

SPP DISIS 2017-001 AFS STUDY REPORT

INTRODUCTION

Associated Electric Cooperative Inc. (AECI), through coordination with the Southwest Power Pool (SPP), has updated the analysis for generator interconnection requests (GIRs) within the DISIS 2017-001 Study Cycle (the “Study Cycle”) for an Affected System Study (AFS) evaluation on the AECI transmission system (the “Study”). The restudy has been conducted to include the withdrawal of the two (2) SPP Study Cycle requests as listed in Table 1 below.

Table 1: Withdrawn Study Cycle Requests

Project #	CA	Capacity (MW)	Service Type	Fuel Type	POI	Cluster Group
GEN-2017-090	KCPL	150.0	ER	Solar	Adrian 161 kV sub	13 - Northeast Kansas/Northwest Missouri
GEN-2017-064	WAPA	110.0	ER/NR	Solar	Underwood - Wayside 230 kV	17 - Western South Dakota

The list of Study Cycle requests included in the Study is listed in Table 2.

Table 2: Study Cycle Requests Evaluated

Project #	CA	Capacity (MW)	Service Type	Fuel Type	POI	Cluster Group
GEN-2017-009	WERE	302.0	ER	Wind	Neosho - Caney River 345 kV	08 - North Oklahoma/South Central Kansas
GEN-2017-061	GRDA	101.5	ER/NR	Solar	GRDA1 to CLARMR 5 161kV line	08 - North Oklahoma/South Central Kansas
GEN-2017-005	WERE	190.0	ER	Wind	Marmaton - Litchfield 161 kV	08 - North Oklahoma/South Central Kansas
GEN-2017-060	EDE	149.4	ER	Wind	LaRussell Energy Center 161kV	12 - Northwest Arkansas
GEN-2017-073	GRDA	72.5	ER	Solar	Dry Gulch 161kV sub	08 - North Oklahoma/South Central Kansas
GEN-2017-022	WERE	65.0	ER/NR	Solar	Altoona- NE Parson 138kV	08 - North Oklahoma/South Central Kansas
GEN-2017-076	AEPW	52.2	ER	Solar	Chamber Springs 161kV sub	12 - Northwest Arkansas
GEN-2017-074	AEPW	72.5	ER	Solar	Pryor Junction 138kV sub	08 - North Oklahoma/South Central Kansas
GEN-2017-082	EDE	149.4	ER	Wind	Asbury Plant 161 kV	12 - Northwest Arkansas
GEN-2017-092	OKGE	200.0	ER	Solar	Canadian River-Muskogee and Muskogee-Seminole 345kV	08 - North Oklahoma/South Central Kansas
GEN-2017-077	AEPW	124.7	ER	Solar	Explorer Claremore Tap EXCLART4	08 - North Oklahoma/South Central Kansas
GEN-2017-086	WERE	150.0	ER	Wind	Viola 345kV	08 - North Oklahoma/South Central Kansas
GEN-2017-018	SUNC	189.0	ER/NR	Solar	Thistle 345 kV sub	03 - Spearville
GEN-2017-040	OKGE	200.1	ER	Solar	Canadian River-Muskogee and Muskogee-Seminole 345kV	08 - North Oklahoma/South Central Kansas
GEN-2017-071	OKGE	124.7	ER	Solar	Greenwood 138kV sub	08 - North Oklahoma/South Central Kansas

Project #	CA	Capacity (MW)	Service Type	Fuel Type	POI	Cluster Group
GEN-2017-072	OKGE	52.2	ER	Solar	Greenwood 138kV sub	08 - North Oklahoma/South Central Kansas
GEN-2017-075	OKGE	200.0	ER	Solar	Hugo-Sunnyside 345 kV	14 - South Central Oklahoma
GEN-2016-037	AEPW	300.0	ER	Wind	Chisholm-Gracemont 345kV	07 - Southwestern Oklahoma
GEN-2017-004	SUNC	201.6	ER	Wind	Elm Creek - Summit 345 kV	04 - Northwest Kansas
GEN-2017-094	WAPA	200.0	ER	Wind	Fort Thompson-Huron 230 kV	15 - Eastern South Dakota
GEN-2017-027	OKGE	140.0	ER	Wind	Pooleville-Ratliff (Carter County) 138kV	14 - South Central Oklahoma
GEN-2017-014	WAPA	300.0	ER	Wind	Underwood - Philip Tap 230 kV	17 - Western South Dakota
GEN-2017-033	AEPW	200.0	ER/NR	Wind	Oklunion 345 kV sub	06 - South Texas Panhandle/New Mexico
GEN-2017-097	WAPA	128.0	ER	Solar	Underwood 115 kV Sub	17 - Western South Dakota
GEN-2017-048	BEPC	300.0	ER	Wind	Neset 230 kV Substation	16 - Western North Dakota
GEN-2017-010	BEPC	200.1	ER	Wind	Rhame 230 kV Sub	16 - Western North Dakota

The results of the analysis for the Study Cycle requests are included below. Network upgrades and cost allocations are subject to change in accounting for any withdraws of equally queued or higher queued requests included in this Study.

INPUTS AND ASSUMPTIONS

Each of the SERC member transmission planners is responsible for submitting system modeling data to SERC for development of the power flow models. Power flow analysis utilized the latest Long-Term Working Group (LTWG) models as developed by SERC Reliability Corporation (SERC). Each of the power flow models for the steady state analysis was modified to include appropriate higher-queued generation interconnection requests at the level of dispatch consistent with requirements of the service type requested as defined in AECI's GI Study Guidelines document. The direct connection network upgrades for MISO higher queued requests J1488 and J1490, as identified through their merchant HVDC requests H104 and H105, were included in the models:

- New J1145 – Montgomery 345 kV double circuit (2 and 3, Ameren facilities)

Modeling parameters in the SPP DISIS 2017-001 steady state models were referenced for each of the Study Cycle requests.

Full details of the inputs and assumptions are provided in Appendix A.

METHODOLOGY

Steady state analysis was performed to confirm the reliability impacts on the AECI system under a variety of system conditions and outages. AECI's transmission system must be capable of operating within the applicable normal ratings, emergency ratings, and voltage limits of AECI planning criteria. AECI is a member of SERC, one of eight Electric Reliability Organizations under the North American Electric Reliability Corporation (NERC). As a member of SERC, AECI develops its planning criteria consistent with NERC Reliability Planning Standards and the SERC planning criteria. The NERC TPL-001-4 Planning Standard Table I requires that, for normal and contingency conditions, line and equipment loading shall be within applicable thermal limits, voltage levels shall be maintained within applicable limits, all customer demands shall be supplied (except as noted), and stability of the network shall be maintained.

In evaluating the impacts of the Study Cycle projects, the following thermal and voltage limits were applied to the analysis for P0 or normal system conditions:

- Thermal Limits within Applicable Rating – Applicable Rating shall be defined as the Normal Rating. The thermal limit shall be 100% of Rating A.
- Voltage Limits within Applicable Rating – Applicable Rating shall have the meaning of Nominal Voltage. Voltage limits shall be set at plus or minus five percent (+/- 5%), 0.95 p.u. - 1.05 p.u. for systems operating at 60 kV or above on load serving buses.

The following thermal and voltage limits were applied to the analysis for contingency conditions under P1 and P2EHV planning events:

- Thermal Limits within Applicable Rating – Applicable Rating shall be defined as the Emergency Rating. The thermal limit shall be 100% of Rating B.
- Voltage Limits within Applicable Rating – Applicable Rating shall have the meaning of Nominal Voltage. Voltage limits shall be set at plus five percent to minus ten percent (+5%/-10%), 0.90 p.u. – 1.05 p.u. for systems operating at 60 kV or above on load serving buses.

In order for the Study Cycle requests to have a negative impact (i.e. criteria violation) on the system, the Study Cycle must cause a three percent (3%) or greater increase in flow on an overloaded facility based upon the rating of the facility. In order for the Project to have a negative voltage impact on the system, the Project must cause a voltage violation and have a two percent (2%) or greater change in the voltage.

System upgrades are required for constraints resulting from the addition of the Study Cycle requests under P0, P1, P2.1, P2.2 (EHV only), and P2.3 (EHV only) system conditions. For the purpose of this study, P2.1 events are included as part of the P1 contingency file. As such, these events will be denoted as a P1 event in the results. All improvements were developed and studied in coordination with AECI.

STEADY STATE ANALYSIS RESULTS

Steady state analysis results showed four (4) new thermal violations on the AECI system due to the addition of the Study Cycle projects as shown in Table 3.

Table 3: Steady State Constraints for the Study Cycle

Constraint ID	Event	Monitored Facility	Contingency	Season	Rating (MVA)	Base Loading	Project Loading
NU01/ NU02	P1	300740 7SPORTSMAN 345.00 300741 5SPORTSMAN 161.00 1	OPEN BRANCH FROM BUS 300741 [5SPORTSMAN 161.00] TO BUS 300740 [7SPORTSMAN 345.00] CKT 2	25H	500	97.3	101.9
			OPEN BRANCH FROM BUS 300739 [7BLACKBERRY 345.00] TO BUS 300740 [7SPORTSMAN 345.00] CKT 1	25L		101.8	106.2
		300740 7SPORTSMAN 345.00 300741 5SPORTSMAN 161.00 2	OPEN BRANCH FROM BUS 300739 [7BLACKBERRY 345.00] TO BUS 300740 [7SPORTSMAN 345.00] CKT 1	25H	500	97.3	101.9
			OPEN BRANCH FROM BUS 300741 [5SPORTSMAN 161.00] TO BUS 300740 [7SPORTSMAN 345.00] CKT 1	25L		101.8	106.2
NU03	P1	300101 5MORGAN 161.00 300782 2MORGAN 69.000 1	OPEN LINE FROM BUS 300774 [2EUDORA 69.000] TO BUS 300788 [2SLAGLE 69.000] CKT 1	25L	56	104.8	108.2
NU04	P1	300381 5BEVIER 161.00 300387 2BEVIER 69.000 1*	OPEN LINE FROM BUS 300172 [2TMHILL 69.000] TO BUS 301318 [2THMINTP 69.000] CKT 1	25S	112	-	100.0
				30S	112	-	102.1
	P2EHV		OPEN BRANCH FROM BUS 345435 [7MAYWOOD 345.00] TO BUS 636645 [SUB T HSK 3 345.00] CKT 1 OPEN BRANCH FROM BUS 40264 [J1026 POI 345.00] TO BUS 345435 [7MAYWOOD 345.00] CKT 1	30S	112	-	100.0

**Adverse impact with the inclusion of the first round of network upgrades applied for the Project, facility was created with the first round of network upgrades applied for the Project so there is no base loading to report, project loading reflects loading with network upgrades applied*

Two facilities were reported as overloaded prior to the addition of the Project, this is due to the stressed condition modeled. However, with the loading increase of three percent (3%) or more these facilities, these facilities are included as Project impacts.

CONTINGENT FACILITY RESULTS

Contingent Facilities are those facilities identified that are the responsibility of higher-queued generators or are included in the Transmission Provider’s transmission expansion plan and that if not included in the Study would otherwise be the responsibility of the Study Cycle requests as necessary to interconnect to the transmission system.

Nineteen (19) facilities were reported as Contingent Facilities with the addition of the Study Cycle requests. The most severe constraints are shown in Table 4.

Table 4: Steady State Contingent Constraints for the Study Cycle

Constraint ID	Event	Monitored Facility	Season	Rating (MVA)	Base Loading	Project Loading	Contingent Generator(s)
CF01	P1	300124 5HOLDENB2 161.00 300336 2HOLDEN 69.000 1	25S	56	156.6	163.5	MISO DPP 2019
			30S		161.5	167.6	
			25W	63	140.7	145.5	
			30W		143.4	147.5	
CF02	P1	300133 5THMHLB3 161.00 543062 SALSARY5 161.00 1	25S	334	108.5	111.8	GI-092/KCPL
CF03	P1	300193 2AVLON 69.000 300199 2HALE 69.000 1	25S	35	105.8	110.9	MISO DPP 2019
			30S		113.0	119.1	
CF04	P1	300194 2CHILLI 69.000 300218 5CHILLIS 161.00 1	25S	56	123.2	128.1	MISO DPP 2019
			30S		128.9	133.4	
CF05	P1	300199 2HALE 69.000 300201 2INGROV 69.000 1	25S	35	115.6	121.1	MISO DPP 2019
	P2EHV	300199 2HALE 69.000 300201 2INGROV 69.000 1	30S		123.5	129.7	
			30S	35	95.3	101.5	
CF06	P1	300327 2ELM 69.000 300336 2HOLDEN 69.000 1	25S	51	99.6	105.9	MISO DPP 2019
			30S		103.3	109.0	
CF07	P1	301168 2MANSFL 69.000 301174 2SEYMOR 69.000 1	25L	35	109.7	117.0	GI-088
CF08	P1	300061 5BOONE 161.00 300519 5MLRSBGB1 161.00 1	30S	285	96.6	100.6	MISO DPP 2019
	P2EHV	300061 5BOONE 161.00 300519 5MLRSBGB1 161.00 1	30S	285	100.7	105.9	
CF09	P1	300090 5KINGDMB1 161.00 301498 5MLRSBGB2 161.00 1	30S	285	100.3	104.3	GI-083
	P2EHV	300090 5KINGDMB1 161.00 301498 5MLRSBGB2 161.00 1	25S	285	94.3	100.2	

Constraint ID	Event	Monitored Facility	Season	Rating (MVA)	Base Loading	Project Loading	Contingent Generator(s)
			30S		104.4	109.5	
CF10	P1	300519 5MLRSBGB1 161.00 301498 5MLRSBGB2 161.00 Z1	30S	285	100.3	104.3	GI-083
	P2EHV	300519 5MLRSBGB1 161.00 301498 5MLRSBGB2 161.00 Z1	25S	285	94.3	100.2	
			30S		104.4	109.5	
CF11	P0	300774 2EUDORA 69.000 300788 2SLAGLE 69.000 1	25H	51	100.1	103.7	GI-088
			25S		96.8	100.7	
			30S		97.3	101.0	
	P2EHV	300774 2EUDORA 69.000 300788 2SLAGLE 69.000 1	25H	51	113.9	119.1	GI-088
			25L		97.3	102.5	
			25S		108.9	113.0	
			30S		110.3	113.9	
	CF12	P0	300388 2AXTELL 69.000 300400 2MACNLK 69.000 1*	25H	46	95.5	117.2
25W				57	90.6	113.4	
30W					89.8	112.6	
P1		300388 2AXTELL 69.000 300400 2MACNLK 69.000 1*	25L	46	98.7	115.9	
P2EHV		300388 2AXTELL 69.000 300400 2MACNLK 69.000 1*	25L	46	87.9	103.8	
CF13	P0	300388 2AXTELL 69.000 300401 2MACNTP 69.000 1*	25H	46	90.4	111.8	SPP DISIS 2016-002/MISO DPP-2019
			25W	57	84.0	106.6	
			30W		83.1	105.8	
	P1	300388 2AXTELL 69.000 300401 2MACNTP 69.000 1*	25L	46	96.9	114.1	
	P2EHV	300388 2AXTELL 69.000 300401 2MACNTP 69.000 1*	25L	46	86.1	102.0	
CF14	P0	300400 2MACNLK 69.000 301623 2BEVIERTP 69.000 1*	25W	57	98.2	121.0	SPP DISIS 2016-002/MISO DPP-2019

Constraint ID	Event	Monitored Facility	Season	Rating (MVA)	Base Loading	Project Loading	Contingent Generator(s)
			30W		97.8	120.7	
	P2EHV	300400 2MACNLK 69.000 301623 2BEVIERTP 69.000 1*	25L	46	91.4	107.4	
CF15	P1	300194 2CHILLI 69.000 300195 2CHILLR 69.000 1*	25S	35	96.5	103.0	MISO DPP 2019
CF16	P1	300275 2BRWNING 69.000 300280 2MILAN 69.000 1*	30S	35	95.1	100.4	GI-092
CF17	P0	300387 2BEVIER 69.000 301623 2BEVIERTP 69.000 1*	25H	60	84.5	101.2	SPP DISIS 2016-002/MISO DPP-2019
	P1	300387 2BEVIER 69.000 301623 2BEVIERTP 69.000 1*	25H	60	102.4	122.3	
	P2EHV	300387 2BEVIER 69.000 301623 2BEVIERTP 69.000 1*	25H	60	101.2	120.8	
CF18	P1	300398 2LOVELK 69.000 300401 2MACNTP 69.000 1*	25S	46	84.3	108.4	MISO DPP 2019
			30S		89.1	112.9	
	P2EHV	300398 2LOVELK 69.000 300401 2MACNTP 69.000 1*	25S	46	83.9	107.6	
			30S		87.9	112.1	
CF19	P1	300172 2TMHILL 69.000 300201 2INGROV 69.000 1*	25S	51	82.0	103.4	MISO DPP 2019
			30S		87.4	110.6	

**Adverse impact with the inclusion of the network upgrades applied for the Project, project loading for this facility reflects the loading after network upgrades were applied*

NEIGHBORING SYSTEM RESULTS

The Study has identified impacts from the Study Cycle requests on the AECI ties with neighboring systems. The most limiting component of the AECI owned portion of the facility was evaluated and if found inadequate, a network upgrade for the AECI equipment was determined. Network upgrades for transmission facilities limited by non-AECI equipment are not captured and will need to be coordinated with the appropriate transmission owner.

Three (3) facilities were reported on the AECI ties with the addition of the Study Cycle requests. The most severe constraints are shown in Table 5.

Table 5: Steady State Neighboring System Constraints for the Study Cycle Requests

Constraint ID	Event	Monitored Facility	Contingency	Area	Season	Rating	Base Loading	Project Loading
AFS01	P1	300194 2CHILLI 69.000 300232 2MPSLAR 69.000 1	OPEN BRANCH FROM BUS 300068 [5CHILLIN 161.00] TO BUS 300087 [5HICKCK 161.00] CKT 1	AECI/KCPL	30S	31	101.6	108.1
					25S		91.0	104.7
AFS02	P1	300232 2MPSLAR 69.000 300233 2MPSTRE 69.000 1	OPEN BRANCH FROM BUS 300068 [5CHILLIN 161.00] TO BUS 300087 [5HICKCK 161.00] CKT 1	AECI/KCPL	30S	31	97.0	103.4
					25S		86.3	100.2
AFS03	P1	300044 7MCCRED 345.00 345408 7OVERTON 345.00 1	OPEN LINE FROM BUS 40264 [J1026 POI 345.00] TO BUS 345435 [7MAYWOOD 345.00] CKT 1	AECI/AMMO	30S	956	96.8	101.1
	P2EHV	300044 7MCCRED 345.00 345408 7OVERTON 345.00 1	OPEN BRANCH FROM BUS 345435 [7MAYWOOD 345.00] TO BUS 636645 [SUB T HSK 3 345.00] CKT 1 OPEN BRANCH FROM BUS 40264 [J1026 POI 345.00] TO BUS 345435 [7MAYWOOD 345.00] CKT 1		30S		97.5	101.7

NETWORK UPGRADES

Transmission upgrades were evaluated to mitigate the impacts reported from the analyses as a result of the Study Cycle projects. The upgrades shown in Table 6 were evaluated in order to mitigate the reported steady state constraints for the Study Cycle as listed in Table 3.

Table 6: Network Upgrades for the Study Cycle Constraints

Constraint ID	Monitored Facility	Network Upgrade
NU01	300740 7SPORTSMAN 345.00	AECI upgrade Construct a new 161 kV terminal at Sportsman
	300741 5SPORTSMAN 161.00 1	
	300740 7SPORTSMAN 345.00	
	300741 5SPORTSMAN 161.00 2	
NU02	300740 7SPORTSMAN 345.00	GRDA/SPP upgrade Reroute Kerr-412 161 kV line to run between Sportsman and 412. Build a 3rd Maid-Kerr 161 kV line.
	300741 5SPORTSMAN 161.00 1	
	300740 7SPORTSMAN 345.00	
	300741 5SPORTSMAN 161.00 2	
NU03	300101 5MORGAN 161.00	Adjustment of transformer taps required to mitigate overload
	300782 2MORGAN 69.000 1	
NU04	300381 5BEVIER 161.00	Adjustment of transformer taps required to mitigate overload
	300387 2BEVIER 69.000 1	

The upgrades shown in Table 7 were evaluated in order to mitigate the reported steady state contingent constraints for the Study Cycle as listed in Table 4.

Table 7: Network Upgrades for the Study Cycle Contingent Constraints

Constraint ID	Monitored Facility	Network Upgrade
CF01	300124 5HOLDENB2 161.00	Contingent on MISO DPP 2019 Adjustment of transformer taps unable to mitigate overload Replace Holden 161/69 kV transformer 1 with 112/127 MVA unit
	300336 2HOLDEN 69.000 1	
CF02	300133 5THMHLB3 161.00	Contingent on GI-092/KCPL Rebuild 18.35-mile-long Thomas Hill to Salisbury 161 kV line using 1192 ACSS at 250C
	543062 SALSBRYS 161.00 1	
CF03	300193 2AVLON 69.000	Contingent on MISO DPP 2019 Rebuild 10.23-mile-long line to 336 ACSR at 100C
	300199 2HALE 69.000 1	
CF04	300194 2CHILLI 69.000 300218	Contingent on MISO DPP 2019 Adjustment of transformer taps able to mitigate base case overload but unable to mitigate overload with cluster generators added. Replace Chillicothe 161/69 kV transformer 1 with 84/95 MVA unit
	5CHILLIS 161.00 1	
CF05	300199 2HALE 69.000 300201	Contingent on MISO DPP 2019 Rebuild 10.9-mile-long 4/0 ACSR segment of line to 336 ACSR at 100C
	2INGROV 69.000 1	
CF06	300327 2ELM 69.000 300336	Contingent on MISO DPP 2019 Use of Holden Operating Guide unable to mitigate overload Uprate 3.1-mile-long 336 ACSR segment to from 75C to 100C
	2HOLDEN 69.000 1	
CF07	301168 2MANSFL 69.000	Contingent on GI-088 Rebuild Mansfield Central – Seymour 69 kV, 8.31 miles, utilize 336 ACSR conductor to be designed for 100°C
	301174 2SEYMOR 69.000 1	

Constraint ID	Monitored Facility	Network Upgrade
CF08	300061 5BOONE 161.00 300519 5MLRSBGB1 161.00 1	Contingent on MISO DPP 2019 Rebuild 9.36-mile-long line to 1192 ACSR at 100C Replace jumpers at Boone and Millersburg 161 kV buses to 1192 ACSR at 100C
CF09	300090 5KINGDMB1 161.00 301498 5MLRSBGB2 161.00 1	Contingent on GI-083 Reconductor Kingdom City – Millersburg 161 kV, 8.07 miles, utilize 795 ACSS High Temp conductor to be designed for 250°C
CF10	300519 5MLRSBGB1 161.00 301498 5MLRSBGB2 161.00 Z1	Contingent on GI-083 Upgrade Millersburg 161 kV bus tie jumpers, utilize 1590 ACSR conductor to be designed for 100°C
CF11	300774 2EUDORA 69.000 300788 2SLAGLE 69.000 1	Contingent on GI-088 Rebuild Eudora – Slagle 69 kV, 9.90 miles, utilize 795 ACSR conductor to be designed for 100°C
CF12	300388 2AXTELL 69.000 300400 2MACNLK 69.000 1	Contingent on SPP DISIS 2016-002/ MISO DPP-2019 Identified as adverse impact of GI-083 upgrades Rebuild 1.15-mile-long line to 795 ACSR at 100C
CF13	300388 2AXTELL 69.000 300401 2MACNTP 69.000 1	Contingent on SPP DISIS 2016-002/ MISO DPP-2019 Identified as adverse impact of GI-083 upgrades Rebuild 1.05-mile-long line to 795 ACSR at 100C
CF14	300400 2MACNLK 69.000 301623 2BEVIERTP 69.000 1	Contingent on SPP DISIS 2016-002/ MISO DPP-2019 Identified as adverse impact of GI-083 upgrades Rebuild 4.25-mile-long line to 795 ACSR at 100C
CF15	300194 2CHILLI 69.000 300195 2CHILLR 69.000 1	Contingent on MISO DPP 2019 Identified as adverse impact of DPP-2019 upgrades Rebuild 2.05-mile-long line to 336 ACSR at 100C
CF16	300275 2BRWNING 69.000 300280 2MILAN 69.000 1	Contingent on GI-092 Identified as adverse impact of GI-092 upgrades Rebuild 14-mile-long Browning to Milan 69 kV line to 336 ACSR at 100C
CF17	300387 2BEVIER 69.000 301623 2BEVIERTP 69.000 1	Contingent on SPP DISIS 2016-002/ MISO DPP-2019 Identified as adverse impact of GI-083 upgrades Rebuild 0.1-mile-long line to 795 ACSR at 100C Replace circuit breakers at Bevier 69 kV bus
CF18	300398 2LOVELK 69.000 300401 2MACNTP 69.000 1	Contingent on MISO DPP 2019 Identified as adverse impact of GI-083 upgrades Rebuild 12.2-mile-long line to 336 ACSR at 100C Replace circuit breakers at Love Lake 69 kV bus
CF19	300172 2TMHILL 69.000 300201 2INGROV 69.000 1	Contingent on MISO DPP 2019 Identified as adverse impact of DPP-2019 upgrades Uprate 23-mile-long line to 336 ACSR at 100C

No upgrades were evaluated for the neighboring system constraints listed in Table 5. The upgrades for these impacts will need to be resolved through coordination with the transmission owner as listed in Table 8 below.

Table 8: Neighboring System Constraints

Constraint ID	Monitored Facility	Network Upgrade
AFS01	300194 2CHILLI 69.000 300232 2MPSLAR 69.000 1	Evergy owns MLE element - coordination with SPP required, no upgrade evaluated

Constraint ID	Monitored Facility	Network Upgrade
AFS02	300232 2MPSLAR 69.000 300233 2MPSTRE 69.000 1	Evergny owns MLE element - coordination with SPP required, no upgrade evaluated
AFS03	300044 7MCCRED 345.00 345408 7OVERTON 345.00 1	Ameren owned line - coordination with MISO required, no upgrade evaluated

Simulations were performed on each of the scenarios with the identified network upgrade and contingent network upgrades included. Results from the simulations found that the network upgrades were able to mitigate the reported overload conditions as shown in Table 9 below.

Table 9: Steady State Results with Upgrades

Constraint ID	Event	Monitored Facility	Season	Rating (MVA)	Base Loading	Project Loading	Mitigation Loading
NU01/ NU02	P1	300740 7SPORTSMAN 345.00 300741 5SPORTSMAN 161.00 1	25H	500	97.3	101.9	83.9
			25L		101.8	106.2	91.8
		300740 7SPORTSMAN 345.00 300741 5SPORTSMAN 161.00 2	25H	500	97.3	101.9	83.9
			25L		101.8	106.2	91.8
NU03	P1	300101 5MORGAN 161.00 300782 2MORGAN 69.000 1	25L	56	104.8	108.2	95.2*
NU04	P1	300381 5BEVIER 161.00 300387 2BEVIER 69.000 1	25S	112	-	100.0	92.1*
			30S	112	-	102.1	94.2*
	P2EHV	300381 5BEVIER 161.00 300387 2BEVIER 69.000 1	30S	112	-	100.0	94.9*
CF01	P1	300124 5HOLDENB2 161.00 300336 2HOLDEN 69.000 1	25S	56	156.6	163.5	88.7
			30S		161.5	167.6	91.0
			25W	63	140.7	145.5	78.5
			30W		143.4	147.5	79.5
CF02	P1	300133 5THMLB3 161.00 543062 SALSBR5 161.00 1	25S	334	108.5	111.8	86.8*
CF03	P1	300193 2AVLON 69.000 300199 2HALE 69.000 1	25S	35	105.8	110.9	69.0
			30S		113.0	119.1	73.1
CF04	P1	300194 2CHILLI 69.000 300218 5CHILLIS 161.00 1	25S	56	123.2	128.1	93.0
			30S		128.9	133.4	97.9
CF05	P1	300199 2HALE 69.000 300201 2INGROV 69.000 1	25S	35	115.6	121.1	73.9
			30S		123.5	129.7	78.4
	P2EHV	300199 2HALE 69.000 300201 2INGROV 69.000 1	30S	35	95.3	101.5	61.1
CF06	P1	300327 2ELM 69.000 300336 2HOLDEN 69.000 1	25S	51	99.6	105.9	84.6
			30S		103.3	109.0	87.1
CF07	P1	301168 2MANSFL 69.000 301174 2SEYMOR 69.000 1	25L	35	109.7	117.0	64.2
CF08	P1	300061 5BOONE 161.00 300519 5MLRSBGB1 161.00 1	30S	285	96.6	100.6	77.7
	P2EHV	300061 5BOONE 161.00 300519 5MLRSBGB1 161.00 1	30S	285	100.7	105.9	82.4
CF09	P1	300090 5KINGDMB1 161.00 301498 5MLRSBGB2 161.00 1	30S	285	100.3	104.3	89.7
	P2EHV		25S	285	94.3	100.2	86.8

Constraint ID	Event	Monitored Facility	Season	Rating (MVA)	Base Loading	Project Loading	Mitigation Loading
		300090 5KINGDMB1 161.00 301498 5MLRSBGB2 161.00 1	30S		104.4	109.5	94.9
CF10	P1	300519 5MLRSBGB1 161.00 301498 5MLRSBGB2 161.00 Z1	30S	285	100.3	104.3	68.7
	P2EHV	300519 5MLRSBGB1 161.00 301498 5MLRSBGB2 161.00 Z1	25S	285	94.3	100.2	66.5
30S			104.4		109.5	72.7	
CF11	P0	300774 2EUDORA 69.000 300788 2SLAGLE 69.000 1	25H	51	100.1	103.7	46.1
			25S		96.8	100.7	44.7
			30S		97.3	101.0	44.9
	P2EHV	300774 2EUDORA 69.000 300788 2SLAGLE 69.000 1	25H	51	113.9	119.1	53.0
			25L		97.3	102.5	45.5
			25S		108.9	113.0	50.1
30S	110.3	113.9	50.7				
CF12	P0	300388 2AXTELL 69.000 300400 2MACNLK 69.000 1	25H	46	95.5	117.2*	48.8
			25W	57	90.6	113.4*	48.0
			30W		89.8	112.6*	47.7
	P1	300388 2AXTELL 69.000 300400 2MACNLK 69.000 1	25L	46	98.7	115.9*	48.3
	P2EHV	300388 2AXTELL 69.000 300400 2MACNLK 69.000 1	25L	46	87.9	103.8*	43.2
CF13	P0	300388 2AXTELL 69.000 300401 2MACNTP 69.000 1	25H	46	90.4	111.8*	46.8
			25W	57	84.0	106.6*	45.3
			30W		83.1	105.8*	45.0
	P1	300388 2AXTELL 69.000 300401 2MACNTP 69.000 1	25L	46	96.9	114.1*	47.5
	P2EHV	300388 2AXTELL 69.000 300401 2MACNTP 69.000 1	25L	46	86.1	102.0*	42.5
CF14	P0	300400 2MACNLK 69.000 301623 2BEVIERTP 69.000 1	25W	57	98.2	121.0*	51.0
			30W		97.8	120.7*	50.9
	P2EHV	300400 2MACNLK 69.000 301623 2BEVIERTP 69.000 1	25L	46	91.4	107.4*	44.6
CF15	P1	300194 2CHILLI 69.000 300195 2CHILLR 69.000 1	25S	35	96.5	103.0*	51.7
CF16	P1	300275 2BRWNING 69.000 300280 2MILAN 69.000 1	30S	35	95.1	100.4*	52.7
CF17	P0	300387 2BEVIER 69.000 301623 2BEVIERTP 69.000 1	25H	60	84.5	101.2*	54.7
	P1	300387 2BEVIER 69.000 301623 2BEVIERTP 69.000 1	25H	60	102.4	122.3*	66.0
	P2EHV	300387 2BEVIER 69.000 301623 2BEVIERTP 69.000 1	25H	60	101.2	120.8*	65.3
CF18	P1	300398 2LOVELK 69.000 300401 2MACNTP 69.000 1	25S	46	84.3	108.4*	77.2
			30S		89.1	112.9*	82.2
	P2EHV	300398 2LOVELK 69.000 300401 2MACNTP 69.000 1	25S	46	83.9	107.6*	76.6
			30S		87.9	112.1*	80.0
CF19	P1	300172 2TMHILL 69.000 300201 2INGROV 69.000 1	25S	51	82.0	103.4*	75.9
			30S		87.4	110.6*	80.4

*Loading with network upgrade and/or transformer tap adjustment

AECI, SPP, and GRDA collaborated to develop NU01 and NU02 to mitigate the overloads on AECI's system due to the addition of the Study Cycle requests. NU01 will be designed and constructed by AECI. SPP interconnection customers with cost allocation for NU01 will be required to execute a Facility Construction Agreement with AECI. NU02 will be designed and constructed by GRDA/SPP. SPP interconnection customers with costs allocation for NU02 will be required to coordinate with GRDA/SPP to fund these upgrades. The Study Cycle projects may be subject to limited operations until both NU01 and NU02 are in service.

AECI developed non-binding, good faith estimates of the timing and cost estimates for NU01 as shown in Table 10. The cost for NU02 shown in Table 10 was provided by GRDA and is shown for reference.

Table 10: Network Upgrade Costs

ID	Option / Description	Current Cost	Lead Time from Written Authorization
NU01	AECI System Upgrade -Construct a new 161 kV terminal at Sportsman	\$ 2,435,000	36 months
NU02	GRDA/SPP System Upgrade -Reroute Kerr-412 161 kV line to run between Sportsman and 412. -Build a 3rd Maid-Kerr 161 kV line.	\$ 9,058,000	TBD by GRDA/SPP
		Total Cost:	\$11,493,000

Cost allocations for each of the impacted facilities is discussed in the Cost Allocation section below.

COST ALLOCATION

Network upgrade costs are allocated to each of the Study Cycle projects based on the worst MW impact¹ each project had on the constraint and as described in the steps below:

1. Determine the MW impact each Study Cycle project had on each constraint using the size of each request:

$$\text{Project X MW Impact on Constraint 1} = \text{DFAX (X)} * \text{MW (X)} = \text{X1}$$

$$\text{Project Y MW Impact on Constraint 1} = \text{DFAX (Y)} * \text{MW (Y)} = \text{Y1}$$

¹ All negative MW impacts (helpers) were set to 0 MW impact.

$$\text{Project Z MW Impact on Constraint 1} = \text{DFAX (Z)} * \text{MW (Z)} = Z1$$

- Determine the maximum MW% impact each generator has as a percentage of the total Study Cycle impact on a given constraint.

$$X2 = \text{Project X MW impact \%} = \frac{X1}{\text{Total MW Impact of Study Cycle on Constraint}}$$

$$Y2 = \text{Project Y MW impact \%} = \frac{Y1}{\text{Total MW Impact of Study Cycle on Constraint}}$$

$$Z2 = \text{Project Z MW impact \%} = \frac{Z1}{\text{Total MW Impact of Study Cycle on Constraint}}$$

- Apply three percent (3%) MW impact De Minimis Threshold: If a Study Cycle project MW% impact is less than 3% for a particular constraint then the project MW% impact is adjusted to 0 for that constraint and the Study Cycle project will not be allocated cost for that particular constraint.
- Determine the cost allocated to each remaining Study Cycle project for each upgrade using the total cost of a given upgrade:

$$\text{Project X Upgrade 1 Cost Allocation (\$)} = \frac{\text{Network Upgrade 1 Cost (\$)} * X2}{X2 + Y2 + Z2}$$

The associated cost allocation of the network upgrades to each of the Study Cycle projects is provided in Table 11. Further breakdown of costs is provided in Appendix B.

Table 11: Network Upgrade Cost Allocation

Project	NU01	NU02	Total Cost
GEN-2016-037	\$ 0	\$ 0	\$ 0
GEN-2017-004	\$ 0	\$ 0	\$ 0
GEN-2017-005	\$ 0	\$ 0	\$ 0
GEN-2017-009	\$ 0	\$ 0	\$ 0
GEN-2017-010	\$ 0	\$ 0	\$ 0
GEN-2017-014	\$ 0	\$ 0	\$ 0
GEN-2017-018	\$ 0	\$ 0	\$ 0
GEN-2017-022	\$ 0	\$ 0	\$ 0
GEN-2017-027	\$ 0	\$ 0	\$ 0
GEN-2017-033	\$ 0	\$ 0	\$ 0
GEN-2017-040	\$ 0	\$ 0	\$ 0
GEN-2017-048	\$ 0	\$ 0	\$ 0
GEN-2017-060	\$ 0	\$ 0	\$ 0
GEN-2017-061	\$ 946,825	\$ 3,522,110	\$ 4,468,935
GEN-2017-071	\$ 0	\$ 0	\$ 0
GEN-2017-072	\$ 0	\$ 0	\$ 0
GEN-2017-073	\$ 688,323	\$ 2,560,505	\$ 3,248,828
GEN-2017-074	\$ 310,987	\$ 1,156,848	\$ 1,467,835
GEN-2017-075	\$ 0	\$ 0	\$ 0
GEN-2017-076	\$ 0	\$ 0	\$ 0
GEN-2017-077	\$ 488,865	\$ 1,818,537	\$ 2,307,402
GEN-2017-082	\$ 0	\$ 0	\$ 0
GEN-2017-086	\$ 0	\$ 0	\$ 0
GEN-2017-092	\$ 0	\$ 0	\$ 0
GEN-2017-094	\$ 0	\$ 0	\$ 0
GEN-2017-097	\$ 0	\$ 0	\$ 0
Total Cost	\$ 2,435,000	\$ 9,058,000	\$ 11,493,000

VERSION HISTORY

Version Number and Date	Author	Change Description
V0 – 04/07/2020	AECI	Initial release
V1 – 10/28/2021	AECI	Withdrawal of the thirteen (13) SPP Study Cycle requests
V2 – 05/16/2022	AECI	Withdrawal of the two (2) SPP Study Cycle requests

APPENDIX A
DISIS-2017-001 AFS STUDY ASSUMPTIONS

APPENDIX A
DISIS-2017-001 AFS Study Assumptions - Setup

AECI Guideline:		Version 3, dated 9/17/2021			Include
Project:	DISIS-2017-001 AFS				x
POI:	N/A				
Pgen MW:	N/A				
POI MW:	N/A				
ISD:	N/A				
Service:	NRIS				x
SS Series:	2020				X
SS Cases:	2022L				
	2022SP				
	2022WP				
	2022Z				
	2025L				x
	2025H				x
	2025SP				x
	2025WP				x
	2030SP				x
	2030WP				x
Topology Updates:					
	6/24/2020	Darlington-Stanberry to 336 ACSR Peach Bottom was made system swing bus			x
	8/21/2020	Updated modeling of GI-061 In SP cases, updated SF1 so that it was in service, Pmax and Pgen set to 241 MW In all other cases, just updated Pmax to 241 MW			x
	10/16/2020	Wright City upgrades			x
	1/14/2021	Morgan-Brookline rating update Maryville tie-line updated to 557 ACSR Wolf Creek - Blackberry 345 kV included in 10 year models (2026+) Improvement 529 - Taps the Jamesville (300089) to Battlefield (300348) 161 kV line to a new Clever 161 bus. A new 161/69 xfmr is being added to Clever DEI area swing updated so that Pgen was within limits (was outside limits in cases off the shelf)			x
	3/4/2021	Carrington topology updates Deletes Carrington Junction bus and all lines going into it Creates Fulton South 69 kV bus Added 69 kV lines to Fulton and Carrington Updated Auxvasse - Kingdom City 69 kV line Updated Kingdom City - Fulton 69 kV line Updated Reform - Kingdom City 69 kV line Added Summit - Carrington 69 kV line Changed area of Dell generation to AECI (area 330)			x
	8/24/2021	Morgan-Dadeville rating update GI-068 removed from benchmark cases			x
Local Gen:	N/A				
Local Subs:	N/A				
Outages:	AECI singles + ties	All			x
	AECI P1 events	All			x
	AECI P2.1 events	All			x
	AECI P2.2-3 EHV events	All			x
	AECI P2.2-3 HV events				
	Tier 1 singles/ties	All			x
	Tier 1 P1 events	2 buses			x
	Tier 1 P2.1 events	2 buses			x
	Tier 1 P2.2-3 events (EHV)	2 buses			x
Monitoring:	AECI facilities	P0-P1-P2			x
	All buses within 5 buses from AECI seam	P0-P1-P2	GI only		
	AECI facilities + ties	P3-P6			
	Tier 1				
Base Upgrades:					
	J1488 + J1490	New J1145 - Montgomery 345 kV double circuit (2 and 3, Ameren facilities)			x
	GI-083	Upgrade Kingdom City 161/69 kV transformers #2 and #3 to 84/96 MVA units Rebuild Kingdom City - Williamsburg 161 kV, 11.89 miles, utilize 1590 ACSR conductor to be designed for 100°C Rebuild Williamsburg - Montgomery City 161 kV, 17.84 miles, utilize 1590 ACSR conductor to be designed for 100°C Upgrade Thomas Hill 345/161 kV transformer #4 to 625/712 MVA unit Thomas Hill - Bevier area upgrades: Move Thomas Hill - Meadville 161 kV line to Thomas Hill Bus #3 Move Thomas Hill - Salisbury 161 kV line to Thomas Hill Bus #4 Add Thomas Hill Bus #2 - Bevier 161 kV line Add Bevier 161/69 kV transformer rated for 112/127 MVA Remove Thomas Hill - Bevier 69 kV line Rebuild Reform-Chamais 69kV, 4.00 miles, utilize 795 ACSR conductor to be designed for 100°C			
	DISIS-2016-002 (contingent for GI-083)	Rebuild Bevier - Macon Lake 69 kV, 4.14 miles, utilize 477 ACSR conductor to be designed for 100°C (Contingent facility) Rebuild Axtell - Macon Lake 69 kV, 1.15 miles, utilize 477 ACSR conductor to be designed for 100°C (Contingent facility) Rebuild Axtell - Macon Tap 69 kV, 1.05 miles, utilize 477 ACSR conductor to be designed for 100°C (Contingent facility)			

APPENDIX A
DISIS-2017-001 AFS Study Assumptions - Generation Dispatch

SPP																				
Study	GIR	Status	Type	Fuel Type	Study Region	Scale Region	POI	SP Pmax	WP Pmax	S	W	L	H	25S	25W	25L	25H	30S	30W	Include
DISIS-2016-002	GEN-2016-162	IA FULLY EXECUTED/ON SUSPENSION	-	Wind	SPP	SPP	-	252	252	0.2	0.2	0.2	0.2	50.4	50.4	50.4	50.4	50.4	50.4	X
DISIS-2016-002	GEN-2016-163	IA FULLY EXECUTED/ON SUSPENSION	-	Wind	SPP	SPP	-	252	252	0.2	0.2	0.2	0.2	50.4	50.4	50.4	50.4	50.4	50.4	X
DISIS-2016-002	GEN-2016-118	IA FULLY EXECUTED/COMMERCIAL OPERATION	-	Wind	SPP	SPP	-	288	288	0.2	0.2	0.2	0.2	57.6	57.6	57.6	57.6	57.6	57.6	X
DISIS-2016-002	GEN-2016-091	IA FULLY EXECUTED/COMMERCIAL OPERATION	-	Wind	SPP	SPP	-	303.6	303.6	0.2	0.2	0.2	0.2	60.72	60.72	60.72	60.72	60.72	60.72	X
DISIS-2016-002	GEN-2016-133	IA FULLY EXECUTED/ON SCHEDULE	-	Wind	SPP	SPP	-	187.1	187.5	0.2	0.2	0.2	0.2	37.42	37.5	37.42	37.42	37.42	37.5	X
DISIS-2016-002	GEN-2016-134	IA FULLY EXECUTED/ON SCHEDULE	-	Wind	SPP	SPP	-	187.5	187.5	0.2	0.2	0.2	0.2	37.5	37.5	37.5	37.5	37.5	37.5	X
DISIS-2016-002	GEN-2016-137	IA FULLY EXECUTED/ON SCHEDULE	-	Wind	SPP	SPP	-	187.5	187.5	0.2	0.2	0.2	0.2	37.5	37.5	37.5	37.5	37.5	37.5	X
DISIS-2016-002	GEN-2016-138	IA FULLY EXECUTED/ON SCHEDULE	-	Wind	SPP	SPP	-	187.5	187.5	0.2	0.2	0.2	0.2	37.5	37.5	37.5	37.5	37.5	37.5	X
DISIS-2016-002	GEN-2016-141	IA FULLY EXECUTED/ON SCHEDULE	-	Wind	SPP	SPP	-	350	350	0.2	0.2	0.2	0.2	70	70	70	70	70	70	X
DISIS-2016-002	GEN-2016-142	IA FULLY EXECUTED/ON SCHEDULE	-	Wind	SPP	SPP	-	350	350	0.2	0.2	0.2	0.2	70	70	70	70	70	70	X
DISIS-2016-002	GEN-2016-143	WITHDRAWN	-	Wind	SPP	SPP	-	175	175	0.2	0.2	0.2	0.2	0	0	0	0	0	0	
DISIS-2016-002	GEN-2016-144	WITHDRAWN	-	Wind	SPP	SPP	-	175	175	0.2	0.2	0.2	0.2	0	0	0	0	0	0	
DISIS-2016-002	GEN-2016-145	IA FULLY EXECUTED/ON SCHEDULE	-	Wind	SPP	SPP	-	175	175	0.2	0.2	0.2	0.2	35	35	35	35	35	35	X
DISIS-2016-002	GEN-2016-146	IA FULLY EXECUTED/ON SCHEDULE	-	Wind	SPP	SPP	-	175	175	0.2	0.2	0.2	0.2	35	35	35	35	35	35	X
DISIS-2016-002	GEN-2016-100	WITHDRAWN	-	Wind	SPP	SPP	-	100	100	0.2	0.2	0.2	0.2	0	0	0	0	0	0	
DISIS-2016-002	GEN-2016-101	WITHDRAWN	-	Wind	SPP	SPP	-	195	195	0.2	0.2	0.2	0.2	0	0	0	0	0	0	
DISIS-2016-002	GEN-2016-119	IA FULLY EXECUTED/ON SCHEDULE	-	Wind	SPP	SPP	-	600	600	0.2	0.2	0.2	0.2	120	120	120	120	120	120	X
DISIS-2016-002	GEN-2016-149	IA FULLY EXECUTED/ON SCHEDULE	-	Wind	SPP	SPP	-	302	302	0.2	0.2	0.2	0.2	60.4	60.4	60.4	60.4	60.4	60.4	X
DISIS-2016-002	GEN-2016-150	IA FULLY EXECUTED/ON SCHEDULE	-	Wind	SPP	SPP	-	302	302	0.2	0.2	0.2	0.2	60.4	60.4	60.4	60.4	60.4	60.4	X
DISIS-2016-002	GEN-2016-174	IA FULLY EXECUTED/COMMERCIAL OPERATION	-	Wind	SPP	SPP	-	302	302	0.2	0.2	0.2	0.2	60.4	60.4	60.4	60.4	60.4	60.4	X
DISIS-2016-002	GEN-2016-176	IA FULLY EXECUTED/COMMERCIAL OPERATION	-	Wind	SPP	SPP	-	302	302	0.2	0.2	0.2	0.2	60.4	60.4	60.4	60.4	60.4	60.4	X
DISIS-2016-002	GEN-2016-157	IA FULLY EXECUTED/ON SCHEDULE	-	Wind	SPP	SPP	-	252	252	0.2	0.2	0.2	0.2	50.4	50.4	50.4	50.4	50.4	50.4	X
DISIS-2016-002	GEN-2016-158	IA FULLY EXECUTED/ON SCHEDULE	-	Wind	SPP	SPP	-	252	252	0.2	0.2	0.2	0.2	50.4	50.4	50.4	50.4	50.4	50.4	X
DISIS-2016-002	GEN-2016-128	IA FULLY EXECUTED/ON SCHEDULE	-	Wind	SPP	SPP	-	176	176	0.2	0.2	0.2	0.2	35.2	35.2	35.2	35.2	35.2	35.2	X
DISIS-2017-001	GEN-2017-090	WITHDRAWN	-	Solar	SPP	SPP	-	150	150	0.2	0.2	0.2	0.2	0	0	0	0	0	0	
DISIS-2017-001	GEN-2017-009	IA PENDING	-	Wind	SPP	SPP	-	302	302	1	1	1	1	302	302	302	302	302	302	Study
DISIS-2017-001	GEN-2017-061	IA PENDING	-	Solar	SPP	SPP	-	101.5	101.5	1	1	1	1	101.5	101.5	101.5	101.5	101.5	101.5	Study
DISIS-2017-001	GEN-2017-005	IA FULLY EXECUTED/ON SCHEDULE	-	Wind	SPP	SPP	-	190	190	1	1	1	1	190	190	190	190	190	190	Study
DISIS-2017-001	GEN-2017-030	WITHDRAWN	-	Wind	SPP	SPP	-	200	200	0.2	0.2	0.2	0.2	0	0	0	0	0	0	
DISIS-2017-001	GEN-2017-060	IA FULLY EXECUTED/COMMERCIAL OPERATION	-	Wind	SPP	SPP	-	149.4	149.4	1	1	1	1	149.4	149.4	149.4	149.4	149.4	149.4	Study
DISIS-2017-001	GEN-2017-073	IA PENDING	-	Solar	SPP	SPP	-	72.5	72.5	1	1	1	1	72.5	72.5	72.5	72.5	72.5	72.5	Study
DISIS-2017-001	GEN-2017-022	FACILITY STUDY STAGE	-	Solar	SPP	SPP	-	65	65	1	1	1	1	65	65	65	65	65	65	Study
DISIS-2017-001	GEN-2017-008	WITHDRAWN	-	Solar	SPP	SPP	-	305	305	0.2	0.2	0.2	0.2	0	0	0	0	0	0	
DISIS-2017-001	GEN-2017-055	WITHDRAWN	-	Solar	SPP	SPP	-	228.25	228.25	0.2	0.2	0.2	0.2	0	0	0	0	0	0	
DISIS-2017-001	GEN-2017-076	IA FULLY EXECUTED/ON SCHEDULE	-	Solar	SPP	SPP	-	52.2	52.2	1	1	1	1	52.2	52.2	52.2	52.2	52.2	52.2	Study
DISIS-2017-001	GEN-2017-074	IA PENDING	-	Solar	SPP	SPP	-	72.5	72.5	1	1	1	1	72.5	72.5	72.5	72.5	72.5	72.5	Study
DISIS-2017-001	GEN-2017-082	IA FULLY EXECUTED/COMMERCIAL OPERATION	-	Wind	SPP	SPP	-	149.4	149.4	1	1	1	1	149.4	149.4	149.4	149.4	149.4	149.4	Study
DISIS-2017-001	GEN-2017-092	IA PENDING	-	Solar	SPP	SPP	-	200	200	1	1	1	1	200	200	200	200	200	200	Study
DISIS-2017-001	GEN-2017-077	IA PENDING	-	Solar	SPP	SPP	-	124.7	124.7	1	1	1	1	124.7	124.7	124.7	124.7	124.7	124.7	Study
DISIS-2017-001	GEN-2017-086	FACILITY STUDY STAGE	-	Wind	SPP	SPP	-	150	150	1	1	1	1	150	150	150	150	150	150	Study
DISIS-2017-001	GEN-2017-018	IA PENDING	-	Solar	SPP	SPP	-	189	189	1	1	1	1	189	189	189	189	189	189	Study
DISIS-2017-001	GEN-2017-040	IA PENDING	-	Solar	SPP	SPP	-	200.1	200.1	1	1	1	1	200.1	200.1	200.1	200.1	200.1	200.1	Study
DISIS-2017-001	GEN-2017-071	IA PENDING	-	Solar	SPP	SPP	-	124.7	124.7	1	1	1	1	124.7	124.7	124.7	124.7	124.7	124.7	Study
DISIS-2017-001	GEN-2017-072	IA PENDING	-	Solar	SPP	SPP	-	52.2	52.2	1	1	1	1	52.2	52.2	52.2	52.2	52.2	52.2	Study
DISIS-2017-001	GEN-2017-075	IA PENDING	-	Solar	SPP	SPP	-	200	200	1	1	1	1	200	200	200	200	200	200	Study
DISIS-2017-001	GEN-2016-037	IA FULLY EXECUTED/ON SCHEDULE	-	Wind	SPP	SPP	-	300	300	1	1	1	1	300	300	300	300	300	300	Study
DISIS-2017-001	GEN-2016-159	WITHDRAWN	-	Wind	SPP	SPP	-	427.8	427.8	0.2	0.2	0.2	0.2	0	0	0	0	0	0	
DISIS-2017-001	GEN-2017-004	IA PENDING	-	Wind	SPP	SPP	-	201.6	201.6	1	1	1	1	201.6	201.6	201.6	201.6	201.6	201.6	Study
DISIS-2017-001	GEN-2017-094	IA PENDING	-	Wind	SPP	SPP	-	200	200	1	1	1	1	200	200	200	200	200	200	Study
DISIS-2017-001	GEN-2016-103	WITHDRAWN	-	Wind	SPP	SPP	-	240	240	0.2	0.2	0.2	0.2	0	0	0	0	0	0	
DISIS-2017-001	GEN-2017-027	IA PENDING	-	Wind	SPP	SPP	-	140	140	1	1	1	1	140	140	140	140	140	140	Study
DISIS-2017-001	GEN-2017-065	WITHDRAWN	-	Solar	SPP	SPP	-	200.25	200.25	0.2	0.2	0.2	0.2	0	0	0	0	0	0	
DISIS-2017-001	GEN-2017-014	IA PENDING	-	Wind	SPP	SPP	-	300	300	1	1	1	1	300	300	300	300	300	300	Study
DISIS-2017-001	GEN-2017-026	WITHDRAWN	-	Wind	SPP	SPP	-	235	235	0.2	0.2	0.2	0.2	0	0	0	0	0	0	
DISIS-2017-001	GEN-2017-033	IA FULLY EXECUTED/ON SCHEDULE	-	Wind	SPP	SPP	-	200	200	1	1	1	1	200	200	200	200	200	200	Study
DISIS-2017-001	GEN-2017-080	WITHDRAWN	-	Solar	SPP	SPP	-	525	525	0.2	0.2	0.2	0.2	0	0	0	0	0	0	
DISIS-2017-001	GEN-2017-039	WITHDRAWN	-	Wind	SPP	SPP	-	200.1	200.1	0.2	0.2	0.2	0.2	0	0	0	0	0	0	
DISIS-2017-001	GEN-2017-064	WITHDRAWN	-	Solar	SPP	SPP	-	110	110	0.2	0.2	0.2	0.2	0	0	0	0	0	0	
DISIS-2017-001	GEN-2017-078	WITHDRAWN	-	Wind	SPP	SPP	-	220	220	0.2	0.2	0.2	0.2	0	0	0	0	0	0	
DISIS-2017-001	GEN-2017-097	IA PENDING	-	Solar	SPP	SPP	-	128	128	1	1	1	1	128	128	128	128	128	128	Study
DISIS-2017-001	GEN-2017-104	WITHDRAWN	-	Solar	SPP	SPP	-	240	240	0.2	0.2	0.2	0.2	0	0	0	0	0	0	
DISIS-2017-001	GEN-2016-172	WITHDRAWN	-	Wind	SPP	SPP	-	231	231	0.2	0.2	0.2	0.2	0	0	0	0	0	0	
DISIS-2017-001	GEN-2017-007	WITHDRAWN	-	Wind	SPP	SPP	-	297.5	297.5	0.2	0.2	0.2	0.2	0	0	0	0	0	0	
DISIS-2017-001	GEN-2017-048	IA PENDING	-	Wind	SPP	SPP	-	300	300	1	1	1	1	300	300	300	300	300	300	Study
DISIS-2017-001	GEN-2017-010	IA PENDING	-	Wind	SPP	SPP	-	200.1	200.1	1	1	1	1	200.1	200.1	200.1	200.1	200.1	200.1	Study

APPENDIX A
DISIS-2017-001 AFS Study Assumptions - Generation Dispatch

MISO																				
Study	GIR	Status	Type	Fuel Type	Study Region	Scale Region	POI	SP Pmax	WP Pmax	S	W	L	H	25S	25W	25L	25H	30S	30W	Include
DPP-2016-AUG	J541	Done	-	Wind	Central	North	-	400	400	0.156	0.156	1	1	62.4	62.4	400	400	62.4	62.4	X
DPP-2016-AUG	J611	Done	-	Wind	West	North	-	110	110	0.156	0.156	1	1	17.16	17.16	110	110	17.16	17.16	X
DPP-2017-AUG	J817	Done	-	Solar	Central	North	-	139	139	1	1	0	0	139	139	0	0	139	139	X
DPP-2017-AUG	J944	Done	-	Solar	South	South	-	200	200	1	1	0	0	200	200	0	0	200	200	X
DPP-2018-APR	J994	Done	-	Solar	Central	North	-	100	100	1	1	0	0	100	100	0	0	100	100	X
DPP-2018-APR	J1107	Done	-	Solar	Central	North	-	200	200	1	1	0	0	200	200	0	0	200	200	X
DPP-2018-APR	J1026	Active	-	Wind	Central	North	-	400	400	0.156	0.156	1	1	62.4	62.4	400	400	62.4	62.4	X
DPP-2018-APR	J1145	Active	-	Solar	Central	North	-	250	250	1	1	0	0	250	250	0	0	250	250	X
DPP-2018-APR	J1087	Done	-	Solar	Central	North	-	200	200	1	1	0	0	200	200	0	0	200	200	X
DPP-2018-APR	J1039	Withdrawn	-	Battery Storage	Central	North	-	50	50	1	1	1	1	0	0	0	0	0	0	
DPP-2018-APR	J976	Done	-	Solar	Central	North	-	300	300	1	1	0	0	300	300	0	0	300	300	X
DPP-2018-APR	J987	Done	-	Solar	Central	North	-	100	100	1	1	0	0	100	100	0	0	100	100	X
DPP-2018-APR	J956	Done	-	Solar	Central	North	-	200	200	1	1	0	0	200	200	0	0	200	200	X
DPP-2018-APR	J1033	Withdrawn	-	Battery Storage	Central	North	-	50	50	1	1	1	1	0	0	0	0	0	0	
DPP-2018-APR	J1034	Done	-	Solar	Central	North	-	225	225	1	1	0	0	225	225	0	0	225	225	X
DPP-2018-APR	J1025	Active	-	Wind	Central	North	-	300	300	0.156	0.156	1	1	46.8	46.8	300	300	46.8	46.8	X
DPP-2018-APR	J1182	Done	-	Solar	Central	North	-	250	250	1	1	0	0	250	250	0	0	250	250	X
DPP-2018-APR	J1007	Done	-	Solar	South	South	-	200	200	1	1	0	0	200	200	0	0	200	200	X
DPP-2018-APR	J1060	Done	-	Solar	South	South	-	500	500	1	1	0	0	500	500	0	0	500	500	X
DPP-2018-APR	J1125	Done	-	Solar	South	South	-	135	135	1	1	0	0	135	135	0	0	135	135	X
DPP-2018-APR	J1155	Done	-	Solar	South	South	-	150	150	1	1	0	0	150	150	0	0	150	150	X
DPP-2018-APR	J1132	Done	-	Solar	West	North	-	50	50	1	1	0	0	50	50	0	0	50	50	X
DPP-2018-APR	J1135	Done	-	Solar	West	North	-	50	50	1	1	0	0	50	50	0	0	50	50	X
DPP-2018-APR	J1024	Withdrawn	-	Wind	West	North	-	200	200	0.156	0.156	1	1	0	0	0	0	0	0	
DPP-2018-APR	J1187	Withdrawn	-	Wind	West	North	-	151.8	151.8	0.156	0.156	1	1	0	0	0	0	0	0	
DPP-2018-APR	J981	Withdrawn	-	Wind	West	North	-	200	200	0.156	0.156	1	1	0	0	0	0	0	0	
DPP-2018-APR	J1040	Done	-	Wind	West	North	-	250	250	0.156	0.156	1	1	39	39	250	250	39	39	X
DPP-2019-Cycle	J1216	Active	-	Solar	Central	North	-	250	250	1	1	0	0	250	250	0	0	250	250	X
DPP-2019-Cycle	J1250	Withdrawn	-	Battery Storage	South	South	-	35	35	1	1	1	1	0	0	0	0	0	0	
DPP-2019-Cycle	J1330	Withdrawn	-	Solar	Central	North	-	200	200	1	1	0	0	0	0	0	0	0	0	
DPP-2019-Cycle	J1376	Withdrawn	-	Wind	Central	North	-	100	100	0.156	0.156	1	1	0	0	0	0	0	0	
DPP-2019-Cycle	J1191	Active	-	Solar	Central	North	-	64	64	1	1	0	0	64	64	0	0	64	64	X
DPP-2019-Cycle	J1354	Active	-	Battery Storage	Central	North	-	146	146	1	1	1	1	146	146	146	146	146	146	X
DPP-2019-Cycle	J1414	Withdrawn	-	Solar	South	South	-	150	150	1	1	0	0	0	0	0	0	0	0	
DPP-2019-Cycle	J1453	Active	-	Wind	Central	North	-	188.3	188.3	0.156	0.156	1	1	29.3748	29.3748	188.3	188.3	29.3748	29.3748	X
DPP-2019-Cycle	J1383	Active	-	Solar	Central	North	-	150	150	1	1	0	0	150	150	0	0	150	150	X
DPP-2019-Cycle	J1488	Active	-	HVDC	Central	North	-	500	500	1	1	1	1	500	500	500	500	500	500	X
DPP-2019-Cycle	J1490	Active	-	HVDC	Central	North	-	1000	1000	1	1	1	1	1000	1000	1000	1000	1000	1000	X
DPP-2019-Cycle	J1464	Active	-	Solar	Central	North	-	592.8	592.8	1	1	0	0	592.8	592.8	0	0	592.8	592.8	X
DPP-2019-Cycle	J1299	Active	-	Solar	Central	North	-	200	200	1	1	0	0	200	200	0	0	200	200	X
DPP-2019-Cycle	J1306	Active	-	Solar	Central	North	-	200	200	1	1	0	0	200	200	0	0	200	200	X
DPP-2019-Cycle	J1268	Active	-	Solar	Central	North	-	150	150	1	1	0	0	150	150	0	0	150	150	X
DPP-2019-Cycle	J1338	Withdrawn	-	Wind	Central	North	-	150	150	0.156	0.156	1	1	0	0	0	0	0	0	
DPP-2019-Cycle	J1363	Withdrawn	-	Solar	Central	North	-	150	150	1	1	0	0	0	0	0	0	0	0	
DPP-2019-Cycle	J1352	Active	-	Solar	Central	North	-	100	100	1	1	0	0	100	100	0	0	100	100	X
DPP-2019-Cycle	J1222	Withdrawn	-	Solar	Central	North	-	200	200	1	1	0	0	0	0	0	0	0	0	
DPP-2019-Cycle	J1213	Active	-	Hydro	Central	North	-	60	60	1	1	1	1	60	60	60	60	60	60	X
DPP-2019-Cycle	J1289	Active	-	Wind	Central	North	-	200	200	0.156	0.156	1	1	31.2	31.2	200	200	31.2	31.2	X
DPP-2019-Cycle	J1408	Active	-	Hybrid	Central	North	-	100	100	1	1	1	1	100	100	100	100	100	100	X
DPP-2019-Cycle	J1241	Active	-	Solar	Central	North	-	200	200	1	1	0	0	200	200	0	0	200	200	X
DPP-2019-Cycle	J1437	Active	-	Wind	South	South	-	180	180	0.156	0.156	1	1	28.08	28.08	180	180	28.08	28.08	X
DPP-2019-Cycle	J1479	Withdrawn	-	Battery Storage	West	North	-	100	100	1	1	1	1	0	0	0	0	0	0	
DPP-2019-Cycle	J1456	Active	-	Wind	West	North	-	300	300	0.156	0.156	1	1	46.8	46.8	300	300	46.8	46.8	X
DPP-2019-Cycle	J1478	Withdrawn	-	Battery Storage	West	North	-	25	25	1	1	1	1	0	0	0	0	0	0	
DPP-2019-Cycle	J1471	Withdrawn	-	Solar	West	North	-	200	200	1	1	0	0	0	0	0	0	0	0	
DPP-2019-Cycle	J1315	Active	-	Wind	West	North	-	600	600	0.156	0.156	1	1	93.6	93.6	600	600	93.6	93.6	X
DPP-2019-Cycle	J1218	Active	-	Solar	West	North	-	200	200	1	1	0	0	200	200	0	0	200	200	X
DPP-2019-Cycle	J1229	Active	-	Hydro	West	North	-	50	50	1	1	1	1	50	50	50	50	50	50	X
TVA																				
Study	GIR	Status	Type	Fuel Type	Study Region	Scale Region	POI	SP Pmax	WP Pmax	S	W	L	H	25S	25W	25L	25H	30S	30W	Include
TVA	292	Active	-	Solar	TVA	TVA	-	80	80	1	1	1	1	80	80	80	80	80	80	X
TVA	299	Active	-	Solar	TVA	TVA	-	67	67	1	1	1	1	67	67	67	67	67	67	X
TVA	337	Active	-	Solar	TVA	TVA	-	30	30	1	1	1	1	30	30	30	30	30	30	X

APPENDIX A
DISIS-2017-001 AFS Study Assumptions - Generation Dispatch

AECI																				
Study	GIR	Status	Type	Fuel Type	Study Region	Scale Region	POI	SP Pmax	WP Pmax	S	W	L	H	25S	25W	25L	25H	30S	30W	Include
Local	ThomasHill	Operation	NRIS	Conv	AECI	SixCluster	-	1210.0	1228.0	1	1	NC	NC	1210.0	1228.0	-	-	1210.0	1228.0	X
Local	MtPleasant	Operation	NRIS	Conv	AECI	SixCluster	-	24.0	24.0	1	1	NC	NC	0.0*	0.0*	-	-	0.0*	0.0*	
Local	NewMadrid	Operation	NRIS	Conv	AECI	SixCluster	-	1232.9	1257.9	1	1	NC	NC	0.0*	0.0*	-	-	0.0*	0.0*	
Local	StFrancis	Operation	NRIS	Conv	AECI	SixCluster	-	465.9	488.9	1	1	NC	NC	0.0*	0.0*	-	-	0.0*	0.0*	
Local	Essex	Operation	NRIS	Conv	AECI	SixCluster	-	105.1	123.1	1	1	NC	NC	0.0*	0.0*	-	-	0.0*	0.0*	
Local	Nodaway	Operation	NRIS	Conv	AECI	SixCluster	-	186.2	230.2	1	1	NC	NC	186.2	230.2	-	-	186.2	230.2	X
Local	Holden	Operation	NRIS	Conv	AECI	SixCluster	-	325.5	347.5	1	1	NC	NC	325.5	347.5	-	-	325.5	347.5	X
Local	WestPlains	Operation	NRIS	Conv	AECI	SixCluster	-	44.0	44.0	1	1	NC	NC	0.0*	0.0*	-	-	0.0*	0.0*	
Local	Chouteau	Operation	NRIS	Conv	AECI	SixCluster	-	-	-	-	-	-	-	-	-	-	-	-	-	
Local	Dell	Operation	NRIS	Conv	AECI	SixCluster	-	578.9	578.9	1	1	NC	NC	0.0*	0.0*	-	-	0.0*	0.0*	
Existing	BluegrassRidge	Operation	NRIS	Wind	AECI	SixCluster	-	56.7	56.7	1	1	1	1	56.7	56.7	56.7	56.7	56.7	56.7	X
Existing	CowBranch	Operation	NRIS	Wind	AECI	SixCluster	-	50.4	50.4	1	1	1	1	50.4	50.4	50.4	50.4	50.4	50.4	X
Existing	Conception	Operation	NRIS	Wind	AECI	SixCluster	-	50.4	50.4	1	1	1	1	50.4	50.4	50.4	50.4	50.4	50.4	X
Existing	LostCreek	Operation	NRIS	Wind	AECI	SixCluster	-	168	168	1	1	1	1	168	168	168	168	168	168	X
Existing	Osage	Operation	NRIS	Wind	AECI	SixCluster	-	150	150	1	1	1	1	150	150	150	150	150	150	X
Existing	WhiteCloud	Operation	NRIS	Wind	AECI	SixCluster	-	236.5	236.5	1	1	1	1	236.5	236.5	236.5	236.5	236.5	236.5	X
Existing	ClearCreek	Operation	NRIS	Wind	AECI	SixCluster	230	242	242	1	1	1	1	242	242	242	242	242	242	X
Existing	FoxTrot	Withdrawn*	NRIS	Solar	AECI	SixCluster	200	201.6	201.6	1	1	1	1	0	0	0	0	0	0	
Queue	GI-077	Active	NRIS	Gas	AECI	SixCluster	-	587	587	1	1	1	1	587	587	587	587	587	587	X
Queue	GI-078	Active	NRIS	Gas	AECI	SixCluster	-	564	564	1	1	1	1	564	564	564	564	564	564	X
Queue	GI-082	Withdrawn	NRIS	Solar	AECI	SixCluster	0	0	0	1	1	1	1	0	0	0	0	0	0	
Queue	GI-083	Active	NRIS	HVDC	AECI	SixCluster	1018	1031	1031	1	1	1	1	1031	1031	1031	1031	1031	1031	X
Queue	GI-084	Active	ERIS	Solar	AECI	SixCluster	196	200.6	200.6	0.65	0.55	0.65	0.65	130.39	110.33	130.39	130.39	130.39	110.33	X
Queue	GI-085	Active	NRIS	Solar	AECI	SixCluster	436	447.3	447.3	1	1	1	1	447.3	447.3	447.3	447.3	447.3	447.3	X
Queue	GI-086	Active	NRIS	Solar	AECI	SixCluster	100	103.4	103.4	1	1	1	1	103.4	103.4	103.4	103.4	103.4	103.4	X
Queue	GI-088	Active	NRIS	Solar	AECI	SixCluster	86.5	87.52	87.52	1	1	1	1	87.52	87.52	87.52	87.52	87.52	87.52	X
Queue	GI-089	Withdrawn	NRIS	Solar	AECI	SixCluster	0	0	0	1	1	1	1	0	0	0	0	0	0	
Queue	GI-090	Active	NRIS	Solar	AECI	SixCluster	100	103.15	103.15	1	1	1	1	103.15	103.15	103.15	103.15	103.15	103.15	X
Queue	GI-091	Active	NRIS	Solar	AECI	SixCluster	96	98.4	98.4	1	1	1	1	98.4	98.4	98.4	98.4	98.4	98.4	X
Queue	GI-092	Active	NRIS	Wind	AECI	SixCluster	170	179.4	179.4	1	1	1	1	179.4	179.4	179.4	179.4	179.4	179.4	X

*Listed generator was dispatched as found in base model

APPENDIX B
DISIS-2017-001 AFS Cost Allocation

APPENDIX B
DISIS-2017-001 AFS Cost Allocation

Monitored Facility	ID	GIR	MW		De Minimis Criteria	Percent Allocation (%)	Cost Allocation (\$)
			Contribution	MW%			
KAMO - Construct a new 161 kV terminal at Sportsman	NU01	G16-037	0.31	1.16%	3.00%	0.00%	\$ -
		G17-004	0.00	0.00%	3.00%	0.00%	\$ -
		G17-005	0.44	1.65%	3.00%	0.00%	\$ -
		G17-009	0.00	0.00%	3.00%	0.00%	\$ -
		G17-010	0.00	0.00%	3.00%	0.00%	\$ -
		G17-014	0.00	0.00%	3.00%	0.00%	\$ -
		G17-018	0.00	0.00%	3.00%	0.00%	\$ -
		G17-022	0.09	0.35%	3.00%	0.00%	\$ -
		G17-027	0.30	1.10%	3.00%	0.00%	\$ -
		G17-033	0.23	0.87%	3.00%	0.00%	\$ -
		G17-040	0.72	2.67%	3.00%	0.00%	\$ -
		G17-048	0.00	0.00%	3.00%	0.00%	\$ -
		G17-060	0.18	0.67%	3.00%	0.00%	\$ -
		G17-061	8.57	33.07%	3.00%	38.88%	\$ 946,825
		G17-071	0.36	1.33%	3.00%	0.00%	\$ -
		G17-072	0.15	0.56%	3.00%	0.00%	\$ -
		G17-073	6.23	24.04%	3.00%	28.27%	\$ 688,323
		G17-074	2.81	10.86%	3.00%	12.77%	\$ 310,987
		G17-075	0.46	1.72%	3.00%	0.00%	\$ -
		G17-076	0.00	0.00%	3.00%	0.00%	\$ -
		G17-077	4.42	17.07%	3.00%	20.08%	\$ 488,865
		G17-082	0.68	2.55%	3.00%	0.00%	\$ -
		G17-086	0.00	0.00%	3.00%	0.00%	\$ -
		G17-092	0.72	2.67%	3.00%	0.00%	\$ -
		G17-094	0.00	0.00%	3.00%	0.00%	\$ -
		G17-097	0.00	0.00%	3.00%	0.00%	\$ -
KAMO Total			26.67	102.34%	3.00%	100.00%	\$ 2,435,000

APPENDIX B
DISIS-2017-001 AFS Cost Allocation

Monitored Facility	ID	GIR	MW		De Minimis	Percent	Cost
			Contribution	MW%	Criteria	Allocation (%)	Allocation (\$)
		G16-037	0.31	1.16%	3.00%	0.00%	\$ -
		G17-004	0.00	0.00%	3.00%	0.00%	\$ -
		G17-005	0.44	1.65%	3.00%	0.00%	\$ -
		G17-009	0.00	0.00%	3.00%	0.00%	\$ -
		G17-010	0.00	0.00%	3.00%	0.00%	\$ -
		G17-014	0.00	0.00%	3.00%	0.00%	\$ -
		G17-018	0.00	0.00%	3.00%	0.00%	\$ -
		G17-022	0.09	0.35%	3.00%	0.00%	\$ -
		G17-027	0.30	1.10%	3.00%	0.00%	\$ -
		G17-033	0.23	0.87%	3.00%	0.00%	\$ -
		G17-040	0.72	2.67%	3.00%	0.00%	\$ -
		G17-048	0.00	0.00%	3.00%	0.00%	\$ -
		G17-060	0.18	0.67%	3.00%	0.00%	\$ -
GRDA	NU02						
- Reroute Kerr-412 161 kV line to run between Sportsman and 412		G17-061	8.57	33.07%	3.00%	38.88%	\$ 3,522,110
- Build a 3rd Maid-Kerr 161 kV line		G17-071	0.36	1.33%	3.00%	0.00%	\$ -
		G17-072	0.15	0.56%	3.00%	0.00%	\$ -
		G17-073	6.23	24.04%	3.00%	28.27%	\$ 2,560,505
		G17-074	2.81	10.86%	3.00%	12.77%	\$ 1,156,848
		G17-075	0.46	1.72%	3.00%	0.00%	\$ -
		G17-076	0.00	0.00%	3.00%	0.00%	\$ -
		G17-077	4.42	17.07%	3.00%	20.08%	\$ 1,818,537
		G17-082	0.68	2.55%	3.00%	0.00%	\$ -
		G17-086	0.00	0.00%	3.00%	0.00%	\$ -
		G17-092	0.72	2.67%	3.00%	0.00%	\$ -
		G17-094	0.00	0.00%	3.00%	0.00%	\$ -
		G17-097	0.00	0.00%	3.00%	0.00%	\$ -
GRDA Total			26.67	102.34%	3.00%	100.00%	\$ 9,058,000