



# EPIC-3 Program Update

Frank Goodman  
SDG&E Program Manager

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# Agenda for SDG&E EPIC-3 Update



- EPIC-3 Program Status Overview
- Advanced Metering Infrastructure (AMI) Data for Operations (Project 3)
- Safety Training Simulators (Project 4)
- Unmanned Aircraft Systems (Project 5)
- Mobile Batteries—Stacked Benefits (Project 7)
- Q&A and Discussion

# SDG&E EPIC-3 Status Overview



Name	Description	Status	Lead Internal Clients
AMI for Operations	Two operating issues: <ul style="list-style-type: none"> <li>• Voltage Sensing</li> <li>• Phase ID</li> </ul>	<ul style="list-style-type: none"> <li>• Final reports (2) in preparation</li> </ul>	Electric Distribution Operations
Safety Training Simulators	Two modules: <ul style="list-style-type: none"> <li>• Safety in Equi-Potential Zones (EPZ)</li> <li>• Focused Patrol</li> </ul>	<ul style="list-style-type: none"> <li>• Final reports (2) in preparation</li> </ul>	Wildfire Mitigation
Unmanned Aircraft Systems (UAS)	Demonstrate new UAS equipment and applications	<ul style="list-style-type: none"> <li>• Final report in preparation</li> </ul>	Emergency Management
Mobile Batteries	Mobile batteries—stacking benefits in rotational applications <ul style="list-style-type: none"> <li>• Port tenant site</li> <li>• SDG&amp;E microgrid site</li> <li>• Community resource centers</li> </ul>	<ul style="list-style-type: none"> <li>• Final reports (2) in preparation</li> <li>• Second phase on additional use cases to be performed in early 2022</li> </ul>	Customer Programs



## Nature of EPIC-3 Projects

Pre-commercial demonstrations, per EPIC requirements

- Proof-of-concept evaluations
- Determination of the value proposition for prospective commercial adoption
- Not evaluations of specific vendor products used in the demonstrations

# Advanced Metering Infrastructure (AMI) Data for Operations (Project 3)



## 1 Objective

Demonstrate capabilities of a utility AMI network beyond its historic purpose of meter reading:

- Module 1 – Use AMI data as a voltage sensor network to enhance utility operations
- Module 2 – Using an analytical, data-based approach, identify end point phasing and meter to transformer mapping using interval data from two meters per transformer.

## 2 Status

- Module 1: The main project activity has concluded. Further investigation is needed in order to operationalize some of the tools.
- Module 2: The main project activity has concluded. The project demonstrated accurate phase identification exceeding 90%, and in some cases greater than 95%. Meter to transformer mapping was less successful indicating accuracy ranging from 50% - 70%

## 3 Policy Support and Customer Benefit

### Policy Support

- Safe and efficient operation of the utility system
- Improved system planning resulting in reduction in capital expenditures, reduced system loss, and improved reliability

### Customer Benefit

Safer and more efficient operation practices resulting in better power quality for every customer and improved reliability and resiliency

Increase Safety	Improve Reliability	Reduce Costs
✓	✓	✓



# Safety Training Simulators (Project 4)



## 1 Objective

Configure existing off-the-shelf software to improve the instructional/training experience for two distinct workgroups:

1. Distribution System Operators in Training (Module 1)
  - Integrate data from various virtual systems to provide one view for operator trainees (SCADA, wireless fault indicators, smart meters, synchrophasors)
2. Journeyman Lineworkers (Module 2)
  - Use augmented/virtual reality to improve the training experience applied to the implementation of equi-potential zones for underground distribution work.

## 2 Status

- Module 1: Main project activity has concluded, with results favorable to recommend commercialization in the final report.
- Module 2: Main project activity is concluding, with results pointing toward a recommendation for commercialization in the final report.

## 3 Policy Support and Customer Benefit

### Policy Support

- Supports commission policy, holding IOUs to a higher standard for safe operation of their systems
- Supports utility needs to modernize the training experience for improved, more efficient student learning outcomes
- Improve public and employee worker personal safety

### Customer Benefit

- Improved reliability, which improves safety.

Increase Safety	Improve Reliability	Reduce Costs
✓	✓	✓

# Example of Training Simulator Screenshot

## 200 Amp Cable Replacement at Fuse Compartment in Air Switch Cabinet





# Unmanned Aircraft Systems (Project 5)



## 1 Objective

Demonstrate new applications of unmanned aircraft systems (UAS).

Evaluate concepts for instrumentation and monitoring of power system equipment using enhanced imaging on UAS and sensor technology.

Evaluate potential UAS applications to increase reliability, safety and cost efficiency in power system operations.



## 2 Status

Aerial Telepresence: Issues identified that may be resolved with new 5G network.

Public Safety Power Shutoff (PSPS)/Wildfire Mitigation Program (WMP): Identified 7 hard-to-access areas for PSPS patrols using UAS. Adopted for commercial use.

Coronal Camera: Licensed thermographers trained on UAS with integrated Coronal Camera.

Tethering: Adopted for commercial use.

Sense and Avoid UAS: Can sense and avoid thin power lines and guy wires. Short flight time. Hard to see, when flying beyond 1000 ft. Viable solution for on-the-spot inspections.

Line Pulling: High value determined and now in commercial use.

Fixed Wing Patrol UAS: Not to be pursued further. Hard to launch/land; large clear areas needed.

UAS for Confined Space Inspections: High value determined and now in commercial use.

## 3 Policy Support and Customer Benefit

Safety increased--UAS can access environments that would be hazardous to humans

Effective tool for use in vegetation management and wildfire mitigation

Avoided emissions and need for public evacuations that are associated with helicopter flights

Time savings in flight planning and authorizations

Avoided costs and risks of human travel into isolated locations

Cost savings for confined space inspections

Increase Safety	Improve Reliability	Reduce Costs
✓	✓	✓





# Demonstration of Multipurpose Mobile Battery (Project 7)



## 1 Objective

Pre-commercial demonstration project which will evaluate the effectiveness of mobile batteries when rotated between applications and identify preferred applications and strategy for the rotation. Two systems included in demonstration work:

### 1. 362 kW/1499kWh Battery (Module 1)

- Demonstration and evaluation of stacked benefits identified through utilizing a mobile BESS at multiple locations with multiple use cases.

### 2. 100kW/525kWh Battery (Module 2)

- Demonstration as a backup power solution during planned safety outages and in emergency events such as response to wildfires, using a smaller mobile battery

## 2 Status

- **Module 1:** Demonstration was successfully completed at two locations, Marine Group Boat Works (a Port of San Diego tenant) and at SDG&E's Cameron Corners WMP Microgrid. Results point toward a recommendation for commercialization.
- **Module 2:** Demonstration was successfully completed at two community resource centers that are in areas highly susceptible to PSPS events. Results point toward a recommendation for commercialization.



## 3 Policy Support and Customer Benefit

### Policy Support

- Reduced emissions of greenhouse gases.
- Contributes to goals related to low emission vehicles and transportation, economic development, and efficient use of ratepayer monies.

### Customer Benefit

- Improved reliability and power quality
- Backup power

Increase Safety	Improve Reliability	Reduce Costs
✓	✓	✓

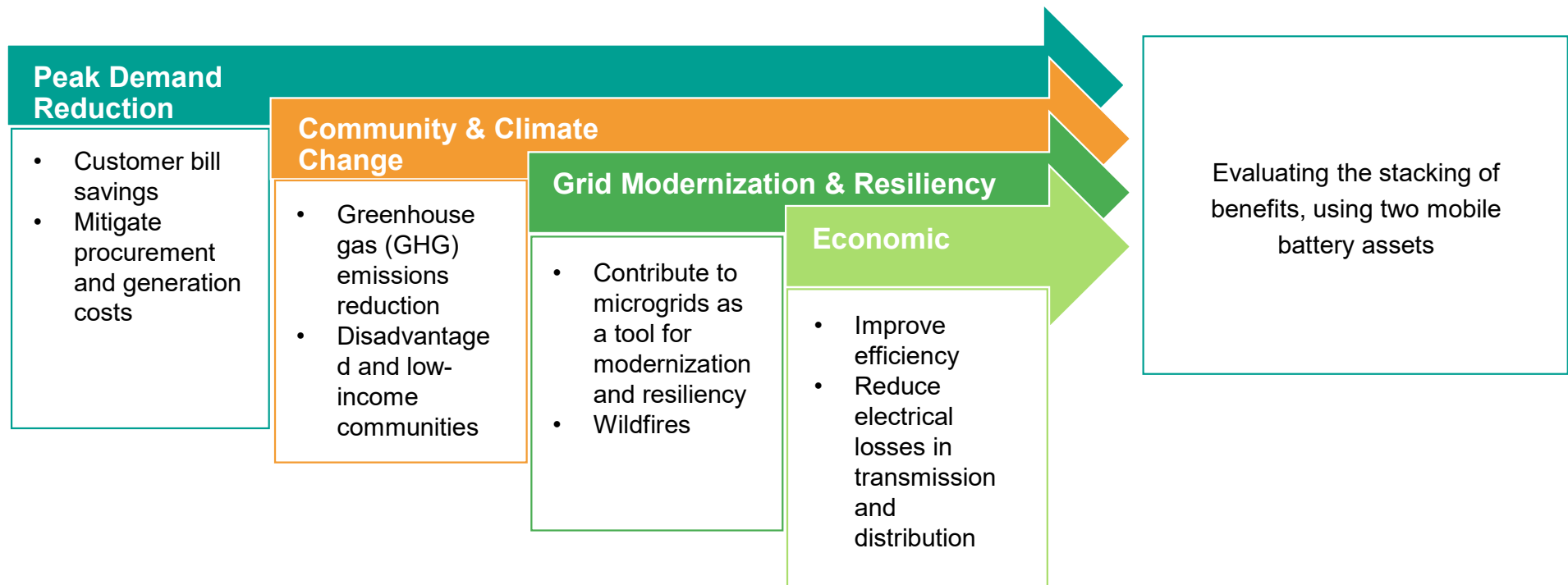


# Use Cases for Mobile Battery Energy Storage Systems (MBESS)

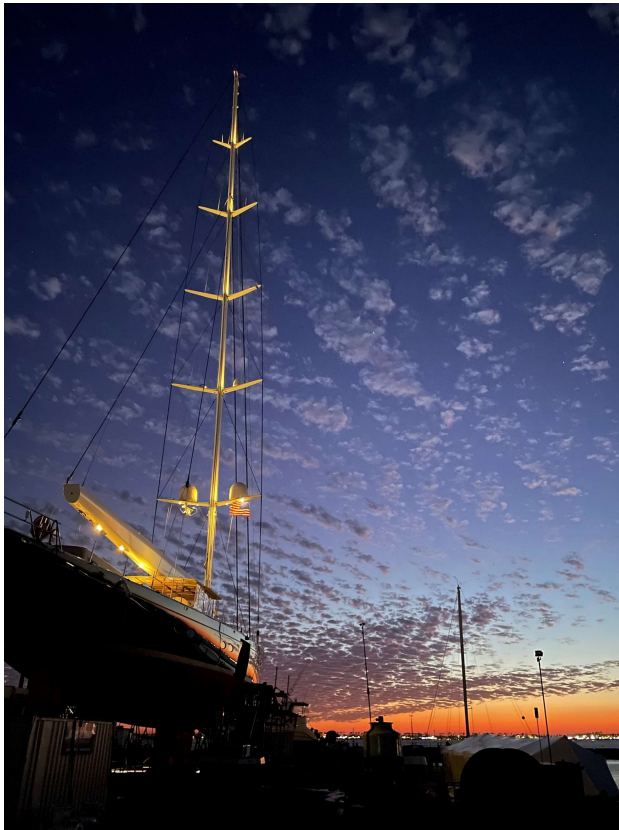


Use Case	Grid Paralleling / Islanding	Description
Safety	Both	MBESS is able to completely shut down after depressing the E-Stop Button. Promotes overall site safety.
Load Factor Correction	Paralleling	Sites with poor load factor, high peaks and relatively low baseload can benefit from strategic reduction of momentary high demand peaks, thereby improving load factor and strain on the grid.
Load Smoothing	Paralleling	The MBESS will control the rate of change of customer loads reducing strain on grid infrastructure.
Demand Peak Shaving	Paralleling	Similar to Peak Load Reduction at the Utility PCC, Demand Peak Shaving can also generate bill savings for the customer if deployed behind the meter. While the MBESS from this EPIC project was deployed, front-of-the-meter and behind-the-meter savings were simulated and presented to the customer.
Demand Response	Paralleling	Discharging the MBESS to the grid can mimic traditional demand response programs, without interrupting the customer's operations. Pre-set amounts of capacity can automatically be dispatched on strategic circuits during peak congestion times.
Deferral of utility infrastructure investments	Paralleling	Strategic MBESS deployment can add temporary capacity to load constrained circuits while more permanent infrastructure upgrades are planned and constructed. Similarly, MBESS deployment can be strategically deployed to eliminate the need for a circuit infrastructure upgrades if driven by specific load peaks.
Reduced Vehicle Emissions	Paralleling	MBESS deployment during times of increased "cold ironing" can alleviate the increase in facility baseload when ships are plugged in. Similarly, MBESS can alleviate the increase in load seen by the grid for targeted Electric Vehicle deployment/charging.
Reduced DAC Pollution	Both	In support of the above use case, MBESS deployment supports a reduction in local pollution in Disadvantaged Communities as many of these communities would be subject to the emissions from ships, vessels, trucks or off-road equipment associated with goods movement. MBESS can also decrease the need to use diesel generators in DACs that are prone to PSPS or other service interruptions.
Load Blackstart	Islanded	When attached to a downstream load, the MBESS can black start loads of appropriate size without the need of additional generating resources.

# Example of Benefits Assessment (Mobile Batteries)

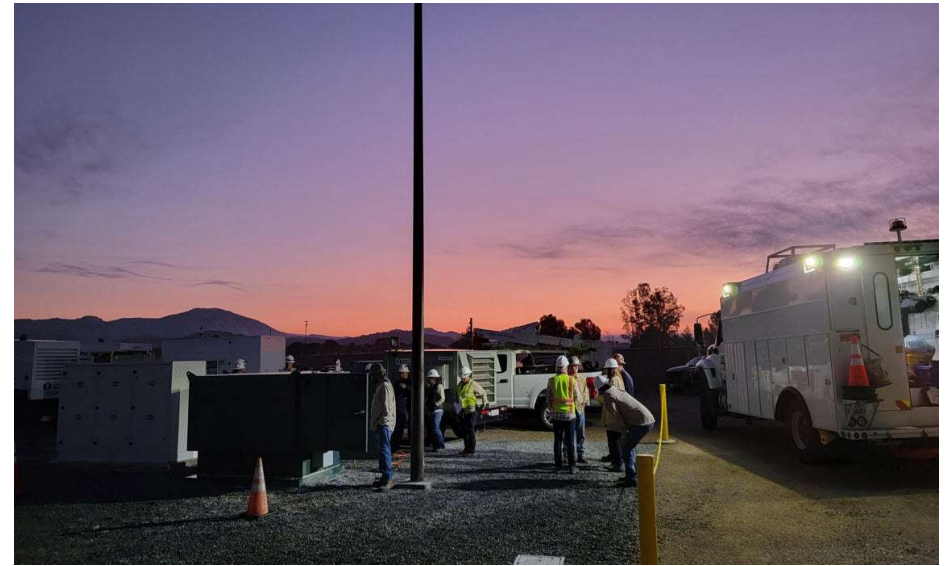


# Mobile Battery Demonstration – Marine Group Boat Works (9/21/21 – 9/24/21)





# Mobile Battery Demonstration – Cameron Corners Microgrid (10/4/21 – 10/8/21)



# Mobile Battery Commissioning – Integrated Test Facility (10/14/21)



100 kW/525 kWh (only 1 string available)





# Mobile Battery Demonstration – Community Resource Centers (November 2021)



Dulzura Community Center



Pine Valley Community Club House



# Q&A and Discussion

## Thank you!

