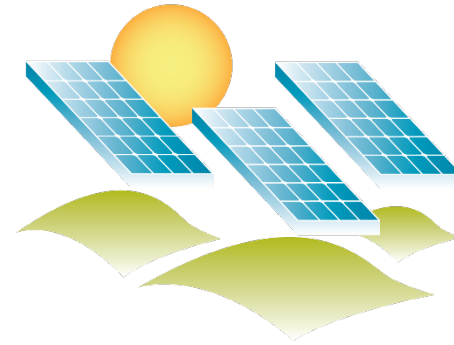


RUTGERS



**Rutgers
Agrivoltaics
Program**

New Jersey Agricultural Experiment Station

Agrivoltaics Roundtable

May 24, 2022

• Purpose of this meeting

- In NJ, farming and energy are complex and important issues
- These issues have many and diverse stakeholders
- There are different ideas/concerns about agrivoltaics (dual-use solar)
- There's very little independent research data available, especially in the NE
- For the dual-use pilot program to be successful, stakeholder participation is key
- Therefore, continued information exchange and discussions are critical
- We predict this will be a multi-year engagement
- We hope this meeting is the first of a number of exchanges
- We encourage open debate so we can identify common ground as well as potential areas of concern
- We are committed to helping address and resolve areas of concern

• Rutgers Agrivoltaics Program Committee Members

- Dave Specca, Lead, Sustainable Ag, RU EcoComplex
- Dunbar Birnie, Solar Design Expert, School of Engineering
- A.J. Both, SEBS and NJAES, Greenhouse Ext. Specialist
- Clint Burgher, Cook Campus Animal Farm Manager
- Daniel Giménez, Soil Scientist, SEBS
- Serpil Guran, Enviro Assessments, Director, RU EcoComplex
- Michael Kornitas, RU Director of Sustainability and Energy
- Pete Nitzsche, Director of Snyder Farm (Pittstown)
- Dean Polk, Acting Director of RSCREC (Cream Ridge)
- Ethan Schoolman, Human Ecology, SEBS
- Kevin Sullivan, Economist, Office of Research Analytics, SEBS
- Dan Ward, Director of RAREC (Bridgeton)
- Mike Westendorf, SEBS and NJAES, Animal Ext. Specialist

• Rutgers Agrivoltaics Program (RAP) Mission

- Formed to take a leadership role in developing science-based answers for agrivoltaic installations across NJ
 - Crop and animal yields and performance
 - Electricity production
 - Soil health and erosion impacts
 - Social and community impacts
 - Environmental impacts and Life-Cycle Assessments (LCA)
- Perform an economic analysis of the impacts of agrivoltaics on farming operations
- Conduct outreach to farmers, project developers, policy makers, and the public
- Provide assistance for the implementation of the Dual-Use Solar Energy Pilot Program
- Collaborate at the regional/national level with universities and research organizations
- Publish outreach materials and scientific papers on agrivoltaics

What we think agrivoltaics is **not**:

- Typical solar farm (large acreage, land no longer in agricultural use)
- Typical solar farm with small animal grazing (e.g., sheep)
- Typical solar farm combined with apiaries or pollinator habitat

Agrivoltaics (dual-use solar)

- ❖ Land is used for agriculture and solar energy generation
- ❖ Agriculture comes first, solar energy generation second
- ❖ Solar energy structures will allow for multiple types of ag uses
- ❖ Goal: Combined more profitable than either one alone
- ❖ Added benefits:
 1. Keeps the land available for farming
 2. Contributes to NJ's renewable energy goals

Typical solar farm (fixed tilt angle, South facing, low to the ground)

It's about electricity production, not about farming...



Typical solar farm combined with grazing sheep



Typical solar farm with a flower meadow
serving as a pollinator habitat



What we envision:

- Minimizing panel impact on farming
 - Reducing panel density
e.g., raised panels in spaced rows



Or, vertically mounted panels (oriented facing East and West)

Bifacial panels



Vertically mounted, double rows of bifacial panels



Vegetable production
Fixed-tilt panels
(UMass)





Largest Commercial
Agrivoltaics Research
Site in the USA

1.2 MW
Single-Axis Tracking
Community Solar
Garden

Boulder County,
Colorado



Photo by Werner Slocum / NREL

Vegetable production
Single-axis trackers





Wine grapes
Single-axis
trackers



Tall enough to let equipment pass

<https://www.agrivoltaics-conference.org/>



SolAg

Making Agrivoltaics Happen

Implemented

18 MW_{DC}
90 Acres
6 Farms

Permitted

42 MW_{DC}
240 Acres
14 Farms

Solar Agricultural Services, Inc.

77 Charlotte Furnace Road
West Wareham, MA 02573

support@solaragservices.com

www.solaragservices.com

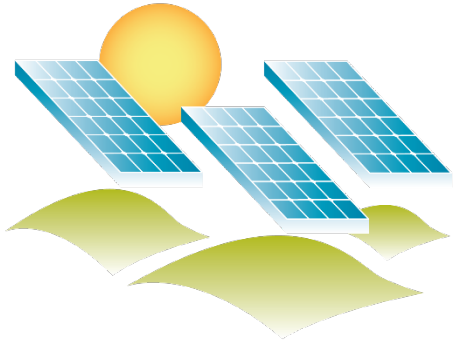


The NJAES received funding through a state appropriation to install agrivoltaic systems at 4 research farms



Locations

1. Rutgers Animal Farm, New Brunswick, NJ
2. Rutgers Agricultural Research and Extension Center, Bridgeton, NJ
3. Clifford E. & Melda C. Snyder Research and Extension Farm, Pittstown, NJ
4. Rutgers Specialty Crop Research and Extension Center, Cream Ridge, NJ



Rutgers Agrivoltaics Program

New Jersey Agricultural Experiment Station

Research: Collecting environmental data

RAREC, Bridgeton, NJ



Animal Farm
New Brunswick, NJ

Research: Assessing shadow patterns

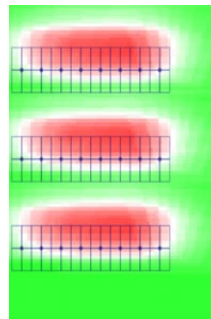
Fixed-Tilt South



<https://www.powerhouse-llc.com/project-1>

Alignment EW

Poor light uniformity



Fixed 20°South

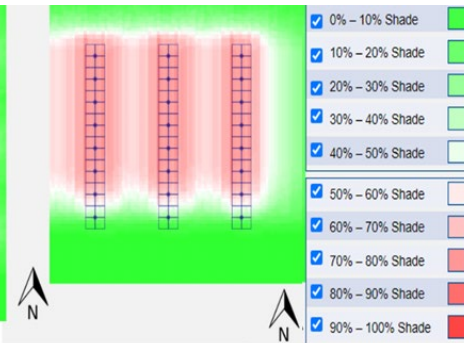
1-Axis Tracking



<https://cleantechnica.com/2019/01/15/nextracker-rolls-bifacial-solar-dice-for-750-megawatts/>

Alignment NS

Good light uniformity,
depending on H and W



Single Axis tracking

Vertical Bifacial



<https://www.next2sun.de/>

Alignment NS

Good light uniformity

