Transmission Planner (TP) - Generator Owner (GO) & Transmission Operator (TOP) - Generator Operator (GOP) - Mappings

December 18, 2018
Vancouver, WA
Welcome Generator Owners and Operators

Role Call

Safety Moment
Functional Mapping Background

WECC Functional Mapping 2013-2019:

2013/14 – BPA confirmed role as PC for other entities
2016 – TOs must map to a TP and TOP
Result = TOP Project and TP CFR
2018/19 – GOs must map to a TP and GOPs must map to a TOP
Result = TP-GO and TOP-GOP Implementation Plans

Mapped Facilities 12/18/2018:

<table>
<thead>
<tr>
<th>BPA PC</th>
<th>TOP-GOP</th>
<th>TO-GO</th>
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Transmission Operator (TOP) to Generator Operator (GOP)
TOP-GOP Timeline

<table>
<thead>
<tr>
<th>Date</th>
<th>Description</th>
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<tbody>
<tr>
<td>11/5/2018</td>
<td>Accept TOP-GOP mappings</td>
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<tr>
<td>2/1/2019</td>
<td>Assess indication and control</td>
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<tr>
<td>7/1/2019</td>
<td>Update LGIAs to capture TOP-GOP</td>
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<tr>
<td>12/1/2019</td>
<td>Achieve full TOP compliance (exc. Fed)</td>
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TOP Processes

- In addition to all requirements under the Mandatory Reliability Standards, BPA will specify Operational Requirements
  - Outage Coordination
  - Real-time Procedures
  - Event Reporting (EOP-004)
  - Changes in equipment
  - Loss of visibility or control repair expectations
TOP Processes: Outage Coordination

- GOPs will be required to follow BPA’s Outage Coordination Policy for all mapped generators.
  - [BPA Outage Coordination Policy](#)

- Transition to CAISO RC:
  - BPA’s 45-day process will change to 60 days to align with CAISO’s Mid-Range process. Change will be implemented in May-June timeframe.
  - Data submission requirement changes *may* include:
    - Estimated time to restore: This is a required field for CAISO.
    - Switching Devices: Must be submitted with every outage.
    - Unit outages must be submitted if the unit is unavailable.
    - Derates as separate requests: Currently some transmission outages are submitted with derates.

*BPA is in discussions with CAISO about these changes. They are not yet final.*
TOP Processes: Real-time Procedures

- Real-time Procedures will be closely tied to Standards but may call out additional notification requirements or specific timelines that are not captured within the Standards.
TOP Processes: Event Reporting (EOP-004)

- Both TOP and GOP are responsible for reporting several event types in the EOP-004 table.
- BPA will clarify which Entity should report for each event type.
- BPA will require that GOPs provide a copy of any reports they file to BPA, and BPA will share copies of any reports it files to impacted GOPs.
TOP Processes: Changes in equipment

- BPA requires that GOPs notify us prior to making changes to equipment.
TOP Processes: Loss of Visibility and/or Control - Repair Expectations

• If BPA loses a single piece of data or a single control point on a generator for which BPA is TOP, BPA may consider allowing response/repair to wait until normal working hours, based on BPA dispatcher judgment.

• Should BPA lose more than a single piece of data or a single control point but less than an entire station, the appropriate response would be up to the judgment of the BPA’s Senior Dispatcher dependent upon system conditions.

• In the event that BPA loses visibility and/or control of an entire station or group of stations for which BPA is TOP, BPA requires an immediate response (24/7) from Customer to troubleshoot and initiate corrective action and may require Customer to call out operations staff to man the station(s) that were lost.
Transmission Planner (TP) to Generator Owner (GO)
TP-GO Timeline

TP-GO High level Plan

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<th>Date</th>
<th>Description</th>
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<tbody>
<tr>
<td>11/5/2018</td>
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<tr>
<td>Nov-Dec</td>
<td>Further refinement of project scope</td>
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<td>Determine appropriate contract vehicle</td>
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TP-GO Processes

• Transmission Planning Implementation Procedures (TPIP)
• TPL-001-4: Annual data request for Planning Horizon > 6 month outages (R1.1.2)
• MOD-026/027
MOD-026/027

- MOD-026: Verification of Models and Data for Generator Excitation Control System or Plant Volt/Var Control Functions:

- MOD-027: Verification of Models and Data for Turbine/Governor and Load Control or Active Power/Frequency Control Functions
BPA’s TP Criterion

- WECC Wind Plant Dynamic Modeling
- BPA’s Wind Power Plant Data Requirements
- BPA’s Generation Model Verification Process
- Adhere to BPA’s Testing Schedule
- What does BPA require in a complete GDR?
What does a TP do with a Generator Data Report (GDR)?
Data Report Testing Procedure

Model Data Review (Transmission Planner actions):

• TP will test the data by performing the following simulations:
  – John Undrill’s Data Checker 3ic/4ia
  – Infinite Bus Oscillation
  – Infinite Bus Line Fault
  – Infinite Bus Under Frequency
  – Infinite Bus Voltage Step
  – Infinite Bus Governor Step
  – WECC approved case- 90 second no disturbance run
  – WECC approved case- Chief Jo Break Insertion
  – WECC approved case- Double Palo Verde Outage
  – *WECC approved case- John Day-Grizzly 1 & 2 500kV outage
  – *High Gen Drop

• TP will inform the GO whether the model is usable or not usable based on the simulations specified above within 90 days of the report receipt date from the GO.
• TP will submit the verified GDR to WECC’s staff associated with an indication of complete or incomplete and notice to GO.
Guideline for Generator Data Report Process with BPA - INTERNAL

Final 11/8/18 1

1. GO submits generator data report (GDR) to TPC-CSRP per WECC requirements as defined in “BPA Process”.
2. GO may request PMU data from BPA on as needed basis.
3. GO resolves issues with TPMG and resubmits GDR to TPMG and TPC-CSRP within 160 days.
4. GO receives confirmation that GDR has been sent to WECC.

TPC-CSRP:
- Initiates data request every 10 years with option of check boxes for no changes.
- Starts tracking initial dates of each GDR with a 90 day due date based upon date received.
- Receives TPC-CSRP Notification and tracks.
- Sends notification to TPMG.
- Receives TPMG Notification and tracks.
- Sends notification to GO to receive GDR issues and informs GO if a response is needed within 180 days.
- Tracks data and notifies GO.

TPMG:
- Sends notification to GO that data is missing in GDR and informs GO if a response is needed within 180 days.
- Receives GDR and reviews with MRT.
- Sends notification to GO to receive GDR issues and informs GO if a response is needed within 180 days.
- Receives notification from GO to resolve GDR issues and sends confirmation email from WECC to TPC-CSRP.
- Sends confirmation email from WECC to TPC-CSRP.
- Receives GDR(s) to WECC.

TPM:
- Performs model validation and simulation tests within the 90 day due date based upon TPC-CSRP received date.
- Notifies MRT of significant PMU events to be coordinated with GO on as needed basis.

Completeness of data:
- Yes or No.

Model Review Team (MRT):}

TPP

19
R1: Each TP provides information to the GO upon request:
   - List of models acceptable to TP
   - Block diagrams and/or data sheets for acceptable models
   - Model data for GO’s existing units

R2: GO provides verified generator dynamic model(s) for each unit
   - Model verified by GO using one or more models acceptable to TP
   - Each verification includes the following:
     - Unit’s model response matches recorded response (next page)
     - Manufacturer, model number (if available), and type of system
       - e.g., digital vs. analog, static vs. rotating exciter, plant controls
       - e.g., turbine type, boiler type, fuel type, manufacturer and controls
     - Model structure and data
       - e.g., block diagram, time constants, gains, limits, generator data
     - Outer loop controls – blocked or nonfunctioning controls or modes of operation that limit response
MOD-026-1/MOD-027-1
Requirements

R3: GO provides written response to TP after receiving from TP:

- Notification that model is not usable
- Comments identifying technical concerns with verification documents
- Comments and supporting evidence indicating modeled response does not approximate recorded response for three or more events
- Response will include either technical basis for maintaining model, model changes, or plan to perform verification

R4: GO provides revised model or plans to perform PPMV within 180 days of making changes to controls or equipment that alters response characteristic.
MOD-026-1:

R5: GO provides response to TP within 90 days following receipt of technically justified* request to perform model review, including:

- Details of plans to verify model
- Corrected model data including source of revision
  * TP demonstrates simulated vs. measured response does not match

MOD-027-1 / MOD-026-1:

R5/R6: TP provides written response to GO within 90 days of receiving verified model that model is usable or not usable, including:

- Initializes without error
- No-disturbance simulation results in negligible transients
- Exhibit positive damping
Formalize Agreement

- LGIA – Appendix H
  - Additions will formalize the TP-GO and the TOP-GOP relationship including requirements for following BPA procedures
Next Steps

Early Spring 2019:
• Share draft LGIA Appendix H
• Draft generator specific information processes and procedures

Late Spring 2019:
• Update LGIA Appendix H
Questions and Answers
Appendix

• MOD-026 and MOD -027
  – Excitation System Models
  – Governor Models
  – Effective dates including phased in implementation
### EXCITATION SYSTEM MODELS (Volt/Var Control Models)

<table>
<thead>
<tr>
<th>GE PSLF</th>
<th>PTI PSS/E*</th>
<th>Power/World Simulator</th>
<th>IEEE Standard</th>
<th>Status</th>
<th>Comments</th>
<th>Modifications/Actions Needed</th>
<th>PTI/KVE/PowderWorld Comments</th>
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<td>EXAC2</td>
<td>EXAC2</td>
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*Note: The output of this model feeds into an exciter as the stabilizer input.*
# WECC- APPROVED Governor Models

## TURBINE/GOVERNOR MODELS

<table>
<thead>
<tr>
<th>GE PSLF</th>
<th>PT/PSS/E*</th>
<th>PowerWorld Simulator</th>
<th>IEEE Standard</th>
<th>Status</th>
<th>Comments</th>
<th>Modifications/Actions Needed</th>
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We have the new GGOV3 model in a test mode. It needs to be made a standard model for the next.
MOD-026/-027 Effective Dates

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<th>Requirement</th>
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