INTERCONNECTION FACILITIES STUDY REPORT

GEN-2019-037

Published February 2025

By SPP Generator Interconnections Dept.

REVISION HISTORY

DATE OR VERSION NUMBER	AUTHOR	CHANGE DESCRIPTION
February 5, 2025	SPP	Initial draft report issued.
February 20, 2025	SPP	Final report issued.

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SUMMARY

INTRODUCTION

This Interconnection Facilities Study (IFS) for Interconnection Request GEN-2019-037 is for a 150 MW generating facility located in Mercer, ND. The Interconnection Request was studied in the DISIS-2018-002/DISIS-2019-001 Impact Study for ER/NR. The Interconnection Customer's requested in-service date is February 4, 2027.

The interconnecting Transmission Owner, Basin Electric Power Cooperative (BEPC), 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-eight (38) SMA MVPS 440 S2-US 4.4 MW solar inverters for a total generating nameplate capacity of 150 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 345 kV transformation substation with associated 34.5 kV and 345 kV switchgear;
- One 345/34.5 kV 102/136/170 MVA (ONAN/ONAF/ONAF) step-up transformer to be owned and maintained by the Interconnection Customer at the Interconnection Customer's substation;
- An Approximately 4.5 mile overhead 345 kV line to connect the Interconnection Customer's substation to the Point of Interconnection ("POI") at the 345 kV bus at existing Transmission Owner substation ("Leland Olds 345kV 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** list 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 ($)	Allocated Percent (%)	Allocated Cost Estimate ($)
Transmission Owner's Leland Olds 345kV GEN-2019-037 Interconnection (TOIF) (BEPC) (UID 156674): Facilitate the interconnection of GEN-2019-037 Estimated Lead Time: 60 Months	$3,066,936	100.00%	$3,066,936
Total	**$3,066,936**		**$3,066,936**

Table 2: Non-Shared Network Upgrade(s)

Non-Shared Network Upgrades Description	ILTCR	Total Cost Estimate ($)	Allocated Percent (%)	Allocated Cost Estimate ($)
Transmission Owner's Leland Olds 345kV GEN-2019-037 Interconnection (Non-shared NU) (BEPC) (UID 156675): Facilitate the interconnection of GEN-2019-037 Estimated Lead Time: 60 Months	Ineligible	$5,916,489	100%	$5,916,489
Total		**$5,916,489**		**$5,916,489**

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 ($)	Allocated Percent (%)	Allocated Cost Estimate ($)
NA				
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
NA		

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 ($)	Allocated Percent (%)	Allocated Cost Estimate ($)
Minnkota Power Cooperative, Inc. Falconer – Oslo 115 kV: Rebuild Line and Terminal Upgrade.	$8,700,000	100%	$8,700,000
Minnkota Power Cooperative, Inc. Grand Forks - Falconer 115 kV: Rebuild Line and Terminal Upgrade.	$1,500,000	100%	$1,500,000
Minnkota Power Cooperative, Inc. Jamestown – Center 345 kV: Structure raises, maximum conductor rating is 1595.4 MVA	$1,000,000	100%	$1,000,000
Minnkota Power Cooperative, Inc. Center 345/230 kV Autotransformers #1 and #2: Add third Center 345/230 kV autotransformer and terminal upgrades.	$10,500,000	100%	$10,500,000
Total	**$21,700,000**		**$21,700,000**

CONCLUSION

After all Interconnection Facilities and Network Upgrades have been placed into service, Interconnection Service for 150 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 Facilities Upgrade(s)	$3,066,936
Non-Shared Network Upgrade(s)	$5,916,489
Shared Network Upgrade(s)	$0
Affected System Upgrade(s)	$21,700,000
Total	**$30,683,425**

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).

Basin Electric Power Cooperative
Facility Study Report
GEN-2019-037

1. Background:

1.1 Per the Generator Interconnection Procedures (GIP), Attachment V, Section 8.11, SPP requests that Basin Electric Power Cooperative (BEPC) perform a facilities study for the following Interconnection and/or Network Upgrade(s):

Upgrade Type	UID	Upgrade Name
Interconnection	156675	Leland Olds 345kV GEN-2019-037 Interconnection (Non-shared NU) (BEPC)
Interconnection	156674	Leland Olds 345kV GEN-2019-037 Interconnection (TOIF) (BEPC)

2. Study Requirements:

BEPC has performed this Facility Study report in accordance with the Generator Interconnection Procedures (GIP), Attachment V, Section 8.11 for the Interconnection and/or Network Upgrade(s) as described in Section 1.

2.1. The Facility Study report includes an evaluation of the following:

2.1.1. Perform/develop a substation layout, perform a preliminary bus design, determine all electrical equipment requirements, and if required determine a suitable site location to accommodate the Request. Develop/compile cost estimates for all BEPC labor, overheads, equipment additions, modifications, etc. to accommodate the generator interconnection.

2.1.2. Develop an overall construction schedule for completion of the necessary additions and/or modifications.

2.1.3. Point Of Change of Ownership. For the purposes of this Facility Study report, the Point of Change of Ownership location is defined as the take-off structure(s) at the BEPC Substation/Switching Station where the Interconnection Customer's transmission line(s) connects to the take-off structure(s). Interconnection Customer will furnish and install the conductor jumper and insulator assembly to the take-off structure(s).

2.1.4. Other Interconnection/Metering Requirements. Basic indication, metering, monitoring, control, and relaying requirements due to a generator interconnection are included in the cost estimate. BEPC's generation metering requirements, as an SPP Transmission Owner, must be met. A list of specific needs will be provided by BEPC once design has progressed.

3. Study Results for GEN-2019-037:

3.1. The following results document the analysis of the required facilities for this Interconnection Request as outlined in Section 1 for a new 345kV line terminal at the Leland Olds 345/230kV Substation. BEPC has determined that the following additions and improvements are required to maintain a safe and reliable interconnection to BEPC's transmission system.

3.2 Substation/Switchyard

A new terminal will be required to be added to the existing 345kV bus to accommodate this interconnection. This will require the addition of 2 – 345 kV circuit breakers, 5 breaker disconnect switches, 1 line disconnect switch, 3 potential transformers, 3 current transformers, all associated bus work required for connection and required protection and control additions. Reference Figures A1 and A2. All protection and control schemes will follow BEPC's internal design standards.

3.3 Environmental Requirements

Compliance with all applicable federal, state, and local regulations will be strictly adhered to. Additionally, all applicable and required permits and approvals will be obtained prior to construction.

3.4 Cost Estimate

GEN-2019-037 Estimated Costs NSNU Network Upgrades	Current Year $
Line Costs	
Engineering Labor	$0
Construction Labor	$0
Reactive Compensation (Labor & Materials)	$0
Material	$0
Right of Way	$0
Line Sub Total	**$0**
Station Costs	
Engineering Labor	$341,000
Construction Labor	$1,259,110
Site Property Rights	$0
Reactive Compensation	$0
Material	$2,216,304
Right of Way	$0
Station Sub Total	**$3,816,414**
AFUDC	$0
Contingency	$2,100,075
GEN-2019-037 Total Costs	**$5,916,489**

GEN-2019-037 Estimated Costs TOIF Network Upgrades	Current Year $
Line Costs	
Engineering Labor	$0
Construction Labor	$0
Reactive Compensation (Labor & Materials)	$0
Material	$0
Right of Way	$0
Line Sub Total	**$0**
Station Costs	
Engineering Labor	$150,000
Construction Labor	$565,573
Site Property Rights	$0
Reactive Compensation	$0
Material	$1,262,745
Right of Way	$0
Station Sub Total	**$1,978,318**
AFUDC	$0
Contingency	$1,088,618
GEN-2019-037 Total Costs	**$3,066,936**

Total Interconnection Cost	**$8,983,425**

3.5 Construction Schedule

The preliminary project schedule provided is for planning level purposes only and will be adjusted with additional project definition. If it is determined that NEPA and/or ROW condemnation is required, 12-18 months will be added to the In-Service date.

Activity	Duration	Estimated Start	Estimated Finish
Executed GIA-Notice To Proceed Letter	--	Month 0	--
Project Planning	1 Month	Month 0	Month 1
Engineering Design	9 Months	Month 2	Month 11
Equipment Procurement	NA	Month 1	Month 55
Advertise and Award Construction Contracts	3 months	Month 41	Month 44
Construction	12 Months	Month 47	Month 59
Energize and In-Service Date	1 Month	Month 59	Month 60

Figure A1: Proposed Switching Diagram

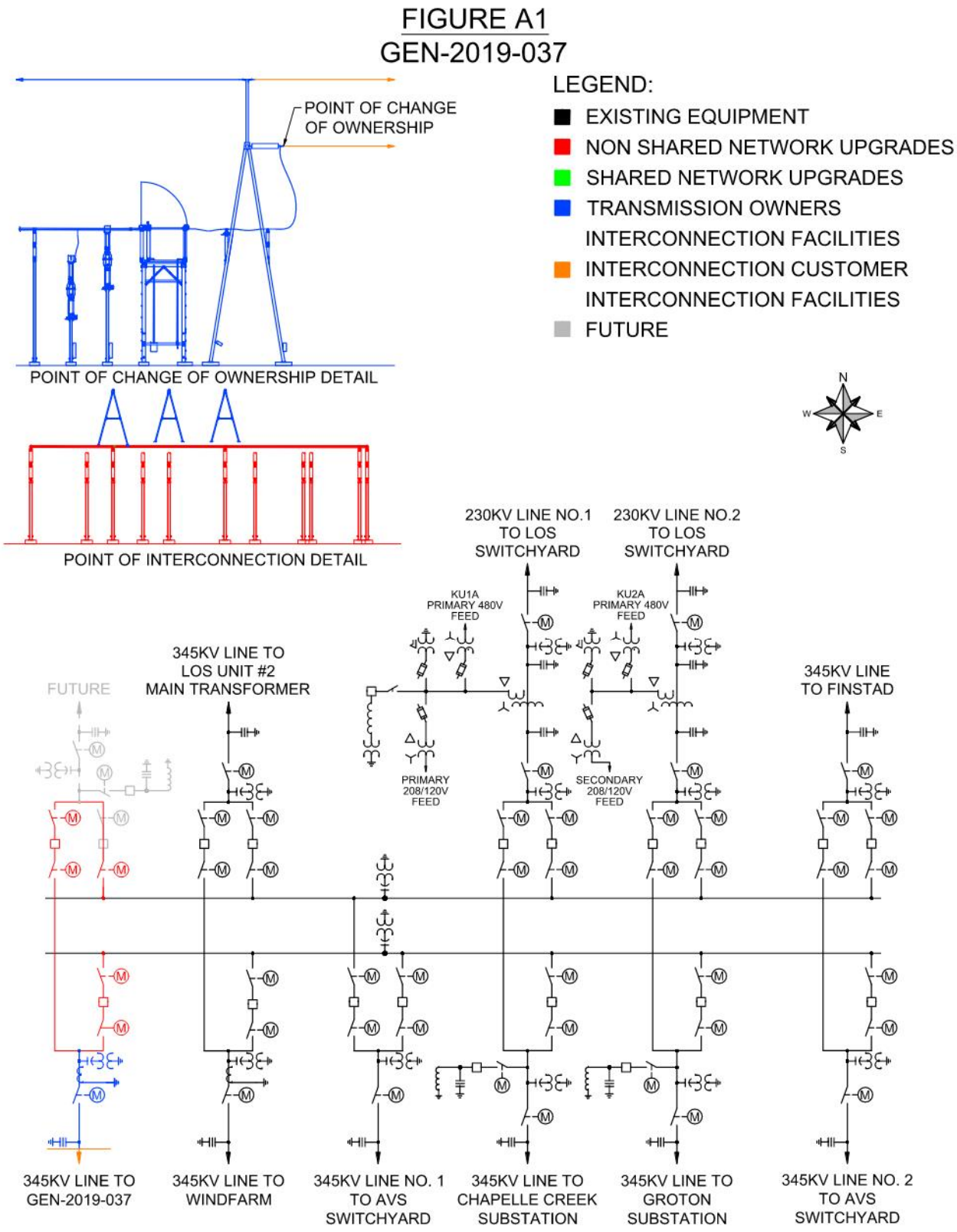

Figure A2: Proposed General Arrangement

FIGURE A2
GEN-2019-037

LEGEND:

- EXISTING EQUIPMENT
- NON SHARED NETWORK UPGRADES
- SHARED NETWORK UPGRADES
- TRANSMISSION OWNERS INTERCONNECTION FACILITIES
- INTERCONNECTION CUSTOMER INTERCONNECTION FACILITIES
- FUTURE