



thoroughbred solar

Exhibit 9

Analysis of Effect on Kentucky Electricity Transmission System

EXHIBIT 9 – ANALYSIS OF EFFECT ON KENTUCKY ELECTRICITY TRANSMISSION SYSTEM

An analysis of the proposed facility's projected effect on the electricity transmission system in Kentucky. KRS 278.706(2)(i).

Respondent: Rob Kalbouss

Thoroughbred Solar has spent significant time and effort developing the interconnection for the Project. The analysis of the proposed facility's projected effect on the electricity transmission system in Kentucky was initiated in 2020 with East Kentucky Power Cooperative as the Transmission Owner and PJM ("PJM") as the Transmission Provider. Thoroughbred Solar was assigned queue position number AF2-365. AF2-365 has completed the Feasibility and System Impact Studies ("SIS") in July 2020 and February 2021, respectively. Thoroughbred was flagged to undergo LG&E and TVA Affected System Studies ("AFS"). The AFS for LG&E and TVA were completed in August of 2022 confirming no overloads or upgrade cost allocations triggered in either study. The completed Facilities Study and draft interconnect agreement are expected in October 2022. An executed interconnect agreement is expected to be completed early in the first quarter of 2023.

Attachment A: PJM Feasibility Study (35 pages)

Attachment B: PJM System Impact Study Report (28 pages)



Generation Interconnection

Feasibility Study Report

for

Queue Project AF2-365

MUNFORDVILLE KU TAP-HORSE CAVE JCT. 69 KV

30 MW Capacity / 50 MW Energy

July 2020

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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 EKPC.

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 Hart County, Kentucky. The installed facilities will have a total capability of 50 MW with 30 MW of this output being recognized by PJM as Capacity. The proposed in-service date for this project is December 31, 2022. This study does not imply a TO commitment to this in-service date.

Queue Number	AF2-365
Project Name	MUNFORDVILLE KU TAP-HORSE CAVE JCT. 69 KV
State	Kentucky
County	Hart
Transmission Owner	EKPC
MFO	50
MWE	50
MWC	30
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

AF2-365 will interconnect with the EKPC transmission system along one of the following Points of Interconnection:

Primary POI: Munfordville KU Tap to the Horse Cave Jct. 69 kV line

Secondary POI: Bonnieville 69 kV substation

5 Cost Summary

The AF2-365 project will be responsible for the following costs:

Description	Total Cost
Total Physical Interconnection Costs	\$4,745,000
Total System Network Upgrade Costs	\$1,515,000
Total Costs	\$6,260,000

This cost excludes a Federal Income Tax Gross Up charges. This tax may or may not be charged based on whether this project meets the eligibility requirements of IRS Notice 88-129. If at a future date it is determined that the Federal Income Tax Gross charge is required, the Transmission Owner shall be reimbursed by the Interconnection Customer for such taxes.

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

6 Transmission Owner Scope of Work

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.

	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 Hart County switching station, to accept the IC generator lead line/bus (Estimated time to implement is 24 months)	\$725,000
Total Attachment Facility Costs	\$725,000

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 (Hart County Switching) to facilitate connection of the IC solar generation project to the existing Munfordville KU-KU Horse Cave Tap 69 kV line (Estimated time to implement is 24 months)	\$2,765,000
Total Direct Connection Facility Costs	\$2,765,000

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 Munfordville KU-KU Horse Cave Tap 69 kV line into the new Hart County switching station (Estimated time to implement is 24 months)	\$125,000
Modify relays and/or settings at Bonnierville substation for the existing line to the new Hart County switching station (Estimated time to implement is 9 months)	\$45,000
Modify relays and/or settings at Barren County substation for the existing line to the new Hart County switching station (Estimated time to implement is 9 months)	\$45,000
Install OPGW on the Hart County-Barren County 69 kV line (8.5 miles) (Estimated time to implement is 18 months)	\$1,040,000
Total Non-Direct Connection Facility Costs	\$1,255,000

7 Incremental Capacity Transfer Rights (ICTRs)

Will be determined at a later study phase

8 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.

9 Revenue Metering and SCADA Requirements

9.1 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.

9.2 Meteorological Data Reporting Requirements

Solar generation facilities shall provide the Transmission Provider with site-specific meteorological data including:

- Back Panel temperature (Fahrenheit)
- Irradiance (Watts/meter²)
- Ambient air temperature (Fahrenheit) – (Accepted, not required)
- Wind speed (meters/second) – (Accepted, not required)
- Wind direction (decimal degrees from true north) – (Accepted, not required)

9.3 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 Summer Peak - Load Flow Analysis - Primary POI

The Queue Project AF2-365 was evaluated as a 50.0 MW (Capacity 30.0 MW) injection tapping the Munfordville KU Tap to the Horse Cave Jct. 69 kV line in the EKPC area. Project AF2-365 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AF2-365 was studied with a commercial probability of 53.0 %. Potential network impacts were as follows:

10.1 Generation Deliverability

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

None

10.2 Multiple Facility Contingency

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

None

10.3 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 LOADIN G %	POST PROJECT LOADIN G %	AC/D C	MW IMPACT
102008594	341287	2CENT HARDIN	69.0	EKPC	341713	2KARGLE	69.0	EKPC	1	EKPC_P1 - 2_CHAR D-HARD138	single	98.0	146.59	148.25	DC	1.62
100309877	341713	2KARGLE	69.0	EKPC	324519	2ETOWN KU	69.0	LGEE	1	EKPC_P1 - 2_CHAR D-HARD138	single	76.0	170.48	172.61	DC	1.62
102009557	342286	2SOMERSET	69.0	EKPC	342287	2SOMERSET KU	69.0	EKPC	1	EKPC_P7 -1_COOP 161 DBL 2	tower	115.0	120.17	121.16	DC	2.52
100310716	342287	2SOMERSET KU	69.0	EKPC	324531	2FERGUSON SO	69.0	LGEE	1	EKPC_P7 -1_COOP 161 DBL 2	tower	105.0	133.2	134.52	DC	3.05
100309770	342718	5SCOOPER2	161.0	EKPC	324141	5ELIHU	161.0	LGEE	1	EKPC_P4 - 5_LAURL S50-1024	breaker	277.0	120.4	121.12	DC	4.4
100310775	342718	5SCOOPER2	161.0	EKPC	324141	5ELIHU	161.0	LGEE	1	EKPC_P7 - 1_LAURL 161 DBL	tower	277.0	120.43	121.16	DC	4.4
102008173	960170	AF2-308 TAP	69.0	EKPC	341287	2CENT HARDIN	69.0	EKPC	1	EKPC_P2 -2_KU HODG 69	bus	98.0	112.5	118.24	DC	5.62

10.4 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 LOADIN G %	POST PROJECT LOADIN G %	AC/D C	MW IMPACT
102008593	341287	2CENT HARDIN	69.0	EKPC	341713	2KARGL E	69.0	EKPC	1	EKPC_P1-2_CHARD - HARD138	operation	98.0	183.46	184.7	DC	2.7
100309876	341713	2KARGLE	69.0	EKPC	324519	2ETOWN KU	69.0	LGEE	1	EKPC_P1-2_CHARD - HARD138	operation	76.0	218.01	219.61	DC	2.7
100310148	342718	5COOPER 2	161.0	EKPC	324141	5ELIHU	161.0	LGEE	1	EKPC_P1-2_LAUR-L DAM161	operation	277.0	120.24	120.97	DC	4.42
100310151	342718	5COOPER 2	161.0	EKPC	324141	5ELIHU	161.0	LGEE	1	Base Case	operation	219.0	104.13	104.91	DC	3.74

10.5 System Reinforcements - Summer Peak Load Flow - Primary POI

ID	Idx	Facility	Upgrade Description	Cost
102009557	3	2SOMERSET 69.0 kV - 2SOMERSET KU 69.0 kV Ckt 1	<u>EKPC</u> r0080 (1430) : Replace the 500 MCM copper jumpers at the Somerset substation using 750 MCM copper or equivalent Project Type : FAC Cost : \$10,000 Time Estimate : 6.0 Months	\$10,000
100310716	4	2SOMERSET KU 69.0 kV - 2FERGUSON SO 69.0 kV Ckt 1	<u>LGEE</u> NonPJMArea (1606) : The external (i.e. Non-PJM) Transmission Owner, LGEE, will not evaluate this violation until the impact study phase. Project Type : FAC Cost : \$0 Time Estimate : N/A Months	\$0
102008173	6	AF2-308 TAP 69.0 kV - 2CENT HARDIN 69.0 kV Ckt 1	<u>EKPC</u> EKPC-r0087 (1459) : Increase the maximum operating temperature of the 556 MCM ACSR conductor in the AF2-308 Tap-Central Hardin 69 kV line section to 302 degrees F (4.15 miles) Project Type : FAC Cost : \$280,000 Time Estimate : 9.0 Months	\$280,000
100309770,100 310775	5	SCOOPER2 161.0 kV - 5ELIHU 161.0 kV Ckt 1	<u>EKPC</u> r0076 (1426) : Increase the maximum operating temperature of the 795 MCM ACSR conductor in the Cooper-Elihu 161 kV line section to 275 degrees F (6.7 miles) Project Type : FAC Cost : \$660,000 Time Estimate : 9.0 Months <u>LGEE</u> NonPJMArea (1606) : The external (i.e. Non-PJM) Transmission Owner, LGEE, will not evaluate this violation until the impact study phase. Project Type : FAC Cost : \$0 Time Estimate : N/A Months	\$660,000

ID	Idx	Facility	Upgrade Description	Cost
100309877	2	2KARGLE 69.0 kV - 2ETOWN KU 69.0 kV Ckt 1	<p><u>EKPC</u> EKPC-r0090a (1462) : 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) Project Type : FAC Cost : \$100,000 Time Estimate : 9.0 Months</p> <p><u>LGEE</u> NonPJMArea (1606) : The external (i.e. Non-PJM) Transmission Owner, LGEE, will not evaluate this violation until the impact study phase. Project Type : FAC Cost : \$0 Time Estimate : N/A Months</p>	\$100,000
102008594	1	2CENT HARDIN 69.0 kV - 2KARGLE 69.0 kV Ckt 1	<p><u>EKPC</u> EKPC-r0086b (1454) : Replace the 556 MCM ACSR jumpers at the Central Hardin substation using bundled 500 MCM copper or equivalent Project Type : FAC Cost : \$15,000 Time Estimate : 6.0 Months</p> <p>EKPC-r0086c (1455) : Rebuild the Central Hardin-Kargle 69 kV line section using 954 MCM ACSS conductor at 392 degrees F (0.6 miles) Project Type : FAC Cost : \$450,000 Time Estimate : 12.0 Months</p>	\$465,000
			TOTAL COST	\$1,515,000

10.6 Flow Gate Details - Primary POI

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".

10.6.1 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
102008594	341287	2CENT HARDIN	EKPC	341713	2KARGLE	EKPC	1	EKPC_P1-2_CHARD-HARD138	single	98.0	146.59	148.25	DC	1.62

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
952821	J762	13.4600	PJM External (MISO)	13.4600
957961	AF2-090 C	29.7580	80/20	29.7580
959691	AF2-260 C O1	19.1730	80/20	19.1730
960171	AF2-308	11.7765	80/20	11.7765
960181	AF2-309 C	17.6648	80/20	17.6648
960741	AF2-365 C O1	1.6191	80/20	1.6191
961001	AF2-391 C O1	40.8773	80/20	40.8773
WEC	WEC	0.0438	Confirmed LTF	0.0438
CPLE	CPLE	0.0814	Confirmed LTF	0.0814
CBM-W2	CBM-W2	3.5708	Confirmed LTF	3.5708
NY	NY	0.0061	Confirmed LTF	0.0061
CBM-W1	CBM-W1	1.5387	Confirmed LTF	1.5387
TVA	TVA	0.7840	Confirmed LTF	0.7840
CBM-S2	CBM-S2	0.9768	Confirmed LTF	0.9768
CBM-S1	CBM-S1	2.8457	Confirmed LTF	2.8457
MADISON	MADISON	0.8588	Confirmed LTF	0.8588
MEC	MEC	0.4147	Confirmed LTF	0.4147
BLUEG	BLUEG	1.1024	Confirmed LTF	1.1024
TRIMBLE	TRIMBLE	0.3066	Confirmed LTF	0.3066

10.6.2 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
100309877	341713	2KARGLE	EKPC	324519	2ETOWN KU	LGEE	1	EKPC_P1- 2_CHAR- HARD138	single	76.0	170.48	172.61	DC	1.62

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
952821	J762	13.4600	PJM External (MISO)	13.4600
957961	AF2-090 C	29.7580	80/20	29.7580
959691	AF2-260 C O1	19.1730	80/20	19.1730
960171	AF2-308	11.7765	80/20	11.7765
960181	AF2-309 C	17.6648	80/20	17.6648
960741	AF2-365 C O1	1.6191	80/20	1.6191
961001	AF2-391 C O1	40.8773	80/20	40.8773
WEC	WEC	0.0438	Confirmed LTF	0.0438
CPLE	CPLE	0.0814	Confirmed LTF	0.0814
CBM-W2	CBM-W2	3.5708	Confirmed LTF	3.5708
NY	NY	0.0061	Confirmed LTF	0.0061
CBM-W1	CBM-W1	1.5387	Confirmed LTF	1.5387
TVA	TVA	0.7840	Confirmed LTF	0.7840
CBM-S2	CBM-S2	0.9768	Confirmed LTF	0.9768
CBM-S1	CBM-S1	2.8457	Confirmed LTF	2.8457
MADISON	MADISON	0.8588	Confirmed LTF	0.8588
MEC	MEC	0.4147	Confirmed LTF	0.4147
BLUEG	BLUEG	1.1024	Confirmed LTF	1.1024
TRIMBLE	TRIMBLE	0.3066	Confirmed LTF	0.3066

10.6.3 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
102009557	342286	2SOMERSET	EKPC	342287	2SOMERSET KU	EKPC	1	EKPC_P7- 1_COOP 161 DBL 2	tower	115.0	120.17	121.16	DC	2.52

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
342900	1COOPER1 G	5.5368	50/50	5.5368
342903	1COOPER2 G	10.7390	50/50	10.7390
939131	AE1-143 C	5.3380	Adder	6.28
939132	AE1-143 E	2.6441	Adder	3.11
940041	AE1-246 C O1	4.2405	Adder	4.99
940042	AE1-246 E O1	2.0651	Adder	2.43
940831	AE2-071 C	1.2982	Adder	1.53
940832	AE2-071 E	0.8655	Adder	1.02
943701	AF1-038 C	6.1949	50/50	6.1949
943702	AF1-038 E	4.1299	50/50	4.1299
943821	AF1-050 C	2.2451	Adder	2.64
943822	AF1-050 E	1.4967	Adder	1.76
944151	AF1-083 C O1	2.3784	Adder	2.8
944152	AF1-083 E O1	1.5856	Adder	1.87
944511	AF1-116 C	5.9866	Adder	7.04
944512	AF1-116 E	3.9911	Adder	4.7
945381	AF1-203 C	0.7418	Adder	0.87
945382	AF1-203 E	0.4946	Adder	0.58
960741	AF2-365 C O1	0.6820	Adder	1.51
960742	AF2-365 E O1	0.4546	Adder	1.01
WEC	WEC	0.0482	Confirmed LTF	0.0482
LGEE	LGEE	0.0131	Confirmed LTF	0.0131
CPL	CPL	0.0318	Confirmed LTF	0.0318
LGE-0012019	LGE-0012019	5.0391	LTF	5.0391
CBM-W2	CBM-W2	3.5872	Confirmed LTF	3.5872
NY	NY	0.0426	Confirmed LTF	0.0426
CBM-W1	CBM-W1	1.7014	Confirmed LTF	1.7014
TVA	TVA	1.0724	Confirmed LTF	1.0724
O-066	O-066	0.5040	Confirmed LTF	0.5040
CBM-S2	CBM-S2	0.6069	Confirmed LTF	0.6069
CBM-S1	CBM-S1	5.3506	Confirmed LTF	5.3506
G-007	G-007	0.0780	Confirmed LTF	0.0780
MADISON	MADISON	0.7560	Confirmed LTF	0.7560
MEC	MEC	0.4513	Confirmed LTF	0.4513

10.6.4 Index 4

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
100310716	342287	2SOMERSET	EKPC	324531	2FERGUSON	LGEE	1	EKPC_P7-1_COOP 161 DBL 2	tower	105.0	133.2	134.52	DC	3.05

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
342900	1COOPER1 G	5.4187	50/50	5.4187
342903	1COOPER2 G	10.5096	50/50	10.5096
939131	AE1-143 C	6.4733	50/50	6.4733
939132	AE1-143 E	3.2064	50/50	3.2064
940041	AE1-246 C O1	5.3436	Adder	6.29
940042	AE1-246 E O1	2.6022	Adder	3.06
940831	AE2-071 C	1.6422	Adder	1.93
940832	AE2-071 E	1.0948	Adder	1.29
943701	AF1-038 C	8.4539	50/50	8.4539
943702	AF1-038 E	5.6359	50/50	5.6359
943821	AF1-050 C	2.5933	Adder	3.05
943822	AF1-050 E	1.7289	Adder	2.03
944151	AF1-083 C O1	2.5632	Adder	3.02
944152	AF1-083 E O1	1.7088	Adder	2.01
944511	AF1-116 C	7.2598	50/50	7.2598
944512	AF1-116 E	4.8398	50/50	4.8398
945381	AF1-203 C	0.9384	Adder	1.1
945382	AF1-203 E	0.6256	Adder	0.74
960741	AF2-365 C O1	0.8247	Adder	1.83
960742	AF2-365 E O1	0.5498	Adder	1.22
WEC	WEC	0.0621	Confirmed LTF	0.0621
CPL	CPL	0.0648	Confirmed LTF	0.0648
LGE-0012019	LGE-0012019	5.1436	LTF	5.1436
CBM-W2	CBM-W2	4.6437	Confirmed LTF	4.6437
NY	NY	0.0431	Confirmed LTF	0.0431
CBM-W1	CBM-W1	2.2018	Confirmed LTF	2.2018
TVA	TVA	1.4154	Confirmed LTF	1.4154
O-066	O-066	0.5107	Confirmed LTF	0.5107
CBM-S2	CBM-S2	1.0115	Confirmed LTF	1.0115
CBM-S1	CBM-S1	6.9864	Confirmed LTF	6.9864
G-007	G-007	0.0790	Confirmed LTF	0.0790
MADISON	MADISON	0.9959	Confirmed LTF	0.9959
MEC	MEC	0.5816	Confirmed LTF	0.5816

10.6.5 Index 5

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
100310775	342718	SCOOPER2	EKPC	324141	SELIHU	LGEE	1	EKPC_P7-1_LAURL 161 DBL	tower	277.0	120.43	121.16	DC	4.4

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
342900	1COOPER1 G	11.1177	50/50	11.1177
342903	1COOPER2 G	21.6286	50/50	21.6286
342945	1LAUREL 1G	6.7288	50/50	6.7288
939131	AE1-143 C	10.0871	50/50	10.0871
939132	AE1-143 E	4.9964	50/50	4.9964
940041	AE1-246 C O1	9.0997	50/50	9.0997
940042	AE1-246 E O1	4.4315	50/50	4.4315
940831	AE2-071 C	2.5761	50/50	2.5761
940832	AE2-071 E	1.7174	50/50	1.7174
943701	AF1-038 C	6.6874	50/50	6.6874
943702	AF1-038 E	4.4582	50/50	4.4582
943821	AF1-050 C	4.5515	50/50	4.5515
943822	AF1-050 E	3.0343	50/50	3.0343
944151	AF1-083 C O1	4.6091	50/50	4.6091
944152	AF1-083 E O1	3.0727	50/50	3.0727
944511	AF1-116 C	11.3126	50/50	11.3126
944512	AF1-116 E	7.5418	50/50	7.5418
945381	AF1-203 C	1.4720	50/50	1.4720
945382	AF1-203 E	0.9814	50/50	0.9814
960741	AF2-365 C O1	1.1905	Adder	2.64
960742	AF2-365 E O1	0.7937	Adder	1.76
WEC	WEC	0.0734	Confirmed LTF	0.0734
CPL	CPL	0.0906	Confirmed LTF	0.0906
LGE-0012019	LGE-0012019	7.9453	LTF	7.9453
CBM-W2	CBM-W2	6.6175	Confirmed LTF	6.6175
NY	NY	0.0879	Confirmed LTF	0.0879
CBM-W1	CBM-W1	2.5520	Confirmed LTF	2.5520
TVA	TVA	2.1140	Confirmed LTF	2.1140
O-066	O-066	1.0349	Confirmed LTF	1.0349
CBM-S2	CBM-S2	1.5086	Confirmed LTF	1.5086
CBM-S1	CBM-S1	10.2666	Confirmed LTF	10.2666
G-007	G-007	0.1602	Confirmed LTF	0.1602
MADISON	MADISON	1.5785	Confirmed LTF	1.5785
MEC	MEC	0.7850	Confirmed LTF	0.7850

10.6.6 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
102008173	960170	AF2-308 TAP	EKPC	341287	2CENT HARDIN	EKPC	1	EKPC_P2-2_KU HODG 69	bus	98.0	112.5	118.24	DC	5.62

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
959691	AF2-260 C O1	36.8184	50/50	36.8184
959692	AF2-260 E O1	18.4092	50/50	18.4092
960171	AF2-308	20.0096	50/50	20.0096
960181	AF2-309 C	30.0145	50/50	30.0145
960182	AF2-309 E	20.0096	50/50	20.0096
960741	AF2-365 C O1	3.3723	50/50	3.3723
960742	AF2-365 E O1	2.2482	50/50	2.2482
WEC	WEC	0.0079	Confirmed LTF	0.0079
CPLE	CPLE	0.0880	Confirmed LTF	0.0880
G-007A	G-007A	0.0240	Confirmed LTF	0.0240
VFT	VFT	0.0645	Confirmed LTF	0.0645
CBM-W2	CBM-W2	1.8018	Confirmed LTF	1.8018
CBM-W1	CBM-W1	0.3378	Confirmed LTF	0.3378
TVA	TVA	0.6342	Confirmed LTF	0.6342
CBM-S2	CBM-S2	1.0057	Confirmed LTF	1.0057
CBM-S1	CBM-S1	2.4623	Confirmed LTF	2.4623
TILTON	TILTON	0.0189	Confirmed LTF	0.0189
MADISON	MADISON	0.4778	Confirmed LTF	0.4778
MEC	MEC	0.1891	Confirmed LTF	0.1891
GIBSON	GIBSON	0.0513	Confirmed LTF	0.0513
BLUEG	BLUEG	0.8802	Confirmed LTF	0.8802
TRIMBLE	TRIMBLE	0.2460	Confirmed LTF	0.2460

10.7 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
AE1-143	Marion County 161 kV	Active
AE1-246	Barren County-Summer Shade 161 kV	Active
AE2-071	Patton Rd-Summer Shade 69 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
AF1-203	Patton Rd-Summer Shade 69 kV	Active
AF2-090	Central Hardin 138 kV	Active
AF2-260	Stephensburg 69 kV	Active
AF2-308	Central Hardin-Stephensburg 69 kV	Active
AF2-309	Central Hardin-Stephensburg 69 kV	Active
AF2-365	Munfordville KU Tap-Horse Cave Jct. 69 kV	Active
AF2-391	Central Hardin 69 kV	Active
J762	MISO	MISO

10.8 Contingency Descriptions - Primary POI

Contingency Name	Contingency Definition
EKPC_P1-2_LAUR-L DAM161	CONTINGENCY 'EKPC_P1-2_LAUR-L DAM161' /* LAUREL CO - LAUREL DAM OPEN BRANCH FROM BUS 342754 TO BUS 342757 CKT 1 /* 342754 5LAUREL CO 161.00 342757 5LAUREL DAM 161.00 END
EKPC_P1-2_CHARD-HARD138	CONTINGENCY 'EKPC_P1-2_CHARD-HARD138' /* CENTRAL HARDIN - KU HARDIN /* 324261 4HARDN 138.00 OPEN BRANCH FROM BUS 324261 TO BUS 342568 CKT 1 342568 4CENT HARDIN138.00 END
EKPC_P7-1_COOP 161 DBL 2	CONTINGENCY 'EKPC_P7-1_COOP 161 DBL 2' /* COOPER - ELIHU 161 & COOPER - LAUREL DAM 161 /* 324141 5ELIHU 161.00 OPEN BRANCH FROM BUS 324141 TO BUS 342718 CKT 1 342718 5COOPER2 161.00 /* 342718 5COOPER2 OPEN BRANCH FROM BUS 342718 TO BUS 342757 CKT 1 161.00 342757 5LAUREL DAM 161.00 END
EKPC_P7-1_LAURL 161 DBL	CONTINGENCY 'EKPC_P7-1_LAURL 161 DBL' /* LAUREL CO - LAUREL DAM 161 & LAUREL CO - TYNER 161 /* 342754 5LAUREL CO OPEN BRANCH FROM BUS 342754 TO BUS 342757 CKT 1 /* 342754 5LAUREL CO 161.00 342757 5LAUREL DAM 161.00 /* 342754 5LAUREL CO OPEN BRANCH FROM BUS 342754 TO BUS 342781 CKT 1 /* 342781 5PITTSBURG 161.00 342781 5PITTSBURG 161.00 /* 342781 5PITTSBURG OPEN BRANCH FROM BUS 342781 TO BUS 342820 CKT 1 161.00 342820 5TYNER 161.00 END
Base Case	
EKPC_P4-5_LAURL S50-1024	CONTINGENCY 'EKPC_P4-5_LAURL S50-1024' /* LAUREL CO OPEN BUS 342754 /* 5LAUREL CO DROPS BUS OPEN BRANCH FROM BUS 324688 TO BUS 342781 CKT 1 /* 324688 2PITTSKU 69.000 342781 5PITTSBURG 161.00 /* 342781 5PITTSBURG OPEN BRANCH FROM BUS 342781 TO BUS 342820 CKT 1 161.00 342820 5TYNER 161.00 END
EKPC_P2-2_KU HODG 69	CONTINGENCY 'EKPC_P2-2_KU HODG 69' /* KU HODGENVILLE 69 TIE OPEN BUS 341632 /* 2HODGENVILLE END

11 Light Load Analysis

Light Load Studies (As applicable)

To be determined during later study phases.

12 Short Circuit Analysis – Primary POI

The following Breakers are overdutied:

To be determined during later study phases.

13 Stability and Reactive Power Assessment

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

To be determined during later study phases.

14 Affected Systems

14.1 LG&E

LG&E Impacts to be determined during later study phases (as applicable).

14.2 MISO

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

14.3 TVA

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

14.4 Duke Energy Progress

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

15 Summer Peak - Load Flow Analysis - Secondary POI

The Queue Project AF2-365 was evaluated as a 50.0 MW (Capacity 30.0 MW) injection at the Bonnieville 69 kV substation in the EKPC area. Project AF2-365 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AF2-365 was studied with a commercial probability of 53.0 %. Potential network impacts were as follows:

15.1 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
100309882	341713	2KARGLE	69.0	EKPC	324519	2ETOWN KU	69.0	LGEE	1	Base Case	single	66.0	99.73	102.66	DC	1.93

15.2 Multiple Facility Contingency

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

None

15.3 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
102008594	341287	2CENT HARDIN	69.0	EKPC	341713	2KARGL E	69.0	EKPC	1	EKPC_P1-2_CHARD - HARD138	single	98.0	151.87	154.74	DC	2.81
153085078	341287	2CENT HARDIN	69.0	EKPC	341713	2KARGL E	69.0	EKPC	1	EKPC_P2-4_CHARD W124-91T	bus	98.0	182.38	189.42	DC	6.9
100309877	341713	2KARGLE	69.0	EKPC	324519	2ETOWN KU	69.0	LGEE	1	EKPC_P1-2_CHARD - HARD138	single	76.0	177.27	180.98	DC	2.81
100309770	342718	5COOPER 2	161.0	EKPC	324141	5ELIHU	161.0	LGEE	1	EKPC_P4-5_LAURL S50-1024	breaker	277.0	120.39	120.94	DC	3.31
100310775	342718	5COOPER 2	161.0	EKPC	324141	5ELIHU	161.0	LGEE	1	EKPC_P7-1_LAURL 161 DBL	tower	277.0	120.43	120.98	DC	3.31
153085101	960170	AF2-308 TAP	69.0	EKPC	961000	AF2-391 TAP	69.0	EKPC	1	EKPC_P2-2_KU HODG 69	bus	98.0	120.4	130.43	DC	9.82
153085059	961000	AF2-391 TAP	69.0	EKPC	341287	2CENT HARDIN	69.0	EKPC	1	EKPC_P2-2_KU HODG 69	bus	98.0	120.3	130.32	DC	9.82

15.4 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	CK T ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADIN G %	POST PROJECT LOADIN G %	AC D C	MW IMPACT
102008593	341287	2CENT HARDIN	69.0	EKPC	341713	2KARGL E	69.0	EKPC	1	EKPC_P1-2_CHARD - HARD138	operation	98.0	191.37	193.52	DC	4.69
102008595	341287	2CENT HARDIN	69.0	EKPC	341713	2KARGL E	69.0	EKPC	1	Base Case	operation	89.0	109.68	111.31	DC	3.22
100309876	341713	2KARGLE	69.0	EKPC	324519	2ETOWN KU	69.0	LGEE	1	EKPC_P1-2_CHARD - HARD138	operation	76.0	228.21	230.99	DC	4.69
100309878	341713	2KARGLE	69.0	EKPC	324519	2ETOWN KU	69.0	LGEE	1	Base Case	operation	66.0	126.54	128.74	DC	3.22
100310148	342718	5COOPER 2	161.0	EKPC	324141	5ELIHU	161.0	LGEE	1	EKPC_P1-2_LAUR-L DAM161	operation	277.0	120.24	120.79	DC	3.32
100310151	342718	5COOPER 2	161.0	EKPC	324141	5ELIHU	161.0	LGEE	1	Base Case	operation	219.0	104.13	104.72	DC	2.8
153552898	960170	AF2-308 TAP	69.0	EKPC	961000	AF2-391 TAP	69.0	EKPC	1	Base Case	operation	89.0	106.67	115.62	DC	7.97
153552899	960170	AF2-308 TAP	69.0	EKPC	961000	AF2-391 TAP	69.0	EKPC	1	EKPC_P1-2_STEPH-KUEAST69	operation	98.0	100.23	108.49	DC	8.1
153552494	961000	AF2-391 TAP	69.0	EKPC	341287	2CENT HARDIN	69.0	EKPC	1	Base Case	operation	89.0	106.56	115.51	DC	7.97
153552495	961000	AF2-391 TAP	69.0	EKPC	341287	2CENT HARDIN	69.0	EKPC	1	EKPC_P1-2_STEPH-KUEAST69	operation	98.0	100.12	108.39	DC	8.1

15.5 Flow Gate Details - Secondary POI

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".

15.5.1 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
100309877	341713	2KARGLE	EKPC	324519	2ETOWN KU	LGEE	1	EKPC_P1- 2_CHAR- HARD138	single	76.0	177.27	180.98	DC	2.81

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
952821	J762	13.4600	PJM External (MISO)	13.4600
957961	AF2-090 C	29.7580	80/20	29.7580
959691	AF2-260 C O2	24.3390	80/20	24.3390
960171	AF2-308	11.7765	80/20	11.7765
960181	AF2-309 C	17.6648	80/20	17.6648
960741	AF2-365 C O2	2.8143	80/20	2.8143
961001	AF2-391 C O2	35.2620	80/20	35.2620
WEC	WEC	0.0438	Confirmed LTF	0.0438
CPLE	CPLE	0.0814	Confirmed LTF	0.0814
CBM-W2	CBM-W2	3.5708	Confirmed LTF	3.5708
NY	NY	0.0061	Confirmed LTF	0.0061
CBM-W1	CBM-W1	1.5387	Confirmed LTF	1.5387
TVA	TVA	0.7840	Confirmed LTF	0.7840
CBM-S2	CBM-S2	0.9768	Confirmed LTF	0.9768
CBM-S1	CBM-S1	2.8457	Confirmed LTF	2.8457
MADISON	MADISON	0.8588	Confirmed LTF	0.8588
MEC	MEC	0.4147	Confirmed LTF	0.4147
BLUEG	BLUEG	1.1024	Confirmed LTF	1.1024
TRIMBLE	TRIMBLE	0.3066	Confirmed LTF	0.3066

15.5.2 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
153085078	341287	2CENT HARDIN	EKPC	341713	2KARGLE	EKPC	1	EKPC_P2-4_CHAR W124-91T	bus	98.0	182.38	189.42	DC	6.9

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
957961	AF2-090 C	54.8614	50/50	54.8614
957962	AF2-090 E	27.1326	50/50	27.1326
959691	AF2-260 C O2	32.5398	50/50	32.5398
959692	AF2-260 E O2	16.2699	50/50	16.2699
960171	AF2-308	15.7094	50/50	15.7094
960181	AF2-309 C	23.5641	50/50	23.5641
960182	AF2-309 E	15.7094	50/50	15.7094
960741	AF2-365 C O2	4.1397	50/50	4.1397
960742	AF2-365 E O2	2.7598	50/50	2.7598
961001	AF2-391 C O2	46.6337	50/50	46.6337
961002	AF2-391 E O2	31.0891	50/50	31.0891
WEC	WEC	0.0069	Confirmed LTF	0.0069
CPLE	CPLE	0.0728	Confirmed LTF	0.0728
G-007A	G-007A	0.0192	Confirmed LTF	0.0192
VFT	VFT	0.0516	Confirmed LTF	0.0516
CBM-W2	CBM-W2	1.5315	Confirmed LTF	1.5315
CBM-W1	CBM-W1	0.3002	Confirmed LTF	0.3002
TVA	TVA	0.5264	Confirmed LTF	0.5264
CBM-S2	CBM-S2	0.8323	Confirmed LTF	0.8323
CBM-S1	CBM-S1	2.0192	Confirmed LTF	2.0192
TILTON	TILTON	0.0132	Confirmed LTF	0.0132
MADISON	MADISON	0.4012	Confirmed LTF	0.4012
MEC	MEC	0.1589	Confirmed LTF	0.1589
GIBSON	GIBSON	0.0349	Confirmed LTF	0.0349
BLUEG	BLUEG	0.7673	Confirmed LTF	0.7673
TRIMBLE	TRIMBLE	0.2137	Confirmed LTF	0.2137

15.5.3 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
100310775	342718	SCOOPER2	EKPC	324141	SELIHU	LGEE	1	EKPC_P7-1_LAURL 161 DBL	tower	277.0	120.43	120.98	DC	3.31

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
342900	1COOPER1 G	11.1177	50/50	11.1177
342903	1COOPER2 G	21.6286	50/50	21.6286
342945	1LAUREL 1G	6.7288	50/50	6.7288
939131	AE1-143 C	10.0871	50/50	10.0871
939132	AE1-143 E	4.9964	50/50	4.9964
940041	AE1-246 C O1	9.0997	50/50	9.0997
940042	AE1-246 E O1	4.4315	50/50	4.4315
940831	AE2-071 C	2.5761	50/50	2.5761
940832	AE2-071 E	1.7174	50/50	1.7174
943701	AF1-038 C	6.6874	50/50	6.6874
943702	AF1-038 E	4.4582	50/50	4.4582
943821	AF1-050 C	4.5515	50/50	4.5515
943822	AF1-050 E	3.0343	50/50	3.0343
944151	AF1-083 C O1	4.6091	50/50	4.6091
944152	AF1-083 E O1	3.0727	50/50	3.0727
944511	AF1-116 C	11.3126	50/50	11.3126
944512	AF1-116 E	7.5418	50/50	7.5418
945381	AF1-203 C	1.4720	50/50	1.4720
945382	AF1-203 E	0.9814	50/50	0.9814
960741	AF2-365 C O2	0.8935	Adder	1.98
960742	AF2-365 E O2	0.5957	Adder	1.32
WEC	WEC	0.0734	Confirmed LTF	0.0734
CPL	CPL	0.0906	Confirmed LTF	0.0906
LGE-0012019	LGE-0012019	7.9453	LTF	7.9453
CBM-W2	CBM-W2	6.6175	Confirmed LTF	6.6175
NY	NY	0.0879	Confirmed LTF	0.0879
CBM-W1	CBM-W1	2.5520	Confirmed LTF	2.5520
TVA	TVA	2.1140	Confirmed LTF	2.1140
O-066	O-066	1.0349	Confirmed LTF	1.0349
CBM-S2	CBM-S2	1.5086	Confirmed LTF	1.5086
CBM-S1	CBM-S1	10.2581	Confirmed LTF	10.2581
G-007	G-007	0.1602	Confirmed LTF	0.1602
MADISON	MADISON	1.5785	Confirmed LTF	1.5785
MEC	MEC	0.7850	Confirmed LTF	0.7850

15.5.4 Index 4

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
153085101	960170	AF2-308 TAP	EKPC	961000	AF2-391 TAP	EKPC	1	EKPC_P2-2_KU HODG 69	bus	98.0	120.4	130.43	DC	9.82

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
959691	AF2-260 C O2	41.9814	50/50	41.9814
959692	AF2-260 E O2	20.9907	50/50	20.9907
960171	AF2-308	20.0096	50/50	20.0096
960181	AF2-309 C	30.0145	50/50	30.0145
960182	AF2-309 E	20.0096	50/50	20.0096
960741	AF2-365 C O2	5.8938	50/50	5.8938
960742	AF2-365 E O2	3.9292	50/50	3.9292
WEC	WEC	0.0079	Confirmed LTF	0.0079
CPLE	CPLE	0.0880	Confirmed LTF	0.0880
G-007A	G-007A	0.0240	Confirmed LTF	0.0240
VFT	VFT	0.0645	Confirmed LTF	0.0645
CBM-W2	CBM-W2	1.8018	Confirmed LTF	1.8018
CBM-W1	CBM-W1	0.3378	Confirmed LTF	0.3378
TVA	TVA	0.6342	Confirmed LTF	0.6342
CBM-S2	CBM-S2	1.0057	Confirmed LTF	1.0057
CBM-S1	CBM-S1	2.4623	Confirmed LTF	2.4623
TILTON	TILTON	0.0189	Confirmed LTF	0.0189
MADISON	MADISON	0.4778	Confirmed LTF	0.4778
MEC	MEC	0.1891	Confirmed LTF	0.1891
GIBSON	GIBSON	0.0513	Confirmed LTF	0.0513
BLUEG	BLUEG	0.8802	Confirmed LTF	0.8802
TRIMBLE	TRIMBLE	0.2460	Confirmed LTF	0.2460

15.5.5 Index 5

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
153085059	961000	AF2-391 TAP	EKPC	341287	2CENT HARDIN	EKPC	1	EKPC_P2-2_KU HODG 69	bus	98.0	120.3	130.32	DC	9.82

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
959691	AF2-260 C O2	41.9814	50/50	41.9814
959692	AF2-260 E O2	20.9907	50/50	20.9907
960171	AF2-308	20.0096	50/50	20.0096
960181	AF2-309 C	30.0145	50/50	30.0145
960182	AF2-309 E	20.0096	50/50	20.0096
960741	AF2-365 C O2	5.8938	50/50	5.8938
960742	AF2-365 E O2	3.9292	50/50	3.9292
961001	AF2-391 C O2	56.4307	50/50	56.4307
961002	AF2-391 E O2	37.6205	50/50	37.6205
WEC	WEC	0.0079	Confirmed LTF	0.0079
CPLE	CPLE	0.0880	Confirmed LTF	0.0880
G-007A	G-007A	0.0240	Confirmed LTF	0.0240
VFT	VFT	0.0645	Confirmed LTF	0.0645
CBM-W2	CBM-W2	1.8018	Confirmed LTF	1.8018
CBM-W1	CBM-W1	0.3378	Confirmed LTF	0.3378
TVA	TVA	0.6342	Confirmed LTF	0.6342
CBM-S2	CBM-S2	1.0057	Confirmed LTF	1.0057
CBM-S1	CBM-S1	2.4623	Confirmed LTF	2.4623
TILTON	TILTON	0.0189	Confirmed LTF	0.0189
MADISON	MADISON	0.4778	Confirmed LTF	0.4778
MEC	MEC	0.1891	Confirmed LTF	0.1891
GIBSON	GIBSON	0.0513	Confirmed LTF	0.0513
BLUEG	BLUEG	0.8802	Confirmed LTF	0.8802
TRIMBLE	TRIMBLE	0.2460	Confirmed LTF	0.2460

15.6 Contingency Descriptions - Secondary POI

Contingency Name	Contingency Definition
EKPC_P2-4_CHARD W124-91T	CONTINGENCY 'EKPC_P2-4_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_STEPH-KUEAST69	CONTINGENCY 'EKPC_P1-2_STEPH-KUEAST69' /* STEPHENSBURG - KU EASTVIEW OPEN BRANCH FROM BUS 324509 TO BUS 342307 CKT 1 /* 324509 2EASTVW 69.000 342307 2STEPHENSBRG69.000 END
EKPC_P1-2_LAUR-L DAM161	CONTINGENCY 'EKPC_P1-2_LAUR-L DAM161' /* LAUREL CO - LAUREL DAM OPEN BRANCH FROM BUS 342754 TO BUS 342757 CKT 1 /* 342754 5LAUREL CO 161.00 342757 5LAUREL DAM 161.00 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
EKPC_P7-1_LAURL 161 DBL	CONTINGENCY 'EKPC_P7-1_LAURL 161 DBL' /* LAUREL CO - LAUREL DAM 161 & LAUREL CO - TYNER 161 OPEN BRANCH FROM BUS 342754 TO BUS 342757 CKT 1 /* 342754 5LAUREL CO 161.00 342757 5LAUREL DAM 161.00 OPEN BRANCH FROM BUS 342754 TO BUS 342781 CKT 1 /* 342754 5LAUREL CO 161.00 342781 5PITTSBURG 161.00 OPEN BRANCH FROM BUS 342781 TO BUS 342820 CKT 1 /* 342781 5PITTSBURG 161.00 342820 5TYNER 161.00 END
Base Case	
EKPC_P4-5_LAURL S50-1024	CONTINGENCY 'EKPC_P4-5_LAURL S50-1024' /* LAUREL CO OPEN BUS 342754 /* 5LAUREL CO DROPS BUS OPEN BRANCH FROM BUS 324688 TO BUS 342781 CKT 1 /* 324688 2PITTSKU 69.000 342781 5PITTSBURG 161.00 OPEN BRANCH FROM BUS 342781 TO BUS 342820 CKT 1 /* 342781 5PITTSBURG 161.00 342820 5TYNER 161.00 END

Contingency Name	Contingency Definition
EKPC_P2-2_KU HODG 69	CONTINGENCY 'EKPC_P2-2_KU HODG 69' /* KU HODGENVILLE 69 TIE OPEN BUS 341632 /* 2HODGENVILLE END



thoroughbred solar

Attachment A

PJM Feasibility Study



thoroughbred solar

Attachment B

PJM System Impact Study Report



**Generation Interconnection
System Impact Study Report**

for

Queue Project AF2-365

MUNFORDVILLE KU TAP-HORSE CAVE JCT. 69 KV

30 MW Capacity / 50 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 Hart County, Kentucky. The installed facilities will have a total capability of 50 MW with 30 MW of this output being recognized by PJM as Capacity.

The proposed in-service date for this project is December 31, 2022. This study does not imply a TO commitment to this in-service date.

Queue Number	AF2-365
Project Name	MUNFORDVILLE KU TAP-HORSE CAVE JCT. 69 KV
State	Kentucky
County	Hart
Transmission Owner	EKPC
MFO	50
MWE	50
MWC	30
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

AF2-365 will interconnect with the EKPC on transmission system tapping the Munfordville KU Tap to the Horse Cave Jct. 69 kV line.

5 Cost Summary

The AF2-365 project will be responsible for the following costs:

Description	Total Cost
Total Physical Interconnection Costs	\$6,290,000
Allocation towards System Network Upgrade Costs*	\$15,135
Total Costs	\$6,305,135

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

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 Hart County 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 (Hart County Switching) to facilitate connection of the IC solar generation project to the existing Munfordville KU-KU Horse Cave Tap 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 Munfordville KU-KU Horse Cave Tap 69 kV line into the new Hart County switching station (Estimated time to implement is 24 months)	\$240,000
Modify relays and/or settings at Bonnierville substation for the existing line to the new Hart County switching station (Estimated time to implement is 9 months)	\$55,000
Modify relays and/or settings at Barren County substation for the existing line to the new Hart County switching station (Estimated time to implement is 9 months)	\$55,000
Install OPGW on the Hart County-Barren County 69 kV line (8.5 miles) (Estimated time to implement is 18 months)	\$1,260,000
Total Non-Direct Connection Facility Costs	\$1,610,000

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 AF2-365 was evaluated as a 50.0 MW (Capacity 30.0 MW) injection tapping the Munfordville KU Tap - Horse Cave Jct. 69 kV line in the EKPC area. Project AF2-365 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AF2-365 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)

None

9.2 Multiple Facility Contingency

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

None

9.3 Contribution to Previously Identified Overloads

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

ID	FROM BUS#	FROM BUS	kV	FROM BUS AREA	TO BUS#	TO BUS	kV	TO BUS AREA	CKT ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADING %	POST PROJECT LOADING %	AC/D C	MW IMPACT
102008594	341287	2CENT HARDIN	69.0	EKPC	341713	2KARGLE	69.0	EKPC	1	EKPC_P1 - 2_CHAR D-HARD138	single	98.0	150.04	151.7	AC	1.62
100309877	341713	2KARGLE	69.0	EKPC	324519	2ETOWN KU	69.0	LGEE	1	EKPC_P1 - 2_CHAR D-HARD138	single	76.0	175.72	177.87	AC	1.62
102009557	342286	2SOMERSET	69.0	EKPC	342287	2SOMERSET KU	69.0	EKPC	1	EKPC_P7 -1_COOP 161 DBL 2	tower	115.0	111.79	115.28	AC	2.52
100310716	342287	2SOMERSET KU	69.0	EKPC	324531	2FERGUSON SO	69.0	LGEE	1	EKPC_P7 -1_COOP 161 DBL 2	tower	105.0	125.34	129.44	AC	3.05
100309770	342718	5COOPER2	161.0	EKPC	324141	5ELIHU	161.0	LGEE	1	EKPC_P4 - 5_LAURL S50-1024	breaker	277.0	113.41	116.18	AC	4.41
100310775	342718	5COOPER2	161.0	EKPC	324141	5ELIHU	161.0	LGEE	1	EKPC_P7 - 1_LAURL 161 DBL	tower	277.0	113.41	116.19	AC	4.41
102008173	960170	AF2-308 TAP	69.0	EKPC	341287	2CENT HARDIN	69.0	EKPC	1	EKPC_P2 -2_KU HODG 69	bus	98.0	117.03	123.68	AC	5.62

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	CK T ID	CONT NAME	Type	Rating MVA	PRE PROJECT LOADIN G %	POST PROJECT LOADIN G %	AC D C	MW IMPAC T
102008593	341287	2CENT HARDIN	69.0	EKPC	341713	2KARGL E	69.0	EKPC	1	EKPC_P1-2_CHARD - HARD138	operatio n	98.0	189.71	192.06	AC	2.7
100309876	341713	2KARGLE	69.0	EKPC	324519	2ETOW N KU	69.0	LGEE	1	EKPC_P1-2_CHARD - HARD138	operatio n	76.0	226.83	229.87	AC	2.7
100310148	342718	5COOPER 2	161.0	EKPC	324141	5ELIHU	161.0	LGEE	1	EKPC_P1-2_LAUR-L DAM161	operatio n	277.0	113.11	115.9	AC	4.42
102008973	960170	AF2-308 TAP	69.0	EKPC	341287	2CENT HARDIN	69.0	EKPC	1	Base Case	operatio n	89.0	100.08	105.08	AC	4.64

9.6 System Reinforcements

ID	Idx	Facility	Upgrade Description	Cost	Cost Allocated to AF2-365	Upgrade Number																
102009557	4	2SOMERSET 69.0 kV - 2SOMERSET KU 69.0 kV Ckt 1	<p>Upgrade the existing 500 MCM CU bus jumpers to 750 MCM CU. 6 month time estimate. New expected SE rating after the upgrade will be 152 MVA.</p> <p>This line overload is presently driven by a prior queue cycle.</p>	\$250 K	\$0	N6232																
100310716	5	2SOMERSET KU 69.0 kV - 2FERGUSON SO 69.0 kV Ckt 1	<p>EKPC: SE rating is 152 MVA. No EKPC upgrade required.</p> <p>LG&E: SE rating is 83 MVA. A LG&E affected system system study will be required to determine if LG&E upgrades are required on this line. Preliminary upgrade, if determined to be required, is to replace terminal equipment at a cost estimate of \$897.613 K.</p>	\$0	\$0	N/A																
161297754,161297751,161297753,161297752,161297617,102008173,112346139	1	AF2-308 TAP 69.0 kV - 2CENT HARDIN 69.0 kV Ckt 1	<p>Increase the maximum operating temperature of the 556 MCM ACSR conductor in the AF2-308 Tap-Central Hardin 69 kV line section to 302 degrees F (4.15 miles). Time Estimate: 9 months. New expected SE rating after the upgrade will be 129 MVA.</p> <p>The cost allocation is:</p> <table border="1"> <thead> <tr> <th>Queue</th> <th>MW contribution</th> <th>% Allocation</th> <th>Cost \$280 K</th> </tr> </thead> <tbody> <tr> <td>AF2-308</td> <td>28.0</td> <td>27.0%</td> <td>75.676</td> </tr> <tr> <td>AF2-309</td> <td>70.0</td> <td>67.6%</td> <td>189.189</td> </tr> <tr> <td>AF2-365</td> <td>5.6</td> <td>5.4%</td> <td>15.135</td> </tr> </tbody> </table>	Queue	MW contribution	% Allocation	Cost \$280 K	AF2-308	28.0	27.0%	75.676	AF2-309	70.0	67.6%	189.189	AF2-365	5.6	5.4%	15.135	\$280 K	\$15.135 K	N7036.1
Queue	MW contribution	% Allocation	Cost \$280 K																			
AF2-308	28.0	27.0%	75.676																			
AF2-309	70.0	67.6%	189.189																			
AF2-365	5.6	5.4%	15.135																			

ID	Idx	Facility	Upgrade Description	Cost	Cost Allocated to AF2-365	Upgrade Number
100309770,100310775	6	5SCOOPER2 161.0 kV - 5ELIHU 161.0 kV Ckt 1	<p>EKPC: EKPC SE rating is 298 MVA. Increase the operating temperature of the 795 MCM ACSR conductor from 212F to 275F (6.7 miles). EKPC's new SE rating would be 371 MVA. Cost estimate \$660K. PJM Network Upgrade N6238.</p> <p>Note: this EKPC upgrade may be dependent upon whether LG&E determines if an LG&E end upgrade is required on this line since the equipment which limits the overall line rating is LG&E equipment. This will be determined with a LG&E affected system study.</p> <p>LG&E: LG&E SE rating is 277 MVA. A LG&E affected system system study will be required to determine if LG&E upgrades are required on this line. Preliminary upgrade, if determined to be required, is to upgrade the line conductor at a cost estimate of \$28.083 K. New LG&E expected SE rating to be 335 MVA.</p>	\$660 K	\$0	N6238
100309877	3	2KARGLE 69.0 kV - 2ETOWN KU 69.0 kV Ckt 1	<p>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.</p> <p>Rebuild the 556 MCM ACSR conductor section of the Kargle-KU Elizabethtown 69 kV line section using 954 MCM ACSR conductor (1.45 miles). Cost estimate: \$2.01 M Time Estimate: 15 months. New expected SE rating after the upgrade will be 182 MVA.</p> <p>AF2-365 does not presently meet PJM cost allocation thresholds.</p>	\$100 K \$2.01 M	\$0	N7035.1 N7035.2

ID	Idx	Facility	Upgrade Description	Cost	Cost Allocated to AF2-365	Upgrade Number
102008594	2	2CENT HARDIN 69.0 kV - 2KARGLE 69.0 kV Ckt 1	<p>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.</p> <p>Replace the 556 MCM ACSR jumpers at the Central Hardin substation using bundled 500 MCM copper or equivalent. EKPC's new rating would be Normal 103 MVA/Emergency 132 MVA. Cost of upgrade: \$15,000. Time to complete 6 months.</p> <p>Rebuild the Central Hardin-Kargle 69 kV line section using 954 MCM ACSS conductor at 392 degrees F (0.6 miles). EKPC's new rating would be Normal 114 MVA/Emergency 146 MVA. Cost of upgrade: \$450,000. Time to complete 12 months.</p> <p>Change the Zone 3 relay setting at Central Hardin associated with the line protection to at least 228 MVA LTE rating. EKPC's new rating would be Normal 147 MVA/Emergency 228 MVA. Cost of upgrade: \$0. Time to complete 6 months.</p> <p>AF2-365 does not presently meet PJM cost allocation thresholds.</p>	\$40 K \$15 K \$450 K \$0	\$0	N6238 N6238.1 N6238.2 N6238.3
Total Cost				\$3,805,000	\$15,135	

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
102008173	960170	AF2-308 TAP	EKPC	341287	2CENT HARDIN	EKPC	1	EKPC_P2-2_KU HODG 69	bus	98.0	117.03	123.68	AC	5.62

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
959691	AF2-260 C	41.1348	50/50	41.1348
959692	AF2-260 E	20.5674	50/50	20.5674
960171	AF2-308	20.3949	50/50	20.3949
960181	AF2-309 C	30.5924	50/50	30.5924
960182	AF2-309 E	20.3949	50/50	20.3949
960741	AF2-365 C O1	3.3723	50/50	3.3723
960742	AF2-365 E O1	2.2482	50/50	2.2482
961003	AF2-391 BAT	16.5936	50/50	16.5936
WEC	WEC	0.0082	Confirmed LTF	0.0082
CPLE	CPLE	0.0886	Confirmed LTF	0.0886
G-007A	G-007A	0.0264	Confirmed LTF	0.0264
VFT	VFT	0.0710	Confirmed LTF	0.0710
GIBSON	GIBSON	0.0508	Confirmed LTF	0.0508
CBM-W2	CBM-W2	1.8100	Confirmed LTF	1.8100
TVA	TVA	0.6356	Confirmed LTF	0.6356
CBM-S2	CBM-S2	1.0115	Confirmed LTF	1.0115
CBM-S1	CBM-S1	2.4708	Confirmed LTF	2.4708
TILTON	TILTON	0.0183	Confirmed LTF	0.0183
MADISON	MADISON	0.4778	Confirmed LTF	0.4778
MEC	MEC	0.1907	Confirmed LTF	0.1907
BLUEG	BLUEG	0.8784	Confirmed LTF	0.8784
TRIMBLE	TRIMBLE	0.2454	Confirmed LTF	0.2454
CBM-W1	CBM-W1	0.3503	Confirmed LTF	0.3503

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
102008594	341287	2CENT HARDIN	EKPC	341713	2KARGLE	EKPC	1	EKPC_P1-2_CHARHARD138	single	98.0	150.04	151.7	AC	1.62

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

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
100309877	341713	2KARGLE	EKPC	324519	2ETOWN KU	LGEE	1	EKPC_P1- 2_CHAR- HARD138	single	76.0	175.72	177.87	AC	1.62

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

9.7.4 Index 4

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
102009557	342286	2SOMERSET	EKPC	342287	2SOMERSET KU	EKPC	1	EKPC_P7- 1_COOP 161 DBL 2	tower	115.0	111.79	115.28	AC	2.52

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
342900	1COOPER1 G	5.3942	50/50	5.3942
342903	1COOPER2 G	10.4621	50/50	10.4621
939131	AE1-143 C	5.3391	Adder	6.28
939132	AE1-143 E	2.6446	Adder	3.11
940041	AE1-246 C O1	4.2412	Adder	4.99
940042	AE1-246 E O1	2.0654	Adder	2.43
940831	AE2-071 C	1.2984	Adder	1.53
940832	AE2-071 E	0.8656	Adder	1.02
943701	AF1-038 C	6.1952	50/50	6.1952
943702	AF1-038 E	4.1302	50/50	4.1302
943821	AF1-050 C	2.2454	Adder	2.64
943822	AF1-050 E	1.4970	Adder	1.76
944151	AF1-083 C O1	2.3789	Adder	2.8
944152	AF1-083 E O1	1.5859	Adder	1.87
944511	AF1-116 C	5.9878	Adder	7.04
944512	AF1-116 E	3.9919	Adder	4.7
945381	AF1-203 C	0.7419	Adder	0.87
945382	AF1-203 E	0.4946	Adder	0.58
960741	AF2-365 C O1	1.2872	Adder	1.51
960742	AF2-365 E O1	0.8582	Adder	1.01
WEC	WEC	0.0485	Confirmed LTF	0.0485
LGEE	LGEE	0.0137	Confirmed LTF	0.0137
CPL	CPL	0.0324	Confirmed LTF	0.0324
CBM-W2	CBM-W2	3.5954	Confirmed LTF	3.5954
NY	NY	0.0415	Confirmed LTF	0.0415
TVA	TVA	1.0738	Confirmed LTF	1.0738
O-066	O-066	0.4973	Confirmed LTF	0.4973
CBM-S2	CBM-S2	0.6127	Confirmed LTF	0.6127
CBM-S1	CBM-S1	5.3591	Confirmed LTF	5.3591
G-007	G-007	0.0770	Confirmed LTF	0.0770
MADISON	MADISON	0.7560	Confirmed LTF	0.7560
MEC	MEC	0.4529	Confirmed LTF	0.4529
CBM-W1	CBM-W1	1.7139	Confirmed LTF	1.7139

9.7.5 Index 5

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
100310716	342287	2SOMERSET	EKPC	324531	2FERGUSON	LGEE	1	EKPC_P7-1_COOP 161 DBL 2	tower	105.0	125.34	129.44	AC	3.05

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
342900	1COOPER1 G	5.2792	50/50	5.2792
342903	1COOPER2 G	10.2390	50/50	10.2390
939131	AE1-143 C	6.4746	50/50	6.4746
939132	AE1-143 E	3.2070	50/50	3.2070
940041	AE1-246 C O1	5.3449	Adder	6.29
940042	AE1-246 E O1	2.6029	Adder	3.06
940831	AE2-071 C	1.6426	Adder	1.93
940832	AE2-071 E	1.0950	Adder	1.29
943701	AF1-038 C	8.4546	50/50	8.4546
943702	AF1-038 E	5.6364	50/50	5.6364
943821	AF1-050 C	2.5940	Adder	3.05
943822	AF1-050 E	1.7293	Adder	2.03
944151	AF1-083 C O1	2.5638	Adder	3.02
944152	AF1-083 E O1	1.7092	Adder	2.01
944511	AF1-116 C	7.2612	50/50	7.2612
944512	AF1-116 E	4.8408	50/50	4.8408
945381	AF1-203 C	0.9386	Adder	1.1
945382	AF1-203 E	0.6257	Adder	0.74
960741	AF2-365 C O1	1.5565	Adder	1.83
960742	AF2-365 E O1	1.0377	Adder	1.22
WEC	WEC	0.0627	Confirmed LTF	0.0627
CPL	CPL	0.0662	Confirmed LTF	0.0662
CBM-W2	CBM-W2	4.6601	Confirmed LTF	4.6601
NY	NY	0.0420	Confirmed LTF	0.0420
TVA	TVA	1.4182	Confirmed LTF	1.4182
O-066	O-066	0.4973	Confirmed LTF	0.4973
CBM-S2	CBM-S2	1.0231	Confirmed LTF	1.0231
CBM-S1	CBM-S1	7.0034	Confirmed LTF	7.0034
G-007	G-007	0.0770	Confirmed LTF	0.0770
MADISON	MADISON	0.9959	Confirmed LTF	0.9959
MEC	MEC	0.5848	Confirmed LTF	0.5848
CBM-W1	CBM-W1	2.2268	Confirmed LTF	2.2268

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
100310775	342718	SCOOPER2	EKPC	324141	SELIHU	LGEE	1	EKPC_P7-1_LAURL 161 DBL	tower	277.0	113.41	116.19	AC	4.41

Bus #	Bus	Gendeliv MW Impact	Type	Full MW Impact
342900	1COOPER1 G	10.8312	50/50	10.8312
342903	1COOPER2 G	21.0708	50/50	21.0708
342945	1LAUREL 1G	6.5554	50/50	6.5554
939131	AE1-143 C	10.0890	50/50	10.0890
939132	AE1-143 E	4.9974	50/50	4.9974
940041	AE1-246 C O1	9.1022	50/50	9.1022
940042	AE1-246 E O1	4.4326	50/50	4.4326
940831	AE2-071 C	2.5767	50/50	2.5767
940832	AE2-071 E	1.7178	50/50	1.7178
943701	AF1-038 C	6.6884	50/50	6.6884
943702	AF1-038 E	4.4590	50/50	4.4590
943821	AF1-050 C	4.5526	50/50	4.5526
943822	AF1-050 E	3.0350	50/50	3.0350
944151	AF1-083 C O1	4.6101	50/50	4.6101
944152	AF1-083 E O1	3.0734	50/50	3.0734
944511	AF1-116 C	11.3148	50/50	11.3148
944512	AF1-116 E	7.5432	50/50	7.5432
945381	AF1-203 C	1.4724	50/50	1.4724
945382	AF1-203 E	0.9816	50/50	0.9816
960741	AF2-365 C O1	2.2471	Adder	2.64
960742	AF2-365 E O1	1.4980	Adder	1.76
WEC	WEC	0.0743	Confirmed LTF	0.0743
CPL	CPL	0.0926	Confirmed LTF	0.0926
CBM-W2	CBM-W2	6.6421	Confirmed LTF	6.6421
NY	NY	0.0863	Confirmed LTF	0.0863
TVA	TVA	2.1168	Confirmed LTF	2.1168
O-066	O-066	1.0147	Confirmed LTF	1.0147
CBM-S2	CBM-S2	1.5259	Confirmed LTF	1.5259
CBM-S1	CBM-S1	10.2922	Confirmed LTF	10.2922
G-007	G-007	0.1570	Confirmed LTF	0.1570
MADISON	MADISON	1.5785	Confirmed LTF	1.5785
MEC	MEC	0.7897	Confirmed LTF	0.7897
CBM-W1	CBM-W1	2.5896	Confirmed LTF	2.5896

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
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
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
AF1-203	Patton Rd-Summer Shade 69 kV	Active
AF2-090	Central Hardin 138 kV	Active
AF2-260	Stephensburg 69 kV	Active
AF2-308	Central Hardin-Stephensburg 69 kV	Active
AF2-309	Central Hardin-Stephensburg 69 kV	Active
AF2-365	Munfordville KU Tap-Horse Cave Jct. 69 kV	Active
AF2-391	Central Hardin 69 kV	Active
J762	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_P2-4_CHARD W124-91T	CONTINGENCY 'EKPC_P2-4_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_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_P1-2_LAUR-L DAM161	CONTINGENCY 'EKPC_P1-2_LAUR-L DAM161' /* LAUREL CO - LAUREL DAM OPEN BRANCH FROM BUS 342754 TO BUS 342757 CKT 1 /* 342754 5LAUREL CO 161.00 342757 5LAUREL DAM 161.00 END
EKPC_P2-3_CHARD W124-814	CONTINGENCY 'EKPC_P2-3_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
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

Contingency Name	Contingency Definition
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
EKPC_P7-1_COOP 161 DBL 2	CONTINGENCY 'EKPC_P7-1_COOP 161 DBL 2' /* COOPER - ELIHU 161 & COOPER - LAUREL DAM 161 OPEN BRANCH FROM BUS 324141 TO BUS 342718 CKT 1 /* 324141 5ELIHU 161.00 342718 5COOPER2 161.00 OPEN BRANCH FROM BUS 342718 TO BUS 342757 CKT 1 /* 342718 5COOPER2 161.00 342757 5LAUREL DAM 161.00 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
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
EKPC_P7-1_LAURL 161 DBL	CONTINGENCY 'EKPC_P7-1_LAURL 161 DBL' /* LAUREL CO - LAUREL DAM 161 & LAUREL CO - TYNER 161 OPEN BRANCH FROM BUS 342754 TO BUS 342757 CKT 1 /* 342754 5LAUREL CO 161.00 342757 5LAUREL DAM 161.00 OPEN BRANCH FROM BUS 342754 TO BUS 342781 CKT 1 /* 342754 5LAUREL CO 161.00 342781 5PITTSBURG 161.00 OPEN BRANCH FROM BUS 342781 TO BUS 342820 CKT 1 /* 342781 5PITTSBURG 161.00 342820 5TYNER 161.00 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

Contingency Name	Contingency Definition
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_P4-5_LAURL S50-1024	CONTINGENCY 'EKPC_P4-5_LAURL S50-1024' /* LAUREL CO OPEN BUS 342754 /* 5LAUREL CO DROPS BUS OPEN BRANCH FROM BUS 324688 TO BUS 342781 CKT 1 /* 324688 2PITTSKU 69.000 342781 5PITTSBURG 161.00 OPEN BRANCH FROM BUS 342781 TO BUS 342820 CKT 1 /* 342781 5PITTSBURG 161.00 342820 5TYNER 161.00 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

A TVA affected system study is required for AF2-365. AF2-365 will need to sign a TVA affected system study agreement.

13.2 Duke Energy Progress

None

13.3 MISO

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

13.4 LG&E

An LG&E Affected System Study will be required. PJM has identified several EKPC-LG&E tie line overloads with limiting equipment on the LG&E side. LG&E will need to determine if LG&E upgrades are required.

14 Attachment 1: One Line Diagram

AF2-365 Conceptual Single-Line Diagram of Interconnection Facilities

