

#P30 – Bellefonte-N. Proctorville Generation Interconnection

This analysis was completed to assess the reliability impact for a new generator interconnecting to the PJM system as a capacity resource.

Network Impacts

The #P30 project was studied as a 20 MW increase in Capacity to previous queue request L01_AEP137 (Bellefonte-N. Proctorville 138 kV). Project #P30 was evaluated for compliance with reliability criteria for summer peak conditions in 2010. Potential network impacts were as follows:

Single Contingency

The Bellefonte-North Proctorville 138 kV line conductors are 397.5 30/7 ACSR and 795 ACSR. The generation project is connecting to the 397.5 ACSR section of the line. The AEP summer ratings for this conductor are **167/245** Summer Normal/Summer Emergency. From a 'Planning' perspective, we should not exceed the **emergency** conductor rating under any credible contingency conditions with the Biomass generation on-line and we don't. However, we may exceed the **normal** conductor rating for a loss of either outlet (P30-North Proctorville or P30-Bellefonte). As per PJM operating criteria, following the initial outage, all facility loadings should be brought back to within their normal ratings. This would imply that Biomass might need to curtail generation since their entire plant output of **185 MW** would be radially feeding into a single 138 kV line outlet, with the line rated at **167 MVA** (summer). Of course, this issue is most significant in the summertime when ratings are lower. The winter conductor normal rating is 210 MVA. This issue was previously addressed in the AEP Facilities Study for the L01_AEP137 165 MW project. The issue becomes more critical as the generation level clearly exceeds the summer rating, and likely is very close to the spring/fall rating.

Generator Deliverability

No problems identified

Multiple Facility Contingency

No problems identified

Short Circuit

Not required, since there are no changes to the generating unit electrical characteristics.

New System Reinforcements

None required

Contribution to Previously Identified System Reinforcements

None identified

Optional Reinforcements

The following options are available to alleviate the single contingency concern described above.

- 1) Curtail generation if/when required.
- 2) Reconductor ~10 miles of 138 kV line.
- 3) Install dynamic line rating device (tension monitor) to get real-time conductor rating.

Cost estimates for the three options are as follows:

- 1) **\$0**
- 2) Reconductor 10 miles of 138 kV line on the Bellefonte-North Proctorville circuit - - estimated cost = **\$1,750,000**.
- 3) Install CAT-1 tension monitoring system - - estimated cost = **\$350,000**.

Description of the optional work:

Option 2 includes reconductoring the 397.5 kcm ACSR line section with 556.5 kcm 26/7 ACSR. The summer normal rating of the 556.5 ACSR is 205 MVA. Use of the 556.5 ACSR requires somewhat minimal tower work. Increasing the size beyond 556.5 (e.g. 636 or 795 ACSR) would require a major amount of tower work, including replacement of many towers.

Option 3 provides for dynamically rating the 138 kV line. With this option, additional capacity MAY be available at any given time. However, there is no guarantee that the dynamic rating will be higher than the static rating at any point in time.