BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

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Application of San Diego Gas & Electric Company
(U 902-E) for Approval of Electric Program Investment Charge Triennial Plan for Years 2015-2017

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APPLICATION OF SAN DIEGO GAS & ELECTRIC COMPANY (U 902-E) FOR APPROVAL OF ELECTRIC PROGRAM INVESTMENT CHARGE TRIENNIAL PLAN FOR YEARS 2015-2017

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I. INTRODUCTION

In compliance with California Public Utilities Commission ("Commission") Decisions ("D.") 12-05-037 and 11-12-035, and pursuant to the Commission's Rules of Practice and Procedure, San Diego Gas & Electric Company ("SDG&E") hereby submits this application ("Application") for Approval of its Second Triennial Electric Program Investment Charge ("EPIC") Investment Plan ("EPIC Plan") to the Commission.

II. BACKGROUND

EPIC was established by the Commission 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 electricity ratepayers" of SDG&E, Pacific Gas and Electric Company ("PG&E") and Southern California Edison Company ("SCE") (collectively, the "IOU Administrators").[1] On May 31, 2012, the Commission issued D.12-05-037, which established the purposes and governance structure for EPIC. On November 1, 2012, SDG&E filed A.12-11-0002, seeking approval for its First EPIC Plan, in which it proposed to execute five smart-grid related projects. SDG&E's Application was granted in full in D.13-11-025.

[1] D.12-05-037 at 2.

A. General Requirements

EPIC is designed to "be the primary vehicle for utility electric [research development & deployment ("RD&D")] proposals other than proposals submitted by the utilities for demand response and electric efficiency RD&D projects."[2] The IOU Administrators may only administer projects funded by EPIC in the area of technology development and deployment ("TD&D").[3]

D.12-05-037 requires that the "coordinated"[4] EPIC plans submitted on May 1, 2014, by the four EPIC Administrators – the three IOUs and the California Energy Commission ("CEC") – meet the following common requirements:

- Any projects funded through EPIC must, first and foremost, demonstrate "the potential to produce electricity ratepayer benefits, defined as promoting greater reliability, lower costs, and increased safety."[5]
- EPIC expenditures are to be guided by the complementary principles of providing societal benefits, assisting with the reduction of greenhouse gas ("GHG") emissions in the electricity sector at the lowest possible cost, supporting the Loading Order,[6] and contributing to goals related to low-emission vehicles and transportation, economic development, and efficient use of ratepayer monies;

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[2] *Id*. at Conclusions of Law ("COL") 15.

[3] *Id*. at Findings of Fact ("FOF") 8.

[4] *Id*. at FOF 9.

[5] *Id*. at FOF 1.

[6] Since 2003, Commission-regulated utilities have had to procure resources to serve demand according to the "Loading Order," which is:
(1) Energy Efficiency & Conservation
(2) Demand Response
(3) Renewable Resources & Clean Distributed Generation, and
(4) Clean Conventional (Fossil) Generation, if necessary.
CPUC, Energy Action Plan, adopted April 18, 2003, available at http://docs.cpuc.ca.gov/published/report/28715.htm.

- EPIC expenditures must follow the statutory guidance provided by sections 740.1 and 8360 of the California Public Utility Code;[7]
- EPIC Plans must be mapped to the electric utility value chain identified in D.12-05-037; and
- EPIC funds may not be used to fund duplicative activities.[8]

In addition, D.12-05-037 articulates specific information that the EPIC plans must include, such as summaries of and responses to stakeholder comments, informational summaries of RD&D efforts underway through approved Energy Efficiency and Demand Response portfolios, and intended intellectual property ("IP") methodologies.[9]

III. SUMMARY OF THE APPLICATION

The SDG&E EPIC Plan, provided as Attachment A to this Application, represented in this Application is fully consistent and responsive to the requirements of D.12-05-037 and D.13-11-025.[10] The Commission's directives, as well as SDG&E's demonstrated vision for EPIC-funded TD&D programs, warrant the Commission's approval of the SDG&E EPIC Plan. The projects proposed in the EPIC Plan have the potential to provide Commission-mandated benefits of lower costs, greater reliability and increased safety, while offering benefits to electric utility ratepayers and alignment with State energy policies and statutes.

IV. SUMMARY OF THE SDG&E EPIC PLAN

SDG&E's EPIC Plan proposes five individual TD&D projects, as well as a sixth project through which SDG&E will participate in industry RD&D consortia. All six projects have the potential to help modernize the electric grid to improve customer benefits. Specifically, the six projects are:

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[7] D.12-05-037 at 18, COL 1 & Ordering Paragraph ("OP") 12(e). All statutory citations herein are to the California Public Utility Code, unless otherwise stated.

[8] *Id*. at 40, FOF 9. As a result, the Commission directs the EPIC Administrators to collaborate to "to ensure there is no duplication of effort".

[9] D.12-05-037 at OPs 12(d) & 15; D-13-11-025 at 66-67.

[10] While SDG&E is not offering any testimony in support of its EPIC Plan in this Application, it will make qualified witnesses available at the Commission's request.

(1) Modernization of Distribution System and Integration of Distributed Generation and Storage: will consist of pilot demonstrations of distribution system infrastructure modernization solutions, including advances in distribution system design that enable the use of new technologies, such as power electronic components, new protection systems, distributed generation, and alternative storage technologies. This project will help make the electric grid and related infrastructure more sophisticated to allow for the coordinated use of new technologies.

(2) Data Analytics in Support of Advanced Planning and System Operations: will address the anticipated "data tsunami" associated with increased and widespread system monitoring and use of controllable devices in the power system. The project will demonstrate solutions for the data management issues and challenges expected to accompany the extensive amount of real-time and stored data being archived from field devices. The demonstrations will also assist in identifying helpful data mining procedures and the data-archiving methods.

(3) Monitoring, Communication, and Control Infrastructure for Power System Modernization: will pilot alternative subsystem solutions and industry standards to determine their suitability for inclusion in the evolving advanced distribution management system infrastructure. Once gaps in the evolving infrastructure have been identified and characteristics of the subsystems have been defined, candidate solutions will be pilot tested. In other words, this project will test monitoring, communication, and control infrastructure to identify best practices for commercial adoption and deployment in the power system.

(4) System Operations Development and Advancement: will support continued modernization of the power system through demonstrations of improved capabilities in system operations. Specifically, the project will demonstrate a

systematic process for the realignment of operating practices in light of advances in technology, software and standards used in the power system.

(5) Integration of Customer Systems into Electric Utility Infrastructure: will address the evolving gateway between customers and utilities. Specifically, it will demonstrate the safe and reliable interoperability of more advanced customer systems with the distribution and transmission systems and CAISO operations.

(6) Collaborative Programs in RD&D Consortia: will provide funding for SDG&E's selective participation in TD&D project offerings of industry collaborative RD&D organizations, such as Centre for Energy Advancement through Technological Innovation ("CEATI"), the Electric Power Research Institute ("EPRI"), and the National Electric Energy Testing, Research and Applications Center ("NEETRAC").

The EPIC projects and industry consortia participation are described in detail in the SDG&E EPIC Plan.

SDG&E is not aware of any other research and development programs that are duplicative of the first five EPIC projects. While some of the projects, specifically Projects 1 and 4, may involve smart inverters, none of those projects have smart inverter testing as their primary objective. Therefore, none of the Projects are directed at Rule 21, and none would overlap or conflict with work concerning Smart Inverter Working Group ("SIWG") recommendations currently being discussed in R.11-09-011.[11] The sixth project – participation in collaborative TD&D programs in RD&D consortia – will help the Commission achieve its goal of promoting collaborative RD&D and leveraging ratepayer-funded EPIC monies through co-funding opportunities.

[11] A portion of R.11-09-011 concerns Rule 21 distribution level interconnection issues. A prehearing conference was held on February 19, 2014 to discuss the process to submit the SIWG documents into the record of Rulemaking 11-09-011. However, no further steps have been taken at this time.

V. SDG&E'S EPIC PLAN SHOULD BE APPROVED AS REASONABLE, APPROPRIATE, AND IN THE INTEREST OF RATEPAYERS

In D.12-05-037, the Commission mandates that any program funded through EPIC must, first and foremost, be able to demonstrate its "potential to produce electricity ratepayer benefits, defined as promoting greater reliability, lower costs, and increased safety."[12] In addition, it must use various complementary and statutory principles to guide the Plan development and ensure the result is "just and reasonable to ratepayers."[13]

As described in more detail in the SDG&E EPIC Plan, the Plan is fully consistent with and responsive to the requirements outlined in D.12-05-037. The SDG&E EPIC Plan has the potential to provide ratepayers with greater reliability, lower costs, and increased safety by modernizing the electric grid.[14] In addition, the EPIC Plan aligns with the complementary principles outlined in D.12-05-037, such as the efficient use of ratepayer monies and support for GHG emission reduction policies.[15] It also meets the statutory criteria outlined in sections 740.1 and 8360.[16] All six projects map to the applicable sections of the electric utility value chain.[17] The sixth project also aligns with the Commission's interest in collaborative and co-funded RD&D projects to better leverage ratepayers' EPIC monies.[18]

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[12] D.12-05-037 at FOF 1.

[13] *Id*. at 20 & OP 2.

[14] See EPIC Plan, Attachment A, at Sections 5.3-5.5, 5.8.2, and 7.

[15] *Id*. at Sections 5.2-5.5, 5.7, and 7.

[16] *Id*. at Section 8.

[17] *Id*. at Sections 3, 5.2-5.7. The only section of the utility value chain that SDG&E's EPIC Plan does not map to is "Generation" because the IOU Administrators are prohibited from funding generation programs through EPIC. D.12-05-037 at OP 13.

[18] See, e.g., D.12-05-037 at FOF 17 ("Activities that include collaboration with and leverage of closely related RD&D projects should be eligible for EPIC funding."). One of PG&E's proposed projects during the first EPIC triennial cycle was funding "Multi-Utility, Industry-Wide RD&D Programs Such as Those Conducted by EPRI" through EPIC. A.12-11-003, Application of Pacific Gas & Electric Company Electric Program Investment Plan, November 1, 2012, Attachment A at 72-73. The Commission found that the "funding of research institutes" with EPIC funds to be permitted. D.13-11-025 at COL 42.

VI. SDG&E'S EPIC PLAN FULFILLS THE COLLABORATION AND CONSULTATION REQUIREMENTS OF D.12-05-037

The Commission requires extensive coordination among the EPIC Administrators, as well as between the EPIC Administrators and interested stakeholders. The Commission has stated that these collaborations between the EPIC Administrators are done under protection of the State Action Immunity doctrine from antitrust liability.[19] D.12-05-037 encourages the four EPIC Administrators to "offer a coordinated approach to clean energy RD&D"[20] through their triennial EPIC plans "to ensure there is no duplication of effort."[21] D.12-05-037 also requires that the EPIC Administrators consult with stakeholders at specific times during the scoping and plan development process. As further described in the SDG&E EPIC Plan, SDG&E has satisfied these requirements.[22]

A. In Accordance with D.12-05-037, SDG&E Has Collaborated With Other EPIC Program Administrators

SDG&E has fulfilled the requirements of D.12-05-037 to coordinate with the other EPIC Administrators through reasonable and constant collaboration throughout the plan development process.

Starting in Spring 2012, SDG&E and the other IOU EPIC Administrators instituted the tradition of frequent, often weekly, conference calls to discuss the development of the first EPIC plans and, after Commission approval in November 2013, plan implementation. The IOU EPIC Administrators continued these calls when developing the second EPIC plans in 2014. During these weekly calls, the IOU EPIC Administrators coordinate their individual EPIC plans to prevent duplication, ensure consistent EPIC program implementation and administration, and determine if there are potential collaboration opportunities.[23]

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[19] D.13-11-025 at 108-110.

[20] D.12-05-037 at FOF 9.

[21] *Id*. at 40.

[22] See EPIC Plan, Attachment A, at Sections 5.8-5.8.3.

[23] *See id* at Section 3 for specific details about the collaboration efforts of SDG&E and the other EPIC Administrators.

B. In Accordance with D.12-05-037, SDG&E Consulted with Stakeholders and Gave Appropriate Consideration to their Comments

SDG&E's efforts to inform and involve interested stakeholders in its EPIC Plan development has been reasonable and in accordance with D.12-05-037. When drafting D.12-05-037, the Commission envisioned that the EPIC Administrators would hold scoping workshops in Winter 2013-14, and propose their EPIC Plans to stakeholders in March 2014 before filing the Plans on May 1, 2014.[24] SDG&E fully satisfied these requirements by engaging in the mandatory consultations with stakeholders, as well as participating in several voluntary consultations with Staff from the Commission's Energy Division, the Office of Ratepayer Advocates ("ORA") and EPRI.

Specifically, on February 21, 2014 the IOU EPIC Administrators conducted a joint webinar to solicit initial stakeholder and public input on the initiatives and scope for each IOU's proposed EPIC plan. The webinar was solely focused on the TD&D investment area.[25]

On March 3, 2014, the four EPIC Administrators convened a one-day workshop with EPRI, during which they presented their draft plans and conducted a 'gap' analysis on the proposed plans' contents.

On March 4, 2014 a meeting was held between the IOU Administrators and representatives from the Commission's Energy Division and ORA to provide them with an overview of the Administrators' coordination process and discuss project proposals under consideration.[26]

On March 17 and 21, 2014, the IOU Administrators jointly held public scoping workshops for the EPIC program. At the workshops, the IOUs summarized their planning and coordination process and presented examples of projects under consideration for the second triennial cycle. As required by D.12-05-037,[27] SDG&E presented its draft EPIC Plan to stakeholders at the workshops. SDG&E outlined its draft second EPIC Plan with its six projects and described in detail the first five projects. The slides were also posted on SDG&E's website

[24] D.12-05-037 at 31.

[25] See EPIC Plan, Attachment A, at Sections 5.8.1 and 5.8.3.

[26] *Id*. at Sections 5.8.2-5.8.3.

[27] D.12-05-037 at 31.

for public review.[28] Attending stakeholders were encouraged to submit comments during and after the workshop. Both the CEC and Commission Staff participated in the workshops.

SDG&E found the stakeholder feedback useful and incorporated many of the stakeholders' input into the EPIC Plan. The feedback SDG&E received from stakeholders regarding its EPIC Plan, as well as stakeholder comments made generally to the IOU Administrators but also relevant to SDG&E, is described in the attached SDG&E EPIC Plan, along with SDG&E's responses to the feedback.[29]

C. The SDG&E EPIC Plan Provides a Sufficient Summary of SDG&E's Approved EE and DR Programs

In accordance with D.12-05-037, EPIC plans must provide informational summaries of RD&D efforts underway through approved Energy Efficiency ("EE") and Demand Response ("DR") portfolios. In D.13-11-025, the Commission instructed that "[t]he IOUs Administrators should provide more thorough informational summaries of their RD&D activities undertaken as part of their approved Energy Efficiency and Demand Response portfolios in their future EPIC investment plan applications. Each IOU investment plan application should include an appendix summarizing the RD&D activities undertaken as part of their approved Energy Efficiency and Demand Response portfolios, and this appendix should describe each RD&D project, including the purpose, funding, deliverables and progress to date."[30] The SDG&E EPIC Plan fulfills this requirement by providing Appendices A and B, summaries of the RD&D activities undertaken as part of SDG&E's approved Energy Efficiency and Demand Response portfolios, respectively.

D. SDG&E Will Implement Intellectual Property Methodologies In Accordance with D.13-11-025

EPIC plans presented for Commission approval are required to describe intended IP methodologies.[31] The EPIC IOU Administrators briefed IP issues at length in the last EPIC

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[28] SDG&E, EPIC, http://sdge.com/regulatory-filing/3749/electric-program-investment-charge-epic. The comments and feedback received by SDG&E, and its response to those comments, are discussed in EPIC Plan, Attachment A at Sections 5.8-5.8.3.

[29] See EPIC Plan, Attachment A at 5.8.3.

[30] D.13-11-025 at COL 59.

[31] D.12-05-037 at 78-79.

proceeding, A.12-11-001 (consolidated). The IOU Administrators commented that the various ways that IP may be developed during an EPIC project necessitate that the IOU Administrators are allowed flexibility in how they approach EPIC-funded IP. In D-13-11-025, the Commission responded by outlining numerous methodologies and requirements for IP developed with EPIC funds.[32]

The execution of SDG&E's First Plan has not reached a stage where SDG&E can evaluate whether the Commission's IP are pragmatic or sufficiently flexible in the context of an EPIC project with contractors. Therefore, pending any changes to the Commission's IP requirements through this proceeding, SDG&E will employ IP methodologies in accordance with D.13-11-025 for those projects in its second triennial EPIC Plan. For the sixth project, before agreeing to participate in any RD&D consortium, SDG&E will evaluate whether the consortium's rules concerning IP are in accordance or, at minimum, do not conflict with the Commission's requirements for IP in EPIC.

VIII. NO RATE INCREASE IS REQUESTED BECAUSE EPIC FUNDS HAVE ALREADY BEEN AUTHORIZED AND ARE BEING COLLECTED

SDG&E is not requesting approval for a rate increase in this Application because the collection of EPIC funds from electric utility ratepayers was previously authorized in D.11-12-035[33] and D.12-05-037.[34] SDG&E has been collecting funds in accordance with those decisions since January 1, 2012 through the electric Public Purpose Program ("PPP") bill component.[35]

In addition, the Consumer Price Index-based adjustment to EPIC collections commencing January 1, 2015 was previously ordered by the Commission in D.12-05-037.[36] The same

[32] D.13-11-025 at OPs 28 & 31-34.

[33] D.11-12-035 at OP 2, 3 (establishing the EPIC surcharge and ordering the electric IOUs to collect EPIC funds from their ratepayers in the same manner as the expiring system benefits charge associated with Public Utilities Code Section 399.8).

[34] D.12-05-037 at OP 1.

[35] *See* AL 2321-E, filed and effective December 22, 2011 (establishing SDG&E's EPIC surcharge and associated EPIC Balancing Account); Advice Letter 2375-E, filed and effective June 22, 2012 (revise its EPIC Balancing Account to align with SDG&E's 8.8% share of authorized funding beginning January 1, 2013); and Advice Letter 2402-E filed October 1, 2012 and effective January 1, 2013 (revising SDG&E's electric PPP rates effective January 1, 2013 in accordance with OP 1 & 7 of D.12-05-037).

[36] D.12-05-037 at OP 7.

decision specifically outlines how the adjustment will be calculated, i.e., by "the average change in the Consumer Price Index, specifically the Consumer Price Index for Urban Wage Earners and Clerical Workers for the third quarter, for the previous three years."[37] SDG&E cannot calculate the rate adjustment at the time of this filing because the Consumer Price Index for Urban Wage Earners and Clerical Workers for the third quarter of 2014 will not be made public until late October 2014.

A. SDG&E's Regulatory Mechanism Proposal for the Triennial Rate Adjustment is Reasonable and Appropriate

Ordering Paragraph 7 of D.12-05-037 states, "The total collection amount [of EPIC] shall be adjusted on January 1, 2015 and January 1, 2018 commensurate with the average change in the Consumer Price Index, specifically the Consumer Price Index for Urban Wage Earners and Clerical Workers for the third quarter, for the previous three years." The Decision is silent on the appropriate regulatory mechanism that should be employed to incorporate the escalated amount into rates, however.

As previously noted, the EPIC funds are collected as part of the electric PPP bill component. SDG&E files a Tier 2 advice letter October 1 of each year for PPP rates effective the following year.[38] Then in late December every year, SDG&E files the Consolidated Filing to Implement January 1 Electric Rates, which incorporates the (usually by then approved) Tier 2 advice letter concerning PPP rates.

SDG&E's current issue is that the third quarter 2014 Consumer Price Index for Urban Wage Earners and Clerical Workers, which is needed to calculate the rate adjustment for EPIC (and thus, the PPP), is generally not made public until the end of October. SDG&E will have already filed the Tier 2 advice letter for the PPP rates effective January 1, 2015 by the time it is released. Therefore, SDG&E suggests that it will make the triennial rate adjustments by filing a supplement or substitute sheets to its October 1 PPP advice letter if the third quarter Consumer Price Index for 2014 becomes available before the October 1 advice letter is approved by Commission staff. If Staff approves the supplemental advice letter/substitute sheets in time to

[37] D.12-05-037 at OP 7.

[38] Pursuant to D.03-04-027, SDG&E must file by October 1 of each year an advice letter requesting to apply to the electric PPP rate effective January 1 of the following year: (1) the net amortization component of electric PPP account balances; and (2) the Commission's currently authorized program budget revenue requirements for the PPPs.

include in its year-end filing, SDG&E will incorporate them into SDG&E's consolidated rate filing made at the end of the year.

This proposed process by which SDG&E would effectuate the mandated January 1, 2015 and January 1, 2018 rate adjustment is reasonable and appropriate. A timely approval of SDG&E's supplemental advice letter or substitute sheets will allow SDG&E to incorporate the new PPP rate, including the required adjustment for EPIC, into the December 2014 Consolidated Filing to Implement January 1, 2015 Electric Rates.[39] Without this process, SDG&E will have to re-file the entire 2014 Consolidated Filing in early 2015 to effectuate the EPIC rate adjustment change. Therefore, the Commission should find the process proposed by SDG&E to be just and reasonable because it promotes efficiency for the Commission and SDG&E by preserving scarce time and resources by avoiding a duplicative filing.

IX. REQUESTED RELIEF

SDG&E respectfully requests that the Commission issue a decision:

1. Finding SDG&E in compliance with the requirements of D.12-05-037 and D.13-11-025;
2. Finding the SDG&E EPIC Plan reasonable, appropriate and in the interest of electric utility ratepayers;
3. Finding SDG&E's proposal for the triennial rate adjustment to be reasonable and appropriate;
4. Rendering other Findings of Fact, Conclusions of Law, and issuing Orders consistent with the foregoing requests; and
5. Any other relief as is necessary and proper.

X. STATUTORY AND PROCEDURAL REQUIREMENTS

A. Rule 2.1 (a) – (c)

In accordance with Rule 2.1 (a) – (c) of the Commission's Rules of Practice and Procedure, SDG&E provides the following information.

[39] SDG&E is not seeking *de facto* approval of its October 1 PPP Tier 2 Advice Letter. Instead, SDG&E is proposing the regulatory process by which it would effectuate the Commission-ordered EPIC collection adjustment, assuming that the supplemental advice letter/substitute sheets are approved by the Commission in time to incorporate them into the SDG&E year-end filing.

1. Rule 2.1 (a) - Legal Name

SDG&E is a corporation organized and existing under the laws of the State of California. SDG&E is engaged in the business of providing electric service in a portion of Orange County and electric and gas service in San Diego County. SDG&E's principal place of business is 8330 Century Park Court, San Diego, California 92123. SDG&E's attorney in this matter is Emma D. Salustro.

2. Rule 2.1 (b) - Correspondence

Correspondence or communications regarding this Application should be addressed to:

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3. Rule 2.1 (c)

a. Proposed Category of Proceeding

This proceeding does not clearly fit into any of the proceeding categories defined in Rules 1.3. Therefore, in accordance with Rule 7.1(e), SDG&E proposes that this proceeding be conducted under the rules applicable to the ratesetting category.

b. No Need for Hearings

SDG&E does not believe that approval of this Application will require hearings. The previous EPIC proceeding, A.12-11-001, did not require testimony or evidentiary hearings. Akin

to SDG&E's application for approval of the SDG&E EPIC Plan, SDG&E has provided ample supporting information, analysis and documentation that provide the Commission with a sufficient record upon which to grant the relief requested. In addition, it has presented the draft SDG&E EPIC Plan to interested stakeholders, including Commission Staff and ORA, several times during the scoping and development process for their comments, and has incorporated relevant feedback into the EPIC Plan.

c. Issues to be Considered

In the January 2013 Scoping Memo for the first EPIC plans, the Commission noted that the major issue to be considered is whether the EPIC plans adequately comply with the requirements of D.12-05-037.[40] The scope of this proceeding should be identical. Therefore, the issues to be considered are whether:

1. The SDG&E EPIC Plan includes an accurate and adequate mapping of the planned investments to the electricity system value chain?
2. The SDG&E EPIC Plan sufficiently identifies and provides an adequate justification for:
    a. the amount of funds to be devoted to the technology demonstration and deployment area;
    b. The type of funding mechanisms (grants, loans, pay-for-output, etc.) to be used for each investment area;
    c. The eligibility criteria for award of funds in particular areas; and
    d. Any suggested limitations for funding (e.g., per-project, per-awardee, matching funding requirements, etc.)?
3. The SDG&E EPIC Plan provides a summary of stakeholder comments received during the development of the investment plan and SDG&E's response to the comments?
4. The six projects proposed in the SDG&E EPIC Plan offer a reasonable probability of providing electricity ratepayer benefits by promoting greater reliability, lowering costs, and increasing safety?
5. The SDG&E EPIC Plan includes an adequate informational summary of the research, development, and demonstration activities SDG&E is undertaking as part of its approved energy efficiency and demand response portfolios as required by D.13-11-025?

[40] First Plan Scoping Memo at 7-11.

6. The SDG&E EPIC Plan includes reasonable and adequate metrics against which the Plan's success may be judged, such as:
    a. The potential to provide benefits to ratepayers and to the state, such as potential energy and cost savings, job creation, economic benefits, environmental benefits, and other benefits; and
    b. Identification of barriers or issues that prevented widespread deployment of technology or strategy?
7. The SDG&E EPIC Plan recommends a reasonable approach to intellectual property rights?
8. The SDG&E EPIC Plan adequately addresses the principles articulated in sections 740.1 and 8360?
9. The SDG&E EPIC Plan includes proposals to fund electricity generation-only projects that contravene the prohibition of IOUs using EPIC funding for such projects?
10. The SDG&E EPIC Plan adequately addresses how the administrators will avoid duplicative efforts?

d. Proposed Schedule

As noted above, SDG&E does not believe hearings will be necessary. The previous EPIC Application proceeding, A.12-11-001, did not require testimony or evidentiary hearings. SDG&E believes that this proceeding should and will be similar.

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PROPOSED SCHEDULE – NO HEARINGS	
ACTION	**DATE**
Application filed	May 1, 2014
Daily Calendar Notice	May 2, 2014
Response/Protests	June 2, 2014
Reply to Response/Protests	June 12, 2014
Prehearing Conference	June 20, 2014
Scoping Memo Issued	June 30, 2014
Intervenor Testimony (if necessary)	July 31, 2014
Rebuttal Testimony (if necessary)	August 22, 2014
Concurrent Opening Briefs	September 22, 2014
Concurrent Reply Briefs	October 7, 2014
Proposed Decision	December 29, 2014
Comments on Proposed Decision	January 20, 2015
Reply Comments on Proposed Decision	January 26, 2015
Commission Approval	February 2015

B. Rule 2.2 – Articles of Incorporation

A copy of SDG&E's Restated Articles of Incorporation as last amended, presently in effect and certified by the California Secretary of State, was filed with the Commission on August 31, 2009 in connection with SDG&E's Application No. 09-08-019, and is incorporated herein by reference.

XI. SERVICE

In accordance with Ordering Paragraph 11 of D.12-05-037, SDG&E will serve this Application and its attachments on parties to the service list for R.11-10-003 (*Order Instituting Rulemaking on the Commission's own motion to determine the impact on public benefits associated with the expiration of ratepayer charges pursuant to Public Utilities Code Section 399.8*), A.10-12-005/A.10-12-006 (SDG&E's most recent GRC proceeding), A.13-11-003 (SCE's pending GRC proceeding), and A.12-11-009 (PG&E's most recent GRC proceeding).

Hard copies will be sent by overnight mail to the Assigned ALJ Gamson in R.11-10-003 and Chief ALJ Karen Clopton.

XII. CONCLUSION

WHEREFORE, SAN DIEGO GAS & ELECTRIC COMPANY requests that the Commission grant SDG&E's Application as described herein.

Respectfully submitted this 1st day of May 2014.

By: /s/ Emma D. Salustro
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SAN DIEGO GAS & ELECTRIC COMPANY

By: /s/ John A. Sowers
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Vice President – Generation & Resource Planning

OFFICER VERIFICATION

OFFICER VERIFICATION

John A. Sowers declares the following:

I am an officer of San Diego Gas & Electric Company and am authorized to make this verification on its behalf. I am informed and believe that the matters stated in the foregoing **APPLICATION OF SAN DIEGO GAS & ELECTRIC COMPANY (U 902-E) FOR APPROVAL OF ELECTRIC PROGRAM INVESTMENT CHARGE TRIENNIAL PLAN FOR YEARS 2015-2017** are true to my own knowledge, except as to matters which are therein stated on information and belief, and as to those matters, I believe them to be true.

I declare under penalty of perjury under the laws of the State of California that the foregoing is true and correct.

Executed on May 1, 2014 at San Diego, California.

By: /s/ John A. Sowers

John A. Sowers
San Diego Gas & Electric Company
Vice President – Generation & Resource Planning

Attachment A

SDG&E SECOND EPIC Triennial Investment Plan
2015-2017

Second EPIC Triennial Investment Plan: 2015-2017

San Diego Gas & Electric

May 1, 2014

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1. Executive Summary of the SDG&E Second Triennial EPIC Investment Plan

The SDG&E Second Triennial EPIC Investment Plan ("the SDG&E EPIC Plan" or "EPIC Plan") is the second of SDG&E's three required EPIC plans and covers funding years 2015 through 2017. The SDG&E EPIC Plan is composed of five individual projects, as well as planned participation in industry R&D consortia. The SDG&E EPIC Plan was developed internally at SDG&E to ensure alignment with the needs of SDG&E's customers, and refined through Commission-ordered collaboration with the other EPIC Administrators, consultations with stakeholders, and an industry gaps analysis.

All six projects aim to help modernize the grid, and have the potential to provide electric utility ratepayers with the Commission-mandated benefits of lower costs, greater reliability and increased safety. In addition, the six projects align with various California energy policies, goals and statutory requirements.

2. Background

The California Public Utilities Commission ("Commission") established the Electric Program Investment Charge ("EPIC") in Decisions ("D.") 11-12-035 and 12-05-037 to provide public interest investments in research and development of clean energy technologies and approaches for the benefit of California's investor-owned utility ("IOU") electric ratepayers.[1] San Diego Gas & Electric Company ("SDG&E"), Pacific Gas and Electric Company ("PG&E"), and Southern California Edison Company ("SCE", collectively, the "IOUs," or "EPIC IOU Administrators"), and the California Energy Commission ("CEC," collectively the "EPIC Administrators") are required to propose plans to the Commission for the use of EPIC funds every three years.

3. Framework for Developing the SDG&E EPIC Plan

D.12-05-037 requires the IOUs to focus their EPIC projects on pre-commercial demonstrations. The SDG&E EPIC Plan reflects ongoing collaboration with the other California electric IOUs to develop a unified set of pre-commercial demonstration activities that will deliver high value to the electric IOU ratepayers. The IOU Administrators collaborated during the planning for the first EPIC triennial cycle to create the IOU Working EPIC Framework ("Working Framework"). This framework was reviewed during the second triennial planning cycle and deemed appropriate by the IOU Administrators for continued use in the second triennial cycle. The Working Framework is shown below in Figure 1.

The Working Framework is not intended to be a legally-binding document within which the IOU Administrators' EPIC programs are limited, but rather a guiding reference that expresses the interplay of the various pressures on today's energy sector, including

[1] D.12-05-037 at 2.

regulatory and legislative requirements and their underlying policy goals, Public Utilities Code section 8360 requirements, the electricity system value chain, and industry gaps.

The Working Framework outlines four possible categories in which the IOU Administrators should focus their EPIC projects:

A. Renewable and Distributed Energy Resource Integration
B. Grid Modernization and Optimization
C. Customer Focused Products and Services Enablement
D. Cross Cutting/Foundational Strategies and Technologies

3.1 Framework Categories

These four categories are described below in more detail. All four categories strive to provide electric IOU ratepayers the benefits of greater reliability, lower costs, and increased safety, while simultaneously providing benefits related to greenhouse gas emissions mitigation, the California Loading Order, low-emission vehicles/transportation issues, economic development, the efficient use of ratepayer monies, and other general societal benefits.

Figure 1. IOU Working Framework for EPIC Plans

3.1.1 Category A: Renewable and Distributed Energy Resource Integration

California's numerous clean energy goals are the primary policy drivers for this category of potential EPIC programs. For example, by 2020, California utilities are required to have (1) reduced carbon dioxide to 1990 levels;[2] (2) purchased or produced enough California-eligible renewable energy to meet 33% of customer needs; (3) retired 16,000 MW of once-through-cooling ("OTC") power plants previously used to provide system capacity and inertia, and integrate renewable energy;[3] and (4) encouraged the development of infrastructure to enable all new buildings and dwellings to operate on a Zero Net Energy ("ZNE") basis.[4] In addition, California utilities are strongly encouraged to interconnect 12,000 MW of locally-produced renewable generation, at the distribution level.[5]

This Working Framework category, *Renewable and Distributed Energy Resource Integration*, encompasses potential EPIC projects designed to help California and its electric utility ratepayers:

1. Safely, reliably and affordably attain the State's clean energy policy goals at the least cost/best fit;
2. Maintain various required balancing area standards (e.g., frequency, voltage and balance) and utility standards (e.g., voltage and harmonics);
3. Demonstrate California's leadership in new technologies and grow the State's economy by developing and investing in leading-edge technology companies;
4. Develop and maintain a skilled workforce versed in the newest technologies; and
5. Strive for minimal rate increases necessary to de-carbonize the utility systems.

3.1.2 Category B: Grid Modernization and Optimization

Recently, the grid infrastructure has been undergoing significant changes. New methods, integrated systems, and tools are needed to manage and maintain existing grid assets and to enable the "next generation" of assets, which will keep the more complex system operating safely, reliably, and cost-efficiently in the future.

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[2] Global Warming Solutions Act of 2006 ("AB32"), September 27, 2006.

[3] State Water Resources Control Board Resolution No. 2010-0020, effective October 1, 2010, amended by Resolution No. 2011-0033, July 19, 2011.

[4] *California Long Term Energy Efficiency Strategic Plan*, September 2008, *available at* http://www.cpuc.ca.gov/NR/rdonlyres/D4321448-208C-48F9-9F62-1BBB14A8D717/0/EEStrategicPlan.pdf (the plan strives to achieve this goal by 2020 for residential buildings and 2030 for commercial buildings).

[5] *See* Governor Jerry Brown, *Clean Energy Jobs Plan*, June 2010, available at http://gov.ca.gov/docs/Clean_Energy_Plan.pdf.

This Working Framework category, *Grid Modernization and Optimization*, encompasses potential EPIC projects designed to help California and its electric utility ratepayers:

1. Integrate a multitude of new technologies into the power system so that they operate harmoniously together and provide maximum benefits to ratepayers
2. Meet the goals of SB17[6] to modernize electric utility power system infrastructure;
3. Protect against cybersecurity and critical infrastructure threats;
4. Safely, reliably and affordably integrate technologies that help to achieve the State's energy goals;
5. Demonstrate California's leadership in new technology;
6. Develop and maintain a skilled workforce versed in the newest technologies;
7. Ensure that ratepayers enjoy a smooth upgrade experience; and
8. Ensure that IOUs are making the best technology choices in terms of functionality and economics.

3.1.3 Category C: Customer Products/Services Enablement and Integration

Thanks to new State policies and related technologies, California energy customers have numerous opportunities to participate in the energy sector through new technologies such smart meters,[7] electric vehicles ("EV"), photovoltaic systems, demand response and demand management methods, and ZNE homes.[8] As a result, customers have the opportunity to evolve from simply being consumers of electricity to being "prosumers" (producers and consumers) of electricity. With the help of new technologies, prosumers can actively participate by supplying power from their own distributed energy resources to the grid and by using energy management systems to operate their energy devices in an optimal manner.

This Working Framework category, *Customer Products/Services Enablement and Integration*, encompasses EPIC projects designed to help California and its electric utility ratepayers:

1. Implement California's energy policies;
2. Develop and maintain a skilled workforce versed in newest technologies;

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[6] *See* SB17, codified at Cal. Pub. Util. Code sec. 8360 et seq., requires the Commission to create a smart grid deployment plan by July 1, 2010 and electrical utilities to submit a smart grid deployment plan to the Commission by June 1, 2011. The statute requires that standards be adopted for California that comply with standards from the National Institute of Standards and Technology ("NIST"), the Gridwise Architecture Council, the International Electrical and Electronics Engineers, the North America Electric Reliability Cooperation, and the Federal Energy Regulatory Commission ("FERC"). Cal. Pub. Util. Code §8362(a).

[7] Recently, more than 10 million smart meters have been installed in California. News Release, *CPUC Acts to Ensure Consumer and Market Benefits from Smart Meters*, October 3, 2012, available at http://old.electricenergyonline.com/?page=show_news&id=166978.

[8] *See California Long Term Energy Efficiency Strategic Plan*, *supra* fn4.

3. Continue to provide reliable power to consumers; and
4. Provide customers with opportunities to better manage their own energy costs and to become producers of electricity.

3.1.4 Category D: Cross Cutting Strategies and Technologies

This Working Framework category includes issues, such as communication systems, physical and cyber system security, system architecture and system data management, that cut across the other three Working Framework categories. This broad category is a reflection of the smart grid development's goal to develop architecture that overlays an advanced communication infrastructure (based on emerging interoperability standards) on an increasingly complex electrical system. The adoption of available, applicable and cost-effective standardized communication protocols is necessary to enable smart devices to "plug and play" in the new advanced communication infrastructure and avoid costly engineering work every time a new device is added.

This Working Framework category, *Cross Cutting Strategies and Technologies*, encompasses potential EPIC programs designed to provide California and its electric utility ratepayers with foundational and cross-cutting utility system infrastructure, promote standards adoption, and enable facilities and support the continuous integration of a growing number of smart devices into smart grid operations.

Projects within this category vary and may include, but are not limited to:

1. Testing system architecture, components, subsystems, and standards for smart grids;[9]
2. Demonstrating cybersecurity protections on IOUs' smart grids; and
3. Demonstrating data analytics technologies that use increased data volumes without reducing processing speeds.

4. SDG&E's EPIC Plan Vision and Strategy

SDG&E developed its EPIC Plan in accordance with the requirements of D.12-05-037. Internally, oversight of the EPIC Plan development internally at SDG&E was provided by the SDG&E Research & Development ("R&D") Governance Committee. The Committee considered the needs of SDG&E and SDG&E's ratepayers for both follow-up projects on programs that are part of the SDG&E first EPIC Plan, as well as for additional new TD&D projects.

[9] For example, demonstrations of conceptual smart grid architecture, including networking of smart devices currently operated autonomously into a coordinated smart system, would fall under this category.

As described below, the EPIC Plan development process included all the required public stakeholder workshops and coordination. Additionally, SDG&E has been continuously coordinating with the other three EPIC administrators, and has consulted with Staff from the Commission's Energy Division, ORA and EPRI.

A summary of SDG&E's EPIC Plan is provided in Figure 2, which shows the proposed projects superimposed on the IOU Working Framework categories.

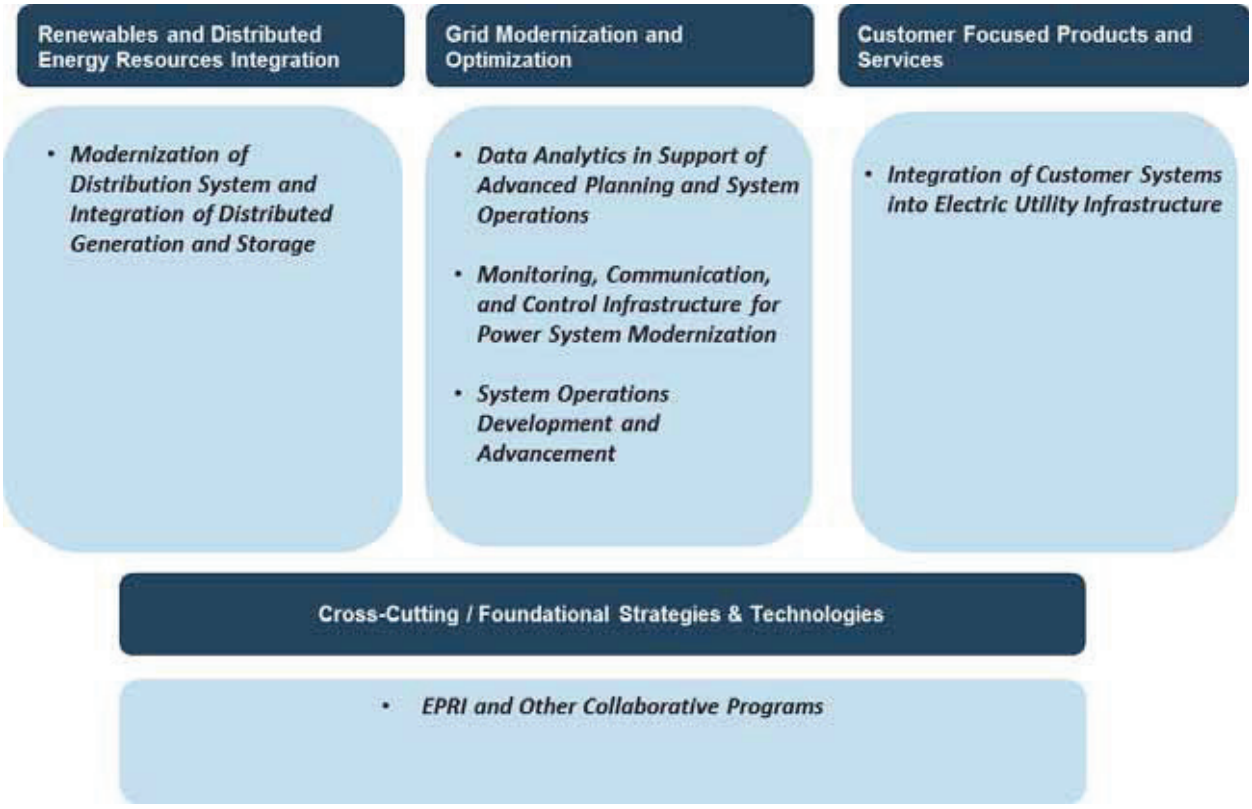

Figure 2. Projects for the SDG&E EPIC Plan mapped into categories of the IOU Working Framework

As shown in Figure 2, SDG&E has planned projects in all areas of the IOU Working Framework, with the largest share in Grid Modernization. The evolution of new power system technology has always been and will continue to be a very dynamic process. The SDG&E EPIC Plan was written to reflect the best understanding of current power system technology trends and the associated technology demonstration needs at the time of its preparation. In response to changes that may have occurred by the time of approval of the SDG&E EPIC Plan (e.g., if something in the plan has been done elsewhere in the intervening period), flexibility has been retained to update the scope

details when the project implementation plans are written, Also, during the preparation of the project implementation plans for EPIC, a re-coordination with the other EPIC Administrators will be done to assure there is proper alignment of all four plans to reflect updates and avoid duplication. A detailed description of SDG&E's project portfolio for its EPIC Plan follows.

5. SDG&E's EPIC Plan Project Portfolio

5.1 General Plan Details

SDG&E's six projects for the second EPIC triennial investment cycle are described in this section, along with their assignment to the relevant Working Framework category. In general, the sequence of work for each project will follow the normal sequence for a demonstration activity. The project will start with a planning phase, during which the specifics for each demonstration will be determined, including a project-specific scope and metrics, equipment needs, tests to be performed, analyses to be performed, staffing requirements, contractor and procurement requirements, equipment and equipment procurement requirements, documentation requirements, and equipment disposition requirements.

Once the specific project details are developed during the project planning phase, a final coordination process will be done to identify any opportunities for collaboration with other EPIC Administrators. The EPIC Administrators will also continue to coordinate to ensure that project duplication is avoided.

The first five projects are not duplicative of any other RD&D known to SDG&E. While some of the projects, specifically Projects 1 and 4, may involve smart inverters, none of those projects have smart inverter testing as their primary objective. Therefore, none of the SGD&E EPIC Plan projects are directed at Rule 21, and none would overlap or conflict with the ongoing work concerning Smart Inverter Working Group ("SIWG") recommendations currently being discussed in R.11-09-011.[10] The sixth project –active participation in collaborative programs in RD&D consortia – helps SDG&E achieve the Commission's goals of promoting collaborative RD&D and co-funding opportunities to better leverage the ratepayer-funded EPIC.

[10] A portion of R.11-09-011 concerns Rule 21 distribution level interconnection issues. A prehearing conference was held on February 19, 2014 to discuss the process to submit the SIWG documents into the record of Rulemaking 11-09-011. However, no further steps have been taken at this time.

5.2 Project 1: Modernization of Distribution System and Integration of Distributed Generation and Storage

Primary Area of IOU Framework: Renewables and Distributed Energy Resources Integration

Objective: This project will demonstrate distribution system infrastructure modernization solutions, including advances in distribution system design to enable use of new technologies, such as power electronic components, new protection systems, distributed generation, and alternative storage technologies. The work will build on the current state of the art for these devices and any track record that is available from the industry. However, the demonstration work in this project will push forward to demonstrating complete integrated smart circuit solutions, versus the individual device focus of prior work.

Concern, Gap, or Problem to be Addressed: The increased use of distributed generation, energy storage, and controllable electronic devices in the power system will require more sophisticated infrastructure to safely and successfully operate the power system. A properly designed infrastructure can optimize the benefits of coordinated use of these new resources for ratepayers. Without the improved infrastructure, the power system's performance could be suboptimal and the quality of service to customers could be compromised.

Description of Technology or Strategy to be Demonstrated: SDG&E will demonstrate advanced integrated distribution circuits to enable high performance of the power system and provide superior service to ratepayers. The advanced infrastructure will encompass integrated system solutions which strategically coordinate and dispatch the new resources in an optimal way. Best practices will be identified by piloting alternative solutions.

Example activities that may be included in this project are:

1. Piloting a robust distribution circuit design with adaptive protection and regulation capabilities that can accommodate a wide variety of new device types at different penetration levels.

2. Determining if Power Factor ("PF") control is better at mitigating voltage fluctuation on a distribution circuit than Volt/VAr control. Distributed generation with intermittent output from photovoltaic ("PV") or wind can contribute to voltage fluctuations on a circuit. And there are other voltage regulation problems to be solved. It is anticipated that smart inverters with Volt/VAr control could help solve these problems. If there are a large number of smart inverters in a given area, it will be essential that they operate in a coordinated manner to maximize

effectiveness and address other circuit design considerations, such as power losses and circuit loading. It is also critical to see and avoid potential adverse interactions. Constant Power Factor Control sets the reactive power in direct relation to the real power. Smart inverters could be set to absorb increasing amounts of reactive power when the real power output increases. The best power factor set point for each site will likely be determined by the electrical characteristics of the site and the circuit.

3. Determining the interaction of PV, energy storage systems ("ESS"), and spinning machine generators (considering also Black Start, and variable output/load) in a Microgrid. One of the areas of concern during Microgrid Islanded operations is the interaction of spinning machines (such as diesel generators) with battery systems during islanded operation. Issues that SDG&E may model and test are:
    a. The interaction of ESS starting or changing output against a generator
    b. The interaction of a generator starting or changing output against ESS
    c. Optimizing the VAr dispatch between generator and batteries
    d. Reconnecting to the grid when both generator and batteries are running
    e. How load fluctuations native to the islanded area will affect the overall performance of the microgrid.

This list of examples is not a complete listing of all the possibilities. A final selection of project's demonstration content, as well as the development of the project's specific scope and metrics, will be made in the project development phase.

Applicable Electricity Value Chain Elements: Distribution (primary) and Transmission (secondary)

Potential Benefits: This project will help optimize customer benefits through grid modernization. In general, the project may help improve the reliability and safety of the power system, improve the performance of the power system (i.e., reduce electrical losses), lower operating costs, make more efficient use of ratepayer monies, lower greenhouse gas ("GHG") emissions and promote economic development. See Section 8 for a more detailed discussion of potential customer benefits resulting from the SDG&E EPIC Plan projects.

As a specific example of potential benefits for this project, the first example demonstration list above, if selected during the project development phase, would demonstrate the ability of an advanced infrastructure that encompasses an integrated system solution which could strategically coordinate and dispatch new resources in an optimal way. This solution could improve the reliability and safety of the power system (such as intentional islanding of a DER, or group of DER's in a coordinated manner during a grid outage known as "Black Start" and ensuring the DER is isolated from the

larger grid so as to not backfeed into the grid), and could allow additional DER on the existing distribution system while minimizing upgrade costs.

5.3 Project 2: Data Analytics in Support of Advanced Planning and System Operations

Primary Area of IOU Framework: Grid Modernization and Optimization

Objective: This project is designed to address the anticipated "data tsunami" associated with more widespread system monitoring and more widespread use of controllable devices in the power system. It will help create better data management. It will also demonstrate solutions for the data management issues and challenges expected to accompany the extensive amount of real-time and stored data being archived from field devices. Finally, it will identify the data mining procedures and the data-archiving methods, utilizing this data to improve power system operations. Solutions that are deemed to be best practices will be documented for use in improving the data management systems that support power system operations. The project results are expected to benefit SDG&E and other utilities, most of which are beginning to have this same problem.

Concern, Gap, or Problem to be Addressed: New devices, such as Advanced Metering Infrastructure ("AMI"), synchrophasors and other sensors, are being widely deployed in power systems. These devices are continuously streaming data. The resulting data tsunami is becoming an engineering challenge to mine, store and archive. If properly managed, it could vastly improve the IOU's operational efficiencies in their power systems with significant resulting ratepayer benefits, such as higher reliability, better power quality, and moderation of rate increases.

Description of Technology or Strategy to be Demonstrated: This demonstration project will first determine the quantity of data-generating devices installed on the power system, the data generation capabilities of these devices and how the resulting data is being stored and archived. The demonstration project will also determine how the data is being used to support the power system, such as predictive maintenance, voltage stability, condition-based maintenance, or post-event analysis. The project will pilot data analytic solutions for filtering data, generating more useful results and developing alternative techniques for processing data. The demonstration project will identify appropriate standards and communication protocols that should be developed and/or adopted.

1. An example of this project activity would be the utilization of AMI "Actual Consumption" data to determine enhanced and improved design loading criteria for various types of power system equipment, especially distribution line transformers.

2. Other project foci may concentrate on larger homes, to compare their connected load, to design and actual consumption and demand in relation to transformer size. The result could be a better match between local transformer capacity, and actual demand, and improved plant utilization. System losses will improve, as will the ability to provide effective protection of the power system.

This list of examples is not a complete listing of all the possibilities. A final selection of project's demonstration content, as well as the development of the project's specific scope and metrics, will be made in the project development phase.

Applicable Electricity Value Chain Elements: Distribution (primary) and Demand-Side Management (secondary)

Potential Benefits: This project will optimize customer benefits through grid modernization. It will demonstrate the ability to enhance data analytics and management. The project results could improve the reliability and safety of the power system, improve the performance of the power system (i.e., reduce electrical losses), lower operating costs, and make more efficient use of ratepayer monies. See Section 8 for a more detailed discussion of potential customer benefits resulting from the SDG&E EPIC Plan projects.

5.4 Project 3: Monitoring, Communication, and Control Infrastructure for Power System Modernization

Primary Area of IOU Framework: Grid Modernization and Optimization

Objective: To demonstrate advanced monitoring, communication and control infrastructure needed to operate an increasing complex ("smarter") power system infrastructure. In other words, to test system controls to "sort" data and use what is helpful and useful.

Technology or Strategy to be Demonstrated: This project will pilot alternative subsystem solutions to determine their suitability for inclusion in the evolving advanced distribution management system infrastructure. Once subsystem gaps in the evolving infrastructure have been identified and characteristics of the subsystems have been defined, subsystem performance and integration into the overall architecture will be demonstrated. Preferred solutions will be incorporated into an overall advanced distribution management system ("DMS") approach.

Concern, Problem, or Gap to be Addressed: The addition of various devices to modernize the grid poses challenges. For instance, a device used to provide VAr support may compete with a device providing CVR. Advanced power system automation will require elaborate monitoring, communication and control infrastructure. Significant increases in system status information and individual component device

status information will be needed. Preferred subsystems of an overall "system of systems" approach for monitoring and control will need to be identified and piloted.

Examples of activities that may be included in the demonstration project are:

1. Piloting new automatic reconfiguration options that can be used to promote a self-healing grid.
2. Pilot testing new communication standards, such as those emerging from the International Electrotechnical Commission ("IEC"). This could be set up during the project definition phase as a collaborative with other EPIC administrators, EPRI, and vendors to share the cost of the multitude of applications that would need to be tested. The testing could include demonstrating use of the engineering tools that come with some of the standards.
3. Demonstrate effective cyber security measures that may be emerging from larger programs developing security practices.

This list of examples is not a complete listing of all the possibilities. A final selection of project's demonstration content, as well as the development of the project's specific scope and metrics, will be made in the project development phase.

Applicable Electricity Value Chain Elements: Distribution

Potential Benefits: This project will help optimize customer benefits through grid modernization. Successful integration of advanced monitoring, communication, and control infrastructure to help modernize the power system could improve the reliability and safety of the power system, improve the performance of the power system (i.e., reduce electrical losses), lower operating costs, contribute to economic development and job creation, and make more efficient use of ratepayer monies. See Section 8 for a more detailed discussion of potential customer benefits resulting from the SDG&E EPIC Plan projects.

5.5 Project 4: System Operations Development and Advancement

Primary Area of IOU Framework: Grid Modernization and Optimization

Objective: The objective of this project is to support continued modernization of SDG&E's power system via demonstrations of improved capabilities in system operations. The project will demonstrate a systematic process for the realignment of operating practices with advances in technology, software and standards used in the power system. The realignment is broad, and will address system integration issues, training programs, worker skill sets, and workforce readiness.

Concern, Problem, or Gap to be Addressed: Power system operations are being improved by evaluating and adopting new power system technology and software. The mix of devices, software and standards used in the system at any given point is dynamic and evolutionary. The best mix needs to be identified for adoption in the long term. However, for ratepayers to fully realize the benefits of advancements in technology, software and standards being adopted into the power system, operating practices must also evolve to include regular realignment with changes in the power system infrastructure. Without such realignment, the improvements in infrastructure will fall short of delivery of the intended benefits. Training programs, skill sets, and workforce readiness need to be simultaneously kept current with the upgrades in operating practices, which in turn support the technology advances and resulting benefits.

Technology or Strategy to be Demonstrated: The project work will demonstrate advanced system infrastructure and associated operating practices to improve power system operations, consistent with evolving power system infrastructure and ratepayer needs. A methodology will be demonstrated to keep operating practices current with changes in infrastructure on an ongoing basis, as power system technology is always advancing. Some examples of candidate areas of power system operations advancement that may be addressed follow.

1. Integrated volt/VAr management and control will involve a combination of traditional measures, such as electromechanical voltage regulators and capacitor banks, and newer concepts, such as standalone solid-state dynamic power-electronic devices and DER's with "smart inverters". Alternative solutions would be piloted and evaluated to develop a complete set of preferred solutions for volt/VAr regulation in a networked distribution control system. At each stage, the operating practices needed to keep pace with the technology solutions would be determined.

2. Demonstrate integration of distributed energy sources ("DER") into advanced distribution automaton, including generation and storage devices, whether owned or operated by SDG&E or by its customers. Whereas the main use of these devices has been for kWh (energy) supply, they are also able to provide other functions, such as VAr (reactive power) supply, acting as power system monitoring devices, and providing fast response emergency (real) power. Most of these functions are realized by adding control options to the inverter (to create what is loosely called a smart inverter). Alternative solutions for using DER to improve system operations would be piloted and evaluated for use in a networked distribution control system. At each stage, revised operating practices needed to keep pace with the technology solutions would be determined.

3. Phasor measurement units ("PMUs"), also called synchrophasors, are a contemporary technology for exploitation on the grid. These devices have wide potential for enhancing protection systems and other aspects of distribution operations. Alternative solutions would be piloted and evaluated for using PMUs to improve system operations, and would be piloted and evaluated for use in a networked distribution control system. At each stage, the operating practices needed to keep pace with the technology solutions would be determined.

4. Piloting emerging technology and software to hasten fault locating, and to anticipate incipient faults becoming system impacts, can provide universal benefits. This would be accomplished by analyzing system operating data in real time. Alternative solutions would be piloted and evaluated to develop a complete set of preferred solutions for fault anticipation and location in a networked distribution control system. At each stage, the operating practices needed to keep pace with the technology solutions would be determined.

5. Another example is to pilot new options for communication infrastructure. In particular, emerging standards for communication protocols and object models will be evaluated, including, but not limited to, IEC 61850 and the Common Information Model ("CIM"). It is essential for SDG&E to test these emerging standards and their associated engineering tools, to advance the knowledge base to make a decision on whether to migrate off existing standards, to the new standards in the long term. Getting familiar with these standards will also help determine what the overall architecture, migration process, and schedule would be, and will enable SDG&E to intelligently specify the standards in the procurement process. Alternative solutions would be piloted and evaluated for suitability to improve system operations in a networked distribution control system. At each stage, the operating practices needed to keep pace with the technology solutions would be determined. Special attention will be given to cybersecurity in this area.

This project will also demonstrate a methodology for mapping the new operating practices into the impacted training programs, worker skill sets, and workforce readiness initiatives. The refinements to operating practices will benefit SDG&E's power system operations and may also benefit the electric utility industry in general. Because the adoption of new technologies will be a continual process for SDG&E, as it has always been, the methodology developed for updating operating practices will be documented for use beyond the life of this project.

Clearly, there will not be sufficient funds in one triennial EPIC cycle to address all of these operating issues. Further, this list of examples is not a complete listing of all the

possibilities. A final selection of project's demonstration content, as well as the development of the project's specific scope and metrics, will be made in the project development phase.

Applicable Electricity Value Chain Elements: Distribution

Potential Benefits: This project helps optimize customer benefits through grid modernization. Upgrading operations to realign with gains in technology in the system will benefit ratepayers by containing rate increases and bolstering reliability and power quality. This project will deliver benefits in the following areas: increased reliability, improved power system performance (loss reduction and better power quality), lower costs, improved safety, more efficient use of ratepayer monies, and contribute to economic development through workforce readiness and development. See Section 8 for a more detailed discussion of potential customer benefits resulting from the SDG&E EPIC Plan projects.

5.6 Project 5: Integration of Customer Systems into Electric Utility Infrastructure

Primary Area of IOU Framework: Customer-Focused Products and Services

Objective: The project will address the evolving gateway between customers and utilities. Specifically, it will demonstrate the safe and reliable interoperability of customer systems with the distribution and transmission system and the California Independent System Operator ("CAISO") operations to improve grid operations and thereby increase ratepayer satisfaction and benefits.

Concern, Problem, or Gap to be Addressed: Consumer devices, including distributed energy resources, electric vehicles, customer premise networks, and demand-side-management-capable appliances are being deployed in increasing numbers by all classes of customers. These customer-owned devices and resources provide both challenges for the safe and reliable operation of the distribution system, as well as creating opportunities for customers to be part of the solution. Robust interoperability systems are needed to enable the information exchange to support increased utility/customer collaboration in system operations and new services and to assure that the customer devices are not, in aggregate, interfering with operations at the distribution system level or the CAISO level. It is also critical to understand the interactions, if any, between customer systems of this type. Technology solutions are needed to determine the locational value of customer resources and to support dispatch of these resources in a way that maximizes value to all ratepayers.

Technology or Strategy to be Demonstrated: First steps of the project will be to identify alternative solutions for successful customer interoperability with utility systems

and CAISO in collaboration with other stakeholders. Requirements for integration with the overall transmission and distribution management systems will be specified. Promising interoperability systems will be demonstrated to create a knowledge base to support decisions on commercial deployment.

The demonstrations will involve an appropriate mix of field and laboratory work to be determined in the project development phase (the first phase of the project).

1. One example of a demonstration activity for this project would be to pilot solutions for utility/customer interoperability systems, using customer end-use devices and distributed energy resources to supply real and reactive power to the grid in response to price signals and events.
2. Another example of a demonstration activity for this project would be to pilot solutions for controlled dispatch of customer resources (direct control for demand management).

This list of examples is not a complete listing of all the possibilities. A final selection of project's demonstration content, as well as the development of the project's specific scope and metrics, will be made in the project development phase.

Applicable Electricity Value Chain Elements: Demand-side management (primary) and distribution (secondary)

Potential Benefits: This project will help optimize customer benefits through grid modernization. Successful integration of customer systems into electric utility infrastructure will improve reliability and safety, lower costs, and open up possible new utility services for customers. The design and integration of innovative utility-customer interoperability systems into power system infrastructure could lead to new products being developed, provide skilled employment and promote economic development. Improved operational efficiencies will reduce electric demand and consumption, resulting in environmental benefits (reducing greenhouse gas emissions) via increased utility-customer collaboration in activities such as demand management through direct control. See Section 8 for a more detailed discussion of potential customer benefits resulting from the SDG&E EPIC Plan projects.

5.7 Project 6: Collaborative Programs in RD&D Consortia[11]

Primary Area of IOU Framework: Cross-Cutting/Foundational Strategies & Technologies

Objective: The objective of this project is to accomplish highly leveraged demonstration work through industry collaborative R&D organizations. The leveraging includes both financial leveraging via co-sponsorship by other members of the collaboratives, and intelligence leveraging by better informing the project content in EPIC activities with the knowledge of relevant activities occurring in a worldwide sense.

Concern, Problem, or Gap to be Addressed: Modernization of power systems has been an ongoing process that gained momentum in the 1990's with efforts to increase distribution system automation. Activities are underway worldwide. There are lessons to be learned from all the worldwide activity via appropriate programs that capture the knowledge and have appropriate sharing mechanisms. Utilities in countries with new power system infrastructure have been able to adopt new technology, software, and communications standards quickly, because they are not encumbered by legacy investments in older infrastructure, as is the case with older power system infrastructure.

Technology or Strategy to be Demonstrated: By using international RD&D collaboratives, a much larger pool of knowledge coming from worldwide demonstrations in the various project areas of this EPIC Plan will be captured than would be achievable in the few smaller demonstrations that could be directly funded by SDG&E's EPIC budget alone. The co-funding of these collaborative demonstrations not only significantly leverages SDG&E's EPIC funding, but also helps SDG&E stay current on international developments in power system technology.

Prospective demonstration work to be covered through the collaboratives include major activities in grid modernization, integration of distributed generation and storage, transmission systems and substations, distribution system operations, and integration of customer systems.

SDG&E actively participates with other co-sponsors in the project definition and management of all collaboratives that it co-funds. SDG&E decides to participate in certain projects based on a project's relevance to current technological issues facing the

[11] One of PG&E's proposed projects during the first EPIC triennial cycle was funding "Multi-Utility, Industry-Wide RD&D Programs Such as Those Conducted by EPRI" through EPIC. A.12-11-003, Application of Pacific Gas & Electric Company Electric Program Investment Plan, November 1, 2012, Attachment A at 72-73. The Commission found that the "funding of research institutes" with EPIC funds to be permitted. D.13-11-025 at COL 42.

company, its customers, the industry and extent of leveraging that is achievable. SDG&E annually reassesses its choice regarding which collaboratives to co-fund and SDG&E may withdraw its participation in an R&D collaborative at any time.

SDG&E has traditionally funded its participation in most R&D collaboratives through GRC-approved funding. The total GRC funding for collaboratives in recent years has been approximately $800k annually. The budget allocation in the SDG&E EPIC Plan for collaboratives is less than that amount (approximately $500k annually). Besides EPIC, SDG&E does not currently have another source for funding its membership in those collaboratives that it had previously purchased with GRC RD&D funding.

Applicable Electricity Value Chain Elements: Distribution (primary) and Demand-Side Management (secondary)

Potential Benefits: This project will help optimize customer benefits through grid modernization. The primary purpose of RD&D is to create and document new knowledge. By using a portion of the EPIC allocation to capture the knowledge coming from demonstrations in worldwide collaborative RD&D programs, the amount of such demonstration results and knowledge captured per dollar spent will be leveraged well beyond what is possible by direct funding of a few, smaller demonstrations. Furthermore, the knowledge coming from the international perspective of the collaboratives will better inform and increase the value of the demonstrations that are directly funded with EPIC funds.

With past experience as a guide, the collaborative programs funded by this project will deliver benefits in the following areas increased reliability, improved power system performance (loss reduction and better power quality), lower costs, improved safety, more efficient use of ratepayer monies, and economic development. See Section 8 for a more detailed discussion of potential customer benefits resulting from the SDG&E EPIC Plan projects.

To execute this Project, SDG&E will consider participation in the demonstration programs of collaborative organizations including, but not limited to:

5.7.1 Centre for Energy Advancement through Technological Innovation ("CEATI")

CEATI organizes its collaborative projects through interest groups in specific technology program areas. There is a nominal fee to join an interest group. The interest groups organize the RD&D projects and members can join the projects at their option. When enough sponsors have joined a project, the project is initiated. CEATI selects contractors to perform the work by competitive procurement. Sponsors have the opportunity to contribute to the content of the work statement used for the procurement

and to review the proposals. Sponsors review the work and manage the direction of the projects to assure that the desired results are obtained.

CEATI interest groups in which SDG&E is currently participating include:

- 0500 - Strategic Options for Sustainable Power Generation
- 3100 - Power System Planning & Operations
- 3200 - Transmission Line Asset Management
- 3300 - Transmission Overhead Design & Extreme Event Mitigation
- 3400 - Transmission Underground Cables
- 5000 - Distribution Assets Life Cycle Management
- 5100 - Power Quality & Advanced Technologies
- 7000 - Customer Energy Solutions
- 3700 - Grounding and Lightning Task Force
- 3800 - Smart Grid Task Force

5.7.2 Electric Power Research Institute ("EPRI")

EPRI's current offering consists of programs in an Annual Research Portfolio and supplemental projects offered via a funding match mechanism. Both the structure and content of the offerings are updated annually. Sponsors pick the activities they wish to fund. SDG&E's RD&D budget has been used to purchase a small portion of EPRI offerings in the past, and this process will be continued using EPIC funds going forward. SDG&E is active in the EPRI governance process for the programs and projects it buys. Sponsorship is reviewed annually, and a decision is made annually on which programs and projects to join as a cosponsor. Examples of programs in which SDG&E has been a sponsor using RD&D funds in recent years are:

- Program 94: Energy Storage
- Program 161: IntelliGrid
- Program 170: End-User Energy Efficiency and Demand Response in a Low-Carbon Future
- Program 174: Integration of Distributed Renewables
- Program 180: Distribution Systems

The exact content of the portfolio for 2015-2017 is not known and will not be known until shortly before each year, when the annual offering is made. SDG&E will make its decision on which programs and projects to cosponsor based on their content relative to either providing needed demonstration activities via a leveraged collaborative basis or supporting intelligence that will aid in better performing SDG&E's own EPIC demonstration work.

5.7.3 National Electric Energy Testing, Research and Applications Center ("NEETRAC")

NEETRAC is a self-supporting, membership based center within the School of Electrical and Computer Engineering at Georgia Tech. The center is uniquely positioned to provide a wide array of analytical, engineering, research and testing services to help improve electric grid reliability and efficiency. The organization offers high power testing services through a partnership with a major supplier to the industry. The focus for NEETRAC is energy delivery, placing this collaborative square within the IOU Administrator space for EPIC.

NEETRAC works with its members and others to help the electric utility industry solve problems associated with the complex task of transmitting and distributing electricity to homes, businesses and industry.

The field of electric energy is faced with changing regulations, emerging technologies, and the approaching integration of utility services. As these changes take place, electric utilities are faced with imperatives to allocate resources cost-effectively, to develop and deploy new technologies, and to recruit and retain educated talent to lead them through these changes. NEETRAC is uniquely positioned to provide a wide array of analytical, engineering, research and testing support, and has a track record of doing so since the mid 1990's.

5.8 Coordination and Consultation with Stakeholders

The IOU Administrators conducted weekly calls, working sessions, and jointly hosted public workshops with the fourth EPIC Administrator – the California Energy Commission ("CEC") – to ensure consistency with the planning process and provide input into the development of the EPIC plans. These working sessions and meetings provided fora for open discussions and an exchange of knowledge to ensure an effective common approach to EPIC.

5.8.1 Public Scoping Workshops with Stakeholders

On February 21, 2014 the IOU administrators of the EPIC program conducted a joint webinar to solicit initial stakeholder and public input on the initiatives and scope for each IOU's proposed Second EPIC Triennial Investment Plan for 2015-2017. The webinar was focused only on the one area the IOUs are authorized to fund through EPIC - Technology Demonstration and Deployment ("TD&D").

On March 17 and 21, 2014, the IOU Administrators held joint public scoping workshops. At the workshops, the IOUs summarized their planning and coordination process and presented examples of projects under consideration for the second triennial cycle. As required by D.12-05-037,[12] SDG&E presented its draft EPIC Plan to stakeholders at the workshops. SDG&E outlined its draft second EPIC Plan with its six projects and described in detail the first five projects. The slides were also posted on SDG&E's website for public review.[13] Stakeholders were encouraged to submit comments during and after the workshop. Both the CEC and Commission Staff attended and participated in the workshops.

5.8.2 Voluntary Consultations with Commission Staff, Industry Experts and ORA

Part of the planning process for SDG&E included a one-day workshop on March 3, 2014 with the Electric Power Research Institute ("EPRI") for a 'gap' analysis on the proposed content of the EPIC plans to assure the demonstrations were filling key gaps in the needed Research, Development, and Deployment ("RD&D").

On March 4, 2014 a meeting was held between the IOU Administrators and representatives from the Commission's Energy Division and the Office of Ratepayers Advocates ("ORA") to overview the Administrators' coordination process, provide example projects, and address questions.

This coordination with other organizations was also done for the first EPIC plans and will continue in the implementation phase of all EPIC plans and the development of the third EPIC plan.

[12] D.12-05-037 at 31.

[13] SDG&E, EPIC, http://sdge.com/regulatory-filing/3749/electric-program-investment-charge-epic.

5.8.3 Stakeholder Feedback and SDG&E's Response

D.12-05-037 requires each EPIC plan to include a summary of stakeholder comments received during the development of its EPIC plan and the Administrator's response to the comments. SDG&E received comments from participants of the webinar and workshops in response to its draft EPIC Plan. In addition, the IOUs received general comments about their project considerations.

SDG&E found the stakeholder feedback useful and incorporated many of the stakeholders' input into the EPIC Plan. The feedback SDG&E received from stakeholders regarding its EPIC Plan, as well as stakeholder comments made generally to the IOU Administrators but also relevant to SDG&E, is described below, along with SDG&E's responses to the feedback.

SDG&E only received direct feedback on its draft EPIC Plan from a few stakeholders. For example, on March 4, 2014, the IOU Administrators presented their draft EPIC plans to Staff from the Commission's Energy Division and ORA. Discussion topics turned to sharing of results among the utilities. SDG&E commented that the SCE pilot of an IEC61850-conforming substation might result in knowledge that would be valuable to the whole industry. SDG&E note that it is considering testing IEC6180-7-420 object models for Distributed Energy Resources ("DER"). Both utilities noted that they would like to explore coordination and collaboration possibilities during the project implementation phase.

In a March 28, 2014 letter to SDG&E and the California Energy Commission, the Natural Resources Defense Council ("NRDC") commended SDG&E's Project 1 (*Modernization of Distribution System and Integration of Distributed Generation and Storage*) and Project 5 (*Integration of Customer Systems into Electric Utility Infrastructure*). SDG&E took into account NRDC's recommendation to add a focus on regional grid optimization. As a result, SDG&E has included integration of customer systems with CAISO operations in one of its EPIC Plan projects.

SDG&E also considered stakeholder feedback that, while aimed at the IOUs generally, was relevant to SDG&E. For example, at the February 21, 2014 Joint Webinar, a stakeholder submitted a live chat message asking if the IOUs could rely on customer-owned assets, such as a solar inverter, to respond to grid dynamics or if it would be more typical for the IOUs to use their own grid equipment. SDG&E notes that both customer-owned assets and utility owned assets are possible components of system operating solutions. Both are included in SDG&E's Projects 1, 3 and 4, which concern grid modernization and integration of distributed resources, along with other possible components of the solution. The objective of these projects is to determine the best mix of solutions for specific types of distribution circuits.

The same participant also asked if Conservation Voltage Reduction ("CVR") was a priority for the IOUs. SDG&E states that it has been studying the need to update CVR practices, and that issue will be studied further as part of the larger scope of SDG&E's Projects 1, 3, and 4 dealing with grid modernization.

At the same workshop, National Aeronautical and Space Administration ("NASA") asked the IOUs generally if there was interest in cloud prediction technologies combined with photovoltaic modelling to look at impacts on the grid. SDG&E states that it is already involved in a series of projects to study this issue collaboratively with other parties, involving a mixture of funding sources and in-kind contributions. Therefore, this topic is not included into the EPIC Plan because of possible duplication. SDG&E's inclusion of additional work in this area in a future EPIC plan will depend on the outcomes of current work.

At the March 17, 2014 Joint Workshop, a representative from the California Institute for Energy and Environment ("CIEE") asked the IOUs generally about modelling and predicting customer load and whether the IOUs take into account the effect of customer resources, such as photovoltaics and energy storage. SDG&E responded by noting that it is currently studying load modeling methodology in a GRC-funded RD&D program. Therefore, this topic is not included into the EPIC Plan because of possible duplication. SDG&E's inclusion of additional work in this area in a future EPIC plan will depend on the outcomes of current work.

6. Project Budget and Project Management for SDG&E's EPIC Investment Plan

6.1 Proposed 2015-2017 EPIC Budget and Funding Allocation

SDG&E has allocated its project budget for the second triennial EPIC cycle as shown in Table 1. Pursuant to previous EPIC decisions, SDG&E proposes to only fund pre-commercial TD&D projects, and overall EPIC program administrative expenses.

The total project-level funding allocation for SDG&E EPIC Plan is $7800k. An additional allocation of $780k is available for required program-level administration activities. SDG&E recognizes that the EPIC collections, and thus the EPIC allocations, will be adjusted on January 1, 2015 in accordance with D.12-05-037.[14] The amount of the adjustment is not known at the time of this filing. SDG&E proposes that the budgetary adjustment, whether to increase or decrease the budget, will be proportionally distributed among the six projects' estimated funding in Table 1.

[14] D.12-05-037 at OP 7.

Table 1
Estimated Funding Allocation for the SDG&E Second EPIC Plan (2015-2017)

Investment Area from IOU Framework	Project Name	3-Year Project Funding Allocation ($k)	% of Total Allocation for Projects
Customer Service and Enablement	Integration of Customer Systems	1000	12.8%
Renewables and DER Integration	Modernization of Distribution System and Integration of Distributed Generation and Storage	1700	21.8%
Cross Cutting/Foundational Strategies and Technologies	EPRI and Other Collaborative Programs	1500	19.2%
Grid Modernization and Optimization	Monitoring, Communication, and Control Infrastructure for Power System Modernization	1200	15.4%
	System Operations Development and Advancement	1200	15.4%
	Data Analytics in Support of Advanced Planning and System Operations	1200	15.4%
	Total Project Budget for Second Triennial Cycle	**7800**	**100.0%**

6.2 Project Management and Procedures for Competitive Solicitation of Contractors

The six projects will be done by SDG&E staff teamed with RD&D contractors. The contracted work will be done primarily through competitive bid research contracts. SDG&E will use pay-for-performance contracts in accordance with its long-standing and documented procurement policies and procedures, including affiliate compliance rules. A contractor's performance will be measured by completion of milestones outlined in the contract.

For the first five projects, SDG&E will follow the "Adopted IOU EPIC Administrator Contractor Solicitation Process and Evaluation Guidelines" as approved in D.13-11-025[15] Whenever possible, SDG&E will use a competitive process, starting with a Request for Information ("RFI") or Request for Qualifications ("RFQ") to perform an initial screen, before issuing a Request for Proposal ("RFP"). The RFP will be sent to potential suppliers including certified (or certifiable) Diverse Business Enterprises ("DBE").

[15] D.13-11-025 at Attachment 3.

Bids will be scored against predetermined evaluation criteria. Successful bidders must demonstrate that they have expertise in the areas of the work specified in the request for proposal for the specific project. They must also demonstrate the ability to design the needed experimental systems, take the data, perform the analyses, and draw critical conclusions from the analyses to support attainment of project objectives. To promote economic efficiency, bonus points will be given for maximizing the use of existing test facilities, such as SDG&E's Integrated Test Facility ("ITF") in Escondido, CA, or an alternative existing test facility. For work that needs to be done at a field location in the distribution system, bonus points will be given for using an existing SDG&E facility to avoid disturbance to customers, reduce costs of the demonstration, and reduce safety risks.

As required by previous EPIC decisions, SDG&E's EPIC annual reports will include the number of bidders passing the initial pass/fail screening test and the ordinal rank of the selected bidder. If the selected bidder did not have the highest score an explanation will be provided.[16] The identity, scope of work and deliverables of the winning bidders will be included in SDG&E's EPIC annual reports. If there are active contract negotiations at the time of filing the EPIC annual report, the information on the winning bidders will be disclosed within 90 days of executing the contract.[17]

There may be situations where competitive bidding is not possible or not justifiable due to cost issues. For example, a project may require unique expertise or the equipment that can only be obtained from one provider, or the cost of competitive bidding would exceed the cost of the services or materials. In these instances, SDG&E may decide to use its "sole source" procurement procedures. Any non-competitive awards will be documented and justified in SDG&E's EPIC annual report.[18]

There will be no limitations on funding, such as per-project, per-awardee, or matching funding requirements. Cost sharing will be sought, but will not be required.

For Project 6 (*Collaborative Programs in RD&D Consortia*), SDG&E will review the various pre-commercial demonstration projects offered by various RD&D consortia, including those organizations discussed above, to identify those projects that would help fill identified RD&D needs. For any selected project, SDG&E actively participates with other co-sponsors in the project definition and

[16] D.13-11-025 at OP 17.

[17] D.13-11-025 at OP 25.

[18] D.13-11-025 at OP 18.

management of all collaboratives that it co-funds. SDG&E is also interested in exploring opportunities for jointly funding the RD&D consortia with other EPIC IOU Administrators.

6.3 SDG&E's Approach to EPIC-Funded Intellectual Property

SDG&E employ Intellectual Property ("IP") methodologies that are consistent with the requirements for EPIC-funded IP outlined by the Commission in D.13-11-025. For the sixth project, before joining any R&D consortium, SDG&E will evaluate whether the consortium's rules concerning IP are in accordance with the Commission-mandated EPIC rules concerning IP, before agreeing to participate.

6.4 Project Metrics

Detailed project-specific metrics will be developed during the project development phase of the projects (i.e., the first phase). SDG&E will use both quantitative metrics and qualitative criteria to evaluate results coming from the demonstrations. SDG&E will use the metrics jointly developed by the IOU Administrators and approved by the Commission in D.12-05-037 as applicable.[19]

The primary purpose of RD&D is to create, document, and transfer new knowledge. Project results will be delivered in the form of reports, spreadsheets, or other appropriate deliverables prepared by SDG&E and contractor project staff. Any such results will be provided in the annual EPIC report, after project completion.

7. Potential Benefits of the SDG&E EPIC Plan

The six projects selected for the SDG&E EPIC Plan are designed to help modernize the grid and improve system operations for the customers' benefit. The projects aim to accomplish these goals in a variety of ways, ranging from demonstrating pre-commercial technologies and software, to testing new standards within the power system design and operations. By helping to modernize the grid and improve system operations, the projects proposed in the SDG&E EPIC Plan have the potential to help provide the following customer benefits:

1. Improved Safety: Devices and software demonstrated as part of a system modernization effort will be scrutinized for their operational safety and their ability to improve safety as a part of an integrated power system infrastructure. Collectively, they have the potential to increase the overall safety for both customers and utility workers if later integrated into the system infrastructure.

[19] D.13-11-025 at Attachment 4.

2. Improved Reliability and Power Quality: Two goals of grid modernization are to improve the level of reliability and to optimize the quality of power, as seen by the customer. Higher reliability means reducing the occurrences of outage and reducing the duration of outages when they do occur. Improved power quality means reducing the disturbances seen in the power itself, such as voltage variation, flicker, and harmonic content in the power waveform.

3. Improved Performance of the Power System: Improved system operations and performance (i.e., system electrical efficiency) will help reduce electrical losses in the system, such as reductions in resistive losses associated with current flow through the conductors and reductions in transformer electrical losses.

4. Lower Greenhouse Gas Emissions: Grid modernization will help reduce system electrical losses, which in turn will help reduce the need for electric generation. Less generation means fewer greenhouse gas emissions.

5. Lower Operating Costs and More Efficient Use of Ratepayer Monies: A more robust and efficient system will help deliver high-quality power to customers, while moderating costs. As one example, modern techniques will help reduce the stress of faults on equipment life and extended equipment life. This should result in a moderation of costs that would otherwise be borne by the customers. Additionally, grid modernization will help increase the level of interoperability between the utility and customers, which will enable increased partnering between customers and utilities around new service offerings.

6. Economic Development: A secure source of low-cost, high-quality, reliable electric power is essential to economic development and to retain and attract businesses in California. Additionally, job creation may result from the work done by SDG&E or contracted by SDG&E to execute the SDG&E EPIC Plan, and more importantly, from subsequent commercial deployment of technology solutions that are chosen for actual adoption.

These benefits are realized to some degree by all six SDG&E EPIC Plan projects. The relative potential for each benefit varies by project.

Table 2 summarizes the expected benefit areas for all of the projects.

Table 2

EPIC Funded Projects Benefits Summary

Primary Area of IOU Framework	Project Description	Safety	Reliability	Improved Performance of the Power System	Lower Greenhouse Gas Emissions	Lower Operating Costs	Efficient Use of Ratepayer Monies	Economic Development
Renewables and Distributed Energy Resources Integration	Modernization of Distribution System and Integration of Distributed Generation and Storage	✓	✓	✓	✓	✓	✓	✓
Grid Modernization and Optimization	Data Analytics in Support of Advanced Planning and System Operations	✓	✓	✓	✓	✓	✓	✓
	Monitoring, Communication, and Control Infrastructure for Power System Modernization	✓	✓	✓	✓	✓	✓	✓
	System Operations Development and Advancement	✓	✓	✓	✓	✓	✓	✓
Customer-Focused Products and Services	Integration of Customer Systems into Electric Utility Infrastructure	✓	✓	✓	✓	✓	✓	✓

8. EPIC Investments Are Consistent with PU Code Section 740.1 and 8360

Public Utilities Code Section 740.1 requires that the Commission consider specific guidelines when evaluating the research, development and demonstration projects proposed by electrical and gas corporations. SDG&E's EPIC Program meets these requirements. Proposed projects should offer a reasonable probability of providing benefits to ratepayers. SDG&E's EPIC programs all have the potential to provide electric utility ratepayers benefits, including greater reliability, lower costs, and increased safety, as well as various other complementary benefits.

Section 740.1 states that expenditures on projects with a low probability for success should be minimized. SDG&E has selected five projects for pre-commercial demonstration of various system integration solutions. The knowledge gained from these demonstrations will aid in resolving key problems now facing system operations. The integration solutions are to be built up from existing components, standards, and software, wherever possible. The sixth project – participation in RD&D consortia – also meets this requirement because the various programs in which SDG&E will consider participating already have been filtered by the consortium organization for likelihood of

success. Therefore, the probability of success in the selected SDG&E EPIC programs is reasonable.

Section 740.1 requires that projects remain consistent with the corporation's resource plan. Again, this requirement is fulfilled by the SDG&E EPIC Plan because its six projects were selected after a rigorous internal process that ensured the plans aligned with SDG&E's infrastructure needs and corporate objectives.

Section 740.1 also requires SDG&E to avoid unnecessarily duplicating research being done by another entity. As has been thoroughly discussed throughout this EPIC Plan, SDG&E has worked diligently to ensure that to its belief and knowledge, its five projects are not duplicative of other known TD&D plans by completing an initial gaps analysis, researching other known TD&D efforts, and soliciting feedback on its plans from stakeholders, the Commission, the other EPIC Administrators, EPRI and its internal business units. The sixth project – participation in RD&D consortia – also meets this requirement because the programs in which SDG&E will consider participating have already been pre-screened by the consortium organization to avoid duplicity.

EPIC expenditures must follow the statutory guidance provided by section 8360 of the California Public Utilities Code. Section 8360 states that it is the policy of the State to modernize the state's electrical transmission and distribution system to maintain safe, reliable, efficient, and secure electrical service, with infrastructure that can meet future growth in demand and achieve ten separate objectives. In essence, it is the policy of the State to support smart grid development.

The SDG&E EPIC Plan meets this power system-centric statutory standard with ample sufficiency because the entire Plan and its project components are designed to help modernize the grid for the benefit of customers.

9. Summary of SDG&E's Approved EE and DR Projects

D.12-05-037 and D.13-11-025 require IOU Administrators to include information about ongoing Efficiency ("EE") and Demand Response ("DR") projects in their EPIC Plans to avoid duplication between the EE/DR projects and the EPIC projects. Specifically, each IOU Administrator must "include an appendix summarizing the RD&D activities undertaken as part of their approved Energy Efficiency and Demand Response portfolios. This appendix should describe each RD&D project, including the purpose, funding, deliverables and progress to date."[20] SDG&E has provided the required

[20] D.13-11-025 at 66.

information in Appendices A (SDG&E's Approved Energy Efficiency (EE) Portfolio) and B (SDG&E's Approved Demand Response (DR) Portfolio).

None of SDG&E's ongoing EE and DR projects are duplicative of SDG&E's six EPIC projects. In addition, as described in the Appendices, SDG&E's ongoing EE and DR projects are traditional *post-commercialization* demonstrations so none of them would even qualify as TD&D under the EPIC definitions.

SDG&E's RD&D activities that fall under Energy Efficiency are part of SDG&E's Emerging Technologies Energy Efficiency ("ET-EE") subprogram.[21] The mission of the Emerging Technologies subprogram is to support increased energy efficiency market demand and technology supply by contributing to the development and deployment of new and underutilized energy efficiency technologies, practices, and tools, and by facilitating their adoption as measures supporting California's aggressive energy and demand savings goals.[22]

SDG&E's ongoing projects in this area are summarized in Appendix A. None of them overlap with SDG&E's EPIC projects.

SDG&E's ongoing Emerging Technology Demand Response ("ET-DR") efforts consist of evaluating demand-reducing technologies and strategies that are applicable to the San Diego region and market.[23] The ET-DR program's focus is on technologies and strategies that promise significant, cost-effective demand reduction in the short- or mid-term, and that appear to be sufficiently reliable and scalable for market-wide implementation. The ET-DR program is intended to identify, evaluate and demonstrate technologies that have strong potential to reduce power consumption during periods of higher energy prices or tight energy supplies in all SDG&E customer segments (residential, agricultural, commercial and industrial), and to help bring these technologies to commercial availability.[24]

SDG&E's ongoing ET-DR projects in this area are summarized in Appendix B. None of them overlap with SDG&E's EPIC projects.

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[21] SDG&E's 2013-2014 ET-EE program was approved by the Commission in D.12-11-015.

[22] SDG&E 2013-2014 EE Portfolio including its EE-Emerging Technology program was approved in D.12-11-015 Table 13 at pages 103-104. SDG&E's EE-ET program implementation plan is available at https://www.sdge.com/sites/default/files/regulatory/SDGE%20PIPs%20Vol%203%20of%205%20SW%20IOU.pdf Beginning at page 636.

[23] SDG&E's 2012-2014 ET-DR program was approved by the Commission in D.12-04-045.

[24] SDG&E's 2012-2014 DRP Portfolio including its DR-Emerging Technology programs was approved in D.12-04-045 at pages 144 to146. SDG&E's DRP-ET program implementation plan is available at https://www.sdge.com/sites/default/files/regulatory/Katsufrakis_Testimony.pdf

10. Appendix A: SDG&E's Approved Energy Efficiency (EE) Portfolio

Table A-1

SDG&E's Approved Energy Efficiency (EE) Portfolio

Program	Project Description	Purpose	Funding	Deliverables	Progress to Date
ET-EE	Climate Specific HVAC Field Testing	Working with EPRI to conduct field tests to evaluate energy savings, economics, and other requirements and considerations for hybrid evaporative Heating, Ventilation and Air Conditioning (HVAC) systems.	$110k	Project Report summarizing findings and recommendations. To be posted to ETCC-CA.com	Site selected, design and planning underway.
ET-EE	Residential VRF HVAC Field Testing	Working with EPRI to conduct field tests to evaluate energy savings, economics, and other requirements and considerations for Variable Refrigerant Flow (VRF) Residential HVAC units.	$125k	Project Report summarizing findings and recommendations. To be posted to ETCC-CA.com	Installation complete, data collection underway.
ET-EE	Climate Specific Equipment Field Testing, Commercial HPWH	Working with EPRI to conduct field tests to evaluate energy savings, economics, and other requirements and considerations for Heat Pump Water Heater (HPWH) use in a multi-family residential settings.	$100k	Project Report summarizing findings and recommendations. To be posted to ETCC-CA.com	Installation complete, data collection underway.
ET-EE	Field Evaluation/Technology Development Support of Interactive Shower Timer	Working with technology developer, University of San Diego, some local homeowners and a Measurement & Verification (M&V) consultant to evaluate the energy savings, economics, and other requirements and considerations for an advanced, interactive shower timer.	$50k	Project Report summarizing findings and recommendations. To be posted to ETCC-CA.com	Reviewing and refining product with vendor prior to field installation.
ET-EE	ALCS Bench Test and Categorization	Working with the California Lighting Technology Center (CLTC) to perform bench testing of Advanced Lighting Control Systems (ALCS) to understand their capabilities and performance as well as qualify their reporting capabilities for potential M&V of energy savings.	$75k	Qualifications documents for a shortlist of technologies. Establishment of process for future technologies to be evaluated.	Contracts signed, initial work underway at CLTC.
ET-EE	ALCS Field Assessment	Performing field technology assessment at two SDG&E territory sites to evaluate the energy savings, economics, and other requirements and considerations for ALCS.	$60k	Project Report summarizing findings and recommendations. To be posted to ETCC-CA.com.	Products installed, data collection underway.
ET-EE	Residential NILM Study	Conducting a field study of 11 homes to gauge the accuracy of Non-Intrusive Load Monitoring (NILM) or "Disaggregation" technologies. These vendors are taking whole house energy consumption data and attempting to deduce end use load curves.	$75k	Project Report summarizing findings and recommendations. To be posted to ETCC-CA.com.	Products installed, data collection and analysis underway.
ET-EE	Embedded Energy in Water Study	Working with local government, institutional partners and Evaluation, Measurement & Verification (EM&V) groups, SDG&E is conducting a study with the University of California, Davis to evaluate the embedded energy in water for a selection of pressure zones in the SDG&E service territory.	$65k	Project Report summarizing findings and recommendations. To be posted to ETCC-CA.com. Information to be shared with water districts to promote joint conservation/efficiency efforts.	UC Davis has integrated with some local water distributors and analysis is ongoing.
ET-EE	Cloud-based Building Envelope Analysis	This study aims to gauge the accuracy of a cloud-based service which uses smart meter and weather data to deduce building envelope characteristics.	$50k	Project Report summarizing findings and recommendations. To be posted to ETCC-CA.com.	Data-structuring to enable this project is underway.
ET-EE	Market Study of Dynamic Billboards	This study aims to categorize and compare different technologies in the new and growing dynamic billboard space. Establishing energy usage statistics and understanding business and market drivers for this space will be important to developing EE incentive programs in the future.	$70k	Project Report summarizing findings and recommendations. To be posted to ETCC-CA.com.	Initial project research has begun.
ET-EE	Continuous Commissioning Field Evaluation	This two-site field study will evaluate the energy savings, economics, and other requirements and considerations for continuous commissioning products.	$180k	Project Report summarizing findings and recommendations. To be posted to ETCC-CA.com.	Currently refining scope and M&V methodology.

11. Appendix B: SDG&E's Approved Demand Response (DR) Portfolio

Table B-1

SDG&E's Approved Demand Response (DR) Portfolio

Program	Project Description	Purpose	Funding	Deliverables	Progress to Date
ET-DR	Smart Grid for Buildings	The purpose of this project is to assess a solution to optimize the operation of energy resources against user-defined constraints, including but not limited to economics, reliability, comfort, and safety. In the case of utilities, the solution will interface with conventional and alternative energy generation, energy storage, and energy consumption resources, thereby optimizing and aggregating them into a virtual power plant, capable of meeting financial, reliability and other operational objectives of assets. These assets may range from loads, micro grids, to larger electric distribution feeders and transmission grids.	$125K	Test events to demonstrate building optimizations, analysis of test events, final report for publication to ETCC-CA.com.	Analysis of the first test event is complete, final report to be completed next month.
ET-DR	Energy Innovation Center Demonstration Showcase	The purpose of this project is to develop a demonstration showcase that exhibits energy saving demand response projects and activities. The showcase will be used for educational purposes and be placed in SDG&E's recently commissioned Energy Innovation Center (EIC). The two main DR technologies that will be demonstrated will be Home Area Network (HAN) technology and lighting controls in the EIC.	$75K	Equipment and materials to assist with tours at the EIC Smart Home.	Most of the technologies in the Smart Home and the lighting controls have been installed and showcased. Scheduled to upgrade the HAN equipment in the Smart Home to reflect what devices are currently commercially available.
ET-DR	Grid-integrated Charging at the SDG&E Workplace	On-peak Electric Vehicle (EV) charging could have a major modifiable impact on the grid. The largest opportunity to impact this will be at workplace EV charging stations. Dynamic Time of Use (TOU) pricing will be an opportunity in the future to create a more natural economy around timing of energy usage. This project will test the impact of TOU pricing on charging behavior.	$75K	Mobile App, Website, Hardware to control Level 1 Chargers. Report on the behavior of customers when given the opportunity to take advantage of TOU pricing while charging EVs at work.	All hardware and software has been deployed. Getting first responses from users and collecting data on usage.
ET-DR	HVAC Optimization	The purpose of this project is to evaluate a building management system overlay that ties together HVAC, occupancy data, weather patterns, and price signals. This system leverages existing building management systems and is mostly used in large buildings. This software saves some HVAC energy, and reduces the peak demand of buildings by throttling air handler supply fans. In addition, it enables demand response by reducing energy automatically on a DR signal. By reducing the peak demand, customers can save around 10% on their energy bill.	$100K	Report to improve the understanding of the EE and DR benefits compared to costs of the system, as well as customer reception.	Agreement completed, field demonstration agreements signed by the customers and the kickoff meeting has been scheduled.
ET-DR	OpenADR 2.0 A/B Evaluation	Evaluate OpenADR 2.0B for various end uses at EIC; provide customers with list of OpenADR 2.0B clients; provide customer programs with advertising collateral for increasing enrollment in AutoDR programs; determine feasibility of ancillary services for future DR programs; and determine response time and load shed from simulated OpenADR 2.0B signal.	$125K	List of OpenADR 2.0B clients, advertising collateral for increasing enrollment in AutoDR programs, final paper detailing results of study.	Contract established with the Demand Response Research Center (DRRC) at Lawrence Berkeley National Laboratory (LBNL). Selecting an additional site from SDG&E AutoDR program applicants to assist with developing marketing collaterals. Establishing setup for EIC demonstrations.
ET-DR	10 kW / 40 kWh Flywheel Energy Storage	Berkeley Energy Sciences Corporation (BESC) is developing a low-cost flywheel energy storage device. The first generation device has a target of 40 kWh/10 kW. This flywheel uses high-strength steel as a rotor and this design has the potential of a 20 year lifetime with over 90% AC to AC efficiency. If successful, this project will lead to BESC's second generation technology which will be 125kW/500kWh.	TBD, SDG&E has agreed to provide M&V Funding	M&V report detailing the performance of the flywheel storage system.	$1.8M grant from the California Energy Commission (CEC) Public Interest Energy Research (PIER) for flywheel development. Currently waiting for flywheel delivery, expected in 12 months.

12. Appendix C: Glossary of Acronyms and Abbreviations

Acronym/Abbreviation	
AMI	Advanced Metering Infrastructure
CAISO	California Independent System Operator
CEATI	Centre for Energy Advancement Through Technological Innovation
CEC	California Energy Commission
CIEE	California Institute for Energy and Environment
CIM	Common Information Model
Commission	California Public Utilities Commission
CVR	Conservation Voltage Reduction
D.	Decision
DBE	Diverse Business Enterprises
DER	Distributed Energy Resources
DMS	Distribution Management System
DR	Demand Response
EE	Energy Efficiency
EPIC	Electric Program Investment Charge
EPIC Administrators	SDG&E, PG&E, SCE, and CEC
EPIC IOU Administrators	Investor-Owned Utilities, Specifically PG&E, SDG&E, SCE
EPRI	Electric Power Research Institute
ESS	Energy Storage Systems
ET-DR	Emerging Technology Demand Response Program
ET-EE	Emerging Technologies Energy Efficiency
EV	Electric Vehicles
FERC	Federal Energy Regulatory Commission
GHG	Greenhouse Gas
IEC	International Electrotechnical Commission
IOU	Investor-Owned Utility

Acronym/Abbreviation	
IP	Intellectual Property
ITF	Integrated Test Facility
NASA	National Aeronautical and Space Administration
NEETRAC	National Electric Energy Testing, Research and Applications Center
NIST	National Institute of Standards and Technology
NRDC	Natural Resources Defense Council
ORA	Office of Ratepayer Advocates
OTC	Once-Through Cooling
PF	Power Factor
PG&E	Pacific Gas and Electric Company
PMUs	Phase Measurement Units
Prosumer	Producers and Consumers
PV	Photovoltaic
R&D	Research and development
RD&D	Research, Development, and Deployment
RFI	Request for Information
RFP	Request for Proposal
RFQ	Request for Qualifications
SCE	Southern California Edison
SDG&E	San Diego Gas & Electric Company
SDG&E EPIC Plan	SDG&E Second Triennial EPIC Investment Plan
SIWG	Smart Inverter Working Group
TD&D	Technology Demonstration and Deployment
VAr	Volt-Ampere Reactive
Working Framework	IOU Working EPIC Framework
ZNE	Zero Net Energy