Utility Industry Targets a Growing Problem: Momentary Outages

UTILITY INDUSTRY TARGETS A GROWING PROBLEM: MOMENTARY OUTAGES

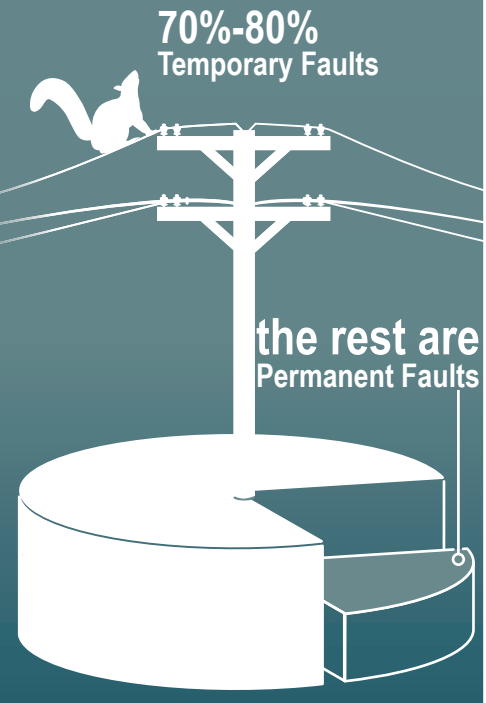
Yesterday's electricity reliability is simply not acceptable to today's consumer. Consumers' growing appetite for digital products, combined with more industrial and commercial use of computerized machinery, is putting performance pressure on electric utilities. Momentary outages, which have been on the rise, are causing frustration and increasing costs for today's users of sensitive digital technology.

Indeed, the significance of a power disruption, even for just a moment, can vary considerably. And regardless of how brief, an outage has the potential to generate a broad range of complaints.

Residential customers are growing irritated, for example, at having to reset clocks and security systems more often. Retail businesses are equally upset at the hassle, costs, and lost sales that occur when customers walk out the door rather than wait an unknown time for the electronic cash registers to reboot. Manufacturing plants also incur significant costs due to lost production and idle workers while product assembly-line controls are reset. They may even have to scrap material and clean up messes caused when factory processes stop suddenly when the electricity "blinks."

Customers may call them "blinks," but the industry calls them momentary interruptions. These are an inevitable consequence of electric utility system designs that, for the past 100 years, have focused on minimizing sustained outages. Some utilities are realizing the need to address customer concerns over momentary outages. One major utility, Florida Power & Light Company (FPL), has made a bold commitment to focus on reducing momentary outages across its system and significantly improve its customer service.

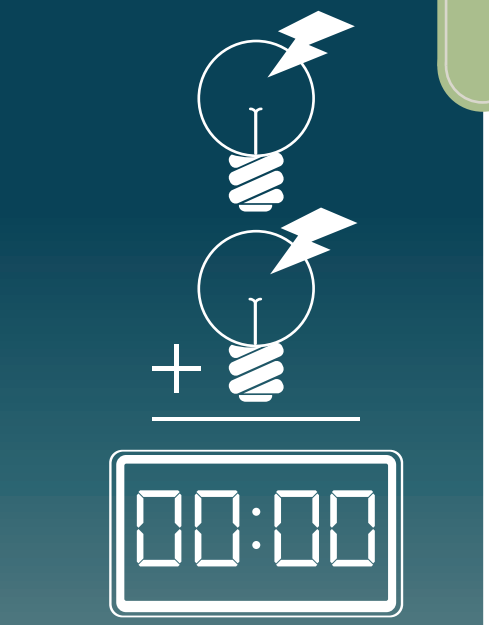
There are two main utility practices that cause blinks to occur: substation breaker-protection schemes and lateral-protection practices.

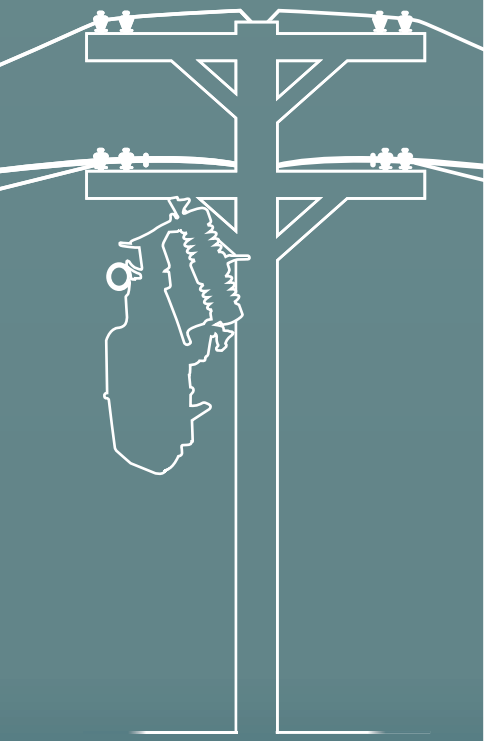


SUBSTATION BREAKER-PROTECTION SCHEMES

Utilities know that 70% to 80% of faults are temporary, meaning they are caused by things such as squirrels or branches that fault the line but fall away as soon as the fault is interrupted.

Typical utility practice is to interrupt those temporary faults with the substation breaker or recloser, and then reclose to restore power to the system. The reason utilities use this practice is so no one on the feeder endures a sustained outage for a temporary fault. The downside is that almost everyone on the feeder is subjected to a momentary outage for every temporary fault. Some utilities also add reclosers out on the feeder to reduce the number of customers experiencing a blink for faults further out on the feeder.





Here's a well-kept secret: Voltage sags (voltage dropping below 70% of nominal) can be very troublesome to customers, affecting their electronic equipment just as much as a blink. Voltage sags are a less talked about, but they are a well-known problem that results from typical substation breaker-protection schemes. Most substation transformers have two to four feeders connected to them. When the breaker for one feeder operates for a sustained fault, it opens and then recloses three to four times. Each time it recloses, it puts the fault back on the system, causing voltage sags on the transformer bus and all the other feeders connected to it.

One large U.S. utility recorded both momentary outages and voltage sags and concluded that there is one voltage sag for every two momentary interruptions. Since a voltage sag can have the same effect on customers as a momentary, this clearly is a big deal.

To eliminate this problem, progressive utilities are replacing breakers and reclosers with innovative PulseClosing™ Technology. These advanced IntelliRupter® fault interrupters leapfrog legacy breakers and reclosers, providing fault interruption without the problems caused by conventional reclosing. Instead, they test the line through advanced technology that eliminates voltage sags.

LATERAL PROTECTION PRACTICES

A typical 15-kV utility feeder has approximately 1,000 customers, but only a handful of them are on most of its 20 to 30 laterals. The utility usually will protect a lateral with a simple fused cutout. For sustained faults, the fuse will operate and isolate the lateral. For temporary faults on the lateral, the utility will set its system one of two ways: It is set to allow the fuse to blow, or set so the feeder breaker will operate, saving the fuse.

If the utility sets for the fuse to blow, the lateral experiences a sustained outage for all faults, even for the 70% to 80% that are temporary. If it sets the system so the breaker operates to save the fuse on all temporary faults, it will do just that, clearing the temporary lateral fault and saving those customers from a sustained outage. All other customers on the feeder, however, will experience a momentary outage.

The solution to this problem is to use reclosers instead of fused cutouts on laterals. The lateral recloser provides the best of both worlds by isolating sustained faults and interrupting temporary faults, and it does so without affecting other customers on the feeder. Utilities have known this for years, but they have only sparingly applied reclosers to laterals because of the complexities, maintenance demands, and costs of some reclosers. FPL chose the innovative S&C TripSaver® II Cutout-Mounted Recloser as the most cost-effective solution for its systemwide deployment of a lateral recloser protection strategy.

This reclosing technology saves a utility from having to spend considerable sums on fuse-replacement and truck rolls, while also saving many utility customers from costs associated with momentary faults. Another benefit is significantly improved utility reliability measures—SAIDI (average customer-outage duration) and MAIFI (average number of momentary interruptions).

MOMENTARY-OUTAGES COSTS

Historically, utilities have been hesitant to take a broad approach to reduce their momentary outages. The primary reason is the budgetary impact, as utilities have not been allowed to recover the costs associated with improving those rates. The reason regulators hadn't historically approved them is because the industry had not been able to reasonably quantify the cost impact from momentary outages on electricity customers. But this is changing, as unbiased data are now emerging showing the real costs of outages to consumers.

In 2004, under contract for the U.S. Department of Energy, The Lawrence Berkley National Laboratory published a study "Understanding the Cost of Power Interruptions to U.S. Electricity Consumers." This study has been broadly scrutinized and is widely accepted as a reasonable electricity user cost-estimator for power outages. More recently, the DOE developed the Interruption Cost Estimate (ICE) Calculator, which takes the study data and allows users to customize the calculation for their geography and system parameters.

With the ICE Calculator, the calculated outage cost for one minute is generally accepted as a reasonable estimate for the cost of a momentary outage. These electricity customer outage costs are beginning to appear in many industry reports and presentations. More importantly, they are now part of many rate-case submissions. Regulators are now accepting the consumer outage-cost data as reasonable and are beginning to allow utilities to recover their reliability-improvement expenses in their rates.

It's encouraging to see a major utility such as FPL make the bold commitment to significantly reduce momentary outages for its electricity customers. And many other utilities are taking notice. Regardless of the utility, the majority of the outage-related costs electricity users face stem from momentary outages. It's refreshing to watch the industry finally begin to attack this issue.

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August 3, 2015