INTERCONNECTION FACILITIES STUDY REPORT

GEN-2021-008

Published August 2025

By SPP Generator Interconnections Dept.

REVISION HISTORY

DATE OR VERSION NUMBER	AUTHOR	CHANGE DESCRIPTION
August 18, 2025	SPP	Initial draft report issued.
September 4, 2025	SPP	Final report issued.

CONTENTS

SUMMARY

INTRODUCTION

This Interconnection Facilities Study (IFS) for Interconnection Request GEN-2021-008 is for a 200 MW generating facility located in McKenzie County, ND. The Interconnection Request was studied in the DISIS-2021-001 Impact Study for ERIS/NRIS. The Interconnection Customer's requested in-service date is 10/19/2030.

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 fifty (50) SMA MVPS 4400 inverters for a total generating nameplate capacity of 200 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 kV/34.5 kV 171/228/285 MVA (ONAN/ONAF/ONAF) step-up transformer to be owned and maintained by the Interconnection Customer at the Interconnection Customer's substation;
- An Approximately 2.5 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 ("345 kV Bus at BEPC Patent Gate 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 345kV Bus at BEPC Patent Gate Substation McKenzie County GEN-2021-008 Interconnection (TOIF) (UID 157009): Interconnection upgrades and cost estimates needed to interconnect the following Interconnection Customer facility, GEN-2021-008 (200/Solar), into the Point of Interconnection (POI) at 345kV Bus at BEPC Patent Gate Substation, McKenzie County, ND. (studied at Leland Olds 345 kV). Estimated Lead Time: 28 Months	$275,000	100.00%	$275,000
Total	**$275,000**		**$275,000**

Table 2: Non-Shared Network Upgrade(s)

Non-Shared Network Upgrades Description	ILTCR	Total Cost Estimate ($)	Allocated Percent (%)	Allocated Cost Estimate ($)
Transmission Owner's 345kV Bus at BEPC Patent Gate Sub McKenzie County GEN-2021-008 Interconnection (Non-shared NU) (UID 157171): Interconnection upgrades and cost estimates needed to interconnect the following Interconnection Customer facility, GEN-2021-008 (200/Solar), into the Point of Interconnection (POI) at 345kV Bus at BEPC Patent Gate Substation, McKenzie County, ND. (studied at Leland Olds 345 kV). Estimated Lead Time: 0 Months	Ineligible	$0	100.00%	$0
Total		**$0**		**$0**

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
WAPA's Finstad Switched Shunt (UID 144231): Install a switched shunt at Finstad.	**$0**	11/30/2026
WAPA's Tande 345 kV Terminal Equipment (UID 144238): Install new terminal equipment at Tande to support a new 345 kV line from Finstad. Install a series compensation device at Finstad or Tande.	**$0**	11/30/2026
WAPA's Leland Olds 345 kV Substation (UID 144237): Build a new 345 kV Substation with terminal equipment to support a new line from Finstad 345 kV substation.	**$0**	11/30/2026
WAPA's Finstad 345 kV New Substation (UID 144230): Build a new 345 kV Substation including 345 kV terminals for lines from Leland Olds 345 kV substation, Tande 345 kV substation and high side terminal equipment for Finstad 345/115 kV Ckt 1 transformer and Finstad 345/115 kV Ckt 2 transformer	**$0**	11/30/2026
WAPA's Finstad - Tande 345 kV New Line (UID 143714): Build a 48 mile 345 kV line from Finstad to Tande.	**$0**	11/30/2026
WAPA's Leland Olds - Finstad - 345 kV New Line (UID 144236): Build a 123 mile 345 kV line from Leland Olds to Finstad.	**$0**	11/30/2026

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 ($)	Allocated Percent (%)	Allocated Cost Estimate ($)
MPC's Coleman - Prairie 69 kV Rebuild	$175,000	20.57%	$35,996
MPC's Center 345 kV MSC: 1 x 50 MVAR	$2,500,000	30.37%	$759,175
MPC's Prairie 345 kV MSC: 1 x 50 MVAR	$2,500,000	19.50%	$487,465
MPC's Prairie 345 kV STATCOM: ± 100 MVAR	$20,000,000	19.50%	$3,899,718
Total	**$25,175,000**		**$5,182,354**

Study Report:
https://opsportal.spp.org/documents/studies/files/2021_Generation_Studies/MPC_ASA_DISIS-2021-001_Phase_2_2024_09_18_(FINAL)_Public.pdf

CONCLUSION

After all Interconnection Facilities and Network Upgrades have been placed into service, Interconnection Service for 200 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)	$275,000
Non-Shared Network Upgrade(s)	$0
Shared Network Upgrade(s)	$0
Affected System Upgrade(s)	$5,182,354
Total	**$5,457,354**

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-2021-008

1. Background:

1.1 Per the Generator Interconnection Procedures (GIP), SPP requested that Basin Electric Power Cooperative (BEPC) perform facility studies in accordance with Attachment V, Section 8.11, for the following Interconnection and/or Network Upgrade(s):

Interconnection	157009	345 kV Bus at BEPC Patent Gate Substation McKenze County GEN-2021-008 Interconnection (TOIF) (BEPC)
Interconnection	157171	345 kV Bus at BEPC Patent Gate Sub McKenzie County GEN-2021-008 Interconnection (Non-shared NU) (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-2021-008:

3.1. The following results document the analysis of the required facilities for this Interconnection Request as outlined in Section 1 for a new generation resource interconnected at the Patent Gate 345/115kV 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

It is assumed that GEN-2021-008 will utilize the same interconnection terminal and transmission line as GEN-2020-091, and therefore a new terminal at Patent Gate 345/115kV Substation is not required for GEN-2021-008.

Considering this stated assumption, GEN-2021-008 will require an analysis and modification of protective relaying, RTU, and metering configurations. Reference Figures A1 and A2. All equipment will follow BEPC's internal design standards for minimum BIL, ampacity, and fault capabilities.

Additional associated work will include a review and update to relay/protection schemes and SCADA RTU configurations at the current facility.

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. For the purposes of this Facility Study report, it is anticipated that this will require incidental minor local permitting.

3.4 Cost Estimate

GEN-2021-008 Non Shared 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	$
Construction Labor	$
Site Property Rights	$0
Reactive Compensation	$0
Material	$
Right of Way	$0
Station Sub Total	**$**
AFUDC	$0
Contingency	$0
Non - Shared Network Upgrades total	**$0**

GEN-2021-008 Transmission Owner Interconnect Facilities	Current Year $
Line Costs	
Engineering Labor	$200,000
Construction Labor	$0
Reactive Compensation (Labor & Materials)	$0
Material	$50,000
Right of Way	$0
Line Sub Total	**$0**
Station Costs	
Engineering Labor	$
Construction Labor	$
Site Property Rights	$0
Reactive Compensation	$0
Material	$
Right of Way	$0
Station Sub Total	**$**
AFUDC	$0
Contingency	$25,000
TOIF Subtotal	**$275,000**

Total Interconnection Cost	**$275,000**

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	3-4 Months	Month 1	Month 5
Equipment Procurement	1-2 Months	Month 2	Month 4
Advertise and Award Construction Contracts	NA	NA	NA
Construction	NA	NA	NA
Energize and In-Service Date	2 Month	Month 5	Month 7

Figure A1: Proposed Switching Diagram

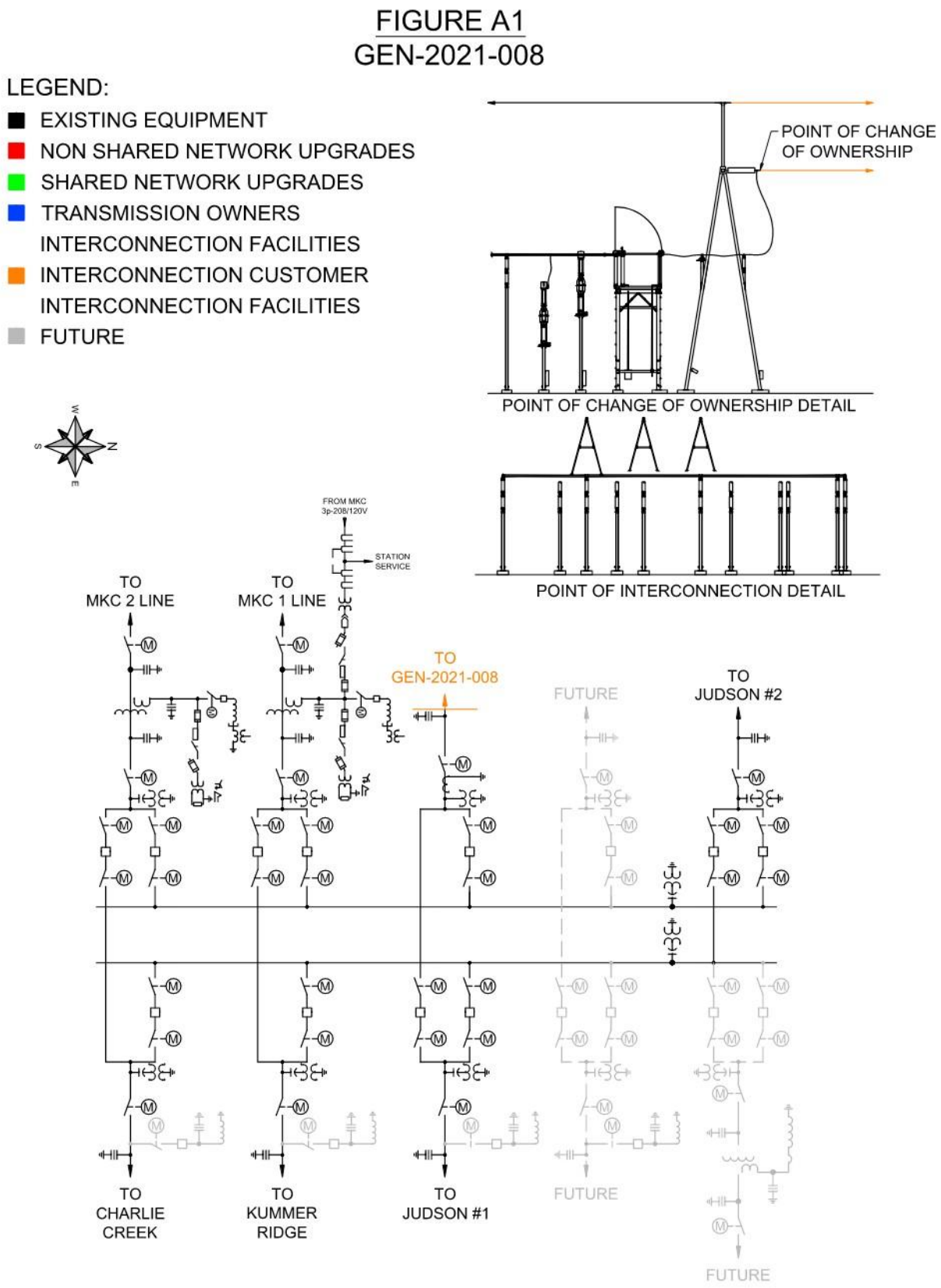

Figure A2: Proposed General Arrangement

FIGURE A2
GEN-2021-008

LEGEND:

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