

Issue Preview  
October 2010

# TRANSMISSION & DISTRIBUTION WORLD

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## Issue Topics

### System Diagnostics

Like many other North American utilities, a majority of the Toronto Hydro distribution system infrastructure is approaching the end of its predicted service life, posing elevated risks to supply system reliability. To sustain and improve the power supply reliability in a financially responsible manner a Risk-Based Asset Management Strategy has been adopted for prioritizing asset replacement and refurbishment investments.

### ROW Planning

Multiple wind farms have been constructed in Wyoming, and more are proposed to take advantage of the state's exceptional wind resources. Multiple interstate transmission export lines have been proposed to export wind power to distant load centers. The Wyoming Collector and Transmission System (WCTS) study presents some options for the missing piece: a high-voltage collector network.

### Underground Facilities

To supply the increasing demand for power in the Changxin Island and Chongming Island area, the Shanghai Municipal Electric Power Company has installed two, 220 kV cables serving these two islands. The Chanjiang bridge and tunnel route was used to reduce the overall project cost.

### Customer Care

For several years First Electric Cooperative envisioned a day when they could extend front office solutions directly to the field. Those visions were very technical in nature and spanned many different departments and software platforms. Ultimately, First Electric saw a dramatic increase in the return on investment when combining automatic vehicle location and a mobile field solution.

### Protection & Control

Among the essential components required for the smart distribution grid is feeder automation or "true field automation". The line-post sensor is one of the foundational technologies of feeder automation being used at Alabama Power that opens the on-ramp to the smart distribution grid and, thus, facilitates the managing of a new era of advanced distribution automation.

### Equipment Installation

In response to the need to improve system reliability, Westpower, of New Zealand's South Island, reviewed their outage risks and identified that single transformer Zone Substations are an unnecessarily high risk. This led to the design and construction of a mobile substation to maintain an uninterrupted supply when planned and unplanned work has to be undertaken.



## Columns in Every Issue

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**GlobalVIEWPOINT**

### 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 largest transitions ever with billions-dollar bets being made on technology, requiring 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 coordinated 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 discusses the 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 Soffer, 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 fused circuit breakers and capacitor switches into the distribution system.

**RENEWABLE GENERATION**

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

On the Big Island of Hawaii, wind regimes are extremely robust with 7,000 mph gusts fairly often. Hawaiian Electric already has 30% wind generation, which "makes the grid behave sometimes like a bucking bronco," states Stahlkopf.

It recalled that the utility had installed a device called the electronic shock absorber (ESA) on the Big Island several years ago to mitigate wind-generated induced voltage swings and related the status. Stahlkopf told me one such device 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 to S&C. Stahlkopf says Hawaiian Electric intends to install more devices like the ESA as the renewable component of generation increases and the difficulties of handling intermittent and highly variable generation increase.

Stahlkopf was advanced metering infrastructure (AMI) as key for Hawaiian Electric. If it 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. Duke, Hawaiian Electric and AMI installed at 750 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 sub-sea 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 offshore combustion turbines and diesel engines," states Stahlkopf, "our utility is looking to build hydroelectric plants. With all of this in hand, we want to diversify from the oil market by getting a selling agreement where the price we pay for hydro is linked to a variable 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 electric 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 issue 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@hawaii.com.

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<sup>1</sup>December 2009 BPA Circulation Statement.  
<sup>2</sup>Publisher's Own Data - January 2010

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