Recommendation for Addressing Gaps between Operations and Planning Processes to Be Able to Identify Constraints Not Resolvable By SCED

Executive Summary

On May 17, 2011 the ERCOT Board of Directors (ERCOT Board) directed the ERCOT Technical Advisory Committee (TAC) to report back to the Board "a recommendation for addressing gaps between operations and planning processes to be able to identify constraints not resolvable by SCED." TAC assigned to the ERCOT Reliability and Operations Subcommittee (ROS) the task of investigating this matter and reporting back to TAC a recommendation for TAC's review and consideration. ROS has diligently investigated the potential reliability implications of Security Constrained Economic Dispatch (SCED) irresolvable constraints over the course of several meetings of the Planning Working Group (PLWG) and ROS, including one ROS meeting devoted solely to this subject. ROS specifically considered whether changes in ERCOT planning or operating processes should be made as a result of the occurrence of SCED irresolvable constraints. After diligent investigation, ROS has determined that intervals of SCED irresolvable constraints are not an unexpected outcome and are not indicative of unacceptable reliability performance or gaps between ERCOT planning and operating processes. Therefore, ROS recommends that no changes to planning or operating processes be made as a result of SCED irresolvable constraints occurring on the ERCOT system.

As part of its investigation into this matter, ROS reviewed information pertaining to the intervals of SCED irresolvable constraints prepared by ERCOT staff. ROS will work with ERCOT staff to investigate efficient ways to review similar information prospectively so that ROS can recommend changes in either planning or operating processes at a future time if such changes are necessary or beneficial based upon updated information.

Discussion

The ERCOT system is conservatively and reasonably planned and operated to a level of reliability that exceeds the requirements of the North American Reliability Corporation (NERC). In particular, ERCOT plans and operates the system such that certain "n-2" contingencies, specifically double circuit outages, are treated as "n-1" events. Double circuit outages can and do occur, but with much less frequency than true n-1 events where one transmission element is outaged. By design, some amount of firm load may be outaged due to true n-1 events (radial transmission circuits) and it is fairly common for some amount of firm load to be outaged when a double circuit is outaged. Furthermore, it is quite common for some amount of firm load to be outaged for n-2 conditions.

These existing practices are reasonable practices that balance the desire for reliability with desires to maintain reasonable costs that customers can afford to pay and to minimize landowner impact. As a general rule[1], the ERCOT system is pre-emptively dispatched on a pre-contingency basis by SCED such that if an n-1[2] contingency event were to occur, network facilities would not be expected to exceed their two hour emergency ratings. It is worth noting that the two hour emergency rating is often a conservatively low value based upon assumed high temperature and low wind conditions that occur a small percentage of the time.[3] When an n-1 contingency event occurs or if unexpected system conditions occur, such as unexpected loading or generation dispatch conditions, SCED will attempt to pre-emptively re-dispatch the system so that in the event of the next contingency (i.e., an n-2 condition), two hour emergency ratings will not be exceeded. In the interim time frame between the first contingency (or unexpected system condition) and the next contingency, SCED may have irresolvable constraints over the next several five-minute intervals due to generation ramp rate limitations or other reasons. It is also possible that SCED may not be able to resolve the constraint for the n-2 contingency situation. In this case, ERCOT uses Mitigation Plans (MPs) or Transmission Outage Approval Plans (TOAPs) to ensure reliability. These plans could include switching actions and could also include shedding some amount of firm load for the n-2 condition. The fact that some amount of firm load may be shed due to rare n-2 conditions is consistent with the design basis of the ERCOT transmission system (and generally any other transmission system in North America), and is not indicative of unacceptable reliability performance or gaps between ERCOT operations and planning.

ERCOT staff provided information pertaining to the instances of recurring SCED irresolvable constraints. One constraint, pertaining to Rio Grande Valley import limitations, is a significant bulk power constraint that is already being addressed in the ERCOT planning process. The other constraints could potentially involve shedding small amounts of localized load in the event of rare n-2 conditions. Planning is a forward-looking process, and there will be differences between forecasted conditions and actual conditions. The fact that such differences occur is not due to gaps between operating and planning processes, but rather is due to uncertainty about future operating conditions inherent in the planning process. The ERCOT planning criteria has been used for many years to achieve a desired balance between ensuring reliability without causing undue cost or landowner impacts that could result from over-building. It is worth noting that, independent of the May 17, 2011 ERCOT Board's

[1] There are certain exceptions to this general rule. For example, if a Remedial Action Plan (RAP) has been developed, a 15 minute emergency rating is used instead of a two hour emergency rating.

[2] As previously noted, n-1 includes certain n-2 events that are classified as n-1 events, such as double circuit outages.

[3] It is possible to adjust the rating based upon ambient conditions, but such adjustments are not always made and, when such adjustments are made, the assumptions are also conservative, such as using the highest expected temperature for a given day.

directive to TAC to investigate this matter, transmission planning processes and criteria are continuing to evolve. Specifically, the NERC Board of Directors approved significant changes to NERC transmission planning requirements in August, 2011. Furthermore, ERCOT is developing enhanced transmission planning processes through the development of enhanced long term planning and probabilistic planning processes. ROS does not recommend additional changes in ERCOT planning or operating criteria based upon a review of SCED irresolvable constraints at this time, but ROS believes the investigation into this matter has been educational and beneficial. Accordingly, ROS plans to work with ERCOT staff to investigate efficient ways to review similar information prospectively.

ROS wishes to express its appreciation to Luminant Energy for sponsoring planning and operating criteria proposals that led to educational and beneficial discussion of this topic, and to ERCOT staff who prepared educational, “on-target” information for ROS to review.