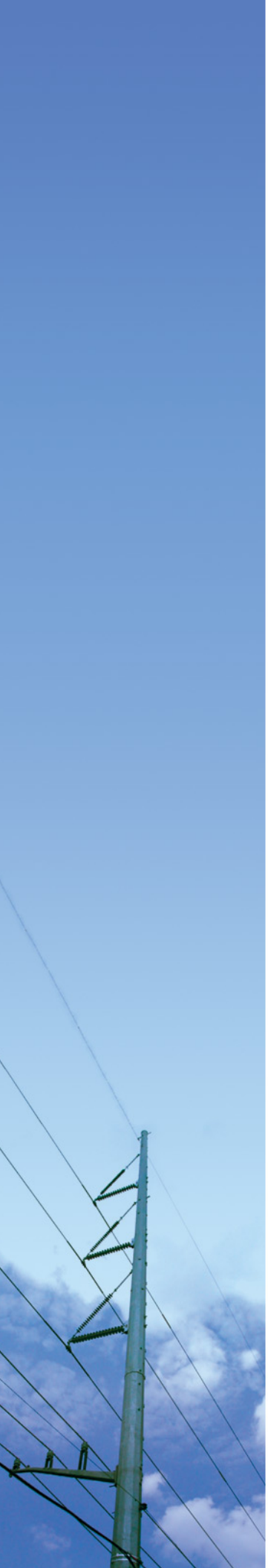

Screening Study
SPP-LTSR-2011-010

For OASIS Request # 76108340

MAINTAINED BY
SPP Engineering, SPP Transmission Service Studies
November 28, 2011

SPP Southwest Power Pool

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Executive Summary

BP Wind Energy has requested a Screening Study to determine the impacts on SPP facilities due to a Long Term Service Request of 100 MW. The service type requested for this screening study is Long Term Service Request (LTSR). The period of the service requested is from 10/31/2012 to 10/31/2017.

The principal objective of this study is to identify system problems and potential system modifications necessary to facilitate the LTSR request while maintaining system reliability. The LTSR request was studied using two system scenarios. The service was modeled by a transfer from WR to KCPL. The two scenarios were studied to capture system limitations caused or impacted by the requested service. An analysis was conducted on the planning horizon from 10/31/2012 to 10/31/2017.

Facilities on the SPP system were identified for the requested service due to the SPP Study Methodology criteria. Tables 1 and 2 summarize the results of the screening study analysis for the transfer for the scenarios listed in the table. Table 1 lists SPP thermal transfer limitations identified. Table 2 lists the network upgrades required to mitigate the limitations impacted by this request.

Introduction

BP Wind Energy has requested a screening study to determine the impacts on SPP facilities for a Long Term Service Request of 100 MW.

The purpose of the LTSR Option Screening Study is to provide the Eligible Customer with an approximation of the transmission remediation costs of each potential LTSR and a reasonable cost differential between alternatives for the purpose of an Eligible Customer's ranking of its potential LTSRs. The results of the Screening Study are not binding and the Eligible Customer retains the rights to enter the Aggregate Transmission Service Study. The Screening Study results will not assess the third party impacts and upgrades required. Service will not be granted based on the Screening Study for potential LTSRs on the Transmission System. To obtain a Service Agreement, Eligible Customers must apply for service and follow the application process set forth in Parts II and III of the Tariff.

This study includes steady-state contingency analysis (PSS/E function FCITC). The steady-state analysis considers the impact of the request on transmission line and transformer loadings for outages of single transmission lines, transformers, and generating units, and selected multiple transmission lines and transformers on the SPP and first-tier third party systems.

The LTSR request was studied using two system scenarios. The service was modeled by a transfer from WR to KCPL. The two scenarios were studied to capture the system limitations caused or impacted by the requested service. Scenario 0 includes projected usage of transmission service included in the SPP 2011 Series Cases. Scenario 5 includes transmission service not already included in the SPP 2011 Series Cases.

Study Methodology

Description

The facility study analysis was conducted to determine the steady-state impact of the requested service on the SPP system. The steady-state analysis was performed to ensure current SPP Criteria and NERC Reliability Standards requirements are fulfilled. SPP conforms to NERC Reliability Standards, which provide strict requirements related to voltage violations and thermal overloads during normal conditions and during a contingency. NERC Standards require all facilities to be within normal operating ratings for normal system conditions and within emergency ratings after a contingency.

Normal operating ratings and emergency operating ratings monitored are Rate A and B in the SPP Model Development Working Group (MDWG) models, respectively. The upper bound and lower bound of the normal voltage range monitored is 105% and 95%. The upper bound and lower bound of the emergency voltage range monitored is 105% and 90%. Transmission Owner voltage monitoring criteria is used if more restrictive. The SPS Tuco 230 kV bus voltage is monitored at 92.5% due to pre-determined system stability limitations. The WERE Wolf Creek 345 kV bus voltage is monitored at 103.5% and 98.5% due to transmission operating procedure.

The contingency set includes all SPP control area branches and ties 69 kV and above; first tier non-SPP control area branches and ties 115 kV and above; any defined contingencies for these control areas; and generation unit outages for the control areas with SPP reserve share program redispatch. The monitor elements include all SPP control area branches, ties, and buses 69 kV. and above,. Voltage monitoring was performed for SPP control area buses 69 kV and above.

A 3 % transfer distribution factor (TDF) cutoff was applied to all SPP control area facilities. For voltage monitoring, a 0.02 per unit change in voltage must occur due to the transfer or modeling upgrades to be considered a valid limit to the transfer.

Model Updates

SPP used four seasonal models to study the WR to KCPL 100 MW request for the requested service period. The following SPP Transmission Expansion Plan 2011 Build 2

Cases were used to study the impact of the requested service on the transmission system:

2012/13 Winter Peak (12WP)
2013 Summer Peak (13SP)
2013/14 Winter Peak (13WP)
2017 Summer Peak (17SP)

The Summer Peak models apply to June through September and the Winter Peak models apply to December through March.

The chosen base case models were modified to reflect the current modeling information. From the four seasonal models, two system scenarios were developed. Scenario 0 includes projected usage of transmission included in the SPP 2011 Series Cases. Scenario 5 includes transmission not already included in the SPP 2011 Series Cases.

Transfer Analysis

Using the selected cases both with and without the requested transfer modeled, the PSS/E Activity FCITC was run on the cases and compared to determine the facility overloads caused or impacted by the transfer. Transfer distribution factor cutoffs and voltage threshold (0.02 change) were applied to determine the impacted facilities. The PSS/E options chosen to conduct the analysis can be found in Appendix A.

Study Results

Study Analysis Results

Tables 1 and 2 contain the initial steady-state analysis results of the LTSR. The tables are attached to the end of this report, if applicable. The tables identify the scenario and season in which the event occurred, the transfer amount studied, the facility control area location, applicable ratings of the thermal transfer limitations and voltage transfer limitations, and the loading percentage and voltage per unit (pu).

Table 1 lists the SPP thermal transfer limitations caused or impacted by the 100 MW requested transfer for applicable scenarios. Solutions are identified for the limitations in this table.

Table 2 lists the network upgrades required to mitigate the limitations caused or impacted by this request. Engineering and construction costs are provided for assigned upgrades in this table.

Conclusion

The results of the screening study show that no new limiting constraints exist within the SPP regional transmission system for the requested transfer of 100 MW. Some constraints identified were not assigned to the Customer assuming that Construction Pending upgrades for prior requests currently in study will be confirmed. The next steps are to WITHDRAW the request on OASIS and, if desired, enter a new OASIS request into the aggregate study queue.

The results contained in this study are for informational purposes only. Service will not be granted based on the Screening Study results. To obtain a Service Agreement, Eligible Customers must apply for service and follow the application processes set forth in Parts II and III of the Tariff and enter the Aggregate Study process. The results of the Aggregate Study may vary from the results of this screening study.

As a final step in this process, it is requested that the customer WITHDRAW the LTSR screening study request on OASIS.

Appendix A

PSS/E MUST CHOICES IN RUNNING LOAD FLOW PROGRAM AND FCITC

FCITC CASES:
Solutions – First Contingency Incremental Transfer Capability (FCITC)

1. AC MW Mismatch Tolerance – 2
2. Base Case Rating-Rating A
3. Base Case Percent of Rating-100
4. Contingency Case Rating – Rate B
5. Contingency Case Rating of Percent of Rating – 100
6. Base Case Load Flow-PSS\E
7. Convert Branch Rating to Estimated MW Rating-No
8. Contingency ID Reporting- Labels
9. Maximum Number of Contingencies to Process- 50,000

Must Solution parameters:

1. Phase Shifter Code – Constant Flow in Cont
2. Ignore Base Case Constraints in FCITC Report- Include
3. Max Number of Violations to Report in FCITC and Gen Sensor Table – 50,000
4. Default Minimum Distribution Factor Magnitude Cutoff(PTDF&OTDF)- 0.030
5. Summary Table Maximum Times to Report the Same Element- 10
6. Apply Min. Distr. Factor Cutoff for Contingency Analysis- Yes
7. Apply Minimum Distribution Factor to FCITC Solution Reports-Yes
8. Minimum Contingency Case (Pre & Post) Flow Change- 3
9. Minimum Contingency Case Distribution Factor Change-0.0
10. Minimum Distribution Factor for Transfer Sensitivity Analysis- 0.0

Scenario	Season	From Area	To Area	Monitored Branch Over 100% Rate B	Transfer Case % Loading	TDF (%)	Outaged Branch Causing Overload	Upgrade Name	Solution
5	17SP	OKGE	OKGE	ADABELL5 161.00 - VBI 161KV CKT 1	102.7	3.2%	FT SMITH - MUSKOGEE 345KV CKT 1	Chamber Springs - Ft Smith 345 kV AEPW	Build 47.5 miles of 95 mile 345 kV line
5	17SP	OKGE	OKGE	ADABELL5 161.00 - VBI 161KV CKT 1	102.7	3.2%	FT SMITH - MUSKOGEE 345KV CKT 1	Chamber Springs - Ft Smith 345 kV with 345/138 kV bus tie at VBI	Build 47.5 miles of 95 mile 345 kV line plus new 345/138 kV bus tie at VBI sub
5	13SP	WERE	WERE	AUBURN ROAD - JEFFREY ENERGY CENTER 230KV CKT 1	114.9	5.2%	WRTOD400	Iatan - Jeffrey Energy Center 345 kV KACP	Build 14.2 miles of new 345 kV
5	17SP	WERE	WERE	AUBURN ROAD - JEFFREY ENERGY CENTER 230KV CKT 1	122.0	4.9%	HOYT - JEFFERY ENERGY CENTER 345KV CKT 1	Iatan - Jeffrey Energy Center 345 kV KACP	Build 14.2 miles of new 345 kV
5	17SP	WERE	WERE	AUBURN ROAD - JEFFREY ENERGY CENTER 230KV CKT 1	118.5	4.7%	WRTOD400	Iatan - Jeffrey Energy Center 345 kV KACP	Build 14.2 miles of new 345 kV
5	13SP	WERE	WERE	AUBURN ROAD - SWISSVALE 230KV CKT 1	102.2	4.7%	WRTOD400	Iatan - Jeffrey Energy Center 345 kV KACP	Build 14.2 miles of new 345 kV
5	13WP	WERE	WERE	AUBURN ROAD - SWISSVALE 230KV CKT 1	100.7	3.9%	WRTOD400	Iatan - Jeffrey Energy Center 345 kV KACP	Build 14.2 miles of new 345 kV
5	17SP	WERE	WERE	AUBURN ROAD - SWISSVALE 230KV CKT 1	102.4	4.2%	WRTOD400	Iatan - Jeffrey Energy Center 345 kV KACP	Build 14.2 miles of new 345 kV
5	17SP	WERE	WERE	CHISHOLM - MAIZE 4 138.00 138KV CKT 1	114.2	8.4%	BENTON - WICHITA 345KV CKT 1	CHISHOLM - MAIZE 138KV CKT 1 #1	Upgrade disconnect switches, wavetrap, breaker, jumpers
5	17SP	MEC	MEC	COUNCIL BLUFFS - RIVER BEND 161KV CKT 1	102.7	8.4%	KCPL-MSL#01	Line - Nebraska City - Maryville 345 kV (GMO)	Build a new 345 kV substation at Maryville with a ring bus and necessary terminal equipment. Build a new 65 mile 345 kV line with at least 3000 A capacity from the new Maryville substation to the Missouri/Nebraska state border towards OPPD's Neb Cty sub.
5	17SP	MEC	MEC	COUNCIL BLUFFS - RIVER BEND 161KV CKT 1	102.7	8.4%	KCPL-MSL#01	Line - Sibley - Maryville 345 kV	Build a new 105 mile 345 kV line with at least 3000 A capacity from Sibley to a new Maryville substation. Upgrade the Sibley substation with the necessary breakers and terminal equipment.
5	13SP	WERE	WERE	EDWARDSVILLE - MUND 115KV CKT 1	116.0	3.9%	87TH 7 345.00 - CRAIG 345KV CKT 1	IATAN - NASHUA 345KV CKT 1	Tap Nashua 345KV bus in Hawthorn - St. Joseph 345 kV line. Build new 345 kV line from Iatan to Nashua,Add Nashua 345/161 kV
5	13SP	WERE	WERE	EDWARDSVILLE (EDWRDV4X) 161/115/12.47KV TRANSFORMER CKT 1	103.1	3.9%	87TH 7 345.00 - CRAIG 345KV CKT 1	IATAN - NASHUA 345KV CKT 1	Tap Nashua 345KV bus in Hawthorn - St. Joseph 345 kV line. Build new 345 kV line from Iatan to Nashua,Add Nashua 345/161 kV
5	17SP	WERE	WERE	EVANS ENERGY CENTER NORTH - MAIZE 4 138.00 138KV CKT 1	119.4	8.4%	BENTON - WICHITA 345KV CKT 1	EVANS ENERGY CENTER NORTH - MAIZE 138KV CKT 1 #1	Upgrade disconnect switches, wavetrap, breaker, jumpers
5	17SP	WERE	WERE	EVANS ENERGY CENTER NORTH - MAIZE 4 138.00 138KV CKT 1	119.4	8.4%	BENTON - WICHITA 345KV CKT 1	EVANS ENERGY CENTER NORTH - MAIZE 138KV CKT 1 #2	Rebuild 4.8 miles
5	17SP	WERE	WERE	EVANS ENERGY CENTER NORTH - MAIZE 4 138.00 138KV CKT 1	103.8	3.3%	SPP-WERE-32	EVANS ENERGY CENTER NORTH - MAIZE 138KV CKT 1 #1	Upgrade disconnect switches, wavetrap, breaker, jumpers
5	17SP	WERE	WERE	EVANS ENERGY CENTER NORTH - MAIZE 4 138.00 138KV CKT 1	103.8	3.3%	SPP-WERE-32	EVANS ENERGY CENTER NORTH - MAIZE 138KV CKT 1 #2	Rebuild 4.8 miles
5	17SP	OKGE	OKGE	FT SMITH - MUSKOGEE 345KV CKT 1	100.1	3.1%	PITTSBURG - VALLIANT 345KV CKT 1	FT SMITH - MUSKOGEE 345KV CKT 1	Replace 1600 amp 345 kV CT in both Muskogee and Ft.Smith Subs
5	12WP	WERE	WERE	GOODYEAR JUNCTION - INDIAN HILLS 115KV CKT 1	102.6	3.2%	WRTOD400	Iatan - Jeffrey Energy Center 345 kV KACP	Build 14.2 miles of new 345 kV
5	13SP	NPPD	NPPD	GRAND ISLAND - SWEETWATER 345KV CKT 1	111.2	3.4%	AXTELL - PAULINE 345KV CKT 1	GRAND ISLAND - SWEETWATER 345KV CKT 1	Rebuild 63.4 miles
5	13SP	NPPD	NPPD	GRAND ISLAND - SWEETWATER 345KV CKT 1	103.9	3.0%	MOORE - PAULINE 345KV CKT 1	GRAND ISLAND - SWEETWATER 345KV CKT 1	Rebuild 63.4 miles
5	13WP	NPPD	NPPD	GRAND ISLAND - SWEETWATER 345KV CKT 1	126.5	3.1%	AXTELL - PAULINE 345KV CKT 1	GRAND ISLAND - SWEETWATER 345KV CKT 1	Rebuild 63.4 miles
5	17SP	NPPD	NPPD	GRAND ISLAND - SWEETWATER 345KV CKT 1	110.0	4.4%	AXTELL - PAULINE 345KV CKT 1	GRAND ISLAND - SWEETWATER 345KV CKT 1	Rebuild 63.4 miles
5	17SP	NPPD	NPPD	GRAND ISLAND - SWEETWATER 345KV CKT 1	102.9	3.9%	MOORE - PAULINE 345KV CKT 1	GRAND ISLAND - SWEETWATER 345KV CKT 1	Rebuild 63.4 miles
5	13SP	WERE	WERE	HOYT - JEFFERY ENERGY CENTER 345KV CKT 1	106.4	11.3%	JEFFERY ENERGY CENTER - MORRIS COUNTY 345KV CKT 1	Iatan - Jeffrey Energy Center 345 kV KACP	Build 14.2 miles of new 345 kV
5	13SP	WERE	WERE	HOYT - JEFFERY ENERGY CENTER 345KV CKT 1	105.6	13.8%	AUBURN ROAD - JEFFREY ENERGY CENTER 230KV CKT 1	Iatan - Jeffrey Energy Center 345 kV KACP	Build 14.2 miles of new 345 kV
5	13SP	WERE	WERE	HOYT - JEFFERY ENERGY CENTER 345KV CKT 1	102.6	17.2%	SWISSVALE - WEST GARDNER 345KV CKT 1	Iatan - Jeffrey Energy Center 345 kV KACP	Build 14.2 miles of new 345 kV
5	17SP	WERE	WERE	HOYT - JEFFERY ENERGY CENTER 345KV CKT 1	115.1	12.4%	AUBURN ROAD - JEFFREY ENERGY CENTER 230KV CKT 1	Iatan - Jeffrey Energy Center 345 kV KACP	Build 14.2 miles of new 345 kV
5	17SP	WERE	WERE	HOYT - JEFFERY ENERGY CENTER 345KV CKT 1	114.3	10.2%	JEFFERY ENERGY CENTER - MORRIS COUNTY 345KV CKT 1	Iatan - Jeffrey Energy Center 345 kV KACP	Build 14.2 miles of new 345 kV
5	17SP	WERE	WERE	HOYT - JEFFERY ENERGY CENTER 345KV CKT 1	111.5	15.8%	SWISSVALE - WEST GARDNER 345KV CKT 1	Iatan - Jeffrey Energy Center 345 kV KACP	Build 14.2 miles of new 345 kV
5	13SP	WERE	WERE	MUND - PENTAGON 115KV CKT 1	125.9	3.9%	87TH 7 345.00 - CRAIG 345KV CKT 1	IATAN - NASHUA 345KV CKT 1	Tap Nashua 345KV bus in Hawthorn - St. Joseph 345 kV line. Build new 345 kV line from Iatan to Nashua,Add Nashua 345/161 kV
5	13SP	WERE	WERE	MUND - PENTAGON 115KV CKT 1	105.1	3.5%	IATAN - ST JOE 345KV CKT 1	IATAN - NASHUA 345KV CKT 1	Tap Nashua 345KV bus in Hawthorn - St. Joseph 345 kV line. Build new 345 kV line from Iatan to Nashua,Add Nashua 345/161 kV
5	17SP	SPRM	SPRM	BROOKLINE (BRKLTX2) 345/161/13.2KV TRANSFORMER CKT 2	101.8	3.3%	BROOKLINE (BRKLTX1) 345/161/13.2KV TRANSFORMER CKT 1	Compton Ridge 345/161 kV Transformer	Install 500 MVA, 345/161 kV transformer and Cut EDE Reeds Spring-Branson line at 50% and route in & out of Compton Ridge
5	17SP	SPRM	SPRM	BROOKLINE (BRKLTX2) 345/161/13.2KV TRANSFORMER CKT 2	101.8	3.3%	BROOKLINE (BRKLTX1) 345/161/13.2KV TRANSFORMER CKT 1	Brookline – Compton Ridge345 kV	Build approx. 30 mile 345 kV line
5	17SP	SPRM	SPRM	BROOKLINE (BRKLTX2) 345/161/13.2KV TRANSFORMER CKT 2	101.8	3.3%	BROOKLINE (BRKLTX1) 345/161/13.2KV TRANSFORMER CKT 1	Compton Ridge – Cox Creek 345 kV	Build approx. 120 mile 345 kV line and Operate Gobbler Knob-Cox Creek at 345 kV
5	17SP	SPRM	SPRM	BROOKLINE (BRKLTX2) 345/161/13.2KV TRANSFORMER CKT 2	101.8	3.3%	BROOKLINE (BRKLTX1) 345/161/13.2KV TRANSFORMER CKT 1	Compton Ridge – Osage Creek 345 kV	Build approx. 50 mile 345 kV line

Transmission Owner	Upgrade	Solution	Earliest Date Upgrade Required (DUN)	Estimated Date of Upgrade Completion (EOC)	Estimated Engineering & Construction Cost
	None				

Construction Pending Projects - The requested service is contingent upon completion of the following upgrades. Cost is not assignable to the transmission customer.

Transmission Owner	Upgrade	Solution	Earliest Date Upgrade Required (DUN)	Estimated Date of Upgrade Completion (EOC)	Estimated Engineering & Construction Cost
WERE	Iatan - Jeffrey Energy Center 345 kV WERE	Build 14.2 miles of new 345 kV	6/1/2013	6/1/2017	$ 15,975,000
NPPD	GRAND ISLAND - SWEETWATER 345KV CKT 1	Rebuild 63.4 miles	10/1/2012	6/1/2017	$ 96,288,750
OKGE	FT SMITH - MUSKOGEE 345KV CKT 1	Replace 1600 amp 345 kV CT in both Muskogee and Ft.Smith Subs	6/1/2014	6/1/2014	$ 700,000
WERE	EVANS ENERGY CENTER NORTH - MAIZE 138KV CKT 1 #1	Upgrade disconnect switches, wavetrap, breaker, jumpers	6/1/2014	6/1/2015	$ 1,575,000
WERE	EVANS ENERGY CENTER NORTH - MAIZE 138KV CKT 1 #2	Rebuild 4.8 miles	6/1/2014	6/1/2015	$ 4,728,000
WERE	CHISHOLM - MAIZE 138KV CKT 1 #1	Upgrade disconnect switches, wavetrap, breaker, jumpers	6/1/2014	6/1/2015	$ 1,575,000
WERE	CHISHOLM - MAIZE 138KV CKT 1 #2	Rebuild 7.25 miles	6/1/2014	6/1/2015	$ 7,141,250
OKGE	Chamber Springs - Ft Smith 345 kV with 345/138 kV bus tie at VBI	Build 47.5 miles of 95 mile 345 kV line plus new 345/138 kV bus tie at VBI sub	6/1/2014	6/1/2017	$ 112,337,500
AEPW	Chamber Springs - Ft Smith 345 kV AEPW	Build 47.5 miles of 95 mile 345 kV line	6/1/2014	6/1/2017	$ 77,662,500

Expansion Plan Projects - The requested service is contingent upon completion of the following upgrades. Cost is not assignable to the transmission customer.

Transmission Owner	Upgrade	Solution	Earliest Date Upgrade Required (DUN)	Estimated Date of Upgrade Completion (EOC)
KACP	IATAN - NASHUA 345KV CKT 1	Tap Nashua 345kV bus in Hawthorn - St. Joseph 345 kV line. Build new 345 kV line from Iatan to Nashua,Add Nashua 345/161 kV	6/1/2012	6/1/2015
MIPU	Line - Nebraska City - Maryville 345 kV (GMO)	Build a new 345 kV substation at Maryville with a ring bus and necessary terminal equipment. Build a new 65 mile 345 kV line with at least 3000 A capacity from the new Maryville substation to the Missouri/Nebraska state border towards OPPD's Neb Cty sub.	6/1/2013	6/1/2017
MIPU	Line - Sibley - Maryville 345 kV	Build a new 105 mile 345 kV line with at least 3000 A capacity from Sibley to a new Maryville substation. Upgrade the Sibley substation with the necessary breakers and terminal equipment.	6/1/2013	6/1/2017

Exploratory Interconnection Project between AECI Cox Creek 345kV (Thayer, Mo) , AEPW Osage Creek 345 kV, EMDE Reeds Spring-Branson 161 kV, and SPRM Brookline 345kV

Transmission Owner	UpgradeName	Solution	Earliest Date Upgrade Required (DUN)	Estimated Date of Upgrade Completion (EOC)	Estimated Engineering & Construction Cost
MULTIPLE	Brookline – Compton Ridge345 kV	Build approx. 30 mile 345 kV line	6/1/2014	6/1/2017	Indeterminate
MULTIPLE	Compton Ridge – Cox Creek 345 kV	Build approx. 120 mile 345 kV line and Operate Gobbler Knob-Cox Creek at 345 kV	6/1/2014	6/1/2017	Indeterminate
MULTIPLE	Compton Ridge – Osage Creek 345 kV	Build approx. 50 mile 345 kV line	6/1/2014	6/1/2017	Indeterminate
MULTIPLE	Compton Ridge 345/161 kV Transformer	Install 500 MVA, 345/161 kV transformer and Cut EDE Reeds Spring-Branson line at 50% and route in & out of Compton Ridge	6/1/2014	6/1/2017	Indeterminate