STATE OF INDIANA

INDIANA UTILITY REGULATORY COMMISSION

IN THE MATTER OF THE PETITION BY CAVALRY ENERGY CENTER, LLC FOR CERTAIN DETERMINATIONS BY THE COMMISSION WITH RESPECT TO ITS JURISDICTION OVER PETITIONER'S ACTIVITIES AS A GENERATOR OF ELECTRIC POWER	**)**	**CAUSE NO. 45474**

CAVALRY ENERGY CENTER, LLC'S QUARTERLY REPORT: SECOND QUARTER 2023

This Quarterly Report ("Report") is filed as required by the Commission's Order in this Cause issued on May 26, 2021. This Report provides the required information to the extent such information is known and available. The requested information is as follows:

(1) Any changes to the information provided in the Initial Report.

The information provided in the Initial Report, as updated by the Second Quarter 2022 Report, remains accurate and there are no changes to report

(2) Any reports of Interconnection System Impact Studies not previously submitted to the Commission.

The Phase II and Phase III System Impact Studies for queue position J1067 were provided with the Second Quarter 2022 Report. All other system impact studies for J1067 have previously been provided.

The Phase I SIS for queue position J1810 is now available, a copy of which is provided with this Report. Additional interconnection studies for J1810 are not yet available.

(3) Copy of the GIA as filed with the FERC.

The GIA for J1067 has been executed and filed with FERC. A copy of the signed GIA was included with the Fourth Quarter 2021 Report.

The interconnection agreement for J1810 is not yet complete.

(4) Notice of the establishment of an independent financial instrument, including its form and amount.

In accordance with the Road Use Agreement executed with White County, a performance bond in the amount of $4,000,000 has been posted.

(5) Achievement of construction milestones described in the GIA and such events as the procurement of major equipment, the receipt of major permits material to the construction and operation of the Facility, construction start-up, initial energization, and commercial operation.

Formal construction began in October 2022.

(6) When commercial operation is achieved, the nameplate capacity, term, and identity of the purchaser(s) for contracts then existing for utility sales, contingency plans (if any) detailing response plans to emergency conditions as required by state or local units of government, the interconnecting transmission owner and/or MISO, and the Facility's certified (or accredited) dependable capacity rating.

Not applicable.

(7) A copy of the decommissioning plan agreed to with White County.

A copy of the decommissioning plan agreement with White County was provided with the Second Quarter 2022 Report.

VERIFICATION

The undersigned, Anthony Pedroni, being first duly sworn upon his oath, states that he is the Vice President of Cavalry Energy Center, LLC; that he prepared or supervised the preparation of Cavalry Energy Center, LLC's Second Quarter 2023 Report; and that the statements contained therein are true to the best of his knowledge, information, and belief.

By: _____

STATE OF FLORIDA)
)
COUNTY OF PALM BEACH)

SS:

Subscribed and sworn to before me, a Notary Public, in and for said State and County this 31 day of July, 2023.

Notary Public State of Florida
Jennifer Reynoso
My Commission HH 091424
Expires 02/21/2025

_____
Signature

Jennifer Reynoso
Printed

My Commission Expires:

2-21-25

My County of Residence:

Palm Beach

Respectfully submitted,

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Attorneys for Petitioner,
Cavalry Energy Center, LLC

CERTIFICATE OF SERVICE

The undersigned hereby certifies that a copy of the foregoing was electronically delivered this 1st day of August, 2023, to the following:

Office of Utility Consumer Counselor
115 West Washington Street, Suite 1500 South
Indianapolis, Indiana 46204
thaas@oucc.in.gov
infomgt@oucc.in.gov

An attorney for Petitioner,
Cavalry Energy Center, LLC

MISO DPP 2020 Central Area Study
Phase 1 Final Report

June 22nd, 2023

Revision 2

MISO
720 City Center
Drive Carmel
Indiana 46032
http://www.misoenergy.org

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1. Executive Summary

This report presents the results of a System Impact Study performed to evaluate the interconnection of the generators in the DPP 2020 Central Phase 1. The study was performed under the direction of MISO and reviewed by an ad hoc study group. The ad hoc study group was formed to review the study scope, methodology, models and results. The ad hoc study group consisted of representatives from the interconnection customers and the following utility companies – Ameren, Big Rivers Electric Cooperation, City of Springfield Water Light & Power, City of Columbia, MO, Duke Energy Midwest, Henderson Municipal Power and Light, Hoosier Energy Rural Electric Cooperative, Indiana Municipal Power Agency, Indianapolis Power & Light Company, Northern Indiana Public Service Company, Prairie Power Inc, Southern Illinois Power Cooperative, Southern Indiana Gas & Electric Co, and Wabash Valley Power Association.

1.1. Project List

The original interconnection requests for DPP 2020 Central had a total of 122 generation projects. 36 projects withdrew prior to the start of DPP Phase 1. Withdrawn projects are listed in Table 1. Therefore, there are 85 generation projects with a combined nameplate rating of 249.2 MW of Energy Resource Interconnection Service (ERIS) & 18,793.02 MW of Network Resource Interconnection Service (NRIS). The detailed list of Central Area DPP projects is shown below in

Table 1: List of Withdrawn DPP 2020 Central Projects

Withdrawn Projects							
J1501	J1617	J1662	J1689	J1702	J1741	J1771	J1837
J1535	J1623	J1675	J1690	J1715	J1742	J1799	
J1548	J1627	J1682	J1692	J1717	J1757	J1807	
J1601	J1628	J1683	J1694	J1718	J1764	J1825	
J1606	J1650	J1688	J1700	J1731	J1768	J1828	

2, and the Phase 1 study was kicked off on March 15th 2021.

Table 1: List of Withdrawn DPP 2020 Central Projects

Withdrawn Projects							
J1501	J1617	J1662	J1689	J1702	J1741	J1771	J1837
J1535	J1623	J1675	J1690	J1715	J1742	J1799	
J1548	J1627	J1682	J1692	J1717	J1757	J1807	
J1601	J1628	J1683	J1694	J1718	J1764	J1825	
J1606	J1650	J1688	J1700	J1731	J1768	J1828	

Table 2: List of Active DPP 2020 Central Phase 1 Projects

Project	Fuel Type	Transmission Owner	County	State	Service Requested	MW	Point of Interconnection
J1491	Battery Storage	Indianapolis Power & Light Company	Marion	IN	NRIS	200	IPL EW Stout North Yard 138 kV Substation
J1517	Battery Storage	Duke Energy Indiana, LLC	Vermillion	IN	NRIS	40	Hillsdale North 230 kV
J1518	Solar	Duke Energy Indiana, LLC	Vermillion	IN	NRIS	185	Hillsdale North 230 kV

Project	Fuel Type	Transmission Owner	County	State	Service Requested	MW	Point of Interconnection
J1519	Solar	Ameren Missouri	Bollinger	MO	NRIS	200	St. Francois to Lutesville 345 kV
J1563	Solar	Duke Energy Indiana, LLC	Montgomery	IN	NRIS	200	Wabash River - Whitesville 230kV line
J1565	Solar	Duke Energy Indiana, LLC	Lawrence	IN	NRIS	200	Bedford - Columbus 345kV line (Line #34517)
J1578	Solar	Duke Energy Indiana, LLC	Johnson	IN	NRIS	200	Columbus -Greenwood Clark Twp 230kV line (Circuit ID 23019)
J1579	Solar	Ameren Illinois	Edwards	IL	NRIS	200	Albion-Crossville 138kV Line
J1585	Solar	Ameren Missouri	Moniteau	MO	NRIS	200	Apache Tap - Barnett 161kV line
J1591	Solar	Duke Energy Indiana, LLC	Clay	IN	NRIS	150	Staunton 138kV
J1593	Solar	Duke Energy Indiana, LLC	Rush	IN	NRIS	200	Greensboro-Gwynneville 345kV
J1600	Solar	Big Rivers Electric Corporation	Meade	KY	NRIS	40	Flaherty Tap to Custer 69kV
J1604	Solar	Henderson Municipal Power & Light	Henderson	KY	NRIS	50	HMPL Substation #7 69kV
J1610	Solar	City Water, Light, and Power	Sangamon	IL	NRIS	100	Auburn North to Chatham Main 138kV
J1616	Solar	Duke Energy Indiana, LLC	Knox	IN	NRIS	200	Amo to Edwardsport 345KV
J1619	Solar	Big Rivers Electric Corporation	Henderson	KY	NRIS	160	Reid Switchyard 161kV
J1624	Solar	Duke Energy Indiana, LLC	Bartholomew	IN	NRIS	100	Columbus Denois Cr - Columbus 345 230 kV Transmission Line
J1625	Solar	Duke Energy Indiana, LLC	Tipton	IN	NRIS	150	Kokomo - Tipton 230kV Transmission line
J1626	Solar	Ameren Illinois	Fayette	IL	NRIS	150	Ramsey East 138kV bus
J1632	Solar	Big Rivers Electric Corporation	Caldwell	KY	NRIS	200	Caldwell County - Barkley 161kV
J1636	Solar	Ameren Missouri	Pike	MO	NRIS	44	Peno Creek Substation 161kV
J1637	Solar	Duke Energy Indiana, LLC	Knox	IN	NRIS	150	Wheatland Substation 345kV
J1638	Solar	Big Rivers Electric Corporation	Hancock	KY	NRIS	150	Skillman Substation 161kV
J1641	Solar	Hoosier Energy REC Inc	Greene	IN	NRIS	150	Worthington Substation 138kV
J1642	Hybrid	Southern Indiana Gas & Electric Company d/b/a Vectren Energy Delivery of Indiana, Inc.	Spencer	IN	NRIS	200	North East (Castle) - Culley 138kV
J1646	Solar	Northern Indiana Public Service Company	Newton	IN	NRIS	150	Morrison Ditch 138kV

Project	Fuel Type	Transmission Owner	County	State	Service Requested	MW	Point of Interconnection
J1649	Solar	Big Rivers Electric Corporation	McCracken	KY	NRIS	60	McCracken County to Shell 69kV
J1651	Solar	Ameren Illinois	Logan	IL	NRIS	149.5	Howlett 138 kV Substation
J1652	Solar	Ameren Illinois	Champaign	IL	NRIS	116	Sidney 138kV
J1653	Solar	Ameren Illinois	Tazewell	IL	NRIS	150	San Jose Rail 138kV
J1655	Battery Storage	Ameren Illinois	Jefferson	IL		50	West Mt Vernon - Xenia 345kV Line (J1241)
J1656	Hybrid	Ameren Illinois	Vermilion	IL	NRIS	412	Sydney to Bunsonville 345kV Line
J1676	Wind	Ameren Illinois	McLean	IL	NRIS	300	Brokaw - Clinton 345 kV line
J1677	Solar	Ameren Illinois	Macon	IL	NRIS	180	Leghorn 345 kV
J1678	Battery Storage	Duke Energy Indiana, LLC	Miami	IN	NRIS	74.7	Deedsville 345 kV
J1679	Solar	Ameren Illinois	Clay	IL	NRIS	125	Xenia - West Mt Vernon 345 kV
J1680	Solar	Duke Energy Indiana, LLC	Cass	IN	NRIS	100	345 kV Walton Substation
J1681	Solar	Ameren Missouri	Maries	MO	NRIS	200	Bland to Franks 345kV line
J1684	Solar	Northern Indiana Public Service Company	Starke	IN	NRIS	200	ROLLIN SCHAFER -BURR OAK 345KV LINE
J1687	Solar	Hoosier Energy REC Inc	Decatur	IN	NRIS	160	Decatur Switching Station 161kv
J1691	Solar	Hoosier Energy REC, Inc.	Sullivan	IN	NRIS	200	Merom 345kV Substation
J1695	Battery Storage	Ameren Illinois	Perry	IL	NRIS	50	Aster 138kV Substation (Rebuild of North Coulterville 138kV)
J1696	Solar	Big Rivers Electric Corporation	Henderson	KY	NRIS	150	Reid 161kV
J1697	Solar	Duke Energy Indiana, LLC	Jackson	IN	NRIS	200	Bedford - Seymour 138kV line (Line#13829)
J1699	Solar	Hoosier Energy REC Inc	Shelby	IN	NRIS	43	HE Lewis Creek 69 kV
J1701	Wind	Ameren Illinois	McDonough	IL	NRIS	200	Macomb to Ipava 138kV line
J1703	Solar	Big Rivers Electric Corporation	Webster	KY	NRIS	74	Reid to Hopkins County 161kV
J1704	Battery Storage	Duke Energy Indiana, LLC	Shelby	IN	NRIS	50	Gwynneville 345kV Substation
J1707	Solar	Southern Indiana Gas & Electric Company d/b/a Vectren Energy Delivery of Indiana, Inc.	Dubois	IN	NRIS	72	DUFF 345KV
J1712	Solar	Ameren Illinois	Perry	IL	NRIS	300	North Coulterville - COMM 345kV
J1713	Wind	Ameren Transmission Company of Illinois	Macon	IL	NRIS	147.2	Faraday (138 kV)

Project	Fuel Type	Transmission Owner	County	State	Service Requested	MW	Point of Interconnection
J1714	Solar	Ameren Illinois	Fayette	IL	NRIS	100	Ramsey East 138kV Substation
J1721	Solar	Duke Energy Indiana, LLC	Vigo	IN	NRIS	175.12	Vigo-Worthington 138kV
J1724	Solar	Northern Indiana Public Service Company	LaPorte	IN	NRIS	150	LNG - STILLWELL 138kV line
J1725	Wind	Ameren Illinois	Tazewell	IL	NRIS	100	San Jose Rail Splitter 138KV (G515)
J1726	Solar	Northern Indiana Public Service Company	Pulaski	IN	NRIS	200	Reynolds - Burr 345kV
J1736	Solar	Southern Indiana Gas & Electric Company d/b/a Vectren Energy Delivery of Indiana, Inc.	Dubois	IN		100	Duff 138kV
J1737	Solar	Duke Energy Indiana, LLC	Rush	IN	NRIS	210	Gwynville 345 kV
J1743	Solar	Duke Energy Indiana, LLC	Miami	IN	NRIS	292.9	Deedsville 345 kV Substation
J1744	Solar	Ameren Illinois	Cumberland	IL	NRIS	149.5	Hutsonville - Neoga 138 kV
J1755	Wind	Ameren Illinois	Bureau	IL	NRIS	147.2	Bureau County 138 kV
J1756	Hybrid	Indianapolis Power & Light Company	Shelby	IN	NRIS	309	Gwynneville to Sunnyside 345kV
J1765	Solar	Duke Energy Indiana, LLC	Tipton	IN	NRIS	93.2	Tipton West Substation 230kV
J1770	Wind	Ameren Illinois	Vermilion	IL	ERIS	150	Hoopston 138kV
J1772	Solar	Northern Indiana Public Service Company	White	IN	NRIS	200	Reynolds 345KV
J1774	Wind	Duke Energy Indiana, LLC	Warren	IN		50	Cayuga 345kV
J1777	Solar	Ameren Illinois	Perry	IL	NRIS	100	Aster 138kV Substation
J1780	Solar	Duke Energy Indiana, LLC	Montgomery	IN	NRIS	200	Linden Tap - Crawfordsville 138kV Line
J1782	Solar	Duke Energy Indiana, LLC	Montgomery	IN	NRIS	150	WABASH RIVER GEN. STA. TO WHITESVILLE SOUTH SUB 230kV
J1783	Solar	Duke Energy Indiana, LLC	Montgomery	IN	NRIS	150	WABASH RIVER GEN. STA. TO WHITESVILLE SOUTH SUB 230 kV
J1784	Solar	Duke Energy Indiana, LLC	Henry	IN	NRIS	39	New Castle to Hagerstown 69 kV
J1785	Solar	Northern Indiana Public Service Company	LaPorte	IN	NRIS	100	Maple 69 kV
J1786	Solar	Hoosier Energy REC Inc	Sullivan	IN	NRIS	200	Merom 345kV Substation

Project	Fuel Type	Transmission Owner	County	State	Service Requested	MW	Point of Interconnection
J1802	Solar	Northern Indiana Public Service Company	Marshall	IN	NRIS	150	Burr Oak 138kV
J1805	Battery Storage	Northern Indiana Public Service Company	LaPorte	IN	NRIS	0	Maple 69 kV
J1806	Battery Storage	Duke Energy Indiana, LLC	Henry	IN		30	Greensboro Substation 345kV
J1810	Hybrid	Northern Indiana Public Service Company	White	IN	NRIS	60	Reynolds 345kV to Burr Oaks 345kV
J1815	Solar	Duke Energy Indiana, LLC	Montgomery	IN	NRIS	180	Linden Junction - Crawfordsville 138 kV
J1829	Solar	Duke Energy Indiana, LLC	Shelby	IN	NRIS	180	DEI's Columbus to Clark Twp. 230 kV (one of the two 230 kV circuits going from Columbus to Five Point
J1830	Hybrid	Ameren Illinois	Pulaski	IL	NRIS	200	Kelso - Joppa (Massac) 345 kV line
J1831	Wind	Ameren Illinois	Menard	IL	NRIS	200	Shockey 138kV
J1835	Wind	Southern Indiana Gas & Electric Company d/b/a Vectren Energy Delivery of Indiana, Inc.	Spencer	IN	NRIS	200	Culley to Grandview 138 KV line tap
J1836	Solar	Ameren Missouri	Callaway	MO	NRIS	300	Callaway Plant-345 kV
J1839	Gas	Ameren Illinois	Macon	IL	NRIS	340.3	Decatur ADM North 138 kV
J1840	Solar	Ameren Illinois	De Witt	IL	NRIS	250	Clinton to Goose Creek-4545 345kV line

1.2. Total Network Upgrades

The cost allocation of Network Upgrades for the projects in the DPP 2020 Central Phase 1 reflects responsibilities for mitigating system impacts. The total cost of Network Upgrades is listed in **Error! Reference source not found.** below. The costs for Network Upgrades are planning-level estimates and subject to revision in the facility studies. Details pertaining to the cost allocation has been detailed in Appendix A – Cost Allocation Summary (CEII).

Table 3: Total Cost of Network Upgrade for DPP 2020 Central Phase 1 Projects

Project Number	DPP Phase I											Payment in DPP Phase I	
	ERIS Network Upgrades ($)				NRIS Network Upgrades ($)	Interconnection Facilities ($)			Shared Network Updates ($)	Total Cost of NU ($)	10% of Total Cost of Phase I NU ($)	M2 ($)	M3 =10% of NU-M2 ($)
	Thermal	Stability	Short Circuit	Affected System	Deliverability	TO Network Upgrades	TO - Owned Direct Assigned	TO Self Fund?					
J1491	$259,094,412	TBD	TBD	TBD	$0	$2,300,000	$0	No	$0	$261,394,412	$26,139,441	$800,000	$25,339,441
J1517	$93,998,273	TBD	TBD	TBD	$5,003,056	$7,000,000	$0	No	$0	$106,001,328	$10,600,133	$160,000	$10,440,133
J1518	$2,038,409	TBD	TBD	TBD	$23,123,060	$0	$0	N/A	$0	$25,161,469	$2,516,147	$740,000	$1,776,147
J1519	$0	TBD	TBD	TBD	$7,220	$12,000,000	$1,500,000	Yes	$0	$12,007,220	$1,200,722	$800,000	$400,722
J1563	$110,110,125	TBD	TBD	TBD	$6,504,840	$17,000,000	$0	No	$0	$133,614,965	$13,361,497	$800,000	$12,561,497
J1565	$0	TBD	TBD	TBD	$83,485	$20,000,000	$0	No	$0	$20,083,485	$2,008,349	$800,000	$1,208,349
J1578	$7,433,851	TBD	TBD	TBD	$0	$17,000,000	$0	No	$0	$24,433,851	$2,443,385	$800,000	$1,643,385
J1579	$0	TBD	TBD	TBD	$92,303	$8,000,000	$1,200,000	Yes	$0	$8,092,303	$809,230	$800,000	$9,230
J1585	$8,500,000	TBD	TBD	TBD	$0	$8,000,000	$1,200,000	Yes	$7,689,822	$24,189,822	$2,418,982	$800,000	$1,618,982
J1591	$1,414,168	TBD	TBD	TBD	$386,187	$8,000,000	$0	No	$0	$9,800,355	$980,035	$600,000	$380,035
J1593	$31,927,390	TBD	TBD	TBD	$3,601,097	$20,000,000	$0	No	$0	$55,528,487	$5,552,849	$800,000	$4,752,849
J1600	$0	TBD	TBD	TBD	$0	$13,000,000	$0	No	$0	$13,000,000	$1,300,000	$160,000	$1,140,000
J1604	$418,666	TBD	TBD	TBD	$0	$444,960	$0	No	$0	$863,626	$86,363	$200,000	$0
J1610	$4,470,949	TBD	TBD	TBD	$4,661	$0	$1,780,807	Yes	$0	$4,475,610	$447,561	$400,000	$47,561
J1616	$0	TBD	TBD	TBD	$18,754,877	$20,000,000	$0	No	$0	$38,754,877	$3,875,488	$800,000	$3,075,488
J1619	$1,425,666	TBD	TBD	TBD	$939,421	$3,259,219	$0	No	$0	$5,624,306	$562,431	$640,000	$0
J1624	$0	TBD	TBD	TBD	$0	$17,000,000	$0	No	$0	$17,000,000	$1,700,000	$400,000	$1,300,000

Project Number	DPP Phase I											Payment in DPP Phase I	
	ERIS Network Upgrades ($)				NRIS Network Upgrades ($)	Interconnection Facilities ($)			Shared Network Updates ($)	Total Cost of NU ($)	10% of Total Cost of Phase I NU ($)	M2 ($)	M3 =10% of NU-M2 ($)
	Thermal	Stability	Short Circuit	Affected System	Deliverability	TO Network Upgrades	TO - Owned Direct Assigned	TO Self Fund?					
J1625	$32,346,462	TBD	TBD	TBD	$11,006,307	$17,000,000	$0	No	$9,611,180	$69,963,950	$6,996,395	$600,000	$6,396,395
J1626	$7,113,721	TBD	TBD	TBD	$298,695	$0	$800,000	Yes	$0	$7,412,416	$741,242	$600,000	$141,242
J1632	$58,611,145	TBD	TBD	TBD	$68,214,699	$13,000,000	$0	No	$0	$139,825,845	$13,982,584	$800,000	$13,182,584
J1636	$0	TBD	TBD	TBD	$0	$0	$800,000	Yes	$0	$0	$0	$600,000	$0
J1637	$0	TBD	TBD	TBD	$10,930,972	$10,000,000	$0	No	$0	$20,930,972	$2,093,097	$600,000	$1,493,097
J1638	$0	TBD	TBD	TBD	$72,392	$5,000,000	$0	No	$0	$5,072,392	$507,239	$600,000	$0
J1641	$0	TBD	TBD	TBD	$12,375,392	$8,600,000	$0	No	$0	$20,975,392	$2,097,539	$600,000	$1,497,539
J1642	$21,050,184	TBD	TBD	TBD	$327,433	$11,167,966	$0	No	$0	$32,545,583	$3,254,558	$800,000	$2,454,558
J1646	$780,295	TBD	TBD	TBD	$4,769,808	$3,600,000	$0	No	$0	$9,150,103	$915,010	$600,000	$315,010
J1649	$0	TBD	TBD	TBD	$0	$13,000,000	$0	No	$0	$13,000,000	$1,300,000	$240,000	$1,060,000
J1651	$10,772,793	TBD	TBD	TBD	$6,674,412	$800,000	$1,200,000	Yes	$0	$18,247,205	$1,824,720	$800,000	$1,024,720
J1652	$1,731,392	TBD	TBD	TBD	$15,491,504	$0	$800,000	Yes	$0	$17,222,896	$1,722,290	$800,000	$922,290
J1653	$8,755,699	TBD	TBD	TBD	$33,052,950	$0	$800,000	Yes	$0	$41,808,650	$4,180,865	$600,000	$3,580,865
J1655	$12,089,318	TBD	TBD	TBD	$2,666	$0	$50,000	Yes	$0	$12,091,984	$1,209,198	$200,000	$1,009,198
J1656	$224,328,500	TBD	TBD	TBD	$75,759,610	$12,000,000	$1,500,000	Yes	$0	$312,088,110	$31,208,811	$1,980,000	$29,228,811
J1676	$108,112,379	TBD	TBD	TBD	$9,107,879	$12,000,000	$1,500,000	Yes	$0	$129,220,258	$12,922,026	$1,200,000	$11,722,026
J1677	$5,900,520	TBD	TBD	TBD	$6,582,089	$2,500,000	$1,500,000	Yes	$0	$14,982,609	$1,498,261	$720,000	$778,261
J1678	$4,765,629	TBD	TBD	TBD	$1,587,180	$5,000,000	$0	No	$0	$11,352,809	$1,135,281	$298,800	$836,481
J1679	$9,906,851	TBD	TBD	TBD	$6,877	$12,000,000	$1,500,000	Yes	$0	$21,913,727	$2,191,373	$500,000	$1,691,373
J1680	$0	TBD	TBD	TBD	$2,189,329	$18,000,000	$0	No	$0	$20,189,329	$2,018,933	$400,000	$1,618,933
J1681	$0	TBD	TBD	TBD	$7,263	$12,000,000	$1,500,000	Yes	$0	$12,007,263	$1,200,726	$800,000	$400,726
J1684	$0	TBD	TBD	TBD	$0	$23,700,000	$0	No	$0	$23,700,000	$2,370,000	$800,000	$1,570,000
J1687	$10,000,000	TBD	TBD	TBD	$0	$9,300,000	$0	No	$0	$19,300,000	$1,930,000	$800,000	$1,130,000
J1691	$0	TBD	TBD	TBD	$14,079,206	$2,350,000	$0	No	$7,123,740	$23,552,946	$2,355,295	$800,000	$1,555,295
J1695	$5,972,719	TBD	TBD	TBD	$2,316	$0	$800,000	Yes	$0	$5,975,035	$597,504	$200,000	$397,504

Project Number	DPP Phase I											Payment in DPP Phase I	
	ERIS Network Upgrades ($)				NRIS Network Upgrades ($)	Interconnection Facilities ($)			Shared Network Updates ($)	Total Cost of NU ($)	10% of Total Cost of Phase I NU ($)	M2 ($)	M3 =10% of NU-M2 ($)
	Thermal	Stability	Short Circuit	Affected System	Deliverability	TO Network Upgrades	TO - Owned Direct Assigned	TO Self Fund?					
J1696	$1,341,933	TBD	TBD	TBD	$881,101	$5,000,000	$0	No	$0	$7,223,034	$722,303	$600,000	$122,303
J1697	$10,000,000	TBD	TBD	TBD	$87,610	$15,000,000	$0	No	$0	$25,087,610	$2,508,761	$800,000	$1,708,761
J1699	$8,764,690	TBD	TBD	TBD	$0	$7,100,000	$0	No	$0	$15,864,690	$1,586,469	$200,000	$1,386,469
J1701	$28,683,412	TBD	TBD	TBD	$70,887,408	$8,000,000	$1,200,000	Yes	$0	$107,570,819	$10,757,082	$800,000	$9,957,082
J1703	$24,945,590	TBD	TBD	TBD	$19,184,230	$13,000,000	$0	No	$0	$57,129,820	$5,712,982	$400,000	$5,312,982
J1704	$23,032,350	TBD	TBD	TBD	$967,868	$20,000,000	$0	No	$0	$44,000,218	$4,400,022	$200,000	$4,200,022
J1707	$0	TBD	TBD	TBD	$47,716	$5,000,000	$0	No	$0	$5,047,716	$504,772	$288,000	$216,772
J1712	$5,124,029	TBD	TBD	TBD	$13,839	$12,000,000	$1,500,000	Yes	$0	$17,137,868	$1,713,787	$1,200,000	$513,787
J1713	$40,573,552	TBD	TBD	TBD	$4,742,796	$0	$800,000	Yes	$0	$45,316,349	$4,531,635	$600,000	$3,931,635
J1714	$4,886,220	TBD	TBD	TBD	$198,956	$0	$50,000	Yes	$0	$5,085,177	$508,518	$400,000	$108,518
J1721	$0	TBD	TBD	TBD	$7,027,087	$15,000,000	$0	No	$0	$22,027,087	$2,202,709	$700,480	$1,502,229
J1724	$0	TBD	TBD	TBD	$0	$14,600,000	$0	No	$0	$14,600,000	$1,460,000	$600,000	$860,000
J1725	$17,349,997	TBD	TBD	TBD	$22,036,081	$0	$50,000	Yes	$0	$39,386,078	$3,938,608	$400,000	$3,538,608
J1726	$0	TBD	TBD	TBD	$0	$23,700,000	$0	No	$0	$23,700,000	$2,370,000	$800,000	$1,570,000
J1736	$0	TBD	TBD	TBD	$58,383	$0	$0	No	$0	$58,383	$5,838	$400,000	$0
J1737	$3,729,401	TBD	TBD	TBD	$4,069,357	$20,000,000	$0	No	$0	$27,798,758	$2,779,876	$840,000	$1,939,876
J1743	$0	TBD	TBD	TBD	$6,223,491	$5,000,000	$0	No	$0	$11,223,491	$1,122,349	$1,171,600	$0
J1744	$3,205,495	TBD	TBD	TBD	$388,542	$8,000,000	$1,200,000	Yes	$0	$11,594,037	$1,159,404	$598,000	$561,404
J1755	$19,634,572	TBD	TBD	TBD	$795,626	$800,000	$1,200,000	Yes	$0	$21,230,198	$2,123,020	$600,000	$1,523,020
J1756	$188,290,797	TBD	TBD	TBD	$5,987,461	$18,500,000	$0	No	$0	$212,778,258	$21,277,826	$1,996,000	$19,281,826
J1765	$20,274,856	TBD	TBD	TBD	$7,151,405	$10,000,000	$0	No	$0	$37,426,261	$3,742,626	$600,000	$3,142,626
J1770	$47,886,750	TBD	TBD	TBD	$0	$0	$800,000	Yes	$0	$47,886,750	$4,788,675	$600,000	$4,188,675
J1772	$0	TBD	TBD	TBD	$0	$0	$0	N/A	$0	$0	$0	$800,000	$0
J1774	$0	TBD	TBD	TBD	$11,190,258	$0	$0	No	$0	$11,190,258	$1,119,026	$200,000	$919,026
J1777	$93,458	TBD	TBD	TBD	$4,632	$800,000	$1,200,000	Yes	$0	$898,090	$89,809	$400,000	$0

Project Number	DPP Phase I											Payment in DPP Phase I	
	ERIS Network Upgrades ($)				NRIS Network Upgrades ($)	Interconnection Facilities ($)			Shared Network Updates ($)	Total Cost of NU ($)	10% of Total Cost of Phase I NU ($)	M2 ($)	M3 =10% of NU-M2 ($)
	Thermal	Stability	Short Circuit	Affected System	Deliverability	TO Network Upgrades	TO - Owned Direct Assigned	TO Self Fund?					
J1780	$88,896,650	TBD	TBD	TBD	$5,855,713	$15,000,000	$0	No	$0	$109,752,363	$10,975,236	$800,000	$10,175,236
J1782	$81,232,855	TBD	TBD	TBD	$4,957,002	$17,000,000	$0	No	$0	$103,189,857	$10,318,986	$600,000	$9,718,986
J1783	$81,232,855	TBD	TBD	TBD	$4,957,002	$17,000,000	$0	No	$0	$103,189,857	$10,318,986	$600,000	$9,718,986
J1784	$20,000,000	TBD	TBD	TBD	$0	$9,000,000	$0	No	$0	$29,000,000	$2,900,000	$156,000	$2,744,000
J1785	$0	TBD	TBD	TBD	$0	$3,000,000	$0	No	$0	$3,000,000	$300,000	$400,000	$0
J1786	$0	TBD	TBD	TBD	$14,079,206	$2,350,000	$0	No	$7,123,740	$23,552,946	$2,355,295	$800,000	$1,555,295
J1802	$0	TBD	TBD	TBD	$0	$3,600,000	$0	No	$0	$3,600,000	$360,000	$600,000	$0
J1805	$691,450	TBD	TBD	TBD	$0	$0	$0	N/A	$0	$691,450	$69,145	$0	$69,145
J1806	$17,893,232	TBD	TBD	TBD	$374,216	$0	$0	N/A	$0	$18,267,448	$1,826,745	$120,000	$1,706,745
J1810	$4,261,192	TBD	TBD	TBD	$0	$0	$0	N/A	$0	$4,261,192	$426,119	$240,000	$186,119
J1815	$81,303,350	TBD	TBD	TBD	$0	$15,000,000	$0	No	$0	$96,303,350	$9,630,335	$720,000	$8,910,335
J1829	$5,566,149	TBD	TBD	TBD	$0	$17,000,000	$0	No	$0	$22,566,149	$2,256,615	$1,000,000	$1,256,615
J1830	$14,682,373	TBD	TBD	TBD	$0	$12,000,000	$1,500,000	Yes	$0	$26,682,373	$2,668,237	$800,000	$1,868,237
J1831	$67,061,370	TBD	TBD	TBD	$6,902,880	$800,000	$1,200,000	Yes	$0	$74,764,250	$7,476,425	$800,000	$6,676,425
J1835	$0	TBD	TBD	TBD	$0	$12,000,000	$0	No	$0	$12,000,000	$1,200,000	$800,000	$400,000
J1836	$0	TBD	TBD	TBD	$11,466	$1,000,000	$1,500,000	Yes	$0	$1,011,466	$101,147	$1,200,000	$0
J1839	$10,537,268	TBD	TBD	TBD	$10,087,233	$1,500,000	$1,200,000	Yes	$0	$22,124,501	$2,212,450	$1,361,200	$851,250
J1840	$7,687,121	TBD	TBD	TBD	$11,028,309	$12,000,000	$1,500,000	Yes	$0	$30,715,430	$3,071,543	$1,425,000	$1,646,543

Analyses performed demonstrate that transmission facilities are required to reliably interconnect this group of generators to the transmission system. ERIS and NRIS Network Upgrades required for full interconnection service detailed in **Error! Reference source not found.**.

Due to the timing of DPP 2020 Central Phase 1, there is a discrepancy with the DPP-2020 South Phase 3 report. MISO is aware of additional Network Upgrades that will impact Central projects once Central completes Phase 2. Please refer to the DPP 2020 South Phase 3 System Impact Study for additional information.

Table 4: ERIS & NRIS Upgrades Required for Interconnection Service

Network Upgrade	Type	TO	NU Cost Estimate ($)	Projects impacted
132-39 Reconductor	ERIS	IPL	$ 5,000,000	J1491
2nd Mason-Quiver Line	NRIS	AMIL	$ 19,000,000	J1653, J1725,
2nd Overton 345/161 kV XFMR; J1490-Montgomery 3 parallel lines	ERIS	AMMO	$ -	J1498,J1590,J1655,J1695,J1754,
2nd San Jose Rail-Towerline Line	NRIS	AMIL	$ 37,000,000	J1651, J1651, J1653, J1653, J1725, J1725, J1831, J1831,
345kV NU Projects	ERIS	AMIL	$ -	J1770
48154 J1815 POI to LINDNT	ERIS	DEI	$ 9,000,000	J1780,J1815,
A.E. Staley to Laf Ind S. - Recon	ERIS	DEI	$ 1,000,000	J1780,J1815,
AEP Facility Limit. No NIPSCO Upgrades.	NRIS	NIPS	$ -	J1497, J1502, J1508, J1510, J1512, J1513, J1567, J1573, J1596, J1615, J1629, J1684, J1706, J1716, J1719, J1720, J1724, J1732, J1735, J1740, J1745, J1746, J1750, J1751, J1752, J1773, J1778, J1779, J1785, J1793, J1803, J1814, J1817, J1824, J1843,
AEP/PJM Howe-Sturgis	NRIS	NIPS	$ -	J1550
Albion S J1422 Rating Update	NRIS	AMIL	$ -	J1579
Albion TR Upgrade	NRIS	AMIL	$ -	J1579
AMO Relaying	NRIS	DEI	$ -	J1616, J1637,
Bloomington 345-138 sub SUM_R1.idv	NRIS	DEI	$ 42,000,000	J1641, J1691, J1721, J1786,
Bunsonville-Eugene 345 kV 2nd Line	ERIS (LPC)	Ameren	$ 30,000,000	J1491, J1492, J1517, J1586, J1635, J1639, J1642, J1655, J1656, J1659, J1660, J1665, J1676, J1678, J1695, J1701, J1704, J1713, J1725, J1755, J1756, J1770, J1805, J1806, J1810, J1831
Bunsonville-J1656 345 kV 2nd Line	ERIS (LPC)	Ameren	$ 20,000,000	J1491, J1492, J1517, J1586, J1635, J1639, J1642, J1655, J1656, J1659, J1660, J1665, J1676, J1678, J1695, J1701, J1704, J1713, J1725, J1755, J1756, J1770, J1805, J1806, J1810, J1831, J1517, J1656, J1676, J1770
Cane-Mason City 138 kV rebuild to 1200A	ERIS (LPC)	Ameren	$ 11,900,000	J1610, J1651, J1653, J1725, J1831
Car Jt to Tipton	ERIS	DEI	$ 35,250,000	J1625,J1765,

Network Upgrade	Type	TO	NU Cost Estimate ($)	Projects impacted
Case W- J1771 Rating Update	NRIS	AMIL	$ -	J1519, J1585, J1610, J1626, J1655, J1679, J1681, J1695, J1712, J1714, J1744, J1777, J1836,
Cay_CT to Cayuga Uprate and 2nd Line	NRIS	DEI	$ 3,500,000	J1591, J1626, J1641, J1652, J1691, J1713, J1714, J1721, J1744, J1786, J1840, J1774,
Caysub to Euguene Parallel Lines	ERIS	AEP/DEI	$ 72,000,000	J1491,J1517,J1642,J1656,J1676,J1704,J1756,J1770,J1806,
Cayuga Bank 10	ERIS	DEI	$ 12,000,000	J1517
Cayuga Bank 9	ERIS	DEI	$ 12,000,000	J1517
Cayuga Plant - Hillsdale North	ERIS	DEI	$ 50,000,000	J1517
Cayuga Sub to Cayuga 2nd Line	ERIS	DEI	$ 34,666,667	J1491,J1517,J1642,J1656,J1676,J1704,J1756,J1770,J1806,
Cayuga Sub to Cayuga 3rd Line	ERIS	DEI	$ 34,666,667	J1517,J1656,J1770,
Cayuga to Nucor Parallel Line and Uprate	ERIS	DEI	$ 119,000,000	J1491,J1517,J1656,J1704,J1756,J1770,J1806,
Cayuga_Nucor_3rdLine.idv	NRIS	DEI	$ 112,000,000	J1517, J1518, J1646, J1652, J1656, J1676, J1677, J1713, J1780, J1839, J1840, J1774,
Century Aluminum RAS	NRIS	HE	$ -	J1642, J1642, J1736, J1736,
Chrys 3 to Kokomo	ERIS	DEI	$ 9,000,000	J1491,J1704,J1756,J1806,J1491,J1704,J1756,J1806,J1563,J1625,J1765,J1782,J1783,J1563,J1625,J1765,J1782,J1783,
CHRYS1 TO CHRYS2	ERIS	DEI	$ 6,000,000	J1563,J1625,J1765,
CHRYS1 TO CHRYS3	ERIS	DEI	$ 1,000,000	J1563,J1625,J1765,J1782,J1783,
Construct 23 mile Weedman-N Champaign 138 kV line	ERIS (LPC)	Ameren	$ 48,000,000	J1517, J1676, J1713, J1831, J1517, J1676, J1713, J1831, J1676, J1676, J1676, J1517, J1676, J1713, J1831, J1491
Construct 2nd 29 mile Kansas-Arland 345 kV line	ERIS (LPC)	Ameren	$ 73,000,000	J1491, J1492, J1517, J1586, J1635, J1639, J1642, J1655, J1656, J1659, J1660, J1665, J1676, J1678, J1695, J1701, J1704, J1713, J1725, J1755, J1756, J1770, J1805, J1806, J1810, J1831, J1491, J1492, J1517, J1586, J1635, J1639, J1642, J1655, J1656, J1659, J1660, J1665, J1676, J1678, J1695, J1701, J1704, J1713, J1725, J1755, J1756, J1770, J1805, J1806, J1810, J1831, J1713, J1491, J1492, J1494, J1495, J1496, J1508, J1512, J1517, J1528, J1572, J1575, J1586, J1613, J1635, J1639, J1642, J1655, J1659, J1660, J1665, J1676, J1678, J1701, J1704, J1713, J1725, J1733, J1755, J1756, J1769, J1773, J1781, J1804, J1806, J1810, J1817, J1826, J1830, J1831
Construct 2nd 3.5 mile Coffeen N-Redhawk 345 kV Line	ERIS (LPC)	Ameren	$ 18,500,000	J1610, J1626, J1646, J1651, J1652, J1653, J1656, J1676, J1677, J1713, J1714, J1725, J1744, J1770, J1831, J1839, J1840
Construct 2nd 31.5 mi 3000 A Callaway-Bland 345 kV line	ERIS (LPC)	Ameren	$ 69,375,000	J1491, J1517, J1521, J1572, J1575, J1590, J1594, J1613, J1621, J1642, J1655, J1695, J1704, J1754, J1756, J1769, J1806, J1826, J1830, J1521, J1523, J1572, J1575, J1590, J1594, J1613, J1621, J1642, J1655, J1695, J1701, J1704, J1723, J1754, J1756, J1769, J1819, J1821, J1826, J1830, J1491, J1517, J1521, J1572, J1575, J1590, J1594, J1613, J1621, J1642, J1655, J1695, J1704, J1754,

Network Upgrade	Type	TO	NU Cost Estimate ($)	Projects impacted
				J1756, J1769, J1806, J1826, J1830, J1491, J1492, J1494, J1495, J1496, J1498, J1517, J1521, J1523, J1528, J1572, J1575, J1586, J1590, J1594, J1613, J1621, J1635, J1639, J1642, J1655, J1659, J1660, J1665, J1678, J1695, J1701, J1704, J1723, J1733, J1754, J1756, J1769, J1804, J1806, J1810, J1819, J1821, J1826, J1830
Construct 2nd 32.5 mile Arland-Faraday 345 kV line	ERIS (LPC)	Ameren	$ 81,000,000	J1491, J1492, J1517, J1586, J1635, J1639, J1642, J1655, J1656, J1659, J1660, J1665, J1676, J1678, J1695, J1701, J1704, J1713, J1725, J1755, J1756, J1770, J1805, J1806, J1810, J1831, J1491, J1492, J1517, J1586, J1635, J1639, J1642, J1655, J1656, J1659, J1660, J1665, J1676, J1678, J1695, J1701, J1704, J1713, J1725, J1755, J1756, J1770, J1805, J1806, J1810, J1831, J1713, J1713, J1831, J1831, J1655, J1676, J1701, J1713, J1725, J1831, J1491, J1492, J1494, J1495, J1496, J1508, J1512, J1517, J1528, J1572, J1575, J1586, J1613, J1635, J1639, J1642, J1655, J1659, J1660, J1665, J1676, J1678, J1701, J1704, J1713, J1725, J1733, J1755, J1756, J1769, J1773, J1781, J1804, J1806, J1810, J1817, J1826
Crawfordsville to Lake Holiday Jct	ERIS	DEI	$ 25,000,000	J1780,J1815,
Docket to Gillet 138 kV to 1200A	ERIS	AMIL	$ 6,800,000	J1831
DPP2020-BREC-1	ERIS	BREC/TVA	$ 23,150,000	J1604,J1619,J1632,J1696,J1703,
DPP2020-BREC-2	ERIS	BREC	$ 9,981,000	J1632,J1703,
DPP2020-BREC-3	ERIS	BREC	$ 8,940,000	J1632,
DPP2020-BREC-4	ERIS	BREC	$ 10,681,000	J1632,
DPP2020-BREC-5	ERIS	BREC	$ -	J1649,
DPP2020-BREC-6	ERIS	BREC	$ -	J1649,
DPP2020-BREC-7	ERIS	BREC	$ 16,930,000	J1632,
DPP2020-BREC-8	ERIS	BREC	$ 17,061,000	J1703,
DPP2020-BREC-9	ERIS	BREC	$ -	J1600,
Dresser to Sugar Creek	ERIS	DEI	$ 4,200,000	J1491,J1517,J1642,J1704,J1756,J1806,
Dresser-Fairbanks Uprate (2018)	NRIS	DEI	$ -	J1565, J1579, J1616, J1619, J1637, J1638, J1641, J1642, J1691, J1696, J1697, J1703, J1707, J1736, J1786,
Enterpsise South Jct to Lebanon Enterprise	ERIS	DEI	$ 4,500,000	J1563,J1782,J1783,
Fall Creek- Noblesville Rebuild pt 1	NRIS	DEI	$ 5,800,000	J1517, J1518, J1563, J1616, J1625, J1637, J1652, J1656, J1765, J1782, J1783, J1774,
Fall Creek- Noblesville Rebuild pt 2	NRIS	DEI	$ 70,000,000	J1517, J1518, J1563, J1616, J1625, J1637, J1652, J1656, J1765, J1782, J1783, J1774,
Fountaintown Jct	ERIS	DEI	$ 13,000,000	J1756
FVPTS1 to MCOMFT Reconductor	ERIS	DEI	$ 9,225,000	J1593,J1737,J1756,J1806,
Gen Foods to Laf S.E. - Recon	ERIS	DEI	$ 3,000,000	J1780,J1815,

Network Upgrade	Type	TO	NU Cost Estimate ($)	Projects impacted
Gillett - Shockey 138 kV to 1200A	ERIS (LPC)	Ameren	$ 6,375,000	J1701, J1725, J1831
Goose Creek- Rising 345 kV 2nd Line	ERIS (LPC)	Ameren	$ 50,000,000	J1491, J1491, J1492, J1492, J1494, J1494, J1495, J1495, J1496, J1496, J1508, J1508, J1512, J1512, J1517, J1517, J1528, J1528, J1572, J1572, J1575, J1575, J1586, J1586, J1613, J1613, J1635, J1635, J1639, J1639, J1642, J1642, J1655, J1655, J1659, J1659, J1660, J1660, J1665, J1665, J1676, J1676, J1678, J1678, J1701, J1701, J1704, J1704, J1713, J1713, J1725, J1725, J1733, J1733, J1755, J1755, J1756, J1756, J1769, J1769, J1773, J1773, J1781, J1781, J1804, J1804, J1806, J1806, J1810, J1810, J1817, J1817, J1826, J1826, J1830, J1830, J1831, J1831
Grand Tower-Wittenberg 138 kV line rating update	NRIS	Ameren	$ -	J1695, J1777,
Grandview sub switch upgrade New rating of 102MVA.	NRIS	SIGE	$ 200,000	J1642
Greensboro to Greenfield	ERIS	DEI	$ 35,000,000	J1593,J1756,J1806,
Greensboro to New Castle	ERIS	DEI	$ 500,000	J1593,J1806,
H.E. Waldon Jct to Prescott	ERIS	DEI	$ 16,000,000	J1699,J1756,
H.E. Waldon to St. Paul	ERIS	DEI	$ 20,000,000	J1756,J1699,
H.H. DTRS to Greensburg	ERIS	HE/DEI	$ 10,000,000	J1687
Haggerstown-J1784 POI 69150 rebuild with 954 ACSR	ERIS	DEI	$ 20,000,000	J1784
Hamilton TR Upgrade	NRIS	AMIL	$ 10,000,000	J1734
Hastpk to Greenfield Reconductor	ERIS	DEI	$ 2,925,000	J1593,J1756,J1806,
Havana- Havana S Rating Update	NRIS	AMIL	$ -	J1651, J1653, J1725, J1831,
Havana S-Cane Line Rebuild	NRIS	AMIL	$ 8,000,000	J1651, J1653, J1725, J1831,
HE Washington Jct to Greenburg Washington St.	ERIS	DEI	$ 2,500,000	J1756
Hillsdale to Montezuma	ERIS	DEI	$ 6,000,000	J1780,J1815,
Install 2nd Faraday 345/138 kV Transformer	ERIS (LPC)	Ameren	$ 9,000,000	J1491, J1517, J1642, J1676, J1701, J1713, J1725, J1831
J1180-Sullivan Rating Update/ AEP AFS	NRIS	AMIL	$ -	J1519, J1585, J1610, J1626, J1651, J1652, J1655, J1676, J1677, J1679, J1681, J1695, J1712, J1713, J1714, J1744, J1777, J1831, J1836, J1839, J1840,
J1352 Montgomery Line Rebuild	NRIS	AMMO	$ 8,000,000	J1494, J1495, J1496, J1497, J1498, J1502, J1503, J1504, J1508, J1510, J1512, J1513, J1520, J1521, J1529, J1534, J1566, J1567, J1572, J1573, J1575, J1581, J1582, J1588, J1594, J1596, J1597, J1605, J1611, J1613, J1615, J1620, J1621, J1629, J1653, J1657, J1701, J1706, J1708, J1716, J1719, J1720, J1725, J1730, J1732, J1733, J1734, J1735, J1740, J1745, J1746, J1750, J1751, J1752, J1754, J1755, J1769, J1773, J1778, J1779,

Network Upgrade	Type	TO	NU Cost Estimate ($)	Projects impacted
				J1781, J1793, J1803, J1808, J1814, J1817, J1824, J1826, J1843,
J1563 to Wabash River	ERIS	DEI	$ 138,000,000	J1563,J1782,J1783,
J1578 POI to Clark Township	ERIS	DEI	$ 13,000,000	J1578,J1829,
J1585 - Barnet - 161 Rebuild to 1200A	ERIS (LPC)	Ameren	$ 8,500,000	J1585
J1701 - Ipava - 138 kV rebuild 1200A	ERIS (LPC)	Ameren	$ 6,375,000	J1701
J1701 Ipava Rebuild	NRIS	AMIL	$ 13,000,000	J1701, J1734,
J1701-Macomb Rating Update	ERIS	AMIL	$ -	J1701
J1771-J1180 Rating Update	NRIS	AMIL	$ -	J1519, J1585, J1610, J1626, J1655, J1679, J1681, J1695, J1712, J1714, J1744, J1777, J1836,
J1780 POI to Crawfordsville	ERIS	DEI	$ 21,000,000	J1780,J1815,
J1782 to Whitesville	ERIS	DEI	$ 36,400,000	J1517,J1518,J1563,J1591,J1782,J1783,
Jacksonville IP Terminal Upgrade- MISO Project ID 23149	ERIS	AMIL	$ -	J1610
JH1453 - Havana 138 kV - Rebuild to 1600A	ERIS (LPC)	Ameren	$ 10,200,000	J1610, J1651, J1653, J1725, J1831
Kinmundy-Louisville Rebuild	NRIS	AMMO	$ -	J1626, J1714,
Kok Chrysler South to Greentown Maple St	ERIS	DEI	$ 20,000,000	J1563, J1625, J1765, J1782, J1783
Kokomo Delco to Kok Highland Park	ERIS	DEI	$ 8,600,000	J1563,J1625,J1765,J1782,J1783,
Laf AE Stealey to General Foods Jct	ERIS	DEI	$ 3,000,000	J1780,J1815,
Lafayette Gen to South Jct	ERIS	DEI	$ 1,200,000	J1780,J1815,
Lafayette S. to Fairfield Reconductor	ERIS	DEI	$ 5,000,000	J1780,J1815,
Lafayette S. to Shadeland	ERIS	DEI	$ 10,000,000	J1780,J1815,
Lafayette SE to Tipmont WEA	ERIS	DEI	$ 11,000,000	J1780,J1815,
Lake Holiday Jct to Park Co. Marshall sub	ERIS	DEI	$ 9,000,000	J1780,J1815,
Lebanon Interprise to Lebanon	ERIS	DEI	$ 3,250,000	J1563,J1782,J1783,
Louisville S- Jasper Rating Update	NRIS	AMIL	$ -	J1655, J1679,
LRTP MISO ID 23417	NRIS	NIPS	$ -	J1646,
LRTP Tranche 1- Hiple to Leesburg	ERIS	NIPS	$ -	J1802
LRTP-16	NRIS	NIPS	$ -	J1646,
Macomb NE - Hornsby Line Rebuild	NRIS	AMIL	$ 20,000,000	J1734
Macomb W-Monument Rebuild	NRIS	AMIL	$ 70,000,000	J1701, J1734,
Mason-San Jose Rail 138 kV line rebuild to 2000 A.idv	NRIS	AMIL	$ 3,000,000	J1653, J1725,

Network Upgrade	Type	TO	NU Cost Estimate ($)	Projects impacted
Mason-San Jose Rail Line Rebuild	NRIS	AMIL	$ 3,000,000	J1651, J1831,
MISO ID 17825	NRIS	AMIL	$ -	J1579
MISO ID 22796	NRIS	AMIL	$ -	J1734
MISO ID 23478	NRIS	AMIL	$ -	J1610, J1701, J1734, J1831,
Mittal - Bureau 138 kV to 1200A	ERIS (LPC)	Ameren	$ 12,962,500	J1755
Mohawk to HASTPK Reconductor	ERIS	DEI	$ 5,300,000	J1704,J1737,
Montezuma to Rockville	ERIS	DEI	$ 16,000,000	J1780,J1815,
NIPS 34501 Stillwell to Dumont	ERIS	AEP/NIPS	$ 9,800,000	J1492,J1586,J1635,J1639,J1659,J1660,J1665,
NIPS 34519 St John to Crete	ERIS	NIPS/CE	$ 900,000	J1492,J1586,J1635,J1678,J1805,J1810,
NRIS BREC 2020-1	NRIS	BREC	$ 16,000,000	J1632, J1703,
NRIS BREC 2020-2	NRIS	BREC	$ 22,000,000	J1632, J1703,
NRIS BREC 2020-3	NRIS	BREC	$ 12,500,000	J1632, J1703,
NRIS BREC 2020-4	NRIS	BREC	$ 21,500,000	J1632, J1703,
NRIS BREC 2020-5	NRIS	BREC	$ 15,000,000	J1632
NRIS BREC 2020-6	NRIS	BREC	$ 2,000,000	J1619, J1696, J1703,
NRIS_DPP-2020-DEI-MEROM_FAIRBANKS_UPRATE_CONDUCTOR	NRIS	HE/DEI	$ 3,000,000	J1565, J1579, J1616, J1619, J1637, J1638, J1641, J1642, J1691, J1696, J1697, J1703, J1707, J1736, J1786,
Nucor to Whitestown Parallel Line and Rebuild	ERIS	DEI	$ 198,000,000	J1491,J1704,J1756,J1806,J1491,
NW-MarionCounty-Reinforcement + Relay Update	ERIS	DEI/IPL	$ 64,200,000	J1491
Park Co to Rockville	ERIS	DEI	$ 16,000,000	J1780,J1815,
Pike Jct to Enterprise South Jct	ERIS	DEI	$ 9,950,000	J1563,J1782,J1783,
Pike Jct to Thorntown	ERIS	DEI	$ 30,000	J1563,J1782,J1783,
Prescott New Bank.idv	NRIS	DEI	$ 15,000,000	J1593, J1704, J1737, J1756, J1806,
Putnam-Mittal 138kV to 1200A	ERIS (LPC)	Ameren	$ 1,000,000	J1755
Quiver - Mason 138 kV to 2000A	ERIS	AMIL	$ 6,800,000	J1725
RAS	NRIS	DEI	$ -	J1616
Rebuild 0.25 miles of Grand Tower-Wittenberg 138 kV line to 1600 A	ERIS (LPC)	Ameren	$ 500,000	J1695, J1712, J1777, J1830
Rebuild 10 miles of Yvonne-Taylorville S 138 kV line to 2000 A	ERIS (LPC)	Ameren	$ 8,500,000	J1701, J1831
Rebuild 10.25 miles of N Nashville-Ashley 138 kV line to 1200 A	ERIS (LPC)	Ameren	$ 8,712,500	J1655, J1679
Rebuild 11 mile J1840-Leghorn 345 kV line to 3000 A	ERIS (LPC)	Ameren	$ 22,000,000	J1491, J1492, J1508, J1512, J1517, J1521, J1572, J1575, J1586, J1594, J1613, J1621, J1635, J1639, J1642, J1655, J1659, J1660,

Network Upgrade	Type	TO	NU Cost Estimate ($)	Projects impacted
				J1665, J1676, J1678, J1701, J1704, J1713, J1725, J1754, J1755, J1756, J1769, J1773, J1781, J1806, J1810, J1817, J1826, J1831
Rebuild 13.5 miles of El Paso tap to Minonk tap section of McLean-Rutland 138 kV line to 1600 A	ERIS (LPC)	Ameren	$ 11,475,000	J1676, J1677, J1839, J1840
Rebuild 16.5 mile Rantoul-Rising 138 kV line to 1600 A	ERIS (LPC)	Ameren	$ 14,000,000	J1517, J1676, J1713, J1831, J1517, J1676, J1713, J1831, J1676, J1676, J1676, J1517, J1676, J1713, J1831
Rebuild 17 mile Rezzy-Moro 138 kV line to 2000 A	ERIS (LPC)	Ameren	$ 14,000,000	J1610, J1626, J1651, J1652, J1655, J1676, J1677, J1679, J1713, J1714, J1744, J1770, J1831, J1839, J1840
Rebuild 2.25 mile J1266-Salem W 138 kV line to 1600 A	ERIS (LPC)	Ameren	$ 2,000,000	J1626, J1655, J1679, J1714, J1744
Rebuild 23 miles of Scarlet-Montgomery 345 kV line to 3000 A; Upgrade Montgomery terminal equipment	ERIS (LPC)	Ameren	$ 27,600,000	J1491, J1492, J1494, J1495, J1496, J1498, J1517, J1521, J1523, J1528, J1572, J1575, J1586, J1590, J1594, J1613, J1621, J1635, J1639, J1642, J1655, J1659, J1660, J1665, J1678, J1695, J1701, J1704, J1723, J1733, J1754, J1756, J1769, J1804, J1806, J1810, J1819, J1821, J1826, J1830
Rebuild 3.5 miles of Decatur JCT to E. Main St. section of N. Decatur-E. Main St. 138 kV line to 2000 A	ERIS (LPC)	Ameren	$ 2,975,000	J1676, J1725, J1831
Rebuild 4 mile Cottage Hills to Laclede S tap section of Wood River-Cottage Hills 138 kV line to 2000 A	ERIS (LPC)	Ameren	$ 3,500,000	J1626, J1713, J1714
Rebuild 4 miles of J1232 POI-Mattoon W 138 kV line to 2000 A	ERIS (LPC)	Ameren	$ 3,400,000	J1676, J1713, J1831
Rebuild 4.5 miles of J1232 POI-Arland 138 kV line to 2000 A	ERIS (LPC)	Ameren	$ 3,825,000	J1676, J1713, J1831
Rebuild 5 mile J1840-Goose Creek 345 kV line to 3000 A	ERIS (LPC)	Ameren	$ 10,000,000	J1491, J1492, J1508, J1512, J1517, J1521, J1572, J1575, J1586, J1594, J1613, J1621, J1635, J1639, J1642, J1655, J1659, J1660, J1665, J1676, J1678, J1701, J1704, J1713, J1725, J1754, J1755, J1756, J1769, J1773, J1781, J1806, J1810, J1817, J1826, J1831
Rebuild 5 miles of Latham-Docket 138 kV line to 2000 A	ERIS (LPC)	Ameren	$ 4,000,000	J1701, J1725, J1831
Rebuild 6 miles of Labadie-Gray Summit-1 345 kV line to 3000 A	ERIS (LPC)	Ameren	$ 12,000,000	J1491, J1498, J1517, J1521, J1572, J1575, J1590, J1594, J1613, J1621, J1642, J1655, J1695, J1704, J1723, J1754, J1756, J1806, J1830
Rebuild 6 miles of Labadie-Gray Summit-2 345 kV line to 3000 A	ERIS (LPC)	Ameren	$ 12,000,000	J1491, J1498, J1517, J1521, J1572, J1575, J1590, J1594, J1613, J1621, J1642, J1655, J1695, J1704, J1723, J1754, J1756, J1806, J1830

Network Upgrade	Type	TO	NU Cost Estimate ($)	Projects impacted
Rebuild 6.5 miles of Austin-Yvonne 138 kV line to 2000 A	ERIS (LPC)	Ameren	$ 5,525,000	J1701, J1831
Rebuild 9.5 miles of N Nashville to Okawville section of Barrel-N Nashville 138 kV line to 1200 A; (1) bus conductor upgrade at Okawville to 1200 A	ERIS (LPC)	Ameren	$ 8,075,000	J1655, J1679, J1712
Rebuild ADM N-Mt. Zion 7.5 mile 138 kV line to 2000 A	ERIS (LPC)	Ameren	$ 6,000,000	J1491, J1517, J1642, J1676, J1701, J1713, J1725, J1831
Rebuild Rezzy to Litchfield tap 138 kV line section to 2000 A	ERIS (LPC)	Ameren	$ 4,000,000	J1610, J1626, J1651, J1652, J1676, J1677, J1713, J1714, J1744, J1831, J1839, J1840
Rebuild Rising-Bondville 138 kV line to 2000 A	ERIS (LPC)	Ameren	$ 2,762,500	J1676
Rebuild Shockey-Dirksen 138 kV line to 1200 A	ERIS (LPC)	Ameren	$ 11,900,000	J1831
Rebuild Whitestown Hortonville	NRIS	620/208	$ 21,000,000	J1517, J1518, J1616, J1637, J1652, J1656, J1774,
Replace 2 345 kV switches at Labadie to 3000 A	ERIS (LPC)	Ameren	$ 500,000	J1491, J1517, J1521, J1572, J1575, J1590, J1594, J1613, J1621, J1642, J1655, J1695, J1704, J1754, J1756, J1806, J1826, J1830
Replace 69 kV 600 A switch with 1200 A 69 kV switch	ERIS (LPC)	Ameren	$ 55,000	J1734
Replace Sioux wave trap with 3000 A wave trap	ERIS (LPC)	Ameren	$ 200,000	J1491, J1492, J1517, J1521, J1572, J1575, J1586, J1590, J1594, J1613, J1621, J1635, J1639, J1642, J1655, J1659, J1660, J1665, J1678, J1695, J1704, J1754, J1756, J1805, J1806, J1810, J1830
Replace Sioux wave trap with 3000 A wave trap; upgrade 0.01 mi of Sioux-Belleau 345 kV line to 3000 A	ERIS (LPC)	Ameren	$ 500,000	J1491, J1517, J1521, J1572, J1575, J1590, J1594, J1613, J1621, J1642, J1655, J1695, J1704, J1754, J1756, J1769, J1806, J1826, J1830
Re-tap (2) 138 kV CTs for 2000 A capability at N Decatur 27th St.	ERIS (LPC)	Ameren	$ 250,000	J1652, J1656, J1676, J1677, J1713, J1770, J1839, J1840
Ruby - Sidney - 345kV 3000A	ERIS	AMIL	$ 3,000,000	J1656,J1770,
Seymour Bank 1	ERIS	DEI	$ 10,000,000	J1697
Spencer Creek to J1352 Line Rebuild	NRIS	AMMO	$ 52,000,000	J1494, J1495, J1496, J1497, J1498, J1502, J1503, J1504, J1508, J1510, J1512, J1513, J1520, J1521, J1529, J1534, J1566, J1567, J1572, J1573, J1575, J1581, J1582, J1588, J1594, J1596, J1597, J1605, J1611, J1613, J1615, J1620, J1621, J1629, J1653, J1657, J1701, J1706, J1708, J1716, J1719, J1720, J1725, J1730, J1732, J1733, J1734, J1735, J1740, J1745, J1746, J1750, J1751, J1752, J1754, J1755, J1769, J1773, J1778, J1779, J1781, J1793, J1803, J1808, J1814, J1817, J1824, J1826, J1843,
Sugar Creek - Kansas 345 kV 2nd Line	ERIS (LPC)	Ameren	$ 90,500,000	J1491, J1492, J1517, J1586, J1635, J1639, J1642, J1655, J1656, J1659, J1660, J1665,

Network Upgrade	Type	TO	NU Cost Estimate ($)	Projects impacted
				J1676, J1678, J1695, J1701, J1704, J1713, J1725, J1755, J1756, J1770, J1805, J1806, J1810, J1831, J1491, J1492, J1517, J1586, J1635, J1639, J1642, J1655, J1656, J1659, J1660, J1665, J1676, J1678, J1695, J1701, J1704, J1713, J1725, J1755, J1756, J1770, J1805, J1806, J1810, J1831, J1642, J1704, J1756, J1830
Sugar Creek to Cay CT Conductor Uprate	NRIS	DEI	$ 3,000,000	J1591, J1626, J1641, J1652, J1691, J1713, J1714, J1721, J1744, J1786, J1840,
Thorntown Substation	ERIS	DEI	$ 12,000,000	J1563,J1782,J1783,
Tipmont Jct to Linden Jct	ERIS	DEI	$ 22,000,000	J1780,J1815,
Tipmont Jct to Tipmont WEA	ERIS	DEI	$ 12,000,000	J1780,J1815,
Upgrade 10 miles of Lawrenceville-Vincennes 138 kV line (Ameren end) line to 2000 A	ERIS (LPC)	Ameren	$ 8,500,000	J1642, J1655
Upgrade Casey W 345 kV Wave Trap	NRIS	AMIL	$ 200,000	J1519, J1610, J1626, J1651, J1655, J1676, J1677, J1679, J1681, J1695, J1712, J1713, J1714, J1744, J1777, J1831, J1836, J1839, J1840,
Walton Transformer Replacement	NRIS	DEI	$ 10,000,000	J1678, J1680, J1743,
Whitesville to Thornton Reconductor	ERIS	DEI	$ 38,000,000	J1517,J1518,J1563,J1591,J1782,J1783,
Whitesville to Whitesville South	ERIS	DEI	$ 10,000,000	J1563,J1782,J1783,

Note:

1) Details pertaining to upgrades, costs, and the execution plan for interconnection of the generating facility at the POI will be documented in the Facility Study for Interconnecting Generator.
2) Facilities that have been included as base case assumptions and the level of interconnection service that would be conditional upon these facilities being in service will be documented in the GIA (Generator Interconnection Agreement) for each respective GI request successfully achieving GIA execution.
3) A detailed summary of the estimated cost of Network Upgrades on a per project basis can be found in Appendix B – Network Upgrade Table Per Project (CEII).

2. FERC Order 827 Compliance Review

The Final Rule of FERC Order 827 “Reactive Power Requirements for Non-Synchronous Generation”, which was issued June 16, 2016, states that “Under this Final Rule, newly interconnecting non-synchronous generators that have not yet executed a Facilities Study Agreement as of the effective date of this Final Rule will be required to provide dynamic reactive power within the range of 0.95 leading to 0.95 lagging at the high-side of the generator substation.” As such, this Final Rule applies to all wind and solar projects included in the DPP 2020 Central study.

In this study, the power factor at the high-side of the generator substation for each inverter-based project was calculated and reviewed. The study method is to set Qgen of each study project at its Qmax, solve the case, then record the P and Q injection on the high side of the generator substation to calculate the lagging power factor (injecting VAR to the system). The same process is then repeated by setting Qgen at Qmin to calculate the leading power factor (absorbing VAR from the system).

The results show that all projects meet the requirement to maintain 0.95 leading power factor, however, 55

projects do not meet the requirement to provide reactive power capability corresponding to 0.95 lagging power factor, as highlighted in red below in **Error! Reference source not found.**. Additional reactive support will be needed for these projects to meet the FERC requirement on reactive power capability prior to the completion of their GIA.

Table 5: FERC Order 827 Review Results

Project	Pmax (MW)	Reactive Power Capability (MVAR)	Modeled VAR Compensation (MVAR)	VAR Injection			VAR Absorbtion				
				P (MW)	Q (MVAR)	P.F. (pu)	P (MW)	Q (MVAR)	P.F. (pu)	Meet FERC Order 827 Requirement?	Add'l VAR Needed (MVAR)
J1491	200.0	±65.00	0	197.0	11.5	0.9983	195.3	-147.4	-0.7982	No	53.3
J1517	45.0	±21.80	0	44.7	19.6	0.9159	44.7	-24.3	-0.8783	Yes	N/A
J1518	219.4	±106.30	0	214.2	75.5	0.9432	212.7	-145.7	-0.8250	Yes	N/A
J1519	203.3	±104.28	0	198.0	49.9	0.9697	192.2	-221.5	-0.6553	No	15.2
J1563	204.0	±66.88	0	199.2	8.3	0.9991	196.1	-164.3	-0.7665	No	57.2
J1565	204.0	±66.88	0	199.5	13.5	0.9977	197.1	-149.4	-0.7969	No	52.1
J1578	204.0	±66.88	0	199.4	12.9	0.9979	196.8	-151.0	-0.7934	No	52.7
J1579	204.0	±66.88	0	199.5	14.9	0.9972	197.3	-145.9	-0.8039	No	50.7
J1585	204.0	±66.88	0	199.3	12.9	0.9979	196.7	-151.1	-0.7932	No	52.6
J1591	91.2	±25.00	28	150.0	57.4	0.9339	180.3	-92.8	-0.8893	Yes	N/A
J1591	91.2	±25.00	28	150.0	57.4	0.9339	180.3	-92.8	-0.8893	Yes	N/A
J1593	100.0	±48.43	0	197.0	62.1	0.9537	195.6	-152.0	-0.7896	No	2.6
J1593	100.0	±48.43	0	197.0	62.1	0.9537	195.6	-152.0	-0.7896	No	2.6
J1600	40.8	±13.45	0	40.0	9.8	0.9714	40.3	-17.8	-0.9147	No	3.4
J1604	51.1	±16.87	0	50.0	10.0	0.9806	50.4	-25.4	0.8933	No	6.4
J1610	102.1	±33.70	0	100.0	15.7	0.9879	99.9	-57.5	-0.8666	No	17.2
J1616	203.3	±104.28	0	198.0	50.8	0.9686	192.4	-219.0	-0.6600	No	14.3
J1619	68.4	±26.30	52	187.3	76.8	0.9252	186.8	-91.2	-0.8986	Yes	N/A
J1619	121.6	±26.30	52	187.3	76.8	0.9252	186.8	-91.2	-0.8986	Yes	N/A
J1624	101.4	±53.25	0	99.8	31.7	0.9530	98.9	-88.3	-0.7460	No	1.1
J1625	152.4	±84.72	0	149.4	46.9	0.9541	146.9	-157.9	-0.6813	No	2.2
J1626	152.4	±84.72	0	149.6	49.5	0.9495	147.5	-148.2	-0.7054	Yes	N/A
J1632	117.8	±33.00	64	232.5	88.2	0.9349	231.6	-128.5	-0.8744	Yes	N/A
J1632	117.8	±33.00	64	232.5	88.2	0.9349	231.6	-128.5	-0.8744	Yes	N/A
J1636	52.0	±17.00	7	51.5	17.5	0.9469	51.4	-26.0	-0.8922	Yes	N/A
J1637	91.2	±25.00	56	180.3	82.6	0.9091	179.8	-91.6	-0.8910	Yes	N/A
J1637	91.2	±25.00	56	180.3	82.6	0.9091	179.8	-91.6	-0.8910	Yes	N/A
J1638	91.2	±25.00	28	150.0	54.5	0.9398	179.6	-95.9	-0.8820	Yes	N/A
J1638	91.2	±25.00	28	150.0	54.5	0.9398	179.6	-95.9	-0.8820	Yes	N/A
J1641	91.2	±25.00	42	180.2	59.6	0.9495	179.5	-95.9	-0.8821	Yes	N/A
J1641	91.2	±25.00	42	180.2	59.6	0.9495	179.5	-95.9	-0.8821	Yes	N/A

Project	Pmax (MW)	Reactive Power Capability (MVAR)	Modeled VAR Compensation (MVAR)	VAR Injection			VAR Absorbtion			Meet FERC Order 827 Requirement?	Add'l VAR Needed (MVAR)
				P (MW)	Q (MVAR)	P.F. (pu)	P (MW)	Q (MVAR)	P.F. (pu)		
J1642	209.0	±68.69	0	200.0	97.4	0.8991	304.3	-209.8	-0.8233	Yes	N/A
J1642	104.5	±34.35	0	200.0	97.4	0.8991	304.3	-209.8	-0.8233	Yes	N/A
J1646	152.1	±67.00	0	149.7	39.8	0.9664	148.8	-105.0	-0.8170	No	19.3
J1649	61.3	±20.16	0	60.0	12.6	0.9787	60.5	-29.6	-0.8982	No	7.1
J1651	149.5	±49.10	92	146.4	120.8	0.7714	144.7	-103.9	-0.8122	Yes	N/A
J1652	134.9	±44.96	0	116.0	29.0	0.9701	132.9	-71.5	-0.8807	No	9.1
J1653	172.2	±57.40	0	150.0	27.4	0.9837	168.5	-110.5	-0.8362	No	21.9
J1655	54.5	±18.15	0	50.0	15.2	0.9569	54.2	-21.9	-0.9271	No	1.3
J1656	112.0	-39.74 / 53.28	28	412.0	110.3	0.9660	409.6	-283.0	-0.8227	No	25.1
J1656	100.0	±32.87	28	412.0	110.3	0.9660	409.6	-283.0	-0.8227	No	25.1
J1656	106.4	-37.75 / 50.62	28	412.0	110.3	0.9660	409.6	-283.0	-0.8227	No	25.1
J1656	103.5	±34.00	28	412.0	110.3	0.9660	409.6	-283.0	-0.8227	No	25.1
J1676	151.2	±73.22	30	294.9	129.0	0.9162	287.7	-292.3	-0.7014	Yes	N/A
J1676	151.2	±73.22	30	294.9	129.0	0.9162	287.7	-292.3	-0.7014	Yes	N/A
J1677	183.0	±137.28	0	178.8	120.5	0.8292	176.7	-169.5	-0.7216	Yes	N/A
J1678	40.5	±14.29	0	74.7	20.4	0.9645	76.0	-34.6	-0.9099	No	4.1
J1678	36.0	±12.70	0	74.7	20.4	0.9645	76.0	-34.6	-0.9099	No	4.1
J1679	126.7	±95.04	0	124.4	74.3	0.8587	121.9	-151.3	-0.6276	Yes	N/A
J1680	102.8	±77.10	0	101.1	56.6	0.8728	99.7	-116.8	-0.6492	Yes	N/A
J1681	100.0	±48.43	0	197.2	73.6	0.9368	196.1	-136.8	-0.8200	Yes	N/A
J1681	100.0	±48.43	0	197.2	73.6	0.9368	196.1	-136.8	-0.8200	Yes	N/A
J1684	201.0	±85.60	0	196.2	24.5	0.9923	188.1	-261.1	-0.5845	No	53.0
J1687	186.6	±62.20	0	160.0	32.2	0.9803	182.3	-120.1	-0.8349	No	20.4
J1691	203.0	±149.32	0	199.5	101.0	0.8922	198.8	-210.0	-0.6875	Yes	N/A
J1695	53.8	±16.40	0	50.0	8.1	0.9873	53.2	-28.3	-0.8832	No	8.4
J1696	152.1	±67.00	0	149.3	40.4	0.9653	147.9	-111.6	0.7981	No	8.7
J1697	204.0	±66.88	0	199.4	13.8	0.9976	196.9	-149.8	-0.7959	No	51.7
J1701	100.1	±33.35	0	196.4	24.2	0.9925	194.8	-128.5	-0.8347	No	40.3
J1701	100.1	±33.35	0	196.4	24.2	0.9925	194.8	-128.5	-0.8347	No	40.3
J1703	91.2	±24.70	24	74.0	35.5	0.9017	89.4	-58.3	-0.8377	Yes	N/A
J1704	53.8	±16.40	0	50.0	7.4	0.9892	53.2	-29.9	-0.8722	No	9.0
J1707	73.4	±31.30	0	72.3	32.2	0.9133	72.2	-31.9	-0.9145	Yes	N/A
J1712	150.7	±78.66	0	297.5	89.7	0.9574	294.9	-269.4	-0.7383	No	8.1
J1712	150.7	±78.66	0	297.5	89.7	0.9574	294.9	-269.4	-0.7383	No	8.1
J1713	151.5	±73.38	0	146.7	38.5	0.9673	143.1	-138.7	-0.7181	No	9.8
J1714	104.7	±32.90	0	100.0	13.8	0.9906	102.9	-60.7	-0.8613	No	19.1

Project	Pmax (MW)	Reactive Power Capability (MVAR)	Modeled VAR Compensation (MVAR)	VAR Injection			VAR Absorbtion				
				P (MW)	Q (MVAR)	P.F. (pu)	P (MW)	Q (MVAR)	P.F. (pu)	Meet FERC Order 827 Requirement?	Add'l VAR Needed (MVAR)
J1721	100.8	±75.60	0	174.8	84.2	0.9010	173.9	-197.9	-0.6601	Yes	N/A
J1721	77.8	±58.32	0	174.8	84.2	0.9010	173.9	-197.9	-0.6601	Yes	N/A
J1724	172.2	±57.40	0	150.0	27.2	0.9840	168.2	-113.8	-0.8283	No	32.1
J1725	100.8	±69.36	0	97.0	55.2	0.8691	94.3	-102.8	-0.6758	Yes	N/A
J1726	207.8	±88.00	0	200.0	44.2	0.9765	200.4	-167.6	-0.7670	No	34.9
J1736	101.6	±52.14	0	99.7	40.5	0.9264	99.0	-70.1	-0.8162	Yes	N/A
J1737	212.5	±87.30	0	208.0	57.6	0.9638	206.6	-127.7	-0.8506	No	10.8
J1743	148.5	±52.41	0	292.9	97.7	0.9486	296.3	-131.0	-0.9145	Yes	N/A
J1743	153.0	±54.00	0	292.9	97.7	0.9486	296.3	-131.0	-0.9145	Yes	N/A
J1744	153.0	±53.92	22	149.9	64.4	0.9188	149.2	-74.2	-0.8954	Yes	N/A
J1755	151.5	±73.33	0	147.2	46.3	0.9539	145.4	-116.0	-0.7816	No	2.1
J1765	96.9	±40.04	20	95.9	46.0	0.9018	95.6	-60.5	-0.8452	Yes	N/A
J1770	150.0	±49.30	0	147.1	31.2	0.9782	146.4	-75.0	-0.8901	No	17.1
J1772	203.3	±104.14	0	199.5	78.6	0.9304	197.9	-145.2	-0.8063	No	0.3
J1777	104.7	±34.41	0	100.0	7.0	0.9976	101.6	-83.6	-0.7724	No	25.9
J1780	200.0	±65.74	0	198.1	58.7	0.9588	198.0	-73.5	-0.9375	No	6.4
J1782	75.0	±24.65	0	147.5	-16.6	-0.9937	144.8	-184.2	-0.6180	No	65.1
J1782	75.0	±24.65	0	147.5	-16.6	-0.9937	144.8	-184.2	-0.6180	No	65.1
J1783	75.0	±24.65	0	147.5	-16.6	-0.9937	144.8	-184.2	-0.6180	No	65.1
J1783	75.0	±24.65	0	147.5	-16.6	-0.9937	144.8	-184.2	-0.6180	No	65.1
J1784	39.0	±12.82	0	37.9	-8.9	-0.9734	37.1	-49.4	-0.6008	No	21.4
J1785	102.4	±49.25	12	100.0	40.4	0.9272	31.9	-120.2	-0.2566	Yes	N/A
J1786	203.0	±149.32	0	199.5	101.6	0.8911	198.8	-209.2	-0.6888	Yes	N/A
J1802	151.2	±72.65	0	147.3	44.5	0.9572	144.7	-126.1	-0.7539	No	13.7
J1805	25.4	±11.80	12	25.3	23.6	0.7316	25.3	-12.9	0.8907	Yes	N/A
J1806	30.0	±13.02		29.9	13.2	0.9145	29.9	-12.3	-0.9247	Yes	N/A
J1810	60.0	±26.00	34	59.6	59.2	0.7094	59.6	-26.5	-0.9136	Yes	N/A
J1815	181.4	±60.79	25	179.4	53.2	0.9587	178.7	-106.5	-0.8591	No	5.7
J1829	180.0	±69.40	0	175.8	37.1	0.9784	174.0	-119.1	-0.8252	No	20.6
J1830	206.0	±16.72	0	200.0	9.8	0.9988	394.0	-301.5	-0.7941	No	55.9
J1830	203.5	±33.44	0	200.0	9.8	0.9988	394.0	-301.5	-0.7941	No	55.9
J1831	202.8	±98.40	0	197.7	31.3	0.9877	189.4	-279.1	-0.5615	No	33.7
J1835	200.0	±66.00	0	195.3	5.6	0.9996	191.8	-172.7	-0.7431	No	58.6
J1836	153.5	±54.10	0	300.0	44.3	0.9893	299.1	-199.8	-0.8315	No	54.3
J1836	153.5	±54.10	0	300.0	44.3	0.9893	299.1	-199.8	-0.8315	No	54.3

Project	Pmax (MW)	Reactive Power Capability (MVAR)	Modeled VAR Compensation (MVAR)	VAR Injection			VAR Absorbtion				
				P (MW)	Q (MVAR)	P.F. (pu)	P (MW)	Q (MVAR)	P.F. (pu)	Meet FERC Order 827 Requirement?	Add'l VAR Needed (MVAR)
J1839	325.0	±200.00		322.5	149.0	0.9079	321.6	-271.7	-0.7638	Yes	N/A
J1840	254.0	±167.20	0	246.4	80.4	0.9506	232.6	-420.4	-0.4841	No	0.6

3. Model Development and Study Assumptions

3.1 Base Case Models

The origin of the DPP 2020 Central Phase 1 models is the MTEP20 models. Since DPP 2019 Central Phase 3 was not completed at the time this study was being performed, all pre-queued projects and associated Network Upgrades from DPP 2019 Central Phase 2 were included with the Bench Cases. The Study Cases contain all the interconnection requests in DPP 2020 Central Phase 1 in addition to all the facilities in the Bench Cases.

- Bench Cases
  - DPP20-2025SH90-Phase 1-Bench_Central_Final_v1
  - DPP20-2025SUM-Phase 1-Bench_Central_Final_v1

- Study Cases
  - DPP20-2025SH90-Phase 1-Study_Charging_Central_Final_v1
  - DPP20-2025SH90-Phase 1-Study_Discharging_Central_Final_v1
  - DPP20-2025SUM-Phase 1-Study_Discharging_Central_Final_v1
  - DPP20-2025SUM-PhaseI-Study_NIPSCO LPC Charging_Final_v1

3.2 Monitored Elements

Under NERC category P0 conditions (system intact) branches were monitored for loading above the normal rating (PSS®E Rating A), and for NERC category P1-P7 conditions branches were monitored for emergency rating (PSS®E Rating B). Voltage limits were specified for system intact and contingent conditions as per applicable Transmission Owner Planning Criteria.

3.3 Contingencies

The following contingencies were considered in the steady state analysis:

1) NERC Category P0 (system intact -- no contingencies)
2) NERC Category P1 contingencies
   a. Single element outages, at buses with a nominal voltage of 68 kV and above
   b. Multiple element NERC Category P1 contingencies
3) NERC Category P2-P7 contingencies
4) For all the contingencies and post-disturbance analyses, cases were solved with transformer tap adjustment enabled, area interchange adjustment disabled, phase shifter adjustment disabled (fixed) and switched shunt adjustment enabled.

3.4 Study Methodology

Non-linear (AC) contingency analysis was performed on the benchmark and study cases, and the incremental impact of the DPP 2020 Central generating facilities was evaluated by comparing the steady state performance of the transmission system in the Bench and Study Cases. Analyses used PSS®E version 34.6.1 and TARA version 2202_2.

3.5 Performance Criteria

A branch is considered a thermal constraint if the following conditions are met:

1) The generator has a larger than twenty percent (20%) sensitivity factor on the overloaded facilities under post-contingent condition (see NERC TPL) or five percent (5%) sensitivity factor under system-intact condition, or
2) The overloaded facility or the overload-causing contingency is at generator's outlet, or
3) The megawatt impact due to the generator is greater than or equal to twenty percent (20%) of the applicable rating (normal or emergency) of the overloaded facility, or
4) For any other constrained facility, where none of the Study Generators meet one of the above criteria, however, the cumulative MW impact of the group of study generators is greater than twenty percent (20%) of the rating of the facility, then only those study generators whose individual MW impact is greater than five percent (5%) of the rating of the facility and has DF greater than five percent (5%) will be responsible for mitigating the cumulative MW impact constraint, or
5) Impacts on Affected Systems would be classified as injection constraints based on the Affected Systems' criteria, or
6) Any other applicable Transmission Owner Local Planning Criteria are met.

A bus is considered a voltage constraint if both of the following conditions are met:

1) The bus voltage is outside of the applicable normal or emergency limits for the post change case, and
2) The change in bus voltage is greater than 0.01 per unit

All generators must mitigate thermal injection constraints and voltage constraints in order to obtain any type of Interconnection Service. Further, all generators requesting NRIS must mitigate constraints found by using the Deliverability algorithm to meet the system performance criteria for NERC category P1 events, if DFAX due to the study generator is equal to or greater than 5%.

4. Voltage Analysis

The voltage analysis for DPP 2020 Central Phase 1 did not identify any valid voltage constraints.

5. Thermal Analysis

The thermal analysis results for DPP 2020 Central Phase 1 show 55 generator projects causing constraints. The details pertaining to the thermal analysis can be found in Appendix C – MISO ERIS Analysis (CEII).

6. Deliverability Analysis

Generator interconnection projects must pass Generator Deliverability Study to be granted NRIS. If the generator is deemed not fully deliverable, the customer can choose either to change the project to an Energy Resource project, reduce their NR service request amount during decision point, or to proceed with the system upgrades that will make the generator fully deliverable. Generator Deliverability Study ensures that the Network Resources, on an aggregate basis, can meet the MISO aggregate load requirements during system peak condition without getting bottled up. The wind and solar generators are tested at 100% of their maximum output level which then can be used to meet Resource Adequacy obligations, under Module E, of the MISO Transmission and Energy Market Tariff (TEMT).

The MISO Generator Deliverability Study whitepaper describing the algorithm can be found in BPM 015 – Generation Interconnection, Appendix C.

6.1 Determining the MW Restriction

If one facility is overloaded based on the assessed "severe yet credible dispatch" scenario described in the study methodology, and the generator under study has a DF greater than 5%, part or all its output it is not deliverable. The restricted MW is calculated as following:

$$(MW\ restricted) = \frac{worst\ loading - MW\ rating}{(generator\ sensitivity\ factor)}$$

If the result is larger than the maximum output of the generator, 100% of this generator's output is not deliverable.

6.2 Deliverability Study Results

The limiting constraints (monitored facilities – contingency facility pairs) seen in the deliverability analysis for the 2024 Summer case are summarized in Appendix D – MISO Deliverability Analysis (CEII). If a project is not determined to be fully deliverable as a result of the NRIS study, upgrades may be required to attain higher deliverable levels. The NRIS amount evaluated reflects the amount at the generator terminal (reviewed by the interconnection customer during the model review period).

Table 6: Deliverability Results (NRIS)

Project #	NR Requested (MW)	Maximum Deliverable Amount (MW)
J1491	200	200
J1517	40	0
J1518	185	0
J1519	200	0
J1563	200	138.36
J1565	200	127.35
J1578	200	200
J1579	200	0
J1585	200	0
J1591	150	0
J1593	200	100.08
J1600	40	40
J1604	50	50
J1610	100	0
J1616	200	0
J1619	160	69.1
J1624	100	100
J1625	150	103.77
J1626	150	0
J1632	200	125.82
J1636	44	44
J1637	150	0
J1638	150	64.78
J1641	150	0

Project #	NR Requested (MW)	Maximum Deliverable Amount (MW)
J1642	200	0
J1646	150	0
J1649	60	60
J1651	149.5	99.06
J1652	116	0
J1653	150	48.78
J1655	50	0
J1656	412	0
J1676	300	0
J1677	180	0
J1678	74.7	66.83
J1679	125	0
J1680	100	89.46
J1681	200	0
J1684	200	148.21
J1687	160	160
J1691	200	0
J1695	50	0
J1696	150	64.78
J1697	200	127.35
J1699	43	43
J1701	200	0
J1703	74	28.64
J1704	50	25.02
J1707	72	31.09
J1712	300	0
J1713	147.2	0
J1714	100	0
J1721	175.12	0
J1724	150	111.16
J1725	100	32.52
J1726	200	200
J1736	100	0
J1737	210	105.09
J1743	292.9	262.03

Project #	NR Requested (MW)	Maximum Deliverable Amount (MW)
J1744	149.5	0
J1755	147.2	117.06
J1756	309	154.62
J1765	93.2	64.48
J1770	0	0
J1772	200	200
J1774	50	0
J1777	100	0
J1780	200	0
J1782	150	103.78
J1783	150	103.78
J1784	39	39
J1785	100	74.11
J1786	200	0
J1802	150	150
J1805	0	0
J1806	1.6	0
J1810	60	60
J1815	180	180
J1829	180	180
J1830	200	200
J1831	200	0
J1835	200	200
J1836	300	0
J1839	340.3	0
J1840	250	0

7. Shared Network Upgrades Analysis

Shared Network Upgrade (SNU) Analysis, which tests for Network Upgrades driven by higher queued interconnection projects, was performed for this System Impact Study.

The maximum MW impacts and SNU cost allocations appear in Table 7.

Table 7: Shared Network Upgrade Cost Allocation

Network Upgrades	Project Study Cycle	Projects sharing cost	MW Contribution	Total NU Cost ($)	Cost Responsibility ($)
Belle Tap-Meta Tap 138 kV Line Rebuild Central 2019	DPP-2019-3	J1488	3.72	$14,000,000	$2,103,393
	DPP-2019-3	J1490	7.44		$4,206,785
	DPP-2020-1	J1585	13.60		$7,689,822
Parallel 08NEWLON - 08KOK HP line Central 2019	DPP-2019-3	J1378	26.84	$24,000,000	$10,717,245
	DPP-2019-3	J1482	9.20		$3,671,575
	DPP-2020-1	J1625	24.07		$9,611,180
Fairbanks - Dresser 345kV new line Central 2018	DPP-2018-APR	J1027	7.5	$6,000,000	$309,130
	DPP-2018-APR	J1028	7.53		$310,366
	DPP-2018-APR	J1074	10.06		$414,646
	DPP-2018-APR	J1189	10.06		$414,646
	DPP-2020-1	J1691	55.21		$2,275,606
	DPP-2020-1	J1786	55.21		$2,275,606

8. Cost Allocation

The cost allocation of Network Upgrades (NU) for the study group reflects responsibilities for mitigating system impacts based on Interconnection Customer-elected level of NRIS as of the draft System Impact Study report date.

8.1 Cost Assumptions for Network Upgrades

The cost estimate for each NU identified in the System Impact Study is provided by the corresponding Transmission Owner.

8.2 Cost Allocation Methodology

The costs of NU for a set of generation projects (one or more sub-groups or entire group with identified NU) are allocated based on the MW impact from each project on the constrained facilities in the Study Case.

Cost Allocation Methodology for Thermal Constraints

1. With all study group generation projects dispatched in the Study Case, all thermal constraints are identified.
2. Distribution factor from each project on each constraint is obtained.
3. For each thermal constraint, the maximum MW contribution (increasing flow) from each project is then calculated in the Post Case without any Network Upgrades.
4. For each thermal constraint, the cost estimates for one or a subset of NU are provided by the corresponding Transmission Owner.
5. The cost of each NU is allocated based on the pro rata share of the MW contribution from each project on the constraints mitigated or partly mitigated by this NU. The methodology to determine

the cost allocation of one NU is:

$$Project\ A\ Cost\ Portion\ of\ NU = \frac{Max(Proj.A\ MW\ contribution\ on\ constraint)}{\sum_i Max(Proj.i\ MW\ contrution\ on\ constraint)}$$

6. The total NU costs for each project are calculated if more than one NU is required.

Appendix A – Cost Allocation Summary (CEII)

Appendix B – Network Upgrade Table Per Project (CEII)

Appendix C – MISO ERIS Analysis (CEII)

Appendix D – MISO Deliverability Analysis (CEII)

Appendix E- Ameren System LPC

Appendix F- LPC Results