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

March 1, 2021

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) 2020 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 2020 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 2020 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 2020 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 2020 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® 2020 EPIC Annual Report

San Diego Gas & Electric Company

2020 EPIC Annual Report

March 1, 2021

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Attachment B – 2020 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 2020 EPIC Annual Report (Report). This Report provides an overview of SDG&E's EPIC activities during the 2020 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 2020 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 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 2020 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 advanced distribution 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 for SDG&E participation 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.

In A.17-05-009[5], 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 occurred in 2020. The RAP application A.19-04-026 was a

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

joint filing of the IOU administrators and was approved in D.20-02-003, releasing the remaining funds.[6] The EPIC-3 funds were applied to four project areas in A.19-04-026.

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 in the 2019 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.

[6] The IOUs' Joint Application (A1904026), approved in D.20-02-003, issued February 10, 2020.

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

EPIC-3 Projects (2018--2020)				
EPIC-3 Projects	**Incurred[7] Costs ($ thousands)**	**Encumbered[8] Costs ($ thousands)**	**Commitments[9] ($ thousands)**	**Project Status**
3. Application of Advanced Metering Infrastructure (AMI) Data to Advanced Utility System Operations	538	2,344	2,344	In Progress
4. Safety Training Simulators with Augmented Visualization	608	2,206	2,206	In Progress
5. Unmanned Aircraft Systems (UAS) with Advanced Image Processing for Electric Utility Inspection and Operations	396	729	729	In Progress
7. Demonstration of Multiple-Purpose Mobile Battery for Port of San Diego and Other Applications	148	3,573	3,573	In Progress
SDG&E Program Administration	428	916	916	In Progress
Total	**$2118**	**$9,768**	**$9,768**	

[7] As used in this Report, incurred costs mean actual booked expenditures.
[8] 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.
[9] 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 by the end of 2018. Summaries of those projects can be found in SDG&E's prior annual reports 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 is performing 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, in commercial use the grid-edge monitoring systems and controls provided by the third-party vendors (procured by SDG&E) would 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 compromising 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

advanced distribution management system (ADMS) and 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 Patrol 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, upgraded AMI functionality, and a revamped ADMS built-in algorithm--to accurately predict the region of the fault, thereby greatly reducing the customer 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. A vendor was selected through competitive procurement to work with the internal SDG&E project team, and contract execution is expected in early 2021.

- **Module 2: Personal Protective Grounding/Equal Potential Zone (PPG/EPZ) Simulated Training Demonstration**

  This project is demonstrating 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 is using internal staff as the subject matter experts and has contracted with a software vendor to provide a training solution to demonstrate improved PPG/EPZ practices. The selected use cases will form the basis for the VR demonstration. SDG&E has built an energized

test yard at which it will evaluate how the VR training compares to existing practice, in terms of actual vs. predicted hazard exposures to workers, and student learning outcomes.

A vendor was selected by a Request for Proposal (RFP) process, and a contract was awarded to one of the bidders to work with the SDG&E team in performing the demonstration. The test yard was completed in the 2020 calendar year. The demonstration is now in progress.

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

The project is demonstrating 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
- Line Pulling

Project 7: Demonstration of Multi-Purpose 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, tentatively the San Diego Unified Port District ("the District"), and at secondary energy hubs.

In fulfillment of "other applications" proposed, an additional mobile battery system use case has been identified for potential implementation at community resource centers (CRCs). This application will assess the value proposition for providing emergency backup power at CRCs during evacuations, power outages and, more specifically, during wildfire situations (i.e. public safety power shutoffs). Based on the applications identified and 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. 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, a smaller mobile battery energy storage system (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 contribute to the accessibility of resources for affected customers.

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

Main Body

of

2020 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 was intended to run through 2020 and is comprised of three triennial program cycles (*i.e.*, EPIC-1, EPIC-2, EPIC-3). It has been extended into 2021 due to delays in decisions on the EPIC-3 program applications.

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 permitted under the program. 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 permitted.

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, pending approval of a Research Administration Plan (RAP) which occurred in 2020. The RAP application A.19-04-026 was a joint filing of the IOU administrators and was approved in D.20-02-003. The EPIC-3 funds were applied to four of project areas in the approved application.

[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. The CPUC has requested that the annual report requirement be extended to include one additional year (2020), which is the subject of this current report, submitted March 1, 2021. This is the ninth 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. Five competitive procurements for EPIC-3 projects were launched in 2020, and resulting contracts were executed or are nearing execution.

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] Due to the COVID-19 pandemic, the annual EPIC Symposium (which had been a winter event in prior years) was slipped to October 19-21, 2020 and was expanded in size and duration from prior years. There was no Fall Workshop in the manner of prior years. SDG&E also participated in all 11 of the workstream workshops that were ordered for the EPIC "Policy+Innovation" Coordination Group (PICG) during 2020.

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.

[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, 2020.

Table 2. SDG&E Budget and Incurred Costs for EPIC-3 as of December 31, 2020 (in $ thousands)

	EPIC Triennial 3 (2020)	
	Technology Demonstration & Deployment	**Program Administrative**
SDG&E Commission-Authorized Budget[3]	8,852	916
SDG&E Incurred Costs[4] as of December 31, 2020	1686	428

[3] D.18-10-052 for EPIC-3.
[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, 2020.

Table 3. SDG&E's Disbursements to the CEC and CPUC for EPIC-1, EPIC-2 and EPIC-3 as of December 31, 2020 (in $ thousands)

	EPIC Triennial 1 (2012 – 2014)		EPIC Triennial 2 (2015 – 2017)		EPIC Triennial 3 (2018-2020)	
	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	14,739	3907
SDG&E Disbursements to Commission for Regulatory Oversight	N/A	273	N/A	224	N/A	244

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, 2020, SDG&E has committed $8,852k of EPIC-3 funds for contracted activities and in-house project work. As of December 31, 2020, SDG&E has expended $333k on contracted work. SDG&E has spent $1353k on internal project work. The total expenditures through December 31, 2020 on EPIC-3 TD&D project work are therefore $1686k.

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, with continuing execution in 2020.

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

All EPIC-1 and EPIC-2 projects were completed in earlier years. 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 updates for those projects to be reported for 2020.

IV. SDG&E EPIC-3 PROJECTS

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

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

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

2. Assignment to Value Chain - Distribution

[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.

3. 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.

4. 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, in commercial use the grid-edge monitoring systems and controls provided by the third-party vendors (procured by SDG&E) would 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 compromising 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 advanced distribution management system (ADMS) and 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.

5. Deliverables

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

6. Metrics

This section provides more information about the metrics and benefits of the project, which are being analyzed in the demonstration work. 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. The transmission fault location use case is particularly beneficial 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 and earthquakes.

    c. Improved access to AMI data and awareness company-wide. For example, in the load curtailment visualization use case, the load curtailment is visually represented to help users visualize the curtailment locations and details as data on a map. This is expected to be beneficial in emergencies.

- **Effectiveness of Information Dissemination**

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

7. Schedule - January 2019 to October 2021

8. EPIC Funds Committed - $2,344k

9. EPIC Funds Spent as of December 31, 2020 - $534k

10. Partners (if applicable) - National Renewable Energy Laboratory (NREL) in Module 1.

11. Match Funding (if applicable) – NREL $400k

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

13. Funding Mechanism (if applicable)

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

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

15. Status Update

Activities in Module 1 have progressed. The SDG&E and NREL team have completed a series of use case demonstrations. Data analysis is in progress and the cost/benefit assessment is underway.

In Module 2, a competitive procurement was carried out to select vendor tools for demonstration and evaluation. One vendor contract was executed and is underway. Another is pending completion of negotiations, which is expected in early 2021. SDG&E will be teaming with these vendors to carry out the demonstration work.

B. Project 4: Safety Training Simulators with Augmented Visualization

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

2. Assignment to Value Chain – Distribution

3. 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.

4. 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 system integrates inputs from multiple sources.

The second module focus is to demonstrate use of virtual-reality visualization tools to aid in training field employees in safe practices for working in situations where there is the possibility of unexpected hazardous levels of electric potential.

5. Scope

- **Module 1: Focused Patrol Simulator**

  The scope of this module is to demonstrate a functioning precommercial training simulator that can help system operators narrow the 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 other prospective users to recognize, understand and utilize the signals that a newly installed array of Wireless Fault Indicators (WFI's), in conjunction with existing SCADA capable devices, upgraded AMI

functionality, and a revamped advanced distribution management system (ADMS) built-in algorithm, for accurately predicting the region of a fault. Furthermore, the use of real-time data from the Automated Metering Infrastructure will be incorporated, along with advanced SCADA functionality (i.e., synchrophasors, where available). Minimizing the fault location process and allowing operators to more strategically dispatch fewer, more-focused field personnel to the scene will provide the following benefits:

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

  Because the Training Simulator will be based on a more efficient approach for determining fault location and directing field personnel to the fault location, it will inherently improve safety for field personnel, 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. And, any system that hastens service restoration inherently improves safety to the public, ensuring local infrastructure operates as intended (e.g., communications and water systems and traffic signals), after faults of any type cause service interruptions.

- **Risk Reduction**

  If a 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 that the company and its customers face as it relates to wildfire.
  - Reducing the need for test closures could make 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 outages, making SDG&E a more reliable provider. It will also increase customer

satisfaction and reduce their exposure to wildfire-related and other risks associated with outages.

This training module will naturally lead to process improvements, which will allow a utility to do the same job with fewer resources (i.e.: if the location of the fault is determined more quickly, personnel can be deployed to the location more quickly, and released from duty earlier, or assigned to subsequent tasks if needed).

- **Module 2: Personal Protective Grounding/Equal Potential Zone (PPG/EPZ) Simulated Training**

  The scope of this module is to demonstrate a Virtual/Augmented Reality (VR) precommercial training stimulator for PPG/EPZ on the electric distribution underground (UG) system. This new training system will be used for a student's initial and/or refresher compliance training to enhance understanding of the procedures for PPG/EPZ. With the energized test yard at SDG&E's training center, the VR would be tested to see how efficient/effective the training with the VR is compared with 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 work on the UG distribution system.

    b. The energized test yard may be used to demonstrate how the PPG/EPZ training will help protect the employees.

  - **Safety to the public**

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

  - **Risk reduction**

    The VR training will help protect the employees from back-feed currents from privately-owned generation sites (malfunctioning solar systems, incorrectly connected small generators, etc.)

- **Reduced Cost**

  The training will help reduce outage times and associated costs. The training itself may be accomplished at a lower cost than current practice.

6. Deliverables

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

7. 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, and improved power quality.
  - The ultimate key metric will be the effectiveness of the training simulator in achieving improved 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 used 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 expected reduction of outage times and injuries attributable to the training. The ultimate key metric will be the general effectiveness of the training simulator, compared to current practice.

8. Schedule - January 2019 to December 2021

9. EPIC Funds Committed - $2,206k

10. EPIC Funds Spent as of December 31, 2019 - $608k

11. Partners (if applicable) - n/a

12. Match Funding (if applicable)

None. However, SDG&E made its energized test yard available for the demonstration.

13. Match Funding Split (if applicable) - n/a

14. Funding Mechanism (if applicable)

SDG&E EPIC funds applied to a combination of internal work and pay-for-performance contracts. Two RFPs were released in 2020. Two vendors were selected to work with the SDG&E team—one vendor for each project module. The contract for Module 1 is in negotiation with execution expected in early 2021. The contract for Module 2 was executed in 2020.

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

16. Status Update

- **Module 1**

  SDG&E chose the circuits for this demonstration. SDG&E chose the methodology that will be used to identify the strategic location where the WFI's may be installed. SDG&E also completed the installation of the WFI's. Concurrently to the WFI task, the team made considerable progress in updating the electrical system data which eventually will lead to the ADMS having values that mirror more closely our current protection software and data. SDG&E anticipates having all the updates completed early 2021.

  Minor adjustments to the company's AMI network were accomplished to help accommodate the new feature.

  SDGE issued an RFP in 2020 securing a contractor to work with SDGE internal staff. Contract execution is expected in 2021.

- **Module 2**

  SDG&E is using internal staff as the subject matter experts performing the project work and hired a software vendor to provide a capability to demonstrate PPG/EPZ training practices. An energized test yard was augmented to provide a facility to evaluate how well the VR compares to current practice.

  The vendor was selected by a Request for Proposal (RFP) process, and a contract was awarded to one of the bidders to work with the SDG&E team in performing the demonstration. The test yard was completed in the 2020 calendar year. The demonstration is now in progress.

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

1. Investment Plan Period – 2018-2020 (EPIC-3)

2. Assignment to Value Chain - Transmission / Distribution

3. Objective

The project is demonstrating 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.

4. 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.

5. 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. Support for vegetation management – reduces potential for wildfires.

7. Ability to efficiently identify corrosion on equipment.

8. Improved long-term planning – ability to determine the status of scenarios as-is versus how they should be.

9. Supporting and increasing staff efficiencies of 9 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)
    - District Operations & Engineering (O&E)
    - Wildfire Mitigation (WMP)
    - Emergency Services (ES)
    - Environmental
    - Planning

The demonstration targets multiple use cases:

- **Use Case 1** - Telepresence software is being demonstrated which would provide 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. Live video feeds can be shared with management or any other employee via weblink.

- **Use Case 2** – Beyond line of sight (BLOS) is not currently normal in UAS operations in the United States. The pros and cons of investing in BLOS were assessed in the project.

- **Use Case 3** – The use case is exploring 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 system, enhance situational awareness, update operating protocols and build community partnerships to improve the 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** –Testing of a Corona camera on a UAS to detect corona 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 a daylight corona ultraviolet camera.

- **Use Case 5** – Testing of a tethered 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).

- **Use Case 6 –** Line pulling utilizing a UAS could assist with new construction in high vegetation areas or areas not permitted for low elevation manned aircraft flights. This would lower the potential risk and avoid asking residents to leave their house, as would be required per the FAA.

6. Deliverables

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

7. Metrics

Example metrics for determining the value proposition of the use cases are:

- **Use Case 1 –** Potential metrics include examining the value proposition for having the ability to live stream video feed to any department during an emergency. This could have immediate cost savings in eliminating the need to have multiple departments out in the field. It would also reduce the number of employees at a job site.

- **Use Case 2** – This use case was discontinued as explained below under Status Update. The metrics were to determine the pros, cons, and value proposition for BLOS UAS applications through demonstration work.

- **Use Case 3** - UAS operations procedures during Red Flag Warnings were created to include a work shift schedule due to Public Safety Power Shutdowns (PSPS). Before and after PSPS, UAS crews will support inspecting overhead power lines to check for debris and equipment damage prior to event or to re-energizing lines. Demonstration work is targeted at determining the value proposition for full integration of UAS night patrols in a PSPS event and being able to bring power back to a customer in a faster and less costly manner.

- **Use Case 4 –** The metrics are to compare the cost of using a corona camera on a UAS versus traditional practice and confirm the value proposition for the former.

- **Use Case 5** -- The metric is the extent of increased situational awareness during emergency events and having a UAS that can stay airborne as long as it has power, without battery changes or charging needed. This system can be utilized alongside of the TCV or a standalone unit using a generator as a power source.

- **Use Case 6** – Commercial success for this use case would be to utilize this tool in any high vegetation areas or areas where manned aircrafts are not desired or allowed due to the low flight elevation, if the value proposition is determined to be great enough during this pre-commercial demonstration project.

8. Schedule - January 2019 to October 2021

9. EPIC Funds Committed - $729k

10. EPIC Funds Spent as of December 31, 2020 - $396k

11. Partners (if applicable) - N/A

12. Match Funding (if applicable) - N/A

13. Match Funding Split (if applicable) - N/A

14. Funding Mechanism (if applicable)

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

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

16. Status Update

- **Use Case 1 –** Negotiations with a vendor are in progress to provide the needed capability.

- **Use Case 2**- After research on companies that were conducting BLOS operations, a vendor was contacted who has experience with assisting other businesses in obtaining BLOS approval from the FAA. Ultimately, SDG&E decided not to pursue a BLOS waiver from the FAA due to expense and changing regulations. The use case was discontinued in the EPIC project.

- **Use Case 3 -** During 2020, this approach was deemed to be successful and commercially viable during 5 different demonstration trials, including both pre- and post-PSPS events. Commercial success would be when each utility district would have employees trained to provide their own as-needed support for their area for easy deployment of such UAS flights.

- **Use Case 4 -** As of Aug 2019, SDG&E was the first company in the United States to fly a corona camera on a UAS with the support of a local vendor integrating the camera on a UAS. 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 approach for this inspection is to use a handheld corona camera, which would have taken four hours. Testing was conducted in 2020, and efforts began to integrate the procedures into the regular workforce operations. Currently all Corona Inspectors are being trained to use this tool daily as needed. Commercial success would be to train all Corona Inspectors on this capability and have it available to them as needed.

- **Use Case 5** - Demonstration of a tethering UAS was conducted in 2020 with a vendor and produced mixed results. Battery issues arose with the demonstration unit, and it did not work properly. This was a new product offering, and it did not appear to be working as advertised. A different vendor was found with a system that worked and tested successfully. The unit was purchased and delivered in December 2020; and training was scheduled for January 2021. Testing will continue in 2021.

- **Use Case 6** – Line pull testing began in mid-2020 using a UAS. Mule tape, jet line and pull strings were tested before actual operations. This technique was found to be successful three times during 2020. Since mid-2020, there have been multiple requests from within the company to use this capability.

- **Public Sharing of Interim Results --** Major project results were presented on August 28, 2020 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. Project information was also shared at the EPIC PICG Wildfire Safety Workstream Event on November 20, 2020.

D. Project 7: Demonstration of Multi-Purpose Mobile Battery for Port of San Diego and/or Other Applications

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

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

3. 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.

4. Focus

The focus of this project is to conduct a pre-commercial demonstration, showcasing the concept of mobile utilization of a containerized battery energy storage system (BESS) for various use cases and locations. Ultimately, the project seeks to determine the effectiveness and value proposition from the stacking of benefits when rotating BESS between applications and identifying which are preferred and most feasible for commercialization.

5. Scope

While mobile batteries are commercially available, the mobile utilization of the same asset in various use cases and applied at multiple locations is new. Therefore, the benefits of adopting such technology 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. 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, a smaller 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 contribute to the accessibility of resources for affected customers.

6. 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 (I^2R) in the system by placing a power supply 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 in real-time.

7. 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.

8. Deliverables

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

9. 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, and emissions reporting.), collecting new data through application of the mobile battery system, comparing the data specific to each use case, and analyzing the benefits.

10. Schedule - January 2019 to October 2021

11. EPIC Funds Committed - $3,573k

12. EPIC Funds Spent as of December 31, 2020 - $148k

Spending is expected to increase significantly during the first quarter of 2021 once the procurement (purchase or lease) of the mobile batteries is fully executed.

13. Partners (if applicable)

San Diego Unified Port District and other customer site hosts.

14. Match Funding (if applicable)

Not applicable.

15. Match Funding Split (if applicable)

Not applicable.

16. Funding Mechanism (if applicable)

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

17. Treatment of Intellectual Property (if applicable)

No IP developed.

18. Status Update

Competitive procurement for two mobile battery systems is being conducted. Module 1 has undergone competitive solicitation and two contractors have been selected for negotiation—one to supply the battery and one for engineering services. The execution of contracts for Module 1 is expected in the first quarter of 2021. Module 2 is in the process competitive solicitation and a contract award is expected in the first quarter of 2021. In parallel, internal tasks to make arrangements with the site hosts and to define the use cases and test plans will continue in the first quarter of 2021. The project demonstration and testing are scheduled to begin by the second quarter of 2021.

V. CONCLUSION

A. Key Results for 2020 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 2020, 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 2020 included continuation of four EPIC-3 projects, including use case definition, test planning, procurement of needed equipment and contractor services. Five RFP processes were carried out, and resulting contracts were executed or are near execution. A major performance audit was completed, working with a CPUC audit contractor. The PICG was launched, and SDG&E provided talent to participate in 11 workstream workshops that were organized by the CPUC's PICG coordinator.

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 occurred in 2020. Four EPIC-3 projects were launched in 2019 and activities in these

projects were increased in 2020, after the RAP approval. Project activities included site development work, coordination with external stakeholders, test and data analysis planning, equipment procurement, and contractor procurement. Actual demonstration work was begun in two of the projects in 2020. The goal is to complete the demonstrations for all four projects by the end of 2021.

ATTACHMENT B

SDG&E 2020 Annual Report

Project Status Spreadsheet

(Excel file follows)

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

Investment Program Period	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: Total Spent to date ($000)	Administrative and overhead costs to be incurred for each project	Leveraged Funds	Partners	Match Funding	Match Funding Split	Funding Mechanism
3rd Triennial (2020)	SDG&E	**PROJECT 3: Application of Advanced Metering Infrastructure (AMI) Data to Advanced Utility System Operations**	Pre-commercial Demonstration	This project is performing 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 subdivided into multiple work modules. A comprehensive final report will be delivered for each major module. Schedule - Jan 2019 - Oct 2021.	Module 1: Apr. 15, 2019 for NREL CRADA and Aug. 19, 2020 for Amendment to NREL CRADA Module 2: Sep. 29, 2020 for Cyient	Yes for two contracts and no for a pending contract	Distribution	**2,344**	**2,344**	**333**	**201**	**534**	N/A	400k	National Renawable Laboratory (NREL)	400k	50/50	SDG&E EPIC funds applied to a combination of in-house work and pay-for-performance contracts. Plus NREL co-funding in Module 1.
3rd Triennial (2020)	SDG&E	**PROJECT 4: Safety Training Simulators with Augmented Visualization**	Pre-commercial Demonstration	The project is demonstrating and evaluating 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 (PPG/EPZ) Training on the Electric Distribution Underground System". A comprehensive final report will be delivered for each module. Schedule - Jan 2019 - Oct 2021.	Module 1: Contract execution pending for 2021. Module 2: Contract executed with 3D Internet on Oct. 23, 2020.	Yes for Module 1 and No for Module 2, for which there is a pending contract	Distribution	**2,206**	**2,206**	**0**	**608**	**608**	N/A	0	0	0	NA	SDG&E EPIC funds applied to a combination of in-house work and pay-for-performance contracts.

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 Period	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: Total Spent to date ($000)	Administrative and overhead costs to be incurred for each project	Leveraged Funds	Partners	Match Funding	Match Funding Split	Funding Mechanism
3rd Triennial (2020)	SDG&E	**PROJECT 5: Unmanned Aircraft Systems (UAS) with Advanced Image Processing for Electric Utility Inspection and Operations**	Pre-commercial Demonstration	The project is demonstrating 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. A comprehensive final report will be delivered. Schedule - Jan 2019 - Oct 2021.	None to date; all work done intenally	NA	Transmission and Distribution	**729**	**729**	**0**	**396**	**396**	N/A	0	0	0	NA	SDG&E EPIC funds applied to a combination of in-house work and test equipment purchases.
3rd Triennial (2020)	SDG&E	**PROJECT 7: Demonstration of Multipurpose Mobile Battery for Port of San Diego and/or Other Applications**	Pre-commercial Demonstration	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 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 project has been structured in two work modules involving different mobile battery sizes and applications. A comprehensive final report will be delivered. Schedule - Jan 2019 - Oct 2021.	None to date	NA	Distribution and Demand-Side Management	**3,573**	**3,573**	**0**	**148**	**148**	N/A	0	0	0	NA	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, 2020					**8,852**	**8,852**	**333**	**1,353**	**1,686**						

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 Period	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 interagency or sole source agreement, specify date of notification to the Joint Legislative Budget Committee (JLBC) was notified and date of JLBC authorization. (This column is applicable to the CEC only.)	Does the recipient for this award identify as a California-based entity, small business, or businesses owned by 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.)
3rd Triennial (2020)	SDG&E	**PROJECT 3: Application of Advanced Metering Infrastructure (AMI) Data to Advanced Utility System Operations**	No	Sole source and RFP	Module 1: NREL was sole sourced. Module 2: Two bidders passed initial screening.	Module 2: Cyient	Rank 1 (Highest)	NA	N/A	No	N/A
3rd Triennial (2020)	SDG&E	**PROJECT 4: Safety Training Simulators with Augmented Visualization**	No	RFPs in 2020	Module 1: Three bidders passed initial screening. Module 2: Three bidders passed initial screening	Module 1: Pending contract execution in 2021. Module 2: 3D Internet.	Both modules: selected highest ranked bidders in the respective RFPs.	NA	N/A	No	N/A

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 Period	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 interagency or sole source agreement, specify date of notification to the Joint Legislative Budget Committee (JLBC) was notified and date of JLBC authorization. (This column is applicable to the CEC only.)	Does the recipient for this award identify as a California-based entity, small business, or businesses owned by 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.)
3rd Triennial (2020)	SDG&E	**PROJECT 5: Unmanned Aircraft Systems (UAS) with Advanced Image Processing for Electric Utility Inspection and Operations**	No	Sole source for test equipment purchases only.	NA	NA	N/A	N/A	N/A	No	N/A
3rd Triennial (2020)	SDG&E	**PROJECT 7: Demonstration of Multipurpose Mobile Battery for Port of San Diego and/or Other Applications**	No	RFPs in 2020	Module 1: Two bidders passed initial screening. Module 2: Two bidders passed initial screening.	Contracts pending execution in 2021	Not yet available	N/A	N/A	No	N/A

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 Period	Program Administrator	Project Name	Applicable Metrics	San Diego Gas & Electric Company 2020 EPIC Project Status Report
3rd Triennial (2020)	SDG&E	**PROJECT 3: Application of Advanced Metering Infrastructure (AMI) Data to Advanced Utility System Operations**	Ability to monitor, visualize, and analyze visualization information can help reduce number of outages, as well as their frequency and duration. The transmission fault location use case is particularly beneficial for this purpose. 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 and earthquakes. Improved access to AMI data and awareness company-wide. For example, in the load curtailment visualization use case, the load curtailment is visually represented to help users visualize the curtailment locations and details as data on a map. This is expected to be beneficial in emergencies.	Activities in Module 1 have progressed. The SDG&E and NREL team have completed a series of use case demonstrations. Data analysis is in progress and the cost/benefit assessment is underway. In Module 2, a competitive procurement was carried out to select vendor tools for demonstration and evaluation. One vendor contract was executed and is underway. Another is pending completion of negotiations, which is expected in early 2021. SDG&E will be teaming with these vendors to carry out the demonstration work.
3rd Triennial (2020)	SDG&E	**PROJECT 4: Safety Training Simulators with Augmented Visualization**	**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, and improved power quality. The ultimate key metric will be the effectiveness of the training simulator in achieving improved 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 used 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 expected reduction of outage times and injuries attributable to the training. The ultimate key metric will be the general effectiveness of the training simulator, compared to current practice.	**Module 1** SDG&E chose the circuits for this demonstration. SDG&E chose the methodology that will be used to identify the strategic location where the WFI's may be installed. SDG&E also completed the installation of the WFI's. Concurrently to the WFI task, the team made considerable progress in updating the electrical system data which eventually will lead to the ADMS having values that mirror more closely our current protection software and data. SDG&E anticipates having all the updates completed early 2021. Minor adjustments to the company's AMI network were accomplished to help accommodate the new feature. SDGE issued an RFP in 2020 securing a contractor to work with SDGE internal staff. Contract execution is expected in 2021. **Module 2** SDG&E is using internal staff as the subject matter experts performing the project work and hired a software vendor to provide a capability to demonstrate PPG/EPZ training practices. An energized test yard was augmented to provide a facility to evaluate how well the virtual reality training compares to current practice. The vendor was selected by a Request for Proposal (RFP) process, and a contract was awarded to one of the bidders to work with the SDG&E team in performing the demonstration. The test yard was completed in the 2020 calendar year. The demonstration is now in progress.

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.

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3rd Triennial (2020)	SDG&E	**PROJECT 5: Unmanned Aircraft Systems (UAS) with Advanced Image Processing for Electric Utility Inspection and Operations**	Example metrics are: •Use Case 1 – Examine the value proposition for having the ability to live stream video feed to any department during an emergency. •Use Case 2 – Determine the pros, cons, and value proposition for Beyond Line of Sight (BLOS) UAS applications. •Use Case 3 - Demonstration work is targeted at determining the value proposition for full integration of UAS night patrols in a PSPS event and being able to bring power back to a customer in a faster and less costly manner. •Use Case 4 – The metrics are to compare the cost of using a corona camera on a UAS versus traditional practice and confirm the value proposition for the former. •Use Case 5 -- The metric is the extent of increased situational awareness during emergency events and having a UAS that can stay airborne as long as it has power, without battery changes or charging needed. •Use Case 6 – Determine the value proposition for using this tool in any high vegetation areas or areas where manned aircrafts are not desired or allowed due to the low flight elevation.	•Use Case 1 – Negotiations with a vendor are in progress to provide the needed capability. •Use Case 2- After research on companies that were conducting BLOS operations, SDG&E decided not to pursue a BLOS waiver from the FAA due to expense and changing regulations. •Use Case 3 - During 2020, this approach was deemed to be successful and commercially viable during 5 different demonstration trials, including both pre- and post-PSPS events. •Use Case 4 - SDG&E completed 5 successful test flights on August 19- 20, 2019 and again on September 12, 2019 and assessed twelve 230-kV tower structures, which took approximately 1.5 hours to complete. The normal past approach was to use a handheld corona camera, which would have taken four hours. In 2020, efforts began to integrate the new procedures into the regular workforce operations. •Use Case 5 - Demonstration of a tethering UAS was conducted in 2020 with a vendor and produced mixed results. A different vendor was found with a system that worked and tested successful. Training for commercial adoption is scheduled for January 2021. •Use Case 6 – Line pull testing began in mid-2020. Mule tape, jet line and pull strings were tested before actual operations. This technique was found to be successful three times. Since mid-2020, there have been multiple requests from within the company to use this capability. •Public Sharing of Interim Results -- Major project results were presented at the 2020 DJI Airworks UAS conference. Project information was also shared at the EPIC PICG Wildfire Safety Workstream Event.
3rd Triennial (2020)	SDG&E	**PROJECT 7: Demonstration of Multipurpose Mobile Battery for Port of San Diego and/or Other Applications**	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, and emissions reporting.), collecting new data through application of the mobile battery system, comparing the data specific to each use case, and analyzing the benefits.	Competitive procurement for two mobile battery systems is being conducted. Module 1 has undergone competitive solicitation and two contractors have been selected for negotiation—one to supply the battery and one for engineering services. The execution of contracts for Module 1 is expected in the first quarter of 2021. Module 2 is in the process competitive solicitation and a contract award is expected in the first quarter of 2021. In parallel, internal tasks to make arrangements with the site hosts and to define the use cases and test plans will continue in the first quarter of 2021. The project demonstration and testing are scheduled to begin by the second quarter of 2021.

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