

# Underground Remote Fault Indicator

## EPIC Fall Symposium

Bryan Pham – Sr. Engineering Manager

October 18, 2017

# Overview

- Project Description
- Project Benefits
- Project Status
- Procurement Summary
- Lessons Learned

# Project Description – UG RFI

- Demonstrate field installations of Underground Remote Fault Indicators to meet the following SCE operating requirements:
  - Submersible;
  - Integrated radio;
  - No Shunt for CT, Fiber Optics output;
  - Power harvesting (15 amps min);
  - Bi-Directional current flow;
  - Lightweight/Small form factor;
  - Real Time current monitoring;
  - 12 CT sensors or 4 position switch; and
  - No planned outage.

# Project Benefits

- Key component for Grid Modernization
- Improve Reliability - Reduce SAIDI index (System Average Interruption Duration Index)
  - Reduce Troubleman Response Time
  - Integrated with utility tools – Distribution Management System & Outage Management System
  - Support Fault Detection Isolation Restoration (FDIR) program
- Support DER (Distributed Energy Resource) Integration by providing real time circuit telemetry to improve Grid Situation Awareness
  - Provide engineering data to perform circuit analysis
  - Provide system operators fault location
  - Provide system operations with power flow & direction

# Project Status Q3 2016 – Q4 2018

- Request for Proposals released to 11 Vendors
- Three vendors selected for demonstration:  
Power Delivery Product, Sentient Energy, & 3M
  - Power Delivery Product UG RFI
    - Complete field installations by December 2017
    - Complete field trial evaluation by Q3 2018
    - Complete standards by Q4 2018
  - 3M & Sentient Energy
    - Complete SCE lab evaluation by Q1 2018
    - Complete field demo evaluation by Q4 2018

# Power Delivery Products UG RFI

## Features:

- Integrated radio
- No Shunt for CT, Fiber Optics output
- Power harvesting (15 amps min)
- Bi-Directional current flow
- Lightweight/Small form factor
- Submersible\* - currently being tested
- Real Time current monitoring
- 12 CT sensors or 4 positions switch
- No Planned outage



# Procurement Summary

- Sentient Energy, one of the selected suppliers, is a California based company

Successfully demonstrated Sentient Energy Overhead Remote Fault Indicator in EPIC1. It is currently SCE standard for OH RFI.

- Power Harvesting
- No battery
- Integrated Landis+Gry Radio & GPS
- Bi-Directional power flow\*
- No Planned outage
- Real Time current monitoring
- 10-15 Year Life – Zero maintenance
- LED indication
- Plug & Play



# Summary - Lesson Learned

- Competition resulted in creativity & best efforts from vendors.
- Accurate technical specifications are crucial for prospective product vendors.
- Teamwork & collaboration are the keys to success. Vendors rely on SCE engineers to test product functionality and to integrate with SCE systems; e.g. Distribution Management System and Outage Management System.
- Accuracy degrades at higher currents.
- Integrated GPS expedited the deployment process.
- Over-The-Air firmware upgrade capability is required for future upgrade.



# Q&A

# EPIC Investment Framework for Utilities

	Safety	Affordability	Reliability	Key Drivers & Policies
<b>Cross Cutting/Foundational Strategies &amp; Technologies</b> Smart Grid Architecture, CyberSecurity, Telecommunications, Standards	<b>Renewables and Distributed Energy Resources Integration</b> <ul style="list-style-type: none"> <li>• Demonstrate Strategies &amp; Technologies to Increase Renewable Resources on the Grid</li> <li>• Adaptive Protection Strategies</li> <li>• Demonstrate Grid-Scale Storage Strategies &amp; Technologies</li> </ul>			<ul style="list-style-type: none"> <li>• 33% RPS</li> <li>• CSI</li> <li>• Gov's 12,000 MW DG Plan</li> <li>• OTC retirements</li> <li>• AB32</li> <li>• Storage Mandate</li> </ul>
	<b>Grid Modernization and Optimization</b> <ul style="list-style-type: none"> <li>• Demonstrate Strategies and Technologies to Optimize Existing Assets</li> <li>• Prepare for Emerging Technologies</li> <li>• Design and Demonstrate Grid Operations of the Future</li> </ul>			<ul style="list-style-type: none"> <li>• SB17</li> <li>• Aging Infrastructure</li> <li>• Workforce Development</li> <li>• CA Economic Resiliency</li> </ul>
	<b>Customer Focused Products and Services Enablement</b> <ul style="list-style-type: none"> <li>• Leverage the SmartMeter Platform to Drive Customer Service Excellence</li> <li>• Provide Greater Billing Flexibility &amp; Visibility</li> <li>• Integrate Demand Side Management for Grid Optimization</li> </ul>			<ul style="list-style-type: none"> <li>• ZNE</li> <li>• CSI</li> <li>• Net Energy Metering</li> <li>• Peak Reduction</li> <li>• Electric Transportation</li> </ul>