

### Improving Reliability and Network OPEX

Automation – Pacific Island Case Study

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### Pacific Islands'...

- Energy Distribution balancing act
- Expenditure focused on:
  - 1. Renewable Energy Generation;
  - 2. G&T Network Stability;
- However, power distribution is faced with:
  - 1. High Vegetation Growth;
  - 2. Primarily **Overhead** networks;
  - 3. Harsh Weather Events yearly;





Customers don't like the lights to blink

### **Protection issues** Fuse-blowing strategy

# FUSE-BLOWING STRATEGY



### Automation Simple, yet effective





Easier is Better

### S&C TripSaver II





### S&C TripSaver II







### S&C TripSaver II

- Cutout-mounted Recloser
- 1. Self-powered
- 2. Electronically Controlled Vacuum Interrupter
- 3. Mounted in a standard S&C Cutout
- 4. No batteries required
- 5. No replaceable parts
- 6. No maintenance





## **TripSaver II Case** PUC's Grid Enhancement Program

### Start of the journey

PPA conference

- Engagement at PPA 2019
- PUC (Pohnpei) looking to *"improve feeder outage* management and service reliability caused by transient faults due to heavy vegetation and other line fault events"
- This is in parallel to large new Power Plant project
- S&C local training session in Pohnpei



### Pohnpei – Com2

- First installation
- Western Feeder (mid-span)



### Pohnpei – Com2

First installation

Faults	Phase A	Phase B	Phase C
Temporary	20	14	6
Permanent	0	1	0

- 40 Outages Avoided in a year, PUC decided to continue with the rollout
  Highest fault level on any phase 626 /
- Highest fault level on any phase = 626 A



### Pohnpei - Dausokele

2<sup>nd</sup> Installation

- Second installation now on Eastern Feeder
- Long main trunk with multiple spur/lateral lines with heavy vegetation
- Specifically placed immediately after most commercial loads, so that transient faults downstream of the Dausokele Bridge are isolated and do not impact the significant commercial loads



### **Pohnpei - Dausokele**

2<sup>nd</sup> Installation

Faults	Phase A	Phase B	Phase C
Temporary	18	29	22
Permanent	5	0	0

- 69 Outages Avoided to date
- Highest fault level on any phase = 1222 A



### **Pohnpei – Sokehs Island**

3<sup>rd</sup> Installation

- Northern part of the main island, connected via bridge
- Mountain ranges, susceptible to soil erosion
- Very heavy vegetation
- Also supplied by the Western Feeder





#### Conclusion

- Easier Installation
- Ratings that suit your network
- Less prolonged outages and repair trips
- Reduced OPEX cost





Sec ELECTRIC COMPANY Excellence Through Innovation Island Nation Enhances System Reliability With Cutout-Mounted Reclosers S&C Featured Solution: TripSaver® II Cutout-Mounted Recloser Location: Pohnpel State, Federated States of Micronesia lines weave over mountains, low coastal zones, and lines weave over mountains, low coastal zones, an onto a smaller adjacent island, pohnpei also gets onto a smaller adjacent Island, Ponnpel also gets up to 300 inches of rain annually, making it one of up to 300 inches of rain annually, making it one of the wettest parts of the globe and causing a fast the wettest parts of the globe and causing a fast vegetation growth cycle that only exacerbated the vegetation growth cycle that only exacerbated the number of temporary faults. Each required a truck to Pohnpei Utilities Corporation (PUC) provides electricity number of temporary faults. Each required a truck to travel to the fault location to make repairs because Customer Challenge Yompel utilities Corporation (PUC) provides electric. to roughly 40,000 inhabitants on Pohnpel Island, a Benific intend test in most of the Frederic distance of the to roughly au, uuu innabitants on Yonnpel Island, a Pacific Island that is part of the Federated States of Microsoftic Island that is part of the Federated States of The utility had a set amount in its budget to address Micronesia. Operating approximately 1,000 miles uaver w use rame warden w in fuses would blow every time. Micronesia, uperaung approximately 1,000 miles from the closest land mass, Guam, the state-owned The utility had a set amount in its budget to ado its distribution system reliability problem, so it its distribution system reliability problem, 50 it needed to make sure a solution would be economical from the closest land mass, suam, the state-owner utility maintains an independent grid and is solely needed to make sure a solution would be economi and long-lasting. It determined it had two options: utility maintains an independent and an is solely responsible for power generation and distribution. responsible for power generation and distribution. However, the isolated location makes providing reliable and long-lasung, it determined it nad uvo opnol use available funding for extensive vegetation use available funding for extensive vegetation management, which would be a recurring expense, or management, which would be a recurring expense, or explore smart devices that could provide a long-term However, the isolated location makes prov and resilient electrical power challenging. explore smart devices that could provide a long-term reliability solution. The solution had to be adaptable PUC had relied solely on diesel oil for power PUC had relied solely on diesel oil for power generation but acquiring the fossil fuel was expensive tenability solution, the solution had to be adaptable to the present grid and require minimal maintenance. generation but acquiring the tossil tuel was expensive because of the island's remotences. The utility wanted to the present grid and require minimal maintenance. PUC chose to explore lateral reclosers able to operate because of the Island's remoteness. The unitry wants to reduce its carbon emissions by curbing diesel oil PUC chose to explore lateral reclosers able to operation on 13.8-W overhead three-phase feeders along with to reduce its carbon emissions by curbing diesel oil consumption and use more renewable resources, such consumption and use more renewable resources, suc as solar and wind. It began that transition through a as solar and wind, it began that transition through a \$15.5 million grant from the World Bank in partnership single-phase lateral lines. "As an island, our isolation presents with the Asian Development Bank. When PUC stabilized generation production by when MUC stabilized generation production by upgrading its diesel generators, the utility expected to unique reliability and resiliency upgrading its diesel generators, the utility expected to see improved reliability. However, frequent temporary challenges. Installing S&C's TripSaver II see improved reliability. However, trequent temporary faults along its distribution system were causing lengthy tauts along its distribution system were causing length power outages, negating the generation improvements Cutout-Mounted Reclosers solved our issues with temporary faults, allowing power ourages, negating the generation in and forcing PUC to reevaluate its strategy. us to keep the power on for our entire Crews were frequently traveling to fault locations to Crews were trequently traveling to fault locations to make repairs regardless of whether the underlying make repairs regardless of whether the underlying cause was permanent. The utility realized it needed to cause was permanent. The unitry realized it needed to secure the backbone of its electrical grid and upgrade -Nixon T. Anson secure the backbone of its electrical grid and upgrade its aging distribution infrastructure, but environmental chief Executive Officer, Its aging distribution intrastructure, but environmental conditions also were making reliability and resilience nation." Pohnpei Utilities Corporation PUC's distribution grid was designed and installed PUC's distribution and was designed and instaned in the 1960s with limited segmentation, meaning a improvements difficult. In the 1960s with limited segmentation, meaning a single fault would affect a large portion of each feeder. single fault would affect a large portion of each teeder. The independent grid uses three main feeders—West, The independent and uses three main teeders—west, East, and Kolonia 2—to distribute power to the entire East, and Kojonia 2—to distribute power to the entire island. As part of that system, long feeder and lateral The TripSaver II recloser helped PUC solve frequent nuisance outages.

