Embracing New Realities

SUBSTATION CATEGORY

2021 Annual Conference & Trade Show

FLORIDA POWER & LIGHT COMPANY

Malabar – Midway 3000A

Upgrade – Less is More, Reliably

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A significant component to the overall solution for Florida Power & Light's (FPL) plans to provide for future load growth and increased transfer capability in the Indian River and Brevard County areas was to rebuild and increase the ampacity of an existing 55-mile 230kV line and the high side of three (3) intermediate substations between the company's Malabar and Midway substations to 2000A and add a new "express" 3000A 230kV line between the stations. The project would cost $110 million over a 2 ½-year period with completion in December 2020. Though seemingly straight forward, the team would be challenged to seek out new technology to avoid substation site expansions and to find innovative ways to provide reliable uninterrupted power delivery to the nearly 30,000 customers served by the distribution substations on the existing Malabar-Heritage (solar)-Midway 230kV transmission line.

The Task – substation high side ampacity increases without expanding the substations existing footprint and zero customer minutes interrupted (CMI) as well as zero injuries during construction. The team looked ahead and found that the existing line ampacity would need to increase to 3000A in the near future. This presented a problem since constructing to 3000A utilizing FPL's usual application of breakers with adjacent disconnect switches would require site expansions which were not achievable for most of the substations on the line. Looking for creative solutions, the team challenged technical services to search the industry for compact 3000A/230kV breaker alternatives. None were readily available that would fit the limited space and meet FPL's technical requirements. Several vendors were open to feedback and proposed to develop a new switch. A first of its kind for FPL and first of its use as a 3000A "Compact Air Insulated Breaker Assembly" (CABA) line load interrupting switch was selected. This was significant for FPL for this project and for future projects where site expansions are not practicable due to site constraints, schedule, environmental impact or cost.

Line and station equipment clearances and associated clear up time during construction for the high side ampacity increases at each of the stations as well as the rebuild of the existing 230kV line were a concern. FPL incorporates the high side bus of each distribution station in the transmission circuit to provide reliability by having the ability to sectionalize a transmission line and maintain service to its customers. When the line is

opened for work, the adjacent stations are now at risk. Depending on the location of the work, a sustained fault could result in as much as 7.2 million CMI, assuming a standard four-hour clear up time. The 55-mile “express” transmission line was moved to the front of the schedule so that portions of the line could be used for a bypass to various segments of the existing line in order to be able to work the existing line in the clear. The new line was also used to “bypass” each of the distribution stations so that the stations high side could be worked in the clear. The construction team employed a new method for FPL by tapping into the energized bypass to a mobile switch and subsequently to the transformer high side load break switch of one or more of the in-service transformers. A similar method was used to tie to a temporary transformer connected to the low side and utilization of a mobile overcurrent protection.