ColumbiaGrid

2019 Annual Interregional Coordination Meeting (AICM)

February 19, 2019

In This Presentation

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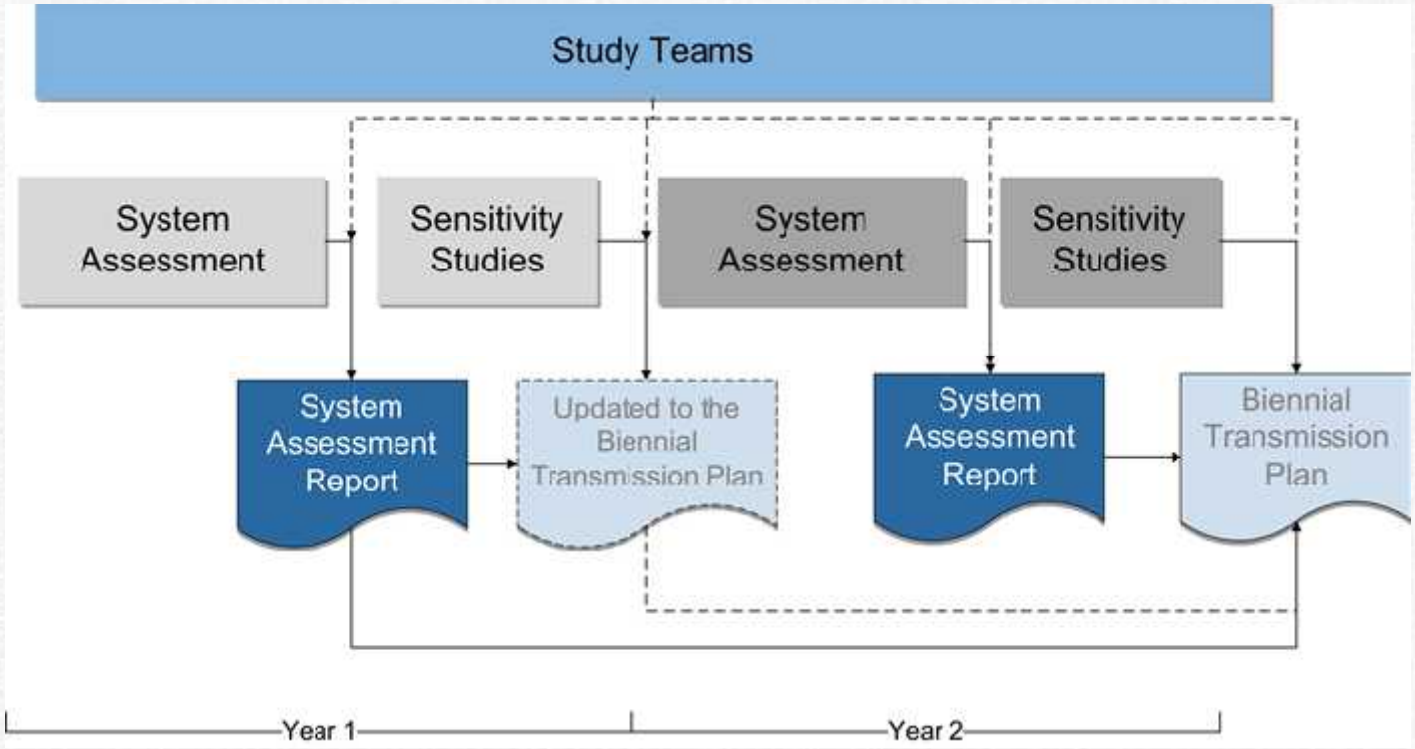
- Planning activities in 2018
  - Core activities
  - Special studies
- Key conclusions i.e. Needs Statement, summary
- Next Steps
  - 2019 Biennial Transmission Expansion Plan (2019 BTEP)
  - Planning meetings
- Information and notifications

CG Planning Process

CG Planning Process: Overview

- Governed by Planning and Expansion (PEFA) & Order 1000 Functional Agreements
  - One single process
- The planning process produces, at least, 2 key documents
  - System Assessment (SA) report
  - Biennial Transmission Expansion Plan (BTEP)
- Additional studies can be conducted based on member's request

CG Planning Process: Overview



CG Planning Process: Where we are now?

- Finalizing the activities under the 2017-2018 planning cycle
  - The final 2017 and 2018 System Assessment reports have been posted on CG's website at: https://columbiagrid.org/basecases-results-overview.cfm
  - The 2019 Biennial Transmission Expansion Plan (2019 BTEP) is being finalized
  - Anticipated completion: Q1, 2019

CG Planning Process: Where we are now?

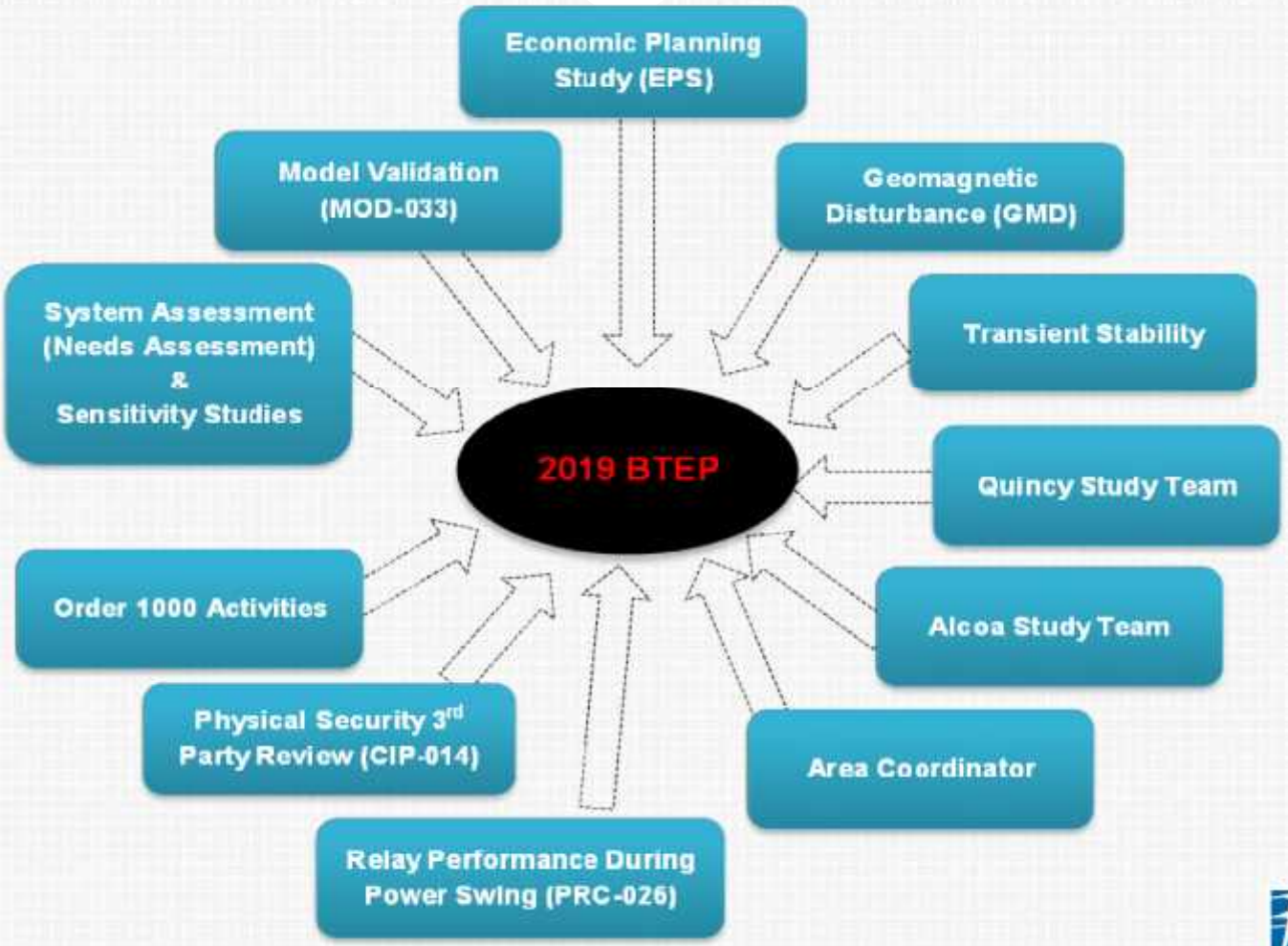
- The new planning cycle (2019-2020) has started
  - Since January 1, 2019
  - The announcement for the new cycle was sent to the interested parties in December 2018
  - The draft Study Plan has been issued
  - The first meeting (Order 1000 Needs Meeting) was held on February 14, 2019
  - Anticipated completion: December 2020

2018 Planning Activities

CG Planning Activities: What we do?

- Key activities in 2018
  - System Assessment (Needs Statement) & Sensitivity Studies
  - Base case development (MOD-032 and internal uses)
  - Order 1000 activities
  - Economic Planning Study
  - One Study Team (Quincy)
  - Four special studies (CIP-014, PRC-026, MOD-033, TPL-007)
- All activities were documented in the 2019 BTEP

CG Planning Activities: What we do?



CG Planning Activities: 2018 System Assessment

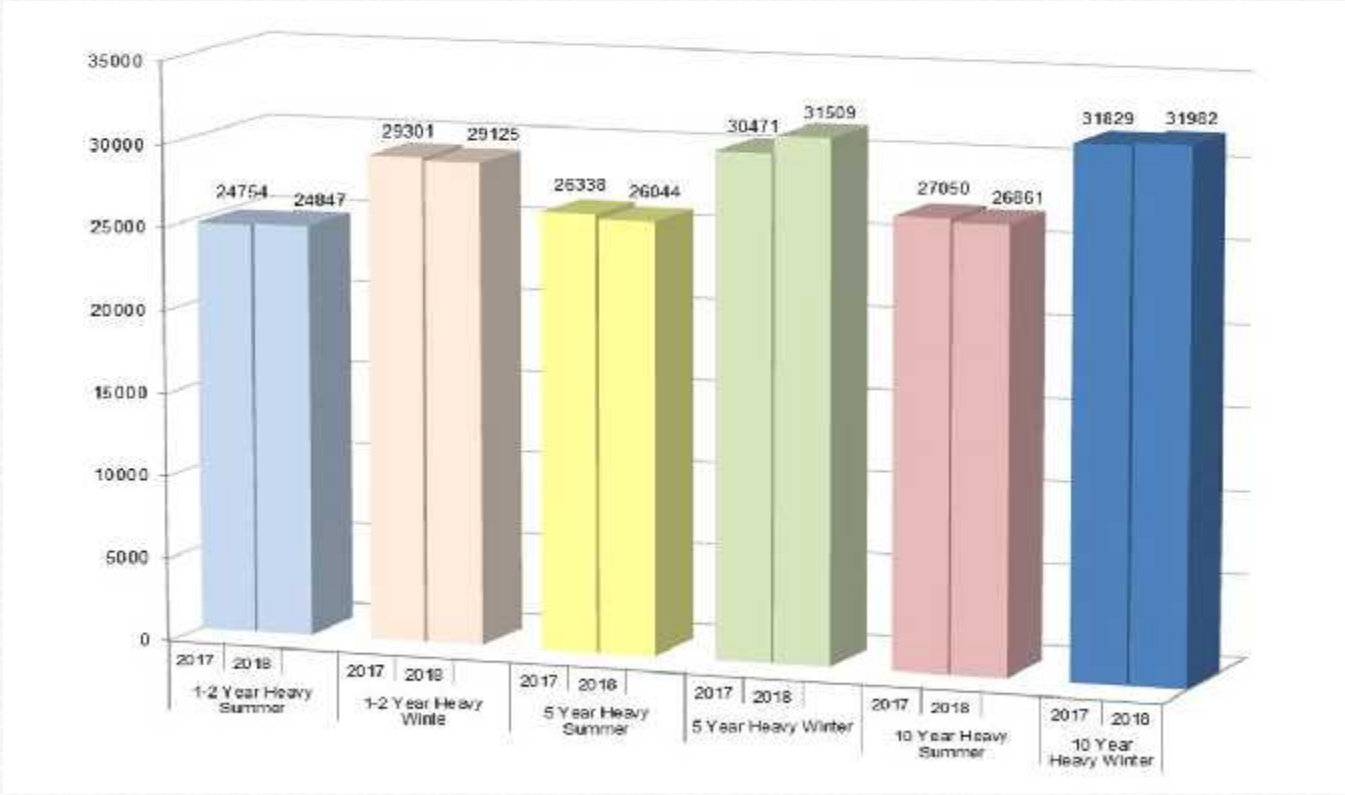
- Primary focus:
  - Evaluate Needs Suggestions
  - Identify regional needs (Needs Statement)
  - Conduct other tasks required by Order 1000
- Three technical studies were conducted as part of the 2018 System Assessment
  - Power flow analysis (identified thermal & voltage issues)
  - Stability assessment
  - Angle differences identification

CG Planning Activities: 2018 System Assessment

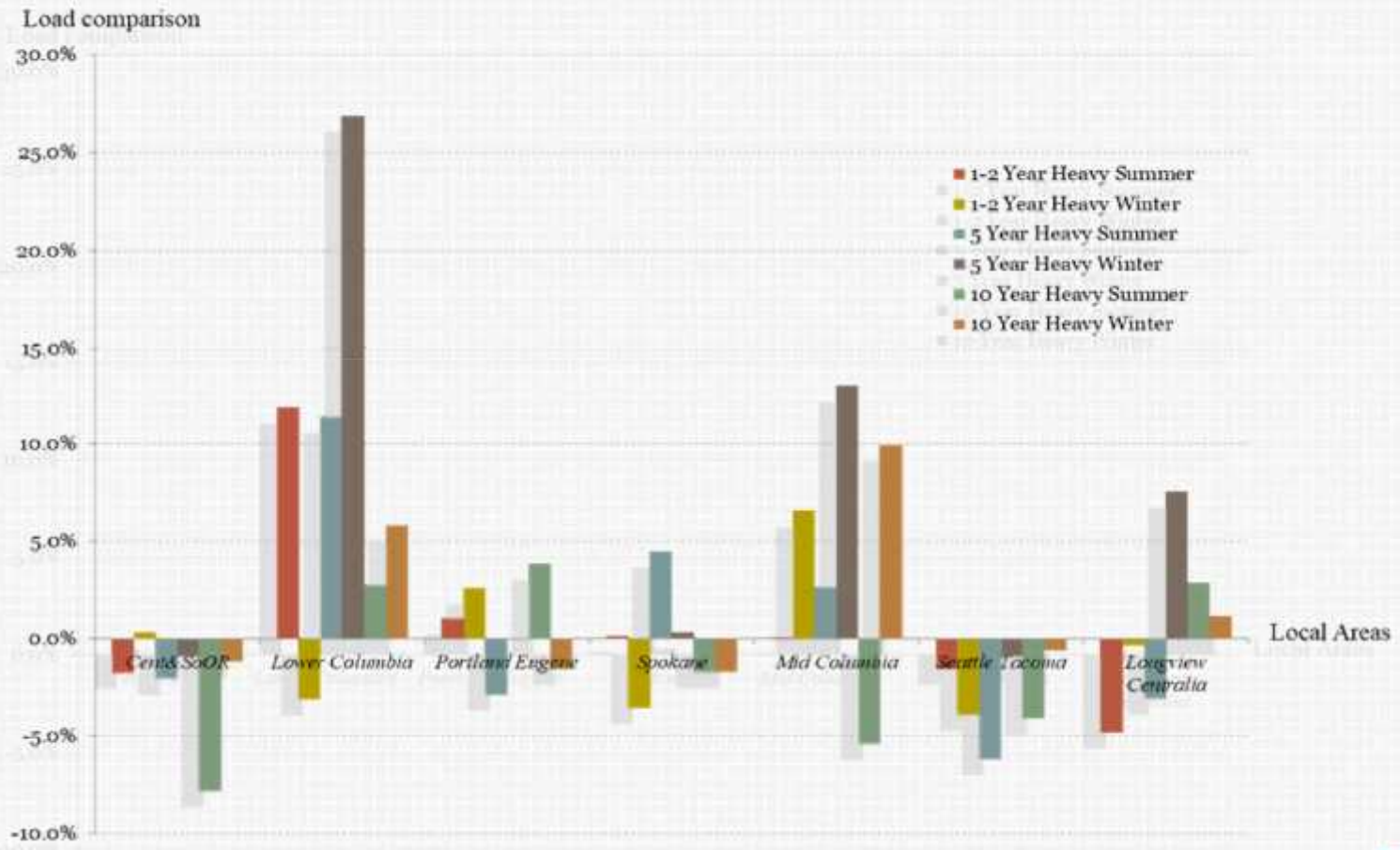
- The results showed eight (8) joint areas of concern
  - Seven (7) "recurring" and one (1) "new" areas
  - No new regional Needs
  - Generally local issues (mitigation plans are being developed)
  - Four (4) areas found in 2017 were no longer identified

CG Planning Activities: 2018 System Assessment

- The new area was identified, primarily due to much higher load forecast in some pockets



CG Planning Activities: 2018 System Assessment



CG Planning Activities: 2018 System Assessment

- Four areas in 2017 System Assessment were not identified due to:
  - Revised load forecast
  - Implementation of transmission projects
  - Different study scenarios
- The N-1-1 study was conducted as part of the Sensitivity Studies
  - Support CG's member in their TPL-001-4 and PRC-023 compliance

CG Planning Activities: Base Case Development

- Two types of base case development activities
  - MOD-032 process for NW area (Area coordinator)
  - Base case development for CG and member's uses
- In 2018, nine (9) base cases were created
  - Along with the dynamic data (files)
  - These cases were used in CIP-014, PRC-026, TPL, GMD, and other studies

No	Study Year	Study Case	Purpose
1	2019	Near-Term Heavy Summer	Member Use
2	2019	Near-Term Heavy Winter	Member Use
3	2018	Short Term Light Load	System Assessment Studies & Member Use
4	2022	5 yr Heavy Summer	Member Use
5	2022	5 yr Heavy Winter	System Assessment Studies & Member Use
6	2023	5 yr Heavy Summer	Member Use
7	2023	5 yr Heavy Winter	Member Use
8	2028	Long-Term Heavy Summer	System Assessment Studies & Member Use
9	2020	Long-Term Heavy Winter	System Assessment Studies & Member Use

CG Planning Activities: Order 1000

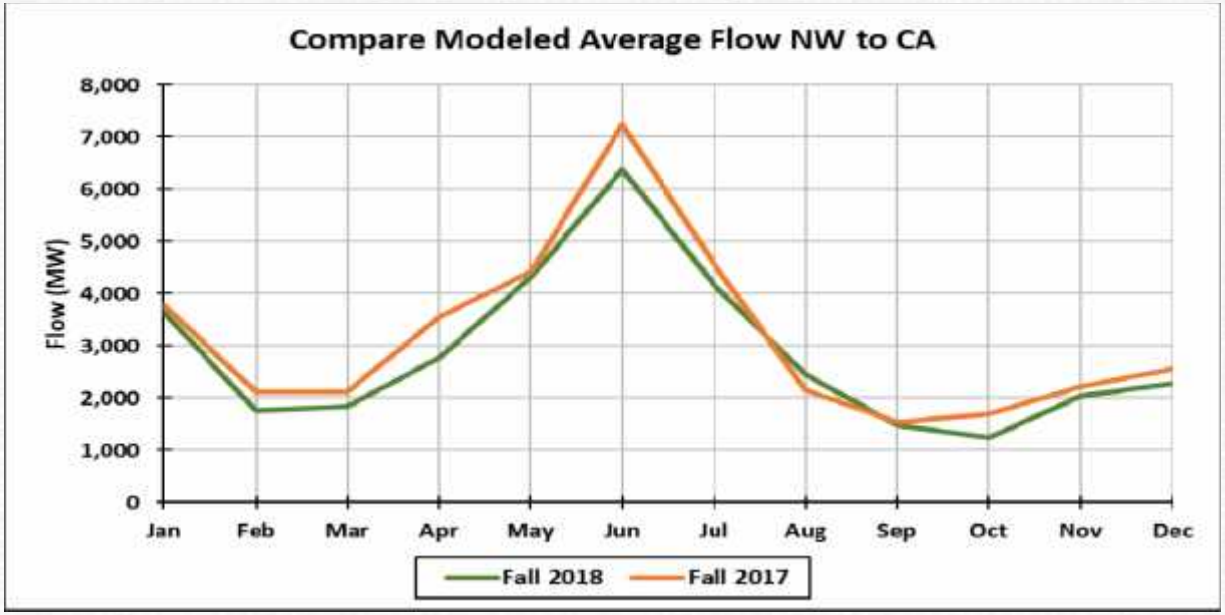
- Key major Order 1000 activities in 2018
  - Order 1000 Needs Suggestion
  - Order 1000 Needs identification
  - Order 1000 project re-evaluation
  - Regional coordination
  - ITP submission window

CG Planning Activities: Economic Planning Study

- Production Cost Simulation, conducted annually
- Assess future system conditions and provide additional information to planning parties
- Significant changes in 2018
  - 15 years scenario
  - Additional model improvements (energy storage/pump storage models & UC and ED logic)
  - Testing additional functions in GridView

CG Planning Activities: Economic Planning Study

- Initial findings (subject to additional review)
  - Lower average flow (particularly export from the NW) in the future, compared to the current level



CG Planning Activities: Economic Planning Study

- The average intra-day swings in the ten and fifteen year scenarios is projected to be higher than current levels
- The min flow on major paths appears to be lower than current levels and is projected to shift towards mid-day

- The 2019 studies will re-analyze these results in more details
- For more details, please refer to this section in the 2019 BTEP: https://columbiagrid.org/biennial-transmission-overview.cfm

CG Planning Activities: Study Team

- The Quincy Study team analyzed potential impacts from major load increase in Mid-C area
  - Participants included BPA, Chelan PUD, CG, Douglas PUD, and Grant PUD
  - Identified potential issues and developed the mitigation plans
  - Almost complete, final study report is being finalized
  - Target completion: Q1, 2019

CG Planning Activities: Special Studies

- Four Special Studies were conducted in 2018
  - Physical Security 3rd Party Review (CIP-014)
  - Relay Performance During Power Swing (PRC-026)
  - Model Validation (MOD-033)
  - Geomagnetic Disturbance Study (TPL-007-1)
- These studies were conducted to support CG member's compliance efforts

CG Planning Activities: Special Studies

- CIP-014 study reviewed the risk assessments of 9 substations in the Pacific Northwest
  - From 4 utilities (Avista, Grant PUD, PSE, and SCL)
  - ColumbiaGrid conducted independent studies to determine the applicability and review the risk assessment
  - An independent review report was issued for each review (substation)
- This task was completed in June, 2018

CG Planning Activities: Special Studies

- PRC-026 focused on identifying relays that may operate following major disturbance
  - Satisfied a portion of the requirements
  - The study was initiated in Q2 of 2018 and it was completed in December 2018
  - The simulation incorporated relay models in the base cases and analyzed five major contingencies
  - Another round of the study will be conducted in 2019 (with improved models and additional data)

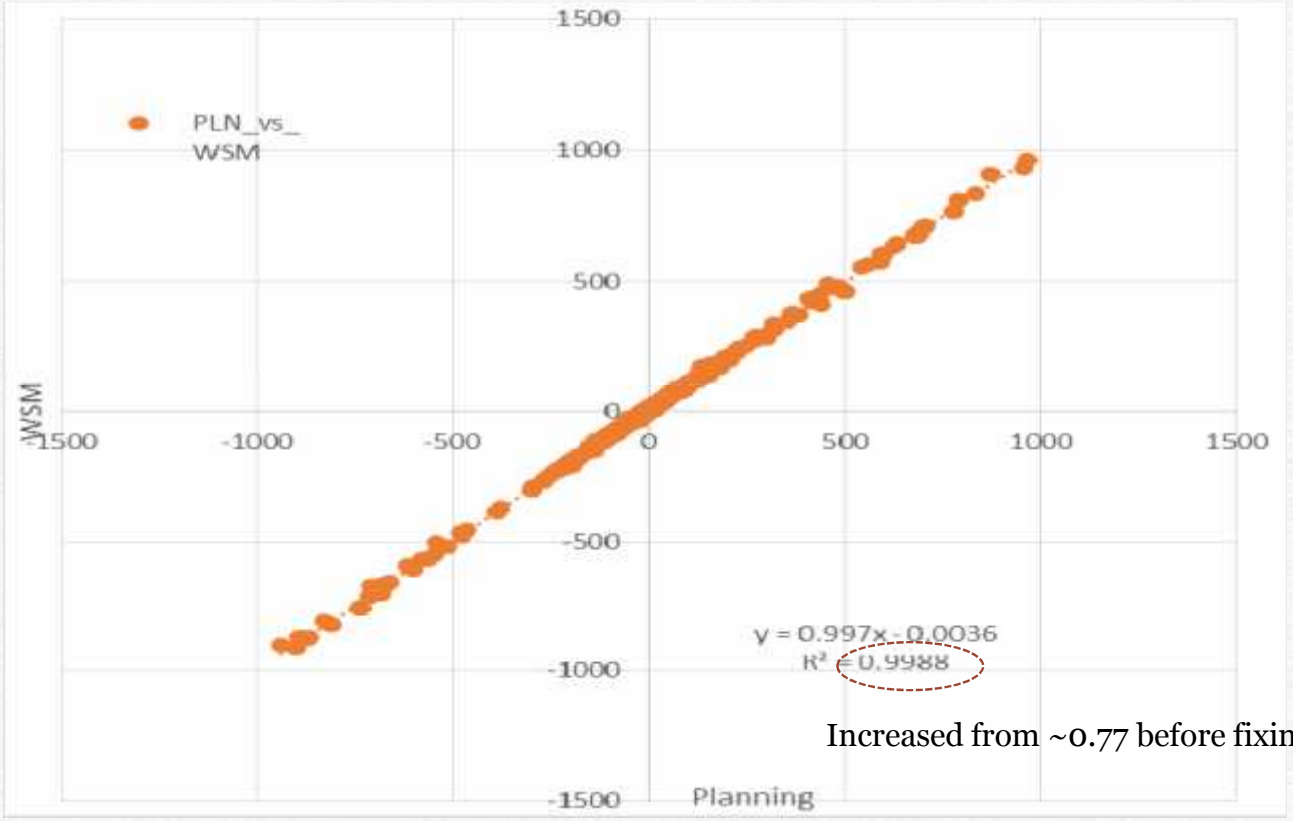
CG Planning Activities: Special Studies

- MOD-033 consists of 3 major tasks
  - Developing the benchmark criteria
  - Comparing simulation results with actual events (steady state and dynamic)
- The study process contains six major steps
  - Event selection: An outage on August 9, 2017 was selected as the reference
  - Data collection: The WSM state estimator case representing this event was used

CG Planning Activities: Special Studies

- Base Case development: A planning base case was modified to mimic the conditions
- Perform the comparison: Comparing the results from the simulations with the events
- Determine potential fixes: Identify potential issues then request the data owners to review the results and issue potential fixes
- Implement the fixes: Incorporate the fixes and re-perform the comparison analysis
  - R^2 was used as the measurement index

CG Planning Activities: Special Studies



Increased from ~0.77 before fixing the models

- Report development

CG Planning Activities: Special Studies

- TPL-007-1 determine the maximum effective Geomagnetic Induced Current (GIC) for applicable BES power transformers
  - Focused more on the Northwest planning region
  - Relied on the methodology and information from the TPL-007-1 standard (such as scaling factors)
  - Initiated in late 2017 and completed in late 2018
  - Additional studies will be conducted in 2019

Next Steps

CG Planning Activities: Next Steps

- 2019 BTEP
  - A draft 2019 BTEP has been posted on ColumbiaGrid's website at: https://columbiagrid.org/biennial-transmission-overview.cfm
  - This draft will be presented to the board, seeking approval on Feb 20, 2019
  - Once approved, the final document will be posted on the website at the same location

CG Planning Activities: Next Steps

- 2019 Planning Studies: Current Work plan (mostly similar to 2018)
  - System Assessment & Sensitivity Studies
  - Node-Breaker model evaluation
  - Economic Planning Study
  - Revision of 3 special studies that were conducted in 2018 (MOD-033, GMD, PRC-026)
  - TPL-007-2 and GMD vulnerability assessment

CG Planning Activities: Planning Meetings

- Five public meetings have been scheduled for 2019
  - February 14, 2019: Portland, OR
  - May 9, 2019: Portland, OR
  - August 8, 2019: TBD (Seattle area)
  - October 10, 2019: Portland, OR
  - December 5, 2019: Portland, OR

Information and Notifications

Stay Informed About Future Activities

- Public notifications
  - ColumbiaGrid will notify interested persons regarding future activities through email
  - Self-register system
  - Refer to “Join Interest List” on ColumbiaGrid’s main page

Stay Informed About Future Activities

Questions

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