



# **INTERCONNECTION FACILITIES STUDY REPORT**

GEN-2015-098  
(IFS-2015-002-45)

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By SPP Generator Interconnections Dept.

## REVISION HISTORY

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DATE OR VERSION NUMBER	AUTHOR	CHANGE DESCRIPTION	COMMENTS
4/10/2017	SPP	Initial draft report issued.	
2/06/2018	SPP	Final report issued.	To account for DISIS-2015-002-4 Upgrades and MISO DISIS-2015-002 Restudy (1/19/2018)

# CONTENTS

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Revision History .....	i
Summary .....	1
Introduction .....	1
Phase(s) of Interconnection Service .....	1
Credits/Compensation for Amounts Advanced for Network Upgrade(s).....	1
Interconnection Customer Interconnection Facilities .....	2
Transmission Owner Interconnection Facilities and Non-Shared Network Upgrade(s) .....	3
Shared Network Upgrade(s) .....	4
Other Network Upgrade(s) .....	5
Affected System Upgrade(s) .....	6
Environmental Review .....	7
Conclusion.....	7
Appendices.....	8
A: Transmission Owner’s Interconnection Facilities Study Report.....	9

## SUMMARY

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### *INTRODUCTION*

This Interconnection Facilities Study (IFS) for Interconnection Request GEN-2015-098/IFS-2015-002-45 is for a 100.00 MW generating facility located in Wibaux County, Montana. The Interconnection Request was studied in the DISIS-2015-002 Impact Study for Energy Resource Interconnection Service (ERIS) and Network Resource Interconnection Service (NRIS). Prior to an executed IFS agreement, the Interconnection Customer requested to withdraw NRIS per Section 4.4.1 of the Southwest Power Pool (SPP) Generator Interconnection Procedures (GIP), therefore ERIS-only was analyzed for this request in the DISIS-2015-002-1, DISIS-2015-002-2, DISIS-2015-002-3, and DISIS-2015-02-4 Impact Restudies. The Interconnection Customer's requested in-service date is December 15, 2017.

The interconnecting Transmission Owner, Western Area Power Administration (WAPA), performed a detailed IFS at the request of SPP. The full report is included in Appendix A. Additionally, the Affected System, Midcontinent Independent System Operator (MISO), has identified the need to perform a detailed Affected System Facilities Study for impacts on the MISO transmission system. SPP has determined that full Interconnection Service will be available after the assigned Transmission Owner Interconnection Facilities, Non-Shared Network Upgrade(s), Other Network Upgrade(s), Shared Network Upgrade(s), and Affected System Upgrade(s) 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, 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 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 forty-three (43) 2.3 MW General Electric (G.E.) wind generators for a total generating nameplate capacity of 98.9 MW.

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

- 34.5 kV underground cable collection circuits;
- 34.5 kV to 230 kV transformation substation with associated 34.5 kV and 230 kV switchgear;
- One (1) 230/34.5 kV 72/95/120 MVA (ONAN/ONAF/ONAF) step-up transformer to be owned and maintained by the Interconnection Customer at the Interconnection Customer's substation;
- A less than one (<1) mile overhead 230 kV line to connect the Interconnection Customer's substation to the Point of Interconnection (POI) at the 230 kV bus at the planned WAPA substation ("Mingusville") that is owned and maintained by WAPA;
- 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 power factor at the POI between 95% lagging and 95% leading, including approximately 9 Mvars<sup>1</sup> of reactors to compensate for injection of reactive power into the transmission system under no/reduced generating conditions. The Interconnection Customer may use wind turbine 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 the wind farm as studied in the GEN-2015-098 Turbine Restudy.

**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** 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: Interconnection Customer TOIF and Non-Shared Network Upgrade(s)*

<b>TOIF and Non-Shared Network Upgrades Description</b>	<b>Total Cost Estimate (\$)</b>	<b>Allocated Percent (%)</b>	<b>Allocated Cost Estimate (\$)</b>	<b>Estimated Lead Time</b>
<b><u>WAPA Mingsville Interconnection Substation: Transmission Owner Interconnection Facilities</u></b> Construct one (1) 230 kV line terminal, line switches, dead end structure, line relaying, communications, revenue metering, line arrester and all associated equipment and facilities necessary to accept transmission line from Interconnection Customer’s Generating Facility.	\$216,180	100%	\$216,180	18 months
<b><u>WAPA Mingsville Interconnection Substation - Non-Shared Network Upgrades</u></b> Construct one (1) 230 kV 2000 continuous ampacity breakers, control panel, line relaying, disconnect switches, structures, foundations, conductors, insulators, and all other associated work and materials.	\$1,653,878	100%	\$1,653,878	
<b>Total</b>	<b>\$1,870,058</b>	<b>100%</b>	<b>\$1,870,058</b>	

A Shared Facilities Usage Agreement for the shared facilities with GEN-2014-014IS/GI-1414 shall be required for Generator Interconnection Service. Shared Facilities Usage Agreement details will be determined during the negotiation phase of the GIA.

**SHARED NETWORK UPGRADE(S)**

The Interconnection Customer’s share of costs for Shared Network Upgrades is estimated in **Table 2** below.

*Table 2: Interconnection Customer Shared Network Upgrade(s)*

<b>Shared Network Upgrades Description</b>	<b>Total Cost Estimate (\$)</b>	<b>Allocated Percent (%)</b>	<b>Allocated Cost Estimate (\$)</b>
<p><b><u>Basin Electric Power Cooperative (BEPC) Dickinson 230/115/13kV Transformer Circuit #2:</u></b> Expand Dickinson Substation, build new 230kV line terminal, build new three (3) breaker ring “East” bus for 115kV configuration, one (1) 230kV 2000 continuous ampacity breaker, three (3) 115kV 1200 continuous ampacity breakers, new 230/115/13kV 166MVA transformer, control panels, line relaying, disconnect switches, structures, foundations, conductors, insulators, and all other associated work and materials.</p> <p>Estimated Lead Time: 23 Months</p>	\$11,764,180	22.53	\$2,650,770
<b>Total</b>	<b>\$11,764,180</b>	<b>22.53</b>	<b>\$2,650,770</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.

**OTHER NETWORK UPGRADE(S)**

Certain Other Network Upgrades are currently not the cost responsibility of the Interconnection Customer but will be required for full Interconnection Service are listed in **Table 3** below.

*Table 3: Interconnection Customer Other Network Upgrade(s)*

Description	Current Cost Assignment	Estimate In-Service Date
<p><b><u>Tande 345/230/13kV Substation and Transformer Circuit #1:</u></b> assigned in Integrated System/Upper Missouri Zone (IS/UMZ) Integration Study.</p>	<p>\$18,000,000</p>	<p>10/31/2017</p>
<p><b><u>Kummer Ridge – Roundup 345kV Circuit #1:</u></b> assigned in the 2016 Integrated Transmission Plan – Near Term (2016 ITPNT) per SPP-NTC-200417</p>	<p>\$52,312,877</p>	<p>12/31/2019</p>

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 Other 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 4** displays the current impact study costs provided by MISO 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 4: Interconnection Customer Affected System Upgrade(s)*

<b>Affected System Upgrades Description</b>	<b>Total Cost Estimate</b>	<b>Allocated Share</b>	<b>Allocated Cost Estimate</b>
<b><u>New Hills 161kV:</u></b> Expand substation and add one (1) x 27.6Mvars of capacitor banks at New Hills (Johnson) 161kV to address low voltage constraint at New Hills 345kV.	\$1,100,000	17.82	\$196,040
<b>Total Shared Network Upgrades</b>	<b>1,100,000</b>	17.82	\$196,040

Big Stone South – Ellendale MVP Project was also included in MISO analysis with an anticipated in-service date by 12/31/2019. Therefore, the DISIS-2015-002 Group 9 and Group 16 request are conditional to the MVP project being in-service.

**ENVIRONMENTAL REVIEW**

For Interconnection Request(s) that result in an interconnection to, or modification to, the transmission facilities of the Western Upper Great Plains (WAPA-UGP), a National Environmental Policy Act (NEPA) Environmental Review will be required. The Interconnection Customer will be required to execute an Environmental Review Agreement per Section 8.6.1 of the GIP.

**CONCLUSION**

After all Interconnection Facilities and Network Upgrades have been placed into service, Interconnection Service for 100.00 MW can be granted. Interconnection Service will be delayed until the Transmission Owner Interconnection Facilities, Non-Shared Network Upgrade(s), Other Network Upgrade(s), Shared Network Upgrade(s), and Affected System Upgrade(s) are completed. The Interconnection Customer’s estimated cost responsibility for Transmission Owner Interconnection Facilities, Non-Shared Network Upgrade(s), and Shared Network Upgrade(s) is summarized in the **Table 5** below.

*Table 5: Cost Summary*

<b>Description</b>	<b>Allocated Cost Estimate</b>
Transmission Owner Interconnection Facilities	\$216,180
Network Upgrades	\$4,304,648
Affected System Upgrades	\$196,040
Environmental Review	TBD by WAPA
<b>Total</b>	<b>\$4,716,868</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.