GRANT REQUEST FORM (GRF)

New Agreement EPC-15-075 (To be completed by CGL Office)

Division	Agreement Manager:	MS-	Phone
ERDD	David Hungerford	51	916-327-2341

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

Title of Project
Customer-centric Demand Management using Load Aggregation and Data Analytics

Term and Amount	Start Date	End Date	Amount
	5/18/2016	12/31/2019	$ 3,998,587

Business Meeting Information			
☐ ARFVTP agreements under $75K delegated to Executive Director.			
Proposed Business Meeting Date	5/11/2016	☐ Consent	☒ Discussion
Business Meeting Presenter	David Hungerford	Time Needed:	5 minutes
Please select one list serve. EPIC (Electric Program Investment Charge)			

Agenda Item Subject and Description

ELECTRIC POWER RESEARCH INSTITUTE (EPRI). Proposed resolution approving agreement EPC-15-075 with Electric Power Research Institute for a $3,998,587 grant to fund assessment of transactive tariff effectiveness. This project will influence aggregated demand side resources and consumer behavior to provide grid stability, reliability, and greenhouse gas reductions. (EPIC funding) Contact: David Hungerford (Staff presentation: 10 minutes)

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":
Agreement will not cause direct physical change in the environment or a reasonably foreseeable indirect physical change in the environment because the primary goal of the project is to deploy and evaluate the impacts of a software platform that assists customers in managing their loads and existing distributed energy resources. Among the subset of participants who will install technology, the devices will be commercially available consumer devices such as smart thermostats and energy efficiency measures.

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: Cal. Code Regs., tit. 14, sec. 15301; Cal. Code Regs., tit. 14, sec. 15306
☐ Common Sense Exemption. 14 CCR 15061 (b) (3)
Explain reason why Agreement is exempt under the above section:
Cal. Code Regs., tit. 14, sec. 15301 provides that projects which consist of the operation, repair, maintenance, permitting, leasing, licensing, or minor alteration of existing public or private structures, facilities, mechanical equipment, or topographical features, and which involve negligible or no expansion of use beyond that existing at the time of the lead agency's determination, are categorically exempt from the provisions of the California Environmental Quality Act. This project will retrofit and install small equipment at approximately 17 existing model homes throughout California and at approximately two small, existing, commercial retail spaces. All of the model homes and small retail spaces will be retrofitted with demand responsive technologies including communicating power strips, smart thermostats, connected heat pump water heaters. At some of the model homes, rooftop solar photovoltaic panels, smart inverters, and wall-mounted battery storage on interior garage or utility room walls will be installed. The retrofits and installation will not increase the existing energy capacity of the homes or offices, but will rather reduce electricity usage through utilizing energy efficiency measures and demand response. Therefore, the project will not have a significant effect on the environment and falls within section 15301.

Cal. Code Regs., tit. 14, sec. 15306 provides that projects which consist 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 install software at existing retail locations and at the residential test sites to monitor electricity loads and feed back real-time energy consumption data, such as ramp rates, state of charge, and load condition, to analyze the efficacy of load management. The monitoring software will reside in a computer already owned by the participant or provided under this project. Therefore, the project will not have a significant effect on the environment and falls within 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

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

Legal Company Name:	Budget
InTech Energy, Inc.	$ 626,476
Olivine Systems	$ 99,500
Zeco Systems, Inc. DBA Greenlots	$ 99,500
Clean Fuel Connection, Inc.	$ 60,000
Pedagogy World, Inc.	$ 60,000
Chai Energy	$ 99,500
TBD-Residential System Integration	$ 0

GRANT REQUEST FORM (GRF)

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

Budget Information				
Funding Source		**Funding Year of Appropriation**	**Budget List No.**	**Amount**
EPIC		14-15	301.001B	$3,998,587
				$
R&D Program Area:	EERO: Buildings		TOTAL:	$3,998,587
Explanation for “Other” selection				
Reimbursement Contract #:			Federal Agreement #:	

Recipient’s Administrator/ Officer		**Recipient’s Project Manager**	
Name:	Sunil Chhaya	Name:	Sunil Chhaya
Address:	3420 Hillview Ave	Address:	3420 Hillview Ave
City, State, Zip:	Palo Alto, CA 94304-1355	City, State, Zip:	Palo Alto, CA 94304-1355
Phone:	650-855-2148 / Fax: - -	Phone:	650-855-2148 / Fax: - -
E-Mail:	schhaya@epri.com	E-Mail:	schhaya@epri.com

Selection Process Used	
☒ Competitive Solicitation	Solicitation #: GFO-15-311
☐ First Come First Served Solicitation	

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

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		Develop Project Requirements
3	X	Design, Build and Test Open Demand Side Resource Integration Platform
4		Deploy, Integrate and Operate the Platform for Data Collection
5		Analyze Data and Develop Insights into Operational Strategies and Consumer Behavior
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
DSRIP	Demand Side Resource Integration Platform
Energy Commission	California Energy Commission
DR	Demand Response
GHG	Greenhouse Gas
ISO	Independent System Operator
M&V	Measurement & Verification
Open DSRIP	Open Demand Resource Integration Platform
PEV	Plug-in Electric Vehicle
PV	Photovoltaic
Recipient	Electric Power Research Institute, Inc.
TAC	Technical Advisory Committee
TSS	Transactive Signal Server
ZNE	Zero Net Energy

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

A. Purpose of Agreement

The purpose of this Agreement is to fund the assessment of transactive tariff effectiveness to influence aggregated demand side resources and consumer behavior to achieve grid stability, reliability, and greenhouse gas (GHG) reduction.

[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.

B. Problem/ Solution Statement

Problem
Over the last few years, there have been a proliferation of customer-side, smart-connected devices such as smart thermostats; heat pump water heaters; photovoltaics (PVs); plug-in electric vehicles (PEVs); and battery storage. These devices are procured by consumers and possess the ability to communicate with the Internet and have computing and control ability to alter their behavior. Their collective potential, however, cannot be harnessed toward supporting grid reliability and stability, as well as GHG reduction goals, without a mechanism to aggregate and manage them in a manner consistent with consumer preferences for their individual performance. They represent a vastly underutilized grid asset.

Solution
The Recipient will develop, deploy and operate a software aggregation platform (tool) that combines the response from multiple residential and small commercial customers and loads in a manner that both stabilizes and verifies the response from individual loads while enhancing grid stability and reliability.

C. Goals and Objectives of the Agreement

Agreement Goals
The goals of this Agreement are to:
- Demonstrate that a wide variety of load types and products (smart thermostats, heat pump water heaters, electric vehicles (EVs), PV and storage) can be aggregated to provide demand response (DR), leverage grid-connected emerging technologies , and provide a better customer experience.
- Better understand individual preferences for residential and small business customers for load management using data from the connected devices.
- Design, develop, test and validate operational strategies for load management using resources behind the meter.
- Design a flexible and open demand-side resource integration platform (Open DSRIP) to enable DR participation by residential and small commercial customers.
- Evaluate effectiveness of different tariff structures through development and testing of baseline estimation, telemetry and measurement and verification (M&V) strategies.
- Demonstrate advanced telemetry using circuit-level and smart meter data.
- Create a path to technology acceleration and commercialization of the resultant tools and benefits through open sourcing tools.

Ratepayer Benefits:[2] This Agreement will result in the ratepayer benefits of greater grid reliability and stability, and GHG reduction, by:
- Responding to transactive tariffs that reflect grid conditions and supply characteristics improving grid reliability and stability, by tweaking the energy consumption profiles of the smart connected end devices in a manner consistent with customer preferences.

[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).

- Developing Open DSRIP that incorporates the operational strategies and control algorithms that can serve as a reference design for advancing industry DR capabilities will to accelerate adoption of aggregation technologies and thus DR participation.

Technological Advancement and Breakthroughs:[3] This Agreement will lead to technological advancement and breakthroughs to overcome barriers to the achievement of the State of California's statutory energy goals by:

- Creating an open, flexible software framework in the form of Open DSRIP that is widely accessible through open source code base and open Application Program Interface that allows integration of diverse customer demand side resources to be managed through aggregation.
- Define, develop, validate and test operational strategies and control algorithms that accomplish customer preference-constrained optimization of grid demand and energy use in response to transactive pricing tariffs.
- Develop and validate circuit and meter-level telemetry methodologies to enable more granular M&V data and validation than is current practice for small loads.

Agreement Objectives
The objective of this Agreement is to demonstrate the effectiveness of transactive pricing tariffs on aggregated management of demand side resources in residential and small commercial segments.

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.

[3] California Public Resources Code, Section 25711.5(a) also requires EPIC-funded projects to lead to technological advancement and breakthroughs to overcome barriers that prevent the achievement of the state's statutory and energy goals.

- 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 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 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 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.

  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

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:

- o 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)
- o Ensure that the document is written in the third person.
- o Ensure that the Executive Summary is understandable to the lay public.
  - 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.
- o Follow the Style Guide format requirements for headings, figures/tables, citations, and acronyms/abbreviations.
- o Ensure that the document omits subjective comments and opinions. However, recommendations in the conclusion of the report are allowed.
- o 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.

  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 <u>no permits</u> 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:
  - o 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.
  - o 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 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.
- 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.
- 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

IV. TECHNICAL TASKS

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.* ***Subtask 1.1 (Products)*** *describes the procedure for submitting products to the CAM.*

TASK 2: DEVELOP PROJECT REQUIREMENTS

The goal of this task is to specify and to define implementation and test requirements for the energy management platform.

The Recipient shall:

- Define software application requirements to successfully demonstrate demand side resource management in response to a variety of grid parameters, such as price signaling.
- Define foundational software and demonstration requirements.
- Define integration and test requirements.
- Define data needs, management and warehousing requirements. These will include customer engagement, behavioral assessment and cost-effectiveness assessment.
- Work with the Electric Power Research Institute, the Group 3 awardee under GFO-15-311, to:
  - Understand all the interfaces to and from the transactive signal server (TSS) developed by the EPRI.
  - Document end-to-end use cases and sequence diagrams for application interactions with the TSS.
- Create *Requirements Definition Document: Demand Side Resource Management*, which will include the requirements that will be the charter for this project. The *Requirements Definition Document: Demand Side Resource Management* will include:
  - Use cases that maximize the daily operating value
  - Interface definition for transactive signal and demonstration requirements, developed by working with Group 3 awardee
  - Requirements to receive the transactive signal made available by the TSS.
  - System integration and test requirements including M&V
  - Data management and warehousing requirements for customer engagement, behavioral assessment and cost effectiveness assessment
  - Metrics for customer behavioral assessment, cost/benefit assessment and tariff evaluation
- Create *Test Plan* documenting the following:
  - M&V Methodology
  - Objectives
  - Procedures
  - Conditions
  - Host site facilities' infrastructure and architecture
  - Equipment being tested
- Procure / Deploy Energy Management Platform at participating commercial sites and create an *Energy Management Platform Configuration Document* containing:
  - Site-specific information (What is being managed)
  - Sensor, local networking hardware and software versions

- Visualization and analytics software version and configuration that stores and analyzes the data captured on-site
- Definition of interfaces between the platform and OpenDSRIP.

Products:

- Requirements Definition Document: Demand Side Resource Management
- Test Plan
- Energy Management Platform Configuration Document

TASK 3: DESIGN, BUILD AND TEST THE OPEN DEMAND SIDE RESOURCE INTEGRATION PLATFORM

The goal of this task is to design, build and test the cloud and fog computing-based software application, Open DSRIP, which will enable aggregation of residential and small commercial loads and distributed resources as utility- and California Independent System Operator (ISO)-dispatchable assets.

The Recipient shall:

- Design the Open DSRIP architecture, control algorithms and interface definitions for external communications as well as a cybersecurity strategy that underpins the entire transaction processing system. Document key elements of this design in the *Open DSRIP Design Document.*
- Develop a software application that implements Open DSRIP and interfaces to external entities. This shall include:
    - Develop mechanisms to receive the transactive signal made available by the TSS.
    - Develop data stream inputs to receive, analyze, and process real-time data from push devices that transmit periodic data.
    - Develop algorithm and software modules into Open DSRIP for interacting with and responding to pricing tariff signals, energy management, aggregation and disaggregation, and data reporting. This includes incorporation of TSS signals as made available by EPRI, the Group 3 awardee.
    - Develop data analytics system for customer behavior and tariff effectiveness evaluation.
    - Develop Open DSRIP dashboard and graphical user interface to enable navigation and presentation of data.
- Incorporate interfaces that will support the following entities within the software:
    - Distribution System Operator, CAISO and transactive pricing tariff servers
    - Residential buildings
    - EVs (as managed by Open Vehicle-Grid Integration Platform) ; and
    - Energy Management Platform as defined in Task 2
- Document development and operation of the software in an *Open DSRIP Software Application Guide and User's Manual.*
- Prepare *CPR Report* in accordance with subtask 1.3 (CPR Meetings).
- Participate in a CPR meeting

Products:

- Open DSRIP Design Document
- Open DSRIP Software Application Guide and User's Manual
- CPR Report

TASK 4: DEPLOY, INTEGRATE AND OPERATE THE OPEN DEMAND SIDE RESOURCE INTEGRATION PLATFORM FOR DATA COLLECTION

The goal of this task is to integrate cloud and fog computing software developed in Task 3 with existing residential, EV and small commercial assets and platforms managing those assets. In addition, the task will also implement the Task 2 Test Plan to collect data by demonstrating the capabilities of the Open DSRIP for aggregation of residential and small commercial loads and distributed resources as utility and ISO-dispatchable assets.

The Recipient shall:

- Install and operate Open DSRIP in a sandbox environment with simulated interfaces, followed by connection to each of its interfacing entities.
- Test the communication mechanisms with the TSS in real time in a staging environment.
- Integrate the Open DSRIP with the interfacing systems – the transactive pricing server, ZNE energy management platform, small commercial energy management platform and platform for control and data interfaces. This includes ensuring that control signals, control algorithms and data reads are being communicated as expected and securely.
- Create an Energy Data Warehouse for energy usage and customer preference data.
- Document Energy Data Warehouse creation in an *Energy Data Warehouse Development Memo*.
- Run a demonstration of TSS signal receipt and provide a report on the demonstration in an *Initial TSS Signal Dispatch Demonstration Materials* (to include items such as slide presentation, video, screen shots, etc.).
- Collect baseline energy utilization data for M&V purposes.
- Install monitoring hardware at participating sites to record energy consumption data.
- Verify energy management related control algorithms through exercising test scenarios.
- Run an overall demonstration of signal receipt, working with other awardees under GFO 15-311, and document the demonstration in a report titled *Signal Dispatch Demonstration Materials*.
- Collect technical and economic data for 15 months to populate data warehouse for analysis of consumer behavior and Energy Efficiency/DR impacts as well as for M&V purposes.
- Document barriers and solutions to deployment, installation issues, operational constraints and operational performance of entire integrated DSRIP in an *Operational Performance and Learnings Report.*

Products:

- Energy Data Warehouse Development Memo
- Initial TSS Signal Dispatch Demonstration Materials
- Signal Dispatch Demonstration Materials
- Operational Performance and Learnings Report

TASK 5: ANALYZE DATA AND DEVELOP INSIGHTS INTO OPERATING STRATEGIES AND CUSTOMER BEHAVIOR

The goal of this task is to analyze data collected from participating sites by exercising control and operational strategies assess relative effectiveness of various pricing tariffs on both consumer participation and behavior; and on actual demand and energy use profiles.

The Recipient shall:

- Define and document methodology to assess consumer preference impact on tariff effectiveness on demand and energy profile shaping in *Consumer Preference Assessment Methodology Document*.
- Assess transactive tariffs' relative effectiveness using the data from the Energy Data Warehouse and by applying the methodologies developed in the *Consumer Preference Assessment Methodology Document*. Document the findings in a *Tariff Effectiveness Assessment Report.*
- Assess effect of tariffs on consumer preferences for energy use through measured and verified energy data. Document the findings in *Consumer Preference Assessment Report.*
- Prepare a *Customer Perspective of Project Value and Benefits Report* written from the customer's perspective of how the project has provided or will provide value and benefits.
- Prepare a *Metrics and Performance Report that* documents the success of the project, measured in accordance with parameters approved by the Energy Commission.
- Prepare a *Lessons Learned and Best Practices Report that* includes a design configuration that provides the highest value to customers, ratepayers, and utilities.

Products:

- Consumer Preference Assessment Methodology Document
- Tariff Effectiveness Assessment Report
- Consumer Preference Assessment Report
- Customer Perspective of Project Value and Benefits Report
- Metrics and Performance Report
- Lessons Learned and Best Practices Report

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:

    - <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.
            - 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.
        - 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 results of the project.
- Provide at least six *High Quality Digital Photographs* (minimum resolution of 1300x500 pixels) of the 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)

TASK 8: PRODUCTION READINESS PLAN

The goal of this task is to determine the steps that will lead to the manufacturing of technologies developed in this project or to the commercialization of the project's results.

The Recipient shall:

- Prepare a *Production Readiness Plan*. The degree of detail in the plan should be proportional to the complexity of producing or commercializing the proposed product, and to its state of development. As appropriate, the plan will discuss the following:
    - Critical production processes, equipment, facilities, personnel resources, and support systems needed to produce a commercially viable product.
    - Internal manufacturing facilities, supplier technologies, capacity constraints imposed by the design under consideration, design-critical elements, and the use of hazardous or non-recyclable materials. The product manufacturing effort may include "proof of production processes."
    - The estimated cost of production.
    - The expected investment threshold needed to launch the commercial product.
    - An implementation plan to ramp up to full production.
    - The outcome of product development efforts, such as copyrights and license agreements.
    - Patent numbers and applications, along with dates and brief descriptions.
    - Other areas as determined by the CAM.

Products:

- Production Readiness Plan (draft and final)

V. PROJECT SCHEDULE

Please see the attached Excel spreadsheet.

RESOLUTION NO: 16-0517-17b

STATE OF CALIFORNIA

STATE ENERGY RESOURCES
CONSERVATION AND DEVELOPMENT COMMISSION

RESOLUTION - RE: ELECTRIC POWER RESEARCH INSTITUTE (EPRI)

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-15-075 from GFO-15-311 with Electric Power Research Institute for a $3,998,587 grant to fund assessment of transactive tariff effectiveness to influence aggregated demand side resources and consumer behavior to provide grid stability, reliability, and greenhouse gas reductions; 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 May 17, 2016.

AYE: [List of Commissioners]
NAY: [List of Commissioners]
ABSENT: [List of Commissioners]
ABSTAIN: [List of Commissioners]

Cody Goldthrite,
Secretariat