	Coordinated Electric System Interconnect Review	DER #21556
	Distributed Energy Resources - NYSSIR	Revision 0 9/22/2023

For
Interconnection Customer: 6985 Lyons Rd
Applicant: Delaware River Solar
2200 kVA PV Generator System
6985 Lyons Rd

Interconnection to NYSEG
Geneva Division
4207946 Tap Circuit
34.5kV Feeder

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1.0 INTRODUCTION

This report presents the analysis results of the NYSEG interconnection study based on the proposed interconnection and design submittal from the Interconnection Customer in accordance with the Company Bulletin 86-01. The intent of this report is to assess this project’s feasibility, determine its impact to the existing electric power system (EPS), determine interconnection scope and installation requirements, and determine costs associated with interconnecting the Interconnection Customer’s generation to the Company’s Electric Power System (EPS). This Coordinated Electric System Impact Review (CESIR) study; according to the New York State Standardized Interconnection Requirements (NYSSIR) Section I.C Step 6; identifies the scope, schedule, and costs specific to this Interconnection Customer’s installation requirements.

2.0 EXECUTIVE SUMMARY

The total estimated planning grade cost of the work associated with the interconnection of the Interconnection Customer is \$255,865.

The interconnection was found to be feasible by distribution planning with modifications to the existing Company EPS and operating conditions, which are described in detail in the body of this Study.


Transmission Planning does not have any concerns with the installation of this proposed generation at this location.

The ability to generate is contingent on this facility being served by the interconnecting circuit during normal Utility operating conditions. Therefore, if the interconnecting circuit is out of service, or if abnormal Utility operating conditions of the area EPS are in effect, NYSEG reserves the right to disengage the facility.

No future increase in generation output beyond that which specified herein for this interconnection has been studied. Any increase in system size and/or design change is subject to a new study and costs associated shall be borne by the Interconnection Customer. An increase in system size may also forfeit the Interconnection Customer’s existing queue position.

NYSEG is no longer accepting cost share payments for substation upgrades until 01/01/2024. If your cost share payment is due prior to 01/01/2024 please email distributedgenerationadmin@avangrid.com for further instruction.

The triggering amount for your cost share eligible substation upgrade is \$169,014.

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3.0 COMPANY EPS PARAMETERS

Substation	Sleight Rd
Transformer Name	N/A
Transformer Peak Load (kVA)	N/A
Contingency Condition Load, N-1 Criteria (kVA)	N/A
Minimum Daytime Load (kVA)	N/A
Generation: Total/Connected/Queued (kVA)	38961 / 202 / 38759
Contingency Condition Generation: T/C/Q (kVA)	N/A
Supply Voltage (kV)	34.5
Transformer Maximum Nameplate Rating (kVA)	N/A
Distribution Bus Voltage Regulation	Yes
Transmission GFOV Status	not installed
Bus Tie	none
Number of Feeders Served from this Bus	N/A
Connecting Feeder/Line	4207946
Peak Load on Feeder (kVA)	5,194
Minimum Daytime Load on Feeder (kVA)	779
Feeder Primary Voltage at POI (kV)	34.50
Line Phasing at POI	Three-Phase
Circuit distance from POI to substation	1.9493 miles
Distance to nearest 3-Phase (if applicable)	N/A
Line Regulation	Yes
Line/Source Grounding Configuration at POI	Effective
Other Generation: Total/Connected/Queued (kVA)	13550 / 124 / 13426
System Fault Characteristics without Interconnection Customer DG at POI with System Upgrades described in Section 6	
Interconnection Customer POI Location	L-546, P-47
I 3-Phase (3LLL)	6615 Amps
I Line to Ground (3I0)	5250 Amps
Z1 (100 MVA Base)	0.0513 + j0.3425 PU
Z0 (100 MVA Base)	0.0988 + j0.435 PU


4.0 INTERCONNECTION CUSTOMER SITE

The Interconnection Customer is proposing a new Primary Metered Service connection.

This location is presently served via Three-Phase 34.5kV.


The proposed generating system consists of :

One (1) Sungrow SG3425UD-MV, 2200 kW (limited)


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5.0 SYSTEM IMPACT ANALYSIS

Category	Criteria	Limit	Result
Voltage	Overvoltage	<105% (ANSI C84.1)	PASS
With the addition of the subject generator, the maximum voltage as modeled on the Feeder is 105.74% of nominal, and is not impacted by the proposed DER. No remediation is required.			
Voltage	Undervoltage	>95% (ANSI C84.1)	PASS
With the addition of the subject generator, the minimum voltage as modeled on the Feeder is 90.19% of nominal, and is not impacted by the proposed DER. No remediation is required.			
Voltage	Source Regulation for Reverse Power	<15% minimum load criteria	N/A
Distribution Planning cannot provide - Transmission Source			
Voltage	Line Regulation for Reverse Power	Minimum load to generation criteria	N/A
Not Applicable			
Voltage	Fluctuation	<3% steady state from proposed generation on feeder	PASS
The greatest steady-state voltage fluctuation on the circuit is 0.07% due to the proposed generation and 0.16% on the substation bus due to the aggregate generation.			
Voltage	Fluctuation	<5% steady state from aggregate DER on substation bus	PASS
The greatest steady-state voltage fluctuation on the substation bus due to aggregate generation is 0.16%.			
Voltage	Regulator Variation	Regulator tap movement >1 position	PASS
The greatest voltage fluctuation seen at the voltage regulation at the source is 0.31V.			
Voltage	Flicker	Screen H Flicker	PASS
With an X/R ratio of 6.68, the Pst for the location with the greatest voltage fluctuation is 0.024 and the emissions limit is 0.350.			
Voltage	Flicker	Aggregate Flicker	PASS
The Pst for the location with the greatest aggregate voltage fluctuation is 0.024 and the emissions limit is 0.900.			
Equipment Ratings	Thermal (Cont. Current)	Thermal limits (assuming no load)	PASS
No issues.			
Equipment Ratings	Withstand (Fault Current)	<90% withstand limits (Distribution Equip.)	PASS
No distribution issues.			
Equipment Ratings	Withstand (Fault Current)	<90% withstand limits (Substation Equip.)	PASS
The additional fault current contribution from the generation does not contribute to interrupting ratings in excess of existing EPS equipment.			


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Protection	Unintentional Islanding	Unintentional Islanding Document & Company Guidelines	PASS
No significant risk of unintentional islanding exists, no further study or investigation required. Provided that the customer uses the same manufacturer of inverters as stated in their application, if the manufacturer is changed it must be reviewed to ensure that the new manufacturer complies with the anti-islanding standards.			
Protection	Protective Device Coordination	Company Guidelines (Dist. Line Fusing)	PASS
There are no existing protective devices between the Source and proposed PCC.			
Protection	Protective Device Coordination	Company Guidelines (Reclosers and Breakers)	PASS
The proposed interconnection does not pose an issue with protective devices.			
Protection	Fault Sensitivity	Rated capabilities of EPS equipment	PASS
The additional fault current contribution from the generation does not contribute to interrupting ratings in excess of existing EPS equipment.			
Protection	Ground Fault Detection	Reduction of reach >100%	PASS
The Interconnection customer is not a ground source to the distribution circuit			
Protection	Overvoltage - Transmission System Fault	Company 3V0 criteria	FAIL
Due to the system configuration Transmission Ground Fault Overvoltage's are not a concern.			
Protection	Overvoltage - Distribution System Fault	<125% voltage rise	FAIL
With subject generator interconnected the modeled voltage rise on the unfaulted phases of the system is 176%. See section 6 point 8.			
Protection	Effective Grounding	[individual utility specifications]	FAIL
With the subject generator interconnected the modeled R0/X1 is 0.26975 PU and the X0/X1 is -159.32 PU. See section 6 point 8.			
SCADA	Required EMS Visibility for Generation Sources	Monitoring & Control Requirements	Needed
The 2.2 MVA subject generator triggers the requirement for SCADA reporting to the Utility			

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Existing Equipment Rating Analysis Table:

EQUIPMENT	VOLTAGE (kV)	LINE or GISID	POLE	PASS/FAIL
NONE				

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6.0 MITIGATIONS FOR SYSTEM IMPACT ANALYSIS FAILURES

Detail below is intended to provide sufficient information and clarity to give the Interconnection Customer an understanding to the relationship of costs and scope associated with the DER interconnection and the system modifications due to the DER impact. This included any required EPS equipment upgrades. Where scope items are identified, associated labor, equipment rentals and indirect project support functions (such as engineering and project management) are intended and implied.

1. Each individual PCC location must have the ability to trip offline within 2.0 seconds for the loss of voltage on any one individual phase in order to electrically isolate the DER from the utility at the generator interconnection and must be verified at checkout.
2. The Interconnection Customer is required to comply with the utility's voltage threshold criteria while operating the generating system. If, after interconnection, the Interconnection Customer cannot meet this requirement the Company reserves the right to disconnect the generation and install voltage regulators on the utility side of the Point Of Common Coupling at the Interconnection Customer's expense.
3. Any potential manual or automatic switching schemes with other distribution circuits will require the customer to disconnect from the distribution circuit at the customer's PCC.
4. Protection & coordination is based on only the system-normal circuit configuration, and is not applicable for switching scenarios and ties with other distribution circuits.
5. The requirements for Remote Crediting, or Community Distributed Generation billing are that an hourly interval MV-90 meter be installed which has remote access via a dial-up telephone circuit known as a land line. The installation of the land line is the responsibility of the customer, and the installation of the meter is the responsibility of the utility.
6. Install a new microprocessor-controlled line recloser equipped with directionality on the utility-side of the primary-metered service at the PCC.
7. Any circuit tap, substation, or distribution line regulators, and substation LTC/regulator controls must be either already equipped with or changed out to retrofitted microprocessor controls that will handle reverse power flow and co-generation functionality.

8. Failure(s) Addressed:


SPC: Overvoltage – Distribution

Due to the installation failing the Overvoltage-Distribution System Fault and Effective Grounding Screens the project must be revised such that if the generation site is islanded from the utility the system from the Point Of Interconnection into and through the generation equipment is maintained as effectively grounded. The interconnection is required to meet the grounding requirements as identified in AVANGRID Bulletin 86-01 section 6.2.2.2 Grounding. A PE stamped revised 3 Line will be required to be submitted to the Distributedgenerationadmin@avangrid.com mailbox clearly identifying the revision(s) made to meet the effective grounding requirements. It is vital that the proposed interconnection maintain an effectively grounded system such that during any case of islanding (intentional or not), the circuit (and load) remains effectively grounded. Therefore, verification by the utility of the system meeting the effective grounding requirements is necessary in order to energize the generation site.

9. Failure(s) Addressed:

SPC: Overvoltage – Transmission

Due to the installation failing the Overvoltage – Transmission System Fault screen it is required that 59N relaying be installed. This will require a microprocessor relay and 3 voltage transformers at station Sleight Rd.

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7.0 Smart Inverter Settings

The following provides Smart Inverter Settings - AVGDFS

Inverter Mode: Vars precedence over Watts

Inverter Ratings

KVA rating: 3425
KW rating: 2200
KVAR rating: 2200

Default Settings: (These are the default settings to be used as reference. The above Volt-Var, Volt Watt takes precedence over following settings)

Bulk Power System Settings


Performance Category III

Frequency Disturbance Trip Settings

OF2 Frequency 62
OF2 Clearing Time 0.16
OF1 Frequency 61.2
OF1 Clearing Time 300
UF2 Frequency 56.5
UF2 Clearing Time 0.16
UF1 Frequency 58.5
UF1 Clearing Time 300

Voltage Disturbance Trip Settings

OV2 Voltage 1.2
OV2 Clearing Time 0.16
OV1 Voltage 1.1
OV1 Clearing Time 2
UV2 Voltage 0.5
UV2 Clearing Time 1.1
UV1 Voltage 0.88
UV1 Clearing Time 3

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Enter Service Criteria

Frequency Minimum (Hz)	59.5
Frequency Maximum (Hz)	60.1
Voltage Minimum (p.u.)	0.917
Voltage Maximum (p.u.)	1.05
Delay Before Export (s)	300
Ramp Time (s)	300
Ramp Characteristics	Linear
Enter Service Exceptions	Linear Ramp Required for Systems >50 kVA

Fixed Power Factor


Constant PF Active	No
Power Factor	1
Power Factor Excitation	0

Volt-VAR Settings

Volt-VAR Profile:	Yes
Vref	1
V1 - [PU]	0.93
Q1 - %Nameplate Apparent Power Rating	0%
V2- [PU]	0.97
Q2 - %Nameplate Apparent Power Rating	0%
V3 - [PU]	1.03
Q3 - %Nameplate Apparent Power Rating	0%
V4 - [PU]	1.07
Q4 - %Nameplate Apparent Power Rating	-44%

Volt-Watt Active

Volt-Watt Profile:	No
Pmin	0.2
V1 - [PU]	1.07
P1	1
V2 - [PU]	1.1
P2	0.2

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8.0 CONCEPTUAL COST ESTIMATE

The following items are a good faith estimate for the scope and work required to interconnect the project estimated under rates and schedules in effect at the time of this study in accordance with the most recent version of the NYSSIR.

Planning Grade Estimate:

Project #21556 REV0


Scope:

- A . Install Interconnection PCC Recloser with SCADA capability
- B . Primary metering installation
- C . Engineering support
- D . Project Administration

Estimate Detail	cost/unit	unit	total
Install Interconnection PCC Recloser			
Labor	\$30,000	1	\$30,000
Materials	\$37,000	1	\$37,000
Overheads	\$18,000	1	\$18,000
3ph line construction from mainline to site			
Labor	\$20,000	1	\$20,000
Materials	\$10,000	1	\$10,000
Overheads	\$5,000	1	\$5,000
Install new primary meter service			
Labor	\$15,000	1	\$15,000
Materials	\$20,000	1	\$20,000
Overheads	\$5,000	1	\$5,000
Engineering support	\$5,000	1	\$5,000
Project Administration	\$10,000	1	\$10,000
Subtotal			\$175,000
15% Contingency			\$26,250
Taxes			\$14,900
Total			\$216,150

Notes to Developer:

Developer is required to pay all actual costs for system upgrades and interconnection facilities.

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Project #21556 REV0 - Cost Share

Scope:

A . 3V0 Protection


B . Engineering support

Estimate Detail	cost/unit	unit	total
3V0 Protection			
Labor	\$11,377	1	\$11,377
Materials	\$11,203	1	\$11,203
Overheads	\$2,098	1	\$2,098
3V0 engineering support	\$7,802	1	\$7,802
Subtotal			\$32,479
15% Contingency			\$4,872
Taxes			\$2,364
Total			\$39,715

Notes to Developer:

This item is eligible for cost sharing per Appendix E of the SIR Standardized Contract. The cost shown above is the pro-rata share of the Qualifying Upgrade Cost which this project is responsible for under the Cost Sharing 2.0 PSC Order. This upgrade will result in an incremental hosting capacity amount of 37.45 MW and the total cost is \$676,056. Please note that under the Cost Sharing 2.0 process, the mobilization threshold for substation Transformer Bank upgrades is upon payment of 75% of the Qualifying Upgrade Cost by the Triggering Project and Sharing Project(s). For other Qualifying Substation Upgrades, the mobilization threshold is 25% of the Qualifying Upgrade Cost. Any remaining reconciliation for Qualifying Upgrade Cost will occur pursuant to Section I-C of the SIR. Qualifying Upgrade Costs are non-refundable until another Sharing Project provides payment such that the utility has received payments equal to the pro-rata share of the Qualifying Upgrade. Triggering amount is \$169,014.

Developer is required to pay all actual costs for system upgrades and interconnection facilities.

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Notes:

- 1.) These estimated costs are based upon the results of this study and are subject to change. All costs anticipated to be incurred by the Company are listed.
- 2.) The Company will reconcile actual charges upon project completion and the Interconnection Customer will be responsible for all final charges, which may be higher or lower than estimated according to the NYSSIR I.C step 11.
- 3.) This estimate does not include the following:
 - additional interconnection study costs, or study rework
 - additional application fees,
 - applicable surcharges,
 - property taxes,
 - future operation and maintenance costs,
 - adverse field conditions such as weather and Interconnection Customer equipment obstructions,
 - extended construction hours to minimize outage time or Company's public duty to serve,
 - the cost of any temporary construction service, or
 - any required permits.
- 4.) Cost adders estimated for overtime would be based on 1.5 and 2 times labor rates if required for work beyond normal business hours. Per Diems are also extra costs potentially incurred for overtime labor.

9.0 REVISION HISTORY

<u>Revision</u>	<u>Date</u>	<u>Description</u>
0.0	9/22/2023	Original