Smart Solar Siting on Farmland: Achieving Climate Goals While Strengthening the Future for Farming in New York

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Survey Limitations

Stakeholder input was gathered through three surveys distributed to farmers, local government officials, land trusts, and environmental organizations. The farmer and local government surveys used voluntary response sampling. They were distributed through agricultural membership organizations representing different constituencies within the New York farming community and town and county local government officials, respectively. The survey of land trusts and environmental organizations used subjective sampling of land trusts who work on farmland protection and environmental organizations with a statewide presence. Land trusts constituted two thirds of survey responses from this group and represented every REDC region except New York City. Responses to all three surveys were voluntary and selection bias may be present from survey respondents who live in communities more directly impacted by existing or proposed solar development.

Though most respondents completed the survey in full, not all questions were required and therefore the number of responses to each question vary and is labeled throughout the report. Due to the non-random sampling method of the surveys, it was not possible to confirm whether findings were statistically significant or generalizable statewide to a reasonable degree. However, the quantity, geographic scope, and written responses from survey respondents provide critical insights into how farmers, local government officials, land trusts, and environmental organizations are approaching smart solar siting in their communities.

Farmer Respondent Characteristics

Table 1 –Approximate gross revenue from farm sales (N=209)

Gross Revenue Bracket	# Survey Respondents	% Total Survey Respondents	% Total NY Famers (USDA 2017 Census)
Less than $10,000	27	12.9%	50.3%
$10,000-$24,999	31	14.8%	14.6%
$25,000-$49,999	20	9.6%	8.5%
$50,000-$99,999	16	7.7%	6.9%
$100,000-$249,999	23	11.0%	9.0%
$250,000-$499,999	19	9.1%	5.1%
Over $500,000	73	34.9%	5.5%

Table 2 – Farmer Age (N=240)

Farmer Age Bracket	# Survey Respondents	% Total Survey Respondents	% New York Farmers (USDA 2017 Census)
<35	17	7.1%	10.4%
35-44	30	12.5%	12.1%
45-54	41	17.1%	19.8%
55-64	77	32.1%	28.4%
65-74	58	24.2%	20.1%
75+	17	7.1%	9.2%

Table 3 – Farmer Primary Crop or Livestock (N=243)
**Respondents could select multiple choices*

Crop	# Survey Respondents	Crops	# Survey Respondents
Hay	139	**Flowers/herbs**	23
Corn	102	**Other (please specify)**	12
Vegetables	77	**Other Grains**	11
Dairy	67	**Sheep/Goats/Mohair**	10
Beef	61	**Horses**	8
Wheat	53	**Maple**	6
Fruit/Orchard	50	**Pork**	5
Soy	48	**Apiary**	4
Poultry	32		

Table 4 – Farmer Location by County (N=322)

County	% Survey Respondents	% Total NY Farms (USDA 2017 Census)	County	% Survey Respondents	% Total NY Farms (USDA 2017 Census)
Albany	1.3%	1.3%	Onondaga	2.3%	1.9%
Allegany	1.8%	2.4%	Ontario	4.3%	2.5%
Broome	2.0%	1.5%	Orange	1.3%	1.9%
Cattaraugus	1.5%	2.9%	Orleans	1.8%	1.5%
Cayuga	6.1%	2.5%	Oswego	1.0%	1.8%
Chautauqua	1.5%	3.7%	Otsego	1.0%	2.6%
Chemung	0.5%	1.2%	Putnam	0.3%	0.3%
Chenango	2.6%	2.3%	Queens	-	-
Clinton	0.8%	1.8%	Rensselaer	2.8%	1.4%
Columbia	2.3%	1.5%	Richmond	-	-
Cortland	2.0%	1.6%	Rockland	-	-
Delaware	1.0%	2.1%	Saratoga	3.1%	0.6%
Dutchess	2.6%	1.9%	Schenectady	0.3%	1.6%
Erie	3.8%	2.8%	Schoharie	1.0%	1.2%
Essex	0.5%	0.9%	Schuyler	1.0%	1.5%
Franklin	0.3%	1.9%	Seneca	1.5%	3.7%
Fulton	1.8%	0.6%	St. Lawrence	2.8%	1.8%
Genesee	8.2%	1.5%	Steuben	2.3%	4.6%
Greene	0.3%	0.6%	Suffolk	1.0%	1.7%
Hamilton	-	-	Sullivan	1.0%	1.1%
Herkimer	3.1%	1.8%	Tioga	1.8%	1.6%
Jefferson	2.0%	2.4%	Tompkins	3.3%	1.6%
Kings			Ulster	2.0%	1.3%
Lewis	1.0%	1.9%	Warren	0.5%	0.2%
Livingston	5.9%	2.0%	Washington	1.5%	2.7%
Madison	4.3%	2.1%	Wayne	2.8%	2.5%
Monroe	2.8%	1.6%	Westchester	0.3%	0.3%
Montgomery	3.1%	1.7%	Wyoming	1.5%	2.2%
Nassau	-	-	Yates	2.0%	2.6%
New York	-	-			
Niagara	4.9%	2.1%			
Oneida	2.8%	2.9%			

Local Government Official Respondent Characteristics

368 local government officials representing 244 unique localities responded to the survey. The survey was directed at officials involved in some capacity with municipal planning functions. Titles self-identified by survey respondents included:

- Town Supervisor or Deputy Supervisor
- Planning Board Chairperson, Deputy Chairperson, or Member
- Zoning Board Chairperson, Deputy Chairperson, or Member
- Director of Planning or Municipal Development
- Assessor
- Town Council Member
- Town Board member
- Town Clerk
- Code Enforcement Officer
- Climate Smart Communities Task Force Member

Table 5 – Town Location by County (N=244)

County	% Responding Towns	% Total NY Towns	County	% Responding Towns	% Total NY Towns	County	% Responding Towns	% Total NY Towns
Albany	1.2%	1.1%	**Herkimer**	2.5%	2.0%	**Schenectady**	0.0%	0.5%
Allegany	1.6%	3.1%	**Jefferson**	1.6%	2.4%	**Schoharie**	2.0%	1.7%
Broome	1.6%	1.7%	**Lewis**	1.6%	1.8%	**Schuyler**	0.8%	0.9%
Cattaraugus	2.0%	3.4%	**Livingston**	1.6%	1.8%	**Seneca**	2.0%	1.1%
Cayuga	2.9%	2.5%	**Madison**	2.5%	1.6%	**Steuben**	1.6%	3.4%
Chautauqua	2.9%	3.6%	**Monroe**	2.5%	2.1%	**Suffolk**	1.6%	1.1%
Chemung	1.2%	1.2%	**Montgomery**	1.2%	1.1%	**Sullivan**	2.0%	1.6%
Chenango	0.4%	2.2%	**Niagara**	3.7%	1.3%	**Tioga**	1.2%	1.0%
Clinton	1.2%	1.5%	**Oneida**	2.5%	2.8%	**Tompkins**	2.5%	1.0%
Columbia	3.3%	1.9%	**Onondaga**	2.9%	2.4%	**Ulster**	1.6%	2.1%
Cortland	1.6%	1.6%	**Ontario**	1.6%	1.7%	**Warren**	0.4%	1.2%
Delaware	1.6%	2.0%	**Orange**	2.5%	2.2%	**Washington**	1.2%	1.8%
Dutchess	3.7%	2.0%	**Orleans**	1.2%	1.1%	**Wayne**	1.2%	1.6%
Erie	3.7%	2.7%	**Oswego**	3.3%	2.4%	**Westchester**	2.0%	2.0%
Essex	1.2%	1.9%	**Otsego**	1.6%	2.6%	**Wyoming**	0.8%	1.7%
Franklin	0.0%	2.0%	**Putnam**	1.2%	0.6%	**Yates**	0.8%	1.0%
Fulton	0.4%	1.1%	**Rensselaer**	0.8%	1.5%			
Genesee	2.5%	1.6%	**St. Lawrence**	6.1%	3.4%			
Greene	1.2%	1.5%	**Saratoga**	2.5%	2.0%			
Hamilton	0.0%	1.0%						

REDC Regions

The Regional Economic Development Council initiative (REDC) is a key component of New York State's approach to State investment and economic development. In 2011, 10 Regional Councils were assembled to develop long-term strategic plans for economic growth for their regions, and counties were assigned to each region. The Councils are public-private partnerships made up of local experts and stakeholders from business, academia, local government, and non-governmental organizations. Regions and county assignments are as follows:

Western New York: Allegany, Cattaraugus, Chautauqua, Erie, Niagara

Finger Lakes: Genesee, Livingston, Monroe, Ontario, Orleans, Seneca, Wayne, Wyoming, Yates

Southern Tier: Broome, Chemung, Chenango, Delaware, Schuyler, Steuben, Tioga, Tompkins

Central New York: Cayuga, Cortland, Madison, Onondaga, Oswego

Mohawk Valley: Fulton, Herkimer, Montgomery, Oneida, Otsego, Schoharie

North Country: Clinton, Essex, Franklin, Hamilton, Jefferson, Lewis, St. Lawrence

Capital Region: Albany, Columbia, Greene, Saratoga, Schenectady, Rensselaer, Warren, Washington

Mid-Hudson: Dutchess, Orange, Putnam, Rockland, Sullivan, Ulster, Westchester

New York City: Bronx, Kings, New York, Richmond, Queens Long Island: Nassau, Suffolk

For more information on REDC regions, please see the 2021 REDC Guidebook.

New York Mineral Soil Groups Compared to USDA Farmland Classifications

Mineral Soil Groups (MSG) 1-4 classifications are defined and used by the NYS Department of Agriculture and Markets to classify the state's agricultural lands based upon soil productivity and capability. Each county in New York State has a listing of all soil types present in the county associated with a specific mineral soil group, MSG 1 through 10. Using GIS analysis, AFT determined the statewide percentage of each mineral soil group represented within the United State Department of Agriculture's more commonly used farmland class designations. For more information on Mineral Soils Groups 1-4, please see the NYSERDA Interactive Map of NYS Mineral Soil Groups 1 through 4 (MSG 1-4) and the Downloadable data for MSG 1-4 by REDC Region

Table 6 – Crossover between NYS Mineral Soil Groups and USDA Farmland Classifications

USDA Farmland Class	Mineral Soil Groups									
	1	2	3	4	5	6	7	8	9	10
All areas are prime farmland	6%	46%	34%	10%	3%	0.1%	-	-	-	-
Farmland of statewide importance	-	-	4%	13%	27%	36%	18%	2%	-	-
Not prime farmland	-	-	0.1%	0.2%	5%	21%	23%	34%	13%	0.2%
Prime farmland if drained	-	0.3%	0.1%	10%	74%	15%	1%	-	-	-

Smart Solar Siting Framework: Utility Scale Solar Energy Project Example

AFT's report, *Smart Solar Siting on Farmland: Achieving Climate Goals While Strengthening the Future for Farming in New York*, proposes a more robust mitigation framework to protect New York's most productive farmland. Within this framework, project-specific mitigation payment amounts vary based on:

1) Each project's facility area;
2) State soil classifications within that facility area;
3) Average regional per acre farmland protection costs; and
4) Achievement of best practice adjustors and discounts, if any.

For purposes of the proposed framework, AFT adopts the following NYSERDA definitions from the current mitigation requirements:

Facility Area is defined as all land area occupied during the commercial operation of the generation facility, the associated interconnection equipment and, if applicable, energy storage equipment. Generally, this will include all areas within the facility's perimeter security fence(s) and the applicable facility related improvements outside of fenced areas. The Facility Area shall include the area "inside the fence" of the project including all fencing inclosing the mechanical equipment such as the solar arrays, inverters, location of any combiner boxes, fuses, switches, meters, distribution boards, monitoring systems such as Balance of Systems components, interconnection equipment, and stormwater controls. The Facility Area shall additionally include improvements of the project "outside of the fence" including access roads, parking areas, stormwater controls and other permanent facilities, or structures installed at the Facility Area, except vegetative landscape screenings or appropriately buried utilities such as electrical conductors or conduit(s).

Mineral Soil Groups 1-4 are defined by the NYS Department of Agriculture and Markets for each soil type in each county identified by the United State Department of Agriculture and are used to classify the state's agricultural lands based upon soil productivity and capability. Each county in New York State has a listing of all soil types present in the county that is associated with a specific mineral soil group, MSG 1 through 10. For more information on the current mitigation requirements, please see the NYSERDA farmland mitigation calculator.

Proposed Mitigation Calculation Rules

1) **Project Facility Area impacts more than 30 acres of MSG 1-4 soils.** Project Facility Areas that impact 30 acres or less of MSG 1-4 are not subject to the proposed mitigation payment framework. The 30-acre threshold is consistent with current Mitigation Payment requirements for projects receiving NY-Sun incentive awards from NYSERDA. AFT acknowledges that this 30-acre threshold may exclude most community distributed generation (CDG) projects of 5 MW ac or less.
2) For the purposes of the proposed mitigation framework, **New York's highest quality agricultural soils are identified as Mineral Soil Groups classifications 1 through 4 (MSG 1-4)**. MSG 1-4 soils correlate strongly with USDA designated Prime Farmland.

3) In contrast to current NYSERDA mitigation requirement, **AFT's proposed framework includes all MSG 1-4 areas, including farmland that is not currently within a County-designated Agricultural District.**

Modeling Mitigation Fees Based on Cost of Protecting Farmland

To derive a regional estimate of farmland protection costs, AFT referred to information from the NYS Department of Agriculture and Market summarizing recent Farmland Protection Implementation Grant (FPIG) awards (Status of Awards and Received Applications). Data was compiled from FPIG Round 16, Round 17, Round 18, and FPIG Dairy Transitions rounds.

Table 7 – Summary of Per Acre Regional FPIG Award Amounts (NYSDAM Regional Designation)

Region	Avg Award Amount / Acre	Highest Avg Award / Acre	Lowest Avg Award / Acre
Finger Lakes/Western	$2,381	$2,457	$2,255
Central	$2,319	$2,776	$1,798
Eastern/Capital	$2,269	$4,216	$1,492
Hudson Valley	$5,990	$10,699	$2,352
Statewide Avg (excluding Long Island)	$3,240		

**Lewis and Jefferson counties included under "Central" within NYSDAM dataset*

The following examples uses a blended statewide average (excluding Long Island) of $3,000/acre, which we acknowledge may be a higher estimate for Central and Finger Lakes/Western regions and a lower estimate for Hudson Valley. For comparison, current NYSERDA farmland mitigation requirements are approximately $1,000/acre averaging across MSG 1-4 with no regional variation built into the formula. If this proposed mitigation framework is adopted by NYSERDA, AFT recommends applying the best available development value cost data to applicable projects to derive the most accurate per acre mitigation fee amounts.

Calculating the Base Mitigation Payment

Table 8 – Proposed Smart Solar Siting Mitigation Framework

Category	Initial Project Classification	Farmland Protection Multiplier (M)
Orange	Project facility area includes **25% or more actively farmed MSG 1-4**; and > 30 acres MSG 1-4	Per-acre fee of **150%** of cost of protecting farmland within impacted REDC region applied to project MSG 1-4 acres
Yellow	Project facility area includes **10-25% actively farmed MSG 1-4**; and > 30 acres MSG 1-4	Per-acre fee of **100%** of cost of protecting farmland within impacted REDC region applied to project MSG 1-4 acres
Green	Project facility area includes **less than 10% actively farmed MSG 1-4**	No mitigation fee

Payment (P) = MSG 1-4 acreage (A) X Farmland Protection Multiplier (M)

Farmland Mitigation Examples – Utility Scale Orange, Yellow, and Green Solar Project

The following tables provide a theoretical application of proposed farmland mitigation framework to a 300 acre (60 MW dc/ 40 MW ac) utility solar project.

Example 1 – Orange Category Utility Scale Solar Project

	Current NYSERDA Mitigation	New Mitigation Proposal
Project Facility Area (LOD)	300 acres (7.5ac/MW)	300 Acres
MSG 1-4 Impacted	100 acres	100 acres (33% of LOD)
Categorization	-	Orange
Average cost of NYSDAM farmland protection award (indexed to REDC)	-	$3,000/acre
Per Acre Mitigation Fee	$1,000 (est. average)	$4,500/acre ($3,000 x 150%)
Total Project Mitigation Fee	$100,000	$450,000 ($11,250/MW)

Example 2 – Yellow Category Utility Scale Solar Project

	Current Mitigation	New Mitigation Proposal
Project Facility Area (LOD)	300 acres (7.5 ac/MW)	300 Acres
MSG 1-4 Impacted	44 acres	44 acres (15% of LOD)
Categorization	-	**Yellow**
Average cost of NYSDAM farmland protection award (indexed to REDC)	-	$3,000/acre
Per Acre Mitigation Fee	$1,000 (est. average)	$3,000/acre (100%)
Total Project Mitigation Fee	$44,000	**$132,000** ($3,300/MW)

Example 3 – Green Category Utility Scale Solar Project

	Current Mitigation	New Mitigation Proposal
Project Facility Area (LOD)	300 acres (7.5 ac/MW)	300 Acres
MSG 1-4 Impacted	44 acres	28 acres (9% of LOD)
Categorization	-	**Green**
Average cost of NYSDAM farmland protection award (indexed to REDC)	-	$3,000/acre
Per Acre Mitigation Fee	N/A (<30 acres)	N/A (<10%)
Total Project Mitigation Fee	$0	**$0**

Best Practices Discounts

Adjustments in the mitigation payment are possible through documented compliance with designated best practices to support intergenerational transition, farm viability, and to keep land within a solar project in farming. The designated best practices and resulting payment adjustors may be combined for additional stacked benefits, up to a reasonable cap.

Note: for acreage committed to bona fide agrivoltaics/dual use solar – that is, a project designed with a farmer to support the farm and prioritize forage and/or crop production – no mitigation payment would be required regardless of MSG 1-4 classification.

Table 9 – Smart Solar Siting Mitigation Framework: Fee Discounts and Adjusters

Adjuster	Fee Discount	Verification Required to Achieve Discount
Supports Farm Viability and Intergenerational Transfer	e.g., 10%	Submission of Letter of Attestation and Farm Business and/or Transition plan proving solar is key to success
Incorporates Agrivoltaics	100% discount on acres used for agrivoltaics	Project designed with farmer, continued farm activity annually verified
Incorporates Co-Utilization	e.g., 10-15%	Project consults farmer to design plan, continued farm activity annually verified
Managed for Soil Health	e.g., 5-10%	Project consults with Soil and Water Conservation District or other expert (NRCS) to design plan, continued management annually verified
Improves Pollinator Habitat	e.g., 5%	Project meets state standards for pollinator performance and includes apiary