Issue Preview March 2010

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- 2008 Paramount Research

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Issue Topics

Safety & Training
Georgia Transmission Corp. (GTC) builds and maintains the high-voltage power infrastructure for 39 of the state's 42 Electric Membership Cooperatives. GTC employs high-tech X-ray equipment to evaluate the integrity of compression splices and dead-end fittings on new transmission projects. This "inside look" at key conductor connections is GTC's latest initiative to improve the reliability of the grid by reducing the margin for error during construction.

Overhead Facilities
After losing over 150 wood poles to Hurricane Ike in September of 2008, Western Kentucky Rural Electric Cooperative installed 10 composite utility poles in their system on a trial basis. A once in a hundred year ice storm came through the WKREC territory in January of 2009 and took down over 1,600 wood poles. The composite poles were not damaged and survived in line sections where wood poles were damaged.

Transmission Construction
Transmission construction projects throughout the world have become more complicated and logistically challenging as environmental stipulations become more demanding. Nowhere is this more evident than in the sub-arctic, in this case interior Alaska, where Golden Valley Electric Association, Inc. recently constructed the 230 kV Northern Intertie transmission line project.

Field Computing
Utility veterans often describe major storm events as "organized chaos". Regardless of the event, a common focus exists: How to restore the system without wasting valuable time and costly resources? Early reports of the number of customers out doesn't tell the whole story. It very much matters to storm response if a line is down or a breaker is open. There is software that can be used to address this information gap to enable better response.

System Reliability
Since 2006, some utilities have experienced an increasing number of polymer insulator failures on 115 and 138 kV transmission lines. Investigations have shown that these failures can be attributed to high electric fields (E-fields) occurring close to, or on the high-voltage end fittings of these insulators. These findings suggest, contrary to common practice, that it might be necessary to consider the application of corona on polymer insulators applied below 161 kV.

System Testing
Electric system losses are a combination of technical losses, which are associated with network design and components and management losses, which are dependent on system load and operational conditions. Guangdong Electric Power Company in China conducted a three-year study of losses on three rural networks to provide basic data for managers to use to improve system performance.

Columns in Every Issue

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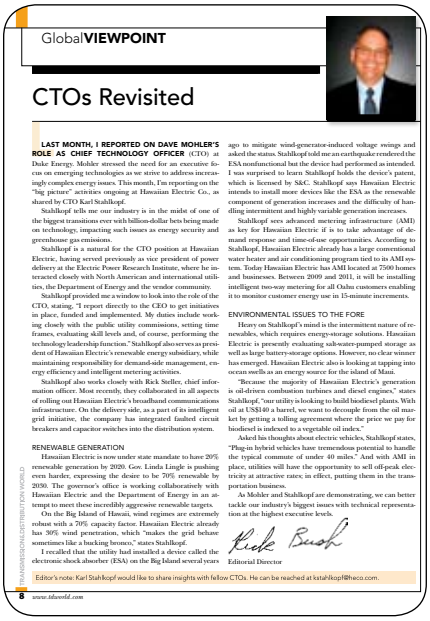

Global**VIEWPOINT**

CTOs Revisited

LAST MONTH, I REPORTED ON DAVE MOHLER'S ROLE AS CHIEF TECHNOLOGY OFFICER (CTO) at Duke Energy. Mohler stressed the need for an executive focus on emerging technologies as we strive to address increasingly complex energy issues. This month, I'm reporting on the "big picture" activities ongoing at Hawaiian Electric Co., as shared by CTO Karl Stahlkopf.

Stahlkopf tells me our industry is in the midst of one of the biggest transitions ever with billion-dollar bets being made on technology, impacting such issues as energy security and greenhouse gas emissions.

Stahlkopf is a natural for the CTO position at Hawaiian Electric, having served previously as vice president of power delivery at the Electric Power Research Institute, where he interacted closely with North American and international utilities, the Department of Energy and the vendor community.

Stahlkopf provided me a window to look into the role of the CTO, stating, "I report directly to the CEO to get initiatives in place, funded and implemented. My duties include working closely with the public utility commissions, setting time frames, evaluating skill levels and, of course, performing the technology leadership function." Stahlkopf also serves as president of Hawaiian Electric's renewable energy subsidiary, while maintaining responsibility for demand-side management, energy efficiency and intelligent metering activities.

Stahlkopf also works closely with Rick Steffes, chief information officer. Most recently, they collaborated in all aspects of rolling out Hawaiian Electric's broadband communications infrastructure. On the delivery side, as a part of its intelligent grid initiative, the company has integrated faulted circuit breakers and capacitor switches into the distribution system.

RENEWABLE GENERATION

Hawaiian Electric is now under state mandate to have 20% renewable generation by 2020. Gov. Linda Lingle is pushing even harder, expressing the desire to be 70% renewable by 2030. The governor's office is working collaboratively with Hawaiian Electric and the Department of Energy in an attempt to meet these incredibly aggressive renewable targets.

On the Big Island of Hawaii, wind regimes are extremely robust with a 70% capacity factor. Hawaiian Electric already has 30% wind penetration, which "makes the grid behave sometimes like a bucking bronco," states Stahlkopf.

I recalled that the utility had installed a device called the electronic shock absorber (ESA) on the Big Island several years ago to mitigate wind-generator-induced voltage swings and asked the status. Stahlkopf told me an earthquake rendered the ESA nonfunctional but the device had performed as intended. I was surprised to learn Stahlkopf holds the device's patent, which is licensed by S&C. Stahlkopf says Hawaiian Electric intends to install more devices like the ESA as the renewable component of generation increases and the difficulty of handling intermittent and highly variable generation increases.

Stahlkopf sees advanced metering infrastructure (AMI) as key for Hawaiian Electric if is to take advantage of demand response and time-of-use opportunities. According to Stahlkopf, Hawaiian Electric already has a large conventional water heater and air conditioning program tied to its AMI system. Today Hawaiian Electric has AMI located at 7500 homes and businesses. Between 2009 and 2011, it will be installing intelligent two-way metering for all Oahu customers enabling it to monitor customer energy use in 15-minute increments.

ENVIRONMENTAL ISSUES TO THE FORE

Heavy on Stahlkopf's mind is the intermittent nature of renewables, which requires energy-storage solutions. Hawaiian Electric is presently evaluating salt-water-pumped storage as well as large battery-storage options. However, no clear winner has emerged. Hawaiian Electric also is looking at tapping into ocean swells as an energy source for the island of Maui.

"Because the majority of Hawaiian Electric's generation is oil-driven combustion turbines and diesel engines," states Stahlkopf, "our utility is looking to build biodiesel plants. With oil at US$140 a barrel, we want to decouple from the oil market by getting a tolling agreement where the price we pay for biodiesel is indexed to a vegetable oil index."

Asked his thoughts about electric vehicles, Stahlkopf states, "Plug-in hybrid vehicles have tremendous potential to handle the typical commute of under 40 miles." And with AMI in place, utilities will have the opportunity to sell off-peak electricity at attractive rates; in effect, putting them in the transportation business.

As Mohler and Stahlkopf are demonstrating, we can better tackle our industry's biggest issues with technical representation at the highest executive levels.

Rick Bush
Editorial Director

Editor's note: Karl Stahlkopf would like to share insights with fellow CTOs. He can be reached at kstahlkopf@heco.com.

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[1]December 2008 BPA Circulation Statement.
[2]Publisher's Own Data - April 2008

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