Comments on Agrivoltaics Research and Demonstration Request for Information (NYSERDA RFI 5397)

Submitted by:
the Alliance for Clean Energy New York

November 15, 2023

I. Introduction

The Alliance for Clean Energy New York (ACE NY)[1] submits the following comments in response to the New York State Energy and Research Development Authority's (NYSERDA) Agrivoltaics Research and Demonstration Request for Information (RFI)[2]. These Comments include feedback on the draft Agrivoltaics Research and Demonstration Request for Proposals (RFP). ACE NY hopes that this input will assist NYSERDA in developing a fruitful project solicitation process and appropriate selection criteria; in addressing applicant capacity and resource needs; and in prioritizing agricultural, solar and economic considerations associated with undertaking a multi-year agrivoltaic research and demonstration project.

We greatly appreciate NYSERDA's leadership on policy and research related to the emerging field of agrivoltaics given the growing interest in this topic.

In these comments, ACE NY is referred to as "we" or "our".

II. General Comments

ACE NY supports the advancement of agrivoltaics, the co-location of agriculture and photovoltaics. Agrivoltaic systems offer a unique synergy, allowing for the simultaneous utilization of land for food production and for solar energy generation. Agrivoltaics can mitigate the relatively minor impact that solar development may exert on farmland. Solar has been proven to safeguard environmental assets by preserving farmland and facilitating soil health recovery. This not only enhances the possibilities for carbon sequestration but also displaces urban or suburban sprawl that permanently converts land for residential or commercial purposes.

[1] **ACE NY** is a member-based organization with a mission of promoting the use of clean, renewable electricity technologies and energy efficiency in New York State to increase energy diversity and security, boost economic development, improve public health, and reduce air pollution. Our diverse membership includes companies engaged in the full range of clean energy technologies as well as consultants, academic and financial institutions, and not-for-profit organizations interested in our mission.

[2] https://portal.nyserda.ny.gov/CORE_Solicitation_Detail_Page?SolicitationId=a0r8z000000D5tSAAS

ACE NY appreciates that NYSERDA is working to advance an RFP to support agrivoltaics research and demonstration projects. Agricultural research projects and demonstration projects are both important components of agrivoltaics advancement, but they have distinct purposes. ACE NY proposes that NYSERDA's work should both (1) support the development of demonstration projects and (2) support an agrivoltaics research program to develop innovative science-based solutions to facilitate the co-location of crops and/or livestock and photovoltaics while promoting the biodiversity of endemic flora and fauna.

Agrivoltaics research projects should be designed to generate new knowledge about agricultural practices, technologies, and crops. These projects should be conducted by scientists and researchers in controlled environments, such as laboratories or experimental farms. In traditional agricultural research, the goal is to develop new solutions to agricultural challenges, such as improving economics, crop yields, reducing pest and disease infestations, and enhancing soil fertility. Agrivoltaics research projects should have very similar objectives, *e.g*., to develop new solutions to agrivoltaics challenges, such as improving economics, crop yields, reducing pest and disease infestations, enhancing soil fertility, equipment adaptability. Research should also strive to reduce the cost premium for agrivoltaics (vs. traditional solar), as well as issues of construction, operations & maintenance, solar facility performance, and land optimization.

Demonstration projects, on the other hand, should be designed to showcase agrivoltaics practices or technologies to solar developers, farmers and other stakeholders. These projects are typically conducted on real-world farms, under real-world conditions. The goal of demonstration projects is to provide farmers and developers with hands-on experience with new techniques and technologies, so that they can adopt them on their own farms or solar projects.

Thus, agrivoltaics research projects should be focused on generating new knowledge, while agrivoltaics demonstration projects should be focused on disseminating knowledge to developers, farmers and other stakeholders. Both types of projects are essential for advancing agrivoltaics in New York State.

With this view in mind, ACE NY respectfully suggests that it may be more effective and efficient to issue separate RFPs for research and for demonstration. One would have the research component removed and would target developers, working with farmers, academia and/or consultants (on their own or through teaming agreements) to install demonstration projects that to showcase agrivoltaics practices and technologies. These projects should be conducted on real-world solar farms, under real-world conditions. The goal of the RFP and the demonstration projects it funds would be to provide farmers and developers with hands-on experience with new techniques and technologies on a smaller pilot scale project, or a smaller portion of a larger project. NYSERDA or an external contractor then could aggregate the learnings from the smaller demonstration projects and help developers and communities increase their awareness of the results and recommendations from what was experienced at the demonstration project.

A different RFP could focus on contracting with a research institution to develop research projects related to the sustainable and resilient co-location of crops and photovoltaics, as solar developers do not necessarily have the requisite research expertise.

III. Responses to NYSERDA's Questions

1. **What agricultural commodities, crops, livestock, and livestock products should be prioritized, if any, for conducting research and demonstrating the feasibility of agrivoltaics?**

All aspects of commercial scale agrivoltaics should be studied and advanced wherever possible, but the demonstration projects should be focused on crops, livestock and agronomic practices and equipment, that are currently being employed, or have the potential with market and farmer interest to be employed at scale within a solar setting on New York farms.

Agricultural commodities and crop demonstration projects should prioritize agrivoltaics that are consistent with current New York agricultural practices.

- The first group is grazing livestock, with a focus on cattle, and which may also include harvesting haylage for the dairy sector where it is not practical for the livestock to graze out in pasture.
- The second category is high-economic-value shade-tolerant crops with photosynthetically-active radiation (PAR) saturation points at or below 1300 micromoles per second and square meter (µmol m^{-2} s^{-1}, roughly 80% of normal direct sunlight) that are economically viable with small-scale equipment and higher labor requirements (or where higher labor requirements can be replaced by robotics or other future innovations).
- The third category is agronomic crops, with maximum growth heights under 36 inches (ex: soy, hay/forage, small grains), that can feasibly be grown and harvested in strips under and/or between rows of panels.

2. **The draft RFP proposes a 100kWdc minimum agrivoltaic project size, which is roughly equivalent to about 0.5-1 acre. Is this appropriate? In addition, should the RFP consider a minimum acreage of agricultural production within the solar facility to be researched?**

We recommend that there be no minimum or maximum project size specified, for the reasons described below.

For utility scale solar, the RFP should provide funding for larger number of demonstration projects creating a more diverse set of learnings and local support.

Projects supported by the RFP should be big enough to provide proof of concept but should not use more acreage than necessary. Respondents to the RFP should be required to provide the rationale for their project size, such as to avoid any boundary effects, or because at a lesser scale is not feasible, or because a smaller scale would not produce meaningful information to support future decision making.

For example, if a certain kind of grazing is the method being applied for, it may not be necessary that the animals being used for grazing are spending all their time grazing under panels. It might be sufficient that a paddock is created as part of the demonstration project, and that the animals spend part of their time grazing under the solar panels, and part of their time grazing in another environment.

Further, it's reasonable that demonstrating a particular crop may be meaningful on a smaller site and demonstrating grazing requires more acreage for a demonstration to generate meaningful results. Therefore, ACE NY recommends that no project size limitations are provided as part of the RFP. Instead, the proposer will explain why a certain size project was selected.

3. **Should the proposed project sites be required to have an existing Large-Scale Renewables or NY-Sun award?**

ACE NY believes projects that have been awarded Tier 1 contracts or NY-Sun award should be prioritized, but it should not be a requirement that projects have been awarded a Tier 1 contract or a NY-SUN award. Projects that can provide meaningful information, conclusions and recommendations to help inform future projects while creating the best value for NYSERDA should be selected. Some initiatives may work well co-located with projects already awarded an LSR contract or NY Sun award. However, other initiatives may require a new project to be proposed.

Provided that the agrivoltaic demonstration project can be operational and start collecting information within 3 years of award as is contemplated in the draft RFP, whether or not a project has an existing LSR contract or NY-Sun award should not be a limiting factor, as it might limit the opportunities and value created by this RFP.

The funding being asked for by projects not already having an LSR contract or NY-Sun award should be limited to the amount necessary to make the project economically viable, and not cover the entire cost of the project. Proposers may also choose to assume that they will have an LSR contract award or NY-SUN contract by the time the project is realized, and assume that value as part of their bid, thus reducing the amount of funding requested. This should also be mentioned as a project risk, where applicable, in the final submission.

4. **Should agrivoltaic projects be required to accommodate a variety of potential crops or agricultural practices? For example, should a solicitation allow for agricultural and solar co-utilization based on the near-term plan for agricultural operations at the site or have minimum solar design requirements (ex. height & row spacing) to ensure the farm operation has flexibility and can change crops or practices in the future?**

This should not be a requirement of the RFP. Requirements should be flexible and allow projects and farmers to choose the best agrivoltaic activities that are feasible for the specific location, soil types, ecology, design, operations and maintenance requirements, landowner requirements, other permit requirements, safety requirements, economics, etc. Requirements that are too strict could limit development, raise costs for consumers, and ultimately limit the ability to meet NY's clean energy goals.

If a proposer has a design idea that would accommodate different agrivoltaic options that can be incorporated within the same proposed design, and include the demonstration of one or more agrivoltaic solutions as part of the proposal, such proposal should somehow be viewed more favorably. For example, this might include rotating the crops being tested within the project each year or at one or more intervals during the five year program period. Or it might involve a combination of grazing with livestock and/or growing and harvesting vegetation at different intervals within the same proposed project footprint.

5. **Are there specific measures NYSERDA should require of the proposer to support disadvantaged communities? Are there specific requirements that should be noted for solar projects sited in disadvantaged communities that traditionally host farming operations?**

This should not be a requirement but there should be additional incentives offered to encourage projects to support disadvantaged communities. Proposers partnered with disadvantaged communities and projects located in disadvantaged communities should also be viewed more favorably.

For example, some see agrivoltaics as a means to reduce the barrier to entry for farmers, as it might create land where farmers can start or expand their operations without needing to purchase land, and where the solar project owner might actually pay the farmer to farm within the facility as they are providing a service. There are already known stories where solar projects have enabled farmers to expand their operations where it wasn't otherwise possible, and this is something that can be further exploited within the context of lowering the barrier to entry for famers, and how that can help to benefit disadvantaged communities.

6. **Does the Proposal Evaluation criteria (Section V of the draft RFP) fairly represent the priorities in the market and information needs of farmers, solar developers and policy makers? If not, what should be included, excluded, or prioritized? Are there other metrics or considerations associated with solar development, agricultural operations, land use or other factors not currently captured in the Proposal Evaluation?**

- The proposed criteria could be difficult for some developers to achieve, and projects should not be dependent on the interacting parties to be eligible. A project may need to coordinate with other parties, and a demonstrated collaboration with other initiatives could be evaluated positively if it increases the benefits of a project.
- With respect to the criteria "Is the site located in a NYS disadvantaged community (DAC)?", we suggest this be an evaluation criteria rather than a threshold requirement. Further, another evaluation criteria could be whether the project will benefit a DAC even if it is not located in one.
- With respect to the criteria "Have information dissemination and transfer methods, such as presentations, reports, or articles in peer-reviewed journals, been identified?", we suggest that this may depend on results, and could be hard to identify upfront.
- We propose rephrasing of the following "Does the proposal have a well thought out community engagement plan that will likely increase support from local residents?" **to** "Does the proposal have a comprehensive community engagement plan that aims to increase support from local residents?"
- We recommend removing the requirement that proposals include a plan for education and training for farmers and other stakeholders on the project (under Section IV Community Engagement Plan). We support robust community engagement, including hosting at least one public site visit per year, however an active solar array is not an ideal place to train or teach someone to farm. The focus should be on public site visits to educate farmers and other stakeholders who are interested in learning about farming operations within an agrivoltaic array, rather than using the site for a training program.

Overall, the technical evaluation criteria is well thought out, comprehensive and provides a good basis for proposers to develop their submissions. Much of the feedback in other parts of this RFI response provides feedback with respect to how to formulate the technical evaluation criteria and effectively evaluate proposals received.

7. **Should NYSERDA require a minimum or uniform financial cost share ratio across all types of potential agrivoltaics demonstration projects? Are the suggested funding payment schedule and milestones sufficient? If there are concerns about meeting these requirements, please explain.**

No, there is too much variation in project geography and needs during the development, construction, and operations phases. Additionally, most of the costs are likely to occur during the construction phase of the project. More weight up front should be considered.

Much of the cost to implement the agrivoltaic solutions, especially on projects that are not currently designed or in operation may be at the material procurement and construction stages. While NYSERDA should be careful to not provide too much funding before the program starts to achieve results (*i.e.*, as suggested in the draft RFP, NYSERDA is capping the funding to 30% at the start of Year 1 Agricultural Operation), there should be some allowance to provide some support prior to that milestone. For example, 25% of funding could occur at the material procurement stage, 25% of funding could occur at the start of Year 1 Agricultural Operation, and then 10% at each of the Deliverable of Year 1, 2, 3, 4 and 5 report). Providing more funding up front might allow proposers to be more creative with their projects and not need to make decisions that effectively reduce the overall effectiveness of the demonstration project because the up front procurement and construction costs are otherwise prohibitive.

At the same time, the agrivoltaic projects need to consider how they affect the overall levelized cost of electricity. While it is understood that some if not most agrivoltaic projects are expected to result in an increased price per kWh or MWh necessary for project to be feasible, it must be demonstrated that the accommodations being provided for agriculture strike an appropriate balance between allowing for meaningful farming and maintaining affordable electricity generation. We believe this topic will be one of much debate in future years, as the balance between accommodating for farming and maintaining affordable energy evolves.

8. **If you have received federal funding (e.g., U.S. Department of Energy (DOE) Solar Energy Technologies Office (SETO)1), or are aware of federal funding in agrivoltaics research, how can NYSERDA's solicitation best complement these other potential funding streams?**

We suggest that the NYSERDA program ensure that requirements do not conflict or make it infeasible to obtain both incentives. Ideally, the incentives could be combined without duplication. For example, if a project already has funding from a different source, its application through this NYSERDA program should show 'additionality' in providing value over and above what was proposed in the other funding mechanism.

9. **What duration should NYSERDA require of an agrivoltaic demonstration project and study? Currently the draft RFP envisions five years of data collection post-construction.**

Overall, ACE NY agrees with the 5-year operational timeframe being proposed by NYSERDA. As mentioned above, some proposals may include a plan to test more than one agrivoltaic opportunity within the same footprint over the 5-year period, such as a mix of grazing and growing/harvesting crops, or performing some form of crop rotation. Those proposals should be viewed favorably as they may multiply the project value.

10. **Please provide examples of preliminary ideas of agrivoltaic projects that could be proposed for the draft RFP and a range for the anticipated funding levels that may be requested.**

ACE NY thinks it is best to leave it to individual developers to provide ideas of more specific projects.

11. **What is a suitable timeframe for Proposers to put forth successful submissions to the RFP? Please list any challenges in meeting deadlines, such as finding suitable team members, securing necessary permits or approvals, supply chain constraints, coordinating with potential partners, etc. Your insights will assist in determining an appropriate timeline and areas where NYSERDA might provide additional assistance to accommodates the complexities of agrivoltaic project proposals while ensuring a fair evaluation process.**

The response to this question depends on how many projects are anticipated to be funded and how many rounds of this RFP there will be. Is this a one-time deal? If this is envisioned to be just one RFP, then we suggest that the timeframe should allow for multiple years of projects out to 2028 CODs. If this is intended to be repeated yearly, a four-month RFP process seems reasonable.

The demonstration projects being created by this RFP will not likely be able to come to fruition until the 2025 agricultural season. Providing more time for the development / agricultural teams to respond will result in more projects and a higher quality of submissions that will benefit agrivoltaics knowledge in the longer term. ACE NY proposes that a four-month timeframe be provided from the date that the RFP is launched to the final submission deadline.

Another consideration is whether or not there might be one, two or three annual solicitations so that as more knowledge is known about agrivoltaics and what may or may not be feasible in New York, other demonstration projects can be afforded an opportunity. Or this might be a way for unsuccessful submissions to the first or second solicitation to refine their proposal and attempt to succeed in a future solicitation.

As contemplated in the draft RFP, proposed projects should be operational within 3 years of award, with preference given to projects that can be operational sooner so that the value created by the project is realized sooner.

12. **Would it be beneficial to implement a two-step proposal submission process, starting with a concept paper limited to a maximum of 5 pages, and then inviting selected applicants to submit a full proposal aligning with the draft RFP's requirements? Additionally, would offering a planning grant to selected teams for developing a more comprehensive proposal be a helpful approach?**

A two-stage process does not appear to add any value to this solicitation. As mentioned above, providing a single stage response timeframe of four months for proposers to respond to the RFP should provide the best value for NYSERDA while allowing some projects to start collecting data during the 2025 agricultural season.

A planning grant is a good concept, however planning these projects can easily be part of the 'in kind' contributions provided by proposer teams and is therefore not necessary.

13. **Would it be beneficial if NYSERDA provided a technical support contractor to develop or review research protocols and/or assist in collecting and analyzing agricultural and environmental field data (e.g., soil health, water management, forage quality, nutrient and manure management)? Would it be beneficial to provide similar technical assistance in developing or reviewing research protocols and/or assist in collecting and analyzing economic and agricultural productivity metrics?**

ACE NY does not see merit in NYSERDA providing a technical support contractor to develop or review research protocols and/or assist in collecting and analyzing agricultural and environmental data or analyzing economic and agricultural productivity metrics.

As part of the proposals submitted, it will be up to the proposer to demonstrate that they have this expertise as part of their team. NYSERDA should ask proposers to indicate as part of their submission how the demonstration projects goals will be achieved, and to demonstrate that they have the right expertise on their team to satisfy these objectives.

ACE NY does see merit in NYSERDA bringing on a certain level of expertise to help with the evaluation of submissions so that the proposed value creation, proposal strength, and ability of the team to achieve what is being proposed is properly evaluated.

14. **Given that agrivoltaics is a new and rapidly evolving field, NYSERDA would like further input on the range of options particularly on specific equipment, novel products and technologies. We ask that respondents provide input on such options, particularly publicly available information via web links, regarding approaches that you are working to deploy or are considering as options on future projects.**

Our view is that in the short-term, these funds for demonstration projects would be better used implementing projects that use current proven technology (*i.e.*, technology now in use for non-agrivoltaic projects). This will provide the largest benefit and lead to more projects being able to successfully execute. Trying to use equipment in demonstration projects that is not already regularly used, while interesting, will be much harder to prove viable and will likely lead to the need for further research rather than being immediately implementable. Using equipment that farmers already typically use will also demonstrate projects that are easier to implement and will keep projects cost-effective.

As we discussed above, we suggest that agrivoltaics research projects (rather than demonstration projects) be conducted by a research institution with a group of experts who can conduct research designed to generate new knowledge about agricultural practices, technologies, and crops. These projects should be conducted by scientists and researchers in controlled environments, such as laboratories or experimental farms. In traditional agricultural research, the goal of agricultural research is to develop new solutions to agricultural challenges, such as improving economics, crop yields, reducing pest and disease infestations, and enhancing soil fertility. Agrivoltaics research projects should have very similar objects, to develop new solutions to agrivoltaics challenges, such as improving economics, crop yields, reducing pest and disease infestations, enhancing soil fertility, equipment adaptability, but also should consider the impact on cost of construction, operations & maintenance, solar facility performance and land optimization.

ACE NY recommends that proposers of demonstration projects be required to highlight why and how their proposed project has the potential to be deployed at scale, as well as the market for the product being demonstrated. Proposers should also specify what technology already exists, or may be available in the future, to help to improve the feasibility of the agrivoltaic solution they want to demonstrate. Answers to these questions may be substantiated with information from previous studies and current or future research and development.

On a different topic, ACE NY suggests that NYSERDA make available the total amount of funding that is being made available as part of this RFP solicitation, the number of demonstration projects it wishes to award and/or the total amount of incentive that will be available per project. That will help proposers provide solutions and responses to the RFP that are more meaningful to NYSERDA and prevent/reduce the number of submissions that do not qualify because they are outside of the realm that NYSERDA will support financially.

IV. Conclusion

The Alliance for Clean Energy New York and our solar developer member companies appreciate the opportunity to respond to this RFI to provide input into NYSERDA's ongoing efforts to study, demonstrate, and encourage agrivoltaic projects in New York. As described herein, while we recognize the need for research projects, we are primarily interested in support for demonstration projects in the real world. We look forward to seeing the agrivoltaics RFP and thank NYSERDA for consideration of this input.