

**SMALL GENERATOR INTERCONNECTION
SYSTEM IMPACT STUDY REPORT**

for integration of the proposed

**100 kW [REDACTED]
IPC PROJECT QUEUE #822**

to the

IDAHO POWER COMPANY ELECTRICAL SYSTEM

for

[REDACTED]

REPORT v.0

August 25th, 2026

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Revision History

Date	Revision	Initials	Summary of Changes
8/25/2026	0	DWP	SISR GI #822 – Original issue

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1.0 Introduction

██████████ has contracted with Idaho Power Company (IPC) to perform a Generator Interconnection System Impact Study for the integration of the proposed 100 kW ██████████ project (the Project). The Project is located in IPC's Southern Region ██████████ in Lincoln County, Idaho (See Figure 3: POI of ██████████ – GI # 822)

The Project has applied to connect to the IPC distribution system for an injection of 100 kW at a single Point of Interconnection (POI) at a 34.5 kV distribution voltage level. The POI is located at the ██████████ distribution circuit at ██████████. The Project's POI would be shared with the POI for the existing ██████████, GI # 494.

This report documents the basis for and the results of this system impact study for the GI #822 Generation Interconnection Customer. The report describes the proposed project, the determination of project interconnection feasibility and estimated costs for integration of the Project to the Idaho Power System. This report satisfies the system impact study requirements of the Idaho Power Tariff.

2.0 Summary

The feasibility of interconnecting the 100 kW ██████████ project to IPC's 34.5 kV ██████████ distribution circuit was evaluated.

The preliminary power flow analysis indicated that interconnecting the Project to the ██████████ distribution circuit is feasible with modifications discussed in this report. Additionally, Operating Requirements will require the generator to provide leading and lagging reactive power as detailed in section 12.0 of this report.

The Project will be required to control voltage in accordance with a voltage schedule as provided by Idaho Power Grid Operations. The Project will be required to use inverters which have UL1741-SB certification in order to meet system support functions such as voltage and frequency ride through requirements.

Generator interconnection service, either as an Energy Resource or a Network Resource, does not in any way convey any right to deliver electricity to any specific customer or point of delivery.

The total preliminary cost estimate to interconnect the Project to the POI on the ██████████ distribution circuit is \$249,711 and includes the following tasks:

- Install a revenue-grade meter at the ██████████ connection point.
- Upgrade one distribution recloser on ██████████ to enable dead-line check capability.
- Install single phase power transformer at ██████████ station to enable dead-line check capability.

The cost estimate includes direct equipment and installation labor costs, indirect labor costs and general overheads, and a 20% contingency allowance. These are cost estimates only and final charges to the customer will be based on the actual construction costs incurred. It should be noted that the preliminary cost estimates do not include the cost of the customer's owned equipment to construct the generation site or required communication circuits.

3.0 Scope of Interconnection System Impact Study

The Interconnection System Impact Study was done and prepared in accordance with Idaho Power Company Standard Generator Interconnection Procedures to provide an evaluation of the system impacts of the interconnection of the proposed generating project to the Idaho Power system. As listed in the Interconnection System Impact Study agreement, the Interconnection System Impact Study report provides the following information:

- identification of any circuit breaker short circuit capability limits exceeded as a result of the interconnection.
- identification of any thermal overload or voltage limit violations resulting from the interconnection.
- identification of additional transformer load tap changer operations, voltage fluctuations (flicker) and additional feeder losses.
- identification of required reactive power support.
- identification of islanding conditions.
- description and non-binding estimated cost of facilities required to interconnect the Small Generating Facility to the IPC System and to address the identified short circuit and power flow issues.

All other proposed generation projects prior to the Project in the Generator Interconnect queue were considered in this study. A current list of these projects can be found in the Generation Interconnection folder located on the Idaho Power web site at the link shown below:

<http://www.oatioasis.com/ipco/index.html>.

4.0 Description of Proposed Generating Project

[REDACTED] GI #822, consists of a single 100 kW [REDACTED] which requested to connect at a 34.5 kV voltage to Idaho Power's [REDACTED] distribution circuit. The supplied single line shows the project using [REDACTED]. The maximum power output of the Project's [REDACTED] will need to be configured to not exceed 100 kW at the POI.

The Project shares a POI with the existing [REDACTED], GI #494. [REDACTED] consists of a 1.3 MW [REDACTED] on the [REDACTED] distribution circuit. The POI would become a co-located resource and would require the installation of a revenue meter at the [REDACTED] connection point.

The Project will be fed by the applicant's existing [REDACTED] wye-ungrounded to wye grounded step-up transformer, with the wye-grounded connection on Idaho Power's side.

100 kW [REDACTED]
System Impact Study Report

Idaho Power requires that any ground fault current contribution shall be limited to 20A at the point of interconnection.

5.0 Description of Transmission Facilities

The Project, GI #822, is in IPCO's Southern load serving area and does not directly impact any monitored transmission path. The [REDACTED] substation is fed by the 138 kV and 46 kV sub transmission systems.

6.0 Description of Power Flow Case

The Project was studied using DNV GL Synergi load flow analysis software to analyze the impact to the [REDACTED] distribution circuit. The Project was studied at peak load and minimum load conditions with all generators on the feeder generating at 100% output.

7.0 Power Flow Analysis Study Results

The distribution modeling studies showed that voltage requirements should be met at the POI, even during periods of light load and peak Project output.

8.0 Description of Substation Facilities

Idaho Power's [REDACTED] station is located in Lincoln County, Idaho. [REDACTED] station is fed by a 138 kV transmission line and three 46 kV transmission lines. The substation transformer feeding the 12.5 kV [REDACTED] substation bus, [REDACTED], is a three-phase 46-12.5 kV delta wye-grounded transformer rated for 14 MVA. [REDACTED] [REDACTED]: [REDACTED]

9.0 Description of Distribution Facilities

The requested POI for the Project is located on the [REDACTED] distribution circuit. This is a grounded-wye feeder operating at 12.5 kV voltage at the feeder getaway cables. Portions of the distribution feeder are served at a 34.5 kV voltage, including at the POI for the Project. The Project will connect to the [REDACTED] substation via a 34.5 kV [REDACTED] distribution feeder.

Refer to Appendix A, Section 3, for additional grounding requirements.

10.0 Short Circuit Study Results

Fault Duty at [REDACTED] 12.5 kV Bus:

SLG Fault (A) 4865.8

LL Fault (A) 3836.3

3PH Fault (A) 4429.5

Fault Duty at POI - 34.5 kV Bus:

SLG Fault (A) 407.0

LL Fault (A) 404.0

3PH Fault (A) 466.0

The existing protection package utilizes a SEL-421 interconnection relay, setup with a 34.5 kV distribution recloser.

The fault current contribution from the inverters does not exceed any circuit breaker rating.

11.0 Description of Required Facility Upgrades

The following upgrades will be required to IPC-owned facilities to facilitate the interconnection of GI #822:

- Install a revenue-grade meter at the [REDACTED] connection point.
- Upgrade one distribution recloser on [REDACTED] to enable dead-line check capability.
- Install single phase power transformer at [REDACTED] station to enable dead-line check capability.

See the conceptual-level cost estimate in Table 1.

Table 1 Conceptual-level POI Cost Estimate for GI #822

Item of Work	Estimate
Generation interconnection metering package	\$ 23,000
Substation upgrades	\$ 67,500
Distribution upgrades	\$ 103,500
Transmission upgrades	\$ 0
Unloaded costs	\$ 194,000
20% Contingency (1)	\$ 38,000
Total unloaded costs	\$ 232,800
Overheads (2)	\$ 16,911
Total Conceptual-level Cost Estimate in 2026 dollars (3)	\$ 249,711

(1) Contingency is added to cover the unforeseen costs in the estimate. These costs can include unidentified design components, material cost increases, labor estimate shortfalls, etc.

(2) Overhead costs cover the indirect costs associated with the Project.

(3) This cost estimate includes direct equipment, material, labor, overheads, and contingency as shown.

- Note that these estimates do not include the cost of the customer's equipment/facilities.
- Note that the overhead rates are subject to change during the year.
- These are estimated costs only and final charges to the customer will be based on the actual construction costs incurred.
- These are non-binding conceptual level cost estimates that will be further refined upon the request and completion of Transmission and Distribution Facility Studies.

12.0 Description of Operating Requirements

The inverter(s) will be required to be UL1741-SB certified prior to the installation. The inverters for the project will require custom settings to ensure consistent operating requirements with the existing [REDACTED]. These custom inverter settings would be identified upon request and completion of the Distribution Facility Study. A specific inverter setting file using the Common File Format will be provided as part of the Generation Interconnection Agreement. Sample default inverter settings are available in the Common File Format and may be found at:

https://docs.idahopower.com/pdfs/BusinessToBusiness/CustomerGeneration/Idaho_Power_Inverter_Settings.csv.

The project shall be capable of injecting reactive power (over-excited) equal to 44 kVAr and absorbing reactive power (under-excited) equal to 44 kVAr at all active power output between 20% and 100% of nameplate active power rating as defined in IEEE 1547-2018 Category B reactive power capability and shown in Figure 1.

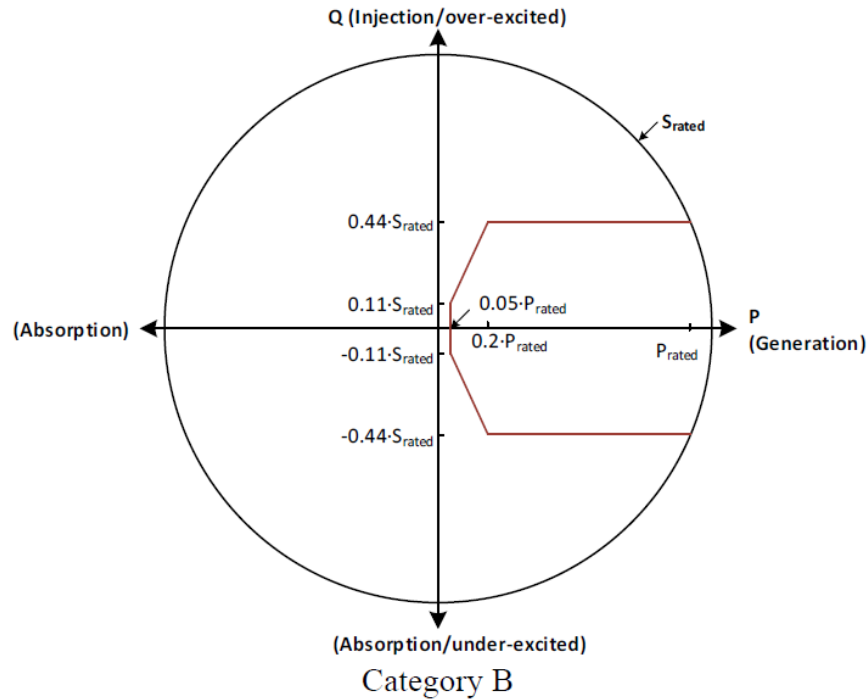


Figure 1: Operating requirements

The Project will be required to control voltage at the Project POI in accordance with a voltage schedule provided by Idaho Power Grid Operations. The Project will be required to follow a voltage-reactive power characteristic curve as shown in Figure 2. Sample default settings for this curve are shown in Table 2.

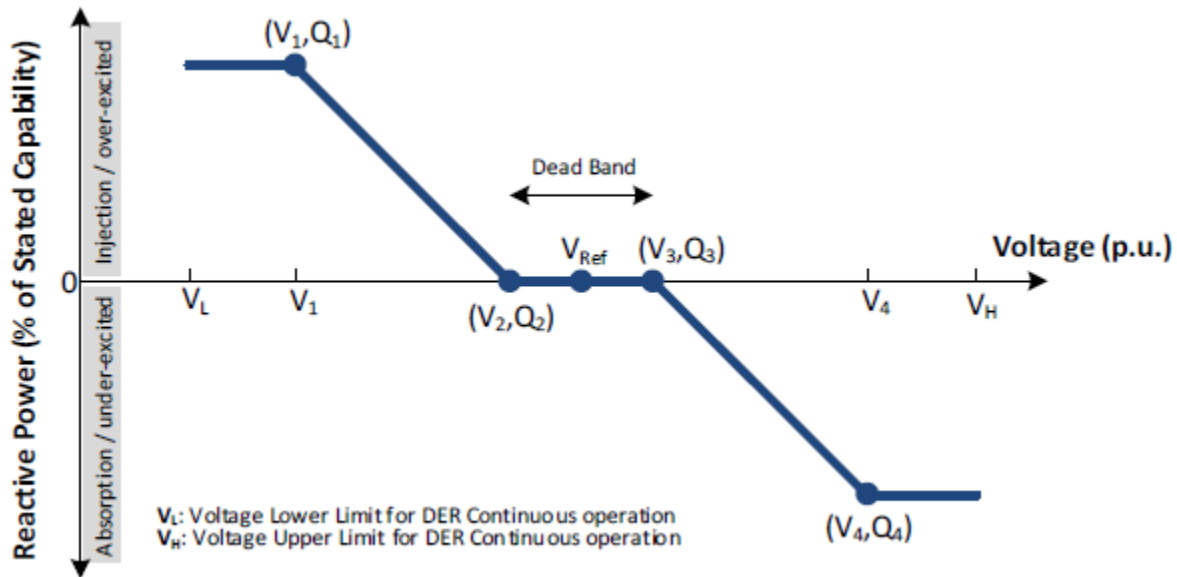


Figure 2: Voltage-Reactive Power Settings (IEEE 1547-2018)

Set Point	V (pu)	Set Point	Q (pu)
V1	0.920	Q1	44%, injecting
V2	0.980	Q2	0
V3	1.030	Q3	0
V4	1.060	Q4	44%, absorption

Table 2: Sample Default Voltage Schedule Requirements

Voltage flicker at startup and during operation will be limited to less than 5% as measured at the POI. The allowable voltage flicker limit is further reduced during operation due to multiple voltage fluctuations per hour or minute, per Idaho Power's T&D Advisory Information Manual.

The Project is required to comply with the applicable voltage fluctuation limits found in IEEE Standard 1453-2004 *IEEE Recommended Practice for Measurement and Limits of Voltage Fluctuations and Associated Light Flicker on AC Power Systems*.

The Project is required to comply with the applicable Voltage and Current Distortion Limits found in IEEE Standard 519-2014 *IEEE Recommended Practices and Requirements for Harmonic Control in Electrical Power Systems*.

The Project shall be capable of anti-islanding and is the responsibility of [REDACTED] to ensure this capability is maintained.

13.0 Conclusion

The requested interconnection of the [REDACTED] project, GI #822, to Idaho Power's system was studied. The project will interconnect to the [REDACTED] distribution circuit at the 34.5 kV distribution voltage level. The results of this study confirm that it is feasible to interconnect the [REDACTED], GI #822, to the Idaho Power system with the identified upgrades. A revenue meter will need to be installed at the [REDACTED] connection point to properly account for the collocated generation past the Project's POI. One recloser on the [REDACTED] distribution circuit will need to be upgraded to provide dead-line check capability to provide protection from unintentional islanding. A power transformer will need to be installed at the [REDACTED] feeder breaker to provide dead-line check capability as well. Operating Requirements will require the generator to provide leading and lagging reactive power as detailed in section 12.0 of this report. The Project will also need to comply with the voltage schedule required by IPC and maintain anti-islanding capabilities.

The estimated cost to interconnect GI #822 to the IPC system at the [REDACTED] distribution circuit bus at the 34.5 kV point of interconnection considered in this study is approximately \$249,711 at the POI.

APPENDIX A

A-1.0 Method of Study

The System Impact Study plan inserts the Project up to the maximum requested injection into the selected Western Electricity Coordinating Council (WECC) power flow case and then, using Power World Simulator or GE's Positive Sequence Load Flow (PSLF) analysis tool, examines the impacts of the new resource on Idaho Power's transmission system (lines, transformers, etc.) within the study area under various operating and outage scenarios. The WECC and Idaho Power reliability criteria and Idaho Power operating procedures were used to determine the acceptability of the configurations considered. The WECC case is a recent case modified to simulate stressed but reasonable pre-contingency energy transfers utilizing the IPC system. For distribution feeder analysis, Idaho Power utilizes DNV GL's Synergi software and EPRI's OpenDSS software.

A-2.0 Acceptability Criteria

The following acceptability criteria were used in the power flow analysis to determine under which system configuration modifications may be required:

The continuous rating of equipment is assumed to be the normal thermal rating of the equipment. This rating will be as determined by the manufacturer of the equipment or as determined by Idaho Power. Less than or equal to 100% of continuous rating is acceptable.

Idaho Power's Voltage Operating Guidelines were used to determine voltage requirements on the system. This states, in part, that distribution voltages, under normal operating conditions, are to be maintained within plus or minus 5% (0.05 per unit) of nominal at each meter or POI on the feeder. Therefore, voltages greater than or equal to 0.95 pu voltage and less than or equal to 1.05 pu voltage are acceptable.

Voltage flicker during the starting or stopping of the generator will be limited to less than 5% as measured at the POI. Allowable voltage flicker limit is further reduced during operation due to multiple voltage fluctuations per hour or minute, per Idaho Power's T&D Advisory Information Manual.

Idaho Power's Reliability Criteria for System Planning was used to determine proper transmission system operation.

All customer generation must meet IEEE 519, IEEE1453, IEEE1547, and ANSI C84.1 Standards.

All other applicable national and Idaho Power standards and prudent utility practices were used to determine the acceptability of the configurations considered.

The stable operation of the system requires an adequate supply of volt-amperes reactive (VAr) to maintain a stable voltage profile under both steady-state and dynamic system conditions. An inadequate supply of VAr will result in voltage decay or even collapse under the worst conditions.

Equipment/line/path ratings used will be those that are in use at the time of the study or that are represented by IPC upgrade projects that are either currently under construction or whose budgets have been approved for construction in the near future. All other potential future ratings are outside the scope of this study. Future transmission changes may, however, affect current facility ratings used in the study.

A-3.0 Grounding Guidance

IPC requires interconnected transformers to limit their ground fault current to 20 amps at the Point of Interconnection.

A-4.0 Electrical System Protection Guidance

IPC requires electrical system protection per Requirements for Generation Interconnections found on the Idaho Power Web site,

<https://docs.idahopower.com/pdfs/BusinessToBusiness/FacConnReq.pdf>

A-5.0 WECC Coordinated Off-Nominal Frequency Load Shedding and Restoration Requirements

IPC requires frequency operational limits to adhere to WECC Under-frequency and Over-frequency Limits per the WECC Coordinated Off-Nominal Frequency Load Shedding and Restoration Requirements available upon request.

APPENDIX B

B-1.0 [REDACTED] GI Project #822 Site Location

Figure 3: POI of [REDACTED] - GI #822