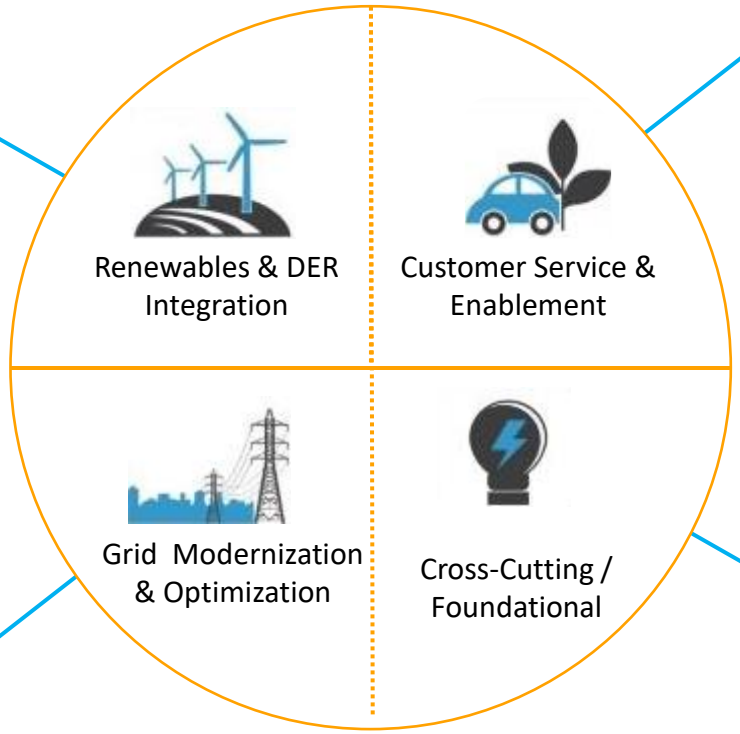
Pacific Gas & Electric
EPIC 3 Portfolio Overview

November 17, 2021

PG&E's EPIC 3 Portfolio

- 3.03 – Advanced DERMS & ADMS
- 3.11 – Location Targeted DERs
- 3.11B – BTM DERs in Microgrids
- **3.44 - Advanced Transformer Protection**



- 3.27 – Multi-Purpose Meter
- 3.32 – System Harmonics for Power Quality Investigations

- 3.13 – Transformer Monitoring Sensors
- 3.15 – Proactive Wire Down Mitigation
- 3.20 – Data Analytics for Predictive Maint.
- 3.43 – Momentary Outage Analytics

- 3.41 – Drone Enablement
- **3.45 - Automated Fire Detection from Wildfire Alert Cameras**
- **3.46 - Advanced Electric Inspection Tools – Wood Poles**
- **3.47 -Operational Vegetation Management Efficiency Through Novel Onsite Equipment**

Legend
In-Flight
To Be Launched

3.03 – Advanced DERMS & ADMS

1 Objective

Develop a DERMS head-end system and associated interfaces for DER telemetry & control and demonstrate this system for single customer and pilot with multiple BTM DERs.

2 Status

- Design and Installation of IEEE 2030.5 DER Head-end server and installation of gateway device at demo site completed
- Third-party site gateway vendors initiated interoperability testing
- Working with aggregators to apply learnings to more complex systems.
- Project will provide low-cost telemetry solution for new/existing DERs; completion 2Q 2022

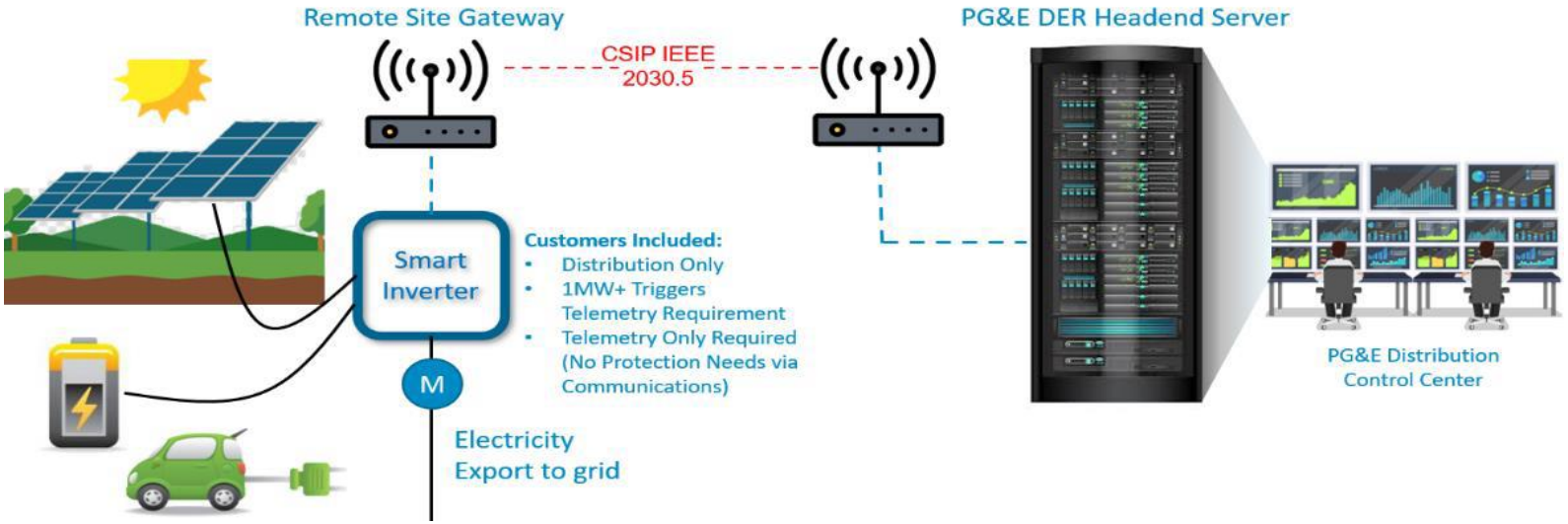
3 Policy Support and Customer Benefit

Policy Support

- Provide visibility for Operations before/during PSPS
- Delivery of low-cost telemetry solutions for BTM assets per R.17-07-0077

Customer Benefits

Increase Safety	Improve Reliability	Reduce Costs
✓	✓	✓



3.11 – Location Targeted DERs

1 Objective

Configure the Arcata-Eureka airport's local microgrid controller to integrate the microgrid into PG&E's distribution network and enable Distribution Control Center visibility and control of the microgrid. Develop scalable and replicable approaches to planning, designing, deploying and operating multi-customer microgrids.

2 Status

- Lab testing of microgrid controllers complete
- RCAM microgrid largely complete and start-up targeted for December 2021
- Project completion ~3Q 2022
- Results will provide immediate blueprint for future multi-customer microgrids

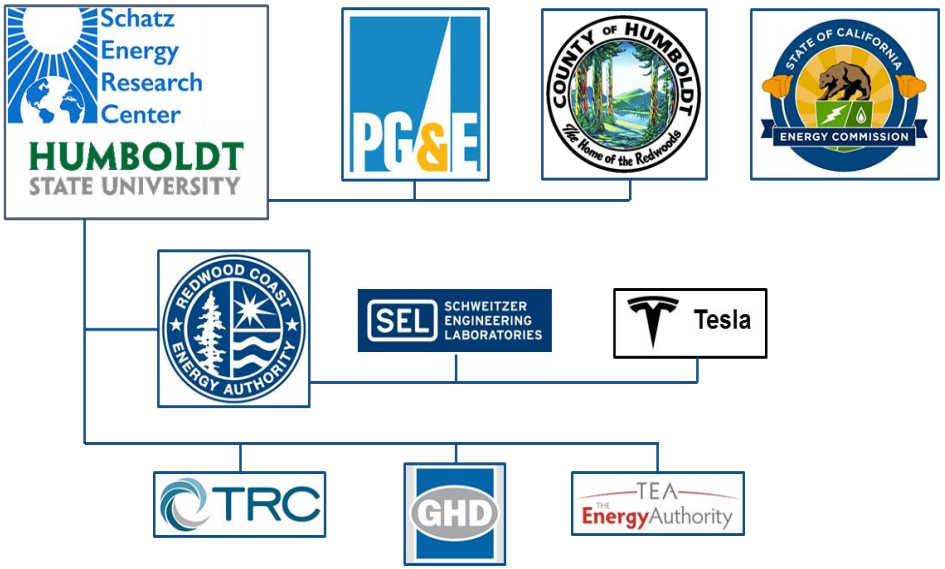
2 Policy Support and Customer Benefit

Policy Support

- Part of PG&E's WMP, helps mitigate PSPS
- Supports PG&E's participation in Microgrid Proceeding (R-19-09-009) and tariff construction
- Directly informed design of PG&E's Community Microgrid Enablement Program

Customer Benefits

Increase Safety	Improve Reliability	Reduce Costs
✓	✓	✓



3.11B – BTM DERs in Microgrids

1 Objective

Demonstrate technical capabilities and operational processes to utilize BTM DERs for resiliency in microgrids for 1) cleaner PSPS and 2) high penetrations of BTM DERs in multi-customer microgrids.

2 Status

- Initial work and data collection at microgrid site paused due to lack of PSPS.
- Determining root cause of BTM curtailments.
- Project completion ~4Q 2022

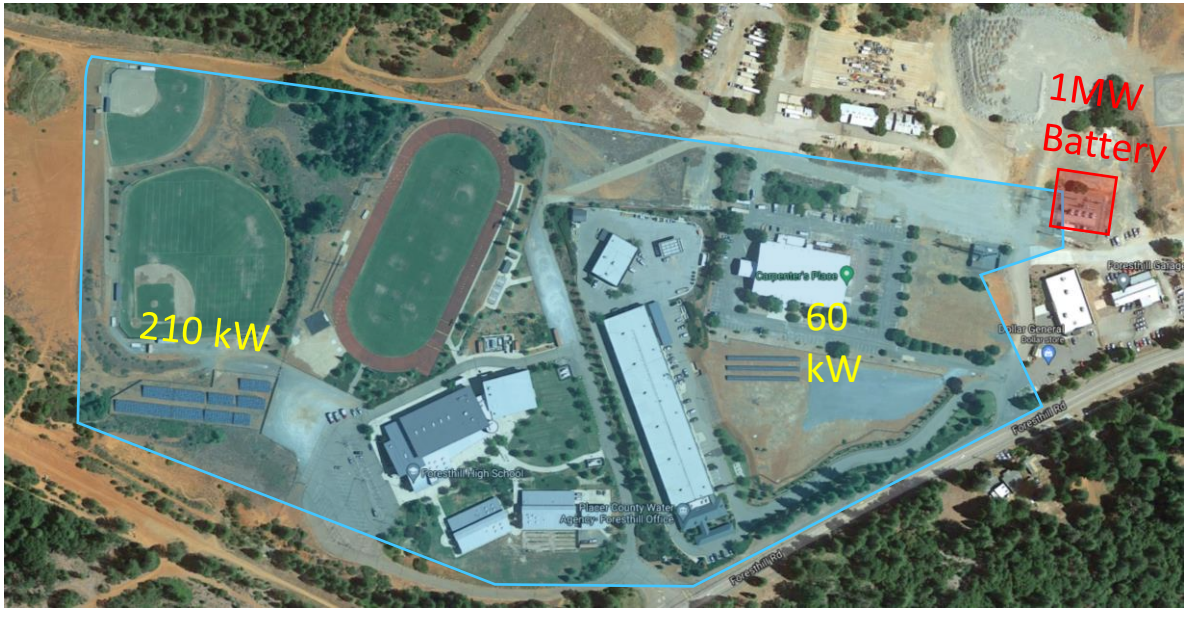
3 Policy Support and Customer Benefit

Policy Support

- Part of PG&E's WMP, supports the minimization of diesel use by enabling customers with renewable behind the meter DERs to island
- Increased resiliency on support of Senate Bill 1339 and the CPUC Microgrid Order Instituting Rulemaking

Customer Benefits

Increase Safety	Improve Reliability	Reduce Costs
✓	✓	✓



3.13 – Transformer Monitoring Sensors

1 Objective

Demonstrate using overhead transformer temperature sensor data to identify transformer issues and risk of failures. In particular, the project aims to identify incipient failures and offer insight into life consumption.

2 Status

- Sensor technology has been identified and 40 have been procured
- Installation of sensors will begin 12 2021 and data collection will be initiated
- If early work is successful, an additional 300+ sensors will be procured and installed.
- The project will conclude ~3Q 2022

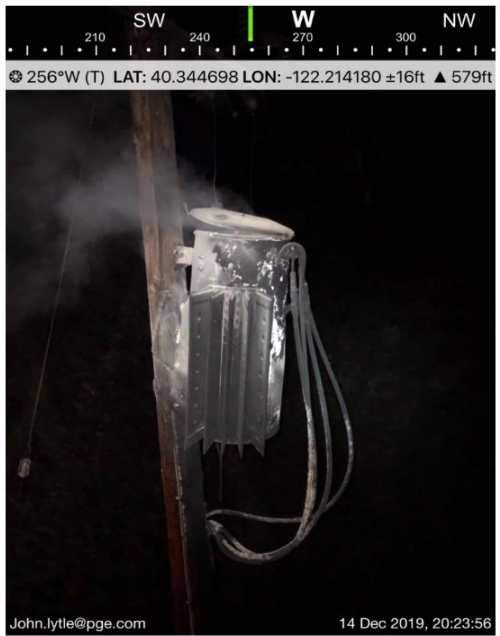
2 Policy Support and Customer Benefit

Policy Support

- Supports PG&Es WMP and wildfire risk reduction

Customer Benefits

Increase Safety	Improve Reliability	Reduce Costs
✓	✓	✓



3.15 – Proactive Wire Down Mitigation

1 Objective

Demonstrate Rapid Earth Fault Current Limiter (REFCL) technology at a PG&E substation serving a high fire-risk area, to assess its effectiveness at automatic current reduction in wires down events, with the goal of drastically reducing the likelihood of wires down events causing wildfires.

2 Status

- REFCL installation and commissioning completed
- Initial test successful
- Equipment failure necessitated redesign
- Redesign to be implemented by EOY, testing in 1Q 2022, project complete by ~2Q 2022
- Prioritizing future installations, in combination with undergrounding and hardening solutions.

3 Policy Support and Customer Benefit

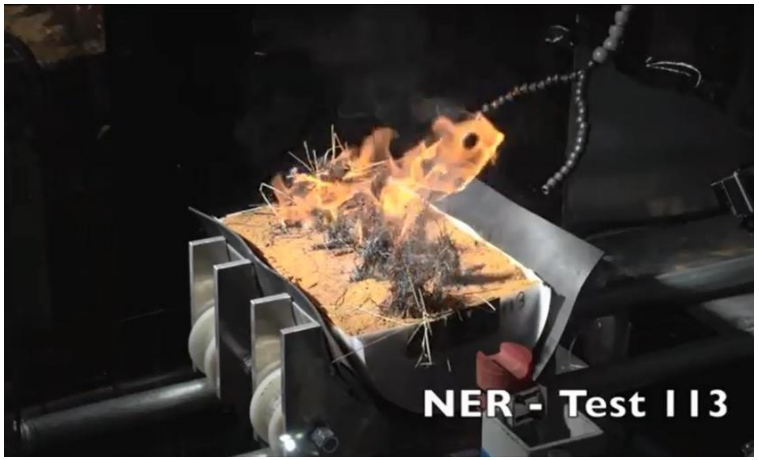
Policy Support

- Part of PG&E's WMP and supports wildfire risk reduction
- Supporting Decision (D.) 17-12-024, which adopts new regulation to enhance the fire safety of overhead electric power lines and communication lines located in high fire-threat areas.

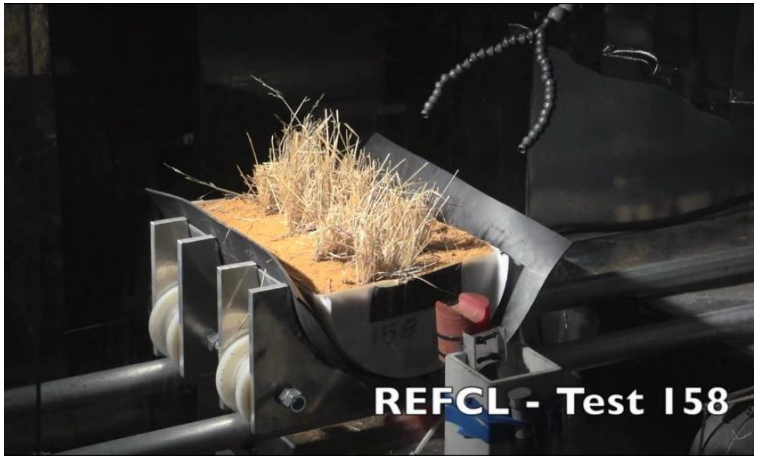
Customer Benefits

Increase Safety	Improve Reliability	Reduce Costs
✓	✓	

Normal Ground Fault



With REFCL Technology



3.20 – Data Analytics for Predictive Maintenance

1 Objective

Leverage existing PG&E data sources, such as GIS, weather, SmartMeter™, SCADA and other data to develop and demonstrate analytical models that predict when maintenance will be needed for distribution assets. Main driver is to move from "run to failure" to predictive maintenance.

2 Status

- Three primary targets for in-depth analytics: fuses, transformers, and vegetation contact.
- Predicting incipient transformer failure has been highly successful.
- Transformer failure prediction has transitioned to operations.
- Vegetation contact work stream in progress, showing promise.
- Project complete ~1Q 2022

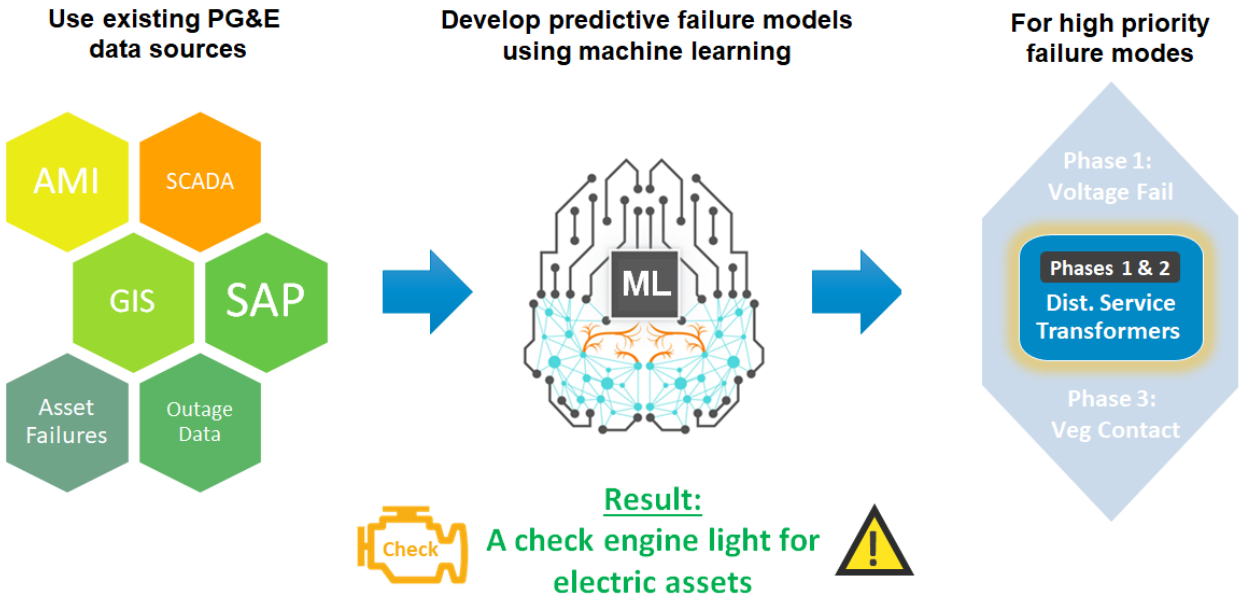
3 Policy Support and Customer Benefit

Policy Support

- Part of PG&E's WMP and supports wildfire risk reduction

Customer Benefits

Increase Safety	Improve Reliability	Reduce Costs
✓	✓	✓



3.43 – Momentary Outage Analytics

1 Objective

Develop analytical models that use new data sources such as AMI momentary events and trap alarms to identify issues with customer service drops, distribution equipment, and intermittent vegetation contact.

2 Status

- Three new data sources have been identified: a behind the meter sensor, a more granular data capture system, and a next generation meter
- Meter procurement and installation has been initiated
- Predictive analytics with more granular data is showing promise
- BTM sensor very good at detecting loose neutrals
- Project completion ~2Q 2022

3 Policy Support and Customer Benefit

Policy Support

- Part of PG&E's WMP and supports wildfire risk reduction

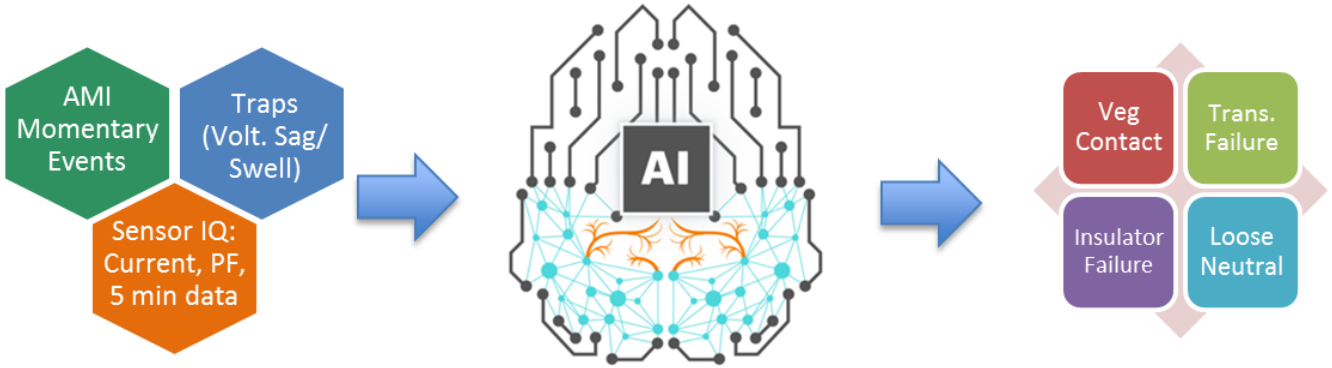
Customer Benefits

Increase Safety	Improve Reliability	Reduce Costs
✓	✓	✓

Use NEW PG&E data sources

Develop predictive failure models using machine learning

Identify conditions indicative of impending asset failure



3.27 – Multi-Purpose Meter

1 Objective

Develop a compact integration of PG&E's Next Generation Meter with L2 EVSEs (internal and external versions) and enable EV charging and submetered billing at specific low rates.

Modular Next Generation Meter Core

External version with Next Generation Meter Core Being Installed

2 Status

Design and lab testing is complete. Prototypes are being manufactured now. Field demonstrations at targeted PG&E commercial and residential sites start in Q1 2022.

3 Policy Support and Customer Benefit

Policy Support

- Supports the state's goal to drive EV adoption by demonstrating an implementation in support of the state's proposed EV submetering protocol (Proceeding R.18-12-006)

Customer Benefits

Increase Safety	Improve Reliability	Reduce Costs
	✓	✓

3.32 – System Harmonics for Power Quality Investigations

1 Objective

Demonstrate the use of modern SmartMeters™ to detect, investigate and mitigate harmonic issues on the distribution system.

Harmonics issues on the grid negatively impact customer equipment operation and can also damage utility assets. Higher incidence of harmonics issues is anticipated with increased DER penetration.

2 Status

- SmartMeters™ installed on representative circuits
- Data connectivity established
- Data pipeline approaching completion
- Data Analysis to follow
- Project completion ~2Q 2022

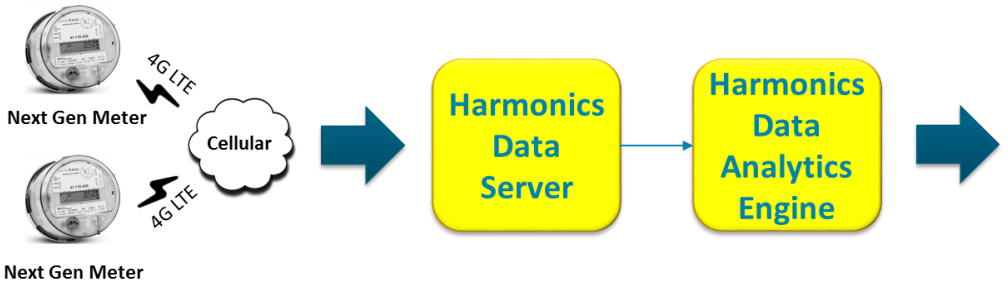
3 Policy Support and Customer Benefit

Policy Support

- This project is part of PG&E's WMP and supports wildfire risk reduction

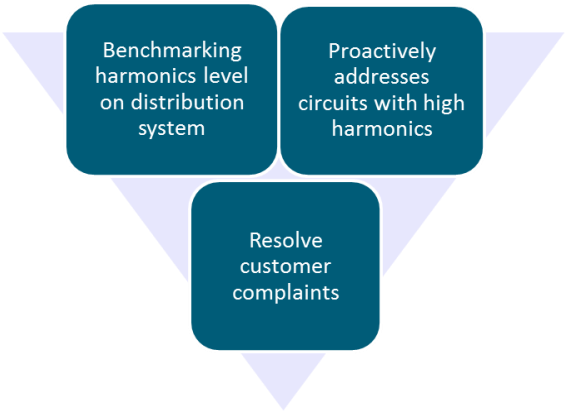
Customer Benefits

Increase Safety	Improve Reliability	Reduce Costs
✓	✓	



Next gen meters continuously monitor and transmit harmonics data

Harmonics data stored within PG&E server. Automated algorithms detect high harmonics level exceeding acceptable limits and flag meter locations for engineering review and analysis.



Harmonics data are used for investigating and resolving harmonics issues and tracking system harmonics

3.41 – Drone Enablement

1 Objective

Demonstrate automated and Beyond Visual Line of Sight (BVLOS) drone operations, to improve routine asset inspections and the ad hoc investigation of potential issues in the distribution system

2 Status

- Developed preliminary Concept of Operations (CONOPS) and socialized it with the FAA
- Translated CONOPS into functional requirements & conducted RFP
- Negotiating contracts with drone vendors
- Expect demonstration start in 1Q 2022, and project completion ~4Q 2022

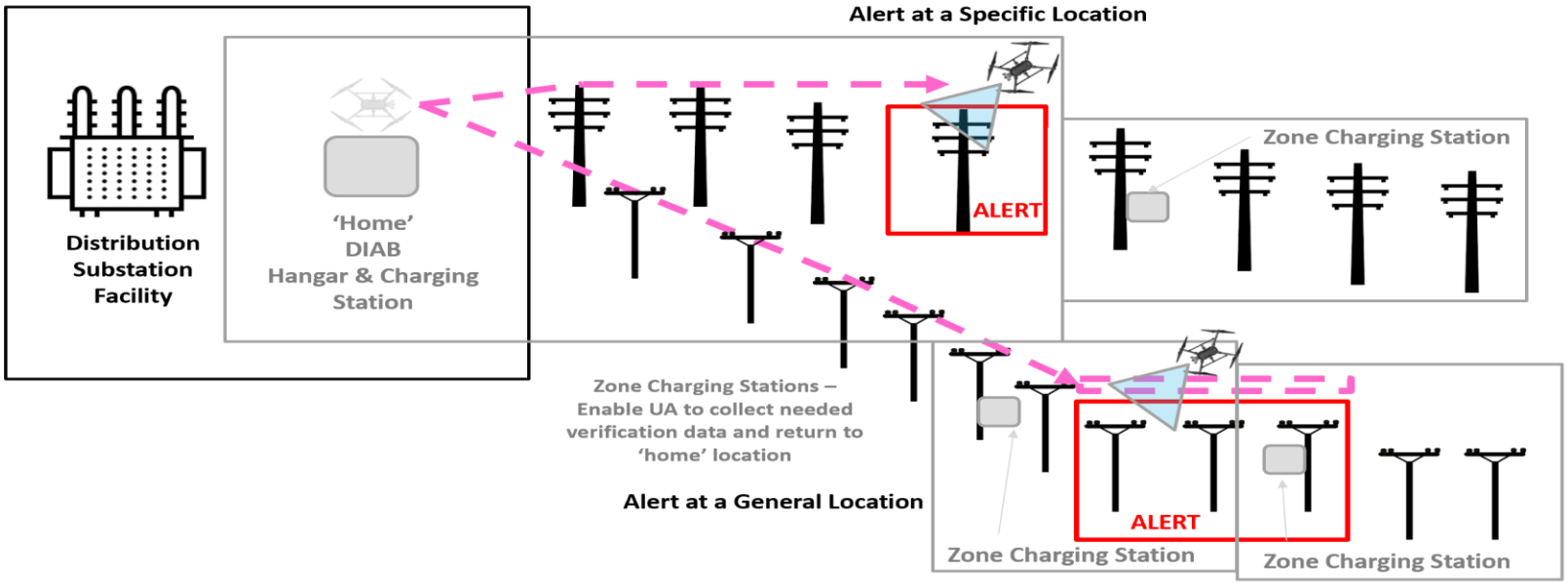
3 Policy Support and Customer Benefit

Policy Support

- Part of PG&E's WMP and supports wildfire risk reduction.

Customer Benefits

Increase Safety	Improve Reliability	Reduce Costs
✓		✓



EPIC 3 Wave 2

Project	Name	Description
3.44	Advanced Transformer Protection	This project will demonstrate and evaluate the use of negative sequence transformer differential protection to provide high sensitivity fault detection and prevent winding failures for substation transformers.
3.45	Automated Fire Detection from Wildfire Alert Cameras	The purpose is to demonstrate an automated fire detection model using machine learning, computer vision, or artificial intelligence techniques that can more accurately detect fires based on visual and infrared camera data streams than can current methodologies.
3.46	Advanced Electric Inspection Tools- Wood Poles	This project will demonstrate radiography testing (RT), a nondestructive testing method, can be utilized to further analyze the health and condition of wood poles along with identifying any deterioration and degradation that may lead to failure prior to the next scheduled inspection.
3.47	Operational Vegetation Management Through Novel Onsite Equipment	This project will demonstrate technologies capable of creating significant improvements to wood management value chain, (i.e. material improvements economic, environmental, and/or safety-related) Objectives are to complete one or more technology demonstrations such as torrefaction, wood bailing and others which could lower VM costs when deployed at scale.

Contract Opportunity Announcements will be published here

Link can also be accessed from www.pge.com/epic