

GRANT REQUEST FORM (GRF)

CEC-270 (Revised 02/13)

CALIFORNIA ENERGY COMMISSION

New Agreement EPC-15-026 (To be completed by CGL Office)

Division	Agreement Manager:	MS-	Phone
ERDD	Leah Mohney	51	916-327-1506

Recipient's Legal Name	Federal ID Number
DOE- Lawrence Berkeley National Laboratory	94-2951741

Title of Project
Unlocking Plug Load Energy Savings through Energy Reporting

Term and Amount	Start Date	End Date	Amount
	5/1/2016	4/30/2019	\$ 1,630,699

Business Meeting Information
 ARFVTP agreements under \$75K delegated to Executive Director.

Proposed Business Meeting Date	3/9/2016	<input type="checkbox"/> Consent	<input checked="" type="checkbox"/> Discussion
Business Meeting Presenter	Felix Villanueva	Time Needed:	10 minutes

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

Agenda Item Subject and Description

LAWRENCE BERKELEY NATIONAL LABORATORY. Proposed resolution approving Agreement EPC-15-026 with Lawrence Berkeley National Laboratory for a \$1,630,699 grant to develop technologies that enable plug-load devices to transmit operating information - such as identity, power consumption, and functional state - through a communications network to alert building owners and operators of wasteful operation and provide them with clear, actionable advice on responding. (EPIC funding)

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":
 A
2. If Agreement is considered a "Project" under CEQA:
 a) Agreement **IS** exempt. (Attach draft NOE)
 Statutory Exemption. List PRC and/or CCR section number: _____
 Categorical Exemption. List CCR section number: _____
 Common Sense Exemption. 14 CCR 15061 (b) (3)
 Explain reason why Agreement is exempt under the above section:
 This agreement will not cause direct physical change in the environment or a reasonably foreseeable indirect physical change in the environment because it is a paper study and will involve the development of electrical devices and computer models in a laboratory setting.
 b) Agreement **IS NOT** exempt. (Consult with the legal office to determine next steps.)
 Check all that apply
 Initial Study Environmental Impact Report
 Negative Declaration Statement of Overriding Considerations
 Mitigated Negative Declaration

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

Legal Company Name:	Budget	Match
Energy Solutions International	\$ 298,314	\$94,318
ARM Inc.	\$ 90,000	
WattStopper	\$	\$50,000

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

Legal Company Name:

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Budget Information			
Funding Source	Funding Year of Appropriation	Budget List No.	Amount
EPIC	14-15	301.001B	\$1,630,699
			\$
R&D Program Area: EERO: Buildings		TOTAL:	\$1,630,699
Explanation for "Other" selection			
Reimbursement Contract #:		Federal Agreement #:	

Recipient's Administrator/ Officer				Recipient's Project Manager			
Name:	Betsy Quayle			Name:	Bruce Nordman		
Address:	1 Cyclotron Rd			Address:	1 Cyclotron Rd, MS 90R2000		
City, State, Zip:	Berkeley, CA 94720-8099			City, State, Zip:	Berkeley, CA 94720-8099		
Phone:	510-486-7391 /	Fax:	- -	Phone:	510-486-7089 /	Fax:	- -
E-Mail:	BEQuayle@lbl.gov			E-Mail:	bnordman@lbl.gov		

Selection Process Used	
<input checked="" type="checkbox"/> Competitive Solicitation	Solicitation #: GFO-15-310
<input type="checkbox"/> First Come First Served Solicitation	

The following items should be attached to this GRF	
1. Exhibit A, Scope of Work	<input checked="" type="checkbox"/> Attached
2. Exhibit B, Budget Detail	<input checked="" type="checkbox"/> Attached
3. CEC 105, Questionnaire for Identifying Conflicts	<input checked="" type="checkbox"/> Attached
4. Recipient Resolution	<input checked="" type="checkbox"/> N/A <input type="checkbox"/> Attached
5. CEQA Documentation	<input checked="" type="checkbox"/> N/A <input type="checkbox"/> Attached

_____	_____	_____	_____	_____	_____
Agreement Manager	Date	Office Manager	Date	Deputy Director	Date

Exhibit A Scope of Work

I. TASK ACRONYM/TERM LISTS

A. Task List

Task #	CPR ¹	Task Name
1		General Project Tasks
2		Create and Test Devices That Implement Energy Reporting Technology
3	X	Create Data Model and Protocols
4		Create and Demonstrate Integration and Control of Management System
5		Assist in Developing Codes and Standards
6		Evaluation of Project Benefits
7		Technology/Knowledge Transfer Activities

B. Acronym/Term List

Acronym/Term	Meaning
CAM	Commission Agreement Manager
CAO	Commission Agreement Officer
CPR	Critical Project Review
LBNL	Lawrence Berkeley National Laboratory
Recipient	Lawrence Berkeley National Laboratory
TAC	Technical Advisory Committee
TWh	Terawatt-hour

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

A. Purpose of Agreement

The purpose of this Agreement is to develop and demonstrate all technology necessary to implement energy reporting in all types of plug-load devices. This project will develop energy-reporting capability for plug-load devices, to enable reporting data on energy use and operational status to the local network. The project also involves developing an energy management system that can receive the reported data, and then relay control signals back to networked devices to reduce their energy use. Project team members will work with the appropriate entities to modify electrical codes and standards and provide documentation to facilitate integration of this work into California Title 24 standards so that they define and require that plug-load devices have an energy reporting capability.

B. Problem/ Solution Statement

Problem

Plug-loads represent an increasing percentage of building energy use. Plug-load devices are diverse, numerous, and poorly addressed by traditional energy efficiency policies and technologies. Building operators and end-users rarely have a clear or accurate tally of the plug-

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

load devices in their building, how much energy the devices use, or how they could be better controlled to save energy. This lack of knowledge impairs effective decision-making about the operating patterns, maintenance, and replacement of plug-load devices. Although external controls and meters are available to measure plug-loads, not only are those devices expensive to purchase; install; utilize; and maintain, but they also use energy themselves. Current solutions on the market must be purchased, are generally proprietary, and are not interoperable with each other. Manufacturers have shown little interest in producing a solution that is free and universal and that utilizes simple and common mechanisms for transmitting information.

Solution

The Recipient will develop technologies that easily acquire data regarding the energy use of networked plug-load devices and make those data available to building owners and operators. The research outcomes can be implemented directly in individual plug-load devices and will, provide documentation to facilitate integration of this work into California Title 24 standards so that they define and require that plug-load devices have an energy reporting capability. Manufacturers of devices that already have communications capability will be able to upgrade their devices to include this new technology at no incremental manufacturing cost. The solutions will be applicable to all plug-load devices and ultimately to all energy-using devices in buildings.

C. Goals and Objectives of the Agreement

Agreement Goals

The goals of this Agreement are the following:

- Create several different prototype plug-load hardware devices capable of reporting energy data using communications protocols specified by Recipient, and conduct lab demonstrations of their correct operation for both reporting and control.
- Define a standard data model for the reported energy data, define how to use existing communication protocols with the model, and incorporate energy reporting capability in the protocols.
- Create a prototype device that collects the energy data transmitted from multiple end-use devices for archiving, aggregation, analysis, and presentation. The device must be able to send control signals to individual plug-load devices. Develop reporting and control devices, and conduct lab demonstrations of how those devices work.
- With input from the Energy Commission determine how best to incorporate the technology into voluntary (e.g., Energy-Star) and mandatory (e.g., California Title 24) energy codes and standards, such as with proposed standard text to include in codes and standards. (CAM will be point of contact for all Energy Commission inclusion in discussions.)

Ratepayer Benefits: Because the energy used by plug-load devices will be reduced, this Agreement will result in the ratepayer benefits of lower costs and increased electricity reliability.

Technological Advancement and Breakthroughs: This Agreement will lead to technological advancement and breakthroughs that overcome barriers to the achievement of the State of California's statutory energy goals. This Agreement will establish the technology of energy reporting as a common capability for plug-load devices. This Agreement is estimated to result in lowering the state's energy use by 5.3 TWh/year when fully deployed.

Exhibit A

Scope of Work

Agreement Objectives

The objectives of this Agreement are the following:

- Create prototype hardware devices that implement energy reporting.
- Create or define standard data models and protocols to communicate energy data.
- Create reference management system software that can receive and process reported energy data and control plug-load devices, and demonstrate it working in a lab setting.
- Provide information to inform California Title 24 standards for plug loads to include energy reporting functionality in all plug load devices.

III. TASK 1 GENERAL PROJECT TASKS

PRODUCTS

Subtask 1.1 Products

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)**. 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**

Exhibit A Scope of Work

- Submit all data and documents required as products under this Agreement in an electronic file format that is fully editable and compatible with the Energy Commission's 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 or CD-ROM.

The following describes the accepted formats for electronic data and documents provided to the Energy Commission 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.
 - Documents intended for public distribution will be in PDF file format.
 - The Recipient must also provide the native Microsoft file format.
 - 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 Energy Commission'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 Energy Commission 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

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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;
- 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 and invoices (subtask 1.5);
 - Final Report (subtask 1.6);
 - Technical Advisory Committee meetings (subtasks 1.10 and 1.11); and
 - Any other relevant topics.
- Provide an *Updated Project Schedule*, *List of Match Funds*, and *List of Permits*, 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:

- Updated Project Schedule (*if applicable*)
- Updated List of Match Funds (*if applicable*)
- Updated List of Permits (*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 Energy Commission 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 Energy Commission 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 Energy Commission.

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

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increase. CPR 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 CAM.

The Recipient shall:

- Prepare 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.
- Submit the CPR Report along with any other *Task Products* that correspond to the technical task for which the CPR meeting is required (i.e., if a CPR meeting is required for Task 2, submit the Task 2 products along with the CPR Report).
- 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* and 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)
- Task Products (draft and/or final as specified in the task)

CAM Products:

- CPR Agenda
- List of Expected CPR Participants
- Schedule for Providing a Progress Determination
- 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 Energy Commission 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.

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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 state-owned equipment.
 - Need to file a Uniform Commercial Code Financing Statement (Form UCC-1) regarding the Energy Commission's interest in patented technology.
 - The Energy Commission'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 *All Draft and Final Written Products* on a CD-ROM or USB memory stick, organized by the tasks in the Agreement.

Products:

- Final Meeting Agreement Summary (*if applicable*)
- Schedule for Completing Agreement Closeout Activities
- All Draft and Final Written 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 Fund and in-state expenditures.

Products:

- Progress Reports
- Invoices

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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. The CAM will review the Final Report, which will be due at least **two months** before the Agreement end date. When creating the Final Report Outline and the Final Report, the Recipient must use the 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 *Style Manual* provided by the CAM. (See *Task 1.1* for requirements for draft and final products.)

Recipient Products:

- Final Report Outline (draft and final)

CAM Product:

- 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, 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)
 - Ensure that the document is written in the third person.
 - Ensure that the Executive Summary is understandable to the lay public.

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- Briefly summarize the completed work. Succinctly describe the project results and whether or not the project goals were accomplished.
- Identify which specific ratepayers can benefit from the project results and how they can achieve the benefits.
- If it's necessary to use a technical term in the Executive Summary, provide a brief definition or explanation when the technical term is first used.
- Follow the Style Guide format requirements for headings, figures/tables, citations, and acronyms/abbreviations.
- Ensure that the document omits subjective comments and opinions. However, recommendations in the conclusion of the report are allowed.
- Include a brief description of the project results in the Abstract.
- 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
- Consider incorporating all CAM comments into the Final Report. 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 Final Report 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.
- Submit one bound copy of the *Final Report* to the CAM along with *Written Responses to Comments on the Draft Final Report*.

Products:

- Final Report (draft and final)
- Written Responses to Comments on the Draft 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 Energy Commission 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 Energy Commission awarding this Agreement and none have been identified at the time this Agreement starts, then state this in the letter.

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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 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.
 - A copy of 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.

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- 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 the 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.

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- 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.

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.

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.

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- 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.

Products:

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

Exhibit A Scope of Work

IV. TECHNICAL TASKS

TASK 2: CREATE AND TEST DEVICES THAT IMPLEMENT ENERGY REPORTING TECHNOLOGY

The goal of this task is to create prototype hardware devices that use the protocols and data models developed in Task 3 to implement energy reporting. The energy reporting function will convey power and energy data that is accurate to within 10 percent of a device's actual consumption.

The Recipient shall:

- Identify candidate hardware products to receive the energy reporting capability, including devices that can control the energy use of networked plug-load devices.
- Prepare a *Device Selection Memo* that describes the advantages and disadvantages of potential devices to which the Recipient would add energy-reporting capability, and recommend which device(s) to pursue.
- Integrate energy reporting hardware and software into at least three sample devices, to follow the data model and protocols developed in Task 3.
- Prepare a *Device Testing Memo* outlining the planned method to test the prototype devices in order to verify that the expected data communications function correctly and that the transmitted power and energy values are within the manufacturer-reported accuracy range for each device.
- Test the prototype sample devices
- Prepare an *Energy Reporting Device Report* that includes information on the devices considered and selected for use and that documents the lab test results of developing and testing their energy reporting capability.

Products:

- Device Selection Memo
- Device Testing Memo
- Energy Reporting Device Report

TASK 3: CREATE DATA MODEL AND PROTOCOLS

The goals of this task are to (1) develop a standard data model for reported energy data, and (2) work with technology standards organizations to modify their standards and guidelines to incorporate energy reporting capabilities. Candidate organizations/standards include but are not limited to the Internet Engineering Task Force (IETF), Consumer Technology Association (CTA), National Electrical Manufacturers Association (NEMA), Open Connectivity Foundation (OCF), Allseen, Extensible Messaging and Presence Protocol (XMPP), OpenADR, and Zigbee.

The Recipient shall:

- Develop a draft protocol structure and data model for reported energy data based on previous LBNL work and on current protocol standards that are relevant to energy reporting.
- Prepare *Draft Protocol Structure and Data Model* to summarize the developed structure and data model.
- Circulate the draft protocol structure and data model for review and comment among interested parties, including but not limited to: product manufacturers, standards organizations, and energy research and public policy organizations. Modify draft protocol based on comments received,

Exhibit A Scope of Work

- Prepare a *Protocol Structure and Data Model Report* that includes a final protocol structure and data model; provide an appendix which includes a list of interested parties that provided comments, and a summary of their comments.
- Prepare a *Technology Standards Organization Memo* that recommends which organization(s) may be best suited to housing general standards for energy reporting, and which should be targeted to synchronize current standards with the *Protocol Structure and Data Model*.
- Work with several of the standards development organizations listed above to modify their communications protocols to incorporate energy reporting. Working with standards organizations involves attending meetings (on the phone and in person), writing and editing documents, and working with individuals to resolve technical issues.
- Prepare an *Energy Reporting Standards Report* that summarizes:
 - Progress toward synchronizing the data model with a protocol structure.
 - How the *Protocol Structure and Data Model* is implemented currently and can be incorporated into future technology standards.
 - Intended integration of the model in devices that report energy data.
 - Intended integration of the model in devices that receive energy data.
- Participate in a CPR Meeting and prepare *CPR Report #1* per subtask 1.3.

Products:

- Protocol Structure and Data Model Report (draft and final)
- Technology Standards Organization Memo
- Energy Reporting Standards Report
- CPR Report #1

TASK 4: CREATE AND DEMONSTRATE INTEGRATION AND CONTROL OF MANAGEMENT SYSTEM

The goals of this task are to create an energy reporting management system that (1) uses the data model and protocols from Task 3, creates sample open-source software that can gather, store, and present reported energy data to make it available for analysis; and (2) demonstrate that the management systems developed in this project can work with the prototype hardware devices to provide both energy reporting and control of plugloads.

The Recipient shall:

- Develop an energy reporting management system.
- Prepare an *Energy Reporting Management System Memo* detailing the features of an energy reporting management system and explaining the strategy for implementing the system.
- Create open-source software that implements the features identified in the *Energy Reporting Management System Memo*.
- Conduct lab demonstrations of the management system, energy reporting protocols, and hardware prototype devices developed in this project interoperating to exchange energy data.
- Conduct lab demonstrations that utilize the management system, energy reporting protocols, and hardware prototype devices to demonstrate control of the plug-load devices.
- Prepare an *Energy Reporting Management System Report* that summarizes the design, implementation, and demonstration of the management software system.

Exhibit A Scope of Work

Products:

- Energy Reporting Management System Memo
- Energy Reporting Management System Report

TASK 5: ASSIST IN DEVELOPING CODES AND STANDARDS

The goals of this task are to (1) catalogue existing and pending policies that are relevant to energy reporting technology, (2) develop a roadmap to accelerate the adoption of energy reporting technology in devices and buildings, and (3) develop a roadmap for using energy reporting data to advance California's energy efficiency policy objectives.

The Recipient shall:

- Assess existing and pending energy policies potentially relevant to energy reporting.
- Review how federal and California energy codes and standards are updated.
- Prepare a *Codes and Standards Background Memo* that includes, but is not limited to:
 - A categorization of existing and pending Title 24 Codes, and regulations (mandatory and voluntary international, federal, California, and local) that aim to reduce energy use in buildings through the advancement of energy reporting technologies
 - A categorization of the processes currently used to establish and update federal and California codes and standards, and if/how actual data collected using energy reporting technology developed in this project could be used to inform future Title 24 Codes and Standards.
- Identify policy changes including using the plug load energy reporting technology developed in this project (voluntary and mandatory) that could expedite the widespread adoption of energy reporting technology in California and across the nation, ensuring that the California Energy Commission Efficiency Division (Codes and Standards) is included in discussions. CAM will be point of contact for Energy Commission inclusion in discussions.
- Identify policy changes (voluntary and mandatory) that could improve interoperability and ensure energy reporting data is accurate and consistent, ensuring that the California Energy Commission Efficiency Division (Codes and Standards) is included in discussions. CAM will be point of contact for Energy Commission inclusion in discussions.
- Develop information on the highest priority policies including proposed draft code language and the associated justification to explain the proposal to the standard-setting body and impacted stakeholders (e.g., cost-effectiveness analyses, energy impacts analysis, etc.), ensuring that the California Energy Commission Efficiency Division (Codes and Standards) is included in discussions and review of content. CAM will be point of contact for Energy Commission inclusion in discussions.
- Identify how data collected using the energy reporting technology could support efforts to establish efficiency standards for devices or buildings, ensuring that the California Energy Commission Efficiency Division (Codes and Standards) is included in discussions. CAM will be point of contact for Energy Commission inclusion in discussions.
- Develop recommendations on the type of data that could be collected and methods for applying the data to support codes and standards initiatives, ensuring that the California Energy Commission Efficiency Division (Codes and Standards) is included in discussions. CAM will be point of contact for Energy Commission inclusion in discussions.
- Categorize opportunities to leverage data to improve compliance and enforcement with existing codes and standards including, but not limited to: calibrating and improving the

Exhibit A Scope of Work

plug-load modeling algorithms for Title 24 and the Home Energy Rating System, verifying that test methods accurately predict energy use, and using measured data to verify compliance with outcome-based codes.

- Prepare *Energy Reporting Codes and Standards Report* that includes, but is not limited to:
 - A roadmap to accelerate the adoption of energy reporting technology, including identification of policy changes.
 - A roadmap for using energy reporting data to advance policy objectives, including data collection and recommendations evaluated in this task and opportunities to leverage data to improve compliance with codes and standards.
 - Code change proposals for the highest priority policies, including draft code language, associated justification and explanation to impacted stakeholders.

Products:

- Codes and Standards Background Memo
- Energy Reporting Codes and Standards Report

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TASK 6: 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, but are not limited to:
 - For Product Development Projects and Project Demonstrations:
 - 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.
 - Additional Information for Product Development Projects:
 - 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.
 - For Information/Tools and Other Research Studies:
 - Outcome of project.
 - Published documents, including date, title, and periodical name.
 - A discussion of policy development. State if the project has been cited in government policy publications or technical journals, or has been used to inform regulatory bodies.
 - The number of website downloads.

Exhibit A Scope of Work

- An estimate of how the project information has affected energy use and cost, or have resulted in other non-energy benefits.
- An estimate of energy and non-energy benefits.
- Data on potential job creation, market potential, economic development, and increased state revenue as a result of 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.
- Respond to CAM questions regarding responses to the questionnaires.

The Energy Commission 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 7: TECHNOLOGY/KNOWLEDGE TRANSFER ACTIVITIES

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

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 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 website downloads or 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 project.
- When directed by the CAM, participate in annual EPIC symposium(s) sponsored by the California Energy Commission.

Exhibit A Scope of Work

- Provide at least (6) six *High Quality Digital Photographs* (minimum resolution of 1300x500 pixels in landscape ratio) of pre and post technology installation at the project sites or related project photographs.
- 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.

STATE OF CALIFORNIA

STATE ENERGY RESOURCES
CONSERVATION AND DEVELOPMENT COMMISSION

RESOLUTION - RE: LAWRENCE BERKELEY NATIONAL LABORATORY

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

RESOLVED, that the Energy Commission approves Agreement EPC-15-026 from GFO-15-310 with the Department of Energy's Lawrence Berkeley National Laboratory for a \$ 1,630,699 grant to develop technologies that enable plug-load devices to transmit operating information—such as identity, power consumption, and functional state—through a communications network to alert building owners and operators of wasteful, or unsafe operation and provide them with clear, actionable advice on responding; and

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

CERTIFICATION

The undersigned Secretariat to the Commission 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 California Energy Commission held on March 9, 2016.

AYE: [List of Commissioners]

NAY: [List of Commissioners]

ABSENT: [List of Commissioners]

ABSTAIN: [List of Commissioners]

Tiffani Winter,
Secretariat