



**Department of
Taxation and Finance**

OFFICE OF REAL PROPERTY TAX SERVICES

2024 Solar and Wind Appraisal Model User Guide

New York State Department of Taxation and Finance
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Glossary

AC	Alternating Current
CA	Community Adder
CC	Community Credit
CDG	Community Distributed Generation
CES	New York State Clean Energy Standard
COD	Commercial Operation Date
DC	Direct Current
DER	Distributed Energy Resource
DPS	Department of Public Service
DRV	Demand Reduction Value
E-Value	Environmental Value
ICSA	Inclusive Community Solar Adder
kW	Kilowatt
LSRV	Locational System Relief Value
Model	Draft 2024 Solar and Wind Appraisal Model
MTC	Market Transition Credit
MW	Megawatt
NEM	Net Energy Metering
NYISO	New York Independent System Operator
NYSAA	New York State Assessors Association
NYSERDA	New York State Energy Research and Development Authority
PILOT	Payment in Lieu of Taxes
REC	Renewable Energy Credits
RES	New York State Renewable Energy Standard
Tax Department	New York State Department of Taxation and Finance
VDER	Value of Distributed Energy Resources
W	Watt

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Model/User Guide Overview

The 2021-2022 Enacted New York State Budget established a process for the New York State Department of Taxation and Finance (the Tax Department) to develop a standard appraisal methodology for solar and wind energy systems with a nameplate capacity equal to or greater than one megawatt (MW). The Tax Department, in consultation with the New York State Energy Research and Development Authority (NYSERDA) and the New York State Assessors Association (NYSAA), will annually develop:

- an appraisal Model using the discounted cash flow approach for solar and wind energy systems, and
- corresponding discount rates to be applied for valuation purposes.

Beginning with 2022 assessment rolls, assessors are required to use the model and discount rates to value and place assessments on affected solar and wind energy systems.

Note: Municipalities will continue to have the flexibility to negotiate payment in lieu of taxes (PILOT) agreements.

This User Guide is designed to assist assessors and stakeholders in entering inputs into and retrieving the appraised value from the Draft 2024 Solar and Wind Appraisal Model (the model) published by the Tax Department. Management and interpretation of the appraisal values are the responsibility of the assessor or stakeholder.

It is the user's responsibility to enter information specific to their solar or wind project on the *Inputs* sheet. This is the only sheet in the model that requires the user to enter information.

This sheet contains four sections that allow for user input:

- *Inputs for All Project Revenue Types*. It includes five required and two optional user inputs that apply to all projects.
- *Additional Required Inputs for VDER Projects*. It includes two required and two optional user inputs that apply only to projects receiving Value of Distributed Energy Resources (VDER) revenues.
- *Additional Input for NEM Projects*. It includes a single required user input that applies only to projects receiving Net Energy Metering (NEM) revenues.
- *Additional Input for Tier 1 Projects*. It includes a single required user input that applies only to projects receiving Tier 1 revenues.

Each of the four user input sections is covered in a subsequent section of this guide.

Note: In each section, only cells highlighted in light blue can be modified by the user. After the user selects *Project Revenue Type*, the model shades the two revenue-specific user input sections that are not applicable for the project. This shading is presented to the user as a black diagonal grid pattern to indicate that these input sections should be ignored.

Figure 1 on page 2 shows the four user input sections on the *Inputs* sheet. The shading of the non-applicable revenue-specific user input sections has been omitted for demonstrative purposes.

Required user inputs are circled in red.

Revenue-specific required user inputs are circled in orange.

Optional user inputs are circled in yellow.

Figure 1. User Input Sections of The Model

Inputs for All Project Revenue Types			
Project Revenue Type	VDER - Value of Distributed Energy Resources		
Plant Type	Solar - Tracking		
System Size	5,000	kW AC	
Start Date of Plant Operation	1/1/2023		
Taxable Status Year	2024		
System Age at Taxable Status Date	1	Year(s)	
Before Tax Discount Rate - Real WACC	6.68%		
Tax Load	3.00%		
Loaded Real Discount Rate	9.88%		
Annual Ground Lease Payment (if applicable)	\$5,000		
Annual Ground Lease Escalator (if applicable)	2.00%		
Additional Required Inputs for VDER Projects			
NYISO Zone	A - West		
Utility Company	NYSEG		
DRV Rate	\$0.0890	\$/kWh	
Default Maximum MTC/CC	\$0.0314	\$/kWh	
Additional Optional Inputs for VDER Projects			
Actual Market Transition or Community Credit or Community Adder/ICSA		\$/kWh	
		\$	
<p>Note: The model assumes that VDER projects receive the maximum possible Market Transition Credit (MTC) by default, but allows a lower MTC or Community Credit (CC) or a Community Adder (CA) to be entered to override the default assumption. VDER projects may receive either a MTC, a CC or a CA. No VDER project can receive more than one of these credits, and some VDER projects receive none of them. VDER projects may also receive the Inclusive Community Solar Adder (ICSA). If applicable, the ICSA should be added to the CA (if any) and the combined CA and ICSA value should be entered into cell C23.</p>			
Additional Input for NEM Projects			
Utility for Retail Rate	ConEd NYC		
Additional Input for Tier 1 Projects			
NYISO Zone	A - West		

Interpreting Model Output

The model output (the Present Value of the Cash Flows) is in cell D36 of the *Model* sheet.

This region of the *Model* sheet is reproduced below for demonstrative purposes, with cell D36 circled in green. The value in D36 is the sum of the discounted cash flows for the project and reflects the estimated current value of the investment.

Note: All cash flows in the Model are pre-tax.

If a lease amount is entered in the *Annual Ground Lease Payment* field, then the model output represents the value of the improvements only.

To derive the fair market value of the parcel, the user should use standard appraisal methodology to value the land and add the result to the present value of cash flows.

If the land is not leased (Annual Ground Lease Payment is \$0 or blank), then the model output represents the total market value for the improvements and underlying land.

Figure 2. Present Value of Cash Flows Model Output

Discounted Cash Flow	\$ -	\$ 672,451	\$ 516,299	\$ 423,467	\$ 406,931	\$ 353,248
Present Value of Cash Flows:	\$ 4,053,320 Value for Improvements Only \$ 811 / kW AC					

*Expense includes O&M, Insurance, Management.
Cash flows are expressed in Real 2022 Dollars.

Inputs for All Project Revenue Types

Project Revenue Type

This required user input determines which revenue(s) the modeled project receives. Due to significant differences between the three Project Revenue Types, this user input has a significant impact on the project's appraised value. Additionally, this user input determines which of the three revenue-specific user input sections remains unshaded for data entry. The user selects from a drop-down list containing the model's three Project Revenue Types:

- **VDER - Value of Distributed Energy Resources.** The New York State Public Service Commission established VDER in 2017 as a new mechanism to compensate energy created by distributed energy resources (DERs), such as solar and wind. VDER compensates projects in the form of utility bill credits based on when and where (some components vary by utility) they provide electricity to the grid. The amount of compensation is determined by a DER's energy value, capacity value, environmental value (E-Value), demand reduction value (DRV) and (for a minority of projects) locational system relief value (LSRV). Additionally, certain Community Distributed Generation (CDG) VDER projects may have incentives called the Market Transition Credit (MTC), Community Credit (CC), or Community Adder (CA). These elements recognize the benefits that DERs provide to the grid and society, including avoided carbon emissions, cost savings to customers and utilities, and other savings from avoided capital investments.¹ The model can be used for fixed solar and tracking solar² VDER projects between 1 MW and 5 MW alternating current (AC) (the maximum project size currently allowed for VDER projects).³
- **NEM - Net Energy Metering.** NEM projects are CDG projects that were built prior to the implementation of VDER. These projects receive net metering credits that compensate them for electricity delivered into the grid based on the residential and commercial retail rate of the local utility. The model can be used for fixed solar and tracking solar NEM projects between 1 MW and 5 MW AC (the maximum project size that was allowed for NEM projects).
- **Tier 1.** Tier 1 projects produce Tier 1 renewable energy credits (RECs) under New York State's Renewable Energy Standard (RES), which is a mechanism enacted by the Clean Energy Standard (CES) to help the state reach its clean energy goals and transition toward a low-carbon energy system.⁴ The RES requires utilities and other load serving entities in the state to procure Tier 1 RECs. Tier 1 RECs are produced by generators using new renewable energy resources that entered commercial operation on or after January 1, 2015.⁵ The model can be used for fixed solar, tracking solar and land-based wind Tier 1 projects greater than 5 MW AC. There are not currently any fixed solar, tracking solar or land-based wind Tier 1 projects that are less than 5 MW AC.

¹ [The Value Stack – Value of Distributed Energy Resources](#), NYSERDA; 2023

² The terms *fixed* and *tracking* refer to the racking upon which a solar array is mounted. For tracking arrays, motors rotate the array throughout the day to follow the sun, resulting in a greater energy output.

³ Further discussion on AC is provided in the System Size section on page 6.

⁴ [Clean Energy Standard \(CES\)](#), NYSERDA; 2023

⁵ [Tier 1 – New Renewables](#), NYSERDA; 2023

The user should select a *Project Revenue Type* for their project using the following guidelines:

- If the project is land-based wind or solar greater than 5MW AC, the user should select Tier 1.
- If the project is solar between 1 MW and 5 MW AC, the user should select either VDER - Value of Distributed Energy Resources or NEM - Net Energy Metering.
 - If unknown, the user can query a publicly available database of solar projects to determine which of these two options to select. Utility interconnection inventories are posted monthly on the [Department of Public Service website](#) under the *SIR Inventory Information* section. If Column AB (*Value Stack Y/N*) reads *Yes* or *Y*, the user should select *VDER – Value of Distributed Energy Resources*. Otherwise, the user should select *NEM – Net Energy Metering*.
 - If the user cannot find their project in this database, then they should select *VDER – Value of Distributed Energy Resources* if it commenced operation on or after January 1, 2017, or *NEM – Net Energy Metering* if it commenced operation before January 1, 2017.
- This input could also be provided by the project developer if they attest to the veracity of the provided information.

The model cannot be used for projects less than 1 MW AC.

Plant Type

This required user input determines the project's *Plant Type*. The plant type affects the annual electricity generated by the project as well as various cost data (operating, decommissioning, etc.). The model can be used for three plant types:

- fixed solar
- tracking solar
- land-based wind.

The user selects from a drop-down list that dynamically populates the available plant types based on the currently selected *Project Revenue Type*. All project revenue types allow for fixed solar and tracking solar, but only the Tier 1 project revenue type also allows for land-based wind.

The user should select *Land-Based Wind* for all wind projects. The two solar plant types account for whether the project's panels have trackers installed. Trackers allow the project's panels to shift their angle throughout the day based on the sun's position to maximize electricity production, while fixed panels remain tilted in a single, unmovable position. Nearly all utility-scale projects use trackers, so the user should select tracking solar for most solar projects.

The user should only select *Fixed Solar* if they have information confirming that the project's panels do not track, or the project developer attests that the project's panels do not track. Selecting *Fixed Solar* decreases the project's electricity generation by an average of 13%.

System Size

This required user input determines the *System Size* (also known as nameplate capacity). The system size is used to scale unitized values and affects various cost data (operating, decommissioning, etc.). Any system size greater than or equal to 1,000 kilowatts (kW) of AC can be entered into this input.⁶ The *System Size* must be entered in kW AC; it is vital that the user ensures that it is entered in the correct units to avoid substantial modeling errors. The electric grid operates in AC, but solar panels and wind turbines produce electricity as direct current (DC). Therefore, inverters are required to convert the produced DC electricity into AC electricity that can be injected into the grid. Due to inverter inefficiency and project-specific design parameters, 1 MW DC of solar panel capacity does not equal 1 MW AC of inverter capacity to the electric grid.

Project developers have the most accurate system size data for their project. If the user can get an AC system size value from the project developer, and the developer attests to the veracity of the provided information, then the user should use the value provided by the project developer. If the project developer is unwilling to provide this information, the project's permitting documents with the local building inspector will probably list both AC and DC size. Alternately, the user may want to conduct a search for press releases containing an AC system size value for their project. If the user is still unable to determine the project's system size, they can query a publicly available database of NYSERDA solar projects to find the project's DC system size.⁷ The DC system size should then be converted into an AC system size by dividing by 1.38. Note that 1.38 is an approximate AC-to-DC conversion factor, but each project's actual AC-to-DC conversion factor varies based on its unique design.

Start Date of Plant Operation

This required user input should be set equal to the *Start Date of Plant Operation*, (the Commercial Operation Date or COD). The *Start Date of Plant Operation* is used to determine how many operating years the project has remaining before it is decommissioned.

The model assumes that all projects have a 25-year operating life. The *System Age at Taxable Status Date* (the value by which the assumed 25-year operating life is reduced) is displayed on the *Inputs* sheet in cell C9. If a date in 2020 is entered, for example, then the 2024 model reduces the project's operating life by four years.

Note: Only the year of the date entered is used (entering 1/1/2020 and 12/31/2020 will result in identical appraised values).

The user can find the date to enter via press releases announcing their project's completion or by querying a publicly available database of NYSERDA solar projects to find their project's date

⁶ *System Size* can be expressed in watts (W), kilowatts or megawatts. 1 kW is equal to 1,000 W or 0.001 MW.

⁷ NEM & VDER Projects: [Solar Electric Programs Reported by NYSERDA: Beginning 2000](#), Open NY; December 18, 2023

Tier 1 Projects: [Large-scale Renewable Projects Reported by NYSERDA: Beginning 2004](#), Open NY; March 14, 2024

completed.⁸ If the project has not yet begun operation, then the user should enter the date construction was completed instead.

Entering a date more than 24 years in the past will result in a project valuation of zero, as the project has no operating years remaining.

Tax Load

This required user input should be set equal to the overall full value tax rate for the property where the plant is sited. This rate should reflect all property taxes applicable to the property, including town, county, village, school district, and special district tax rates.

The model allows a *Tax Load* between 0% and 100% to be entered. The *Tax Load* is used by the model to calculate the *Loaded Discount Rate*, which is shown on the *Inputs* sheet in cell C12.

To calculate the *Tax Load*, the user should follow three steps:

1. For each taxing jurisdiction, multiply the tax rate per thousand dollars of assessed valuation by the latest final equalization rate (Note: Use the actual equalization rate, not the percentage. For example: 100.0, 90.0, 25.34, etc.).
2. Divide the product by 1,000.
3. Sum the results of all jurisdictions to arrive at the *Tax Load*.

For example, assume a project has a town tax rate of 5.561390, a county tax rate of 13.264834, a special district tax rate of 1.024976 and a school tax rate of 29.241161. The total of those tax rates is 49.092361. The property is entirely in one town, so the equalization rate can be applied after the tax rates are summed. The equalization rate is 66. The product of 49.092361 and 66 is 3,240.0958. 3,240.0958 divided by 1,000 equals 3.2401, so the *Tax Load* to enter into the model is 3.24%.

⁸ NEM & VDER Projects: [Solar Electric Programs Reported by NYSERDA: Beginning 2000](#), Open NY; December 18, 2023

Tier 1 Projects: [Large-scale Renewable Projects Reported by NYSERDA: Beginning 2004](#), Open NY; March 14, 2024

Annual Ground Lease Payment (if applicable)

This optional user input should be set equal to the *Annual Ground Lease Payment* amount, if applicable. The entered value will be treated as an annual expense.

If the land is not leased, the user should enter \$0 or leave the input blank. As a result of the land not being leased, the model output will represent the total market value for the improvements and necessary supporting land. In the income approach, the land value is inherent to the concluded value, unless removed with a lease expense. For instance, assessors and appraisers may use the income approach to value an apartment building and the land below it.

The land lease information is available from the project developer, who should attest to the veracity of the provided information.

Annual Ground Lease Escalator (if applicable)

This optional user input should be set equal to the escalation rate of the *Annual Ground Lease Payment*, if applicable. If the annual ground lease includes an escalator clause, the user should enter the escalation rate as a percentage.

If there is no escalator, the user should enter 0% or leave the user input blank for a constant lease. The land lease information is available from the developer, who should attest to the veracity of the provided information.

If the *Annual Ground Lease Payment* is set to \$0 or left blank, then the *Annual Ground Lease Escalator* input does not have an impact, even if a value is entered.

Additional Required Inputs for VDER Projects

NYISO Zone

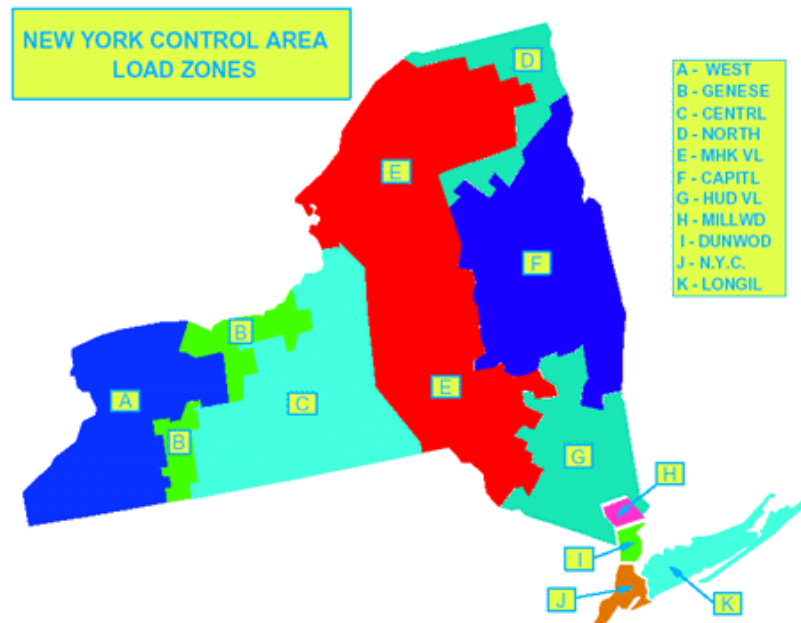
This revenue-specific required user input should be set to the NYISO Zone that the user's project is located within. The New York Independent System Operator (NYISO) runs the state's electric grid.

NYISO divides the state into eleven main zones for wholesale electricity pricing, which are mapped in Figure 3 below. A dynamic version of this map is also accessible online.⁹ The user should use these maps to determine which NYISO Zone their project is in and then select it from the drop-down list.

The model uses the NYISO Zone to determine which energy and capacity price forecasts to use for the project. If a project spans multiple zones, or the user does not have precise location data for their project, they should ask the project developer for the project's NYISO Zone and have them attest to the veracity of the provided information.

If the project developer is unwilling to provide this information, then the user should make an informed choice based on the user's examination of the maps.

Figure 3. Map of NYISO Load Zones



Source: NYISO [New York Control Area Load Zones](#)

⁹ A dynamic version of Figure 3 [is available online](#).

Utility Company

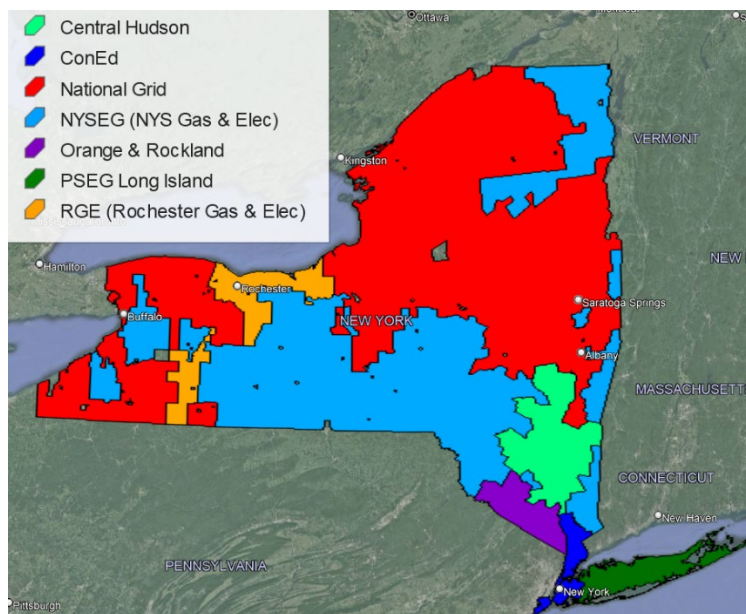
This revenue-specific required user input should be set to the *Utility Company* whose service area the project is located in using the drop-down list. The selected *Utility Company* is used to populate utility-specific DRV data, default maximum MTC/CC data and utility loss adjustment factor data. New York State is served by seven major electric utility companies. The user can query a publicly available database of NYSERDA solar projects to determine their project's utility company.¹⁰ If the user's project is not in the NYSERDA database, a map of the company's service area is shown in Figure 4 below. A dynamic version of this map is also accessible online.¹¹ The user should use these maps to determine which Utility Company's service area their project is located in.

Con Edison (ConEd) appears in the drop-down list four times since it has four different DRV windows. If the user's project is in ConEd's service area, they should ask the project developer which DRV window applies to the project and have them attest to the veracity of the provided information. If the developer is unwilling to provide this information, the user should select the 11 A.M. – 3 P.M. DRV window option since it results in the highest project appraisal. All other inputs being equal.

Note: If one of the four ConEd options are selected for the utility company, the NYISO Zone must be set to H – Millwood, I – Dunwoodie, or J – N.Y.C.

If a project spans multiple utility companies' service areas, or the user does not have precise location data for their project, they should ask the project developer for the project's utility company and have them attest to the veracity of the provided information. If the project developer is unwilling to provide this information, then the user should make an informed choice based on the user's examination of the maps.

Figure 4. Map of New York Electric Utility Service Areas



¹⁰ [Solar Electric Programs Reported by NYSERDA: Beginning 2000](#), Open NY; December 18, 2023

¹¹ A dynamic version of Figure 4 [is available online](#).

Actual Market Transition or Community Credit or Community Adder/ Inclusive Community Solar Adder

These two revenue-specific optional user inputs allow the user to override the model's default handling of the incentives known as the Market Transition Credit (MTC), Community Credit (CC), and Community Adder (CA). Certain Community Distributed Generation (CDG) projects receive one of these revenues, but no project can receive more than one of them.

Some VDER projects receive none of these revenues. By default, the model assumes that VDER projects receive the maximum possible MTC/CC for the selected *Utility Company*, but it allows a lower MTC/CC or a CA to be entered to override this default assumption. The MTC and CC are administered by the utilities and are included in a project's per-kilowatt-hour compensation. The CA is an upfront lump-sum incentive paid to the project developer by NYSERDA.

The user should ask the project developer whether the project receives an MTC/CC/CA. If so, the developer should be asked to provide the value and attest to its veracity.

If the project developer provides an MTC/CC/CA value or attests that their project receives no MTC/CC/CA, then the user should follow the instructions in Figure 5 on page 12 to override the model's default assumption.

If the project developer is unwilling to provide the MTC/CC/CA information, then the user should leave both of these user inputs blank, thereby resorting to the default assumption. The default assumption will lead to the highest appraised value, all other inputs being equal.

The Community Adder input can also contain a value for the *Inclusive Community Solar Adder* (ICSA). If the project receives a CA but no ICSA, then the Community Adder/ICSA user input should be set to the value of the CA. If the project receives an ICSA but no CA, then the Community Adder/ICSA user input should be set to the value of the ICSA. If the project receives both a CA and an ICSA, then the Community Adder/ICSA user input should be set to the sum of the CA and ICSA. The user should ask the project developer whether the project receives an ICSA. The developer should be asked to provide the value and attest to its veracity.

Figure 5. MTC/CC/CA Model Scenarios

Scenario	User Enters	Model Behavior
Scenario 1	No MTC/CC/CA	If no actual MTC/CC/CA information was provided by the project developer, the model will use the maximum MTC/CC rate for the selected utility company to ensure the highest possible appraised value and incentivize the project developer to provide proof of a lower value if applicable.
Scenario 2	Actual MTC/CC	If the project developer attests that their project receives a lower MTC/CC than the maximum default, the user should enter it into the user input cell for the MTC/CC. The model will then use the provided value to override the maximum default assumption. If a project developer attests that their project receives no MTC/CC/CA, the user should enter a value of zero into the user input cell for the MTC/CC to override the maximum default assumption.
Scenario 3	Actual CA	If a project developer attests that their project receives a CA, the user should enter it into the user input cell and the model will use the provided value to override the maximum default MTC/CC assumption (which changes to zero since the project can't receive both). CA values are also listed in a NYSERDA database of solar projects. ¹²
Scenario 4 (Invalid)	Actual MTC/CC and Actual CA	If the user accidentally enters values into both the MTC/CC and CA user input cells, a bold red error message displays warning them that only one of the two inputs can be used (since a project cannot receive both). If the user does not fix this error, the model ignores the entered MTC/CC value and uses only the entered CA value to avoid double counting this revenue category.

¹² [Solar Electric Programs Reported by NYSERDA: Beginning 2000](#), Open NY; December 18, 2023
Column AH, *Community Adder*.

Additional Input for NEM Projects

Utility for Retail Rate

This revenue-specific required user input should be set to the electric utility whose service area the project is located in using the drop-down list.

The selected *Utility for Retail Rate* determines which residential and commercial retail rate forecasts are used to forecast the value of the project's net metering credits. New York State is served by seven major electric utilities.

The user can query a publicly available database of NYSERDA solar projects to determine their project's utility company.¹³ If the user's project is not in the NYSERDA database, a map of the utility company's service area is shown previously in Figure 4 on page 10. The user should use these maps to determine which utility's service area their project is located in.

If a project spans multiple utility companies' service areas, or the user does not have precise location data for their project, they should ask the project developer for the project's electric utility and have them attest to the veracity of the provided information.

If the project developer is unwilling to provide this information, then the user should make an informed choice based on the user's examination of the maps.

Additional Input for Tier 1 Projects

NYISO Zone

This revenue-specific required user input should be set to the NYISO Zone that the user's project is located within. The NYISO runs the state's electric grid. NYISO divides the state into eleven main zones for wholesale electricity pricing, which are mapped in Figure 3 on page 9.

The user should use these maps to determine which NYISO Zone their project is in and then select it from the drop-down list. The model uses the NYISO Zone to determine which energy and capacity price forecasts to use for the project.

If a project spans multiple zones, or the user does not have precise location data for their project, they should ask the project developer for the project's NYISO Zone and have them attest to the veracity of the provided information. Alternately, the user can query a publicly available database of NYSERDA solar projects to determine their project's utility company.¹⁴

If the project developer is unwilling to provide this information, then the user should make an informed choice based on the user's examination of the maps.

¹³ [Solar Electric Programs Reported by NYSERDA: Beginning 2000](#), Open NY; December 18, 2023

¹⁴ [Large-scale Renewable Projects Reported by NYSERDA: Beginning 2004](#). Open NY; March 14, 2024