



**Generation Interconnection  
Feasibility Study Report  
for  
Queue Project AG1-268  
ESSEX 230 KV  
48 MW Capacity / 80 MW Energy**

January 2021

## Table of Contents

1	Introduction.....	3
2	Preface.....	3
3	General .....	4
4	Point of Interconnection.....	4
5	Cost Summary .....	4
6	Transmission Owner Scope of Work .....	5
7	Schedule.....	5
8	Revenue Metering and SCADA Requirements .....	5
8.1	PJM Requirements .....	5
8.2	Interconnected Transmission Owner Requirements.....	5
9	Summer Peak - Load Flow Analysis .....	6
9.1	Generation Deliverability .....	6
9.2	Multiple Facility Contingency .....	6
9.3	Contribution to Previously Identified Overloads.....	6
9.4	Potential Congestion due to Local Energy Deliverability.....	6
9.5	System Reinforcements - Summer Peak Load Flow - Primary POI.....	7
9.6	Flow Gate Details.....	7
9.6.1	Index 1 .....	8
9.7	Queue Dependencies .....	11
9.8	Contingency Descriptions.....	12
10	Short Circuit Analysis.....	13
10.1	System Reinforcements - Short Circuit.....	13
11	Affected Systems .....	13
11.1	NYISO .....	13

## 1 Introduction

This Feasibility Study has been prepared in accordance with the PJM Open Access Transmission Tariff, 36.2, as well as the Feasibility Study Agreement between the Interconnection Customer (IC), and PJM Interconnection, LLC (PJM), Transmission Provider (TP). The Interconnected Transmission Owner (ITO) is PSEG.

## 2 Preface

The intent of the feasibility study is to determine a plan, with ballpark cost and construction time estimates, to connect the subject generation to the PJM network at a location specified by the Interconnection Customer. The Interconnection Customer may request the interconnection of generation as a capacity resource or as an energy-only resource. As a requirement for interconnection, the Interconnection Customer may be responsible for the cost of constructing: (1) Direct Connections, which are new facilities and/or facilities upgrades needed to connect the generator to the PJM network, and (2) Network Upgrades, which are facility additions, or upgrades to existing facilities, that are needed to maintain the reliability of the PJM system.

In some instances a generator interconnection may not be responsible for 100% of the identified network upgrade cost because other transmission network uses, e.g. another generation interconnection, may also contribute to the need for the same network reinforcement. Cost allocation rules for network upgrades can be found in PJM Manual 14A, Attachment B. The possibility of sharing the reinforcement costs with other projects may be identified in the feasibility study, but the actual allocation will be deferred until the impact study is performed.

The Feasibility Study estimates do not include the feasibility, cost, or time required to obtain property rights and permits for construction of the required facilities. The project developer is responsible for the right of way, real estate, and construction permit issues. For properties currently owned by Transmission Owners, the costs may be included in the study.

### 3 General

The Interconnection Customer (IC) has proposed a Storage generating facility located in Essex County, New Jersey. The installed facilities will have a total capability of 80 MW with 48 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this project is October 31, 2022. This study does not imply a TO commitment to this in-service date.

<b>Queue Number</b>	<b>AG1-268</b>
<b>Project Name</b>	ESSEX 230 KV
<b>State</b>	New Jersey
<b>County</b>	Essex
<b>Transmission Owner</b>	PSEG
<b>MFO</b>	80
<b>MWE</b>	80
<b>MWC</b>	48
<b>Fuel</b>	Storage
<b>Basecase Study Year</b>	2024

Any new service customers who can feasibly be commercially operable prior to June 1st of the basecase study year are required to request interim deliverability analysis.

### 4 Point of Interconnection

AG1-268 will interconnect with the PSEG Transmission system at the 230 kV Essex Newark Bay substation, behind the existing Newark Bay Co-generation Facility's Point of Interconnection.

### 5 Cost Summary

The AG1-268 project will be responsible for the following costs:

<b>Description</b>	<b>Total Cost</b>
Total Physical Interconnection Costs	\$380,000
Total System Network Upgrade Costs	\$1,235,000
<b>Total Costs</b>	<b>\$1,615,000</b>

This cost excludes a Federal Income Tax Gross Up charges. This tax may or may not be charged based on whether this project meets the eligibility requirements of IRS Notice 2016-36, 2016-25 I.R.B. (6/20/2016). If at a future date it is determined that the Federal Income Tax Gross charge is required, the Transmission Owner shall be reimbursed by the Interconnection Customer for such taxes.

Cost allocations for any System Upgrades will be provided in the System Impact Study Report.

## 6 Transmission Owner Scope of Work

The total physical interconnection costs is given in the table below:

Description	Total Cost
Attachment Facilities Installation of revenue grade metering. Relay modifications at the Essex Switching Station.	\$380,000
Direct Connection Network Upgrades	\$0
Non-Direct Connection Network Upgrades	\$0
<b>Total Physical Interconnection Costs</b>	<b>\$380,000</b>

## 7 Schedule

The estimated time to complete the scope of work is **15 months** after the relevant agreement(s) are signed and PSE&G receives Notice to Proceed. This duration does not include time for the IC to obtain necessary permits, and easement, and approvals for Interconnection Facilities. The developer must obtain these approvals prior to PSE&G installation. PSE&G's schedule assumes reasonable efforts will be made by the Interconnection Customer to meet the proposed schedule consequently, Delays to the Interconnection Customer's activities may lead to delays/changes to the TO's schedule as well

## 8 Revenue Metering and SCADA Requirements

### 8.1 PJM Requirements

The Interconnection Customer will be required to install equipment necessary to provide Revenue Metering (KWH, KVARH) and real time data (KW, KVAR) for IC's generating Resource. See PJM Manuals M-01 and M-14D, and PJM Tariff Section 8 of Attachment O.

### 8.2 Interconnected Transmission Owner Requirements

The IC will be required to comply with all Interconnected Transmission Owner's revenue metering requirements for generation interconnection customers located at the following link:

<http://www.pjm.com/planning/design-engineering/to-tech-standards/>

## 9 Summer Peak - Load Flow Analysis

The Queue Project AG1-268 was evaluated as an 80 MW (Capacity 48.0 MW) injection at the 230 kV Essex Newark Bay substation in the PSEG area. Project AG1-268 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AG1-268 was studied with a commercial probability of 53.0 %. Potential network impacts were as follows:

### 9.1 Generation Deliverability

(Single or N-1 contingencies for the Capacity portion only of the interconnection)

None

### 9.2 Multiple Facility Contingency

(Double Circuit Tower Line, Fault with a Stuck Breaker, and Bus Fault contingencies for the full energy output)

None

### 9.3 Contribution to Previously Identified Overloads

(This project contributes to the following contingency overloads, i.e. "Network Impacts", identified for earlier generation or transmission interconnection projects in the PJM Queue)

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC  DC	MW IMPACT
165319274	218469	METUCHEN	230.0	PSE&G	218357	PRSSNAV_Z	230.0	PSE&G	1	PS_P7-1_D2204+S2219_LT	tower	885.0	104.45	105.11	DC	12.86

### 9.4 Potential Congestion due to Local Energy Deliverability

PJM also studied the delivery of the energy portion of this interconnection request. Any problems identified below are likely to result in operational restrictions to the project under study. The developer can proceed with network upgrades to eliminate the operational restriction at their discretion by submitting a Merchant Transmission Interconnection request.

Note: Only the most severely overloaded conditions are listed below. There is no guarantee of full delivery of energy for this project by fixing only the conditions listed in this section. With a Transmission Interconnection Request, a subsequent analysis will be performed which shall study all overload conditions associated with the overloaded element(s) identified.

None

## 9.5 System Reinforcements - Summer Peak Load Flow - Primary POI

ID	Index	Facility	Upgrade Description	Cost
165319274	1	METUCHEN 230.0 kV - PRSNVAV_R 230.0 kV Ckt 1	r_PS_I017a_MetPierZ (2334) : Reconnector to 1080MVA SER Project Type : FAC Cost : \$1,235,000 Time Estimate : 39.0 Months	\$1,235,000
			TOTAL COST	\$1,235,000

## 9.6 Flow Gate Details

The following indices contain additional information about each facility presented in the body of the report. For each index, a description of the flowgate and its contingency was included for convenience. The intent of the indices is to provide more details on which projects/generators have contributions to the flowgate in question. All New Service Queue Requests, through the end of the Queue under study, that are contributors to a flowgate will be listed in the indices. Please note that there may be contributors that are subsequently queued after the queue under study that are not listed in the indices. Although this information is not used "as is" for cost allocation purposes, it can be used to gage the impact of other projects/generators. It should be noted the project/generator MW contributions presented in the body of the report are Full MW Impact contributions which are also noted in the indices column named "Full MW Impact", whereas the loading percentages reported in the body of the report, take into consideration the PJM Generator Deliverability Test rules such as commercial probability of each project as well as the ramping impact of "Adder" contributions. The MW Impact found and used in the analysis is shown in the indices column named "Gendeliv MW Impact".

## 9.6.1 Index 1

ID	FROM BUS#	FROM BUS	FROM BUS AREA	TO BUS#	TO BUS	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC DC	MW IMPACT
165319274	218469	METUCHEN	PSE&G	218357	PRSNV_Z	PSE&G	1	PS_P7-1_D2204+S2219_LT	tower	885.0	104.45	105.11	DC	12.86

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
206742	28SUX_V3-011 (Deactivation : 26/04/2020)	0.1512	Adder	0.18
207412	28AA2-060 E	0.4535	Adder	0.53
207413	28AA2-061 E	0.6047	Adder	0.71
207440	AE1-081 E O1	0.1011	Adder	0.12
217082	WEATEXAS E	0.1442	Adder	0.17
217168	METRODIV E	0.2218	Adder	0.26
217195	REDH E	0.4164	Adder	0.49
217203	FBANKSOLAR E	0.0873	Adder	0.1
217205	WCALDSOLAR E	0.0846	Adder	0.1
217207	PARK ELE E	0.0368	Adder	0.04
217210	CAMDEN ST E	0.0410	Adder	0.05
217212	AMBOY SO E	0.5642	50/50	0.5642
217213	AMBOY SO C	0.3568	50/50	0.3568
217214	CENTRL HS E	0.0790	Adder	0.09
217216	BARNGR HS E	0.0463	Adder	0.05
217249	HACKENSOLA E	0.0860	Adder	0.1
217275	DOREMUSP1_C	0.0036	Adder	0.0
217276	DOREMUSP1_E	0.0061	Adder	0.01
217825	UMD_NJ	1.4463	Adder	1.7
218344	TOSCO_G6	6.4070	50/50	6.4070
218418	LINDEN_G5	2.5874	50/50	2.5874
218419	LINDEN_G6	2.5874	50/50	2.5874
218423	LINDEN_G21	6.7276	50/50	6.7276
218424	LINDEN_G22	6.7276	50/50	6.7276
218425	LINDEN_1201	6.7276	50/50	6.7276
218426	LINDEN_2ST	11.5490	50/50	11.5490
218435	LINDEN_1101	10.4263	50/50	10.4263
218436	LINDEN_1001	6.0736	50/50	6.0736
218449	LINSOLAR C	0.1589	Adder	0.19
218450	LINSOLAR E	0.2592	Adder	0.3
218672	KENILWRTH E	1.1776	Adder	1.39
219001	SEWAREN7GT	19.3899	50/50	19.3899
219002	SEWAREN7ST	12.9266	50/50	12.9266
219035	LINDEN_G8	2.2843	50/50	2.2843
219036	LINDEN_G7	2.2843	50/50	2.2843
219123	BCRR_COGEN (Deactivation : 26/04/2020)	-0.5324	Adder	-0.63
219728	YARDVSOLFA C	-0.1728	Adder	-0.2
219817	TRENTONSOL C	-0.0391	Adder	-0.05



Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
219901	Z1-116 (Suspended)	278.8676	50/50	278.8676
903672	W3-106 E	0.4678	Adder	0.55
903682	W3-110 E	0.3524	Adder	0.41
905542	W4-064 E	0.1427	Adder	0.17
907012	X1-012 E	0.4681	Adder	0.55
917521	SEWARENG7E1	4.9221	50/50	4.9221
917522	SEWARENG7E2	4.9221	50/50	4.9221
919802	AA2-066 E	-0.2761	Adder	-0.32
930901	AB1-139 C	0.1639	50/50	0.1639
930902	AB1-139 E	1.7040	50/50	1.7040
933332	AC2-145 E (Suspended)	0.0175	Adder	0.02
933582	AC2-175 E	0.1207	Adder	0.14
934302	AD1-054 E	0.2073	Adder	0.24
936193	AD2-025 BAT (Suspended)	0.3140	Merchant Transmission	0.3140
937512	AD2-210 E (Suspended)	0.1880	Adder	0.22
938281	AE1-041 C	0.0131	50/50	0.0131
938282	AE1-041 E	0.3740	50/50	0.3740
938412	AE1-060 E	1.3666	Adder	1.61
94150	G22_VFT FTIR	0.8729	50/50	0.8729
942251	AE2-237 C	1.6360	Adder	1.92
942252	AE2-237 E	6.5440	Adder	7.7
943482	AF1-019 E	1.5074	Adder	1.77
943841	AF1-052 C	15.5390	Adder	18.28
943842	AF1-052 E	0.0544	Adder	0.06
945723	AF1-237 BAT	28.2260	Merchant Transmission	28.2260
945801	AF1-245 C O1	10.9330	Adder	12.86
945802	AF1-245 E O1	16.3996	Adder	19.29
946602	AF1-324 E (Withdrawn : 12/03/2020)	1.8017	Adder	2.12
946612	AF1-325 E	1.5203	Adder	1.79
958441	AF2-138 C	0.5851	Adder	0.69
958442	AF2-138 E	0.8080	Adder	0.95
961231	AF2-414 O1	48.2103	Adder	56.72
961241	AF2-415 O1	21.8127	Adder	25.66
961251	AF2-416	1.3872	Adder	1.63
961511	AF2-442 NFTI	7.5533	Merchant Transmission	7.5533
961521	AF2-443 NFTI	7.5550	Merchant Transmission	7.5550
962111	AG1-055 NFIR	107.7120	Merchant Transmission	107.7120
962992	AG1-148 E	0.0730	Adder	0.16
963512	AG1-200 E	0.2864	Adder	0.64
964101	AG1-268 C	3.4748	Adder	7.71
964102	AG1-268 E	2.3165	Adder	5.14
G-007A	G-007A	0.1678	Confirmed LTF	0.1678
VFT	VFT	142.7385	Confirmed LTF	142.7385
CALDERWOOD	CALDERWOOD	0.2674	Confirmed LTF	0.2674
PRAIRIE	PRAIRIE	1.3277	Confirmed LTF	1.3277
CHEOAH	CHEOAH	0.2698	Confirmed LTF	0.2698
CBM-N	CBM-N	9.1800	Confirmed LTF	9.1800
COTTONWOOD	COTTONWOOD	1.1067	Confirmed LTF	1.1067
HAMLET	HAMLET	0.3321	Confirmed LTF	0.3321
GIBSON	GIBSON	0.2768	Confirmed LTF	0.2768
BLUEG	BLUEG	0.8819	Confirmed LTF	0.8819

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
TRIMBLE	TRIMBLE	0.2821	Confirmed LTF	0.2821
CATAWBA	CATAWBA	0.1971	Confirmed LTF	0.1971

## 9.7 Queue Dependencies

The Queue Projects below are listed in one or more indices for the overloads identified in your report. These projects contribute to the loading of the overloaded facilities identified in your report. The percent overload of a facility and cost allocation you may have towards a particular reinforcement could vary depending on the action of these earlier projects. The status of each project at the time of the analysis is presented in the table. This list may change as earlier projects withdraw or modify their requests.

Queue Number	Project Name	Status
AA2-060	Branchville-Sussex #1 34kV	Engineering and Procurement
AA2-061	Branchville-Sussex #2 34.5kV	Engineering and Procurement
AA2-066	Penns Neck 13kV	In Service
AB1-139	Metuchen 26kV	In Service
AC2-145	Beach Glen 4.8kV	Suspended
AC2-175	Berkshire Solar 12 kV	Engineering and Procurement
AD1-054	Bergen 13 kV	In Service
AD2-025	Hillsborough 13 kV	Suspended
AD2-210	Cedar Knolls 12.5 kV	Suspended
AE1-041	Edison 4kV	In Service
AE1-060	Kittatinny-Newton 34.5 kV	Active
AE1-081	Landing 12.47 kV	In Service
AE2-237	Vernon-Sugar Loaf #2 115 kV	Active
AF1-019	Branchville-Holiday Lakes 34.5 kV	Active
AF1-052	Mason 230 kV	Active
AF1-237	Mercer 230 kV	Active
AF1-245	Hudson 230 kV	Active
AF1-324	Greystone-West Denville 34.5 kV	Withdrawn
AF1-325	Sparta-Woodruff's Gap 34.5 kV	Active
AF2-138	Flanders-West Wharton 34.5 kV	Active
AF2-414	Bergen 345 kV	Active
AF2-415	Bergen 138 kV	Active
AF2-416	Bergen 26 kV	Active
AF2-442	Vernon 115 kV	Active
AF2-443	Vernon 115 kV	Active
AG1-055	Bergen 230 kV	Active
AG1-148	McCarter 26.4 kV	Active
AG1-200	Kingsland 13 kV	Active
AG1-268	Essex 230 kV	Active
V3-011	Sussex 12.47kV	In Service
W3-106	Sussex-Wykertown 34.5kV	In Service
W3-110	Sussex	In Service
W4-064	N. Newton 12kV	In Service
X1-012	Branchville-Sussex 34.5kV	In Service
Z1-116	Metuchen 230kV	Suspended

## 9.8 Contingency Descriptions

Contingency Name	Contingency Definition
PS_P7-1_D2204+S2219_LT	CONTINGENCY 'PS_P7-1_D2204+S2219_LT' TRIP LINE FROM BUS 218304 TO BUS 218306 CKT 1 /* D-2204 BRUNSWICK - DEANS DISCONNECT BUS 218358 /* PIERSON AVE S CLOSE LINE FROM BUS 218401 TO BUS 218402 CKT Z/* PIERSON AVE T10/20 MOVE 8 MW LOAD FROM BUS 218402 TO BUS 218413 MOVE 8 MW LOAD FROM BUS 218402 TO BUS 218390 MOVE 8 MW LOAD FROM BUS 218402 TO BUS 218399 DISCONNECT BUS 218351 /* MEADOWS ROAD S CLOSE LINE FROM BUS 218392 TO BUS 218393 CKT Z/* MEADOWS ROAD T10/20 MOVE 8 MW LOAD FROM BUS 218392 TO BUS 218401 MOVE 8 MW LOAD FROM BUS 218392 TO BUS 219616 MOVE 8 MW LOAD FROM BUS 218392 TO BUS 219618 MOVE 8 MW LOAD FROM BUS 218392 TO BUS 218384 MOVE 8 MW LOAD FROM BUS 218392 TO BUS 218387 END

## **10 Short Circuit Analysis**

The following Breakers are overdutied:

None

### **10.1 System Reinforcements - Short Circuit**

None

## **11 Affected Systems**

### **11.1 NYISO**

NYISO Impacts to be determined during later study phases (as applicable).