

Initiative Title: 2. Next Generation Resilience and Response

SO #13: Cost-Effective Grid Hardening for Long-Term Climate Impacts

INITIATIVE DESCRIPTION Pages 21-23

- Evaluates AI-enabled planning tools, preventive sensing, and integrated risk analytics that help SDG&E anticipate climate, wildfire, outage, vegetation, and asset risks before they disrupt customers
- The three RTAs together integrate climate, weather, load, vegetation, asset, and community vulnerability data into a single predictive view of system conditions
- No single vendor tool delivers this; the value comes from validating how novel technologies and capabilities operationalize together in a utility operating environment

PROPOSED INITIATIVE BUDGET	\$2,500,000
% OF TOTAL BUDGET (excl. admin & overhead)	16.3%
# OF RESEARCH TOPIC AREAS	3

ALIGNMENT SUMMARY

STRATEGIC OBJECTIVE ALIGNMENT Page 22

By 2033, the EPIC program will develop and demonstrate data, tools, technologies, and frameworks that improve long-term planning and achieve more cost-effective operational practices and capital investments for grid hardening to maintain grid resilience and reliability to long-term climate impacts, with a focus on increasing affordability, reducing outage risk, and reducing social burdens of outages.

SO 13 Alignment: Developing & demonstrating integrated data, tools, technologies, & analytical frameworks that improve long-term grid-hardening planning & enable more cost-effective operational & capital decisions under increasing climate risks. Supporting earlier hazard & fault detection, targeted investments, safer field operations, faster restoration, & fewer unnecessary field activities.

CPUC ALIGNMENT Pages 22-23

- As the CPUC advances climate-adaptation requirements & reviews resilience & grid-hardening investments through CAVA, improved climate-risk data, analytical methods, & decision-support tools are needed to evaluate vulnerabilities, alternatives, costs, and potential impacts.
- The research will provide climate-risk data, analytical tools, and wildfire mitigation strategies to support CPUC adaptation guidance and selection of cost-effective investments.
- Validates how emerging resilience technologies can work together under real-world utility operating, regulatory, equity, cybersecurity, & interoperability requirements. This integration & benefit-cost evaluation are not typically addressed by vendors or other research programs & are necessary before broader ratepayer investment.

RTA #3: Artificial Intelligence (AI) for Utility Resilience & Adaptation (AURA)

SO #13: Cost-Effective Grid Hardening for Long-Term Climate Impacts

WHAT PROBLEM ARE WE SOLVING? Pages 41-42

SDG&E holds climate, weather, load, vegetation, asset, and community vulnerability data in separate systems, limiting its ability to predict where climate impacts will hit customers hardest. Resilience investments are therefore prioritized without a consolidated view of exposure, which directly limits predictability of weather and climate impacts on the grid.

Next Generation Resilience and Response	
START	Q4 2027
OUTPUTS	2029
MARKET READY	2029

ALIGNMENT SUMMARY

WHAT IS THE DISTINCT RESEARCH APPROACH?	HOW WILL YOU KNOW YOU ARE SUCCESSFUL?	HOW WILL YOU COORDINATE?
- Integrates climate vulnerability, grid vulnerability, community vulnerability, and load growth data into AI-enabled planning tools. (p. 41 Gaps Addressed) - Evaluates explainable AI outputs against real SDG&E operating conditions, California regulatory requirements, and cybersecurity and data governance needs. (p. 41 Unique Role) - Distinct in combining community vulnerability with grid and climate data to prioritize investment, not only to forecast conditions. (p. 41 Expected Outcomes)	- Improved identification of the communities and circuits most exposed to climate and reliability risk. - Evidence on whether AI-informed prioritization avoids duplicative spending and improves long-term resilience. - Climate-informed investment prioritization capability, measured by customers in disadvantaged communities covered and improvement in risk-prediction accuracy. (p. 41 Expected Outcomes)	- Continue to share best practices and findings through IOU coordination, forums and relevant CPUC, CEC & climate resilience workshops - Foundational Community Impact Platform (CIP), a digital twin platform developed to support Climate CAVA visualization (p. 41 Leveraging Past RD&D) - Expands on limited research focused on integrating climate, grid, community vulnerability, & load growth data into a unified decision-support framework (p. 41 Leveraging Past RD&D)

RTA # 4: Preventive Grid Sensing and Response

SO #13: Cost-Effective Grid Hardening for Long-Term Climate Impacts

WHAT PROBLEM ARE WE SOLVING? Pages 43-46

Addresses the lack of granular & actionable visibility into feeder & lateral conditions, customer load, & DER activity needed to plan/operate the grid cost effectively under increased climate related stress. Research will evaluate the integration, scalability, cybersecurity, & operational value of line-mounted sensors, AMI 2.0 capabilities, & mobile situational-awareness tools. These capabilities may support more cost-effective grid-hardening investments & operational practices by enabling earlier fault detection, faster outage response, fewer truck rolls, & reduced outage risks.

Next Generation Resilience & Response

START	Q4, Y2027
OUTPUTS	2028
MARKET READY	2029

ALIGNMENT SUMMARY

WHAT IS THE DISTINCT RESEARCH APPROACH?

HOW WILL YOU KNOW YOU ARE SUCCESSFUL?

HOW WILL YOU COORDINATE?

- Demonstrate line-mounted multi-sensor devices & their integration w/utility systems to improve fault detection, outage response, climate-risk visibility,& grid-hardening decisions (p. 43 Gaps Addressed)
- Evaluate whether AMI 2.0 meters can cost-effectively provide scalable feeder-, lateral-, customer-load, & DER-level visibility (p. 43 Gaps Addressed)
- Demonstrate mobile tools to improve response speed, consistency, safety, & operational efficiency (p. 43 Gaps Addressed)
- Innovation comes from application of advanced sensing & mobile technologies to real-world use cases where existing systems provide limited grid visibility & operational insight

- Validate advanced feeder monitoring, communications, AMI-enabled visibility, & mobile field technologies for improved outage detection, fault location, inspection efficiency, & the timeliness and accuracy of operational data (p. 45 Expected Outcomes)
- Reduced outage risk & operating costs, improved long-term resilience planning & more targeted, cost-effective grid-hardening investments
- Reduction (%) in avg outage-detection & diagnostic time compared with baseline, %age-point improvement in fault-location accuracy based on field-confirmed conditions, % reduction in repeat site visits or unnecessary truck rolls compared with current processes (p 44 Metrics) .

- Coordinate alignment with EPIC Administrators to achieve complementary and not duplicative demonstrations for future knowledge sharing
- EPIC and other RD&D efforts on advanced monitoring, communications, and control system integration; AMI 2.0 research builds on EPIC 4 Project 3, Smoke Detection Cameras and Power Quality; Mobile-first field operations platform leverages EPIC grid modernization investments (p. 43-44 Leveraging Past RD&D)

RTA # 5: Integrated Risk Analytics for Wildfire Mitigation

WHAT PROBLEM ARE WE SOLVING?

Pages 47-49

Addresses the lack of validated, integrated methods for translating remote sensing, advanced data sources, & AI-enabled analytics into actionable, asset-level wildfire and climate-risk information. Evaluates whether these technologies can improve the accuracy, timeliness, scalability, and cost-effectiveness of inspections, PSPS decisions, and restoration activities. Closing this gap improves resilience by enabling earlier risk identification, more targeted mitigation, faster restoration, and reduced customer impacts from wildfire- and climate-related events.

Next Generation Resilience & Response

START	Q4 Y2027
OUTPUTS	2029
MARKET READY	2029

ALIGNMENT SUMMARY

WHAT IS THE DISTINCT RESEARCH APPROACH?

- Demonstrate & validate an enterprise-wide framework that integrates advanced sensing, AI-enabled analytics and real time monitoring to provide actionable information that supports wildfire mitigation, PSPS decision-making, and restoration activities (p. 47 Gaps Addressed)
- The integration of emerging technologies across work management workflows while applying cost-and-risk analyses (p. 47 Unique Role)

HOW WILL YOU KNOW YOU ARE SUCCESSFUL?

- Validated technologies and risk-based approaches that support faster restoration and wildfire response and reduce vegetation-related outages as they are integrated into routine utility operations. (p. 48 Expected Outcomes)
- Validated integrated wildfire-risk decision framework, percentage improvement in risk-identification accuracy, percentage reduction in restoration time for high-fire-threat-related outages (P. 48 Metrics and Impact Assessment)

HOW WILL YOU COORDINATE?

- EPIC Admin meetings & relevant state, federal, Gas RD&D, research, and private-sector forums to avoid duplication and share lessons on wildfire risk, climate resilience, advanced sensing, and outage response
- Builds on SDG&E’s EPIC-3 Project 5, which provided a foundation of identifying practical UAS applications for electric utility inspections, wildfire mitigation, PSPS patrols, confined-space inspections, line-pulling support, coronal camera use, tethered UAS operations, & related field use cases (p. 47 Leveraging Past RD&D)