Hawaiian Electric Company
Integrated automation helps improve grid reliability

Smart Grid

Project summary
To address reliability concerns in East Oahu, Hawaii, Hawaiian Electric Company (HECO) is automating its 46 kV sub-transmission system as a first step in creating a self-healing grid. The automation project serves as an alternative to construction of new infrastructure and supports environmental care and community values.

Smart Grid design approach addresses overload and reliability issues
In West Oahu, the island’s two main transmission corridors are linked together by transmission lines between power plants and substations. However, no similar connection exists in East Oahu.

HECO’s two-phase East Oahu Transmission Project (EOTP) was undertaken to address overload and reliability concerns in East Oahu. The first completed phase included installation of new transformers to shift the load from the north to the south corridor.

Initially, the second phase included a plan to install an additional transformer and new underground lines in heavily populated areas – an expensive and time-consuming prospect.

HECO opted instead to take a Smart Grid design approach and automate high-load distribution circuits to feed sections of East Oahu. The new approach will deploy new technology and automation on the radial sub-transmission and potentially the distribution system.

New technology keeps the entire system running smoothly
The project integrates distribution automation applications and hardware into intelligent hierarchical control systems. Substations and automated devices become intelligent agents supervised by the control center providing robust contingency situations, maintenance switching, fault isolation and restoration.

Cost-effective and efficient self-healing grid increases reliability
With this new approach, the East Oahu Switching Project (EOSP) will cost significantly less than traditional design methods, modernize the grid and improve reliability of electric service for more than half of HECO’s customers in Oahu. It will also greatly reduce outage durations, in many cases, from 2-4 hours, down to a few minutes. With improved decision speed, coordination and reliability, HECO will be able to provide a cost-effective and efficient self-healing grid.

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Project components
Siemens’ project scope includes establishing an intelligent 46 kV substation and sub-transmission infrastructure integrated with the existing control center system. The project components are:
- Sub-transmission automation: installing intelligent substation controllers, automated switches and reclosers to quickly isolate and restore power (this forms the basis of a self-healing grid)
- Advanced control center grid visualization, intelligent information analysis/filtering and tools for predictive analysis of operational issues
- Cost-effective standard/open communication for the 46 kV sub-transmission system feeding the 12 kV distribution system
- Development of a standard installation process.

An intelligent platform
The Siemens Smart-Substation™ controller will provide an intelligent substation information technology platform that enables real-time substation and feeder automation. The controller will also integrate a variety of intelligent devices from multiple vendors, providing improved data availability and increased flexibility. In addition, the project’s standard, modular and resilient components will increase interoperability and enhance cyber security.

Path to integration
Siemens’ Spectrum Power™ energy management system will be integrated with the sub-transmission automation to provide overall management and supervision for the eight substations in the project. Contingency switching plans will be developed in the control center and supplied to the Smart-Substation controller, along with associated event triggers.