



**Generation Commissioning Milestones Required for
Commercial Operations**

STD-N-000001 Number 02 REVISION 00

Standard/Technical Content Owner: TOOC/TOII

DISTRIBUTION STATEMENT: Approved for public release

DESCRIPTION:

This document is a supporting document to the BPA STD-N-000001 “Technical Requirements for Interconnection to the BPA Grid”. It details a process required by BPA for a generator commencing operations approximately 180 days prior to Commercial Operations. This document’s content does not pertain to contractual matters.

Questions should be directed to the BPA Technical Operations (TO) Control Center Coordinator to facilitate better communications and coordination during this phase of construction.

For additional information reference supporting documents:

- STD-N-000001 Number 03 (Generation Commissioning Task Checklist Required for Commercial Operations)
- STD-N-000001 Number 04 (Generation Commissioning Process Flow for Commercial Operations)

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1. REVISION HISTORY

- Revision 00 02/10/2022: Initial development of the Checklist. This Checklist replaces STD-N-000002, which will be archived when the Checklist is published.

2. INTENT

The intent of the Generation Commissioning Process is to provide a high-level overview of the coordination effort, with internal and external customers, to support the addition of generators towards Commercial Operations status. This content applies to new generators, generators that are adding additional unit(s) to existing capacity and generators that are transitioning from a load serving resource (known as “behind the meter” status) to marketing its generation (known as “in front of the meter” status).

This document is not a comprehensive list of every task to be performed nor a detailed timeline of those tasks. The Generation Commissioning Task Checklist (Number 03) and the Generation Commissioning Process Flow (Number 04) are intended to accompany this document to enhance the understanding of generator connection procedures.

3. SUMMARY OF REQUIREMENTS

The checklist elements will be broken into three primary categories and objectives:

Milestone 1: In-Service Date (Backfeed) objective

Milestone 2: Initial Synchronization Date objective

Milestone 3: Trial Operations Period with the Commercial Operations Date objective

4. CLARIFYING INFORMATION

The following information is intended to provide clarification information to the elements described in the different categories from the Generation Commissioning Task Checklist.

4.1 Milestone 1 – In-Service (Backfeed)

- Voltage Schedules:
 - If required, BPA will provide a time-of-day voltage schedule or a minimum/maximum voltage range with a target voltage.
 - As a registered Transmission Operator (TOP), BPA is required to direct the Generator Operator/Generator Operator (GO/GOP) to comply with the voltage schedule.
- RAS NERC/WECC requirements:

- Any applicable RAS NERC requirements will be met during this period, if needed. This includes the WECC level review of design.
- Technical Plant Data Supplied:
 - The developer associated with the generator will supply all required technical data concerning the plant to the BPA Transmission Planning/ BPA Customer Service Engineer (CSE) representative who will distribute the data to appropriate representatives in BPA Operations Planning, BPA Operations Control and BPA Grid Modeling organizations. This data will include, but not be limited to, the following:
 - Generator Max output
 - Reactive capability
 - Line impedances/ratings
 - Breaker configurations
 - Final plant substation one-line
 - Generator Reactance and Time Constants
 - Exciter, Governor, PSS and Step-up Transformer Parameter data
 - Generator protective relays and settings
- 30 Day Communications Systems Tune-Up
 - For new installations, communication circuits must go through the current process for turning over to operations before use. The process of turning communications equipment over to operations has a nominal duration of 30 days.
 - Traditionally, the 30 day tune-up was to root out infant mortality on equipment. Today, most of the problems that are revealed are unexpected interactions with existing systems.
 - The turn-up period does not start until all alarms, connections, software interfaces, and Control Center alarm screens are running.
 - Then a test signal is initiated for the duration of the '30' days. The system is monitored for its performance over the time frame. Upon successful completion of the time frame, the equipment is released to BPA Operations.
- EIR (Electric Industry Registry) Registration:
 - The organization representing the generator/generating plant will submit an EIR application to register the generator Source/Sink and Point of Receipt/Point of Delivery (POR/POD) names a minimum of 6 Weeks before Initial Synchronization.
 - Any customer entity changes and/or ownership changes that require EIR changes, prior to the Initial Synchronization Date, will delay this process a minimum of six weeks.
- Backfeed Coordination Notifications:
 - The generator operator will coordinate with the BPA Automatic Generation Control (AGC) Generation Dispatcher before any power can be back-fed or put on the Transmission grid.

- Before the generator can receive Backfeed for station services, the generator will coordinate with BPA Field Personnel (System Protection Control (SPC) group), and the local utility to ensure that all protective relays are in place and working.
- The generator operator will also coordinate with BPA Project Manager and TO Control Center Coordinator before any energization action occurs.
- RAS Installed, Tested and Released to BPA Operations:
 - Functionality will require approval by the BPA Transmission Operations Operations Control (TOOC) RAS team. This includes:
 - A functional test that trips the appropriate circuit breakers that isolate the generator from the transmission grid from each RAS controller.
 - Testing of applicable SER/SCADA alarms.
 - The generator will be made aware of its post RAS trip event requirements.
 - Verification of situational awareness/ICCP indications for RAS.
 - Perform AGC Suspend test (if applicable) to the Balancing Authority that operates that generator.
- Initial Meter Test:
 - The site MW/MWh meters will have had an initial test performed. The test will use injected values to simulate full scale calibration & polarity of an actual line value.
 - **Until BPA successfully performs an initial meter test, the plant will not be allowed to proceed to Backfeed and Initial Synchronization.**

4.2 Milestone 2 – Initial Synchronization

- Final Meter In-Service Test
 - The Final Meter In-Service Test will be defined as the point when the generator has enough capacity commissioned and available to fully test all meters on the site. This generation MW value is the minimum amount needed for testing and is dependent on the size and configuration of the CTs. BPA SPC Field Personnel and BPA Operations will help determine this value.
- Final Relay In-Service Test
 - The Final Relay In-Service Test will be defined as the point when the generator has enough capacity commissioned and available to fully test all relays on the site. This generation MW value is the minimum amount needed for testing and is dependent on the size of the generator, the line characteristics and configuration of the CTs. BPA SPC Field Personnel and BPA Operations will help determine this value.
- During the Initial Synchronization and Trial Operation periods, the generator will not be allowed to schedule power or be reimbursed for generated MW.

4.3 Milestone 3 –Trial Operations Activities prior to Commercial Operations

- The Trial Operation period is the period during which the Generator is engaged in on-site test operations and commissioning of the Generating Facility prior to Commercial Operations.
- Test Energy shall be coordinated beforehand between BPA Operations, Dispatch, and the generator. The generator will be allowed to generate up to a predetermined MW value. This value will be dependent on input from the BPA Field Personnel, BPA Operations Planning Group, and BPA Dispatch. This value may also be contingent on system conditions.
- During the Initial Trial Operations period, the generator shall bear the cost of all testing and modifications required to perform the tests.
- For Variable Energy Resources (wind & solar generation):
 - The generator plant will be required to stay below a BPA Operations specified generation MW limit during the Trial Operations period.
- For Combustion/Fuel Generators:
 - The generator operator should provide a generation testing schedule for coordination purposes with the BPA TO Control Center Coordinator prior to the Trial Operations period.
- All applicable generators are required to monitor and follow real-time requirements:
 - The generating plant will be required to monitor iCRS for notifications of OCBR / OSM curtailment events. Limitation events may be managed via signals sent to the plant controller from BPA.
 - The generator will be responsible to follow all OCBR / OSM commands.
- Generators will be required to perform voltage and frequency control tests as outlined in the BPA “Required Voltage and Frequency Control Performance Commissioning Tests” standard STD-N-000001-01 and achieve acceptable performance.
- Test results will be provided to BPA for review and approval from BPA Operations Planning, Customer Service Engineering, and Operations.
- Unsuccessful test results could require software and/or equipment changes. Follow up testing will be required. BPA Operations reserves the right to evaluate requests for extensions of the Trial Operations period on a case-by-case basis.

4.4 Commercial Operations

- Commercial Operations approval will be granted upon completion of items identified in the Generation Commissioning Checklist, including approval of required generation testing identified in the Trial Operation period.
- Notification of the Commercial Operation status and approval will be completed by the BPA Account Executive representing the generator.

- Once Commercial Operation status is granted, the generation limits in place during the Trial Operation period will be lifted. The generator will be allowed to schedule power for sale. Once scheduling of power commences, the generator will be responsible for any generation imbalances, intentional deviation, etc.

5. OCBR/OSM TEST RESULTS LIST

Personnel needed from BPA's side

- TOOC AGC engineer – to run and facilitate the testing
- Real Time AGC Dispatcher – to verify readings in the AGC software
- AGC software programmer – to view and confirm the data within the AGC system
- SCADA software programmer – to send the level 1 and level 2 limiting signals to the Generator Operator's EMS
- Energy Accounting (EA) programmer – to perform the cutover of generator into the EA application – This is the official "cutover" in BPA's systems for EA and AGC
- Field SPC engineer – To work with the meter and meter values, as required for testing
- Field Test & Energization (T&E) engineer- To work with the meter values and other issues, as required for testing

Personnel needed from the Generator Owner/Operator's side

- GO Dispatcher or EMS programmer- To validate common readings with BPA.
- GO EMS programmer – To view and comment on readings being received from generation equipment.
- GO Field representative – If needed? – To work with the meter values and other issues, as required for testing.

Procedure for the Validation of Meter Testing to Control Centers

Prerequisites

- Verify T&E testing completed
- Verify GO can control plant set-point
- Schedule date of test with BPA field (power engineers), Dispatch, and TOOC AGC (see personnel list above)
- Check with GO and T&E to verify that they're prepared for in service tests, once power is flowing

Test

1. Bring individual plant up to 3 MW and verify polarity and magnitude with the field.
 - a. If there are discrepancies between field and Control Center fix issue and retest
2. Allow plant to generate up to 3 MW and monitor.

3. T&E and GO finish in service checks

Procedure for the Limit Gen Testing (OSM/OCBR)

Prerequisites

- Confirm that communication path from SCADA to the RTU, and then RTU to customer controller was completed during T&E testing.
- Plant controls are implemented such that a limit signal from BPA will automatically limit plant generation.
- Each Plant must be generating 3 MW or greater so that limitation is visible in graphical data.
- Schedule test with applicable parties for both BPA and the GO.

Test

1. All parties join the testing conference call to initiate test.
 - a. Perform Roll Call: BPA EMS Engineer, BPA Operations Engineer, BPA TO Control Center Coordinator, GO EMS engineer.
2. Both parties agree on MW generation value. If each plant is over 3 MW then perform limitation test.
3. 85% warning signal notification sent from SCADA.
 - a. Verify warning signal was received by GO.
4. Notification level 1 from SCADA, BPA limits generation to GO to zero.
 - a. It is possible the specific plant we are testing cannot ramp to zero based on external conditions, environmental factors, or system limitations. In that case, the plant will need to ramp down by 50% or more of their current generation.

Example - they are generating 10MW and cannot ramp to zero, we can ramp them down to 5MW to verify their correct response (referred to in AGC as the Target Gen Dec MW).
 - b. Verify limitation was successful.
5. Notification level 1 from SCADA, BPA sets generation to GO to over 3 MW.
 - a. Verify set point adjustment was successful.
6. Notification level 2 from SCADA, BPA limits generation to GO to zero. (See Step 4a above if the plant cannot ramp to zero)
 - a. Verify limitation was successful.
7. Notification level 2 from SCADA, BPA sets generation to GO to over 3 MW.
 - a. Verify set point adjustment was successful.