

# EPIC Public Outreach Workshop

October 20, 2021

# Agenda

## 1 Safety Moment & Workshop Introduction

**Russ Ragsdale**, Director of Asset and Engineering Strategy

## 2 Wildfire Prevention & Resilience Technologies

**Kevin Sharp**, Senior Manager, T&D Innovation & **Michael Balestrieri**, Engineer

## 3 Beyond Lithium-ion Energy Storage Demonstration

**Josh Mauzey**, Senior Manager, Grid Edge Innovation & **Gabriel Andaya**, Engineer

## 4 Q&A and Closing

**Alex Mokover**, Senior Advisor, Asset Strategy Integration

# Presenters



**Russ Ragsdale**

Director, Asset and  
Engineering Strategy



**Kevin Sharp**

Senior Manager, T&D  
Innovation



**Michael Balestrieri**

Project Engineering  
Lead



**Josh Mauzey**

Senior Manager, Grid Edge  
Innovation



**Gabriel Andaya**

Project Engineering  
Lead



**Alex Mokover**

Senior Advisor, Asset  
Strategy Integration



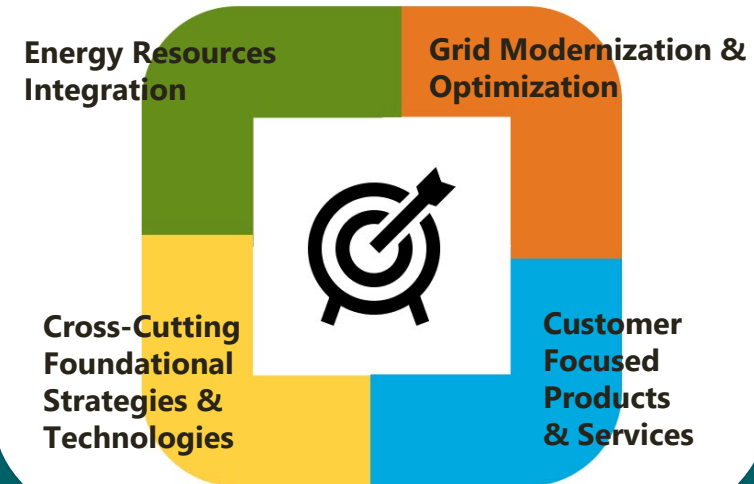
# Safety Moment

# Our project portfolio is screened to ensure alignment with EPIC's guiding principles and investment planning framework

## CORE EPIC VALUES

- Providing benefits to ratepayer of the electric investor-owned utilities
- Advancing energy innovation
- Supporting California's energy policy goals

## JOINT IOU FRAMEWORK CATEGORIES



# SCE's strategic priorities are also aligned with the joint IOU framework categories and EPIC core values

We're focused on accelerating clean power and electrification, strengthening and modernizing the grid, achieving operational and service excellence and proactively mitigating climate change-related risks, including wildfires.

## Our View

### **PATHWAY 2045**

Achieves 100% carbon neutrality

### **WILDFIRE MITIGATION PLAN**

Actionable, measurable and adaptive plan to reduce wildfire risk

### **TECHNOLOGY ROADMAP**

Articulates SCE's technology development needs and priorities

### **REIMAGINING THE GRID**

Enables Pathway 2045 vision and evolve SCE's grid

# Our demonstration projects are designed to further the industry knowledge-base for the benefit of all stakeholders

As the need to strengthen the resiliency of the electric grid became a more urgent priority, the CPUC approved two new projects in the Feb. 2020 Research Administration Plan (RAP) Application.



## Wildfire Prevention & Resiliency Technologies Demonstration

- Waveform Analytics
- Machine Learning at the Edge



## Beyond Lithium-ion Energy Storage Demonstration



# Wildfire Prevention & Resilience Technologies (WP&RT)



# The WP&RT project demonstrates the latest advancements in hardware and software-based solutions in wildfire prevention, detection and mitigation

WP&RT utilizes **Machine Learning** (ML) in two different applications:



In a centralized application, waveform analytics aims to integrate grid data streams into ML algorithms that could **detect potential failures before they happen**



In a decentralized application, ML on edge devices could provide **faster decision making** for wildfire mitigation applications

# WP&RT intends to expand upon SCE's existing wildfire mitigation efforts

## Alignment with SCE's Wildfire Mitigation Plan

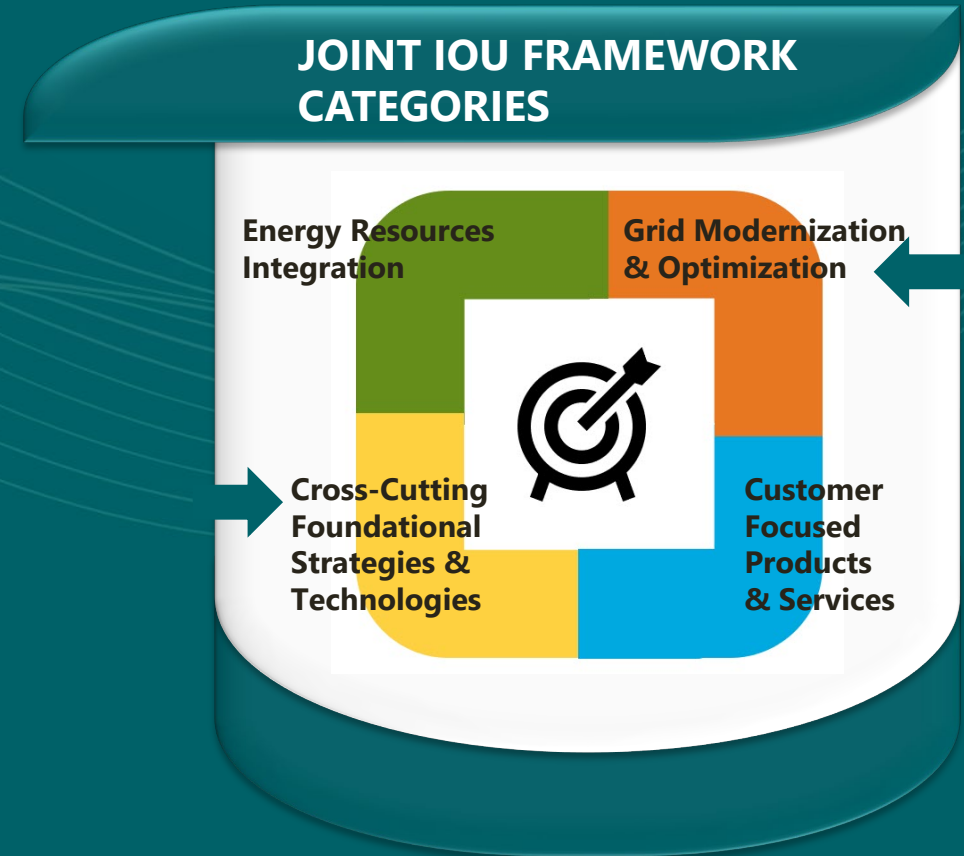
- Situational Awareness and Forecasting
- Asset Management and Inspections

## Alignment with SCE's Reimagining the Grid

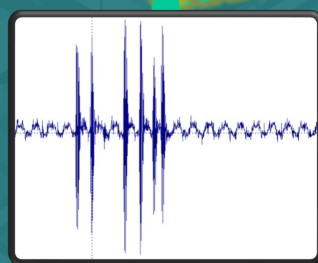
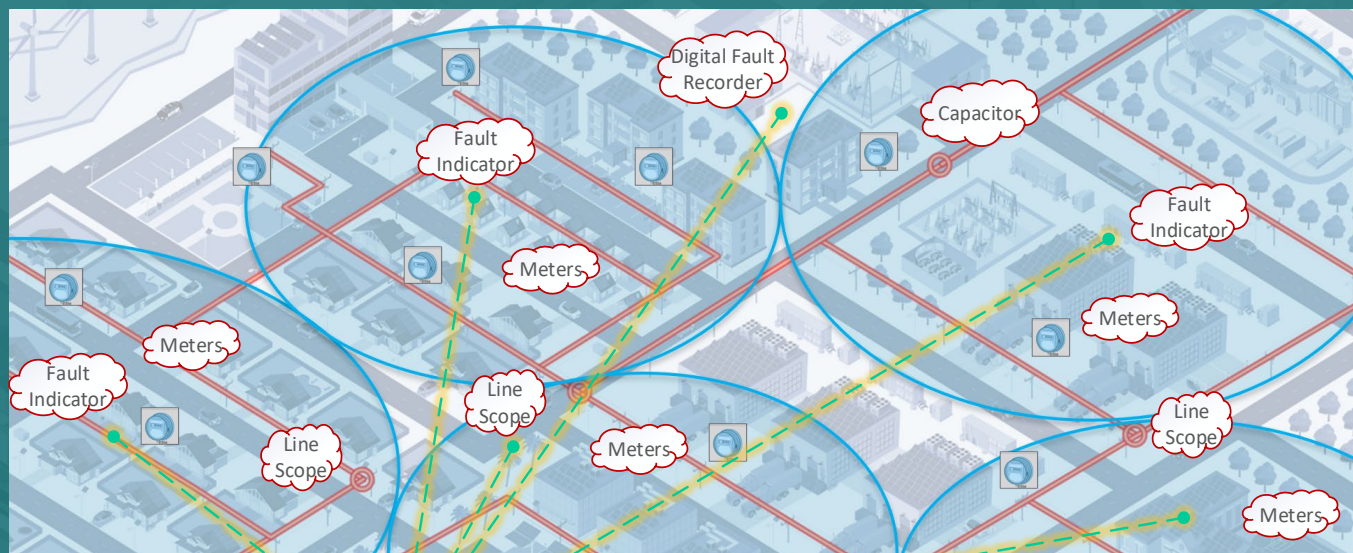
- Foundational (Grid-Wide)
- Grid Control and Data Analytical Systems
- Sensors and Edge Computing

## Alignment with SCE's Technology Roadmap

- **Technology Challenge:** Addressing Wildfire Risk
- **Technology Objective and Capability:** Advanced data analytics solutions (e.g., automated image processing, machine learning, artificial intelligence, etc.) and decision-support tools in service of wildfire modeling, prevention, asset management, and response activities



# Waveform analysis is a useful tool for troubleshooting incipient events within an electrical system



Grid Telemetry Data



Predictive Analytics

## Distribution Waveform Analytics Diagram

**Concept:** Integrate disparate grid data sources from existing equipment into a single analytics platform capable of running advanced predictive models

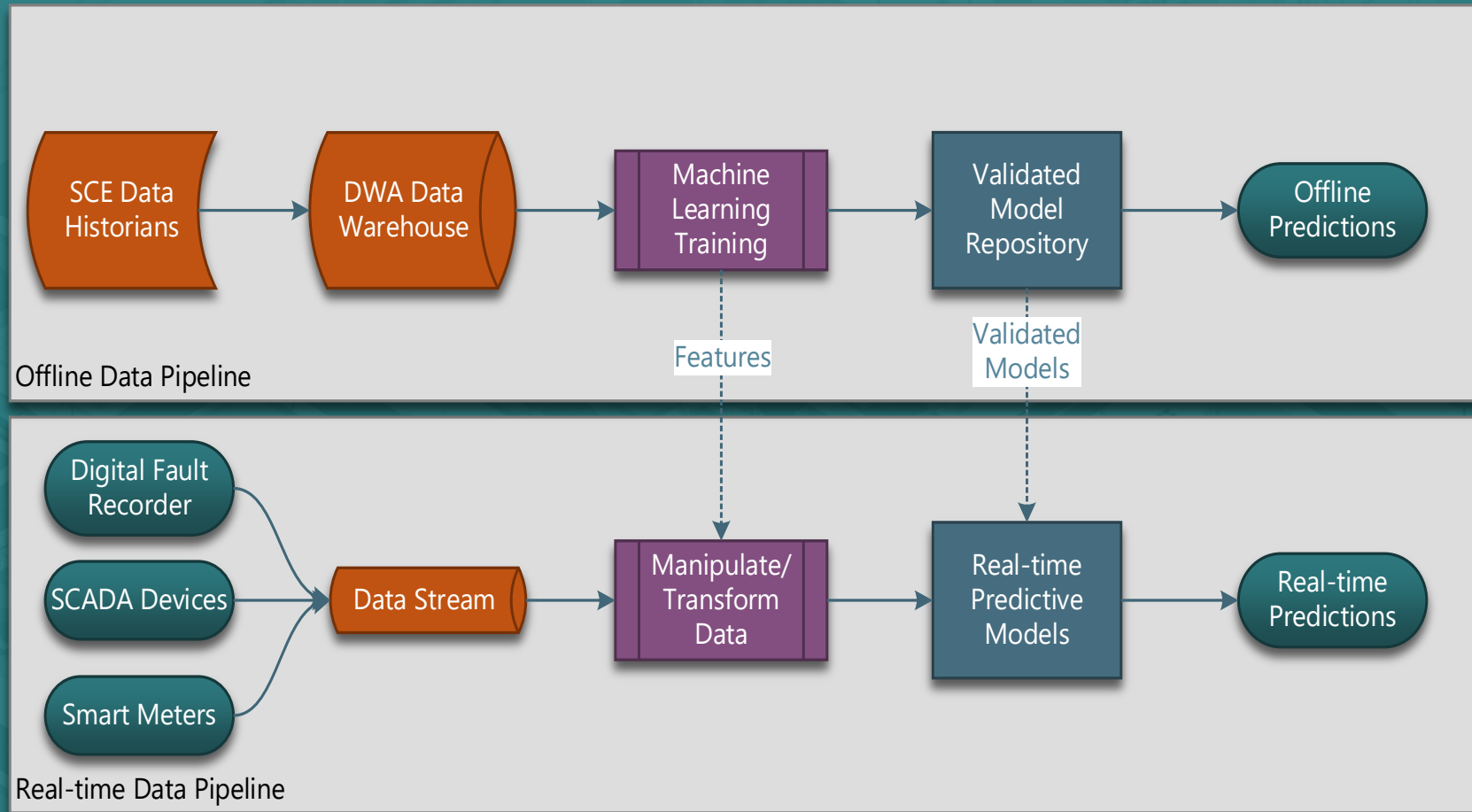
**Outcome:** Provide situational awareness of when and where a failure may be developing that could potentially spark a wildfire

### Devices in Scope:

- Digital Fault Recorder (DFR): Records high-resolution data at the feeder head that can pick up minute transient events
- SCADA<sup>1</sup> Devices: Switches, capacitors, and fault indicators that record data such as status, events, and system conditions (*V & I*)
- Smart Meters: Customer energy meters provide granular view of energy and voltage across the grid

<sup>1</sup> SCADA is the acronym for Supervisory Control and Data Acquisition

# The Distribution Waveform Analytics platform enables data integration and machine learning modeling

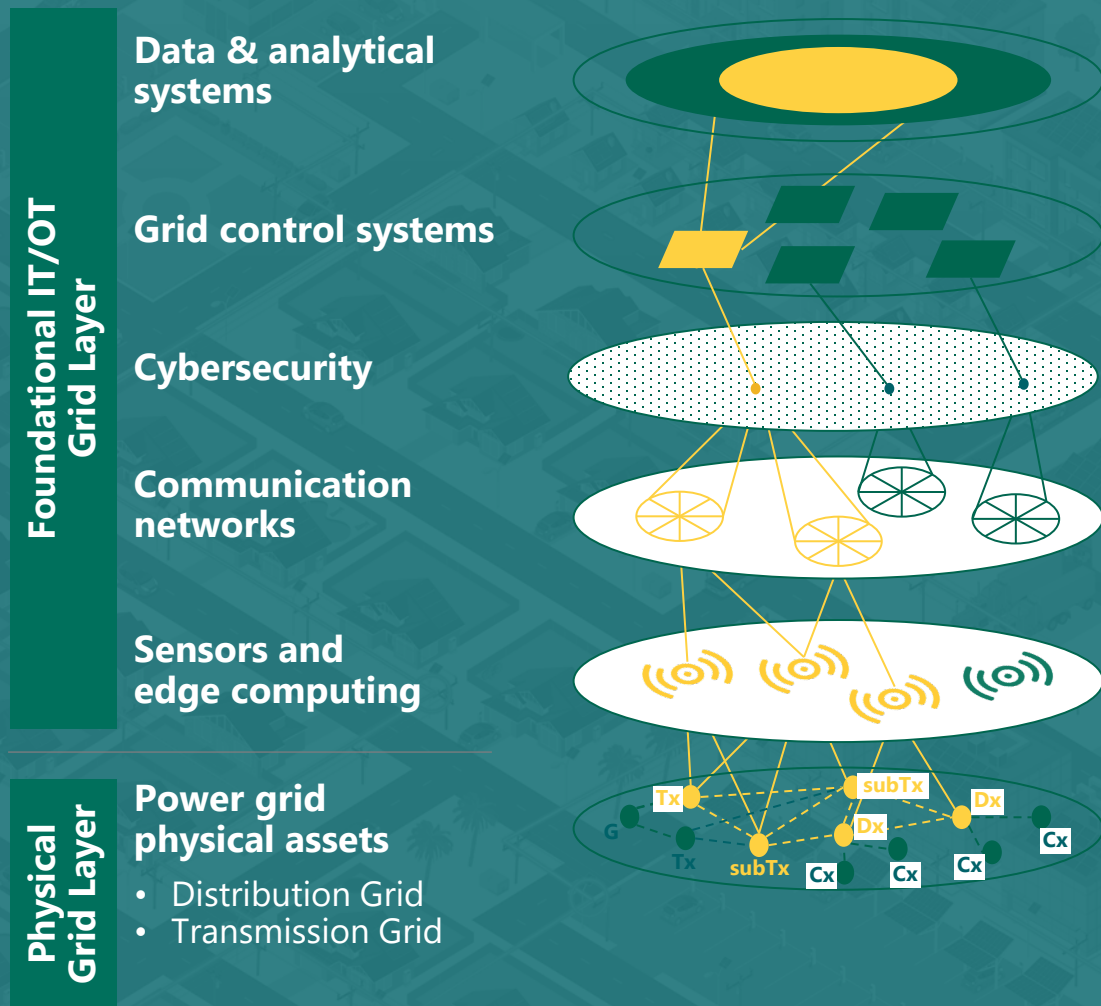


## Platform Components

- Data management and integration
- Data accessibility
- Data viewer and exploratory analysis
- Machine Learning toolkits
- Offline model development
- Model deployment to real-time data stream
- Real-time incipient event predictions

# Machine Learning at the Edge streamlines processes and provides predictive insights for proactive damage assessment

## Machine Learning At The Edge Conceptual



## Project Objective

- Target processes related to high fire risk area asset inspections and PSPS circuit patrols
- Investigate moving algorithms from the back-office to edge devices like UAVs<sup>1</sup> and imagery equipment
- On-site identification of damaged/defective field equipment to mitigate ignition
- Localized decision making to reduce delays in business processes

<sup>1</sup> UAV is the acronym for Unmanned Aerial Vehicle

# WP&RT Project Benefits

## Prevent Ignition

- The analytics platform senses incipient issues and allows SCE to target its infrastructure replacement on equipment in imminent danger of failing and igniting a wildfire
- Distribution Waveform Analytics (DWA) may be able to alert operators to a **potential failure before it happens in 5 of the currently projected High Fire Threat District (HFTD) ignition instances** in 2022
- ML at the Edge will help expedite the remediation of high priority issues

## Detect Ignition

- The analytics platform detects the signature of an ignition event for early warning
- DWA may be able to alert operators to **30 currently projected potential ignition events in HFTD** in 2022, allowing for more immediate fire response and suppression efforts to occur before fires expand

## PSPS Outage Reduction

- Through reduction of manual patrols, ML at the Edge could reduce the impact of PSPS events to our customers



# Beyond Lithium-ion

# SCE's portfolio includes a project that looks beyond the fundamental limits of lithium-ion technology to the development and commercialization of new battery chemistries

The project demonstrates one or multiple examples of **next-generation, pre-commercial, "beyond lithium-ion" energy storage technologies** that require real-world field experience to reduce technology and adoption barriers on the path to commercialization. Project objectives:



**Identify and prioritize** non-lithium-ion energy storage system (NoLESS) technologies



- Procure, install, and demonstrate a NoLESS
- Evaluate NoLESS **safety, performance, and reliability** in use cases appropriate for the storage technology (e.g., long duration, renewable integration, microgrid, etc.)



**Gain experience** of deploying and operating NoLESS technology



# To achieve California's long-term energy policy goals and SCE's Pathway vision, the marketplace will require a diversity of cost-competitive energy storage products

## Alignment with California Policy

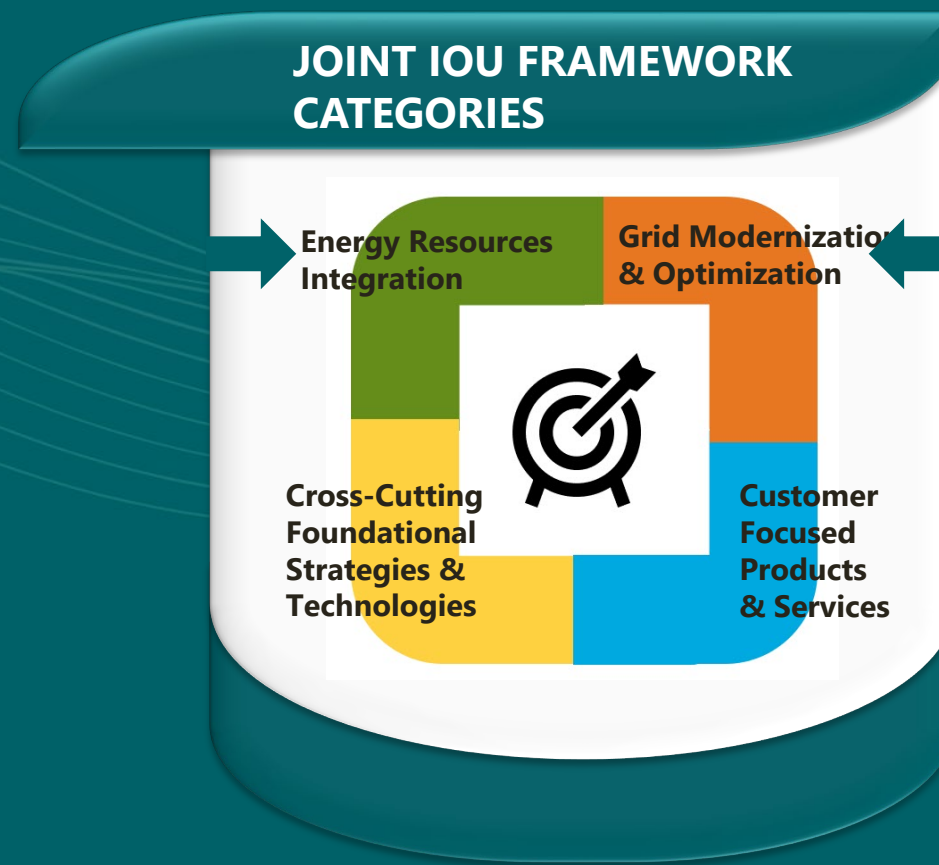
- Supports California's decarbonization goals
- Will allow SCE to meet state mandates such as Senate Bill SB 100

## Alignment with SCE's Reimagining the Grid

- Power Grid Physical Assets
- Situational (Location-Specific)

## Alignment with SCE's Technology Roadmap

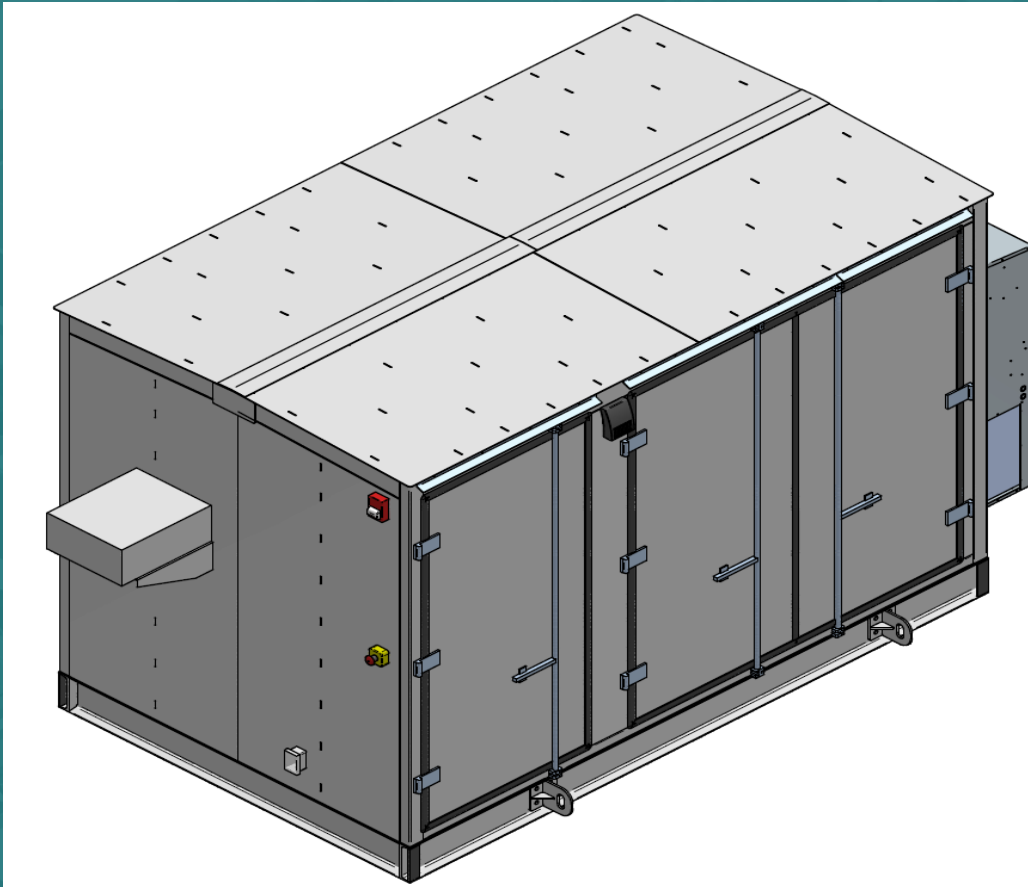
- **Technology Challenge:** Cleaning the power system
- **Technology Objective:** Develop additional operational flexibility through new resources
- **Technology Capability:** Deep understanding of energy storage technologies to inform selection of best performance and cost to power and energy needs



# Pathways to Engagement

- We are seeking opportunities to:
  - **Engage industry and receive feedback** on potential technologies to demonstrate
  - **Create partnerships** with vendors to demonstrate their products and help them reach commercialization
- We do not want to procure or own a NoLESS
  - SCE would pay for shipping, interconnection, facility upgrades, etc. and would be responsible for testing and providing results

# Gap the Technology Addresses



Grid planners must understand the characteristics and capabilities of different energy storage technologies

Lithium-ion batteries are well-suited to low-duration, high power use cases due to their energy density

Intermittent power sources on the grid may create a need for longer duration batteries

This project advances the industry's understanding of lithium-ion alternatives to ensure new storage technologies can "cross the chasm" and compete with lithium-ion

# Beyond Lithium-ion Project Benefits

## Safety

- Some new battery technologies are less prone to thermal runaway than lithium-ion, and some may use safer or more plentiful raw materials

## Reliability

- **30 GW of utility-scale energy storage** will be needed to support the state's policy goal in the next 25 years
- Some non-lithium-ion batteries could be used for longer durations than lithium-ion, which gives applications for both mitigation of long-term PSPS and base load capabilities to the point that a non-lithium battery could provide base load rather than the ramping capabilities that lithium-ion provides.
- Improved storage technologies may make microgrids more attractive and allow for longer lasting backup generation, power quality improvement, and fast ramping

## Emissions

- Natural gas plants currently provide 46% of in-state generation
- A cost-competitive long-duration storage technology could reduce the **60 million tonnes of CO<sub>2</sub>e released in 2019** by the California electric sector

## Costs

- NoLess batteries can be potentially cost competitive at mid- or long-duration storage levels
- NoLess technologies may offer better capacity and power degradation characteristics, reducing upgrade and maintenance costs

The background of the slide is a teal-colored isometric map of a city. The map shows a grid of streets, various buildings of different sizes, trees, and utility poles. The perspective is from an elevated angle, looking down at the city layout.

# Q & A

# Share your feedback and ideas



**Provide written feedback** on the WP&RT and Beyond Lithium-ion projects:

Email [ideas@sce.com](mailto:ideas@sce.com) with the name of the project in the subject line



**Submit your product or service idea** for SCE to review:

Complete the form at [sceideas.com](https://sceideas.com)



**Request a letter of support or commitment** for your CEC EPIC, DOE or other funding source proposal:

Visit [sceideas.com/Idea/LetterofSupport](https://sceideas.com/Idea/LetterofSupport)



**Attend the Joint Utilities Fall EPIC Workshop**

Wednesday, **Nov. 17, 2021**  
9 a.m. – 12 p.m.