

Grid West Reliability Benefits Analysis

SUMMARY

This process examines past disturbances considering the various causal factors involved. It then seeks to estimate the number of causal factors with the potential to be reduced by specific provisions within a Grid West formulation. The analysis looks forward in time assuming that past outages are typical of what could happen in the future in the WECC system in terms of cause and impact, without intervention. The final results of this analysis are intended to be a collaborative process that will result in a clearer understanding of the possible benefits and the features needed in Grid West to realize those benefits. The data provided to populate the process are a “best first estimate” of the causation factors and therefore are to be considered preliminary until the collaboration is complete.

The cost estimate of benefits of Grid West to the NWPP-US area is determined as follows:

1. Establish the historical contingency list and WECC cost estimate
2. Develop a cost/MW or cost/MWhr unit cost
3. Estimate future costs to the NWPP-US area on a prorated basis using summer and winter peak load and assuming an even distribution of consequences for future loading conditions
4. Determine the causal factors of the historical outages
5. Determine the reliability related features in the Grid West plan
6. Estimate the percentage of causal factors that may be mitigated by Grid West
7. Estimate the outage cost reduction based on the reduction of causal factors and the NWPP-US predicted outage costs
8. Revise and update the GRID West plan to better address outage causal factors

A detailed review of this information will result in a better estimate of the causal factors that would likely be mitigated and what specific features must be a part of the Grid West plan to achieve these results.

Grid WEST FEATURES

The draft features of Grid West as related to reliability are summarized in a Word document “Potential Grid West Policies Impacting Reliability.” To be considered in this analysis these must be features that would realistically become part of Grid West with necessary tools and expertise. The features are delineated by letter A, B, C...etc so as to be related to specific causal factors identified in the spreadsheet.

SPREADSHEET

The spreadsheet is the workspace for bringing together the necessary information for an analysis of Grid West reliability benefits. It consists of several workspace tabs where the information is collected. These are briefly described.

Event Synopsis

This tab is synopsis of the events considered in the analysis. Column F is a brief description in words of the causal elements of the disturbance and Column G is a place for comments.

Event Driven Needs

This tab provides a listing of Improvement Goals (things that if done would reduce the risk of an outage) and a mapping of Grid West Features (identified by letter) that address these specific needs. It also includes an index number that is used in the Analysis tab.

Analysis

This is the main working area of the spreadsheet where calculations are done. Information provided as user input to the tab is as follows:

- General Information in rows 2-4, Columns H to the end (all events).
- Entries in rows 8-35, Columns H to the end. Enter a “1” if a causal factor is found in Column A, otherwise leave blank.
- The Benefit Index number from the Event Driven Needs tab is Column C (rows 8-35) for each case where a Grid West feature is applicable. If there is no Grid West feature that applies the number 33 is used.

Computed information is as follows:

- The count of occurrences for each contributing cause is given in Column B and the applicable Grid West Feature automatically brought forward to Column D.
- Rows 48-50 provide information on the percentage estimate of NWPP-US portion of the WECC system.

Note that when using the scroll bars that Columns A-D and Rows 1-6 are fixed in place so as to keep this information available to the user. It is necessary to use the scroll bars at the bottom and right hand side of the window to view all of the events and calculations on this worksheet.

Potential Grid West Policies Impacting Reliability:

A. Independent, centralized state estimator:

Grid West will implement a State Estimator, which will enable operators to evaluate the impact of transmission rights and schedules well in advance of the hour of delivery, as well as in real-time. This should provide for an improved ability to manage the system and anticipate transmission problems before they occur. SE features include:

- Performs analyses automatically every few minutes based on real-time conditions.
- Able to perform analyses in study mode using preschedules, or planned load/generation patterns and planned outages as input.
- Performs power flow, contingency, and dynamic stability analyses.
- Model uses approved flow limits, relaying standards, planning standards, planning and operating margins, system characteristics, Remedial Action Schemes, etc.

B. Centralized Planning/Backstop authority.

Grid West will have backstop authority for transmission construction. In the long run this will provide for true one-region planning, assurance that needed construction will get built, and a more reliable system. It will also help ensure that enhancements address the needs of maintaining main grid reliability – including stability controls. Features include:

- A single planning standard will be applied to the Grid West Managed Transmission System (GWMT) using a flow-based approach.
- Develop and maintain transmission and resource models, methodologies and tools to evaluate system performance and resource adequacy.
- Define, collect or develop and share information required for planning, including:
 - Transmission facility characteristics and ratings
 - Demand resource forecasts (capacity and energy)
 - Generator unit performance characteristics and capabilities
 - Long term capacity purchases and sales
- Evaluate plans for customer service – transmission purchases and integration requests.
- Review and determine TTC, IROL, and SOL values.
- Assess, develop, document and report on resource and transmission expansion plans and their implementation.
- Coordinate projects requiring transmission outages that can impact reliability and firm transactions.
- Evaluate the impact of revised transmission and generator in-service dates.
- Work with adjacent areas so that system models and resource and transmission expansion plans take into account modifications in adjacent areas.
- **Prepare regional power flow and stability data bases**

C. Outage Coordination.

Grid West participants will conduct outage planning amongst themselves, This could provide for outages that more directly support reliability from a region-wide perspective.

Features include:

- Outage coordination is based on the current NWPP process.
- All Grid West participants will coordinate outages through Grid West.
- Facility owners will submit generation and transmission outages to Grid West.
- Grid West will evaluate transmission outage requests against reliability criteria and known generation outages and approve requests, or propose changes (detailed Grid West authority will be spelled out in the Transmission Agreement).

D. Consolidated Control Area: Single operation of consolidated control area.

The single control area operation of at least BPA, PACE, PACW and ID PWR provides for more direct communication with PNSC and more direct control over generators (as opposed to schedules) in the face of a transmission problem. Also helps to manage all consolidated flow paths in real time. Also provides a better tool, redispatch, for managing transmission overloads than does TLR. CCA features include:

- Primary & Backup control centers, with dual redundancy for all critical control systems.
- Participants are required to provide balanced load and generation schedules, including offers of IOS necessary to support those schedules. Load forecasts and schedules will be validated for accuracy and feasibility by Grid West.
- Central calculation of Area Control Error and dispatch of generation from the IOS resource stack using a Security Constrained Economic Dispatch (SCED) algorithm.
- Re-dispatch generation from the balancing stack to clear congestion.
- Curtail schedules, generation and load as required to maintain reliability.
- Uniform application of WECC.NERC Reliability Standards including all Category A-C Performance levels in both planning and operations.

E. Consolidated Control Area: Balancing Market

The CCA's balancing market provides a clear mechanism for compensating for real time changes to scheduled & unscheduled flows – this may make participants more willing to redispatch for reliability and will give a more direct and coordinated response to congestion. Features include:

- Balancing offers can be made by CCA resources and resources outside the CCA.
- Offers do not need transmission rights attached, except to get the resources to the CCA if the offered resource is outside the CCA.
- Offers are priced by the generation owner, subject to a cap that will be set by Grid West.
- Resources are dispatched in merit (price) order, subject to congestion, using the SCED algorithm.

F. Flow-Based ATC & Scheduling

Grid West will estimate ATC/AFC using a flow-based methodology. This is expected to produce a more accurate estimate of available flow capacity on constrained paths. Injection/withdrawal scheduling, coupled with flow-based analysis tools will enable Grid West to anticipate congestion based on preschedules and to take corrective action in advance of the hour of delivery. It will also give a better indication of loop flow impacts on congested paths. [You might not have included this in your list because it is expected that TBL will implement this prior to Grid West. However, Grid West will implement this approach more broadly.]

G. Reliability Functional Model

Roles and responsibilities of Grid West and its members with respect to key reliability, market operations and system operations functions identified by the NERC Reliability Functional Model are summarized in the table below. NOTE – These functions are based on the proposed Version 3 of the functional model.

Table 1 NERC Reliability Functional Model Roles and Responsibilities in Grid West

| Function | Grid West | Member: CCA | Member: Non-CCA | IPPs | PNSC |
|---------------------------------------|---|--|--|--|-----------------------------------|
| Interconnection Reliability Authority | None | | | | Pacific North West including GWMT |
| Balancing Authority | CCA | | Own Balancing Authority Area | | |
| Interchange Coordinator | CCA (initially) | | Own Balancing Authority Area | | |
| Transmission Service Provider | GWMT | (for pre-existing contracts) | (for pre-existing contracts) | | |
| Transmission Authority | GWMT | Operational responsibilities for own facilities as directed by GW or per standing orders | Operational responsibilities for own facilities as directed by GW or per standing orders | Operational responsibilities for own facilities as directed by GW or per standing orders | |
| Planning Reliability Authority | GWMT | | | | |
| Market Operator | Reserve Market and RTBS for CCA foot print, RCS | | | | |

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|-----------------------|----------|----------------|----------------|----------------|--|
| | for GWMT | | | | |
| Generator Operator | | Own facilities | Own facilities | Own facilities | |