



Grid Enhancing Technologies

MA EOEEA "Pop-Up" Forum

Brent Oberlin

DIRECTOR, TRANSMISSION PLANNING



General use of Grid-enhancing Technologies

- In general terms, the Grid-enhancing Technologies (GETs) being focused on today (dynamic line ratings (DLRs), power flow controllers (PFCs), and topology control) seek to maximize the use of a system that is thermally limited (limited by transmission line power flow ratings)
 - These GETs allow more power to move through transmission facilities before the facilities are overloaded
 - Implementation of these technologies can have many benefits on systems where thermal limitations prevent optimal use of the existing facilities
- However, most meaningful limits, major interfaces, on today's transmission system in New England are either stability or voltage based
- As a result of the extensive transmission system additions over the past twenty years, there is very little congestion on the New England system today
- Therefore, there must be careful consideration of the additional expense and complexity that are inherent to these devices vs. their benefit
- There are existing avenues for consideration of these technologies under the current Tariff



DLRs

- DLRs provide benefit in real time and near real time operation of the system. Their consideration in planning may be limited to certain use cases
 - Planning studies still need to assume that it is hot during summer peak load conditions
 - With the implementation of ambient-adjusted ratings* (AARs), the impact of lower temperatures on equipment ratings can already be accounted for when considering winter peak load in planning studies
 - If DLRs and rating methodologies are consistent, static line ratings under the assumed conditions of the planning assessment will be reasonably close to those ratings being provided by DLRs under the studied conditions
- New England must implement AARs by July 2025 as a result of Order 881
 - While integration of automated AARs into ISO New England's systems is still in its infancy, the expectation is this effort will establish the necessary groundwork for receipt and use of DLRs in real-time operations
 - Note that New England has been using AARs for a very long time. While the process has been manual, it allowed the operators to take advantage of higher line ratings when ambient conditions allowed
 - Therefore, the open question is whether there are sufficient system benefits associated with the cost of installing the equipment required to implement DLRs

*AARs are ratings that vary based on ambient temperature and whether it is day or night.



Power Flow Controllers/Topology Controllers

- In order to provide a meaningful change to the performance of the system, the PFCs/topology controllers need to create worthwhile changes to impedance/topology
 - Because of this, the system changes need to be modeled and understood. If the changes are so small that they don't need to be modeled, they will not change the performance of the system – defeating the purpose of installing them
- There is a significant issue facing the industry as the available transmission technologies continue to advance and improve...technology is outpacing the capability to model it
 - The ISO is already experiencing significant issues modeling the capabilities/impact of newer technologies in forward looking tools like PSS/E and, more importantly, in the Energy Management System (EMS)
 - The modeling concerns will need to be overcome to be able to incorporate these devices
 - The ISO is currently discussing these issues at various user group meetings
- Currently, stability simulations are performed in “off-line” studies, rather than in real time operations
 - As the number of possible system states increases, the difficulty in evaluating necessary system states increases
 - Necessary simplifications may temper the benefit of installing these devices
- Any automatic controls must be simple and predictable, in order for operators to correctly anticipate their actions and to avoid unexpected actions during unusual system conditions



Power Flow Controllers/Topology Controllers, cont.

- Similar to AARs, the ISO has been manually implementing topology changes to improve system performance for a very long time
 - The ISO is currently evaluating software to automatically identify topology control solutions for thermal constraints

