Generation Interconnection

System Impact Study Report

for

Queue Project AF2-260

STEPHENSBURG – CENTRAL HARDIN 69 KV

60 MW Capacity / 90 MW Energy

February 2021

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1 Introduction

This System Impact Study has been prepared in accordance with the PJM Open Access Transmission Tariff, 205, as well as the System Impact Study Agreement between the Interconnection Customer (IC), and PJM Interconnection, LLC (PJM), Transmission Provider (TP). The Interconnected Transmission Owner (ITO) is EKPC.

2 Preface

The intent of the System Impact Study is to determine a plan, with approximate cost and construction time estimates, to connect the subject generation interconnection project to the PJM network at a location specified by the Interconnection Customer. As a requirement for interconnection, the Interconnection Customer may be responsible for the cost of constructing: Network Upgrades, which are facility additions, or upgrades to existing facilities, that are needed to maintain the reliability of the PJM system. All facilities required for interconnection of a generation interconnection project must be designed to meet the technical specifications (on PJM web site) for the appropriate transmission owner.

In some instances an Interconnection Customer may not be responsible for 100% of the identified network upgrade cost because other transmission network uses, e.g. another generation interconnection or merchant transmission upgrade, may also contribute to the need for the same network reinforcement. 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 System Impact Study is performed.

The System Impact 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.

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.

3 General

The Interconnection Customer (IC), has proposed a Solar generating facility located in Hardin County, Kentucky. The installed facilities will have a total capability of 90 MW with 60 MW of this output being recognized by PJM as Capacity.

The proposed in-service date for this project is December 31, 2023. This study does not imply a TO commitment to this in-service date.

Queue Number	AF2-260
Project Name	STEPHENSBURG 69 KV
State	Kentucky
County	Hardin
Transmission Owner	EKPC
MFO	90
MWE	90
MWC	60
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

AF2-260 will interconnect with the EKPC transmission system tapping the Stephensburg – Central Hardin 69 kV line.

5 Cost Summary

The AF2-260 project will be responsible for the following costs:

Description	Total Cost
Total Physical Interconnection Costs	$5,445,000
Allocation towards System Network Upgrade Costs*	$84,090
Total Costs	**$5,529,090****

*As your project progresses through the study process and other projects modify their request or withdraw, then your cost allocation could change.

**LG&E Impacts and necessary LG&E system upgrade(s) will be determined once the LG&E affected system study is completed by LG&E.

The estimates provided in this report are preliminary in nature, as they were determined without the benefit of detailed engineering studies. Final estimates will require an on-site review and coordination to determine final construction requirements. In addition, Stability analysis will be completed during the Facilities Study stage. It is possible that a need for additional upgrades could be identified by these studies.

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.

Note 1: PJM Open Access Transmission Tariff (OATT) section 217.3A outline cost allocation rules. The rules are further clarified in PJM Manual 14A Attachment B. The allocation of costs for a network upgrade will start with the first Queue project to cause the need for the upgrade. Later queue projects will receive cost allocation contingent on their contribution to the violation and are allocated to the queues that have not closed less than 5 years following the execution of the first Interconnection Service Agreement which identifies the need for this upgrade.

Note 2: For customers with System Reinforcements listed: If your present cost allocation to a System Reinforcement indicates $0, then please be aware that as changes to the interconnection process occur, such as prior queued projects withdrawing from the queue, reducing in size, etc, the cost responsibilities can change and a cost allocation may be assigned to your project. In addition, although your present cost allocation to a System Reinforcement is presently $0, your project may need this system reinforcement completed to be deliverable to the PJM system. If your project comes into service prior to completion of the system reinforcement, an interim deliverability study for your project will be required.

6 Transmission Owner Scope of Work

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

6.1 Attachment Facilities

The total preliminary cost estimate for the Attachment work is given in the table below. These costs do not include CIAC Tax Gross-up.

Description	Total Cost
Install necessary equipment (a 69 kV isolation switch structure and associated switch, plus interconnection metering, fiber-optic connection and telecommunications equipment, circuit breaker and associated switches, and relay panel) at the new Leitchfield Road switching station, to accept the IC generator lead line/bus (Estimated time to implement is 24 months)	$1,170,000
Total Attachment Facility Costs	**$1,170,000**

6.2 Direct Connection Cost Estimate

The total preliminary cost estimate for the Direct Connection work is given in the table below. These costs do not include CIAC Tax Gross-up.

Description	Total Cost
Construct a new 69 kV switching station (Leitchfield Road Switching) to facilitate connection of the IC solar generation project to the existing Central Hardin-Stephensburg 69 kV line (Estimated time to implement is 24 months)	$3,510,000
Total Direct Connection Facility Costs	**$3,510,000**

6.3 Non-Direct Connection Cost Estimate

The total preliminary cost estimate for the Non-Direct Connection work is given in the table below. These costs do not include CIAC Tax Gross-up.

Description	Total Cost
Construct facilities to loop the existing Central Hardin-Stephensburg 69 kV line into the new Long Grove Road switching station (Estimated time to implement is 24 months)	$240,000
Modify relays and/or settings at Central Hardin substation for the existing line to the new Long Grove Road switching station (Estimated time to implement is 9 months)	$55,000
Modify relays and/or settings at Stephensburg substation for the existing line to the new Long Grove Road switching station (Estimated time to implement is 9 months)	$55,000
Install OPGW on the Leitchfield Road-Stephensburg 69 kV line (2.8 miles) (Estimated time to implement is 14 months)	$415,000
Total Non-Direct Connection Facility Costs	**$765,000**

7 Interconnection Customer Requirements

It is understood that the Interconnection Customer (IC) is responsible for all costs associated with this interconnection. The costs above are reimbursable to the Transmission Owner. The cost of the IC's generating plant and the costs for the line connecting the generating plant to the Point of Interconnection are not included in this report; these are assumed to be the IC's responsibility.

The Generation Interconnection Agreement does not in or by itself establish a requirement for the Transmission Owner to provide power for consumption at the developer's facilities. A separate agreement may be reached with the local utility that provides service in the area to ensure that infrastructure is in place to meet this demand and proper metering equipment is installed. It is the responsibility of the developer to contact the local service provider to determine if a local service agreement is required.

1. An Interconnection Customer entering the New Services Queue on or after October 1, 2012 with a proposed new Customer Facility that has a Maximum Facility Output equal to or greater than 100 MW shall install and maintain, at its expense, phasor measurement units (PMUs). See Section 8.5.3 of Appendix 2 to the Interconnection Service Agreement as well as section 4.3 of PJM Manual 14D for additional information.

2. The Interconnection Customer may be required to install and/or pay for metering as necessary to properly track real time output of the facility as well as installing metering which shall be used for billing purposes. See Section 8 of Appendix 2 to the Interconnection Service Agreement as well as Section 4 of PJM Manual 14D for additional information.

8 Revenue Metering and SCADA Requirements

8.1 PJM Requirements

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

8.2 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)

8.3 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/

9 Summer Peak Analysis

The Queue Project AF2-260 was evaluated as a 90.0 MW (Capacity 60.0 MW) injection into a tap of the Stephensburg – Central Hardin 69 kV line in the EKPC area. Project AF2-260 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AF2-260 was studied with a commercial probability of 100.0 %. Potential network impacts were as follows:

9.1 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	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
101860589	341287	2CENT HARDIN	69.0	EKPC	341713	2KARGLE	69.0	EKPC	1	EKPC_P1-2_CHARD-HARD138	single	98.0	94.89	118.93	AC	23.49

9.2 Multiple Facility Contingency

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

None

9.3 Contribution to Previously Identified Overloads

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

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC|DC	MW IMPACT
98821232	324010	7TRIMBL REAC	345.0	LGEE	248000	06CLIFTY	345.0	OVEC	1	Base Case	single	1134.0	107.08	108.18	AC	12.1
100166723	341713	2KARGLE	69.0	EKPC	324519	2ETOWN KU	69.0	LGEE	1	EKPC_P1-2_CHARD-HARD138	single	76.0	104.22	135.39	AC	23.49

9.4 Steady-State Voltage Requirements

To be determined

9.5 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
98821225	324010	7TRIMBL REAC	345.0	LGEE	248000	06CLIFTY	345.0	OVEC	1	AEP_P1-2_#363	operation	1451.0	125.96	127.25	AC	18.44
98821231	324010	7TRIMBL REAC	345.0	LGEE	248000	06CLIFTY	345.0	OVEC	1	Base Case	operation	1134.0	112.3	113.93	AC	18.15
101860588	341287	2CENT HARDIN	69.0	EKPC	341713	2KARGLE	69.0	EKPC	1	EKPC_P1-2_CHARD-HARD138	operation	98.0	110.02	146.12	AC	35.24
100166722	341713	2KARGLE	69.0	EKPC	324519	2ETOWN KU	69.0	LGEE	1	EKPC_P1-2_CHARD-HARD138	operation	76.0	123.73	170.42	AC	35.24

9.6 System Reinforcements

<table>
<tr><th>ID</th><th>Idx</th><th>Facility</th><th>Upgrade Description</th><th>Cost</th><th>Cost Allocated to AF2-260</th><th>Upgrade Number</th></tr>
<tr><td>101860589,101860594</td><td>1</td><td>2CENT HARDIN 69.0 kV - 2KARGLE 69.0 kV Ckt 1</td><td>Increase the operating temperature of the 556.5 MCM ACSR/TW conductor from 212F to 302F. EKPC's new rating would be Normal 103 MVA/Emergency 129 MVA. Cost of upgrade: $40,000. Time to complete 6 months.</td><td>$40 K</td><td>$40 K</td><td>N6238</td></tr>
<tr><td>98821232</td><td>6</td><td>7TRIMBL REAC 345.0 kV - 06CLIFTY 345.0 kV Ckt 1</td><td>Trimble-Clifty 345 kV line is a tie line between LG&E and OVEC. The line is owned by LG&E. The potential upgrade on the Trimble-Clifty 345 kV line, if determined to be a constraint by LG&E, is to reconductor the line with a high temperature conductor and upgrade necessary terminal equipment to achieve ratings of 2610/2610 MVA SN/SE. Cost estimate is $17.4M with a time estimate of 18 months.
**LG&E will determine if there are any LG&E system impacts, including on Trimble- Clifty line. Final LG&E Impacts and necessary LG&E system upgrade(s) will be determined once the LG&E affected system study is completed by LG&E.

OVEC: no upgrades required.</td><td>$17.4 M</td><td>TBD**</td><td>N/A</td></tr>
<tr><td>100166723,100166728</td><td>2</td><td>2KARGLE 69.0 kV - 2ETOWN KU 69.0 kV Ckt 1</td><td>EKPC:
Increase the maximum operating temperature of the 556 MCM ACSR conductor in the Kargle-KU Elizabethtown 69 kV line section to 302 degrees F (1.45 miles).
Cost estimate: $100 K
Time Estimate: 9 months.
New expected SE rating after the upgrade will be 132 MVA.

The cost allocation is:

<table><tr><th>Queue</th><th>MW contribution</th><th>% Allocation</th><th>Cost $100 K</th></tr><tr><td>AF2-090</td><td>29.8</td><td>55.9%</td><td>55.910</td></tr><tr><td>AF2-260</td><td>23.5</td><td>44.1%</td><td>44.090</td></tr></table>
LG&E end:
LG&E impacts to be determined during the LG&E affected system study.</td><td>$100 K</td><td>$44.09 K</td><td>N7035.1</td></tr>
<tr><td></td><td></td><td></td><td>Total Cost</td><td>$17,540,000</td><td>$84,090**</td><td></td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table>

Note : For customers with System Reinforcements listed: If your present cost allocation to a System Reinforcement indicates $0, then please be aware that as changes to the interconnection process occur, such as prior queued projects withdrawing from the queue, reducing in size, etc, the cost responsibilities can change and a cost allocation may be assigned to your project. In addition, although your present cost allocation to a System Reinforcement is presently $0, your project may need this system reinforcement completed to be deliverable to the PJM system. If your project comes into service prior to completion of the system reinforcement, an interim deliverability study for your project will be required.

9.7 Flow Gate Details

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

9.7.1 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
101860589	341287	2CENT HARDIN	EKPC	341713	2KARGLE	EKPC	1	EKPC_P1-2_CHARD-HARD138	single	98.0	94.89	118.93	AC	23.49

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
952821	J762	13.4600	PJM External (MISO)	13.4600
957961	AF2-090 C	29.7594	80/20	29.7594
959691	AF2-260 C	23.4924	80/20	23.4924
960171	AF2-308	12.1621	80/20	12.1621
960181	AF2-309 C	18.2431	80/20	18.2431
960741	AF2-365 C O1	1.6197	80/20	1.6197
961001	AF2-391 C O1	40.8787	80/20	40.8787
WEC	WEC	0.0444	Confirmed LTF	0.0444
CPLE	CPLE	0.0827	Confirmed LTF	0.0827
CBM-W2	CBM-W2	3.5872	Confirmed LTF	3.5872
NY	NY	0.0050	Confirmed LTF	0.0050
TVA	TVA	0.7868	Confirmed LTF	0.7868
CBM-S2	CBM-S2	0.9884	Confirmed LTF	0.9884
CBM-S1	CBM-S1	2.8627	Confirmed LTF	2.8627
MADISON	MADISON	0.8588	Confirmed LTF	0.8588
MEC	MEC	0.4179	Confirmed LTF	0.4179
BLUEG	BLUEG	1.0989	Confirmed LTF	1.0989
TRIMBLE	TRIMBLE	0.3055	Confirmed LTF	0.3055
CBM-W1	CBM-W1	1.5637	Confirmed LTF	1.5637

9.7.2 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
100166723	341713	2KARGLE	EKPC	324519	2ETOWN KU	LGEE	1	EKPC_P1-2_CHARD-HARD138	single	76.0	104.22	135.39	AC	23.49

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
952821	J762	13.4600	PJM External (MISO)	13.4600
957961	AF2-090 C	29.7594	80/20	29.7594
959691	AF2-260 C	23.4924	80/20	23.4924
960171	AF2-308	12.1621	80/20	12.1621
960181	AF2-309 C	18.2431	80/20	18.2431
960741	AF2-365 C O1	1.6197	80/20	1.6197
961001	AF2-391 C O1	40.8787	80/20	40.8787
WEC	WEC	0.0444	Confirmed LTF	0.0444
CPLE	CPLE	0.0827	Confirmed LTF	0.0827
CBM-W2	CBM-W2	3.5872	Confirmed LTF	3.5872
NY	NY	0.0050	Confirmed LTF	0.0050
TVA	TVA	0.7868	Confirmed LTF	0.7868
CBM-S2	CBM-S2	0.9884	Confirmed LTF	0.9884
CBM-S1	CBM-S1	2.8627	Confirmed LTF	2.8627
MADISON	MADISON	0.8588	Confirmed LTF	0.8588
MEC	MEC	0.4179	Confirmed LTF	0.4179
BLUEG	BLUEG	1.0989	Confirmed LTF	1.0989
TRIMBLE	TRIMBLE	0.3055	Confirmed LTF	0.3055
CBM-W1	CBM-W1	1.5637	Confirmed LTF	1.5637

9.7.3 Index 3

None

9.7.4 Index 4

None

9.7.5 Index 5

None

9.7.6 Index 6

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
98821232	324010	7TRIMBL REAC	LGEE	248000	06CLIFTY	OVEC	1	Base Case	single	1134.0	107.08	108.18	AC	12.1

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
342900	1COOPER1 G	2.3471	80/20	2.3471
342903	1COOPER2 G	4.5514	80/20	4.5514
342918	1JKCT 1G	1.8619	80/20	1.8619
342921	1JKCT 2G	1.3341	80/20	1.3341
342924	1JKCT 3G	1.8619	80/20	1.8619
342927	1JKCT 4G	1.2356	80/20	1.2356
342930	1JKCT 5G	1.2289	80/20	1.2289
342933	1JKCT 6G	1.2356	80/20	1.2356
342936	1JKCT 7G	1.2356	80/20	1.2356
342939	1JKCT 9G	1.2710	80/20	1.2710
342942	1JKCT 10G	1.2710	80/20	1.2710
342945	1LAUREL 1G	1.3284	80/20	1.3284
925981	AC1-074 C O1	4.0947	80/20	4.0947
932551	AC2-075 C	0.9725	80/20	0.9725
936381	AD2-048 C	3.5216	80/20	3.5216
936571	AD2-072 C O1	10.1170	80/20	10.1170
939131	AE1-143 C	9.4830	80/20	9.4830
940041	AE1-246 C O1	11.7289	80/20	11.7289
940831	AE2-071 C	2.9763	80/20	2.9763
941411	AE2-138 C	15.4421	80/20	15.4421
941981	AE2-210 C O1	5.3209	80/20	5.3209
942411	AE2-254 C O1	4.0317	80/20	4.0317
942591	AE2-275 C O1	6.8827	80/20	6.8827
942891	AE2-308 C O1	11.6237	80/20	11.6237
943111	AE2-339 C	2.5991	80/20	2.5991
943701	AF1-038 C	4.6076	80/20	4.6076
943821	AF1-050 C	5.3330	80/20	5.3330
944151	AF1-083 C O1	4.9210	80/20	4.9210
944511	AF1-116 C	10.6351	80/20	10.6351
944621	AF1-127 C O1	4.5147	80/20	4.5147
945381	AF1-203 C	1.7008	80/20	1.7008
945861	AF1-251 C	10.9204	80/20	10.9204
946021	**AF1-267 C (Withdrawn : 11/10/2020)**	**3.8535**	**80/20**	**3.8535**
952811	J759	9.7195	PJM External (MISO)	9.7195
952821	J762	30.3840	PJM External (MISO)	30.3840
952861	J783 C	9.2991	PJM External (MISO)	9.2991
953611	J800	12.5675	PJM External (MISO)	12.5675
953931	J856	9.2400	PJM External (MISO)	9.2400
955451	J1027	12.8910	PJM External (MISO)	12.8910
955461	J1028	14.5680	PJM External (MISO)	14.5680
955891	J1074	22.4080	PJM External (MISO)	22.4080
956911	J1189	0.4233	PJM External (MISO)	0.4233
957961	AF2-090 C	16.2457	80/20	16.2457
959691	AF2-260 C	12.0972	80/20	12.0972
960151	AF2-306	1.7259	80/20	1.7259

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
960161	AF2-307 C	2.6286	80/20	2.6286
960171	AF2-308	5.7294	80/20	5.7294
960181	AF2-309 C	8.5940	80/20	8.5940
960641	AF2-355 C O1	15.2388	80/20	15.2388
960741	AF2-365 C O1	4.6461	80/20	4.6461
961001	AF2-391 C O1	15.4066	80/20	15.4066
LGEE	LGEE	18.1733	Confirmed LTF	18.1733
CPLE	CPLE	1.2939	Confirmed LTF	1.2939
CBM-W2	CBM-W2	48.2555	Confirmed LTF	48.2555
NY	NY	0.1045	Confirmed LTF	0.1045
TVA	TVA	8.8774	Confirmed LTF	8.8774
WEC	WEC	0.4454	Confirmed LTF	0.4454
CBM-S2	CBM-S2	15.1725	Confirmed LTF	15.1725
CBM-S1	CBM-S1	94.3846	Confirmed LTF	94.3846
MADISON	MADISON	9.7978	Confirmed LTF	9.7978
MEC	MEC	4.6272	Confirmed LTF	4.6272
CBM-W1	CBM-W1	13.2106	Confirmed LTF	13.2106

9.8 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
AC1-074	Jacksonville-Renaker 138kV I	Active
AC2-075	Great Blue Heron Solar	Active
AD2-048	Cynthia-Headquarters 69 kV	Active
AD2-072	Van Arsdell-Mercer Industrial 69kV	Engineering and Procurement
AE1-143	Marion County 161 kV	Engineering and Procurement
AE1-246	Barren County-Summer Shade 161 kV	Active
AE2-071	Patton Rd-Summer Shade 69 kV	Active
AE2-138	Avon-North Clark 345 kV	Active
AE2-210	Avon-North Clark 345 kV	Active
AE2-254	Garrard County-Tommy-Gooch 69 kV	Active
AE2-275	JK Smith-Fawkes 138 kV	Active
AE2-308	Three Forks-Dale 138 kV	Active
AE2-339	Avon 138 kV	Active
AF1-038	Sewellton Jct-Webbs Crossroads 69 kV	Active
AF1-050	Summer Shade - Green County 161 kV	Active
AF1-083	Green County-Saloma 161 kV	Active
AF1-116	Marion County 161 kV	Active
AF1-127	Avon 345 kV	Active
AF1-203	Patton Rd-Summer Shade 69 kV	Active
AF1-251	Avon-North Clark 345 kV	Active
AF1-267	Union City Tap 138 kV	Withdrawn
AF2-090	Central Hardin 138 kV	Active
AF2-260	Stephensburg 69 kV	Active
AF2-306	Hope-Blevins Valley Tap 69 kV	Active
AF2-307	Hope-Blevins Valley Tap 69 kV	Active
AF2-308	Central Hardin-Stephensburg 69 kV	Active
AF2-309	Central Hardin-Stephensburg 69 kV	Active
AF2-355	West Gerrard-J.K. Smith 345 nkV	Active
AF2-365	Munfordville KU Tap-Horse Cave Jct. 69 kV	Active
AF2-391	Central Hardin 69 kV	Active
J1027	MISO	MISO
J1028	MISO	MISO
J1074	MISO	MISO
J1189	MISO	MISO
J759	MISO	MISO
J762	MISO	MISO
J783	MISO	MISO
J800	MISO	MISO
J856	MISO	MISO

9.9 Contingency Descriptions

Contingency Name	Contingency Definition
EKPC_P4-2_CHARD W124-814	CONTINGENCY 'EKPC_P4-2_CHARD W124-814' /* CENTRAL HARDIN OPEN BRANCH FROM BUS 341287 TO BUS 342568 CKT 1 /* 341287 2CENT HARDIN69.000 342568 4CENT HARDIN138.00 OPEN BRANCH FROM BUS 324261 TO BUS 342568 CKT 1 /* 324261 4HARDN 138.00 342568 4CENT HARDIN138.00 END
EKPC_P4-2_CHARD W124-804	CONTINGENCY 'EKPC_P4-2_CHARD W124-804' /* CENTRAL HARDIN OPEN BRANCH FROM BUS 341287 TO BUS 342568 CKT 1 /* 341287 2CENT HARDIN69.000 342568 4CENT HARDIN138.00 OPEN BRANCH FROM BUS 324047 TO BUS 342568 CKT 1 /* 324047 4BLACKBRNCH 138.00 342568 4CENT HARDIN138.00 OPEN BRANCH FROM BUS 324047 TO BUS 324260 CKT 1 /* 324047 4BLACKBRNCH 138.00 324260 4HARDBG 138.00 END
EKPC_P2-2_STEPBG 69	CONTINGENCY 'EKPC_P2-2_STEPBG 69' /* STEPHENSBURG 69 BUS OPEN BUS 342307 /* 2STEPHENSBRG END
AEP_P1-2_#10135	CONTINGENCY 'AEP_P1-2_#10135' OPEN BRANCH FROM BUS 243208 TO BUS 243209 CKT 1 / 243208 05JEFRSO 765 243209 05ROCKPT 765 1 OPEN BRANCH FROM BUS 243209 TO BUS 243442 CKT 1 / 243209 05ROCKPT 765 243442 05RKG1 26.0 1 REMOVE UNIT 1H FROM BUS 243442 / 243442 05RKG1 26.0 REMOVE UNIT 1L FROM BUS 243442 / 243442 05RKG1 26.0 END
EKPC_P1-2_CHARD-HARD138	CONTINGENCY 'EKPC_P1-2_CHARD-HARD138' /* CENTRAL HARDIN - KU HARDIN OPEN BRANCH FROM BUS 324261 TO BUS 342568 CKT 1 /* 324261 4HARDN 138.00 342568 4CENT HARDIN138.00 END
AEP_P1-2_#10136	CONTINGENCY 'AEP_P1-2_#10136' OPEN BRANCH FROM BUS 243208 TO BUS 243209 CKT 1 / 243208 05JEFRSO 765 243209 05ROCKPT 765 1 OPEN BRANCH FROM BUS 243209 TO BUS 243443 CKT 2 / 243209 05ROCKPT 765 243443 05RKG2 26.0 2 REMOVE UNIT 2H FROM BUS 243443 / 243443 05RKG2 26.0 REMOVE UNIT 2L FROM BUS 243443 / 243443 05RKG2 26.0 END

Contingency Name	Contingency Definition
EKPC_P4-5_CHARD W124-848	CONTINGENCY 'EKPC_P4-5_CHARD W124-848' /* CENTRAL HARDIN OPEN BRANCH FROM BUS 341287 TO BUS 342568 CKT 1 /* 341287 2CENT HARDIN69.000 342568 4CENT HARDIN138.00 END
AEP_P1-2_#363	CONTINGENCY 'AEP_P1-2_#363' OPEN BRANCH FROM BUS 243208 TO BUS 243209 CKT 1 / 243208 05JEFRSO 765 243209 05ROCKPT 765 1 END
Base Case	
EKPC_P4-6_CHARD W124-91T	CONTINGENCY 'EKPC_P4-6_CHARD W124-91T' /* CENTRAL HARDIN OPEN BRANCH FROM BUS 324047 TO BUS 342568 CKT 1 /* 324047 4BLACKBRNCH 138.00 342568 4CENT HARDIN138.00 OPEN BRANCH FROM BUS 324047 TO BUS 324260 CKT 1 /* 324047 4BLACKBRNCH 138.00 324260 4HARDBG 138.00 OPEN BRANCH FROM BUS 324261 TO BUS 342568 CKT 1 /* 324261 4HARDN 138.00 342568 4CENT HARDIN138.00 END
EKPC_P1-2_C HAR-KU ETN69	CONTINGENCY 'EKPC_P1-2_C HAR-KU ETN69' /* CENTRAL HARDIN - KU ETOWN OPEN BRANCH FROM BUS 341287 TO BUS 341713 CKT 1 /* 341287 2CENT HARDIN69.000 341713 2KARGLE 69.000 OPEN BRANCH FROM BUS 324519 TO BUS 341713 CKT 1 /* 324519 2ETOWN KU 69.000 341713 2KARGLE 69.000 END
EKPC_P2-2_KU HODG 69	CONTINGENCY 'EKPC_P2-2_KU HODG 69' /* KU HODGENVILLE 69 TIE OPEN BUS 341632 /* 2HODGENVILLE END

10 Light Load Analysis

Not applicable

11 Short Circuit Analysis

The following Breakers are overdutied:

None

12 Stability and Reactive Power

(Summary of the VAR requirements based upon the results of the dynamic studies)

To be determined in the Facilities Study Phase.

13 Affected Systems

13.1 TVA

None

13.2 Duke Energy Progress

Duke Energy Progress Impacts to be determined during later study phases (as applicable).

13.3 MISO

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

13.4 LG&E

An LG&E affected system study is required. An LG&E affected system study agreement will need to be signed.

14 Attachment 1: One Line Diagram

AF2-260 Conceptual Single-Line Diagram of Interconnection Facilities