



February 23, 2018

Commissioner Judith Judson
Massachusetts Department of Energy Resources
100 Cambridge Street, Suite 1020
Boston, MA 02114

Re: Comments on the Solar Massachusetts Renewable Target ("SMART"), Definition of Agricultural Solar Tariff Generation Units Guideline, Energy Storage Guideline, Land Use Siting Guideline and Statement of Qualification Reservation Period Guideline

Dear Commissioner Judson:

Thank you for the opportunity to comment on the Department of Energy Resources' (DOER) SMART [Guidelines](#) ("guidelines"), which were released to the public on January 22, 2018. BlueWave Solar ("BlueWave") appreciates the progress that the Baker Administration and the solar industry have made together on SMART to date, and we look forward to continuing that progress through the development of these guidelines.

In reviewing the proposed guidelines, we have identified several issues that we believe must be addressed before DOER issues the final guidelines. These issues and our corresponding recommendations relate specifically to the Agricultural Solar Tariff Generation Units, Energy Storage, Land Use siting and Statement of Qualification Reservation Period guidelines.

BlueWave believes that by incorporating these recommendations into the guidelines, the SMART program will meet its goals of preserving and expanding agricultural activities, encouraging the deploying energy storage, ensuring responsible solar siting, enable an efficient and fair qualification process and ultimately support the Commonwealth's clean energy goals.

BlueWave proposes the following revisions to the proposed guideline:

I. Agricultural Solar Tariff Generation Units Guideline Comments

There are three critical issues related to the Agricultural Solar Tariff Generation Units Guide that we believe must be addressed in order to ensure the success of an agricultural/solar dual-use program: (1) the 2 MWac cap, which renders traditional ground-mount solar (without-adders) the better choice for a given property, (2) prescriptive design standards, particularly the 4' spacing between panels, that inadvertently encourage inefficient site planning, erode economic value for both farmer and developer, and eliminate design innovations and (3) the 50% shade rule, which is

underdefined and will significantly restrict the development of dual-use systems that would otherwise enable sufficient sunlight to maintain crop yield.

The following recommendations address each of these issues.

1. **Remove the 2 MWac cap.**

Guideline: “The maximum AC rated capacity of an Agricultural Solar Tariff Generation Unit shall be two MW in the first two Capacity Blocks of each Distribution Company’s service territory.”

Agricultural Solar Tariff Generation Unit projects are not profitable under the current design standards at 2 MWac. By extension, in order to participate in developing solar on their properties, farmers would remove their land from agricultural use, build standard solar in one area, and leave remaining land unutilized if it could not properly accommodate farming. Any farmer with enough land would accept the higher returns associated with 5.0 MWac of standard solar rather than 2 MWac of dual-use solar.

Permitting up to 5.0 MWac of dual-use solar would allow development fees that incentivize their implementation over 5.0 MWac standard solar (no-adders); enticing developers to build dual-use solar while enabling them to subsidize dual-use farming via higher rent.

Analysis

BlueWave performed an in-house analysis that took into consider a landowner’s choice to farm, rent land to solar, or explore dual-use under different conditions. We evaluated options for a hypothetical 20-acre farm in which the lease revenue for a landowner/ farmer is kept constant.

We compared standard ground-mounted projects to dual-use projects of varying designs: no space between panels but oriented to minimize shading; a space every other panel; and a space every third panel.

Our analysis showed, using our own landowner rates, with a 2 MWac cap, the subsidy is simply not sufficient to incentivize both developers and farmers to adopt dual-use. The higher racking and installations costs associated with dual-use overcome the incentive value for smaller projects for developers, therefore they are not able to pass on a significant subsidy in the form of rental payments to the farmers. Under the prescriptive design criteria and 2 MWac cap, dual-use will be a marginal loss to both the farmer and the developer as compared to standard ground-mounted systems.

When considering the increased cost and increased land use, farmers will not be incentivized to adopt dual-use solar because of the lower income projected based

on the current guidelines. BlueWave uses proprietary landowner rates and cannot disclose these in public comment, but we can provide more analysis about the decreased income to the farmers upon request.

Unless the proposed guideline is amended to address the economic and land-use dynamics represented above, we believe dual-use solar will not be achieved in Massachusetts.

2. Remove certain prescriptive design standards and allow for MDAR “pre-approval” or discretionary review.

Guideline: “Fixed tilt designs shall include a minimum four feet distance between each panel(s) in order to avoid full shade beneath and behind each row of panels”

Requiring four feet between each panel encourages highly inefficient solar designs from a variety of perspectives (e.g. land use, electrical design, structural design, cost); because of this, these designs will not be built in any meaningful commercial sense. Requiring four feet between each panel also ignores that there is a growing understanding of the interplay between panel spacing, sunlight access, and biological yield. As such, it is premature to memorialize one design approach into policy.

The prescriptive nature of this design criteria reduces flexibility designers have to create arrays that best meet the need of their site. There are a wide range of array designs that can achieve equal sunlight penetration as a 4’ spacing. For example, appropriate panel layout and density can be combined with bi-facial modules, available on the market today, that may allow 5% more direct beam irradiation directly through the modules.

There are multiple approaches to solar design that can enable sufficient sunlight penetration. Therefore, we feel strongly that this section should be removed. The method by which projects meet the shading rule should be left to the creativity of the developers. MDAR should be equipped with the discretionary powers to judge a proposed system’s allowed sunlight penetration and decide if it is adequate.

3. Replace 50% shade maximum with provision enabling system designs that demonstrate adequate sunlight penetration or alternatively establish 65% shade-time maximum from beam radiation.

Guideline: “the typical growing season shall be considered to be March through October, with sunlight hour conditions with maximum 50% sunlight reduction to be between 10AM and 5PM for March and October, and from 9AM to 6PM from April through September”

The current evaluation of a 50% shade rule is underdefined as it does not account for diffuse radiation, or the fact that irradiance of direct sunlight varies throughout the day because of the relative position of the sun.

It is unclear whether MDAR defines this figure based on valuing each hour equally (i.e. one hour direct-beam shaded and one hour with access to direct sunlight = 50%), or if it is based off of energy that meets the plant (e.g. if two hours sum to 1000W/m² of irradiance, where one hour of direct sunlight in the morning is 250 W/m² and one hour with direct sunlight in the afternoon is 750W/m², shading the morning hour would then be equal to a 25% loss of energy).

As a result, the 50% shade rule will unnecessarily prohibit dual use systems that maximize biological yield and ensure responsible solar unit designs, two important objectives of the program.

Analysis

Preliminary research by Professor Stephen Herbert of the UMass Stockbridge School of Agriculture suggests that between designs that yield a greatest shading value from 50% - 65% of the hours defined have negligible impact on biological yield compared to 50% shade. Crops in the UMass trial that BlueWave assessed to be receiving a 65% max shade value still achieved 90-95% biological yield compared to the baseline open field.

We believe this criterion is overly prescriptive and should be replaced with a provision that the developer must demonstrate to MDAR and the UMass School of Agriculture that their design allows for adequate sunlight penetration. Alternatively, MDAR could allow for the maximum shaded area(s) to be shaded from direct beam radiation for 65% of the hours defined, as this has been found to retain the biological yield of the site. This may also be attributed that the fact that ~15% of irradiation is diffuse during these hours meaning that even when it is shaded from direct- beam radiation, it is receiving energy (this is why shadows are not pitch black).

II. Energy Storage Guideline Comments

Regarding the Energy Storage Guideline, BlueWave believes there are two issues that need further consideration by DOER in order for storage to be adopted for larger scale projects and remain beneficial to the grid. BlueWave suggests (1) consider a KW threshold for larger projects rather than a percentage and base the rate of capacity off the alternating current and (2) have DOER provide clarification of the definition of and “nominal useful energy capacity.”

- 1. Consider a KW threshold for larger projects and base the rate of capacity off of alternating current.**

Guideline: “Minimum and Maximum Nominal Rated Power. The nominal rated power capacity of the Energy Storage System paired with the Solar Tariff Generation Unit must be at least 25 percent and shall be incentivized for no more than 100 percent of the rated capacity, as measured in direct current, of the Solar Tariff Generation Unit”.

DOER might consider making a KW threshold, rather than a percentage for larger projects. 25% of a 1 MW facility is 250 KW – however a 100 KW battery might be more feasible in terms of cost, and still provide benefit to the grid. The current threshold is specific to residential and commercial systems, which are operating against load.

There are distinct benefits to the industry associated with lowering the incentive rates in accordance with basing the capacity impact off of system capacity rated in alternating current. The ability to utilize storage as a means of increasing the DC/AC ratio and capturing clipped energy associated with that has the added benefits of smoothing out the supply profile to the grid, increasing dispatchability, and reducing the impact on the utilities electrical infrastructure per kWh provided. This will be much further pursued as a measure of comparison versus AC size because the incentive will be negatively associated with the impact to the grid per kWh rather than the current method which positively relates these factors.

2. Provide clarity on the definition of “nominal useful energy capacity.”

Guideline “Minimum and Maximum Nominal Useful Energy. The nominal useful energy capacity of the Energy Storage System paired with the Solar Tariff Generation Unit must be at least two hours and shall be incentivized for no more than six hours.”

BlueWave believes there should be further clarification of the definition of “nominal useful energy capacity”, to avoid any doubt in the application of the term. BlueWave anticipates this term relates to the number of hours a battery is able to discharge, rather than the number of hours a battery can retain a charge. Limiting a battery to six hours of discharge would enable the battery’s discharge to coincide with a peak period which may be outside the normal generation periods of a solar PV system.

If “nominal useful energy capacity” is interpreted as the nominal useful energy capacity of a battery, it could be implied as a requirement to discharge the battery within 6 hours of charging it, which would decrease the benefit to the grid related to peak shifting. As the term, “nominal useful energy capacity” is not defined elsewhere, clarification on the DOER’s interpretation of the term is important.

III. Land Use Siting Guideline Comments

BlueWave is also providing comments on the Land Use Siting Guideline. BlueWave suggests that (1) DOER consider allowing solar projects that comply with local bylaws to qualify for Category 1, (2) remove the commercial and industrial land provision from Category 2 and (3) take into consideration “tilt” when calculating the Greenfield Subtractor.

1. **Allow projects that comply with local zoning codes to qualify for category 1.**

Guideline: “Category 1 Non-Agricultural can apply to STGU’s that are ground-mounted with a capacity greater than 500 kW and less than or equal to 5,000 kW that are sited within a solar overlay district or that comply with established local zoning that explicitly addresses solar power generation” and “...if a project needs to seek a variance, special permit, waiver, or other discretionary approval, it would not qualify under this categorization”

Municipalities may prefer special permits versus As-of-Right siting to regulate solar for any number of reasons beyond land use concerns: institutional familiarity, efficiency of applying the same regulatory tool to different land uses, lack of capacity/resources to craft a well-designed solar bylaw, etc.

Many municipalities already explicitly address solar in their zoning code by requiring a special permit for solar when proposed in specific areas. In addition, solar overlay districts may be indirectly crafted to prevent ground-mounted solar altogether by virtue of limiting as-of-right siting to non-developable parcels.

Clarity is needed because, as written, the regulation contradicts itself: if a project complies with a local zoning code that requires special permits for solar, it could qualify as either Category 1 or Category 2. BlueWave urges DOER to allow projects that comply with local zoning codes – that may or may not specifically require special permits for solar – to qualify for Category 1.

2. **Remove the commercial and industrial land provision from Category 2.**

Guideline: “Category 2 Land Use applies to projects: 500kW AC < STGU size < 5000kWAC; and sited on land that... is zoned for commercial and industrial use.”

Administering a subtractor for projects located in commercial and industrial zoning unfairly penalizes communities for exercising what is an otherwise appropriate and local discretionary land use siting tool.

Since some communities treat solar as a commercial or industrial use, and have crafted local zoning codes accordingly, the rationale that penalizing solar over other commercial and industrial uses is not conducive to encouraging environmental stewardship. Consider that other commercial and industrial land

uses would consume a comparable amount of land area with potentially greater environmental impacts (e.g. impervious surfaces) - without a similar penalty.

BlueWave proposes that DOER remove the commercial and industrial land provision from Category 2 altogether. If a local zoning code explicitly addresses solar by allowing it via As-of-Right or Special Permit in commercial and industrial zones, the STGU should qualify for Category

3. Add “tilt” into the calculation of the value of the total Greenfield Subtractor.

Guideline: “Per 225 CMR 20.07(3)(f), the value of the total Greenfield Subtractor applied to a STGU is measured as the acreage of land that a STGU occupies, represented by the square footage of the solar photovoltaic modules.

If you install a facility with 5,000 panels measuring 5ftx4ft then the impact of the project will be calculated as, with the understanding that 1acre=43,560ft²:

$$5,000 \times 20\text{ft}^2 = 100,000 \text{ ft}^2$$

If the goal is to calculate the area of land over which the panels reside, tilt must be taken into account. BlueWave believes that this is a more accurate way to calculate the area of the land being used. Please see the following method of calculation of the area of land over which panels reside.

$$\text{10 degrees: Area} = 5,000 * (4') * (5' * (\cos (10))) = 98,481 \text{ ft}^2$$

$$\text{30 degrees: Area} = 5,000 * (4') * (5' * (\cos (30))) = 86,6602 \text{ ft}^2$$

IV. Statement of Qualification Reservation Period Guideline Comments

In regards to the Statement of Qualifications Guideline BlueWave encourages DOER to provide clarity on the method through which off-taker based adders are assigned.

1. Clarify the method through which off-taker based adders are assigned.

As is currently written, in section 8.b of the *Statement of Qualification Reservation Period Guideline*, it is unclear at which point a project is able to “lock in” its off-taker based adder value. A lack of clarity during late-stage project operations as to the final tariff rate a project is to receive reduces investor confidence. Please consider that some operations may be time-sensitive to sign off from utilities or other third parties regarding final off-taker approval.

Final Comments

We would like to emphasize BlueWave’s support for the forward-thinking dual-use, and storage priorities and thoughtful land use objectives of SMART. The guidelines reflecting these priorities are an important step towards achieving several the Baker Administration

and DOER's solar goals. BlueWave believes that by incorporating the recommendations we have proposed, these guidelines will have a positive impact on farmers landowners, the emerging energy storage market, municipalities, consumers, the solar industry, and the Commonwealth's clean energy goals. We believe that our recommendations along with those of our colleagues in the solar industry will help the Commonwealth develop an innovative successor program to SREC II, that will create a national leading solar incentive program that encourages (1) agricultural dual-use solar development, (2) robust deployment of solar + energy storage, (3) thoughtful land-use siting and (4) a more efficient qualification process.

BlueWave appreciates the opportunity to provide these comments to DOER and MDAR and appreciates the consideration you and your team may afford us in incorporating these recommendations into the final guidelines. As always, BlueWave stand ready to provide any additional information you may require and we welcome the opportunity to participate in any further discussion on the guidelines.

Sincerely,

A handwritten signature in black ink, appearing to read 'Mark D. Sylvia', with a stylized flourish at the end.

Mark D. Sylvia
Managing Director of External Affairs