California Energy Commission

COMMISSION REPORT

Electric Program Investment Charge 2015 Annual Report

California Energy Commission

Edmund G. Brown Jr., Governor

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California Energy Commission

Robert B. Weisenmiller, Ph.D.
Chair

Energy Commissioners
Karen Douglas, J.D.
Andrew McAllister
David Hochschild
Janea A. Scott, J.D.

Ross Zelen
Primary Author

Rachel Salazar
Project Manager

Erik Stokes
Manager
ENERGY DEPLOYMENT AND MARKET FACILITATION

Laurie ten Hope
Deputy Director
RESEARCH AND DEVELOPMENT DIVISION

Robert P. Oglesby
Executive Director

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The *Electric Program Investment Charge 2015 Annual Report* was prepared with contributions from the following staff:

Pam Doughman

Lorraine Gonzalez

Mike Gravely

Aleecia Gutierrez

Virginia Lew

Fernando Piña

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ABSTRACT

The California Energy Commission is the state's primary energy policy and planning agency. As part of its overall work, the Energy Commission administers several clean energy research and development programs that drive innovation and advance science and technology in the fields of energy efficiency, renewable energy and advanced clean generation, energy-related environmental protection, energy transmission and distribution, and transportation. The Energy Commission is one of the administrators of the Electric Program Investment Charge (EPIC), which funds innovation investments in clean energy technologies and approaches for the benefit of electricity ratepayers of California's three largest electric investor-owned utilities. EPIC funding is authorized for applied research and development, technology demonstration and deployment, and market facilitation.

This report outlines the progress and status of Energy Commission activities funded by EPIC from January 1, 2015, through December 31, 2015. It has been prepared in accordance with applicable California Public Utilities Commission decisions and California Public Resources Code Section 25711.5.

Keywords: California Energy Commission, Electric Program Investment Charge, energy research, innovation pipeline, RDD&D, energy efficiency, advanced generation, renewable energy, demand response, energy storage, buildings, distributed generation, transmission, smart grid, transportation, environmental, climate change, smart infrastructure, ratepayer benefits, public interest program, electricity, energy policy, loading order, jobs, greenhouse gas, California Public Utilities Commission

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EXECUTIVE SUMMARY

One of the roles of the California Energy Commission is to administer research and development programs to spur innovation in energy efficiency, renewable energy and advanced clean generation, energy-related environmental protection, energy transmission and distribution, and transportation. The Energy Commission is one of four administrators of the Electric Program Investment Charge (EPIC). The other administrators are the state's three largest investor-owned utilities: Pacific Gas and Electric Company, San Diego Gas & Electric Company, and Southern California Edison Company. The California Public Utilities Commission (CPUC) established the EPIC Program to fund investments to advance pre-commercial clean energy technologies and approaches for the benefit of electricity ratepayers of California's three largest electric investor-owned utilities. EPIC funds projects in the areas of applied research and development, technology demonstration and deployment, and market facilitation.

The Energy Commission is committed to ensuring public participation in its research and development programs. This commitment reflects the rich and diverse characteristics of California, its people and its innovative spirit. The mandatory, primary guiding principle for these investments is to provide electricity ratepayer benefits to promote greater reliability, lower costs and increase safety. Complementary guiding principles include:

- Provide societal benefits
- Reduce greenhouse gas emissions in the electricity sector at the lowest possible cost
- Support California's loading order to meet energy needs first with energy efficiency and demand response, then renewable energy (distributed generation and utility scale), and third with clean conventional electricity supply
- Support low-emission vehicles and transportation
- Provide economic development
- Use ratepayer funds efficiently

This report provides an overview of Energy Commission activities related to its administration of EPIC funds in calendar year 2015. It has been prepared in accordance with CPUC Decision 12-05-037, as modified; in Rulemaking 11-10-003, Decision 13-11-025 in Application 12-11-001, as consolidated; in CPUC Decision 15-04-020 in Application 14-04-34, as modified; and in California Public Resources Code Section 25711.5.

Overview of Programs and Plan Highlights

EPIC funds an energy-pipeline approach to creating new energy solutions, fostering regional innovation, and bringing clean energy ideas to the marketplace for the benefit of California's investor-owned utility ratepayers. The coordinated administration of these funds consolidates the research, development, and deployment initiatives of the Energy

Commission and the three largest investor-owned electric utilities in California, avoiding duplication in spending, providing for public interest considerations, and helping attain state energy policy goals. An overview of the Energy Commission's administrative activities, investment areas, and funding levels is provided in Chapters 1 and 2.

Status of Programs

During calendar year 2015, EPIC administrators and the CPUC continued to work together to implement the administrators' approved investment plans. The Energy Commission's *2012–2014 EPIC Investment Plan* (also referred to as the first EPIC Triennial Investment Plan) was approved as modified by the CPUC in Decision 13-11-025 in November 2013. The Energy Commission's *2015-2017 EPIC Investment Plan* (also referred to as the second EPIC Triennial Investment Plan) was approved as modified by the CPUC in Decision 15-04-020 in April 2015.

Coordination, as well as guidance from state policy makers in 2012 and 2013, allowed the Energy Commission to continue to administer funds as approved by the CPUC and as authorized in Senate Bill 1018 (Committee on Budget and Fiscal Review, Chapter 39, Statutes of 2012), Assembly Bill 110 (Blumenfeld, Chapter 20, Statutes of 2013), and Senate Bill 96 (Committee on Budget and Fiscal Review, Chapter 356, Statutes of 2013). The Energy Commission maintains a schedule of funding opportunities on its website at http://www.energy.ca.gov/contracts/epic.html. This schedule is updated regularly and includes active and planned funding opportunities available for EPIC project awards.

In 2015, the Energy Commission released 17 competitive solicitations totaling $229,595,643 million in EPIC funding. This total includes the remaining $152.6 million in program funding from the 2012-14 triennial investment plan; as well as $77 million from the 2015-17 triennial investment plan.

Also in 2015, the Energy Commission posted "Notice of Proposed Awards" for 100 projects, totaling $214,290,623. Of these proposed awards, the Energy Commission approved 81 projects at Energy Commission business meetings totaling $170,903,885. As of December 31, 2015, $180,899,717 was encumbered for the 88 projects that have been approved to date. All of these projects resulted from funding initiatives found in the 2012-2014 Investment Plan. The Energy Commission will release additional requests for comments and competitive solicitations in 2016 and will continue program development and implementation throughout the year and beyond.

CHAPTER 1: Introduction and Overview : Building a 21st Century California Electrical Grid

In September 2015, Governor Edmund G. Brown Jr. signed Senate Bill 350 (De León, Chapter 547, Statutes of 2015) into law, deepening California's commitment to increasing renewable energy production and the efficiency of cars, buildings, and appliances. SB 350 outlines goals to boost the Renewables Portfolio Standard to 50 percent and doubles the energy efficiency savings in electricity of retail customers through energy efficiency and conservation by 2030. Furthermore, SB 350 prioritizes manufacturing and installing clean energy and pollution reduction technologies that create employment opportunities, including high-wage, highly skilled employment opportunities, and increased investment in the state.

Energy research, development, demonstration, and deployment (RDD&D) are critical in achieving the commitments addressed in SB 350. Energy RDD&D continues to fund the transformational technologies for electricity systems in California to make the necessary leaps to improve system reliability, affordability, and public safety. Rigorous, public, and objective research and development, demonstration, deployment, and market facilitation investments are imperative to continue moving innovations through the technology maturation pipeline -from concept to market.

Through its transparent and public process for investment plan development and competitive award selection, the California Energy Commission administers the Electric Program Investment Charge (EPIC) funds to support RDD&D investments advancing the next generation of clean energy technologies, systems, tools, and strategies. These investments will provide benefits to investor-owned utility (IOU) electricity ratepayers as cleaner, safer, more affordable, and more reliable electricity generation. Projects funded through EPIC will also reduce greenhouse gas emissions and other air pollutants and provide valuable societal, environmental, and economic benefits. These investments support California on the path to achieve its dynamic energy, environmental, and economic goals.

Background on EPIC

The Importance of Energy Innovation

Energy innovation has a history of success in California. Investments by the Energy Commission and other research programs complement private corporate funding, provide guidance and direction to state policies, share results publicly, and fund research not adequately addressed by competitive or regulated markets. Energy RDD&D investments reduce risk to investors, accelerate the path to market for emerging technologies, address barriers, and support projects through energy innovation pipeline phases.

Creating EPIC

The Public Goods Charge, which funded electricity research and renewable energy in California, expired at the end of 2011.[1] Governor Jerry Brown recognized the importance and benefits of energy innovation and renewable energy programs supported by the Public Goods Charge and requested the California Public Utilities Commission (CPUC) take action under its authority to institute a new program, similar in size, but revised to "take into account the constructive ideas for program reform identified during the legislative process as well as ways to create jobs swiftly through investment in energy savings retrofits."[2]

Following a deliberative process, the CPUC created the EPIC Program in December 2011 and authorized the utilities to collect EPIC funds for renewables and RDD&D purposes.[3] In May 2012, the CPUC adopted Decision 12-05-037, as modified, which provides the framework for CPUC oversight of the administration of EPIC. Investments funded by EPIC are administered by the Energy Commission and the state's three largest electric investor-owned utilities (IOUs): Pacific Gas and Electric Company (PG&E), Southern California Edison Company (SCE), and San Diego Gas & Electric Company (SDG&E). The administrators submitted their proposed first triennial investment plans for EPIC funds to the CPUC in November 2012.

The Energy Commission received authorization from the Legislature to spend EPIC Program funds in Senate Bill 1018 (Committee on Budget and Fiscal Review, Chapter 39, Statutes of 2012) and Assembly Bill 110 (Blumenthal, Chapter 20, Statutes of 2013) and received program direction in Senate Bill 96 (Committee on Budget and Fiscal Review, Chapter 356, Statutes of 2013).

The Energy Commission's *2012–2014 EPIC Investment Plan* was approved as modified by the CPUC through Decision 13-11-025 in November 2013. Decision 13-11-025 incorporates requirements specified in SB 96 for the portion of the EPIC Program administered by the Energy Commission. The Energy Commission's *2015-2017 EPIC Investment Plan* was approved as modified by the CPUC through Decision 15-04-020 in April 2015.

EPIC Program Components

Investment Areas

CPUC Decision 12-05-037 approved Energy Commission administration of EPIC funds in the following investment areas:

- **Applied Research and Development**: This area is defined as activities supporting precommercial technologies and approaches that are designed to solve specific

1 Public Utilities Code Section 399.8.

2 September 23, 2011, Governor Jerry Brown letter to CPUC President Michael Peevey.

3 Decision 11-12-035, as modified

problems in the electricity sector. Such approaches include technology advancements in efficiency, renewables, and smart grid. Activities that address environmental and public health impacts of electricity-related activities and support clean transportation with a linkage to electricity sector ratepayer benefits also fall into this area.

- **Technology Demonstration and Deployment**: This area is defined as the installation and operation of precommercial technologies or strategies at a sufficient scale to assess operational and performance characteristics and financial risks.
- **Market Facilitation**: This area is defined as a range of activities to support clean energy technology and strategy deployment. These activities include incubating statewide clean energy innovation and entrepreneurship efforts, increasing capacity to deploy emerging clean energy solutions, developing the workforce needed to achieve the state's energy goals, encouraging greater participation from diverse businesses and communities, regulatory assistance and permitting, market research, program tracking, education and outreach to support clean energy technology, and strategy deployment. The CPUC Decision 12-05-037 further clarifies that this category should not necessarily be limited to renewables but may include any other clean energy technologies and/or approaches.

Total EPIC funding for the Energy Commission activities is summarized in Chapter 2.

Guiding Principles

The mandatory guiding principle of EPIC is to invest in clean energy technologies and approaches that benefit electricity ratepayers by promoting greater reliability, lower costs, and increased safety. In addition, complementary guiding principles include:

- Providing societal benefits.
- Reducing greenhouse gas emissions and increasing adaptation in the electricity sector at the lowest possible cost.
- Supporting the loading order.
- Advancing low-emission vehicles/transportation.
- Increasing economic development.
- Using ratepayer funds efficiently.

Principles articulated in Public Utilities Code Sections 740.1 and 8360 (which govern utility expenditures in the areas of RD&D and smart grid) serve as guidance. Section 740.1[4] states that in evaluating RDD&D projects, consideration will be given to:

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4 Public Utilities Code Section 740.1: http://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=PUC&sectionNum=740.1.

- Projects providing reasonable probability of ratepayer benefits.
- Projects with a low probability of success being minimized.
- Projects consistent with the utility corporation's resource plan.
- Projects not duplicating previous or current research by other electrical or gas corporations or research organizations.
- Projects supporting one or more of these objectives:
    - Environmental improvement.
    - Public and employee safety.
    - Conservation by efficient resource use or by reducing or shifting system load.
    - Developing new resources and processes, particularly renewables resources and processes to advance supply technologies.
    - Improving operating efficiency and reliability or otherwise reduce operating costs.

Section 8360 outlines the requirements for the state's electrical transmission and distribution system to maintain safe, reliable, efficient, and secure electrical service to meet future growth and demand to achieve:[5]

- Increased use of cost-effective digital information and control technology to improve reliability, security, and efficiency of the electric grid.
- Dynamic optimization of grid operations and resources, including appropriate consideration for asset management and use of related grid operations and resources, with cost-effective full cybersecurity.
- Deploying and integrating cost-effective distributed energy resources and generation, including renewable energy sources.
- Deploying and integrating cost-effective demand response, demand-side resources, and energy-efficient resources
- Deploying cost-effective "smart" technologies, including real-time, automated, and interactive technologies that improve the operation of appliances and consumer devices. for metering, communications concerning grid operations and status, and distribution automation.
- Integrating cost-effective "smart" appliances and consumer devices.

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5 Public Utilities Code Section 8360: http://www.leginfo.ca.gov/cgi-bin/displaycode?section=puc&group=08001-09000&file=8360-8369.

- Deploying and integrating cost-effective advanced electricity storage and peak-shaving technologies., including plug-in electric and hybrid electric vehicles, and thermal-storage air conditioning
- Outreach to consumers with timely information and control options.
- Developing standards for communication and interoperability of appliances and equipment connected to the electric grid, including the infrastructure serving the grid.
- Identifying and lowering of unreasonable or unnecessary barriers to adoption of smart grid technologies, practices, and services.[6]

Connections to the Electricity Value Chain

EPIC investments are mapped or correlated to the different elements of the electricity "value chain," composed of grid operations/market design, generation, transmission, distribution, and demand-side management. Similar to the previously mentioned guiding principles, the *2015–2017 EPIC Investment Plan* directs each project funded to be mapped clearly to the appropriate section of the value chain.

EPIC Investment Strategy

California energy policy frames a vision for the state's electricity future to include a significant transition from fossil generation to renewable sources, highly efficient homes and businesses, and electrifying portions of the transportation system. EPIC funds projects to help bridge gaps along the energy innovation pipeline through competitive project selection.[7]

Homes and businesses require high-quality and cost-effective efficiency products and services. Renewable generation and electric transportation must be seamlessly integrated into the electric grid at all levels of interconnection, ranging from small-scale home applications to large central-station power plants. The Energy Commission's *Integrated Energy Policy Report* and ongoing analysis at the California Independent System Operator (California ISO), the CPUC, the United States Department of Energy (U.S. DOE), and the United States Environmental Protection Agency (U.S. EPA) identified key challenges to achieving this clean energy vision for California's IOU service territories. Each initiative described in the Energy Commission's *2015-2017 EPIC Investment Plan* addresses an important barrier and investment gap for clean energy.

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6 A *smart grid* consists of interactive equipment and communication protocols allowing electricity system operators and customers to adjust energy consumption and energy generation in response to price signals or information about the status of the electricity system to help maintain affordability, safety, and reliability of the electricity system.

7 As specified in Public Resources Code Section 25711.5, the Energy Commission is authorized to use noncompetitive sole source and interagency agreement methods if certain conditions are met.

Outreach Including Implementing Diverse and Inclusive Energy Innovation in California

In 2015, the Energy Commission reinforced its commitment to ensuring that a diverse range of applicants have the opportunity to participate in EPIC projects, including small businesses, women, minorities, and disabled veterans.

On April 8, 2015, the Energy Commission unanimously approved a formal Diversity Policy Resolution, highlighting that it is the policy of the Energy Commission, consistent with state and federal law, to improve fair and equal opportunities for small businesses; women-, disabled veteran-, minority-and LGBT-owned business enterprises; and economically disadvantaged and underserved communities to participate in and benefit from Commission programs.

On October 8, 2015, Governor Brown signed Assembly Bill 865 (Alejo, Chapter 583, Statutes of 2015), which directs that the Energy Commission to establish a diversity task force to consider and make recommendations about diversity in the energy industry. These efforts build upon the outline Energy Commission Chair Robert Weisenmiller submitted in a letter to the CPUC in November 2013.[8] In his letter, Chair Weisenmiller committed to increasing the participation of businesses owned by women, minorities, and disabled veterans through undertaking a comprehensive outreach plan to ensure that a diverse range of potential applicants know about, and understand how to participate in, EPIC Program activities, especially solicitations for projects. The plan included four main tenets, including:

- Initiating an outreach plan to ensure that women, minorities, and disabled veterans know about and understand how to participate in EPIC Program activities, especially solicitations for projects.
- Targeting particular geographic regions within the state for certain program activities (for example, job training or energy efficiency retrofits in economically depressed communities).
- Commencing efforts to address energy-related challenges and opportunities in economically depressed communities.
- Implementing a system to track, monitor, and report on the participation of California-based entities, women-, minority-, disabled-veteran-owned, and small businesses for the recipients of EPIC awards using the same definitions used by the IOUs via CPUC General Order 156.[9]

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8 Letter to CPUC President Peevey from California Energy Commission Chair Robert Weisenmiller, http://www.energy.ca.gov/research/epic/documents/2013-11-07_Letter_from_the_Chair_re_AB_340-Docket_12-EPIC-01.pdf.

9 General Order 156 seeks to increase the participation of women, minority and disabled veteran-owned business enterprises (WMDVBE) in utility procurement, and requires the IOUs to submit annual plans to the CPUC for increasing WMDVBE participation in procurement and to submit annual reports on the implementation of those plans. Refer to CPUC Decision 13-11-025, p. 108.

In 2015, the Energy Commission continued implementing activities in support of the goals listed above. These activities included informing stakeholders about available Energy Commission funding opportunities and providing strategies to develop successful proposals.

Below are highlights of these efforts outlined in Chair Weisenmiller's letter.

Initiating a Comprehensive Outreach Plan

Energy Commission staff developed a comprehensive outreach plan in 2015, including meeting with various stakeholders, developing comprehensive diversity outreach distribution lists, enhancing the Energy Commission website, expanding use of social networking platforms, and developing additional informational materials to increase awareness of EPIC funding opportunities. Specific outreach activities include:

- Launching a LinkedIn group page titled the "California Energy Commission's Research and Development Networking Hub." This group is open to all and has 858 members. The group provides a user-driven platform to help potential applicants – including disabled veteran-, women- and minority-owned businesses – connect and team up on proposals for solicitations funded through the EPIC Program.
- Printing and providing funding materials translated for non-English speakers, such as designing opportunity postcards and relevant materials in Spanish, Vietnamese, Mandarin, Tagalog, Korean, and Japanese. The Energy Commission takes steps to promote funding opportunities in other languages on multiple media platforms.
- Hosting a workshop on December 3, 2015 to share information and answer questions about the Energy Commission's competitive EPIC project selection and funding process. Staff explained the EPIC Program and current solicitations; requirements for potential applicants; the solicitation timeline and application process; the evaluation process, including scoring criteria and potential hurdles; and general tips for application development.
- Distributing EPIC information at key expositions and conferences in 2015, including
    - California Women in Energy Panel, March 2015.
    - Sacramento (Asian, Black, Hispanic) Multi-Chamber of Commerce Networking Event, March 2015.
    - Southern California Minority Supplier Development Council, March 2015.
    - Green California Summit and Exposition, April 2015.
    - Greenlining's The Good Economy Legislative Briefing, April 2015.
    - UCLA Luskin Center Conference to Advance Women in Technology, April 2015.
    - Governor's Zero Emission Vehicle Summit, May 2015.

- National Fuel Cell Symposium, May 2015.
- California Legislative Black Caucus Diversity Job Fair, May 2015.
- Disabled Veteran Business Alliance's Keeping the Promise Conference and Expo, May 2015.
- SARTA's TechEdge, June 2015.
- Rethink Methane Symposium, June 2015.
- Local Government Commission's Statewide Energy Efficiency Forum, June 2015.
- Camp Pendleton Energy Forum, June 2015.
- Investing in Manufacturing Communities Partnership, June 2015.
- Silicon Valley Energy Summit, June 2015.
- Sacramento Black Chamber of Commerce Event, August 2015.
- Unlocking Renewables Workshop at CSU Fresno, August 2015.
- Advanced Energy Economy's Pathway to 2050: Delivering on the Promise, August 2015.
- Blue Lake Rancheria Microgrid Launch, August 2015.

- Posting audio recordings of "how to apply" workshops to Energy Commission EPIC website page, in addition to posting step-by-step presentations and related materials.
- Announcing EPIC funding opportunities, workshops, and the EPIC Innovation Symposium on social media such as Twitter to reach a more diverse audience.

Ensuring Energy Benefits Throughout California's Diverse Geographic Regions

Between September and October 2015, Energy Commission staff held a series of workshops statewide to highlight recent community-scale renewable energy integration research and development projects. The workshops focused on understanding community needs and future opportunities for renewable energy. The workshops also provided information on federal, state, and local resources, to help energize local communities to secure their primary energy supply through locally available renewable resources. The eight workshops took place in Oakland, Fresno, Lynwood, Redding, Sacramento, San Bernardino, San Diego, and Victorville. Building off two previous Energy Commission programs, the Renewable Energy Secure Communities program and the Community Scale Renewable Energy Development, Deployment, and Integration program, the workshops helped to inform communities about future EPIC funding opportunities.

Energy Commission staff also held three public workshops in Oakland, Fresno, and Lynwood highlighting funding opportunities to promote Advancing California's Innovation Ecosystem. These areas of investment included funding for local innovation clusters, small grant entrepreneurship, and market assessment for advanced energy technologies.

Addressing Energy-Related Challenges and Opportunities in Disadvantaged Communities

The Energy Commission approved projects aimed at providing increased opportunities in disadvantaged communities. Eighteen EPIC projects awarded in 2015 have either headquarters or a project demonstration site in disadvantaged communities.

Tracking Diverse and Inclusive Energy Innovation in California

Energy Commission staff developed a voluntary survey for EPIC funding recipients to better track participation of self-reported California based entities, women-, minority-, disabled-veteran-owned, and small businesses. The survey sought to monitor participation by these groups and to identify opportunities for future outreach efforts to encourage program diversity.

The Energy Commission received 52 completed surveys, which identified the following:

- Thirty-seven of the 52 projects include a small business as either a prime or subcontractor. (Sixteen were prime.)
- Thirteen of the 52 projects include a woman-owned business as either a prime or subcontractor. (Three were prime.)
- Six of the 52 projects include a minority-owned business as either a prime or subcontractor. (Two were prime.)
- Three of the 52 projects include a disabled-veteran-owned business enterprise as a subcontractor.
- More than 95 percent of awardees were certified California-based entities.

Looking to 2016, the Energy Commission plans to continue efforts to ensure that participation in the EPIC Program reflects the rich and diverse characteristics of California and its people. These plans include but are not limited to:

- Collecting diversity data and providing reports identifying the diversity of Energy Commission program participants.
- Meeting with small businesses, veteran, women, minority, and other interested groups to provide information on partnering for success through the EPIC Program. The materials will also be available on the Energy Commission EPIC Web page.
- Holding regional preapplication and prebid workshops throughout the state to explain requirements for grant and contract funding opportunities, answer questions, and encourage networking and partnering among potential applicants.

EPIC Program Regulatory Process

The CPUC has regulatory authority over the Energy Commission's administration of EPIC funds, including the approval of investment plans. In addition, the Legislature must grant the Energy Commission spending authority to disburse EPIC funds for project awards and use EPIC funds for administrative expenses.

The Energy Commission is providing this annual report to the CPUC in accordance with Decision 12-05-037, as modified, in Rulemaking 11-10-003; Decision 13-11-025 in Application 12-11-001, as consolidated; and Decision 15-04-020 in Application 14-04-034, as consolidated. These decisions specify the outline of this report, as well as specific reporting requirements for projects awarded EPIC funds, to ensure consistent reporting among all administrators. The Energy Commission will also provide an EPIC annual report to the Legislature as specified in California Public Resources Code Section 25711.5 and make the report publicly available on its website.

The Energy Commission administers the EPIC Program according to all applicable state laws and standards and follows the investment plans that were approved as modified by the CPUC to administer EPIC funds collected in the first two investment periods. Guidance from the CPUC includes selection of projects to ensure that innovations funded by EPIC provide IOU electricity ratepayer benefits and that EPIC investments are aligned with the electricity value chain, which includes grid operations/market design; generation; transmission; distribution; and demand-side management.[10] In California Public Resources Code Section 25711.5, the Legislature directs the Energy Commission to fund projects that will benefit electricity ratepayers and lead to technological advancement and breakthroughs to overcome barriers that prevent the achievement of the state's statutory energy goals. Furthermore, funding should result in a portfolio of projects that is strategically focused and sufficiently narrow to make advancement on the most significant technological challenges. These challenges include, but are not limited to, energy storage, renewable energy and its integration into the electrical grid, energy efficiency, integration of electric vehicles into the electrical grid, and accurately forecasting the availability of renewable energy for integration into the grid.

Coordination

The Energy Commission is committed to ongoing coordination and collaboration with the IOU administrators of EPIC funds along with other energy innovation stakeholders during development and implementation of its EPIC investment plans. This coordination is important to ensure EPIC projects funded by the Energy Commission address priority topics and critical funding gaps and leverage other public and private funding sources.

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10 CPUC Decision 12-05-037 in Rulemaking 11-10-003, ordering paragraph 12.

EPIC Administrator Coordination

Administrator coordination meetings have been valuable in developing and implementing the first and second investment plans to identify each administrator's area of focus and synergistic opportunities for further collaboration.

Under CPUC Decision 12-05-037, the CPUC requires the four EPIC administrators to consult with interested stakeholders no less than twice a year, both during the development of each investment plan and during execution. CPUC Decision 15-04-020 requires one of these two annual workshops to be an EPIC Innovation Symposium intended to share progress, results, and future plans; improve coordination and understanding among administrators, parties, and the CPUC; raise awareness and visibility of EPIC investments; and promote program transparency.

During 2015, Energy Commission staff continued to work collaboratively with the three administrators (PG&E, SCE, and SDG&E), conducting conference calls, coordinating notification and outreach for upcoming events, and participating in public workshops on EPIC. The following highlights EPIC administrator coordination for 2015:

- On August 18, 2015, Energy Commission staff participated in a joint workshop on the Implementation of the Electric Program Investment Charge Program in San Diego at SDG&E's Energy Innovation Center. During the workshop, administrators shared progress on EPIC investments related to distributed energy resources integration.
- On December 3, 2015, Energy Commission staff organized and conducted the Electric Program Investment Charge Innovation Symposium in coordination with the EPIC administrators. The Innovation Symposium showcased more than 40 EPIC projects, including projects addressing energy efficiency, generation and integration, data analytics, and systems architecture. The Innovation Symposium drew more than 150 participants in person and more than 80 participants online. Highlights from the Innovation Symposium include:
    - Research on energy efficiency technologies and strategies for new buildings, including zero net energy, existing buildings, and energy efficiency for agriculture and water sectors. Projects discussed included lighting and HVAC efficiency solutions, as well as energy management systems and system optimization for agriculture, industrial and water industries.
    - Research on technologies and strategies for generating and integrating renewable energy, such as grid operations in real-time and vehicle to grid applications. Projects discussed numerous advances in residential solar power, sustainable bioenergy production, and renewable energy forecasting.
    - Research and demonstrations on technologies and strategies related to efficient information exchange for grid operations. Projects discussed the expanded deployment of new monitoring, management, and communications technologies.

- Staff participated in regularly scheduled conference calls with EPIC IOU administrators throughout 2015 to coordinate efforts on implementation of the EPIC Investment Plans, and to prepare for the two coordinated public stakeholder consultations for 2015: the August 18, 2015, public workshop in San Diego and the December 3, 2015, EPIC Innovation Symposium in Folsom.
- IOUs participated in Energy Commission workshops on topics related to electric vehicle charging, smart grid, storage, and electricity sector vulnerability. Further information on these workshops is provided in later sections of this chapter.

In 2016, the EPIC administrators will continue to work together, as appropriate, using the following principles of coordination:

Information Sharing and Coordinated Planning

The administrators will continue to work together to address common goals, consistent with the state's energy and environmental policies and the guiding principles for EPIC as stated in CPUC Decision 12-05-037. To this end, the administrators will share information regarding their investment plans, programs, and projects as much as possible to maximize the efficient use of funds and ease dissemination of results for the benefit of electric utility ratepayers.

Leveraging Funding and Avoiding Duplication of Projects

To the extent legally permissible, the administrators will work together to avoid unnecessary duplication of efforts, consistent with Public Utilities Code Section 740.1, and leverage funds for the benefit of electric utility ratepayers.

Coordinated Input and Advice from Stakeholders

The administrators will continue to work together to schedule, solicit, and respond to comments and advice from stakeholders on their respective proposed and ongoing plans and programs.

Consistent Evaluation, Measurement, and Verification of RDD&D Results

The administrators worked together to establish consistent and common evaluation, measurement, and verification protocols for developing and reporting to the CPUC and stakeholders the performance and results of funded projects.

Coordination With Other Energy Innovation Efforts

In 2015, the Energy Commission engaged in several coordination efforts with other state and federal entities involved in similar RDD&D activities, including the following:

- On February 27, Energy Commission staff convened a workshop on selecting climate scenarios for the California energy sector. External researchers and staff discussed parameters and scenarios for an in-depth study of the vulnerability of the California energy system to climate change. The study is designed to identify realistic adaptation options that will minimize or eliminate negative impacts.

- On March 6, Energy Commission staff convened a workshop on Microgrid Assessment and Recommended Future RDD&D Investments. Staff solicited public input to help identify RDD&D investments that address technical, economic, market, and commercialization issues to better enable stable microgrids to provide better and more reliable services to energy customers. Staff received comments on performance metrics and standardization of microgrid configurations that will accelerate microgrid deployment and help customers realize the many potential benefits that microgrids offer.
- On April 22-23, Energy Commission staff attended a stakeholder workshop in Washington, D.C., held by the United States Department of Energy's Office of Electricity and Energy Reliability to provide input on the draft *Grid Modernization Multi-Year Program Plan*. The plan describes the RDD&D activities that the DOE will focus on over the next five years to help meet grid modernization challenges. Participants including grid experts from industry, universities, nonprofit associations, government, and National Laboratories provided input on activities and improvements, prioritization, measures of success, and collaborative arrangements.
- On July 27, Energy Commission staff supported the first Climate Adaptation Workshop cohosted by the CPUC. Commissioners, advisors to Governor Brown, and energy sector stakeholders, including IOUs and publicly owned utilities, discussed climate-related risks to the energy system, adaptation planning, and implementation of climate readiness strategies.
- Between August 24-25, the Energy Commission assisted with the California Climate Change Symposium, put on by the California Natural Resources Agency, which drew more than 600 participants, including leading researchers and policy makers, to a two-day event in Sacramento. The symposium was a forum for sharing of research addressing the impacts of climate change on California and its electrical infrastructure.
- On November 18, Energy Commission staff held a public workshop to review the status of advanced distributed generation technology and recommendations for future research. Input from the workshop will inform the draft *Advanced Distributed Generation Research Roadmap* developed by Energy Commission staff.
- On December 14, Energy Commission staff convened the Second Annual California Multi-Agency Update on Vehicle-Grid Integration Research. Energy-related agencies reviewed the progress of research called for in the *California Vehicle-Grid Integration Roadmap* as part of the Governor's *Zero-Emission Vehicle Action Plan*. Participants included the California Independent System Operator, the CPUC, the Energy Commission, and a panel of electric vehicle fleet managers, a variety of research and demonstration project leaders, and other organizations interested in vehicle-grid integration.

- On December 15, Energy Commission staff convened a scoping workshop to gather public comments on draft material for a possible future solicitation addressing vehicle-grid integration topics. The draft solicitation material was based on topics called for in Strategic Objectives S9 "Advance Electric Vehicle Infrastructure to Provide Electricity System Benefits" and Strategic Objective S16 "Expand Smart Charging and Vehicle-to-Grid Power Transfer for Electric Vehicles" under the Energy Commission's *2015-2017 Triennial EPIC Investment Plan*.
- Energy Commission staff participated as a technical scorer for several proposals submitted under the California Air Resources Board solicitation for zero-carbon buildings in California. Energy Commission staff provided scores and constructive feedback that resulted in selecting UC Berkeley to explore the technical feasibility of zero or near-zero carbon building for both homes and commercial buildings.
- Energy Commission staff participated in Water Energy Technology-Climate Action Team (WET-CAT)[11] meetings to communicate and share water energy research needs, policies, and science issues.
- Energy Commission staff participated in the Emerging Technologies Coordinating Council[12] meetings to communicate, share, and coordinate energy efficiency research needs and information with California's investor-owned utilities, public utilities, CPUC, and other stakeholders.
- Energy Commission staff met with the United States Department of Agriculture to share energy and water research, development, and demonstration programs and to find opportunities for future collaboration.
- Energy Commission staff participated at the Plug Load Workshop and Advisory Board meeting at the California Plug Load Research Center in UC Irvine.
- Energy Commission staff released several requests for public input on research topics associated with zero net energy buildings, plug loads, and industrial, agriculture and water research needs. These requests for public input helped refine the scope of solicitation topics.
- Energy Commission staff participated in Integrated Energy Policy Report workshops on plug loads, water efficiency, and energy efficiency. These workshops provided information on current research, avoided duplication with other governmental agencies, and obtained public input on research gaps and needs.

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11 The WET-CAT is a multi-agency working group for the California Climate Action Team, focused on energy intensity of water use, and water-related climate change impacts. http://www.climatechange.ca.gov/climate_action_team/water.html.

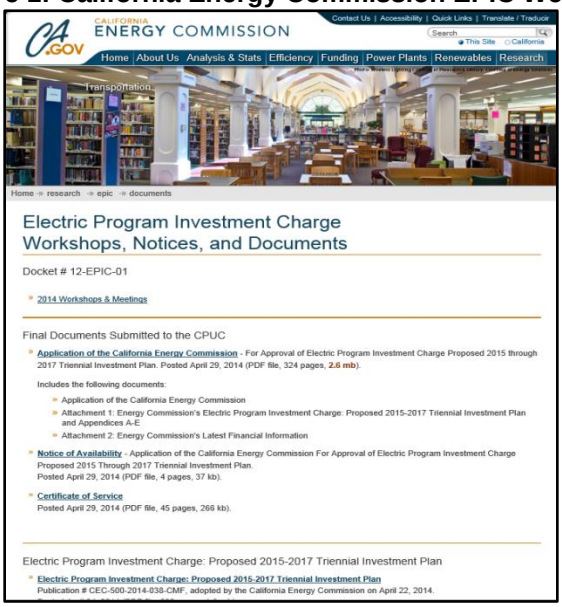
12 The Emerging Technologies Coordinating Council provides a collaborative forum for electricity utilities to exchange information on emerging energy efficiency technologies. http://www.etcc-ca.com/.

Transparent and Public Process and Solicitation Activities

The Energy Commission is committed to a transparent and public process in all phases of EPIC administration, including investment plan development and approval, competitive solicitation processes, and project approval and management.

To help ensure a transparent and public process, the Energy Commission operates a Web page (http://energy.ca.gov/research/epic/) that provides information about EPIC, including previous and upcoming workshops, public comments, upcoming events, information explaining how to sign up for the listserv, and documents associated with the program. The page also serves as a resource for Energy Commission proceedings related to developing future triennial EPIC Investment Plans. Interested stakeholders can navigate to Energy Commission EPIC policy documents, presentations, funding solicitations, annual EPIC reports, workshop announcements and other resources that promote active participation in the program. EPIC solicitations and requests for comments to inform selected solicitation development are available online at http://www.energy.ca.gov/contracts/epic.html. Information on public workshops is available online at http://www.energy.ca.gov/research/epic/documents/.

Figure 1: California Energy Commission EPIC Website



Research Division EPIC Homepage, http://energy.ca.gov/research/epic/

All EPIC-related documents, http://www.energy.ca.gov/research/epic/documents/

Source: California Energy Commission

Investment Plan Development and Approval

In 2015, the CPUC continued consideration of the Energy Commission's application for approval of the proposed *2015-2017 EPIC Investment Plan*, along with consideration of the other three EPIC administrators proposed *2015-2017 EPIC Investment Plans* in a combined proceeding (A.14-04-034, A.14-05-003, A.14-05-004, and A.14-05-005, as consolidated). The Energy Commission 2015 activities associated with this proceeding included the following:

- March 30, 2015. The Energy Commission filed opening comments recommending clarifications and supporting the proposed decision for approval of its *2015-2017 EPIC Investment Plan* as modified.
- April 6, 2015. The Energy Commission filed reply comments in support of the proposed decision for approval of its *2015-2017 EPIC Investment Plan* as modified.
- June 19, 2015. The Energy Commission responded to a CPUC Energy Division staff data request related to Phase 2 of this proceeding.
- June 22, 2015. The Energy Commission attended a prehearing workshop for Phase 2 of this proceeding.
- July 13, 2015. The Energy Commission filed opening comments on the issue of flexibility to fund new projects between EPIC application cycles.
- July 21, 2015. The Energy Commission filed reply comments on the issue of flexibility to fund new projects between EPIC application cycles. The Energy

Commission filed minor nonsubstantive changes to the reply comments on July 29, 2015.

- September 8, 2015. The Energy Commission filed opening comments recommending clarifications and supporting the proposed decision addressing EPIC new projects. The comments supported the proposed decision to balance administrator flexibility and the need of the program for an expedited review process with due process rights.
- September 14, 2015. The Energy Commission filed reply comments on the proposed decision addressing EPIC new projects.

The CPUC approved the Energy Commission's proposed *2015-2017 EPIC Investment Plan* with modifications in April 2015 (Decision 15-04-020). The Energy Commission began conducting competitive solicitations under the *2015-2017 EPIC Investment Plan* after the plan was approved by the CPUC and budget authority to spend EPIC funds under the plan was approved by the state Legislature.

Competitive Solicitation Process and Activities

In 2015, the Energy Commission issued 17 solicitations to fund initiatives outlined in the first two EPIC Investment Plans. To ensure a fair and transparent competitive solicitation, Energy Commission staff conducted the following for each solicitation:

- Posted the solicitation on the Energy Commission's website and notified interested parties of the solicitation through the Opportunity listserv, the EPIC listserv, and the LinkedIn Networking Hub. The Opportunity listserv contains 4,614 subscribers, and the EPIC listserv contains 1,369 subscribers. (There is some overlap.) The LinkedIn Networking Hub has 801 subscribers.
- Held at least one publicly noticed workshop for each solicitation to review the purpose, requirements, eligibility, and innovation topics of the solicitation with interested parties. The public workshop also provided an opportunity for potential applicants to participate remotely and ask questions about the solicitation and the application process.
- Provided interested parties the opportunity to submit written questions about the solicitation.
- Posted staff responses to solicitation questions on the Energy Commission's website to ensure that all potential applicants had access to the same information. These responses are also sent out to everyone on the Opportunity listserv.
- Posted on the Energy Commission's website and sent to the Opportunity listserv any revisions made to the solicitation (via addenda).
- For solicitations where scoring was completed in 2015, a notice of proposed awards (NOPA) was released by the Energy Commission identifying proposed funding recipients.

- For recipients not awarded funding for these solicitations, an opportunity was provided to receive a debriefing.

In addition to the administrative standards and practices listed above, the Energy Commission conducts activities to ensure that the competitive solicitation process – including solicitation development – is done in a fair and transparent manner. As stated in the Energy Commission's *2015-2017 EPIC Investment Plan*, to benefit from coordination among EPIC administrators and to ensure fairness for all bidders in competitive solicitations, IOUs may not submit bids to those solicitations they help develop. Similarly, state agencies, universities, and other stakeholders that provide input on the development of a solicitation are precluded from submitting bids in that solicitation, unless the input is provided through a public forum (such as a workshop, webinar, or staff survey) in which other entities have the same opportunity to provide input.

Project Approval and Management

After the NOPA is issued, Energy Commission staff works with each awardee to develop a grant agreement or contract. Before work can begin, the grant agreement or contract must be approved by the Energy Commission at a publicly noticed business meeting. In 2015, the Energy Commission approved 81 EPIC projects. Project details are provided in Chapter 3 of this report.

Once agreements are approved, Energy Commission staff manages the agreement. Project fact sheets, final reports, and other public documents related to, or supported by, EPIC funds will be publicly accessible on the Energy Commission's website to maximize transparency and increase value for the program and related projects. Except when valid reasons exist for confidentiality, the Energy Commission will make available upon request all data, findings, results, computer models and other products developed through the Electric Program Investment Charge Program, consistent with the treatment of intellectual property requirements.[13] In addition, each annual report includes summaries and metrics for all active projects and all projects completed during the past year.[14]

13 As required in CPUC Decision 13-11-025, Ordering Paragraph 13.

14 As required by Public Resources Code Section 25711.5 and CPUC Decision 13-11-025, Ordering Paragraphs 14, 23, and 27.

CHAPTER 2: Budget

Authorized Budget

The CPUC approved a final EPIC budget for the first triennial investment cycle (2012-2014) in Decision 13-11-025. Table 1 shows the Energy Commission's total EPIC funding allocation of $368.7 million for funds collected in 2012-2014. The amount includes $331.8 million in project funds to be awarded under the three program areas, as well as $36.9 million for program administration. Decision 12-05-037, as modified, caps program administrative costs for each EPIC administrator at 10 percent. The Energy Commission administrative costs for EPIC include all research planning, project management, and administrative and program oversight work performed by Energy Commission staff for the EPIC Program, including the following tasks[15]:

- Research available energy technologies and identify the most promising emerging technological solutions. Scope solicitations to reach performance targets and to attract proposals that provide the most promise in delivering energy technologies that are cleaner, safer, more reliable, and affordable.
- Manage research agreements to achieve technological goals for the EPIC-funded grants, contracts, and awards. Research managers conduct site visits, evaluate technology progress to plan, and determine if research is on track. Corrective action is taken to redirect projects or stop work if research is not meeting expectations.
- Execute EPIC research, development and demonstration, and market facilitation program, including planning, contracting, and awarding grants as defined in the approved investment plans.
- Conduct workshops, meetings, and web conferences on the current state of the energy market, policy impacts, and opportunities for renewable energy and other energy emerging technologies to assist in the development of competitive solicitations and to assist in preparing future investment plans' initiatives.
- Develop, coordinate, publish, and submit required annual reports and documents to the CPUC and the Legislature.
- Research, coordinate, develop, and submit to CPUC proposed investment plans.
- Participate in CPUC EPIC-related proceedings and workshops.

15 Energy Commission administrative costs are categorized differently than IOU administrative costs.

Table 1: CPUC-Approved Energy Commission EPIC Funding 2012-2014

Funding Element/Program Area	Total (in millions)
Applied Research and Development	$158.7
Technology Demonstration and Deployment	$129.8
Market Facilitation	$43.3
Sub Total	**$331.8**
Program Administration	$36.9
Grand Total	**$368.7**

Source: California Energy Commission

The Energy Commission must also obtain spending authority to disburse these funds from the Legislature each fiscal year. Between fiscal years 2012-2013 and 2014-2015, the Energy Commission received a total state spending authority of $22.98 million for program administration and $331.8 million for project awards.[16] This made the total state authorized budget for project awards through fiscal year 2014-2015 consistent with the CPUC's approved budget of $331.8 million for project awards. The Energy Commission has committed this full amount in completed, active, and planned solicitations.

The Energy Commission's proposed *2015-2017 EPIC Investment Plan* calls for a total of $388.8 million over the three-year period. In 2015, the CPUC approved an additional $16.99 million in funding over the three year period as a result of Consumer Price Index (CPI) adjustments.[17] This brings the adjusted total for project awards to $365.01 million and $40.78 million for program administration. See Table 2 for details.

16 These amounts do not reflect funding for NSHP.

17 CPUC Decision 15-04-020, Appendix B, Table 5.

Table 2: CPUC-Approved, Escalated Energy Commission EPIC Funding 2015-2017

Funding Element/Program Area	Total (in millions)
Applied Research and Development	$158.17
Technology Demonstration and Deployment	$151.27
Market Facilitation	$55.57
Sub Total	**$365.01**
Program Administration	$40.78
Grand Total	**$405.79**

Source: California Energy Commission

In fiscal year 2015-2016, the Energy Commission received spending authority of $13.485 million for program administration and $115 million for project awards.[18]

Funding Commitments and Encumbrances

This section provides definitions for "commitments" and "encumbrances"; provides information on completed, active, and planned funding opportunities; and reports expenditures for program administration.

CPUC Definitions of Commitments and Encumbrances

To clarify the difference between commitments and encumbrances for the EPIC Program, the CPUC adopted the following definitions in Decision 13-11-025:

> "'Committed funds' are funds identified during the planning of a solicitation for a specific project that will be needed to fund a contract or grant for that project at the conclusion of a planned or released solicitation.
>
> …'Encumbered funds' are monies that are specified within contracts and grants signed during a previous triennial investment plan cycle and associated with specific activities under the contract or grant. All activities carried out under a contract or grant during a specific triennial investment plan cycle need not be completed and funds need not be spent during that particular program cycle if the activities undertaken pursuant to the contract or grant are expected to be completed. Only funds that are committed or encumbered during the prior program cycle are eligible for being rolled into the following program cycle."[19]

18 These amounts do not reflect funding for the New Solar Homes Partnership.

19 CPUC Decision 13-11-025, Ordering paragraphs 44 and 45, p. 143.

Table 3 shows projects that were recommended for funding in 2015. A full list of projects can be seen in the Energy Commission's NOPA for each solicitation.[20]

Table 3: Proposed EPIC Funding Awards in 2015

Prime Applicant	Project Title	EPIC Funds Recommended
Developing a Portfolio of Advanced Efficiency Solutions: Technologies and Approaches for More Affordable and Comfortable Buildings (PON-13-301) Applied Research and Development (S1)		
Lawrence Berkeley National Laboratory	Solar-Reflective "Cool" Walls: Benefits, Technologies, and Implementation	$2,500,000
Lawrence Berkeley National Laboratory	Comparing Attic Approaches for Zero Net Energy Homes	$1,000,000
Regents of the University of California, Davis - California Lighting Technology Center	From the Laboratory to the California Marketplace: A New Generation of LED Lighting Solutions	$2,995,187
Lawrence Berkeley National Laboratory	Developing Flexible, Networked Lighting Control Systems That Reliably Save Energy	$1,875,000
The Regents of the University of California on behalf of the Berkeley campus	Very Low-Cost MEMS-Based Ultrasonic Anemometer for Use Indoors and in HVAC Ducts	$2,488,964
Lawrence Berkeley National Laboratory	Direct Current as an Integrating and Enabling Platform	$1,000,000
BIRA Energy	Cost- and Energy-Efficient Attic Designs for CA Homes	$1,000,000
The Regents of the University of California on behalf of the Berkeley campus	Optimizing Radiant Systems for Energy Efficiency and Comfort	$2,939,964
Electric Power Research Institute (EPRI)	Development and Testing of the Next Generation Residential Space Conditioning System for California	$2,993,005
Lawrence Berkeley National Laboratory	High-Performance Integrated Window and Facade Solutions for California Buildings	$3,000,000
Electric Power Research Institute (EPRI)	Climate Appropriate HVAC Systems for Commercial Buildings to Reduce Energy Use and Demand	$2,834,721

20 More information on proposed awards can be found at http://www.energy.ca.gov/contracts/epic.html#closed.

Electric Power Research Institute (EPRI)	Intelligent HVAC Controls for Low Income Households: A Low Cost Non-connected Device That Understands Consumer Preferences and Performs Adaptive Optimization	$2,705,759
The Regents of the University of California, University of California, Davis, Western Cooling Efficiency Center	Low Cost, Large Diameter, Shallow Ground Loops for Ground Coupled Heat Pumps	$1,235,223
CREE Santa Barbara Technology Center	Novel High Efficiency, Low-Cost LED Luminaries	$2,777,700*
Philips Lumileds Lighting Center	Innovation for Disruptive Efficacy and Cost Improvements of CRI 90 LEDs and LED Lamps	$2,988,722*
Subtotal		$34,334,245
*** Recipient declined the award.**		
Developing Advanced Energy Storage Technology Solutions to Lower Costs and Achieve Policy Goals (PON-13-302) **Applied Research and Development (S8)**		
Electric Power Research Institute (EPRI)	Energy Storage Valuation and Optimization Tool	$1,000,000
Eos Energy Storage LLC	Utility Demonstration of Znyth(Trademark) Battery Technology to Characterize Performance and Grid Benefits	$2,156,704
The Regents of the University of California; University of California, Los Angeles	High Temperature Hybrid CAES	$1,621,628
LightSail Energy, UC San Diego	Isothermal Compressed Air Energy Storage with Solar and Load Forecasting Integration	$1,200,276
LightSail Energy, UC Irvine	Utilizing Waste Heat to Increase Efficiency of Isothermal Compressed Air Energy Storage in a Smart Microgrid Environment	$1,085,125
EOS Energy Storage LLC	Pilot Testing of Eos' Znyth Battery Technology in Distributed Energy Storage Systems	$1,894,866
Amber Kinetics	A Transformative Flywheel R&D Project	$2,000,000
FuelCell Energy, Inc.	Advanced Hybrid Battery-Fuel Cell Energy Storage System	$1,199,975
Subtotal		$12,158,574

Demonstrating Secure, Reliable Microgrids and Grid-Linked EVs to Build Resilient, Low-Carbon Facilities and Communities (PON-14-301) **Technology Demonstration and Deployment**		
Gridscape Solutions	City of Fremont Fire Stations Microgrid Project	$1,817,925
Chabot-Las Positas Community College District	Las Positas Community College Microgrid	$1,522,591
Trane U.S., Inc.	Laguna Subregional Wastewater Treatment Plant Microgrid	$4,999,804
Lawrence Berkeley National Laboratory	Smart Charging of Plug-in Vehicles With Driver Engagement for Demand Management and Participation in Electricity Markets	$1,993,355
San Diego Gas & Electric Company	Borrego Springs - A Renewable-Based Community Microgrid	$4,724,802
Robert Bosch LLC	Bosch-A Renewable Based Direct Current Building Scale Microgrid	$2,817,566
Regents of the University of California, Los Angeles	Demonstration of PEV Smart Charging to Support Grid Operational Needs	$1,989,432
Charge Bliss, Inc.	Renewable Microgrid for a Medical Center	$4,776,171
Humboldt State University Sponsored Programs Foundation	Demonstrating a Community Microgrid at the Blue Lake Rancheria	$5,000,000
Subtotal		$29,641,646
Advancing Cleaner, Less Costly, More Reliable DG to Enable Customer Solutions and Zero-Net Energy Communities (PON-14-303) **Applied Research and Development**		
West Biofuels, LLC	Modular Biomass Power Systems to Facilitate Forest Fuel Reduction Treatment	$2,000,000
Lawrence Berkeley National Laboratory	Paths to Sustainable Distributed Generation Through 2050: Matching Local Waste Biomass Resources With Grid, Industrial, and Community Levels	$1,500,000
InnoSepra, LLC	Low Cost Biogas Power Generation With Increased Efficiency and Lower Emissions	$1,318,940

Sunfolding Inc.	Mass-Manufactured, Air Driven Trackers for Low Cost, High Performance Photovoltaic Systems	$1,000,000
Southern California Gas Company (SoCalGas)	Dairy Waste-to-Bioenergy via the Integration of Concentrating Solar Power and a High Temperature Conversion Process	$1,494,736
Interra Energy, Inc.	Interra Reciprocating Reactor for Low-Cost & Carbon Negative Bioenergy	$2,000,000
Lawrence Berkeley National Laboratory	Demonstration of Integrated Photovoltaic Systems and Smart Inverter Functionality Utilizing Advanced Distribution Sensors	$1,000,000
SunSpec Alliance	Smart Inverter Interoperability Standards and Open Testing Framework to Support High-Penetration Distributed Photovoltaics and Storage	$2,000,000
Taylor Energy	Advanced Recycling to 1-MW Municipal Solid Waste of Electricity Generation	$1,499,481
All Power Labs, Inc.	Cleaner Air, Cleaner Energy: Converting Forest Fire Management Waste to On Demand Renewable Energy	$1,990,071
Glint Photonics, Inc.	Self-Tracking Concentrator Photovoltaics for Distributed Generation	$999,940
Electric Power Research Institute (EPRI)	Assessing the Ability of Smart Inverters and Smart Consumer Devices to Enable More Residential Solar Energy	$1,705,478
Subtotal		$18,508,646
Bringing EE Solutions to CA's Industrial, Ag, and Water Sectors (PON-14-304) Technology Demonstration and Deployment		
Regents of the University of California, Berkeley	Unlocking Industrial Energy Efficiency Through Optimized Energy Management Systems	$4,981,729
Porifera, Inc.	Advance Wastewater Treatment Using Forward Osmosis to Produce High Quality Water	$3,230,420

Porifera, Inc.	Demonstration of Forward Osmosis to Produce Juice Concentrate, Purify and Reuse Wastewater and Reduce Energy Use	$2,499,289
Wexus Technologies, Incorporated	Wexus Energy and Water Management Mobile Software for the Agricultural Industry	$4,000,000
Kennedy/Jenks Consultants	Raw Wastewater Filtration to Increase Organic Removal Efficiency and Achieve Significant Electrical Savings	$3,476,085
University of California, Riverside	Bringing Energy Efficiency Solutions to California's Water Sector With the Use of Customized Energy Management System and Supervisory Control and Data Acquisition System	$3,017,034
Asetek USA, Inc.	Demonstration of Low-Cost Liquid Cooling Technology for Data Centers	$3,552,678
PowWow Energy, Inc.	Irrigation Optimization and Well Pump Monitoring to Reduce Energy and Water Consumption	$2,292,829
Kennedy/Jenks Consultants	Improving Membrane Treatment Energy Efficiency Through Monitoring the Removal of Colloidal Particle Foulants	$1,167,034
Subtotal		$28,217,098
EPIC Demonstrating Bioenergy Solutions That Support CA's Industries, Environment and Grid (PON-14-305) **Technology Demonstration and Deployment**		
ABEC #3 LLC, dba Lakeview Farms Dairy Biogas	The Lakeview Farms Dairy Biogas - to - Electricity Project	$4,000,000
ABEC #2 LLC, dba West Star North Dairy Biogas	The West Star North Dairy Biogas-to - Electricity Project	$4,000,000
The Watershed Research and Training Center	North Fork Community Power Forest Bioenergy Facility Demonstration	$4,965,420
Lawrence Berkeley National Laboratory	Enabling Anaerobic Digestion Deployment for Municipal Solid Waste-to-Energy	$4,300,000
University of California, Irvine	Pollution Control and Power Generation for Low Quality Renewable Fuel Streams	$1,499,386

Biogas & Electric, LLC	Installation of a Lean Burn Biogas Engine With Emissions Control to Comply With Rule 1110.2 at a Wastewater Treatment Plant in South Coast Air Quality Management District	$2,249,322
Kennedy/Jenks Consultants	Lowering Food-Waste Co-digestion Costs Through an Innovative Combination of a Pre-sorting Technique and a Strategy for Cake Solids Reduction	$1,496,902
Organic Energy Solutions	Community Scale Digester With Advanced Interconnection to the Electrical Grid	$5,000,000
Subtotal		$27,511,030
Analysis of Social, Cultural, and Behavioral Aspects of Achieving Energy Efficiency Potential (PON-14-306) **Market Facilitation (Phase I)**		
Regents of the University of California, Berkeley	Examining the Heterogeneity of Energy Efficiency Adoption and Savings Across Socio-economic and Ethnic Groups Using a Large-Scale Quasi-Experiment	$360,632
Inova Energy Group, LLC	Capturing Cultural Diversity in California Residential Energy Efficiency Potential: An Energy Ethnography of Hispanic Households	$224,593
Center for Sustainable Energy	Home Energy Efficiency Retrofits in California: An Analysis of Sociocultural Factors Influencing Customer Adoption	$599,924
Indicia Consulting	Fieldwork to Document Technology Adoption and Behavior Change Across Diverse Geographies and Populations to Inform Energy Efficiency Program Design	$574,545
TRC Engineers, Inc.	Cultural Factors in the Energy Use Patterns of Multifamily Tenants	$379,019
Subtotal		$2,138,713

Demonstrating Clean Energy Solutions That Support CA's Industries, Environment, and the Electrical Grid (PON-14-307) Technology Demonstration and Deployment		
Sierra Institute for Community and Environment	Advancing Biomass Combined Heat and Power Technology to Support Rural California, the Environment, and the Electrical Grid	$2,603,228
Prospect Silicon Valley dba Bay Area Climate Collaborative (BACC)	College of San Mateo Internet of Energy	$2,999,601
ABEC #4 LLC	ABEC #4 Renewable Combined Heat and Power Project	$3,000,000
UC Davis	Demonstration of Community Scale Low Cost Highly Efficient PV and Energy Management System	$1,238,491
The Regents of the University of California - Riverside	Aerosol Impacts on the Hydrology and Hydropower Generation in California	$2,588,906
Subtotal		$12,430,226
Reduce the Environmental and Public Health Impacts of Electricity Generation and Make the Electricity System Less Vulnerable to Climate Impacts: Phase I (PON-14-309) Applied Research and Development (S5)		
Regents of the University of California, Riverside Campus	Aerosol Impacts on the Hydrology and Hydropower Generation in California	$399,818
Regents of the University of California, Berkeley Campus	Improving Hydrological Snowpack Forecasting for Hydropower Generation Using Intelligent Information Systems	$1,100,000
Maulbetsch Consulting	Evaluation of Cost, Performance and Water Conserving Capability of Hybrid Cooling	$581,580
Energy and Environmental Economics, Inc. (E3)	Develop Analytical Tools and Technologies to Plan for and Minimize the Impacts of Climate Change on the Electricity System	$700,000
Lawrence Berkeley National Laboratory	Monitoring the Urban Heat Island Effect and the Efficiency of Future Countermeasures	$500,000
Frontier Wind	Rotor-Mounted Bat Impact Deterrence System Design and Testing	$862,875

Lawrence Berkeley National Laboratory	Building a Healthier and More Robust Future: 2050 Low Carbon Energy Scenarios for California	$700,000
The Regents of the University of California, Irvine	Building a Climate Change Resilient Electricity System for Meeting California's Energy and Environmental Goals	$698,792
U.S. Geological Survey (Forest and Rangeland Ecosystem Science Center - FRESC)	Learning From Real-World Experience to Understand Renewable Energy Impacts to Wildlife	$1,000,000
Subtotal		$6,543,065
Driving the Integration of EVs to Maximize Benefits to Grid (PON-14-310) **Applied Research and Development (S9)**		
Center for Sustainable Energy	Vehicle-Grid Integration in California Using the ISO/IEC 15118 Global Interoperability Standard	$1,499,999
ChargePoint, Inc.	Next-Generation Grid Communication for Residential PEVs	$1,500,000
Electric Power Research Institute (EPRI)	Distribution System Aware Vehicle to Grid Services for Improved Grid Stability and Reliability	$1,499,977
The Regents of the University of California, Berkeley	An Open Source, Open-Architecture Software Platform for Plug-in Electric Vehicle Smart Grid	$1,500,000
Andromeda Power, LLC	-InCISIVE- grid Communication Interface for Smart Electric Vehicle Services	$681,693
Subtotal		$6,681,669
Market Analysis of Trends in California Investor-Owned Utility Electricity Load Shapes (RFP-15-301) **Market Facilitation**		
Navigant Consulting, Inc.	California Investor-Owned Utility Electricity Load Shapes	$1,798,861
Subtotal		$1,798,861

Investing in California Communities Through Building Energy Efficiency Workforce Development (GFO-15-302) **Market Facilitation**		
California Homebuilding Foundation (CHF)	Workforce Instruction for Standards and Efficiency (WISE)	$4,431,918
Center for Sustainable Energy	Expanding Energy-Related Career Pathways in the Electrical Industry: Increasing Workforce Development Opportunities in Disadvantaged Communities and Delivering Training on Automated Demand Response Communication Equipment to Inside Wireman Apprentices	$4,476,189
Subtotal		$8,908,107
Electricity Sector Vulnerability Studies and Adaptation Options to Promote Resilience in a Changing Climate (GFO-15-303) **Applied Research and Development**		
Lawrence Berkeley National Laboratory	Modeling the Impact of Wildfires on California's Transmission and Distribution Grid	$500,000
The Regents of the University of California, Los Angeles	Climate Change in Los Angeles County: Grid Vulnerability to Extreme Heat	$500,000
ICF Incorporated, L.L.C.	Potential Impacts and Adaptation Options for the Electricity System From Sea Level Rise in the San Diego Area	$499,929
Regents of the University of California, Berkeley	Visualizing Climate-Related Risks to the Electricity System Using Cal-Adapt	$400,000
Subtotal		$1,899,929
Reducing Costs for Communities and Businesses Through Integrated Demand-Side Management and Zero Net Energy Demonstrations (GFO-15-308) **Technology Demonstration and Deployment**		
Center for Sustainable Energy	San Diego Public Libraries Zero Net Energy and Integrated Demand Side Management Demonstration Project: Achieving Clean Energy Solutions Through a Public-Private-Non-profit Partnership	$3,866,184

Prospect Silicon Valley	MarketZero: Taking an Existing Grocery Store to Scalable Near-ZNE	$2,999,591
Electric Power Research Institute	Customer-Centric Approach to Scaling IDSM Retrofits	$3,894,721
Prospect Silicon Valley	Innovate Net Zero: First ZNE Demonstration in Existing Low-Income Mixed-Use Housing	$2,995,653
California Homebuilding Foundation	Zero Energy Residential Optimization-Community Achievement (ZERO-CA)	$4,819,856
Electric Power Research Institute	Demonstration of Affordable, Comfortable, Grid Integrated Zero Net Energy Communities	$4,942,809
Subtotal		$23,518,814
Total		**$214,290,623**

Source: California Energy Commission

Committed Funds

The Energy Commission has committed the full $331.8 million from the *2012-14 Triennial Investment Plan*. In addition, the Energy Commission has a plan to commit the full funding amount for the *2015-17 Triennial Investment Plan*. As of December 31, 2015, $77 million from the 2015-17 Triennial Investment Plan has been released in solicitations. Table 4 shows EPIC solicitations that were still active on December 31, 2015. Table 5 shows solicitations that were closed, and that did not yet have a notice of proposed award posted before December 31, 2015.

Table 4: Active Solicitations for Energy Commission EPIC Project Funding[21]

Active EPIC Solicitations as of December 31, 2015			
Solicitation Title	**Release Date**	**Program Area/Strategic Objective**	**Proposed Funding Amount**
Research Roadmap for Advancing Technologies in California's Industrial, Agricultural, and Water Sectors (RFP-15-316)	November 12, 2015	Applied Research and Development (S10)	$0.7 million
Research Roadmap for Getting to Zero Net Energy Buildings (RFP-15-315)	November 12, 2015	Applied Research and Development (S10)	$1 million
Research Roadmap for Integrating High-Penetrations of Renewable and Distributed Energy Resources (RFP-15-314)	November 12, 2015	Applied Research and Development (S10)	$1.3 million
Advancing Water and Energy Efficient Strategies and Technologies in California (GFO-15-317)	November 20, 2015	Applied Research (S1) Technology, Demonstration and Deployment (S12) Market Facilitation (S20)	$15 million*
The EPIC Challenge: Accelerating the Deployment of Advanced Energy Communities (GFO-15-312)	November 24, 2015	Market Facilitation (S16)	$48 million*
Developing the Smart Grid of 2020: Clean, Safe, and Highly Intelligent (GFO-15-313)	November 30, 2015	Applied Research and Development (S6)	$11.7 million
California Commercial End-Use Survey (RFP-15-319)	December 30, 2015	Market Facilitation (S18)	$8 million†
Advancing Solutions That Allow Customers To Manage Their Energy Demand (GFO-15-311)	December 14, 2015	Applied Research and Development (S2)	$17 million
Total			$102.7 million

** Solicitations include $37 million in funding from the 2015-2017 EPIC Investment Plan.*

† This solicitation includes additional, non-EPIC funding. Amount shown is only for EPIC funding.

Source: California Energy Commission

21 21 Solicitation status may have changed since December 31, 2015. Please visit http://energy.ca.gov/research/epic/ for the most current funding opportunities.

Table 5: Closed Solicitations for Energy Commission EPIC Project Funding

Closed EPIC Solicitations, With No Proposed Award Posted as of December 31, 2015[22]			
Solicitation Title	**Date Closed**	**Program Area/Strategic Objective**	**Proposed Funding Amount**
Regional Energy Innovation Clusters (GFO-15-306)	September 2, 2015	Applied Research and Development (S10)	$20 million*
Sustainable Energy Entrepreneur Development (SEED) Initiative (RFP-15-305)	September 2, 2015	Applied Research and Development (S10)	$33 million*
Connecting Emerging Technologies and Strategies to Market Needs (RFP-15-304)	September 2, 2015	Market Facilitation (S18)	$7 million*
Reducing Costs for Communities and Businesses Through Integrated Demand-Side Management and Zero Net Energy Demonstrations (GFO-15-308)	November 20, 2015	2015-2017: Applied Research and Development (S1)	$10 million*
Developing A Portfolio of Advanced Efficiency Solutions: Plug Load Technologies and Approaches for Buildings (Phase II). (GFO-15-310)	November 23, 2015	Applied Research and Development (S1)	$10 million
Reduce the Environmental and Public Health Impacts of Electrical Generation and Make the Electricity System Less Vulnerable to Climate Impacts: Phase II. (GFO-15-309)	December 18, 2015	Applied Research and Development (S5)	$9.5 million
Total			$89.50 million

* Solicitations include a total of $40 million in funding from *2015-2017 Investment Plan*.

Source: California Energy Commission

Federal Cost Share

The Energy Commission maintains an ongoing federal cost share solicitation to provide cost-share funding to applicants that apply for and receive an award under an eligible federal Funding Opportunity Announcement (FOA). Table 6 shows the list of FOAs released in 2015 that were eligible for federal cost share under the EPIC Program and the number of applications for each FOA that received a letter of cost-share commitment.

22 Solicitation status may have changed since December 31, 2015. Please visit http://energy.ca.gov/research/epic/ for the most current funding opportunities.

Table 6: Federal Cost Share Activities in 2015

Funding Opportunity Announcement Number	Funding Opportunity Announcement Name	Funding Opportunity Announcement Description	Number of Applications Receiving a Letter of Cost Share Commitment	NOPA Posting Date
DE-FOA-0001166	Building Energy Efficiency Frontier & Innovation Technologies	Advance innovations in non-vapor compression HVAC technologies or advanced vapor compression HVAC technologies.	0	N/A
DE-FOA-0001171	Solid-State Lighting Advanced Technology Research and Development	Develop advanced solid-state lighting technologies with lighting that closely reproduces the visible portion of the sunlight spectrum.	1	1/13/2015
DE-FOA-0001108	Sustainable and Holistic Integration of Energy Storage and Solar PV	Enable holistic design, development, and widespread sustainable deployment of low-cost, flexible, and reliable energy storage solutions.	3	3/11/2015
DE-FOA-0001117	Building Industry Partnerships for High Performance Housing Innovation	Develop and implement solutions to technical challenges in the process of meeting performance goals for both new and existing homes.	0	N/A
DE-FOA-0001168	Advancing Solutions to Improve the Energy Efficiency of U.S. Commercial Buildings	Projects that seek to increase investments in energy-saving upgrades that can be widely adopted in offices, shops, restaurants, hospitals, hotels, and other commercial buildings.	0	N/A

Funding Opportunity Announcement Number	Funding Opportunity Announcement Name	Funding Opportunity Announcement Description	Number of Applications Receiving a Letter of Cost Share Commitment	NOPA Posting Date
DE-FOA-0001186	Concentrating Solar Power: Advanced Projects Offering Low LCOE Opportunities	Develop transformative projects targeting all components of a concentrating solar power plant.	0	N/A
DE-FOA-0001195	The Physics Reliability: Evaluating Design Insights for Component Technologies in Solar 2 (Predicts 2)	Supports projects that evaluate and model the degradation and failure mechanisms of concentrating solar power and photovoltaic collection and conversion components.	0	N/A
DE-FOA-0001197	Advanced Research in Dry-Cooling	Develop transformational cooling technologies including, but not limited to, ultra-high-performance air-cooled heat exchangers, supplemental cooling systems, and cool storage systems.	2	2/9/2015
DE-FOA-0001219	The Resilient Electricity Delivery Infrastructure Initiative	Aimed at deploying smart grid tools and technologies to advance climate preparedness and resiliency of the electricity delivery infrastructure.	0	N/A
DE-FOA-0001225	SunShot Technology to Market (Incubator Round 10, SolarMaT Round 3, SUNPATH Round 2)	Enable the widespread market penetration of highly impactful solar technologies and solutions through technology research, development and demonstration to overcome technical, institutional and market challenges.	1	4/24/2015

Funding Opportunity Announcement Number	Funding Opportunity Announcement Name	Funding Opportunity Announcement Description	Number of Applications Receiving a Letter of Cost Share Commitment	NOPA Posting Date
DE-FOA-0001255	Micro-scale Optimized Solar-cells Arrays with Integrated Concentration (MOSAIC)	Aimed at supporting new micro-CPV technologies to overcome the performance/cost barriers engendered by current discrete CPV and 1-sun PV technologies.	0	N/A
DE-FOA-0001263	Manufacturing Innovation Institute for Smart Manufacturing: Advanced Sensors, Controls, Platforms, and Modeling for Manufacturing	Aimed to support research and development that can reduce the cost of deployment for technologies such as advanced sensors, controls, platforms, and modeling for manufacturing.	0	N/A
DE-FOA-0001268	Concentrating Solar Power: Concentrating Optics for Lower Levelized Energy Costs (CSP:COLLECTS)	Aimed at advancing technologies for concentrated solar power and advance targets set out in the SunShot Vision Study, enabling CSP to be cost-competitive with conventional forms of electric power generation.	1	8/14/2015
DE-FOA-0001285	U.S.-China Clean Energy Research Center: Energy and Water	Develop and fund a new technical track under the U.S.-China Clean Energy Research Center, which is a bilateral initiative to encourage collaboration and accelerate technology development.	0	N/A

Funding Opportunity Announcement Number	Funding Opportunity Announcement Name	Funding Opportunity Announcement Description	Number of Applications Receiving a Letter of Cost Share Commitment	NOPA Posting Date
DE-FOA-0001289	Network Optimized Distributed Energy Systems (NODES)	Enable renewables penetration at the 50% level or greater, by developing transformational grid control algorithms and architectures that optimize the usage of flexible load and DERs.	1	8/5/2015
DE-FOA-0001383	Buildings Energy Efficiency Frontiers & Innovation Technologies	Aimed at supporting development of hardware and/or software solutions for real-time occupant-centered control of building systems; and novel air infiltration diagnostic technologies.	0	N/A
DE-FOA-0001385	Solutions to Improve the Energy Efficiency of U.S. Small and Medium Commercial Buildings	Enable solutions to the market barriers that hinder the growth of energy efficiency in the small and medium commercial building sector.	0	N/A
DE-FOA-0001395	Building Industry Partnerships for High Performance Housing Innovation	Develop and implement solutions to technical challenges in the process of meeting performance goals for both new and existing homes.	0	N/A
DE-FOA-0001429	Single-Pane Highly Insulating Efficient Lucid Designs	Aimed at funding research and development that would reduce heat-loss for improved building efficiency.	0	N/A

Funding Opportunity Announcement Number	Funding Opportunity Announcement Name	Funding Opportunity Announcement Description	Number of Applications Receiving a Letter of Cost Share Commitment	NOPA Posting Date
DE-FOA-0001441	Industry Partnerships for Cybersecurity of Energy Delivery Systems Research, Development and Demonstration for the Energy Sector	Enable next-generation tools and technologies to enhance and accelerate additional cybersecurity capabilities for the U.S energy critical infrastructure.	N/A	N/A
DE-FOA-0001384	2016 Vehicle Technologies Program Wide Funding Opportunity Announcement	Projects to reduce the cost of advanced highway transportation technologies that reduce petroleum consumption and greenhouse gas emission, while meeting or exceeding vehicle performance and cost expectations.	N/A	N/A
DE-FOA-0001496	State Energy Evolution and Diffusion Studies II - State Energy Strategies, Topic 1 Focus Areas only	Aimed at increasing foundational understanding of the technology evolution, soft costs, and barriers to solar deployment in the U.S.	N/A	N/A

Source: California Energy Commission

2015 Encumbered Program Funds

In calendar year 2015, 81 projects encumbered a total of $170,903,885 from the *2012-2014 EPIC Investment Plan* funds.[23] There are no encumbrances to report for projects with funding from the *2015-2017 Investment Plan.*

23 This does not include one project that was approved at a business meeting and later cancelled by the recipient.

2015 Program Expenditures

The Energy Commission approved a total of $15,580,723 for EPIC project invoices in 2015. All these expenditures account for projects resulting from the *2012-2014 Investment Plan*.

2015 Program Administration Funds

Expenditures for Energy Commission administrative costs totaled $9,345,686.25 in calendar year 2015.

Funding Shifts

In accordance with Decision 13-11-025, funds shifted between funding categories or program areas are limited to 5 percent.

In 2015, the Energy Commission did not shift funds between funding categories or program areas.

Uncommitted/Unencumbered Funds

Based on the definitions provided above, "uncommitted" and "unencumbered" funds are funds that are not identified in solicitation plans or encumbered into project awards. Moreover, these funds are considered "unspent."

As stated in Decision 13-11-025, "Given the shortened timeframe of the initial investment plan cycle, and for the purposes of the initial investment plan cycle only (2012-2014), the uncommitted and unencumbered funds that would, under normal circumstances be returned to ratepayers if legally permitted to do so, must be rolled over as if those funds were encumbered or committed. At the conclusion of the second investment plan cycle, if any funds approved for the first investment plan cycle are uncommitted or unencumbered, they must be credited against the approved budget for the third investment plan cycle."[24]

At the end of each investment plan cycle, any unspent funds will be rolled over into the subsequent investment plan cycle as required. In addition, EPIC administrators must explain in their triennial investment plans what caused any unspent funds in the prior investment plan cycle, and how the unspent funds would affect the program area(s) and projects.[25] Furthermore, the investment plan cycle budget for 2017-2020 will be reduced by the amount of unspent funds from the 2012-2014 and 2015-2017 *EPIC Investment Plans* to offset future program funding requirements.[26] In addition, the budget adopted for a subsequent investment plan cycle must be reduced by the amount of interest accrued in the previous investment plan cycle.[27] At the end of the third investment plan cycle, any unspent

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24 CPUC Decision 13-11-025, Ordering Paragraph 39, p. 142.

25 CPUC Decision 13-11-025, Ordering Paragraph 41.

26 CPUC Decision 13-11-025, Ordering Paragraph 38 and 39.

27 CPUC Decision 13-11-025, Ordering Paragraph 42.

funds and accumulated interest should be returned to the ratepayers, if there is a legal means to do so.[28]

Regarding the means for returning accumulated interest to the ratepayers, Decision 13-11-025 states: "Because the CEC cannot administratively return accumulated interest, the CEC must report the accumulated interest in arrears from the previous investment plan cycle, and the IOUs must reduce the amounts transferred to the CEC during the next triennial investment cycle by the reported accumulated interest amount and return an amount equal to the accumulated interest to ratepayers."[29]

Decision 12-05-037, as modified, states: "[I]f administrative costs can be less than the cost cap, we expect the administrators to put those extra funds to good use for program purposes."[30]

All EPIC funding under the Energy Commission's *2012-2014 EPIC Investment Plan* is encumbered or committed.

During the 2012-2014 investment cycle, the Energy Commission accumulated $95,019.91 of interest in arrears. The Energy Commission will provide an update to interest accrued at the end of the 2015-2017 investment cycle.

New Solar Homes Partnership

The first two investment periods do not include EPIC funding for solar (photovoltaics) incentives for new home construction under the Energy Commission's New Solar Homes Partnership (NSHP) program. However, the Energy Commission is providing information on the NSHP program in accordance with Chapter 6 of the Energy Commission's approved *EPIC 2015-2017 Investment Plan*. In Chapter 6 of the *2015-2017 Investment Plan*, the Energy Commission proposed options for funding the NSHP program using EPIC funds and/or funds through the California Solar Initiative proceeding (Rulemaking 12-11-005)[31] and indicated that it would keep the CPUC informed on the status of the NSHP program and available program funding to help simplify the CPUC's consideration of these options.

In Decision (D.) 15-04-020, issued on April 15, 2015, the CPUC commented on the Energy Commission's proposed options for funding the NSHP program using EPIC funds and/or funds through the California Solar Initiative (CSI), stating the following:

> R.12-11-005 remains the proceeding where a programmatic funding decision for NSHP is expected to be made; accordingly, this Decision makes no judgments

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28 CPUC Decision 13-11-025, Ordering Paragraph 43.

29 CPUC Decision 13-11-025, p. 105.

30 CPUC Decision 12-05-037, p. 66.

31 Rulemaking (R.) 12-11-005, Order Instituting Rulemaking Regarding Policies, Procedures and Rules for the California Solar Initiative, the Self-Generation Incentive Program and Other Distributed Generation Issues.

> thereto. We understand that the CEC's intent in discussing NSHP in this proceeding is to "keep its options open" to request to fund NSHP under EPIC at some possible future time (for example, if the Commission in R.12-11-005 decides not to allocate funding to NSHP), consistent with the policy interpretation in previous EPIC decisions. Should the Commission determine at a later date that it is reasonable to fund NSHP using EPIC funds, the CEC will need to shift funds that were allocated to other projects. We will evaluate such a petition or application to shift EPIC funds to NSHP when and if it is submitted. (D.15-04-020, p.17.)

Since the issuance of D.15-04-020, the Energy Commission has submitted a formal request to the CPUC under to Public Utilities Code Section 2851 (e)(3), which authorizes the CPUC to require PG&E, SCE, and SDG&E to continue the NSHP program following guidelines established by the Energy Commission until the $400 million funding limit in the law is reached. Section 2851 (e)(3) also authorizes the CPUC to designate a third party, including the Energy Commission, to administer the continuation of the NSHP program.

The Energy Commission's request was submitted to the CPUC on November 13, 2015.[32] The Energy Commission requests that the CPUC initiate action under Section 2851 (e)(3) to (1) require PG&E, SCE, and SDG&E to continue the NSHP program by collecting additional program funds until the $400 million funding limit is reached, by requesting about $111.78 million; (2) designate the Energy Commission to serve as the administrator of the continued NSHP program; and (3) establish any necessary administrative and oversight-related requirements for the continued NSHP program.

In response to the Energy Commission's November 13, 2015, request, the CPUC issued an Assigned Commissioner's Ruling in R.12-11-005 directing parties in the proceeding to comment on the Energy Commission's request and a list of questions related to the request.[33] A proposed CPUC decision on the Energy Commission's request is expected in the first quarter of 2016.[34]

The Energy Commission is hopeful that the CPUC will respond favorably to its November 13, 2015, request. If the request is denied in whole or in part, the Energy Commission may seek EPIC monies for the NSHP program by requesting a modification to its approved *2015-2017 EPIC Investment Plan*. Such a request by the Energy Commission would be submitted to the CPUC under D.13-11-025, Ordering Paragraph 36, which allows the Energy Commission and the other EPIC administrators to file a petition for modification to request

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32 The November 13, 2015, request included a letter addressed to Timothy J. Sullivan, the CPUC's acting Executive Director, and supporting materials.

33 Refer to *Assigned Commissioner's Ruling Seeking Comments In Response to Request From The California Energy Commission Regarding New Solar Homes Partnership Under Public Utilities Code Section 2851 (e)(3)* in R.12-11-005, dated December 7, 2015.

34 Refer to *Assigned Commissioner's Amended Ruling and Scoping Memo* in R.12-11-005, issued December 11, 2015, p. 8.

authority to shift more than 5 percent of the adopted budget for each funding category/program area of their investment plans or to shift monies "to new categories of funding."[35] The request would include a proposal that identifies 1) the maximum amount of EPIC monies requested for the NSHP, 2) the EPIC funding categories or initiatives from which the EPIC monies would be reallocated or shifted, and 3) the process for triggering a shift of these EPIC monies, including any notifications or reports to the CPUC.

As of January 5, 2016, the Energy Commission has nearly $53 million in available NSHP program funds.[36] This amount does not include requests for more than $20 million in projects that are under review but that do not yet have approved reservations. Available funds are slightly higher than the previous year due to a return of roughly $30.5 million to the Renewable Resource Trust Fund (RRTF) from accounts that borrowed funds or were redirected during the period when the state experienced severe budget shortfalls. These accounts with redirected funding from the RRTF include the Energy Conservation Assistance Account (ECAA) and the California Alternative Energy and Advanced Transportation Financing Authority (CAEATFA) account. During 2015, the following funding shifts included:

- $4.4 million that was abated back to the RRTF from CAEATFA. The Clean Energy Upgrade Financing Program (Skinner, AB X1 14, Chapter 9, Statutes of 2011) provided credit enhancements to lenders for whole-house energy efficiency and solar loans to help lower financing costs. This program expires on January 1, 2015. Of the $25 million appropriated, $0.55 million was for administrative costs and $24.45 million was for local assistance. About $5 million of the local assistance was transferred to a trustee bank for program implementation. Of that $5 million, only about $0.6 million was used; therefore, $4.4 million was unencumbered and transferred back to the RRTF.
- $19.887 million that was appropriated from the RRTF to CAEATFA in the FY 2014/2015 budget. CAEATFA didn't use the money, and, therefore, the expenditure was not realized on fiscal year 2014/2015 accounting reports, resulting in an increase to the RRTF for $19.887 million.
- $6.23 million that was returned from the Energy Conservation Assistance Account (ECAA). Senate Bill 1128 (Padilla, Chapter 677, Statutes of 2012) appropriated $25 million from the RRTF to ECAA. Any unexpended funds were reverted to the RRTF. About $6.23 million transferred from ECAA to RRTF as a result of projects that were cancelled, came in under budget, and other reasons.

Energy Commission staff expects funds to be exhausted around September 2016, depending on program demand.

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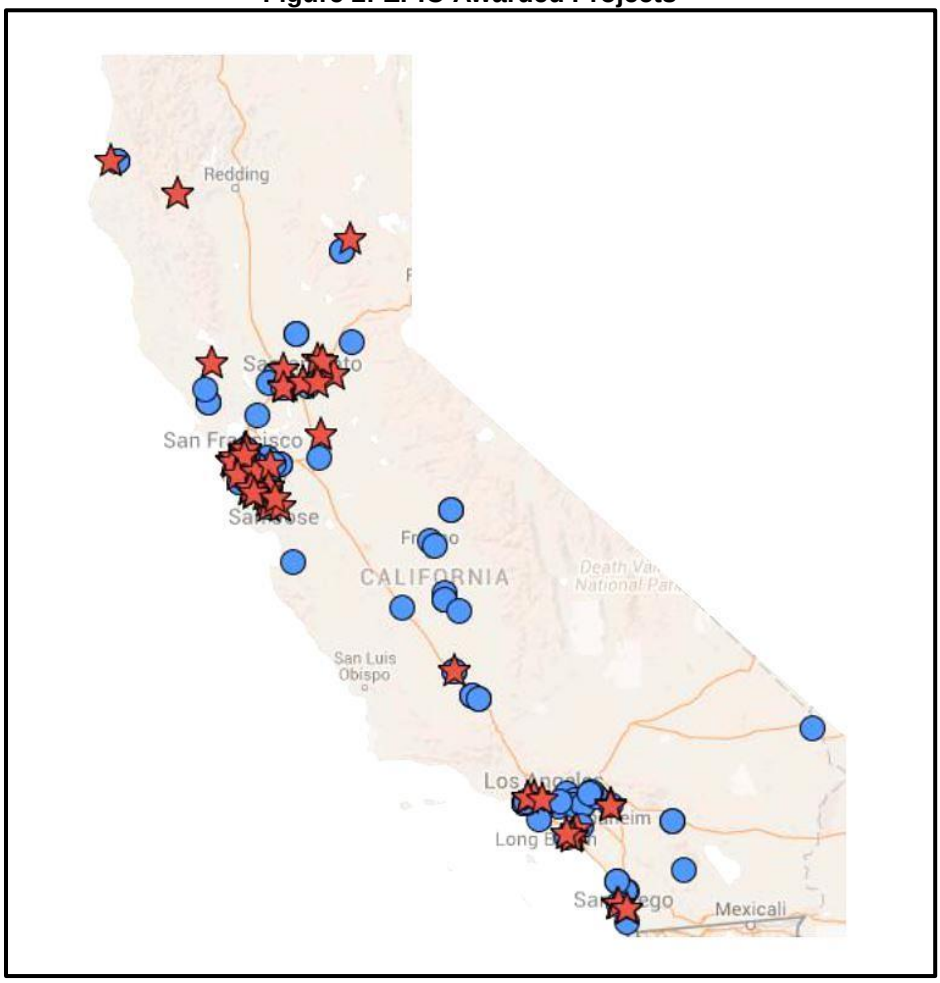
35 D.13-11-025, OP 36, pp. 141-142.

36 Information on the status of NSHP funding is available online at http://www.gosolarcalifornia.org/about/nshp.php.

CHAPTER 3: Projects

In calendar year 2015, the Energy Commission made 81 project awards encumbering $170,903,885 of EPIC funds. Overall, the Energy Commission has made 88 project awards, encumbering $180,899,717. This chapter provides an overview of the project write-ups for all active or approved projects in 2015. The project write-ups are found in Appendix B, and provide information highlighting how the project will lead to technological advancement or breakthroughs in overcoming barriers to achieving the state's statutory energy goals. Figure 2 (below) depicts a map of the projects awarded, with the red stars depicting recipient addresses and the blue dots depicting all project site locations as of December 31, 2015.

Figure 2: EPIC Awarded Projects



Source: California Energy Commission

Table 7 shows a high level summary of the 88 projects that have been awarded to date.

Table 7 High-Level Summary of EPIC Projects

2012-14 EPIC Investment Plan		
Strategic Objective	**Number of Projects (as of December 31, 2015)**	**Total Funding (as of December 31, 2015)**
S1: Develop Next-Generation End-Use Energy Efficiency Technologies and Strategies for the Building Sector	11	$24,626,841
S2: Develop New Technologies and Applications That Enable Cost Beneficial Customer-Side-of-the-Meter Choices	0	$0
S3: Develop Innovative Technologies, Tools, and Strategies to Make Distributed Generation More Affordable	13	$21,097,552
S4: Develop Emerging Utility Scale Renewable Energy Generation Technologies and Strategies to Improve Power Plant Performance, Reduce Costs, and Expand the Resource Base	7	$9,995,832
S5: Reduce the Environmental and Public Health Impacts of Electricity Generation and Make the Electricity System Less Vulnerable to Climate Impacts	13	$8,442,994
S6: Develop Technologies, Tools, and Strategies to Enable the Smart Grid of 2020	0	$0
S7: Develop Operational Tools, Models, and Simulations to Improve Grid Resource Planning	0	$0
S8: Integrate Grid Level Energy Storage Technologies and Determine Best Applications That Provide Locational Benefits	4	$5,978,608
S9: Advance Technologies and Strategies That Optimize the Benefits of Plug in Electric Vehicles to the Electricity System	3	$4,499,976
S10: Leverage California's Regional Innovation Clusters to Accelerate the Deployment of Early-Stage Clean Energy Technologies and Companies	0	$0

S11: Provide Federal Cost Share for Federal Applied Research and Development Awards	0	$0
S12: Demonstrate and Evaluate the Technical and Economic Performance of Emerging Energy Efficiency and Demand-Side Management Technologies and Strategies	8	$23,235,369
S13: Demonstrate and Evaluate Emerging Clean Energy Generation Technologies and Deployment Strategies	13	$42,334,079
S14: Demonstrate the Reliable Integration of Energy Efficient Demand-side Resources, Distributed Clean Energy Generation, and Smart Grid Components to Enable Energy Smart Community Development	9	$29,641,646
S15: Provide Cost Share for Federal Technology Demonstration and Deployment Awards	0	$0
S16: Collaborate With Local Jurisdictions and Stakeholder Groups in IOU Territories to Establish Strategies for Enhancing Current Regulatory Assistance and Permit Streamlining Efforts that Facilitate Coordinated Investments and Widespread Deployment of Clean Energy Infrastructure	0	$0
S17: Strengthen the Clean Energy Workforce by Creating Tools and Resources that Connect the Clean Energy Industry to the Labor Market	2	$8,908,107
S18: Guide EPIC Investments through Effective Market Assessment, Program Evaluation, and Stakeholder Outreach	5	$2,138,713

Source: California Energy Commission

The following information has been provided for each project awarded EPIC funds in Appendix B. The information is also provided electronically in spreadsheet format using the template provided in Attachment 6 of CPUC Decision 13-11-025:

a. Investment Program Period

b. Program Administrator

c. Project Name

d. Project Type

e. A Brief Description of the Project

f. Date of the Award

g. Was This Project Awarded in the Immediately Prior Calendar Year?

h. Assignment to Value Chain

i. Encumbered Funding Amount ($)

j. Committed Funding Amount ($)

k. Funds Expended to Date: Contract/Grant Amount ($)

l. Funds Expended to date: In-House Expenditures ($)

m. Funds Expended to Date: Total Spent to Date ($)

n. Administrative and Overhead Costs to be Incurred for Each Project

o. Leveraged Funds

p. Partners

q. Match Funding

r. Match Funding Split

s. Funding Mechanism

t. Intellectual Property

u. Identification of the Method Used to Grant Awards

v. If competitively selected, provide the number of bidders passing the initial pass/fail screening for project.

w. If competitively selected, provide the name of selected bidder.

x. If competitively selected, provide the rank of the selected bidder in the selection process.

y. If competitively selected, explain why the bidder was not the highest scoring bidder, explain why a lower scoring bidder was selected.

z. If interagency or sole source agreement, specify date of notification to the Joint Legislative Budget Committee (JLBC) was notified and date of JLBC authorization.

aa. Does the recipient for this award identify as a self-reported California-based entity, small business, or businesses owned by women, minorities, or disabled veterans?

ab. How the project leads to technological advancement or breakthroughs to overcome barriers to achieving the state's statutory energy goals.

ac. Applicable Metrics

ad. Project Update.

CHAPTER 4: Conclusion

Key Results for the Year

- In 2015, the Energy Commission released 17 competitive solicitations totaling up to $229,595,643 million of EPIC project funding. This includes funding from both EPIC Investment Plan periods.
- As of December 31, 2015, $170,903,885 was encumbered for 81 projects that were approved in 2015. The Legislature authorized the Energy Commission to award the funding, consistent with Senate Bill 96.
- In April, the CPUC adopted the Energy Commission's *2015-2017 EPIC Investment Plan*, which describes strategic objectives and initiatives for investing $365.01 million of EPIC funds.
- The Energy Commission filed its third *EPIC Annual Report* to the CPUC as required in February 2015 and its first *EPIC Annual Report* to the Legislature as required, in April 2015.
- The Energy Commission held 12 workshops throughout California in 2015 to solicit stakeholder input on a variety of topics related to electricity research and development activities.
- The Energy Commission held public preapplication workshops, one or more for each solicitation, to explain open solicitations and answer questions before the due date for applications or bids.
    - Many of these workshops took place in different locations throughout the state, including Oakland, Fresno, and Lynwood.
- In coordination with the IOU administrators and the CPUC, the Energy Commission held a public workshop on EPIC in August and held the first EPIC Innovation Symposium in December. These events met the requirement in CPUC Decision 12-05-037, as modified.
- In December, the Energy Commission held a public workshop to explain how to apply to Energy Commission EPIC program opportunity notices for grants and contracts.
- The Energy Commission participated in the CPUC EPIC proceeding to consider the proposed *2015-2017 Investment Plans* submitted by the EPIC program administrators, Application 14-04-034, et al., as consolidated into a single public proceeding.

- All EPIC funding under the *2012-2014 EPIC Investment Plan* is encumbered or committed.

Next Steps for EPIC

The Energy Commission's next steps for the continuation of EPIC administration include the following:

- The Energy Commission will continue to release competitive solicitations and requests for comment according to the schedule available on the Energy Commission's EPIC Web page (http://www.energy.ca.gov/research/epic/) and provide updates to the schedule as needed.
- Consistent with its investment plans, the Energy Commission will continue to release a NOPA for each competitive solicitation and approve each award at a public business meeting.
- The Energy Commission will hold public workshops no less than twice a year, both during the development of each investment plan and during its execution, consistent with ordering paragraph 15 in CPUC Decision 12-05-037, as modified.

Issues

As stated in Attachment 5, page 2 of CPUC Decision 13-11-025, the Energy Commission's EPIC annual report will include a discussion of issues "that may have major impact on progress in projects, if any." The Energy Commission has no issues to report at this time.

APPENDIX A:
TABLE OF ENERGY COMMISSIONI EPIC REQUIREMENTS TO REPORT FOR 2015

The California Energy Commission is committed to full compliance with all guidance and requirements pertaining to its management of Electric Program Investment Charge (EPIC) funds for the advancement of energy innovation. The following table lists Energy Commission responsibilities and requirements for its administration of EPIC in calendar year 2015. These requirements include those specified by the California Public Utilities Commission (CPUC) and by the Legislature in Senate Bill 96.

Energy Commission Responsibility or Requirement	**Status for Portion of the EPIC Funds Administered by the Energy Commission**	**Date Completed or Anticipated Completion Date**
Project Reporting Requirements in SB 96 (Committee on Budget and Fiscal Review, Chapter 356, Statutes of 2013) and D.13-11-025, Attachment 6: A brief description of each project awarded or completed in the previous year, as well as an update for each project underway. **Among other items**, this includes: 1. The name of the recipient, project title, and date and amount awarded. 2. Comply with SB 96 (PRC §25711.5)(e)(1)-(6), provided later in the table.	This annual report identifies the required information for each EPIC project.	12/31/2015
CPUC project reporting requirements: Identify ratepayer benefits, any leveraged or matched funds, any intellectual property, and other information as specified in Attachment 6 of the CPUC final decision (D. 13-11-025), for each project. Specific formatting requirement for Project Status Reports: "The information below must be reported electronically in spreadsheet format. Information for each project must be listed on separate rows in the columns specified" in Attachment 6.	This annual report identifies the required information for each EPIC project.	12/31/2015

Energy Commission Responsibility or Requirement	Status for Portion of the EPIC Funds Administered by the Energy Commission	Date Completed or Anticipated Completion Date
CPUC project metric reporting requirements: The EPIC administrators "may choose metrics on a project-by-project basis from those included as Attachment 4 or additional metrics where appropriate. However, the Administrators must identify in the Electric Program Investment Charge annual report the metrics used for each project." (D.13-11-025, Ordering Paragraph 27).	This annual report identifies metrics used for each EPIC project.	12/31/2015
CPUC project reporting requirements: Submit a final report for every project completed during the previous year, including a comprehensive description of the project, detailed findings and results, a summary of all data collected, and how the data may be accessed (D.13-11-025, Ordering Paragraph 14).	This annual report includes a project write-up, including comprehensive description of the project.	12/31/2015
CPUC project reporting requirements: Identify the use of non-competitive awards (D. 13-11-025, Ordering Paragraph 15).	No non-competitive awards were made in 2015.	12/31/2015
CPUC project reporting requirements: Provide a justification for every non-competitive award made (D.13-11-025, Ordering Paragraph 18).	No non-competitive awards were made in 2015.	12/31/2015
CPUC Annual Report Requirements: Follow the report outline agreed to by the EPIC administrators and DRA, and approved by the CPUC as contained in D. 13-11-025 (Attachment 5).	This report follows the outline indicated in D.13-11-025 Attachment 5.	2/28/2016
CPUC Budget Requirements: 10 percent cap on administrative costs, excluding program evaluation costs (D.12-05-037, ordering paragraph 5). IOU in-house costs are not included in the 10 percent administrative cap (D.13-11-025, Conclusion of Law 40). D.13-11-025, Ordering Paragraph 31: "The administrative costs to grant and administer the Intellectual Property licenses and royalties are not subject to the Energy Commission's cap on the California Energy Commission's administrative budget for Electric Program Investment Charge."	Energy Commission administrative costs for 2012-2014 are less than the capped amount.	12/31/2015

Energy Commission Responsibility or Requirement	Status for Portion of the EPIC Funds Administered by the Energy Commission	Date Completed or Anticipated Completion Date
CPUC Budget Requirements: 5 percent cap on fund shifting between the following category areas (D.12-05-037, ordering paragraph 14): applied research and development, technology demonstration and deployment, and market facilitation (D.12-05-037, ordering paragraph 12(b)(i) lists the program areas; program areas are defined in D.12-05-037 Findings of Fact paragraph 3, 4, and 6). In addition, D.13-11-025, Ordering Paragraph 36: EPIC Program administrators "must file a petition to modify to request authority to shift more than five percent of the adopted budget for each funding category/program area or to new categories of funding."	In 2015, the Energy Commission did not shift funds between funding categories or program areas.	12/31/2015
CPUC Budget Requirements: Report authorized budget (program administration and each category/program area), committed/encumbered funds (administration, program solicitations, and individual project awards), and amount spent. IOUs must also report in-house activities. All administrators must report uncommitted/unencumbered funds. (D.13-11-025, Attachment 5).	The annual report includes authorized budget, committed/encumbered project and administrative funds, amount spent, and uncommitted/unencumbered funds.	12/31/2015
CPUC Accumulated Interest Requirements: “Because the CEC cannot administratively return accumulated interest, the CEC must report the accumulated interest in arrears from the previous investment plan cycle, and the IOUs must reduce the amounts transferred to the CEC during the next triennial investment cycle by the reported accumulated interest amount and return an amount equal to the accumulated interest to ratepayers.” (D.13-11-025, p. 105)	In the 2012-2014 investment cycle, the Energy Commission accumulated $95,019.91 of interest in arrears. The next report of accumulated interest will be provided at the end of the of the second investment cycle.	Planned for completion in the annual report due 2/28/2018

Energy Commission Responsibility or Requirement	Status for Portion of the EPIC Funds Administered by the Energy Commission	Date Completed or Anticipated Completion Date
CPUC Annual Report Distribution Requirements: File Annual Reports annually on 2/28/13 through 2/28/20 with the CPUC's Energy Division Director. Annual reports shall be served on all parties in the most recent EPIC proceeding, all parties to the most recent general rate case of each electricity utility named above, and each successful and unsuccessful applicant for an EPIC funding award during the previous calendar year, except bidders for an IOU-administered EPIC contract that have signed a voluntary and informed waiver of the right to be served an EPIC annual report. (D.12-05-037, OP 16; D.13-11-025, p. 64 and OP 24).	The Energy Commission prepared the distribution list for this annual report in coordination with the CPUC and the EPIC IOU administrators to ensure the distribution list meets these requirements.	2/28/2016
CPUC Annual Report Distribution (additional): The CPUC Commissioners approving the final decision "encourage the CEC to make its reports accessible to the public on its EPIC webpage and through its Public Advisor." (D.13-11-025, p. 64)	The Energy Commission will post the EPIC annual report on its EPIC webpage and make the report available through the Public Adviser's Office.	2/28/2016

Energy Commission Responsibility or Requirement	Status for Portion of the EPIC Funds Administered by the Energy Commission	Date Completed or Anticipated Completion Date
CPUC EPIC Report Distribution: In Section 2.15 Annual Reports, the CPUC final decision states: "PRC Section 25711.5(e) requires the CEC to submit reports to the Legislature on its administration of the EPIC program. The CEC should promptly provide copies of each of these reports to the Commission through the Commission's Executive Director and Energy Division Director." (D.13-11-025, p. 63). In addition, in the section of the CPUC EPIC final decision discussing treatment of intellectual property interests developed and royalties derived from EPIC-funded CEC grants and contracts (Section 2.18.1), the CPUC EPIC final decision states: "As a condition of approving the CEC's 2012-2014 investment plan, we will require that the CEC provide the Commission (through the Commission's Energy Division Director) a copy of all reports prepared for the Legislature. (D.13-11-025, p. 71-72). In D.13-11-025 Ordering Paragraph 29(a): "The California Energy Commission (CEC) must: Provide to the Commission copies of the Electric Program Investment Charge (EPIC) reports to the Legislature required by Public Resources Code Section 25711.5(e)."	In progress.	2015 EPIC report to the Legislature planned for completion prior to 4/30/2016
SB 96 (PRC §25711.5(a)): Award funds for projects that will benefit electricity ratepayers and lead to technological advancement and breakthroughs to overcome the barriers that prevent the achievement of the state's statutory energy goals and that result in a portfolio of projects that is strategically focused and sufficiently narrow to make advancement on the most significant technological challenges that shall include, but not be limited to, energy storage, renewable energy and its integration into the electrical grid, energy efficiency, integration of electric vehicles into the electrical grid, and accurately forecasting the availability of renewable energy for integration into the grid.	All EPIC funded projects meet the requirements of SB 96 to benefit electricity ratepayers and lead to technological advancement and breakthroughs to overcome the barriers that prevent the achievement of the state's statutory energy goals.	12/31/2015

Energy Commission Responsibility or Requirement	Status for Portion of the EPIC Funds Administered by the Energy Commission	Date Completed or Anticipated Completion Date
SB 96 (PRC §25711.5(b)): In consultation with the Treasurer, establish terms that shall be imposed as a condition to receipt of funding for the state to accrue any intellectual property interest or royalties that may derive from projects funded by the EPIC Program. The Energy Commission, when determining if imposition of the proposed terms is appropriate, shall balance the potential benefit to the state from those terms and the effect those terms may have on the state achieving its statutory energy goals. The Energy Commission shall require each reward recipient, as a condition of receiving moneys pursuant to this chapter, to agree to any terms the Energy Commission determines are appropriate for the state to accrue any intellectual property interest or royalties that may derive from projects funded by the EPIC Program.	Energy Commission staff consulted with the State Treasurer's Office to establish terms and conditions for intellectual property and royalties for EPIC funding awards.	2/2/14
SB 96 (PRC §25711.5(c)): Require each applicant to report how the proposed project may lead to technological advancement and potential breakthroughs to overcome barriers to achieving the state's statutory energy goals.	Each EPIC solicitation includes this requirement for each applicant.	Included in first EPIC solicitation released in March 2014 and each solicitation thereafter.
SB 96 (PRC §25711.5(d)): Establish a process for tracking the progress and outcomes of each funded project, including an accounting of the amount of funds spent by program administrators and individual grant recipients on administrative and overhead costs and whether the project resulted in any technological advancement or breakthrough to overcome barriers to achieving the state's statutory energy goals.	Management tools are in place to comply with these requirements. Energy Commission staff uses Attachment 6 of D.13-11-025 to report annual progress and outcomes of each funded project, including the information required by PRC§ 25711.5, subparagraph (d).	12/31/2013

Energy Commission Responsibility or Requirement	Status for Portion of the EPIC Funds Administered by the Energy Commission	Date Completed or Anticipated Completion Date
SB 96 (PRC §25711.5(e)): Notwithstanding Section 10231.5 of the Government Code, prepare and submit to the Legislature no later than April 30 of each year an annual report in compliance with Section 9795 of the Government Code that shall include all of the following:	This report, including information required by SB 96, will be considered by the Energy Commission for adoption prior to April 30. The Energy Commission will submit the adopted version of the report to the Legislature no later than April 30, 2016.	Planned for completion prior to 4/30/2016
SB 96 (PRC §25711.5(e)(1)): A brief description of each project for which funding was awarded in the immediately prior calendar year, including the name of the recipient and the amount of the award, a description of how the project is thought to lead to technological advancement or breakthroughs to overcome barriers to achieving the state's statutory energy goals, and a description of why the project was selected.	This report provides this information for the projects awarded EPIC funding in 2015.	12/31/2015
SB 96 (PRC §25711.5(e)(2)): A brief description of each project funded by the EPIC Program that was completed in the immediately prior calendar year, including the name of the recipient, the amount of the award, and the outcomes of the funded project.	No EPIC project was completed in calendar year 2015. The Energy Commission will comply in 2016 and beyond.	12/31/2015
SB 96 (PRC §25711.5(e)(3)): A brief description of each project funded by the EPIC Program for which an award was made in the previous years but that is not completed, including the name of the recipient and the amount of the award, and a description of how the project will lead to technological advancement or breakthroughs to overcome barriers to achieving the state's statutory energy goals.	Projects awarded EPIC funds in 2015 are listed as required for PRC Section 25711.5(e)(1). The Energy Commission will continue to comply in 2016 and beyond.	12/31/2015
SB 96 (PRC §25711.5(e)(4)): Identification of the award recipients that are self-reported California-based entities, small businesses, or businesses owned by women, minorities, or disabled veterans.	This report provides this information for projects awarded EPIC funds through December 31, 2015. Data was collected and a summary of this data can be found in the attached 2015 EPIC Annual Report Project Status Report, Column AA.	2/28/2015

Energy Commission Responsibility or Requirement	Status for Portion of the EPIC Funds Administered by the Energy Commission	Date Completed or Anticipated Completion Date
SB 96 (PRC §25711.5(e)(5)): Identification of which awards were made through a competitive bid, interagency agreement, or sole source method, and the action of the Joint Legislative Budget Committee pursuant to paragraph (2) of subdivision (g) for each award made through an interagency agreement or sole source method.	Competitive bids were used for all projects awarded EPIC funding in 2015.	12/31/2015
SB 96 (PRC §25711.5(e)(6)): Identification of the total amount of administrative and overhead costs incurred for each project.	Administrative costs for EPIC for calendar year 2015 are reported herein. This report includes administrative and overhead costs incurred for each EPIC project through December 31, 2015.	12/31/2015
SB 96 (PRC §25711.5(f)): Establish requirements to minimize program administration and overhead costs, including costs incurred by program administrators and individual grant recipients. Each program administrator and grant recipient, including a public entity, shall be required to justify actual administration and overhead costs incurred, even if the total costs incurred do not exceed a cap on those costs that the Energy Commission may adopt.	Administrative costs for EPIC for calendar year 2015 are reported and justified herein.	12/31/2015
SB 96 (PRC §25711.5(g)(1)): The Energy Commission shall use a sealed competitive bid as the preferred method to solicit project applications and award funds pursuant to the EPIC program.	All EPIC solicitations released in calendar year 2015 used a competitive selection process.	12/31/2015
SB 96 (PRC §25711.5(g)(2)(A)): The Energy Commission may use a sole source or interagency agreement method if the project cannot be described with sufficient specificity so that bids can be evaluated against specifications and criteria set forth in a solicitation for bid and if both of the following conditions are met:	The Energy Commission made no sole source or interagency agreements for EPIC funds in calendar year 2015. The Energy Commission will comply in 2016 and beyond.	12/31/2015

Energy Commission Responsibility or Requirement	Status for Portion of the EPIC Funds Administered by the Energy Commission	Date Completed or Anticipated Completion Date
SB 96 (PRC §25711.5(g)(2)(A)(i)): The Energy Commission, at least 60 days prior to making an award pursuant to this subdivision, notifies the Joint Legislative Budget Committee and the relevant policy committees in both houses of the Legislature, in writing, of its intent to take the proposed action.	The Energy Commission made no sole source or interagency agreements for EPIC funds in calendar year 2015. The Energy Commission will comply in 2016 and beyond.	12/31/2015
SB 96 (PRC §25711.5(g)(2)(A)(i)): The Energy Commission, at least 60 days prior to making an award pursuant to this subdivision, notifies the Joint Legislative Budget Committee and the relevant policy committees in both houses of the Legislature, in writing, of its intent to take the proposed action.	The Energy Commission made no sole source or interagency agreements for EPIC funds in calendar year 2015. The Energy Commission will comply in 2016 and beyond.	12/31/2015
SB 96 (PRC §25711.5(g)(2)(A)(ii)): The Joint Legislative Budget Committee either approves or does not disapprove the proposed action within 60 days from the date of notification required by clause (i).	The Energy Commission made no sole source or interagency agreements for EPIC funds in calendar year 2015. The Energy Commission will comply in 2016 and beyond.	12/31/2015
SB 96 (PRC §25711.5(g)(2)(B)): It is the intent of the Legislature to enact this paragraph to ensure legislative oversight for awards made on a sole source basis, or through an interagency agreement.	The Energy Commission made no sole source or interagency agreements for EPIC funds in calendar year 2015. The Energy Commission will comply in 2016 and beyond.	12/31/2015

Energy Commission Responsibility or Requirement	Status for Portion of the EPIC Funds Administered by the Energy Commission	Date Completed or Anticipated Completion Date
CPUC Decision 12-05-037, requires the four EPIC Administrators (the Energy Commission, Pacific Gas and Electric Co., San Diego Gas and Electric Co., and Southern California Edison Co.) to consult with interested stakeholders no less than twice a year. CPUC Decision 15-04-020 requires one of these two annual workshops to be an Electric Program Investment Charge Innovation Symposium (EPIC Innovation Symposium) intended to achieve the following: share progress, results, and future plans; improve coordination and understanding among administrators, parties, and the CPUC; raise awareness and visibility of EPIC investments; and, promote program transparency.	The EPIC Administrators hosted two events in 2015. The first workshop was hosted by SDG&E and took place on August 18. It was focused on sharing progress on EPIC investments related to distributed energy resources (DER) integration. The second, hosted by the Energy Commission, was the EPIC Innovation Symposium on December 3. The Innovation Symposium had three tracks, focusing on energy efficiency, generation and integration, and data analytics.	12/3/2015

APPENDIX B: PROJECT WRITE-UPS OF ALL ACTIVE AND APPROVED ENERGY COMMISSION EPIC PROJECT AWARDS

In calendar year 2015, the Energy Commission made 81 project awards encumbering $170,903,885 of EPIC funds. Overall, the Energy Commission has made 88 project awards, encumbering $180,899,717. Appendix B, provides an overview of the project write-ups for all active or approved projects in 2015. The project write-ups provide information highlighting how the project will lead to technological advancement or breakthroughs in overcoming barriers to achieving the state's statutory energy goals.

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1. EPC-14-009

Project Name: Optimizing Radiant Systems for Energy Efficiency and Comfort [EPC-14-009]	
Recipient/Contractor: The Regents of the University of California on behalf of the Berkeley campus	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 6/30/2015 to 3/31/2019
Program Area and Strategic Objective: Applied Research and Development S1: Develop Next-Generation End-Use Energy Efficiency Technologies and Strategies for the Building Sector	
Issue: Application of radiant systems has increased in recent years, as they provide an opportunity to achieve energy and peak demand savings compared to conventional all-air systems. Despite this growth, controls and operation of radiant systems can be challenging due to a lack of familiarity within HVAC design and operation professions. Also, recent research has shown that new and/or revised definitions and methods for the design, sizing, and control of effective radiant cooling and heating systems is needed. This has created a situation where radiant systems are being designed, installed, and operated with only limited guidance and inappropriate tools to assist designers and building operators.	
Project Description: The purpose of this project is to develop new practical design and operation tools for radiant cooling and heating systems in order to provide a standardized guidance for radiant systems. The technical approach will include a combination of fundamental full-scale laboratory experiments, whole-building simulations, development of simplified models for radiant system controls, validation of these new methods in field studies, occupant satisfaction surveys, and an update to Title-24 for radiant systems. The project outcomes will include 1) a simplified tool for calculating the cooling load and cooling capacity of a radiant slab system, including calculation methods with significant direct solar radiation, 2) a simplified online operational tool for radiant slab systems, and 3) updates to the Title 24 Alternative Calculation Method Reference Manual to enable improved modeling capabilities of radiant systems.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: If successful, radiant systems radiant systems can be an integral part of ZNE and other advanced high performance buildings and reduce energy and peak energy use and cost compared to conventional systems.	
CPUC Proceedings addressing issues related to this EPIC project: Resource Adequacy (RA) 2016 and 2017 Compliance Years: R.14-10-020 Energy Efficiency Strategic Plan update and action plans: EE Strategic Plan docs Energy Efficiency Proceedings: R.13-11-005, R. 12-01-005, R.09-11-014	

Applicable Metrics: CPUC Metrics- 1e, 1f, 1h, 4a Lower Costs: The technology could reduce energy consumption and costs in California commercial buildings. Environmental Benefits: The technology could reduce CO2e emissions due to reductions in energy use for cooling California commercial buildings.			
Assignment to Value Chain: Demand-side Management		**Total Budgeted Project Admin and Overhead Costs:** $450,466	
EPIC Funds Encumbered: $2,939,964		**EPIC Funds Spent:** $0	
Match Partner and Funding Split: Center for the Built Environment - UC Berkeley: $239,194 (7.4 %) Price Industries: $60,000 (1.9 %)		**Match Funding:** $299,194	
Leverage Contributors:		**Leveraged Funds:** $0	
Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 122 out of 122	**Rank of Selected Applicant/ Bidder:** Ranked # 3
If not the highest scoring applicant/bidder, explain why selected: Funds were awarded to passing proposals in rank order.			
Treatment of Intellectual Property: Pre-existing intellectual property identified in agreement EPC-14-009 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.			
Update: Project completed its kick off meeting 9/14/15 and is currently underway.			

2. EPC-14-010

Project Name: Solar-Reflective "Cool" Walls: Benefits, Technologies, and Implementation [EPC-14-010]	
Recipient/Contractor: DOE- Lawrence Berkeley National Laboratory	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 3/30/2015 to 6/30/2018
Program Area and Strategic Objective: Applied Research and Development S1: Develop Next-Generation End-Use Energy Efficiency Technologies and Strategies for the Building Sector	
Issue: Increasing the albedo (solar reflectance) of a building's envelope reduces solar heat gain in the cooling season. Raising envelope albedo can also cool the outside air, boosting energy savings and demand reduction by decreasing the air temperature difference across the building envelope. Lowering urban surface and air temperatures improves air quality by slowing the reactions that produce smog, and delays global warming through negative radiative forcing ("global cooling"). Current data are insufficient to accurately predict savings impacts for different cool wall materials; which prevents cool wall technology from being included in building standards or utility rebate programs.	
Project Description: This project will (a) quantify the energy savings, peak demand reduction, urban cooling, and air quality improvements attainable from cool walls in California; (b) assess the performance of existing cool wall technologies, and develop innovative cool wall solutions; and (c) facilitate collaboration among government agencies, utilities, and industry to create a cool-wall infrastructure that includes application guidelines, a product rating program, incentives, and building code credits.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: Cool walls could increase building energy efficiency, saving money for ratepayers and reducing emissions from power plants. This would lower the risks of grid failure, loss of air conditioning, and morbidity/mortality on hot, sunny days. Cool walls will also reduce urban air temperatures, helping mitigate extreme heat events and air pollution episodes.	
CPUC Proceedings addressing issues related to this EPIC project: Residential Zero Net Energy Action Plan (2015): Residential ZNE Action Plan (June 2015) Energy Efficiency Strategic Plan update and action plans: EE Strategic Plan docs	

Applicable Metrics: CPUC Metrics- 1e, 1f, 1h, 4a

Lower Costs:

The project will reduce heat gain through building shells, thus reducing space conditioning energy use and peak demand, which will directly reduce customer bills, generation costs and, when incorporated in the Load Forecast, procurement requirements.

Environmental Benefits:

By reducing space conditioning load, annual power plant emissions would be reduced, with consequent reductions in greenhouse gas emissions as well as nitrogen oxides and sulfur dioxide.

Public Health:

Reduced heat load would lower the risks of grid failure, loss of air conditioning, and morbidity/mortality on hot, sunny days. Cool walls will also reduce urban air temperatures, helping mitigate extreme heat events and air pollution episodes.

Assignment to Value Chain: Demand-side Management	**Total Budgeted Project Admin and Overhead Costs:** $908,941
EPIC Funds Encumbered: $2,500,000	**EPIC Funds Spent:** $1,004,820
Match Partner and Funding Split: _3M: $7,600 (0.2 %) BEHR: $33,000 (1.1 %) Metal Construction Association: $88,100 (2.8 %) PPG Industries: $100,000 (3.2 %) Saint-Gobain: $90,000 (2.9 %) Tex-Cote: $10,000 (0.3 %) Valspar: $270,000 (8.7 %)	**Match Funding:** $610,800
Leverage Contributors:	**Leveraged Funds:** $0

Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 122 out of 122	**Rank of Selected Applicant/ Bidder:** Ranked # 4

If not the highest scoring applicant/bidder, explain why selected:

Funds were awarded to passing proposals in rank order.

Treatment of Intellectual Property:

Pre-existing intellectual property identified in agreement EPC-14-010 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.

Update:

The project team has simulated wall albedo impacts on hourly energy consumption for different prototypical buildings and orientations in multiple climate zones as a basis for calculating annual cooling and heating energy use impacts. This basic science will allow reliable estimation of energy use impacts for different cool coatings and paints. They have also continued lab testing of different pigment types

to establish relative viability for use in developing cool coatings and obtained coating samples from industry partners for installation on exposure racks to measure albedo degradation over time under different weather conditions. This project was highlighted at the 2015 EPIC Symposium.

3. EPC-14-011

Project Name: From the Laboratory to the California Marketplace: A New Generation of LED Lighting Solutions [EPC-14-011]	
Recipient/Contractor: Regents of the University of California, Davis	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 4/1/2015 to 3/19/2019
Program Area and Strategic Objective: Applied Research and Development S1: Develop Next-Generation End-Use Energy Efficiency Technologies and Strategies for the Building Sector	
Issue: Adoption of lighting emitting diode (LED) lighting for general illumination is poised to be the largest advancement in lighting building efficiency during the 21st century. A variety of market actors have introduced LED products and made performance claims that have set the technology up with unrealistic performance expectations. LED manufacturers have focused on research into efficacy cost at the expense of quality, resulting in an influx of poor quality LED products with minimal options such as color and dimmability. This has led to a lack of consumer satisfaction, and resulting minimal market share for LED products in key indoor residential and commercial applications.	
Project Description: This project will result in the design and development of innovative LED lighting solutions for three key general illumination product categories. These solutions are a best-in-class medium, screw-base replacement lamp, linear tubular light emitting diode (TLED) replacement lamps and spectrally optimized, dedicated LED luminaires. Product design requirements will be based on consumer light quality and functional performance preferences determined through a series of unique laboratory-based consumer preference and product characterization studies.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: This project could improve understanding of metrics and test procedures associated with LED quality and performance, increase lamp manufacturer's ability to comply with future energy codes and standards and increase consumer acceptance and use of LED lamps.	
CPUC Proceedings addressing issues related to this EPIC project: Energy Efficiency Proceedings: R.13-11-005, R. 12-01-005, R.09-11-014	

Applicable Metrics: CPUC Metrics- 1e, 1f, 1h, 3e, 4a Lower Costs: The LED products developed could result in direct electricity and peak demand reduction and cost savings for consumers. Environmental Benefits: The development and deployment of the developed LED products could reduce electricity use and CO2 emissions. Public Health: The development and deployment of the developed LED products could help regulate circadian rhythm and production of important neurochemicals, impacting everything from sleep and mood to the health of the human immune system.			
Assignment to Value Chain: Demand-side Management		**Total Budgeted Project Admin and Overhead Costs:** $557,072	
EPIC Funds Encumbered: $2,995,187		**EPIC Funds Spent:** $55,966	
Match Partner and Funding Split: California Lighting Technology Center - UC Davis: $5,000 (0.2 %)		**Match Funding:** $5,000	
Leverage Contributors: California Lighting Technology Center - UC Davis : $5,000		**Leveraged Funds:** $5,000	
Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 122 out of 122	**Rank of Selected Applicant/ Bidder:** Ranked # 5
If not the highest scoring applicant/bidder, explain why selected: Funds were awarded to passing proposals in rank order.			
Treatment of Intellectual Property: Pre-existing intellectual property identified in agreement EPC-14-011 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.			
Update: Approximately 15% of the total agreement has been completed. This includes kick-off meeting, technical advisory committee meetings and development of test methodologies. Project was highlighted at the 2015 EPIC Symposium.			

4. EPC-14-012

Project Name: Comparing Attic Approaches for Zero Net Energy Homes [EPC-14-012]	
Recipient/Contractor: Lawrence Berkeley National Laboratory	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 3/30/2015 to 12/31/2018
Program Area and Strategic Objective: Applied Research and Development S1: Develop Next-Generation End-Use Energy Efficiency Technologies and Strategies for the Building Sector	
Issue: As homes approach zero net energy (ZNE), the energy impacts of some emerging construction strategies need investigation to determine their energy impacts. One strategy is to seal and insulate the attic that contains the home's thermal distribution system. However there are questions regarding the level of air sealing and insulation needed, the impact on attic humidity and potential for attic or roof damage, and the overall impact on annual building energy use.	
Project Description: The project will focus on the performance of different attic assemblies and their associated heating, ventilating and air conditioning (HVAC) systems. Field measurements of attic and HVAC system performance will be conducted in two new high performance homes in California with sealed and insulated attics. One home will be built to be about 30 percent better than Title 24 and the other will be a ZNE home. The attic insulation approach will be a new lower-cost approach using blown insulation that does not use expensive spray-foam. The results of the measurements will be used directly to provide technical support for potential changes to Title 24 and provide information to contractors and builders on sealed and insulated attic performance and alternative approaches.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: The technologies and construction techniques studied could lead to electricity savings and peak demand savings and changes in future construction practices. There is potential for reductions of up to 50% in energy use relative to typical duct systems. Comfort is also increased because homes take less time to cool down to meet setpoints. For new construction, this performance improvement will contribute to achieving ZNE goals. The techniques can be applied to home retrofits with HVAC equipment.	
CPUC Proceedings addressing issues related to this EPIC project: Energy Efficiency Strategic Plan update and action plans: EE Strategic Plan docs Energy Efficiency Proceedings: R.13-11-005, R. 12-01-005, R.09-11-014	

<table>
<tr><td colspan="4">Applicable Metrics: CPUC Metrics- 1f, 1h, 4a
Lower Costs:
The technologies and construction techniques could result in significant reduction in heating and cooling energy cost and use.
Environmental Benefits:
A 50 percent reduction in energy use could result in reductions in greenhouse gas emissions.</td></tr>
<tr><td colspan="2">Assignment to Value Chain:
Demand-side Management</td><td colspan="2">Total Budgeted Project Admin and Overhead Costs: $563,439</td></tr>
<tr><td colspan="2">EPIC Funds Encumbered:
$1,000,000</td><td colspan="2">EPIC Funds Spent:
$560,000</td></tr>
<tr><td colspan="2">Match Partner and Funding Split:</td><td colspan="2">Match Funding:
$0</td></tr>
<tr><td colspan="2">Leverage Contributors:</td><td colspan="2">Leveraged Funds:
$0</td></tr>
<tr><td>Funding Method:
Competitive</td><td>Funding Mechanism:
Grant</td><td>No. of Passing Applicants/ Bidders:
122 out of 122</td><td>Rank of Selected Applicant/ Bidder:
Ranked # 10</td></tr>
<tr><td colspan="4">If not the highest scoring applicant/bidder, explain why selected:
Funds were awarded to passing proposals in rank order.</td></tr>
<tr><td colspan="4">Treatment of Intellectual Property:
Pre-existing intellectual property identified in agreement EPC-14-012 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.</td></tr>
<tr><td colspan="4">Update:
This project was approved at the February 15, 2015 Business Meeting. A project update review was held on September 25th 2015. They have completed the draft field test plan and literature review. Instrumentation of first test house is finished, with a focus on instruments to be installed before the insulation is put in place. A Letter of Agreement has been approved by the Commission to add De Young Properties as a Subcontractor. This was a highlighted project at the 2015 EPIC Symposium in Folsom, California on December 3, 2015.</td></tr>
</table>

5. EPC-14-013

Project Name: Very Low-cost MEMS-based Ultrasonic Anemometer for Use Indoors and in HVAC Ducts [EPC-14-013]	
Recipient/Contractor: The Regents of the University of California on behalf of the Berkeley campus	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 8/25/2015 to 3/30/2019
Program Area and Strategic Objective: Applied Research and Development S1: Develop Next-Generation End-Use Energy Efficiency Technologies and Strategies for the Building Sector	
Issue: Air velocity and air flow are currently measured using devices such as hot-wire anemometers or are inferred from pressure measurements. These are inaccurate, failure-prone, and often expensive. They limit the applications in which air speeds and their associated energy flows are measured in buildings, causing very large energy costs and health risks.	
Project Description: This project will develop low-cost, low power, accurate, calibration-free, and compact airflow sensors (anemometers) for measuring: (1) room airflow in occupied commercial buildings; and (2) volumetric air flow in heating, ventilation and air conditioning (HVAC) systems. The technology will save energy by using the collected data to correct current wasteful HVAC malfunctions that result in inefficient systems and uncomfortable buildings. The anemometers will be wireless, able to be inexpensively installed in existing buildings, and operate on a battery for years and communicate wirelessly via the internet to the building's control system. The device will also sense temperature, its orientation, and its location.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: Improvements to accurate measurement of airflow coupled with being able to provide these measurements in a cost-effective manner would result in heating and cooling savings and improved air flow in buildings. Besides reducing HVAC energy use, improved airflows will also improve occupant comfort and extend equipment life.	
CPUC Proceedings addressing issues related to this EPIC project: Resource Adequacy (RA): R.11-10-023 [Closed] Energy Efficiency Strategic Plan update and action plans: EE Strategic Plan docs	
Applicable Metrics: CPUC Metrics- 1f, 1h, 4a Lower Costs: Estimated savings of $56 million per year in reduced energy bills for building owners/occupants, assuming technology applicability in 25-75% of buildings, a 20-30% potential for savings on all HVAC related energy use, and market penetration of 5-25%	

Greater Reliability:

HVAC systems can be turned off when measured airflow indicates ventilation requirements have been met, resulting in improved system operation, power reliability, and reduce grid impacts.

Increase Safety:

Safety of occupants is improved when ventilation air is accurately measured, as inaccurate pressure sensors often lead to reduced zone ventilation rates, and malfunctioning outside air dampers often do not provide sufficient minimum outside air

Environmental Benefits:

Estimated savings of 112,000 metric tons of carbon dioxide/yr, assuming technology applicability in 25-75% of buildings, a 20-30% potential for savings on all HVAC related energy use, and market penetration of 5-25%

Assignment to Value Chain: Demand-side Management	**Total Budgeted Project Admin and Overhead Costs:** $595,177
EPIC Funds Encumbered: $2,488,964	**EPIC Funds Spent:** $0
Match Partner and Funding Split: Price Industries: $40,000 (1.5 %) BAF Technologies Inc.: $45,000 (1.6 %) Chirp Microsystems, Inc.: $120,000 (4.4 %) Center for the Built Environment - UC Berkeley: $14,000 (0.5 %)	**Match Funding:** $249,000
Leverage Contributors:	**Leveraged Funds:** $0

Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 122 out of 122	**Rank of Selected Applicant/ Bidder:** Ranked # 2

If not the highest scoring applicant/bidder, explain why selected:

Funds were awarded to passing proposals in rank order.

Treatment of Intellectual Property:

Pre-existing intellectual property identified in agreement EPC-14-013 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.

Update:

Project was approved at the February 25, 2015, business meeting and was highlighted at the EPIC Symposium on December 3, 2015.

6. EPC-14-015

Project Name: Direct Current as an Integrating and Enabling Platform [EPC-14-015]	
Recipient/Contractor: Lawrence Berkeley National Laboratory	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 4/15/2015 to 6/30/2018
Program Area and Strategic Objective: Applied Research and Development S1: Develop Next-Generation End-Use Energy Efficiency Technologies and Strategies for the Building Sector	
Issue: The potential energy savings and interoperability advantages of direct current (DC) and alternating current (AC)-DC hybrid systems are estimated to be very significant, especially for zero net energy (ZNE) buildings that integrate on-site renewable energy with battery storage, electric vehicle (EV) charging, and the Smart Grid. Yet the barriers to transitioning from traditional AC-powered electric systems to DC or AC-DC hybrid systems are significant, even in a world dominated by digital devices and end-use equipment that require DC power. More research, information, design guidelines/templates, and training are needed to understand the savings potential and costs for implementing DC and AC.	
Project Description: This project will research direct current (DC) and alternating current (AC)-DC hybrid systems in ZNE buildings and develop resource information, end-use templates, and building guidelines that could improve the ability to achieve zero net energy buildings. The feasibility, costs, benefits, market barriers, and customer and education needs will be assessed, including guidelines for residential and small commercial buildings.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: If the results from this project are promising, there is the potential for future DC powered building designs. A DC powered buildings could reduce energy use by 10% to 30% compared to a ZNE building with storage and or EV charging. It is estimated that a ZNE DC home could reduce site energy use by 20%, reduce PV size by 25%, and reduce the home energy cost by $22,000.	
CPUC Proceedings addressing issues related to this EPIC project: Residential Zero Net Energy Action Plan (2015): Residential ZNE Action Plan (June 2015)	
Applicable Metrics: CPUC Metrics- 1f, 1h, 3b, 4a Lower Costs: Use of DC power will avoid unnecessary power conversions, improving efficiency, and eliminate the need for some conversion equipment. Total savings are estimated to be $800 million over a ten year period, assuming full penetration of DC distribution in all buildings that install PV between 2015 and 2024.	

<table>
<tr><td colspan="4">Greater Reliability:

DC power has a long history of reliability in the telecommunications sector. Similar improvement is expected for DC power use in buildings. DC power use in buildings will improve reliability by eliminating failure in power conversion equipment.

Environmental Benefits:

Reduction in energy use could result in reductions in greenhouse gas emissions. Also, eliminating the need for some conversion equipment could reduce the cost of PV, storage and other related systems.</td></tr>
<tr><td colspan="2">Assignment to Value Chain:
Demand-side Management</td><td colspan="2">Total Budgeted Project Admin and Overhead Costs: $495,365</td></tr>
<tr><td colspan="2">EPIC Funds Encumbered:
$1,000,000</td><td colspan="2">EPIC Funds Spent:
$822,245</td></tr>
<tr><td colspan="2">Match Partner and Funding Split:
California LMCC IBEW-NECA: $50,000 (4.5 %)
EMerge Alliance: $50,000 (4.5 %)</td><td colspan="2">Match Funding:
$100,000</td></tr>
<tr><td colspan="2">Leverage Contributors:</td><td colspan="2">Leveraged Funds:
$0</td></tr>
<tr><td>Funding Method:
Competitive</td><td>Funding Mechanism:
Grant</td><td>No. of Passing Applicants/ Bidders:
122 out of 122</td><td>Rank of Selected Applicant/ Bidder:
Ranked # 1</td></tr>
<tr><td colspan="4">If not the highest scoring applicant/bidder, explain why selected:
Funds were awarded to passing proposals in rank order.</td></tr>
<tr><td colspan="4">Treatment of Intellectual Property:
Pre-existing intellectual property identified in agreement EPC-14-015 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.</td></tr>
<tr><td colspan="4">Update:
Project was approved on February 25, 2015 and was highlighted at the EPIC Symposium on December 3, 2015.</td></tr>
</table>

7. EPC-14-016

Project Name: Cost- and Energy-Efficient Attic Designs for California Homes [EPC-14-016]	
Recipient/Contractor: BIRAenergy	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 6/29/2015 to 6/30/2018
Program Area and Strategic Objective: Applied Research and Development S1: Develop Next-Generation End-Use Energy Efficiency Technologies and Strategies for the Building Sector	
Issue: In 2013, new California home construction totaled 85,310 units; 36,878 single family units and 48,432 multifamily units. An estimated 90% of the single family homes had the heating, ventilation and air conditioning (HVAC) equipment and ductwork (ducts) in the temperature extremes of ventilated attics. California homes place the HVAC and ducts in the attic to avoid using valuable living space. Placing ducts in the attic makes duct installations easier and less expensive. However, this practice results in wasted energy estimated at about 4.8 TWh and significant carbon emissions estimated at 1.2 million metric tons of equivalent carbon dioxide emissions (CO2e) each year.	
Project Description: Three different attic designs will be refined, tested, evaluated, and demonstrated in new home construction. The team will recommend the best of these approaches to home builders addressing cost-effectiveness and energy-efficiency. The baseline for comparison will be current energy efficiency code practices for attic construction involving ventilated, un-insulated attics containing code compliant ducts. The team will evaluate the new design approaches analytically at the start of the project. Researchers will assess approaches that include methods to produce sealed, insulated attics, as well as, standard vented attics, both of which have been demonstrated and are in limited use in the market today but currently add considerable cost to builders. The team will employ new and novel installation methods and materials that have the potential for energy savings on par with ducts in the conditioned space, but at a cost similar to current practice.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: This project has the potential to lower utility costs, improve comfort, reduce carbon emissions through reduced energy use, and reduce peak electricity demand in new and existing homes. Pilot work has demonstrated that these approaches have the potential to be cost neutral. Assuming a market penetration of 73% of the current single-family, new construction market would potentially recoup the costs to ratepayers within a single year.	
CPUC Proceedings addressing issues related to this EPIC project: Resource Adequacy (RA) 2016 and 2017 Compliance Years: R.14-10-020 Residential Zero Net Energy Action Plan (2015): Residential ZNE Action Plan (June 2015)	

Energy Efficiency Strategic Plan update and action plans: EE Strategic Plan docs Energy Efficiency Proceedings: R.13-11-005, R. 12-01-005, R.09-11-014			
Applicable Metrics: CPUC Metrics- 1f, 1h, 4a Lower Costs: The project could lower energy cost to consumers by developing attic assemblies that allow ducts to perform as if they were located in the "conditioned space" and reduce HVAC energy costs. Environmental Benefits: The new attic designs proposed in this project could save 3700 metric tons of CO2e per year.			
Assignment to Value Chain: Demand-side Management		**Total Budgeted Project Admin and Overhead Costs:** $228,148	
EPIC Funds Encumbered: $1,000,000		**EPIC Funds Spent:** $418,389	
Match Partner and Funding Split:		**Match Funding:** $265,000	
Leverage Contributors:		**Leveraged Funds:** $0	
Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 122 out of 122	**Rank of Selected Applicant/ Bidder:** Ranked # 11
If not the highest scoring applicant/bidder, explain why selected: Funds were awarded to passing proposals in rank order.			
Treatment of Intellectual Property: Pre-existing intellectual property identified in agreement EPC-14-016 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.			
Update: This project was highlighted in the December 2015 EPIC symposium. The research team is currently coordinating with LBNL on putting together a technical advisory committee (TAC) for feedback on the project. The first TAC meeting will be held in early 2016.			

8. EPC-14-017

Project Name: Developing Flexible, Networked Lighting Control Systems That Reliably Save Energy [EPC-14-017]	
Recipient/Contractor: DOE- Lawrence Berkeley National Laboratory	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 4/1/2015 to 3/31/2019
Program Area and Strategic Objective: Applied Research and Development S1: Develop Next-Generation End-Use Energy Efficiency Technologies and Strategies for the Building Sector	
Issue: The greatest difficulty in deploying advanced, intelligent lighting control systems, is the lack of multi-vendor interoperability and standard user interface elements. Building owners may have multiple lighting systems that cannot be controlled by whole-building automation because of different user interfaces, and replacing working lighting systems in order to use whole-building automation is costly.	
Project Description: The recipient will develop low-cost lighting components with open communication interfaces, that allow seamless integration into whole-building control and automation systems. The project will target future California Building Energy Efficiency Standards (Title 24), and establish methods by which the site-specific configuration and operation of networked lighting controls systems can be effectively addressed, and more easily implemented by the marketplace.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: If the project is successful, it will accelerate the adoption of standardized lighting control systems and will help realize the California Lighting Action Plan goal of 60-80 percent reduction in lighting energy use by 2020. Estimated overall energy savings potential of advanced, networked lighting controls exceeds 20%, or about 1.5 TWh/year, after the technologies have been implemented in the commercial building stock.	
CPUC Proceedings addressing issues related to this EPIC project: Energy Efficiency Proceedings: R.13-11-005, R. 12-01-005, R.09-11-014	
Applicable Metrics: CPUC Metrics- 1f, 1h, 4a Lower Costs: The technology could reduce energy consumption and costs associated with lighting energy use in commercial buildings. Additionally, one of the goals is to develop low cost lighting components which could facilitate easier implementation into the marketplace. Greater Reliability: Reduced stress on the grid due to lighting efficiencies.	

<table>
<tr><td colspan="4">Environmental Benefits:
The technology could reduce greenhouse gas emissions due to reductions in energy use for lighting in commercial buildings.</td></tr>
<tr><td colspan="2">Assignment to Value Chain:
Demand-side Management</td><td colspan="2">Total Budgeted Project Admin and Overhead Costs: $216,162</td></tr>
<tr><td colspan="2">EPIC Funds Encumbered:
$1,875,000</td><td colspan="2">EPIC Funds Spent:
$669,000</td></tr>
<tr><td colspan="2">Match Partner and Funding Split:</td><td colspan="2">Match Funding:
$0</td></tr>
<tr><td colspan="2">Leverage Contributors:</td><td colspan="2">Leveraged Funds:
$0</td></tr>
<tr><td>Funding Method:
Competitive</td><td>Funding Mechanism:
Grant</td><td>No. of Passing Applicants/ Bidders:
122 out of 122</td><td>Rank of Selected Applicant/ Bidder:
Ranked # 7</td></tr>
<tr><td colspan="4">If not the highest scoring applicant/bidder, explain why selected:
Funds were awarded to passing proposals in rank order.</td></tr>
<tr><td colspan="4">Treatment of Intellectual Property:
Pre-existing intellectual property identified in agreement EPC-14-017 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.</td></tr>
<tr><td colspan="4">Update:
Kickoff meeting was held August, 2015. Recipient is finalizing agreements with other participants.</td></tr>
</table>

9. EPC-14-021

Project Name: Development and Testing of the Next Generation Residential Space Conditioning System for California [EPC-14-021]	
Recipient/Contractor: Electric Power Research Institute, Inc.	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 6/30/2015 to 12/31/2018
Program Area and Strategic Objective: Applied Research and Development S1: Develop Next-Generation End-Use Energy Efficiency Technologies and Strategies for the Building Sector	
Issue: Cooling and heating of buildings to achieve comfortable temperature and humidity levels accounts for a large portion of the electricity bills for Californians. The building sector awaits the promise of novel energy-efficiency technologies that will decrease operating costs of space-conditioning equipment and increase comfort. Many of the technologies that deliver efficiency exist, but are not integrated into a single HVAC system, nor are they optimized for California climates.	
Project Description: This project will develop a next-generation residential space-conditioning system optimized for California climates. The advanced efficiency solutions integrated into the HVAC system will include: variable-capacity compressor and variable-speed fans using state-of-the-art inverter technology; integrated ventilation to harness fresh air for "free cooling;" intelligent dual-fuel technology to decrease energy cost and empower consumers to choose between electricity and natural gas; zonal control to prevent conditioning of unoccupied rooms; demand-response interactivity to grid flexibility and reliability; advanced fault detection and diagnostics to ensure proper installation, operation, and maintenance; and alternative refrigerants for improved operation and significant reductions in the potential for global warming.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: This project will develop a climate optimized HVAC system that includes advanced energy efficiency features. If successful, the technology could reduce electricity use, demand and costs, enhance occupant comfort, provide for fault detection and diagnostics to ensure continued optimal system performance, and allow the use of alternative refrigerants that reduce the potential for global warming.	
CPUC Proceedings addressing issues related to this EPIC project: Resource Adequacy (RA) 2016 and 2017 Compliance Years: R.14-10-020	

Applicable Metrics: CPUC Metrics- 1e, 1f, 1g, 1h, 4a Lower Costs: This technology is estimated to reduce electricity usage by 725 GWh per year, or approximately $108 million annually. In addition the fault detection and diagnostic feature could help reduce operation and maintenance costs on HVAC equipment. Greater Reliability: The technology is estimated to reduce peak demand by 1.5 GW which could reduce impacts to the grid. Environmental Benefits: The technology is estimated to reduce greenhouse gas emissions by 193,000 metric tons of CO2 emissions annually due to reductions in energy use.			
Assignment to Value Chain: Demand-side Management		**Total Budgeted Project Admin and Overhead Costs:** $1,072,105	
EPIC Funds Encumbered: $2,993,005		**EPIC Funds Spent:** $10,362	
Match Partner and Funding Split:		**Match Funding:** $322,281	
Leverage Contributors:		**Leveraged Funds:** $0	
Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 122 out of 122	**Rank of Selected Applicant/ Bidder:** Ranked # 9
If not the highest scoring applicant/bidder, explain why selected: Funds were awarded to passing proposals in rank order.			
Treatment of Intellectual Property: Pre-existing intellectual property identified in agreement EPC-14-021 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.			
Update: Project completed its kickoff meeting on July 14, 2015 and is currently underway.			

10. EPC-14-066

Project Name: High-Performance Integrated Window and Facade Solutions for California Buildings [EPC-14-066]	
Recipient/Contractor: Lawrence Berkeley National Laboratory	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 6/30/2015 to 3/29/2019
Program Area and Strategic Objective: Applied Research and Development S1: Develop Next-Generation End-Use Energy Efficiency Technologies and Strategies for the Building Sector	
Issue: Windows are responsible for annual building HVAC energy use and have a significant impact on peak heating and cooling loads, & HVAC system sizing and layout. Windows can provide ventilation air and can offset electric use for lighting. While most envelope systems are static (insulation), windows can dynamically change their energy properties (switchable glass) in response to user, building owner, and grid demands. However, smart systems and controls infrastructure to optimize dynamic operations to reliably capture these energy advantages is unavailable.	
Project Description: To develop, validate and quantify energy impacts of a new generation of high performance façade systems and provide the design and management toolkits that will enable the building industry to meet challenging energy performance goals leading to net zero buildings by 2030. Building envelope technologies can be integrated into a cost-effective system that reduces energy-use associated with HVAC and lighting while improving occupant comfort. Technology development activities include highly insulating (Hi-R) windows, energy recovery-based envelope ventilation systems, and dynamic daylight redirecting systems. Supporting tools, data, and design methods will also be developed to enable widespread, reliable, cost-effective deployment throughout California.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: Improvements in window and façade technologies could lower energy use and demand in buildings due to reduced HVAC and lighting loads while also reduce building owner operating costs.	
CPUC Proceedings addressing issues related to this EPIC project: Energy Efficiency Strategic Plan update and action plans: EE Strategic Plan docs Energy Efficiency Proceedings: R.13-11-005, R. 12-01-005, R.09-11-014	
Applicable Metrics: CPUC Metrics- 1e, 1f, 1h, 4a Lower Costs: The technologies included in this project are estimated to be capable of reducing statewide energy use by 6118 gigawatt-hours and peak electricity demand by 2250	

megawatts resulting in lower electricity costs of $867 million/year. Environmental Benefits: By reducing electricity and natural gas used to heat and cool and buildings, this technology could also reduce greenhouse gas emissions.			
Assignment to Value Chain: Demand-side Management		**Total Budgeted Project Admin and Overhead Costs:** $1,308,746	
EPIC Funds Encumbered: $3,000,000		**EPIC Funds Spent:** $550,000	
Match Partner and Funding Split: United States Department of Energy: $450,000 (13.0 %)		**Match Funding:** $450,000	
Leverage Contributors: United States Department of Energy : $450,000		**Leveraged Funds:** $450,000	
Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 122 out of 122	**Rank of Selected Applicant/ Bidder:** Ranked # 12
If not the highest scoring applicant/bidder, explain why selected: Funds were awarded to passing proposals in rank order.			
Treatment of Intellectual Property: Pre-existing intellectual property identified in agreement EPC-14-066 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.			
Update: The agreement was approved at the Energy Commission's May 2015 business meeting and the kick off meeting was held in July 2015. The project is currently underway.			

11. EPC-15-004

Project Name: Climate appropriate HVAC Systems for Commercial Buildings to Reduce Energy Use and Demand [EPC-15-004]	
Recipient/Contractor: Electric Power Research Institute, Inc.	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 8/3/2015 to 12/30/2018
Program Area and Strategic Objective: Applied Research and Development S1: Develop Next-Generation End-Use Energy Efficiency Technologies and Strategies for the Building Sector	
Issue: Cooling and heating buildings contribute to a large portion of the electricity bills for California ratepayers. Traditional heating, ventilating and air conditioning (HVAC) systems waste energy. Innovations in HVAC systems that include variable refrigerant flow and advanced indirect evaporative cooling systems are well suited for California climates. However the full potential of these innovations have not been realized.	
Project Description: This project will develop and demonstrate a Climate Appropriate Air Conditioning system that could cut the energy required to cool and heat commercial buildings. The heart of this system is an intelligent HVAC controller that processes signals from building sensors and system feed-back to maximize system efficiency. This control system will manage two technologies to optimize overall building energy and peak demand reduction. Getting fresh air into commercial buildings is a code requirement. However, the ingress of hot air into a cooling system (or cold air into a heating system) presents an inefficiency problem. Two technologies to increase the efficiency of fresh-air intake: heat-recovery ventilation (HRV) and indirect evaporative cooling (IEC) are used in this project to decrease the temperature of the incoming air in the summer and increase it in the winter. Both technologies can be intelligently controlled by the building controller to reduce cooling and heating costs.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: This project will benefit small and medium commercial buildings, such as retail stores, offices buildings and food service. It is estimated that the HVAC systems for these sectors use 7,000 GWh and contributes 5 GW of peak demand. This project could reduce HVAC energy consumption and peak demand by as much as 40 percent and could be implemented in existing and new commercial buildings through direct replacement of rooftop packaged air conditioners.	
CPUC Proceedings addressing issues related to this EPIC project: Energy Efficiency Strategic Plan update and action plans: EE Strategic Plan docs Energy Efficiency Proceedings: R.13-11-005, R. 12-01-005, R.09-11-014	

<table>
<tr><td colspan="4">Applicable Metrics: CPUC Metrics- 1f, 1h, 4a
Lower Costs:
This project could reduce electricity use for HVAC systems. This could mean lower energy costs for commercial building owners or occupants that pay utility bills.
Environmental Benefits:
This project could reduce electricity use in HVAC systems which could reduce greenhouse gas emissions.</td></tr>
<tr><td colspan="2">Assignment to Value Chain:
Demand-side Management</td><td colspan="2">Total Budgeted Project Admin and Overhead Costs: $1,088,673</td></tr>
<tr><td colspan="2">EPIC Funds Encumbered:
$2,834,721</td><td colspan="2">EPIC Funds Spent:
$0</td></tr>
<tr><td colspan="2">Match Partner and Funding Split:
Electric Power Research Institute (EPRI): $440,509 (13.4 %)</td><td colspan="2">Match Funding:
$440,509</td></tr>
<tr><td colspan="2">Leverage Contributors:</td><td colspan="2">Leveraged Funds:
$0</td></tr>
<tr><td>Funding Method:
Competitive</td><td>Funding Mechanism:
Grant</td><td>No. of Passing Applicants/ Bidders:
122 out of 122</td><td>Rank of Selected Applicant/ Bidder:
Ranked # 10</td></tr>
<tr><td colspan="4">If not the highest scoring applicant/bidder, explain why selected:
Funds were awarded to passing proposals in rank order.</td></tr>
<tr><td colspan="4">Treatment of Intellectual Property:
Pre-existing intellectual property identified in agreement EPC-15-004 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.</td></tr>
<tr><td colspan="4">Update:
The agreement was approved at the July 8, 2015 Business Meeting. The contract was signed on November 12, 2015. This project was highlighted at the 2015 EPIC Symposium in Folsom, California on December 3, 2015. A team meeting was held in San Ramon on December 18, 2015 to review the project and discuss subcontractor responsibilities. EPRI is currently reviewing Northern California sites for a second demonstration site of the system.</td></tr>
</table>

12. EPC-14-024

Project Name: Modular Biomass Power Systems to Facilitate Forest Fuel Reduction Treatment [EPC-14-024]	
Recipient/Contractor: West Biofuels LLC	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 4/13/2015 to 3/31/2018
Program Area and Strategic Objective: Applied Research and Development S3: Develop Innovative Technologies, Tools, and Strategies to Make Distributed Generation More Affordable	
Issue: Community-scale bioenergy infrastructure is critical to support sustainable management of the forested landscape to protect communities, watersheds, and energy infrastructure from the catastrophic wildfire. As identified in the California Bioenergy Action Plan (2012), the utilization of forest waste to promote sustainable forest management practices is of critical importance to the State and to utility ratepayers. While biomass power has existed in the forested settings in California with the deployment of large-scale direct combustion power plants, mostly built in the 1980's, community-scale biomass conversion technology has yet to be successful largely due to cost and performance issues.	
Project Description: This project will develop a modular system that can be rapidly deployed to communities across California to promote and support fire-safe management activities. The project will develop a pilot-scale modular biomass gasification system integrated with a high-efficiency lean-burn engine in order to convert forest residues into renewable grid power to reduce the cost and increase the benefits of forest fuel reduction projects in high fire risk regions of the state.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: This project will reduce direct costs of utility-caused wildfire, protect utility infrastructure, preserve forest carbon sequestration, promote defensible communities, protect key watersheds, and lower size and intensity of wildfires.	
CPUC Proceedings addressing issues related to this EPIC project: Renewables Portfolio Standard: R.11-05-005 SB 1122 Bioenergy feed-in tariff: R.11-05-005	
Applicable Metrics: CPUC Metrics- 1a, 1c, 2a Lower Costs: The IOUs pay an average of more than $11 million per year in fire-related damages to state and federal land management agencies. Reducing wildfire risks would reduce direct costs to utilities and likely also reduce costs of fire insurance. Economic Development: It is estimated that approximately 4.9 jobs are created per MW of bioenergy	

generation. Most bioenergy facilities are, and will be, sited in rural areas that are experiencing significant economic hardship.

Environmental Benefits:

As forest landscapes are treated and excess biomass is removed, wildfire behavior is mitigated. Over time, as a result, strategic fire suppression effectiveness will be enhanced as fossil fuels are reduced through generation of renewable electricity using forest biomass.

Assignment to Value Chain: Generation	**Total Budgeted Project Admin and Overhead Costs:** $334,354
EPIC Funds Encumbered: $2,000,000	**EPIC Funds Spent:** $0
Match Partner and Funding Split: West Biofuels, LLC : $510,000 (20.1 %) TSS Consultants: $18,754 (0.7 %) Soper-Wheeler Co. LLC: $8,160 (0.3 %) Christiana Darlington: $3,000 (0.1 %)	**Match Funding:** $539,914
Leverage Contributors:	**Leveraged Funds:** $0

Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 27 out of 27	**Rank of Selected Applicant/ Bidder:** Ranked # 3

If not the highest scoring applicant/bidder, explain why selected:

Funds were awarded to passing proposals in rank order.

Treatment of Intellectual Property:

Pre-existing intellectual property identified in agreement EPC-14-024 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.

Update:

Researchers submitted the technical portion of the Feedstock Test Plan and are working with TSS Consultants on the background information about feedstock availability across the state.

13. EPC-14-025

Project Name: Mass-manufactured, Air Driven Trackers for Low Cost, High Performance Photovoltaic Systems [EPC-14-025]	
Recipient/Contractor: Sunfolding Inc.	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 6/1/2015 to 3/31/2019
Program Area and Strategic Objective: Applied Research and Development S3: Develop Innovative Technologies, Tools, and Strategies to Make Distributed Generation More Affordable	
Issue: Solar tracking has taken off in the last few years, but current trackers have run out of options for cost reductions. The state of the art designs use a traditional approach of motors, gearboxes, and bearings. These components are manually assembled with high-cost materials, leading to limits in cost reduction and scale up. Further, this approach includes many points of failure and has high maintenance costs.	
Project Description: The project will install and test a 300 kW photovoltaic solar system with air driven trackers for research purposes at a facility that is already used for these types of activities. Two key technical innovations will be demonstrated. First, the use of mass-manufacturing for the drive system results in an extremely low cost structure and very low part count. Second, only tubing is connected to each actuator, removing requirements for outdoor wiring or individual control hardware. The proposed research will also involve collecting six-month performance data for the proposed solar PV tracking technology.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: This project will result in ratepayer benefits of reduced cost of energy and increased energy supply reliability. The reduced cost of energy will be achieved by demonstrating a new type of ground mount tracker that adds 20-40% more power over fixed tilt systems at a cost that is well below the cost of current solar trackers. The increases in energy supply reliability will be achieved by delivering additional power that occurs in the late afternoons to the grid.	
CPUC Proceedings addressing issues related to this EPIC project: California Solar Initiative: R.12-11-005	
Applicable Metrics: CPUC Metrics- 1e, 2a, 3b, 4a Lower Costs: This project will lower levelized cost of electricity (LCOE) by 40 - 50% of the levelized cost of electricity of currently available solar energy systems with trackers. Greater Reliability:	

This project will result in greater energy supply reliability by increasing the energy efficiency by 20 - 40% over fixed tilt systems at a cost well below the cost of current solar energy systems with trackers.			
Assignment to Value Chain: Generation		**Total Budgeted Project Admin and Overhead Costs:** $157,497	
EPIC Funds Encumbered: $1,000,000		**EPIC Funds Spent:** $9,358	
Match Partner and Funding Split: PV Evolution Labs: $265,000 (12.2 %) Sunfolding, Inc. : $906,565 (41.7 %)		**Match Funding:** $1,171,565	
Leverage Contributors:		**Leveraged Funds:** $0	
Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 27 out of 27	**Rank of Selected Applicant/ Bidder:** Ranked # 2
If not the highest scoring applicant/bidder, explain why selected: Funds were awarded to passing proposals in rank order.			
Treatment of Intellectual Property: Pre-existing intellectual property identified in agreement EPC-14-025 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.			
Update: The project was kicked off in July 2015. Significant progress has been made on subsystem development including pneumatics, compressor system, and controls. The actuator work has moved to design, building, and testing for the 1-axis tracking system, which includes manufacturing of a new bellows design with improved torque capability. Researchers are modeling how potential failures due to leaks or blockages can impact tracker operation and performance. A 6.5kW tracker was assembled and installed as a precursor to the PVUSA field installation. It has been continuously tracking without issues or downtime since it went online.			

14. EPC-14-028

Project Name: Low Cost Biogas Power Generation with Increased Efficiency and Lower Emissions [EPC-14-028]	
Recipient/Contractor: InnoSepra, LLC	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 5/1/2015 to 3/31/2019
Program Area and Strategic Objective: Applied Research and Development S3: Develop Innovative Technologies, Tools, and Strategies to Make Distributed Generation More Affordable	
Issue: Conventional biogas purification technologies used for biogas upgrading have high capital and operating costs, and have not been used commercially in power generation applications. Innovative technologies and physical sorbents to effectively remove multiple impurities from raw biogas in a single step prior to power generation would enable a significant reduction in the capital and operating costs and energy required for biogas purification. The use of purified biogas for power generation can provide significant cost, efficiency and environmental benefits in combined heat and power generation applications.	
Project Description: This project will deploy a pre-commercial technology demonstrating a sorbent-based biogas purification process for combined heat and power generation at the pilot scale that removes multiple troublesome impurities from biogas, upgrading the fuel to near-pure methane for combustion in conventional prime movers. The pilot plant will be installed and tested at a brewery wastewater plant and at a landfill site to demonstrate the environmental and cost benefits of biogas purification prior to use in combined heat and power applications.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: The project will help meet renewable fuel obligations at a lower cost by generating baseload renewable energy with a higher efficiency and a lower cost, lowering the cost of environmental compliance, and enabling utilization of marginal biogas sources for CHP applications using conventional natural-gas fired prime movers.	
CPUC Proceedings addressing issues related to this EPIC project: Self-Generation Incentive Program: R.12-11-005 SB 1122 Bioenergy feed-in tariff: R.11-05-005 Combined heat and power: D.10-12-035., R.08-06-024.	
Applicable Metrics: Lower Costs: This project is expected to lower costs by reducing the number of stages required to condition biogas to meet fuel specifications of most prime movers. Environmental Benefits:	

The project will reduce carbon dioxide emissions by using biogas in place of natural gas. The project will result in fewer methane emissions by reducing the flaring of natural gas into the atmosphere.			
Assignment to Value Chain: Generation		**Total Budgeted Project Admin and Overhead Costs:** $105,570	
EPIC Funds Encumbered: $1,318,940		**EPIC Funds Spent:** $21,968	
Match Partner and Funding Split: InnoSepra, LLC: $700,000 (34.2 %) Environ Strategy Consultants, Inc.: $11,000 (0.5 %) Waste Management of California, Inc.: $18,150 (0.9 %)		**Match Funding:** $729,150	
Leverage Contributors:		**Leveraged Funds:** $0	
Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 27 out of 27	**Rank of Selected Applicant/ Bidder:** Ranked # 10
If not the highest scoring applicant/bidder, explain why selected: Funds were awarded to passing proposals in rank order.			
Treatment of Intellectual Property: Pre-existing intellectual property identified in agreement EPC-14-028 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.			
Update: The project has completed process simulation, designed adsorber unit, designed and initiated modifications to their biogas upgrader unit, and commenced deployment activities for testing at one of the two field locations. Currently, first deployment is scheduled for 6-8 weeks at the Simi Valley Landfill and 4-6 week deployment at the Miller-Coors wastewater treatment.			

15. EPC-14-030

Project Name: Paths to Sustainable Distributed Generation Through 2050: Matching Local Waste Biomass Resources with Grid, Industrial, and Community Levels [EPC-14-030]	
Recipient/Contractor: Lawrence Berkeley National Laboratory	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 4/15/2015 to 3/31/2019
Program Area and Strategic Objective: Applied Research and Development S3: Develop Innovative Technologies, Tools, and Strategies to Make Distributed Generation More Affordable	
Issue: There is a disconnect between studies that develop waste biomass utilization strategies and studies focused on identifying opportunities for distributed generation (DG), and specifically combined heat and power (CHP) or combined cooling, heat, and power (CCHP). No previous research has attempted to match local waste biomass sources in California with the variety of available conversion/power generation technologies and local demand for DG and waste heat applications to identify opportunities for efficient, cost-effective, and environmentally sustainable projects.	
Project Description: This project will highlight locations where waste biomass can be used most efficiently and sustainably for distributed generation by developing scenarios through 2050 that identify the most promising opportunities for waste biomass DG, identify key technical and regulatory hurdles to waste biomass DG utilization, develop tools for matching available waste biomass resources with energy production opportunities, and suggest solutions for achieving cost parity with fossil fuels.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: This analysis will: (1) identify high-priority areas within California and feedstock types for further public deployment funding, (2) highlight promising geographic areas or available technologies to encourage increased investment in waste biomass DG by the private sector, and (3) improve efficiency and reduce environmental burdens by helping to minimize biomass transportation distances and maximize the efficiency of power production and waste heat utilization.	
CPUC Proceedings addressing issues related to this EPIC project: Renewables Portfolio Standard: R.11-05-005 Distribution Resources Plans (AB 327): R.14-08-013 Combined heat and power: D.10-12-035., R.08-06-024. Integration of Distributed Energy Resources (IDER): R. 14-10-003	

Applicable Metrics: CPUC Metrics- 3c, 3g, 4a Economic Development: Integrated use of waste biomass (from municipal wastes, agricultural residues, and food processing wastes) for distributed generation applications in California has the potential to produce about 4.2 terawatt-hours of renewable electricity per year. Environmental Benefits: The use of waste biomass is expected to result in avoided fossil greenhouse gas emissions of about 2.5 million metric tons of carbon dioxide (CO2)-equivalent per year (of which 1.2 million tons is from avoided grid electricity, and 1.3 million tons is from avoided natural gas use for heating).			
Assignment to Value Chain: Generation		**Total Budgeted Project Admin and Overhead Costs:** $670,276	
EPIC Funds Encumbered: $1,500,000		**EPIC Funds Spent:** $331,939	
Match Partner and Funding Split:		**Match Funding:** $46,616	
Leverage Contributors:		**Leveraged Funds:** $0	
Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 27 out of 27	**Rank of Selected Applicant/ Bidder:** Ranked # 8
If not the highest scoring applicant/bidder, explain why selected: Funds were awarded to passing proposals in rank order.			
Treatment of Intellectual Property: Pre-existing intellectual property identified in agreement EPC-14-030 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.			
Update: The researchers have started work to develop near term and long term scenario projections for waste biomass supply in California.			

16. EPC-14-034

Project Name: Interra Reciprocating Reactor for Low-Cost & Carbon Negative Bioenergy [EPC-14-034]	
Recipient/Contractor: Interra Energy, Inc.	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 5/15/2015 to 3/29/2019
Program Area and Strategic Objective: Applied Research and Development S3: Develop Innovative Technologies, Tools, and Strategies to Make Distributed Generation More Affordable	
Issue: Baseload bioenergy technologies have the potential to increase the reliability of California's energy supply, reduce the cost of renewable generation, reduce GHG emissions from the energy sector, and reduce the risk of forest fires. Current bioenergy technologies are not profitable at distributed scales. Further, the use of waste biomass resources in the state currently can have negative environmental impacts without appropriate technology and management strategy.	
Project Description: The purpose of this project is to install a pilot-scale demonstration of an innovative biomass conversion system to generate high quality biomethane with high fixed carbon biochar as co-product. The projects will determine if the technology, known as Reciprocating Reactor, coupled with valuable co-product, are sufficient to demonstrate economic feasibility for small distributed generation bioenergy projects in California.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: This project will help to stabilize the grid, improve service reliability, and reduce the risk of forest fire. Advanced bioenergy systems that produce useful co-products can also reduce the cost of renewable energy procurement and mitigate the GHG impacts of energy generation. Interra technology could prove to be a cost-effective modular distributed generation system alternative compared to conventional biomass plants, helping to meet California's aggressive renewable energy goals.	
CPUC Proceedings addressing issues related to this EPIC project: Renewables Portfolio Standard: R.11-05-005 SB 1122 Bioenergy feed-in tariff: R.11-05-005	
Applicable Metrics: CPUC Metrics- 1a, 1c, 2a Lower Costs: This project is expected to cross subsidize power production and reduce the capital expenditures of bioenergy facilities. Greater Reliability: The system demonstrated under this project is expected to stabilize the grid, improve service reliability, and provide baseload renewable energy generation.	

<table>
<tr><td colspan="4">Economic Development:

The project will help the economic viability of distributed bioenergy facilities. Each facility created using the technology demonstrated under this project is expected to support 12-15 high paying permanent jobs.

Environmental Benefits:

This project will reduce the GHG emissions of waste biomass processing. In addition, the water neutral technology reduces the use of water compared to competing energy conversion technologies.</td></tr>
<tr><td colspan="2">Assignment to Value Chain:
Generation</td><td colspan="2">Total Budgeted Project Admin and Overhead Costs: $264,400</td></tr>
<tr><td colspan="2">EPIC Funds Encumbered:
$2,000,000</td><td colspan="2">EPIC Funds Spent:
$401,889</td></tr>
<tr><td colspan="2">Match Partner and Funding Split:</td><td colspan="2">Match Funding:
$4,627,400</td></tr>
<tr><td colspan="2">Leverage Contributors:</td><td colspan="2">Leveraged Funds:
$0</td></tr>
<tr><td>Funding Method:
Competitive</td><td>Funding Mechanism:
Grant</td><td>No. of Passing Applicants/ Bidders:
27 out of 27</td><td>Rank of Selected Applicant/ Bidder:
Ranked # 7</td></tr>
<tr><td colspan="4">If not the highest scoring applicant/bidder, explain why selected:
Funds were awarded to passing proposals in rank order.</td></tr>
<tr><td colspan="4">Treatment of Intellectual Property:
Pre-existing intellectual property identified in agreement EPC-14-034 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.</td></tr>
<tr><td colspan="4">Update:
The project team is currently in the process of finalizing the modifications to the technology in order to conduct the first stage of testing required under the project. In addition, they are finalizing the control system software in order to accurately monitor, analyze, and report the data generated during the project.</td></tr>
</table>

17. EPC-14-035

Project Name: Demonstration of integrated photovoltaic systems and smart inverter functionality utilizing advanced distribution sensors [EPC-14-035]	
Recipient/Contractor: Lawrence Berkeley National Laboratory	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 5/15/2015 to 3/29/2019
Program Area and Strategic Objective: Applied Research and Development S3: Develop Innovative Technologies, Tools, and Strategies to Make Distributed Generation More Affordable	
Issue: Power distribution networks of today have limited visibility and diagnostic capabilities, and were designed to accommodate a limited number of rotating power generation plants. A future grid that incorporates large numbers of distributed PV systems will require different and more complex control mechanisms, which in turn will require coordinated control of both utility distribution equipment and solar inverters.	
Project Description: The research project will develop, demonstrate, and evaluate, at the pilot scale, the ability of an integrated, advanced PV and storage system at a state-of-art test bed in the LBNL Facility for Low Energy Experiments (FLEXLAB). The system includes smart inverter control to enhance and optimize grid support and system performance. The strategy will evaluate the use of distribution synchrophasor units data to support specific visualization and control applications on distribution circuits. The project includes a 13 to 15 kilowatt (kW) PV electric generating system and a 14 kW (56 kW-hour) battery storage installation at FLEXLAB.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: The project will advance a breakthrough technology that is scalable across investor-owned utility territory leading to well-coordinated and managed high-density PV installations and ratepayer benefits of greater reliability, lower costs and increased safety.	
CPUC Proceedings addressing issues related to this EPIC project: Smart grid: R.08-12-009 Demand Response (DR): R.13-09-011 Integration of Distributed Energy Resources (IDER): R. 14-10-003	
Applicable Metrics: CPUC Metrics- 1g, 2a, 3f, 3h, 4a, 5c, 5d, 5e Lower Costs: Ratepayers will experience reduced costs because of decreased utility infrastructure spending and increased allowable PV penetration.	

Greater Reliability: Ratepayers will see electricity reliability improve as high-density PV installations are coordinated and managed more efficiently. Increase Safety: This project will enhance grid safety by improving the ability for PV installations to detect and understand grid conditions and ensure safe operation in the event of grid failures.			
Assignment to Value Chain: Grid Operations/Market Design		**Total Budgeted Project Admin and Overhead Costs:** $375,000	
EPIC Funds Encumbered: $1,000,000		**EPIC Funds Spent:** $594,424	
Match Partner and Funding Split:		**Match Funding:** $25,000	
Leverage Contributors:		**Leveraged Funds:** $0	
Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 27 out of 27	**Rank of Selected Applicant/ Bidder:** Ranked # 12
If not the highest scoring applicant/bidder, explain why selected: Funds were awarded to passing proposals in rank order.			
Treatment of Intellectual Property: Pre-existing intellectual property identified in agreement EPC-14-035 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.			
Update: The project was kicked off in July 2015 with the first technical advisory committee meeting in December 2015. The recipient also presented and participated in the EPIC Symposium in December 2015. Researchers performed statistical analyses of micro-phasor units data from installations at LBNL and obtained equipment and evaluated locations for new unit installations. Software to create a grid event library is now functional. Researchers are mining the dataset for information that pertains to generator operation and event characterization is in progress.			

18. EPC-14-036

Project Name: Smart Inverter Interoperability Standards and Open Testing Framework to Support High-Penetration Distributed Photovoltaics and Storage [EPC-14-036]	
Recipient/Contractor: SunSpec Alliance	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 5/15/2015 to 3/31/2019
Program Area and Strategic Objective: Applied Research and Development S3: Develop Innovative Technologies, Tools, and Strategies to Make Distributed Generation More Affordable	
Issue: High PV penetration with legacy inverters on California grid feeder circuits can exacerbate problems associated with grid stability. While inverter power technology exists to address grid operating variability, a standard and cost-effective communication interface to monitor and control inverter operating functions has not been broadly deployed. It is currently both expensive and risky for grid operators to monitor and control diverse distributed energy resources (DER) assets. What is missing is the availability of a test framework for interoperability, empirical data to validate the effects of smart inverters on the grid, and market data to evaluate economic impacts.	
Project Description: The purpose of this agreement is to develop a complete solution of smart solar PV-based DER system that addresses key barriers impeding the progress towards high penetration of solar and DER. The work includes development of a CA Rule 21 test framework and test scripts; compliance testing of smart inverters with functionality as described in the CPUC CA Rule 21 Smart Inverter Working Group (SIWG) recommendations; monitor and control inverter operating functions including participation in ancillary service for diverse DER assets; increase of photovoltaic (PV) penetration and cost effectiveness while enhancing safety and reliability of the California grid. This agreement will deliver a smart inverter test framework and open source software tools to enable rapid product development and safety testing and will demonstrate the benefits to all stakeholders including ratepayers, utilities, manufacturers, investors and operators.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: Ratepayer benefits are greater reliability, lower cost, and increased safety from the use of smart inverters with single standard communication interface to save installation time; a field demonstration of DER systems on feeder circuits at or above 15% penetration; measure of reliability and safety impacts; and demonstrating participation in ancillary service markets to evaluate benefits of utility cost avoidance.	

CPUC Proceedings addressing issues related to this EPIC project: Smart grid: R.08-12-009 Rule 21: R.11-09-011 Smart Inverter: D.14-12-035 (in R.11-09-011) Demand Response (DR): R.13-09-011 Integration of Distributed Energy Resources (IDER): R. 14-10-003			
Applicable Metrics: CPUC Metrics- 1b, 1e, 1g, 1h, 2a, 3a, 3b, 3d, 3f, 3h, 4a, 5a, 5b, 5c, 5d, 5e Lower Costs: Savings of $0.16 to $0.30 per installed watt are achievable in IOU cost avoidance for circuit upgrades. Standardization can provide $0.05 per installed watt savings in avoided switching costs and can result in a $0.02 savings per watt due to decreased need for specialized labor. Greater Reliability: The testing of smart inverters will demonstrate that higher levels of PV penetration can be achieved. Integration of energy storage with renewables provides greater flexibility to local capacity and increases reliability through improved capacity.			
Assignment to Value Chain: Grid Operations/Market Design		**Total Budgeted Project Admin and Overhead Costs:** $162,005	
EPIC Funds Encumbered: $2,000,000		**EPIC Funds Spent:** $70,632	
Match Partner and Funding Split: SunSpec Alliance: $1,421,875 (35.0 %) Olivine, Inc.: $70,000 (1.7 %) Solar City Corporation: $575,000 (14.1 %)		**Match Funding:** $2,066,875	
Leverage Contributors:		**Leveraged Funds:** $0	
Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 27 out of 27	**Rank of Selected Applicant/ Bidder:** Ranked # 1
If not the highest scoring applicant/bidder, explain why selected: Funds were awarded to passing proposals in rank order.			
Treatment of Intellectual Property: Pre-existing intellectual property identified in agreement EPC-14-036 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.			
Update: The project was kicked off in August 2015. The researchers finalized the subcontract agreement with Solar City and are making progress with other subcontractors. The recipient presented this project at the EPIC Symposium in December 2015. The project is on track.			

19. EPC-14-040

Project Name: Self-Tracking Concentrator Photovoltaics for Distributed Generation [EPC-14-040]	
Recipient/Contractor: Glint Photonics, Inc.	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 5/15/2015 to 3/31/2019
Program Area and Strategic Objective: Applied Research and Development S3: Develop Innovative Technologies, Tools, and Strategies to Make Distributed Generation More Affordable	
Issue: The highest efficiency PV cells are multijunction PV cells used in concentrator photovoltaic (CPV) systems, which offer about 40% conversion efficiency compared to about 16% for polycrystalline Silicon. However, concentrator photovoltaic systems require special mounting and precision tracking, and the resulting cost and complexity has prevented them from achieving significant market penetration.	
Project Description: This research will develop, test, and demonstrate Self-Tracking Concentrator Photovoltaic (ST-CPV) systems, a new concentrator photovoltaic technology that does not require a precision mechanical tracker to keep it aligned to the sun. The ST-CPV panel contains a thin layer of fluids that passively responds to the changing solar angle, automatically adjusting optical pathways within the device to ensure that incident sunlight is captured and concentrated over a wide range of angles. The passive internal tracking allows ST-CPV panels to be mounted in a stationary configuration or with a simple single axis tracker. This makes the system highly economical, greatly reduces installation and maintenance complexity, and enables distributed generation with higher efficiency CPV modules.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: Glint technology has the potential to capture 1% of the future potential rooftop solar market (153 MW). Glint Photonics anticipates a product introduction to the market in 2018, with penetration of the rooftop market to grow in the 2020s. If the anticipated performance can be realized, the company anticipates 1 MW of panels installed by the end of 2020, with significant potential for additional capacity and cost savings in future years.	
CPUC Proceedings addressing issues related to this EPIC project: Renewables Portfolio Standard: R.11-05-005 Distribution Resources Plans (AB 327): R.14-08-013 California Solar Initiative: R.12-11-005 Integration of Distributed Energy Resources (IDER): R. 14-10-003	

Applicable Metrics: CPUC Metrics- 1a, 4a

Lower Costs:

This research will develop a novel self-tracking concentrator panel that does not require a precision mechanical tracker to maintain alignment of the sun. This technology can cut the installed system cost for distributed PV systems in half.

Economic Development:

The ST-CPV technology being developed under this project will help boost rooftop-installed solar energy that will produce renewable electricity, the equivalent worth of which will contribute to the state's economy. Additional benefits from successfully introducing ST-CPV products will accrue in job creation and improved peak demand management.

Environmental Benefits:

Greater adoption of PV power will reduce greenhouse gas emissions. Specifically, commercial adoption of ST-CPV systems on rooftops will help offset several millions of metric tons of carbon dioxide equivalent (CO2e) compared to conventional generation.

Assignment to Value Chain: Generation	**Total Budgeted Project Admin and Overhead Costs:** $67,377
EPIC Funds Encumbered: $999,940	**EPIC Funds Spent:** $107,581
Match Partner and Funding Split: United States Department of Energy: $1,000,000	**Match Funding:** $0
Leverage Contributors:	**Leveraged Funds:** $0

Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 27 out of 27	**Rank of Selected Applicant/ Bidder:** Ranked # 5

If not the highest scoring applicant/bidder, explain why selected:
Funds were awarded to passing proposals in rank order.

Treatment of Intellectual Property:
Pre-existing intellectual property identified in agreement EPC-14-040 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.

Update:
A project kickoff meeting was held on July 20, 2015. The first Technical Advisory Committee (TAC) meeting was held in January 2016 where diverse comments and recommendations were gathered. TAC members agreed that anticipated performance should be reported in terms that facilitate a direct comparison to silicon panels, and to use levelized cost of energy as a performance metric for ultimate comparison. The technical report from Task 2 was delivered in December 2015, and all progress reports have been delivered on time.

20. EPC-14-045

Project Name: Advanced Recycling to 1-MW Municipal Solid Waste of Electricity Generation [EPC-14-045]	
Recipient/Contractor: Taylor Energy	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 5/15/2015 to 3/29/2019
Program Area and Strategic Objective: Applied Research and Development S3: Develop Innovative Technologies, Tools, and Strategies to Make Distributed Generation More Affordable	
Issue: In California, 30-million tons of organic materials are being added to landfills each year – equivalent to disposing 30-million barrels of oil per year in 80 California landfills. There is a broad gap in available technology and scientific knowledge required for economic use of municipal solid waste as a gasification feed, particularly in the 1-MWe to 20-MWe power output range. There is a market need to address refuse derived biomass (RDB) as an "opportunity" feedstock and to address the equipment size range needed for distributed power generation in California communities.	
Project Description: This project will design, develop and test a Waste-to-Energy Process Development Unit (PDU), involving conversion of Refuse Derived Biomass into clean fuel gas by Thermal-Catalytic Gasification, Reforming and Pulse Detonation Technology. This project will start-up and test a 3-pound per minute PDU, evaluate the results, and provide engineering data to design a 30 ton/day plant generating 1-MW electric power.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: The project will research, develop, and verify thermal catalytic gasification technology that will overcome technical and economic barriers preventing the use of RDB as an energy resource in California. Completion of the current gasification/reforming test program will enable future scale-up to 30-ton/day RDB-to-energy (1-MWe scale), in preparation for commercial scale design at 300-ton/day, generating 10-MW of electricity with costs of less than $3,750/kWh of installed capacity.	
CPUC Proceedings addressing issues related to this EPIC project: Renewables Portfolio Standard: R.11-05-005 SB 1122 Bioenergy feed-in tariff: R.11-05-005 Combined heat and power: D.10-12-035., R.08-06-024. Integration of Distributed Energy Resources (IDER): R. 14-10-003	

Applicable Metrics: CPUC Metrics- 1a, 1b, 1e, 2a, 3a, 4a, 4e Lower Costs: The Levelized Cost of Power (LCOP) is estimated at $118/MWh for 10-MW scale, which results in ratepayer savings of approximately $30/MWh compared to grid supplier power that will likely average $150/MWh through 2024. Environmental Benefits: The project will divert MSW from landfills and generate electricity, reducing NOx emissions from flaring or direct combustion.			
Assignment to Value Chain: Generation		**Total Budgeted Project Admin and Overhead Costs:** $188,248	
EPIC Funds Encumbered: $1,499,481		**EPIC Funds Spent:** $524,280	
Match Partner and Funding Split:		**Match Funding:** $46,616	
Leverage Contributors:		**Leveraged Funds:** $0	
Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 27 out of 27	**Rank of Selected Applicant/ Bidder:** Ranked # 4
If not the highest scoring applicant/bidder, explain why selected: Funds were awarded to passing proposals in rank order.			
Treatment of Intellectual Property: Pre-existing intellectual property identified in agreement EPC-14-045 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.			
Update: The contractor is working on the design of the Process Development Unit and the fabrication drawings. Preliminary layout work has been started at the host site.			

21. EPC-14-047

Project Name: Dairy Waste-to-Bioenergy via the Integration of Concentrating Solar Power and a High Temperature Conversion Process [EPC-14-047]	
Recipient/Contractor: Southern California Gas Company	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 4/15/2015 to 12/31/2018
Program Area and Strategic Objective: Applied Research and Development S3: Develop Innovative Technologies, Tools, and Strategies to Make Distributed Generation More Affordable	
Issue: Because of the intermittent nature of many renewable energy sources, special attention must be taken when connecting them to the electrical grid. Energy storage technologies have the potential to increase the reliability of California's energy supply, as well as the ability to dispatch renewable energy sources on demand instead of upon production. Yet, traditional forms of energy storage are often prohibitively costly and lack mature mechanisms for participation in electricity markets.	
Project Description: This project will integrate Concentrating Solar Power (CSP) and Hydrothermal Processing (HTP) into a single, integrated system; confirm that it can convert dairy manure into RNG and bio-crude; study the economics of integrated CSP-HTP systems sited at dairy farms; and confirm that the RNG produced meets pipeline-transmission and geological-storage quality standards. In this way, the project anticipates proving that it is possible to store the energy contained in dairy manure waste in a manner that enables California natural gas plants to produce readily dispatchable, ultra-low-emissions renewable electricity.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: This project will develop and demonstrate a new bioenergy pathway which utilizes hydrothermal processing and concentrating solar power to convert dairy manure into bio-crude and renewable natural gas that will enable dispatchable and low emissions renewable electricity.	
CPUC Proceedings addressing issues related to this EPIC project: Alternative Fueled Vehicles: R.13-11-007 Renewables Portfolio Standard: R.11-05-005 Energy storage: R.15-03-011 SB 1122 Bioenergy feed-in tariff: R.11-05-005	

Applicable Metrics: CPUC Metrics- 1a, 1i, 2a, 3a, 3f, 3g, 3h, 4a, 4b, 4e, 5a

Lower Costs:

Cost-effective production of pipeline-quality renewable natural gas and bio-crude will offset use of fossil fuels and provide a pathway for low-cost energy storage, reducing peak electricity costs and lowering the price for ratepayers.

Economic Development:

Commercialization of this technology would positively impact several markets including: dairies, fuel refineries, natural gas pipeline operators, and electricity producers.

Environmental Benefits:

By converting dairy manure into renewable natural gas and bio-crude, greenhouse gas emissions typically associated with manure can be avoided.

Assignment to Value Chain: Generation	**Total Budgeted Project Admin and Overhead Costs:** $98,501
EPIC Funds Encumbered: $1,494,736	**EPIC Funds Spent:** $186,237
Match Partner and Funding Split: Southern California Gas Company (SoCalGas): $600,000 (28.6 %)	**Match Funding:** $600,000
Leverage Contributors:	**Leveraged Funds:** $0

Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 27 out of 27	**Rank of Selected Applicant/ Bidder:** Ranked # 6

If not the highest scoring applicant/bidder, explain why selected:
Funds were awarded to passing proposals in rank order.

Treatment of Intellectual Property:
Pre-existing intellectual property identified in agreement EPC-14-047 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.

Update:
A project kickoff meeting was held in June 2015 and technical progress is underway. Negotiations with subcontractor NREL were completed in December 2015 and the completed redesign of the receiver is expected to stay on schedule, completing by April 2016. Design of the Genifuel hydrothermal processing (HTP) unit with input from the Pacific Northwest National Laboratories (PNNL) is proceeding as planned and is expected to complete in May 2016, after which the construction will go out to bid.

22. EPC-14-051

Project Name: Cleaner Air, Cleaner Energy: Converting Forest Fire Management Waste to On Demand Renewable Energy [EPC-14-051]	
Recipient/Contractor: All Power Labs, Inc.	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 5/15/2015 to 3/31/2019
Program Area and Strategic Objective: Applied Research and Development S3: Develop Innovative Technologies, Tools, and Strategies to Make Distributed Generation More Affordable	
Issue: California has an opportunity from forest biomass to help achieve the state's renewable energy goals but it also faces conflicting challenges managing parched forests in a time of drought and climate change. Gasification is a key technology to forest biomass-to-energy conversion leading to reliable energy, reduced cost and greenhouse gas (GHG) emissions, and reduced risk of forest fires. Current related technologies are not profitable at distributed scales. Further, any negative environmental impacts from the use of forest waste and biomass resources in the state must be mitigated with appropriate technology and management strategy.	
Project Description: This project offers a solution that addresses a range of California's energy, climate, and air quality goals. Under this grant, a 150kW modular biomass gasification energy device will be designed and deployed. It will make renewable energy from fire remediation material, while dramatically lowering air pollution and meeting applicable air quality standards.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: Biomass gasification can provide ratepayers with a new kind of energy, one that is on demand and renewable, but not weather dependent. This project, built entirely of technology designed and manufactured in California, will demonstrate a cost effective way to address a myriad of issues associated with climate change, including drought, fires, and the need for more renewable energy.	
CPUC Proceedings addressing issues related to this EPIC project: Renewables Portfolio Standard: R.11-05-005 SB 1122 Bioenergy feed-in tariff: R.11-05-005	
Applicable Metrics: CPUC Metrics- 1a, 1c, 2a Lower Costs: The project will use increased forest thinning to produce renewable energy more economically via a low cost modular and mobile biomass gasification technology that is able to have a levelized cost of energy at or below SB1122 incentive target levels. Greater Reliability:	

This project will analyze and demonstrate how this technology could present CAISO and other regulatory bodies with a dynamic peak load shifting tool to address localized load and capacity constraints. Environmental Benefits: The project will provide a 95%+ reduction in Carbon Monoxide, Volatile Organic Compounds, and PM-10 emissions compared to burning forest wastes.			
Assignment to Value Chain: Generation		**Total Budgeted Project Admin and Overhead Costs:** $463,311	
EPIC Funds Encumbered: $1,990,071		**EPIC Funds Spent:** $701,621	
Match Partner and Funding Split:		**Match Funding:** $477,550	
Leverage Contributors:		**Leveraged Funds:** $0	
Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 27 out of 27	**Rank of Selected Applicant/ Bidder:** Ranked # 9
If not the highest scoring applicant/bidder, explain why selected: Funds were awarded to passing proposals in rank order.			
Treatment of Intellectual Property: Pre-existing intellectual property identified in agreement EPC-14-051 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.			
Update: Researchers completed review of Alpha requirements and design and transportation of the Beta subsystems as planned. The primary subsystem was built at a smaller scale for cost and testing purposes.			

23. EPC-14-079

Project Name: Assessing the Ability of Smart Inverters and Smart Consumer Devices to Enable more Residential Solar Energy [EPC-14-079]	
Recipient/Contractor: Electric Power Research Institute, Inc.	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 6/30/2015 to 3/29/2019
Program Area and Strategic Objective: Applied Research and Development S3: Develop Innovative Technologies, Tools, and Strategies to Make Distributed Generation More Affordable	
Issue: One of the most prominent limiting factors for solar generation on California distribution systems occurs when multiple PV systems are installed behind a single distribution transformer. Limitations have already occurred in which consumers were not permitted to add solar, or inverters experienced shutdown due to local overvoltage conditions. It is not known whether multiple inverters can operate side-by-side in stable conditions when each one is performing smart-inverter functions. High PV penetration on the feeder and the voltage profile may be fine, but local over-voltage, variability, and equipment stress occurs on the customer side, limiting PV deployments and production.	
Project Description: The purpose of this project is to resolve the limiting conditions that occur on California distribution systems when many PV systems are installed behind a single residential distribution transformer by evaluating advanced inverter functionality with specific goal of enabling higher penetration of photovoltaic on the grid. The project will identify, implement, and test (both in lab and field) optimal methods by which smart inverters can mitigate the issues that otherwise would limit local high penetrations of residential PV. The process will identify how California Rule 21 functions can be used and configured so that multiple smart inverters work in harmony (supporting one another actions) and will also identify how other naturally-occurring consumer devices, such as electric vehicle chargers and other smart loads, can serve to further enable high-levels of solar PV.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: A key benefit of this project to California IOU ratepayers is to find the upper limits of solar PV hosting that may be achieved using smart inverters and naturally occurring products, thereby providing insight into the necessity and timing in which such additional DER devices may be required in addition to lower costs and greater electricity reliability.	
CPUC Proceedings addressing issues related to this EPIC project: Smart grid: R.08-12-009 Rule 21: R.11-09-011 Smart Inverter: D.14-12-035 (in R.11-09-011) Demand Response (DR): R.13-09-011	

Integration of Distributed Energy Resources (IDER): R. 14-10-003			
Applicable Metrics: CPUC Metrics- 1b, 1e, 1g, 1h, 2a, 3a, 3b, 3d, 3f, 3h, 4a, 5a, 5b, 5c, 5d, 5e Lower Costs: The use of smart inverter functions, together with smart (PV-optimized) behavior of loads, can increase production (KWh) of residential systems by 15%. For an affected consumer on a constrained distribution circuit, this means more annual savings. Greater Reliability: The multi-inverter interaction testing and evaluation of smart inverter functions and smart management of consumer loads under this projects can minimize stress on grid equipment and will further improve reliability.			
Assignment to Value Chain: Grid Operations/Market Design		**Total Budgeted Project Admin and Overhead Costs:** $400,537	
EPIC Funds Encumbered: $1,705,478		**EPIC Funds Spent:** $23,542	
Match Partner and Funding Split: Electric Power Research Institute, Inc.: $149,452 (5.8 %) Underwriters Laboratories, Inc.: $78,174 (3.0 %) Southern California Edison Advanced Technology Organization: $260,000 (10.0 %) Intwine Connect: $107,758 (4.1 %) ClipperCreek, INC.: $66,480 (2.6 %) Sacramento Municipal Utility District: $156,000 (6.0 %) Pentair: $50,000 (1.9 %) Emerson Climate Technologies: $8,550 (0.3 %) A. O. Smith Corporate Technology Center: $15,000 (0.6 %)		**Match Funding:** $891,414	
Leverage Contributors:		**Leveraged Funds:** $0	
Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 27 out of 27	**Rank of Selected Applicant/ Bidder:** Ranked # 11
If not the highest scoring applicant/bidder, explain why selected: Funds were awarded to passing proposals in rank order.			
Treatment of Intellectual Property: Pre-existing intellectual property identified in agreement EPC-14-079 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.			
Update: The project was kicked off August 2015 and researchers are In the process of			

signing subcontractors agreements. The project is on track.

24. EPC-15-003

Project Name:

Demonstration of Community Scale Generation System at the Chemehuevi Community Center

[EPC-15-003]

Recipient/Contractor:

The Regents of the University of California, on behalf of the Riverside Campus

Investment Plan:	**Project Term:**
2012-2014 Triennial Investment Plan	10/29/2015 to 3/29/2019

Program Area and Strategic Objective:

Applied Research and Development

S3: Develop Innovative Technologies, Tools, and Strategies to Make Distributed Generation More Affordable

Issue:

California's electricity grid is undergoing significant changes. With major reductions in the cost of solar, customers are choosing distributed generation to meet their electricity needs. All these developments are crucial for California to meet its AB 32 goals, but they come with a number of challenges such as supply uncertainty, changing demand patterns, continual increase in energy consumption and ramping demands. New solutions will be required for the future electricity grid to continue providing reliable and cost effective electricity.

Project Description:

This project will deploy and demonstrate a community energy generation system at the Chemehuevi Indian Tribe Community Center. The energy system will incorporate two pre-commercial solar technologies with flow-battery energy storage integrated with energy management system. The integration of the energy management system components will reduce peak energy demand for the center by utilizing battery storage to shift building and community loads and provides an uninterruptable power for the center when it is used as an Emergency Response Center for the tribe.

How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals:

This system will result in greater electricity reliability, lower electricity costs, reduced peak energy demand and avoidance of failures and outages. The project is scalable in both size and quantity. Therefore, this effort will demonstrate the commercial feasibility to deploy many megawatt hours of dispatchable energy integrated in a photovoltaic/battery storage configuration.

CPUC Proceedings addressing issues related to this EPIC project:

Smart grid: R.08-12-009
Demand Response (DR): R.13-09-011
Integration of Distributed Energy Resources (IDER): R. 14-10-003

Applicable Metrics: CPUC Metrics- 1e, 1g, 1h, 2a, 3f, 3h, 4a, 5a

Lower Costs:

The system is designed to lower the kW demand by more than 10 percent of the daily average energy demand during peak times. This will result in a reduction of

costs associated with procuring additional energy during periods of peak demand. Greater Reliability: Greater electricity reliability is achieved by managing energy use associated with PV generation and battery storage during daily energy use profiles. This will reduce failures and outages associated with demand response.			
Assignment to Value Chain: Distribution		**Total Budgeted Project Admin and Overhead Costs:** $525,157	
EPIC Funds Encumbered: $2,588,906		**EPIC Funds Spent:** $0	
Match Partner and Funding Split: The Regents of the University of California - Riverside: $77,451 (2.4 %) Cogenra Solar, Inc.: $25,000 (0.8 %) Solexel: $12,000 (0.4 %) OSISoft, LLC: $479,467 (14.5 %) Primus Power: $21,780 (0.7 %) Chemehuevi Indian Tribe: $91,000 (2.8 %)		**Match Funding:** $706,698	
Leverage Contributors:		**Leveraged Funds:** $0	
Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 22 out of 22	**Rank of Selected Applicant/ Bidder:** Ranked # 4
If not the highest scoring applicant/bidder, explain why selected: Funds were awarded to passing proposals in rank order.			
Treatment of Intellectual Property: Pre-existing intellectual property identified in agreement EPC-15-003 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.			
Update: The project was kicked off in December 2015. UC Riverside initiated the coordination effort with the Chemehuevi Indian Tribe and project partners and started collecting the Community Center energy consumption data. UC Riverside presented the project at the EPIC Symposium in December 2015.			

25. EPC-14-001

Project Name: Improving Solar & Load Forecasts: Reducing the Operational Uncertainty Behind the Duck Chart [EPC-14-001]	
Recipient/Contractor: Itron Inc., which will do business in California as IBS	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 1/15/2015 to 6/29/2018
Program Area and Strategic Objective: Applied Research and Development S4: Develop Emerging Utility Scale Renewable Energy Generation Technologies and Strategies to Improve Power Plant Performance, Reduce Costs, and Expand the Resource Base	
Issue: Solar is an intermittent resource, and accurate forecasting techniques for predicting when and how much solar resource is available are currently lacking. Increasingly accurate forecasting tools have been developed in recent years, but they have yet to be fully implemented into grid operations to optimize operations for high-penetration solar. Furthermore, the error associated with predicting net-load on California's grid is largely affected by solar availability. State-of-the-art solar forecasts need to be integrated into net-load forecasts to minimize solar integration costs.	
Project Description: This project plans to improve solar forecasts for grid-connected PV in California, use those improved forecasts to create enhanced net-load forecasts, and apply these enhanced forecasts to reduce scheduling errors for utilities and the California Independent System Operator (CAISO).	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: The project will reduce resource scheduling uncertainty for California utilities and CAISO by improving solar forecasts, integrating those forecasts into enhanced net-load forecasts, and implementing the forecasts to quantify specific improvements and cost savings.	
CPUC Proceedings addressing issues related to this EPIC project: Resource Adequacy (RA) 2016 and 2017 Compliance Years: R.14-10-020 Long-Term Procurement Proceeding. LTPP (2016 cycle): TBD	
Applicable Metrics: CPUC Metrics- 1c, 2a, 4a, 5c Lower Costs: The project aims to result in estimated near-term savings of $10 to $17 million annually by reducing the scheduling errors associated with forecasting PV power output and net-load for the California grid. Greater Reliability: The project will increase system reliability by significantly increasing the accuracy of	

solar PV forecasts and the associated net load forecasts.

Environmental Benefits:

Reduced requirements for regulation services and spinning reserves will help reduce GHG emissions by an estimated 2.7 million tons per year through reduced use of natural gas fired peaker plants.

Assignment to Value Chain: Generation	**Total Budgeted Project Admin and Overhead Costs:** $0
EPIC Funds Encumbered: $998,926	**EPIC Funds Spent:** $0
Match Partner and Funding Split: Itron, Inc., dba IBS: $451,062 (31.1 %) Clean Power Research: $2,400 (0.2 %)	**Match Funding:** $453,462
Leverage Contributors:	**Leveraged Funds:** $0

Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 18 out of 18	**Rank of Selected Applicant/ Bidder:** Ranked # 3

If not the highest scoring applicant/bidder, explain why selected:

Funds were awarded to passing proposals in rank order.

Treatment of Intellectual Property:

Pre-existing intellectual property identified in agreement EPC-14-001 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.

Update:

A project kickoff meeting was held in April 2015 as part of a combined forecasting programmatic kickoff, and technical progress on the project has begun. The project is currently undergoing an amendment process to allow Itron and subcontractor Clean Power Research access to data made available through the California Public Utilities Commission, to support the project analysis. The scope and schedule of the project will remain unchanged. The project team is currently assembling an advisory committee and will schedule the first meeting in early 2016.

26. EPC-14-002

Project Name: Investigating Flexible Generation Capabilities at the Geysers [EPC-14-002]	
Recipient/Contractor: Geysers Power Company, LLC	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 1/5/2015 to 3/31/2018
Program Area and Strategic Objective: Applied Research and Development S4: Develop Emerging Utility Scale Renewable Energy Generation Technologies and Strategies to Improve Power Plant Performance, Reduce Costs, and Expand the Resource Base	
Issue: Electric system operators are concerned about large quantities of intermittent energy sources being reliably integrated onto the grid. While geothermal energy has served to provide a steady level of baseload energy, reducing impacts of intermittent energy will require quickly dispatchable sources of generation with the flexibility to ramp up or down as needed. Modifying geothermal operations to provide this flexibility would be valuable to system operation. However physical and operational issues are associated with providing such flexible generation from geothermal facilities.	
Project Description: This project will investigate how the operation of Geysers geothermal facilities may be modified in order to address the greater demands imposed on the grid by the significant addition of intermittent resources. To do so, the project will develop an integrated model that simulates the effects of providing flexible operation on the reservoir, wells, pipelines, and power plants. The model will be tested at an isolated well(s), pipeline and power plant, and then at a cross-tied location, to determine the effects of flexible operation on the larger steam field. Results will be used to identify risks to structure and operations. Management and mitigation strategies needed to address specific flexible generation objectives will be identified and tested at a variety of representative problem areas. An evaluation of management strategies and costs will be developed to provide flexible generation and ancillary services.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: This project will result in the ratepayer benefits of greater electricity reliability and lower costs by determining if low carbon geothermal resources at the Geysers can cost-effectively be used to provide the flexible capacity needed to integrate renewable energy onto the grid.	
CPUC Proceedings addressing issues related to this EPIC project: Demand Response (DR): R.13-09-011 Integration of Distributed Energy Resources (IDER): R. 14-10-003	

Applicable Metrics: CPUC Metrics- 1c, 1g, 3a, 3b, 3f, 3h, 4a, 5b, 5c Lower Costs: Increased flexibility and increased renewable generation will result in lower electricity cost to ratepayers. Greater Reliability: If successful, geothermal facilities will have electric generation flexibility allowing integration of intermittent resources and leading to greater reliability. Environmental Benefits: Improved geothermal flexibility and increased generation from other renewable resources reduces fossil fuel generation, reducing air pollutants and greenhouse gas emissions.			
Assignment to Value Chain: Generation		**Total Budgeted Project Admin and Overhead Costs:** $0	
EPIC Funds Encumbered: $3,000,000		**EPIC Funds Spent:** $0	
Match Partner and Funding Split:		**Match Funding:** $3,000,000	
Leverage Contributors:		**Leveraged Funds:** $0	
Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 18 out of 18	**Rank of Selected Applicant/ Bidder:** Ranked # 4
If not the highest scoring applicant/bidder, explain why selected: Funds were awarded to passing proposals in rank order.			
Treatment of Intellectual Property: Pre-existing intellectual property identified in agreement EPC-14-002 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.			
Update: This project commenced initial project modeling activities in the first half of 2015. However, due to forest fires in late 2015 that damaged Geyser's geothermal facilities, project-related activities halted and the company focused on restoring the facilities damaged by the fire. The project schedule will be adjusted to reflect this unanticipated delay.			

27. EPC-14-003

Project Name: Low- Cost Thermal Energy Storage for Dispatchable CSP [EPC-14-003]	
Recipient/Contractor: Regents of the University of California, Los Angeles Campus	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 1/15/2015 to 3/15/2018
Program Area and Strategic Objective: Applied Research and Development S4: Develop Emerging Utility Scale Renewable Energy Generation Technologies and Strategies to Improve Power Plant Performance, Reduce Costs, and Expand the Resource Base	
Issue: There is a growing problem facing the California electric grid as more and more electricity is being generated by renewable resources such as wind and solar. While there are many benefits to these resources, by their nature, they are 1) unable to match power production to usage, and 2) highly variable and/or intermittent in their production when compared to traditional electricity sources. A possible solution to these issues is increased use of thermal energy storage (TES) with concentrating solar power (CSP). Unfortunately, current TES technologies are prohibitively expensive and difficult to dispatch.	
Project Description: The innovation in this project is the use of a system cost-optimal approach that employs a robust and low-cost thermal energy storage (TES) fluid, elemental sulfur. Use of sulfur as a TES fluid will enable overall low system costs, long lifetime, and scalability for a wide range of concentrating solar power (CSP) applications and temperatures. The primary objectives of the project are to: 1. Develop an innovative and low-cost TES system for CSP systems using elemental sulfur; along with a system/cost model for system and market analyses. 2. Perform an on-sun pilot-scale demonstration of a modular single-tank TES design along with laboratory and computational analyses to validate long-term component life and performance. 3. Develop a market strategy and IP portfolio for the proposed system and single-tank thermal battery designs.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: This project will develop a low-cost thermal storage fluid, elemental sulfur, which enables overall low system costs, long lifetime, and scalability for a wide range of concentrating solar power applications.	
CPUC Proceedings addressing issues related to this EPIC project: Renewables Portfolio Standard: R.11-05-005 Energy storage: R.15-03-011	

Applicable Metrics: CPUC Metrics- 2a, 3a, 3b, 3h, 4a, 4b

Lower Costs:

This project aims to reduce the cost of TES to $15/kWh. Compared to current state-of-the-art, this leads to a decrease in LCOE from 3 Â¢/kWh to 0.4 Â¢/kWh, providing $0.66 billion to $1.32 billion in annual savings depending on CSP penetration.

Greater Reliability:

Use of TES allows excess harvested solar energy to be stored during the day to be used during peak or non-solar hours, which increases dispatchability of renewable resources and provides load shifting.

Economic Development:

Assuming 5% to 10% penetration of CSP and deployment beginning in 2017, the 10-year net present value of this technology is estimated to be between $680 and $906 million. The associated economic development will greatly benefit California.

Environmental Benefits:

Assuming 5% to 10% penetration of CSP and 1010 MWh of TES by 2020, significant GHG and criteria air pollutant reductions would be achieved: 2791 ton/MW of CO2, 37 ton/MW of SO2, 5 ton/MW of NOx, and 2.4 ton/MW of CO.

Assignment to Value Chain: Generation		**Total Budgeted Project Admin and Overhead Costs:** $198,528	
EPIC Funds Encumbered: $1,497,024		**EPIC Funds Spent:** $39,962	
Match Partner and Funding Split: Southern California Gas Company: $300,000 (16.7 %)		**Match Funding:** $300,000	
Leverage Contributors:		**Leveraged Funds:** $0	
Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 18 out of 18	**Rank of Selected Applicant/ Bidder:** Ranked # 6

If not the highest scoring applicant/bidder, explain why selected:

Funds were awarded to passing proposals in rank order.

Treatment of Intellectual Property:

Pre-existing intellectual property identified in agreement EPC-14-003 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.

Update:

A project kickoff meeting was held in April 2015 and technical progress is underway. The project team has conducted heat transfer modeling and simulation as well as laboratory-scale material compatibility experiments that will feed into deliverables due in 2016.

28. EPC-14-004

Project Name: Systems Integration of Containerized Molten Salt Thermal Energy Storage in Novel Cascade Layout [EPC-14-004]	
Recipient/Contractor: Halotechnics	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 1/15/2015 to 1/14/2019
Program Area and Strategic Objective: Applied Research and Development S4: Develop Emerging Utility Scale Renewable Energy Generation Technologies and Strategies to Improve Power Plant Performance, Reduce Costs, and Expand the Resource Base	
Issue: California has aggressive renewable energy goals; 33% of energy production must be from renewable sources by 2020. More variable renewable energy from wind and solar means more energy storage is needed to maintain grid reliability. The California Public Utilities Commission recently implemented a requirement for the State's Investor Owned Utilities to procure 1325 MW of grid scale energy storage by 2024. Thermal energy storage (TES) using molten salt has been commercially proven at various CSP plants over the past 15 years. However further cost reductions are required in order to increase the competitiveness of CSP.	
Project Description: The project aimed to build, validate, thermally cycle, and pilot test a modular 75 kW, 6 hour (500 kWh) molten salt thermal energy storage (TES) system, using standard shipping containers and commercially available tanks and insulation. The project leverages a novel cascaded tank arrangement and high-volume manufacturing and factory assembly, to significantly reduce the installed cost of TES for concentrating solar power (CSP).	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: The Halotechnics thermal storage system sought to improve system design and modularity and reduce the cost of molten salt energy storage by 25% by reducing the required storage volume.	
CPUC Proceedings addressing issues related to this EPIC project: Renewables Portfolio Standard: R.11-05-005 Energy storage: R.15-03-011	
Applicable Metrics: CPUC Metrics- 1i, 2a, 3b Lower Costs: At a 20 MW scale, storage tanks are the dominant cost of thermal energy systems. By deploying a cascade tank system, Halotechnics estimates an installed cost reduction of $8/kWh, which is equivalent to savings of $400,000 per system. Greater Reliability:	

Storage will help grid ramping needs by replacing the use of peaking units during late afternoon hours of 3:00 pm - 7:00 pm

Environmental Benefits:

Assuming that 10 percent of RPS resources are CSP in 2020, Halotechnics estimated a total emission reduction of 7,450,000 tons of CO2 over the 30-year plant life of a typical CSP system.

Public Health:

Development of the Halotechnics thermal energy storage for CSP was estimated to offset emissions of 1,150 tons of NOx, 1,140 tons of CO, and 63 tons of SOx, and heavy metal particles compared to generation from natural gas peaker plants.

Assignment to Value Chain: Generation		**Total Budgeted Project Admin and Overhead Costs:** $283,080	
EPIC Funds Encumbered: $1,500,000		**EPIC Funds Spent:** $377,870	
Match Partner and Funding Split:		**Match Funding:** $19,038	
Leverage Contributors:		**Leveraged Funds:** $0	
Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 18 out of 18	**Rank of Selected Applicant/ Bidder:** Ranked # 2

If not the highest scoring applicant/bidder, explain why selected:
Funds were awarded to passing proposals in rank order.

Treatment of Intellectual Property:
Pre-existing intellectual property identified in agreement EPC-14-004 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.

Update:
The project was approved at the December 10, 2014 Energy Commission Business Meeting and the project work was started in January 2015. The process design and the mechanical design of all major components were completed, along with specified control system requirements which included the use of three tanks, the minimum number prescribed to evaluate the operation and viability of a multiple tank system. Halotechnics terminated the project after 10 months prior to the procurement of any hardware due to insufficient commercial traction from customers in the concentrated solar power industry.

29. EPC-14-005

Project Name: Solar Forecast Based Optimization of Distributed Energy Resources in the LA Basin and UC San Diego Microgrid [EPC-14-005]	
Recipient/Contractor: The Regents of the University of California, San Diego	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 1/15/2015 to 3/15/2018
Program Area and Strategic Objective: Applied Research and Development S4: Develop Emerging Utility Scale Renewable Energy Generation Technologies and Strategies to Improve Power Plant Performance, Reduce Costs, and Expand the Resource Base	
Issue: The variable nature of solar power is of concern to electric grid operators in California. If short-term solar variability cannot be predicted or reduced, the integration cost of solar power increases through investment in energy storage or regulation capacity by the grid operator. Especially at the microgrid and distribution feeder level, the geographic diversity is less available and solar generation is the primary contributor to net load variability, causing voltage issues affecting service quality and reliability.	
Project Description: This project aims to integrate high-accuracy solar forecasting to optimize the operation of distributed energy resources, and utilize the value of solar forecasting in utility grid operations to improve grid reliability, reduce ratepayer costs and increase safety. The objectives are to apply forecasts to inform control and scheduling decisions for distributed energy resources with emphasis on energy storage and electric vehicle charging control at warehouse photovoltaic clusters in the LA-Orange-Riverside-San Bernardino-San Diego Counties as well as the UCSD microgrid.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: This project aims to improve solar energy forecast accuracy by 45% over the existing persistence forecast method to optimize the operation of distributed energy resources. Doing so will mitigate the concerns of electric operations over the variable nature of solar power that contributes to net load variability, causing voltage issues affecting service quality and reliability.	
CPUC Proceedings addressing issues related to this EPIC project: Alternative Fueled Vehicles: R.13-11-007 Renewables Portfolio Standard: R.11-05-005 Energy storage: R.15-03-011 Distribution Resources Plans (AB 327): R.14-08-013 California Solar Initiative: R.12-11-005 Integration of Distributed Energy Resources (IDER): R. 14-10-003	

Applicable Metrics: CPUC Metrics- 5c Lower Costs: The project will lower the energy cost by developing strategies to reduce electricity peak demand through system optimization including peak (net) load shifting and PV smoothing and ramp rate mitigation. Greater Reliability: The project is expected to result in greater reliability by integrating high-accuracy solar forecasts to distributed energy resources (DERs), offering a highly accurate and granular solar forecasting resource available to utilities and balancing authorities like CAISO. Economic Development: The project will boost economic activities related to the technology transfer and the energy cost reduction accomplished by better utilization of existing generation resources. Environmental Benefits: The project will stimulate better use of solar energy resource that helps to reduce water consumption and greenhouse gas (GHG) emissions in the energy generation sector. Public Health: The project will help improve public health by reducing air emission pollutants including NOx, SOx, and PM10.			
Assignment to Value Chain: Generation		**Total Budgeted Project Admin and Overhead Costs:** $157,282	
EPIC Funds Encumbered: $999,984		**EPIC Funds Spent:** $0	
Match Partner and Funding Split: San Diego Gas & Electric Company: $250,000 (12.5 %) Strategen: $93,614 (4.7 %) Itron, Inc.: $483,032 (24.2 %) University of California, San Diego, San Diego Supercomputer Center: $173,338 (8.7 %)		**Match Funding:** $999,984	
Leverage Contributors:		**Leveraged Funds:** $0	
Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 18 out of 18	**Rank of Selected Applicant/ Bidder:** Ranked # 1
If not the highest scoring applicant/bidder, explain why selected: Funds were awarded to passing proposals in rank order.			

Treatment of Intellectual Property: Pre-existing intellectual property identified in agreement EPC-14-005 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.
Update: A project kickoff meeting was held in April 2015 as part of a combined forecasting programmatic kickoff. Technical progress is underway. The original project schedule was revised in June 2015, and the first technical tasks are now scheduled for completion in April 2016.

30. EPC-14-007

Project Name: Improving Short-Term Wind Power Forecasting through Measurements and Modeling of the Tehachapi Wind Resource Area [EPC-14-007]	
Recipient/Contractor: The Regents of the University of California, on behalf of the Davis campus	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 1/15/2015 to 7/15/2017
Program Area and Strategic Objective: Applied Research and Development S4: Develop Emerging Utility Scale Renewable Energy Generation Technologies and Strategies to Improve Power Plant Performance, Reduce Costs, and Expand the Resource Base	
Issue: Large, rapid changes (ramps) in wind power production are one of the most significant renewable integration issues for balancing authorities. If not effectively managed, these ramps can impose reliability issues and additional costs on the electric system. Accurate forecasting of wind ramps can ameliorate these impacts. However, this remains difficult because of the complexity of the meteorological processes that drive wind ramps. This is particularly challenging in the Tehachapi Wind Resource Area (TWRA) with its large amount of installed capacity, lack of spatial diversity in generation assets, and complex multi-scale wind patterns across the complex terrain.	
Project Description: This project comprises coordinated atmospheric field measurements and computational modeling improvements to improve the accuracy of prediction of short-term wind ramps (i.e. large, rapid changes in wind power production). The Tehachapi Pass Wind Resource Area will be the focus of the project. Since the area features complex terrain and meteorology, the findings can be readily adapted and applied to many other regions.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: Improvements to accuracy of short-term (3-15 hours) and very short-term (0-3 hours) wind ramp forecasting would reduce generating reserves scheduled by grid operators, with corresponding decreases in grid operating costs and greenhouse gas emissions, and, simultaneously, increased grid reliability.	
CPUC Proceedings addressing issues related to this EPIC project: Renewables Portfolio Standard: R.11-05-005 Integrated Resource Planning: R.16-02-007	
Applicable Metrics: Lower Costs: Reducing wind forecast error by a little as 10% will reduce annual grid integration costs by $28 million in the WECC (which includes California) at 14% wind penetration, and as much as $100 million annually at 24% wind penetration.	

<table>
<tr><td colspan="2">Assignment to Value Chain:
Generation</td><td colspan="2">Total Budgeted Project Admin and Overhead Costs: $247,542</td></tr>
<tr><td colspan="2">EPIC Funds Encumbered:
$1,000,000</td><td colspan="2">EPIC Funds Spent:
$58,423</td></tr>
<tr><td colspan="2">Match Partner and Funding Split:</td><td colspan="2">Match Funding:
$90,325</td></tr>
<tr><td colspan="2">Leverage Contributors:</td><td colspan="2">Leveraged Funds:
$0</td></tr>
<tr><td>Funding Method:
Competitive</td><td>Funding Mechanism:
Grant</td><td>No. of Passing Applicants/ Bidders:</td><td>Rank of Selected Applicant/ Bidder:</td></tr>
<tr><td colspan="4">If not the highest scoring applicant/bidder, explain why selected:
Funds were awarded to passing proposals in rank order.</td></tr>
<tr><td colspan="4">Treatment of Intellectual Property:
Pre-existing intellectual property identified in agreement EPC-14-007 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.</td></tr>
<tr><td colspan="4">Update:
A project kickoff meeting was held in April 2015 as part of a combined forecasting programmatic kickoff, and technical work commenced in June.</td></tr>
</table>

31. EPC-14-008

Project Name: High-Fidelity Solar Power Forecasting Systems for the 392 MW Ivanpah Solar Plant (CSP) and the 250 MW California Valley Solar Ranch (PV) [EPC-14-008]	
Recipient/Contractor: The Regents of the University of California, San Diego	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 1/15/2015 to 3/15/2018
Program Area and Strategic Objective: Applied Research and Development S4: Develop Emerging Utility Scale Renewable Energy Generation Technologies and Strategies to Improve Power Plant Performance, Reduce Costs, and Expand the Resource Base	
Issue: Accurate forecasting tools for solar irradiance and solar power output have the potential to increase the reliability of California's energy supply, and the ability to optimize the dispatch of energy sources by reducing the uncertainty created by fast-changing weather conditions. High fidelity solar forecasting is an enabling technology for increasing solar penetration into the grid. However, there is a lack of well-developed forecasting models for components of solar irradiance that are critical to concentrating solar technologies, especially Direct Normal Irradiance (DNI) and Plane of Array (POA).	
Project Description: This project will focus on the development and validation of tools capable of monitoring and forecasting the DNI solar component and the power generation accurately, from 5 minutes out to 72 hours in the future, mainly at the Ivanpah Solar Thermal plant. The project will also include the development of tools for predicting wind speed, which affects the heliostats' deployment, and produce a generation forecast via a Resource-to-Power Model (RTP). The goal of this system is aimed at reducing uncertainties associated with operation, regulation and scheduling of Ivanpah. The new forecast models will be used as a feed forward input to the RTP model in the solar field controls system that will enable the solar field to preemptively position itself for weather transients.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: The project will develop and validate forecast models optimized for direct normal irradiance (DNI), plane of array (POA) irradiance for large-scale concentrating solar power (CSP), concentrating photovoltaics (PV), and tracking PV power plants. The application of big data and behavioral analysis will help optimize power plant operations.	
CPUC Proceedings addressing issues related to this EPIC project: Renewables Portfolio Standard: R.11-05-005 California Solar Initiative: R.12-11-005	

Applicable Metrics: CPUC Metrics- 5c

Lower Costs:

The project will deliver models that will help utility scale costs associated with day-ahead scheduling, reduce plant operation costs associated with intra-day variability, and reduce ancillary service purchases needed to avoid forced outages.

Greater Reliability:

The project will result in greater reliability by developing high-fidelity models that increase the accuracy of solar energy forecasting to decrease the number of forced outages associated ancillary reserves.

Economic Development:

The project will help economic development by reducing solar power plant operating cost by more than 10% and having the ability to substantially affect the effective solar capacity in California.

Environmental Benefits:

The project will result in GHG emission reductions by decreasing the uncertainty associated with solar power generation to diminish the need of fossil fuel generation.

Public Health:

The project will improve public health by increasing level of renewable energy utilization which results in reduction of air emission pollutants generated from fossil fuel generation.

Assignment to Value Chain: Grid Operations/Market Design		**Total Budgeted Project Admin and Overhead Costs:** $168,624	
EPIC Funds Encumbered: $999,898		**EPIC Funds Spent:** $0	
Match Partner and Funding Split: NRG Energy, Inc.: $460,000 (26.1 %) Itron, Inc.: $304,019 (17.2 %)		**Match Funding:** $764,019	
Leverage Contributors:		**Leveraged Funds:** $0	
Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 18 out of 18	**Rank of Selected Applicant/ Bidder:** Ranked # 5

If not the highest scoring applicant/bidder, explain why selected:

Funds were awarded to passing proposals in rank order.

Treatment of Intellectual Property:

Pre-existing intellectual property identified in agreement EPC-14-008 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.

Update:

A project kickoff meeting was held in April 2015 as part of a combined forecasting programmatic kickoff. Technical progress on the project is underway, and all of the 2015 progress reports were delivered on time. The original project schedule was revised in November 2015, and the first technical task is now scheduled for April 2016, when the initial forecast models will be delivered. The first Technical Advisory Committee meeting will be held in March 2016.

32. EPC-14-061

Project Name: Learning from Real-World Experience to Understand Renewable Energy Impacts to Wildlife [EPC-14-061]	
Recipient/Contractor: U.S. Geological Survey	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 6/30/2015 to 3/29/2019
Program Area and Strategic Objective: Applied Research and Development S5: Reduce the Environmental and Public Health Impacts of Electricity Generation and Make the Electricity System Less Vulnerable to Climate Impacts	
Issue: There is a general lack of data to adequately determine some impacts of renewable generation on wildlife and habitat loss. This lack of understanding presents challenges to assessing, mitigating and permitting new renewable energy development.	
Project Description: The goal of this research is to use real-world data to understand renewable energy impacts to wildlife. The approach will be to analyze observed wildlife fatalities and habitat loss to determine the significance of fatalities to population persistence; compare pre-construction predicted and post-construction actual impacts (fatalities) to sensitive species, as a foundation for improving predictive accuracy; and compare predicted and actual benefits of mitigation to sensitive species, as a foundation for improving predictive accuracy. The research goal is to produce a set of decision-making tools for renewable energy developers and permitting and regulatory agencies in California. Implementation of this set of tools will benefit ratepayers by streamlining permitting and reducing costs of energy development and electricity.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: Outcomes from this project can affect the reliability of energy delivery, cost structures and, in some cases, safety. For example, reliability of energy delivery can be influenced by costly approaches to environmental management (e.g., turbine curtailment when protected species are present). Furthermore, cost structures are determined in part by the quantity and efficiency of compliance with environmental regulations.	
CPUC Proceedings addressing issues related to this EPIC project: Renewables Portfolio Standard: R.11-05-005	
Applicable Metrics: CPUC Metrics- 4f, 4g Lower Costs: This project is expected to help streamline environmental permitting management (improving reliability and cost). Likewise, improved prediction of fatality and mitigation outcomes allow streamlining minimization of compliance efforts, which	

reduces costs.

Greater Reliability:

Having a better understanding of impacts and how to mitigate them could lead to more capacity via more developments and longer operating time (e.g., reduced curtailments).

Environmental Benefits:

Refining predictions associated with infrastructure development will reduce impacts and improve mitigation effectiveness in future renewable energy development.

Assignment to Value Chain: Generation	**Total Budgeted Project Admin and Overhead Costs:** $262,924
EPIC Funds Encumbered: $1,000,000	**EPIC Funds Spent:** $0
Match Partner and Funding Split: US Geological Survey: $94,707 (3.6 %) University of Maryland Center for Environmental Studies Appalachian Laboratory: $22,470 (0.9 %) NextEra Energy: $1,500,000 (57.3 %)	**Match Funding:** $1,617,177
Leverage Contributors:	**Leveraged Funds:** $0

Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 14 out of 14	**Rank of Selected Applicant/ Bidder:** Ranked # 6

If not the highest scoring applicant/bidder, explain why selected:
Funds were awarded to passing proposals in rank order.

Treatment of Intellectual Property:
Pre-existing intellectual property identified in agreement EPC-14-061 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.

Update:

The agreement was approved at the Energy Commission's June 2015 business meeting and the kickoff meeting was held in November 2015. The project is currently underway.

33. EPC-14-064

Project Name: Aerosol impacts on the hydrology and hydropower generation in California [EPC-14-064]	
Recipient/Contractor: The Regents of the University of California, on behalf of the Riverside Campus	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 5/13/2015 to 6/30/2018
Program Area and Strategic Objective: Applied Research and Development S5: Reduce the Environmental and Public Health Impacts of Electricity Generation and Make the Electricity System Less Vulnerable to Climate Impacts	
Issue: Hydrologic forecasts for hydropower units can have substantial errors. This hampers the efficient management of hydropower units. Hydropower is a very important clean resource that provides peak generation in hot summer months and can provide electricity when wind and/or solar resources go down. Improving hydrologic forecasts could substantially increase these and other benefits obtained from hydropower units.	
Project Description: This project will develop a fully coupled aerosol-meteorology-snowpack forecast model for hydropower applications, using observational datasets (precipitation, snowpack, stream inflow) for Southern California Edison's hydropower plant on Big Creek. The researchers will also use a SCE model designed to optimize the operation of their hydropower units. The main goal is to demonstrate that the use of advanced forecasts can improve the management of hydropower units.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: The results of this project are expected to improve the management of hydropower units which should reduce overall electricity generation costs.	
CPUC Proceedings addressing issues related to this EPIC project: Resource Adequacy (RA) 2016 and 2017 Compliance Years: R.14-10-020 Long-Term Procurement Proceeding. LTPP (2016 cycle): TBD	
Applicable Metrics: Lower Costs: The proposed research is intended to significantly advance our understanding of aerosol impacts on the hydrology and hydropower generation in California. The improved forecast should maximize California ratepayer benefits by increasing the hydroelectric power plant's availability, flexibility and revenue in the wholesale electricity market.	
Assignment to Value Chain: Generation	**Total Budgeted Project Admin and Overhead Costs:** $92,951

<table>
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$399,818</td><td colspan="2">EPIC Funds Spent:
$18,855</td></tr>
<tr><td colspan="2">Match Partner and Funding Split:
University of California, Riverside: $56,237 (8.0 %)
Jet Propulsion Laboratory-California Institute of Technology: $250,000 (35.4 %)</td><td colspan="2">Match Funding:
$306,237</td></tr>
<tr><td colspan="2">Leverage Contributors:</td><td colspan="2">Leveraged Funds:
$0</td></tr>
<tr><td>Funding Method:
Competitive</td><td>Funding Mechanism:
Grant</td><td>No. of Passing Applicants/ Bidders:
14 out of 14</td><td>Rank of Selected Applicant/ Bidder:
Ranked # 2</td></tr>
<tr><td colspan="4">If not the highest scoring applicant/bidder, explain why selected:
Funds were awarded to passing proposals in rank order.</td></tr>
<tr><td colspan="4">Treatment of Intellectual Property:
Pre-existing intellectual property identified in agreement EPC-14-064 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.</td></tr>
<tr><td colspan="4">Update:
The agreement was approved at the Energy Commission's May 2015 business meeting and the kick off meeting was held in August 2015. The project is currently underway.</td></tr>
</table>

34. EPC-14-067

Project Name: Improving Hydrological Snowpack Forecasting for Hydropower Generation Using Intelligent Information Systems [EPC-14-067]	
Recipient/Contractor: The Regents of the University of California, on behalf of the Berkeley Campus	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 5/13/2015 to 12/31/2018
Program Area and Strategic Objective: Applied Research and Development S5: Reduce the Environmental and Public Health Impacts of Electricity Generation and Make the Electricity System Less Vulnerable to Climate Impacts	
Issue: Next-generation hydrographic data networks are needed to better measure and predict critical snowpack levels that can help hydropower operators adjust to increased variability and precipitation consequences of climate change.	
Project Description: The purpose of this project is to develop improved snowpack forecasts within a representative Sierra Nevada watershed in order bolster the hydrographic data network that supports hydropower planning and operations. The project is expected to reduce uncertainty in water forecasts in a changing climate, and assist in the development of reliable and flexible operations of hydropower dams that will also bring economic benefits to utilities and ratepayers.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: The anticipated benefits to California includes improved predictive planning and scheduling tools to manage hydroelectric resources that are needed to adapt to increasing vulnerabilities and uncertainties of a changing climate. This project will specifically target three powerhouses (Rock Creek, Crest, and Poe Powerhouses) operated by PG&E.	
CPUC Proceedings addressing issues related to this EPIC project: Water-Energy Nexus: R.13-12-011	
Applicable Metrics: Greater Reliability: The improved snowpack data should allow for greater predictability and therefore increased reliability in hydropower generation.	
Assignment to Value Chain: Generation	**Total Budgeted Project Admin and Overhead Costs:** $278,056
EPIC Funds Encumbered: $1,100,000	**EPIC Funds Spent:** $0

Match Partner and Funding Split: University of California Merced: $86,263 (7.8 %) California Department of Water Resources: $150,000 (13.6 %)		**Match Funding:** $0	
Leverage Contributors:		**Leveraged Funds:** $0	
Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 14 out of 14	**Rank of Selected Applicant/ Bidder:** Ranked # 1
If not the highest scoring applicant/bidder, explain why selected: Funds were awarded to passing proposals in rank order.			
Treatment of Intellectual Property: Pre-existing intellectual property identified in agreement EPC-14-067 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.			
Update: The agreement was approved at the Energy Commission's May 2015 business meeting and the kick off meeting was held in September 2015. The project is currently underway.			

35. EPC-14-068

Project Name: Evaluation of Cost, Performance and Water Conserving Capability of Hybrid Cooling [EPC-14-068]	
Recipient/Contractor: Maulbetsch Consulting	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 5/13/2015 to 1/31/2018
Program Area and Strategic Objective: Applied Research and Development S5: Reduce the Environmental and Public Health Impacts of Electricity Generation and Make the Electricity System Less Vulnerable to Climate Impacts	
Issue: The needs for increasing amounts of electric power and clean water have sometimes come into conflict in California. Hybrid, wet/dry cooling systems enable significant water savings in comparison to wet cooling and improved plant efficiency and output in comparison to all-dry systems. To expedite the introduction of hybrid systems, a methodology and computational tool to provide regulators, planners and potential users with reliable, validated comparative performance and water use cost comparisons with optimized wet and dry cooling systems is needed.	
Project Description: This project will analyze the design, performance and cost of optimized hybrid cooling systems at utility power plant scale to illustrate the potential benefits of hybrid cooling in California. This project will use an existing Excel spreadsheet-based computational tool with the capability of specifying, at an "engineering-level", design parameters for optimized closed-cycle wet, direct dry and parallel wet/dry hybrid cooling systems. The tool's output will be checked against information from participating plants equipped with wet, dry and hybrid cooling systems. The capability to make rigorous, reliable evaluations of hybrid cooling systems and the trade-offs between economic power production and water resource conservation will enable the selection of preferred cooling systems for the economic and environmental benefit of California.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: Hybrid cooling systems for electric power plants will provide an alternative cooling option for California power plants that can simultaneously achieve significant reduction in water consumed for power production compared to closed-cycle wet cooling, improve both peak load and annual average power production efficiency and output compared to all-dry cooling and reduce the air emissions that all dry cooling systems can impose on fossil-fired power plants.	
CPUC Proceedings addressing issues related to this EPIC project: Water-Energy Nexus : R.13-12-011	

Applicable Metrics: Lower Costs: The results of this project will be used to reduce plant capital costs below the cost of dry cooled plants of comparable output. Greater Reliability: The results of this project are expected to eliminate the significant efficiency penalties incurred by dry cooled plants during the hot periods of the year when power demand is the highest. Environmental Benefits: The results of the project are expected to reduce the amount of water required to keep plants operating in comparison to traditional wet cooling.			
Assignment to Value Chain: Generation		**Total Budgeted Project Admin and Overhead Costs:** $0	
EPIC Funds Encumbered: $581,580		**EPIC Funds Spent:** $38,168	
Match Partner and Funding Split:		**Match Funding:** $0	
Leverage Contributors:		**Leveraged Funds:** $0	
Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 14 out of 14	**Rank of Selected Applicant/ Bidder:** Ranked # 9
If not the highest scoring applicant/bidder, explain why selected: Funds were awarded to passing proposals in rank order.			
Treatment of Intellectual Property: Pre-existing intellectual property identified in agreement EPC-14-068 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.			
Update: The Contractor conducted site visits to three thermal generating plants Xcel Energy's in Colorado (Comanche plant, Unit 3) and PG&E's Colusa and Gateway generating stations that use hybrid cooling. Data acquisition has begun at all three plants so that preliminary comparisons of spreadsheet tool estimates for hybrid cooling with actual plant data can be accomplished. Seven progress reports and the Final Technology/Knowledge Transfer plan have been submitted.			

36. EPC-14-069

Project Name: Develop Analytical Tools and Technologies to Plan for and Minimize the Impacts of Climate Change on the Electricity System [EPC-14-069]	
Recipient/Contractor: Energy and Environmental Economics, Inc. (E3)	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 5/13/2015 to 7/31/2017
Program Area and Strategic Objective: Applied Research and Development S5: Reduce the Environmental and Public Health Impacts of Electricity Generation and Make the Electricity System Less Vulnerable to Climate Impacts	
Issue: If California is to achieve its long-term goal of reducing greenhouse gas emissions 80 percent below 1990 levels by 2050, the electricity system must play a pivotal role. Electricity generation must have carbon intensity and much of transportation and other end uses that are currently powered by direct fossil fuel combustion must be electrified. Prior research has identified "proof of concept" low carbon scenarios, but many aspects of the energy transition remain poorly understood.	
Project Description: The purpose of this agreement is to advance the understanding of key parameters of long-term energy scenarios and greenhouse gas abatement options in the California energy system. This project will achieve this by further developing scenarios and modeling capabilities of the California electricity sector, as well as interactions between the electricity sector and other sectors, and by exploring the implications of particular policy choices on the electricity system in the medium (2020-2030) and long term (2050). This project will provide critical insight into some of the key challenges facing the low carbon transition in the electricity system, the options for addressing these challenges, and the dynamic interactions among these options, which are likely to grow more important over time. In addition, this project will develop new insights into critical research areas pertaining to long-term energy scenarios for California.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: This project will develop options for improving electricity planning methodologies, such that they better incorporate knowledge of how the electricity system will need to evolve over the next 15 to 30 years. This will include a better understanding of how current policy choices will impact long-term climate outcomes, providing critical policy-relevant information to state energy agencies that will be implementing the Governor's energy and climate goals over the next 15 years.	
CPUC Proceedings addressing issues related to this EPIC project: Long-Term Procurement Proceeding (LTPP): R.13-12-010 Long-Term Procurement Proceeding. LTPP (2016 cycle): TBD	

Applicable Metrics: Lower Costs: This research will provide information to policy makers about key choices that would lower the cost of meeting the state's environmental goals in the electricity sector. Greater Reliability: This project will provide information to policy makers about the key choices and decisions needed to maintain electric reliability under a higher renewable generation and high distributed generation future. Environmental Benefits: This project will investigate the environmental and land use implications of different renewable development scenarios under a 50 percent renewable future in 2030 while reducing environmental impacts.			
Assignment to Value Chain: Grid Operations/Market Design		**Total Budgeted Project Admin and Overhead Costs:** $286,936	
EPIC Funds Encumbered: $700,000		**EPIC Funds Spent:** $94,953	
Match Partner and Funding Split:		**Match Funding:** $0	
Leverage Contributors:		**Leveraged Funds:** $0	
Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 14 out of 14	**Rank of Selected Applicant/ Bidder:** Ranked # 7
If not the highest scoring applicant/bidder, explain why selected: Funds were awarded to passing proposals in rank order.			
Treatment of Intellectual Property: Pre-existing intellectual property identified in agreement EPC-14-069 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.			
Update: The research team is improving their models and data sets. The project team participated in a joint technical meeting in September 2015 to coordinate on assumptions and contributions for scenario development among the three research teams that received awards for this work. Policy and Technical Advisory Committees meetings took place on February 24, 2016.			

37. EPC-14-071

Project Name: Rotor-Mounted Bat Impact Deterrence System Design and Testing [EPC-14-071]	
Recipient/Contractor: Frontier Wind	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 6/30/2015 to 3/29/2019
Program Area and Strategic Objective: Applied Research and Development S5: Reduce the Environmental and Public Health Impacts of Electricity Generation and Make the Electricity System Less Vulnerable to Climate Impacts	
Issue: Measures put in place to mitigate the impact of wind generation facilities on wildlife species, including bats, limit the achievement of key state objectives. These mitigation measures serve to limit the productivity and ability to develop and construct new wind energy projects. Developing more effective technology and methods to mitigate fatal interaction of bat species with wind turbine facilities could enable wider deployment of wind energy with less curtailment.	
Project Description: The project will design, lab test, and field test a new bat deterrence system utilizing ultrasound transmitters mounted in an array along the rotor blades, providing complete coverage over the entire rotor/nacelle envelope. A field test study utilizing substantially similar methods to prior bat impact studies will be implemented post-installation at the test site to measure the effectiveness of the new ultrasound system.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: A key benefit of the project is the ability to avoid the need to curtail California wind turbine capacity to mitigate against potential fatal bat interactions. A second key benefit of the project is the ability to enable an increase in installed California wind generation capacity. Wildlife concerns limit the in-state geographies where wind power facilities can be sited.	
CPUC Proceedings addressing issues related to this EPIC project: Long-Term Procurement Proceeding. LTPP (2016 cycle): TBD	
Applicable Metrics: CPUC Metrics- 1c, 3a, 4g Lower Costs: Currently available mitigation measures can be costly to ratepayers through forced curtailments and limit pursuit of State renewable capacity expansion goals. As such, the project benefits ratepayers by providing a less costly alternative approach. Environmental Benefits: The project will develop new technology that could significantly reduce bat fatalities at wind energy facilities.	

Assignment to Value Chain: Generation		**Total Budgeted Project Admin and Overhead Costs:** $29,547	
EPIC Funds Encumbered: $862,875		**EPIC Funds Spent:** $120,387	
Match Partner and Funding Split: Bruce Walker: $14,000 (1.6 %) Frontier Wind: $22,313 (2.5 %)		**Match Funding:** $37,047	
Leverage Contributors: United States Department of Energy : $249,000		**Leveraged Funds:** $249,000	
Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 14 out of 14	**Rank of Selected Applicant/ Bidder:** Ranked # 8
If not the highest scoring applicant/bidder, explain why selected: Funds were awarded to passing proposals in rank order.			
Treatment of Intellectual Property: Pre-existing intellectual property identified in agreement EPC-14-071 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.			
Update: The first Technical Advisory Committee meeting was held in October 2015. Researchers have completed the design stage and is in lab testing for the system.			

38. EPC-14-072

Project Name: Building a Healthier and More Robust Future: 2050 Low Carbon Energy Scenarios for California [EPC-14-072]	
Recipient/Contractor: Lawrence Berkeley National Laboratory	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 6/30/2015 to 12/30/2017
Program Area and Strategic Objective: Applied Research and Development S5: Reduce the Environmental and Public Health Impacts of Electricity Generation and Make the Electricity System Less Vulnerable to Climate Impacts	
Issue: California has set an aggressive long-term climate goal of 80% GHG reduction in 2050 relative to the 1990 level. Several studies have been conducted on how to achieve this goal but they have not considered some important factors such as aggressive demand response options, plug-in electric vehicle (PEV) adoption, and more realistic energy efficiency scenarios.	
Project Description: This project will significantly expand prior studies using stochastic modeling capabilities of the electricity system, simulating more comprehensive demand response options, and more realistic PEV modeling. The project will also include more realistic simulations of the potential for energy efficiency and consider the impacts of climate change on energy resources.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: Long-term energy scenario analysis contributes multiple benefits to California's ratepayers by providing guidance for future electricity system investment that can meet carbon limits at the lowest cost. In addition, the energy system resilience analysis will help to ensure the electricity system is more robust to future external shocks.	
CPUC Proceedings addressing issues related to this EPIC project: Alternative Fueled Vehicles: R.13-11-007 Smart grid: R.08-12-009 Demand Response (DR): R.13-09-011 Long-Term Procurement Proceeding (LTPP): R.13-12-010 Energy Efficiency Strategic Plan update and action plans: EE Strategic Plan docs	
Applicable Metrics: CPUC Metrics- 3f, 3h, 4a Energy Security: Studying the optimal paths for developing California's energy system to meet its GHG goals may prevent inefficiency in the energy system investments and potentially avert stranded investments.	
Assignment to Value Chain: Generation	**Total Budgeted Project Admin and Overhead Costs:** $236,701

EPIC Funds Encumbered: $700,000		**EPIC Funds Spent:** $371,040	
Match Partner and Funding Split: University of California, Berkeley: $65,000 (8.5 %)		**Match Funding:** $65,000	
Leverage Contributors:		**Leveraged Funds:** $0	
Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 14 out of 14	**Rank of Selected Applicant/ Bidder:** Ranked # 4
If not the highest scoring applicant/bidder, explain why selected: Funds were awarded to passing proposals in rank order.			
Treatment of Intellectual Property: Pre-existing intellectual property identified in agreement EPC-14-072 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.			
Update: This project began in June 2015. It is one of three contracts to separate research groups to develop comprehensive long term energy scenarios that take into account both climate change impacts and climate policy changes to the electricity system The researchers prepared a presentation for a technical advisory committee and policy advisory committee held on February 24, 2016.			

39. EPC-14-073

Project Name: Monitoring the Urban Heat Island Effect and the Efficiency of Future Countermeasures [EPC-14-073]	
Recipient/Contractor: DOE- Lawrence Berkeley National Laboratory	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 6/29/2015 to 12/31/2018
Program Area and Strategic Objective: Applied Research and Development S5: Reduce the Environmental and Public Health Impacts of Electricity Generation and Make the Electricity System Less Vulnerable to Climate Impacts	
Issue: The prevalence of dark, dry surfaces and man-made heat in cities creates Urban Heat Islands (UHIs) of elevated near-surface air temperature. UHI countermeasures, such as reflective surfaces and urban vegetation, can save cooling energy, improve indoor and outdoor thermal comfort in summer, reduce pollutant emissions, and improve health. Implementation of these measures can also help counter potential microclimate, emissions, and air-quality impacts of climate change. An empirical, real-world, and fine-resolution observational characterization of UHIs, using strategically placed, research-grade weather stations, is needed.	
Project Description: This project will improve understanding of the distribution of near-surface air temperatures within urban heat islands in California, identify and quantify the determinants of local temperatures, and enhance the foundation for location-specific assessments of mitigation strategies. In collaboration with local governments and organizations in the Los Angeles Basin, the research team will design and implement a network of fixed monitoring stations, supplemented with mobile monitoring and data from existing weather-station networks. This research will (a) assess spatial and temporal variations in near-surface air temperature; (b) monitor the effects of urban heat island countermeasures, such as cool surfaces and urban vegetation, on urban air temperature; and (c) recast these observations for use in validating and calibrating the climate/meteorological models applied to assess potential benefits of urban heat island countermeasures throughout the state.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: Research will maximize benefits from urban heat island (UHI) mitigation by verifying relationships between the UHI effect and land use/land cover; using these measurements to calibrate and validate models that estimate benefits of mitigation measures; establishing a baseline of today's UHI effect against which the efficacy of future UHI mitigation (cool community) programs can measured; and leaving in place a set of research-grade monitors that can be used to track changes in the UHI effect.	
CPUC Proceedings addressing issues related to this EPIC project: Long-Term Procurement Proceeding (LTPP): R.13-12-010	

Long-Term Procurement Proceeding. LTPP (2016 cycle): TBD Resource Adequacy (RA): R.11-10-023 [Closed] Residential Zero Net Energy Action Plan (2015): Residential ZNE Action Plan (June 2015)			
Applicable Metrics: CPUC Metrics- 1c, 1e, 1f Greater Reliability: Extensive prior research indicates that urban heat island (UHI) mitigation attainable through cool community strategies can save electricity, reduce peak power demand, lower strain on the electrical grid, and increase reliability. Research project will facilitate regionally optimized deployment of UHI mitigation technologies. Public Health: UHI mitigation can reduce air pollutant emissions and slow production of ground-level ozone, thus improving air quality and protecting public health. The research project will help ensure that future UHI mitigation efforts maximize public health benefits associated with reducing ground-level ozone concentrations and improving air quality.			
Assignment to Value Chain: Grid Operations/Market Design		**Total Budgeted Project Admin and Overhead Costs:** $116,818	
EPIC Funds Encumbered: $500,000		**EPIC Funds Spent:** $366,348	
Match Partner and Funding Split: Altostratus, Inc.: $4,000 (0.8 %)		**Match Funding:** $4,000	
Leverage Contributors:		**Leveraged Funds:** $0	
Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 14 out of 14	**Rank of Selected Applicant/ Bidder:** Ranked # 3
If not the highest scoring applicant/bidder, explain why selected: Funds were awarded to passing proposals in rank order.			
Treatment of Intellectual Property: Pre-existing intellectual property identified in agreement EPC-14-073 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.			
Update: In 2015, the team assembled a Technical Advisory Committee with participation from key stakeholders as well as scientists; identified and characterized a study area in the Los Angeles air basin, based on existing observed weather datasets as well as several Land-Use-Land Cover datasets; developed a strategy for manipulating existing data into an appropriate form for further analysis involving the teams meso-urban meteorological model; and performed preliminary analysis of the urban heat island signal in selected areas of Los Angeles.			

40. EPC-14-074

Project Name: Building a Climate Change Resilient Electricity System for Meeting California's Energy and Environmental Goals [EPC-14-074]	
Recipient/Contractor: The Regents of the University of California, Irvine Campus	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 6/30/2015 to 7/2/2018
Program Area and Strategic Objective: Applied Research and Development S5: Reduce the Environmental and Public Health Impacts of Electricity Generation and Make the Electricity System Less Vulnerable to Climate Impacts	
Issue: The energy system needs to respond to the impacts of climate change such as increased precipitation extremes, higher peak energy demand from hotter and more frequent temperature extremes, and damage to energy infrastructure. At the same time, the energy sector must comply with mandates to reduce greenhouse gas emissions. These two pressures (climate impacts and changes in energy policy) interact in complex ways on the existing grid. In order to support future planning, this project will estimate how climate change would interact with efforts to reduce GHG emissions and to comply with renewable energy targets.	
Project Description: The project will utilize climate change simulations to produce modeled conditions that disrupt electricity system generation, renewable capacity potential, and demand for the years of 2030, 2040, and 2050. The combined effect of these impacts then will be simulated on the electricity system using an integrated electric grid modeling platform.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: The project will help limit the costs of energy while complying with GHG goals.	
CPUC Proceedings addressing issues related to this EPIC project: Renewables Portfolio Standard: R.11-05-005 Long-Term Procurement Proceeding (LTPP): R.13-12-010 Long-Term Procurement Proceeding. LTPP (2016 cycle): TBD Water-Energy Nexus: R.13-12-011	
Applicable Metrics: Environmental Benefits: The project will estimate the potential environmental benefits of different energy scenarios. This project is partnered with two other long term energy scenarios projects that will use a common base set of assumptions (based on prior work by E3 for the energy principals). This project is aimed at understanding impacts from changes in hydrology. Energy Security:	

The project includes analyses of robust energy systems. Robustness can be simulated and tested to produce results to inform which set of technologies in which places are the most protected from climate change, and therefore more energy secure.			
Assignment to Value Chain: Generation		**Total Budgeted Project Admin and Overhead Costs:** $181,613	
EPIC Funds Encumbered: $698,792		**EPIC Funds Spent:** $2,835	
Match Partner and Funding Split: Southern California Edison: $150,000 (15.0 %) Southern California Gas Company (SoCal Gas): $150,000 (15.0 %)		**Match Funding:** $300,000	
Leverage Contributors:		**Leveraged Funds:** $0	
Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 14 out of 14	**Rank of Selected Applicant/ Bidder:** Ranked # 5
If not the highest scoring applicant/bidder, explain why selected: Funds were awarded to passing proposals in rank order.			
Treatment of Intellectual Property: Pre-existing intellectual property identified in agreement EPC-14-074 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.			
Update: The research team has met with the two other Energy Commission funded long term energy scenario projects. The three teams have established a base set of shared assumptions. They prepared a joint Technical Advisory Committee meeting and a Policy Advisory Committee meeting that was held on February 24, 2016.			

41. EPC-15-005

Project Name: Potential Impacts and Adaptation Options for the Electricity System from Sea Level Rise in the San Diego Area. [EPC-15-005]	
Recipient/Contractor: ICF Incorporated, L.L.C.	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 12/4/2015 to 5/30/2018
Program Area and Strategic Objective: Applied Research and Development S5: Reduce the Environmental and Public Health Impacts of Electricity Generation and Make the Electricity System Less Vulnerable to Climate Impacts	
Issue: Sea-level rise (SLR) presents a critical threat to California's low-lying coastal areas and the energy infrastructure located there. The reliability of California's electricity service could be threatened by either permanent inundation from SLR, or through temporary coastal flooding events that cause disruptions to generation, transmission and distribution.	
Project Description: The project will evaluate SLR vulnerability and adaptation options at a level of detail appropriate for informing electricity sector policy and planning. ICF International will partner with SDG&E to conduct a detailed, robust, sea level rise vulnerability assessment and to identify and evaluate appropriate adaptation measures. Detailed sea level rise inundation modeling that builds on previous studies will be used to identify the SDG&E infrastructure that will be exposed to coastal flooding, and assess how the electricity system could be affected. Impacts of coastal inundation, and possible adaptation measures, will be determined using literature reviews, interviews with key experts, modeling and workshop elicitation. Potential direct and indirect impacts will be used at an asset by asset level, and through system-wide assessment including power flow modeling to support Value of Lost Load analysis	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: This project will identify adaptation measures for electrical system that are practical and aligned with existing policies, based on a comprehensive understanding of the vulnerabilities of specific assets and how these combine at a system level. This work will further the state of knowledge by employing improved modeling techniques that take into account protective structures and coastal processes.	
CPUC Proceedings addressing issues related to this EPIC project: Resource Adequacy (RA) 2016 and 2017 Compliance Years: R.14-10-020	
Applicable Metrics: CPUC Metrics- 5a, 5d Greater Reliability: This project is expected to result in the greater electricity reliability and lower costs by establishing a better understanding of vulnerabilities and adaptation measures	

for the electrical system that benefit SDG&E, the San Diego area, as well as other IOUs in California and the United States.			
Assignment to Value Chain: Generation		**Total Budgeted Project Admin and Overhead Costs:** $240,425	
EPIC Funds Encumbered: $499,929		**EPIC Funds Spent:** $0	
Match Partner and Funding Split: San Diego Gas & Electric Company: $166,200 (25.0 %)		**Match Funding:** $166,200	
Leverage Contributors:		**Leveraged Funds:** $0	
Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:**	**Rank of Selected Applicant/ Bidder:**
If not the highest scoring applicant/bidder, explain why selected: Funds were awarded to passing proposals in rank order.			
Treatment of Intellectual Property: Pre-existing intellectual property identified in agreement EPC-15-005 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.			
Update: The project kickoff meeting was held on January 27, 2016. The meeting was combined with the parallel natural gas project to promote synergy and reduce non-labor cost. There was a minor delay in starting of the project, in order to synchronize with the natural gas project. However, the project is expected to progress as scheduled.			

42. EPC-15-006

Project Name: Modeling the Impact of Wildfires on California's Transmission and Distribution Grid [EPC-15-006]	
Recipient/Contractor: Lawrence Berkeley National Laboratory	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 11/1/2015 to 6/1/2018
Program Area and Strategic Objective: Applied Research and Development S5: Reduce the Environmental and Public Health Impacts of Electricity Generation and Make the Electricity System Less Vulnerable to Climate Impacts	
Issue: Climate projections indicate longer, warmer dry seasons in California, thus increasing the risk of large wildfires. Previous research funded by the Energy Commission established that some climate change scenarios could cause a substantial increase in exposure of major existing transmission lines to wildfire, but the vulnerability of distribution circuits has yet to be investigated. Research is needed to extend this previous assessment of vulnerability of the transmission system in California to include the distribution system.	
Project Description: This study will advance scientific knowledge by combining and enhancing several state-of-the-art models to produce the most detailed analysis to-date of California's future electric grid and fire risk under alternative conditions of climate change and grid evolution, including changes in the use of demand response, renewables, and distributed generation.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: The project will lead to technological advancement and breakthroughs to overcome barriers to the achievement of California's statutory energy goals--namely to maintain grid reliability and safety while adapting to the challenge of changing climate and wildfire risk. Researchers will apply a unique methodology to measure wildfire risk, allowing them to match an evolving wildfire probability over time with an evolving electricity grid.	
CPUC Proceedings addressing issues related to this EPIC project: Resource Adequacy (RA) 2016 and 2017 Compliance Years: R.14-10-020	
Applicable Metrics: CPUC Metrics- 1c Lower Costs: The study will use modeling to minimize the cost of maintaining a reliable electricity supply in the face of increased wildfire risk. Greater Reliability: The study is designed to increase reliability and the capacity of the electricity system to respond to increasing climate change-related wildfire risk. The project will	

<table>
<tr><td colspan="4">explore adaptation strategies for minimizing impacts of wildfire, including well-designed transmission and distribution system paths and better located generation assets.

Increase Safety:

Greater ratepayer safety follows from improved electricity system reliability because that reduces the potential hazards associated with power outages, such as public health and operations of critical facilities.</td></tr>
<tr><td colspan="2">Assignment to Value Chain:
Distribution</td><td colspan="2">Total Budgeted Project Admin and Overhead Costs: $169,786</td></tr>
<tr><td colspan="2">EPIC Funds Encumbered:
$500,000</td><td colspan="2">EPIC Funds Spent:
$0</td></tr>
<tr><td colspan="2">Match Partner and Funding Split:
University of Hawaii at Manoa: $17,157</td><td colspan="2">Match Funding:
$17,157</td></tr>
<tr><td colspan="2">Leverage Contributors:</td><td colspan="2">Leveraged Funds:
$0</td></tr>
<tr><td>Funding Method:
Competitive</td><td>Funding Mechanism:
Grant</td><td>No. of Passing Applicants/ Bidders:
13 out of 13</td><td>Rank of Selected Applicant/ Bidder:
Ranked # 2</td></tr>
<tr><td colspan="4">If not the highest scoring applicant/bidder, explain why selected:
Funds were awarded to passing proposals in rank order.</td></tr>
<tr><td colspan="4">Treatment of Intellectual Property:
Pre-existing intellectual property identified in agreement EPC-15-006 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.</td></tr>
<tr><td colspan="4">Update:
The agreement was approved at the Energy Commission's October 2015 business meeting.</td></tr>
</table>

43. EPC-15-007

Project Name: Climate Change in Los Angeles County: Grid Vulnerability to Extreme Heat [EPC-15-007]	
Recipient/Contractor: The Regents of the University of California, on behalf of the Los Angeles campus	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 12/1/2015 to 9/30/2018
Program Area and Strategic Objective: Applied Research and Development S5: Reduce the Environmental and Public Health Impacts of Electricity Generation and Make the Electricity System Less Vulnerable to Climate Impacts	
Issue: Because Los Angeles County is such a geographically diverse region, the impacts of climate change will be experienced differently across neighborhoods. Understanding the localized effects of climate change and the impacts on communities has been difficult to assess. Research predicts the Los Angeles region will be warmer by 3-5 ˚F annually by mid-century, and will have an increase in the number of "extreme heat days" varying regionally, with some cities experiencing up to 5-6 times their current levels. What is still unknown however, and what remains to be studied, is how and where these increases in temperature will impact the electric grid.	
Project Description: This project will develop a sophisticated and in depth description of future electric grid demand, response, and vulnerability due to increased (and prolonged) heat events in Southern California Edison territory under current and future climate scenarios. It will enable innovative grid management and operation strategies and will identify adaptation guidance. Ultimately, researchers will provide the information to local governments, regional and state agencies, utilities, and the general public in tangible, easy-to-understand formats to enhance local and state capacity to respond to potential disruptions in transmission due to climate change.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: Local and regional governments and utilities will gain an understanding of the capacity of substations and transmission lines and how those capacities might be impacted by extreme heat events. Doing so will create a greater level of understanding on where the grid is most vulnerable, which neighborhoods they serve, and what types of adaptation measures need to be taken by the utility as well as state, regional, and local actors. It can equally help guide investments in distributed generation.	
CPUC Proceedings addressing issues related to this EPIC project: Distribution Resources Plans (AB 327): R.14-08-013 Resource Adequacy (RA): R.11-10-023 [Closed]	

Applicable Metrics: CPUC Metrics- 1e, 5a, 5d

Lower Costs:

The study will provide information to support decisions that would result in lowered costs for ratepayers, by providing utilities and policymakers with further information on where and how they can prioritize investments in the grid moving forward.

Greater Reliability:

By evaluating the vulnerability of critical substations and transmission lines during future projected heat scenarios, the study will identify problem spots in the grid in Los Angeles County. This is turn will provide a greater understanding to the utilities of localized risk, such that they can plan for a more reliable energy system.

Increase Safety:

Identifying grid vulnerabilities can help utilities and decision-makers better plan for potential outages, and resultant ratepayer safety risks. As this analysis will be mapped out geographically, it will facilitate the identification of and planning for those ratepayer communities at greatest risk.

Public Health:

Extreme heat events can worsen numerous health problems, which can be exacerbated by grid outages. This project will identify vulnerable segments of the grid to guide decisions about adaptation measures to minimize these health risks.

Assignment to Value Chain: Distribution	**Total Budgeted Project Admin and Overhead Costs:** $0
EPIC Funds Encumbered: $500,000	**EPIC Funds Spent:** $0
Match Partner and Funding Split: The Regents of the University of California, Los Angeles: $168,753 (24.7 %) County of Los Angeles: $15,000 (2.2 %)	**Match Funding:** $183,753
Leverage Contributors:	**Leveraged Funds:** $0

Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 13 out of 13	**Rank of Selected Applicant/ Bidder:** Ranked # 3

If not the highest scoring applicant/bidder, explain why selected:

Funds were awarded to passing proposals in rank order.

Treatment of Intellectual Property:

Pre-existing intellectual property identified in agreement EPC-15-007 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.

Update:
Agreement was approved at the Energy Commission's December Business Meeting.

44. EPC-15-008

Project Name: Visualizing Climate-Related Risks to the Electricity System using Cal-Adapt [EPC-15-008]	
Recipient/Contractor: Regents of the University of California, on behalf of the Berkeley Campus	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 11/16/2015 to 6/28/2019
Program Area and Strategic Objective: Applied Research and Development S5: Reduce the Environmental and Public Health Impacts of Electricity Generation and Make the Electricity System Less Vulnerable to Climate Impacts	
Issue: California's electricity system is vulnerable to a variety of weather- and climate-related events, and stakeholders involved in electricity system management, operations, and planning must have timely access to relevant, best available, peer-reviewed data in a form that is easy to understand and useful for timely decision-support.	
Project Description: This project develops a suite of analytical and outreach approaches to provide electricity system stakeholders with actionable data pertaining to local climate risks. The project is organized around three technical tasks. The first is developing interactive, visually compelling, and useful web-based visualization applications depicting climate-related risks to the electricity infrastructure. The second is to build focused toolsets to support planning to protect energy infrastructure. Finally, the project includes outreach and training with energy stakeholders, climate practitioners, planners, managers, educators and ratepayers in the state through targeted workshops, webinars, and presentations.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: Cal-Adapt will provide integrated tools that will support planners and managers as they protect and plan for future electricity infrastructure reliability and stability. Such integrated planning will contribute multiple benefits to California's electricity ratepayers by helping to stabilize the grid, improve service reliability, and reduce financial losses associated with power outages.	
CPUC Proceedings addressing issues related to this EPIC project: Smart grid: R.08-12-009 Long-Term Procurement Proceeding (LTPP): R.13-12-010 Long-Term Procurement Proceeding. LTPP (2016 cycle): TBD	
Applicable Metrics: CPUC Metrics- 4a, 5d, 5e Greater Reliability: Integrated planning supported by this project will help improve service reliability and reduce financial losses associated with power outages. Energy Security:	

Integrated planning supported by this project will help stabilize the grid.			
Assignment to Value Chain: Grid Operations/Market Design		**Total Budgeted Project Admin and Overhead Costs:** $74,324	
EPIC Funds Encumbered: $400,000		**EPIC Funds Spent:** $0	
Match Partner and Funding Split:		**Match Funding:** $0	
Leverage Contributors:		**Leveraged Funds:** $0	
Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:**	**Rank of Selected Applicant/ Bidder:**
If not the highest scoring applicant/bidder, explain why selected: Funds were awarded to passing proposals in rank order.			
Treatment of Intellectual Property: Pre-existing intellectual property identified in agreement EPC-15-008 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.			
Update: The research team has created a new beta version of Cal-Adapt with several new enhancements including a new way to display climate projections showing the full range of potential outcomes and selected climate projections. Scripps Institution of Oceanography created the new climate scenarios using an advanced downscaling technique.			

45. EPC-14-019

Project Name: Validated and Transparent Energy Storage Valuation and Optimization Tool [EPC-14-019]	
Recipient/Contractor: Electric Power Research Institute, Inc.	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 4/11/2015 to 12/30/2016
Program Area and Strategic Objective: Applied Research and Development S8: Integrate Grid Level Energy Storage Technologies and Determine Best Applications That Provide Locational Benefits	
Issue: The California Public Utility Commission has set a target of 1.325 GW of energy storage by 2020, however, the role and value of energy storage is not fully understood. The barriers to energy storage use include: high capital costs; lack of information regarding performance; limited operational experience; and lack of comprehensive, publicly available tools that can analyze the financial and technical performance of energy storage systems. Models are needed that optimize grid-level energy storage deployment with respect to location, size, and type.	
Project Description: This project will develop, test, and validate a publicly available computer model for the CPUC's energy storage use cases to determine the most optimal energy storage systems. This software model will assess costs and benefits and will guide energy storage projects with respect to location, size, and type. The software will be publicly released as a cloud-hosted tool.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: This agreement will attempt to develop a "first of its kind" publically available tool that can determine the value of energy storage with respect to location, size, and type.	
CPUC Proceedings addressing issues related to this EPIC project: Energy storage: R.15-03-011 Distribution Resources Plans (AB 327): R.14-08-013 Integration of Distributed Energy Resources (IDER): R. 14-10-003	
Applicable Metrics: CPUC Metrics- 1c, 2a, 3a, 3b, 5b Lower Costs: This Agreement will lower costs by making available a tool for determining the costs and benefits of energy storage projects with with respect to location, size, and type so that the lowest cost solution can be selected. Greater Reliability: This Agreement will increase reliability of the transmission and distribution grid by encouraging greater use of energy storage in the bulk and distribution system to increase resilience to disruptions and intermittency of renewable generation.	

Assignment to Value Chain: Grid Operations/Market Design		**Total Budgeted Project Admin and Overhead Costs:** $482,416	
EPIC Funds Encumbered: $1,000,000.00		**EPIC Funds Spent:** $66,173	
Match Partner and Funding Split: Electric Power Research Institute (EPRI): $901,944 (47.4 %)		**Match Funding:** $901,944	
Leverage Contributors:		**Leveraged Funds:** $0	
Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 38 out of 39	**Rank of Selected Applicant/ Bidder:** Ranked # 4
If not the highest scoring applicant/bidder, explain why selected: Funds were awarded to passing proposals in rank order.			
Treatment of Intellectual Property: Pre-existing intellectual property identified in agreement EPC-14-019 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.			
Update: Project started June 4, 2015. Project Kickoff meeting was held on June 8, 2015. There have been two workshops to determine the use cases for the StorageVET tool on September 1 and December 10, 2015. The use cases for the tool were finalized on December 21. Alpha and Beta Software is expected in the second half of 2016.			

46. EPC-14-023

Project Name: Utility Demonstration of Znyth Battery Technology to Characterize Performance and Grid Benefits [EPC-14-023]	
Recipient/Contractor: Eos Energy Storage, LLC	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 5/8/2015 to 3/31/2017
Program Area and Strategic Objective: Applied Research and Development S8: Integrate Grid Level Energy Storage Technologies and Determine Best Applications That Provide Locational Benefits	
Issue: The California Public Utility Commission has set a target of 1.325 GW of energy storage by 2020, but the role and value of energy storage is not understood. The barriers to energy storage use include: high capital costs; lack of information regarding performance; limited operational experience; and lack of comprehensive, publicly available tools that can analyze the financial and technical performance of energy storage systems. Advanced energy storage technologies and systems need to be developed and demonstrated for eventual deployment by investor owned utilities.	
Project Description: Eos will perform pilot testing of a 125 kW/375 kWh AC-integrated energy storage system consisting of approximately 140 Eos ZnythTM battery modules. The system will be installed at PG&E's Advanced Technology Services laboratory and at the grid simulation testing 'Distribution Test Yard' in San Ramon, CA. System performance will be characterized against a variety of use cases, including peak shaving, ancillary services, load following, and frequency regulation. Eos will model a portion of PG&E's distribution network to create simulated grid conditions that will allow for dynamic testing of the battery before its deployment to the electricity grid. Eos will also model, simulate, and extrapolate the economic impacts of installed grid scale systems and quantify the expected benefits to California utilities and ratepayers.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: This demonstration will provide operational experience and data to better determine the value and cost savings of battery energy storage when interconnected to the grid.	
CPUC Proceedings addressing issues related to this EPIC project: Energy storage: R.15-03-011 Distribution Resources Plans (AB 327): R.14-08-013 Integration of Distributed Energy Resources (IDER): R. 14-10-003	

Applicable Metrics: CPUC Metrics- 1c, 1e, 1i, 2a, 3f, 3h, 4a, 4b, 5a, 5b Lower Costs: This project will determine any cost savings by testing this battery system and determining how well the battery can cost effectively provide the grid with peak shaving, ancillary services, load following, and frequency regulation. These markets and services may provide a revenue stream for energy storage users.			
Assignment to Value Chain: Distribution		**Total Budgeted Project Admin and Overhead Costs:** $691,504	
EPIC Funds Encumbered: $2,156,704		**EPIC Funds Spent:** $0	
Match Partner and Funding Split: Eos Energy Storage, LLC: $1,002,611 (30.2 %) ETM-Electromatic Inc: $69,724 (2.1 %) Stem Inc: $45,272 (1.4 %) Electric Power Research Institute, Inc.: $50,000 (1.5 %)		**Match Funding:** $1,167,607	
Leverage Contributors:		**Leveraged Funds:** $0	
Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 38 out of 39	**Rank of Selected Applicant/ Bidder:** Ranked # 1
If not the highest scoring applicant/bidder, explain why selected: Funds were awarded to passing proposals in rank order.			
Treatment of Intellectual Property: Pre-existing intellectual property identified in agreement EPC-14-023 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.			
Update: The agreement was approved at the Energy Commission's April 2015 business meeting and the kick off meeting was held in August 2015. Eos has successfully executed sub-contracts with project team members PG&E and EPRI. Eos performed a site visit to PG&E's San Ramon technology center, where the Aurora battery system will be installed and tested. Initial turn-key system design and engineering was completed, with final product design and specification expected in Q1 2016. The project team completed a first draft testing plan using battery testing protocols developed by EPRI with broader input from the utility industry.			

47. EPC-14-027

Project Name: High Temperature Hybrid Compressed Air Energy Storage (HTH-CAES) [EPC-14-027]	
Recipient/Contractor: The Regents of the University of California, on behalf of the Los Angeles campus	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 5/8/2015 to 3/31/2017
Program Area and Strategic Objective: Applied Research and Development S8: Integrate Grid Level Energy Storage Technologies and Determine Best Applications That Provide Locational Benefits	
Issue: The California Public Utility Commission has set a target of 1.325 GW of energy storage by 2020, but the role and value of energy storage is not understood. The barriers to energy storage use include: high capital costs; lack of information regarding performance; limited operational experience; and lack of comprehensive, publicly available tools that can analyze the financial and technical performance of energy storage systems. Advanced energy storage technologies and systems need to be developed and demonstrated for eventual deployment by investor owned utilities.	
Project Description: This project will build a fully-functional, low-cost and scalable high temperature hybrid compressed air energy storage (HTH-CAES) system that can efficiently store grid-level energy from renewable sources and release that energy when it is needed to meet peak demand, particularly for ancillary services and load following use-cases. The HTH-CAES system utilizes a state of the art, high temperature energy storage unit to reduce losses in the air compression process. This innovative technology offers a highly efficient, ultra-low cost solution for mitigating intermittent renewables.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: Compressed air energy storage may be a viable solution for long-term and large-scale storage applications. HTH-CAES potentially has lower capital and maintenance cost and less geographic restrictions than other storage technologies. In HTH-CAES technology, compressors are used to convert inexpensive off-peak electric power into compressed air and thermal reservoirs. Industry is interested if HTH-CAES can support large-scale power applications with low capital cost.	
CPUC Proceedings addressing issues related to this EPIC project: Energy storage: R.15-03-011 Distribution Resources Plans (AB 327): R.14-08-013 Integration of Distributed Energy Resources (IDER): R. 14-10-003	

Applicable Metrics: CPUC Metrics- 1c, 1e, 2a, 3h, 4a, 4b, 4c, 5b Lower Costs: The proposed 74 kW system to be quantified has a designed cost of $938/kW and $156/kWh installed. If it achieves a life-time of 15,000 cycles and reaches an efficiency goal of 85%, the levelized cost could be 7 cents/kWh/cycle. Environmental Benefits: HTH-CAES produces no carbon emissions and utilizes a low-waste and environmentally friendly construction. This technology will reduce emissions of CO2, SO2, NOx, and CO by displacing natural gas fired peaker plants.			
Assignment to Value Chain: Distribution		**Total Budgeted Project Admin and Overhead Costs:** $206,222	
EPIC Funds Encumbered: $1,621,628		**EPIC Funds Spent:** $0	
Match Partner and Funding Split:		**Match Funding:** $0	
Leverage Contributors:		**Leveraged Funds:** $0	
Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 38 out of 39	**Rank of Selected Applicant/ Bidder:** Ranked # 3
If not the highest scoring applicant/bidder, explain why selected: Funds were awarded to passing proposals in rank order.			
Treatment of Intellectual Property: Pre-existing intellectual property identified in agreement EPC-14-027 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.			
Update: The agreement was approved at the Energy Commission's April 2015 business meeting and the kick off meeting was held in June 2015. The project is currently underway.			

48. EPC-15-011

Project Name: Isothermal Compressed Air Energy Storage with Solar and Load Forecasting Integration [EPC-15-011]	
Recipient/Contractor: LightSail Energy	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 2/1/2016 to 3/29/2019
Program Area and Strategic Objective: Applied Research and Development S8: Integrate Grid Level Energy Storage Technologies and Determine Best Applications That Provide Locational Benefits	
Issue: This project will help solve several barriers preventing the widespread incorporation of energy storage assets into the grid. This project will provide California utilities with information that can be used in assessing the costs and benefits of isothermal compressed air energy storage (I-CAES) for various use cases as well characterizing the operation of I-CAES. Results will be used to reduce the capital, installation and operation costs of the system, as well as determine areas for performance improvement.	
Project Description: LightSail Energy, along with its partner, the University of California San Diego (UCSD), will design build, operate, monitor, and analyze an I-CAES system on the Eliot Field PV station owned by UCSD. The energy storage system will be a pilot unit for testing the capabilities and performance potential of I-CAES for load following and ancillary services, as well as renewables integration. The project will also gather data needed to reduce the cost of I-CAES, increase its efficiency, and support its incorporation into the California electric grid. The installed energy storage system will be capable of charging from both the installed PV on site and the electric grid (operated by SDG&E) and will be capable of 200kW of discharging power and will store up 800kWh of energy (or 4 hours of discharge at nominal power).	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: This project will provide California utilities with information that can be used in assessing the costs and benefits of I-CAES to reduce the capital, installation and operation costs of the system. This constitutes a step towards meeting the Energy Commission targets of $1,000/kW, $200/kWh, and 80% round trip efficiency for energy storage.	
CPUC Proceedings addressing issues related to this EPIC project: Energy storage: R.15-03-011 Distribution Resources Plans (AB 327): R.14-08-013 Integration of Distributed Energy Resources (IDER): R. 14-10-003	

Applicable Metrics: CPUC Metrics- 1e, 1i, 4a, 5b

Lower Costs:

Lowering the cost of energy storage to $1,000/kW$200kWh (installed). The high capital costs of energy storage due to the lack of information regarding performance, and limited operational experience is a significant barrier to its use.

Greater Reliability:

Reduce distributed PV impact on the grid. Due to the intermittent nature of renewable energy (PV) as well as the increased ramping requirements it places on the grid, reducing these impacts will increase grid reliability.

Economic Development:

I-CAES' potential to be the lowest-cost and longest-lifetime energy storage system on the market can provide beneficial impact on: End-user Bill Management, Resource Adequacy, Flexible Capacity and T&D Support/Deferral.

Consumer Appeal:

The I-CAES system can be sited almost anywhere, including in dense urban areas where traditional energy storage and generation facilities could not be sited due to size, safety and use of hazardous chemicals.

Assignment to Value Chain: Distribution	**Total Budgeted Project Admin and Overhead Costs:** $102,846
EPIC Funds Encumbered: $1,200,276	**EPIC Funds Spent:** $0
Match Partner and Funding Split: LightSail Energy: $779,400	**Match Funding:** $779,400
Leverage Contributors:	**Leveraged Funds:** $0

Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 38 out of 39	**Rank of Selected Applicant/ Bidder:** Ranked # 5

If not the highest scoring applicant/bidder, explain why selected:
Funds were awarded to passing proposals in rank order.

Treatment of Intellectual Property:
Pre-existing intellectual property identified in agreement EPC-15-011 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.

Update:

The grant was approved at an Energy Commission Business Meeting in December 2015.

49. EPC-14-077

Project Name: Enable Standardized Vehicle-Grid Integration through Development of Universal Standard [EPC-14-077]	
Recipient/Contractor: Center for Sustainable Energy	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 6/30/2015 to 6/30/2018
Program Area and Strategic Objective: Applied Research and Development S9: Advance Technologies and Strategies That Optimize the Benefits of Plug in Electric Vehicles to the Electricity System	
Issue: California utilities are currently working to meet the State's Renewables Portfolio Standard of 33% by 2020, while simultaneously planning for the 1.5 million zero-emission vehicles that will be deployed by 2025, with over 130,000 plug-in vehicles (PEVs) sold since 2011. The State's vision to achieve cross-cutting benefits from these two separate yet interconnected efforts, however, requires new thinking on precisely how electric system operators can leverage and utilize PEVs as beneficial Distributed Energy Resources without compromising safety, data security, consumer simplicity or the mobility needs of the PEV owner.	
Project Description: The project will design and develop a Demand Clearing House (DCH) to monitor published energy pricing from the California Independent System Operator's Fifteen-Minute Energy Market as well as load forecasts from San Diego Gas & Electric and other participating utilities through an Application Programming Interface translation from Open ADR 2.0b, a Demand Response protocol used by all California Investor Owned Utilities. The DCH will then use algorithms that convert grid conditions into ISO/IEC 15118 “grid profiles," or Tariff Tables, which in turn will be communicated to 15118-capable charging stations and vehicles. The DCH will allow utilities to respond to supplemental energy market prices, proving a viable and scalable pathway toward using plug-in electric vehicles to manage variable grid conditions, solar oversupply, and other system wide challenges.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State’s Statutory Energy Goals: This project will provide greater reliability, lower costs, and increased safety for California IOU ratepayer. The project will provide California with an open protocol that enables large amounts of new, low cost flexible capacity on the grid. It will minimize potential stranded investments in less cost effective forms of flexible grid resources, maximize renewable and PEV integration, and promote a safer, more reliable low carbon future.	
CPUC Proceedings addressing issues related to this EPIC project: Alternative Fueled Vehicles: R.13-11-007 Smart grid: R.08-12-009	

Applicable Metrics: CPUC Metrics- 4a, 4b Greater Reliability: Better integration of more plug-in electric vehicles onto the grid as distributed energy resources will help address renewable energy intermittency.			
Assignment to Value Chain: Grid Operations/Market Design		**Total Budgeted Project Admin and Overhead Costs:** $193,033	
EPIC Funds Encumbered: $1,499,999		**EPIC Funds Spent:** $114,656	
Match Partner and Funding Split: KnGrid: $100,000 (6.3 %)		**Match Funding:** $100,000	
Leverage Contributors:		**Leveraged Funds:** $0	
Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 25 out of 25	**Rank of Selected Applicant/ Bidder:** Ranked # 2
If not the highest scoring applicant/bidder, explain why selected: Funds were awarded to passing proposals in rank order.			
Treatment of Intellectual Property: Pre-existing intellectual property identified in agreement EPC-14-077 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.			
Update: CSE has developed the Demand Clearing House specifications and have begun recruiting participants for the demonstration phase. CSE continues to develop the M&V plan.			

50. EPC-14-078

Project Name: Next-Generation Grid Communication for Residential PEVs [EPC-14-078]	
Recipient/Contractor: ChargePoint, Inc.	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 6/30/2015 to 6/30/2018
Program Area and Strategic Objective: Applied Research and Development S9: Advance Technologies and Strategies That Optimize the Benefits of Plug in Electric Vehicles to the Electricity System	
Issue: Currently there are no adequate communication interfaces that allow communication between utilities, charging stations, and residential plug-in electric (PEV) vehicle customers. While there is some capability for aggregated commercial charging applications to provide grid stability, residential PEV participation in grid stabilization requires significantly more fine-grained data collection, coordination of charging at stations owned by different parties, and sensitivity to each driver's needs and preferences as well as a real-time understanding of each vehicle's state of charge or charge needed before next departure.	
Project Description: The project will develop communication interfaces between PEV customers and utilities using cloud-to-cloud OpenADR 2.0b communication with a vehicle charging network and will leverage emerging means for retrieving vehicle information via the ISO/IEC 15118 standard for consideration in the decision process. The communication will be able to gather customer data and receive signals from a third party (utility) for the purpose of optimizing PEV charging in a mutually beneficial manner to the customer and the utility. In addition to investigation and implementation of the ISO/IEC 15118 standard, the project will also investigate using control methods that do not require having vehicle charging information. This may be done through statistical estimation, rate of charge output from charging stations or driver opt-in based on maximum charge needed.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: This project will result in the ratepayer benefits of greater electricity reliability and lower or deferred costs in upgrading local distribution infrastructure by providing a mechanism for demand management for local distribution networks, specifically managing PEV charging with input from PEV customers, vehicles, and utility signals.	
CPUC Proceedings addressing issues related to this EPIC project: Alternative Fueled Vehicles: R.13-11-007 Smart grid: R.08-12-009	

Applicable Metrics: Greater Reliability: The methodology developed under this agreement will assess and test the real time potential for residential smart chargers to respond to utility signaling to support grid stabilization.			
Assignment to Value Chain: Demand-side Management		**Total Budgeted Project Admin and Overhead Costs:** $139,418	
EPIC Funds Encumbered: $1,500,000		**EPIC Funds Spent:** $0	
Match Partner and Funding Split: ChargePoint, Inc.: $142,500 (8.7 %)		**Match Funding:** $142,500	
Leverage Contributors:		**Leveraged Funds:** $0	
Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 25 out of 25	**Rank of Selected Applicant/ Bidder:** Ranked # 1
If not the highest scoring applicant/bidder, explain why selected: Funds were awarded to passing proposals in rank order.			
Treatment of Intellectual Property: Pre-existing intellectual property identified in agreement EPC-14-078 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.			
Update: ChargePoint is currently developing the communication interface and testing protocols to enable level 2 alternating current chargers to exchange data and control messages with plug-in electric vehicles.			

51. EPC-14-086

Project Name: Distribution System Aware Vehicle to Grid Services for Improved Grid Stability and Reliability [EPC-14-086]	
Recipient/Contractor: Electric Power Research Institute, Inc.	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 8/1/2015 to 6/30/2018
Program Area and Strategic Objective: Applied Research and Development S9: Advance Technologies and Strategies That Optimize the Benefits of Plug in Electric Vehicles to the Electricity System	
Issue: Several barriers must be overcome for plug-in electric vehicles to become viable distributed energy resources, including inconsistent data communication approaches among PEVs, a lack of situational awareness of the PEVs relative to grid state, fragmented technology and standards preventing interoperability and inclusion of vehicle-to-grid (V2G) resources into applicable distribution and independent system operator grid services related programs. In addition, there is limited availability of on- or off-vehicle V2G systems on scale from original equipment manufacturers (OEMs) because OEMs do not see their value to end customers.	
Project Description: The project will develop an integrated vehicle-to-grid (V2G) system that can be tested and demonstrated to be distribution-aware, self-regulating, interoperable, secure and open as well as scalable and flexible. These real-world tests and demonstrations will provide confidence in the V2G systems that provide grid support functions and possibly influence investor owned utilities (IOUs) to add them to their Assembly Bill 2514 Storage Mandate compliance plans. The data gathered will also enable validation of cost effectiveness models through direct engagement with the IOUs' existing infrastructure and distribution networks, combined with simulated independent system operator interaction.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: Plug-in electric vehicles with integrated vehicle-to-grid systems have the potential to simultaneously improve air quality, reduce vehicle operational costs and have the potential to reduce grid stress and increase grid reliability and stability.	
CPUC Proceedings addressing issues related to this EPIC project: Alternative Fueled Vehicles: R.13-11-007 Smart grid: R.08-12-009	

Applicable Metrics: Greater Reliability: Vehicle to grid technologies provide ancillary support to the grid during gaps in service and when addressing renewable generation intermittency.			
Assignment to Value Chain: Grid Operations/Market Design		**Total Budgeted Project Admin and Overhead Costs:** $666,988	
EPIC Funds Encumbered: $1,499,977		**EPIC Funds Spent:** $13,228	
Match Partner and Funding Split: Electric Power Research Institute (EPRI): $795,754 (53.1 %)		**Match Funding:** $0	
Leverage Contributors:		**Leveraged Funds:** $0	
Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 25 out of 25	**Rank of Selected Applicant/ Bidder:** Ranked # 3
If not the highest scoring applicant/bidder, explain why selected: Funds were awarded to passing proposals in rank order.			
Treatment of Intellectual Property: Pre-existing intellectual property identified in agreement EPC-14-086 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.			
Update: EPRI has developed the system requirements, architecture, and design parameters as well as the test protocols for the proposed V2G communication system.			

52. EPC-14-062

Project Name:

Bringing Energy Efficiency Solutions to California's Water Sector With the Use of Customized Energy Management System and Supervisory Control and Data Acquisition System

[EPC-14-062]

Recipient/Contractor:

The Regents of the University of California on behalf of the Riverside campus

Investment Plan:	**Project Term:**
2012-2014 Triennial Investment Plan	7/1/2015 to 3/29/2019

Program Area and Strategic Objective:

Technology Demonstration and Deployment

S12: Demonstrate and Evaluate the Technical and Economic Performance of Emerging Energy Efficiency and Demand-Side Management Technologies and Strategies

Issue:

Many water and wastewater treatment facilities in California have a variety of older energy consuming equipment from different vendors each having their own unique communication protocols. Upgrades, modernization and of integration of control equipment of various vintages presents serious communication challenges for optimizing energy efficiency and peak demand management.

Project Description:

This project will demonstrate and deploy energy management and supervisory control and data acquisition (SCADA) system strategies that can improve energy efficiency while reducing peak loads and electricity costs in the delivery and treatment of water in California. This new system will use the existing SCADA system without disrupting current operations. This project will involve water agencies that pump ground water and surface water, and that handle reclaimed water, in large, medium, and small quantities.

How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals:

This project will highlight a pathway for water agencies in California to increase energy efficiency and reduce their peak energy consumption with no decrement in service or reliability by overcoming communication challenges with different vintages and vendors of control equipment. Better pump and other equipment management will reduce energy costs; especially during peak demand periods when energy costs are most expensive.

CPUC Proceedings addressing issues related to this EPIC project:

Demand Response (DR): R.13-09-011
Energy Efficiency Strategic Plan update and action plans: EE Strategic Plan docs

Applicable Metrics: CPUC Metrics- 1e, 1h, 4a

Lower Costs:

The project could reduce energy costs for California water treatment facilities due to lower costs or demand related charges which are related to power use based on time of day.

Environmental Benefits:

By lowering peak demand, the project could reduce greenhouse gas emissions. Fast start peaker plants used during periods of peak demand; particularly on the hottest days of summer typically produce more emissions of GHG and criteria pollutants.			
Assignment to Value Chain: Demand-side Management		**Total Budgeted Project Admin and Overhead Costs:** $452,544	
EPIC Funds Encumbered: $3,017,034		**EPIC Funds Spent:** $55,524	
Match Partner and Funding Split: Opto 22: $94,198 (2.0 %) OSISoft, LLC: $1,081,469 (22.8 %) Regents of the University of California, Riverside Campus: $123,709 (2.6 %)		**Match Funding:** $1,722,732	
Leverage Contributors: Opto 22 : $94,198 OSISoft, LLC : $1,081,469		**Leveraged Funds:** $0	
Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 53 out of 62	**Rank of Selected Applicant/ Bidder:** Ranked # 3
If not the highest scoring applicant/bidder, explain why selected: Funds were awarded to passing proposals in rank order.			
Treatment of Intellectual Property: Pre-existing intellectual property identified in agreement EPC-14-062 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.			
Update: Kick off meeting held. The contractor is doing an initial assessment of site conditions at the 3 proposed demonstration sites. Project was highlighted at the EPIC Symposium December 3.			

53. EPC-14-063

Project Name: Advance Wastewater Treatment Using Forward Osmosis to Produce High Quality Water [EPC-14-063]	
Recipient/Contractor: Porifera, Inc.	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 6/30/2015 to 3/29/2019
Program Area and Strategic Objective: Technology Demonstration and Deployment S12: Demonstrate and Evaluate the Technical and Economic Performance of Emerging Energy Efficiency and Demand-Side Management Technologies and Strategies	
Issue: Industrial-scale water treatment systems have the potential to save energy, reduce wastewater volumes, and generate pure water streams on-site. However, many industrial wastewaters are very difficult to treat, as they contain high levels of dissolved and suspended solids, making low cost treatment with membrane-based systems ineffectual.	
Project Description: This project will demonstrate an advanced water treatment technology that produces high quality water while reducing energy, chemicals and maintenance required for treatment of industrial waste waters. The project includes technological advancements in membrane development and module design in forward osmosis to address cost and performance issues. The demonstration projects will occur at a winery, frozen food facility and a soap company. Each demonstration will document energy savings and potential for this technology to purify, concentrate and reuse challenging wastewaters that contains high levels of contaminants. This technology has the potential for application in the food and beverage, oil and gas, and other industrial sectors.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: Treatment of industrial wastewater is very challenging because of the high solids, pulps, free and emulsified oils and greases and their high chemical and biological oxygen demand. If the project is successful then this technology could be used to treat challenging wastewaters to achieve high purity and provide high temperature water for reuse while using less energy than other processes. Reclaiming water for onsite reuse will reduce the need for fresh water purchases.	
CPUC Proceedings addressing issues related to this EPIC project: Water-Energy Nexus: R.13-12-011 Energy Efficiency Proceedings: R.13-11-005, R. 12-01-005, R.09-11-014	
Applicable Metrics: CPUC Metrics- 1f, 1h, 3e, 4a, 4c Lower Costs: This technology will treat challenging industrial wastewaters for water reuse and	

can result in energy and water saving benefits and also cost savings. Environmental Benefits: By reducing electricity use and water use, the project could reduce greenhouse gas emissions. With broad adoption, the technology could enable the reuse of industrial wastewaters rather than being disposed in the sewer system.			
Assignment to Value Chain: Demand-side Management		**Total Budgeted Project Admin and Overhead Costs:** $964,131	
EPIC Funds Encumbered: $3,230,420		**EPIC Funds Spent:** $461,233	
Match Partner and Funding Split: CDM Smith, Inc. : $9,885 (0.3 %) Porifera, Inc.: $417,108 (10.8 %) Jackson Family Wines : $99,800 (2.6 %) Dr. Bronner's Magic Soaps : $69,700 (1.8 %) Wawona Frozen Foods : $50,000 (1.3 %)		**Match Funding:** $646,493	
Leverage Contributors:		**Leveraged Funds:** $0	
Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 53 out of 62	**Rank of Selected Applicant/ Bidder:** Ranked # 2
If not the highest scoring applicant/bidder, explain why selected: Funds were awarded to passing proposals in rank order.			
Treatment of Intellectual Property: Pre-existing intellectual property identified in agreement EPC-14-063 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.			
Update: The project is underway, kick off meeting held, construction underway, and equipment being ordered. This project was highlighted at the 2015 EPIC Symposium.			

54. EPC-14-065

Project Name: Demonstration of Forward Osmosis to Produce Juice Concentrate, Purify and Reuse Wastewater and Reduce Energy Use [EPC-14-065]	
Recipient/Contractor: Porifera, Inc.	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 6/30/2015 to 3/29/2019
Program Area and Strategic Objective: Technology Demonstration and Deployment S12: Demonstrate and Evaluate the Technical and Economic Performance of Emerging Energy Efficiency and Demand-Side Management Technologies and Strategies	
Issue: There is a need for energy efficient methods to concentrate food and beverage products and wastes under varying processing conditions and operations while preserving or improving product quality. Food and beverage operators are eager to implement new methods, but first need to be convinced of the effectiveness without compromising the high quality standards of California's food and beverage products.	
Project Description: This project will demonstrate a new technology innovation to reduce the energy, chemicals, and maintenance required for food and beverage processing and waste concentration. The technology uses forward osmosis and reverse osmosis in an energy efficient way to achieve the equipment performance of an evaporator and that, in addition, generates purified water streams for reuse. When designed and implemented correctly, the technology can save energy and money.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: If successful, this technology can save thermal and electrical energy for each facility and eliminate the use of evaporators for making juice concentrates. Evaporators require massive amounts of steam created from boilers to produce concentrate, and boilers need massive amounts of fuel in creating that steam.	
CPUC Proceedings addressing issues related to this EPIC project: Water-Energy Nexus: R.13-12-011 Energy Efficiency Proceedings: R.13-11-005, R. 12-01-005, R.09-11-014	
Applicable Metrics: CPUC Metrics- 1f, 1h, 4a, 4c Lower Costs: This technology could lower energy use and costs. Environmental Benefits: Since this technology could lower energy use, it could lower greenhouse gas emissions. Also the project has the potential to reuse on-site wastewater for non-process uses.	

Assignment to Value Chain: Demand-side Management		**Total Budgeted Project Admin and Overhead Costs:** $621,536	
EPIC Funds Encumbered: $2,499,289		**EPIC Funds Spent:** $553,342	
Match Partner and Funding Split: CDM Smith, Inc. : $9,885 (0.3 %) Porifera, Inc.: $233,108 (7.5 %) Los Gatos Tomato: $385,575 (12.3 %)		**Match Funding:** $628,568	
Leverage Contributors:		**Leveraged Funds:** $0	
Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 53 out of 62	**Rank of Selected Applicant/ Bidder:** Ranked # 7
If not the highest scoring applicant/bidder, explain why selected: Funds were awarded to passing proposals in rank order.			
Treatment of Intellectual Property: Pre-existing intellectual property identified in agreement EPC-14-065 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.			
Update: The project is underway. Kick off meeting held, construction underway, equipment has been ordered. The technology was highlighted at the 2015 EPIC Symposium.			

55. EPC-14-070

Project Name: Wexus Energy and Water Management Mobile Software for the Agricultural Industry [EPC-14-070]	
Recipient/Contractor: GDRU Energy Solutions LLC (dba Wexus Technologies)	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 6/30/2015 to 3/29/2019
Program Area and Strategic Objective: Technology Demonstration and Deployment S12: Demonstrate and Evaluate the Technical and Economic Performance of Emerging Energy Efficiency and Demand-Side Management Technologies and Strategies	
Issue: California's agricultural industry is one of the state's largest users of energy and water and has been historically underserved by a lack of effective efficiency technologies. The agriculture industry is also rapidly transitioning to the next generation of technology: mobile, cloud-based software, big data, and connected devices in the field. The combination of rising energy rates, increasing regulation and reporting, drought and changing weather patterns is driving demand for new agricultural energy efficiency solutions. Farmers currently can't manage what they don't measure, leading to higher operational costs for farms.	
Project Description: This project will deploy the Wexus (Water-Energy Nexus) mobile, cloud-based software platform into California's agricultural industry. The Wexus platform leverages existing utility meter infrastructure and helps agribusinesses to quickly assess energy (and water) usage and cost from virtually anywhere on any mobile device. Through customized alerts and reporting, the platform allows farms to quickly respond to changes in energy usage, adjust and optimize equipment in the field, and reduce operational expenses due to energy costs. Through collaboration with project partners, this project will further extend existing water-energy data analysis, visualization and remote controlling capabilities to the Wexus platform to further optimize water-energy resource management in the agribusiness sector.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: The Wexus platform uses site data and electric and water utility data to estimate how energy is used on-farm. The data is translated into reports and informs the farmer when to turn off equipment in order to participate in demand response programs. The technology could save farmers about 10% in energy and water bills. The following are the estimated savings over three years for the 3 demonstration farms: 2.4 million kWh, 4000 acre feet of water, 600 metric tons of GHG and more than $400,000.	
CPUC Proceedings addressing issues related to this EPIC project: Demand Response (DR): R.13-09-011 Water-Energy Nexus: R.13-12-011 Energy Efficiency Strategic Plan update and action plans: EE Strategic Plan docs	

Applicable Metrics: CPUC Metrics- 1e, 1f, 1h, 4c Lower Costs: The project could reduce energy costs (and water costs where possible) for California farmers who may use Wexus Software solution to monitor their onsite electricity and water use. (Consistent with CPUC metrics 1f, 1h, and 4c). Greater Reliability: The project could reduce the demand on the grid from California farms that may use the Wexus Software solution to make informed decisions on the cost/benefit of participating in utility sponsored demand response programs. (Consistent with CPUC metrics 1e).			
Assignment to Value Chain: Demand-side Management		**Total Budgeted Project Admin and Overhead Costs:** $571,397	
EPIC Funds Encumbered: $4,000,000		**EPIC Funds Spent:** $773,638	
Match Partner and Funding Split: Wexus Technologies, Incorporated: $1,000,000 (20.0 %)		**Match Funding:** $1,000,000	
Leverage Contributors:		**Leveraged Funds:** $0	
Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 53 out of 62	**Rank of Selected Applicant/ Bidder:** Ranked # 3
If not the highest scoring applicant/bidder, explain why selected: Funds were awarded to passing proposals in rank order.			
Treatment of Intellectual Property: Pre-existing intellectual property identified in agreement EPC-14-070 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.			
Update: The project kick-off meeting was held on June 30th and the project team is currently conducting site-visits to determine baseline energy (and water where possible) usage. This project was highlighted at the 2015 EPIC Symposium.			

56. EPC-14-076

Project Name:

Raw Wastewater Filtration to Increase Organic Removal Efficiency and Achieve Significant Electrical Savings

[EPC-14-076]

Recipient/Contractor:

Kennedy/Jenks Consultants, Inc.

Investment Plan:	**Project Term:**
2012-2014 Triennial Investment Plan	6/30/2015 to 3/29/2019

Program Area and Strategic Objective:

Technology Demonstration and Deployment

S12: Demonstrate and Evaluate the Technical and Economic Performance of Emerging Energy Efficiency and Demand-Side Management Technologies and Strategies

Issue:

The secondary biological wastewater treatment process is usually the most energy intensive process of a wastewater treatment plant (WWTP). The most common secondary biological treatment method is called the "activated sludge process", and is accomplished by aerating wastewater. On average the activated sludge process accounts for 40 to 60 percent of total WWTP electricity consumption. The electricity used for aeration is proportional to the organic load entering the aerated activated sludge process. Achieving a higher degree of removal of the organic load before the aerated activated sludge process provides a breakthrough opportunity to reduce electricity consumption.

Project Description:

This project will extend the application of Cloth Depth Filters (CDF) to raw wastewater filtration at three wastewater treatment plants in California. The CDF concept replaces the current technology of primary clarification by offering the following advantages: (1) substantially higher removal of organic load resulting in significantly lower aeration electrical power demand, and (2) smaller footprint requirements both for primary and secondary treatment steps. CDF employs established principles of gravitational forces which results in minimal operational and maintenance complexities. The unique attribute which offers promise for CDF technology in raw wastewater is the vertical placement of the filter medium and flow direction of this filtration process. Unlike prevailing filtration systems, the vertical orientation of the filter medium permits heavy solids to settle within the tank.

How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals:

If the project is successful, the application of CDF to wastewater filtration could result in 35 percent aeration electrical savings. Assuming 10 percent market implementation by the wastewater treatment sector, this could result in annual savings of 34 million kWh and $3.6 million in reduced operating costs.

CPUC Proceedings addressing issues related to this EPIC project:

Energy Efficiency Strategic Plan update and action plans: EE Strategic Plan docs

Applicable Metrics: CPUC Metrics- 1f, 1h, 4a Lower Costs: The project could reduce the cost of wastewater plant operations within California by reducing wastewater treatment plant electricity consumption (CPUC Metrics 1f and 1h). Environmental Benefits: By reducing electricity consumption, this project could reduce greenhouse gas emissions.			
Assignment to Value Chain: Demand-side Management		**Total Budgeted Project Admin and Overhead Costs:** $1,184,735	
EPIC Funds Encumbered: $3,476,085		**EPIC Funds Spent:** $78,883	
Match Partner and Funding Split: Kennedy/Jenks Consultants: $38,400 (0.8 %) Aqua-Aerobic Systems, Inc.: $631,000 (13.2 %) Process Wastewater Technologies LLC: $552,300 (11.6 %) Linda County Water District: $29,640 (0.6 %) Water Environment Research Foundation: $25,000 (0.5 %) Regents of the University of California (University of California, Davis): $12,000 (0.3 %)		**Match Funding:** $1,288,340	
Leverage Contributors:		**Leveraged Funds:** $0	
Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 53 out of 62	**Rank of Selected Applicant/ Bidder:** Ranked # 5
If not the highest scoring applicant/bidder, explain why selected: Funds were awarded to passing proposals in rank order.			
Treatment of Intellectual Property: Pre-existing intellectual property identified in agreement EPC-14-076 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.			
Update: The project kick-off meeting was held on June 30th and the project team is currently in the design phase. This project was highlighted at the 2015 EPIC Symposium.			

57. EPC-14-081

Project Name:

Irrigation Optimization and Well Pump Monitoring to Reduce Energy and Water Consumption

[EPC-14-081]

Recipient/Contractor:

PowWow Energy, Inc.

Investment Plan:	**Project Term:**
2012-2014 Triennial Investment Plan	6/15/2015 to 12/29/2017

Program Area and Strategic Objective:

Technology Demonstration and Deployment

S12: Demonstrate and Evaluate the Technical and Economic Performance of Emerging Energy Efficiency and Demand-Side Management Technologies and Strategies

Issue:

Annual electricity used to supply water to farms is estimated to be 10 TWh per year, or about 4% of California's total electricity usage. This usage increases significantly in drought years due to the need to pump water from increasingly deeper wells. In 2014, California growers extracted an estimated additional 5 million acre-feet of groundwater from aquifers to compensate for the lack of surface water and rain, resulting in an additional $454 million of energy costs for water pumping. This usage of groundwater is not sustainable, and resulted in the Governor recently signing a law (SB1168) to require growers to monitor groundwater extraction.

Project Description:

This project will demonstrate a software tool that links groundwater extraction with smart meter data to provide growers with automated information on energy and water consumption. This data is augmented by weather data and optional soil moisture data from local sensors to provide information to growers regarding irrigation needs. Use of the software program could help inform growers and reduce irrigation while maintaining or optimizing yield. The technology will be applied to over 1,579 acres of farms owned by several growers of alfalfa, tomato, pistachios and almonds.

How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals:

The deployment of this technology could result in energy savings of approximately 20 percent due to reduction in pumping energy. For the affected demonstration farms, this could annually save approximately 396,786 kWh and 992 Acre-feet of water.

CPUC Proceedings addressing issues related to this EPIC project:

Customer Data Access Program: Applications A.12-03-002, 003, 004. Decisions D.11
Water-Energy Nexus: R.13-12-011

Applicable Metrics: CPUC Metrics- 1f, 1h, 4a, 4c

Lower Costs:

Supplying water for on-farm irrigation is an energy intensive task (especially for groundwater pumped from wells) that results in a large expense for growers. This technology could lower electricity costs associated with water pumping for farms.

Additionally, optimized irrigation may reduce water use and could increase crop yield. Environmental Benefits: Reduction in energy use will result in reductions in greenhouse gas emissions. Reduction in water use will lessen the impact on ground water pumping and issues associated with subsidence, especially in the Central Valley.			
Assignment to Value Chain: Demand-side Management		**Total Budgeted Project Admin and Overhead Costs:** $332,162	
EPIC Funds Encumbered: $2,292,829		**EPIC Funds Spent:** $364,187	
Match Partner and Funding Split: UC Santa Barbara: $83,401 (2.9 %) UC Davis: $83,469 (3.0 %) PowWow Energy, Inc.: $368,698 (13.0 %)		**Match Funding:** $535,568	
Leverage Contributors:		**Leveraged Funds:** $0	
Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 53 out of 62	**Rank of Selected Applicant/ Bidder:** Ranked # 1
If not the highest scoring applicant/bidder, explain why selected: Funds were awarded to passing proposals in rank order.			
Treatment of Intellectual Property: Pre-existing intellectual property identified in agreement EPC-14-081 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.			
Update: Kickoff meeting completed. Contractor has begun analyzing data collected at sites. This project was highlighted at the 2015 EPIC Symposium.			

58. EPC-14-088

Project Name: Demonstration of Low-Cost Liquid Cooling Technology for Data Centers [EPC-14-088]	
Recipient/Contractor: Asetek	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 6/13/2015 to 3/29/2019
Program Area and Strategic Objective: Technology Demonstration and Deployment S12: Demonstrate and Evaluate the Technical and Economic Performance of Emerging Energy Efficiency and Demand-Side Management Technologies and Strategies	
Issue: Data centers consume a disproportionate amount of electricity in California. As traditional building efficiency improves, data centers continue to grow in size and power. Approximately 40% of the electricity used in data centers goes just to cool them. Since California is home to many data centers, improving data center cooling efficiency represents one of the major energy efficiency measures for this sector.	
Project Description: This project will validate the performance, reliability, cost savings and payback of a data center efficiency technology that uses direct-to-chip liquid-cooling to cut data center cooling energy use. The technology will be demonstrated at two full scale data center installations and the deployment will occur with minimal operational disruptions during installation. Energy consumption, load, reliability and server performance will be monitored. The results of the demonstrations, along with "lessons learned", will be made broadly available to the data center community and public-policy makers to stimulate adoption of this technology.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: If successful, the project would validate the performance, reliability, cost savings and payback of a data center efficiency technology that could reduce cooling costs while being able to be installed as a retrofit. This could lead to overcoming barriers to adoption by minimizing operational disruptions and costs compared with conventional installations and retrofits.	
CPUC Proceedings addressing issues related to this EPIC project: Energy Efficiency Strategic Plan update and action plans: EE Strategic Plan docs	
Applicable Metrics: CPUC Metrics- 1f, 1h, 4a Lower Costs: This technology could reduce electricity use and cost for cooling data centers. Environmental Benefits: The reduction of statewide data center annual energy consumption could result in significant GHG savings of CO2e/year.	

Assignment to Value Chain: Demand-side Management		**Total Budgeted Project Admin and Overhead Costs:** $1,038,931	
EPIC Funds Encumbered: $3,552,678		**EPIC Funds Spent:** $101,650	
Match Partner and Funding Split: Asetek USA, Inc.: $303,726 (6.0 %) University of California, San Diego, San Diego Supercomputer Center: $1,200,000 (23.7 %) Lawrence Berkeley National Laboratory: $16,012 (0.3 %)		**Match Funding:** $1,519,738	
Leverage Contributors:		**Leveraged Funds:** $0	
Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 53 out of 62	**Rank of Selected Applicant/ Bidder:** Ranked # 3
If not the highest scoring applicant/bidder, explain why selected: Funds were awarded to passing proposals in rank order.			
Treatment of Intellectual Property: Pre-existing intellectual property identified in agreement EPC-14-088 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.			
Update: The agreement was approved at the Energy Commission's June 2015 business meeting and the kick off meeting was held in June 2015. The project is currently underway.			

59. EPC-15-012

Project Name: Improving Membrane Treatment Energy Efficiency through Monitoring the Removal of Colloidal Particle Foulants [EPC-15-012]	
Recipient/Contractor: Kennedy/Jenks Consultants, Inc.	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 1/30/2016 to 3/29/2019
Program Area and Strategic Objective: Technology Demonstration and Deployment S12: Demonstrate and Evaluate the Technical and Economic Performance of Emerging Energy Efficiency and Demand-Side Management Technologies and Strategies	
Issue: Currently, there are no techniques available to measure the levels of colloidal particles directly in wastewater, and minimize their deposition in membrane pores. As many utilities do not pretreat the in-coming wastewater prior to membrane treatment, this results in membrane fouling and high energy use.	
Project Description: The purpose of this Agreement is to demonstrate a technology that directly measures the colloidal particle concentration and size in treated wastewater prior to going through membranes that are used in water reclamation facilities. This will reduce energy use by identifying appropriate pre-treatment needed to minimize membrane fouling.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: If this project is successful, it will overcome barriers to the use of membrane treatment and could reduce energy use by reducing the build-up in membrane pores and removing colloidal particles in the feed water. The anticipated benefits include reducing the energy associated with the membrane treatment process and the cost of water reclamation.	
CPUC Proceedings addressing issues related to this EPIC project: Water-Energy Nexus: R.13-12-011 Energy Efficiency Strategic Plan update and action plans: EE Strategic Plan docs	
Applicable Metrics: CPUC Metrics- 1f, 1h, 4a Lower Costs: The project could reduce the frequency of cleaning and membrane replacement and reduce energy use and cost. Environmental Benefits: By reducing energy use, the project could reduce greenhouse gas emissions.	
Assignment to Value Chain: Demand-side Management	**Total Budgeted Project Admin and Overhead Costs:** $429,784

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Orange County Water District: $60,000
West Basin Municipal Water District: $50,000
Evoqua Water Technologies: $6,000</td><td colspan="2">Match Funding:
$336,000</td></tr>
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Grant</td><td>No. of Passing Applicants/ Bidders:
53 out of 62</td><td>Rank of Selected Applicant/ Bidder:
Ranked # 9</td></tr>
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Funds were awarded to passing proposals in rank order.</td></tr>
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Pre-existing intellectual property identified in agreement EPC-15-012 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.</td></tr>
<tr><td colspan="4">Update:
This agreement was approved at the December 2015 Business Meeting.</td></tr>
</table>

60. EPC-14-022

Project Name: The Lakeview Farms Dairy Biogas - To - Electricity Project [EPC-14-022]	
Recipient/Contractor: ABEC #3 LLC, dba Lakeview Farms Dairy Biogas	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 5/15/2015 to 5/14/2019
Program Area and Strategic Objective: Technology Demonstration and Deployment S13: Demonstrate and Evaluate Emerging Clean Energy Generation Technologies and Deployment Strategies	
Issue: The reasons in favor of dairy-based bioenergy generation systems are compelling; however, many factors hinder their financing, development, demonstration, and deployment. Important factors are the economics and that dairy farmers lack expertise in electricity generation and are not interested in becoming energy managers. California Bioenergy and some dairy farmers in the San Joaquin Valley are pursuing an ownership structure, in which multiple dairies pool their interest across multiple biogas electricity and fuel production projects. This model could be used for California dairy farms interested in dairy biogas systems, but concerned about the economic and technical risks.	
Project Description: ABEC #3 LLC, DBA Lakeview Farms Dairy Biogas will install and demonstrate an innovative covered lagoon digester system that will process dairy manure into biogas to generate renewable electricity for export to the electricity distribution grid. This particular project is located near 11 other dairies and will help launch the state's first "hub-and-spoke" dairy digester cluster by preparing the 1 MW generator platform to accept 2 MWs of future capacity potentially utilizing biogas from neighboring dairies. This hub and spoke approach was initially proposed in a case study prepared for the USDA on the economic feasibility of dairy digester clusters in California. The idea is to allow the dairies to benefit from the aggregation of capital investment and reduce operation and management costs by centrally locating the generators and associated electrical equipment.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: The project will significantly reduce methane emissions and generate renewable electricity helping to achieve the State's GHG emission reductions and renewable electricity goals. The improved digester design will decrease dairy operating costs and provide valuable co-products, such as nutrient-rich, more absorbable irrigation water. Further, this hub and spoke model, if successful, could lead to the development of more dairy digester biogas-to-electricity projects.	
CPUC Proceedings addressing issues related to this EPIC project: Renewables Portfolio Standard: R.11-05-005 SB 1122 Bioenergy feed-in tariff: R.11-05-005	

Applicable Metrics: CPUC Metrics- 3h, 4a, 4e

Lower Costs:

The project aims to demonstrate a system that ultimately reduces dairy digester project costs by participating in electricity energy markets and taking advantage of economies of scale from the planned hub and spoke build-out.

Increase Safety:

By employing state-of-the-art controls and best practices for safety, the proposed system will help maintain the safety of the grid as well as safety for those operating and managing the system.

Environmental Benefits:

The project will deploy new renewable power generation and destroy methane gas currently vented into the atmosphere. The double-lined lagoon enhances groundwater protection by minimizing leaching of manure into underlying groundwater.

Consumer Appeal:

The project will improve odor control, through hydrogen sulfide removal, an issue important to the dairy employees and benefits the local community.

Assignment to Value Chain: Generation		**Total Budgeted Project Admin and Overhead Costs:** $32,107	
EPIC Funds Encumbered: $4,000,000		**EPIC Funds Spent:** $26,173	
Match Partner and Funding Split: Caterpillar Financial Services Corporation: $4,500,000 (52.9 %)		**Match Funding:** $4,500,000	
Leverage Contributors:		**Leveraged Funds:** $0	
Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 23 out of 23	**Rank of Selected Applicant/ Bidder:** Ranked # 1

If not the highest scoring applicant/bidder, explain why selected:

Funds were awarded to passing proposals in rank order.

Treatment of Intellectual Property:

Pre-existing intellectual property identified in agreement EPC-14-022 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.

Update:

A project kick-off meeting was held in June 2015. Technical progress is underway, and all of the 2015 progress reports were delivered.

61. EPC-14-029

Project Name: The West Star North Dairy Biogas-to -Electricity Project [EPC-14-029]	
Recipient/Contractor: ABEC #2 LLC, dba West Star North Dairy Biogas	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 5/15/2015 to 3/29/2019
Program Area and Strategic Objective: Technology Demonstration and Deployment S13: Demonstrate and Evaluate Emerging Clean Energy Generation Technologies and Deployment Strategies	
Issue: Despite a regulatory environment encouraging renewable energy production and greenhouse gas reductions, dairy digester development has lagged in California. Fewer than two-dozen dairies in California have installed digesters and roughly half of these projects are operating. With dairy digesters having the potential to play an important role in providing renewable baseload electricity as well as reducing California's GHG emissions, California needs to demonstrate projects, which include design, operation and management strategies, that result in successful dairy digester-to-electricity projects.	
Project Description: This project will advance digester design by building and demonstrating an innovative, double-cell covered lagoon digester and 1-megawatt (MW) generation system. The system will convert dairy manure into biogas and store the biogas above the Primary and Secondary Lagoons under an inflatable cover. The biogas will be converted into renewable electricity anticipated for sale and export to the PG&E distribution grid through a SB 1122 Bioenergy Feed-in Tariff. Further, dairy biogas systems qualify for participation in the CPUC's Assembly Bill (AB) 2514 electricity storage program. In a future phase, the biogas system may compete for an energy storage contract. The project will also improve groundwater protection by minimizing leaching of manure into groundwater.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: The project will significantly reduce methane emissions and generate renewable electricity helping to achieve the State's GHG emission reduction and renewable electricity goals. The improved digester design will decrease dairy and digester operating costs while also enhancing the protection of groundwater. Other important benefits include: lowered manure handling costs and valuable co-products, such as nutrient-rich, more absorbable irrigation water.	
CPUC Proceedings addressing issues related to this EPIC project: Renewables Portfolio Standard: R.11-05-005 SB 1122 Bioenergy feed-in tariff: R.11-05-005	

Applicable Metrics: CPUC Metrics- 3h, 4a, 4e

Lower Costs:

By advancing digester economics and design, through efficient manure management practices, the project will help lower dairy management and operation costs.

Increase Safety:

By employing state-of-the-art controls and best practices for safety, the proposed system will help maintain the safety of the grid as well as safety for those operating and managing the system.

Environmental Benefits:

The project supports implementation of California's energy and GHG management goals and targets through the deployment of new renewable power generation capacity and the capture and destruction of methane currently vented into the atmosphere. The double-lined lagoon enhances groundwater protection by minimizing leaching of manure into groundwater.

Consumer Appeal:

The project will improve odor control, through hydrogen sulfide removal, an issue important to the dairy employees and benefits the local community.

Assignment to Value Chain: Generation	**Total Budgeted Project Admin and Overhead Costs:** $32,107
EPIC Funds Encumbered: $4,000,000	**EPIC Funds Spent:** $44,785
Match Partner and Funding Split: Caterpillar Financial Services Corporation: $5,000,000 (55.6 %)	**Match Funding:** $5,000,000
Leverage Contributors:	**Leveraged Funds:** $0

Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 23 out of 23	**Rank of Selected Applicant/ Bidder:** Ranked # 2

If not the highest scoring applicant/bidder, explain why selected:

Funds were awarded to passing proposals in rank order.

Treatment of Intellectual Property:

Pre-existing intellectual property identified in agreement EPC-14-029 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.

Update:

A project kick-off meeting was held in June 2015. Technical progress is underway, and all of the 2015 progress reports were delivered.

62. EPC-14-031

Project Name: Pollution Control and Power Generation for Low Quality Renewable Fuel Streams [EPC-14-031]	
Recipient/Contractor: The Regents of the University of California on behalf of the Irvine Campus	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 6/1/2015 to 3/31/2019
Program Area and Strategic Objective: Technology Demonstration and Deployment S13: Demonstrate and Evaluate Emerging Clean Energy Generation Technologies and Deployment Strategies	
Issue: Many potential renewable fuel streams cannot be used to generate electricity using current technology without considerable upgrading (i.e., increasing the heating value) and substantial clean up (e.g., cleaning contaminants such as hydrogen sulfide or siloxanes introduced by the feedstock). Prime examples include landfills that are approaching end of life that produce gases with some heating value, but the values are generally too low for commonly used combustion devices (e.g., reciprocating engines, gas turbines). Landfill biogases are also notoriously challenging due to the variability in level of contaminants.	
Project Description: The project will utilize a 250 kW gas turbine system that converts relatively dirty, low heating value fuels into heat using gradual oxidation. This gradual oxidation technology was developed by Ener-Core, a California company, and has been demonstrated in operating systems for well over 500 hours, but has not yet been commercially deployed in California. The intended site for the demonstration is a closed landfill producing low quality gas that is currently flared. This site is a good match for the proposed 250kW demonstration as it will eliminate the flaring of the otherwise unusable gas by generating electricity for onsite use and use in other county-owned facilities as facilitated by SB 1122 or SB 43. The project will be carried out in collaboration with Orange County Waste & Recycling who is responsible for the test site.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: This project will demonstrate and deploy a novel gradual oxidation system in conjunction with a gas turbine that is capable of converting low-grade landfill biogas into renewable electricity.	
CPUC Proceedings addressing issues related to this EPIC project: Self-Generation Incentive Program: R.12-11-005 Renewables Portfolio Standard: R.11-05-005	

Applicable Metrics: CPUC Metrics- 1a, 1c, 1e, 1f, 1h, 2a, 3a, 3c, 3h, 4a, 4b, 5b

Lower Costs:

This project will generate 250 kW of baseload power, reducing peak demand to the surrounding grid and saving the landfill $240,000 annually.

Greater Reliability:

The electricity generated on site will help offset grid draw of power during peak use times, thus helping with overall reliability of the electricity system.

Environmental Benefits:

Low-grade biogas produced by landfills is typically flared. By utilizing it to produce electricity instead, this project will reduce NOx produced at the landfill by nearly one ton per year.

Assignment to Value Chain: Generation	**Total Budgeted Project Admin and Overhead Costs:** $98,402
EPIC Funds Encumbered: $1,499,386	**EPIC Funds Spent:** $424,149
Match Partner and Funding Split: Ener-Core, Inc.: $384,856 (19.9 %) Environ Strategy Consultants, Inc.: $5,000 (0.3 %) The Regents of the University of California - Irvine: $48,489 (2.5 %)	**Match Funding:** $438,345
Leverage Contributors:	**Leveraged Funds:** $0

Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 23 out of 23	**Rank of Selected Applicant/ Bidder:** Ranked # 7

If not the highest scoring applicant/bidder, explain why selected:

Funds were awarded to passing proposals in rank order.

Treatment of Intellectual Property:

Pre-existing intellectual property identified in agreement EPC-14-031 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.

Update:

Site engineering and drawings were completed in December 2015 and the project schedule has been accelerated by approximately eight months; equipment installation will begin in late 2016 instead of early 2017. No major roadblocks have been encountered, however Southern California Edison has identified the need for minor substation upgrades as well as another project in the local area which has applied to interconnect. A supplemental review is being performed which will add approximately 20 days to the 6 month “fast track" interconnection schedule. The project was recently presented at the December 2015 EPIC Innovation Symposium in the “Bioenergy and High Fire Risk Areas" session.

63. EPC-14-033

Project Name: North Fork Community Power Forest Bioenergy Facility Demonstration [EPC-14-033]	
Recipient/Contractor: The Watershed Research and Training Center	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 5/15/2015 to 9/30/2018
Program Area and Strategic Objective: Technology Demonstration and Deployment S13: Demonstrate and Evaluate Emerging Clean Energy Generation Technologies and Deployment Strategies	
Issue: Forest biomass fueled bioenergy gasification projects have the potential to be more efficient and cleaner electricity generation than direct combustion systems, and can reduce the risk of forest fires and pollutant emissions. The electricity generation is anticipated to be economical in the long-term, but is dependent on the ability of developers to achieve necessary operating hours. However, forest bioenergy demonstration facilities must collect additional scientific and technical data that will help demonstrate economic viability and attract private investment.	
Project Description: The North Fork Forest Bioenergy project will construct and demonstrate a 1 megawatt (MW) forest waste bioenergy gasification-to-electricity facility in the foothills of the Sierra Mountains. The biomass gasification facility is targeted to be a commercial-scale, community-based facility capable of accepting and processing wood waste from forest management that would otherwise create wildfire and air quality challenges, and generating renewable grid-connected electricity. Key activities of the project will include investigation of the best practices including evaluation of individual components and protocols to improve performance and reduce operating costs.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: This project has allowed General Electric, an industry leader that has not previously participated in gasification in the United States, to enter this emerging market in California. A combination of use of General Electric's commercial-ready gasification technology along with the producer gas clean up research will prove distributed, renewable, and cleaner woody biomass fueled electricity as demonstrably economically feasible and able to operate for 7000 hours/year.	
CPUC Proceedings addressing issues related to this EPIC project: Renewables Portfolio Standard: R.11-05-005 SB 1122 Bioenergy feed-in tariff: R.11-05-005	

Applicable Metrics: CPUC Metrics- 1a, 1c, 2a

Lower Costs:

Siting these plants near the forest reduces the cost of hauling biomass from the forest and reduces biomass electricity costs below those of larger, traditional biomass power plants.

Increase Safety:

This system will be smaller than most electricity systems and will not require a pressurized system, which increases safety.

Economic Development:

This plant will be built and operated by local contractors. In some cases, workers may even be trained to work on site. It is owned in part by a local Community Development Council, which will receive profits from the PPA and reinvest them in the community.

Environmental Benefits:

This project will be fueled by forest restoration by-product, which will increase air quality and reduce wildfire threat or intensity. Removing small, overstocked trees from the forest will release water into the watershed. Additionally, the power plant will anchor a biomass utilization campus, which will expand to include other forest products.

Public Health:

Disposing of biomass in controlled systems dramatically decreases emissions over pile and burn or wildfire. Placer County Air Pollution Control District published 60% CO2, 3% CH4, and 41% particulate emissions reductions over pile and burn in a direct combustion system. The system will reduce these even further by using gasification.

Consumer Appeal:

Providing jobs, protecting homes, and enhancing functioning forest ecosystems through water release, increased biodiversity, and decreased wildfire threat are all benefits that this power plant will be able to advertise to increase consumer appeal.

Energy Security:

This project will rely on California-grown fuel and operates as a baseload plant. Development will also require PG&E and plant owners to invest in the local substation, which will increase rural energy security.

Assignment to Value Chain: Generation	**Total Budgeted Project Admin and Overhead Costs:** $87,680
EPIC Funds Encumbered: $4,965,420	**EPIC Funds Spent:** $2,032,046
Match Partner and Funding Split: The Watershed Research and Training Center: $16,706 (0.3 %) Phoenix Energy: $500,000 (8.1 %) Yosemite Sequoia Resource Conservation and Development Council: $55,500 (0.9 %) Western Energy Systems: $253,750 (4.1	**Match Funding:** $1,179,216

%) North Fork Community Development Council: $180,000 (2.9 %) USDA Forest Service - Sierra National Forest: $150,000 (2.4 %) TSS Consultants: $13,260 (0.2 %)			
Leverage Contributors:		**Leveraged Funds:** $0	
Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 23 out of 23	**Rank of Selected Applicant/ Bidder:** Ranked # 9
If not the highest scoring applicant/bidder, explain why selected: Funds were awarded to passing proposals in rank order.			
Treatment of Intellectual Property: Pre-existing intellectual property identified in agreement EPC-14-033 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.			
Update: Construction and research planning have begun and equipment with a long lead time has been ordered. Permitting work is ongoing. Local meetings with potential contractors for groundwork have been planned to prepare them for bidding.			

64. EPC-14-041

Project Name: Installation of a Lean Burn Biogas Engine with Emissions Control to Comply with Rule 1110.2 at a Wastewater Treatment Plant in South Coast Air Quality Management District [EPC-14-041]	
Recipient/Contractor: Biogas & Electric, LLC	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 6/1/2015 to 5/31/2018
Program Area and Strategic Objective: Technology Demonstration and Deployment S13: Demonstrate and Evaluate Emerging Clean Energy Generation Technologies and Deployment Strategies	
Issue: Combustion of biogas in a low cost lean burn combined heat and power (CHP) is vastly more economical than alternatives such as fuel cells, micro-turbines or conditioning biogas to pipeline quality. However, biogas fired internal combustion engines generate NOx and SOx, thus to obtain necessary air permits, biogas projects are required to deploy costly post-treatments such as selective catalytic reduction (SCR) to attain compliance. In addition to employing expensive catalysts, a downside of selective catalytic reduction -type systems is the need to maintain stocks of ammonia on hand to support the clean up process.	
Project Description: Biogas & Electric will design, build and install a continuously operating commercial scale emissions reduction system for the lean burn biogas engine(s) at a municipal wastewater treatment plant in Palm Springs California. The technology being deployed is a low cost NOx and SOx reduction wet scrubbing technology called NOxRx (a registered trademark) which can be used in conjunction with all biogas engines and anaerobic digesters in the market today. NOxRx has a patented method of utilizing the effluent stream from an anaerobic digester to reduce emissions from biogas engines. Unlike SCR, it does not produce N2O and does not require H2S removal or biogas conditioning prior to combustion. Therefore, NOxRx represents a significant cost savings over competing NOx reduction solutions. The chief goal of this demonstration will be to demonstrate the commercial viability of NOxRx for biogas-fired lean burn engines to comply with CARB NOx and SOx standards, and SCAQMD Rule 1110.2.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: The project will enable lean burn biogas engines to comply with existing and future air quality regulations when deployed at wastewater treatment plants, resulting in reduced flaring and net reductions in emissions.	
CPUC Proceedings addressing issues related to this EPIC project: Renewables Portfolio Standard: R.11-05-005 SB 1122 Bioenergy feed-in tariff: R.11-05-005	

Applicable Metrics: CPUC Metrics- 1a, 1c, 1f, 3a, 3b, 4b, 4e

Lower Costs:

This technology will enable operators to deploy low-cost internal combustion engines for biogas generation by avoiding the need for pre-treatment and by replacing conventional selective catalytic reduction with a wet scrubber that uses the chemistry of the plant's available effluent rather than purchased or stored chemicals.

Environmental Benefits:

Cost-effective solutions for converting biogas to power will enable wastewater treatment facilities to reduce flaring to the atmosphere, and subject the products of combustion to post-processing that will reduce NOx and SOx emissions to tighter regulatory standards.

Energy Security:

Lower cost internal combustion engine technology will increase the viability of deploying biogas-fired distributed generation at smaller wastewater treatment plants.

Assignment to Value Chain: Generation		**Total Budgeted Project Admin and Overhead Costs:** $0	
EPIC Funds Encumbered: $2,249,322		**EPIC Funds Spent:** $13,175	
Match Partner and Funding Split: Veolia North America: $450,000 (20.0 %)		**Match Funding:** $0	
Leverage Contributors:		**Leveraged Funds:** $0	
Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 23 out of 23	**Rank of Selected Applicant/ Bidder:** Ranked # 5

If not the highest scoring applicant/bidder, explain why selected:

Funds were awarded to passing proposals in rank order.

Treatment of Intellectual Property:

Pre-existing intellectual property identified in agreement EPC-14-041 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.

Update:

The recipient is currently engaged in analysis of the anaerobic digester effluent, site conditions and emissions analysis necessary prior to selecting an internal combustion engine to be matched with the NOxRx scrubber unit. Detailed NOxRx designs will be executed after an engine is selected. The project team pursued and received approval from the Palm Springs City Council of a non-binding letter of interest with Veolia North America for development of a biogas-to-electricity energy project at the Palm Springs wastewater treatment plant which authorized the City Manager to execute all the necessary documents to that end.

65. EPC-14-044

Project Name: Enabling Anaerobic Digestion Deployment for Municipal Solid Waste-to-Energy [EPC-14-044]	
Recipient/Contractor: Lawrence Berkeley National Laboratory	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 5/15/2015 to 3/30/2019
Program Area and Strategic Objective: Technology Demonstration and Deployment S13: Demonstrate and Evaluate Emerging Clean Energy Generation Technologies and Deployment Strategies	
Issue: Production of energy from waste biomass aligns with California's clean energy policies and diverts waste from landfills, reduces landfill methane and fossil carbon dioxide (CO2) emissions, reduces fossil fuel reliance, and improves grid reliability and resiliency. Using the organic fraction of California's municipal solid waste (MSW) for combined heat and power (CHP) generation would help the state meet its Renewable Portfolio Standard (RPS), diversify the mix of resources in the state's electric generation portfolio, and help municipal governments achieve sustainability goals.	
Project Description: The purpose of this project is to perform research to enable environmentally and economically sustainable deployment of technology that transforms organic municipal solid waste into heat, electricity, and compost via dry anaerobic digestion. A dry anaerobic digestion and composting facility processing the organic fraction of MSW will be scaled up from 40,000 tons/year to 90,000 tons/year, and will increase production of renewable electricity and heat.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: This project will provide valuable insight to identify optimum pathways that overcome barriers for large-scale deployment of biomass conversion technologies. The research will focus on overcoming barriers to large-scale deployment for urban stakeholders, including odor, access to the utility grid, and improved utilization of waste heat.	
CPUC Proceedings addressing issues related to this EPIC project: Renewables Portfolio Standard: R.11-05-005 Distribution Resources Plans (AB 327): R.14-08-013 SB 1122 Bioenergy feed-in tariff: R.11-05-005 Combined heat and power: D.10-12-035., R.08-06-024. Integration of Distributed Energy Resources (IDER): R. 14-10-003	

Applicable Metrics: CPUC Metrics- 2a, 3g, 3h, 4a

Lower Costs:

The renewable electricity and heat output has the potential to offset fossil fuel use, thus reducing fuel costs and helping to insulate ratepayers from future fluctuations in fossil fuel prices.

Economic Development:

It is estimated that 10 percent diversion of California's organic MSW for CHP generation has the potential to produce about 0.5 terawatt-hours (TWh) of renewable electricity per year, as well as about 51 million therms of renewable heat energy per year.

Environmental Benefits:

The strategies to minimize odor-causing and other air emissions will improve public perception of anaerobic digestion, CHP, and compost facilities, and increase the likelihood that these facilities can be sited in or near cities throughout California to reduce transportation costs. Avoided GHG is estimated to be 298,651 metric tons CO2e per year.

Assignment to Value Chain: Generation		**Total Budgeted Project Admin and Overhead Costs:** $1,497,504	
EPIC Funds Encumbered: $4,300,000		**EPIC Funds Spent:** $1,928,853	
Match Partner and Funding Split:		**Match Funding:** $1,500,000	
Leverage Contributors:		**Leveraged Funds:** $0	
Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 23 out of 23	**Rank of Selected Applicant/ Bidder:** Ranked # 6

If not the highest scoring applicant/bidder, explain why selected:

Funds were awarded to passing proposals in rank order.

Treatment of Intellectual Property:

Pre-existing intellectual property identified in agreement EPC-14-044 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.

Update:

The agreement was approved at the Energy Commission's April 2015 business meeting and the kick off meeting was held in July 2015. The project is currently underway.

66. EPC-14-046

Project Name:

Lowering Food-Waste Co-digestion Costs through an innovative Combination of a Pre-Sorting Technique and a Strategy for Cake Solids Reduction

[EPC-14-046]

Recipient/Contractor:

Kennedy/Jenks Consultants, Inc.

Investment Plan:	**Project Term:**
2012-2014 Triennial Investment Plan	6/1/2015 to 5/31/2018

Program Area and Strategic Objective:

Technology Demonstration and Deployment

S13: Demonstrate and Evaluate Emerging Clean Energy Generation Technologies and Deployment Strategies

Issue:

Energy generation potential through the digestion of municipal sewage at wastewater treatment plants (WWTP) and the co-digestion of fats, oils and grease (FOG) and food wastes is estimated at more than 600 megawatts (MW). While combined heat and power generation systems using digester gas is highly beneficial, several barriers exist that impedes the installation of these systems. Among the key barriers for food waste co-digestion are the challenges in pre-processing food wastes prior to their addition to the digesters.

Project Description:

The proposed study will demonstrate two complementary approaches to lower the overall cost of co-digestion: a new technology to lower preprocessing cost of food wastes, and a new strategy to lower the mass of cake solids requiring disposal. The new technology for the preprocessing of food wastes uses an organic waste preprocessing technique known as an organic extrusion press (OEP) for selective extrusion of organic materials and is capable of recovering 95% of organics. The project will apply a new strategy in operating co-digestion systems in a way that will lower the mass of cake solids requiring disposal relative to the conventional process.

How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals:

This project will result in reliable and cost effective energy production by producing bioenergy from waste water treatment plants (WWTP) through the addition of locally available food waste and restaurant fats, oil, and grease (FOG). Though there is some seasonal variation, the supply of wastewater, food waste and FOG are very reliable.

CPUC Proceedings addressing issues related to this EPIC project:

SB 1122 Bioenergy feed-in tariff: R.11-05-005

Applicable Metrics: CPUC Metrics- 2a

Greater Reliability:

Applying the results of this project to waste water treatment facilities will reduce grid imports and provide a reliable generation source for these facilities and the grid.

Environmental Benefits:

The technology from this project has the potential to reduce greenhouse gas emissions by 443,345 MTCO2e/year at a modest 10% market penetration. Furthermore, a lower volume of sludge requiring disposal will lower the emissions from trucks used for hauling sludge.

Public Health:

The project will help avoid manual handling and separation of decomposable waste materials and divert up to around 4,100 tons per day of food wastes out of landfills.

Energy Security:

The project will help increase market penetration of renewable energy thereby adding more diversity to electric supply mix and help in achieving energy security.

Assignment to Value Chain: Generation		**Total Budgeted Project Admin and Overhead Costs:** $323,906	
EPIC Funds Encumbered: $1,496,902		**EPIC Funds Spent:** $70,155	
Match Partner and Funding Split:		**Match Funding:** $2,630,000	
Leverage Contributors:		**Leveraged Funds:** $0	
Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 23 out of 23	**Rank of Selected Applicant/ Bidder:** Ranked # 4

If not the highest scoring applicant/bidder, explain why selected:

Funds were awarded to passing proposals in rank order.

Treatment of Intellectual Property:

Pre-existing intellectual property identified in agreement EPC-14-046 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.

Update:

Researchers are establishing baseline conditions for digester operations without the addition of food waste and FOG. Periodic samples are analyzed to determine steady state operations of Digester #2 at the Silicon Valley Clean Water facility. Extensive sample analyses to benchmark digester performance will be performed by mid-March, 2016. Installation of the food waste pre-processing unit and high strength waste (FOG) cleaning equipment is underway. Installation and pre-testing of the equipment should be completed in early summer, and the evaluation of enhanced digester gas production will be available by fall 2016.

67. EPC-14-052

Project Name: Community Scale Digester with Advanced Interconnection to the Electrical Grid [EPC-14-052]	
Recipient/Contractor: Organic Energy Solutions, Inc.	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 6/1/2015 to 5/31/2018
Program Area and Strategic Objective: Technology Demonstration and Deployment S13: Demonstrate and Evaluate Emerging Clean Energy Generation Technologies and Deployment Strategies	
Issue: Digester systems have the potential to play an important role in providing renewable electricity while reducing California's GHG emissions. Despite a regulatory environment encouraging renewable energy production and greenhouse gas reductions, there are need for technology to lower the system cost as traditional methods require high capital costs to remove organic materials from the waste water stream to create good quality slurry for anaerobic digester system.	
Project Description: The project will install and operate an innovative anaerobic digestion system using an innovative high-rate biodigester technology that will process approximately 50 tons per day (TPD) of organic waste from a large supermarket (Albertsons) distribution center and 50 TPD (20,000 gallons) of high-strength slurry created by recovering and concentrating organics in wastewater streams. This project will be co-located with the Co-West Commodities Wastewater Pre-Treatment Facility- an operation that collects wastewater (Carbs, sugar, protein, and fat, grease, and oil known as FOG) from industrial businesses and pre-treats the material for disposal into the local sewer system.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: The project will demonstrate the use of electrical generation powered by digester gas to provide reliable power to a critical facility during outages on the grid. The electricity from this project will be exported to the SoCal Edison distribution grid through SB 1122 Bioenergy Feed-in Tariff. The system will also be equipped with islanding capability to support the critical facility during an interruption in the grid.	
CPUC Proceedings addressing issues related to this EPIC project: SB 1122 Bioenergy feed-in tariff: R.11-05-005	
Applicable Metrics: CPUC Metrics- 1b, 1c, 2a Lower Costs: The method develop by this project would lower the system cost resulting to significantly lower price of electricity compared to traditional or fossil generation. Greater Reliability:	

This project will provide reliable renewable electricity without the need for standby and backup power, capable of providing power during peak energy demand.

Environmental Benefits:

The project will divert and use food wastes to generate electricity that will yield reductions in GHG emissions. It will also improve environmental quality by providing clean energy while improving wastewater quality and reducing odor via anaerobic digestion.

Assignment to Value Chain: Generation	**Total Budgeted Project Admin and Overhead Costs:** $252,977
EPIC Funds Encumbered: $5,000,000	**EPIC Funds Spent:** $0
Match Partner and Funding Split: Organic Energy Solutions: $7,920,805	**Match Funding:** $7,772,939
Leverage Contributors:	**Leveraged Funds:** $0

Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 23 out of 23	**Rank of Selected Applicant/ Bidder:** Ranked # 3

If not the highest scoring applicant/bidder, explain why selected:
Funds were awarded to passing proposals in rank order.

Treatment of Intellectual Property:
Pre-existing intellectual property identified in agreement EPC-14-052 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.

Update:

This project has been delayed significantly due to a contracting issue between Organic Energy Solutions and its main technology holder and inability to secure the match funds needed for the project. Recently, OES was able to secure the match funds through a new technology provider and reorganizing the project team including replacement of its administration team. The proposed changes were submitted to Energy Commission staff in February 2016 and are pending management review as whether to proceed with the new technology provider.

68. EPC-14-075

Project Name: Unlocking Industrial Energy Efficiency Through Optimized Energy Management Systems [EPC-14-075]	
Recipient/Contractor: Regents of the University of California, on behalf of the Berkeley Campus	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 6/15/2015 to 3/29/2019
Program Area and Strategic Objective: Technology Demonstration and Deployment S13: Demonstrate and Evaluate Emerging Clean Energy Generation Technologies and Deployment Strategies	
Issue: Historically, industrial facilities have paid little attention to electricity consumption. Many industrial customers are unaware of low-cost energy conservation and energy efficiency opportunities. Often the only electricity data available is at the whole facility level and cannot be easily analyzed to find energy-saving opportunities. Process-level sub-metering has been rare due to its historically high costs and it is typically not used to find ways to lower energy costs. Energy management systems that use real-time data and analysis to identify energy savings are not available in the market.	
Project Description: The University of California at Berkeley, Massachusetts Institute of Technology, and the University of Chicago, have partnered with Lightapp Technologies to demonstrate a pre-commercial, software-based, optimized energy management system in industrial facilities. The Lightapp technology takes an innovative approach by relating electricity use and operating measurements to the production outputs of specific facility systems. The software tool then identifies anomalies and makes recommendations to lower the overall energy intensity of production and save energy and money. This project will demonstrate the operational effectiveness and financial viability of deploying a more developed version of the technology in California industries. This project will focus on optimizing electricity consumption in compressed air systems, a common system in many industries.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: If successful, the proposed technology could reduce the energy intensity of industrial facilities by 5% to 26% by reducing energy inefficiencies. Market assessments have estimated savings of 15% to 17% in compressed air system energy use with paybacks of less than 2 to 3 years, respectively.	
CPUC Proceedings addressing issues related to this EPIC project: Energy Efficiency Proceedings: R.13-11-005, R. 12-01-005, R.09-11-014	

Applicable Metrics: CPUC Metrics- 1f, 1h, 4a Lower Costs: The project could lower energy use and costs by optimizing industrial processes in a variety of manufacturing sectors. Environmental Benefits: The project could potentially have environmental benefits as increased energy efficiency could result in lower greenhouse gas emissions			
Assignment to Value Chain: Demand-side Management		**Total Budgeted Project Admin and Overhead Costs:** $451,253	
EPIC Funds Encumbered: $4,981,729		**EPIC Funds Spent:** $0	
Match Partner and Funding Split: University of California, Berkeley: $1,530,590 (23.5 %)		**Match Funding:** $1,530,590	
Leverage Contributors:		**Leveraged Funds:** $0	
Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 53 out of 62	**Rank of Selected Applicant/ Bidder:** Ranked # 8
If not the highest scoring applicant/bidder, explain why selected: Funds were awarded to passing proposals in rank order.			
Treatment of Intellectual Property: Pre-existing intellectual property identified in agreement EPC-14-075 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.			
Update: Business meeting approval date: 5/13/2015. Contract executed 9/4/2015. Kickoff meeting benefits questionnaire submitted 12/14/2015.			

69. EPC-14-082

Project Name: Advancing Biomass Combined Heat and Power Technology to Support Rural California, the Environment, and the Electrical Grid [EPC-14-082]	
Recipient/Contractor: Sierra Institute for Community and Environment	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 6/29/2015 to 7/31/2018
Program Area and Strategic Objective: Technology Demonstration and Deployment S13: Demonstrate and Evaluate Emerging Clean Energy Generation Technologies and Deployment Strategies	
Issue: Communities in the colder high Sierra regions of California often experience peak electrical loads during the winter due to a reliance on electric resistance heating, heat pumps with poor performance, and fuel switching from oil and propane to electricity when fossil fuel prices spike. These regions are also prone to catastrophic wildfires due to overstocked forests that exacerbate drought conditions. Electric and thermal energy from forest biomass clearing operations offer a unique opportunity to reduce peak loads using local renewable resources.	
Project Description: This project will deploy a biomass-fired combined heat and power system to provide heat and power to Plumas County health facilities and to dormitories at Feather River College. Biomass from local forest clearing operations will be used by a new biomass boiler to supply heat to an Organic Rankine Cycle (ORC) power unit. Waste heat from the ORC will be piped to all buildings to provide source heat for heat pumps, improving their performance for the winter heating season. New heat pumps will be deployed in dormitories to replace existing propane/electric resistance heaters.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: The project will result in greater electricity reliability, lower costs, and increased safety by decreasing peak demand. Reducing electricity consumption at peak and off-peak times at a public facility will lower costs to ratepayers locally and on the grid in general. Reducing risk of catastrophic wildfire in a fire-prone and drought-stricken region will increase safety. Wildfires can affect infrastructure such as electric transmission lines, as well as threatening human life and safety.	
CPUC Proceedings addressing issues related to this EPIC project: SB 1122 Bioenergy feed-in tariff: R.11-05-005 Combined heat and power: D.10-12-035., R.08-06-024.	

Applicable Metrics:

Greater Reliability:

Electricity reliability will be enhanced by decreasing consumption of grid electricity during winter peak periods.

Increase Safety:

Safety will be improved by reducing both the risk and destructiveness of wildfires in forest communities.

Environmental Benefits:

Burning biomass in a controlled setting rather than in the field will result in fewer pollutants (CO2, NOx, VOC and CO) being released into the environment.

Energy Security:

Energy security is enhanced by deploying a source of distributed electricity that will reduce load on the local grid.

Assignment to Value Chain: Generation		**Total Budgeted Project Admin and Overhead Costs:** $262,813	
EPIC Funds Encumbered: $2,603,228		**EPIC Funds Spent:** $60,799	
Match Partner and Funding Split: Plumas County: $400,000 (12.3 %)		**Match Funding:** $652,400	
Leverage Contributors:		**Leveraged Funds:** $0	
Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 22 out of 22	**Rank of Selected Applicant/ Bidder:** Ranked # 2

If not the highest scoring applicant/bidder, explain why selected:
Funds were awarded to passing proposals in rank order.

Treatment of Intellectual Property:

Pre-existing intellectual property identified in agreement EPC-14-082 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.

Update:

The Sierra Institute is coordinating with its major design subcontractor (High Sierra Community Energy Development Corporation-HSCEDC) and Feather River College to finalize designs for the Organic Rankine Cycle to be deployed at the Plumas County facility. Additionally, High Sierra is negotiating with HSCEDC to serve as the project developer to procure construction contractors and oversee the construction process. Construction is currently anticipated to begin in late summer, 2016.

70. EPC-14-083

Project Name: College of San Mateo Internet of Energy [EPC-14-083]	
Recipient/Contractor: Prospect Silicon Valley dba Bay Area Climate Collaborative (BACC)	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 6/29/2015 to 9/30/2018
Program Area and Strategic Objective: Technology Demonstration and Deployment S13: Demonstrate and Evaluate Emerging Clean Energy Generation Technologies and Deployment Strategies	
Issue: As the California grid continues to increase intermittent renewable generation, approaches are needed to solve critical issues of grid stability and efficient utilization of distributed energy resources. Batteries can provide dispatchable load-following power to address some of these issues. However, current battery storage technologies are not cost competitive with conventional generation sources and have limited deployment, which leads to potential risks. Other mitigation strategies, such as demand response and load shifting, are growing but still limited and largely uncoordinated across assets, limiting the effectiveness thus far.	
Project Description: This project aims to demonstrate an integrated solar PV, energy storage, and advanced power electronics within a single module to significantly increase overall efficiencies by minimizing conversion losses. The demonstration will include the integration of a 200 kW pre-commercial high-performance PV system from SunEdison, a 200 kWh stationary battery energy storage system, and advanced HVAC system and controls, with advanced energy management system that uses the Internet of Energy concept to optimize performance of distributed energy resources and the local grid.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: This project will offer immediate benefits to the College of San Mateo campus by saving a projected $150,000 or more annually from peak demand reduction and efficient energy management measures. In addition the integrated PV and energy storage system will reduce hardware and installation costs compared to installing each unit separately, and will capture significantly more energy than a traditional solar module over the course of a year (up to 13% more energy).	
CPUC Proceedings addressing issues related to this EPIC project: Energy storage: R.15-03-011 Smart grid: R.08-12-009 Distribution Resources Plans (AB 327): R.14-08-013 Demand Response (DR): R.13-09-011 Integration of Distributed Energy Resources (IDER): R. 14-10-003	

Applicable Metrics: CPUC Metrics- 1a, 1b, 1c, 1e, 1f, 1h, 1i, 2a, 3a, 3c, 4a Lower Costs: The integrate PV-storage system is projected to produce as much as 13% more energy over a traditional PV system with storage, while reducing power loss 10-15% and reducing installed costs by roughly 10%. Greater Reliability: Energy storage is a key component to maintain reliability in microgrids and community-based energy generation/management systems. This project will reduce the relative costs of maintaining that reliability by reducing the relative costs of storage. Environmental Benefits: The additional energy generation and energy savings expected from this integrated PV-storage system compared to traditional PV and energy storage system will translate to greenhouse gas emissions associated with the replaced grid-purchase power. Energy Security: This system will enable energy security by enabling reliable power with PV and energy storage, while reducing overall costs and increasing total system efficiency.			
Assignment to Value Chain: Generation		**Total Budgeted Project Admin and Overhead Costs:** $136,927	
EPIC Funds Encumbered: $2,999,601		**EPIC Funds Spent:** $16,974	
Match Partner and Funding Split: San Mateo County Community College District: $688,960 (13.0 %) SunEdison Inc.: $1,595,000 (30.0 %) Growing Energy Labs, Inc.: $32,000 (0.6 %)		**Match Funding:** $2,315,960	
Leverage Contributors:		**Leveraged Funds:** $0	
Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 22 out of 22	**Rank of Selected Applicant/ Bidder:** Ranked # 5
If not the highest scoring applicant/bidder, explain why selected: Funds were awarded to passing proposals in rank order.			
Treatment of Intellectual Property: Pre-existing intellectual property identified in agreement EPC-14-083 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.			
Update: The project kick off meeting was held in August 2015. Technical progress is underway.			

71. EPC-14-084

Project Name: ABEC #4 Renewable Combined Heat and Power Project [EPC-14-084]	
Recipient/Contractor: ABEC #4 LLC	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 6/30/2015 to 3/29/2019
Program Area and Strategic Objective: Technology Demonstration and Deployment S13: Demonstrate and Evaluate Emerging Clean Energy Generation Technologies and Deployment Strategies	
Issue: California has had a lack of success in the dairy biogas industry. Issues include permitting obstacles and complexities, high environmental compliance costs, lack of long-term, economical, power purchase agreements, high financing risk and costs, and little commercialization of the industry. Further, dairy farmers typically are not experienced in building and operating digesters and generation systems. Combined Heat and Power (CHP) has the potential to increase dairy farm energy efficiency and reduce peak demand and dairy operation electricity costs. Projects demonstrating how dairies can benefit from CHP are critical to the success of future dairy digester-to-electricity projects.	
Project Description: The project will use biogas derived from on-site dairy manure to generate low-carbon, renewable electricity and achieve high overall efficiency by capturing waste heat from the power generation system, and using it to drive an absorption chiller. The absorption chiller will convert waste heat into chilling capacity, which will be used to chill milk produced by the dairy cows. New absorption chiller capacity will directly offset electricity consumption from existing electric chillers.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: Combining renewable generation with waste heat collection and cooling, the project will increase energy efficiency of the existing dairy by an estimated 10% or more, while also reducing peak grid power demand. The project benefits include substantial reductions in greenhouse gas emissions, lower manure handling costs, and provide technical and economic data on community-scale biopower production.	
CPUC Proceedings addressing issues related to this EPIC project: Renewables Portfolio Standard: R.11-05-005 SB 1122 Bioenergy feed-in tariff: R.11-05-005	

Applicable Metrics: CPUC Metrics- 3h, 4a, 4e

Greater Reliability:

The project aims to provide greater reliability during peaking periods due to reduced peaking power demand on site, increased peak-power-period generation potential, and possible implementation of demand response.

Increase Safety:

By employing state-of-the-art controls and best practices for safety, the system will help maintain safety for those operating and managing the associated electrical equipment.

Environmental Benefits:

The project supports implementation of California's statutory energy and GHG management goals and targets through the incremental deployment of new renewable power generation capacity and the capture and destruction of methane. The double-lined lagoon enhances groundwater protection by minimizing leaching of manure into groundwater.

Consumer Appeal:

The project will improve odor control, through hydrogen sulfide removal, an issue important to the dairy employees and benefits the local community.

Assignment to Value Chain: Generation	**Total Budgeted Project Admin and Overhead Costs:** $0
EPIC Funds Encumbered: $3,000,000	**EPIC Funds Spent:** $0
Match Partner and Funding Split:	**Match Funding:** $4,983,619
Leverage Contributors:	**Leveraged Funds:** $0

Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 22 out of 22	**Rank of Selected Applicant/ Bidder:** Ranked # 1

If not the highest scoring applicant/bidder, explain why selected:

Funds were awarded to passing proposals in rank order.

Treatment of Intellectual Property:

Pre-existing intellectual property identified in agreement EPC-14-084 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.

Update:

A project kick-off meeting was held in July 2015. Technical progress is underway, and all of the 2015 progress reports were delivered.

72. EPC-14-085

Project Name: Demonstration of community scale low cost highly efficient PV and energy management system [EPC-14-085]	
Recipient/Contractor: The Regents of the University of California, Davis	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 6/30/2015 to 9/28/2018
Program Area and Strategic Objective: Technology Demonstration and Deployment S13: Demonstrate and Evaluate Emerging Clean Energy Generation Technologies and Deployment Strategies	
Issue: The intermittent nature of solar energy generation requires special attention when connecting to the grid. Critical issues include the grid instability of the distributed energy resources, and imbalance between energy demand and production, especially during periods of overgeneration. Although energy storage has the potential to serve multiple valuable functions in a microgrid setting, it is currently a very expensive resource because it is generally in the early stages of technology development. Renewable-based microgrids also require a reliable control system since they have insufficient inertia to dampen disturbances from distributed generation.	
Project Description: This project will demonstrate that the combination of advanced PV generation and an energy management system can reduce the community's average daily power and daily peak energy demand by more than 10%. The project includes a smart electrical energy storage system that integrates retired electric vehicle batteries. The generator and storage system will be controlled by a commercial-grade microgrid controller, with the three levels of hierarchy. The demonstration site is located in the Robert Mondavi Institute at the UC Davis campus.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: This project will result in an estimated reduction in annual electricity consumption of up to 87% (at least greater than 10%), for a cost savings of roughly $29,000 per year and associated greenhouse gas reductions of up to 253 tons per year. Furthermore, the success of this project will provide follow-on benefits to California's large wine industry by proving that winemaking can be an environmentally-friendly process.	
CPUC Proceedings addressing issues related to this EPIC project: Energy storage: R.15-03-011 Smart grid: R.08-12-009 Distribution Resources Plans (AB 327): R.14-08-013 Smart Inverter: D.14-12-035 (in R.11-09-011) Demand Response (DR): R.13-09-011 Integration of Distributed Energy Resources (IDER): R. 14-10-003	

Applicable Metrics: CPUC Metrics- 1a, 1c, 1e, 1f, 1h, 1i, 2a, 3a, 3e, 3g, 4a

Lower Costs:

The project aims to reduce the high costs of energy storage by using second-life electric vehicle batteries and an advanced energy management system.

Economic Development:

Proving the concept of a high-penetration renewable microgrid at the Robert Mondavi Institute is expected to lead to adoption of similar concepts at a number of vineyards and breweries across California.

Environmental Benefits:

The deployment of additional PV capacity will allow the campus to offset the greenhouse gas emissions associated with grid-purchased electricity.

Consumer Appeal:

California's wine and brewery market represents a significant market. The Robert Mondavi institute is generally considered a leader in this area, and if this concept is demonstrated successfully at this site, it is expected to be adopted elsewhere.

Energy Security:

This project will increase energy security on the UC Davis campus by enabling a microgrid with the potential to function during outages of the larger grid.

Assignment to Value Chain: Generation	**Total Budgeted Project Admin and Overhead Costs:** $124,883
EPIC Funds Encumbered: $1,238,491	**EPIC Funds Spent:** $0
Match Partner and Funding Split: Solexel: $12,000 (0.6 %) UC Davis: $167,262 (8.8 %) OSISoft, LLC: $479,467 (25.3 %)	**Match Funding:** $658,729
Leverage Contributors:	**Leveraged Funds:** $0

Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 22 out of 22	**Rank of Selected Applicant/ Bidder:** Ranked # 6

If not the highest scoring applicant/bidder, explain why selected:
Funds were awarded to passing proposals in rank order.

Treatment of Intellectual Property:
Pre-existing intellectual property identified in agreement EPC-14-085 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.

Update:
The agreement was approved at the Energy Commission's June 2015 business meeting and the kick off meeting was held in October 2015. The project is currently underway.

73. EPC-14-050

Project Name: City of Fremont Fire Stations Microgrid Project [EPC-14-050]	
Recipient/Contractor: Gridscape Solutions	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 5/8/2015 to 3/31/2018
Program Area and Strategic Objective: Technology Demonstration and Deployment S14: Demonstrate the Reliable Integration of Energy Efficient Demand-side Resources, Distributed Clean Energy Generation, and Smart Grid Components to Enable Energy Smart Community Development	
Issue: California needs to make better use of locally available renewable energy to increase resiliency and address climate change impacts such as increased fires, severe storms, and heatwaves. Critical facilities are especially vulnerable to climate change impacts that disrupt the normal delivery of energy needed for their operation. Microgrids could help increase the resiliency of critical facilities through maximizing use of local renewable energy. Microgrid demonstrations at fire stations are needed to develop a case study to assess their ability to support fire station operations and safely island from the grid.	
Project Description: The Recipient will design and build low carbon-based microgrids at three fire stations in Fremont, California. Each microgrid consists of a microgrid energy management system, parking lot canopy photovoltaic system, and battery energy storage. The automated microgrid control system will optimally manage local energy resources and loads. The microgrid will provide at least three hours a day of power for critical loads during a utility power outage.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: The microgrids will attempt to reduce grid congestion which increases grid reliability. The microgrids will demonstrate their ability to improve energy efficiency by optimizing power generation and loads using advanced, automated microgrid control. Local, renewable photovoltaic generation and energy storage may provide increased energy security during utility power outages and reduce carbon dioxide emissions.	
CPUC Proceedings addressing issues related to this EPIC project: Distribution Resources Plans (AB 327): R.14-08-013 Rule 21: R.11-09-011 Integration of Distributed Energy Resources (IDER): R. 14-10-003	
Applicable Metrics: CPUC Metrics- 1a, 1b, 1c, 1e, 1f, 1h, 1i, 2a, 3a, 3b, 3c, 3d, 3e, 3f, 4a, 4b, 5a, 5b, 5d, 5h Greater Reliability: This project will attempt to reduce congestion and improve resiliency for the distribution system by using local photovoltaic generation, thus reducing the utility	

load where substations are near maximum capacity. The fire stations will have greater reliability by using local energy resources during a utility outage, at least three hours a day.

Environmental Benefits:

This project will reduce carbon dioxide emissions by using local clean power generation (solar photovoltaics) and energy storage when available. This emissions reduction will help the City of Fremont meet its goal of reduced greenhouse gas emissions by 2020 and achieve its zero net energy goals for city government buildings.

Energy Security:

The fire station microgrids will provide at least three hours a day of electricity to critical loads during utility power outages. The fire stations are vulnerable to earthquakes from the nearby Hayward faults, so having local, renewable generation decreases their dependence on outside electricity sources.

Assignment to Value Chain: Distribution		**Total Budgeted Project Admin and Overhead Costs:** $73,475	
EPIC Funds Encumbered: $1,817,925		**EPIC Funds Spent:** $349,199	
Match Partner and Funding Split: Delta Products Corporation: $121,691 (4.9 %) City of Fremont: $80,000 (3.2 %) Microgrid Energy: $10,000 (0.4 %)		**Match Funding:** $657,260	
Leverage Contributors:		**Leveraged Funds:** $0	
Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 40 out of 40	**Rank of Selected Applicant/ Bidder:** Ranked # 8

If not the highest scoring applicant/bidder, explain why selected:

Funds were awarded to passing proposals in rank order.

Treatment of Intellectual Property:

Pre-existing intellectual property identified in agreement EPC-14-050 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.

Update:

Gridscape Solutions built a small-scale prototype microgrid system in their lab consisting of batteries, photovoltaic panels, a and smart inverter. Work has begun on developing the eScope dashboard display and microgrid controller. Testing of the design is ongoing.

74. EPC-14-053

Project Name: Bosch-A Renewable Based Direct Current Building Scale Microgrid [EPC-14-053]	
Recipient/Contractor: Robert Bosch LLC	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 6/30/2015 to 3/30/2018
Program Area and Strategic Objective: Technology Demonstration and Deployment S14: Demonstrate the Reliable Integration of Energy Efficient Demand-side Resources, Distributed Clean Energy Generation, and Smart Grid Components to Enable Energy Smart Community Development	
Issue: California needs to make better use of locally available renewable energy to increase resiliency and address climate change impacts such as increased fires, severe storms, and heatwaves. Microgrids are able to disconnect from the grid and provide islands of stable, independent power that maximizes the use of local renewable energy. Microgrids can reliably integrate energy efficient demand-side resources, distributed clean energy generation, and smart grid components to enable energy smart community development.	
Project Description: This renewable-based DC microgrid will connect on-site generation with loads and provide a low cost, high energy efficiency solution. Solar PV is planned to be directly connected to energy efficient DC lighting, DC energy storage systems, and ventilation on a 380 V DC bus to form a DC building microgrid. This microgrid system reduces the need for DC-AC inverters for PV and AC-DC rectification equipment in the loads, thus improving the overall utilization of solar energy by 7-10% as compared to conventional AC systems, while lowering component complexity and cost. The DC Microgrid system also provides a more reliable and resilient power supply to critical loads. Bosch has brought together top industry expertise in electricity grid analysis and commercial building electrical design, such as Navigant Consulting and the California Lighting Technology Center at UC Davis. They will partner with Bosch on design, technical validation and economic analysis.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: This project will demonstrate the feasibility and benefits of a commercial-scale DC building microgrid that integrates multiple advanced technologies to provide reliable power to the loads on the DC circuits, resilience during grid outages, increased energy efficiencies and renewable energy utilization.	
CPUC Proceedings addressing issues related to this EPIC project: Distribution Resources Plans (AB 327): R.14-08-013 Rule 21: R.11-09-011 Integration of Distributed Energy Resources (IDER): R. 14-10-003	

Applicable Metrics: CPUC Metrics- 1a, 1b, 1c, 1e, 1f, 1h, 1i, 2a, 3a, 3b, 3c, 3d, 3e, 3f, 4a, 4b, 5a, 5b, 5d, 5h Lower Costs: By operating advanced technologies such as LED lighting and energy storage systems on DC power as opposed to AC power, installation and operating costs will be reduced. Environmental Benefits: If adopted by 2-5 percent of commercial buildings in California, it can result in 128 gigawatt-hours per year of energy savings. This translates to avoided carbon dioxide emissions of 36,000 metric tons per year, and avoided NOx emissions of 343 metric tons per year.			
Assignment to Value Chain: Distribution		**Total Budgeted Project Admin and Overhead Costs:** $276,825	
EPIC Funds Encumbered: $2,817,566		**EPIC Funds Spent:** $62,054	
Match Partner and Funding Split: Regents of the University of California, Davis - California Lighting Technology Center: $9,183 (0.2 %) Maxwell Technologies: $56,393 (1.2 %) Imergy Power Systems: $45,000 (1.0 %) American Honda Motor Company, Inc.: $110,631 (2.4 %)		**Match Funding:** $1,797,544	
Leverage Contributors:		**Leveraged Funds:** $0	
Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 40 out of 40	**Rank of Selected Applicant/ Bidder:** Ranked # 2
If not the highest scoring applicant/bidder, explain why selected: Funds were awarded to passing proposals in rank order.			
Treatment of Intellectual Property: Pre-existing intellectual property identified in agreement EPC-14-053 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.			
Update: The agreement was approved at the Energy Commission's April 2015 business meeting and the kick off meeting was held in July 2015. The project is currently underway			

75. EPC-14-054

Project Name:

Demonstrating a Community Microgrid at the Blue Lake Rancheria

[EPC-14-054]

Recipient/Contractor:

Humboldt State University Sponsored Programs Foundation

Investment Plan:	**Project Term:**
2012-2014 Triennial Investment Plan	7/6/2015 to 3/30/2018

Program Area and Strategic Objective:

Technology Demonstration and Deployment

S14: Demonstrate the Reliable Integration of Energy Efficient Demand-side Resources, Distributed Clean Energy Generation, and Smart Grid Components to Enable Energy Smart Community Development

Issue:

California needs to make better use of locally available renewable energy to increase resiliency and address climate change impacts such as increased fires, severe storms, and heatwaves. Microgrids are able to disconnect from the grid and provide islands of stable, independent power that maximizes the use of local renewable energy. Microgrids can reliably integrate energy efficient demand-side resources, distributed clean energy generation, and smart grid components to enable energy smart community development.

Project Description:

This project will demonstrate the ability of a community-scale microgrid to bolster the resiliency of an American Red Cross critical support facility. The project will demonstrate the capability of the microgrid to power itself with a high penetration of local renewable resources. The microgrid will be designed to island indefinitely.

How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals:

The project will measure customer energy and cost savings benefits and demonstrate the benefits of microgrids for vulnerable communities. The microgrid will have the ability to disconnect from and operate without the larger electric grid by managing and balancing a portfolio of distributed energy resources.

CPUC Proceedings addressing issues related to this EPIC project:

Distribution Resources Plans (AB 327): R.14-08-013
Rule 21: R.11-09-011
Integration of Distributed Energy Resources (IDER): R. 14-10-003

Applicable Metrics: CPUC Metrics- 1a, 1b, 1c, 1e, 1f, 1h, 1i, 2a, 3a, 3b, 3c, 3d, 3e, 3f, 4a, 4b, 5a, 5b, 5d, 5h

Lower Costs:

The solar PV array and battery storage system will lower annual energy purchases and also lower average peak demand by using onsite renewable energy resources.

Greater Reliability:

The proposed microgrid will be designed to be capable of supplying electric power indefinitely, even in the event of a utility grid outage. The microgrid controller will

prevent uncontrolled export of energy to the electric grid which will increase grid reliability.

Increase Safety:

The microgrid as anticipated will increase the safety of the community by being able to provide electric power to the emergency response center if the electric grid goes down during a disaster.

Environmental Benefits:

The microgrid system will reduce power purchased from the electric grid by using onsite renewables and lower the amount of power generated by the on-site diesel generator.

Assignment to Value Chain: Distribution	**Total Budgeted Project Admin and Overhead Costs:** $832,908
EPIC Funds Encumbered: $5,000,000	**EPIC Funds Spent:** $0
Match Partner and Funding Split: Blue Lake Rancheria: $715,935 (11.3 %) Humboldt State University Foundation, Schatz Energy Research Center: $82,221 (1.3 %) GHD, Inc.: $10,266 (0.2 %) Siemens Energy and Automation, Inc.: $250,000 (4.0 %) Tesla Motors: $210,000 (3.3 %) Pacific Gas and Electric Company: $50,000 (0.8 %)	**Match Funding:** $1,318,422
Leverage Contributors:	**Leveraged Funds:** $0

Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 40 out of 40	**Rank of Selected Applicant/ Bidder:** Ranked # 6

If not the highest scoring applicant/bidder, explain why selected:
Funds were awarded to passing proposals in rank order.

Treatment of Intellectual Property:
Pre-existing intellectual property identified in agreement EPC-14-054 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.

Update:

The agreement was approved at the Energy Commission's June 2015 business meeting and the kick off meeting was held in September 2015. The project is currently underway.

76. EPC-14-055

Project Name: Las Positas Community College Microgrid [EPC-14-055]	
Recipient/Contractor: Chabot-Las Positas Community College District	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 5/8/2015 to 3/30/2018
Program Area and Strategic Objective: Technology Demonstration and Deployment S14: Demonstrate the Reliable Integration of Energy Efficient Demand-side Resources, Distributed Clean Energy Generation, and Smart Grid Components to Enable Energy Smart Community Development	
Issue: California needs to make better use of locally available renewable energy to increase resiliency and address climate change impacts such as increased fires, severe storms, and heatwaves. Microgrids are able to disconnect from the grid and provide islands of stable, independent power that maximizes the use of local renewable energy. Microgrids can reliably integrate energy efficient demand-side resources, distributed clean energy generation, and smart grid components to enable energy smart community development.	
Project Description: This project will demonstrate the ability of a commercial-scale microgrid to optimize distributed energy resources for customers, distribution utilities, and the California ISO by using advanced energy management tools to coordinate a high penetration of customer renewable energy assets with multiple energy storage technologies on a community college microgrid.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: The project identifies and measures the benefits of microgrids for customers that sift peak energy use to coincide with peak solar production and for distribution utilities and the California ISO by demonstrating the resource capability of microgrids. This project will measure the microgrid's benefits by using existing retail rates as well as simulating a market in which all microgrid benefits can be monetized.	
CPUC Proceedings addressing issues related to this EPIC project: Distribution Resources Plans (AB 327): R.14-08-013 Rule 21: R.11-09-011 Integration of Distributed Energy Resources (IDER): R. 14-10-003	
Applicable Metrics: CPUC Metrics- 1a, 1b, 1c, 1e, 1f, 1h, 1i, 2a, 3a, 3b, 3c, 3d, 3e, 3f, 4a, 4b, 5a, 5b, 5d, 5h Lower Costs: The project will try to optimize renewable energy production and energy utilization to reduce maximum demand, peak demand, and part-peak demand with a goal of 400kW reduction. Based on the campus' current tariff this could reduce annual	

demand charges by approximately $100,000.

Greater Reliability:

The project may increase energy reliability on the campus by increasing the amount of solar energy that is used for campus operations instead of allowing uncontrolled export of solar energy to the local utility grid. Controlling the export of energy onto the grid will also increase reliability by reducing congestion.

Energy Security:

The project will attempt to increase energy security of the campus by enabling critical loads on the campus to island from the main distribution grid and operate for up to 10 hours with power generated from the campus solar PV system.

Assignment to Value Chain: Distribution	**Total Budgeted Project Admin and Overhead Costs:** $260,719
EPIC Funds Encumbered: $1,522,591	**EPIC Funds Spent:** $0
Match Partner and Funding Split: Imergy Power Systems: $150,000 (7.6 %) Chabot-Las Positas Community College District: $300,000 (15.2 %)	**Match Funding:** $450,000
Leverage Contributors:	**Leveraged Funds:** $0

Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 40 out of 40	**Rank of Selected Applicant/ Bidder:** Ranked # 7

If not the highest scoring applicant/bidder, explain why selected:

Funds were awarded to passing proposals in rank order.

Treatment of Intellectual Property:

Pre-existing intellectual property identified in agreement EPC-14-055 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.

Update:

The Energy Commission and Chabot-Las Positas Community College District kicked of the micorgrid project in Summer 2015 and during Fall/Winter 2015 the district executed subcontracts and vendor agreements. During Winter 2016 the district completed the basis of design for the microgrid and initiated an interconnection request with PG&E.

77. EPC-14-056

Project Name: Demonstration of Electric Vehicle Smart Charging and Storage Supporting Grid Operational Needs [EPC-14-056]	
Recipient/Contractor: The Regents of the University of California, on behalf of the Los Angeles campus	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 6/30/2015 to 3/30/2018
Program Area and Strategic Objective: Technology Demonstration and Deployment S14: Demonstrate the Reliable Integration of Energy Efficient Demand-side Resources, Distributed Clean Energy Generation, and Smart Grid Components to Enable Energy Smart Community Development	
Issue: Plug-in electric vehicles (PEVs) appear to offer a promising alternative for meeting the state's transportation needs. For instance, load patterns when charging plug-in electric vehicles (PEVs) tend to spike, rather than remain a constant current. PEVs may also provide a number of benefits to the electrical grid when integrated with smart charging technologies and other advanced systems. The California Independent System Operator has identified barriers requiring additional research such as determining how vehicle grid integration can be implemented into residential and fleet applications and the possible role PEVs could play in grid stabilization.	
Project Description: The Recipient will develop and demonstrate technologies that integrate electric vehicles into the electrical grid. The Recipient's core technology of using networked devices to collect data and send control signals to regulate the level of charge going into an electric vehicle, is the backbone for the project. The demonstration will collect data such as vehicle identification, status of charge, battery temperature, power usage in kW, voltage, amperage, and power quality variables, such as active and reactive power to assess performance. The control signals will connect and disconnect a charger based on various inputs, such as grid capacity, user preferences, time of use, demand response events, etc. The Recipient's artificial intelligence-based control system will determine the optimized charging and/or backfill operations. The project will use simulations and emulations to provide useful results for Investor Owned Utilities to integrate in their planning processes.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: This Agreement aims to provide greater electricity reliability and lower costs by demonstrating technologies for the deployment and integration of cost effective use of plug-in electric and hybrid electric vehicles for electricity storage and peak shaving. The project attempts to provide grid services to mitigate the PV duck-curve with vehicle-to-grid and grid-to-vehicle infrastructure to smooth renewable over-generation while generating a revenue stream for the vehicle user.	

CPUC Proceedings addressing issues related to this EPIC project: Rule 21: R.11-09-011 Integration of Distributed Energy Resources (IDER): R. 14-10-003			
Applicable Metrics: CPUC Metrics- 1e, 1f, 1i, 2a, 5b Lower Costs: The project attempts to provide grid services to smooth renewable over-generation while generating a revenue stream for the vehicle user.The center will define the scenarios and smart charging tools, and apply them to five sites in Santa Monica, which is a leader in municipal EV fleets. Greater Reliability: The project will potentially increase reliability by implementing V2G to provide the equivalent of energy storage. This will be compared with the grid impacts of the surrounding area to determine the effectiveness of this approach.			
Assignment to Value Chain: Demand-side Management		**Total Budgeted Project Admin and Overhead Costs:** $358,770	
EPIC Funds Encumbered: $1,989,432		**EPIC Funds Spent:** $54,133	
Match Partner and Funding Split: California Lithium Battery: $100,000 (4.0 %) Proximetry: $130,000 (5.2 %) City of Santa Monica: $146,000 (5.9 %) Korea Institute of Energy Research (KIER): $36,000 (1.4 %)		**Match Funding:** $500,000	
Leverage Contributors: City of Santa Monica : $146,000 Korea Institute of Energy Research		**Leveraged Funds:** $500,000	
Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 40 out of 40	**Rank of Selected Applicant/ Bidder:** Ranked # 5
If not the highest scoring applicant/bidder, explain why selected: Funds were awarded to passing proposals in rank order.			
Treatment of Intellectual Property: Pre-existing intellectual property identified in agreement EPC-14-056 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.			
Update: The agreement was approved at the Energy Commission's April 2015 business meeting and the kick off meeting was held in June 2015. The project is currently underway			

78. EPC-14-057

Project Name: Smart Charging of Plug-in Vehicles with Driver Engagement for Demand Management and Participation in Electricity Markets [EPC-14-057]	
Recipient/Contractor: DOE- Lawrence Berkeley National Laboratory	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 6/4/2015 to 3/30/2018
Program Area and Strategic Objective: Technology Demonstration and Deployment S14: Demonstrate the Reliable Integration of Energy Efficient Demand-side Resources, Distributed Clean Energy Generation, and Smart Grid Components to Enable Energy Smart Community Development	
Issue: Plug-in vehicle (PEV) charging presents new challenges for reliable grid operations and ratepayers. PEV charging can add substantial power draw to a facility and when several PEV chargers are co-located the ratepayer is likely to face substantial demand charges. For grid operators, PEV charging can add substantial loads during periods when the grid is already stressed. Currently, no commercially-available solutions exist for intelligently coordinating the charging of vehicles by either responding to automated demand response signals, by mitigating demand charges for a ratepayer, or by offering PEVs as a resource for the wholesale market.	
Project Description: This project will develop an aggregation system for smart charging PEV vehicles to provide demand response, mitigate demand charges, leverage time of use rates, and offer wholesale market services. The demonstration will tap into the inherent flexibility in the time and rate of PEV charging to participate in PG&E's automated demand response programs, and CAISO wholesale markets for demand response and ancillary services. A charging control system will be applied to a fleet of vehicles owned by Alameda County and to charging stations that are used by both county vehicles and the public. The project will add systems for intelligent prediction of PEV loads and control algorithms to create a flexible, modular, and scalable solution for smart charging county fleet and public PEVs.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: Benefits include greater reliability in the electrical transmission and distribution infrastructure, increased safety, and lower costs. The managed charging control system will enable growth in PEV adoption without straining current grid infrastructure. The system will be developed to help avoid vehicles stranding during travel, thereby increasing safety.	
CPUC Proceedings addressing issues related to this EPIC project: Rule 21: R.11-09-011 Integration of Distributed Energy Resources (IDER): R. 14-10-003	

Applicable Metrics: CPUC Metrics- 1c, 1g, 2a, 3f, 3h, 4a, 4b, 5b Lower Costs: This project attempts to lower cost for energy users by allowing them to participate in energy markets which creates a revenue stream for vehicle users. Greater Reliability: This project will attempt to use plug-in vehicles for demand management and supply needed grid services by using the vehicles as mobile energy storage. Economic Development: New revenues will be enabled by controlling PEV charging to offer grid services, including demand response and ancillary services.			
Assignment to Value Chain: Demand-side Management		**Total Budgeted Project Admin and Overhead Costs:** $812,829	
EPIC Funds Encumbered: $1,993,355		**EPIC Funds Spent:** $583,530	
Match Partner and Funding Split: Kisensum Inc.: $416,800 (16.5 %) Bay Area Climate Collaborative: $25,000 (1.0 %) County of Alameda, General Services Agency: $27,711 (1.1 %) ChargePoint, Inc.: $45,743 (1.8 %) Regents of the University of California, Berkeley Campus: $21,507 (0.9 %)		**Match Funding:** $536,761	
Leverage Contributors:		**Leveraged Funds:** $0	
Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 40 out of 40	**Rank of Selected Applicant/ Bidder:** Ranked # 4
If not the highest scoring applicant/bidder, explain why selected: Funds were awarded to passing proposals in rank order.			
Treatment of Intellectual Property: Pre-existing intellectual property identified in agreement EPC-14-057 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.			
Update: The agreement was approved at the Energy Commission's April 2015 business meeting and the kick off meeting was held in July 2015. The project is currently underway			

79. EPC-14-059

Project Name: Laguna Subregional Wastewater Treatment Plant Microgrid [EPC-14-059]	
Recipient/Contractor: Trane U.S., Inc.	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 5/8/2015 to 3/30/2018
Program Area and Strategic Objective: Technology Demonstration and Deployment S14: Demonstrate the Reliable Integration of Energy Efficient Demand-side Resources, Distributed Clean Energy Generation, and Smart Grid Components to Enable Energy Smart Community Development	
Issue: California needs to make better use of locally available renewable energy to increase resiliency and address the impacts of climate change such as increased fires, severe storms, and heat waves. Critical facilities are vulnerable to climate change impacts that disrupt the normal delivery of energy needed for their operation. A demonstration of a microgrid at a wastewater treatment plant is needed to develop a case study on the plant's ability to provide sanitary services during times of emergency and to maximize on-site renewable energy use.	
Project Description: This project will upgrade an existing wastewater treatment plant to act as a microgrid with the ability to provide ancillary services to the grid. The project team will then monitor the plant as it operates, gathering data for microgrid operations.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: This Agreement will demonstrate that a microgrid at a wastewater treatment plant can: - Operate without compromising water quality guidelines or negatively affecting plant operation - Deliver reliable ancillary services to the grid - Reduce the need for new peaker or load following generation resources by providing a load balancing ancillary service in the form of dispatchable, curtailable loads.	
CPUC Proceedings addressing issues related to this EPIC project: Distribution Resources Plans (AB 327): R.14-08-013 Rule 21: R.11-09-011 Integration of Distributed Energy Resources (IDER): R. 14-10-003	

Applicable Metrics: CPUC Metrics- 1a, 1b, 1c, 1e, 1f, 1h, 1i, 2a, 3a, 3b, 3c, 3d, 3e, 3f, 4a, 4b, 5a, 5b, 5d, 5h Lower Costs: This project will explore using on site renewables and demand response to lower the facility peak load, which will reduce operating costs. Environmental Benefits: This microgrid proposes to provide ancillary services by using renewables and demand-side resources instead of peaker plants. Public Health: If successful, this microgrid will support a critical facility that is vital to maintaining public health in an emergency.			
Assignment to Value Chain: Distribution		**Total Budgeted Project Admin and Overhead Costs:** $187,080	
EPIC Funds Encumbered: $4,999,804		**EPIC Funds Spent:** $0	
Match Partner and Funding Split: Alstom: $1,460,000 (20.3 %) City of Santa Rosa: $750,000 (10.4 %)		**Match Funding:** $2,210,000	
Leverage Contributors:		**Leveraged Funds:** $0	
Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 40 out of 40	**Rank of Selected Applicant/ Bidder:** Ranked # 10
If not the highest scoring applicant/bidder, explain why selected: Funds were awarded to passing proposals in rank order.			
Treatment of Intellectual Property: Pre-existing intellectual property identified in agreement EPC-14-059 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.			
Update: The agreement was approved at the Energy Commission's April 2015 business meeting and the kick off meeting was held in September 2015. The project is currently underway.			

80. EPC-14-060

Project Name: Borrego Springs - A Renewable-Based Community Microgrid [EPC-14-060]	
Recipient/Contractor: San Diego Gas & Electric Company	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 6/22/2015 to 3/30/2018
Program Area and Strategic Objective: Technology Demonstration and Deployment S14: Demonstrate the Reliable Integration of Energy Efficient Demand-side Resources, Distributed Clean Energy Generation, and Smart Grid Components to Enable Energy Smart Community Development	
Issue: California needs to make better use of locally available renewable energy to increase resiliency and address climate change impacts such as increased fires, severe storms, and heatwaves. Microgrid demonstrations are needed to show if microgrids are able to disconnect from the grid and provide islands of stable, independent power using local renewable energy. Demonstrations of Microgrids integrating energy efficient demand-side resources, distributed clean energy generation, and smart grid components are needed to encourage energy smart community development.	
Project Description: SDG&E and the project team will demonstrate a utility owned community microgrid at Borrego Springs. The renewable based microgrid will be able to island the entire community with a peak load of approximately 14 MW serving approximately 2,500 residential and 300 commercial and industrial customers. SDG&E will utilize two large PV systems, 14 rooftop PV systems, two substation batteries and three distributed batteries.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: The project proposes to demonstrate and measure improved grid resiliency. The project will attempt to lower costs and provide environmental benefits by making greater use of locally available renewable energy while avoiding adverse grid impacts through the use of a microgrid controller/energy management system.	
CPUC Proceedings addressing issues related to this EPIC project: Distribution Resources Plans (AB 327): R.14-08-013 Rule 21: R.11-09-011 Integration of Distributed Energy Resources (IDER): R. 14-10-003	
Applicable Metrics: CPUC Metrics- 1a, 1b, 1c, 1e, 1f, 1h, 1i, 2a, 3a, 3b, 3c, 3d, 3e, 3f, 4a, 4b, 5a, 5b, 5d, 5h Lower Costs: Borrego Springs saw an average of 4 hours of outages per year between 2008 and 2012. If the Microgrid in this project can avoid these outages then using Lawrence	

Berkeley National Labs value of service estimates tool, savings for customers may top $600,000 per year.

Greater Reliability:

It is anticipated that the Microgrid in this project may be able to achieve a 98 percent reduction in the System Average Interruption Duration Index figure.

Environmental Benefits:

Once deployed for this project, a single 26 MW array could represent a reduction of as much as 21,000 metric tons of CO2 according to the CEC benefits methodology.

Assignment to Value Chain: Distribution	**Total Budgeted Project Admin and Overhead Costs:** $923,165
EPIC Funds Encumbered: $4,724,802	**EPIC Funds Spent:** $0
Match Partner and Funding Split: SMA America: $90,000 (1.4 %) San Diego Gas & Electric Company: $530,000 (8.2 %) OSISoft, LLC: $1,119,560 (17.3 %)	**Match Funding:** $1,739,560
Leverage Contributors:	**Leveraged Funds:** $0

Funding Method:	**Funding Mechanism:**	**No. of Passing Applicants/ Bidders:**	**Rank of Selected Applicant/ Bidder:**
Competitive	Grant	40 out of 40 bidders	Ranked # 9

If not the highest scoring applicant/bidder, explain why selected:

Funds were awarded to passing proposals in rank order.

Treatment of Intellectual Property:

Pre-existing intellectual property identified in agreement EPC-14-060 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.

Update:

As of December 2015, the project is on time and on budget. Test plans for the microgrid controllers are being formulated for the Real Time Digital Simulator. Work is ongoing with the Borrego Chamber of Commerce to identify the area's critical loads and evaluation of gas stations, grocery stores, restaurants, and cool zones for emergency sheltering.

81. EPC-14-080

Project Name: Renewable Microgrid for a Medical Center [EPC-14-080]	
Recipient/Contractor: Charge Bliss, Inc.	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 6/17/2015 to 3/30/2018
Program Area and Strategic Objective: Technology Demonstration and Deployment S14: Demonstrate the Reliable Integration of Energy Efficient Demand-side Resources, Distributed Clean Energy Generation, and Smart Grid Components to Enable Energy Smart Community Development	
Issue: California needs to make better use of locally available renewable energy to increase resiliency and address climate change impacts such as increased fires, severe storms, and heatwaves. Critical facilities are especially vulnerable to climate change impacts that disrupt the normal delivery of energy needed for their operation. A demonstration of a renewable-based microgrid at a hospital is needed to develop a case study to assess their ability to support hospital operations, and convince the Office of Statewide Health Planning and Development to allow microgrids for hospitals.	
Project Description: This project consists of a full-scale demonstration of a renewable-based microgrid for a hospital. The microgrid consists of a solar photovoltaic array, battery energy storage, and a microgrid controller integrated with an existing combined heat and power system. The microgrid will provide at least three hours of power during a utility outage and will also use automated demand response to reduce electrical demand.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: The microgrid will demonstrate reduced electrical system downtime for the hospital in critical areas. The microgrid and controller will showcase reduced greenhouse gas emissions, reduced electrical demand, save direct energy costs, and provide grid support.	
CPUC Proceedings addressing issues related to this EPIC project: Distribution Resources Plans (AB 327): R.14-08-013 Rule 21: R.11-09-011 Integration of Distributed Energy Resources (IDER): R. 14-10-003	
Applicable Metrics: CPUC Metrics- 1a, 1b, 1c, 1e, 1f, 1h, 1i, 2a, 3a, 3b, 3c, 3d, 3e, 3f, 4a, 4b, 5a, 5b, 5d, 5h Lower Costs: As originally envisioned, this project expects to save $141,000 per year in direct energy costs for the site owner (997,000 kWh/yr x $0.1418/kWh) and create	

efficiencies in both usage and demand (automated demand response).

Greater Reliability:

As conceived, this microgrid plans to increase electric reliability by participating in the CA Independent System Operator's fast power quality regulation to mitigate large power quality fluctuations. A 250 kW output from the microgrid could mitigate up to a 6 MW oscillation in the larger grid.

Environmental Benefits:

Initial plans for the microgrid indicate that it may provide environmental benefits by attempting to reduce greenhouse gas emissions by 263 tons of carbon dioxide per year (997,000 kWh/yr x 0.5888 lbs/kWh) through the use of renewables.

Public Health:

The microgrid will be designed to provide at least three hours of power during a utility outage for critical hospital facilities that are essential during mass casualties or illnesses.

Assignment to Value Chain: Distribution		**Total Budgeted Project Admin and Overhead Costs:** $729,842	
EPIC Funds Encumbered: $4,776,171		**EPIC Funds Spent:** $1,509,499	
Match Partner and Funding Split: General Electric Power Systems: $400,000 (5.8 %) OSISoft, LLC: $1,119,560 (16.3 %) John Muir Health: $576,275 (8.4 %)		**Match Funding:** $2,095,835	
Leverage Contributors:		**Leveraged Funds:** $0	
Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 40 out of 40	**Rank of Selected Applicant/ Bidder:** Ranked # 11
If not the highest scoring applicant/bidder, explain why selected: Funds were awarded to passing proposals in rank order.			
Treatment of Intellectual Property: Pre-existing intellectual property identified in agreement EPC-14-080 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.			
Update: The original site host withdrew from the project, therefore the Energy Commission is in the process of reviewing the potential changes to the agreement for a project site.			

82. EPC-15-009

Project Name: Workforce Instruction for Standards and Efficiency (WISE) [EPC-15-009]	
Recipient/Contractor: California Homebuilding Foundation (CHF)	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 11/30/2015 to 3/31/2020
Program Area and Strategic Objective: Market Facilitation S17: Strengthen the Clean Energy Workforce by Creating Tools and Resources that Connect the Clean Energy Industry to the Labor Market	
Issue: California's homebuilding market is emerging from the recession to find that many skilled tradespeople have permanently left the residential construction market. Meanwhile, techniques for constructing high performance attics, walls, and roof assemblies that were once considered "advanced practices" employed by few builders will soon become code requirements for high performance attics and walls. The lack of skilled labor, coupled with increased demand for high-performance insulation techniques, could disrupt the rate of adoption of these measures or lead to poor installation of them. This may result in lower than expected energy savings and construction defects that impose safety risks.	
Project Description: This project will provide education, tools and on-the-job training to homebuilders in California's residential construction market on High Performance Attics (HPAs) and High Performance Walls (HPWs), two new requirements in California's Building Energy Efficiency Standards for 2016. The project will help homebuilders better understand the new requirements and options for compliance, as well as provide technical support to enable the transition to the new requirements. Additionally, the project team will provide on-the-job training to homebuilders, installing trades, subcontractors and field crews on the proper installation of insulation and changes to other building systems that will be necessary to meet the new requirements.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: The California Energy Code will soon require new homes to be constructed with high performance walls and attics to meet energy efficiency standards. This project will help overcome market barriers for high-performance walls and attics by providing the construction industry with access to on-the-job training and tools on the best available technologies, techniques, and practices for complying with the new requirements.	
CPUC Proceedings addressing issues related to this EPIC project: Residential Zero Net Energy Action Plan (2015): Residential ZNE Action Plan (June 2015) Energy Efficiency Strategic Plan update and action plans: EE Strategic Plan docs Energy Efficiency Proceedings: R.13-11-005, R. 12-01-005, R.09-11-014	

Applicable Metrics: CPUC Metrics- 1c, 1e, 1f, 1h, 2a, 3c, 4a, 4b Lower Costs: Education, tools and training will ease the cost burden and risks to California businesses that make significant changes to construction practices to meet the new HPA and HPW requirements. In addition, proper installation of these energy efficiency measures will lead to increased energy savings for customers. Greater Reliability: Proper installation of HPAs and HPWs will reduce electricity consumption for air conditioning during peak demand periods. Increase Safety: Training will improve safety by ensuring builders follow code-compliant manufacturers' installation guidelines to reduce the risk of construction and structural defects. Environmental Benefits: Lower energy consumption for heating and cooling will reduce greenhouse gas emissions and other air pollutants. Public Health: Supplemental ventilation training will ensure indoor air quality is unaffected or improved by changes to construction practices.	
Assignment to Value Chain: Demand-side Management	**Total Budgeted Project Admin and Overhead Costs:** $552,808
EPIC Funds Encumbered: $4,431,918.00	**EPIC Funds Spent:** $0
Match Partner and Funding Split: APA - Engineered Wood Association: $329,710 (1.6 %) BASF: $990,000 (4.9 %) Bayer Material Science: $1,230,290 (6.1 %) California Building Industry Association (CBIA): $58,110 (0.3 %) Ensoltis Green Hybrid Roofing: $631,600 (3.1 %) KB Home: $3,043,500 (15.1 %) Owens Corning: $2,327,444 (11.6 %) Panasonic Eco Solutions North America: $265,200 (1.3 %) PCBC: $151,200 (0.8 %) QC Manufacturing: $785,220 (3.9 %) Shea Homes: $2,248,623 (11.2 %) SIPA - Structural Insulated Panel Association: $303,000 (1.5 %) SPFA - Spray Polyurethane Foam Alliance: $239,000 (1.2 %) Taylor Morrison Homes of California, LLC: $1,929,494 (9.6 %) Tru Team of California: $1,008,684 (5.0	**Match Funding:** $15,685,075

%)			
Leverage Contributors:		**Leveraged Funds:** $0	
Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 4 out of 4 bidders	**Rank of Selected Applicant/ Bidder:** Ranked # 1
If not the highest scoring applicant/bidder, explain why selected: Funds were awarded to passing proposals in rank order.			
Treatment of Intellectual Property: Pre-existing intellectual property identified in agreement EPC-15-009 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.			
Update: Project was approved at the November Energy Commission Business Meeting.			

83. EPC-15-010

Project Name: Expanding Energy-Related Career Pathways in the Electrical Industry: Increasing Workforce Development Opportunities in Disadvantaged Communities and Delivering Training on Automated Demand Response Communication Equipment to Inside Wireman Apprentices [EPC-15-010]	
Recipient/Contractor: Center for Sustainable Energy	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 12/8/2015 to 3/31/2020
Program Area and Strategic Objective: Market Facilitation S17: Strengthen the Clean Energy Workforce by Creating Tools and Resources that Connect the Clean Energy Industry to the Labor Market	
Issue: Automated demand response (AutoDR) equipment and communications standards have evolved significantly over past decade. However, these advances and standards have not been adequately translated into training programs to help facilitate the widespread deployment of AutoDR communication equipment. Lack of an adequately trained workforce could limit the benefits provided by demand response to electric customers and the larger grid.	
Project Description: The project will recruit workers from disadvantaged communities into an apprenticeship program, and provide them with comprehensive classroom and on-the-job training on the installation and maintenance of AutoDR communications equipment. The project will pilot a new California Advanced Lighting Controls Training Program course focused on installation and maintenance of AutoDR communications equipment for lighting applications. In addition, this project will recruit small and medium buildings located in disadvantaged communities to serve as on-the-job training sites for the apprentices enrolled in the program.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: The California Energy Code was updated in 2013 to require lighting systems in large buildings to be capable of receiving and automatically responding to at least one standards-based messaging protocol which enables demand response. This project will help ensure an adequate workforce, trained in the proper installation and maintenance of AutoDR communications equipment, exists to meet California Energy Code requirements for commercial buildings.	
CPUC Proceedings addressing issues related to this EPIC project: Smart grid: R.08-12-009 Demand Response (DR): R.13-09-011	

Applicable Metrics: CPUC Metrics- 1e, 1g, 1h, 2a, 3f

Lower Costs:

Proper installation of AutoDR communications equipment will facilitate greater levels of demand response by reducing the transaction costs for participating customers.

Greater Reliability:

Compared to manual response, properly installed AutoDR communications equipment increases customer response to utility or system operator messages about a demand response event.

Economic Development:

Training on the proper installation and maintenance of AutoDR communications can provide increased employment opportunities for workers in disadvantaged communities.

Assignment to Value Chain: Demand-side Management	**Total Budgeted Project Admin and Overhead Costs:** $863,874
EPIC Funds Encumbered: $4,476,189.00	**EPIC Funds Spent:** $0
Match Partner and Funding Split: California LMCC IBEW-NECA: $16,165,080 (78.3 %)	**Match Funding:** $16,165,080
Leverage Contributors:	**Leveraged Funds:** $0

Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 4 out of 4 bidders	**Rank of Selected Applicant/ Bidder:** Ranked # 2

If not the highest scoring applicant/bidder, explain why selected:
Funds were awarded to passing proposals in rank order.

Treatment of Intellectual Property:
Pre-existing intellectual property identified in agreement EPC-15-010 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.

Update:
Project was approved at the November 12, 2015 Energy Commission Business Meeting.

84. EPC-14-026

Project Name: Examining the Heterogeneity of Energy Efficiency Adoption and Savings Across Socio-Economic and Ethnic Groups Using a Large Scale Quasi-Experiment [EPC-14-026]	
Recipient/Contractor: Regents of the University of California, on behalf of the Berkeley Campus	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 5/8/2015 to 6/30/2017
Program Area and Strategic Objective: Market Facilitation S18: Guide EPIC Investments through Effective Market Assessment, Program Evaluation, and Stakeholder Outreach	
Issue: Numerous studies have found that consumers are failing to adopt seemingly cost-effective investments in energy efficiency. Current energy efficiency programs and energy demand forecasts do not account for varying participation across social, cultural, and socioeconomic groups. Previous studies have been small scale or based on stated-choice surveys. The results of these studies can be unreliable due to low participation rates, recall bias, and other biases.	
Project Description: This project will conduct a quasi-experimental, econometric study of energy efficiency adoption and energy savings with a focus on differences between social, cultural, and socio-economic groups. The study will apply modern economic methods, including regression-discontinuity and propensity score matching. The large data sets and rigorous methods will result in precise estimates to improve demand forecasts, energy efficiency program design, and future energy studies concerning social, cultural, and socioeconomic groups.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: Senate Bill 350 (De Leon, 2015) sets energy efficiency targets for 2030 and allows for the targets to be achieved, in part, from utility programs that provide financial incentives and rebates to their customers to increase energy efficiency. This project will examine opportunities to increase customer participation in utility efficiency programs in a cost-optimal manner.	
CPUC Proceedings addressing issues related to this EPIC project: Customer Data Access Program: Applications A.12-03-002, 003, 004. Decisions D.11 Resource Adequacy (RA) 2016 and 2017 Compliance Years: R.14-10-020 Long-Term Procurement Proceeding (LTPP): R.13-12-010 Long-Term Procurement Proceeding. LTPP (2016 cycle): TBD Energy Efficiency Strategic Plan update and action plans: EE Strategic Plan docs Energy Efficiency Proceedings: R.13-11-005, R. 12-01-005, R.09-11-014	

Applicable Metrics: CPUC Metrics- 1f, 1h, 5c Lower Costs: Understanding social, cultural and behavioral aspects can help utilities more cost-effectively and efficiently market their energy efficiency programs to hard-to-reach customer groups. Greater Reliability: New metrics on the impacts of utility energy efficiency programs for various subpopulations can increase the accuracy of energy demand forecasts used in Long Term Procurement Planning and Resource Adequacy proceedings. Consumer Appeal: Energy efficiency programs that incorporate social, behavioral and cultural aspects into the program design are likely to have greater appeal to potential customers.			
Assignment to Value Chain: Demand-side Management		**Total Budgeted Project Admin and Overhead Costs:** $65,406	
EPIC Funds Encumbered: $360,632.00		**EPIC Funds Spent:** $109,842	
Match Partner and Funding Split: Regents of the University of California, Berkeley: $150,784 (29.5 %)		**Match Funding:** $150,784	
Leverage Contributors:		**Leveraged Funds:** $0	
Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 12 out of 12	**Rank of Selected Applicant/ Bidder:** Ranked # 1
If not the highest scoring applicant/bidder, explain why selected: Funds were awarded to passing proposals in rank order.			
Treatment of Intellectual Property: Pre-existing intellectual property identified in agreement EPC-14-026 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.			
Update: In 2015, Haas completed the SCE data security review; consulted with SCE program staff to determine data request needs, covering program data, participant billing data, and non-participant data; worked with SCE to prepare the first data request and data transfer protocol; continued spatial analysis of climate zone boundaries within SCE territory; and performed literature review to identify number of participants and reported savings by year.			

85. EPC-14-032

Project Name: Capturing Cultural Diversity in California Residential Energy Efficiency Potential: An Energy Ethnography of Hispanic Households [EPC-14-032]	
Recipient/Contractor: Inova Energy Group, LLC	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 5/8/2015 to 5/8/2018
Program Area and Strategic Objective: Market Facilitation S18: Guide EPIC Investments through Effective Market Assessment, Program Evaluation, and Stakeholder Outreach	
Issue: An increasing proportion of California's population identify as being Hispanic, but Hispanics have historically had low participation in energy efficiency programs. Due to cultural background, frequent linguistic isolation, and higher densities of rental, low-income, and multifamily households, Hispanics are considered hard-to-reach customers in California's energy efficiency landscape and are found to have disproportionately low participation in energy efficiency programs. As such, there is a significant energy efficiency potential that has not been realized from this hard-to-reach group.	
Project Description: This project will focus on reaching Hispanic subpopulations in California to better understand the social, cultural, and behavioral aspects of their decisions to adopt energy efficient technologies and behaviors. The study will combine data collected from participants via energy usage journals, in-home interviews, and energy meters to further the knowledge of Hispanic cultural associations and beliefs related to energy use decisions and choices. The information gathered in this study can be used to improve the metrics and assumptions underlying energy demand forecasting and energy efficiency potential and goals studies. In addition, the study will provide information that can be used for targeted marketing of energy efficiency programs to the Hispanic population and improved levels of service to these households.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: Senate Bill 350 (De Leon, 2015) sets energy efficiency targets for 2030 and allows for the targets to be achieved, in part, from utility programs that provide financial incentives and rebates to their customers to increase energy efficiency. This project will help increase customer participation in utility efficiency programs by better understanding the social, cultural and behavior aspects of the Hispanic subpopulation that discourage or prevent their participation.	
CPUC Proceedings addressing issues related to this EPIC project: Resource Adequacy (RA) 2016 and 2017 Compliance Years: R.14-10-020 Long-Term Procurement Proceeding. LTPP (2016 cycle): TBD Energy Efficiency Strategic Plan update and action plans: EE Strategic Plan docs	

Energy Efficiency Proceedings: R.13-11-005, R. 12-01-005, R.09-11-014
Applicable Metrics: CPUC Metrics- 1f, 1h, 5c Lower Costs: Understanding social, cultural and behavioral aspects can help utilities more cost-effectively and efficiently market their energy efficiency programs to hard-to-reach customer groups. Greater Reliability: New metrics on the impacts of utility energy efficiency programs for various subpopulations can increase the accuracy of energy demand forecasts used in Long Term Procurement Planning and Resource Adequacy proceedings. Consumer Appeal: Energy efficiency programs that incorporate social, behavioral and cultural aspects into the program design are likely to have greater appeal to potential customers.

Assignment to Value Chain: Demand-side Management		**Total Budgeted Project Admin and Overhead Costs:** $10,681	
EPIC Funds Encumbered: $224,593.00		**EPIC Funds Spent:** $36,564	
Match Partner and Funding Split:		**Match Funding:** $0	
Leverage Contributors:		**Leveraged Funds:** $0	
Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 12 out of 12	**Rank of Selected Applicant/ Bidder:** Ranked # 3

If not the highest scoring applicant/bidder, explain why selected: Funds were awarded to passing proposals in rank order.
Treatment of Intellectual Property: Pre-existing intellectual property identified in agreement EPC-14-032 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.
Update: In 2015 the project team completed an extensive literature review, as well as a set of interviews with subject matter experts in both the energy efficiency field as well as Hispanic community leaders. These efforts have established a solid baseline that will inform the rest of the study. In 2016, the project will move to recruiting individual level participants to conduct energy-use journals, in-home interviews and electricity meter data analysis.

86. EPC-14-037

Project Name: Home Energy Efficiency Retrofits in California: An Analysis of Sociocultural Factors Influencing Customer Adoption [EPC-14-037]	
Recipient/Contractor: Center for Sustainable Energy	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 5/8/2015 to 3/31/2018
Program Area and Strategic Objective: Market Facilitation S18: Guide EPIC Investments through Effective Market Assessment, Program Evaluation, and Stakeholder Outreach	
Issue: The current policy framework used to assess the adoption of residential energy efficiency measures is driven primarily by estimates of cost effectiveness. However, cost effectiveness calculations alone are inadequate to accurately predict adoption and market potential, as they do not capture the multitude of factors influencing the decision-making process of individual market sectors. Recent studies suggest that social, cultural and behavioral factors have a significant influence on the adoption of energy efficiency measures in residential households and should be considered in the decision-making process.	
Project Description: This project will conduct a multidisciplinary, data driven study to understand the role and interactions of various factors influencing the adoption and utilization of residential energy efficiency measures. The study will provide insight into the stand alone and interactive effects of factors such as income, ethnicity, language, and political orientation on the adoption of energy efficient technologies. The study will facilitate the learnings from prescriptive energy-efficiency programs in California and enhance energy policy and program design.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: Senate Bill 350 (De Leon, 2015) sets energy efficiency targets for 2030 and allows for the targets to be achieved, in part, from utility programs that provide financial incentives and rebates to their customers to increase energy efficiency. This project will help increase customer participation in utility efficiency programs by better understanding the social, cultural and behavior aspects of the Hispanic subpopulation that discourage or prevent their participation.	
CPUC Proceedings addressing issues related to this EPIC project: Customer Data Access Program: Applications A.12-03-002, 003, 004. Decisions D.11 Resource Adequacy (RA) 2016 and 2017 Compliance Years: R.14-10-020 Long-Term Procurement Proceeding (LTPP): R.13-12-010 Long-Term Procurement Proceeding. LTPP (2016 cycle): TBD Energy Efficiency Strategic Plan update and action plans: EE Strategic Plan docs	

Energy Efficiency Proceedings: R.13-11-005, R. 12-01-005, R.09-11-014

Applicable Metrics: CPUC Metrics- 1f, 1h, 5c

Lower Costs:

Understanding social, cultural and behavioral aspects can help utilities more cost-effectively and efficiently market their energy efficiency programs to hard-to-reach customer groups.

Greater Reliability:

New metrics on the impacts of utility energy efficiency programs for various subpopulations can increase the accuracy of energy demand forecasts used in Long Term Procurement Planning and Resource Adequacy proceedings.

Consumer Appeal:

Energy efficiency programs that incorporate social, behavioral and cultural aspects into the program design are likely to have greater appeal to potential customers.

Assignment to Value Chain: Demand-side Management	**Total Budgeted Project Admin and Overhead Costs:** $166,993
EPIC Funds Encumbered: $599,924.00	**EPIC Funds Spent:** $79,361
Match Partner and Funding Split: Renovate America: $214,000 (26.3 %)	**Match Funding:** $214,000
Leverage Contributors:	**Leveraged Funds:** $0

Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 12 out of 12	**Rank of Selected Applicant/ Bidder:** Ranked # 4

If not the highest scoring applicant/bidder, explain why selected:

Funds were awarded to passing proposals in rank order.

Treatment of Intellectual Property:

Pre-existing intellectual property identified in agreement EPC-14-037 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.

Update:

In 2015 the project team began work on the regression analysis and market characterization. The first Technical Advisory Committee meeting was conducted in September; the initial benefits questionnaire has been completed. Work also started to conduct literature review on energy behaviors and financial decision-making among Chinese-speaking, Spanish-speaking and African American populations.

87. EPC-14-038

Project Name: Fieldwork to Document Technology Adoption and Behavior Change Across Diverse Geographies and Populations to Inform Energy Efficiency Program Design [EPC-14-038]	
Recipient/Contractor: Indicia Consulting	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 5/8/2015 to 1/31/2019
Program Area and Strategic Objective: Market Facilitation S18: Guide EPIC Investments through Effective Market Assessment, Program Evaluation, and Stakeholder Outreach	
Issue: Technological innovation has been an impressive driver of efficiency gains; however, over time it has become clear that without a greater understanding of the human factors, potential energy savings will remain unlocked. The goal of this research is to be able to recommend an alternative energy efficiency potential model. This new model would draw upon variables descriptive of culture and behavior among California sub-populations, and demonstrate the cost-effectiveness of programs designed to holistically address how different people experience and respond to technologies.	
Project Description: This project will use empirical research methods grounded in anthropology and other social and behavioral sciences to explore the factors affecting behavior beyond simply economic rational. This practice will be achieved by documenting and analyzing emerging attitudes, emotions, experience, habits, and practices around technology adoption for purposes of devising predictive indicators for on-going potential studies regarding energy consumption in California.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: Senate Bill 350 (De Leon, 2015) sets energy efficiency targets for 2030 and allows for the targets to be achieved, in part, from utility programs that provide financial incentives and rebates to their customers to increase energy efficiency. This project will help increase customer participation in utility efficiency programs by better understanding the social, cultural and behavior aspects of various subpopulations that discourage or prevent their participation.	
CPUC Proceedings addressing issues related to this EPIC project: Residential Zero Net Energy Action Plan (2015): Residential ZNE Action Plan (June 2015) Energy Efficiency Strategic Plan update and action plans: EE Strategic Plan docs Energy Efficiency Proceedings: R.13-11-005, R. 12-01-005, R.09-11-014	

Applicable Metrics: CPUC Metrics- 1f, 1h, 5c

Lower Costs:

Understanding social, cultural and behavioral aspects can help utilities more cost-effectively and efficiently market their energy efficiency programs to hard-to-reach customer groups.

Greater Reliability:

New metrics on the impacts of utility energy efficiency programs for various subpopulations can increase the accuracy of energy demand forecasts used in Long Term Procurement Planning and Resource Adequacy proceedings.

Consumer Appeal:

Energy efficiency programs that incorporate social, behavioral and cultural aspects into the program design are likely to have greater appeal to potential customers.

Assignment to Value Chain: Demand-side Management	**Total Budgeted Project Admin and Overhead Costs:** $40,208
EPIC Funds Encumbered: $574,545.00	**EPIC Funds Spent:** $69,409
Match Partner and Funding Split: California State University San Marcos Indicia Consulting: $52,500 (8.4 %)	**Match Funding:** $52,500
Leverage Contributors:	**Leveraged Funds:** $0

Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 12 out of 12	**Rank of Selected Applicant/ Bidder:** Ranked # 5

If not the highest scoring applicant/bidder, explain why selected:

Funds were awarded to passing proposals in rank order.

Treatment of Intellectual Property:

Pre-existing intellectual property identified in agreement EPC-14-038 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.

Update:

The project kicked off in June, 2015 and is proceeding on schedule. The TAC was formed immediately after the kickoff meeting, held an initial conference call in mid-June and a first meeting in October. The research team has identified potential respondents, developed interview guides, conducted interviews, and is currently transcribing interview data for analysis. The team has also been working with utilities and community choice aggregators to develop partnerships to identify a sample frame for the next stage of interviews. One roadblock was encountered when PG&E pulled out and decided not to participate or provide data access. Discussions with other IOUs continue.

88. EPC-14-039

Project Name: Cultural Factors in the Energy Use Patterns of Multifamily Tenants [EPC-14-039]	
Recipient/Contractor: TRC Engineers, Inc.	
Investment Plan: 2012-2014 Triennial Investment Plan	**Project Term:** 5/8/2015 to 12/22/2017
Program Area and Strategic Objective: Market Facilitation S18: Guide EPIC Investments through Effective Market Assessment, Program Evaluation, and Stakeholder Outreach	
Issue: Currently, one third of all Californians live in multifamily housing. Multifamily units have represented 50 percent of all new housing starts in the state continuously since 2009. However, energy patterns and cultural factors in multifamily settings have been understudied. A better understanding of energy usage patterns in multifamily settings will provide important insight into the future of California energy use as this housing type becomes increasingly common, and an essential component of future zero-net energy strategies.	
Project Description: This project will examine the cultural and demographic factors that correlate with multifamily tenants' electric energy use patterns, before and after energy efficiency upgrades. For this project, a field experiment will be conducted to better determine how cultural factors influence tenant interest in consumer level technologies that can reduce electricity use, especially for lighting and plug loads.	
How the Project Leads to Technological Advancement or Breakthroughs to Overcome Barriers to Achieving the State's Statutory Energy Goals: Senate Bill 350 (De Leon, 2015) sets energy efficiency targets for 2030 and allows for the targets to be achieved, in part, from utility programs that provide financial incentives and rebates to their customers to increase energy efficiency. This project will help increase customer participation in utility efficiency programs by better understanding the social, cultural and behavior aspects of multi-family building tenants that discourage or prevent their participation.	
CPUC Proceedings addressing issues related to this EPIC project: Resource Adequacy (RA) 2016 and 2017 Compliance Years: R.14-10-020 Long-Term Procurement Proceeding (LTPP): R.13-12-010 Long-Term Procurement Proceeding. LTPP (2016 cycle): TBD Resource Adequacy (RA): R.11-10-023 [Closed] Energy Efficiency Strategic Plan update and action plans: EE Strategic Plan docs Energy Efficiency Proceedings: R.13-11-005, R. 12-01-005, R.09-11-014	

Applicable Metrics: CPUC Metrics- 1f, 1h, 5c

Lower Costs:

Understanding social, cultural, and behavioral aspects of can help utilities most cost-effectively and efficiently market their energy efficiency programs to hard-to-reach customer groups.

Greater Reliability:

New metrics on the impacts of utility energy efficiency programs for various subpopulations can increase the accuracy of energy demand forecasts used in Long Term Procurement Planning and Resource Adequacy proceedings.

Consumer Appeal:

Energy efficiency programs that incorporate social, behavioral and cultural aspects into the program design are likely to have greater appeal to potential customers.

Assignment to Value Chain: Demand-side Management	**Total Budgeted Project Admin and Overhead Costs:** $107,714
EPIC Funds Encumbered: $379,019.00	**EPIC Funds Spent:** $80,450
Match Partner and Funding Split: Pacific Gas and Electric Company: $100,000 (20.9 %)	**Match Funding:** $100,000
Leverage Contributors:	**Leveraged Funds:** $0

Funding Method: Competitive	**Funding Mechanism:** Grant	**No. of Passing Applicants/ Bidders:** 12 out of 12	**Rank of Selected Applicant/ Bidder:** Ranked # 2

If not the highest scoring applicant/bidder, explain why selected:
Funds were awarded to passing proposals in rank order.

Treatment of Intellectual Property:
Pre-existing intellectual property identified in agreement EPC-14-039 (Confidential Products and Pre-Existing Intellectual Property Lists, Attachment C-2) will reside with the recipient. New intellectual property developed under this agreement will be subject to the agreement Terms and Conditions.

Update:
In 2015, the research plan for recruitment and project launch was finalized. Study preparation included the development of data collection instruments and outreach material targeting multifamily tenant study participation to assist in conducting the study.