



**INTERCONNECTION
FACILITIES STUDY
REPORT**

GEN-2017-085

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By SPP Generator Interconnections Dept.

REVISION HISTORY

DATE OR VERSION NUMBER	AUTHOR	CHANGE DESCRIPTION
12/01/2021	SPP	Initial draft report issued.

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SUMMARY

INTRODUCTION

This Interconnection Facilities Study (IFS) for Interconnection Request GEN-2017-085 is for a 0.6 MW generating facility located in Saline County, NE. The Interconnection Request was studied in the DISIS-2017-001 Impact Study and DISIS-2017-001-1 Impact Restudy for Network Resource Interconnection Service (NRIS). The Interconnection Customer's requested in-service date is June 30th, 2023.

The interconnecting Transmission Owner, Nebraska Public Power District (NPPD), 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 Interconnection Facilities (TOIF), Non-Shared Network Upgrades, Shared Network Upgrades, Contingent Network Upgrades, 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.

COMPENSATION FOR AMOUNTS ADVANCED FOR NETWORK UPGRADE(S)

FERC Order ER20-1687-000 eliminated the use of Attachment Z2 revenue crediting as an option for compensation. The Incremental Long Term Congestion Right (ILTCR) process will be the sole process to compensate upgrade sponsors as of July 1st, 2020.

INTERCONNECTION CUSTOMER INTERCONNECTION FACILITIES

The Generating Facility is proposed to consist of thirty-seven (37) Vestas V110 Wind Turbine Generation Systems for a total generating nameplate capacity of 0.6 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 115 kV transformation substation with associated 34.5 kV and 115 kV switchgear;
- One 115/34.5 kV 54/72/90 MVA (ONAN/ONAF/ONAF) step-up transformer to be owned and maintained by the Interconnection Customer at the Interconnection Customer's substation;
- An approximately .1 mile overhead mile overhead kV line to connect the Interconnection Customer's substation to the Point of Interconnection ("POI") at the 115 kV bus at existing Transmission Owner substation ("Friend 115kV Substation") that is owned and maintained by 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. 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; and,
- All necessary relay, protection, control and communication systems required to protect Interconnection Customer's Interconnection Facilities and Generating Facilities and coordinate with Transmission Owner's relay, protection, control and communication systems.

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
None	\$0	N/A	\$0	N/A
Total	\$0		\$0	

Table 2: Non-Shared Network Upgrade(s)

Non-Shared Network Upgrades Description	ILTCR	Total Cost Estimate (\$)	Allocated Percent (%)	Allocated Cost Estimate (\$)	Estimated Lead Time
None	N/A	\$0	N/A	\$0	N/A
Total		\$0		\$0	

*GEN-2017-085 is an uprate to an existing interconnection request (GEN-2014-039).

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 Upgrade(s)

Shared Network Upgrades Description	ILTCR	Total Cost Estimate (\$)	Allocated Percent (%)	Allocated Cost Estimate (\$)	Estimated Lead Time
None	N/A	\$0	N/A	\$0	N/A
Total		\$0		\$0	

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.

CONTINGENT NETWORK UPGRADE(S)

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

Table 4: Interconnection Customer Contingent Network Upgrade(s)

Contingent 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 Contingent 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 provided by either MISO or AECI 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 Percent (%)	Allocated Cost Estimate (\$)
None	\$0	N/A	\$0
Total	\$0		\$0

CONCLUSION

After all Interconnection Facilities and Network Upgrades have been placed into service, Interconnection Service for 0.6 MW can be granted. Full Interconnection Service will be delayed until the TOIF, Non-Shared NU, Shared NU, Contingent NU, Affected System Upgrades that are required for full interconnection service are completed. The Interconnection Customer's estimated cost responsibility for full interconnection service is summarized in the table below.

Table 6: Cost Summary

Description	Allocated Cost Estimate
Transmission Owner Interconnection Facilitie Upgrade(s)	\$0
Non-Shared Network Upgrade(s)	\$0
Shared Network Upgrade(s)	\$0
Affected System Upgrade(s)	\$0
Total	\$0

Use the following link for Quarterly Updates on upgrades from this report: <https://spp.org/spp-documents-filings/?id=18641>

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

**A: TRANSMISSION OWNER'S INTERCONNECTION FACILITIES STUDY
REPORT AND NETWORK UPGRADES REPORT(S)**

See next page for the Transmission Owner's Interconnection Facilities Study Report and Network Upgrades Report(s).

**DISIS-2017-001-1
GENERATION INTERCONNECTION
FACILITY STUDY**

NPPD

SPP GEN-2017-085 0.6 MW at Friend 115 kV Substation

SEPTEMBER 2021

**PREPARED FOR:
SOUTHWEST POWER POOL**

**PREPARED BY:
NEBRASKA PUBLIC POWER DISTRICT
ENERGY DELIVERY
TRANSMISSION ASSET PLANNING
ENGINEERING & ASSET MANAGEMENT**



Nebraska Public Power District

"Always there when you need us"

The *NPPD DISIS-2017-001-1 Facility Study* was performed to document the interconnection facilities required for GEN-2017-085. GEN-2017-085 is a 0.6 MW increase to GEN-2014-039 and both projects will share the same gen lead line. GEN-2014-039 is a 73.4 MW wind generation interconnection request at NPPD's Friend 115 kV Substation. NPPD performed the DISIS-2014-002-1 Generation Interconnection Facility Study in August of 2015 to document the interconnection facility requirements for GEN-2014-039. This Facility Study is posted on the SPP Generation Interconnection website under 2014 Facility Studies / GEN-2014-039 / IFS-2014-002-13. From the previous Facility Study, the Interconnection Facilities required for GEN-2014-039 are:

GEN-2014-039 : Expansion of Friend 115 kV substation to ring configuration due to proposed generation interconnection and new 115 kV terminal. \$4.9 Million

To support this facility study, a review of the previous facility study was performed to update the cost estimate associated with the expansion of the Friend 115 kV substation for inclusion of GEN-2017-085. GEN-2017-085 is 0.6 MW increase to GEN-2014-039 for a new total of 74.0 MW. The previous studywork performed for GEN-2014-039 was reviewed and this review is documented below:

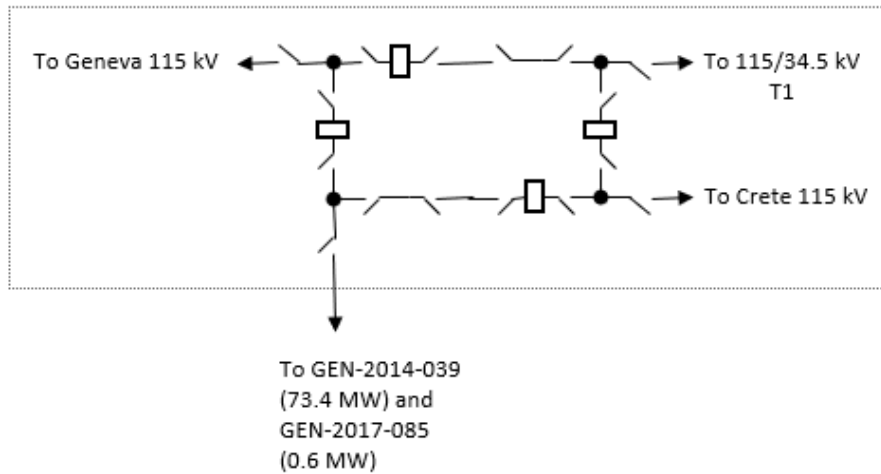
Powerflow Analysis – The powerflow analysis performed for *NPPD DISIS-2014-002-1* is sufficient and not needed to be updated for *NPPD DISIS-2017-001-1*.

Short Circuit Analysis – The short circuit analysis performed for *NPPD DISIS-2014-002-1* is sufficient and not needed to be updated for *NPPD DISIS-2017-001-1*.

Stability Analysis – The stability analysis performed for *NPPD DISIS-2014-002-1* is sufficient and not needed to be updated for *NPPD DISIS-2017-001-1*.

A one-line diagram of the Friend 115 kV substation with the wind project generation interconnection requests is below:

Friend 115 kV



NPPD has reviewed and prepared the following updated cost estimate for the Friend 115 kV substation:

Friend 115 kV substation: Expansion of Friend 115 kV substation to ring configuration due to interconnect GEN-2014-039.

\$ 4.9 Million

Friend 115 kV substation: Expansion of Friend 115 kV substation to ring configuration due to interconnect GEN-2017-085.

\$ 0.0 Million