SIEMENS

HAWAIIAN ELECTRIC

Enhances grid reliability

With Siemens Fusesaver® medium-voltage circuit breakers

HAWAIIAN ELECTRIC DISTRIBUTION RELIABILITY TEAM'S QUESTION

How can we make our grid **more reliable?**

Medium-voltage circuit breakers support Distribution Reliability team initiatives

Abstract
Electricity providers depend on interrupting devices to protect their overhead distribution systems. With the right equipment, utilities can improve power quality by reducing the number and duration of power outages. And, when outages do happen, limiting the number of affected customers is an important factor.

Over the last three years, Hawaiian Electric has deployed hundreds of Siemens Fusesaver® medium-voltage circuit breakers and Remote Control Units (RCUs) to support its power quality and reliability initiatives, particularly in the more remote and rural parts of its service area.

Siemens' Fusesaver is the world's fastest circuit breaker for overhead distribution networks, a distinction achieved by adding a layer of intelligence to clear transient faults at the fuse level. As a result, utility providers like Hawaiian Electric realize improved network reliability and reduced operating costs, while also bolstering the organization's wildfire mitigation efforts.

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Hawaiian Electric enhances reliability with Siemens' Fusesaver

Hawaiian Electric is committed to becoming one of the most progressive, forward-thinking energy companies in the world. Driven by a vision to empower its customers and communities with affordable, reliable, and clean energy, Hawaiian Electric has been making upgrades and improvements to infrastructures in ways that would increase resiliency of the grid throughout the islands.

Hawaiian Electric's Consulting Engineer Richard Shiroma explains that he has been working on the company's distribution substation reliability team for the last three years. "Our goal was to improve the reliability for our distribution circuits. We began looking for smart devices and were introduced to Siemens and Fusesaver," he says. The company's leadership decided to take on a pilot project and deployed several into operation to see how they would work under Hawai'i's challenging utility operating conditions.

Challenges

- Need to **build in greater resiliency** to electrical distribution network
- **Reduce or eliminate truck rolls** to restore power in remote areas of islands
- Commitment to **creating stable power supply** for customers – and **reducing outage time** when they do occur
- **Support and augment wildfire mitigation** strategies

Solution

Siemens' Fusesaver medium-voltage circuit breakers

Results

1. **Ease of installation and deployment** in remote rural locations
2. Built-in wireless communications enable **grid visibility as well as remote operation/monitoring** as needed
3. **Reduced impact of outages** keeps more customers online when outages do occur
4. **Faster restoration times and enhanced grid reliability**
5. Ultra-fast fault clearing **reduces electrical arc hazards**

Mitchell La Puente, a Protection Engineer for Hawaiian Electric, explains that they need to have more sectionalizing devices in these remote areas to establish the stable, reliable power supply that customers deserve. Still, outages do occur, and Hawaiian Electric is committed to limiting the scope of these outages while restoring power as quickly and efficiently as possible. "We can get trees and other things that fall onto the lines, and of course high winds. So instead of leaving the whole circuit vulnerable, we need to have more of these sectionalizing devices to create smaller sections of service and keep more of our customers online," La Puente notes.

Built-in wireless communications save truck rolls, labor costs, and time to restoration
For Shiroma, what initially set Fusesaver apart was the built-in peer-to-peer wireless communications allowing single- or three-phase tripping. Because each Fusesaver comes with an integrated short-range radio, engineers can easily connect to the devices for commissioning. But more importantly, remote control is enabled through the wirelessly connected RCU so there is no need to roll a truck to reset the device after it has operated. "For the pilot project and certain locations, it's important for us to have communication with these devices from the dispatch center so we have visibility into their status. We can also use the communications to remotely trip and close the devices, which saves travel time and labor when it's time to restore power," he explains.

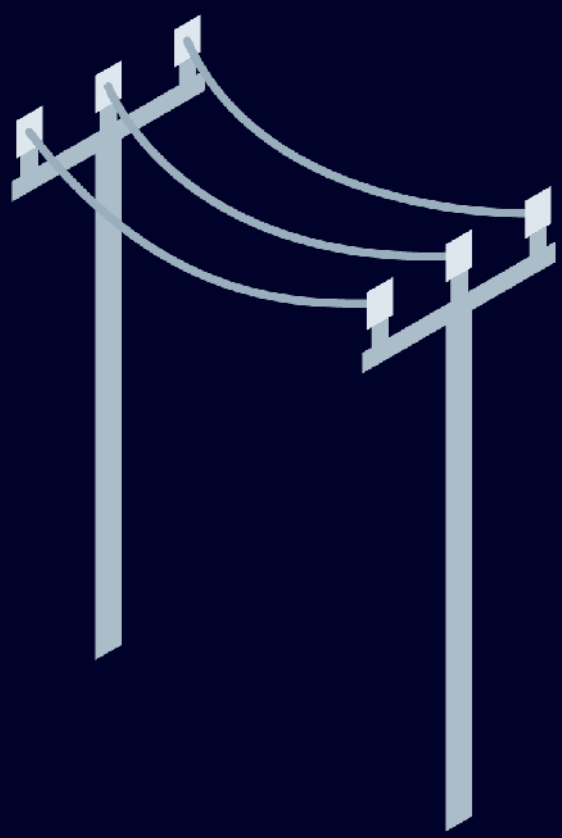
Today, La Puente says that Fusesaver has "definitely reduced the size of outages when they have needed to operate." Shiroma concurs: "We're seeing correct operations in terms of sectionalizing the circuit and minimizing the number of customers without power."

Following a successful Fusesaver pilot program, Protection Engineer Stacey Ueda explains that Hawaiian Electric chose to standardize on the Fusesaver because it would allow the organization to adopt a standard policy setting while also streamlining training requirements for the company's line crews. In addition, she says, "The Fusesaver is easy to deploy and decreases testing times. We can deploy them almost anywhere very quickly." This is due – in large part – to the device's mounting arrangement and small size. Fusesaver weighs only 12 pounds and can install directly on the conductor, crossarm, or the pole.

"We're seeing correct operations in terms of sectionalizing the circuit and minimizing the number of customers without power."

Richard Shiroma

Consulting Engineer, Hawaiian Electric



Rural, remote locations benefit from Fusesaver's self-powering off lightly loaded lines

The remote nature of many Hawaiian Electric service areas also means that their lines can be more lightly loaded, meaning that any devices installed must be low-powered devices. La Puente says that they had tried smart devices in the past, but: "We had issues with operating them the way we wanted because of their current requirements."

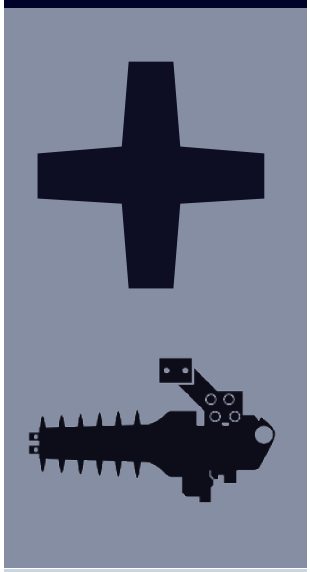
Fusesaver, however, helps to resolve this challenge because it can be self-powered off as little as half an amp, which makes it ideally suited to lightly loaded applications, such as rural locations and low-density residential loads. And now that Siemens has a rechargeable battery available for these circuit breakers, "It's a big plus," says Shiroma

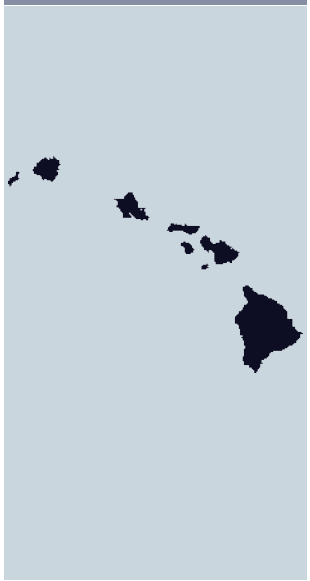
Protecting the islands with wildfire mitigation strategies
The speed with which Fusesaver can clear faults also impressed Shiroma, who mentions that feature as an important aspect of Hawaiian Electric's wildfire protection and mitigation strategies. Specifically, Shiroma says, "We're watching the industry to stay ahead of the curve on wildfires so that we have protection in areas that are vulnerable. We partner with the fire department to deploy recloser devices, including Fusesaver, that give us fast tripping capability as part of our mitigation solutions."

That is, because high-risk wildfire days are primarily determined by temperature, humidity, and prevailing wind conditions, utility providers like Hawaiian Electric work hard to eliminate any probability of faults on the electrical network that might ignite a fire. The ultra-fast fault clearing capability of Fusesaver ensures that an arc is cleared in less than one cycle, minimizing electrical arc hazards, which can otherwise spark fires. Likewise, La Puente points to the remote monitoring and access functionality as another important factor relative to wildfire mitigation.

Help when help was needed - Siemens assisted Hawaiian Electric apply Fusesaver to achieve reliability, resiliency goals
According to Shiroma, "the Siemens team has been helpful to explain things and help us understand the device operation so we can apply it correctly." Ueda concurs, noting that the teams have been responsive to all of Hawaiian Electric's questions: "We had an event we needed them to review, which they did, even going further to conduct a bench test for us to confirm the current operations."

Shiroma concludes that the reliability team has partnered with Siemens to help make Fusesaver work well for Hawaiian Electric's infrastructure needs: "Ultimately, it's a better product we've worked with."





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