



# **INTERCONNECTION FACILITIES STUDY REPORT**

GEN-2016-014

IFS-2016-001-04

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By SPP Generator Interconnections Dept.

## REVISION HISTORY

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DATE OR VERSION NUMBER	AUTHOR	CHANGE DESCRIPTION
9/17/2019	SPP	Initial draft report issued.
10/18/2019	SPP	Final report issued.

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## SUMMARY

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### *INTRODUCTION*

This Interconnection Facilities Study (IFS) for Interconnection Request GEN-2016-014/IFS-2016-001-04 is for a 10 MW uprate to the GEN-2001-030 generating facility located in Jasper County, Missouri. The Interconnection Request was studied in the DISIS 2016-001 and DISIS-2016-001-1 Impact Studies for Energy Resource Interconnection Service (ERIS) and Network Resource Interconnection Service (NRIS). The customer then elected to be studied for ERIS only in the Material Modification study. The Interconnection Customer's Commercial Operation Date is 7/01/2017.

The interconnecting Transmission Owner, Empire District Electric (EDE) performed a detailed IFS at the request of SPP. The full report is included in Appendix A. SPP has determined that full Interconnection Service will be available after the assigned transmission owner interconnect facilities (TOIF), non-shared network upgrades, shared network upgrades, previously allocated, and affected system upgrades that are required for full interconnection service are completed.

The primary objective of the IFS is to identify necessary Transmission Owner Interconnection Facilities, Network Upgrades, other direct assigned upgrades, cost estimates, and associated upgrade lead times needed to grant the requested Interconnection Service.

### *PHASE(S) OF INTERCONNECTION SERVICE*

It is not expected that Interconnection Service will occur in phases. However, full Interconnection Service will not be available until all Interconnection Facilities and Network Upgrade(s) can be placed in service.

### *CREDITS/COMPENSATION FOR AMOUNTS ADVANCED FOR NETWORK UPGRADE(S)*

Interconnection Customer shall be entitled to compensation in accordance with Attachment Z2 of the SPP OATT for the cost of SPP creditable-type Network Upgrades, including any tax gross-up or any other tax-related payments associated with the Network Upgrades, that are not otherwise refunded to the Interconnection Customer. Compensation shall be in the form of either revenue credits or incremental Long Term Congestion Rights (iLTCR).

### ***INTERCONNECTION CUSTOMER INTERCONNECTION FACILITIES***

The Generating Facility is proposed to consist of a 10 MW uprate to the existing La Russell Energy Unit #4 location in which is connected to the Empire District Electric Company (EDE) transmission network.

The Interconnection Customer's Interconnection Facilities to be designed, procured, constructed, installed, maintained, and owned by the Interconnection Customer at its sole expense include:

- 13.8 kV underground cable collector circuits;
- 13.8 kV to 161 kV transformation substation with associated 13.8 kV and 161 kV switchgear;
- One (1) 13.8/161 kV, 45/60/75 MVA (ONAN/ONAF/ONAF) step-up transformer to be owned and maintained by the Interconnecting Customer at the Interconnection Customer's substation;
- A 0 mile overhead 161 kV line to connect the Interconnection Customer's substation to the Point of Interconnection ("POI") at the 161 kV bus at the existing Transmission Owner substation La Russell 161 kV that is owned and maintained by the Transmission Owner;
- All transmission facilities required to connect the Interconnection Customer's substation to the POI;
- Equipment at the Interconnection Customer's substation necessary to maintain a composite power delivery at continuous rated power output at the high-side of the generator substation at a power factor within the range of 95% lagging and 95% leading in accordance with Federal Energy Regulatory Commission (FERC) Order 827. Additionally, approximately 0 Mvars<sup>1</sup> of reactors will be required to compensate for injection of reactive power into the transmission system under no/reduced generating conditions. The Interconnection Customer may use inverter manufacturing options for providing reactive power under no/reduced generation conditions. The Interconnection Customer will be required to provide documentation and design specifications demonstrating how the requirements are met.

The Interconnection Customer shall coordinate relay, protection, control, and communication system configurations and schemes with the Transmission Owner.

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<sup>1</sup> This approximate minimum reactor amount is needed for the current configuration of GEN-2016-014 as studied in the DISIS-2016-001 Impact Study and Restudies.

## **TRANSMISSION OWNER INTERCONNECTION FACILITIES AND NON-SHARED NETWORK UPGRADE(S)**

To facilitate interconnection, the interconnecting Transmission Owner will perform work as shown below necessary for the acceptance of the Interconnection Customer's Interconnection Facilities.

**Table 1** and **Table 2** lists the Interconnection Customer's estimated cost responsibility for Transmission Owner Interconnection Facilities (TOIF) and Non-Shared Network Upgrade(s) and provides an estimated lead time for completion of construction. The estimated lead time begins when the Generator Interconnection Agreement has been fully executed.

*Table 1: Transmission Owner Interconnection Facilities (TOIF)*

Transmission Owner Interconnection Facilities (TOIF)	Total Cost Estimate (\$)	Allocated Percent (%)	Allocated Cost Estimate (\$)	Estimated Lead Time
<b>EDE LaRussell:</b> As applicable, change of CT ratios at substation injection position of existing breaker & ½ terminal, along with associated costs for relaying set point updates to incorporate additional flow into terminal at Interconnection Customer's Generating Facility.	\$50,000	100%	\$50,000	6 Months
<b>Total</b>	<b>\$50,000</b>		<b>\$50,000</b>	

*Table 2: Non-Shared Network Upgrade(s)*

Non-Shared Network Upgrades Description	Z2 Type <sup>2</sup>	Total Cost Estimate (\$)	Allocated Percent (%)	Allocated Cost Estimate (\$)	Estimated Lead Time
None	N/A	\$0	N/A	\$0	N/A
<b>Total</b>		<b>\$0</b>		<b>\$0</b>	

<sup>2</sup> Indicates the method used for calculating credits impacts under Attachment Z2 of the Tariff.

### **SHARED NETWORK UPGRADE(S)**

The Interconnection Customer's share of costs for Shared Network Upgrades is estimated in **Table 3** below.

*Table 3: Interconnection Customer Shared Network Upgrades*

Shared Network Upgrades Description	Z2 Type	Total Cost Estimate (\$)	Allocated Percent (%)	Allocated Cost Estimate (\$)	Estimated Lead Time
None	N/A	\$0	N/A	\$0	N/A
<b>Total</b>		<b>\$0</b>		<b>\$0</b>	

All studies have been conducted assuming that higher-queued Interconnection Request(s) and the associated Network Upgrade(s) will be placed into service. If higher-queued Interconnection Request(s) withdraw from the queue, suspend or terminate service, the Interconnection Customer's share of costs may be revised. Restudies, conducted at the customer's expense, will determine the Interconnection Customer's revised allocation of Shared Network Upgrades.

### **PREVIOUS NETWORK UPGRADE(S)**

Certain Previous Network Upgrades are **currently not the cost responsibility** of the Interconnection Customer but will be required for full Interconnection Service.

*Table 4: Interconnection Customer Previous Network Upgrade(s)*

Previous Network Upgrade(s) Description	Current Cost Assignment	Estimated In-Service Date
None	\$0	N/A

Depending upon the status of higher- or equally-queued customers, the Interconnection Request's in-service date is at risk of being delayed or Interconnection Service is at risk of being reduced until the in-service date of these Previous Network Upgrades.

***AFFECTED SYSTEM UPGRADE(S)***

To facilitate interconnection, the Affected System Transmission Owner will be required to perform the facilities study work as shown below necessary for the acceptance of the Interconnection Customer's Interconnection Facilities. **Table 5** displays the current impact study costs as part of the Affected System Impact review. The Affected System facilities study could provide revised costs and will provide each Interconnection Customer's allocation responsibilities for the upgrades.

*Table 5: Interconnection Customer Affected System Upgrade(s)*

Affected System Upgrades Description	Total Cost Estimate (\$)	Allocated Share (%)	Allocated Cost Estimate (\$)
None	\$0	N/A	\$0
<b>Total</b>	<b>\$0</b>		<b>\$0</b>

***CONCLUSION***

After all Interconnection Facilities and Network Upgrades have been placed into service, Interconnection Service for 10 MW can be granted. Full Interconnection Service will be delayed until the transmission owner interconnect facilities (TOIF), non-shared network upgrades, shared network upgrades, previously allocated, and affected system upgrades that are required for full interconnection service are completed. The Interconnection Customer's estimated cost responsibility is summarized in the table below.

*Table 6: Cost Summary*

Description	Allocated Cost Estimate
Transmission Owner Interconnection Facilities	\$50,000
Network Upgrades	\$0
<b>Total</b>	<b>\$50,000</b>

A draft Generator Interconnection Agreement will be provided to the Interconnection Customer consistent with the final results of this IFS report. The Transmission Owner and Interconnection Customer will have 60 days to negotiate the terms of the GIA consistent with the SPP Open Access Transmission Tariff (OATT).



## APPENDICES

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## A: TRANSMISSION OWNER'S INTERCONNECTION FACILITIES STUDY REPORT

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See next page for the Transmission Owner's Interconnection Facilities Study Report.



# **INTERCONNECTION FACILITIES STUDY REPORT**

**GEN-2016-014  
(IFS-2016-001)**

**Facilities Study For  
Southwest Power Pool (SPP)**  
Upgrade of LaRussell Unit #4

**GEN-2016-014**

LaRussell Unit #4 10MW Increase

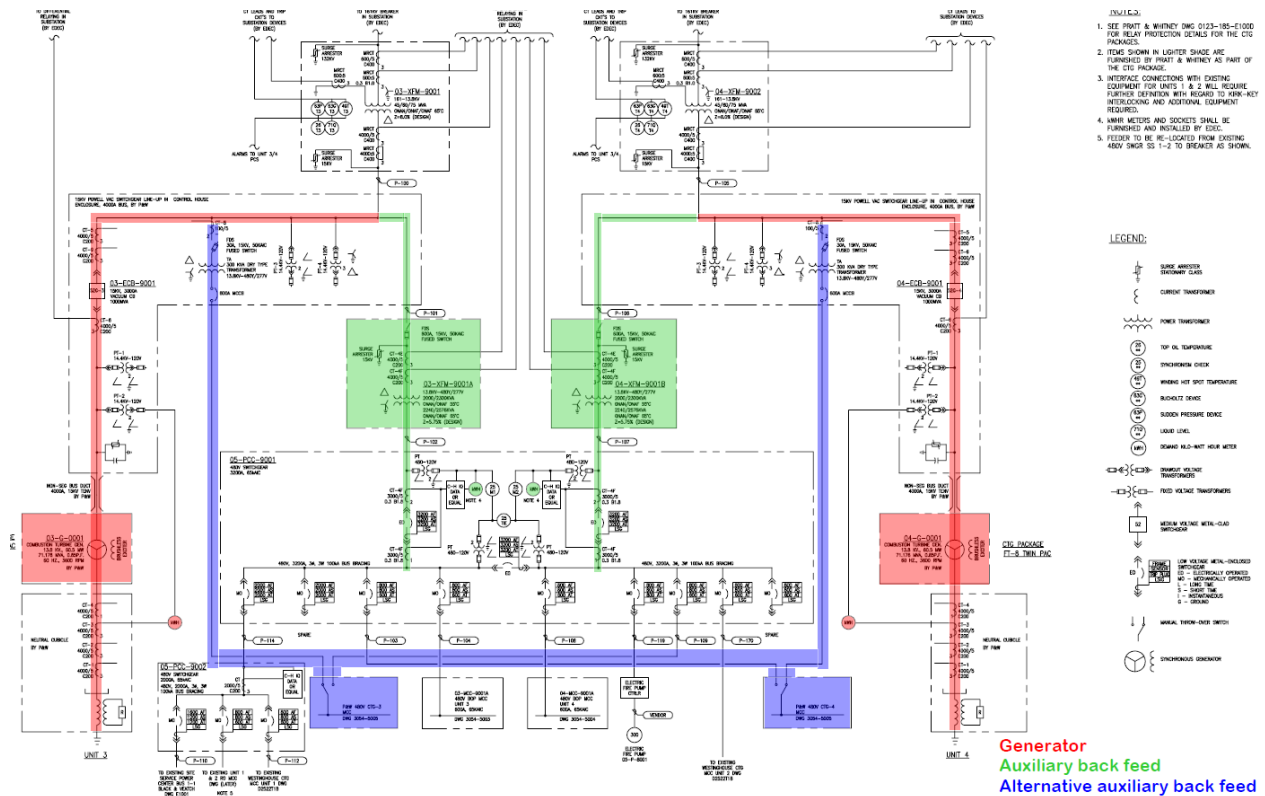
## **Executive Summary**

In 2016, a request was made by an Interconnection Customer (IC; Empire District Electric Company) to uprate of the existing LaRussell Unit #4 machine by an incremental amount of 10 MW at the existing LaRussell Energy Center facility located near the town of LaRussell, MO (approximately 23 miles ENE of Joplin, MO) which is presently connected to the Empire District Electric Company(EMDE) transmission network. The requested commercial operation date for the existing facility will be July 1, 2017. EMDE expects this capacity to be available once the GI study is completed.

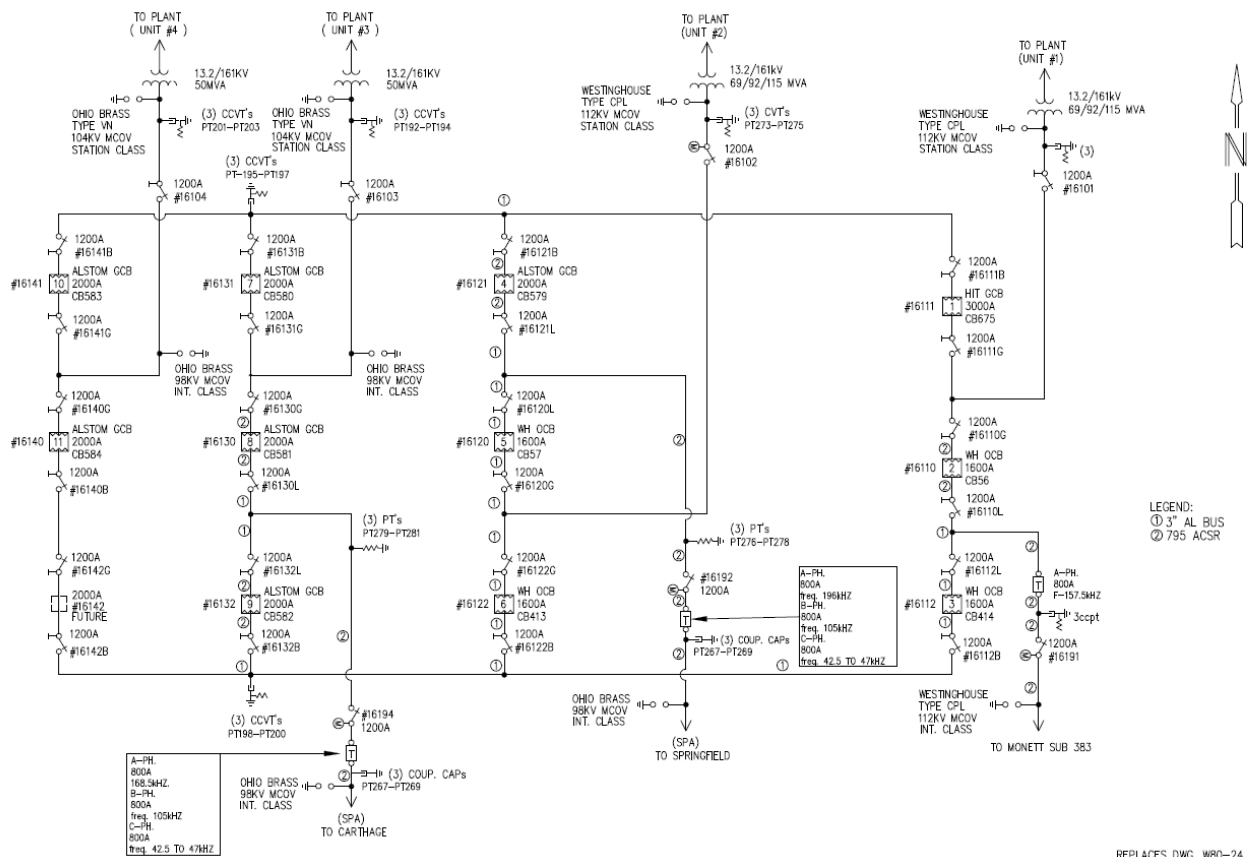
The Southwest Power Pool (SPP) evaluated the request (GEN-2016-014) to interconnect the expanded capacity of the LaRussell generation facility to the EMDE transmission system in a Definitive Interconnection System Impact Study (DISIS-2016-001-1). The interconnection request studied 10MW of additional capacity. No upgrades will be required at the existing substation which serves as the interconnection point of 161 kV bus work present at the LaRussell Energy Center substation.

## General Description of EMDE Facilities<sup>1</sup>

1. **No construction is required. EMDE will utilize Unit #4 existing bus work and infrastructure to accomplish the expanded capacity request. This is purely a gain in the existing machine and will not change the existing connection to the 161kV system**



2. **Transmission Work:**  
No additional transmission work will be required as a result from this request.
3. **Construction Power and Distribution Service:**  
None. All infrastructure is already present and the Generator Unit of interest is already energized and operable.
4. **Project and Operating Concerns:**  
None. The requested increase in capacity is facilitated via gains in the mechanical and control apparatus on the already present generator.
5. **Fault or Short Circuit Study:**  
All breakers present within the switchyard are adequately rated for the requested increase in capacity. Breakers are arranged in a breaker and a half scheme, are rated at or above 20kA (most of which are 40kA interrupting capability), and have a continuous rating of at least 1600 Amps (most of which are 2000 Amp rated for continuous current). See diagram below for configuration and breaker ratings specific to Unit #4 bus position.



## 6. Estimated Construction Costs

This project is anticipated to cost less than or equal to 50,000 due to commissioning costs, testing, and controls configuration changes. Minor materials may be needed for specific control wiring and connections, however any costs are anticipated to be minor.

## 7. Engineering and Construction:

No additional work is required by this study.

– END OF REPORT –