



Regulatory Affairs
8330 Century Park Ct. CP32F
San Diego, CA 92123-1530



February 28, 2020

Edward Randolph
Energy Division Director
California Public Utilities Commission
505 Van Ness Avenue
San Francisco, CA 94102-3298

**RE: COMPLIANCE FILING OF SAN DIEGO GAS & ELECTRIC COMPANY'S
(U 902 E) 2019 ELECTRIC PROGRAM INVESTMENT CHARGE ANNUAL
REPORT**

Dear Mr. Randolph:

In compliance with Ordering Paragraph 16 of Decision (D.) 12-05-037 and in accordance with the Annual Report Outline provided in Attachment 5 of D.13-11-025, San Diego Gas & Electric Company (SDG&E) hereby submits its 2019 Annual Report for its Electric Program Investment Charge (EPIC) Program (Report), provided as Attachment A hereto. In addition, SDG&E provides the excel file titled "SDG&E 2019 EPIC Project Status Report" in accordance with D.13-11-025 as Attachment B.¹ All EPIC-1 and EPIC-2 comprehensive final project reports were delivered with prior annual reports and are posted on SDG&E's websites at www.sdge.com/epic. There are not yet any comprehensive final project reports for the EPIC-3

¹ SDG&E, the California Energy Commission (CEC), Pacific Gas and Electric Company (PG&E), and Southern California Edison Company (SCE) (together, the EPIC Administrators) are required to provide with the annual report "electronically in spreadsheet format the information identified in Attachment 6 to report on projects described in Section 4.b of the EPIC annual report outline adopted by this decision." D.13-11-025 at 63. *Id.* at Attachment 5 and Attachment 6.

cycle.² Together, these documents provide an overview of SDG&E’s EPIC activities and program financial information during the 2019 calendar year.

SDG&E and its fellow EPIC Administrators are required to each submit an annual report “detailing program activities.”³ The annual reports are designed “to facilitate consistent reporting by the [EPIC] Administrators on their investment plans and project results.”⁴ In accordance with D.12-05-037, SDG&E serves this Report on “all parties in the most recent EPIC proceeding, and all parties to the most recent general rate cases for [SDG&E, PG&E, and SCE], and each successful and unsuccessful applicant for an EPIC funding award” during the 2019 calendar year.⁵

Sincerely,

/s/ SDG&E Regulatory Affairs

cc: SDG&E Central Files

² The EPIC Administrators “must include with their [EPIC] annual report a final report on every project completed during the previous year.” D.13-11-025 at 136, Ordering Paragraph 14.

³ D.12-05-037 at 8.

⁴ D.13-11-025 at 4-5, 62.

⁵ *Id.* at Ordering Paragraph 16.

ATTACHMENT A

SDG&E® 2019 EPIC Annual Report

San Diego Gas & Electric Company
2019 EPIC Annual Report

February 28, 2020



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NOTE:

Attachment B – 2019 Annual Report Spreadsheet follows this Attachment A (Excel document).

I. EXECUTIVE SUMMARY

Pursuant to Ordering Paragraph 16 of Decision D.12-05-037 and in accordance with the Annual Report outline provided in Attachment 5 of D.13-11-025, San Diego Gas & Electric Company (SDG&E) hereby submits its 2019 EPIC Annual Report (Report). This Report provides an overview of SDG&E's EPIC activities during the 2019 calendar year. As required by D.13-11-025, SDG&E is providing additional information about SDG&E's EPIC activities in an excel file titled, "SDG&E 2019 EPIC Project Status Report" as Attachment B. There are not yet any comprehensive final project reports for the EPIC-3 cycle, and therefore none are attached to this annual report.¹

SDG&E proposed and received approval for five projects that demonstrate smart grid system integration solutions in its first triennial application for years 2012-2014 (EPIC-1).² In addition, SDG&E proposed and received approval for six projects that demonstrate grid modernization and technology integration solutions in its second triennial application for years 2015-2017 (EPIC-2).³ SDG&E proposed and received approval for seven projects in multiple policy areas in its third triennial application for years 2018-2020 (EPIC-3).⁴ This report provides an update on SDG&E's 2019 progress and year-end status for projects approved for EPIC-1, EPIC-2, and EPIC-3.

A. Overview of Programs/Plan Highlights

In A.12-11-002, SDG&E requested Commission approval of five programs that demonstrate smart grid system integration solutions. In November 2013, SDG&E's Application and First Triennial EPIC Plan was approved in full, with minor modifications, by the Commission in D.13-11-025.

In A.14-05-004, SDG&E requested Commission approval of its Second Triennial EPIC Plan which included five programs that have the potential to help modernize the utility power system to improve customer benefits, as well as a sixth project through which SDG&E will participate in industry RD&D consortia. In April 2015, SDG&E's Application and Second Triennial EPIC Plan was approved in full, with minor modifications, by the Commission in D.15-04-020.

¹ D.13-11-025 at 63 and 136.

² SDG&E's Application (A.12-11-002) for EPIC-1, approved in D.13-11-025, issued November 19, 2013.

³ SDG&E's Application (A.14-05-004) for EPIC-2, approved in D.15-04-020, issued April 15, 2015

⁴ SDG&E's Application (A.17-05-009) for EPIC-3, approved in D.18-10-052, issued November 2, 2018.

In A.17-05-009⁵, SDG&E requested Commission approval of its Third Triennial EPIC Application which included seven project areas addressing topics in grid modernization, such as safety, advanced operation solutions, and resiliency. The total estimated cost in the application for the third EPIC cycle was \$9,768k. D.18-10-052 approved the project areas that were included in the application but only released 2/3 of the funds, pending approval of a Research Administration Plan (RAP) which did not happen until 2020. The portion that was released was applied to launching work in four of the approved project areas in 2019.

B. Status of EPIC-1 and EPIC-2 Projects

All EPIC-1 and EPIC-2 projects were completed by the close of 2018, as reported on in the last annual report. All final reports for the EPIC-1 and EPIC-2 cycles were provided with prior annual reports and are posted on the SDG&E EPIC public web site.

Current funding information for SDG&E's EPIC-3 cycle is provided in Table 1.

⁵ SDG&E's Application (A.17-05-009), approved in D.18-10-052, issued November 2, 2018.

Table 1. SDG&E’s EPIC-3 (2018-2020) Portfolio as of December 31, 2019

EPIC-3 Projects (2018--2020)				
EPIC-3 Projects	Incurred⁶ Costs (\$ thousands)	Encumbered⁷ Costs (\$ thousands)	Commitments⁸ (\$ thousands)	Project Status
3. Application of Advanced Metering Infrastructure (AMI) Data to Advanced Utility System Operations	231	2,344	2,344	In Progress
4. Safety Training Simulators with Augmented Visualization	176	2,206	2,206	In Progress
5. Unmanned Aircraft Systems (UAS) with Advanced Image Processing for Electric Utility Inspection and Operations	107	729	729	In Progress
7. Demonstration of Multiple-Purpose Mobile Battery for Port of San Diego and Other Applications	53	3,573	3,573	In Progress
SDG&E Program Administration	199	916	916	In Progress
Total	\$765	\$9,768	\$9,768	

⁶ As used in this Report, incurred costs mean actual booked expenditures.

⁷ As used in this Report, encumbered costs are funds that are specified for contracts (D.13-11-025 at 101; Ordering Paragraph 45) or for in-house work necessary in collaboration with a contractor (D.13-11-025 at 53). They differ from commitments in that commitments are the identification of blocks of funds to be assigned to projects, whereas encumbrances specify how the commitments will be used in the projects.

⁸ As used in this Report, commitment means assigned for anticipated work on a project, including anticipated contractual commitments, equipment purchases, software licenses, associated technical work by the SDG&E project team, and other expenses directly associated with the project work.

C. Status Summary of EPIC Projects

1. EPIC-1 and EPIC-2 Projects

All EPIC-1 and EPIC-2 projects were completed prior to 2019. Summaries of those projects can be found in SDG&E's last EPIC annual report for 2018 on SDG&E's EPIC website. The comprehensive final reports for those projects can also be found on that website. The site address is www.sdge.com/epic.

2. EPIC-3 Projects

The following are brief summaries of the projects that have been launched from SDG&E's CPUC-approved EPIC-3 application. More detailed descriptions of activities in these projects appear in the main body of this annual report.

Project 3: Application of Advanced Metering Infrastructure (AMI) Data to Advanced Utility System Operations

This project will perform pre-commercial demonstrations of two critical capabilities (towards modernization) for leveraging SDG&E's AMI system with its 1.4 million endpoints to provide actionable secondary voltage data and analysis to SDG&E and other prospective users. The following are two key modules that are the focus of this project:

- **Module 1: AMI System as a Voltage Sensor Network**

This module is being performed as part of a Cooperative Research and Development Agreement (CRADA) with the National Renewable Energy Laboratory (NREL). The primary focus of the module is to demonstrate and evaluate the capabilities of AMI-based controls for distribution system operations, including monitoring and control at the secondary transformer level using existing AMI infrastructure. In other words, the grid-edge monitoring systems and controls provided by the third-party vendors (procured by SDG&E) will perform grid operations using AMI data. The module scope will also include efforts for developing and validating models that are representative of real SDG&E feeders in a distribution simulation environment. These models will be tuned and validated using AMI data collected from the field to produce accurate feeder models. Moreover, a demonstration comprising of control use case scenarios, performance metrics and evaluation procedures will be performed.

- **Module 2: Phase Identification**

Visibility into the physical state of distribution system and its real-time load flow conditions is required to advance grid modernization. Accurate phasing information is essential for optimal control and effective operation of a utility distribution system with modernization functions such as an advanced distribution management system (ADMS) and a distributed energy resource management system (DERMS) platforms. Thus, it is becoming more important to have accurate information (i.e. phase identification) of the distribution network to be able to effectively manage/control it. This module will demonstrate the application of AMI data to automatically identify phasing information within the SDG&E distribution system.

Project 4: Safety Training Simulators with Augmented Visualization

This project is divided into two modules: “Training Environment for System Operators Allowing Focused Patrol of Overhead Distribution” and “Personal Protective Grounding/Equal Potential Zones (PPG/EPZ) Training on the Electric Underground Distribution System”.

- **Module 1: Focused Patrols Stimulator**

The main feature of the project is to demonstrate a functioning pre-commercial training simulator that can help narrow the search location of a fault during a power outage for a set of selected test circuits. This new training environment will be utilized to teach the system operators as well as the technical support team (TST) to recognize, understand and utilize, the signals that a newly installed array of Wireless Fault Indicators (WFIs) in conjunction with existing SCADA capable devices and revamped Network Management System (NMS) built-in algorithm to accurately predict the region of the fault, thereby greatly reducing the impact of a distribution overhead line power outage. This benefit will come from the reduced duration and extent of distribution overhead line patrols. The selected test circuits are mainly in rural communities, which are commonly subjected to Public Safety Power Shutoffs (PSPS) during high wind events, following many months of very dry conditions.

- **Module 2: Personal Protective Grounding/Equal Potential Zone Simulated Training Demonstration**

This project will demonstrate a Virtual Reality (VR) pre-commercial training stimulator for PPG/EPZ on the electric distribution underground (UG) system. This new training will be applied to students during initial and/or refresher compliance training to improve understanding of the procedures for PPG/EPZ.

SDG&E will use internal staff as the subject matter experts and will contract with a software vendor to develop a site to demonstrate PPG/EPZ practices. SDG&E is building an energized test yard to evaluate how the VR compares to reality, in terms of actual vs. predicted hazard exposures to workers.

The internal SDG&E project team developed five scenarios and had three vendors demonstrate their VR capabilities. In the final quarter of 2019, SDG&E developed a Request for Proposal (RFP) to be released the first quarter of 2020. In December, SDG&E broke ground on the energized test yard to be used to simulate five test scenarios. The test yard is anticipated to be completed in the first quarter in 2020.

Project 5: Unmanned Aircraft Systems (UAS) with Advanced Image Processing for Electric Utility Inspection and Operations

The project will demonstrate new applications of Unmanned Aircraft Systems ("UAS") with enhanced image processing capabilities for electric operations. The project will define, demonstrate and evaluate concepts for instrumentation and monitoring of the power system equipment using enhanced imaging and sensor technology on UAS. The project will evaluate the potential to increase reliability, safety and cost efficiency to improve power system operations. The focus use cases are as follows:

- Telepresence
- Beyond Line of Sight (BLOS)
- Night Flights
- Corona Camera
- Tethering

Project 7: Demonstration of Multipurpose Mobile Battery for Port of San Diego and/or Other Applications

The objective of this project is to undertake a pre-commercial demonstration of a multi-purpose mobile battery system. The project will examine the possibilities for using a mobile battery at its home base, the San Diego Unified Port District (“the District”), and at secondary energy hubs.

Furthermore, the project will evaluate stacking of various benefits that can be derived from the asset, the mobile battery, when rotated between its primary location at the District’s cruise ship terminal and different energy hubs at multiple locations. The battery will be used at the District’s cruise ship terminal during the peak cruise ship season between September and May as well as at alternate locations during non-peak season.

In fulfillment of “other applications” proposed, an additional mobile battery system use case has been identified for potential implementation at a community resource center (CRC). This application will assess the benefit of providing emergency backup power at CRCs during evacuations, power outages and more specifically during wildfire situations (i.e. public safety power shutoffs).

Overall, the project is to evaluate the effectiveness of implementing a mobile battery (or multiple mobile batteries) to showcase the benefits when rotated between applications; identifying the most desirable applications and strategies for optimal rotation.

Main Body
of
2019 SDG&E EPIC Annual Report

I. INTRODUCTION AND OVERVIEW

A. Background on the EPIC Program

The EPIC program was established by the California Public Utilities Commission (alternatively referred to as “The Commission” or “CPUC”) in D.11-12-035 to provide public interest investments in applied research and development, technology demonstration and deployment, market support, and market facilitation of clean energy technologies and approaches for the benefit of ratepayers of California investor-owned utilities (IOUs). D.12-05-037 established the purposes and governance structure for the EPIC program and D.13-11-025 clarified many of the program’s regulatory requirements.

The EPIC program is designed to provide funding for electric utility research, development, and demonstration (RD&D). Specific funding allotments are made to four EPIC program administrators, including SDG&E.¹ The EPIC program is intended to run through 2020 and is comprised of three triennial program cycles (*i.e.*, EPIC-1, EPIC-2, EPIC-3).

B. EPIC Program Components

The IOUs, including SDG&E, may only administer EPIC projects in the area of pre-commercial technology demonstration and deployment (TD&D). Post-commercial demonstrations and deployments are not allowed. Utility participation in the early stages of the research and development process, *i.e.*, basic research and applied research for new utility-related technology, is also not allowed.

C. EPIC Program Regulatory Process

Pursuant to D.12-05-037, SDG&E was required to submit an application seeking Commission approval of an EPIC plan every three years. SDG&E submitted its First Triennial EPIC Plan for years 2012-2014 (A.12-11-002) on November 1, 2012 (EPIC-1) and received full Commission approval of its EPIC-1 Plan in D.13-11-025. No hearings were held. SDG&E submitted its Second Triennial EPIC Plan for years 2015-2017 (A.14-05-004) on May 1, 2014 (EPIC-2) and received Commission approval of its EPIC-2 Plan in D.15-04-020. No hearings were held. SDG&E submitted its Third Triennial EPIC Plan for years 2018-2020 (A.17-05-009) on May 1, 2017 (EPIC-3). The Commission approved SDG&E’s EPIC-3 Application in D.18-10-052, issued on November 2, 2018, with partial release of the funds and orders regarding implementation of the work and requirements that must be met for release of the balance of the funds. SDG&E launched four EPIC-3 projects in 2019.

¹ The EPIC administrators are the California Energy Commission (CEC), SDG&E, Southern California Edison Company (SCE) and Pacific Gas and Electric Company (PG&E).

In accordance with Ordering Paragraph 16 of D.12-05-037 and consistent with the Annual Report outline provided in Attachment 5 of D.13-11-025, SDG&E and the other EPIC Administrators are required to submit an annual report annually on February 28, 2013 through February 28, 2020. This is the eighth annual report submitted by SDG&E for its EPIC program.

D. Coordination among EPIC Administrators

The four EPIC Administrators have regular teleconferences and face-to-face meetings as needed to coordinate EPIC activities.

E. Transparent and Public Process

SDG&E is committed to conducting competitive procurements for those parts of the project work that require contracted services or major purchases of equipment or software. Development and issuance of requests for proposal (RFPs) for two EPIC-1 projects were initiated in late 2014 and for a third EPIC-1 project in 2015. Competitive procurements for four additional EPIC projects were initiated in 2016 (including one for an EPIC-1 project and three for EPIC-2 projects). One informal competitive procurement was performed for an EPIC-2 project in 2017. No new competitive procurements were performed in completing the remaining two modules of EPIC-1, Project 2, in 2018.

SDG&E and the other EPIC Administrators are required to host at least two stakeholder meetings annually to discuss their EPIC programs, proposals, and progress.² On February 19, 2019, SDG&E and the other EPIC Administrators, conducted the annual EPIC Symposium in Sacramento. SDG&E also participated with the other Administrators in the EPIC Fall Workshop (November 8, 2019), which SDG&E hosted in San Diego. Throughout 2019, the Administrators also conducted special workshops related to writing the Research Administration Plan (RAP), including a workshop with pier R&D programs and a workshop with disadvantaged community organizations.

SDG&E established and maintains an EPIC website accessible to the public: www.sdge.com/epic. This website provides EPIC program information and updates, as well as SDG&E's EPIC annual reports and comprehensive final project reports. It is also used to announce contractor bid opportunities. Several RFPs are to be released during the first quarter of 2020.

² D.12-05-037 at 74.

II. SDG&E’S EPIC BUDGET AND RELATED COSTS

A. SDG&E Authorized Budget and Incurred Costs for EPIC-3 (2018-2020)

Table 2 below, sets forth SDG&E’s Commission-authorized EPIC budget incurred costs for EPIC-3 as of December 31, 2019.

**Table 2. SDG&E Budget and Incurred Costs for EPIC-3
as of December 31, 2019 (in \$ thousands)**

	EPIC Triennial 3 (2019)	
	Technology Demonstration & Deployment	Program Administrative
SDG&E Commission- Authorized Budget ³	8,852	916
SDG&E Incurred Costs ⁴ as of December 31, 2019	566	199

³ D.13-11-025 for EPIC-1 and D.15-04-020 for EPIC-2.

⁴ Incurred costs mean actual booked expenditures.

Table 3 below, sets forth SDG&E’s disbursements to the CEC and CPUC for EPIC-1, EPIC-2 and EPIC-3 as of December 31, 2019.

Table 3. SDG&E’s Disbursements to the CEC and CPUC for EPIC-1, EPIC-2 and EPIC-3 as of December 31, 2019 (in \$ thousands)

	EPIC Triennial 1 (2012 – 2014)		EPIC Triennial 2 (2015 – 2017)		EPIC Triennial 3 (2018-2019)	
	RD&D	Program Administrative	RD&D	Program Administrative	RD&D	Program Administrative
SDG&E Disbursements to CEC	16,127	3,024	40,624	2,991	6,331	1,302
SDG&E Disbursements to Commission for Regulatory Oversight	N/A	273	N/A	224	N/A	163

B. Commitments/Encumbrances^{5,6} for TD&D Projects

SDG&E has committed \$8,852k of its TD&D budget for the EPIC-3 cycle to four projects in its approved EPIC-3 plan. As of December 31, 2019, SDG&E has committed \$8,852k of EPIC-3 funds for contracted activities and in-house work in collaboration with contractors. As of December 31, 2019, SDG&E has expended \$384k on contracted work. SDG&E has spent \$182k on internal project work. The total expenditures through December 31, 2019 on EPIC-3 TD&D project work is therefore \$566k.

C. Commitments/Encumbrances for Program Administration

As of December 31, 2019, SDG&E has committed \$916k for its EPIC-3 administrative budget.

D. Fund Shifting Above 5% between Program Areas

The utility EPIC Administrators are only allowed to fund EPIC projects in the TD&D program area. SDG&E has done no fund shifting to other program areas.

E. Uncommitted/Unencumbered Program Funds

SDG&E has committed all of its EPIC-3 TD&D funds to the four projects that were launched in 2019.

III. SDG&E EPIC-1 and EPIC-2 PROJECTS

All EPIC-1 and EPIC-2 projects were completed prior to 2019. The comprehensive final project reports were delivered with prior annual reports and are posted on SDG&E's public website at www.sdge.com/epic. There are no annual report updates on these projects for 2019 or subsequent years.

IV. SDG&E EPIC-3 PROJECTS

This section provides a detailed description and status report for the active EPIC-3 projects.

⁵ Commitment means assigned for anticipated work on a project, including anticipated contractual commitments, equipment purchases, software licenses, associated technical work by the SDG&E project team, and other expenses directly associated with the project work.

⁶ Encumbrances are funds that are specified for contracts (D.13-11-025 at 101; Ordering Paragraph 45) or for in-house work necessary in collaboration with a contractor (D.13-11-025 at 53). They differ from commitments in that commitments are the identification of blocks of funds to be assigned to projects, whereas encumbrances specify how the commitments will be used in the projects.

Project 3: Application of Advanced Metering Infrastructure (AMI) Data to Advanced Utility System Operations

A. Investment Plan Period - 2018-2020 (EPIC-3)

B. Assignment to Value Chain - Distribution

C. Objective

The objective of this project is to perform pre-commercial demonstrations of critical capabilities for leveraging SDG&E's AMI system with its 1.4 million endpoints to provide actionable secondary voltage data and analysis to SDG&E and other prospective users.

D. Scope

The pre-commercial demonstration work is focused in two modules:

- **Module 1: AMI System as a Voltage Sensor Network**

This module is being performed as part of a Cooperative Research and Development Agreement (CRADA) with the National Renewable Energy Laboratory (NREL). The primary focus of the module is to demonstrate and evaluate the capabilities of AMI-based controls for distribution system operations, including monitoring and control at the secondary transformer level using existing AMI infrastructure. In other words, the grid-edge monitoring systems and controls provided by the third-party vendors (procured by SDG&E) will perform grid operations using AMI data. The module scope will also include efforts for developing and validating models that are representative of real SDG&E feeders in a distribution simulation environment. These models will be tuned and validated using AMI data collected from the field to produce accurate feeder models. Moreover, a demonstration comprising of control use case scenarios, performance metrics and evaluation procedures will be performed.

- **Module 2: Phase Identification**

Visibility into the physical state of the distribution system and its real-time load flow conditions is required to advance grid modernization. Accurate phasing information is essential for optimal control and effective operation of a utility distribution system with modernization functions such as an advanced distribution management system (ADMS) and a distributed energy resource management system (DERMS) platforms. Thus, it is becoming more important to have accurate information (i.e. phase identification) of the distribution network to be able to effectively manage/control it. This module will demonstrate the application of AMI data to automatically identify phasing information within SDG&E distribution system.

E. Deliverables

Two comprehensive final reports, including thorough documentation of the module approaches, demonstration results, final benefits estimate, value proposition, and recommendations regarding commercial adoption.

F. Metrics

This section provides more information about the metrics and benefits of the project. The most important benefits are in areas of:

- **Safety, Power Quality, and Reliability**

- a. Ability to monitor, visualize, and analyze visualization information can help reduce number of outages, as well as their frequency and duration. Transmission fault location use case is particularly useful for this purpose.
- b. Public safety improvement and hazard exposure reduction can also be accomplished by advanced visualization tools, for example, in the AMI for operations use case, where the voltage swell, and sag are visually monitored. This application is used for monitoring in emergency scenarios, such as Red Flag Warnings, earthquakes etc.
- c. Improved access to AMI data and awareness company-wide. For example, the load curtailment visualization use case, where the load curtailment is visually represented to help users to visualize the curtailment locations and details as data on a map. This is expected to be useful in emergencies.

- **Effectiveness of Information Dissemination**

- a. The visualization platform will enable the creation of numerous reports and fact sheets for various users.

G. Schedule - January 2019 to October 2021

H. EPIC Funds Committed - \$2,344k

I. EPIC Funds Spent as of December 31, 2019 - \$231k

J. Partners (if applicable) - National Renewable Energy Laboratory (NREL)

K. Match Funding (if applicable) – NREL \$250k; additional match dependent on future procurements.

L. Match Funding Split (if applicable) – 50/50

M. Funding Mechanism (if applicable)

SDG&E EPIC funds applied to a combination of in-house work and pay-for-performance contracts. Cost share by National Renewable Energy Laboratory (NREL).

N. Treatment of Intellectual Property (if applicable) - No IP developed

O. Status Update

Activities in Module 1 have progressed. Several on-site meetings and working sessions have been completed. The SDG&E team provided requested data to the NREL team for use in the demonstration.

Project 4: Safety Training Simulators with Augmented Visualization

A. Investment Plan Period - 2018-2020 (EPIC-3)

B. Assignment to Value Chain - Distribution

C. Objective

The project will demonstrate and evaluate augmented reality applications for field focused design, operations, and asset monitoring and management solutions. It will demonstrate the ability of the latest simulator technologies to train utility industry personnel on safety related issues, such as electric potential zones and grounding techniques associated with construction work practices. Capabilities to be demonstrated will include the utilization of augmented reality tools to visualize and provide rich contextual information at the point of work.

D. Focus

EPIC Project 4 is divided into two modules.

The first module focus is to conduct a pre-commercial demonstration of a functioning fault location system, that will be utilized to create a training stimulator for electric distribution system operators and other prospective users.

The second module focus is to perform a pre-commercial demonstration of augmented reality applications for field-focused design, operations, and asset monitoring and management solutions. The project will demonstrate the ability of latest simulator technologies to train utility industry personnel on safety-related issues, such as equal potential zones and grounding techniques associated with construction work practice. The demonstration will include utilization of augmented reality tools to visualize and provide rich contextual information at the point of work.

E. Scope

Module 1: Focused Patrols Simulator

The Scope of the project is to demonstrate a functioning pre-commercial training simulator that can help narrow the location of a fault search during a power outage for a set of selected test circuits. This new training environment will be utilized to teach the system operators as well as other prospective users to recognize, understand and utilize, the signals that a newly installed array of Wireless Fault Indicators (WFIs) in conjunction with existing SCADA capable devices and revamped Network Management System (NMS) built-in algorithm to accurately predict the region of a fault. Minimizing the fault location process and allowing them to more strategically dispatch fewer and more focused field personnel to the scene will provide the following benefits:

- **Safety to SDG&E's Personnel**
Because the Training Simulator will make the operators more efficient at determining fault location and directing field personnel to the correct location, it will inherently make the field personnel safer by reducing their driving exposure into more rural areas and sometimes dangerous weather conditions.

- **Safety to the Public**
The new Training Process and improved field equipment, could allow the operators to find wire down events quicker, reducing public exposure to a potentially energized system.

- **Risk Reduction**
If the fault location can be identified quicker, and the correct personnel deployed accurately and faster to that location, it will:
 - Enable the organization to be better prepared for the future, by offering more measures to mitigate/decrease the risk of starting fires due to wire down or possibly other events, thus significantly reducing the overall risk faced by the company and its customers, as it relates to wildfire.
 - Reducing the need for test closure could make us a more resilient utility by extending the life cycle of distribution equipment.

- **Reduced Cost**

Focused patrol training will allow for a quicker fault identification, effectively reducing the duration of power interruption and therefore potentially reducing the overall System Average Interruption Duration Index (SAIDI) impact of an outage, making SDG&E a more reliable utility. It will also increase customer satisfaction and reduce their exposure to wildfire-related and other risks associated with outages, resulting in cost reductions.

- This training module will naturally lead to reduced costs due to process improvements because it will allow a utility to do the same job more quickly with fewer resources (i.e.: if the location of the fault is determined more quickly, personnel can be deployed to the location more quickly).

Module 2: Personal Protective Grounding/Equal Potential Zone Simulated

Virtual Reality (VR) Training Demonstration

The scope of this module is to demonstrate a VR pre-commercial training stimulator for PPG/EPZ on the electric distribution underground (UG) system. This new training will be used for students initial and/or refresher compliance training to understanding of the procedures for PPG/EPZ. With the energized test yard, the VR would be tested to see how efficient the training with the VR compared with reality (current practice). The case for prospective commercial adoption of the training will be examined. The following benefits will be evaluated:

- **Safety to SDG&E's Personnel**

- a. With the VR simulator, SDG&E will be able to provide initial and refresher training to more employees on the proper procedures of doing PPG/EPZ on distribution UG.
- b. The energized test yard would be used to demonstrate how the PPG/EPZ training will help protect employees from electric potential zones that are hazardous to human life.

- **Safety to the Public**

With the VR training, SDG&E would be able to restore power to the customer more quickly and safely and to reduce public exposure to a potentially energized system.

- **Risk Reduction**
The VR training will help protect employees from back-feed currents from non-utility generation sites (e.g., photovoltaic systems, wind turbines, etc.).
- **Reduced Cost**
The training will help reduce outage times and associated costs.

F. Deliverables

One or more comprehensive final reports, including thorough documentation of the module approaches, demonstration results, final benefits estimate, value proposition, and recommendations regarding commercial adoption.

G. Metrics

- **Module 1**

A key metric will be shorter SAIDI minutes for outages because of quicker fault location identification.

Another key metric will be reduced usage of test closure to identify fault location, and the resulting longer asset life.

The ultimate key metric will be the effectiveness of the training simulator in improving operating practices that result in achieving the above metrics. There will be a task that tests the capture of learning by those taking the training.

A quantitative basis for valuation of the above metrics will be created in the analysis phase of this project module. Additional benefits of commercial adoption may also be identified as the work progresses.

- **Module 2**

A key metric that will be used is the safety of the employees, in the context of back feed from customer generation (distributed energy resources)

Another key metric will be the extent of reduction of outage times and injuries attributable to the training. The ultimate key metric will be the general effectiveness of the training simulator.

- H. Schedule - January 2019 to October 2021**
- I. EPIC Funds Committed - \$2,206k**
- J. EPIC Funds Spent as of December 31, 2019 - \$176k**
- K. Partners (if applicable) - N/A**
- L. Match Funding (if applicable)**
Will depend on outcome of competitive procurement
- M. Match Funding Split (if applicable) - N/A**
- N. Funding Mechanism (if applicable)**
SDG&E EPIC funds applied to a combination of in-house work and pay-for-performance contracts. A competitive solicitation was released in 2019, an award was made in December 2019, and two additional competitive solicitations will be released in 2020.
- O. Treatment of Intellectual Property (if applicable) - No IP developed.**
- P. Status Update**
- **Module 1**

SDG&E is choosing the circuits for this demonstration and will select the methodology that will be used to identify the strategic location where the WFIs will be installed. SDG&E also started the installation of the WFIs, which will be completed in 2020. Concurrently to the WFI task, the team made considerable progress in updating the electrical system data which eventually will lead to the network management system (NMS) having values that mirror more closely our current protection software and data. SDG&E anticipates having all the updates completed in early 2020.

SDG&E will issue a competitive solicitation in early 2020 with the goal of hiring a contractor to work with SDG&E internal staff.
 - **Module 2**

SDG&E is using internal staff as the subject matter experts and anticipates hiring a software vendor to provide a capability to demonstrate PPG/EPZ practices. An energized test yard is being built to evaluate how well the VR compares to reality.

The internal project team developed five scenarios and had three vendors exhibit their VR capabilities to SDG&E. SDG&E also broke ground on the energized test yard that will be used to simulate the five scenarios.

An energized test yard is being built to evaluate how well the virtual reality (VR) training compares to existing practices. An initial contractor selection was completed in 2019. An additional contractor selection will be completed in 2020 to procure a software vendor to work with SDG&E.

Project 5: Unmanned Aircraft Systems (UAS) With Advanced Image Processing for Electric Utility Inspection and Operations

A. Investment Plan Period - 2018-2020 (EPIC-3)

B. Assignment to Value Chain - Transmission / Distribution

C. Objective

The project will demonstrate new applications of Unmanned Aircraft Systems ("UAS") with enhanced image processing capabilities for electric operations. The project will define, demonstrate and evaluate concepts for instrumentation and monitoring of the power system equipment using enhanced imaging on UAS and sensor technology. The project will evaluate the potential to increase reliability, safety and cost efficiency to improve power system operations.

D. Focus

The focus of this project will demonstrate practical applications of UAS that have strong implications for worker safety, system reliability, data collection and storage, and improved decision making in operations. The project will follow a logical structure to capture, process, analyze, and share information using UAS.

E. Scope

Define, demonstrate and evaluate concepts for instrumentation and monitoring of the power system equipment using enhanced imaging on UAS and sensor technology. Evaluate the potential to increase reliability, safety and cost efficiency to improve power system operations and thereby add value to customers.

Nine benefit areas are to be studied:

1. Improved sensor technologies (i.e., LiDAR and Corona camera) monitor power system equipment with more accuracy and provide better photo documentation.
2. Night flights and beyond line of sight (BLOS) operations provide more long-range inspection and documentation opportunities – improved modern methods of data collection.
3. Improved worker safety – fewer near-miss accidents and reduced potential OSHA reports such as accidents, worker’s comp, and other paid leave.
4. Increased power system reliability, safety, and cost efficiencies – improved operations and higher cost savings.
5. Advanced imaging provides more efficient disaster response times, reporting, and re-energization of patrols after a site is deemed all-clear.
6. Supports vegetation management – reduces potential for wildfires.
7. Ability to efficiently identify corrosion on equipment near coastlines.
8. Improved long-term planning – ability to determine the status of scenarios as-is versus how they should be.
9. Supports and increases staff efficiencies of 7 departments including:
 - Aviation Services Department (ASD)
 - Electric Distribution Engineering (EDE)
 - Distributed Energy Resources (DER)
 - Fire Risk Mitigation (FiRM)
 - Fire Science and Coordination
 - Transmission, Construction & Maintenance (TCM), and
 - District Operations & Engineering (O&E)

The demonstration targets multiple use cases:

- **Use Case 1** - Telepresence software provides teams with the ability to integrate drones into their operational workflows; both systems and personnel. Experts can participate from their office, which limits equipment and personnel on-site. Evaluation of repair needs can be done remotely and assess risk before any personnel arrive on site. Video feeds can be shared with management.
- **Use Case 2** – BLOS is not currently the normal operations when operating UAS in the United States. We explored the pros and cons of investing in BLOS.

- **Use Case 3** - Explores night flights in support of Public Safety Power Shutoff (PSPS) and wildfire mitigation. Since 2007, SDG&E has invested \$1.5 billion in fire mitigation. This includes robust efforts to fire harden the power grid, enhance situational awareness, update operating protocols and build community partnerships to improve this region's overall ability to respond to wildfire. SDG&E has 25 drones to assess infrastructure working in conjunction with CalFire as needed. The EPIC project work benefits from the past buildup of these capabilities.
- **Use Case 4** –Investigation of a corona camera has been initiated. Corona is a luminous partial electrical discharge due to ionization of the air. Corona causes faulty components of the network, RF interference and audible noise. Corona will appear when the local electric field exceeds a critical value. The ultraviolet emission can be visualized with daylight corona ultraviolet camera.
- **Use Case 5** – Investigation of tethering a UAS has been initiated. Tethering could provide unlimited flight time and would be ideal in an emergency situation. It could provide situational awareness when using the Tactical Command Vehicle (TCB).

F. Deliverables

A comprehensive final report, including thorough documentation of the project approach, demonstration results, final benefits estimate, value proposition, and recommendations regarding commercial adoption.

G. Metrics

The project tracking metrics were established as follows:

- **Use Case 1** - Due to a vendor acquisition, the establishment of metrics had to be deferred.
- **Use Case 2**- After some research on companies that were conducting Beyond Line of Sight operations, we contacted Harris Corporation who has experience with assisting other businesses in obtaining BLOS approval from the FAA. Ultimately, we decided not to pursue a BLOS waiver from the FAA due to expense, constant changing regulations, and the following reasons:
 - a. BLOS waivers are not really beyond line of site and requirements of tracking the UAS remain.
 - b. Costs to get to a BLOS waiver exceed the funding for this project.
 - c. BLOS waivers could be a thing of the past as the FAA addresses concerns and changes policies for UAS.

- **Use Case 3** - UAS operations procedures during Red Flag Warnings were created to include a work shift schedule due to a PSPS. After the PSPS, UAS crews will support inspecting overhead power lines to check for debris and equipment damage prior to re-energizing lines. Success will be measured when full integration of UAS night patrols are demonstrated during a PSPS event and will prove beneficial when we bring power on to customer in a faster and less costly manner.
- **Use Case 4**- As of Aug 2019, SDG&E is the first company in the United States to fly the corona camera on the UAS with the support of a local vendor integrating the camera on a UAS. In recent work, SDG&E completed 5 successful test flights on August 19- 20, 2019 and again on September 12, 2019 and assessed twelve 230kV tower structures, which took approximately one and half hours to complete. The normal way for this inspection is to use a handheld corona camera and that would have taken four hours. More testing is scheduled for 2020, and efforts will be made to integrate the procedures into the regular workforce operations.
- **Use Case 5** - Demonstration of the tethering UAS was conducted November 19, 2020 with a vendor and produced mixed results. Battery issues arose with the demonstration unit, and it did not work properly. This is a new technology, and it does not appear to be working as advertised. The metric goal is increased situational awareness during emergency events and use for increased flight time using the Tactical Command Vehicle (TCB).

Major project results were presented for consideration in September 2019 at the DJI Airworks UAS conference. Airworks is a hub for innovation and growth, enabling participants in the UAS industry to exchange ideas and steer the future development of the industry.

- H. Schedule - January 2019 to October 2021**
- I. EPIC Funds Committed - \$729k**
- J. EPIC Funds Spent as of December 31, 2019 - \$106k**
- K. Partners (if applicable) - N/A**
- L. Match Funding (if applicable) - N/A**
- M. Match Funding Split (if applicable) - N/A**

N. Funding Mechanism (if applicable)
SDG&E EPIC funds applied to a combination of in-house work and pay-for-performance contracts.

O. Treatment of Intellectual Property (if applicable) - No IP developed

P. Status Update

Due to Use Case 2 having limitations to the use of BLOS (still needing visual or electronic means of tracking), it negated any real benefit. SDG&E would not achieve any return on investment and therefore will not pursue this use case further. Use Cases 1, 3, 4, & 5 continue to be researched, tested, and evaluated.

Project 7: Demonstration of Multipurpose Mobile Battery for Port of San Diego and/or Other Applications

A. Investment Plan Period - 2018-2020 (EPIC-3)

B. Assignment to Value - Distribution (primary) and Demand-Side Management (primary)

C. Objective

The objective of this project is to undertake a pre-commercial demonstration of a mobile battery system. The project will examine the possibilities for using a mobile battery at its home base (tentatively the Port of San Diego (“Port”)) and at secondary energy hubs (such as SDG&E substations or large customers) within the service area. The project will evaluate stacking of various benefits that can be derived from a mobile battery, when rotated between multiple locations. The battery will be used at the Port cruise ship terminal during the peak cruise ship season and in other applications at other locations during non-peak season. The objective is to evaluate the effectiveness of mobile batteries when rotated between applications and identify preferred applications and strategy for the rotation.

D. Focus

The focus of this project is to conduct a pre-commercial demonstration, showcasing the new concept of mobile utilization of a containerized battery energy storage system (BESS) for various locations and use cases. To evaluate the stacking of benefits when rotated between applications, identifying preferred applications and feasibility for commercialization.

E. Scope

While mobile batteries are commercially available, the mobile utilization of the same asset at multiple locations with multiple use cases is new and needs to be demonstrated and evaluated. To better approach the demonstration, this project has been devised into two modules.

- **Module 1 – San Diego Unified Port District (referred to as “the District”):**
A primary issue for commercial and industrial businesses within the District is low load usage yet high peak demand for relatively short periods, which results in undesirable energy demand charges. Specifically, the District cruise ship terminal has an unusual load profile with high peak demand and low load usage, resulting in a poor load factor and high demand charges. This project seeks to demonstrate a new solution to assist the District and other surrounding energy hubs in alleviating these problems. Whereas, pursuing a more traditional solution for load factor improvements has proven to be challenging due to geographical restrictions for the District.
- **Module 2 – Community Resource Center (CRC):**
As an additional application, the mobile BESS will also be considered for demonstration as a backup power solution during emergency response situations such as wildfires and other calamities. In anticipation of extended power outages, such as public safety power shutoffs (PSPS), SDG&E may request activation of a CRC in affected areas. These facilities offer resources for residents such as water and food supply, electronic device charging, and outage information updates. Enhancing the resiliency of these communities will attribute to the accessibility of resources for affected customers.

F. Benefit Areas:

- Reduced emissions of greenhouse gases - augment the use of traditional generation by use of a mobile BESS. Use of infrastructure such as a BESS helps to offset periods of heavy localized electric power demand in support of the Port of San Diego’s Climate Action Plan.
- Improved reliability and system performance – directly mitigate the duration and frequency of any service disturbances (i.e. voltage fluctuation, flicker, and harmonics) and/or interruptions (planned or unplanned) to the customer.
- Improved electric system efficiency – reduce power losses (I²R) in the system by placing a power generating source closer to customer load.
- Increased utilization of the mobile battery asset, flexibility to assist in multiple use cases, and ability to more effectively react to real-time situations.

G. Use Cases:

The demonstration will test the mobile battery for use in functions such as demand shaving, emergency energy supply, voltage regulation, and frequency regulation at the various energy hubs.

- **Reducing End-Use Consumer Demand Charges:** Large power consumers such as commercial and industrial facilities, including the District, can reduce their electricity demand charges, which are generally based on the facilities' highest observed rates of electricity consumption during peak periods, by using on-site energy storage during peak demand times.
- **Peak Shaving:** Shifting portions of electricity demand from peak hours to other times of day also reduces the amount of higher-cost, seldom-used generation capacity needed to be online, which can result in overall lower wholesale electricity prices.
- **Voltage Regulation:** Batteries can help control voltage and frequency on multiple time scales (by the second, minute, or hour). In particular, fast-ramping batteries are well suited to provide such ancillary grid services as voltage and frequency regulation. Overall, this helps maintain the grid's electric frequency optimizing the performance of the system.
- **Back-Up Power:** Batteries can provide back-up power to load pockets such as households, businesses, and CRCs. The back-up power capability not only supports electric reliability efforts but also ensures customer needs are met. Ideally, the BESS can seamlessly provide uninterrupted power when distribution services are temporarily deenergized and electrically separated from the utility system.

H. Deliverables

A comprehensive final report, including thorough documentation of the project approach, demonstration results, final benefits estimate, value proposition, and recommendations regarding commercial adoption.

I. Metrics

The project metrics will be tracked through milestones marked by completion of project plan tasks. Specific value metrics for the project will be measured by comparative analysis, utilizing current base practices and historical data (i.e. customer load demand and profile, net energy metering, power quality metering, energy consumption algorithms and calculations, emissions reporting, etc.), collecting new data through application of the mobile battery system, comparing the data specific to each use case, and analyzing the benefits.

J. Schedule - January 2019 to October 2021

K. EPIC Funds Committed - \$3,573k

L. EPIC Funds Spent as of December 31, 2019 - \$53k

Spending is expected to increase significantly in 2020 with procurement (purchase or lease) of one or more mobile batteries.

M. Partners (if applicable) - San Diego Unified Port District

N. Match Funding (if applicable)

Will depend on outcome of competitive procurement

O. Match Funding Split (if applicable) – N/A

P. Funding Mechanism (if applicable)

SDG&E EPIC funds applied to a combination of in-house work and pay-for-performance contracts.

Q. Treatment of Intellectual Property (if applicable) - No IP developed.

R. Status Update

Competitive procurement of a mobile battery system is being conducted. A competitive solicitation will be released during the first quarter of 2020, with an expected bidder evaluation and contract award in the second quarter of 2020. In conjunction, tasks to prepare the use cases and test plan will commence in the first quarter of 2020. The project demonstration and testing are scheduled to begin in the third quarter of 2020.

V. CONCLUSION

A. **Key Results for 2019 SDG&E EPIC Program**

As of December 31, 2018, SDG&E had completed all technical project work for its 11 Commission-approved EPIC-1 and EPIC-2 projects. No projects were completed in 2019, and no new final project reports are ready for filing with this annual report. Past EPIC comprehensive final project reports are available on the SDG&E EPIC website at www.sdge.com/epic.

Major accomplishments in 2019 included launching four EPIC-3 projects, including development of project plans and formation of internal teams. Construction or field test work was initiated in the projects. Needed contractor services were identified, and RFPs were developed for release in 2020.

Additionally, extensive work went into development of the Research Administration Plan (RAP). The effort included ongoing coordination among the administrators and engagement with external groups, such as pier R&D programs and representatives of disadvantaged communities. The plan was filed and ushered through the regulatory proceeding.

B. **Next Steps for SDG&E's EPIC Program**

SDG&E's EPIC-3 Application was approved by the Commission in October 2018, with release of 2/3 of the funds requested in the application. The remaining funds were held, pending approval of a Research Administration Plan (RAP) to be jointly prepared by the utility EPIC Administrators. The RAP approval did not come until 2020. Four projects were launched in 2019. Project plans were written, and internal project teams were formed. Initial work on tasks in the project plans was performed to choose the focus of each project, define use cases, determine each project's requirements for additional internal resources, contractors, facilities, site(s) for the demonstration, equipment, and materials. RFPs to procure contractors will be released in 2020. Contracts will be executed. The demonstration systems will be set up. Use case demonstrations, data assimilation, and analysis will then follow. The rate of spending in all projects will accelerate as these steps unfold.

ATTACHMENT B

SDG&E 2019 Annual Report

Project Status Spreadsheet

(Excel file follows)

Attachment B - San Diego Gas Electric Company - 2019 EPIC Project Status Report

Investment Program	Program Administrator	Project Name	Project Type	Brief Description of the Project (objective; scope; deliverables; schedule)	Date of the Award	Was project awarded in the immediately prior calendar year?	Assignment to Value Chain	Encumbered Funding Amount (\$000)	Committed Funding Amount (\$000)	Funds Expended to date: Contract/Grant Amount (\$000)	Funds Expended to date: In-house expenditures (\$000)	Funds Expended to date: Administrative and overhead costs to be incurred for each project	Leveraged Funds (\$000)	Partners	Match Funding (\$000)	Match Funding Split	Funding Mechanism	
3rd Triennial (2019)	SDG&E	Application of Advanced Metering Infrastructure (AMI) Data to Advanced Utility System Operations	Pre-Commercial Demonstration	The project will perform pre-commercial demonstrations of two critical capabilities (towards modernization) for leveraging SDG&E's AMI system with its 1.4 million endpoints to provide actionable secondary voltage data and analysis to SDG&E and other prospective users. The project is split into multiple work packages. A comprehensive final report will be delivered for each major module. Schedule - Jan 2019 - Oct 2021.	Initial Award on April 15, 2019	Yes	Distribution	2,344	2,344	161	70	N/A	250	NREL	250	50/50	SDG&E EPIC funds applied to a combination of in-house work and pay-for-performance contracts.	
3rd Triennial (2019)	SDG&E	Safety Training Simulators with Augmented Visualization	Pre-Commercial Demonstration	The project will demonstrate and evaluate augmented reality applications for field focused design, operations, and asset monitoring and management solutions. This project is divided into two modules: "Training Environment for System Operators Allowing Focused Patrol of Overhead Distribution" and "Personal Protective Grounding/Equal Potential Zones (PPGEPZ) Training on the Electric Underground Distribution System". A comprehensive final report will be delivered for each module. Schedule - Jan 2019 - Oct 2021.	Initial Award in December 2019	No	Distribution	2,206	2,206	131	45	N/A	None to date	None to date	None to date	N/A	None to date	SDG&E EPIC funds applied to a combination of in-house work and pay-for-performance contracts.
3rd Triennial (2019)	SDG&E	Unmanned Aircraft Systems (UAS) with Advanced Image Processing for Electric Utility Inspection and Operations	Pre-Commercial Demonstration	The project will demonstrate new applications of Unmanned Aircraft Systems ("UAS") with enhanced image processing capabilities for electric operations. The project will define, demonstrate and evaluate concepts for instrumentation and monitoring of the power system equipment using enhanced imaging and sensor technology on UAS. The project will evaluate the potential to increase reliability, safety and productivity of electric utility operations. A comprehensive final report will be delivered. Schedule - Jan 2019 - Oct 2021.	None to date	No	Transmission and distribution	729	729	92	14	N/A	None to date	None to date	None to date	N/A	None to date	SDG&E EPIC funds applied to a combination of in-house work and pay-for-performance contracts.
3rd Triennial (2019)	SDG&E	Demonstration of Multiple-Purpose Mobile Battery for Port of San Diego and/or Other Applications	Pre-Commercial Demonstration	The objective of this project is to demonstrate a pre-commercial mobile battery system. The project will examine the possibilities for using a mobile battery at its home base (tentatively the Port of San Diego ("Port")) and at secondary energy hubs (such as SDG&E substations or large customers) within the service area. The project will evaluate stacking of various benefits that can be derived from a mobile battery, when mobile battery is used in locations. A comprehensive final report will be delivered. Schedule - Jan 2019 - Oct 2021.	None to date	No	Distribution (primary) and demand side management (secondary)	3,573	3,573	0	53	N/A	None to date	Port of San Diego	None to date	N/A	None to date	SDG&E EPIC funds applied to a combination of in-house work and pay-for-performance contracts.
													3rd Triennial (2018 - 2020) - Current Financial Totals as of December 31, 2019					
									8,952	8,952	384	182	566					

Project status information for EPIC-1 and EPIC-2 was included in prior annual reports and is not included above, because the projects were completed in prior years.

Attachment B - San Diego Gas Electric Company - 2019 EPIC Project Status Report

Investment Program	Program Administrator	Project Name	Intellectual Property	Identification of the method used to grant awards	If competitively selected, provide the number of bidders passing the initial pass/fail screening for project	If competitively selected, provide the name of selected bidder.	If competitively selected, provide the rank of the selected bidder in the selection process.	If competitively selected, explain why the bidder was not the highest scoring bidder, explain why a lower scoring bidder was selected.	If Intergovernmental or sole source agreement, specify date of notification to the Joint Legislative Budget Committee (JLBC) authorized. (This column is applicable to the CEC only.)	Does the recipient for this award identify as a small business, or women, minorities, or disabled veterans?	How the project leads to technological advancement or breakthroughs to overcome barriers to achieving the state's statutory energy goals (This column is applicable to the CEC only.)	Applicable Metrics	Project Status Report
3rd Triennial (2019)	SDG&E	Application of Advanced Metering Infrastructure (AMI) Data to Advanced Utility System Operations	No	Sole source	N/A	N/A	N/A	N/A	Legislative Budget Committee (JLBC) was notified and date of notification to the Joint agreement, specify date of Intergovernmental or sole source agreement, specify date of notification to the CEC (This column is applicable to the CEC only.)	No	N/A	Ability to monitor, visualize, and analyze visualization information can help reduce number of outages, as well as their frequency and duration. Public safety improvement and hazard exposure reduction can also be accomplished by advanced visualization tools, for example, in the AMI for operations use case, where the voltage swell, and sag are visually monitored. This application is used for monitoring in emergency scenarios, such as Red Flag Warnings, earthquakes etc. Improved access to AMI data and awareness company-wide.	Activities in Module 1 have progressed. Several on-site meetings and working sessions have been completed. The SDG&E team provided requested information to NREL team for use in the demonstration.
3rd Triennial (2019)	SDG&E	Safety Training Simulators with Augmented Visualization	No	Module 2. Competitive procurement in 2019	3	A.M. Ortega	1	N/A		Yes		Module 1 - Key metrics will be shorter (AIDI) minutes for outages, reduced usage of test closure to identify fault location, and the resulting longer asset life. The ultimate key metric will be the effectiveness of the training simulator in improving operating practices that result in achieving the above metrics.	<p>Module 1 - SDG&E is choosing the circuits for this demonstration and will start installation of test equipment in 2020. SDG&E will issue a competitive solicitation in early 2020 with the goal of hiring a contractor to work with SDG&E internal staff.</p> <p>Module 2 - An energized test yard is being built to evaluate how well the virtual reality (VR) training compares to existing practices. An initial contractor selection was completed in 2019. An additional contractor selection will be completed in 2020 to procure a software vendor to work with SDG&E.</p>
				Module 1. Competitive procurement in 2020	TBD	TBD	TBD	TBD	TBD	N/A	TBD		
				Module 2. Competitive procurement in 2020	TBD	TBD	TBD	TBD	TBD	TBD	TBD		
3rd Triennial (2019)	SDG&E	Unmanned Aircraft Systems (UAS) with Advanced Image Processing for Electric Utility Inspection and Operations	No	Competitive procurement in 2020	TBD	TBD	TBD	TBD	N/A	TBD	N/A	The novel solutions under investigation will be demonstrated in relevant, high-priority applications. The benefits derived will be quantified and compared with the costs of procuring and using these solutions in current practices. These results will be used to inform decision making on prospective commercialization.	The beyond line of sight (BLOS) use case was found to have limitations (still needing visual or electronic means of tracking) that negated any real benefit. SDG&E would not achieve any return on investment and therefore will not pursue this use case further. Other use cases, such as use of a corona camera, will continue to be researched, tested, and evaluated.
3rd Triennial (2019)	SDG&E	Demonstration of Multiple-Purpose Mobile Battery for Port of San Diego and/or Other Applications	No	Competitive procurement in 2020	TBD	TBD	TBD	TBD	N/A	TBD	N/A	The project metrics will be tracked through milestones marked by completion of project plan tasks. Specific value metrics for the project will be measured by comparative analysis, utilizing current base practices and historical data (i.e., customer load demand and profile, net energy metering, power quality metering, energy consumption, etc.) collecting new data through application of a mobile battery system, comparing the data specific to each use case, and analyzing the benefits.	Tasks to prepare the use cases and test plan will commence in the first quarter of 2020. A competitive solicitation for a mobile battery system will be expected during the first quarter of 2020, with an expected bidder evaluation and contract award in the second quarter of 2020. The project demonstration and testing are scheduled to begin in the third quarter of 2020.

Project status information for EPIC-1 and EPIC-2 was included in prior annual reports and is not included above, because the projects were completed in prior years.