Generation Interconnection

Feasibility Study Report

for

Queue Project AG1-040

MORGAN STREET-MOUNT HOPE 34.5 KV

12 MW Capacity / 20 MW Energy

January 2021

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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, LLC (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 Crawford 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 December 01, 2022. This study does not imply a TO commitment to this in-service date.

Queue Number	**AG1-040**
Project Name	MORGAN STREET-MOUNT HOPE 34.5 KV
State	Pennsylvania
County	Crawford
Transmission Owner	PENELEC
MFO	20
MWE	20
MWC	12
Fuel	Solar
Basecase Study Year	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

AG1-040 will interconnect with the PENELEC on distribution system via a tap on the 34.5 kV Mount Hope circuit at pole # MP-25152. The IC's proposed generating unit site is approximately 8.8 miles west of Titusville, PA., near Le Boeuf Trail Road and Meadville Road.

Attachment 1 shows a one-line diagram of the proposed primary direct connection facilities for the AG1-040 generation project to connect to the Penelec distribution system.

5 Cost Summary

The AG1-040 project will be responsible for the following costs:

Description	Total Cost
Total Physical Interconnection Costs	$222,000
Total System Network Upgrade Costs	$80,105,286[1]
Total Costs	**$80,327,286**

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.

[1] This project currently contributes to overloads of the Transmission System (see Summer Peak Load Flow Analysis section below) and therefore has potential to have cost allocation for the system reinforcements listed in the report. This will be re-evaluated in the System Impact phase. The results may vary with queue customers withdrawing from the queue and other generators deactivating over time. If a customer is the first to cause the need for a project (causes loading to exceed 100% of rating), then the customer is responsible. If a customer contributes to a facility that is already overloaded by a prior queue, then they may receive cost allocation.

6 Transmission Owner Scope of Work

The AG1-040 will interconnect with the Penelec distribution system via a tap on the 34.5 kV Mount Hope circuit at pole # MP-25152. The IC will be responsible for acquiring all easements, properties, and permits that may be required to construct the new interconnection station and the associated facilities.

Attachment 1 shows a one-line diagram of the proposed primary direct connection facilities for the AG1-040 generation project to connect to the Penelec distribution system. The IC will be responsible for constructing all of the facilities on its side of the POI, including the attachment facilities which connect the generator to the FE distribution system's direct connection facilities.

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

Description	**Total Cost**
The proposed tap point was noted near pole # MP-25151 on the Morgan Street substation 34.5kV Mount Hope. Install SCADA Switch and 34.5kV metering.	$ 133,400
Relay Settings Updates	$ 50,200
Customer drawings and NP Review. @ AG1-040 Customer	$ 38,400
Total Physical Interconnection Costs	$222,000

7 Schedule

Based on the scope of work for the interconnection facilities, it is expected to take a minimum of **14 months** after the signing of an Interconnection Construction Service Agreement and construction kickoff call to complete the installation. 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 physical interconnection work, and that all system outages will be allowed when requested.

If the customer is ultimately responsible for network upgrades, then the schedule for those upgrades will be refined in future study phases. The customer would need to wait for those upgrades to be completed prior to commercial operation unless determined deliverable by an interim deliverability study. The elapsed time to complete any network upgrades is provided in the System Reinforcements table of this report[1].

8 Transmission Owner Analysis

Penelec performed an analysis of its distribution system. The AG1-040 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 Morgan Street-Mount Hope 34.5 kV (AG1-040) 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 Morgan Street – 34.5kV Mount Hope circuit at pole MP-25152.

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". Anti-islanding system shall meet IEEE 1547 and UL 1741. Therefore, no Direct Transfer Trip (DTT) will be required.

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.

9.3 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 'Re-synchronizing 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.

9.4 Compliance Issues

IC will be responsible for meeting a power factor between 0.95 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) - (Required for plants with Maximum Facility Output of 3 MW or higher)
- Irradiance (Watts/meter2) - (Required for plants with Maximum Facility Output of 3 MW or higher)
- 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

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/

11 Summer Peak - Load Flow Analysis

The Queue Project AG1-040 was evaluated as a 20.0 MW (Capacity 12.0 MW) injection at the Morgan Street #1 34.5 kV substation in the PENELEC area. Project AG1-040 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AG1-040 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)

None

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	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
16725921 1	235197	01KARNSC	138.0	AP	235152	01BUTLER	138.0	AP	1	ATSI-P2-3-CEI-345-004D	breaker	179.0	227.81	228.28	DC	1.87
16725922 3	235240	01COLMBGPN	138.0	AP	235202	01KISKIV	138.0	AP	1	ATSI-P2-3-CEI-345-004D	breaker	151.0	173.37	173.83	DC	1.54
16725922 1	235282	01GAR RN	138.0	AP	235240	01COLMBGPN	138.0	AP	1	ATSI-P2-3-CEI-345-004D	breaker	151.0	175.68	176.14	DC	1.54

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
16611481 7	200575	26MRGAN ST	115.0	PENELEC	200573	26VENGO JT	115.0	PENELEC	1	PN-P1-2-PN-345-001	operation	149.0	113.32	118.89	DC	8.3

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
16779786 3	235197	01KARNSC	138.0	AP	235152	01BUTLER	138.0	AP	1	PN-P1-2-PN-345-107T	operation	179.0	226.09	226.56	DC	1.86
16779786 4	235197	01KARNSC	138.0	AP	235152	01BUTLER	138.0	AP	1	ATSI-P1-2-CEI-345-700T	operation	179.0	226.09	226.56	DC	1.86
16779790 9	235240	01COLMBGPN	138.0	AP	235202	01KISKIV	138.0	AP	1	PN-P1-2-PN-345-107T	operation	151.0	169.49	169.94	DC	1.53
16779791 0	235240	01COLMBGPN	138.0	AP	235202	01KISKIV	138.0	AP	1	ATSI-P1-2-CEI-345-700T	operation	151.0	169.49	169.94	DC	1.53
16779789 7	235282	01GAR RN	138.0	AP	235240	01COLMBGPN	138.0	AP	1	PN-P1-2-PN-345-107T	operation	151.0	171.8	172.26	DC	1.53
16779789 8	235282	01GAR RN	138.0	AP	235240	01COLMBGPN	138.0	AP	1	ATSI-P1-2-CEI-345-700T	operation	151.0	171.8	172.26	DC	1.53

11.5 System Reinforcements - Summer Peak Load Flow - Primary POI

ID	Idx	Facility	Upgrade Description	Cost
167259221	3	01GAR RN 138.0 kV - 01COLMBGPN 138.0 kV Ckt 1	APS WP-AG1-F-0017 (251) : Reconductor 10.4 miles of 4/0 CU from Columbia Big Pine - Garretts Run Jct 138 kV (99 spans). Project Type : FAC Cost : $27,092,520 Time Estimate : 48.0 Months	$27,092,520
167259211	1	01KARNSC 138.0 kV - 01BUTLER 138.0 kV Ckt 1	APS WP-AG1-F-0008A (216) : Replace 336 ACSR, 954 ACSR, & 1024.5 ACAR bus conductor at Karns City substation. Project Type : FAC Cost : $130,252 Time Estimate : 12.0 Months WP-AG1-F-0008B (217) : Replace 350 CU, 1.00 IPS CU, & 954 ACSR bus conductor at Butler substation. Project Type : FAC Cost : $130,252 Time Estimate : 12.0 Months WP-AG1-F-0008C (218) : Replace 336 ACSR line risers at Butler substation. Project Type : FAC Cost : $130,252 Time Estimate : 12.0 Months WP-AG1-F-0008D (219) : Replace 336 ACSR line risers at Karns City substation. Project Type : FAC Cost : $130,252 Time Estimate : 12.0 Months WP-AG1-F-0008E (220) : Reconductor 15.6 miles of 336 ACSR on the Butler - Karns City 138 kV line (102 spans). Project Type : FAC Cost : $40,638,780 Time Estimate : 60.0 Months WP-AG1-F-0008F (221) : Replace 600 A line side and bus side disconnects at Butler substation. Project Type : FAC Cost : $390,758 Time Estimate : 12.0 Months	See Next Page

ID	Idx	Facility	Upgrade Description	Cost
167259211	1	**01KARNSC 138.0 kV - 01BUTLER 138.0 kV Ckt 1**	**APS** **WP-AG1-F-0008G (222) : Replace 350 CU wire to WT at Butler substation.** **Project Type : FAC** **Cost : $130,252** **Time Estimate : 12.0 Months** **WP-AG1-F-0008H (223) : Replace relaying (WT, ZR) at Butler substation.** **Project Type : FAC** **Cost : $455,884** **Time Estimate : 12.0 Months** **WP-AG1-F-0008I (224) : Replace relaying (RT, OR, WT, MT) at Karns City substation.** **Project Type : FAC** **Cost : $455,884** **Time Estimate : 12.0 Months** **WP-AG1-F-0008J (225) : Replace 1200 A circuit breaker at Karns City substation.** **Project Type : FAC** **Cost : $781,515** **Time Estimate : 12.0 Months**	$42,918,197
167259223	2	**01COLMBGPN 138.0 kV - 01KISKIV 138.0 kV Ckt 1**	**APS** **WP-AG1-F-0018A (252) : Reconductor 3.7 miles of 4/0 CU.** **Project Type : FAC** **Cost : $9,638,685** **Time Estimate : 36.0 Months** **WP-AG1-F-0018B (253) : Replace relays (RT) at Kiski Valley substation.** **Project Type : FAC** **Cost : $455,884** **Time Estimate : 12.0 Months**	$10,094,569
			TOTAL COST	**$80,105,286[1]**

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
167259211	235197	01KARNSC	AP	235152	01BUTLER	AP	1	ATSI-P2-3-CEI-345-004D	breaker	179.0	227.81	228.28	DC	1.87

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
200608	26PINEY #1	0.7388	50/50	0.7388
200662	26SCRUB GR	1.6803	50/50	1.6803
235030	01MHNG-T155	0.1596	50/50	0.1596
236828	01GRAYMONT	0.1716	Adder	0.2
290086	Q-036 E	1.7010	Adder	2.0
293393	V3-030E	1.2402	Adder	1.46
915951	Y3-092 FTIR	95.0500	Merchant Transmission	95.0500
916202	Z1-069 E	2.6874	Adder	3.16
921642	AA2-000	21.5351	Adder	25.34
930511	AB2-092	0.7907	Adder	0.93
931092	AB1-160 E	0.7678	Adder	0.9
935191	AD1-154	2.3032	50/50	2.3032
936421	AD2-055	1.6279	Adder	1.92
936991	AD2-133 C	0.7655	Adder	0.9
936992	AD2-133 E	3.5011	Adder	4.12
938951	AE1-123	2.7911	50/50	2.7911
939171	AE1-147 C	0.5172	Adder	0.61
939172	AE1-147 E	0.3448	Adder	0.41
939291	AE1-160 C	1.4995	50/50	1.4995
939292	AE1-160 E	0.8619	50/50	0.8619
940201	AE2-001 C	0.5159	Adder	0.61
940202	AE2-001 E	0.3439	Adder	0.4
940861	AE2-074 C	0.7659	Adder	0.9
940862	AE2-074 E	1.0081	Adder	1.19
941191	AE2-113 C	3.5353	Adder	4.16
941192	AE2-113 E	3.8063	Adder	4.48
941261	AE2-120 C	0.5152	Adder	0.61
941262	AE2-120 E	0.3435	Adder	0.4
941271	AE2-121 C	0.2762	Adder	0.32
941272	AE2-121 E	0.1844	Adder	0.22
941321	AE2-126 C	0.6680	Adder	0.79
941322	AE2-126 E	0.4453	Adder	0.52
941331	AE2-129 C	0.5598	Adder	0.66
941332	AE2-129 E	0.3732	Adder	0.44
941351	**AE2-131 C (Suspended)**	**0.5598**	**Adder**	**0.66**
941352	**AE2-131 E (Suspended)**	**0.3732**	**Adder**	**0.44**
942491	AE2-262 C	2.4259	Adder	2.85
942492	AE2-262 E	1.6302	Adder	1.92
942501	AE2-263 C	2.2803	Adder	2.68
942502	AE2-263 E	1.5225	Adder	1.79
942811	AE2-299 C	2.0656	Adder	2.43

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
942812	AE2-299 E	8.2623	Adder	9.72
942961	AE2-316 C	4.3499	50/50	4.3499
942962	AE2-316 E	6.2031	50/50	6.2031
943151	AE2-344 C	5.2796	Adder	6.21
943152	AE2-344 E	3.5197	Adder	4.14
943351	AF1-006 C	0.9302	Adder	1.09
943352	AF1-006 E	0.5233	Adder	0.62
943751	AF1-043	4.8838	Adder	5.75
944181	AF1-086 C O1	1.0729	Adder	1.26
944182	AF1-086 E O1	4.6675	Adder	5.49
944261	AF1-094 C	0.9660	Adder	1.14
944262	AF1-094 E	0.6440	Adder	0.76
944281	AF1-096 C	1.4168	50/50	1.4168
944282	AF1-096 E	0.9446	50/50	0.9446
944301	AF1-098 C	3.2077	Adder	3.77
944302	AF1-098 E	2.1385	Adder	2.52
944311	AF1-099 C	3.6825	Adder	4.33
944312	AF1-099 E	2.4550	Adder	2.89
944321	AF1-100 C	7.9114	Adder	9.31
944322	AF1-100 E	5.2742	Adder	6.2
944381	AF1-103 O1	1.2386	Adder	1.46
944391	AF1-104 O1	1.5677	Adder	1.84
944691	AF1-134 C	0.6241	Adder	0.73
944692	AF1-134 E	0.4161	Adder	0.49
944771	AF1-142 C	5.8920	Adder	6.93
944772	AF1-142 E	3.9280	Adder	4.62
944881	AF1-153 C O1	0.9010	Adder	1.06
944882	AF1-153 E O1	0.6006	Adder	0.71
944901	AF1-155 C	0.9096	Adder	1.07
944902	AF1-155 E	0.6064	Adder	0.71
945021	AF1-167 C	1.5046	50/50	1.5046
945022	AF1-167 E	1.0049	50/50	1.0049
945051	AF1-170 C	3.6027	Adder	4.24
945052	AF1-170 E	2.4018	Adder	2.83
945451	AF1-210 C	1.7061	50/50	1.7061
945452	AF1-210 E	1.1374	50/50	1.1374
945491	AF1-214 C (Withdrawn : 12/03/2020)	0.5153	Adder	0.61
945492	AF1-214 E (Withdrawn : 12/03/2020)	0.3435	Adder	0.4
945751	AF1-240 C O1	1.3819	50/50	1.3819
945752	AF1-240 E O1	0.9213	50/50	0.9213
946111	AF1-276 C	3.7393	Adder	4.4
946112	AF1-276 E	1.8418	Adder	2.17
946121	AF1-277 C	3.7393	Adder	4.4
946122	AF1-277 E	1.8418	Adder	2.17
946131	AF1-278 C	2.9825	Adder	3.51
946132	AF1-278 E	1.4823	Adder	1.74
946221	AF1-287 C	0.9076	Adder	1.07
946222	AF1-287 E	0.6051	Adder	0.71
946381	AF1-302 C	1.8995	50/50	1.8995
946382	AF1-302 E	2.5327	50/50	2.5327
946401	AF1-304 C	7.6224	50/50	7.6224

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
946402	AF1-304 E	5.0816	50/50	5.0816
946421	AF1-306 C	3.1031	Adder	3.65
946422	AF1-306 E	12.4123	Adder	14.6
946771	AF1-217 C	0.9076	Adder	1.07
946772	AF1-217 E	0.6051	Adder	0.71
957161	AF2-010 C	3.7466	Adder	4.41
957162	AF2-010 E	2.5249	Adder	2.97
957451	AF2-039 C	0.4190	Adder	0.49
957452	AF2-039 E	0.2793	Adder	0.33
957571	AF2-051 C	2.7680	Adder	3.26
957572	AF2-051 E	1.4259	Adder	1.68
957941	AF2-088 C	0.2017	Adder	0.24
957942	AF2-088 E	0.1345	Adder	0.16
958271	AF2-121 C	0.5598	Adder	0.66
958272	AF2-121 E	0.3732	Adder	0.44
958361	AF2-130 C	1.7143	50/50	1.7143
958362	AF2-130 E	1.1429	50/50	1.1429
958731	AF2-164 C O1	3.9772	Adder	4.68
958732	AF2-164 E O1	2.6515	Adder	3.12
958741	AF2-165 C	1.5448	50/50	1.5448
958742	AF2-165 E	1.0298	50/50	1.0298
958751	AF2-166 C	1.7143	50/50	1.7143
958752	AF2-166 E	1.1429	50/50	1.1429
959441	AF2-235 C	0.7084	50/50	0.7084
959442	AF2-235 E	0.4723	50/50	0.4723
959521	AF2-243 C	1.1586	50/50	1.1586
959522	AF2-243 E	0.7724	50/50	0.7724
959822	AF2-273 E	0.6750	50/50	0.6750
960022	AF2-293 E	0.0503	Adder	0.06
960041	AF2-295 C	0.9096	Adder	1.07
960042	AF2-295 E	0.6064	Adder	0.71
960051	AF2-296 C	0.6241	Adder	0.73
960052	AF2-296 E	0.4161	Adder	0.49
960891	AF2-380 C	3.6836	50/50	3.6836
960892	AF2-380 E	2.4557	50/50	2.4557
961201	**AF2-411 O1 (Withdrawn : 12/08/2020)**	**12.7653**	**Adder**	**15.02**
961971	AG1-040 C	0.5056	Adder	1.12
961972	AG1-040 E	0.3370	Adder	0.75
962411	AG1-090 C O1	1.4834	Adder	3.29
962412	AG1-090 E O1	0.9889	Adder	2.2
962511	AG1-100 C	0.4897	Adder	1.09
962512	AG1-100 E	0.3265	Adder	0.72
962891	AG1-138 C	0.6786	50/50	0.6786
962892	AG1-138 E	0.0357	50/50	0.0357
962901	AG1-139 C	0.6115	50/50	0.6115
962902	AG1-139 E	0.0322	50/50	0.0322
962911	AG1-140 C	0.0616	Adder	0.14
962912	AG1-140 E	0.0281	Adder	0.06
962951	AG1-144 C	0.2967	Adder	0.66
962952	AG1-144 E	0.1978	Adder	0.44
963281	AG1-177 C O1	0.5120	Adder	1.14

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
963282	AG1-177 E O1	0.3413	Adder	0.76
963441	AG1-193 C	1.3675	50/50	1.3675
963442	AG1-193 E	0.9117	50/50	0.9117
963481	AG1-197 C	0.3834	Adder	0.85
963482	AG1-197 E	0.2556	Adder	0.57
963491	AG1-198 C	0.3072	Adder	0.68
963492	AG1-198 E	0.2048	Adder	0.45
963531	AG1-202 C	0.2719	Adder	0.6
963532	AG1-202 E	0.1401	Adder	0.31
963571	AG1-206 C	0.1952	Adder	0.43
963572	AG1-206 E	0.1051	Adder	0.23
963891	AG1-242 C	0.1792	Adder	0.4
963892	AG1-242 E	0.0965	Adder	0.21
963991	AG1-253 C	0.0924	Adder	0.21
963992	AG1-253 E	0.0445	Adder	0.1
964341	AG1-296 C	0.7284	50/50	0.7284
964342	AG1-296 E	0.3922	50/50	0.3922
964411	AG1-303 C O1	1.1736	Adder	2.61
964412	AG1-303 E O1	0.7824	Adder	1.74
964451	AG1-308 C O1	0.2120	Adder	0.47
964452	AG1-308 E O1	0.2963	Adder	0.66
965121	AG1-377 C O1	0.2967	Adder	0.66
965122	AG1-377 E O1	0.1978	Adder	0.44
965131	AG1-378 C O1	0.2967	Adder	0.66
965132	AG1-378 E O1	0.1978	Adder	0.44
965201	AG1-385 C	0.6140	Adder	1.36
965202	AG1-385 E	0.1819	Adder	0.4
965241	AG1-389 C O1	0.3064	Adder	0.68
965242	AG1-389 E O1	0.2043	Adder	0.45
965251	AG1-390 C O1	0.3064	Adder	0.68
965252	AG1-390 E O1	0.2043	Adder	0.45
965261	AG1-391 C O1	0.3064	Adder	0.68
965262	AG1-391 E O1	0.2043	Adder	0.45
965271	AG1-392 C O1	0.6128	Adder	1.36
965272	AG1-392 E O1	0.4085	Adder	0.91
965301	AG1-395 C	0.3812	Adder	0.85
965302	AG1-395 E	0.1132	Adder	0.25
965861	AG1-455	1.4372	Adder	3.19
966121	AG1-481	0.5097	Adder	1.13
966771	AG1-548 C	4.8243	Adder	10.71
966772	AG1-548 E	1.4683	Adder	3.26
G-007A	G-007A	1.8820	Confirmed LTF	1.8820
VFT	VFT	5.1923	Confirmed LTF	5.1923
CALDERWOOD	CALDERWOOD	0.2798	Confirmed LTF	0.2798
PRAIRIE	PRAIRIE	1.6660	Confirmed LTF	1.6660
CHEOAH	CHEOAH	0.2803	Confirmed LTF	0.2803
CBM-N	CBM-N	1.0296	Confirmed LTF	1.0296
COTTONWOOD	COTTONWOOD	1.2579	Confirmed LTF	1.2579
HAMLET	HAMLET	0.2535	Confirmed LTF	0.2535
GIBSON	GIBSON	0.3647	Confirmed LTF	0.3647
BLUEG	BLUEG	1.1562	Confirmed LTF	1.1562
TRIMBLE	TRIMBLE	0.3712	Confirmed LTF	0.3712

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
CATAWBA	CATAWBA	0.1677	Confirmed LTF	0.1677

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
167259223	235240	01COLMBGPN	AP	235202	01KISKIV	AP	1	ATSI-P2-3-CEI-345-004D	breaker	151.0	173.37	173.83	DC	1.54

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
235030	01MHNG-T155	0.1762	50/50	0.1762
235134	01AL&D6	0.1825	50/50	0.1825
915951	Y3-092 FTIR	82.2700	Merchant Transmission	82.2700
935191	AD1-154	1.1432	Adder	1.34
936881	AD2-112 C	-2.1694	Adder	-2.55
936882	AD2-112 E	-0.8609	Adder	-1.01
938951	AE1-123	1.4097	Adder	1.66
939291	AE1-160 C	0.8797	Adder	1.03
939292	AE1-160 E	0.5056	Adder	0.59
941191	AE2-113 C	2.8350	Adder	3.34
941192	AE2-113 E	3.0524	Adder	3.59
942811	AE2-299 C	1.6660	Adder	1.96
942812	AE2-299 E	6.6640	Adder	7.84
942961	AE2-316 C	3.4396	Adder	4.05
942962	AE2-316 E	4.9049	Adder	5.77
943151	AE2-344 C	4.3415	Adder	5.11
943152	AE2-344 E	2.8943	Adder	3.41
943351	AF1-006 C	0.7677	Adder	0.9
943352	AF1-006 E	0.4318	Adder	0.51
944261	AF1-094 C	0.7265	Adder	0.85
944262	AF1-094 E	0.4844	Adder	0.57
944281	AF1-096 C	0.8312	Adder	0.98
944282	AF1-096 E	0.5541	Adder	0.65
944301	AF1-098 C	2.5835	Adder	3.04
944302	AF1-098 E	1.7223	Adder	2.03
944381	AF1-103 O1	0.9957	Adder	1.17
944391	AF1-104 O1	1.3352	Adder	1.57
944881	AF1-153 C O1	0.6661	Adder	0.78
944882	AF1-153 E O1	0.4440	Adder	0.52
944901	AF1-155 C	0.6712	Adder	0.79
944902	AF1-155 E	0.4474	Adder	0.53
945021	AF1-167 C	0.9419	50/50	0.9419
945022	AF1-167 E	0.6291	50/50	0.6291
945051	AF1-170 C	3.0090	Adder	3.54
945052	AF1-170 E	2.0060	Adder	2.36
945451	AF1-210 C	1.2366	50/50	1.2366
945452	AF1-210 E	0.8244	50/50	0.8244
945751	AF1-240 C O1	0.6859	Adder	0.81
945752	AF1-240 E O1	0.4573	Adder	0.54
946111	AF1-276 C	3.0650	Adder	3.61

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
946112	AF1-276 E	1.5097	Adder	1.78
946121	AF1-277 C	3.0650	Adder	3.61
946122	AF1-277 E	1.5097	Adder	1.78
946131	AF1-278 C	2.4447	Adder	2.88
946132	AF1-278 E	1.2150	Adder	1.43
946221	AF1-287 C	0.7457	Adder	0.88
946222	AF1-287 E	0.4971	Adder	0.58
946381	AF1-302 C	1.5020	Adder	1.77
946382	AF1-302 E	2.0027	Adder	2.36
946401	AF1-304 C	4.3569	Adder	5.13
946402	AF1-304 E	2.9046	Adder	3.42
946421	AF1-306 C	2.4158	Adder	2.84
946422	AF1-306 E	9.6633	Adder	11.37
946771	AF1-217 C	0.7457	Adder	0.88
946772	AF1-217 E	0.4971	Adder	0.58
957161	AF2-010 C	2.8043	Adder	3.3
957162	AF2-010 E	1.8898	Adder	2.22
957571	AF2-051 C	2.2793	Adder	2.68
957572	AF2-051 E	1.1742	Adder	1.38
958361	AF2-130 C	0.9128	Adder	1.07
958362	AF2-130 E	0.6085	Adder	0.72
958731	AF2-164 C O1	3.6169	Adder	4.26
958732	AF2-164 E O1	2.4113	Adder	2.84
958741	AF2-165 C	0.8858	Adder	1.04
958742	AF2-165 E	0.5905	Adder	0.69
958751	AF2-166 C	0.9128	Adder	1.07
958752	AF2-166 E	0.6085	Adder	0.72
959441	AF2-235 C	0.4156	Adder	0.49
959442	AF2-235 E	0.2771	Adder	0.33
959521	AF2-243 C	0.6643	Adder	0.78
959522	AF2-243 E	0.4429	Adder	0.52
959822	AF2-273 E	0.4640	50/50	0.4640
960041	AF2-295 C	0.6712	Adder	0.79
960042	AF2-295 E	0.4474	Adder	0.53
960891	AF2-380 C	0.4951	Adder	0.58
960892	AF2-380 E	0.3301	Adder	0.39
961971	AG1-040 C	0.4167	Adder	0.92
961972	AG1-040 E	0.2778	Adder	0.62
962511	AG1-100 C	0.4046	Adder	0.9
962512	AG1-100 E	0.2698	Adder	0.6
962891	AG1-138 C	0.1915	Adder	0.43
962892	AG1-138 E	0.0101	Adder	0.02
962901	AG1-139 C	0.1858	Adder	0.41
962902	AG1-139 E	0.0098	Adder	0.02
962911	AG1-140 C	0.0497	Adder	0.11
962912	AG1-140 E	0.0226	Adder	0.05
963281	AG1-177 C O1	0.3851	Adder	0.85
963282	AG1-177 E O1	0.2567	Adder	0.57
963441	AG1-193 C	0.4659	Adder	1.03
963442	AG1-193 E	0.3106	Adder	0.69
963481	AG1-197 C	0.3162	Adder	0.7
963482	AG1-197 E	0.2108	Adder	0.47

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
963491	AG1-198 C	0.2310	Adder	0.51
963492	AG1-198 E	0.1540	Adder	0.34
963531	AG1-202 C	0.2284	Adder	0.51
963532	AG1-202 E	0.1176	Adder	0.26
963571	AG1-206 C	0.1499	Adder	0.33
963572	AG1-206 E	0.0807	Adder	0.18
963991	AG1-253 C	0.0745	Adder	0.17
963992	AG1-253 E	0.0359	Adder	0.08
964341	AG1-296 C	0.6993	50/50	0.6993
964342	AG1-296 E	0.3765	50/50	0.3765
964411	AG1-303 C O1	0.9664	Adder	2.15
964412	AG1-303 E O1	0.6443	Adder	1.43
965201	AG1-385 C	0.4539	Adder	1.01
965202	AG1-385 E	0.1344	Adder	0.3
965861	AG1-455	1.2004	Adder	2.66
966121	AG1-481	0.4098	Adder	0.91
966453	AG1-514 BAT	0.2684	Merchant Transmission	0.2684
966771	AG1-548 C	3.6540	Adder	8.11
966772	AG1-548 E	1.1121	Adder	2.47
G-007A	G-007A	1.4505	Confirmed LTF	1.4505
VFT	VFT	4.0119	Confirmed LTF	4.0119
CALDERWOOD	CALDERWOOD	0.2112	Confirmed LTF	0.2112
PRAIRIE	PRAIRIE	1.2063	Confirmed LTF	1.2063
CHEOAH	CHEOAH	0.2122	Confirmed LTF	0.2122
CBM-N	CBM-N	0.8004	Confirmed LTF	0.8004
COTTONWOOD	COTTONWOOD	0.9303	Confirmed LTF	0.9303
HAMLET	HAMLET	0.2050	Confirmed LTF	0.2050
GIBSON	GIBSON	0.2621	Confirmed LTF	0.2621
BLUEG	BLUEG	0.8333	Confirmed LTF	0.8333
TRIMBLE	TRIMBLE	0.2677	Confirmed LTF	0.2677
CATAWBA	CATAWBA	0.1326	Confirmed LTF	0.1326

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
167259221	235282	01GARRN	AP	235240	01COLMBGPN	AP	1	ATSI-P2-3-CEI-345-004D	breaker	151.0	175.68	176.14	DC	1.54

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
235030	01MHNG-T155	0.1762	50/50	0.1762
235134	01AL&D6	0.1825	50/50	0.1825
915951	Y3-092 FTIR	82.2700	Merchant Transmission	82.2700
935191	AD1-154	1.1432	Adder	1.34
936881	AD2-112 C	-2.1694	Adder	-2.55
936882	AD2-112 E	-0.8609	Adder	-1.01
938951	AE1-123	1.4097	Adder	1.66
939291	AE1-160 C	0.8797	Adder	1.03
939292	AE1-160 E	0.5056	Adder	0.59
941191	AE2-113 C	2.8350	Adder	3.34
941192	AE2-113 E	3.0524	Adder	3.59
942811	AE2-299 C	1.6660	Adder	1.96
942812	AE2-299 E	6.6640	Adder	7.84
942961	AE2-316 C	3.4396	Adder	4.05
942962	AE2-316 E	4.9049	Adder	5.77
943151	AE2-344 C	4.3415	Adder	5.11
943152	AE2-344 E	2.8943	Adder	3.41
943351	AF1-006 C	0.7677	Adder	0.9
943352	AF1-006 E	0.4318	Adder	0.51
944261	AF1-094 C	0.7265	Adder	0.85
944262	AF1-094 E	0.4844	Adder	0.57
944281	AF1-096 C	0.8312	Adder	0.98
944282	AF1-096 E	0.5541	Adder	0.65
944301	AF1-098 C	2.5835	Adder	3.04
944302	AF1-098 E	1.7223	Adder	2.03
944381	AF1-103 O1	0.9957	Adder	1.17
944391	AF1-104 O1	1.3352	Adder	1.57
944881	AF1-153 C O1	0.6661	Adder	0.78
944882	AF1-153 E O1	0.4440	Adder	0.52
944901	AF1-155 C	0.6712	Adder	0.79
944902	AF1-155 E	0.4474	Adder	0.53
945021	AF1-167 C	0.9419	50/50	0.9419
945022	AF1-167 E	0.6291	50/50	0.6291
945051	AF1-170 C	3.0090	Adder	3.54
945052	AF1-170 E	2.0060	Adder	2.36
945451	AF1-210 C	1.2366	50/50	1.2366
945452	AF1-210 E	0.8244	50/50	0.8244
945751	AF1-240 C O1	0.6859	Adder	0.81
945752	AF1-240 E O1	0.4573	Adder	0.54
946111	AF1-276 C	3.0650	Adder	3.61

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
946112	AF1-276 E	1.5097	Adder	1.78
946121	AF1-277 C	3.0650	Adder	3.61
946122	AF1-277 E	1.5097	Adder	1.78
946131	AF1-278 C	2.4447	Adder	2.88
946132	AF1-278 E	1.2150	Adder	1.43
946221	AF1-287 C	0.7457	Adder	0.88
946222	AF1-287 E	0.4971	Adder	0.58
946381	AF1-302 C	1.5020	Adder	1.77
946382	AF1-302 E	2.0027	Adder	2.36
946401	AF1-304 C	4.3569	Adder	5.13
946402	AF1-304 E	2.9046	Adder	3.42
946421	AF1-306 C	2.4158	Adder	2.84
946422	AF1-306 E	9.6633	Adder	11.37
946771	AF1-217 C	0.7457	Adder	0.88
946772	AF1-217 E	0.4971	Adder	0.58
957161	AF2-010 C	2.8043	Adder	3.3
957162	AF2-010 E	1.8898	Adder	2.22
957571	AF2-051 C	2.2793	Adder	2.68
957572	AF2-051 E	1.1742	Adder	1.38
958361	AF2-130 C	0.9128	Adder	1.07
958362	AF2-130 E	0.6085	Adder	0.72
958731	AF2-164 C O1	3.6169	Adder	4.26
958732	AF2-164 E O1	2.4113	Adder	2.84
958741	AF2-165 C	0.8858	Adder	1.04
958742	AF2-165 E	0.5905	Adder	0.69
958751	AF2-166 C	0.9128	Adder	1.07
958752	AF2-166 E	0.6085	Adder	0.72
959441	AF2-235 C	0.4156	Adder	0.49
959442	AF2-235 E	0.2771	Adder	0.33
959521	AF2-243 C	0.6643	Adder	0.78
959522	AF2-243 E	0.4429	Adder	0.52
959822	AF2-273 E	0.4640	50/50	0.4640
960041	AF2-295 C	0.6712	Adder	0.79
960042	AF2-295 E	0.4474	Adder	0.53
960891	AF2-380 C	0.4951	Adder	0.58
960892	AF2-380 E	0.3301	Adder	0.39
961971	AG1-040 C	0.4167	Adder	0.92
961972	AG1-040 E	0.2778	Adder	0.62
962511	AG1-100 C	0.4046	Adder	0.9
962512	AG1-100 E	0.2698	Adder	0.6
962891	AG1-138 C	0.1915	Adder	0.43
962892	AG1-138 E	0.0101	Adder	0.02
962901	AG1-139 C	0.1858	Adder	0.41
962902	AG1-139 E	0.0098	Adder	0.02
962911	AG1-140 C	0.0497	Adder	0.11
962912	AG1-140 E	0.0226	Adder	0.05
963281	AG1-177 C O1	0.3851	Adder	0.85
963282	AG1-177 E O1	0.2567	Adder	0.57
963441	AG1-193 C	0.4659	Adder	1.03
963442	AG1-193 E	0.3106	Adder	0.69
963481	AG1-197 C	0.3162	Adder	0.7
963482	AG1-197 E	0.2108	Adder	0.47

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
963491	AG1-198 C	0.2310	Adder	0.51
963492	AG1-198 E	0.1540	Adder	0.34
963531	AG1-202 C	0.2284	Adder	0.51
963532	AG1-202 E	0.1176	Adder	0.26
963571	AG1-206 C	0.1499	Adder	0.33
963572	AG1-206 E	0.0807	Adder	0.18
963991	AG1-253 C	0.0745	Adder	0.17
963992	AG1-253 E	0.0359	Adder	0.08
964341	AG1-296 C	0.6993	50/50	0.6993
964342	AG1-296 E	0.3765	50/50	0.3765
964411	AG1-303 C O1	0.9664	Adder	2.15
964412	AG1-303 E O1	0.6443	Adder	1.43
965201	AG1-385 C	0.4539	Adder	1.01
965202	AG1-385 E	0.1344	Adder	0.3
965861	AG1-455	1.2004	Adder	2.66
966121	AG1-481	0.4098	Adder	0.91
966453	AG1-514 BAT	0.2684	Merchant Transmission	0.2684
966771	AG1-548 C	3.6540	Adder	8.11
966772	AG1-548 E	1.1121	Adder	2.47
G-007A	G-007A	1.4505	Confirmed LTF	1.4505
VFT	VFT	4.0119	Confirmed LTF	4.0119
CALDERWOOD	CALDERWOOD	0.2112	Confirmed LTF	0.2112
PRAIRIE	PRAIRIE	1.2063	Confirmed LTF	1.2063
CHEOAH	CHEOAH	0.2122	Confirmed LTF	0.2122
CBM-N	CBM-N	0.8004	Confirmed LTF	0.8004
COTTONWOOD	COTTONWOOD	0.9303	Confirmed LTF	0.9303
HAMLET	HAMLET	0.2050	Confirmed LTF	0.2050
GIBSON	GIBSON	0.2621	Confirmed LTF	0.2621
BLUEG	BLUEG	0.8333	Confirmed LTF	0.8333
TRIMBLE	TRIMBLE	0.2677	Confirmed LTF	0.2677
CATAWBA	CATAWBA	0.1326	Confirmed LTF	0.1326

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
AA2-000	N/A	N/A
AB1-160	Gold-Sabinsville 115kV	In Service
AB2-092	Bergen 138kV	Partially in Service - Under Construction
AD1-154	Timblin 34.5 kV	Active
AD2-055	Moshannon-East Towanda 230 kV	Active
AD2-112	Springdale CC II 138kV	Engineering and Procurement
AD2-133	Eagle Valley 115kV	Active
AE1-123	Emlenton 34.5 kV	Engineering and Procurement
AE1-147	Bellefonte 46 kV	Engineering and Procurement
AE1-160	Venango 34.5 kV	Engineering and Procurement
AE2-001	Nittany-Zion 46 kV	Active
AE2-074	Potter 46 kV	Active
AE2-113	Farmers Valley-Ridgeway 115 kV	Active
AE2-120	Graymont-Zion 46 kV	Active
AE2-121	Milesburg-Tanney Junction 46 kV	Active
AE2-126	Dubois-Curwensville 34.5 kV	Engineering and Procurement
AE2-129	Philipsburg-Clarence 34.5 kV	Engineering and Procurement
AE2-131	Philipsburg-Karthaus 34.5	Suspended
AE2-262	Moshannon-Milesburg 230 kV	Active
AE2-263	Moshannon-Milesburg 230 kV	Active
AE2-299	Erie East 230 kV	Active
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
AF1-043	Moshannon-East Towanda 230 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
AF1-134	Philipsburg-Madera 34.5 kV	Active
AF1-142	Moshannon-Milesburg 230 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

Queue Number	Project Name	Status
AF1-210	Burma 23 kV	Engineering and Procurement
AF1-214	Nittany-Zion 46 kV	Withdrawn
AF1-217	Edinboro -Cambridge Springs 34.5 kV	Active
AF1-240	Timblin 34.5 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
AF1-287	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
AF2-010	Union City-Titusville 115 kV	Active
AF2-039	Shawville-Clearfield 34.5 kV	Active
AF2-051	Geneva 115 kV	Active
AF2-088	Shawville-Clearfield 34.5 kV II	Active
AF2-121	Philipsburg-Shawville 34.5 kV	Active
AF2-130	Wolfs Corners 34.5 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
AF2-235	Titusville-Oil Creek 34.5 kV	Active
AF2-243	Clark Summit 34.5 kV	Active
AF2-273	Sligo 25 kV	Engineering and Procurement
AF2-293	Beech Creek 12.47 kV	Active
AF2-295	Wilcox-Paper City 46 kV	Active
AF2-296	Madera 34.5 kV	Active
AF2-380	Karns City-Bear Creek 25 kV	Active
AF2-411	Mainesburg 345 kV	Withdrawn
AG1-040	Morgan Street-Mount Hope 34.5 kV	Active
AG1-090	Philipsburg 115 kV	Active
AG1-100	Venango-Saegertown 34.5 kV	Active
AG1-138	Wolfs Corners 34.5 kV	Active
AG1-139	Clark Summit-Emlenton 34.5 kV	Active
AG1-140	Union City 34.5 kV	Active
AG1-144	Phillipsburg 34.5 kV	Active
AG1-177	Union City 34.5 kV	Active
AG1-193	Utica Junction 34.5 kV	Active
AG1-197	Morgan Street-Cochranton 34.5 kV	Active
AG1-198	Union City 34.5 kV	Active
AG1-202	Springboro 12.47 kV	Active
AG1-206	Snyder Twp 34.5 kV	Active
AG1-242	Beccaria 34.5 kV	Active
AG1-253	Erie East-Union City 34.5 kV	Active
AG1-296	Snyder Township 34.5 kV	Active
AG1-303	Geneva 115 kV	Active
AG1-308	Shawville-Philipsburg 115 kV	Active
AG1-377	Philipsburg 115 kV	Active
AG1-378	Philipsburg 115 kV	Active
AG1-385	Motion-Ridgeway 46 kV	Active
AG1-389	Gold 115 kV I	Active
AG1-390	Gold 115 kV II	Active
AG1-391	Gold 115 kV III	Active

Queue Number	Project Name	Status
AG1-392	Gold 115 kV IV	Active
AG1-395	Philipsburg-Karthaus 34.5 kV 2	Active
AG1-455	Springboro-Venango Junction 115 kV	Active
AG1-481	Warren 34.5 kV	Active
AG1-514	Springdale CT III 138 kV	Active
AG1-548	Erie South-Union City 115 kV	Active
V3-030	St. Benedict-Patton 46kV	In Service
Y3-092	Erie West 345kV	Engineering and Procurement
Z1-069	Gold-Sabinsville 115kV	In Service

11.8 Contingency Descriptions

Contingency Name	Contingency Definition
ATSI-P2-3-CEI-345-004D	CONTINGENCY 'ATSI-P2-3-CEI-345-004D' /* ERIE WEST 345KV BKR 8 DISCONNECT BRANCH FROM BUS 200599 TO BUS 200600 CKT 1 /* 26ERIE W 345 26ERIE SO 345 DISCONNECT BRANCH FROM BUS 200599 TO BUS 238547 CKT 1 /* 26ERIE W 345 02AT 345 DISCONNECT BRANCH FROM BUS 238547 TO BUS 239036 CKT 1 /* 02AT 345 02PERRY 345 DISCONNECT BRANCH FROM BUS 238547 TO BUS 239082 CKT 1 /* 02AT 345 02S8-ATT 345 DISCONNECT BUS 200600 /* 26ERIE SO 345 DISCONNECT BUS 238547 /* 02AT 345 END
PN-P1-2-PN-345-001	CONTINGENCY 'PN-P1-2-PN-345-001' /* ERIE WEST - WAYNE 345KV DISCONNECT BRANCH FROM BUS 200599 TO BUS 200595 CKT 1 /* 26ERIE W 345 26WAYNE 345 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
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

12 Short Circuit Analysis

The following Breakers are overdutied:

None

12.1 System Reinforcements - Short Circuit

None

13 Affected Systems

13.1 NYISO

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

14 Attachment 1: One Line Diagram