

Commonwealth of Massachusetts  
Executive Office of Energy and Environmental Affairs  
DEPARTMENT OF ENERGY RESOURCES

**SOLAR MASSACHUSETTS RENEWABLE TARGET PROGRAM  
(225 CMR 20.00)**

**GUIDELINE**

**Guideline Regarding the Definition of Agricultural Solar Tariff Generation Units**

Effective Date: ~~April 26, 2018~~ TBD

**PURPOSE**

This document provides guidance regarding the manner in which a solar photovoltaic facility may qualify as an Agricultural Solar Tariff Generation Unit (“ASTGU”) under the Department of Energy Resource’s (Department) Solar Massachusetts Renewable Target (SMART) Program.

**BACKGROUND AND PURPOSE**

On April 11, 2016, Governor Baker signed Chapter 75 of the Acts of 2016 into law. The Act directs the Department to create a long-term sustainable solar incentive program to promote cost-effective solar in the Commonwealth. The Act further directed the Department to “...differentiate incentive levels to support diverse installation types and sizes that provide unique benefits...” In developing the SMART Program, the Department established six types of location based Compensation Rate Adders, one of which is provided for ASTGUs.

Given the ~~small number~~ relative lack of solar facilities that meet the ~~objectives and~~ criteria outlined in ~~the~~ definition of ASTGU in the Commonwealth today, but the desire to see the installation of such systems that can provide the dual-use benefits, the Department, in consultation with the Massachusetts Department of Agricultural Resources (MDAR), has developed this Guideline to clarify additional eligibility criteria not prescribed in regulation.

Adopting these provisions via Guideline, as was requested by many commenters in the initial stakeholder process that led to the promulgation of the regulation, will provide the necessary flexibility for the Department, in consultation with MDAR, to make modifications to key eligibility criteria as lessons are learned in constructing and operating ASTGUs.

Any modifications to this Guideline will only be made following an opportunity for public comment that shall remain open for at least two weeks. All capitalized terms in this Guideline are defined in 225 CMR 20.02.

**225 CMR 20.00 Regulatory Provisions Specific to ~~ASTGUs~~ Agricultural Solar Tariff Generation Units**

Under the SMART program, Solar Tariff Generation Units are eligible to qualify as an ASTGU, which is defined under 225 CMR 20.02 as follows:

Agricultural Solar Tariff Generation Unit. A Solar Tariff Generation Unit located on Land in Agricultural Use or Prime Agricultural Farmland that allows the continued use of the land for agriculture.

Additionally, 225 CMR 20.06(1)(d) contains special provisions pertaining specifically to the eligibility of ASTGUs:

(d) Special Provisions for Agricultural Solar Tariff Generation Units. In order to qualify as an Agricultural Solar Tariff Generation Unit, a Solar Tariff Generation Unit must submit documentation itemized in 225 CMR 20.06(1)(d) below. All final determinations regarding the eligibility of such facilities will be made by the Department, in consultation with MDAR. A Solar Tariff Generation Unit must also submit satisfactory documentation to the Department as detailed in the Department's *Guideline Regarding the Definition of Agricultural Solar Tariff Generation Units*.

1. the Solar Tariff Generation Unit will not interfere with the continued use of the land beneath the canopy for agricultural purposes;
2. the Solar Tariff Generation Unit is designed to optimize a balance between the generation of electricity and the agricultural productive capacity of the soils beneath;
3. the Solar Tariff Generation Unit is a raised structure allowing for continuous growth of crops underneath the solar photovoltaic modules, with height enough for labor and/or machinery as it relates to tilling, cultivating, soil amendments, harvesting, *etc.* and grazing animals;
4. crop(s) to be grown to be provided by the farmer or farm agronomist in conjunction with UMass Amherst agricultural extension services, including compatibility with the design of the agricultural solar system for such factors as crop selection, sunlight percentage, *etc.*;
5. annual reporting to the Department and MDAR of the productivity of the crop(s) and herd, including pounds harvested and/or grazed, herd size growth, success of the crop, potential changes, *etc.*, shall be provided after project implementation and throughout the SMART incentive period; and
6. other system design information, which shall include, but not be limited to:
  - a. dual-use type, *e.g.*, ground mount racking, pole towers, tracking, *etc.*;
  - b. total gross acres of open farmland to be integrated with the project;
  - c. type of crop(s) to be grown, including grazing crops;
  - d. pounds of crop(s) projected to be grown and harvested, or grazed;
  - e. animals to be grazed with herd size(s); and
  - f. design drawing including mounting system type (fixed, tracking), panel tilt, panel row spacing, individual panel spacing, for pole towers tower spacing and mounting height, *etc.*

#### **Additional Provisions for ~~ASTGUs~~ Agricultural Solar Tariff Generation Units**

Provided a Solar Tariff Generation Unit meets all program eligibility criteria in 225 CMR 20.00, in particular the provisions relating to ASTGUs prescribed in 225 CMR 20.02 and 20.06(1)(d), a Solar Tariff Generation Units must also satisfy all of the following provisions to qualify as an ASTGU. Note ~~that~~ these provisions take into account the entire useful life of the solar photovoltaic array with consideration for the variety of possible agricultural activities and crops that ~~could~~ typically can take place on farm land over that timeframe. In other words, they do not simply consider present use.

The parameters defined in Section A below will allow for the variety and flexibility of potential farming operations at any given farm throughout the life of the solar ~~photovoltaic array-PV system~~. These parameters are stated as minimums, giving farms the flexibility to determine and finalize ~~farming operations for a variety of considerations including crop selection and sunlight needs, machinery requirements, etc.~~ Applicants complying with the additional provisions in ~~Section~~section A below will be reviewed in an expedited process.

DOER ~~intends to develop~~has developed a standard design tool (SMART Tool) to be mandated for use by all Agricultural Solar Generation Tariff Unit applicants, and to be used by developers and farmers alike to demonstrate meeting the SMART regulations and Guidelines. The SMART Tool will ~~be designed to:~~

a) assist in the design of an Agricultural Solar Generation Tariff Unit by understanding the shading impact on all the land beneath, behind, and throughout the farmed area, of various dual-use array system designs and layouts;

~~b) In addition to the SMART tool, the Department, in coordination with the University of Massachusetts and MDAR, has provided an Agricultural Solar Generation Tariff Unit Pre-Determination Form to~~ provide a farm plan template to be used by the landowner to propose their active agricultural production plan consistent with the array configuration and shading profile and compliant with the Guideline requirements; ~~and~~ and provide an annual reporting form template compliant with the Guideline requirements.

~~c) provide an annual reporting form template compliant with the Guideline requirements.~~

#### **A. Base System Design Parameters Requirements:**

##### **1. Panel Height Requirements:**

a. For fixed tilt ASTGUs, the minimum height of the lowest panel point shall be eight (8) feet above ground;

b. For tracking ASTGUs, the minimum height of the panel at its horizontal position shall be 10 feet above ground;

##### **2. Maximum Direct Sunlight Reduction Requirements:**

~~A) a. These are only the base sunlight requirements without the need for a waiver request; satisfying this item does not mean the applicant has met the A. Base System Design Requirements as the applicant must also demonstrate meeting Compatible Sunlight Needs, 225 CMR 20.06(1)(d)(4), and further emphasized under A.3 herein;~~

~~b. ASTGUs must demonstrate that the maximum sunlight reduction from the panel shading ~~on~~for each and every square foot of land directly beneath, behind and in the areas adjacent to~~

and within the ASTGU's design ~~shall not be more than 50% of baseline field conditions, shall not be more than 40% of baseline conditions and the overall sunlight average for the project design area shall be at least 70% as calculated by the SMART tool; that is the ASTGU minimum design sunlight for each and every square foot shall be at least 60% of baseline conditions with a corresponding 70% or greater sunlight average for the entire project area using the SMART Tool; calculated over the growing season and time of day specifications provided in (A.4) below;~~

3. Compatible Sunlight Needs:

a. Per SMART Regulations 225 CMR 20.06(1)(d)(4), applicant shall provide documentation that the project's proposed solar design's sunlight amount and sunlight reduction is compatible with the proposed agricultural crops and productivity over the project lifetime;

4. Growing Season/Time of Day Considerations:

The typical growing season shall be considered to be March through October, with sunlight hour conditions with maximum ~~50~~40% sunlight reduction to be between 10AM and 5PM for March and October, and from 9AM to 6PM from April through September;

5. Maximum ~~Size~~ASTGU Rated Capacity:

The maximum AC rated capacity of an ASTGU shall be two MW ~~with a corresponding maximum DC rated capacity of 2.5 MW. The ASTGU area for any proposed ASTGU project shall then be equivalent to a system design that incorporates the first two Capacity Blocks of each Distribution Company's service territory~~ number of solar panels that in total have a corresponding maximum DC rated capacity of 2.5 MW. D.C. while meeting the **A. Base System Design Requirements**. The Department, in consultation with MDAR, will make an evaluation as to whether or not this provision shall be adjusted in subsequent Capacity Blocks.

6. Agricultural Yields:

- a. Using the methodology in A.6.b. herein, the minimum agricultural yield requirement to satisfy **A. Base System Design Requirements** shall be 1.40 using the land equivalent ratio (LER) method which is equivalent to a minimum 70% projected crop yield/acre with an ASTGU compared to the base agricultural yield without an ASTGU.
- b. The applicant shall use the following methodology to demonstrate meeting minimum agricultural yield requirements as an ASTGU:
  - The LER, an intercropping assessment tool, that can be used to quantify the pre- and post-production yields for two (or more) crops, and can demonstrate if a proposed inter-cropping project would be more beneficial in comparison to single cropping. The ASTGU Guidelines are primarily interested in evaluating the agricultural crop production. The calculation is:
    - 1) Quantify the entire proposed dual use project land area – can be in acres, or square feet, but keep units consistent throughout;
    - 2) Crop Yield (specific to the crop) - so can be in weight, barrels, bales, head of livestock etc., but keep units specific throughout;

- 3) Divide the proposed area in 1.) in half;
- 4) Presume one of the half areas is without any solar system and is planted with the crop proposed for your project; calculate the projected crop yield in yield units/acre and then calculate the total yield for the total half area, so that your final result is total weight of product yield in one half of the proposed project area without solar PV – you can call this Yns ( yield no solar);
- 5) Next calculate the projected yield(s) in yield units/acre of the crop if it were planted within the total area of the proposed dual use system, using the projected crop yield factor of your specific project design, and then calculate the total crop yield for the entire dual use project area, so that your final result is the total product yield for the entire area with solar PV – you call this Yws (yield with solar);
- 6) Compare the results; Yws must be greater than Yns to be beneficial and to be greater by at least a factor of 1.40 more than Yns to demonstrate an agriculturally effective system design and meeting the minimum agricultural yield requirements as an ASTGU.

#### 7. Optimized Balance:

- a. Per 225 CMR 20.06(1)(d)(2) an ASTGU optimized balanced design meeting **A. Base System Design Requirements** shall be one where the agricultural post-/pre- yield production percentage is at least equal to the electrical post-/pre- kW capacity percentage, using the LER methodology and meeting the minimum agricultural yield requirements in A.6 herein.

#### **B. Waiver from ~~Additional Provisions~~Base System Design Parameters:**

DOER recognizes the variety and, in some cases, the uniqueness of farming operations where some of the ~~Additional Provisions~~**A. Base System Design Requirements** for an ASTGU may not be required to achieve the objectives of the ASTGU. –To address this issue, ~~a landowner~~an applicant may request that DOER, in consultation with MDAR, issue a waiver from ~~any of the Additional Provisions~~certain requirements under A. Base System Design Parameters above for an ASTGU ~~that is, which are~~ not contrary to the law or the intent of the regulations. All ~~waiver requests should~~waivers granted shall be ~~submitted~~for the current proposed project only and shall not apply to [DOER.SMART@state.ma.us](mailto:DOER.SMART@state.ma.us) any future system design modifications without the consent of DOER in consultation with MDAR.

In order to request a waiver, the applicant must provide the Department with the following:

1. Plan Development:

Develop a plan ~~that:~~

a-which clearly describes how the applicant will integrate the ASTGU into ~~their~~the farming operation;

~~b. demonstrates and clearly show~~ that a waiver does not result in a diminishment in the acreage of land being farmed and the agricultural production capacity of the land; relative to the AGSTU, and

~~e. demonstrates~~ that the primary use of ~~the that~~ land is for agricultural or horticultural production; as defined under M.G.L. Chapter 61A. -The plan must consider not only the agricultural activity anticipated for the next few years, but also demonstrate that a reasonable variety of agriculture can still be viable given likely changes in conditions over the 25-year lifetime of the array.

## 2. Justification and Substantiation

~~An applicant must~~ As part of applying for a waiver for approval as an ASTGU, provide;  
a.) justification as to why an ASTGU design is necessary for the proposed agricultural operations on the relevant parcel of land; and;

## 3. Additional Documentation

~~An applicant must provide documentation for each specific aspect~~ b.) substantiation of the design parameters from Section A incremental cost of this Guideline the planned solar array and thereby for the additional "adder" included in the SMART regulations for which the ASTGU requires.

## 3. Waivers:

As a means of evaluating a waiver ~~as follows~~ request for the following requirements under **A. Base System Design Requirements** for an ASTGU, provide respective responses for each relevant waiver being requested:

- a. For a waiver on A.1 Panel Height Requirements: Provide documentation demonstrating as to how the proposed solar design system will allow for the variety and flexibility of a variety of potential farming operations at the your given farm throughout the term of the SMART Tariff twenty-five (25) year life of the solar PV system. The variety of farm operations must consider not only the planned activities in the first 3-5 years, but also a reasonable range of farming that could be desirable due to changing conditions over the 25-year planning horizon.
- b. For a waiver on A.2 Maximum Direct Sunlight Reduction Requirements:
  - i. Demonstrate how the your proposed dual use design will provide equal or greater total agricultural yields than if ~~both~~ the agricultural crop and the solar ~~array~~ PV system were grown and installed separately, utilizing the same amount of total dual use land ~~area~~ for the comparison; using the methodology in A.6 above.
  - ii. Demonstrate how ~~each~~ every square foot of land will be used for agriculture production; and that agricultural production remains a primary purpose of the land relative to the ASTGU;

- iii. Demonstrate how ~~the~~this design will be able to accommodate a variety of potential agricultural ~~products~~productive uses throughout the twenty-~~five (25)~~year ~~term~~life of the ~~SMART Tariff~~solar PV system.
- c. For a waiver on A.4 Growing Season/Time of Day Considerations: Provide documentation on how ~~the~~this time of season and day data ~~in Section A~~ is not relevant to the farming practice and operation, currently, and for the ~~term of the SMART Tariff~~next 25 years.
- d. For a waiver on A.5 Maximum ASTGU Rated Capacity: Provide documentation why a larger rated capacity project is required, addressing the risks and concerns associated with the larger land impact and assurance of long-term agricultural productivity at a larger than initial SMART program desired scale.
- ~~d.e.~~ Other waivers: For all ~~other requirements for which a waiver is being sought~~waiver requests not included in Section 3. Waivers above please add the waiver(s) to this section as part e., etc. describe the waiver(s) requested, and why the proposed alternatives require a waiver, and how these alternatives will meet the intention of the ASTGU regulations.