Introduction to Agrivoltaics for New Jersey Farmers

This information sheet serves as an introduction to agrivoltaics as envisioned by the Rutgers Agrivoltaics Program (RAP). Agrivoltaic installations integrate farming and energy production, allowing for the simultaneous dual-use of land to produce both food and electricity. Agrivoltaics can play a key role in maintaining New Jersey's farm viability while also substantially increasing the State's electricity generation from renewable energy resources.

Agrivoltaics has the potential to further the renewable energy goals of New Jersey with minimal disruption to New Jersey's approximately 700,000 acres of farmland. New Jersey is home to more than 10,000 farms, with approximately one third of these farms on preserved land. Agrivoltaic projects may help preserve the agricultural industry while alleviating land use issues across the State, whose legislature and utility companies are actively planning to substantially increase electricity generation from renewable energy sources.

Agrivoltaic projects have originally been associated with limited agricultural applications such as small animal grazing or pollinator habitat using low-mounted and closely spaced solar panel arrays. Such systems have been termed solar farms. These systems emphasize energy generation at the expense of agricultural production. RAP defines agrivoltaics as systems that allow for a more diverse range of agriculture or horticulture, including large animal grazing, staple and specialty crop production, and hay production. This definition emphasizes food production and views the generated electricity as a low-risk supplemental income for farmers.

The goal of an agrivoltaics project is to increase land use profitability from both agricultural production and energy generation beyond what agricultural production could provide alone. The benefits include maintaining land that is available for farming and providing a contribution to New Jersey's renewable energy goals (The New Jersey Energy Masterplan includes a goal of 100% renewable energy by 2050, while Governor Murphy has proposed to achieve this goal by 2035).

Key considerations for agrivoltaic projects:

The land must be in active agricultural or horticultural use (prior to and after solar array installation)

- This helps to ensure the land will continue to be used for agriculture or horticulture, as well as for the generation of renewable energy.

Agriculture comes first, solar energy generation second

- This helps ensure the land is kept suitable for a wide range of agricultural or horticultural practices. Solar array row spacing, panel height, and panel configuration should be designed to accommodate a wide range of agricultural or horticultural practices and machinery.

Rutgers Agrivoltaics Program (RAP) Information Sheet

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Examples of agrivoltaic installations:

Agrivoltaic installations are designed to accommodate multiple types of agricultural or horticultural use (Figure 1). Design considerations include accommodations for typical farming operations such as tillage, seeding or planting, irrigation, chemical application, and harvesting. Array type, row orientation and spacing, and panel mounting height must be selected or designed so that farm machinery can perform typical duties without interference from the agrivoltaic installation.

Figure 1: Examples of agrivoltaic installations. Top left: single-axis trackers with a single row of panels; top right: single-axis trackers with a double row of panels; bottom left: vertical bifacial panels; bottom right: elevated single-axis trackers. Image credits: Top left, top right, bottom left: Rutgers Agrivoltaics Program, bottom right: https://www.reuters.com/ (no endorsement implied).

Design considerations:

Key design considerations for agrivoltaic installations include:

- How to pay for the installation?
- How to connect to the local utility grid?
- What agricultural or horticultural management practice adjustments are needed?
- Would the electricity generation revenue cover any yield reductions?

These considerations should be carefully assessed before the installation of an agrivoltaics system. For more information, see https://agrivoltaics.rutgers.edu/