	Coordinated Electric System Interconnect Review	DER #21108
	Distributed Energy Resources - NYSSIR	Revision 1 12/29/2023

For
 Interconnection Customer: USNY - 6882 Rice Rd-001
 Applicant: Abundant Solar Power
 5000 kVA PV Generator System
 6882 Rice Rd

 Interconnection to RG&E
 Canandaigua Division
 0145CF5144 Substation Circuit
 12.47kV Feeder

THIS DOCUMENT AND ANY ATTACHMENTS HERETO ('DOCUMENT') IS MADE AVAILABLE BY RG&E UPON AND SUBJECT TO THE EXPRESS UNDERSTANDING THAT: (A) NEITHER RG&E NOR ANY OF ITS OFFICERS, DIRECTORS, AFFILIATES, AGENTS, OR EMPLOYEES MAKES ANY WARRANTY, ASSURANCE, GUARANTY, OR REPRESENTATION WITH RESPECT TO THE CONTENTS OF THE DOCUMENT OR THE ACCURACY OR COMPLETENESS OF THE INFORMATION CONTAINED OR REFERENCED IN THE DOCUMENT, AND (B) RG&E, ITS OFFICERS, DIRECTORS, AFFILIATES, AGENTS, AND EMPLOYEES SHALL NOT HAVE ANY LIABILITY OR RESPONSIBILITY FOR INACCURACIES, ERRORS, OR OMISSIONS IN, OR ANY BUSINESS OR POLICY DECISIONS MADE BY ANY DIRECT OR INDIRECT RECIPIENT IN RELIANCE ON, THIS DOCUMENT OR THE INFORMATION CONTAINED OR REFERENCED THEREIN; ALL SUCH LIABILITY IS EXPRESSLY DISCLAIMED.



	Coordinated Electric System Interconnect Review	DER #21108
	Distributed Energy Resources - NYSSIR	Revision 1 12/29/2023

Table of Contents

<u>Section</u>	<u>Page</u>
1.0 Introduction	3
2.0 Executive Summary	3
3.0 Company EPS Parameters	4
4.0 Interconnection Customer Site	4
5.0 System Impact Analysis	5
6.0 Mitigations for System Impact Analysis Failures	8
7.0 Smart Inverter Settings	10
8.0 Conceptual Cost Estimate	12
9.0 Revision History	13

	<p style="text-align: center;">Coordinated Electric System Interconnect Review</p>	<p style="text-align: center;">DER #21108</p>
	<p style="text-align: center;">Distributed Energy Resources - NYSSIR</p>	<p style="text-align: center;">Revision 1 12/29/2023</p>

1.0 INTRODUCTION

This report presents the analysis results of the RG&E 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 \$2,478,285.

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


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, RG&E 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.

Triggering amount for ilne extension is \$1,335,150.

Triggering amount for the 3V0 protection is \$144,027.

	<p align="center">Coordinated Electric System Interconnect Review</p>	<p align="center">DER #21108</p>
	<p align="center">Distributed Energy Resources - NYSSIR</p>	<p align="center">Revision 1 12/29/2023</p>

3.0 COMPANY EPS PARAMETERS

Substation	145
Transformer Name	2
Transformer Peak Load (kVA)	7,260
Contingency Condition Load, N-1 Criteria (kVA)	N/A
Minimum Daytime Load (kVA)	597
Generation: Total/Connected/Queued (kVA)	5463.506 / 2259.506 / 3204
Contingency Condition Generation: T/C/Q (kVA)	N/A
Supply Voltage (kV)	12.47
Transformer Maximum Nameplate Rating (kVA)	10,500
Distribution Bus Voltage Regulation	Yes
Transmission GFOV Status	not installed
Bus Tie	none
Number of Feeders Served from this Bus	2

Connecting Feeder/Line	0145CF5144
Peak Load on Feeder (kVA)	4,320
Minimum Daytime Load on Feeder (kVA)	648
Feeder Primary Voltage at POI (kV)	12.47
Line Phasing at POI	Three-Phase
Circuit distance from POI to substation	2.976 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)	442.004 / 438.004 / 4

System Fault Characteristics without Interconnection Customer DG at POI with System Upgrades described in Section 6	
Interconnection Customer POI Location	L-107913, P-3
I 3-Phase (3LLL)	1468 Amps
I Line to Ground (3I0)	1130 Amps
Z1 (100 MVA Base)	1.4678 + j3.0504 PU
Z0 (100 MVA Base)	1.5567 + j5.8816 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 12.47kV.

The proposed generating system consists of :

Forty (40) Sungrow String Inverters SG125HV UL1741, 125 kW each.



Coordinated Electric System Interconnect Review


DER #21108

Distributed Energy Resources - NYSSIR

Revision 1
12/29/2023

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 104.98% 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 99.88% of nominal, and is not impacted by the proposed DER. No remediation is required.			
Voltage	Source Regulation for Reverse Power	<15% minimum load criteria	FAIL
The total generation downstream of the source regulation is 10.464MVA. The total minimum load on this source is 0.597MVA. Therefore, the generation to load ratio is 1753%.			
Voltage	Fluctuation	<3% steady state from proposed generation on feeder	PASS
The greatest steady-state voltage fluctuation on the circuit is 2.32% due to the proposed generation and 0.51% 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 0.51%.			
Voltage	Regulator Variation	Regulator tap movement >1 position	PASS
The greatest voltage fluctuation seen at the voltage regulation at the source is 0.96V.			
Voltage	Flicker	Screen H Flicker	PASS
With an X/R ratio of 2.08, the Pst for the location with the greatest voltage fluctuation is 0.273 and the emissions limit is 0.350.			
Voltage	Flicker	Aggregate Flicker	PASS
The Pst for the location with the greatest aggregate voltage fluctuation is 0.273 and the emissions limit is 0.900.			
Equipment Ratings	Thermal (Cont. Current)	Thermal limits (assuming no load)	FAIL
The proposed generation exceeds an existing equipment thermal capability. (see failed equipment chart below)			
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.			

	Coordinated Electric System Interconnect Review	DER #21108
	Distributed Energy Resources - NYSSIR	Revision 1 12/29/2023

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)	FAIL
There are 3 existing protective devices between the Source and PCC. Distribution line Protection and Coordination must be reviewed, any changes or upgrades will be included in the Section 6 below.			
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 has proposed a Zig-Zag Transformer with an impedance of TBD ohms and X/R ratio of 7.26. To be within Company guidelines the Zig-Zag Transformer shall have an impedance of ohms. The Interconnection Customer will contribute approximately A of 310 current to remote bolted line to ground faults and A to faults at the PCC.			
Protection	Overvoltage - Transmission System Fault	Company 3V0 criteria	FAIL
Transmission Ground Fault Overvoltage's are a concern and mitigations must be installed. See Section 6.11.			
Protection	Overvoltage - Distribution System Fault	<125% voltage rise	PASS
With subject generator interconnected the modeled voltage rise on the unfaulted phases of the system is 106%			
Protection	Effective Grounding	[individual utility specifications]	PASS
With the subject generator interconnected the modeled R0/X1 is 0.21153 PU and the X0/X1 is 1.14323 PU.			
SCADA	Required EMS Visibility for Generation Sources	Monitoring & Control Requirements	Needed
The 5 MVA subject generator triggers the requirement for SCADA reporting to the Utility			



Coordinated Electric System
Interconnect Review


DER #21108

Distributed Energy Resources - NYSSIR

Revision 1
12/29/2023

Existing Equipment Rating Analysis Table:

EQUIPMENT	VOLTAGE (kV)	LINE or GISID	POLE	PASS/FAIL
3P_FUSE_65K	12.47	0	0	FAIL
BLD	12.47	0	0	FAIL
BLD	12.47	0	0	FAIL
BLD	12.47	0	0	FAIL
3P_FUSE_80K	12.47	0	0	FAIL
ARMLESS_1/O_ACSR_RG	12.47	0	0	FAIL
BLD	12.47	0	0	FAIL
BLD	12.47	0	0	FAIL
BLD	12.47	0	0	FAIL
3P_FUSE_100K	12.47	0	0	FAIL
BLD	12.47	0	0	FAIL
BLD	12.47	0	0	FAIL
SW_SP_14.4_15	12.47	0	0	FAIL

	<p align="center">Coordinated Electric System Interconnect Review</p>	<p align="center">DER #21108</p>
	<p align="center">Distributed Energy Resources - NYSSIR</p>	<p align="center">Revision 1 12/29/2023</p>

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. These include:

Control is REQUIRED for the Source Regulation:

a. Substation 2T145ii transformer LTC 34.5/12.47 kV

- | | |
|--------------------------|-------------|
| 8. Failure(s) Addressed: | DP: Thermal |
|--------------------------|-------------|

Remove existing cutouts and solids at or about

GISID:300085365,GISID:300085461,GISID:300085592,GISID:300377811,GISID:300377829,GISID:300377833,GISID:300610698,GISID:300377959 and GISID:300377947 on circuit 0145CF5144 and install a new 600A 3P_SWITCH.



Coordinated Electric System Interconnect Review

DER #21108

Distributed Energy Resources - NYSSIR

Revision 1
12/29/2023

9 Failure(s) Addressed: DP: Thermal


Replace 3 phase 65 AFuse at or about GISID:300085426,3 phase 80 AFuse at or about GISID:300085426,3 phase 100 AFuse at or about GISID:300377922 on circuit 0145CF5144 with 3 phase recloser, 12.47 kV, 12.5 kA interrupting rating. A microprocessor control is needed with source side PT sensing on all three phases. The directionality feature will need to be enabled.

10 Failure(s) Addressed: DP: Thermal

Reconductor existing ARMLESS_1/0_ACSR_RG overhead conductor from GISID:300377695 to GISID:300085335, with 3P_477AL (approx. 2.15 miles) on Circuit 0145CF5144.

11 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 to be installed at the high side of the substation transformer.

	<p align="center">Coordinated Electric System Interconnect Review</p>	<p align="center">DER #21108</p>
	<p align="center">Distributed Energy Resources - NYSSIR</p>	<p align="center">Revision 1 12/29/2023</p>

7.0 Smart Inverter Settings

The following provides Smart Inverter Settings: AGGRESSVAR22

Inverter Mode: Vars precedence over Watts

Inverter Ratings

KVA rating: 5000
KW rating: 5000
KVAR rating: 5000
De-Rating Required? NO

Inverter profiles

Reactive Power Profile VAR22_3
Real Power Profile Watt22_1
Bulk System Settings JUDefault22

Bulk Power System Settings


Performance Category III

Frequency Distrubance 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

	<p style="text-align: center;">Coordinated Electric System Interconnect Review</p>	<p style="text-align: center;">DER #21108</p>
	<p style="text-align: center;">Distributed Energy Resources - NYSSIR</p>	<p style="text-align: center;">Revision 1 12/29/2023</p>

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	0.99
V1 - [PU]	0.93
Q1 - %Nameplate Apparent Power Rating	0
V2- [PU]	0.97
Q2 - %Nameplate Apparent Power Rating	0
V3 - [PU]	0.99
Q3 - %Nameplate Apparent Power Rating	0
V4 - [PU]	1.03
Q4 - %Nameplate Apparent Power Rating	-0.44

Volt-Watt Active

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



Coordinated Electric System
Interconnect Review

DER #21108

Distributed Energy Resources - NYSSIR

Revision 1
12/29/2023

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 # 21108 Non Cost Share

Scope:

- A . Install Interconnection PCC Recloser with SCADA capability
- B . Upgrade Substation LTC controller
- C . Remove cutouts and install 600A 3P_Switch
- D . Replace 3P_Fuse and install 3P_Recloser
- E . Primary metering installation
- F . Engineering support
- G . 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
Upgrade Substation LTC controller			
Labor	\$22,620	1	\$22,620
Materials	\$24,425	1	\$24,425
Overheads	\$4,030	1	\$4,030
Remove cutouts and install 600A 3P_Switch			
Labor	\$900	9	\$8,100
Materials	\$800	9	\$7,200
Overheads	\$800	9	\$7,200
Replace 3P_Fuse and install 3P_Recloser			
Labor	\$16,400	3	\$49,200
Materials	\$47,000	3	\$141,000
Overheads	\$1,600	3	\$4,800
Install new primary meter service			
Labor	\$15,000	1	\$15,000
Materials	\$20,000	1	\$20,000
Overheads	\$5,000	1	\$5,000



Coordinated Electric System
Interconnect Review

DER #21108

Distributed Energy Resources - NYSSIR

Revision 1
12/29/2023

Engineering support	\$23,438	1	\$23,438
Project Administration	\$10,000	1	\$10,000
Subtotal			\$462,013
15% Contingency			\$69,302
Taxes			\$39,830
Total			\$571,145

Notes to Developer:

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


Project # 21108 Cost Share

Scope:

A . *Reconductoring to 3P_477AL (2.15 miles)

B . **Install 3V0 Protection

Estimate Detail	cost/unit	unit	total
*Reconductoring to 3P_477AL (2.15 miles)			
Labor	\$322,500	1	\$322,500
Materials	\$430,000	1	\$430,000
Overheads	\$322,500	1	\$322,500
**Install 3V0 Protection			
Labor	\$160,297	1	\$160,297
Materials	\$157,931	1	\$157,931
Overheads	\$30,965	1	\$30,965
**3V0 Engineering support	\$119,012	1	\$119,012
Sub Total			\$1,543,205
15% Contingency			\$231,481
Taxes			\$132,454
Total			\$1,907,140

	<p align="center">Coordinated Electric System Interconnect Review</p>	<p align="center">DER #21108</p>
	<p align="center">Distributed Energy Resources - NYSSIR</p>	<p align="center">Revision 1 12/29/2023</p>

Notes to Developer:


*This item is eligible for cost sharing per Appendix E of the SIR Standardized Contract. Since this project is the Triggering Project for this upgrade, this project will be responsible for paying 100% of the Qualifying Upgrade Cost. This upgrade will result in an incremental hosting capacity amount of 9.8 MW. Upon receipt of additional payments by Sharing Projects the utility shall reconcile with the Triggering Project based on a calculated estimated pro-rata share. Any remaining reconciliation for Qualifying Upgrade Cost will occur pursuant to Section I-C of the SIR. Qualifying Upgrade Costs are non-refundable for the Triggering Project until a Sharing Project provides payment such that the utility has receipt of 100% of Qualifying Upgrade Cost. The triggering cost for this line extension is \$1,335,150.

**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 5.04 MW and the total cost is \$576,108. 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. The triggering amount is \$144,027.

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

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.

	Coordinated Electric System Interconnect Review	DER #21108
	Distributed Energy Resources - NYSSIR	Revision 1 12/29/2023

9.0 REVISION HISTORY

<u>Version</u>	<u>Date</u>	<u>Description</u>
0.0	4/25/2023	Original
1.0	12/29/2023	RERUN- Change in Queue