

State of New Jersey
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Board of Public Utilities



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NOTICE¹

IN THE MATTER OF THE DUAL-USE SOLAR ENERGY PILOT PROGRAM

[Docket No. QO23090679](#)

Pursuant to the Open Public Meetings Act, N.J.S.A. 10:4-6 et seq., Staff of the New Jersey Board of Public Utilities ("Board") ("Staff") invites all interested parties and members of the public to participate in virtual stakeholder meeting to discuss the design of the Dual-Use Solar Energy Pilot Program, pursuant to P.L. 2021, c.170 of the Dual-Use Solar Energy Act.

Stakeholder Meeting

Staff will be holding a virtual stakeholder meeting to discuss the Straw Proposal.

VIRTUAL STAKEHOLDER MEETING

MEETING DATE: November 29, 2023
START TIME: 10:00 a.m. Eastern Time
LOCATION: Virtual Link and Call-in Information to Join the Stakeholder Meeting
REGISTER: https://us06web.zoom.us/webinar/register/WN_9uOqbekdSrW25I3I4FeUKw
If you would like to speak during this Stakeholder Meeting, you must register via this form:
https://us06web.zoom.us/webinar/register/WN_9uOqbekdSrW25I3I4FeUKw

Please note that the meeting will be conducted virtually via Zoom. To participate in this meeting, you must register for the meeting at least 48 hours prior to the scheduled date. Stakeholders and members of the public may participate after registering by utilizing the link set forth above. In order to encourage full participation, please submit any requests for needed accommodations, such as interpreters and/or listening assistance, at least 48 hours prior to the above meeting dates to the Secretary of the Board at board.secretary@bpu.nj.gov.

If you wish to reserve a speaking opportunity, please designate this during the online registration process. After registering, you will receive a confirmation email containing information about joining the meeting and information about checking your system requirements in advance of the meeting. Please check your access devices in advance of the meeting to ensure that they will properly connect.

¹ Not a paid legal advertisement.

Please submit any questions regarding this stakeholder process to benjamin.hunter@bpu.nj.gov and include the subject line "Dual-Use Solar Pilot" as applicable.

Comments

The Board is also accepting written and/or electronic comments. All public comments should be filed under [Docket No. QO23090679](#) In the Matter of the Dual-Use Solar Energy Pilot Program.

The deadline for comments on this matter is 5 p.m. Eastern Time on December 13, 2023.

While all comments will be given equal consideration and will be made part of the final record of this proceeding, the preferred method of transmittal is via the submittal of comments directly to the specific docket listed above using the "Post Comments" button on the Board's [Public Document Search](#) tool. All comments are considered "public documents" for purposes of the State's Open Public Records Act. Any confidential information should be submitted in accordance with the procedures set forth in N.J.A.C. 14:1-12.3. In addition to hard copy submissions, confidential information may also be filed electronically via the Board's e-filing system or by e-mail to the Secretary of the Board. Please include "Confidential Information" in the subject line of any e-mail. Instructions for confidential e-filing are found on the Board's webpage <https://www.nj.gov/bpu/agenda/efiling/>.

E-mailed and/or written comments may be submitted to:

Secretary of the Board
44 South Clinton Ave., 1st Floor
PO Box 350
Trenton, NJ 08625-0350
Phone: 609-292-1599
Email: board.secretary@bpu.nj.gov

Staff looks forward to receiving and reviewing your responses.

Sherri L. Golden

Sherri L. Golden
Secretary of the Board

Dated: 11-09-2023

**Dual-Use Solar Energy Pilot Program
Staff Straw Proposal**

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I. Summary of Statute, Rules Required, and Anticipated Schedule for the Pilot

The Dual-Use Solar Energy Act of 2021 (P.L. 2021, c. 170, “Dual-Use Act” or “Act”) requires the New Jersey Board of Public Utilities (“Board” or “BPU”), in consultation with the Secretary of Agriculture, to adopt rules establishing a Dual-Use Solar Energy Pilot Program (“Pilot Program” or “Program”). The Pilot Program is designed to encourage the development of dual-use solar facilities, also known as agrivoltaics, and the creation of a new segment of the solar industry in New Jersey that is compatible with the State’s rich agricultural heritage. Specifically, the Pilot Program seeks to demonstrate and study the compatibility of agricultural or horticultural production and solar photovoltaic infrastructure on the same land.

This Pilot Program will permit the construction, installation, and operation of solar energy projects that are “connected to the distribution or transmission system owned or operated by a New Jersey public utility or local government unit” and “located on unreserved farmland, while maintaining the affected land in active agricultural or horticultural use” (emphasis added).² Dual-use solar can provide farmers with an additional stream of revenue, contributing to farm financial stability and allowing for continued agricultural or horticultural production of land while increasing the production of clean energy.

Staff envisions that the Pilot Program will be opened via Board Order. The comments received in response to this Straw Proposal will be used to inform the proposed program rules. Staff anticipates presenting recommendations for a Board Order and accompanying rule proposal defining the Pilot Program’s design for the Board’s consideration in early winter of 2023/24. Based on this schedule, the Pilot Program would be opened in early 2024 with the issuance of a notice of funding availability and project pre-qualification criteria as proposed in Section III (“Dual-Use Pilot Program Application Process”) of this document. The first solicitation round and first application window (“First Solicitation”) is envisioned to commence on the date that Pilot Program rules are adopted since the Act requires that the Pilot Program shall continue for 36 months after the adoption of rules.³ Staff anticipates this the First Solicitation to occur mid-2024 and project selections would be made before Fall 2024.

Staff envisions that the Pilot Program would be designed based on consultation with the New Jersey Department of Agriculture (“NJDA”), State Agricultural Development Committee (“SADC”), and the New Jersey Department of Environmental Protection (“NJDEP”) collectively with the NJDA and SADC, the “State Agencies”, as well as the input of public stakeholders. The Board has engaged the Rutgers Agrivoltaics Program (“RAP”) at Rutgers University (“RU”) to assist with the development and management of the Pilot Program. Based on the consultation with the State Agencies and RAP, Staff has developed this Straw Proposal to commence the public stakeholder engagement process. One or more public meetings will be convened to discuss the contents of the Straw Proposal. After review of public input and consultation with the State Agencies and RU RAP on a proposed program design, Staff will make a recommendation to the Board to approve the program design, application materials, and a rule proposal for the Pilot Program. An announcement of the rule proposal will be published on the Board’s website and through the Board’s email distribution list in mid-2024.

² N.J.S.A. 48:3-87.13(1)(a).

³ N.J.S.A. 48:3-87.13(1)(e).

II. Program Intent, Definitions, and Threshold Eligibility Criteria

The Dual-Use Act requires the Board to establish a Dual-Use Solar Energy Pilot Program for the development of solar energy projects that are connected to New Jersey's transmission or distribution system and located on unpreserved farmland, while maintaining the affected land in active agricultural or horticultural use.⁴ Lessons learned from the Pilot Program and relevant research are intended to serve as the basis for the development of a permanent dual-use program.⁵

Pursuant to the Dual-Use Act, participants in the Pilot Program must meet specific siting and other criteria and will be selected in a competitive evaluation and scoring process that takes into account the incentive level sought by the applicant.⁶ Staff, in consultation with the Secretary of Agriculture, will evaluate qualifying proposed projects and develop a recommendation for the Board's consideration of which projects will be awarded incentives. Staff recommends that the Pilot Program follow the structure, processes and eligibility criteria established by the Board to implement the Solar Act of 2021 (L. 2021, c. 169, "Solar Act"). Staff proposes that the incentives for dual-use pilot projects will be in the form of a supplement to New Jersey Solar Renewable Energy Certificate ("SREC") -IIs ("SREC-IIs"), which are denominated in \$/megawatt-hour ("\$/MWh") of solar energy produced from selected projects.

SREC-IIs were established by the Solar Act to serve as the successor program to the legacy SREC program. The Solar Act contains provisions for a small solar facilities incentive program and a competitive solicitation process for grid supply solar facilities and net metered solar facilities greater than five (5) megawatts ("MW") [direct current ("DC")] in size. The Board has established the Administratively Determined Incentive ("ADI") Program and the Competitive Solar Incentive ("CSI") Program to implement the mandates of the Solar Act.

The definitions provided in the Dual-Use Act provide further insight to the intent of the Pilot Program, including specifying that the land below and adjacent to the solar panels in dual-use projects is to remain in continued, simultaneous, and active agricultural or horticultural use.⁷

The Act sets the threshold requirements and parameters for the Pilot Program⁸, including, in relevant part:

1. A 10 MW⁹ capacity limit, measured in direct current, for each individual Dual-Use solar energy project.¹⁰

⁴ Id.

⁵ N.J.S.A. 48:3-87.13(g).

⁶ N.J.S.A. 48:3-87.13(b)(9).

⁷ See N.J.S.A. 48:3-87.13(h) generally, and specifically the definition of "Dual-Use Solar Energy Project."

⁸ N.J.S.A. 48:3-87.13(b).

⁹ All capacity measurements in this document are MW dc measurements.

¹⁰ N.J.S.A. 48:3-87.13(b)(1).

2. An overall Pilot Program size of 200 MW for a duration of three (3) years, with an opportunity for extension of the Pilot Program for an additional two (2) years.¹¹
3. A prohibition on siting dual-use projects on prime agricultural soils and soils of statewide importance, as identified by the United States Department of Agriculture's Natural Resources Conservation Service, which are in Agriculture Development Areas, *unless* the project is in association with a research study undertaken in coordination with a New Jersey public research institution of higher education as approved by the Board in consultation with the Secretary of Agriculture.¹²
4. Prohibitions on siting dual-use projects on coastal or freshwater wetlands, in certain areas within the Pinelands and in the Highlands preservation area, unless granted a waiver by the Board, in consultation with the NJDEP and Secretary of Agriculture "based on unique factors that make the project consistent with the character of the specific parcel."¹³
5. A requirement that land hosting a dual-use project must continue to be in active agricultural or horticultural use.¹⁴

Staff seeks insight from stakeholders on proposed program design elements and identifies relevant sections of the Dual-Use Act to facilitate the process. Staff poses specific questions to stakeholders highlighted in italics throughout the document. In answering the questions, stakeholders must number their responses using the corresponding question number and follow the instructions for submitting comments posted on the first page of this Stakeholder Notice.

A. Size and Term of the Dual-Use Pilot Program

The Dual-Use Act directs the Board to establish a Pilot Program for three (3) years, which may be extended to four (4) or five (5) years at the Board's discretion. The Act directs the Board to establish annual capacity targets not to exceed a total of 200 MW over the first three (3) years of the Pilot Program (each, "Program Year").¹⁵ The Board may expand this initial capacity target by up to 50 MW per year for two (2) additional years.¹⁶

Staff proposes to set an initial annual capacity target for Program Year 1 at 30 MW, Program Year 2 at 70 MW, and Program Year 3 at 100 MW, subject to a Board Order formally establishing the Pilot Program, with the flexibility to adjust capacity targets closer to the beginning of each program year. Staff's recommendation for this strategy is based upon balancing factors, which include:

¹¹ N.J.S.A. 48:3-87.13(b)(2).

¹² N.J.S.A. 48:3-87.13(b)(4).

¹³ N.J.S.A. 48:3-87.13(b)(5).

¹⁴ N.J.S.A. 48:3-87.13(b)(6).

¹⁵ N.J.S.A. 48:3-87.13(b)(2).

¹⁶ N.J.S.A. 48:3-87.13(e).

- the benefits of developing a Pilot Program with periodic application rounds that refine the selection criteria iteratively over time, based upon lessons learned in prior application rounds and improve the likelihood of program success;
- the administrative capacity to effectively and efficiently review Pilot Program applications;
- recognition of the need for early research results to inform a permanent dual-use program;
- anticipated demand for the Pilot Program;
- anticipated barriers to the adoption of a new program; and
- the currently constrained interconnection review and approval processes at the Regional Transmission Organization, PJM Interconnection LLC (“PJM”), and to a lesser extent the electric distribution companies (“EDCs”), each of which are anticipated to ramp-up in response to ongoing proceedings.

B. Requirement that Affected Lands Remain in Active Agricultural or Horticultural Use

One of the key requirements of the Dual-Use Program is that “the land on which the Dual-Use solar energy project is installed continues to be actively devoted to agricultural or horticultural use[.]”¹⁷ A definition of land actively devoted to agricultural and horticultural use must be developed prior to the launch of the Pilot Program. Staff views the Act as generally requiring that the agricultural or horticultural use of the land below and adjacent to the panels and any associated control area dedicated to project research trials must be maintained throughout the term of any Pilot Program award. A requirement that land “continues to be actively devoted to agricultural or horticultural use” may be construed to mean that the land be used in a manner roughly consistent with its current or immediately prior usage allowing for the ability to substitute agricultural or horticultural uses or adapt crop rotation in response to the installation of the solar array.¹⁸ To fulfill this requirement, Staff proposes a process in Section III. C. for applicants to document their initial plans and seek approval of subsequent modifications to these plans.

In Staff’s view, the intent of this requirement is that dual-use projects be located on active farmland versus land that was not farmed but could potentially be used for farming or horticultural use. Staff proposes to require Dual-Use Pilot Projects to be located only on lands that have had at least the three (3) most recent years of continuous agricultural or horticultural usage as demonstrated by participation in the State’s farmland assessment program pursuant to the New Jersey Farmland Assessment Act of 1964, P.L.1964, c.48 (C.54:4-23.1 et seq.). Staff also recommends requiring additional evidence of active agricultural or horticultural use through recent pictures, aerial or satellite images of the land that would confirm such land’s recent dedication to crops or livestock, as applicable.

Further, Staff views the statute as requiring that land hosting dual-use projects continue to be used for agriculture or horticulture. This requirement effectively requires a documented assessment of the historical agricultural or horticultural use of the land prior to the installation of the solar facility, and a method of ensuring that the presence of the solar electric generation equipment does not result in a substantively negative change or reduction in the quality of the land that would impair its agricultural or horticultural usage. Staff recommends that continued

¹⁷ N.J.S.A. 48:3-87.13(b)(6).

¹⁸ *Id.*

participation of the farm parcel in the State's farmland assessment program be a minimum criterion for demonstrating this land usage requirement. Appendix B includes additional project design considerations derived from this requirement such as the prohibition against the use of concrete in structural footings without written justification supplied by a licensed professional engineer.

C. Enforcement of Dual-Use Commitments

Staff proposes that any Pilot Program participant that does not maintain active agricultural or horticultural use of the land would risk forfeiture of future dual-use incentive payments. The Act allows the Secretary of Agriculture to "request that the board suspend or revoke an approval issued pursuant to this section for a violation of any term or condition of the approval or any provision of this section."¹⁹ Staff proposes to work with the Secretary of Agriculture to audit compliance with the terms of the Pilot Program and work with farmers and project developers to remedy any non-compliance.

Staff recognizes the cyclical and sometimes unpredictable nature of agricultural and horticultural production, as well as the fact that dual-use facilities are experimental in nature. The proposed enforcement provisions listed herein are not intended to penalize good faith efforts to install and operate dual-use facilities but are instead aimed at preventing the receipt of Dual-Use Program revenues from solar on farmland that is no longer in active agricultural or horticultural use.

In order to ensure a fair system, Staff recommends that project developers be required to maintain the subject land in active agricultural or horticultural use, as defined by objective criteria. Participants would be required to submit annual reports, and program staff would conduct periodic site visits to verify compliance. Participants that violate the requirement to maintain the land in active agricultural or horticultural use would initially be informed that they are not meeting the requirements of the Pilot Program and be provided a standardized opportunity to propose a remedy and cure their non-compliance. During this probationary period, any financial incentive would be held in escrow pending successful resolution of the non-compliance. Should the solar project fail to correct the non-compliance after the probationary period, the project may be terminated from the Pilot Program and the incentive for the dual-use project, or portion of the project, would be suspended.

In extreme cases, including fraud or misrepresentation, Staff recommends the Board reserve the right to seek rescission of any incentives paid to the project for a period of time to be determined by the Board. At that point, the developer may be required to decommission the project and make the land suitable for its prior agricultural or horticultural usage. Staff recommends the consideration of making exceptions to the enforcement strategy for 'force majeure events,' e.g., crop loss due to drought or severe weather.

¹⁹ N.J.S.A. 48:3-87.13(d).

D. Size Limitations on Individual Dual-Use Pilot Projects

Staff recommends the Board adopt a per-project size limitation of 10 MW as specified in the Act.²⁰ The definition of a dual-use solar energy project is included in Appendix A. Staff proposes that each dual-use solar energy project must contain a dedicated array of solar panels, balance of system equipment, with an accompanying research control area identical in size to the area under and adjacent to the solar panels. Staff notes that the statute does not provide a limit to the amount of capacity per farm, farm parcel, entity or interconnection point. However, the statute does require the Board to consider geographic location as well as the diversity of size and types of agricultural and horticultural production in selecting projects. Staff recommends that the application evaluation rubric take into account the impacts to the Act's requirement for diversity of size and agricultural and horticultural production should multiple projects be proposed at or near the 10 MW limit at or near the same geography location, farm, farm parcel, entity or interconnection point.

A minimum project size may be established for representative crops and agricultural or horticultural practices reflective of the research requirements of the Pilot Program, particularly with respect to projects proposed on prime agricultural soils and soils of statewide importance located in Agricultural Development Areas. Allowing for a wide diversity in project sizes will give the Pilot Program sufficient flexibility to select projects of various sizes and types, which will provide experience and research results critical to the future development of the permanent dual-use program.

There is likely to be a limit to the utility of knowledge, experience, and research results gained with projects substantially smaller than 500 kW, given the costs associated with application processing, application evaluation, project monitoring, data collection, and project and program evaluation. As a result, it may be useful to implement a minimum solar capacity requirement (e.g., at a minimum project solar capacity of 500kW, a dual-use project including the solar installation and an associated research control area is expected to require approximately 4 to 16 acres of farmland depending upon module and row spacing and the requirement for a research control area of identical size as the array area).

Hence, Staff also recommends a minimum project size (in MW) per crop type or crop category. The purpose of the minimum size requirement would be consistent with the pilot nature of the Program, which should be designed to demonstrate the ability to generate meaningful revenue from the solar facility to supplement the agricultural or horticultural operation with minimal impact to the land. A minimum project size requirement will also increase the efficiency of program administration including application evaluation and scoring, project monitoring, data collection, and project and program evaluation. Staff anticipates that the importance of the imposition of a minimum project size will become apparent over time but may become apparent from an analysis of the first pre-qualification submissions. The Act's requirement to consider diversity of size and types of agricultural and horticultural production in project selection and the proposal to reach these goals is discussed further in Section III. C. (I).

²⁰ N.J.S.A. 48:3-87.13(b)(1).

E. Siting Considerations for Dual-Use Projects

The Act contains a prohibition on siting dual-use projects on prime agricultural soils and soils of statewide importance, as identified by the United States Department of Agriculture's Natural Resources Conservation Service, which are in Agricultural Development Areas, unless the project is in association with a research study undertaken in coordination with a New Jersey public research institution of higher education as approved by the Board in consultation with the Secretary of Agriculture.²¹ The Act also mandates setting provisions under a permanent dual-use program to protect these soils.²²

The Act also prohibits siting of dual-use solar energy projects on wetlands, in the Pinelands preservation and designated forest areas, or Highlands preservation areas, unless the Board grants a waiver after consultation with NJDEP and the Secretary of Agriculture. Staff notes that these siting requirements differ slightly from the siting prohibitions defined in the Solar Act of 2021 (L. 2021, c. 169).²³ The Act mandates that rules and regulations for the permanent program consider any "siting criteria and restrictions which may differ from those established pursuant to" the Solar Act of 2021.²⁴ The statutory waiver process for Pilot Projects proposed on these areas prescribes that the Board, in consultation with the NJDEP and the Secretary of Agriculture, consider the character of the specific parcel.

Staff recommends adopting most of the processes and mechanisms developed by the Board to implement the siting prohibitions contained in the Solar Act of 2021.²⁵ In the adoption of the rules for siting CSI-eligible facilities at N.J.A.C. 14:8-12.4 (d),²⁶ the Board determined that dual-use solar projects, as long as they maintain active agricultural or horticultural use of the land, not be construed as subject to the limitations and restrictions contained in the Solar Act of 2021 specific to siting solar facilities on "prime agricultural soils or soils of Statewide importance, as identified by the United States Department of Agriculture's Natural Resources Conservation Service, which are located in Agricultural Development Areas certified by the State Agricultural Development Committee".²⁷

Staff also recommends adopting the processes and mechanisms developed by the Board to implement the waiver process associated with siting prohibitions for CSI-eligible projects contained in the Solar Act of 2021, whereby a developer can petition the Board for a waiver of the project to be sited in a prohibited area under the Solar Act of 2021 if the Board deems the project to be in the public interest.²⁸ Consultation with the NJDEP and NJDA is required for this waiver and petition process. Staff has commenced work with the State Agencies, the Pinelands

²¹ *Id.*, N.J.S.A. 48:3-87.13(b)(4).

²² *Id.*, N.J.S.A. 48:3-87.13(g)(3).

²³ N.J.S.A. 48:3-119(c).

²⁴ N.J.S.A. 48:3-87.13(g)(6).

²⁵ N.J.S.A. 48:3-119(c).

²⁶ insert 55 N.J.R. 2022 adopted September 18, 2023.

²⁷ N.J.S.A. 48:3-119(d)(1).

²⁸ N.J.S.A. 48:3-119(f).

Commission and the Highlands Commission to develop the waiver process. Staff notes the significant limitations to developing solar in the Pinelands preservation area particularly in the Agricultural Production Areas. Developers interested in projects located in the Pinelands region are encouraged to contact the Pinelands Commission early in the development process.

All dual-use projects would be required to comply with all applicable federal, state, or local laws, rules, regulations, or ordinances.²⁹ Additionally, the Act states “Notwithstanding any law, ordinance, rule or regulation to the contrary, a dual-use solar energy project approved pursuant to this section shall be considered a permitted use within every municipality.”³⁰ Staff is working with RAP to develop educational materials for project participants that includes guidance on project design considerations for increasing public, municipal and neighbor acceptance of Pilot Projects.

III. Dual-Use Pilot Program Application Process

A. Overview of the Application Process

The Dual-Use Act provides for the Board’s creation of an application process and requires that the Board consult with the Secretary of Agriculture in the review and approval of Pilot Program applications according to specific criteria listed in the Act.³¹ The Act provides further direction on the application process including the option for the Board’s institution of fees or deposits and the Board’s establishment of criteria for evaluating and scoring proposed projects to determine which projects should be allowed to participate in the Pilot Program and be awarded incentives.³²

Staff proposes to score projects submitted for participation in the Pilot Program based on the robustness of the responses to these criteria and seeks feedback on the specific questions included below. Given the novelty of dual-use applications in New Jersey, the various criteria for project selection, and the importance of research requirements of the Act, a preliminary step in the application process would be beneficial to potential applicants and the successful implementation of the Pilot Program. A notice of funding availability and pre-qualification component of the application process will enable Staff, including Staff from the NJDA and RAP to review the prospective project plans including their research plans and provide feedback to prospective applicants prior to the submission of a full application.

Staff anticipates developing a recommendation to the Board to direct Staff to develop an application process, including notice of funding availability and pre-qualification, pro-forma application and a proposed scoring rubric, which would be made public prior to the opening of the First Solicitation for Program Year 1 dual-use projects.

Staff proposes to review the submissions in response to the notice of funding availability, request additional information as needed, and provide feedback to prospective applicants prior to the opening of the First Solicitation. Staff would provide aggregated, anonymized results from the

²⁹ P.L. 2021, c. 170, Section 1.b.(7).

³⁰ N.J.S.A. 48:3-87.13(f).

³¹ N.J.S.A. 48:3-87.13(c)(1).

³² N.J.S.A. 48:3-87.13(b)(8) and (b)(9).

review of pre-qualification submissions in an announcement of the opening of the First Solicitation. Depending on the responses to the notice of funding availability, particularly the amount of aggregate capacity in relation to the amount available in round one, any application fees required to be submitted with an application would be contained in the application round announcement.

The application would include a description of the application evaluation criteria and a basic criteria-weighting scheme. Such an application-scoring rubric is envisioned for the Pilot Program that would assign points to various price and non-price terms in advance of the First Solicitation. Thereafter, the scoring rubric would be adjusted if needed based on experience from the first round of solicitations. Projects would be evaluated against the scoring rubric and those with the highest scores would be approved to receive awards/incentives subject to the availability of capacity for the application round. In order to encourage applicants and facilitate applications, Staff recommends general guidance for the application process and educational materials about the program be made publicly available. The application process required by the Act also provides for collection of fees or deposits. Fees may be important to help cover administrative, data collection, or evaluation costs if a large number of small projects were to indicate interest during the pre-qualification phase. In order to discourage frivolous applications, requiring a nominal fee to apply could be helpful.

B. Pre-Qualification, Application, and Incentive Program Registration Requirements and Timing

A pre-qualification process designed to provide feedback to prospective applicants on their proposed projects is recommended in light of the short-term duration of a Pilot Program, the need for an effective and efficient method to address applicants seeking a waiver of the land prohibitions for siting dual-use projects³³, and the emergent need for research results to inform the development of a permanent dual-use program. The pre-application process would commence with the Board's issuance of a Notice of Funding Availability, as defined below, and precede the opening of an application window.

A pre-qualification process would be consistent with the CSI Program. This process would encourage diversity of applications, dissuade applicants with less feasible plans or sites that are unlikely to receive a waiver pursuant to the Act from investing time and other resources into a full application that is unlikely or not ready to proceed, and avoid overloading the EDCs with unapproved projects seeking interconnection approvals.³⁴

Staff recommends a Notice of Funding Availability which would include a description of the upcoming solicitation round, deadlines for submission and instructions for completing a pre-qualification proposal.

The Notice of Funding Availability would specify:

- the total Pilot Program capacity available in the First Solicitation,

³³ N.J.S.A. 48:3-87.13(b)(4) and (b)(5).

³⁴ Id at (b)(5).

- an optimal allocation of capacity among project sizes and types of agricultural and horticultural uses based on a statistical representation of New Jersey's farm economy,
- the minimum project size by crop type,
- the minimum research standards by proposed crop, project size, and location (eg. within an Agricultural Development Area ("ADA") or outside of an ADA),
- the method for describing the proposed dual-use solar and farm activity including solar design characteristics and research elements,
- the method for prospective applicants to demonstrate the need for a dual-use incentive
- a proposed scoring rubric for the First Solicitation, and
- request prospective applicants to submit sufficient detail on their prospective dual-use project and research plans to enable review and feedback by a team comprising Staff, RAP, and NJDA representatives.

The pre-qualification proposal would require potential applicants to provide project information including, but not limited to, a description of the parcel on which it would be sited, existing use of the land, preliminary design and location of a solar array, and a multi-year plan including commodity characteristics such as animal descriptions or crop rotations by frequency and type.

Written feedback on the pre-qualification submissions would be provided to potential applicants. Potential applicants encouraged to submit a full proposal would then be required to submit a more detailed application addressing the criteria outlined in Act, as described hereafter. The application would entail greater specificity of project details such as the array type, row spacing, and an estimate of the fraction of the land that can be farmed once the array was installed. Staff notes that the Act provides criteria for consideration in project selection, with the intent that selected projects provide research results that can inform a permanent dual-use program as part of the Successor Solar Incentive ("SuSI") Program.

C. Application Requirements and Criteria

The following section discusses Staff recommendations for defining the criteria (a) through (k) as they are listed in the Act. The Act also requires the review of applications consider the diversity of size and types of agricultural and horticultural production which Staff have labeled as criteria (l). Staff further anticipates recommending a consolidation of criteria in order to facilitate an evaluation-weighting scheme that is logical and effective.

For example, Staff will work with RAP and the NJDA to develop a weighting scheme that consolidates criteria that are logically related such as (a) proposals for monitoring the quality of agricultural or horticultural use of the land, (e) minimizing negative impacts to farmland, (f) address decommissioning, and (g) address storm water runoff and other environmental issues. The criteria (h) and (i) for consideration of technical feasibility and innovation, (j) quality of research commitment, (c) geographic location, and (l) diversity of size and type of agriculture or horticultural have similar attributes contributing to the intent of the Pilot Program to develop experience important to informing a future permanent program. The criteria (b) for consideration regarding the incentive level sought by the applicant and (d) that for interconnection planning

each relate to how dual-use projects can be assimilated into the Board's existing incentive and interconnection processes.

Staff propose that key elements of the application materials submitted for selected projects will form the basis of a Construction, Operations, Monitoring, and Project Research Plan ("COMPR"). The COMPR will establish the terms and conditions for maintaining eligibility for the SREC-II adder. Requests to change provisions of the COMPR will be required to be submitted in writing to the Board Secretary, and approved by Board Staff in consultation with RAP and NJDA. The COMPR described further in Appendix B will provide a record for each project and the expectations for implementation which will be evaluated against project results for purposes of informing the development of a permanent program.

(a) Proposals for Monitoring the Quality of Agricultural or Horticultural Use of the Land

As discussed in Section II. B. of the Straw Proposal, one of the key requirements of the Dual-Use Pilot Program is that "the land on which the dual-use solar energy project is installed continues to be actively devoted to agricultural or horticultural use[.]"³⁵ Staff interprets the application evaluation criteria in the context of the intent of the Act to require the establishment of a baseline assessment of the quality and productivity of the agricultural or horticultural use of the land prior to a solar installation, in order to then enable monitoring of the land after the installation of the solar facility. Moreover, the Act requires that provisions for ensuring the continued active agricultural or horticultural use of the land, on which dual-use projects are located, be set for the permanent dual-use program.³⁶ Therefore, as part of the application requirements, Staff recommends mandating as a minimum requirement that the farm parcel maintain its eligibility for state farmland assessment taxation after construction of the solar facility.

The minimum standard for demonstrating continued agricultural or horticultural use of the land would be combined with other data collection and evaluation components as part of an overall strategy to monitor the quality of the agricultural or horticultural use of the land. The application will require a proposal for supplying data to Staff designed to sufficiently confirm that farming-related land usage requirement continues to be met throughout the 15-year term of the SREC-II life of the dual-use pilot project.

Staff recommends requiring that each applicant who applies to participate in the Pilot Program follow a standardized methodology for documenting the pre-solar condition of the farm parcel proposed for the solar array and associated control plot and commit to retaining land in active agricultural or horticultural use. Staff recommends the following method of establishing and reporting on the productivity of the affected land.

First, the applicant must supply a municipal tax map demonstrating the block and lot location of the farm parcel proposed to contain the dual-use solar energy project and its associated research control area together referred to as "the project site". The municipal tax map showing block and lot delineation must have an overlay showing the proposed location of the array and control areas. Along with this map, the applicant must supply documentation that the farm parcel containing this block and lot qualified for New Jersey Farmland Assessment for the previous three (3) years. Additionally, consistent with the recently adopted construction requirements for the CSI Program

³⁵ N.J.S.A. 48:3-87.13(b)(6).

³⁶ N.J.S.A. 48:3-87.13(g)(5).

at N.J.A.C. 14:8-12.8 (g), the applicant must commit to providing a report on the pre-construction soil quality characteristics across the project site, array and control area, on a 100-foot grid by a qualified soil scientist or geotechnical engineer, including:

- (1) soil map unit;
- (2) soil textural classification;
- (3) hydrologic soil group;
- (4) organic matter content;
- (5) salinity; and
- (6) macro nutrient content (nitrogen, phosphorous, potassium).

Additionally, Staff recommends that the soil bulk density, overall slope, and topography of the project site be provided in the pre-construction soil quality report in a manner that would enable the determination of erosion potential using the Revised Universal Soil Loss Equation (“RUSLE”) system.

Staff recommends that an applicant’s proposal for monitoring the quality of agricultural and horticultural use of the land constitute a key element of the COMPR and ultimate evaluation of the project.

Staff seeks input from stakeholders on the following:

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.

(b) Incentive Level Sought by the Applicant

Staff observes that the law does not prescribe how incentives are to be delivered but instead includes the “incentive level sought by the applicant” as a consideration in the competitive project selection process. The Act does, however, mandate the Board “convert the Dual-Use Solar Energy Pilot Program to a permanent program as part of the permanent successor to the solar incentive program established pursuant to P.L. 2021, c. 169 (C.48:3-114 et al.)”.³⁷ As a result, Staff recommends that the existing SuSI Program, including the ADI Program, the CSI Program, and their associated SREC-IIs, serve as the primary source of incentive for dual-use projects.

Using the ADI and CSI Program rules, an individual project’s proposed system size, jurisdiction for interconnection and sale of electricity will determine under which program a dual-use project may be eligible. For example, proposed dual-use projects less than or equal to five (5) MW that net meter will be eligible for incentive as an ADI project within the relevant market segment of the ADI Program. Proposed dual-use projects which will interconnect and sell wholesale electricity through PJM and those which net meter and are greater than five (5) MW must participate in the CSI and may participate in a CSI solicitation prior to or after submitting an application in the Dual-Use Pilot Program. A CSI-eligible project that has yet to receive a CSI incentive and scores highly in the dual-use application evaluation process will receive a dual-use incentive approval conditioned upon the project’s successful participation in the next CSI solicitation. The relevant

³⁷ N.J.S.A. 48:3-87.13(g).

ADI or CSI incentive amount will determine the base level of incentive available to prospective projects.

In addition to the base level of incentive provided through the ADI or CSI Program, individual projects with costs that can be demonstrated to be higher than those experienced by similarly sized and sited projects may submit with their application a proposed dual-use incentive adder request.

Applicants would submit their desired incentive level on a dollar per solar-produced megawatt hour (\$/MWh) basis in their pre-application. Applicants eligible for the ADI Program will be required to identify which market segment they expect their project to qualify within and determine the associated base incentive level. Applicants eligible for the CSI Program will be required to report their awarded or anticipated base incentive level. Applicants will also be instructed on how to calculate and report their requested dual-use incentive adder.

Applicants will be required to justify the amount of the dual-use adder by itemizing the costs which make the project more expensive than comparable projects in ADI or the CSI Program. The adder to baseline incentive approach is intended to make transparent the incremental cost of the agrivoltaic investment and dual-use pilot-related operational costs including; research, data collection, reporting, reduced solar production per acre due to the lower density of modules and positioning of modules to allow more light to the crop, increased racking costs for raising or customizing arrays, and loss or gain in agricultural productivity. Staff may require additional information be supplied by an applicant seeking an adder that is higher than market conditions warrant.

The amount of dual-use adder requested, normalized by project size proposed, will be a weighted component in the application evaluation process. Projects receiving a Pilot Program award would receive SREC-IIs, which provide the selected projects a \$/MWh of solar production, corresponding to the amount of base plus adder approved by the Board. If an otherwise qualified application seeks a dual-use adder that cannot be justified by the application materials submitted, Staff may recommend the applicant reconfigure the project to enable a competitively priced SREC-II adder.

An alternative approach to requiring a CSI-eligible applicant to obtain a winning bid in the CSI Program, either prior to or after a dual-use solicitation, would be to derive a proxy baseline SREC-II value from a recent CSI solicitation. Potential dual-use candidates with CSI-eligible projects would then participate in a single solicitation, and applicants would have to pre-qualify for the CSI program. The CSI-eligible applicant's dual-use solicitation bid would consist of a dual-use application covering all elements discussed elsewhere in this Straw, as well as a proposed all-in SREC-II price. The SREC-II price would be comprised of the proxy baseline value and the dual use adder. If the dual-use applicant were to win an award in the dual-use solicitation, the project would be subject to risk of repeal of the part of the dual-use adder for non-compliance with program terms and conditions, as contemplated by the Act.

Regardless of the solicitation approach, Staff proposes that capacity awarded under the Pilot Program be in addition to capacity block limits under the ADI Program and procurement targets under the CSI Program.

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.

As with the current solar market, there will likely be several models of ownership/financing for dual-use projects. Staff anticipates that the use of existing incentive programs will provide flexibility in allowing different models to participate, consistent with the nature of a pilot. Staff anticipates some basic guidance will be published that explains the different common finance models and how different entities participate in the current SuSI incentive registration process.

Moreover, Staff recognizes the importance and significance of the Farmland Assessment Act to dual-use projects, as contemplated by the Legislature in the Act. As such, Staff expects to include information about farmland assessment, and other laws pertaining to solar use on farmland, in the educational materials and resources produced for the Pilot Program.

(c) Geographic Location

Staff interprets the intent behind including geographic location as a consideration in choosing among dual-use projects as an encouragement to consider diversity in coverage across the State, counties and municipalities, EDC territories, or other geographic regions, e.g., North, Central, and South. Staff also recognizes this criterion relates to the mandate under the Act for the Pilot Program to achieve diverse types of agricultural and horticultural production.³⁸ Staff believes the goal of this criterion is to support the development of dual-use projects throughout New Jersey in combination with the other criteria to ensure adequate research results are obtained from all areas of the State to adequately inform the permanent dual-use program. Therefore, Staff anticipates that the weight or score applied to geographic location in the application process would change over time as projects are selected and coverage of the state/sub-geographies is attained.

(d) Interconnection Planning

Dual-use projects in the Pilot Program would be subject to the requirements of either the ADI or CSI Program. In the review of projects during the pre-qualification process, Staff would consider an applicant's determination of project feasibility based on public hosting capacity maps. In the full application scoring process, Staff anticipates that lower scores would be assigned to those projects that have not progressed through the interconnection application process, whereas higher scores would be assigned to those projects that have applied, been approved, identified any distribution system interconnection costs and are demonstrated to be close to commencing construction.

Staff questions for stakeholders:

Question (3) three, 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?

³⁸ N.J.S.A. 48:3-87.13(c)(1).

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?

(e) Proposals for Minimizing the Negative Impacts to Farmland

The Act requires that standards for installation and decommissioning techniques be established for the permanent dual-use program.³⁹ Applications in the Pilot Program are to be evaluated based on their proposals to minimize negative impacts to farmland and proposals to address decommissioning.⁴⁰ Negative impacts to farmland from the construction and operation of the solar facility include conditions such as soil compaction by construction equipment, soil erosion and potential runoff from rain collection along drip edges, etc. Staff anticipates that Pilot Projects will be monitored for impacts from the installation and operation of the solar arrays according to the monitoring plans submitted in the application and site visits by RAP. The research results obtained from the Pilot Projects will be used to inform the development of standards for installation, operation, and decommissioning techniques intended to minimize negative impacts to farmland. Staff anticipates the application evaluation will consider a proposal's inclusion of techniques to minimize impacts of impervious coverage and optimize water management, including, but not limited to water capture and filtration.

In order to determine if negative impacts to farmland have occurred, the initial condition of the farmland prior to commencement of solar construction will be determined through an initial assessment. Staff envisions that a proposal for minimizing negative impacts to farmland would incorporate a plan to conduct the assessment and follow construction and operation guidelines or best practices, which would have the least impact to the farmland.

Such guidance for Dual-Use Pilot participants will be published by RAP based on experience with Rutgers' Experiment Station agrivoltaic projects, existing resources from NJDA, and/or the Natural Resource Conservation Service. Aside from the basic elements required, such as contact information, the following elements could prove to be useful and effective in achieving this criterion:

- The report on pre-construction soil quality characteristics submitted to satisfy criteria (a) above;
- An aerial or satellite image and diagram of the field showing row crop contours, elevation changes;
- A list of conservation practices to be implemented to minimize negative impacts to farmland;
- The location and schedule for applying new agricultural practices;
- Records of plan implementation activities; and
- A plan for solar facility operation and maintenance.

Additionally, there may be helpful elements of a farm "conservation plan" as currently required pursuant to SADC's rules for agricultural management practices ("AMP") applicable for solar

³⁹ N.J.S.A. 48:3-87.13(g)(4).

⁴⁰ *Id.*, N.J.S.A. 48:3-87.13(c)(1)(e) and (f).

facilities installed and operated on preserved farmland.⁴¹ In the AMP context, a farm “conservation plan” means “a site specific plan developed by the landowner and approved by the local soil conservation district which prescribes needed land treatment and related conservation and natural resource management measures including forest management practices that are determined practical and reasonable to conserve, protect and develop natural resources, to maintain and enhance agricultural productivity and to control and prevent nonpoint source pollution.”⁴² Staff recommends an applicant’s proposal to minimize negative impacts to farmland would be less onerous than a farm conservation plan which is generally required to conform to technical guidance published by the Natural Resources Conservation Service (“NRCS”).⁴³

Given Staff’s proposal for how incentives are to be delivered, dual-use projects in the Pilot Program would be subject to the requirements of either the ADI or CSI Program, depending upon project characteristics such as size and net metering or wholesale power market participation. Therefore, at a minimum, Staff recommends that proposals would need to meet applicable requirements under the Board’s rules for these programs that pertain to covered agricultural lands for CSI-eligible projects. Specifically, Staff believes it is appropriate for project proposals to include a plan that addresses requirements under N.J.A.C. 14:8-12.8(g), for example, using a qualified soil scientist or geotechnical engineer to identify pre-construction soil quality characteristics and installing a solar facility that does not require a concrete footing or other permanent mounting.

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?

(f) Proposals to Address Decommissioning

The Act requires that standards for decommissioning techniques also be set for the permanent dual-use program, which may include the posting of a performance bond.⁴⁴ Applications to participate in the Pilot Program are to be evaluated based on their proposals to address decommissioning. Staff envisions the evaluation of Pilot Project proposals will take into account the extent to which applicants plan to follow an established set of guidelines or best practices that facilitates farming following decommissioning.

Similar to the rationale described under Section III-B(e) for minimizing negative impacts to farmland, Staff recommends that proposals would need to meet applicable requirements under the Board’s rules that pertain to covered agricultural lands for CSI-eligible projects. Specifically, Staff believes it is appropriate for project proposals to include a plan that addresses requirements adopted by the Board as the CSI Siting Rules N.J.A.C. 14:8-12.8(g), for example, for sequencing

⁴¹ N.J.A.C. 2:76-2A.12.

⁴² N.J.A.C. 2:76-2A.7.

⁴³

<https://www.nj.gov/agriculture/sadc/rtfprogram/amps/adoptedamps/natresconserv.html#:~:text=%22Farm%20conservation%20plan%22%20means%20a,are%20determined%20practical%20and%20reasonable>

⁴⁴ N.J.S.A. 48:3-87.13(g)(4).

facility infrastructure removal and site restoration and for preventing topsoil within inter-panel row travel lanes from being compacted during installation and decommissioning.

Staff question (6) six for stakeholders: What additional information pertaining to techniques for addressing decommissioning would be useful in the Pilot Program for the purposes of informing a future, permanent dual-use program design?

(g) Proposals for Addressing Stormwater Runoff and Other Environmental Issues

The Act contemplates the development of standards for a permanent dual-use program that includes impervious coverage, water management, water capture and filtration in installation and decommissioning techniques that minimize negative impacts to farmland.⁴⁵ Applications to participate in the Pilot Program are to be evaluated based on proposals for addressing stormwater runoff and other environmental issues. Given Staff's recommendations for how incentives are to be delivered, dual-use projects in the Pilot Program would be subject to the requirements of either the ADI or CSI Program, depending on size and whether the project net meters or sells power in PJM's wholesale electricity market. Therefore, at a minimum, Staff recommends that proposals would need to meet applicable requirements under the Board's rules for these programs that pertain to stormwater management, soil erosion, and sediment control. Specifically, Staff believes it is appropriate for project proposals to include the following:

- A commitment to meet New Jersey's Soil Erosion and Sediment Control Act (N.J.S.A. 4:24-39 et seq.) and the implementing rules at N.J.A.C. 2:90
- A comprehensive siting plan that assesses existing drainage conditions and identifies any areas where surface runoff currently exists or where proposed grades will create surface runoff concentration, whereby all such areas would be designed to prevent onsite erosion, as well as protect offsite areas from erosion and flooding
- A commitment to meet NJDEP's Stormwater Management Rules, N.J.A.C. 7:8
- A method to protect against soil erosion from solar equipment drip lines
- A commitment to meet any applicable Soil Conservation District guidelines for stormwater runoff quantity and erosion control

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?

(h) and (i) Technical Feasibility and Technical Innovation

With respect to a criterion for technical feasibility, Staff recommends including a review of both technical solar feasibility and agricultural/horticultural feasibility in its evaluation of applications. Regarding a criterion for technical innovation, Staff envisions scoring projects with higher points for design aspects that seek to increase or maintain both solar and agricultural productivity compared to standard designs or practices. In scoring a project for both of these criteria, the

⁴⁵ *Id.*

likelihood for success would be evaluated which is a necessary component to be able to ensure the success of the Pilot Program.

A preferred project would enable access to the site and provide data and documentation about the design as to enable replicability and applicability to support a robust permanent dual-use program. Farmers should be allowed to change their agricultural or horticultural practices (e.g., crop rotation, switching from grazing animals to hay production, or switching to a different production system). Additional elements pertaining to the ability of a project to scale to a commercially viable installation could include a description and location of barriers to construction or control area such as tile/drainage fields, irrigation equipment and coverage, and potential conflicts with underground conduit runs.

With respect to meeting applicable federal, State, or local laws, rules, regulations, or ordinances,⁴⁶ a project proposal should meet the National Electrical Code (“NEC”) without restricting farming activities.⁴⁷ For instance, with respect to fencing, Staff recommends that it should be required around the entire dual-use and control area. However, it should be set back enough from the racking to allow farm equipment to turn around on the ends. Fencing will also help to minimize deer damage. Requirements for fencing and other criteria under the NEC are discussed in more detail in Section IV (“Project Design, Monitoring, and Evaluation”) and the Appendix B.

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?

(j) Quality of Any Research Commitments During the Evaluation Period

Staff believes that research studies are critical to allowing the Board and Secretary of Agriculture to carefully evaluate the concept of dual-use solar, in order to understand how best to design and operate these types of projects in a manner that is consistent with both solar and the agricultural nature of the site.

The Dual-Use Act specifically envisions an important role for New Jersey public research institutions of higher education in helping to evaluate the efficacy of dual-use projects on New Jersey farmland.⁴⁸ The Act expressly directs the Board to “take into account the results of the pilot program *and any research studies on the efficacy of dual-use solar energy in New Jersey*” (emphasis added).⁴⁹ Additionally, the Act directs the Board and the Secretary of Agriculture to consider “the quality of any research committed to during the [Pilot Program] period”.⁵⁰

⁴⁶ N.J.S.A. 48:3-87.13 (b)(7).

⁴⁷ N.J.S.A. 48:3-87.13(b)(7); *Insert citation to the National Electrical Code here.*

⁴⁸ Staff proposes to define a “New Jersey public research institution of higher education” as any public college, university or community college located in New Jersey.

⁴⁹ N.J.S.A. 48:3-87.13 (g).

⁵⁰ *Id.*, (c)(j).

The Act further provides that dual-use solar projects located on prime agricultural soils or soils of statewide importance in ADAs shall only be permitted if they are conducted “in association with a research study undertaken in coordination with a New Jersey public research institution of higher education...”⁵¹ While in this instance, the Act references public research institutions in the context of a specific siting location, Staff believes that research institutions have an important role to play for all dual-use projects, regardless of location. The Board approved RAP to assist in the development and implementation of the Pilot Program in recognition of Rutgers University’s longstanding commitment to advancing New Jersey as a federal land grant institution. In particular, RAP will assist with the public stakeholder process and will serve an advisory role in the evaluation of Pilot Program applications. RAP will also participate in the development of the Board’s scoring and evaluation process as well as post-award project evaluation and monitoring.

An evaluation of the quality of research commitments in the Pilot Program applications may consider studies that address the farmland both prior to the installation of solar and throughout the term of the solar facilities’ operations, as well as the decommissioning of the facility. Staff recommends that any research plan submitted with the application would be required to document who will conduct the research and how the baseline condition of the land will be assessed. As such, applicants would also document historic uses and productivity of the land and soils, e.g., through farmland assessment paperwork, as well as anticipated impacts from the construction and operations of the dual-use solar project, including impacts occurring adjacent to or not directly in the area in which the solar facilities will be sited, such as the building of new access roads. Documentation for the latter, for example, could be demonstrated by evidence of equipment used, operating dates, and illustrative site photos taken before, during, and after installation.

In short, while applicants that propose projects outside of ADAs may not be statutorily required to participate in the research required of applicants within ADAs, Staff proposes the application scoring rubric could be structured to reward participation in such research programs as a key evaluation criterion. In scoring applications, Staff recommends a scaled approach for scoring applications based on the level of planned research. Given the short duration of the Pilot Program, planned research should be achievable within three years (36 months) with results produced to inform the permanent dual-use program.

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?

(k) Other Criteria that the Board May Deem Advisable

The Act gives the Board the authority to designate additional criteria in reviewing and making decisions about dual-use projects.⁵² Staff is interested in suggestions about additional criteria that should be recommended for the Board’s consideration in selecting projects to participate in the Dual-Use Pilot Program. Staff’s recommendations for additional criteria are outlined here. Since the issuance of Executive Order No. 23 (2018) (“E.O. 23”), all agencies, departments, boards, etc. encompassing the Executive Branch of the State Government in New Jersey have been required to consider environmental justice in the implementation of their mandatory and

⁵¹ *Id.*, (b.)(4).

⁵² *Id.* at (c)(1)(k).

regulatory responsibilities.⁵³ Considering the guidance issued by the NJDEP for the Executive Branch to implement E.O. 23, Staff would anticipate the evaluation of applications with the additional criterion for environmental justice.⁵⁴ In particular, Staff believes reviewing the locations of projects for their proximity in or around overburdened communities in coordination with the geographic location criterion would make sense as well as a project's plan for outreach and engagement with the potentially impacted community(ies).

New Jersey's efforts for achieving environmental justice are in line with the federal government's initiatives to strengthen diversity, equity, and inclusion.⁵⁵ In particular, Staff also anticipates that applicants would be reviewed with the former considerations in combination with "underserved communities" as characterized by the federal government as "populations sharing a particular characteristic, as well as geographic communities, that have been systematically denied a full opportunity to participate in aspects of economic, social, and civic life, as exemplified by the list in the preceding definition of 'equity'."^{56,57}

Staff questions for stakeholders:

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) Size and Production Type Diversity

The Act requires the review of applications to include consideration of size and diversity of agricultural and horticultural productivity. The Act also mandates setting provisions under a permanent dual-use program to protect the State's agricultural and horticultural diversity.

Staff proposes that this requirement will be informed by a classification scheme shown in Table 1, under development by RAP, which will account for the current diversity and size of farms active in New Jersey. To obtain a diverse collection of projects from among applicants to the Dual-Use Solar Pilot Program, the Board will target a set number of projects within each product classification. This information will also be used to inform minimum project size.

⁵³ Exec. Order No. 23 (Apr. 20, 2018), 50 N.J.R. 1241(b) (May 21, 2018) ("EO 23").

⁵⁴ *Furthering the Promise: A Guidance Document for Advancing Environmental Justice Across State Government*, New Jersey Department of Environmental Protection, September 2020, <https://dep.nj.gov/wp-content/uploads/ej/docs/furthering-the-promise.pdf>

⁵⁵ Exec. Order No. 13985 (Jan. 21, 2021), 86 FR 7009 (Jan. 25, 2021).

⁵⁶ *Id.* at 2(b).

⁵⁷ *Id.* at 2(a): "[E]quity" means the consistent and systematic fair, just, and impartial treatment of all individuals, including individuals who belong to underserved communities that have been denied such treatment, such as Black, Latino, and Indigenous and Native American persons, Asian Americans and Pacific Islanders and other persons of color; members of religious minorities; lesbian, gay, bisexual, transgender, and queer (LGBTQ+) persons; persons with disabilities; persons who live in rural areas; and persons otherwise adversely affected by persistent poverty or inequality.

Table 1. NJ Farm Characteristics by product classification for the Dual-Use Pilot Program.

Product Classification	Farms (#)	Cropland (acres)	Total sales	Percentage of cropland
Crop production				
Oilseed and grain	810	161,641	\$77,955,000	39.3%
Other crop farming	2,143	78,489	\$43,913,000	19.1%
Vegetable and melon	895	65,221	\$226,747,000	15.8%
Fruit & tree nut, nursery & floriculture	1,886	60,085	\$514,812,000	14.6%
Strawberry and berry farming	212	13,751	\$97,852,000	3.3%
Animal production				
Cattle, beef, and dairy farming	792	24,272	\$35,816,000	5.9%
Other animal production	1,728	4,467	39,441,000	1.1%
Horse and other equine	1,312	3,726	28,781,000	0.9%
Total	9,778	411,652	\$1,065,317,000	100.0%

Source: 2017 Census of Agriculture, USDA, National Agricultural Statistics Service

As dual-use projects are selected for participation in the Pilot Program, the application evaluation criteria in subsequent solicitation rounds will be adjusted to seek greater diversity in agricultural and horticultural use and project size. For example, after sufficient pilot project coverage of the main New Jersey agriculture categories; field crop, row crop, ornamentals, animal agriculture, etc., subsequent notices of funding availability and pre-qualification materials will define coverage goals for specific crops ranked by annual sales or acreage. Staff believes that diversity with respect to categories or crops that are commonly referred to as “exotic” should not compromise the Pilot Program’s coverage of the main commodities in New Jersey.

Other aspects of size and productivity diversity that could be considered, which are somewhat subsumed in the classification scheme, include farm location, farm size, agrivoltaic system type and size, type of agriculture/horticulture, soil type/condition, adaptability to multiple types of agriculture, and innovative implementation of agrivoltaics.

To better inform a permanent dual-use program, Staff recommends surveying all applicants about their decision process and asking why they applied to the Pilot Program and/or how it could be improved.

Staff question (12) twelve for stakeholders: The Act gives the Board the authority to designate additional criteria in reviewing and making decisions about dual-use projects.⁵⁸ What additional information pertaining to diversity of size and productivity would be useful for the purposes of future permanent dual-use program design?

IV. Project Design, Monitoring, Evaluation, and other Post-Award Considerations

A. Project Design

The Act requires that all dual-use projects comply with all applicable federal, state, or local laws, rules, regulations, or ordinances.⁵⁹ The Act also prescribes that a dual-use project “be a permitted use within every municipality.”⁶⁰ Staff interprets this provision to mean that a dual-use project would not be required to obtain a variance from a municipality and municipalities would not be required to update their ordinances to make such an allowance.

Staff believes that developing design standards specific to dual-use projects is necessary to ensure compliance with the intent of the Act by all Pilot Projects. For instance, consistent with the statutory definition of a dual-use solar energy project, Staff recommends that agrivoltaic systems which include solar panels that are mounted on or attached to permanent agricultural structures not be considered for the Pilot Program. In addition, proposed agrivoltaic systems with solar panels that are mounted on or attached to non-permanent structures that are in turn directly attached to permanent structures will not be considered. The definition of permanent agricultural structure and non-permanent agricultural structure are included in Appendix A.

These minimum standards could be part of the selected application’s COMPR used to demonstrate a commitment to the implementation of the Act’s requirements. Additional minimum design standards for the installation/construction of a dual-use project could include the following:

- Compliance with the approved design as proposed and evaluated under the application process. For instance, for fencing see Section III-B(h) and Section III.B.(i) with supplemental information provided in the Appendix B.
- In the case of farms that incorporate agritourism, an element of the design would be required to account for protecting the public and ensuring public safety around a solar facility and its associated infrastructure. Examples of this would be ensuring the solar array is a certain height above which a person would not come into contact with it by walking around the farm, ensuring that all electrical components are installed and maintained according to the National Electrical Code, and following fencing requirements specific to more traditional solar electric generation facilities.

Staff recommends setting minimum standards for conducting required research studies that would apply to all projects participating in the Pilot Program, regardless of their size and location. An objective means of evaluating the impact of solar construction, maintenance, and operations as

⁵⁸ *Id.*, N.J.S.A. 48:3-87.13(c)(1)(k).

⁵⁹ N.J.S.A. 48:3-87.13(b)(7).

⁶⁰ *Id.* at (f).

directed under the Act for assessing the quality of agricultural and horticultural use of land, impacts to farmland, and storm water runoff and other environmental issues is necessary.

A public research institution of higher education may serve as the primary designer and organizer of research studies involving projects selected as part of the Pilot Program. These studies should evaluate topics such as the impact of solar on crop types and yields, growing conditions, soil health, optimal solar panel installations and orientations, the economic feasibility of agricultural or horticultural operations affected by dual-use solar facilities, and other topics that the Board, a public research institution, and the State agencies determine to be relevant.

However, Staff will work with RAP to establish separate minimum standards for research requirements for non-ADA projects and more robust standards for ADA projects. These minimum standards would be part of the Dual-Use COMPR addressing project monitoring, data collection and research requirements. Staff envisions establishing minimum standards for crop specific design and research components that applications would be scored against criteria communicated prior to the notice of funding availability. RAP will provide extension documents describing best practices and design considerations accounting for anticipated equipment use, row spacing, array heights, ground coverage ratios, as well as ranges for certain characteristics of minimum designs.

- Minimum standards for sizing array test and control area sizes, location, and comparable soil conditions.
- Minimize and account for edge effects in design and evaluation: consider the geometry of subject parcel and solar array/mount.
- The site should accommodate a control area (i.e., without solar panels) for yield/impact comparisons.
- The control area should be equal in size to the photovoltaic-covered area, i.e., no more than one-half of the crop at that location could be covered with PV arrays.
- Plan for minimizing impact on soils.
- Anticipate the need for crop rotations annually and interannually; require applicant to submit a crop plan for a certain number of years including a method by which RAP would be notified of when harvesting the test and control plots would occur.

In addition to the minimum requirements for all projects in the Pilot Program, Staff believes there should be added requirements for those projects located in ADAs, of certain size for a given agricultural or horticultural product or with unique crops or solar designs.

Staff recognizes the need for balance between standards, guidance, and flexibility in a design to allow for innovation and opportunity to learn from research results. There is also the recognition of a goal to ensure this process is as simple as possible for all parties involved, i.e., applicants, developers, farmers, and the team evaluating applications.

B. Monitoring & Evaluation

Staff envisions that a Dual-Use COMPR Plan required of each applicant would form the basis for a monitoring regime imposed on winning bidders as a condition of incentive award. As discussed

in Section III-B, a preferred application would include a commitment to addressing the various aspects of monitoring the quality of agricultural or horticultural use of the land, minimizing negative impacts to farmland, decommissioning, addressing storm water runoff and other environmental issues, and conducting research to produce results to inform a permanent dual-use program. To reiterate, several of the elements required of a generic farm conservation plan can be utilized to effectively establish a baseline of conditions and be further expanded on to formulate a method for monitoring and evaluating a dual-use project. Staff recommends reporting and recordkeeping commitments as part of the COMPR Plan. The ability for efficiently evaluating the data collected from approved Pilot Program projects is a necessary function in determining how to develop a permanent dual-use program.

The NRCS has extensive soil conservation recommendations which may play a role in the Pilot Program. For example, NRCS currently recommends surface and soil water management practices to avoid erosion and enhance farmland productivity for many farms. Staff and RAP will approach NRCS to discuss the role that NRCS may play in the Pilot Program.

The main impact to farmland that is expected from construction and decommissioning activities is soil compaction and trenching. The COMPR documentation required of a selected project might simply suggest the right post-treatment of the soil to mitigate these impacts. Monitoring for soil compaction before and after construction will be a requirement of the COMPR. Evaluation of the impact of these activities would require a comparison between the project site and the control area including soil conditions and the relative productivity of the agrivoltaic area. RAP may propose to include other environmental parameters to monitor for the projects in ADA areas or those proposing large solar arrays.

C. Other Post-Award Considerations

In line with the SuSI Program, as well as past solar energy programs in New Jersey, Staff recommends that a conditional letter of approval be issued for awarded projects. The letter would outline conditions by which a dual-use pilot project would be required to meet in order to receive the incentive, e.g., implementation of a Dual-Use COMPR Plan. The set of conditions may vary by size of project. Discussed in Section II. C., the letter would define and clarify the enforcement of these commitments.

For both approved and non-selected projects, Staff anticipates that a list of these projects would be available on New Jersey's Clean Energy Program website. Each project would be assigned a BPU docket number in which its application and supporting documents would be included. A public version of an application would be made available on the website in addition to specific information pertaining to the Pilot Program such as application requirements and forms, evaluation criteria, the total capacity of approved projects for each program year, and assorted dual-use related educational resources.

Appendix A. Definitions

“Agricultural practices” means practices used to produce field crops, fruits and vegetables, specialty crops, forage crops, aquaculture, as well as animal production.

“Board” means the New Jersey Board of Public Utilities.

“Construction, Operations, Monitoring, and Project Research” Plan (COMPR) means the document describing key elements of a Dual-use solar energy project selected by the Board to participate in the Dual-use Solar Energy Pilot Program.

“Dual-use” means the practice of siting energy generation facilities, structures, and equipment for the production of electric power from solar photovoltaic panels located on unpreserved farmland in agricultural or horticultural production that ensures the continued simultaneous use of the land below and adjacent to the panels for agricultural or horticultural production.

“Dual-Use Pilot Program award” means the Board-approved action conveying eligibility for a specific incentive or incentives for a Dual-use solar energy project with terms and conditions designated in a Board Order.

“Dual-use solar energy project” means the energy generation facilities, structures, and equipment for the production of electric power from solar photovoltaic panels located on unpreserved farmland in agricultural or horticultural production that ensures the continued simultaneous use of the land below or adjacent to the panels for agricultural or horticultural use.

“Farmer” means an individual involved in agricultural and/or horticultural practices who derives at least \$2,500 of their taxable income from farming activities. A farmer can be the owner of the land or rent/lease it.

“Horticultural practices” means practices used to produce horticultural crops, including potted plants, vegetable transplants, cut flowers, nursery plants, trees and shrubs, vine crops, and sod.

“NJDA” means the New Jersey Department of Agriculture.

“NJDEP” means the New Jersey Department of Environmental Protection.

“Non-permanent agricultural structure” means a movable structure including post-driven fences, trellises, seasonal animal shelters, greenhouses without permanent anchoring systems or foundations, high tunnels, center-pivot irrigation systems.

“Land owner” means an individual who owns unpreserved farmland that is in active agricultural or horticultural production. The land owner may also be the farmer or have a rent/lease agreement with a farmer who operates the land.

“Permanent agricultural structure” means a structure that has been built with a permanent anchoring system or foundation typically involving cement or concrete. Examples include farm houses, labor camps, farm retail stores, barns, packing houses, agricultural equipment and materials storage sheds, greenhouses, grain storage facilities, plant and animal processing facilities, cold storage facilities, feedlots.

“Preserved Farmland” means land on which a development easement was conveyed to, or retained by, the State Agricultural Development Committee”, a county agricultural development board, or a qualifying tax exempt nonprofit organization pursuant to the provisions of section 24 of L.1983, c.32 (C.4:1C-31), section 5 of L.1988,c.4 (C.4:1C-31.1), section 1 of L.1989, c.28 (C.4:1C-38), section 1 of L.1999, c.180 (C.4:1C-43.1), sections 37 through 40 of L.1999, c.152 (C.13:8C-37 through C.13:8C-40), or any other State law enacted for farmland preservation purposes.

“Program Year” means the twelve-month period with an associated annual capacity target. Program Year 1 will commence on the day that the requisite rules are adopted establishing the Dual-Use Pilot Program.

“Project Site” means the location of the farm parcel proposed to contain the dual use solar energy project and its associated research control area together.

“RAP” means the Rutgers Agrivoltaic Program” within the Rutgers University Agricultural Experiment Station.

“Research Control Area” means the plot of land of equal size and soil quality characteristics to the area under and adjacent to the solar array. The land within the Research Control Area will be farmed using the same cultural practices as those employed in the area under and adjacent to the solar array.

“Solar Operator” means the person or entity that installs, owns or controls the solar energy generation facilities, structures and equipment.

“Unpreserved farmland” means any land that is valued, assessed, and taxed pursuant to the “Farmland Assessment Act of 1964” P.L. 1964, c. 48 (C.54:4-23.c) and is not preserved farmland.

Appendix B. Construction, Operations, Monitoring and Project Research Plan

1. Purpose and Use

The COMPR will provide a record for an individual project including the initial application, any terms or conditions specific the project award, and any subsequent modifications requested, reviewed, and approved by the Staff/RAP team. The COMPR will document the expectations for project implementation which will be evaluated for purposes of informing the development of a permanent program. Each COMPR will be used in the evaluation of individual projects and an evaluation of the complete Pilot Program with results intended to inform a permanent dual-use program.

2. Elements of the Plan

The application and Board Order approving selected projects will form the basis of each individual project's plan. The COMPR will provide a record of the project's planned design, construction, operations, maintenance, and monitoring. Staff anticipates that project plans may change over time. A request to modify the plan must be submitted to Staff and will be reviewed by Staff and RAP before it will be approved by Staff to become a part of the COMPR.

a. Construction

The application will require design specifications of the solar electric generation facility including but not limited to capacity, location of modules and balance of system equipment, dimensions, row spacing, tilt, orientation, module type, row spacing, mounting configuration, and height.

b. Operations

The application will require a three year plan for the farming operation intended to occur under and adjacent to the solar electric generation facility as well as any special operational requirements specific to the solar facility. The three year plan will include crop types, cover cropping and other cultural practices over this time period will be required. These practices may change over time, for example using novel production methods and/or switching to a different crop. However, if the changes are not identified in the application then they must be submitted as a request to modify the COMPR to RAP and Staff for review and approval.

c. Monitoring

The application will require data to be supplied which will identify the type and frequency of information to be collected which will facilitate evaluation of the Pilot Project. The applicant's proposals for (i) monitoring the quality of the agricultural or horticultural use of the land, (ii) minimizing negative impacts to farmland, and (iii) addressing stormwater runoff and other environmental issues will be incorporated into the COMPR.

d. Project Research: Goals, Objectives, and Required data collection for approved applications

The Pilot Program is designed to inform the development of a permanent program as part of the permanent successor to the solar incentive program.⁶¹ The Dual-Use Act consistently placed

⁶¹ N.J.S.A. 48:3-87.13(g).

great emphasis on the role of research and evaluation in the development of standards for dual-use solar energy projects in a permanent program.⁶²

The Act requires the Board, in consultation with the Secretary of Agriculture, to review and approve projects based on various considerations including but not limited to the quality of any research committed to during the evaluation period and proposals for (i.) monitoring the quality of agricultural and horticultural use of the land,⁶³ (ii.) minimizing negative impacts to farmland,⁶⁴ and (iii.) addressing stormwater runoff and environmental issues⁶⁵.

In addition, the Act also places a prohibition on siting a dual-use solar energy project on prime agricultural soils and soils of Statewide importance located in ADAs unless the project is in association with a research study undertaken in coordination with a New Jersey public research institution of higher education as approved by the Board and in consultation with the Secretary of Agriculture.⁶⁶ Staff interprets this additional requirement as an intent to place greater emphasis on the research effort expended on projects located in ADAs.

The Board has engaged RAP to advise and assist in developing the Pilot Program's research plan, to evaluate the research proposals for individual applicants, and to lead the research efforts on individual projects. A prime goal of RAP's research on individual projects is to provide comparable estimates of farm productivity with and without agrivoltaic arrays installed over the land. Each approved project will generate paired agricultural production data from an agrivoltaic array covered area and an equal-sized non array-covered area from the same farm. Both members of the pair will have the same crop and will be farmed by the same operator using the same methods.

RAP will use the paired yield and cost data for each crop or cropping system to 1) estimate the magnitude of any effect of the agrivoltaic arrays on the agricultural yield per unit area of farmed land, 2) estimate the magnitude of any effect of the agrivoltaic arrays on the cost of production per unit area of farmed land, and 3) when sufficient data is obtained, to statistically test whether agricultural yield is significantly affected by the presence of the agrivoltaic arrays. Submitted electrical production data from each approved project will be summarized and analyzed by array technology type and agricultural cropping system. Approved projects will also be required to provide data on farm operators' experiences with agrivoltaics, including challenges encountered and adaptations made to farm operations as a result of the introduction of agrivoltaics. Each approved project will be required to collect and submit data to the Board to be analyzed, summarized, and interpreted by the RAP team.

The following sections describe the proposed research effort for projects located outside of ADAs and the research required for projects located within ADAs.

⁶² *Id.*

⁶³ N.J.S.A. 48:3-87.13(g)(5).

⁶⁴ N.J.S.A. 48:3-87.13(c)(1)(e).

⁶⁵ N.J.S.A. 48:3-87.13(c)(1)(g).

⁶⁶ N.J.S.A. 48:3-87.13(b)(4).

(1) Data collection for approved dual-use projects NOT located on ADAs (minimum level of data collection)

Site Data

- Name of property owner and farmer (including phone number and email address)
- Postal address
- GPS coordinates⁶⁷
- Soil type and topography
- Two-year record of electricity consumption (utility bills) prior to solar array installation
- Type of agricultural or horticultural operation
- Solar array size (ground area), type, panel specs, number of panels, and nominal production
- Size of area within the solar array area rendered unfarmable by the solar array structure and its infrastructure
- Installation date (first day of operation) of the solar array
- Name of local electric utility
- Name of the solar developer involved with the project design and installation

Crop production

- Type of crop
- Sowing or transplanting date
- Sowing or transplanting rate
- Harvest date
- Yield
- Direct reporting on whether having an agrivoltaic array on-farm has led the farm operator to introduce, expand, decrease, or stop production of specific crops

Animal production

- Type of animal
- Type of grazing strategy (procedures, dates, number of grazing days)
- Average start weight of animals when put on pasture (including date)
- Yield of hay/silage
- Supply of drinking water (system, rate)
- If applicable, average end weight of animals when removed from pasture (including date)
- If applicable: Grass maintenance after animals are removed from pasture (including dates)
- Direct reporting on whether having an agrivoltaics array on-farm has led the farm operator to introduce, expand, decrease, or stop production of specific livestock types

⁶⁷ The applicant will provide the latitude and longitude of the vertices of the polygon (e.g. four corners of a rectangle) for both the array area and the paired control area. Precision of latitude and longitude reporting will be at least to five decimal places if reported in decimal degrees or two decimal places in the seconds if reported in degrees, minutes, seconds format.

Environmental data

Data should be recorded in time intervals of no longer than one hour. If recording a single value for a specific time interval, that value should be the average measurement of all the measurements collected during that time interval. All environmental data should be collected in duplicate: One measurement at a representative location in the control area (i.e., unobstructed by any solar panel), and the other at a representative location near/underneath the solar panels). Sensors should be (re)calibrated according to manufacturers' recommendations.

- Solar radiation (horizontal)
- Air temperature (using an aspirated box)
- Air relative humidity (using an aspirated box)
- Soil temperature (at 6 inches below the surface)
- Soil volumetric water content (at 6 inches below the surface)

Solar array performance

- Electricity production (using time intervals of one day)
- For net-metered projects monthly accounting of any additional electricity purchased from local utility.
- Income to farmer from lessee form projects with leased array site.
- If available: Performance of individual solar panels
- If applicable: Solar radiation as measured by the array (e.g., sensor attached to a tilting panel)
- If applicable: Maintenance and repairs

General attitudes toward and experience with dual-use; policy views

- Survey scale to examine the overall valence (positive or negative) of farm operators' views toward agrivoltaics as an agricultural technology (and how this changes with further experience)
- General reporting of challenges encountered by farmers with agrivoltaics, and whether/how these challenges were overcome
- Farm operators' views regarding possible public policies that would encourage or advance agrivoltaics in New Jersey

(2) Data collection for approved dual-use projects located on ADAs (maximum level of data collection)

Site Data

- Name of property owner and farmer (including phone number and email address)
- Postal address
- GPS coordinates
- Soil type and topography
- Two-year record of electricity consumption (utility bills) prior to solar array installation
- Type of agricultural/horticultural operation

- Solar array size (ground area), type, panel specs, number of panels, and nominal production
- Size of area within the solar array area rendered unfarmable by the solar array structure and its infrastructure
- Installation date (first day of operation) of the solar array
- Name of local electric utility
- Name of the solar developer involved with the project design and installation

Crop production

- Type of crop
- Pre-planting soil prep (including dates)
- Equipment used for pre-planting soil prep
- Sowing or transplanting date
- Sowing or transplanting rate
- Sowing or transplanting equipment used
- Applications of fertilizer (dates, rates, equipment)
- Applications of chemicals (dates, rates, equipment)
- Post-planting soil and crop maintenance
- Equipment used for post-planting soil and crop maintenance
- If applicable: Irrigation (dates, rates, equipment)
- Harvest date
- Harvesting equipment used
- Yield
- If applicable: Post-harvesting soil maintenance
- If applicable: Post harvesting cover crop planting and maintenance
- Direct reporting on whether having an agrivoltaics array on-farm has led the farm operator to introduce, expand, decrease, or stop production of specific crops

Animal production

- Type of animal
- Type of grazing strategy (procedures, dates, number of grazing days)
- Average start weight of animals when put on pasture (including date)
- Grass maintenance (fertilizers, chemicals, dates, rates)
- Equipment used for grass maintenance
- Procedures and equipment used for hay/silage production (including dates)
- Yield of hay/silage
- Supply of drinking water (system, rate)
- If applicable, average end weight of animals when removed from pasture (including date)
- If applicable: Grass maintenance after animals are removed from pasture (including dates)
- If applicable: Equipment used for pasture maintenance after animals are removed (including dates)
- Direct reporting on whether having an agrivoltaics array on-farm has led the farm operator to introduce, expand, decrease, or stop production of specific livestock types

Environmental data

Data should be recorded in time intervals of no longer than one hour. If recording a single value for a specific time interval, that value should be the average measurement of all the measurements collected during that time interval. All environmental data should be collected in duplicate: One measurement at a representative location in the control area (i.e., unobstructed by any solar panel), and the other at a representative location near/underneath the solar panels). Sensors should be (re)calibrated according to manufacturers' recommendations.

- Solar radiation (horizontal)
- Air temperature (using an aspirated box)
- Air relative humidity (using an aspirated box)
- Soil temperature (at 6 inches below the surface)
- Soil volumetric water content (at 6 inches below the surface)
- Precipitation (date and amount)

Solar array performance

- Electricity production (using time intervals of one day)
- For net-metered projects monthly accounting of any additional electricity purchased from local utility.
- Income to farmer from lessee from projects with leased array site.
- If available: Performance of individual solar panels
- If applicable: Solar radiation as measured by the array (e.g., sensor attached to a tilting panel)
- If applicable: Maintenance and repairs

General attitudes toward and experience with agrivoltaics; policy views

- Survey scale to examine the overall valence (positive or negative) of farm operators' views toward agrivoltaics as an agricultural technology (and how this changes with further experience)
- General reporting of challenges encountered by farmers with agrivoltaics, and whether/how these challenges were overcome
- Farm operators' views regarding possible public policies that would encourage or advance agrivoltaics in New Jersey

Appendix C. Design Considerations

Dual-use or agrivoltaics arrays should be designed with full understanding of the farming and energy collection impacts of particular design features. The Dual-Use Solar Energy Pilot Program is intended to encourage commissioning of arrays that are compatible with long-term continued productive farming use. With this perspective in mind, it is important to understand how farming equipment will be able to operate within and around the array as well as the amount of sunlight that is available for agricultural or horticultural purposes.

This appendix covers general array types that are either commonly used for large utility-scale installations (and would have relatively economical equipment availability), as well as newer installation types that allow for farming within and around solar arrays. These examples should not be viewed as specific recommendations or limitations, rather, they should be viewed as a starting point for discussions between farmers and solar developers to reach designs that will satisfy the Dual-Use Solar Energy Pilot Program mission. Other array types will be considered with a strong preference for installations that provide for diverse future farming land use of the sites.

Key parameters that farmers and solar developers should consider include array height, row spacing, tilt or track angle limits, and array azimuth angle from due South. In large grid-scale array projects the ideal azimuth angle is almost always built into the design to achieve the maximum annual energy production. This may not be the best approach for agrivoltaics installations that compromise between agricultural or horticultural and photovoltaic functionality. For farmers, row alignment choices are often impacted by land boundaries, erosion prevention, elevation contours, water features, roads, buildings and other features. As noted above, the Dual-Use Solar Energy Pilot Program has a strong preference for installations that provide for diverse future farming land use adaptability of the chosen sites.

The Dual Use Pilot Program will be providing customized incentive adders to compensate for the potential higher costs (e.g., associated with higher arrays, wider row spacing, etc.) or potentially lower annual energy production (e.g., associated with non-optimal tilt, azimuth angle, row spacing, etc.). During the pre-application phase, project teams will need to specify their project plans aiming to meet the Program goals. Those projects invited to submit full applications will be expected to make reasonable projections of the applicable financial aspects when requesting their incentive adder.

1. General Array Types

a. Fixed-Tilt

One example is shown in Figure C.1; fixed-tilt arrays are most commonly installed with a small tilt angle aiming directly South and in rows running East-to-West that are spaced so that wintertime shadowing between the rows is substantially reduced or avoided.



Figure C.1: Fixed-tilt solar array on Rutgers University campus, New Brunswick, NJ. This array is built in rows that run East-to-West and are tilted at a fixed angle. No agricultural operations are conducted at this site.

b. Single-Axis Tracking

An example is shown in Figure C.2; single-axis tracking arrays are designed so that they aim the solar modules more directly at the sun through the progression of the day. This installation has individual motors on each row that control the tracking motion but many other designs are commercially available.



Figure C.2: Single-axis tracking solar array at Rutgers University's Snyder Research Farm, Pittstown, NJ. This array is built in rows that run typically North-to-South and are actuated by motors through the day to point more directly at the sun. Starting in 2023, agricultural research has commenced at this site funded by the US Department of Energy under the FARMS program and with support from the New Jersey Agricultural Experiment Station.

c. Vertical Bifacial

An example is shown in Figure C.3; vertical bifacial arrays are typically designed so that they aim front and back sides of the bifacial solar modules due-East and due-West. They generate better early morning and late afternoon power outputs but sacrifice power during the middle of the day. Bifacial panels can have a bifaciality factor, indicating that both panel sides have different conversion efficiencies.



Figure C.3: A vertical bifacial array highlighting farm usage considerations. There is no limitation to the equipment headroom resulting in excellent ability to farm for all types of crops as well as grazing animals.

d. Dual-Axis Tracking

An example is shown in Figure C.4; dual-axis tracking follows the sun better than single-axis tracking but has more complicated shading issues at various times of the day and year. Each of these larger installations may require more robust footings or foundations that may be less appropriate for sustained agricultural or horticultural production.



Figure C.4: Example of a dual-axis tracking array. Each unit is motorized rotating East to West through the day, and adjusting their angle of Southward tilt through the seasons of the year, always following the sun, and optimizing the solar energy production annually.

e. Other Array Types

Many more diverse examples of agrivoltaic arrays can be found online and in the archival literature. This is a hot topic for agricultural and solar research and new ideas are offered each year. Since agrivoltaics is at its relative infancy it might be expected that interesting and useful array designs can be proposed for the Dual-Use Solar Energy Pilot Program and advance understanding of the pros and cons of different configurations. At this stage, the Pilot Program is

eager to promote a diversity of array designs to maximize data collection that will be used to inform decisions about a possible future permanent dual-use program.

2. Compatibility of Arrays with Farming

As noted above, array and row crop orientation may impact both the agricultural or horticultural and solar aspects of a project. For reference, the Google satellite image in Figure C.5 shows an example of various row orientations that have been chosen by farmers for their operations. As noted above, the Dual-Use Solar Energy Pilot Program has a strong preference for installations that provide for diverse future farming land use so proposals for different row orientations are acceptable to the Pilot Program.



Figure C.5: Google satellite view of an area of New Jersey farmland showing the several different row alignments (yellow lines) that farmers have chosen for their work. None of these alignments coincide with the North-South direction.

3. Fencing Around Agrivoltaic Pilot Installations

The proposals solicited in the Dual-Use Solar Energy Pilot Program are required to have equal sized areas for the array and a control area without an array. Non-dual-use arrays are typically installed with surrounding fencing, partly to discourage public access, but also to be in compliance with the National Electrical Code (NEC), especially pertaining to provisions about eliminating exposure to high DC voltage wiring.

The requirement for a fence around ground mounted photovoltaic (“PV”) system stems from two areas in the NEC. The first is a general requirement for any electrical installation operating at voltages over 1000V. Sometimes, larger ground mount systems utilize 1500Vdc strings and are thus subject to this requirement. However, some inverters operate below 1000Vdc nominal so would not trigger this requirement.

The NEC also requires that PV source and output circuits that operate over 30Vdc and are installed in 'readily accessible' locations be guarded, installed using metal clad cable, or in a raceway. Fencing around an agrivoltaic installation qualifies as guarding. While this section applies to many solar installations, however, exposed DC wiring that is installed higher than 6'-7" would not be considered 'readily accessible'.

The present strategy being used at Rutgers University for their three experimental dual-use research arrays is that the farms are enclosed in tall deer fencing, which has the primary advantage of protecting the crops from larger wildlife and also satisfying the NEC requirements.

4. Future Dual-Use Array Design Information

RAP is working closely with Staff to launch the Dual-Use Solar Energy Pilot Program as well as participating in various research and data collection requirements for the program. As part of that, RAP will be offering "Ag. Extension Training" tutorials that will cover a variety of array design considerations including both light uniformity and energy production aspects for the different array types and cropping systems. Interested potential applicants should refer to the RAP main website available at: <https://ecocomplex.rutgers.edu/agrivoltaics-research.html>

5. Right to Farm Act Considerations

Dual-use Solar Energy Project applicants must comply with the Right to Farm Act to enjoy protection against municipal ordinances and county resolutions that unnecessarily constrain agricultural operations and against nuisance suits. The Right to Farm Act is the policy of this State providing protection to commercial farm operations "from nuisance action, where recognized methods and techniques of agricultural production are applied, while, at the same time, acknowledging the need to provide a proper balance among the varied and sometimes conflicting interests of all lawful activities in New Jersey." (N.J.S.A. 4:1C-9)

To ensure protection of this law, dual-use projects must be in compliance with agricultural AMPs that have been promulgated by the SADC, or seek a Site-Specific AMP. Full text of the AMP for the Construction, Installation, Operation or Maintenance of Solar Energy Generation Facilities, Structures and Equipment on Commercial Farms (N.J.A.C. 2:76-2A.12) can be found on the SADC website here:

<https://www.nj.gov/agriculture/sadc/rtfprogram/amps/adoptedamps/solar.html>

Dual-use project developers that propose system designs that do not comply with the AMP for Solar Energy Generation Facilities may request that their County Agriculture Development Board (CADB) - or the SADC in counties where no CADB exists - determine whether their specific operation and/or practices constitute generally accepted agricultural management practices.

The farm's operation or practices will be entitled to Right to Farm Act protection if the CADB or SADC determines that the farm meets the Act's eligibility criteria. When a site-specific AMP request is made, the municipality in which the farm is located is notified, and municipal input is considered when requests involve potential preemption of municipal regulations. The municipality and property owners within 200' of the farm are also notified of the site-specific AMP hearing held by the CADB or SADC.

A formal site-specific AMP process has been established by the Right to Farm Program in its program rules, N.J.A.C. 2-76-2.3 and 2.4. For more information about the site-specific AMP process, contact CADB <https://www.nj.gov/agriculture/sadc/farmpreserve/contacts/cadbs.htm> or the SADC at (609) 984-2504.