For

Interconnection Customer: Rosario Giufre

Applicant: Rosario Giufre

3425 kW Solar Generator System

Route 302, Wallkill NY 10941

Interconnection to Orange & Rockland Utilities

NY Western Division

Silver Lake Substation

13.2 kV Feeder 113-2-13

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1.0 INTRODUCTION

This report presents the analysis results of the Orange and Rockland Utilities ("Orange and Rockland" or the "Company") interconnection study based on the proposed interconnection and design submittal from the Interconnection Customer in accordance with the Company O&R CESIR Study Requirements Rev. 1.6. 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 **$222,928**.

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.

The study was performed between daylight hours of 0800-2000 hrs.

3.0 COMPANY EPS PARAMETERS

Substation	Silver Lake
Transformer Name (list multiple where normally tied to common bus)	Bank 1113
Transformer Peak Load (kW)	17550
Contingency Condition Load, N-1 Criteria (kW) (as applicable)	N/A
Daytime Light Load (kW)	4950
Generation: Total, Connected, Queued (kW)	4436, 1011, 3425
Contingency Condition Generation: Total, Connected, Queued (kW)	14226, 2801, 11425
Supply Voltage (kV)	69
Transformer Maximum Nameplate Rating (kVA)	35000
Distribution Bus Voltage Regulation	Yes
Transmission GFOV Status	Not installed
Bus Tie	Open
Number of Feeders Served from this Bus	4

Connecting Feeder/Line	**113-2-13**
Peak Load on feeder (kW)	7460
Daytime Light Load on Feeder (kW)	1470
Feeder Primary Voltage at POI (kV)	13.2
Line Phasing at POI	3
Circuit distance from POI to substation	3.74 mile(s)
Distance from POI to nearest 3-phase, (if applicable)	n/a
Line Regulation	N
Line/Source Grounding Configuration at POI	effective
Other Generation: Total, Connected, Queued (kW)	4270, 845, 3425

System Fault Characteristics without Interconnection Customer DG at POI with System Upgrades described in Section 6	
Interconnection Customer POI Location (Pole X/Y)	Route 302, Wallkill, NY Pole: 48328/54440
I 3-phase (3LLL)	2600.7 Amps
I Line to Ground (3I0)	1850 Amps
Z1 (100 MVA base)	[0.8538+j3.1325] [PU]
Z0 (100 MVA base)	[1.8744+j6.3659] [PU]

4.0 INTERCONNECTION CUSTOMER SITE

The Interconnection Customer is proposing a new primary service connection at a new customer location. The service voltage is 13.2 kV. The applicant proposes installing one Solar Generation System with AC power rating of 3425 kW.

The proposed generating system consists of:

7,384 PV modules each rated 535 Watts

1 Inverter rated 3,425 kW at 600 Volts (SUNGROW, SC 3425 UD-MV)

1 Generator Step Up transformer, 3,425 kVA, grounded wye primary and wye secondary winding configuration, 13200 primary volts, 600 secondary volts.

5.0 SYSTEM IMPACT ANALYSIS

The analysis was run at the rated project size in normal system configuration connected to the feeder 113-2-13. The following table shows the impact study results of 3,425 kW at 1.0 power factor project interconnecting to the distribution system.

#	Category	Criteria	Limit	Result
1	Voltage	Overvoltage	< 105% (ANSI C84.1)	Pass
	With the addition of the subject generator the maximum voltage as modeled on the Feeder is 103% of nominal.			
2	Voltage	Undervoltage	> 95% (ANSI C84.1)	Pass
	With the addition of the subject generator the minimum voltage as modeled on the Feeder is 99% of nominal.			
3	Voltage	Substation Regulation for Reverse Power	<100% minimum load criteria	Pass
	The total generation on Feeders [113-1-13, 113-2-13, 113-3-13, 113-4-13] is 4.44 MW. The total minimum load on these Feeders is 9.97 MW. Therefore, the generation to load ratio is 44.49%.			
4	Voltage	Feeder Regulation for Reverse Power	<100% Minimum load to generation ratio	Pass
	There is no regulator on the project feeder.			
5	Voltage	Fluctuation	<3% steady state from proposed generation on feeder	Pass
	The greatest voltage fluctuation on the feeder occurs at: The resulting fluctuation at the feeder location is 1.33% due to this project's generation output stepping from 0% to 100%.			
6	Voltage	Fluctuation	<5% steady state from aggregate DER on substation bus	Pass
	The maximum component voltage fluctuation on the system is 2.212% due to all generation output stepping from 0% to 100%.			
7	Voltage	Fluctuation	Regulator tap movement exceeds 1 position; generation change of 75% of nameplate rating does not result in voltage change > ½ the bandwidth of any feeder voltage regulating device.	Pass
	No failures observed.			
8	Voltage	Flicker	Screen H Flicker	Pass
	The Pst for the location with the greatest voltage fluctuation is 0.05 and the emissions limit is 0.35.			

9	Equipment Ratings	Thermal (continuous current)	< 100% thermal limits assuming no load	Pass
	No overloaded equipment observed.			
10	Equipment Ratings	Withstand (fault current)	<90% withstand limits	Pass
	The additional fault current contribution from the generation contributes 2.78% to interrupting ratings in excess of existing EPS equipment.			
11	Protection	Unintentional Islanding	Unintentional Islanding Document & Company Guidelines	Pass
	The subject generator is a 3.425 MW PV generation system. The project passes Unintentional Islanding Screening.			
12	Protection	Protective device coordination	Company Guidelines	Fail
	Project will require a recloser that coordinates with the feeder breaker and upstream reclosers. A detailed protection study is required to evaluate the protection coordination impact due to fault current increase by the proposed project.			
13	Protection	Fault Sensitivity	Rated capabilities of EPS equipment	Fail
	A detailed protection study is required.			
14	Protection	Ground Fault Detection	Reduction of reach > 10% (by Utility)	Fail
	The Interconnection has not proposed a grounding bank. A detailed protection study is required.			
15	Protection	Overvoltage - Transmission System Fault	Company 3V0 criteria	Pass
	The generation to load ratio on the serving distribution system **is within** the Company's planning threshold in which transmission ground fault overvoltage **does not** become an electrical hazard due to the distribution source contribution. An evaluation of the existing EPS has been performed and it has been determined that protection mitigation methods **are not required**.			
16	Protection	Overvoltage - Distribution System Fault	< 138% voltage rise	Fail
	A detailed protection study is required.			
17	Protection	Effective Grounding	IEEE 142 (0<R0/X1<1; 0<X0/X1<3)	Pass
	With subject generator interconnected the modeled R0/X1 is [0.60] PU and the X0/X1 is [2.03] PU			

18	SCADA	Required EMS Visibility for Generation Sources	Monitoring & Control Requirements	Yes
	The 3425 kW subject generator triggers the requirement for SCADA reporting to the Utility.			
19	Auto-Loop or Other			Fail
	Feeder 113-2-13 has an Autoloop with 109-1-13. Fails in Screens 15, 16.			

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 includes 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.

Upgrade Required	Failures Addressed
Installing Conductor (477 ACSR, 3-phase, 150ft)	Construction to facilitate the interconnection
Install Recloser	Monitoring and Control
Install Primary Metering Cluster at PCC	Monitoring and Control
Install SCADA monitoring and control for communications and reporting for proposed DG site	SCADA, Required EMS Visibility for Generation Sources
Effective Grounding Protection and Coordinating Screening Required	Screens 12, 13, 14, 16

Additional details on the scope of each option can be found below:

Upgrades Required:

The Distribution upgrades required to facilitate the proposed installation include the following:

- Operate the CDG-00479 project at unity power factor producing maximum output of 3,425 KW AC with no VAR absorption from grid.
- Install SCADA monitoring and control for application DG site
- Install primary metering at PCC
- Install electronic recloser at PCC

This study was conducted based upon this facility being served by the interconnecting circuit during normal utility operating conditions. The terms, conditions, notification requirements, and

other obligations of both the Company and the facility pertaining to disconnection of the facility are set forth in the applicable section(s) of the NYSSIR and the Interconnection Agreement that will be executed for the project(s) that were studied in this CESIR. Any change in system size and/or design is subject to the requirements of the NYSSIR, as well as supplemental documents developed by the Interconnection Technical Working Group and Interconnection Policy Working Group.

7.0 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

Description	Option 1
Installing Conductor (477 ACSR, 3-phase, 150ft)	$5,850
Installing Recloser (1)	$80,000
Installing Smart Capacitor (1)	$40,700
Installing Junction Pole	$10,000
Installing Primary Metering Cluster	$6,800
Commissioning Time Post Installation	$5,500
Design and Inspections	$5,000
SCADA Monitoring/Power Quality Meter	$40,000
Contingency (15%)	$29,078
Total Distribution Estimate	**$222,928**

The total interconnection cost estimate:

Option 1 is **$222,928**.

Notes:

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.

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.

This estimate does not include the following:

- additional interconnection study costs, or study rework
- additional application fees,
- applicable surcharges,
- property taxes,
- overall project sales tax,
- 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.

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.

8.0 REVISION HISTORY

Revision	Date	Description of Revision
1.0	08/31/2022	Initial document