INTERCONNECTION FACILITIES STUDY REPORT

GEN-2018-069

Published March 2025

By SPP Generator Interconnections Dept.

REVISION HISTORY

DATE OR VERSION NUMBER	AUTHOR	CHANGE DESCRIPTION
March 13, 2025	SPP	Initial draft report issued.
April 2, 2025	SPP	Final report issued.

CONTENTS

SUMMARY

INTRODUCTION

This Interconnection Facilities Study (IFS) for Interconnection Request GEN-2018-069 is for a 125 MW generating facility located in Wibaux County, MT. 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 January 5, 2027.

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. 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 forty-one (41) GE 2.82-127, three (3) GE 2.3-116, and two (2) GE 1.24-116 wind turbines for a total generating nameplate capacity of 125 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 230/34.5 kV 150/200/250 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 230 kV line to connect the Interconnection Customer's substation to the Point of Interconnection ("POI") at the 230 kV bus at existing Transmission Owner substation ("WAPA-UGP Mingusville 230kV") 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 WAPA-UGP Mingusville 230kV GEN-2018-069 Interconnection (TOIF) (WAPA) (UID 156826): Facilitate the interconnection of GEN-2018-069 Estimated Lead Time: 60 Months	$330,000	100.00%	$330,000
Total	**$330,000**		**$330,000**

Table 2: Non-Shared Network Upgrade(s)

Non-Shared Network Upgrades Description	ILTCR	Total Cost Estimate ($)	Allocated Percent (%)	Allocated Cost Estimate ($)
NA				
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 ($)	Allocated Percent (%)	Allocated Cost Estimate ($)
Transmission Owner's WAPA-UGP Mingusville 230kV Interconnection Expansion (DISIS-2018-002 - DISIS-2019-001) (UID 156828): Facilitate the interconnection of GEN-2018-069 Estimated Lead Time: 60 Months	Ineligible	$3,275,000	53.19%	$1,742,021
Total		**$3,275,000**		**$1,742,021**

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
Basin Electric Power Cooperative Leland Olds - Finstad - 345 kV New Line (UID144236): Build a 123 mile 345 kV line from Leland Olds to Finstad.	$0	11/30/2026
Basin Electric Power Cooperative Leland Olds 345 kV Substation (UID144237): Build a new 345 kV Substation with terminal equipment to support a new line from Finstad 345 kV substation.	$0	11/30/2026
Midwest Energy, Inc. NE Williston - Folvag 115 kV New Line (UID144177): Build a new 4.5 mile 115 kV line from NE Williston to Folvag.	$0	11/1/2024
Midwest Energy, Inc. NE Williston 115 kV Terminal Equipment (UID144178): Install terminal equipment at NE Williston 115 kV sub to accommodate new 115 kV line from Folvag 115 kV sub.	$0	12/31/2024
Transmission Owner's New Branch Dawsonc4 to Wiliston 230 kV Line (UID170512): Dawson County - Williston 230 kV Ckt 1 New Line	$0	9/1/2030
Transmission Owner's New Branch Larame to Underwood to Maurine to Belfeild 345 kV Line (UID170511): Belfield - Maurine - Underwood - Laramie River 345 kV New Line	$0	TBD
Basin Electric Power Cooperative Round Up 345 kV Terminal Upgrades (UIS143590): Install terminal equipment at Round Up substation 345 kV to support a new 345 kV line from Kummer Ridge	$0	3/1/2025
Basin Electric Power Cooperative East Fork 345/115 kV Transformer (UID144198): Install a 345/115 kV Transformer at the new East Fork 345/115 kV Substation.	$0	11/30/2024
XEL Fargo 230kV Terminal Upgrade (UID156282): Upgrade terminal conductor at Fargo 230 kV substation to support the line to Sheyenne	$0	12/31/2025
Basin Electric Power Cooperative Finstad - Tande 345 kV New Line (UID143714): Build a 48 mile 345 kV line from Finstad to Tande.	$0	11/30/2026
Basin Electric Power Cooperative Finstad 345 kV New Substation (UID144230): 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
Basin Electric Power Cooperative Finstad – Switched Shunt (UID144231): Install a switched shunt at Finstad.	$0	11/30/2026

Midwest Energy, Inc. Folvag 115 kV Terminal Equipment (UID144163): Folvag 115 kV Terminal Equipment	$0	11/1/2024
Basin Electric Power Cooperative New Kummer Ridge - Round Up 345 kV Line (UID143588)	$0	3/1/2025
Basin Electric Power Cooperative Kummer Ridge 345 kV Terminal Upgrades (UID143589)	$0	3/1/2025
Nebraska Public Power District Build A Second 345-115kV transformer at Antelope (UID 158586): Build a new ANTELOPE 3 to ANTELOPE 7 345-115 kV transformer 2 with a rating of 417 MVA	$0	TBD
Basin Electric Power Cooperative East Fork 345/115 kV Substation (UID144171): Bisect the Judson to Tande 345 kV line approximately 18 miles from Judson and build a new 345 kV Substation.	$0	11/30/2024

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 ($)	Allocated Percent (%)	Allocated Cost Estimate ($)
Midcontinent Independent System Operator "MISO": Add 4×40 MVAR switched cap at Panther 230 kV (615529)	$9,000,000	14.48%	$1,303,327
Midcontinent Independent System Operator "MISO": Add 4×40 MVAR switched cap at McLeod 230 kV (658276)	$5,500,000	13.69%	$753,056
Midcontinent Independent System Operator "MISO": Add 1×40 MVAR switched cap at Paynesville 230 kV (602036)	$2,000,000	14.69%	$293,848
Total	**$16,500,000**		**$2,350,231**

CONCLUSION

After all Interconnection Facilities and Network Upgrades have been placed into service, Interconnection Service for 125 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)	$330,000
Non-Shared Network Upgrade(s)	$0
Shared Network Upgrade(s)	$1,742,021
Affected System Upgrade(s)	$2,350,231
Total	**$4,422,252**

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).

Interconnection Facilities Study Report

Southwest Power Pool, Inc. (SPP) Generator Interconnection Request GEN-2018-069

(DISIS-2018-002/2019-001)

Western Area Power Administration

Upper Great Plains Region (WAPA-UGP)

March 2025

Page Left Blank Intentionally

1.0 Background:

The Western Area Power Administration Upper Great Plains Region (WAPA-UGP[1]) received a request for an Interconnection Facilities Study in accordance with the Southwest Power Pool Inc. (SPP) Open Access Transmission Tariff (Tariff) for interconnection of a Generating Facility in Wibaux County, Montana to WAPA-UGP's Mingusville 230-kV Switchyard. SPP generator interconnection request GEN-2017-069 represents a 125 MW nameplate wind generation facility with Point of Interconnection (POI) at WAPA-UGP's Mingusville 230-kV Switchyard.

The wind generator's collector substation will be located in close proximity to the proposed POI at WAPA-UGP'S Mingusville 230-kV Switchyard. The collector station will consist of a 230/34.5-kV transformer and multiple 34.5-kV deliveries to interconnect the individual wind turbines. The Interconnection Customer will construct, own, and maintain a 230-kV tie-line between the collector substation and WAPA-UGP's Mingusville 230-kV Switchyard. The POI will be at the 230-kV bus in WAPA-UGP's Mingusville 230-kV Switchyard, which will consist of a four (4) breaker ring bus configuration. The Point of Change of Ownership between Interconnection Customer and WAPA-UGP will be at the points where Interconnection Customer's 230-kV conductors, jumpers, and insulators connect to WAPA-UGP's 230-kV take-off structure and the rigid bus underhung from the 230-kV take-off structure, as illustrated in Attachment B.

This Facilities Study does not address transmission service or any delivery component of transmission service; only the interconnection requirements and operating impacts of the interconnection service component of the Generating Facility.

2.0 Study Requirements:

This Facilities Study includes an evaluation of the following:

2.1 Prepare/develop a substation layout, perform a preliminary bus design, and determine all electrical equipment requirements to accommodate the request. Develop/compile cost estimates for all WAPA-UGP labor, overheads, equipment additions, modifications, etc. to accommodate the generator interconnection.

2.2 Review and document any other interconnection/control area requirements. Document these additional requirements (such as indication/metering, monitoring, control, relaying) and include these in the cost estimate.

2.3 Determination of need to develop an Operating Guide for WAPA-UGP's Dispatch to document the conditions under which the new Generating Facility must be operated to protect against unacceptable pre- or post-contingent transient voltage and loading conditions.

2.4 Develop an overall time schedule for completion of the necessary addition/modifications.

[1] WAPA-UGP is also referred to as "Western-UGP" in the SPP Tariff.

3.0 Study Results:

The following results document the analysis of the addition of the Generating Facility to WAPA-UGP's transmission system and fulfill the tasks outlined in Section 2.0 above:

3.1 Required Facility Upgrades by WAPA-UGP: WAPA-UGP has determined that following additions are required to maintain a safe and reliable interconnection to WAPA-UGP's transmission system:

- Add 4th breaker in the existing 230-kV 3-breaker ring bus which includes but is not limited to: one 230-kV breaker, two disconnect switches, instrument transformers, and associated transmission line bay equipment. WAPA-UGP's estimated cost for labor, overhead, equipment, construction, and other miscellaneous costs to add a 4th position in the existing 230-kV 3-breaker ring bus are outlined in Attachment A. The total cost is estimated at $3,605,000.

3.1.1 Transmission Owner's Interconnection Facilities: Equipment installed by WAPA-UGP for the sole purpose of this interconnection, such as the Transmission Owner's Interconnection Facilities, which includes equipment between of the Point of Interconnection and Point of Change of Ownership, interrogation, and communication equipment, are considered direct assignment facilities and not subject to inclusion as Network Upgrades. The direct assigned costs for such equipment are estimated at $330,000 based upon WAPA-UGP's understanding of the SPP Tariff provisions and are included in the total cost estimate provided in Attachment A.

3.1.2 Non-Shared Network Upgrades constructed by Transmission Owner: Non-Shared Network Upgrades to be designed, procured, constructed, installed, and owned by WAPA-UGP are the cost responsibility of the Interconnection Customer. This includes adding a 4th position in the existing 230-kV breaker ring bus. The cost estimate for the Network Upgrades constructed by the Transmission Owner is $3,275,000. Based on WAPA-UPG's understanding of the SPP Tariff, these Non-Shared Network Upgrades are considered Non-Capacity Network Upgrades. These Upgrades are not subject to the transmission service credits described in Article 11.5 of the SPP Generator Interconnection Agreement (GIA).

3.2 Contractual Agreements:

Pursuant to the SPP Tariff, SPP and WAPA-UGP will execute a GIA (or initially an Interim GIA, if applicable, with a subsequent execution of a GIA) with the Interconnection Customer for the interconnection of the Generating Facility. The GIA will address specific funding requirements and provide an advanced payment schedule for facility additions and upgrades to address WAPA-UGP's requirements. The GIA, which discusses the construction and interconnection aspects of this project, will need to be developed and offered by SPP, pursuant to their

obligations and procedures under the SPP Tariff, and forwarded to the Interconnection Customer for review and signature. A schedule for payment(s) based on design, procurement, and construction activities will be included in the GIA consistent with the SPP Tariff provisions.

3.3 Other Interconnection, Metering Requirements:

Basic indication, monitoring, control, and relaying requirements due to a generator interconnection are included in the cost estimate. A list of specific needs will be provided by WAPA-UGP's Operations Office and WAPA-UGP's Montana Maintenance Office once design has progressed.

Interconnection Customer shall install metering at their 230/34.5-kV collector substation in accordance with SPP and WAPA-UGP metering requirements. WAPA-UGP's generation metering requirements, as an SPP Transmission Owner, must be also met, unless specific SPP metering requirements are more restrictive, in accordance with the most current ***Western Area Power Administration Meter Policy*** posted at the "WAPA Meter Policy" link at the following page: http://www.oasis.oati.com/WAPA/WAPAdocs/Western-Common-Business-Practices.html

Any WAPA-UGP specific implementation of more restrictive SPP metering requirements are also posted on WAPA-UGP's OASIS home page under the "Effective Business Practices" folder at the "UGP Meter Policy Modifications" link at the following URL: http://www.oasis.oati.com/wapa/index.html

WAPA's ***General Requirements for Interconnection*** must also be met in accordance with the *General Requirements for Interconnection* document posted at the "General Requirements for Interconnection (GRI)" link at the following page: http://www.oasis.oati.com/WAPA/WAPAdocs/Western-Common-Business-Practices.html

3.4 Operating Guide/Operating Agreement:

Prior to energization, an Operating Guide needs to be developed by WAPA-UGP in coordination with SPP, if necessary, to outline any required operating restrictions under which the generation interconnection must be energized (or de-energized) to protect against unacceptable system stability limits and/or pre-contingent and post-contingent voltage and loading conditions. The Operating Guide will be developed by WAPA-UGP's Transmission System Planning Division in coordination with SPP Staff. In addition, an Operating Agreement will be developed by WAPA-UGP's Operations Office, jointly with the Interconnection Customer and SPP, if necessary, as will be set forth in the GIA to outline the necessary operations coordination and requirements not otherwise set forth in the GIA.

3.5 Schedule:

Attachment A outlines WAPA-UGP's estimated schedule for planning, design and construction of the facilities required to accommodate the Interconnection Customer's Request. WAPA-UGP anticipates the addition of the 4th position in the existing 230-kV ring bus will be completed by December 1, 2031. This schedule is based on the GIA (or Interim GIA) being executed prior to December 1, 2025, and issuance of the NEPA Finding of No Significant Impact (FONSI) or Record of Decision (ROD) by September 1, 2029.

3.6 Environmental Review:

The Environmental Review for this project, as described in Attachment V, Sections 3.3.5, and 8.6.1, and any other applicable sections of the SPP Tariff. An Environment Review agreement was executed between WAPA-UGP and Interconnection Customer on January 30, 2023. The Environmental Review is performed at the Interconnection Customer's expense, and those costs are considered direct assigned costs and are ineligible for credits under the SPP Tariff. Until the appropriate NEPA review is completed (issuance of a FONSI, ROD, or other), no construction activities relating to the Transmission Owner's Network Upgrades may commence.

4.0 <u>Facilities Study Cost:</u>

WAPA-UGP will audit the Interconnection Facilities Study costs and provide a summary of costs once the study is completed or the interconnection request is withdrawn.

ATTACHMENT A

Addition 4th Position in the 230-kV Ring Bus
IN WAPA-UGP'S MINGUSVILLE 230-kV SWITCHYARD

PROJECT ACTIVITY	ESTIMATED START DATE	ESTIMATED COST, MILESTONE PAYMENT DUE
Preconstruction activities – planning, project management, etc.	30 Calendar Days Following GIA Execution*	$130,000
Provide staff and other resources to engineer, design, and plan construction	30 Calendar Days Following GIA Execution*	$491,000
Procure equipment, parts, and control equipment necessary to construct	30 Calendar Days Following GIA Execution*	$980,000
Development, Solicitation, and Award of Construction Contract(s)	November 1, 2029	$1,413,000
WAPA-UGP Construction Administration	November 1, 2029	$265,000
Commissioning, Energization, and construction supervision	May 1, 2031	$241,000
In-Service (Estimated Completion Date)	May 1, 2031	$85,000
TOTAL ESTIMATED COSTS		$3,605,000**

*Assumes Execution of GIA NLT December 1, 2025.
**Includes Transmission Owner Interconnection Facilities costs estimated at $330,000 and Non-Shared Network Upgrades constructed by Transmission Owner costs estimated at $3,275,000.

ATTACHMENT B