

Dual-Use: Agriculture and Solar Photovoltaics



In 2018, the Massachusetts Department of Energy Resources (MA DOER) established the Solar Massachusetts Renewable Target (SMART) program, which regulates incentives associated with new solar photovoltaic (PV) development in the state. This document is part of a series of fact sheets designed to help farmers navigate the program. Additional fact sheets and information are available on the UMass Clean Energy Extension (CEE) website, <https://ag.umass.edu/clean-energy>.

What does dual-use mean?

In general, dual-use refers to agricultural production and electricity production from solar photovoltaic (PV) panels occurring together on the same piece of land. These facilities may also be referred to as agrivoltaic systems, agrisolar, or co-location of solar and agriculture. It is expected that in most cases individual crop yield (lbs/acre) or electricity output (kWh/acre) will be lower in dual-use systems than it would be if either activity was carried out alone, but that the combined value of crops and electricity produced will be equal to or higher than single-use of the land for production of crops or electricity alone.

In the state of Massachusetts, specific kinds of dual-use systems are known as “Agricultural Solar Tariff Generation Units” (or ASTGUs), and can qualify for financial incentives under the SMART program. In these systems, every square foot of land possible must be maintained in continuous agricultural production. The SMART regulation can be found on the MA DOER website: <https://www.mass.gov/info-details/solar-massachusetts-renewable-target-smart-program#regulation-&-general-information->.

The requirements to qualify for compensation as a dual-use system are further defined by two guidelines.

- Land Use and Siting Guideline: <https://www.mass.gov/doc/smart-land-use-and-siting-guideline-final>
- Agricultural Solar Tariff Generation Unit Guideline: <https://www.mass.gov/doc/agricultural-solar-tariff-generation-units-guideline-final>

[Note that the ASTGU guideline is under review and may be updated in 2022.]

What types of land can dual-use systems be installed on?

For a dual-use system to qualify for compensation as an ASTGU under the SMART regulation, it must be installed on land officially defined as **Land in Agricultural Use** or **Important Agricultural Farmland**:

- **Land in Agricultural Use** is land used for agricultural or horticultural production, as defined under Mass General Law 61A Sections 1 & 2. If your land is or could be taxed as agricultural land under Chapter 61A, or has been within the last five years, it qualifies as Agricultural for the purposes of the SMART regulation. *If you are not sure of the tax status of your land, contact your municipal tax assessors' office.*
- **Important Agricultural Farmland.** Your land may also qualify as Agricultural under the SMART program if your land is defined as having prime farmland soils, unique farmland soils, or soils of statewide importance by the Natural Resources Conservation Service.

You can find soil definitions for your property on the MassMapper website

(<https://maps.massgis.digital.mass.gov/MassMapper/MassMapper.html>) using the following process:

1. On the right-hand side of the screen, select "Physical Resources," and then "Soils."
2. Select "Prime Farmland Soils," which will add it to the list in the bottom right portion of the screen.
3. You can then find for your property by zooming in to the Massachusetts map, or entering a street address into the "Enter a location" box. To qualify as *Important Agricultural Farmland*, the land must be in one of the brownish-green colors identified as prime farmland soils in the box on the bottom right.

You can establish an additional canopy or building-mounted PV system on the same parcel of land as a dual-use array, but there are significant restrictions regarding placement of additional ground-mounted PV arrays on the same property or parcels adjacent to a dual-use system. For more information, see DOER's guidance on project segmentation: <https://www.mass.gov/doc/land-use-and-siting-guideline-clean-draft-092221/download>.

What system parameters are required for dual-use arrays?

Under the ASTGU Guideline, dual-use systems incorporating the following design parameters will be reviewed in an expedited process:

- **System Size.** The capacity (rated electricity production) of the system must be no more than 2 MW AC.
- **Height:** The lowest edge of the panel must be at least 8 feet above the ground for a fixed tilt panel system, or 10 feet at horizontal position for tracking systems.
- **Shading:** During the growing season, the maximum sunlight reduction due to shading from the panels on any square foot of land under the dual-use system may be no more than 50%. This shading analysis must be completed using the Shading Analysis Tool, available here: <http://s3.us-east-2.amazonaws.com/bluewave-shade/jan23-1002/index.html>
A video describing how to use the tool is available here: <https://vimeo.com/313941069>
Note that a solar developer can assist with this analysis.
- **Agricultural use:** The system should be designed to optimize a balance between electrical generation and agricultural production, and the land must be under continuous agricultural production over the 20-year SMART program period.

If you believe these design parameters are not appropriate for your particular situation, you can apply for a waiver for one or more provisions. The waiver application process requires submission of detailed documentation to MA DOER, demonstrating that the proposed alternative design parameters will meet the intention of the regulation (see the [Agricultural Solar Tariff Generation Unit Guideline](#) for further details).

What is the financial compensation associated with a dual-use system?

Qualifying solar PV systems receive a base compensation rate of \$0.14-\$0.26 per kilowatt-hour (kWh) of electricity produced, depending on the size of the system and the local electricity utility (e.g. National Grid, Eversource). As solar facilities are approved to participate in the SMART program and solar capacity is added to the electricity grid, this base rate declines at a rate of 4% per capacity block. Dual-use systems qualifying as Agricultural Solar Tariff Generation Units receive an additional \$0.06 per kWh. For more details, please see the CEE Fact Sheet entitled *SMART Program Incentives for Solar Arrays* (<https://ag.umass.edu/clean-energy/fact-sheets/smart-program-incentives-for-solar-arrays>).

What documentation do I need to apply?

All solar PV systems applying to qualify under the SMART program must submit a Statement of Qualification Application to the Massachusetts Department of Energy Resources (MA DOER). The application information must be submitted by the solar system owner, in consultation with the solar developer. The application process is detailed under the “Apply” tab on the SMART program website (<http://masmartsolar.com>).

Dual-use systems applying to qualify as Agricultural Solar Tariff Generation Units must also apply for a Pre-Determination Letter from MA DOER, using the application form available here:

<https://www.mass.gov/files/documents/2018/10/30/Application%20for%20an%20Agricultural%20Solar%20Tariff%20Generation%20Unit.pdf>

A draft version of this application form is typically submitted to UMass Clean Energy Extension prior to formal submission, in order to fulfill the requirement that ASTGU applicants must consult with UMass Extension in development of their agricultural plan. Following consultation with UMass Extension, a revised and finalized application is then submitted to MDAR and MA DOER.

What are the annual reporting requirements?

In order to continue to qualify for financial compensation over the 20-year SMART program period, the owners or managers of ASTGUs must submit annual reports. The reporting form, which is currently under development, will require reporting of the following information:

- **Productivity of crop or herd:** Including pounds harvested or grazed, herd size growth and/or success of the crop, as applicable, and actual productivity relative to expectations.
- **Crop management:** Detailing any observable differences in necessary crop treatment relative to solely agricultural systems, including irrigation, soil amendments, disease and weed management, etc.
- **Potential changes for future years:** Including revised crop or grazing plans.

More Information

For more information, visit our website: <https://ag.umass.edu/clean-energy/solarag>.

After reviewing website materials, you can contact Zara Dowling (zdowling@umass.edu, 413-545-8516) with any additional questions related to solar PV use on your farm.