Generation Interconnection

Feasibility Study Report

for

Queue Project AF2-318

EAST TOWANDA-NEW ALBANY 34.5 KV

12 MW Capacity / 20 MW Energy

July 2020

Table of Contents

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 Mid-Atlantic Interstate Transmission, Inc. (MAIT, PENELEC Zone).

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 Interconnection Customer seeking to interconnect a wind or solar generation facility shall maintain meteorological data facilities as well as provide that meteorological data which is required per Schedule H to the Interconnection Service Agreement and Section 8 of Manual 14D.

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 Solar generating facility located in Bradford County, Pennsylvania. The installed facilities will have a total capability of 20 MW with 12 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this project is April 01, 2022. This study does not imply a TO commitment to this in-service date.

Queue Number	AF2-318
Project Name	EAST TOWANDA-NEW ALBANY 34.5 KV
State	Pennsylvania
County	Bradford
Transmission Owner	MAIT (PENELEC Zone)
MFO	20
MWE	20
MWC	12
Fuel	Solar
Basecase Study Year	2023

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

4.1 Primary Point of Interconnection

AF2-318 primary Point of Interconnection (POI) will interconnect with the PENELEC distribution system via a tap on the East Towanda Substation 34.5 kV New Albany circuit #0029-62 at pole # TA-462 (Attachment 1). The IC's proposed generating unit site is located at GPC: 41.7598990, -76.4585040

Attachment 1 shows a one-line diagram of the proposed primary direct connection facilities for the AF2-318 generation project to connect to the Penelec distribution system. IC will be responsible for constructing all the facilities on its side of the POI, including the attachment facilities which connect the generator to the Penelec distribution system's direct connection facilities.

4.2 Secondary Point of Interconnection

AF2-318 secondary POI will interconnect with the PENELEC distribution system via a tap on the East Towanda Substation 34.5 kV Poplar Street circuit. No physical interconnection costs are provided for the secondary POI, only analysis results are provided. If the customer choses the secondary POI for the System Impact phase, then the costs will be provided at that time.

The analysis results for the primary and secondary POI are the same as the project was studied at the same electrical point in the model for each location.

5 Cost Summary

The AF2-318 project will be responsible for the following costs:

Description	Total Cost
Total Physical Interconnection Costs	$ 180,700
Total System Network Upgrade Costs	$ 178,161,960
Total Costs	$ 178,342,660

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 88-129. 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

AF2-318 will interconnect with the PENELEC distribution system via a tap on the East Towanda Substation 34.5 kV New Albany circuit #0029-62 at pole # TA-462 (Attachment 1). The IC's proposed generating unit site is located at GPC: 41.7598990, -76.4585040

Attachment 1 shows a one-line diagram of the proposed primary direct connection facilities for the AF2-318 generation project to connect to the Penelec distribution system. IC will be responsible for constructing all the facilities on its side of the POI, including the attachment facilities which connect the generator to the Penelec distribution system's direct connection facilities.

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

Description	Total Cost
Tap the existing East Towanda 34.5kV New Albany line at an existing pole or interspersed pole on Penelec' s existing distribution circuit (00529-62) near pole TA-462, new SCADA recloser tap to interconnect queue project AF2-318. Install 34.5 kV metering in customer's facilities. The customer will have to provide Penelec with permanent access/roadway to this off-road location/equipment. The customer is responsible to build their own line from their site to Penelec' s existing facilities.	$100,000
East Towanda 34.5kV SS. Adjust Remote Relay and Metering Settings.	$29,200
New Albany 34.5kV SS. Adjust Remote Relay and Metering Settings.	$29,200
Review customer drawings, create nameplates and update CD drawing.	$22,300
Total Physical Interconnection Costs	$ 180,700

7 Schedule

Based on the scope of work for the Direct and Non-Direct Connection facilities, it is expected to take a minimum of 6 months after the signing of an Interconnection Construction Service Agreement to complete the installation. This includes the requirement for the IC to make a preliminary payment that compensates FE for the first three months of the engineering design work that is related to the construction of the interconnection substation. This assumes that there will be no environmental issues with any of the new properties associated with this project, that there will be no delays in acquiring the necessary permits for implementing the defined direct connection and that any distribution system outages will be allowed when requested.

8 Transmission Owner Analysis

Penelec performed an analysis of its distribution system. The AF2-318 project did not contribute to any overloads on the distribution system.

9 Interconnection Customer Requirements

9.1 System Protection

An analysis was conducted to assess the impact of the East Towanda-New Albany 34.5kV (AF2-318) Project on the system protection requirements in the area. The results of this review show that the following relay additions will be required:

Proposed single line diagrams show the IC constructing a generation facility tapping Penelec's East Towanda Substation 34.5 kV New Albany circuit #0029-62 at pole # TA-462.

The 34.5kV interconnection proposal will require Developer to meet applicable "Technical Requirements" as outlined in First Energy's document titled "Technical Requirements for the Interconnection of Customer-Owned Generation to the FirstEnergy Distribution System".

Protection requirements are included in the "Technical Requirements" document.

9.2 General Concerns

It is to be understood, for abnormal operation of the Penelec system, which could cause Developer's generation facility to be electrically isolated from the Penelec system synchronous source via the tripping of a interconnecting primary voltage line or device, Developer will, via Penelec's direction, be required to disconnect the generation from Penelec's system and remain disconnected (**units are required to be OFF LINE**), until the Penelec system normal circuitry is restored. These abnormal conditions will be reviewed by Penelec system operators as to the need for the generation facility to be disconnected.

Requirements for Owner's/Developer's generation IPP Facility

The proposed interconnection Owner's/Developer's facilities must be designed in accordance with the document titled *FirstEnergy Distribution Engineering Practices Interconnection of Customer-Owned Generation to the FirstEnergy Distribution System* dated 11/17/14 located at the following link:

http://www.pjm.com/planning/design-engineering/to-tech-standards/private-firstenergy.aspx

The document is referred to as engineering practice EP (# 02-280) with section 4, part C specifically referencing the "interconnection technical requirements". Certain protection requirements are shown.

Additionally, Owner/Developer is responsible to provide adequate protection (for their equipment) under any distribution system operating condition' - which includes 'Separation from supply' (i.e. tripping of F.E. circuit breakers) and 'resynchronizing the generation after electric restoration of the supply' (i.e. reclosing of F.E. circuit breakers).

Owner's/Developer's protection must be designed to coordinate with the reclosing practices of FirstEnergy line protective devices. The generator must cease to energize the FirstEnergy circuit to which it is connected prior to reclosing of any (FE) automatic reclosing devices.

Owners/Developer's electrical protection and control schematics shall be provided to FE for consideration. FE may request modifications, if required, to meet the technical requirements.

9.3 Power Factor

The IC will be responsible for meeting a power factor between 0.90 lagging (producing MVARs) to 0.95 leading (absorbing MVARs) and assure that voltage deviation will be less than 1.0 volt as measured at the POI

under all Solar Gen operating conditions due to the inherent dynamic reactive power capability of this solar facility.

Generators with no inherent VAR (reactive power) control capability, or those that have a restricted VAR capability less than the defined requirements, must provide dynamic supplementary reactive support located at the generation facility with electrical characteristics equivalent to that provided by a similar sized synchronous generator. A Dynamic Reactive Compensation (either Static VAR Compensator (SVC) or STATCOM) or other method be applied in order to maintain the required specifications at the POI. IC is responsible for the installation of equipment on its side of the POI in order to adhere to the criteria stated above by FirstEnergy.

10 Revenue Metering and SCADA Requirements

10.1 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.

10.2 Meteorological Data Reporting Requirements

The solar generation facility shall provide the Transmission Provider with site-specific meteorological data including:

- Back panel temperature (Fahrenheit)
- Irradiance (Watts/meter^2)
- Ambient air temperature (Fahrenheit) - (Accepted, not required)
- Wind speed (meters/second) – (Accepted, not required)
- Wind direction (decimal degrees from true north) – (Accepted, not required)

10.3 Interconnected Transmission Owner Requirements

IC will be required to comply with all FE Revenue Metering Requirements for Generation Interconnection Customers. These FE requirements are the following:

The FE operating company (Penelec) shall provide, own, operate, test, and maintain the revenue metering equipment at the Interconnection Customer's (IC) expense. The revenue metering equipment includes, but is not limited to, current transformers, voltage transformers, secondary wires, meter socket, bidirectional revenue meter, and associated devices. The IC shall mount the instrument transformers unless otherwise agreed to by Penelec. The instrument transformers and meter socket shall be installed in a location that is readily accessible to authorized Penelec representatives. Penelec will provide the IC access to bidirectional kWh and kVARh pulses from the Penelec meter at the IC's expense if requested. The IC shall, at its expense,

install, own, operate, test, and maintain any metering and telemetry equipment that may be required to provide real-time meter data to FE or PJM.

11 Summer Peak - Load Flow Analysis

The Queue Project AF2-318 was evaluated as a 20.0 MW (Capacity 12.0 MW) injection at the East Towanda 34.5 kV substation in the PENELEC area. Project AF2-318 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AF2-318 was studied with a commercial probability of 53.0 %. Potential network impacts were as follows:

11.1 Generation Deliverability

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

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CKT ID	CONTNAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
99574911	200810	26KEYSTONE	230.0	PENELEC	999401	KEYSTONE	1.0	PJM	4	PN-P1-2-PN-345-107T	single	635.0	99.97	100.03	DC	0.87
99574912	200810	26KEYSTONE	230.0	PENELEC	999401	KEYSTONE	1.0	PJM	4	ATSI-P1-2-CEI-345-700T	single	635.0	99.97	100.03	DC	0.87

11.2 Multiple Facility Contingency

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

None

11.3 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	CONTNAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
101317045	200674	26TOWANDA	115.0	PENELEC	200677	26NOMESHO	115.0	PENELEC	1	PN-P1-2-PN-230-013A	single	202.0	171.67	173.04	DC	2.78
99574664	200676	26E.SAYRE	115.0	PENELEC	130836	N.WAV115	115.0	NYISO	1	PN-P1-2-PN-230-101T	single	128.0	124.44	125.86	DC	1.82

11.4 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.

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
101317044	200674	26TOWANDA	115.0	PENELEC	200677	26NOMESHO	115.0	PENELEC	1	PN-P1-2-PN-230-013A	operation	202.0	211.78	214.0	DC	4.63
99574723	200675	26E.TWANDA	230.0	PENELEC	200924	26CANYON	230.0	PENELEC	1	Base Case	operation	515.0	168.12	169.01	DC	5.49
99574724	200675	26E.TWANDA	230.0	PENELEC	200924	26CANYON	230.0	PENELEC	1	AP-P1-2-WP-230-324T_FSA_A-B	operation	615.0	162.27	163.28	DC	6.64
99574725	200675	26E.TWANDA	230.0	PENELEC	200924	26CANYON	230.0	PENELEC	1	200908 26CHAPMAN+ 230 235220 01MOSHAN 230 230 1	operation	615.0	162.27	163.28	DC	6.64
99574726	200675	26E.TWANDA	230.0	PENELEC	200924	26CANYON	230.0	PENELEC	1	200908 26CHAPMAN+ 230 919490 AA2-000 TAP 230 1	operation	615.0	162.27	163.28	DC	6.64
99574955	200675	26E.TWANDA	230.0	PENELEC	130763	HILSD230	230.0	NYISO	1	PN-P1-2-PN-230-102T	operation	531.0	131.78	133.04	DC	6.75
99574663	200676	26E.SAYRE	115.0	PENELEC	130836	N.WAV115	115.0	NYISO	1	PN-P1-2-PN-230-101T	operation	128.0	155.88	158.25	DC	3.03
99574988	200706	26N.MESHPN	230.0	PENELEC	200708	26OXBOW	230.0	PENELEC	1	Base Case	operation	855.0	120.19	121.23	DC	8.84
99574989	200706	26N.MESHPN	230.0	PENELEC	200708	26OXBOW	230.0	PENELEC	1	200908 26CHAPMAN+ 230 919490 AA2-000 TAP 230 1	operation	984.0	121.33	122.36	DC	10.05
99574990	200706	26N.MESHPN	230.0	PENELEC	200708	26OXBOW	230.0	PENELEC	1	200908 26CHAPMAN+ 230 235220 01MOSHAN 230 230 1	operation	984.0	121.33	122.36	DC	10.05
99574991	200706	26N.MESHPN	230.0	PENELEC	200708	26OXBOW	230.0	PENELEC	1	AP-P1-2-WP-230-324T_FSA_A-B	operation	984.0	121.33	122.36	DC	10.05
99575008	200708	26OXBOW	230.0	PENELEC	208009	LACK	230.0	PPL	1	AP-P1-2-WP-230-324T_FSA_A-B	operation	984.0	117.58	118.64	DC	10.35
99575009	200708	26OXBOW	230.0	PENELEC	208009	LACK	230.0	PPL	1	200908 26CHAPMAN+ 230 919490 AA2-000 TAP 230 1	operation	984.0	117.58	118.64	DC	10.35
99575010	200708	26OXBOW	230.0	PENELEC	208009	LACK	230.0	PPL	1	200908 26CHAPMAN+ 230 235220 01MOSHAN 230 230 1	operation	984.0	117.58	118.64	DC	10.35
99575011	200708	26OXBOW	230.0	PENELEC	208009	LACK	230.0	PPL	1	Base Case	operation	855.0	113.88	114.95	DC	9.13
99574769	200924	26CANYON	230.0	PENELEC	200706	26N.MESHPN	230.0	PENELEC	1	Base Case	operation	546.0	157.52	158.35	DC	5.49

11.5 System Reinforcements - Summer Peak Load Flow - Primary POI

ID	Idx	Facility	Upgrade Description	Cost
99574664	3	**26E.SAYRE 115.0 kV - N.WAV115 115.0 kV Ckt 1**	**PENELEC** **PN-AF2-F-0007A (1721) : Replace relay at East Sayre on North Waverly terminal** **Note: PJM to coordinate with NYSEG on miscellaneous relay replacement** **Project Type : FAC** **Cost : $427,980** **Time Estimate : 12.0 Months** **PN-AF2-F-0007C (1723) : Replace line relaying at East Sayre.** **Project Type : FAC** **Cost : $427,980** **Time Estimate : 12.0 Months** **Note: It should be noted that some of the contingencies taken in the analysis may not be valid due to system condition changes that were not captured in the model. This will be re-evaluated for validity in the System Impact phase.**	$855,960
101317045	2	**26TOWANDA 115.0 kV - 26NO MESHO 115.0 kV Ckt 1**	**PENELEC** **PN-AF2-F-0045 (1813) : Reconductor 2 miles of transmission.** **Adjust relay settings as necessary at East Towanda and North Meshoppen** **Project Type : FAC** **Cost : $6,114,000** **Time Estimate : 30.0 Months** **b3137 (1915) : PJM Baseline Upgrade b3137. Rebuild 20 miles of the East Towanda - North Meshoppen 115 kV line. The baseline project has a projected in-service date of 06/01/2024.** **Project Type : FAC** **Cost : $0** **b2678 (1916) : PJM Baseline Upgrade b2678. Convert the East Towanda 115 kV substation to breaker and half configuration. The baseline project has a projected in-service date of 06/01/2020.** **Project Type : FAC** **Cost : $0** **s1729 (1917) : Expand the existing North Meshoppen 115 kV yard to a breaker-and-a-half configuration. (s1729)** **Project Type : FAC** **Cost : $0**	$6,114,000

ID	Idx	Facility	Upgrade Description	Cost
99574911,99574912	1	26KEYSTONE 230.0 kV - STAR592 1.0 kV Ckt 4	**PENELEC** **PN-AF2-F-0005 (544) : Construct 500 kV yard consisting of three-500 kV breakers configured in a breaker-and-a-half layout (initially a ring bus)** **Tap the Keystone - Conemaugh 500 kV line and loop into the new Homer City 500 kV yard** **Install one 500/345 kV transformer** **Install a new 345 kV breaker-and-a-half string using three new breakers** **Project Type : CON** **Cost : $85,596,000** **Time Estimate : 48.0 Months**	$171,192,000
N/A	N/A	26E.TWANDA 230.0 kV - HILSD230 230.0 kV Ckt 1	**Note: It should be noted that some of the contingencies taken in the analysis may not be valid due to system condition changes that were not captured in the model. This will be re-evaluated for validity in the System Impact phase.**	$0
N/A	N/A	26N.MESHPN 230.0 kV - 26OXBOW 230.0 kV Ckt 1	**Note: It should be noted that some of the contingencies taken in the analysis may not be valid due to system condition changes that were not captured in the model. This will be re-evaluated for validity in the System Impact phase.**	$0
N/A	N/A	26OXBOW 230.0 kV - 208009 LACK 230.0 kV Ckt 1	**Note: It should be noted that some of the contingencies taken in the analysis may not be valid due to system condition changes that were not captured in the model. This will be re-evaluated for validity in the System Impact phase.**	$0
N/A	N/A	26E.TWANDA 230.0 kV - 26CANYON 230.0 kV Ckt 1	**Note: It should be noted that some of the contingencies taken in the analysis may not be valid due to system condition changes that were not captured in the model. This will be re-evaluated for validity in the System Impact phase.**	$0
			TOTAL COST	**$178,161,960**

11.6 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".

11.6.1 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
99574912	200810	26KEYSTONE	PENELEC	999401	KEYSTONE	PJM	4	ATSI-P1-2-CEI-345-700T	single	635.0	99.97	100.03	DC	0.87

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
200503	**26C.SLOPE (Deactivation : 07/06/2019)**	**12.4530**	**80/20**	**12.4530**
200636	26IUP CO-G	0.3626	80/20	0.3626
200794	26CONEMAGH	0.2477	80/20	0.2477
200805	**26COLVER13 (Deactivation : 01/09/2020)**	**14.5783**	**80/20**	**14.5783**
200809	26SITHE	1.1327	80/20	1.1327
200828	26HNSMLK 1	1.0312	80/20	1.0312
200829	26HNSMLK 2	1.0312	80/20	1.0312
200830	26HNSMLK 3	1.0312	80/20	1.0312
200831	26HNSMLK 4	1.0312	80/20	1.0312
200832	26HNSMLK 5	1.0312	80/20	1.0312
200833	26SEWRDB34	11.9335	80/20	11.9335
200834	26SW_E13_K22	0.0376	80/20	0.0376
200837	26HOMER C1	19.5069	80/20	19.5069
200838	26HOMER C2	16.9129	80/20	16.9129
200839	26HOMER C3	17.9046	80/20	17.9046
200846	26FORWARD	0.1343	80/20	0.1343
200886	26ARWF_N39	0.3313	80/20	0.3313
200888	26HIGHLAND	0.2934	80/20	0.2934
200889	26STNY CRK	0.2253	80/20	0.2253
200898	26AA1-106	1.3402	Adder	1.58
200905	26Q36	0.1852	80/20	0.1852
200906	26KEYSTN#3	0.5743	80/20	0.5743
200915	26CHSTN_FL	0.1594	80/20	0.1594
200925	26R32	0.3385	80/20	0.3385
200945	26CT_V3-030	0.1174	80/20	0.1174
201477	26Y2-055	2.5486	Adder	3.0
202158	26CON.GEN1	0.0620	80/20	0.0620
202160	26CON.GEN2	0.0438	80/20	0.0438
202225	26SCI_S29B	0.0585	80/20	0.0585
203034	26NA_O38_P22	0.2899	80/20	0.2899
203910	26Z1-091	1.2194	Adder	1.43
915951	Y3-092 FTIR	100.8400	Merchant Transmission	100.8400
919201	AA1-144 OP	9.8883	Adder	11.63
919491	AA2-000	31.0826	Adder	36.57
920341	**AA2-132 (Suspended)**	**1.3420**	**Adder**	**1.58**
922932	**AB1-082 OP (Suspended)**	**2.1701**	**80/20**	**2.1701**

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
930511	AB1-092	1.1413	Adder	1.34
935191	AD1-154	2.2258	80/20	2.2258
936421	AD2-055	2.3497	Adder	2.76
936991	AD2-133 C	1.9323	80/20	1.9323
938351	AE1-053	0.8690	Adder	1.02
938881	AE1-116	0.5449	80/20	0.5449
938951	AE1-123	1.4491	Adder	1.7
938991	AE1-128 C	9.2549	80/20	9.2549
939171	AE1-147 C	0.7276	Adder	0.86
939291	AE1-160 C	1.0744	Adder	1.26
940201	AE2-001 C	0.7264	Adder	0.85
940681	**AE2-055 C (Suspended)**	**0.7083**	**Adder**	**0.83**
940861	AE2-074 C	1.6477	80/20	1.6477
941191	AE2-113 C	6.5768	80/20	6.5768
941231	AE2-117 C	0.8287	Adder	0.97
941241	AE2-118 C	0.8287	Adder	0.97
941261	AE2-120 C	0.7257	Adder	0.85
941271	AE2-121 C	0.3880	Adder	0.46
941321	AE2-126 C	0.9652	Adder	1.14
941331	AE2-129 C	1.0320	Adder	1.21
941351	AE2-131 C	1.0320	Adder	1.21
941421	AE2-139 C	3.7257	Adder	4.38
942121	AE2-224 C	8.0706	80/20	8.0706
942351	AE2-248 C	0.5727	Adder	0.67
942491	AE2-262 C	3.2823	Adder	3.86
942501	AE2-263 C	3.0853	Adder	3.63
942511	AE2-264 C	3.8776	Adder	4.56
942811	AE2-299 C	2.7755	Adder	3.27
942961	AE2-316 C	3.0542	Adder	3.59
943151	AE2-344 C	6.0734	Adder	7.15
943351	AF1-006 C	1.1040	Adder	1.3
943711	AF1-039 C O1	0.6028	Adder	0.71
943751	AF1-043	7.0490	Adder	8.29
944001	AF1-068 C O1	0.7612	Adder	0.9
944181	AF1-086 C O1	2.4970	80/20	2.4970
944261	AF1-094 C	1.0289	Adder	1.21
944281	AF1-096 C	1.0152	Adder	1.19
944301	AF1-098 C	4.1628	Adder	4.9
944311	AF1-099 C	4.9825	Adder	5.86
944321	AF1-100 C	10.5901	Adder	12.46
944381	AF1-103 O1	1.7576	Adder	2.07
944391	AF1-104 O1	1.7201	Adder	2.02
944411	AF1-106 O1	1.4530	Adder	1.71
944471	AF1-112 C	0.7656	Adder	0.9
944671	AF1-132 C O1	0.7123	Adder	0.84
944691	AF1-134 C O1	1.3150	80/20	1.3150
944751	AF1-140 C	1.2401	80/20	1.2401
944771	AF1-142 C	7.9720	Adder	9.38
944781	AF1-143 C	5.2142	Adder	6.13
944841	AF1-149 C	0.7257	Adder	0.85
944881	AF1-153 C O1	0.8896	Adder	1.05
944901	AF1-155 C	0.8895	Adder	1.05

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
945021	AF1-167 C	0.5551	Adder	0.65
945051	AF1-170 C	4.0209	Adder	4.73
945121	AF1-177	0.4394	Adder	0.52
945161	AF1-181	0.0568	Adder	0.07
945171	AF1-182	0.2838	Adder	0.33
945181	AF1-183	0.0751	Adder	0.09
945331	AF1-198	0.1929	Adder	0.23
945451	AF1-210 C	0.6069	Adder	0.71
945491	AF1-214 C	0.7258	Adder	0.85
945551	AF1-220 C	7.3722	Adder	8.67
945671	AF1-232 C O2	12.8159	80/20	12.8159
945751	AF1-240 C O1	1.3355	80/20	1.3355
946071	AF1-272 C O1	11.3018	80/20	11.3018
946081	AF1-273 C O1	6.3031	80/20	6.3031
946111	AF1-276 C	7.6427	80/20	7.6427
946121	AF1-277 C	7.6427	80/20	7.6427
946131	AF1-278 C	6.0913	80/20	6.0913
946211	AF1-286 C O1	0.5885	Adder	0.69
946221	AF1-287 C	1.0433	Adder	1.23
946381	AF1-302 C	1.3337	Adder	1.57
946401	AF1-304 C	5.0618	Adder	5.96
946421	AF1-306 C	3.7262	Adder	4.38
946431	AF1-307 C	5.2006	80/20	5.2006
946571	AF1-321 C O1	1.6274	80/20	1.6274
946771	AF1-217 C O2	1.0433	Adder	1.23
957001	AF2-001 C O1	1.6274	80/20	1.6274
957011	AF2-002 C O1	0.8137	80/20	0.8137
957161	AF2-010 C	2.0889	Adder	4.64
957451	AF2-039 C	0.3417	Adder	0.76
957561	AF2-050 C	4.0353	80/20	4.0353
957571	AF2-051 C O1	3.4356	80/20	3.4356
957581	AF2-052 C	4.1007	80/20	4.1007
957681	AF2-062 C	13.8720	80/20	13.8720
957931	AF2-087 C	0.3396	80/20	0.3396
957941	AF2-088 C	0.1645	Adder	0.37
957951	AF2-089 C	0.1480	Adder	0.33
957981	AF2-092 C	0.9227	80/20	0.9227
958031	AF2-097 C	0.1371	Adder	0.3
958101	AF2-104 C	0.2906	80/20	0.2906
958271	AF2-121 C	0.5470	Adder	1.21
958361	AF2-130 C	0.5229	Adder	1.16
958411	AF2-135 C	0.1382	Adder	0.31
958471	AF2-141	0.3685	Adder	0.82
958731	AF2-164 C O1	5.3635	80/20	5.3635
958741	AF2-165 C	0.5365	Adder	1.19
958751	AF2-166 C	0.5229	Adder	1.16
958791	AF2-170 C	0.5470	Adder	1.21
959061	AF2-197 C O1	1.3327	Adder	2.96
959301	AF2-221 C	0.8456	80/20	0.8456
959401	AF2-231 C	0.1098	Adder	0.24
959441	AF2-235 C	0.2690	Adder	0.6
959461	AF2-237 C	0.2727	Adder	0.61

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
959471	AF2-238 C	0.4701	Adder	1.04
959481	AF2-239 C	0.3622	Adder	0.8
959491	AF2-240 C	0.4158	Adder	0.92
959501	AF2-241 C	0.4351	Adder	0.97
959521	AF2-243 C	0.4024	Adder	0.89
959741	AF2-265 C	0.3369	Adder	0.75
960031	AF2-294 C	0.4289	Adder	0.95
960041	AF2-295 C	0.4715	Adder	1.05
960051	AF2-296 C	1.3150	80/20	1.3150
960211	AF2-312 C	1.3734	80/20	1.3734
960271	AF2-318 C	0.3916	Adder	0.87
960321	AF2-323 C O1	2.7504	80/20	2.7504
960391	AF2-330 C	6.0977	80/20	6.0977
960451	AF2-336 C O1	1.5378	80/20	1.5378
960461	AF2-337 C O1	1.5378	80/20	1.5378
960471	AF2-338 C O1	1.5378	80/20	1.5378
960481	AF2-339 C O1	1.5378	80/20	1.5378
960901	AF2-381 C	10.8427	80/20	10.8427
961141	AF2-405	0.3850	Adder	0.85
961151	AF2-406	2.8878	Adder	6.41
961201	AF2-411 O1	31.5150	80/20	31.5150
961211	AF2-412 O1	5.7464	Adder	12.76
961451	AF2-436	0.0442	Adder	0.1
NEWTON	NEWTON	0.7038	Confirmed LTF	0.7038
FARMERCITY	FARMERCITY	0.0364	Confirmed LTF	0.0364
G-007A	G-007A	1.0765	Confirmed LTF	1.0765
VFT	VFT	3.1218	Confirmed LTF	3.1218
CALDERWOOD	CALDERWOOD	0.3071	Confirmed LTF	0.3071
PRAIRIE	PRAIRIE	1.6764	Confirmed LTF	1.6764
CHEOAH	CHEOAH	0.3083	Confirmed LTF	0.3083
EDWARDS	EDWARDS	0.2303	Confirmed LTF	0.2303
TILTON	TILTON	0.4152	Confirmed LTF	0.4152
MADISON	MADISON	0.0323	Confirmed LTF	0.0323
GIBSON	GIBSON	0.3593	Confirmed LTF	0.3593
BLUEG	BLUEG	1.1440	Confirmed LTF	1.1440
TRIMBLE	TRIMBLE	0.3673	Confirmed LTF	0.3673
CATAWBA	CATAWBA	0.2034	Confirmed LTF	0.2034

11.6.2 Index 2

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
101317045	200674	26TOWANDA	PENELEC	200677	26NO MESHO	PENELEC	1	PN-P1-2-PN-230-013A	single	202.0	171.67	173.04	DC	2.78

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
200649	26PENNTECH	0.3714	80/20	0.3714
200665	26SHAWVL 3	1.5072	80/20	1.5072
200666	26SHAWVL 4	1.4899	80/20	1.4899
200887	26ARMNA MT	0.5912	80/20	0.5912
200898	26AA1-106	3.3036	80/20	3.3036
200949	26X1-109	26.2332	80/20	26.2332
203261	26BLOSSBCT	0.4864	80/20	0.4864
203283	26MANOR_T86	0.0519	80/20	0.0519
203349	26Z1-069 C	0.2495	80/20	0.2495
203350	26MILZ1-092	0.6000	80/20	0.6000
203351	26GROZ1-110	0.5698	80/20	0.5698
203352	26CANZ2-011	0.5698	80/20	0.5698
919201	AA1-144 OP	31.9154	80/20	31.9154
919491	AA2-000	44.5915	80/20	44.5915
920351	AA2-133	0.2275	80/20	0.2275
922932	**AB1-082 OP (Suspended)**	**1.6238**	**80/20**	**1.6238**
923442	AB1-160 C	0.0713	80/20	0.0713
930511	AB1-092	1.6373	80/20	1.6373
934801	AD1-108	0.0430	80/20	0.0430
934811	AD1-109	0.0315	80/20	0.0315
935061	AD1-142	0.0332	80/20	0.0332
936421	AD2-055	3.3708	80/20	3.3708
940861	AE2-074 C	1.2330	80/20	1.2330
941191	AE2-113 C	3.4749	80/20	3.4749
941421	AE2-139 C	10.9083	80/20	10.9083
942491	AE2-262 C	2.5070	80/20	2.5070
942501	AE2-263 C	2.3566	80/20	2.3566
943751	AF1-043	10.1125	80/20	10.1125
944311	AF1-099 C	3.8056	80/20	3.8056
944321	AF1-100 C	7.8540	80/20	7.8540
944411	AF1-106 O1	3.4958	80/20	3.4958
944771	AF1-142 C	6.0890	80/20	6.0890
945161	AF1-181	0.0406	80/20	0.0406
945171	AF1-182	0.2020	80/20	0.2020
945331	AF1-198	0.3711	80/20	0.3711
946111	AF1-276 C	3.5322	80/20	3.5322
946121	AF1-277 C	3.5322	80/20	3.5322
946131	AF1-278 C	2.8152	80/20	2.8152
946211	AF1-286 C O1	1.4158	80/20	1.4158
957581	AF2-052 C	2.1708	80/20	2.1708

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
957681	AF2-062 C	6.4416	80/20	6.4416
959061	AF2-197 C O1	10.2256	80/20	10.2256
959471	AF2-238 C	2.1307	80/20	2.1307
959481	AF2-239 C	2.5693	80/20	2.5693
959491	AF2-240 C	1.8877	80/20	1.8877
959501	AF2-241 C	1.9751	80/20	1.9751
959741	AF2-265 C	1.5270	80/20	1.5270
960271	AF2-318 C	2.7776	80/20	2.7776
961141	AF2-405	1.7479	80/20	1.7479
961151	AF2-406	13.1092	80/20	13.1092
961201	AF2-411 O1	34.0710	80/20	34.0710
961211	AF2-412 O1	18.2585	80/20	18.2585
961451	AF2-436	0.0994	80/20	0.0994
WEC	WEC	0.1852	Confirmed LTF	0.1852
LGEE	LGEE	0.3240	Confirmed LTF	0.3240
CPLE	CPLE	0.2209	Confirmed LTF	0.2209
CBM-W2	CBM-W2	4.3898	Confirmed LTF	4.3898
CBM-W1	CBM-W1	7.6686	Confirmed LTF	7.6686
TVA	TVA	0.7014	Confirmed LTF	0.7014
CBM-S2	CBM-S2	2.2195	Confirmed LTF	2.2195
CBM-S1	CBM-S1	4.3793	Confirmed LTF	4.3793
MEC	MEC	0.9026	Confirmed LTF	0.9026

11.6.3 Index 3

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
99574664	200676	26E.SAYRE	PENELEC	130836	N.WAV115	NYISO	1	PN-P1-2-PN-230-101T	single	128.0	124.44	125.86	DC	1.82

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
200851	26MEHOOP3	0.7270	80/20	0.7270
200898	26AA1-106	1.2716	80/20	1.2716
200917	26MTNTP_P28	0.3696	80/20	0.3696
200949	26X1-109	14.2910	80/20	14.2910
203283	26MANOR_T86	0.0340	80/20	0.0340
203347	26NME_Y1-047	0.2452	80/20	0.2452
203350	26MILZ1-092	1.9559	80/20	1.9559
203351	26GROZ1-110	0.2193	80/20	0.2193
203352	26CANZ2-011	0.2193	80/20	0.2193
203907	26Y2-042	1.1253	80/20	1.1253
203909	26Z1-038	1.6097	80/20	1.6097
917631	Z2-104	0.0170	80/20	0.0170
919201	AA1-144 OP	17.2861	80/20	17.2861
920351	AA2-133	0.4137	80/20	0.4137
934801	AD1-108	0.0165	80/20	0.0165
934811	AD1-109	0.0121	80/20	0.0121
934821	AD1-110	0.0185	80/20	0.0185
935061	AD1-142	0.1081	80/20	0.1081
941421	AE2-139 C	5.7219	80/20	5.7219
944411	AF1-106 O1	11.3960	80/20	11.3960
946211	AF1-286 C O1	4.6154	80/20	4.6154
959061	AF2-197 C O1	6.2835	80/20	6.2835
959481	AF2-239 C	1.6834	80/20	1.6834
959491	AF2-240 C	6.1538	80/20	6.1538
959501	AF2-241 C	6.4387	80/20	6.4387
960271	AF2-318 C	1.8199	80/20	1.8199
961141	AF2-405	5.6980	80/20	5.6980
961151	AF2-406	42.7350	80/20	42.7350
961451	AF2-436	0.1808	80/20	0.1808
961461	AF2-437	0.0922	80/20	0.0922
NEWTON	NEWTON	0.4459	Confirmed LTF	0.4459
FARMERCITY	FARMERCITY	0.0230	Confirmed LTF	0.0230
G-007A	G-007A	2.1122	Confirmed LTF	2.1122
VFT	VFT	5.9856	Confirmed LTF	5.9856
CALDERWOOD	CALDERWOOD	0.1784	Confirmed LTF	0.1784
NY	NY	1.8620	Confirmed LTF	1.8620
PRAIRIE	PRAIRIE	1.0513	Confirmed LTF	1.0513
CHEOAH	CHEOAH	0.1787	Confirmed LTF	0.1787
EDWARDS	EDWARDS	0.1488	Confirmed LTF	0.1488
TILTON	TILTON	0.2671	Confirmed LTF	0.2671
MADISON	MADISON	0.0222	Confirmed LTF	0.0222

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
GIBSON	GIBSON	0.2277	Confirmed LTF	0.2277
BLUEG	BLUEG	0.7222	Confirmed LTF	0.7222
TRIMBLE	TRIMBLE	0.2315	Confirmed LTF	0.2315
CATAWBA	CATAWBA	0.1092	Confirmed LTF	0.1092

11.7 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
AA1-106	Grover II 34.5kV	Withdrawn
AA1-144	East Towanda-Grover 230kV	Engineering and Procurement
AA2-000	N/A	N/A
AA2-132	Thompson 34.5kV	Suspended
AA2-133	Wyalusing 34.5kV	In Service
AB1-082	Potter 46kV	Suspended
AB1-092	Moshannon-East Towanda 230kV	Active
AB1-160	Gold-Sabinsville 115kV	In Service
AD1-108	Grover 34 kV	In Service
AD1-109	Canton 34.5 kV	In Service
AD1-110	North Meshoppen 34.5 kV	In Service
AD1-142	Milan 34.5 kV	In Service
AD1-154	Timblin 34.5 kV	Active
AD2-055	Moshannon-East Towanda 230 kV	Active
AD2-133	Eagle Valley 115kV	Active
AE1-053	Meyersdale North	Active
AE1-116	Somerset Windpower 23 kV	Active
AE1-123	Emlenton 34.5 kV	Engineering and Procurement
AE1-128	Bedford North-Wills Mounain 115 kV	Active
AE1-147	Bellefonte 46 kV	Engineering and Procurement
AE1-160	Venango 34.5 kV	Engineering and Procurement
AE2-001	Nittany-Zion 46 kV	Active
AE2-055	Shingletown-Boalsburg 46 kV	Suspended
AE2-074	Potter 46 kV	Active
AE2-113	Farmers Valley-Ridgeway 115 kV	Active
AE2-117	ABW Tap-Alexandria 46 kV	Active
AE2-118	ABW Tap-Williamsburg 46 kV	Active
AE2-120	Graymont-Zion 46 kV	Active
AE2-121	Milesburg-Tanney Junction 46 kV	Active
AE2-126	Dubois-Curwensville 34.5 kV	Active
AE2-129	Philipsburg-Clarence 34.5 kV	Active
AE2-131	Philipsburg-Karthaus 34.5	Active
AE2-139	East Towanda-Grover 230 kV	Active
AE2-224	Bearrock-Johnstown 230 kV	Active
AE2-248	Fillmore-Thompson Farm 46 kV	Active
AE2-262	Moshannon-Milesburg 230 kV	Active
AE2-263	Moshannon-Milesburg 230 kV	Active
AE2-264	Altoona-Raystown 230 kV	Active
AE2-299	Erie East 230 kV	Active

Queue Number	Project Name	Status
AE2-316	Brookville-Squab Hollow 138 kV	Active
AE2-344	Edinboro South-Venango Junction 115 kV	Active
AF1-006	Fairview East 34.5 kV	Active
AF1-039	Listonburg-Highpoint 24.9 kV	Active
AF1-043	Moshannon-East Towanda 230 kV	Active
AF1-068	Boalsburg-Centre Hall 46 kV	Active
AF1-086	Madera-Westover South 115 kV	Active
AF1-094	Union City-Cambridge Springs 34.5 kV	Active
AF1-096	Titusville-Oil Creek 34.5 kV	Active
AF1-098	Four Mile Jct-Corry East 115 kV	Active
AF1-099	Moshannon-Milesburg 230 kV	Active
AF1-100	Shawville-Moshannon 230 kV	Active
AF1-103	Warren 34.5 kV	Active
AF1-104	Erie West 34.5 kV	Active
AF1-106	East Sayre 34.5 kV	Active
AF1-112	Centre Hall-Boalsburg 46 kV	Active
AF1-132	Shingletown-Boalsburg 46 kV	Active
AF1-134	Philipsburg-Madera 34.5 kV	Active
AF1-140	Claysburg 23 kV	Engineering and Procurement
AF1-142	Moshannon-Milesburg 230 kV	Active
AF1-143	Lick Run 115 kV	Active
AF1-149	Graymont-Zion 46 kV	Active
AF1-153	Motion-Ridgeway 46 kV	Active
AF1-155	Paper City-Wilcox 46 kV	Engineering and Procurement
AF1-167	West Freedom-C&K Coal 25 kV	Active
AF1-170	Springboro-Venango Junction 115 kV	Active
AF1-177	Warren 115 kV	Partially in Service - Under Construction
AF1-181	Shawville 3 230 kV	Partially in Service - Under Construction
AF1-182	Shawville 4 230 kV	Partially in Service - Under Construction
AF1-183	Shawville 1 230 kV	Partially in Service - Under Construction
AF1-198	Blossburg #1 CT 34.5 kV	Partially in Service - Under Construction
AF1-210	Burma 23 kV	Engineering and Procurement
AF1-214	Nittany-Zion 46 kV	Active
AF1-217	Edinboro -Cambridge Springs 34.5 kV	Active
AF1-220	Ridgway-Whetstone 115 kV	Active
AF1-232	Allegheny-Somerset 115 kV	Active
AF1-240	Timblin 34.5 kV	Active
AF1-272	Lucerne 115 kV	Active
AF1-273	Allegheny 115 kV	Active
AF1-276	Lewis Run-Pierce Brook 230 kV	Active
AF1-277	Lewis Run-Pierce Brook 2 230 kV	Active
AF1-278	Lewis Run-Pierce Brook 3 230 kV	Active
AF1-286	East Sayre 34.5 kV II	Active
AF1-287	Edinboro South 34.5 kV II	Active
AF1-302	Brookville-Squab Hollow 138 kV	Active
AF1-304	Titusville-Grandview 115 kV	Active
AF1-306	Squab Hollow 230 kV	Active
AF1-307	Seward-Jackson Rd 115 kV	Active
AF1-321	Hooversville 115 kV I	Active
AF2-001	Hooversville 115 kV II	Active
AF2-002	Hooversville 115 kV III	Active
AF2-010	Union City-Titusville 115 kV	Active

Queue Number	Project Name	Status
AF2-039	Shawville-Clearfield 34.5 kV	Active
AF2-050	Bearrock-Johnstown 230 kV	Active
AF2-051	Geneva 115 kV	Active
AF2-052	Farmers Valley-Ridgeway 115 kV	Active
AF2-062	Lewis Run-Pierce Brook 230 kV	Active
AF2-087	East Altoona-Pinecroft 12.47 kV	Active
AF2-088	Shawville-Clearfield 34.5 kV II	Active
AF2-089	Titusville 34.5 kV	Active
AF2-092	Snake Spring-Bedford Area 23 kV	Active
AF2-097	Fairview East 34.5 kV II	Active
AF2-104	Somerset 23 kV	Active
AF2-121	Philipsburg-Shawville 34.5 kV	Active
AF2-130	Wolfs Corners 34.5 kV	Active
AF2-135	Rockwood-Confluence 23 kV	Active
AF2-141	Lick Run 115 kV	Active
AF2-164	Handsome Lake 345 kV	Active
AF2-165	Clark Summit-Emlenton 34.5 kV	Active
AF2-166	Clark Summit-Emlenton 34 kV	Active
AF2-170	Erie West-Springboro 34.5 kV	Active
AF2-197	East Towanda 115 kV	Active
AF2-221	Scalp Level 22.9 kV	Active
AF2-231	Belleville 12.47 kV	Active
AF2-235	Titusville-Oil Creek 34.5 kV	Active
AF2-237	Union City-Cambridge Springs 34.5 kV	Active
AF2-238	Mansfield-South Troy 34.5 kV	Active
AF2-239	Wyalusing-Hollenback WRC 34.5 kV	Active
AF2-240	North Orwell 12.47 kV	Active
AF2-241	Athens-Milan 34.5 kV	Active
AF2-243	Clark Summit 34.5 kV	Active
AF2-265	South Troy-Athens 34.5 kV	Active
AF2-294	Thompson 34.5 kV	Active
AF2-295	Wilcox-Paper City 46 kV	Active
AF2-296	Madera 34.5 kV	Active
AF2-312	Carrolltown-Patton 46 kV	Active
AF2-318	East Towanda-New Albany 34.5 kV	Active
AF2-323	Geneva-Franklin Tap 115 kV	Active
AF2-330	Claysburg-Summit 115 kV	Active
AF2-336	Snake Spring 115 kV I	Active
AF2-337	Snake Spring 115 kV II	Active
AF2-338	Snake Spring 115 kV III	Active
AF2-339	Snake Spring 115 kV IV	Active
AF2-381	Bedford North-Central City West 115 kV	Active
AF2-405	East Sayre 34.5 kV III	Active
AF2-406	Sayre 115 kV	Active
AF2-411	Mainesburg 345 kV	Active
AF2-412	Mainesburg 115 kV	Active
AF2-436	Wyalusing 34.5 kV II	Active
AF2-437	Oxbow 34.5 kV III	Active
V3-030	St. Benedict-Patton 46kV	In Service
X1-109	E. Towanda 230kV	In Service
Y1-047	North Meshoppen 34.5kV	In Service
Y2-042	Oxbow 25kV	In Service

Queue Number	Project Name	Status
Y2-055	Elm Street 34.5kV	Withdrawn
Y3-092	Erie West 345kV	Engineering and Procurement
Z1-038	Florey Knob 34.5kV	Withdrawn
Z1-069	Gold-Sabinsville 115kV	In Service
Z1-091	Lenox 34kV	Withdrawn
Z1-092	Milan 34kV	In Service
Z1-110	Grover 34kV	In Service
Z2-011	Canton 34.5kV	In Service
Z2-104	Oxbow 25kV II	In Service

11.8 Contingency Descriptions

Contingency Name	Contingency Definition
ATSI-P1-2-CEI-345-700T	CONTINGENCY 'ATSI-P1-2-CEI-345-700T' /* PN/ATSI ERIE WEST - ASHTABULA - PERRY 345KV DISCONNECT BRANCH FROM BUS 239036 TO BUS 238547 CKT 1 /* 02PERRY 345 02AT 345 DISCONNECT BRANCH FROM BUS 238547 TO BUS 239082 CKT 1 /* 02AT 345 02S8-ATT 345 DISCONNECT BRANCH FROM BUS 239082 TO BUS 238544 CKT 8 /* 02S8-ATT 345 02ASH_3 138 DISCONNECT BRANCH FROM BUS 238547 TO BUS 200599 CKT 1 /* 02AT 345 26ERIE W 345 END
200908 26CHAPMAN+ 230 235220 01MOSHAN 230 230 1	CONTINGENCY '200908 26CHAPMAN+ 230 235220 01MOSHAN 230 230 1' OPEN BRANCH FROM BUS 200908 TO BUS 235220 CKT 1 END
AP-P1-2-WP-230-324T_FSA_A-B	CONTINGENCY 'AP-P1-2-WP-230-324T_FSA_A-B' /* MOSHANNON-MARSHALL 230KV APS-PN TIE DISCONNECT BRANCH FROM BUS 235220 TO BUS 200908 CKT 1 /* 01MOSHAN 230 26CHAPMAN+ 230 DISCONNECT BRANCH FROM BUS 200908 TO BUS 919490 CKT 1 /* 26CHAPMAN+ 230 AA2-000 TAP 230 END
PN-P1-2-PN-230-013A	CONTINGENCY 'PN-P1-2-PN-230-013A' /* EAST TOWANDA - NORTH MESHOPPEN 230KV DISCONNECT BRANCH FROM BUS 200675 TO BUS 200924 CKT 1 /* 26E.TWANDA 230 26CANYON 230 DISCONNECT BRANCH FROM BUS 200924 TO BUS 200706 CKT 1 /* 26CANYON 230 26N.MESHPN 230 END
Base Case	

Contingency Name	Contingency Definition
PN-P1-2-PN-230-102T	CONTINGENCY 'PN-P1-2-PN-230-102T' /* NORTH MESHOPPEN - LACKAWANNA 230KV RTEP B2952 DISCONNECT BRANCH FROM BUS 200706 TO BUS 200708 CKT 1 /* 26N.MESHPN 230 26OXBOW 230 DISCONNECT BRANCH FROM BUS 200708 TO BUS 208009 CKT 1 /* 26OXBOW 230 LACK 230 DISCONNECT BRANCH FROM BUS 200708 TO BUS 200709 CKT 1 /* 26OXBOW 230 26OXBOW 35 END
200908 26CHAPMAN+ 230 919490 AA2-000 TAP 230 1	CONTINGENCY '200908 26CHAPMAN+ 230 919490 AA2-000 TAP 230 1' OPEN BRANCH FROM BUS 200908 TO BUS 919490 CKT 1 END
PN-P1-2-PN-230-101T	CONTINGENCY 'PN-P1-2-PN-230-101T' /* EAST TOWANDA - HILLSIDE 230KV DISCONNECT BRANCH FROM BUS 200675 TO BUS 130763 CKT 1 /* 26E.TWANDA 230 HILSD230 230 END
PN-P1-2-PN-345-107T	CONTINGENCY 'PN-P1-2-PN-345-107T' /* ERIE WEST - ASHTABULA - PERRY 345KV DISCONNECT BRANCH FROM BUS 200599 TO BUS 238547 CKT 1 /* 26ERIE W 345 02AT 345 DISCONNECT BRANCH FROM BUS 238547 TO BUS 239082 CKT 1 /* 02AT 345 02S8-ATT 345 DISCONNECT BRANCH FROM BUS 238547 TO BUS 239036 CKT 1 /* 02AT 345 02PERRY 345 DISCONNECT BUS 238547 /* 02AT 345 END

12 Short Circuit Analysis

Short circuit analysis will be provided in the System Impact Study report.

13 Affected Systems

13.1 NYISO

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