



State of New Jersey  
Board of Public Utilities  
44 South Clinton Ave.  
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December 13, 2023

Re: Comments to Docket No. QO23090679 – In the Matter of the Dual-Use Solar Energy Pilot Program

To the BPU:

Our company Sun'Agri is very pleased to submit our ideas related to New Jersey's Dual-Use Solar Energy Pilot Program Staff Straw Proposal. Thank you for the opportunity to respond.

#### About Sun'Agri

Sun'Agri is a French company that develops and markets a unique technology for agrivoltaics. Our technology, termed "Dynamic Agrivoltaics" is a type of solar energy production that directly combines the production of electricity with the cultivation of crops. The Sun'Agri technology uses adjustable solar louvres controlled by our proprietary artificial intelligence system to control the amount of sunlight that reaches the crops. This allows farmers to optimize the growing conditions for their crops, while also generating renewable energy. Sun'Agri's technology is based on 14 years of agronomic research and 5 patents.

Our company's accomplishments are significant. To date we have over 20 large scale agrivoltaic projects in operation currently covering over 150 acres. These projects support the growth of 15 different vegetable, fruit, and nursery crops. Sun'Agri's focus on next generation agrivoltaics research is supported by our team of 12 in house scientists and agronomists with numerous articles in scientific journals. All told Sun'Agri is a major pioneer in the piloting of the use of solar systems to create microclimates. At this time, we have offices in France, Italy, Israel and a satellite office in the United States.

**Our research findings are that Sun'Agri's agrivoltaics technologies are an important climate mitigation measure for farmers.**

These systems offer several benefits for farmers, including:

- Increased yields: Studies have shown that agrivoltaic systems can help to increase crop yields by up to 20%. This is because the solar louvres can provide shade during hot weather, which helps to reduce stress on the crops and improve their productivity.
- Reduced water consumption: Agrivoltaic systems can help to reduce water consumption by up to 30%. This is because the solar louvres can help to reduce evaporation from the soil.
- Lessening the impact of early and late season frosts by acting like a barrier, trapping heat radiated by the earth during the day and preventing it from escaping at night. This trapped heat

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creates a microclimate under the panels that can be several degrees warmer than the surrounding air, effectively delaying frost formation and protecting sensitive crops.

- Improved soil health: Agrivoltaic systems can help to improve soil health by reducing compaction and increasing organic matter content.
- Reduced pesticide use: Agrivoltaic systems can help to reduce pesticide use by providing a physical barrier between the crops and pests.

Sun'Agri's agrivoltaic systems are also beneficial for the environment. They help to reduce greenhouse gas emissions by generating renewable energy. At the same time, they help to protect biodiversity by providing habitat for birds and other wildlife.

Sun'Agri is committed to developing sustainable agrivoltaic solutions that benefit both farmers and the environment. The company is working with farmers and researchers around the world to implement agrivoltaic systems on farms.

Below are our thoughts related to issues that our team has identified in our review of the straw proposal as well as direct responses to questions raised.

#### I. Issues

- a. The US uptake of agrivoltaics has been slower than in other countries. However, it is important to understand that the findings from these countries have strong validity and applicability in New Jersey and the US.
  - i. There are significant research results from Europe, Israel and the Far East on the use of agrivoltaics in farm operations. We have compiled a library of research studies, best practices documents and other information from this work worldwide that is available at [Agrivoltaics References](#) . This directory will be updated as new data becomes available.
- b. We find it very positive that the Straw Proposal identifies the fact that there is significant variability in the types of agrivoltaic systems and that their effectiveness in assisting farmers differs dramatically. It is imperative that the impact of agrivoltaics on agricultural operations be a key criterion in the selection of pilot projects and development of standards.
- c. Our research has determined that there is a strong technical synergy between the growing of high value crops and Dynamic Agrivoltaics. We have also found that this synergy does not exist to the same extent with livestock and most field crops under solar. As such it is important to look at the order of magnitude related to the economic impact of growing under solar. High value crops have been shown to have very high impact while field crops and livestock under solar have not. Fruits, berries, nuts, vegetables, nursery stock, hops and cannabis are all examples of crops that have seen significant benefits from being grown under these systems.
- d. It is our belief that the grazing of sheep is already a proven market and starting to have maturity. As such does not require the level of investigation that crops under solar does.



We also believe that just increasing the spacing between fixed tilt or single axis tilt systems will not achieve the strong farmer benefits that are possible.

- e. An important consideration for this program is that dynamic agrivoltaic systems differ from more standard solar projects in that a portion of the time the solar modules are positioned to maximize plant growth rather than for renewable energy output. This reduction, termed “Agricultural Production Offset (APO)”, needs to be considered if the incentive structure being proposed, increased SREC-II’s, is to be fair. A better metric may be to consider the overall economic value of the land being used, combining the value of both agricultural and renewable energy production.
- f. In creating this program, it is important for the BPU to consider the changes that are being seen in small scale and regenerative agriculture. While we generally agree with the idea that dual use solar projects be sited on lands presently being farmed there are cases where new small scale farming operations may be created that should be able to participate. Often these new farms are owned by veterans, women, members of disadvantaged communities and others. As such there should be a reduction in the minimum project size presently being proposed. We believe that 100kw is a more reasonable alternative value.
- g. Sun’Agri believes that the research element of the integration of farming and renewable energy generation in New Jersey is a critical path item and that the involvement of university researchers is incredibly important. As such we would like to see their participation in ALL PROJECTS rather than just systems sited on prime soils. This may create a challenge in not having an adequate number of researchers within New Jersey institutions only. To counter this we propose that researchers from other states also be allowed to be involved with projects.
- h. In conversations that we have had with other stakeholders as well as our attendance at the Sustainable Farm Energy Workgroup Meeting at Rutgers University in late October we heard concerns about the requirement that control plots be maintained as part of participation in the dual-use program. Sun’Agri’s experience is the integration of well-designed control fields is extremely important to these projects and needs to be included for project viability and success. Our research has found that it is not necessary for the control areas to be the same size as the areas under solar, however they must be in close proximity with the same agricultural production and practices as under solar. Without this we cannot ensure data validity.
- i. Additionally, Sun’Agri has concerns about the terming of the criteria for “farming success” in agrivoltaic projects being its ability to “minimize negative impacts to farmland ...” being proposed. Instead we need an objective criteria that gauges the positive effects that the system has on agricultural production. While it is unrealistic to expect positive results in each growing season, our research indicates that the net positive effect on farming from agrivoltaics is significant.



- II. Finally, Sun'Agri has found that detailed agronomic planning is essential to the creation of high quality, impactful agrivoltaic projects. This goes beyond the items identified in the straw proposal related to array type, row spacing, etc. with the goal of enhancing impacts to farmland.

Our researchers are available to meet with BPU staff and others to clarify this.

### **Straw Proposal Question Responses**

- a. Question (1) one, What additional pre-solar conditions of the farm parcel proposed for a solar array should be documented? Question (2) two, What additional information should be collected to enable an evaluation of solar construction and operational impacts on the land beneath and adjacent to the solar array.
  - i. Sun'Agri believes that this will vary based upon the crops that will be positioned under or near the solar system. In the case of fruit, grapes, berries, etc. the solar system will be installed either within an existing growing area or one that will be planted following the solar installation.
  - ii. Again, this points to the importance of detailed farm plans being part of the process and the involvement of researchers from Rutgers and other Land Grant Universities. Our belief is that this involvement should exist for all projects, not just those on Class A soils.
- b. Question (3) three, which of the alternative approaches to awarding an incentive to a dual-use solar energy project eligible for the CSI Program provide the most competitive, efficient and effective outcome at the least cost to ratepayers.
  - i. We are very pleased to review the concept of offering variable incentives for development of agrivoltaic systems based upon the design and operational plan. In the case of the Dynamic Agrivoltaics systems that Sun'Agri this is extremely important for two reasons:
    1. Additional Capex to build these systems associated with racking, sensors, controls, and software.
    2. The incremental reduction in solar power production results due to supporting photosynthesis (Agricultural Production Offset – APO).
- c. Question (3) three B, In addition to scoring an application based on its status in the interconnection process, should a minimum level of project maturity within the interconnection planning process be required of an applicant?
  - i. This question raises some concerns that we have as to whether a percentage of the projects that applications will be made for are just more traditional solar farm projects that are having trouble receiving approval and are looking to use agrivoltaics as a way to remedy this.
  - ii. Much of this will be based around the size of the proposed project and plans for power offtake. In the case of smaller net metering systems, the likelihood of utility approval will be quite high so nothing more than review of Hosting Capacity Maps will probably be adequate.



- d. Question (4) four, What stage should a project have achieved in the PJM interconnection queue or in the NJ EDC interconnection application process to be considered eligible to apply in the Pilot Program?
  - i. Agrivoltaic projects, particularly Dynamic Agrivoltaics systems over high value crops represent a new project paradigm. As such we believe that projects at all interconnection stages should be considered.
- e. Staff question (5) five for stakeholders: What additional information pertaining to techniques for minimizing the negative impacts to farmland would be useful for including in the Pilot Program for the purposes of informing a future, permanent dual-use program design? Staff question (7) seven for stakeholders: What additional information pertaining to techniques for managing stormwater impacts from impervious coverage and optimizing water management would be useful for considering in the Pilot Program for the purposes of informing a future, permanent dual-use program design? Is there a certain panel density below which we can anticipate minimal environmental impact, including but not limited to those from stormwater runoff? Staff question (8) eight for stakeholders: What additional information pertaining to technical feasibility and technical innovation would be useful for the purposes of informing a future, permanent dual-use program design? Staff question (9) nine for stakeholders: What challenges or obstacles do you foresee that could prevent a project applicant from providing research results within the timeframe of the Pilot Program?
  - i. As a research-based organization Sun'Agri has developed specific methodologies for planning, operation, and ongoing maintenance of dynamic agrivoltic systems. We would be open to meeting with BPU staff and others as appropriate to describe our techniques in more detail and discuss how Sun'Agri's successes can be achieved on agrivoltaic dual-use projects in New Jersey. We would also be open to providing this information to agronomists and other technologists that are working on projects in New Jersey.
  - ii. One important consideration is related to project duration. Some crops, particularly fruit trees and vineyards will take at least three years to become productive. These projects will still be able to generate research data though not related to harvest results.
  - iii. An important component of any proposal submitted should be that a detailed farm production plan be included. These farming plans need be reviewed by agronomists and other professionals for validity as part of the proposal evaluation process as well on on-going.
  - iv. Also critical will be that a control plot in close proximity to the agrivoltaics plot with similar plants and growing conditions be established at each project site.



- f. Question (10) ten, What additional criteria, if any, should the Board consider in making its awards? Question (11) eleven, If so, how should those additional criteria be weighted?
  - i. The ability to include new farmers who often are often living in disadvantaged and environmental justice areas is another reason that smaller systems should be included in the program.
  - ii. An interesting subset of the program research relates to the potential for agrivoltaics within urban agricultural efforts as well as on green roof projects. At this time we are in discussions with local NGO's in New York City about this.
- g. 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?
  - i. This will be dependent on the farm operation and will vary from farm to farm.
  - ii. An important component of any proposal submitted should be that a detailed farm production plan be included.
    - 1. These farming plans need to be reviewed by agronomists and other professionals for validity as part of the proposal evaluation process as well on on-going.
  - iii. Also critical will be that a control plot in close proximity to the agrivoltaics plot with similar plants and growing conditions be established at each project site.
  - iv. We would also suggest that a research and extension partner be attached to each project site so that appropriate knowledge management occurs and benefits the entirety of New Jersey State.
  - v. When evaluating agrivoltaic project proposals it is essential that a "Farmer First" intention be employed
    - 1. Farmers face considerable challenges from climate change and changing market forces.
    - 2. Dynamic agrivoltaics has the potential to reduce these impacts while at the same time providing additional revenue streams for the farmers from solar production.
    - 3. Key to the success of growing crops under solar are light management and microclimate optimization. Agrivoltaics has its value from the synergistic co-benefits of dual use.
      - a. These are best seen from solar over high value crops.
        - i. There is an order of magnitude related to impact.
        - ii. Solar over high value crops has a very high order of magnitude while field crops is much lower.



- b. This is proven in research literature.
    - c. Our data finds that non piloted shade has not been shown to produce significant agricultural results.
  - 4. While it is important to look at the energy size of projects it is important to focus on the use of Agrivoltaics as an agricultural tool with similarity to greenhouses, etc.
    - a. This also will have the potential to change the classification of solar over crops from a land use basis.
  - vi. Examples of Sun'Agri's Dynamic Agrivoltaic projects installed or under development can be viewed at <https://sunagri.fr/carte-de-projets/>
  - vii. Projects should include a range of economically important crops in New Jersey including apples, grapes, berries, vegetables, field crops and grains, as well as pasture.

We hope that the information provided will be helpful to the New Jersey Board of Public Utilities in the creation of this exciting program. Please feel free to contact us directly if there is any additional information or clarification that we can provide.

Very truly yours,

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