LOLE, LOLH, & LOLP . . . LOL!

As I said in a previous blog on the topic of resource adequacy, SPP requires its member utilities to maintain reserve margins of at least 13.6 percent. Have you ever wondered how or why this requirement was established?

As it turns out, the basis for our industry’s reserve-margin requirements – the amount of generating capacity in excess of that needed to meet peak demand – goes back to at least the late 1960s!

In 1968, three years after the Northeast Blackout, the Mid-Atlantic Area Council (MAAC) established a resource-adequacy standard for its region. The MAAC required enough planned generating capacity to ensure the probability of an event where demand exceeded supply would not be greater than one day in 10 years. Many utilities and regions followed suit with similar standards. Almost 47 years later, the industry still tries to maintain reserve margins high enough that service interruptions due to inadequate generation supplies do not occur more than once in 10 years.

Reliable reserve-margin requirements are typically determined on a regional or state-wide basis by probabilistic assessments using one of two interpretations of the 1-in-10 standard. Many regions determine the minimum reserve margin required to meet a loss-of-load-expectation (LOLE) of one event in 10 years or a loss-of-load-probability (LOLP) of .1 per year. Alternatively, some regions determine their reserve-margin requirements based on an LOLE of one day in 10 years, which is equivalent to 2.4 loss-of-load-hours (LOLH) per year. Reserve-margin requirements determined by the probabilistic assessment can vary 5 percent or greater, depending on the interpretation of the 1-in-10 standard used.

SPP performs a probabilistic assessment biennially. The assessment evaluates SPP’s regional ability to maintain a LOLH standard of 2.4 hours per year and provides resource-adequacy metrics to the North American Electric Reliability Corporation (NERC). SPP’s assessments typically show that its 13.6 percent reserve-margin requirement is sufficient to meet its 2.4 LOLH standard. Although SPP’s assessments have occasionally shown a lower reserve-margin requirement would have been sufficient to meet a 2.4 LOLH standard, SPP has maintained its 13.6 percent reserve-margin requirement since 1998.
Like SPP, most regions develop a specific requirement, but some simply establish a target, using it for reporting purposes only. Some regions assess and update their requirements annually, while others assess their requirements regularly – but seldom change them. NERC does not mandate the 1-in-10 standard or a consistent interpretation, nor does it mandate a specific reserve-margin requirement. NERC does recommend a reference level of 15 percent in the event that a region has not established a requirement for its utilities. As shown below, reserve-margin requirements across North America generally vary between 10 and 20 percent, a result of regional differences in electric system characteristics and in the application of resource-adequacy standards.

A number of papers have been written over the last several years questioning the 1-in-10 standard’s validity and the economic prudence of applying it to derive reserve-margin requirements. Despite the standard’s wide use in the industry, there is little historical record of its reliability value for resource adequacy.

SPP’s newly formed Capacity Margin Task Force will need to consider the appropriateness of continued usage of this standard in the SPP region. It will not be a simple task. How much reliability is assured by maintaining reserve margins to meet a 1-in-10 standard? Is that amount of reliability worth the cost? Can we reduce reserve margins to meet a lower standard and still maintain a reasonable and affordable level of reliability?

I look forward to addressing these and other similar questions with the Capacity Margin Task Force in the near future. Stay tuned!

Read more from Lanny on our website. Questions and comments can be emailed to communication@spp.org.