STATE OF CALIFORNIA

GRANTS/CONTINGENT AWARD REQUEST

CEC-270 (Revised 02/10) CALIFORNIA ENERGY COMMISSION

To: Grants and Loans Office Date: 3/21/2013

Project Manager: Leah Mohney Phone Number: 916-327-1506

Office: Energy Efficiency Research Office Division: Energy Research and Development MS- 51

Project Title: Codes and Standards Quality Demonstration Program

Type of Request: *(check one)*

☒ **New Agreement:** *(include items A-F from below)* Agreement Number: PIR-12-027

Program: PIER NG / Buildings End-Use Energy Efficiency

Solicitation Name and/or Number: PON-12-503-26 (Building Energy Efficiency Research and Technology Grant Program)

Legal Name of Recipient: The Regents of the University of California, Davis

Recipient's Full Mailing Address: 633 PENA DR.
DAVIS, CA 95618-6570

Recipient's Project Officer: Cori Jackson Phone Number: 530.747.3843

Agreement Start Date: 6/30/2013 Agreement End Date: 3/31/2017

☐ **Amendment :** *(Check all that apply)* Agreement Number:

- ☐ Term Extension – New End Date:
- ☐ Work Statement Revision *(include Item A from below)*
- ☐ Budget Revision *(include Item B from below)*
- ☐ Change of Scope *(include Items A – F as applicable from below)*
- ☐ Other:

ITEMS TO ATTACH WITH REQUEST:

A. Work Statement
B. Budget
C. Recipient Resolution, if applicable. (Resolution may be requested in Special Conditions if not currently available.)
D. Special Conditions, if applicable.
E. CEQA Compliance Form
F. Other Documents as applicable
- Copy of Score Sheets
- Copy of Pre-Award Correspondence
- Copy of All Other Relevant Documents

California Environmental Quality Act (CEQA)

☒ CEC finds, based on recipient's documentation in compliance with CEQA:
- ☒ Project exempt: 14 CCR Sections 15301 and 15306 NOE filed:
- ☐ Environmental Document prepared: NOD filed:
- ☐ Other:

☒ CEC has made CEQA finding described in CEC-280, attached

Funding Information:

*Source #1:	NG	Amount:	$ 525,000.00	Statute:	11-	FY:	12-13	Budget List #:	501.001F
*Source #2:	PIER-E	Amount:	$ 642,103.00	Statute:	11-	FY:	12-13	Budget List #:	501.027J
*Source #3:		Amount:	$	Statute:		FY:		Budget List #:	

If federally funded, specify federal agreement number:

*** Source Examples include ERPA, PIER-E, PIER-NG, FED, GRDA, ARFVT, OTHER.**

Business Meeting Approval: *(refer to Business Meeting Schedule)*

Proposed Business Meeting Date: 6/12/2013 ☐ Consent ☒ Discussion

Business Meeting Participant: Leah Mohney Time Needed: 5 minutes

Agenda Notice Statement: *(state purpose in layperson terms)*

Possible approval of a ☒ Grant / ☐ Contingent Award to…

Possible approval of Agreement PIR-12-026 with The Regents of the University of California, Davis for $1,167,103 to conduct detailed field studies to document and verify actual performance, energy savings, and cost characteristics for advanced lighting, lighting controls, HVAC, and other emerging technologies. The data will be used to create a robust guide for conducting technology assessments. The research will be performed by the University of California, Davis. This agreement includes $121,600 in match funding. (PIER electricity and natural gas funding) Contact: Leah Mohney.

Project Manager	Date	Office Manager	Date	Deputy Director	Date

Exhibit A
Scope of Work

TECHNICAL TASK LIST

Task #	CPR	Task Name
1	N/A	Administration
2	X	CASE-QDP Foundations and Development
3	X	CASE-QDP Assessments
4		Post Assessment Verification and Analysis
5	X	Program Refinement and Next-Phase Readiness Activities
6		Technology Transfer Activities

KEY NAME LIST

Task #	Key Personnel	Key Subcontractor(s)	Key Partner(s)
1-6	Michael Siminovitch and Konstantinos Papamichael – California Lighting Technology Center, UC Davis Mark Modera – Western Cooling Efficiency Center, UC Davis		

GLOSSARY

Specific terms and acronyms used throughout this scope of work are defined as follows:

Term/ Acronym	Definition
BERG	Building Efficiency Research Grant
C&S	Codes and Standards
CALCTP	California Advanced Lighting Controls Training Program
CASE	Codes And Standards Enhancement
CASE-QDP	CASE-Quality Demonstration Program
CPM	Commission Project Manager
CPR	Critical Project Review
CWPB	Clothes Washers using Polymer Bead technology
FDD	Fault Detection and Diagnostics
GHP	Gas-engine Heat Pump
M&V	Measurement and Verification
HVAC	Heating, Ventilation, and Air Conditioning

Exhibit A
Scope of Work

Term/ Acronym	Definition
IOSO	Innovative Occupancy Sensors for Outdoor Applications
IOU	Investor Owned Utility
LBNL	Lawrence Berkeley National Laboratory
RLLR	Residential LED Luminaries and Lamp Replacements
SCE	Southern California Edison
SPEED	State Partnership in Energy Efficient Demonstrations
TAG	Technical Advisory Group

Problem Statement:
The California Energy Commission's PIER program provides funding for technology research, development, and demonstration. Funds provide a valuable mechanism for research teams to transfer energy efficiency ideas, designs, and prototypes into real-world energy saving products. These activities form a foundational building block in California's efforts to achieve its energy reduction goals. However, activities may be expanded to better support statewide Codes and Standards Enhancement (CASE) efforts.

Goals of the Agreement:
The goal of this Agreement is to develop a detailed demonstration and assessment program for Energy Commission-sponsored and other related building energy efficiency technologies. The CASE-Quality Demonstration Program (CASE-QDP) will provide: (1) a complete, robust data set on key, energy-efficient technologies; and (2) a data set that can inform and affect California CASE activities. CASE-QDP will achieve these goals through three key program activities:

- Rigorous assessment of primary codes and standards (C&S)-ready building technologies.
- Rigorous assessment of emerging technologies that do not have funding to support a CASE-quality measurement and verification (M&V) component, to ensure their inclusion in future C&S activities.
- Post-assessment verification and analysis of key projects to verify estimated and/or demonstrated performance, energy savings, and carbon savings.

The CASE-QDP can be utilized over the long-term to ensure that research, development, and demonstration activities have a consistent and rigorous pathway to inform and positively affect future California CASE activities.

Objectives of the Agreement:
The objectives of this Agreement are to establish a solid programmatic framework that will allow the CASE-QDP to operate beyond the research period. The Agreement will involve:

- Demonstration of the viability and success of the program through multiple assessment projects to include lighting, daylighting, HVAC, and other energy efficiency technologies.
- Verification and documentation of post-assessment performance.
- Delivery of energy, market, and economic analyses on all technologies to the Energy Commission and other C&S stakeholders for use in future iterations of CASE activities.

TASK 1 ADMINISTRATION

Instructions for Submitting Electronic Files and Developing Software

Electronic File Format
The Recipient will deliver an electronic copy (CD ROM or memory stick or as otherwise specified by the Commission Project Manager (CPM) of the full text of any Agreement products in a compatible version of Microsoft Word (.doc).

The following describes the accepted formats of electronic data and documents provided to the Energy Commission as products and establishes the computer platforms, operating systems, and software versions that will be required to review and approve all software deliverables.

- Data sets will be in Microsoft (MS) Access or MS Excel file format.
- PC-based text documents will be in MS Word file format.
- Documents intended for public distribution will be in PDF file format, with the native file format provided as well.
- Project management documents will be in MS Project file format.

Software Application Development
If this Scope of Work includes any software application development, including but not limited to databases, websites, models, or modeling tools, the Recipient will use the following standard Application Architecture components in compatible versions:

- Microsoft ASP.NET framework (version 3.5 and up) Recommend 4.0.
- Microsoft Internet Information Services (IIS), (version 6 and up) Recommend 7.5.
- Visual Studio.NET (version 2008 and up) Recommend 2010.
- C# Programming Language with Presentation (UI), Business Object and Data Layers.
- SQL (Structured Query Language).
- Microsoft SQL Server 2008, Stored Procedures Recommend 2008 R2.
- Microsoft SQL Reporting Services Recommend 2008 R2
- XML (external interfaces).

Any exceptions to the Electronic File Format requirements above must be approved in writing by the Energy Commission's Information Technology Services Branch.

Task 1.1 Attend Kick-off Meeting

The goal of this task is to establish the lines of communication and procedures for implementing this Agreement.

The Recipient shall:

- Attend a "Kick-Off" meeting with the CPM, the Grants Officer, and a representative of the Accounting Office. The Recipient shall bring its Project Manager, Agreement Administrator, Accounting Officer, and others designated by the CPM to this meeting. The administrative and technical aspects of this Agreement will be discussed at the meeting. Prior to the kick-off meeting, the CPM will provide an agenda to all potential meeting participants.

  The administrative portion of the meeting shall include, but not be limited to, the following:
  - Discussion of the terms and conditions of the Agreement
  - Discussion of Critical Project Review (Task 1.2)
  - Match fund documentation (Task 1.6) *No work may be performed until this documentation is in place.*
  - Permit documentation (Task 1.7)
  - Discussion of subcontracts needed to carry out project (Task 1.8)

  The technical portion of the meeting shall include, but not be limited to, the following:
  - The CPM's expectations for accomplishing tasks described in the Scope of Work
  - An updated Schedule of Products
  - Discussion of Progress Reports (Task 1.4)
  - Discussion of Technical Products (Product Guidelines located in Section 5 of the Terms and Conditions)
  - Discussion of the Final Report (Task 1.5)

  The CPM shall designate the date and location of this meeting.

- Submit an updated Schedule of Products, List of Match Funds, and List of Permits to the CPM.

Recipient Products:

- Updated Schedule of Products

- Updated List of Match Funds
- Updated List of Permits

Commission Project Manager Product:

- Kick-Off Meeting Agenda

Task 1.2 Critical Project Review (CPR) Meetings

The goal of this task is to determine if the project should continue to receive Energy Commission funding to complete this Agreement and to identify any needed modifications to the tasks, products, schedule, or budget.

CPRs provide the opportunity for frank discussions between the CPM and the Recipient. The CPM may schedule CPRs as necessary, and CPR costs will be borne by the Recipient.

Participants include the CPM and the Recipient, and may include the Commission Grants Officer, the Energy Research and Development Division technical lead, other Energy Commission staff and Management, and any other individuals selected by the CPM to provide support to the Energy Commission.

The Commission Project Manager shall:

- Determine the location, date, and time of each CPR meeting with the Recipient. These meetings generally take place at the Energy Commission, but they may take place at another location or may be conducted via electronic conferencing (e.g., WebEx), as determined by the Commission Project Manager.
- Send the Recipient the agenda and a list of expected participants in advance of each CPR. If applicable, the agenda shall include a discussion of both match funding and permits.
- Conduct and make a record of each CPR meeting. One of the outcomes of this meeting will be a schedule for providing the written determination described below.
- Determine whether to continue the project, and if so whether modifications are needed to the tasks, schedule, products, and/or budget for the remainder of the Agreement. If the CPM concludes that satisfactory progress is not being made, this conclusion will be referred to the Deputy Director of the Energy Research and Development Division.
- Provide the Recipient with a written determination in accordance with the schedule. The written response may include a requirement for the Recipient to revise one or more products that were included in the CPR.

The Recipient shall:

- Prepare a CPR Report for each CPR that discusses the progress of the Agreement toward achieving its goals and objectives. This report shall include recommendations and conclusions regarding continued work on the project. This report shall be submitted along with any other products identified in this Scope of Work. The Recipient shall submit these documents to the CPM and any other designated reviewers at least 15 working days in advance of each CPR meeting.
- Present the required information at each CPR meeting and participate in a discussion about the Agreement.

Commission Project Manager Products:

- Agenda and a list of expected participants
- Schedule for written determination
- Written determination

Recipient Product:

- CPR Report(s)

Task 1.3 Final Meeting

The goal of this task is to close out this Agreement.

The Recipient shall:

- Meet with Energy Commission staff to present the project findings, conclusions, and recommendations. The final meeting must be completed during the closeout of this Agreement.

  This meeting will be attended by, at a minimum, the Recipient, the Commission Grants Office Officer, and the CPM. The technical and administrative aspects of Agreement closeout will be discussed at the meeting, which may be divided into two separate meetings at the discretion of the CPM.

  The technical portion of the meeting shall involve the presentation of an assessment of the degree to which project and task goals and objectives were achieved, in addition to findings, conclusions, recommended next steps (if any) for the Agreement, and recommendations for improvements. The CPM will determine the appropriate meeting participants.

  The administrative portion of the meeting shall involve a discussion with the CPM and the Grants Officer about the following Agreement closeout items:

  - Disposition of any equipment purchased with Energy Commission funds
  - Energy Commission's request for specific "generated" data (not already provided in Agreement products)
  - Need to document Recipient's disclosure of "subject inventions" developed under the Agreement
  - "Surviving" Agreement provisions
  - Final invoicing and release of retention
- Prepare written documentation of any agreements made between the Recipient and Commission staff during the meeting.
- Prepare a schedule for completing the closeout activities for this Agreement.

Products:

- Written documentation of meeting agreements
- Schedule for completing closeout activities

Task 1.4 Monthly Progress Reports

The goal of this task is to periodically verify that satisfactory and continued progress is made towards achieving the research objectives of this Agreement on time and within budget.

The objectives of this task are to summarize activities performed during the reporting period, to identify activities planned for the next reporting period, to identify issues that may affect performance and expenditures, and to form the basis for determining whether invoices are consistent with work performed.

The Recipient shall:

- Prepare a Monthly Progress Report that summarizes all Agreement activities conducted by the Recipient for the reporting period, including an assessment of the ability to complete the Agreement within the current budget and any anticipated cost overruns. Each progress report is due to the CPM within 10 days of the end of the reporting period. The recommended specifications for each progress report are contained in the Terms and Conditions of this Agreement.
- In each Monthly Progress Report and invoice, document and verify:
  - Energy Commission funds received by California-Based Entities (CBEs);
  - Energy Commission funds spent in California; and
  - Match fund expenditures

  Provide a synopsis of project progress.

Product:

- Monthly Progress Reports

Task 1.5 Final Report

The goal of the Final Report is to assess the project's success in achieving its goals and objectives, advancing science and technology, and providing energy-related and other benefits to California.

The objectives of the Final Report are to clearly and completely describe the project's purpose, approach, activities performed, results, and advancements in science and technology; to present a public assessment of the success of the project as measured by the degree to which goals and objectives were achieved; to make insightful observations based on results obtained; to draw conclusions; and to make recommendations for further projects and improvements.

The Final Report shall be a public document. If the Recipient has obtained confidential status from the Energy Commission and will also prepare a confidential version of the Final Report, the Recipient shall perform the following activities for both the public and confidential versions of the Final Report.

The Recipient shall:

- Prepare an Outline of the Final Report.
- Prepare a Final Report following the approved outline and the latest version of the Final Report guidelines which will be provided by the CPM. The CPM shall provide written comments on the Draft Final Report within 15 working days of receipt. The Final Report must be completed at least 90 days before the end of the Agreement Term.
- Submit one bound copy of the Final Report with the final invoice.

Products:

- Draft Outline of the Final Report
- Final Outline of the Final Report
- Draft Final Report
- Final Report

Task 1.6 Identify and Obtain Match Funds

The goal of this task is to ensure that the match funds planned for this Agreement are obtained and applied to this Agreement during the term of this Agreement.

Exhibit A
Scope of Work

The costs to obtain and document match fund commitments are not reimbursable through this Agreement. Although the Energy Commission budget for this task will be zero dollars, the Recipient may utilize match funds for this task. Match funds shall be spent concurrently or in advance of Energy Commission funds for each task during the term of this Agreement. Match funds must be identified in writing and the associated commitments obtained before the Recipient can incur any costs for which the Recipient will request reimbursement.

The Recipient shall:

- Prepare a letter documenting the match funding committed to this Agreement and submit it to the CPM at least 2 working days prior to the kick-off meeting. If no match funds were part of the proposal that led to the Energy Commission awarding this Agreement and none have been identified at the time this Agreement starts, then state such in the letter. If match funds were a part of the proposal that led to the Energy Commission awarding this Agreement, then provide in the letter a list of the match funds that identifies the:
  - Amount of each cash match fund, its source (including a contact name, address and telephone number), and the task(s) to which the match funds will be applied.
  - Amount of each in-kind contribution, a description, documented market or book value, its source (including a contact name, address and telephone number), and the task(s) to which the match funds will be applied. If the in-kind contribution is equipment or other tangible or real property, the Recipient shall identify its owner and provide a contact name, address, telephone number, and the address where the property is located.
- Provide a copy of the letter of commitment from an authorized representative of each source of cash match funding or in-kind contributions that these funds or contributions have been secured. For match funds provided by a grant a copy of the executed grant shall be submitted in place of a letter of commitment.
- Discuss match funds and the implications to the Agreement if they are reduced or not obtained as committed, at the kick-off meeting. If applicable, match funds will be included as a line item in the progress reports and will be a topic at CPR meetings.
- Provide a letter including the appropriate information to the CPM if during the course of the Agreement additional match funds are received.
- Provide a letter to the CPM within 10 days if during the course of the Agreement existing match funds are reduced. Reduction in match funds must be approved through a formal amendment to the Agreement and may trigger an additional CPR.

Products:

- A letter regarding match funds or stating that no match funds are provided
- Copy(ies) of each match fund commitment letter(s) (if applicable)
- Letter(s) for new match funds (if applicable)
- Letter that match funds were reduced (if applicable)

Task 1.7 Identify and Obtain Required Permits

The goal of this task is to obtain all permits required for work completed under this Agreement in advance of the date they are needed to keep the Agreement schedule on track.

Permit costs and the expenses associated with obtaining permits are not reimbursable under this Agreement. Although the Energy Commission budget for this task will be zero dollars, the Recipient shall budget match funds for any expected expenditures associated with obtaining permits. Permits must be identified in writing and obtained before the Recipient can make any expenditure for which a permit is required.

The Recipient shall:

- Prepare a letter documenting the permits required to conduct this Agreement and submit it to the CPM at least 2 working days prior to the kick-off meeting. If there are no permits required at the start of this Agreement, then state such in the letter. If it is known at the beginning of the Agreement that permits will be required during the course of the Agreement, provide in the letter:
  - A list of the permits that identifies the:
    - Type of permit
    - Name, address and telephone number of the permitting jurisdictions or lead agencies
  - The schedule the Recipient will follow in applying for and obtaining these permits.
- Discuss the list of permits and the schedule for obtaining them at the kick-off meeting and develop a timetable for submitting the updated list, schedule, and copies of the permits. The implications to the Agreement if the permits are not obtained in a timely fashion or are denied will also be discussed. If applicable, permits will be included as a line item in the Progress Reports and will be a topic at CPR meetings.
- If during the course of the Agreement additional permits become necessary, provide an updated list of permits (including the appropriate information on each permit) and an updated schedule to the CPM.
- As permits are obtained, send a copy of each approved permit to the CPM.

- If during the course of the Agreement permits are not obtained on time or are denied, notify the CPM within 5 working days. Either of these events may trigger an additional CPR.

Products:

- Letter documenting the permits or stating that no permits are required
- Updated list of permits as they change during the term of the Agreement (if applicable)
- Updated schedule for acquiring permits as changes occur during the term of the Agreement (if applicable)
- A copy of each approved permit (if applicable)

Task 1.8 Obtain and Execute Subcontracts

The goal of this task is to ensure quality products and to procure subcontracts required to carry out the tasks under this Agreement consistent with the terms and conditions of this Agreement and the Recipient's own procurement policies and procedures. This task will also provide the Energy Commission an opportunity to review the subcontracts to ensure that the tasks are consistent with this Agreement, and that the budgeted expenditures are reasonable and consistent with applicable cost principles.

The Recipient shall:

- Manage and coordinate subcontractor activities.
- Submit a draft of each subcontract required to conduct the work under this Agreement to the Commission Agreement Manager for review.
- Submit a final copy of the executed subcontract.
- If the Recipient decides to add new subcontractors, it shall notify the Commission Agreement Manager.

Products:

- Draft subcontracts
- Final subcontracts

Exhibit A
Scope of Work

TECHNICAL TASKS

*Products not requiring a draft version are indicated by marking **"(no draft)"** after the product name.*

TASK 2 CASE-QDP FOUNDATIONS AND DEVELOPMENT

The goal of this task is to establish a framework for the successful operation of the CASE-QDP.

2.1 Technical Advisory Group Formation

The goal of this task is to form a Technical Advisory Group (TAG) that will establish important research questions and map out data and analysis requirements to ensure that CASE program needs are met.

The Recipient shall:

- Coordinate CASE-QDP program development with the Energy Commission, California Public Utilities Commission, and other C&S stakeholders via creation of a TAG.
- Prepare a List of Potential TAG Members that includes name, company, physical and electronic address, phone number, and area of expertise.
    - Submit the list to the CPM at least two working days prior to the kick-off meeting. The Recipient and CPM will discuss the list at the meeting.
- Recruit TAG members and ensure that each individual understands member obligations and the meeting schedule developed in Task 2.2.
- Prepare a final List of TAG Members.
- Submit Documentation of TAG Member Commitment from each member, such as Letters of Acceptance.
- Develop a List of Key Research Questions to address during formation of the CASE-QDP program manual (see Task 2.3), including questions to be addressed during Task 4.
- Prepare a TAG Formation Report that details the TAG formation activities in this task.

Products:

- List of Potential TAG Members
- List of TAG Members
- Documentation of TAG Member Commitment (no draft)
- List of Key Research Questions (no draft)
- TAG Formation Report (no draft)

2.2 Conduct TAG Meetings

The goal of this task is for the TAG to provide strategic guidance to this project by

participating in regular meetings or teleconferences.

The Recipient shall:

- Prepare a TAG Meeting Schedule to be presented to the TAG members during recruiting. Finalize the schedule prior to the first TAG meeting.
- Discuss the meeting schedule at the kick-off meeting. Determine the location of TAG meetings and the number of face-to-face meetings or teleconferences in consultation with the CPM.
- Prepare TAG Meeting Agendas that include back-up materials for agenda items.
- Organize and lead up to four TAG meetings in accordance with the schedule. Changes to the schedule must be pre-approved in writing by the CPM.
- Provide technical material to the TAG for review and comment, as needed.
- Prepare TAG Meeting Minutes or Summaries.
- Prepare TAG Meeting Summary Reports for each TAG meeting. The reports will include but not be limited to:
    - A summary of items discussed at TAG Meeting
    - Recommended resolutions of major TAG issues
    - Future topics to be discussed by the TAG

Products:

- TAG Meeting Schedule
- TAG Meeting Agendas (no draft)
- TAG Meeting Minutes or Summaries
- TAG Meeting Summary Reports (no draft)

2.3 Program Development

The goal of this task is to develop a program plan and manual that will guide implementation of CASE-QDP projects.

The Recipient shall:

- Develop a CASE-QDP technology and demonstration site selection process.
- Develop an M&V program framework to support unique M&V activities for each CASE-QDP technology.
- Develop a CASE-QDP reporting and information transfer process.

- Conduct a Literature Review on Lighting Control and Labor Costs for use in analysis of the 60 projects proposed for review under Task 4. These costs may also inform the development of the CASE-QDP Manual.
- Prepare a CASE-QDP Manual that details all program processes and procedures for conducting a CASE-QDP project. The manual will include but not be limited to:
  - Program Mission and Objectives
  - Technology and Demonstration Site Selection Procedures
  - M&V Program Framework and Development Procedures
  - Procedures and a Template for Reporting of Results
  - Analysis Methods
  - Discussion Requirements and a Sample Discussion
  - Reporting and Information Transfer Process
  - Post-Assessment Purpose Statement and Objectives
  - Post-Assessment Project Review Procedure
  - Schedule Template
  - Budget Template
  - Final Assessment Report Requirements
  - Final Assessment Report Template
- Participate in a CPR meeting and prepare CPR Report as specified in Task 1.2.

Products:

- Literature Review on Lighting Control and Labor Costs (no draft)
- CASE-QDP Program Manual
- CPR Report (no draft)

TASK 3 CASE-QDP ASSESSMENTS

The goal of this task is to apply the methods and framework developed under Task 2 to the assessment of multiple lighting, daylighting, HVAC, and natural gas efficiency technologies that are ready for inclusion in future California C&S enhancement activities. All assessments will include technology refinement or laboratory testing prior to field trial, demonstration site selection, technology installation, M&V, and reporting in a format consistent with the requirements detailed in the CASE-QDP Program Manual.

3.1 Identification of Technology Assessments

The goal of this task is to identify the technologies that are ready for potential inclusion in future C&S enhancement activities. The Recipient will leverage the results of existing projects based on their applicability to codes and standards activities, product availability, potential savings, and market potential. The Recipient will provide up to five technology assessments. Sample technology assessment areas include:

- Residential LED Luminaries and Lamp Replacements

- Innovative Occupancy Sensors for Outdoor Applications
- Fault Detection and Diagnosis
- Gas-Engine Heat Pumps
- Heating Swimming Pools with Air-Conditioner Waste Heat
- Energy and Water Efficient Commercial Clothes Washers using Polymer Bead Technology

The Recipient shall:

- In consultation with the TAG and CPM, select up to five technologies for assessments.
- Complete the required analysis and assessments for the selected technologies based on the requirements specified in Tasks 3.2 to 3.7, as applicable or as required by the CPM.
- Identify the selected technologies to be analyzed in one or more Letter Reports and confirm the applicable requirements to be followed.

Products:

- Letter Report(s) (no draft)

3.2 Residential LED Luminaries and Lamp Replacements

The goal of this task is to demonstrate the energy, performance, and cost characteristics of dedicated residential LED luminaries and lamp replacements (RLLR) for residential applications.

The Recipient shall:

- Select technologies and host sites.
- Prepare a Host Site Agreement.
- Develop a unique Technology M&V Plan, consistent with general program requirements detailed in the CASE-QDP program manual. The M&V plan will include but not be limited to:
  - Plan purpose and objectives
  - M&V Equipment List and descriptions
  - Equipment installation procedures
  - Measurements may include:
    - Energy consumption (e.g., kWh, kWh, Therms, BTU)
    - Operating time (daily, monthly, or other seasonal profiles)
    - Technology functional performance
    - User satisfaction with technology
- Complete technology refinements, laboratory evaluation, installation, M&V, and documentation activities in a manner that is consistent with requirements and guidelines detailed in the CASE-QDP program manual.
- Prepare an RLLR CASE-QDP Assessment Report for this demonstrated technology, which will be included as an Appendix to the final Project

Report required under Task 1.5. The report will include but not be limited to:

- Demonstration purpose and objectives
- Technology description and background
- Statewide energy use that the technology would impact
- Demonstration site description
- M&V plan
- M&V results
- Discussion on results, impacts, and other outcomes
- Economic analysis
- Analysis of technology performance with respect to current local, state, or federal code requirements
- Conclusions and next steps, if appropriate.
- Participate in a CPR meeting and prepare a CPR Report as specified in Task 1.2

Products:

- Host Site Agreement (no draft)
- Technology M&V Plan (no draft)
- RLLR CASE-QDP Assessment Report (no draft)
- CPR Report (no draft)

3.3 Innovative Occupancy Sensors for Outdoor Applications

The goal of this task is to refine and demonstrate innovative, outdoor occupancy sensors (IOSOs) for use in applications currently underserved by available products.

The Recipient shall:

- Select technologies and host sites.
- Prepare a Host Site Agreement.
- Develop a unique Technology M&V Plan for these technologies, consistent with program requirements detailed in the CASE-QDP program manual. The plan will include but not be limited to:
  - Plan purpose and objectives
  - M&V equipment list and descriptions
  - Equipment installation procedures
  - Measurements may include:
    - Energy consumption (e.g., kWh, kWh, Therms, BTU)
    - Operating time (daily, monthly, or other seasonal profiles)
    - Technology functional performance
    - User satisfaction with technology
- Complete technology refinements, laboratory evaluation, installation, M&V, and documentation activities in a manner that is consistent with requirements and guidelines detailed in the CASE-QDP program manual.

- Deliver an IOSO CASE-QDP Assessment Report for each demonstrated technology. Each report will be included as an Appendix to the Final Report required under Task 1.5, and will include but not be limited to:
  - Demonstration purpose and objectives
  - Technology description and background
  - Statewide energy use that the technology would impact
  - Demonstration site description
  - M&V plan
  - M&V results
  - Discussion on results, impacts, and other outcomes
  - Economic analysis
  - Analysis of technology performance with respect to current local, state, or federal code requirements
  - Conclusions and next steps, if appropriate.

Products:

- Host Site Agreement (no draft)
- Technology M&V Plan (no draft)
- IOSO CASE-QDP Assessment Report(s) (no draft)

3.4 Fault Detection and Diagnosis

The goal of this task is to build upon existing test methods to quantify the performance of current fault detection and diagnosis (FDD) technologies in rooftop unit applications.

The Recipient shall:

- Research available literature related to HVAC maintenance and FDD.
- Engage FDD manufacturers in a manner that will support project goals.
- Prepare a List of Viable FDD Technologies Ready for Testing Consideration.
- Prepare a list of HVAC Maintenance Faults Ready for Testing Consideration.
- Prepare a proposed list of test scenarios.
- Draft the initial FDD test method.
- Solicit feedback from the TAG and finalize a Technology Test Plan that includes test scenarios.
- Procure test products.
- Install test products and ensure reasonable compliance with relevant installation and testing protocols.
- Set up required instrumentation for testing.
- Conduct test scenarios.
- Make preparations for future test product use/disposal.

- Screen raw data for validity.
- Prepare Raw Data Spreadsheets and Setup Documentation, including but not limited to data analysis and development of charts/tables, photographs, and diagrams. Analyze the data for meaningful trends/conclusions.
- Carry out field verification and validation of test methods.
- Compare trends/conclusions (e.g., fault impact, FDD performance) with those witnessed in other known HVAC maintenance/FDD testing.
- Investigate the feasibility of extending FDD requirements to heating performance (beyond stuck-open economizers).
- Prepare a Feasibility Report on FDD Extension to Heating Performance and Controls that includes but is not limited to:
    - A summary of findings regarding extending FDD to heating performance controls
    - A comparison of fault impacts and FDD performance
    - A discussion of HVAC maintenance and FDD testing
    - A discussion of any applicable analysis and results from this task
- Prepare an FDD CASE-QDP Assessment Report for demonstrated technologies, included as an Appendix to the Final Report required under Task 1.5. Each Assessment Report will include but not be limited to:
    - Demonstration purpose and objectives
    - Technology description and background
    - Statewide energy use that the technology would impact
    - Demonstration site description
    - M&V plan
    - M&V results
    - Discussion on results, impacts, and other outcomes
    - Economic analysis
    - Analysis of technology performance with respect to current local, state or federal code requirements
    - Conclusions and next steps, if appropriate

Products:

- List of Viable FDD Technologies Ready for Testing Consideration (no draft)
- List of HVAC Maintenance Faults Ready for Testing Consideration (no draft)
- Technology Test Plan (no draft)
- Raw Data Spreadsheets and Setup Documentation (no draft)
- Feasibility Report on FDD Extension to Heating Performance and Controls (no draft)

- FDD CASE-QDP Assessment Report(s) (no draft)

3.5 Gas-Engine Heat Pumps

The goal of this task is to demonstrate the savings possible through use of gas-engine heat pumps (GHPs).

The Recipient shall:

- Develop a model of GHP performance and compare it to furnace/DX systems and electric heat pumps.
- Prepare a GHP Model Report and compare it with the furnace/DX systems and electric heat pumps.
- Prepare a Technology M&V Plan that discusses the protocol and procedures for monitoring and verifying equipment performance and energy savings.
- Prepare a Laboratory Field-Test Report that discusses the testing of components and whether they are consistent with general program requirements prescribed in the CASE-QDP program manual.
- Conduct laboratory testing of one GHP and prepare a Laboratory Test Report.
- Secure a host site and prepare a Host Site Agreement.
- Conduct data collection and analysis from field installations of GHPs.
- Develop a GHP CASE-QDP Assessment Report for this demonstrated technology. The report will be included as an Appendix to the Final Report required under Task 1.5, and will include but not be limited to:
  - Demonstration purpose and objectives
  - Technology description and background
  - Statewide energy use that the technology would impact
  - Demonstration site description
  - M&V plan
  - M&V results
  - Discussion on results, impacts, and other outcomes
  - Economic analysis
  - Analysis of technology performance with respect to current local, state, or federal code requirements
  - Conclusions and next steps, if appropriate.

Products:

- GHP Model Report (no draft)
- Technology M&V Plan (no draft)
- Laboratory Test Report (no draft)
- Host Site Agreement (no draft)
- GHP CASE-QDP Assessment Report (no draft)

3.6 Heating Swimming Pools with Air-Conditioner Waste Heat

The goal of this task is to use modeling and field testing to demonstrate the potential natural gas, electricity, and cost savings in pool heating made possible by the use of reclaimed waste heat from building air conditioning systems.

The Recipient shall:

- Adapt existing modeling tools to determine potential energy savings in these applications and summarize findings in a Potential Energy Savings Report.
- Adapt prior models to simplify calculations of anticipated gas savings.
- Prepare a Field Test and M&V Plan consistent with general program requirements prescribed in the CASE-QDP Program Manual.
- Secure a host site and prepare a Host Site Agreement.
- Conduct field testing in at least one site.
- Analyze field test data and compare it to modeling data.
- Deliver a Heated Swimming Pool CASE-QDP Assessment Report for the demonstrated technology. The report will be included as an Appendix to the final Project Report required under Task 1.5, and will include but not be limited to:
  - Demonstration purpose and objectives
  - Technology description and background
  - Statewide energy use that the technology would impact
  - Demonstration site description
  - M&V plan
  - M&V results
  - Discussion on results, impacts, and other outcomes
  - Economic analysis
  - Analysis of technology performance with respect to current local, state, or federal code requirements
  - Conclusions and next steps, if appropriate.

Products:

- Potential Energy Savings report (no draft)
- Field Test and M&V Plan (no draft)
- Host Site Agreement (no draft)
- Heated Swimming Pool CASE-QDP Assessment Report (no draft)

3.7 Energy and Water-Efficient Commercial Clothes Washers using Polymer Bead Technology

The goal of this task is to demonstrate the potential gas savings made possible by the adoption of an innovative clothes washer polymer bead (CWPB) technology in commercial laundries.

The Recipient shall:

- Conduct an analysis of statewide energy use in commercial laundries.
- Locate one or more appropriate sites for field testing.
- Prepare a Field Test and M&V Plan consistent with general program requirements prescribed in the CASE-QDP Program Manual.
- Secure a host site and prepare a Host Site Agreement.
- Install and commission monitoring equipment.
- Collect and analyze data from field tests and prepare a Field Test Report that includes results and analysis.
- Deliver a CWPB CASE-QDP Assessment Report for the demonstrated technology. The report will be included as an Appendix to the final Report required under Task 1.5, and will include but not be limited to:
    - Demonstration purpose and objectives
    - Technology description and background
    - Statewide energy use that the technology would impact
    - Demonstration site description
    - M&V plan
    - M&V results
    - Discussion on results, impacts, and other outcomes
    - Economic analysis
    - Analysis of technology performance with respect to current local, state, or federal code requirements
    - Conclusions and next steps, if appropriate

Products:

- Field Test and M&V Plan (no draft)
- Host Site Agreement (no draft)
- Field Test Report (no draft)
- CWPB CASE-QDP Assessment Report (no draft)

TASK 4 POST-ASSESSMENT VERIFICATION AND ANALYSIS

The goal of this task is to conduct post-assessment analysis of key projects to verify estimated and/or demonstrated savings. This analysis will compare the economic, energy, and performance impacts of projects installed by CALCTP-certified electricians versus projects installed by non-certified electricians.

4.1 Data Collection

The goal of this task is to select and document up to 60 lighting control projects (half installed by non-certified electricians and half by CALCTP certified electricians) to identify: common metrics for energy usage before and after the lighting control

installation; labor costs; installation time and challenges; customer usage of lighting controls; and customer satisfaction of the products.

The Recipient shall:

- Develop a data collection tool.
- Develop and administer a stakeholder survey and/or interviews.
- Conduct a literature review on lighting control and labor costs for use in analysis of the 60 projects proposed for review as described in Task 2.3. These costs may also inform the development/modification of the CASE-QDP Program Manual.
- Develop a Post-Assessment Methodology Report that is consistent with the CASE-QDP program manual and TAG requirements for CALCTP projects. The report shall include but not be limited to:
  - A discussion of literature review and results with respect to lighting control and labor costs
  - A description of the data collection tool
  - A copy of the stakeholder survey and/or interviews, including who participated, how participants were selected, response rate versus total contacted, survey results, and other information collected
- Prepare a Populated Data Collection Tool that includes information on up to 60 lighting control installation projects.

Products:

- Post-Assessment Methodology Report
- Populated Data Collection Tool

4.2 Data Analysis

The goal of this task is to analyze the collected data on parallel projects and compare the costs and benefits from installations by CALCTP electricians to those by non-certified electricians.

The Recipient shall:

- Analyze data and responses from parallel projects.
- Prepare an Interim Report that describes the study and the following:
  - Data collected
  - Analysis of survey responses and all supporting documentation
  - Comparison of costs and benefits from installations by CALCTP electricians to those by non-certified electricians

Products:

- Interim Report (no draft)

4.3 Findings

The goal of this task is synthesize, document, and deliver a comprehensive final project report on Task 4 activities.

The Recipient shall:

- Conduct a Task 4 closeout meeting with key research team members.
- Prepare Closeout Meeting Minutes.
- Prepare a Task 4 Final Report on key findings. The report will be included as an Appendix to the final report described in Task 1.5 and will summarize all the key activities and results from Task 4.
- Prepare a Task 4 Presentation on key activities and results from Task 4, for use by project stakeholders.

Products:

- Closeout Meeting Minutes (no draft)
- Task 4 Final Report (no draft)
- Task 4 Presentation (no draft)

TASK 5 PROGRAM REFINEMENT AND NEXT-PHASE READINESS ACTIVITIES

The goal of this task is to collect results from all program activities, including lessons learned during implementation of the CASE-QDP Program Manual via select technology assessments, and refine the Program Manual to ensure that future demonstration and assessment activities meet or exceed stakeholder expectations. This work is one element of Next-Phase readiness activities and includes stakeholder interviews, comparison of CASE-QDP outcomes to other ongoing CASE activities, and planning activities for continued and future CASE-QDP work.

The Recipient shall:

- Conduct stakeholder interviews and/or reconvene the TAG to identify benefits and remaining gaps in the CASE-QDP. Prepare an Interview and Post Assessment Results Summary.

- Compare, contrast and document program outcomes against other historical or ongoing CASE activities.
- Prepare a Revised CASE-QDP Program Manual that includes any necessary revisions to the manual.
- Prepare a Next-Phase Program Plan that will be included as an Appendix to the Final Report required under Task 1.5, and will include but not be limited to:
    - A discussion of the follow-up plan to utilize research results in a future building or appliance efficiency standard
    - A discussion of additional research or follow-up needed
    - A discussion of recommended improvements and future research needs
- Participate in a CPR meeting and prepare a CPR Report as specified in Task 1.2.

Products:

- Interview and Post-Assessment Results Summary (no draft)
- Revised CASE-QDP Program Manual
- Next-Phase Program Plan (no draft)
- CPR Report (no draft)

TASK 6 TECHNOLOGY TRANSFER ACTIVITIES

The goal of this task is to develop a plan to make the knowledge gained, experimental results, and lessons learned available to key decision-makers.

The Recipient shall:

- Prepare a Technology Transfer Plan that explains how the knowledge gained in this project will be made available to the public. The level of detail expected is least for research-related projects and highest for demonstration projects. Key elements from this report will be included in the Final Report.
- Conduct technology transfer activities in accordance with the Technology Transfer Plan. These activities will be reported in the Monthly Progress Reports.
- Indicate the intended use(s) for and users of the project results.

Products:

- Technology Transfer Plan

STATE OF CALIFORNIA

CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA) COMPLIANCE

CEC-280 (Revised 02/10) CALIFORNIA ENERGY COMMISSION

Award Number: PIR-12-027 Date: 3 / 25 / 2013

Note: The Energy Commission Project Managers Manual includes detailed instructions on how to complete this section, with examples of grants that are "Projects" and are not "Projects". When the Project Manager is completing this section, if questions arise as to the appropriate answers to the questions below, please consult with the Energy Commission attorney assigned to review grants or loans for your division.

1. Is grant/loan considered a "Project" under CEQA? ☒ Yes *(skip to question #2)* ☐ No *(continue with question #1)*

   Please complete the following: *[Public Resources Code (PRC) 21065 and 14 California Code of Regulations (CCR) 15378]:*

   Explain why the grant/loan is ***not*** considered a "Project"? The grant/loan will not cause a direct physical change in the environment or a reasonably foreseeable indirect physical change in the environment because grant/loan involves:

2. If grant/loan is considered a "Project" under CEQA: *(choose either **IS** or **IS NOT**)*

   ☒ Grant/loan **IS** exempt:

   ☐ Statutory Exemption: *(List PRC and/or CCR section numbers)*

   ☒ Categorical Exemption: *(List CCR section number)* 14 CCR sections 15301 and 15306

   ☐ Common Sense Exemption. *(14 CCR 15061(b)(3))*

   Explain reason why the grant/loan is exempt under the above section:

   The project involves research, data collection, modeling, and testing of energy efficiency technologies. Testing will be conducted at existing facilities.

Please attach draft Notice of Exemption (NOE). Consult with the Energy Commission attorney assigned to your division for instructions on how to complete the NOE.

☐ Grant/loan **IS NOT** exempt. The Project Manager needs to consult with the Energy Commission attorney assigned to your division and the Siting Office regarding a possible initial study.