash flow scenarios for different project ownership scenarios
- Resources: (ag.umass.edu/solarplanning3)
  - Guide: *Understanding and Evaluating Solar Financing and Ownership Options*
  - Fact Sheet: *Solar Financing and Ownership Options*
  - Financial Tool: *Solar Financing and Ownership Options: Cash Flow Model*

4. Assess community preferences regarding solar development and financing

- This step involves:
  - Learning about the design, implementation, and analysis of community surveys as a means to assess preferences regarding solar development
  - Identifying and engaging community stakeholders
  - Conducting community focus groups
  - Developing, conducting, and interpreting a community solar survey
- Resources: (ag.umass.edu/solarplanning4)
  - Guide: *Defining Realistic Solar Development Options*
  - Example: *Realistic Solar Development Options*
  - Fact Sheet: *Assessing Community Preferences Regarding Solar Development*
  - Guide: *Conducting Focus Groups for Solar Planning*
  - Guide: *Conducting a Community Solar Survey*
  - Template: *Community Solar Survey*

5. Develop a *Community Solar Action Plan* to guide solar decision-making and development

- This step involves:
  - Learning about the elements that go into a final actionable plan for a community to address solar development
  - Designing, drafting, evaluating, and finalizing a *Community Solar Action Plan*
  - Promoting and using the *Community Solar Action Plan*
  - Tracking progress, establishing guidelines to monitor and update your *Community Solar Action Plan*
- Resources: (ag.umass.edu/solarplanning5)
  - Guide: *Compiling a Community Solar Action Plan*
  - Example: *Community Solar Action Plan*

6. Keep your *Community Solar Action Plan* current

- This step involves:
  - Monitoring, evaluating, and updating your *Community Solar Action Plan*
  - Tracking the implementation of the plan over time
  - Assessing the effectiveness of the plan at achieving its stated purpose and goals
- Resources: (ag.umass.edu/solarplanning6)
  - Fact Sheet: *Monitoring, Evaluating, and Updating Your Community Solar Action Plan*

Support and Feedback

If your community needs assistance in carrying out the *Community Planning for Solar* process, there may be help available. We encourage Massachusetts communities to reach out to CEE for assistance as they explore and utilize the *Community Planning for Solar* Toolkit.

Non-Massachusetts communities should reach out to their local planning departments, regional planning agencies, or state energy departments to see if technical assistance or funding is available.

Please contact us at energyextension@umass.edu with any feedback or questions.