STATE OF CALIFORNIA
GRANT REQUEST FORM (GRF)
CEC-270 (Revised 12/2019) CALIFORNIA ENERGY COMMISSION

A) New Agreement # EPC-20-030

B) Division	Agreement Manager:	MS-	Phone
ERDD	Adel Suleiman	51	916-327-3313

C) Recipient's Legal Name	Federal ID Number
Electric Power Research Institute, Inc.	23-7175375

D) Title of Project
Smart, Hybrid, Grid-Connected Exterior Lighting Systems.

E) Term and Amount

Start Date	End Date	Amount
6/1/2021	3/31/2025	$ 3,308,595

F) Business Meeting Information

☐ ARFVTP agreements $75K and under delegated to Executive Director

Proposed Business Meeting Date 4/14/2021 ☐ Consent ☒ Discussion

Business Meeting Presenter Adel Suleiman Time Needed: 5 minutes

Please select one list serve. EPIC (Electric Program Investment Charge)

Agenda Item Subject and Description:
ELECTRIC POWER RESEARCH INSTITUTE, INC. Proposed resolution approving agreement EPC-20-030 with Electric Power Research Institute, Inc. for a $3,308,595 grant to fund the development and demonstration of a novel hybrid power (solar and grid-tied) exterior LED lighting system that includes a unique wrap-around solar panel, sensors, controls and battery storage and adopting staff's determination that this project is exempt from CEQA. (EPIC funding) Contact: Adel Suleiman.

G) California Environmental Quality Act (CEQA) Compliance

1. Is Agreement considered a "Project" under CEQA?
   ☒ Yes (skip to question 2)
   ☐ No (complete the following (PRC 21065 and 14 CCR 15378)):

   Explain why Agreement is not considered a "Project":

2. If Agreement is considered a "Project" under CEQA:
   a) ☒ Agreement **IS** exempt.
   ☐ Statutory Exemption. List PRC and/or CCR section number:
   ☒ Categorical Exemption. List CCR section number: Cal. Code Regs., tit. 14, §15306 and §15301.
   ☐ Common Sense Exemption. 14 CCR 15061 (b) (3)

   Explain reason why Agreement is exempt under the above section: This project would replace existing exterior luminaires in low-income multifamily complex with a more energy efficient, hybrid luminaires which would not cause harm to the environment.

- Cal. Code Regs., tit. 14, §15301 provides and exemption for projects consisting of the operation, repair, maintenance, permitting, leasing, licensing, or minor alteration of existing public or private structures, facilities, mechanical equipment, or topographical features, involving negligible or no expansion of existing or former use. This project would replace existing exterior luminaires in low-income multifamily complex with a more energy efficient, hybrid luminaires. Specifically, this project will retrofit over 100 high intensity discharge luminaires with newly developed hybrid luminaire prototypes in 6 low-income/disadvantaged communities Therefore, the project falls within section 15301 and will not have a significant effect on the environment.

- Cal. Code Regs., tit. 14, sect. 15306 consists of basic data collection, research, experimental management, and resource evaluation activities which do not result in a serious or major disturbance to an environmental resource. This project will involve the development and will evaluate a hybrid powered area luminaire that lowers the grid energy consumption of exterior lighting compared to existing grid-tied, non-dimmable, high intensity discharge lighting. Prototype designs will be lab tested in a controlled research laboratory. This project will then replace existing exterior luminaires in low-income multifamily complex with a more energy efficient, hybrid luminaires. This work will not result in a serious or major disturbance to an environmental resource. For these reasons, the proposed project will have no significant effect on the environment and is categorically exempt under section 15306.

b) Agreement **IS NOT** exempt. (consult with the legal office to determine next steps)

Check all that apply

- ☐ Initial Study
- ☐ Negative Declaration
- ☐ Mitigated Negative Declaration
- ☐ Environmental Impact Report
- ☐ Statement of Overriding Considerations

H) List all subcontractors (major and minor) and equipment vendors: (attach additional sheets as necessary)

Legal Company Name:	**Budget**
Redwood Energy Services, Inc.	$ 500,000
Hubbell Incorporated	$ 240,450 $306,450 (Match)

I) List all key partners: (attach additional sheets as necessary)

Legal Company Name:
Affirmed Housing

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J) Budget Information

Funding Source	Funding Year of Appropriation	Budget List Number	Amount
EPIC	19-20	301.001G	$3,308,595

R&D Program Area: EERO: Buildings TOTAL: $ 3,308,595

Explanation for "Other" selection

Reimbursement Contract #: Federal Agreement #:

K) Recipient's Contact Information

1. Recipient's Administrator/Officer

Name: Cynthia Toth

Address: 942 Corridor Park Blvd

City, State, Zip: Knoxville, TN 37932-3723

Phone: 865.218.8106

E-Mail: ctoth@epri.com

2. Recipient's Project Manager

Name: Sara Beaini

Address: 3420 Hillview Ave

City, State, Zip: Palo Alto, CA 94304-1355

Phone:

E-Mail: sbeaini@epri.com

L) Selection Process Used

☒ Competitive Solicitation Solicitation #: GFO-20-303

☐ First Come First Served Solicitation Solicitation #:

M) The following items should be attached to this GRF

1.	Exhibit A, Scope of Work		☒ Attached
2.	Exhibit B, Budget Detail		☒ Attached
3.	CEC 105, Questionnaire for Identifying Conflicts		☒ Attached
4.	Recipient Resolution	☒ N/A	☐ Attached
5.	CEQA Documentation	☐ N/A	☒ Attached

Adel Suleimen *3/12/2021*

Agreement Manager **Date**

Virginia Lew *3/12/2021*

Office Manager **Date**

Linda Spiegel *3/12/2021*

Deputy Director **Date**

Exhibit A
Scope of Work
Electric Power Research Institute (EPRI)

I. TASK ACRONYM/TERM LISTS

A. Task List

Task #	CPR[1]	Task Name
1		General Project Tasks
2		Community Engagement
3	X	Concept Luminaire Design and Development
4	X	Lab Evaluation of Concept Luminaire
5	X	Luminaire Concept Revision and Update
6	X	Site Evaluation and Design
7		Production of Concept Luminaires for Installation
8		Concept Luminaires Installation
9		Field Evaluation and Monitoring
10		Data Completion and Analysis
11		Evaluation of Project Benefits
12		Technology/Knowledge Transfer Activities

B. Acronym/Term List

Acronym/Term	Meaning
CAM	Commission Agreement Manager
CAO	Commission Agreement Officer
CEC	California Energy Commission
CPR	Critical Project Review
DR	Demand Response
EPRI	Electric Power Research Institute
HID	High Intensity Discharge
HPS	High Pressure Sodium
IOU	Investor Owned Utilities
LED	Light Emitting Diode
MH	Metal Halide
M&V	Measurement and Verification
PG&E	Pacific Gas and Electric
SAA	Street and Area
SCE	Southern California Edison
SDG&E	San Diego Gas and Electric
TAC	Technical Advisory Committee

[1] Please see subtask 1.3 in Part III of the Scope of Work (General Project Tasks) for a description of Critical Project Review (CPR) Meetings.

Exhibit A
Scope of Work
Electric Power Research Institute (EPRI)

II. PURPOSE OF AGREEMENT, PROBLEM/SOLUTION STATEMENT, AND GOALS AND OBJECTIVES

A. Purpose of Agreement

The purpose of this Agreement is to fund the development and demonstration of a hybrid power (solar and grid-tied) exterior Light Emitting Diode (LED) area light system using a unique wrap-around solar panel with embedded sensors, controls and monitoring in the luminaire. Development and demonstration of this system could improve light quality and reduce nighttime energy consumption. All demonstrations will be in low income or disadvantaged communities.

B. Problem/ Solution Statement

Problem

A significant amount of California's street and area lights use alternating current (AC), are tied to the electric grid and are operated in an ON / OFF function using photocells and do not offer fixture level dimming, circuit level control, occupancy sensing, energy monitoring, or remote fixture monitoring /control. Because of this, the exterior lights are operating at full illuminance for more hours than needed and often at night when solar energy is not available. Since there is little renewable energy available at night, finding solutions to reduce nighttime load is important to minimize greenhouse gas emissions from electricity generated from fossil fuels.

Solution

This project develops a novel lighting product that has the potential to operate in a way that would be beneficial to the electric grid. This includes having the ability to dim, to remotely control, schedule or monitor fixtures and to operate in a way to maximize use of renewable energy. This project develops a product that includes the following:

- Flexible solar panel with battery storage on the pole. The innovative flexible solar panels wrap around the light pole and has integrated lithium-ion batteries. Fixture level storage helps to ensure that illuminance can be provided regardless of the state of the grid.
- Use the electric grid to provide backup power
- Local dimming control and motion sensing
- Individual and grouped luminaire scheduling
- Ability to respond to demand response (DR) signals
- Ability to report and collect data on energy consumption and operations (e.g., schedule)
- High quality light, properly aimed and shielded to reduce glare

The benefits include:

- The incorporation of a flexible solar panel with an integrated battery storage could collect and store solar energy for use at night, which may reduce electricity bills while reducing night-time lighting load on the grid. Motion sensors and wireless controls are intended to be integrated into the LED luminaire that may provide further reduction in the energy used, prolonging the battery charge level.
- There is potential to improve light quality (higher color rendering, lower glare) and more than 50% energy savings when converting (High Intensity Discharge) HID to LED fixtures.
- The developed system could collect operational data on the area lighting fixtures and respond to DR signals and events. These two functions may allow for additional reduction in cost of operation via lower energy consumption and the potential elimination of labor to

access the operational status of the fixture. In cases where HID technologies are replaced with LED based designs, the conversion could reduce the need for routine maintenance to address lamp and ballast outages.

C. Goals and Objectives of the Agreement

Agreement Goals

The goals of this Agreement are to:

- Design and develop a hybrid-powered area lighting pole/luminaire that includes a flexible solar panel and battery as the primary energy source but also has a grid Alternating Current backup.
- Demonstrate the new multi-feature lighting product in low-income or disadvantaged communities in California IOU electric service areas and measure illuminance and energy consumption during on and off-peak periods.
- Provide a means of delivering light to communities regardless of the state of the grid using battery storage or regardless of the charge state of the batteries because grid power is available as backup for improved lighting conditions and resiliency during power failures.
- Deliver luminaire-level control to area lighting by use of motion, dimming, photosensor and wireless controls integrated into the luminaire to provide further reduction in energy used and prolonging battery charge level and assess demand response (DR) potential.
- Evaluate the ability for net metering of the hybrid luminaire to provide excess electricity back to the grid.

Ratepayer Benefits:[2] This Agreement may result in ratepayer benefits through developing a product that provides effective lighting that can remove most of the exterior area lighting load from the grid. This could help reduce the amount of non-renewable, electric grid power required at night. If this technology is deployed for all outdoor lighting in CA, an estimated 4,000 GWh of electricity could be offset per year which equates to 132,000 tons of carbon dioxide[2] emission reduction.

By reducing electric utility bills, the developed technology may allow building owners and housing community operators to reinvest the energy cost savings to other services for their community. This technology may also benefit residents and small business owners by reducing operating cost while having effective lighting. The motion controls aim to ramp up the lights to full brightness when motion is detected, thus reducing energy use. The improved lighting could result in reduction in glare, and improved visibility for drivers.

Technological Advancement and Breakthroughs:[3] Specific technological breakthroughs features include:

[2] California Public Resources Code, Section 25711.5(a) requires projects funded by the Electric Program Investment Charge (EPIC) to result in ratepayer benefits. The California Public Utilities Commission, which established the EPIC in 2011, defines ratepayer benefits as greater reliability, lower costs, and increased safety (See CPUC "Phase 2" Decision 12-05-037 at page 19, May 24, 2012, http://docs.cpuc.ca.gov/PublishedDocs/WORD_PDF/FINAL_DECISION/167664.PDF).

- creation of a battery charging system for exterior area lighting that prioritizes renewable energy charging but can charge with the grid as a backup during off-peak hours or when cost advantageous
- addition of light dimming, motion sensing, photo sensing and scheduling to reduce battery size while lowering the cost of solar lighting systems
- integration of low-glare, motion-sensing, smart-grid-enabled, renewable energy powered LED luminaires for enhanced safety and reliability while reducing installation and maintenance cost compared to pole-top solar designs

Few (if any) companies have demonstrated a grid-tied, solar lighting retrofit solution. This project aims to bring renewable energy benefits to existing exterior lights by minimizing the size of the required solar and battery solution, which directly results in lower cost. Furthermore, the wrap-around solar panel design allows for faster installation, lower maintenance, and lower cost than pole-top mounted solar designs.

Integration of motion sensors and dimming controls into the hybrid powered LED luminaire could reduce battery size. Typical battery sizes are designed provide power for five days in the event of bad weather. This project aims to reduce the battery size to provide power for two days due to the availability of the grid to provide backup charging. With the goal of minimizing any grid electricity consumption during peak and partial periods (e.g., 2:00 pm to 11:00 pm), the project team aims to implement automated switching controls to keep the battery charging in the middle of the day, when it is cost advantageous and whether solar is available or not. Furthermore, embedded sensors could monitor and report energy data and air quality, and to respond individually or as a group to people activity. This allows the hybrid luminaires to be remotely monitored, controlled, and scheduled.

Agreement Objectives

The objectives of this Agreement are to:

- Develop and field evaluate a hybrid powered area luminaire that lowers the grid energy consumption of exterior lighting compared to existing grid-tied, non-dimmable, HID lighting.
- Retrofit over 100 HID luminaires with newly developed hybrid luminaire prototypes in 6 low-income/disadvantaged communities
- Determine energy performance, savings and cost compared to conventional technologies
- Determine electric rate schedule impacts on project cost effectiveness for each IOU service area.
- Communicate project learnings and recommendations to building and housing communities, and utilities
- If project meets performance metrics established in Subtask 1.12, conduct activities to commercialize technology.

III. TASK 1 GENERAL PROJECT TASKS

PRODUCTS

Subtask 1.1 Products

Exhibit A
Scope of Work
Electric Power Research Institute (EPRI)

The goal of this subtask is to establish the requirements for submitting project products (e.g., reports, summaries, plans, and presentation materials). Unless otherwise specified by the Commission Agreement Manager (CAM), the Recipient must deliver products as required below by the dates listed in the **Project Schedule (Part V).** All products submitted which will be viewed by the public, must comply with the accessibility requirements of Section 508 of the federal Rehabilitation Act of 1973, as amended (29 U.S.C. Sec. 794d), and regulations implementing that act as set forth in Part 1194 of Title 36 of the Federal Code of Regulations**.** All technical tasks should include product(s). Products that require a draft version are indicated by marking **"(draft and final)"** after the product name in the "Products" section of the task/subtask. If "(draft and final)" does not appear after the product name, only a final version of the product is required. With respect to due dates within this Scope of Work, **"days"** means working days.

The Recipient shall:

For products that require a draft version, including the Final Report Outline and Final Report

- Submit all draft products to the CAM for review and comment in accordance with the Project Schedule (Part V). The CAM will provide written comments to the Recipient on the draft product within 15 days of receipt, unless otherwise specified in the task/subtask for which the product is required.
- Consider incorporating all CAM comments into the final product. If the Recipient disagrees with any comment, provide a written response explaining why the comment was not incorporated into the final product.
- Submit the revised product and responses to comments within 10 days of notice by the CAM, unless the CAM specifies a longer time period, or approves a request for additional time.

For products that require a final version only

- Submit the product to the CAM for acceptance. The CAM may request minor revisions or explanations prior to acceptance.

For all products

- Submit all data and documents required as products in accordance with the following:

Instructions for Submitting Electronic Files and Developing Software:

- **Electronic File Format**
  - Submit all data and documents required as products under this Agreement in an electronic file format that is fully editable and compatible with the California Energy Commission's (CEC) software and Microsoft (MS)-operating computing platforms, or with any other format approved by the CAM. Deliver an electronic copy of the full text of any Agreement data and documents in a format specified by the CAM, such as memory stick.

  The following describes the accepted formats for electronic data and documents provided to the CEC as products under this Agreement, and establishes the software versions that will be required to review and approve all software products:
  - Data sets will be in MS Access or MS Excel file format (version 2007 or later), or any other format approved by the CAM.

- Text documents will be in MS Word file format, version 2007 or later.
- Project management documents will be in Microsoft Project file format, version 2007 or later.

- **Software Application Development**

  Use the following standard Application Architecture components in compatible versions for any software application development required by this Agreement (e.g., databases, models, modeling tools), unless the CAM approves other software applications such as open source programs:
  - 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 CAM. The CAM will consult with the CEC's Information Technology Services Branch to determine whether the exceptions are allowable.

MEETINGS

Subtask 1.2 Kick-off Meeting
The goal of this subtask is to establish the lines of communication and procedures for implementing this Agreement.

The Recipient shall:

- Attend a "Kick-off" meeting with the CAM, the Commission Agreement Officer (CAO), and any other CEC staff relevant to the Agreement. The Recipient will bring its Project Manager and any other individuals designated by the CAM to this meeting. The administrative and technical aspects of the Agreement will be discussed at the meeting. Prior to the meeting, the CAM will provide an agenda to all potential meeting participants. The meeting may take place in person or by electronic conferencing (e.g., WebEx), with approval of the CAM.

  The administrative portion of the meeting will include discussion of the following:
  - Terms and conditions of the Agreement;
  - Invoicing and auditing procedures;
  - Administrative products (subtask 1.1);
  - CPR meetings (subtask 1.3);
  - Match fund documentation (subtask 1.7);
  - Permit documentation (subtask 1.8);
  - Subcontracts (subtask 1.9); and

- Any other relevant topics.

The technical portion of the meeting will include discussion of the following:
- The CAM's expectations for accomplishing tasks described in the Scope of Work;
- An updated Project Schedule;
- Technical products (subtask 1.1);
- Progress reports (subtask 1.5);
- Final Report (subtask 1.6);
- Technical Advisory Committee meetings (subtasks 1.10 and 1.11); and
- Any other relevant topics.

- Provide *Kick-off Meeting Presentation* to include but not limited to:
  - Project overview (i.e. project description, goals and objectives, technical tasks, expected benefits, etc.)
  - Project schedule that identifies milestones
  - List of potential risk factors and hurdles, and mitigation strategy

- Provide an *Updated Project Schedule, Match Funds Status Letter,* and *Permit Status Letter*, as needed to reflect any changes in the documents.

The CAM shall:
- Designate the date and location of the meeting.
- Send the Recipient a *Kick-off Meeting Agenda*.

Recipient Products:
- Kick-off Meeting Presentation
- Updated Project Schedule *(if applicable)*
- Match Funds Status Letter (subtask 1.7) *(if applicable)*
- Permit Status Letter (subtask 1.8) *(if applicable)*

CAM Product:
- Kick-off Meeting Agenda

Subtask 1.3 Critical Project Review (CPR) Meetings
The goal of this subtask is to determine if the project should continue to receive CEC funding, and if so whether any modifications must be made to the tasks, products, schedule, or budget. CPR meetings provide the opportunity for frank discussions between the CEC and the Recipient. As determined by the CAM, discussions may include project status, challenges, successes, advisory group findings and recommendations, final report preparation, and progress on technical transfer and production readiness activities (if applicable). Participants will include the CAM and the Recipient and may include the CAO and any other individuals selected by the CAM to provide support to the CEC.

CPR meetings generally take place at key, predetermined points in the Agreement, as determined by the CAM and as shown in the Task List on page 1 of this Exhibit. However, the CAM may schedule additional CPR meetings as necessary. The budget will be reallocated to cover the additional costs borne by the Recipient, but the overall Agreement amount will not increase. CPR

meetings generally take place at the CEC, but they may take place at another location, or may be conducted via electronic conferencing (e.g., WebEx) as determined by the CAM.

The Recipient shall:

- Prepare and submit a *CPR Report* for each CPR meeting that: (1) discusses the progress of the Agreement toward achieving its goals and objectives; and (2) includes recommendations and conclusions regarding continued work on the project.
- Attend the CPR meeting.
- Present the CPR Report and any other required information at each CPR meeting.

The CAM shall:

- Determine the location, date, and time of each CPR meeting with the Recipient's input.
- Send the Recipient a *CPR Agenda* with a list of expected CPR participants in advance of the CPR meeting. If applicable, the agenda will include a discussion of match funding and permits.
- Conduct and make a record of each CPR meeting. Provide the Recipient with a schedule for providing a Progress Determination on continuation of the project.
- Determine whether to continue the project, and if so whether modifications are needed to the tasks, schedule, products, or budget for the remainder of the Agreement. If the CAM 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 *Progress Determination* on continuation of the project, in accordance with the schedule. The Progress Determination may include a requirement that the Recipient revise one or more products.

Recipient Products:

- CPR Report(s)

CAM Products:

- CPR Agenda
- Progress Determination

Subtask 1.4 Final Meeting

The goal of this subtask is to complete the closeout of this Agreement.

The Recipient shall:

- Meet with CEC staff to present project findings, conclusions, and recommendations. The final meeting must be completed during the closeout of this Agreement. This meeting will be attended by the Recipient and CAM, at a minimum. The meeting may occur in person or by electronic conferencing (e.g., WebEx), with approval of the CAM.

  The technical and administrative aspects of Agreement closeout will be discussed at the meeting, which may be divided into two separate meetings at the CAM's discretion.
  - The technical portion of the meeting will involve the presentation of findings, conclusions, and recommended next steps (if any) for the Agreement. The CAM will determine the appropriate meeting participants.
  - The administrative portion of the meeting will involve a discussion with the CAM and the CAO of the following Agreement closeout items:

  - Disposition of any procured equipment.
  - The CEC's request for specific "generated" data (not already provided in Agreement products).
  - Need to document the Recipient's disclosure of "subject inventions" developed under the Agreement.
  - "Surviving" Agreement provisions such as repayment provisions and confidential products.
  - Final invoicing and release of retention.
- Prepare a *Final Meeting Agreement Summary* that documents any agreement made between the Recipient and Commission staff during the meeting.
- Prepare a *Schedule for Completing Agreement Closeout Activities*.
- Provide copies of *All Final Products* on a USB memory stick, organized by the tasks in the Agreement.

Products:
- Final Meeting Agreement Summary *(if applicable)*
- Schedule for Completing Agreement Closeout Activities
- All Final Products

REPORTS AND INVOICES

Subtask 1.5 Progress Reports and Invoices
The goals of this subtask are to: (1) periodically verify that satisfactory and continued progress is made towards achieving the project objectives of this Agreement; and (2) ensure that invoices contain all required information and are submitted in the appropriate format.

The Recipient shall:
- Submit a monthly *Progress Report* to the CAM. Each progress report must:
  - Summarize progress made on all Agreement activities as specified in the scope of work for the preceding month, including accomplishments, problems, milestones, products, schedule, fiscal status, and an assessment of the ability to complete the Agreement within the current budget and any anticipated cost overruns. See the Progress Report Format Attachment for the recommended specifications.
- Submit a monthly or quarterly *Invoice* that follows the instructions in the "Payment of Funds" section of the terms and conditions, including a financial report on Match Funds and in-state expenditures.

Products:
- Progress Reports
- Invoices

Subtask 1.6 Final Report
The goal of this subtask is to prepare a comprehensive Final Report that describes the original purpose, approach, results, and conclusions of the work performed under this Agreement. When

creating the Final Report Outline and the Final Report, the Recipient must use the CEC Style Manual provided by the CAM.

Subtask 1.6.1 Final Report Outline

The Recipient shall:

- Prepare a *Final Report Outline* in accordance with the *Energy Commission Style Manual* provided by the CAM.

Recipient Products:

- Final Report Outline (draft and final)

CAM Product:

- Energy Commission Style Manual
- Comments on Draft Final Report Outline
- Acceptance of Final Report Outline

Subtask 1.6.2 Final Report

The Recipient shall:

- Prepare a *Final Report* for this Agreement in accordance with the approved Final Report Outline, Energy Commission Style Manual, and Final Report Template provided by the CAM with the following considerations:
  - Ensure that the report includes the following items, in the following order:
    - Cover page (**required**)
    - Credits page on the reverse side of cover with legal disclaimer (**required**)
    - Acknowledgements page (optional)
    - Preface (**required**)
    - Abstract, keywords, and citation page (**required**)
    - Table of Contents (**required**, followed by List of Figures and List of Tables, if needed)
    - Executive summary (**required**)
    - Body of the report (**required**)
    - References (if applicable)
    - Glossary/Acronyms (If more than 10 acronyms or abbreviations are used, it is required.)
    - Bibliography (if applicable)
    - Appendices (if applicable) (Create a separate volume if very large.)
    - Attachments (if applicable)
- Submit a draft of the Executive Summary to the TAC for review and comment.
- Develop and submit a *Summary of TAC Comments* received on the Executive Summary. For each comment received, the Recipient will identify in the summary the following:
  - Comments the Recipient proposes to incorporate.
  - Comments the Recipient does propose to incorporate and an explanation for why.
- Submit a draft of the report to the CAM for review and comment. The CAM will provide written comments to the Recipient on the draft product within 15 days of receipt.
- Incorporate all CAM comments into the *Final Report*. If the Recipient disagrees with any

comment, provide a *Written Responses to Comments* explaining why the comments were not incorporated into the final product.

- Submit the revised *Final Report* electronically with any Written Responses to Comments within 10 days of receipt of CAM's Written Comments on the Draft Final Report, unless the CAM specifies a longer time period or approves a request for additional time.

Products:

- Summary of TAC Comments
- Draft Final Report
- Written Responses to Comments *(if applicable)*
- Final Report

CAM Product:

- Written Comments on the Draft Final Report

MATCH FUNDS, PERMITS, AND SUBCONTRACTS

Subtask 1.7 Match Funds

The goal of this subtask is to ensure that the Recipient obtains any match funds planned for this Agreement and applies them to the Agreement during the Agreement term.

While the costs to obtain and document match funds are not reimbursable under this Agreement, the Recipient may spend match funds for this task. The Recipient may only spend match funds during the Agreement term, either concurrently or prior to the use of CEC funds. Match funds must be identified in writing, and the Recipient must obtain any associated commitments before incurring any costs for which the Recipient will request reimbursement.

The Recipient shall:

- Prepare a *Match Funds Status Letter* that documents the match funds committed to this Agreement. If no match funds were part of the proposal that led to the CEC awarding this Agreement and none have been identified at the time this Agreement starts, then state this in the letter.

  If match funds were a part of the proposal that led to the CEC awarding this Agreement, then provide in the letter:
  - A list of the match funds that identifies:
    - The amount of cash match funds, their source(s) (including a contact name, address, and telephone number), and the task(s) to which the match funds will be applied.
    - The amount of each in-kind contribution, a description of the contribution type (e.g., property, services), the documented market or book value, the 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 must identify its owner and provide a contact name, address, telephone number, and the address where the property is located.
    - If different from the solicitation application, provide a letter of commitment from an authorized representative of each source of match funding that the funds or

contributions have been secured.

- At the Kick-off meeting, discuss match funds and the impact on the project if they are significantly reduced or not obtained as committed. 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 *Supplemental Match Funds Notification Letter* to the CAM of receipt of additional match funds.
- Provide a *Match Funds Reduction Notification Letter* to the CAM if existing match funds are reduced during the course of the Agreement. Reduction of match funds may trigger a CPR meeting.

Products:

- Match Funds Status Letter
- Supplemental Match Funds Notification Letter *(if applicable)*
- Match Funds Reduction Notification Letter *(if applicable)*

Subtask 1.8 Permits

The goal of this subtask 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, with the exception of costs incurred by University of California recipients. Permits must be identified and obtained before the Recipient may incur any costs related to the use of the permit(s) for which the Recipient will request reimbursement.

The Recipient shall:

- Prepare a *Permit Status Letter* that documents the permits required to conduct this Agreement. If no permits are required at the start of this Agreement, then state this in the letter. If permits will be required during the course of the Agreement, provide in the letter:
    - A list of the permits that identifies: (1) the type of permit; and (2) the name, address, and telephone number of the permitting jurisdictions or lead agencies.
    - The schedule the Recipient will follow in applying for and obtaining the permits.

  The list of permits and the schedule for obtaining them will be discussed at the Kick-off meeting (subtask 1.2), and a timetable for submitting the updated list, schedule, and copies of the permits will be developed. The impact on the project 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 progress reports and will be a topic at CPR meetings.
- If during the course of the Agreement additional permits become necessary, then provide the CAM with an *Updated List of Permits* (including the appropriate information on each permit) and an *Updated Schedule for Acquiring Permits*.
- Send the CAM a *Copy of Each Approved Permit*.
- If during the course of the Agreement permits are not obtained on time or are denied, notify the CAM within 5 days. Either of these events may trigger a CPR meeting.

Products:

- Permit Status Letter
- Updated List of Permits *(if applicable)*
- Updated Schedule for Acquiring Permits *(if applicable)*
- Copy of Each Approved Permit *(if applicable)*

Subtask 1.9 Subcontracts
The goals of this subtask are to: (1) procure subcontracts required to carry out the tasks under this Agreement; and (2) ensure that the subcontracts are consistent with the terms and conditions of this Agreement.

The Recipient shall:
- Manage and coordinate subcontractor activities in accordance with the requirements of this Agreement.
- Incorporate this Agreement by reference into each subcontract.
- Include any required Energy Commission flow-down provisions in each subcontract, in addition to a statement that the terms of this Agreement will prevail if they conflict with the subcontract terms.
- If required by the CAM, submit a draft of each *Subcontract* required to conduct the work under this Agreement.
- Submit a final copy of each executed subcontract.
- Notify and receive written approval from the CAM prior to adding any new subcontractors (see the discussion of subcontractor additions in the terms and conditions).

Products:
- Subcontracts *(draft if required by the CAM)*

TECHNICAL ADVISORY COMMITTEE

Subtask 1.10 Technical Advisory Committee (TAC)
The goal of this subtask is to create an advisory committee for this Agreement. The TAC should be composed of diverse professionals. The composition will vary depending on interest, availability, and need. TAC members will serve at the CAM's discretion. The purpose of the TAC is to:
- Provide guidance in project direction. The guidance may include scope and methodologies, timing, and coordination with other projects. The guidance may be based on:
  - Technical area expertise;
  - Knowledge of market applications; or
  - Linkages between the agreement work and other past, present, or future projects (both public and private sectors) that TAC members are aware of in a particular area.
- Review products and provide recommendations for needed product adjustments, refinements, or enhancements.
- Evaluate the tangible benefits of the project to the state of California, and provide recommendations as needed to enhance the benefits.
- Provide recommendations regarding information dissemination, market pathways, or commercialization strategies relevant to the project products.
- Help set the project team's goals and contribute to the development and evaluation of its statement of proposed objectives as the project evolves.
- Provide a credible and objective sounding board on the wide range of technical and financial barriers and opportunities.
- Help identify key areas where the project has a competitive advantage, value proposition, or strength upon which to build.

- Advocate, to the extent the TAC members feel is appropriate, on behalf of the project in its effort to build partnerships, governmental support and relationships with a national spectrum of influential leaders.
- Ask probing questions that insure a long-term perspective on decision-making and progress toward the project's strategic goals.

The TAC may be composed of qualified professionals spanning the following types of disciplines:

- Researchers knowledgeable about the project subject matter;
- Members of trades that will apply the results of the project (e.g., designers, engineers, architects, contractors, and trade representatives);
- Public interest market transformation implementers;
- Product developers relevant to the project;
- U.S. Department of Energy research managers, or experts from other federal or state agencies relevant to the project;
- Public interest environmental groups;
- Utility representatives;
- Air district staff; and
- Members of relevant technical society committees.

The Recipient shall:

- Prepare a *List of Potential TAC Members* that includes the names, companies, physical and electronic addresses, and phone numbers of potential members. The list will be discussed at the Kick-off meeting, and a schedule for recruiting members and holding the first TAC meeting will be developed.
- Recruit TAC members. Ensure that each individual understands member obligations and the TAC meeting schedule developed in subtask 1.11.
- Prepare a *List of TAC Members* once all TAC members have committed to serving on the TAC.
- Submit *Documentation of TAC Member Commitment* (such as Letters of Acceptance) from each TAC member.

Products:

- List of Potential TAC Members
- List of TAC Members
- Documentation of TAC Member Commitment

Subtask 1.11 TAC Meetings

The goal of this subtask is for the TAC to provide strategic guidance for the project by participating in regular meetings, which may be held via teleconference.

Exhibit A
Scope of Work
Electric Power Research Institute (EPRI)

The Recipient shall:

- Discuss the TAC meeting schedule with the CAM at the Kick-off meeting. Determine the number and location of meetings (in-person and via teleconference) in consultation with the CAM.
- Prepare a *TAC Meeting Schedule* that will be presented to the TAC members during recruiting. Revise the schedule after the first TAC meeting to incorporate meeting comments.
- Prepare a *TAC Meeting Agenda* and *TAC Meeting Back-up Materials* for each TAC meeting.
- Organize and lead TAC meetings in accordance with the TAC Meeting Schedule. Changes to the schedule must be pre-approved in writing by the CAM.
- Prepare *TAC Meeting Summaries* that include any recommended resolutions of major TAC issues.

The TAC shall:

- Help set the project team's goals and contribute to the development and evaluation of its statement of proposed objectives as the project evolves.
- Provide a credible and objective sounding board on the wide range of technical and financial barriers and opportunities.
- Help identify key areas where the project has a competitive advantage, value proposition, or strength upon which to build.
- Advocate on behalf of the project in its effort to build partnerships, governmental support and relationships with a national spectrum of influential leaders.
- Ask probing questions that insure a long-term perspective on decision-making and progress toward the project's strategic goals.
- Review and provide comments to proposed project performance metrics.
- Review and provide comments to proposed project Draft Technology Transfer Plan.

Products:

- TAC Meeting Schedule (draft and final)
- TAC Meeting Agendas (draft and final)
- TAC Meeting Back-up Materials
- TAC Meeting Summaries

Subtask 1.12 Project Performance Metrics

The goal of this subtask is to identify key performance targets for the project. The performance targets should be a combination of scientific, engineering, techno-economic, and/or programmatic metrics that provide the most significant indicator of the research or technology's potential success.

The Recipient shall:

- Complete and submit the draft *Project Performance Metrics Questionnaire* to the CAM prior to the Kick-off Meeting.
- Present the draft *Project Performance Metrics Questionnaire* at the first TAC meeting to solicit input and comments from the TAC members.
- Develop and submit a *TAC Performance Metrics Summary* that summarizes comments received from the TAC members on the proposed project performance metrics. The *TAC*

Performance Metrics Summary will identify:
  - TAC comments the recipient proposes to incorporate into the final *Project Performance Metrics Questionnaire*.
  - TAC comments the recipient does not propose to incorporate with and explanation why.
- Submit a final *Project Performance Metrics Questionnaire* with incorporated TAC feedback.
- Develop and submit a *Project Performance Metrics Results* document describing the extent to which the recipient met each of the performance metrics in the final *Project Performance Metrics Questionnaire*.
- Discuss the final *Project Performance Metrics Questionnaire* and *Project Performance Metrics Results* at the Final Meeting.

Products:
- Project Performance Metrics Questionnaire (draft and final)
- TAC Performance Metrics Summary
- Project Performance Metrics Results

IV. TECHNICAL TASKS

TASK 2 – Community Engagement
The goal of this task is to understand and engage with the communities selected to demonstrate the concept luminaire.

Subtask 2.1 Outreach Plan
The goal of this subtask is to develop a plan to provide outreach to the selected communities to solicit widescale feedback on their lighting needs.

The Recipient shall:
- Coordinate with subcontractor team members and collaborate with community owners / operators to develop a *Community Outreach Plan.* This plan will identify the impacts and potential benefits of deploying the concept luminaire within the selected communities, including, but not limited to, summaries of online and in-person meetings and input from the formation of a tenant-based volunteer Lighting Advisory Committee for each site with the support of site management

Products:
- Community Outreach Plan

Subtask 2.2 Resident Surveys
The goal of this subtask is to conduct surveys of the residents of the communities designated for installation of the developed concept luminaire.

The Recipient shall:
- Direct and support the execution of Pre-Install Resident Surveys of the selected communities prior to installation of the concept luminaires. These surveys intend to focus on determining the benefits and goals that residents would like to see delivered by improved area lighting. This survey will occur prior to beginning Subtask 3.1 – Concept

Design – to be sure these factors are accounted for in the design of the concept fixture. Provide the CEC with *Pre-Install Resident Survey Results* that summarize the input from residents.

- Direct and support the execution of Post-Install Resident Surveys of residents of the selected communities after installation of the concept luminaires. These surveys intend to focus on determining if the benefits and goals that community residents provided via the Pre-Install Resident Surveys were delivered via the installation of the concept area lighting fixture. This survey will occur several months post Subtask 8.2 - Luminaire Installation – to be sure that the community residents have time to assess the operation of the concept fixture. Provide the CEC with *Post-Install Resident Survey Results* that summarize the input from residents.

Products:

- Pre-Install Resident Survey Results
- Post-Install Resident Survey Results

TASK 3- Concept Luminaire Design and Development

The goal of this task is to design, construct and preliminarily evaluate a hybrid powered, controllable, connected area LED luminaire.

Subtask 3.1 Concept Design

The goal of this subtask is to develop the core design of the concept system and identify the components / sub systems to be used in the development of the hybrid luminaire and its support systems. This subtask aims to leverage the prior knowledge of industry team members and their identified component partners to design an integrated solution that combines existing and new technologies and components into a single integrated hybrid powered controllable area lighting product.

The Recipient shall:

- Assist in creating and approving a Component and Sub Assembly List of elements to be used within the concept luminaire
- Participate in the development of draft Detailed Renderings and Drawings of the concept luminaire in partnership with industry team member and their component partners
- Revise Detailed Renderings and Drawings into a final form
- Prepare a *Concept Design Memo* which includes a discussion of the design process, final design of the concept luminaire, and includes the component and sub assembly list and the final rendering and drawings.

Products:

- Concept Design Memo (final)

Subtask 3.2 Control Switch Development

The goal of this subtask is to develop the control technology to intelligently switch the hybrid luminaire between solar charging and grid charging.

The Recipient shall:

- Design a method to monitor solar output and battery charge state
- Write code to implement autonomous switching through a solid-state relay
- Prepare a *Battery Charging Controller Design Memo* which includes a discussion of the design process of the battery charger controller.

Products:
- Battery Charging Controller Design Memo

Subtask 3.3 Concept Construction
The goal of this subtask is to construct / assemble the concept luminaire based on the design developed in Subtasks 3.1 and 3.2 using the identified and selected components / sub-systems.

The Recipient shall:
- Develop / assist in creation of Concept Luminaire Test Protocol
- Coordinate with the industry partner to manufacture a Prototype Concept Luminaire, based on the design developed in Subtasks 3.1 and 3.2, for evaluation and testing
- Manage preliminary testing of concept luminaire to assure concept luminaire meets project specifications
- Create *Preliminary Testing Report* that includes the minimum performance and operation guidelines for the concept luminaire, the concept luminaire test protocol, results of concept luminaire evaluation and test results in meeting minimum performance and operation guidelines.
- Coordinate for the delivery of the Prototype Concept Luminaire to Recipient's lighting laboratory
- Prepare *CPR Report #1* and Participate in CPR meetings per subtask 1.3

Products:
- Preliminary Testing Report
- CPR Report #1

TASK 4- Lab Evaluation of Concept Luminaire
The goal of this task is to independently evaluate the concept luminaire developed within Task 3 to determine its true operational performance. This task includes a combination of laboratory and outdoor testing to identify any revisions and updates needed prior to the manufacture of approximately 100 concept luminaires for field installation.

The Recipient shall:
- Complete the lab evaluation of the developed concept luminaire from Task 3
- Analyze the operational performance of the concept luminaire
- Produce a report of *Prototype Concept Luminaire Laboratory Test Results* that includes test results and any modifications needed prior to manufacture of luminaires for field installation
- Prepare CPR Report #2 and Participate in CPR meetings per subtask 1.3

Products:

- Prototype Concept Luminaire Laboratory Test Results (Draft and Final)
- CPR Report #2

TASK 5 - Luminaire Concept Revision and Update
The goal of this task is to revise and update the prototype concept luminaire to create the final luminaire design prior to manufacture of luminaires (Task 6) for field installation.

Subtask 5.1 Design and Testing Protocol Update
The goal of this subtask is to revise the prototype concept luminaire designed and developed in Task 3 based on learnings and findings from Task 4.

The Recipient shall:
- Develop a *Product Design Memo for Revised Concept* that identifies the changes to the concept luminaire
- Prepare an *Updated Laboratory Evaluation Protocol* that will include a review and update of the laboratory test protocol created in Subtask 3.3 as needed to account for the testing of any performance issues identified within Task 4 and any additional or modified components that are added as a result of learnings from Task 4.

Products:
- Product Design Memo for Revised Concept
- Updated Laboratory Evaluation Protocol

Subtask 5.2 Production of Revised Concept Luminaire Prototype
The goal of this subtask is to produce the luminaire that include the revisions, modifications and potential component additions that result from the efforts of Subtask 5.1. Within this subtask the production of the final planned prototype concept luminaire, prior to the production of the approximate 100 luminaires to be deployed in the field, is planned to occur.

The Recipient shall:
- Coordinate with Hubbell and Hubbell's component partners to produce a second prototype concept luminaire.
- Prepare a *Production Report for Revised Concept Luminaire Prototype* that includes updates on second prototype concept luminaire and the production timeline
- Coordinate for the delivery of the second prototype concept luminaire to the recipient's lighting laboratory

Products:
- Production Report for Revised Concept Luminaire Prototype

Subtask 5.3 Laboratory Evaluation of Revised Concept Luminaire Prototype
The goal of this subtask is to evaluate the second prototype concept luminaire designed in Subtask 5.1 and produced in Subtask 5.2. The task will consist primarily of conducting laboratory testing on the luminaire.

The Recipient shall:

- Complete the lab evaluation of the second prototype concept luminaire from Task 5.2 using the luminaire test protocol developed in Task 5.1
- Analyze the data from the lab evaluation of the second prototype luminaire
- Determine if additional updates and revisions need to occur prior to manufacturer
- Provide feedback to the manufacturing team, and their collaborators, on any revisions that need to occur
- Coordinate the production of any additional second prototype concept luminaires
- Conduct retesting of any additional second prototype concept luminaires until all required specifications determined in Subtask 3.3 are met or exceeded
- Produce the *Revised Concept Luminaire Prototype Laboratory Test Report and Plans for Production Concept Luminaire* to include final specifications and plans for production concept fixture
- Prepare CPR Report #3 and Participate in CPR meetings per subtask 1.3
-

Products:

- Revised Concept Prototype Luminaire Laboratory Test Report and Plans for Production Concept Luminaire
- CPR Report #3

TASK 6 – Site Evaluation and Design

The goal of this task is to survey the identified sites for their exact luminaire count and existing wattage of current lighting.

Subtask 6.1 Site Survey

The goal of this subtask is to visit each site to conduct a lighting survey of the existing lighting.

The Recipient shall:

- Coordinate with the owners / operators of the selected communities to conduct field surveys of current lighting conditions at each of the selected communities
- Count each pole to be replaced, height of pole, and wattage of existing luminaire
- Conduct light level measurements
- Take pictures of existing lighting conditions at night
- Prepare a *Site Survey Memo* that discusses the results of the site survey for each installation including the data collected in this subtask.

Products:

- Site Survey Memo

Subtask 6.2 Site Lighting Designs

The goal of this subtask is to develop site specific lighting designs for each of the selected communities.

- Analyze the data collected from the field surveys
- Develop and prepare *Site Specific Lighting Designs Memos* for each of the selected communities to deliver light levels that provide effective lighting, improve the baseline lighting conditions, and that meet the goals and objectives in Section II.C. of this SOW and the needs of the community as identified in Task 2, and identify any local requirements (including permits).
- Prepare CPR Report #4 and Participate in CPR meetings per subtask 1.3

Products:
- Site Specific Lighting Design Memos
- CPR Report #4

TASK 7 – Production of Concept Luminaires for Installation
The goal of this task is to produce the technology designed in Task 5.

Subtask 7.1 Manufacture Planning
The goal of this subtask is to develop a plan and timeline for the production of the luminaire designed and finalized in Task 5.

The Recipient shall:
- Develop plan to produce the luminaires designed in Task 5
- Provide *Detailed Luminaire Manufacturing Plan* which includes a timeline for luminaire production and plan for delivery to designated installation sites

Products:
- Detailed Luminaire Manufacturing Plan

Subtask 7.2 Concept Luminaire Manufacture
The goal of this subtask is to produce in quantity the luminaire finalized in Task 6. The produced luminaires are scheduled to be installed in Task 8.

The Recipient shall:
- Coordinate with the manufacturing partner to produce and deliver the concept luminaire in quantity and summarize the status in a *Concept Luminaires Manufacturing Memo and Deployment Plans.*

Products:
- Concept Luminaires Manufacturing Memo and Deployment Plans

TASK 8 – Concept Luminaire Installation
The goal of this task is to install the luminaires produced in Task 7 at designated sites.

Subtask 8.1 Site Installation Planning
The goal of this subtask is plan for the installation of the luminaires manufactured in Task 7 at each of the selected communities.

The Recipient shall:

- Identify and evaluate California based electrical and/or lighting contractors which are capable of installing the produced concept luminaires
- Obtain electrical and other permits for each site
- Coordinate with community owners / operators and local utilities, as needed, regarding rate schedule changes or other impacts
- Develop *Site Specific Luminaire Installation Plans* that includes a summary of the electrical and lighting contractors, permits obtained and coordination activities in a staged fashion, where one system is installed to assess preliminary feedback before completing remainder of installs. In the plan indicate the number of electrical and lighting contractors hired within the low income/disadvantaged community where the luminaires are being installed.

Products:

- Site Specific Luminaire Installation Plans

Subtask 8.2 Luminaire Installation
The goal of this subtask is plan for the installation of the manufactured concept luminaires.

The Recipient shall:

- Contract with the local installers for luminaire installation
- Carry out the luminaire installation plan created in Subtask 8.1. Summarize the status in a *Concept Luminaire Installation Memo*

Products:

- Concept Luminaire Installation Memo

TASK 9 - Field Evaluation and Monitoring
The goal of this task to install monitoring equipment for the field evaluation of the concept luminaires.

Subtask 9.1 Monitoring Planning
The goal of this subtask is to plan the monitoring and verification plan that will be used to evaluate the concept luminaires.

The Recipient shall:

- Collaborate with subcontractor team members, owners / operators of the selected communities, utilities and the selected luminaire installers to identify the specific components and sub-systems within the manufactured concept luminaires and site

specific community electrical circuits that need to be monitored to fully assess the field performance of the installed luminaires
- Create and develop a *Monitoring and Verification (M&V) Plan* to include:
  - a plan to monitor the identified electrical circuits at the selected communities to provide a baseline energy consumption for the existing area lighting (i.e. before) versus a post conversion energy consumption value (i.e. after).
  - a plan to evaluate any performance and operational differences that occur within the selected luminaire components of the installed concept luminaires and on the selected site electrical circuits at the designated community sites.
  - how each of the performance and operation guidelines in Task 3, Subtask 1.12, and Section II.C. of this SOW (Goals and Objectives) will be monitored and evaluated

Products:
- M&V Plan (draft and final)

Subtask 9.2 Monitoring System
The goal of this subtask is to design a custom monitoring and verification system to evaluate the performance of the concept luminaires designed and installed by this project.

The Recipient shall:
- Develop a custom M&V System capable of evaluating luminaire level performance of identified luminaire components and the energy consumption of the community area lighting circuits identified as part of the M&V plan developed above.
- Prepare a *M&V System Memo* to discuss the ability of the monitoring system to evaluate luminaire and luminaire component performance based on energy performance. A minimum of 20% of the luminaires installed in this project will be evaluated. (Based on 100 luminaires, this would be approximately 20 systems).

Products:
- M&V System Memo

Subtask 9.3 Monitoring Implementation
The goal of this subtask is implementing the M&V Plan developed in Subtask 9.1 to determine the energy and operational nature of the luminaires installed in Task 8. This goal intends to be achieved using the M&V System designed and developed in Subtask 9.2

The Recipient shall:
- Coordinate with subcontractor team members to install M&V Systems which were produced as part of Subtask 9.2
- Verify that all installed M&V Systems are operational and functioning via the receipt of data post installation
- Assure that collected data is stored securely on Recipient's data storage systems
- Prepare an Installation of *Monitoring Verification Systems Memo* which describes the status of the M&V System installations

Products:
- Installation of Monitoring and Verification Systems Memo

Exhibit A
Scope of Work
Electric Power Research Institute (EPRI)

TASK 10 – Data Completion and Analysis
The goal of this task is to compile, analyze and package the data produced by the monitoring and verification systems installed in Task 9.

The Recipient shall:

- Compile the data collected by the measurement and verification systems developed and installed and produce an *Analyzed Site Data Report* for each of the collaborating communities. This report should include all Site-Specific Findings, including but not limited to: 1) whether the needs of the communities (based on the pre- and post-resident surveys from Task 2) were met; 2) the goals and objectives in Section II.C. and the performance requirements in Subtask 1.12 of this SOW were met; and 3) the technology economics at scale versus competing technologies.

Products:

- Analyzed Site Data Report (draft and final)

TASK 11 EVALUATION OF PROJECT BENEFITS
The goal of this task is to report the benefits resulting from this project.

The Recipient shall:

- Complete three Project Benefits Questionnaires that correspond to three main intervals in the Agreement: (1) *Kick-off Meeting Benefits Questionnaire*; (2) *Mid-term Benefits Questionnaire*; and (3) *Final Meeting Benefits Questionnaire*.
- Provide all key assumptions used to estimate projected benefits, including targeted market sector (e.g., population and geographic location), projected market penetration, baseline and projected energy use and cost, operating conditions, and emission reduction calculations. Examples of information that may be requested in the questionnaires include:

    - <u>For Product Development Projects and Project Demonstrations:</u>
        - Published documents, including date, title, and periodical name.
        - Estimated or actual energy and cost savings and estimated statewide energy savings once market potential has been realized. Identify all assumptions used in the estimates.
        - Greenhouse gas and criteria emissions reductions.
        - Other non-energy benefits such as reliability, public safety, lower operational cost, environmental improvement, indoor environmental quality, and societal benefits.
        - Data on potential job creation, market potential, economic development, and increased state revenue as a result of the project.
        - A discussion of project product downloads from websites, and publications in technical journals.
        - A comparison of project expectations and performance. Discuss whether the goals and objectives of the Agreement have been met and what improvements are needed, if any.
        - <u>Additional Information for Product Development Projects</u>:
            - Outcome of product development efforts, such copyrights and license agreements.
            - Units sold or projected to be sold in California and outside of California.

- Total annual sales or projected annual sales (in dollars) of products developed under the Agreement.
- Investment dollars/follow-on private funding as a result of Energy Commission funding.
- Patent numbers and applications, along with dates and brief descriptions.

▪ Additional Information for Product Demonstrations:

- Outcome of demonstrations and status of technology.
- Number of similar installations.
- Jobs created/retained as a result of the Agreement.

- Respond to CAM questions regarding responses to the questionnaires.

The CEC may send the Recipient similar questionnaires after the Agreement term ends. Responses to these questionnaires will be voluntary.

Products:

- Kick-off Meeting Benefits Questionnaire
- Mid-term Benefits Questionnaire
- Final Meeting Benefits Questionnaire

TASK 12 TECHNOLOGY/KNOWLEDGE TRANSFER ACTIVITIES

The goal of this task is to ensure the technological learning that resulted from the demonstration(s) is captured and disseminated to the range of professions that will be responsible for future deployments of this technology or similar technologies.

The Recipient Shall:

- Prepare an *Initial Fact Sheet* at start of the project that describes the project. Use the format provided by the CAM.
- Prepare a *Final Project Fact Sheet* at the project's conclusion that discusses results. Use the format provided by the CAM.
- Prepare a *Technology/Knowledge Transfer Plan* that includes:
  - An explanation of how the knowledge gained from the project will be made available to the public, including the targeted market sector and potential outreach to end users, utilities, regulatory agencies, and others.
  - A detailed vision on how to move the technology developed under this research from the laboratory and demonstration sites out to the market place, including: 1) the next steps for commercialization of the technology, including plans for future deployment to other communities; 2) what are the target markets that would benefit the most from adopting the technology; and 3) how the plan will address and overcome potential barriers to increase penetration and further deployment of the technology.
  - A description of the intended use(s) for and users of the project results.
  - Published documents, including date, title, and periodical name.
  - Copies of documents, fact sheets, journal articles, press releases, and other documents prepared for public dissemination. These documents must include the Legal Notice required in the terms and conditions. Indicate where and when the documents were disseminated.
  - A discussion of policy development. State if project has been or will be cited in government policy publications or used to inform regulatory bodies.

  - The number of public requests for project results.
  - Additional areas as determined by the CAM.
- Conduct technology transfer activities in accordance with the *Technology/Knowledge Transfer Plan*. These activities will be reported in the Progress Reports.
- When directed by the CAM, develop *Presentation Materials* for an Energy Commission-sponsored conference/workshop on the results of the project.
- When directed by the CAM, participate in annual EPIC symposium sponsored by the California Energy Commission.
- Provide at least six *High Quality Digital Photographs (*minimum resolution of 1300x500 pixels in landscape ratio) of pre and post technology installation at the project sites.
- Prepare a *Technology/Knowledge Transfer Report* on technology transfer activities conducted during the project.

Products:

- Initial Fact Sheet (draft and final)
- Final Project Fact Sheet (draft and final)
- Presentation Materials (draft and final)
- High Quality Digital Photographs
- Technology/Knowledge Transfer Plan (draft and final)
- Technology/Knowledge Transfer Report (draft and final)

V. PROJECT SCHEDULE

Please see the attached Excel spreadsheet.

RESOLUTION NO: 21-04-14-21a

STATE OF CALIFORNIA

STATE ENERGY RESOURCES
CONSERVATION AND DEVELOPMENT COMMISSION

RESOLUTION - RE: ELECTRIC POWER RESEARCH INSTITUTE, INC.

RESOLVED, that the State Energy Resources Conservation and Development Commission (CEC) adopts the staff CEQA findings contained in the Agreement or Amendment Request Form (as applicable); and

RESOLVED, that the CEC approves Agreement EPC-20-030 with Electric Power Research Institute, Inc. for a $3,308,595 grant to fund the development and demonstration of a novel hybrid power (solar and grid tied) exterior LED lighting system that includes a unique wrap around solar panel, sensors, controls, and battery storage. This project will be demonstrated in six low-income or disadvantaged communities; and

FURTHER BE IT RESOLVED, that the Executive Director or his/her designee shall execute the same on behalf of the CEC.

CERTIFICATION

The undersigned Secretariat to the CEC does hereby certify that the foregoing is a full, true, and correct copy of a Resolution duly and regularly adopted at a meeting of the CEC held on April 14, 2021.

AYE:
NAY:
ABSENT:
ABSTAIN:

_____
Patricia Carlos
Secretariat