Generation Interconnection

Feasibility Study Report

for

Queue Project AG1-339

CURRYVILLE-RKB-YELLOW CREEK 23 KV II

4.6 MW Capacity / 5 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; Storage generating facility located in Bedford County, Pennsylvania. The installed facilities will have a total capability of 5 MW with 4.6 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this project is June 30, 2023. This study does not imply a TO commitment to this in-service date.

Queue Number	AG1-339
Project Name	CURRYVILLE-RKB-YELLOW CREEK 23 KV II
State	Pennsylvania
County	Bedford
Transmission Owner	PENELEC (MAIT)
MFO	5
MWE	5
MWC	4.6
Fuel	Solar; Storage
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

4.1 Primary Point of Interconnection

AG1-339 will interconnect to the Penelec system through a new delivery point with the New Enterprise Rural Electric Cooperative(REC), a member company of Alleghany Electric Cooperative (AEC). Alleghany Electric Cooperative is the wholesale power representative for New Enterprise. The Penelec Curryville substation will require a bus extension a new breaker position underground take off structure and underground feeder capable of supporting both AG1-339 and AG1-340. The underground feeder will be constructed from internal to the substation to a riser pole and bi-directional meter point for the IC Delivery Point. Underground construction will be required to provide proper clearance below the 115kV line to the South Side of the substation.

Attachment 1 shows a one-line diagram of the proposed primary direct connection facilities for the AG1-339 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

There is no secondary point of interconnection specified for AG1-339.

5 Cost Summary

The AG1-339 project will be responsible for the following costs:

Description	Total Cost
Total Physical Interconnection Costs	$4,660,400
Total System Network Upgrade Costs	$5,100,000[1]
Total Costs	$9,760,400

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 causes and/or 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 AG1-339 will interconnect with the Penelec distribution system via a new 23 kV circuit on the #1 bus at the Curryville substation. 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. The new 23kV circuit will require a #1 Bus extension as well as a new breaker. The Breaker will require a new Panel in the substation control house. The substation feeder will require underground conductor to a riser pole. At this pole the construction of the IC Delivery point will be constructed with a Bi-directional meter and Aclara Line monitors, as required by the AEC. The new breaker position will be interconnected with existing protection schemes. This will require a line side PT on the feeder.

The Load study for the storage charging showed overload on the #1 transformer at Curryville. The transformer will require replacement to allow charging during peak loading.

Attachment 1 shows a one-line diagram of the proposed primary direct connection facilities for the AG1-339 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 are given in the table below:

Description	**Total Cost**
Install new line for AG1-339 and AG1-340 at Curryville,	$ 408,900
Install new breaker, bus and protection at Curryville	$1,251,500
Replace Transformer at substation	$3,000,000
Total Physical Interconnection Costs	$4,660,400

7 Schedule

Based on the scope of work for the Direct and Non-Direct Connection facilities, it is expected to take a minimum of **18 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.

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.

8 Transmission Owner Analysis

Penelec performed an analysis of its distribution system. The AG1-339 project did contribute to the Curryville transformer overload on the distribution system. The peak load of 18.6 MW Coupled with the combined proposal of 13.5 MW of AG1-338, AG1-339 and AG1-340 raised the loading above the Summer Nominal Peak Rating (SNPR) of the #1 transformer at Curryville.

9 Interconnection Customer Requirements

9.1 System Protection

An analysis was conducted to assess the impact of the CURRYVILLE-RKB-YELLOW CREEK 23 KV II (AG1-339) Project on the system protection requirements in the area. The results of this review show that the following relay additions will be required:

Proposed connection the developer to constructing a generation facility (AG1-339 and AG1-340) that will direct connect to Penelec's 23 kV bus via a dedicated circuit breaker. This breaker will be controlled and operated by a SEL-351 relay for overload, sync check/ dead-line closing, voltage and frequency monitoring. Anti-islanding system shall meet IEEE 1547 and UL 1741 therefore, Direct Transfer Trip (DTT) will not be required on the service breaker.

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.

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

The generation 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/storage 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. The

developer 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/

10.4 Interconnected REC Owner Requirements

The IC will be required to comply with all requirements set forth by New Enterprise REC and the Alleghany Electric Cooperative. The Interconnecting delivery point will be bi-directional allowing the battery storage system to charge from the New Enterprise Delivery Point as well as generation back to Penelec's transmission system at Curryville.

11 Summer Peak - Load Flow Analysis

The Queue Project AG1-339 was evaluated as a 5.0 MW (Capacity 4.6 MW) injection at the Curryville 23 kV substation in the PENELEC area. Project AG1-339 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AG1-339 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
16599458 7	20263 7	26PRID E	115. 0	PENELE C	20074 4	26SOMERS T	115. 0	PENELE C	1	PN-P2-3-PN-115-11A	breake r	160.0	152.92	154.13	DC	1.92
16599460 9	94567 0	AF1-232 TAP	115. 0	PENELE C	96492 0	AG1-356 TAP	115. 0	PENELE C	1	PN-P2-3-PN-115-11A	breake r	160.0	155.67	156.88	DC	1.92
16599457 7	96492 0	AG1-356 TAP	115. 0	PENELE C	20263 7	26PRIDE	115. 0	PENELE C	1	PN-P2-3-PN-115-11A	breake r	160.0	155.67	156.88	DC	1.92

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
16622847 9	20050 5	26CLYSBUR G	115. 0	PENELE C	20052 5	26SUMMI T	115. 0	PENELE C	1	PN-P1-2-PN-115-082	operatio n	252.0	106.91	108.06	DC	2.88

11.5 System Reinforcements - Summer Peak Load Flow - Primary POI

ID	Idx	Facility	Upgrade Description	Cost
165994587	1	**26PRIDE 115.0 kV - 26SOMERST 115.0 kV Ckt 1**	**PENELEC** **No violation, incorrect contingency.** **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
165994577	3	**AG1-356 TAP 115.0 kV - 26PRIDE 115.0 kV Ckt 1**	**PENELEC** **PN-AG1-F-0036X : Reconductor 2.1 miles of line.** **Project Type :** **Cost : $5,100,000** **Time Estimate : 30 Months**	$5,100,000
165994609	2	**AF1-232 TAP 115.0 kV - AG1-356 TAP 115.0 kV Ckt 1**	**PENELEC** **No violation, incorrect contingency.** **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	**$5,100,000**

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
165994587	202637	26PRIDE	PENELEC	200744	26SOMERST	PENELEC	1	PN-P2-3-PN-115-11A	breaker	160.0	152.92	154.13	DC	1.92

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
200835	26ARN_Z1-066	-0.5118	Adder	-0.6
200864	K-013 E	1.4859	Adder	1.75
200889	26STNY CRK	0.8974	50/50	0.8974
294903	P-060 E	28.1064	50/50	28.1064
917673	Z2-108 BAT	1.3547	Merchant Transmission	1.3547
938352	AE1-053 BAT	0.7526	Merchant Transmission	0.7526
938993	AE1-128 C	27.7142	50/50	27.7142
938994	AE1-128 E	18.4762	50/50	18.4762
942361	AE2-249 C	3.1179	50/50	3.1179
942362	AE2-249 E	2.0786	50/50	2.0786
945671	**AF1-232 C (Withdrawn : 01/19/2021)**	**78.4108**	**50/50**	**78.4108**
945672	**AF1-232 E (Withdrawn : 01/19/2021)**	**42.2212**	**50/50**	**42.2212**
957981	AF2-092 C	2.7714	50/50	2.7714
957982	AF2-092 E	1.8476	50/50	1.8476
958472	AF2-141 BAT	1.5052	Merchant Transmission	1.5052
959792	AF2-270 E	1.4323	50/50	1.4323
960451	AF2-336 C	4.6190	50/50	4.6190
960452	AF2-336 E	3.0794	50/50	3.0794
960461	AF2-337 C	4.6190	50/50	4.6190
960462	AF2-337 E	3.0794	50/50	3.0794
960471	AF2-338 C	4.6190	50/50	4.6190
960472	AF2-338 E	3.0794	50/50	3.0794
960481	AF2-339 C	4.6190	50/50	4.6190
960482	AF2-339 E	3.0794	50/50	3.0794
960901	AF2-381 C	13.5225	50/50	13.5225
960902	AF2-381 E	7.1162	50/50	7.1162
962292	AG1-077 E	2.9082	50/50	2.9082
962642	AG1-113 BAT	0.4249	Merchant Transmission	0.4249
962652	AG1-114 BAT	0.3989	Merchant Transmission	0.3989
963541	AG1-203 C	4.7258	50/50	4.7258
963542	AG1-203 E	2.5446	50/50	2.5446
964751	AG1-338 C	1.6936	50/50	1.6936
964752	AG1-338 E	0.2310	50/50	0.2310
964761	AG1-339 C	1.7706	50/50	1.7706
964762	AG1-339 E	0.1540	50/50	0.1540
964771	AG1-340 C	1.6936	50/50	1.6936
964772	AG1-340 E	0.2310	50/50	0.2310
964921	AG1-356 C	16.9759	50/50	16.9759
964922	AG1-356 E	11.3172	50/50	11.3172

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
G-007A	G-007A	0.1151	Confirmed LTF	0.1151
VFT	VFT	0.3161	Confirmed LTF	0.3161
CALDERWOOD	CALDERWOOD	0.0204	Confirmed LTF	0.0204
PRAIRIE	PRAIRIE	0.0956	Confirmed LTF	0.0956
CHEOAH	CHEOAH	0.0205	Confirmed LTF	0.0205
CBM-N	CBM-N	0.0624	Confirmed LTF	0.0624
COTTONWOOD	COTTONWOOD	0.0819	Confirmed LTF	0.0819
HAMLET	HAMLET	0.0254	Confirmed LTF	0.0254
GIBSON	GIBSON	0.0202	Confirmed LTF	0.0202
BLUEG	BLUEG	0.0642	Confirmed LTF	0.0642
TRIMBLE	TRIMBLE	0.0206	Confirmed LTF	0.0206
CATAWBA	CATAWBA	0.0154	Confirmed LTF	0.0154

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
165994609	945670	AF1-232 TAP	PENELEC	964920	AG1-356 TAP	PENELEC	1	PN-P2-3-PN-115-11A	breaker	160.0	155.67	156.88	DC	1.92

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
200835	26ARN_Z1-066	-0.5118	Adder	-0.6
200864	K-013 E	1.4859	Adder	1.75
200889	26STNY CRK	0.8974	50/50	0.8974
294903	P-060 E	28.1064	50/50	28.1064
917673	Z2-108 BAT	1.3547	Merchant Transmission	1.3547
938352	AE1-053 BAT	0.7526	Merchant Transmission	0.7526
938993	AE1-128 C	27.7142	50/50	27.7142
938994	AE1-128 E	18.4762	50/50	18.4762
942361	AE2-249 C	3.1179	50/50	3.1179
942362	AE2-249 E	2.0786	50/50	2.0786
945671	**AF1-232 C (Withdrawn : 01/19/2021)**	**78.4108**	**50/50**	**78.4108**
945672	**AF1-232 E (Withdrawn : 01/19/2021)**	**42.2212**	**50/50**	**42.2212**
957981	AF2-092 C	2.7714	50/50	2.7714
957982	AF2-092 E	1.8476	50/50	1.8476
958472	AF2-141 BAT	1.5052	Merchant Transmission	1.5052
959792	AF2-270 E	1.4323	50/50	1.4323
960451	AF2-336 C	4.6190	50/50	4.6190
960452	AF2-336 E	3.0794	50/50	3.0794
960461	AF2-337 C	4.6190	50/50	4.6190
960462	AF2-337 E	3.0794	50/50	3.0794
960471	AF2-338 C	4.6190	50/50	4.6190
960472	AF2-338 E	3.0794	50/50	3.0794
960481	AF2-339 C	4.6190	50/50	4.6190
960482	AF2-339 E	3.0794	50/50	3.0794
960901	AF2-381 C	13.5225	50/50	13.5225
960902	AF2-381 E	7.1162	50/50	7.1162
962292	AG1-077 E	2.9082	50/50	2.9082
962642	AG1-113 BAT	0.4249	Merchant Transmission	0.4249
962652	AG1-114 BAT	0.3989	Merchant Transmission	0.3989
963541	AG1-203 C	4.7258	50/50	4.7258
963542	AG1-203 E	2.5446	50/50	2.5446
964751	AG1-338 C	1.6936	50/50	1.6936
964752	AG1-338 E	0.2310	50/50	0.2310
964761	AG1-339 C	1.7706	50/50	1.7706
964762	AG1-339 E	0.1540	50/50	0.1540
964771	AG1-340 C	1.6936	50/50	1.6936
964772	AG1-340 E	0.2310	50/50	0.2310
G-007A	G-007A	0.1151	Confirmed LTF	0.1151
VFT	VFT	0.3161	Confirmed LTF	0.3161
CALDERWOOD	CALDERWOOD	0.0204	Confirmed LTF	0.0204

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
PRAIRIE	PRAIRIE	0.0956	Confirmed LTF	0.0956
CHEOAH	CHEOAH	0.0205	Confirmed LTF	0.0205
CBM-N	CBM-N	0.0624	Confirmed LTF	0.0624
COTTONWOOD	COTTONWOOD	0.0819	Confirmed LTF	0.0819
HAMLET	HAMLET	0.0254	Confirmed LTF	0.0254
GIBSON	GIBSON	0.0202	Confirmed LTF	0.0202
BLUEG	BLUEG	0.0642	Confirmed LTF	0.0642
TRIMBLE	TRIMBLE	0.0206	Confirmed LTF	0.0206
CATAWBA	CATAWBA	0.0154	Confirmed LTF	0.0154

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
165994577	964920	AG1-356 TAP	PENELEC	202637	26PRIDE	PENELEC	1	PN-P2-3-PN-115-11A	breaker	160.0	155.67	156.88	DC	1.92

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
200835	26ARN_Z1-066	-0.5118	Adder	-0.6
200864	K-013 E	1.4859	Adder	1.75
200889	26STNY CRK	0.8974	50/50	0.8974
294903	P-060 E	28.1064	50/50	28.1064
917673	Z2-108 BAT	1.3547	Merchant Transmission	1.3547
938352	AE1-053 BAT	0.7526	Merchant Transmission	0.7526
938993	AE1-128 C	27.7142	50/50	27.7142
938994	AE1-128 E	18.4762	50/50	18.4762
942361	AE2-249 C	3.1179	50/50	3.1179
942362	AE2-249 E	2.0786	50/50	2.0786
945671	AF1-232 C (Withdrawn : 01/19/2021)	78.4108	50/50	78.4108
945672	AF1-232 E (Withdrawn : 01/19/2021)	42.2212	50/50	42.2212
957981	AF2-092 C	2.7714	50/50	2.7714
957982	AF2-092 E	1.8476	50/50	1.8476
958472	AF2-141 BAT	1.5052	Merchant Transmission	1.5052
959792	AF2-270 E	1.4323	50/50	1.4323
960451	AF2-336 C	4.6190	50/50	4.6190
960452	AF2-336 E	3.0794	50/50	3.0794
960461	AF2-337 C	4.6190	50/50	4.6190
960462	AF2-337 E	3.0794	50/50	3.0794
960471	AF2-338 C	4.6190	50/50	4.6190
960472	AF2-338 E	3.0794	50/50	3.0794
960481	AF2-339 C	4.6190	50/50	4.6190
960482	AF2-339 E	3.0794	50/50	3.0794
960901	AF2-381 C	13.5225	50/50	13.5225
960902	AF2-381 E	7.1162	50/50	7.1162
962292	AG1-077 E	2.9082	50/50	2.9082
962642	AG1-113 BAT	0.4249	Merchant Transmission	0.4249
962652	AG1-114 BAT	0.3989	Merchant Transmission	0.3989
963541	AG1-203 C	4.7258	50/50	4.7258
963542	AG1-203 E	2.5446	50/50	2.5446
964751	AG1-338 C	1.6936	50/50	1.6936
964752	AG1-338 E	0.2310	50/50	0.2310
964761	AG1-339 C	1.7706	50/50	1.7706
964762	AG1-339 E	0.1540	50/50	0.1540
964771	AG1-340 C	1.6936	50/50	1.6936
964772	AG1-340 E	0.2310	50/50	0.2310
964921	AG1-356 C	16.9759	50/50	16.9759
964922	AG1-356 E	11.3172	50/50	11.3172
G-007A	G-007A	0.1151	Confirmed LTF	0.1151

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
VFT	VFT	0.3161	Confirmed LTF	0.3161
CALDERWOOD	CALDERWOOD	0.0204	Confirmed LTF	0.0204
PRAIRIE	PRAIRIE	0.0956	Confirmed LTF	0.0956
CHEOAH	CHEOAH	0.0205	Confirmed LTF	0.0205
CBM-N	CBM-N	0.0624	Confirmed LTF	0.0624
COTTONWOOD	COTTONWOOD	0.0819	Confirmed LTF	0.0819
HAMLET	HAMLET	0.0254	Confirmed LTF	0.0254
GIBSON	GIBSON	0.0202	Confirmed LTF	0.0202
BLUEG	BLUEG	0.0642	Confirmed LTF	0.0642
TRIMBLE	TRIMBLE	0.0206	Confirmed LTF	0.0206
CATAWBA	CATAWBA	0.0154	Confirmed LTF	0.0154

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
AE1-053	Meyersdale North	Active
AE1-128	Bedford North-Wills Mounain 115 kV	Active
AE2-249	Bedford North-Pennsylvania Hollow 23 kV	Engineering and Procurement
AF1-232	Allegheny-Somerset 115 kV	Withdrawn
AF2-092	Snake Spring-Bedford Area 23 kV	Active
AF2-141	Lick Run 115 kV	Active
AF2-270	Bedford South RCB-Bedford Area 23 kV	Engineering and Procurement
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
AG1-077	Allegheny Tunnel 23 kV	Active
AG1-113	Somerset Windpower 22.86 kV	Active
AG1-114	Meyersdale North 115 kV	Active
AG1-203	Reels Corner 23 kV	Active
AG1-338	Curryville-RKB-Yellow Creek 23 kV I	Active
AG1-339	Curryville-RKB-Yellow Creek 23 kV II	Active
AG1-340	Curryville 23 kV	Active
AG1-356	Somerset-Allegheny 115 kV	Active
Z1-066	Arnold 34.5kV	In Service
Z2-108	Meyersdale North 115kV	In Service

11.8 Contingency Descriptions

Contingency Name	Contingency Definition
PN-P1-2-PN-115-082	CONTINGENCY 'PN-P1-2-PN-115-082' /* HILLTOP - KRAYN - RACHEL HILL 115KV DISCONNECT BRANCH FROM BUS 200878 TO BUS 200790 CKT 1 /* 26KRAYN 115 26SALIX 115 DISCONNECT BRANCH FROM BUS 200790 TO BUS 200751 CKT 1 /* 26SALIX 115 26HILLCLAY 115 DISCONNECT BRANCH FROM BUS 200751 TO BUS 200752 CKT 1 /* 26HILLCLAY 115 26HILLTOP 115 DISCONNECT BRANCH FROM BUS 200751 TO BUS 200749 CKT 1 /* 26HILLCLAY 115 26RACHEL H 115 DISCONNECT BRANCH FROM BUS 200790 TO BUS 200785 CKT 1 /* 26SALIX 115 26SALIX 23 DISCONNECT BRANCH FROM BUS 200749 TO BUS 200784 CKT 1 /* 26RACHEL H 115 26RACHEL#1 23 DISCONNECT BUS 200790 /* 26SALIX 115 DISCONNECT BUS 200751 /* 26HILLCLAY 115 END
PN-P2-3-PN-115-11A	CONTINGENCY 'PN-P2-3-PN-115-11A' /* CLAYSBURG 115KV SB DISCONNECT BRANCH FROM BUS 200505 TO BUS 200525 CKT 1 /* 26CLYSBURG 115 26SUMMIT 115 DISCONNECT BRANCH FROM BUS 200505 TO BUS 200878 CKT 1 /* 26CLYSBURG 115 26KRAYN 115 DISCONNECT BRANCH FROM BUS 200505 TO BUS 200516 CKT 1 /* 26CLYSBURG 115 26OSTRBURG 115 DISCONNECT BRANCH FROM BUS 200516 TO BUS 200564 CKT 1 /* 26OSTRBURG 115 26OSTRE SB 23 DISCONNECT BRANCH FROM BUS 200501 TO BUS 200516 CKT 1 /* 26BDFORD N 115 26OSTRBURG 115 DISCONNECT BRANCH FROM BUS 200505 TO BUS 200506 CKT 1 /* 26CLYSBURG 115 26CURYVILE 115 DISCONNECT BRANCH FROM BUS 200506 TO BUS 200521 CKT 1 /* 26CURYVILE 115 26SAXTON 115 DISCONNECT BRANCH FROM BUS 200506 TO BUS 200552 CKT 1 /* 26CURYVILE 115 26CURY SUB 23 DISCONNECT BRANCH FROM BUS 200505 TO BUS 200541 CKT 2 /* 26CLYSBURG 115 26CLAYSBRG 46 DISCONNECT BRANCH FROM BUS 200505 TO BUS 200551 CKT 1 /* 26CLYSBURG 115 26CLAY SUB 23 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