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HVDC Analysis - Stakeholder Outreach

Phase 2: Results and Recommendations

Agenda

- Review phase 1 key points
- Modeling assumption adjustments
- Review PSSE results
- Review PROMOD results
- HVDC recommendations

Background

- Original purpose of HVDC device – Reliability
- HVDC set-points established to maintain system reliability
- HVDC has been (predominantly) used to support planned maintenance and construction outages since August 2014
- HVDC and the two 138-kV circuits that cross the Straits of Mackinac are capable of facilitating additional future commercial opportunities
- ATC has received various HVDC questions from stakeholders

Proposed Study Objective

- Identify the “sweet spot” where the HVDC is positioned to maintain reliability and create economic benefit
- Utilize the results of this analysis to adjust MISO’s 2018 MTEP models, as appropriate
  - 2018 MTEP Model submission date is September 30, 2017

Stakeholder Engagement and Schedule

- Phase I – Objectives and Study Design
  - Identify commonly shared objectives
  - Seek alignment on major modeling assumptions
  - Request feedback/”blind-spots”
  - Stakeholder Engagement: July 2017

- Phase II – Results and Recommendations
  - Review study results and proposed recommendations
  - Request feedback/”blind spots”
  - Seek alignment before implementing any changes to the HVDC set points
  - Stakeholder Engagement: September 2017
  - MISO MTEP18 Model updates: September 2017

Modeling Assumption Updates

- Incorporated Stakeholder Feedback
  - Generation adjustments
    - Upper Peninsula – Presque Isle and Pulliam
    - Lower Michigan – Ludington and Alpine
  - Load adjustments
    - None

PSSE – Results and Conclusions

- Performed power flow analysis to identify system impacts of HVDC base model setting changes
  - Used MISO MTEP17 models
    - Modifications implemented per stakeholder feedback
  - Performed single contingency analysis with the HVDC device at 20 MW N-S, 0 MW and 20 MW S-N flow settings
  - Monitored 69 kV and above facilities in study area
- Power flow results
  - Adjusting HVDC from 20 MW N-S to 20 MW S-N
    - No new overloads or voltage issues
    - Post-contingent flow changes were small, even reduced in some cases
- Conclusions
  - Reliability analysis supports a range of base case settings from 20 MW N-S to 20 MW S-N

PROMOD – Results and Conclusions

- Evaluated Benefit Metrics
  - Evaluated various HVDC settings from 20 MW N-S to 20 MW S-N
- PROMOD Results
  - No clear Adjusted Production Cost trends
    - APC results were inconclusive
    - Minimal savings or costs by adjusting HVDC device
    - Results did not indicate any congestion between bounds
  - System loss analysis indicate the smallest difference in loss savings or costs between LRZ-2 and LRZ-7 is at an ~5 MW N-S flow setting
- Conclusion
  - The economic results support a range of base case set points
  - System loss analysis identified 5 MW N-S as reasonable set point

Recommendations

- Have separate HVDC system intact target flows for power flow models and the Operating Guide.
- ATC's modeling inputs for the MTEP18 model building process will continue to reflect a 20 MW N-S system intact set point of the HVDC device.
  - Continue to stress the weaker transmission system
  - Continue to support system bias
- Adjust the Operating Guide system intact target flow from 20 MW N-S to 5 MW N-S
  - APC results were inconclusive
  - Reliability results did not indicate any negative impacts
  - System loss analysis identified 5 MW N-S as reasonable set point
- Continue to work collaboratively with our neighbors/MISO on HVDC settings and model sensitivities
  - Maintain capability to support outage/emergency operations in eastern U.P. and northern Lower Michigan
- ATC will periodically review the HVDC device system intact set point.