

GRANT REQUEST FORM (GRF)

CEC-270 (Revised 10/2015)

CALIFORNIA ENERGY COMMISSION

New Agreement EPC-15-054 (To be completed by CGL Office)

Division	Agreement Manager:	MS-	Phone
ERDD	Eli Harland	43	916-327-1463

Recipient's Legal Name	Federal ID Number
Universal Devices, Inc.	20-3436603

Title of Project
Complete and Low Cost Retail Automated Transactive Energy System (RATES)

Term and Amount	Start Date	End Date	Amount
	6/30/2016	3/29/2019	\$ 3,187,370

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

Proposed Business Meeting Date	5/11/2016	<input type="checkbox"/> Consent	<input checked="" type="checkbox"/> Discussion
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Business Meeting Presenter	David Hungerford	Time Needed:	5 minutes
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Please select one list serve. EPIC (Electric Program Investment Charge)

Agenda Item Subject and Description

UNIVERSAL DEVICES, INC. Proposed resolution approving agreement EPC-15-054 with Universal Devices, Inc. for a \$3,187,370 grant to develop and pilot-test a Retail Automated Transactive Energy System (RATES) that uses behind-the-meter energy management solutions. The goal is to minimize the cost and complexity of customer participation in demand response programs, while maximizing the potential participation of large numbers of small loads that can improve system load factor, shave peaks, integrate renewable generation and provide low opportunity-cost resources to the grid.

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

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, § 15301 -- Cal. Code Regs., tit 14, § 15306

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

Explain reason why Agreement is exempt under the above section:

15301: Existing Facilities

The pilot phase of the project will consist of installing energy management controllers, installing sensors, and replacing inverters at existing residential and small commercial sites. Installation of these devices will not expand the use of the properties.

15306: Information Collection

The design phase of this project will consist of data collection and research to develop interfaces for energy management controllers, creating communication protocols for energy devices, and testing the ability of devices to communicate through the interfaces. The design phase will take place in a research laboratory and will not disturb environmental resources.

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
TeMix, Inc	\$ 1,634,100
TBD Electrical Contractor	\$ 95,000
TBD - Controls	\$ 21,850

EXHIBIT A Scope of Work

I. TASK ACRONYM/TERM LISTS

A. Task List

Task #	CPR ¹	Task Name
1		General Project Tasks
2	X	Requirements Analysis
3	X	Design, Development, Testing, and Certifications
4		Pilot Deployment and Analysis
5		Evaluation of Project Benefits
6		Technology/Knowledge Transfer Activities
7		Production Readiness Plan

B. Acronym/Term List

Acronym/Term	Meaning
AESI	Automated Energy Service Interface
CPUC	California Public Utilities Commission
CAM	Commission Agreement Manager
CAO	Commission Agreement Officer
CPR	Critical Project Review
DR	Demand Response
DER	Distributed Energy Resources
DSO	Distribution Service Operator
IoT	Internet of Things
IOU	Investor Owned Utility
ISO	Independent System Operator
LSE	Load Serving Entity
OpenADR	Open Automated Demand Response
RATES	Retail Automated Transactive Energy System
RTEP	Retail Transactive Energy Platform
RTP	Real Time Price
SCE	Southern California Edison
SRS	System Requirements Specifications
TAC	Technical Advisory Committee
TLM	Transactive Load Management
VTN	Virtual Top Node in OpenADR

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

A. Purpose of Agreement

The purpose of this Agreement is to fund the development and pilot-testing of a low-cost and standards-based Retail Automated Transactive Energy System (RATES), using a simplified

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.

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tariff structure and low-cost behind-the-meter energy management system. The goal is to minimize the cost and complexity of customer participation in energy efficiency programs, while maximizing the potential of large numbers of small customer loads. This can lead to improved system load factor, reduced peaks in demand, integrated renewable generation and provide low opportunity-cost resources to the electric grid.

B. Problem/ Solution Statement

Problem

California's climate goals and plans for more electrification, distributed generation, and intermittent renewable energy require millions of smaller end customers and their distributed generation systems to play a much larger role in management of and investment in California's electricity systems. The exorbitant costs and complexities involved in measurement, verification, and settlement activities are major barriers for the utilities to expand Demand Response (DR) programs to large numbers of average customers with relatively small electric load. Furthermore, there is no demonstrated and simplified retail tariff structure and supporting system that can engage millions of California retail customers and prosumers in playing the larger role envisioned in California climate and energy goals and policies.

At the direction of the California legislature, the California Public Utilities Commission (CPUC) is developing default Time-of-Use tariffs for Investor Owned Utility (IOU) retail customers. However these tariffs only provide static price signals that may not reflect the variability of solar and wind resources in 2030. Real Time Price (RTP) tariffs can better reflect this variability, however RTP tariffs can result in customer bill volatility and utility revenue volatility which prevents wide spread adoption of RTP tariffs.

Solution

The Recipient will design and pilot-test an innovative standards-based system, using a simplified tariff structure and a behind-the-meter low-cost energy management system. Interfaces will be developed to work with IOU distribution operators, the California Independent System Operator (ISO), retail customers, stand-alone distributed generation and storage, IOU retailers and non-IOU retailers on the IOU distribution grid. The tariff and platform will be standards-based and will use extensions to Open Automated Demand Response (OpenADR) platforms and signals that are being developed by the grant recipient from Group 3 of the Energy Commission's Grant Funding Opportunity-15-311.

C. Goals and Objectives of the Agreement

Agreement Goals

The goals of this Agreement are to:

- Create ratepayer benefits by developing and pilot-testing a breakthrough transaction platform and transactive tariffs to enable behind-the-meter customers to improve electric grid reliability and lower energy costs.
- Simplify the major barrier of complex and expensive measurement, verification, and settlement activities by developing an Internet of Things (IoT)-based energy management and automation system for DR that is market ready and open source.

EXHIBIT A Scope of Work

Ratepayer Benefits:²

This Agreement will result in the ratepayer benefits of (1) greater electricity reliability and (2) lower costs.

Greater electricity reliability will result as customers respond to variable spot prices that reflect grid conditions and spot costs. Through a low cost energy management and automation system, customer technologies will shift and shape their electricity usage to present net loads to the electric grid that reduce peak loads, minimize power plant ramp rates and quickly respond to contingency events that threaten grid reliability.

Lower costs of electricity will result from reduced investment in wholesale generation, energy storage capacity, and transmission and distribution capacity because the investments and operations of retail customers will be better coordinated with the wholesale energy market and grid operations. Such coordination can be achieved through the deployment of prices and decentralized transactions that the Recipient will pilot-test.

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. The proposed technology will facilitate low cost, anytime responsiveness of retail electricity customers and their electricity using and producing devices by providing low-cost transactive short-term and long-term signals to customers' low cost and behind-the-meter energy management and automation system. A two-way retail tariff will be interfaced with IOU Distribution System Operators (DSO), other retailers, and with the California ISO market portal.

California companies are leading the revolution in the IoT with connected stationary and mobile electric loads, distributed generation and smart controls. This technology solution and the economic payments that result will increase customer interest and investment in smart buildings, vehicles and distributed generation and further the electrification and the development of technology by California businesses. What is missing today is actionable spot and investment price signals to monetize the benefits of these investments and a low cost energy management and automation system that automates the transactions and actions. This project will help monetize these benefits to ratepayers and to the electric system.

Agreement Objectives

The objectives of this Agreement are to:

- Complete development and testing of a robust RATES to support the pilot-tests and serve as a foundation for full scale up of the solution to millions of customers and several million devices.

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).

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.

EXHIBIT A Scope of Work

- Pilot-test the technology for 12-months on a selection of residential and small/medium commercial venues, some of which may have Distributed Energy Resources (DER), like solar and storage.
- Create an easy-to-use RATES inspection tool for maintenance personnel.
- Document and communicate the results of this project and recommend a path toward commercialization.

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**

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

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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

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- 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
- Approval 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)

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- Ensure that the document is written in the third person.
- 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.
- 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:

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- 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 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.

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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:

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- 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.

EXHIBIT A

Scope of Work

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

EXHIBIT A

Scope of Work

IV. TECHNICAL TASKS

TASK 2 – REQUIREMENTS ANALYSIS

The goal of this task is to develop the Systems Requirements Specifications (SRS) that will serve as the basis for executing the project by identifying and describing the barriers, interfaces, use-cases, stakeholders and potential pilot participants.

The Recipient shall:

- Develop and provide a *Systems Requirements Specifications (SRS) Report* that:
 - Identifies regulatory, institutional, and technological barriers and describes steps to overcome such barriers by:
 - Conducting interviews with IOUs, including Southern California Edison (SCE), and the California ISO to understand institutional barriers.
 - Conducting interviews with CPUC to understand regulatory barriers.
 - Conduct interviews with OpenADR Virtual Top Node (VTN), Virtual End Node, and IoT vendors to understand technological barriers.
 - Conducting interviews with DER vendors to understand technological barriers.
 - Defines all the interfaces to, from, and within RATES by:
 - Working with the CAM to incorporate the OpenADR transactive interface and signal being developed by the grant recipient from Group 3 of GFO-15-311:
 - Understand all the interfaces to and from the Transactive Load Management (TLM) signals developed by the grant recipient from Group 3 of GFO-15-311.
 - Document end-to-end use cases and sequence diagrams for interactions with the TSS.
 - Specifying the Automation Distribution Service Interface for DSOs.
 - Specifying the Automated Load Serving Entity (LSE) Energy Service Interface for LSEs.
 - Specifying customer registration and subscriptions interfaces for RATES.
- Defines end-to-end use cases, system behavior and constraints for RATES taking into account the barriers and interfaces, including, but not limited to:
 - Automated Energy Service Interface (AESI) – Use cases for intelligent automation algorithms using smart meter, smart inverter, other sensory and environmental input, and communication with devices.
 - Retail Transactive Energy Platform (RTEP) – Use cases and sequence diagrams for interactions between RTEP, DSO, LSE, and VTN.
 - RATES - Use cases for registration, subscriptions, and transactions between RTEP and AESI as well as other customer interactions such as command, control, and monitoring of devices.
 - System constraints – Security, privacy, performance, and costs.
- Develop and provide a Stakeholder and Pilot Participant Report that:
 - Describes how the Recipient will engage relevant stakeholders, specifically how the Recipient will ensure that a California IOU and California ISO fulfill their participation commitments in their letters of support for the grant application.
 - Explain how the Recipient will work with a California IOU, like SCE, to recruit pilot participants.

EXHIBIT A

Scope of Work

- Describes how the Recipient will identify the list of potential pilot participants and includes a list of potential participants for executing Task 4 that:
 - Includes up to 200 participants made up of approximately:
 - 80 percent residential customers and 20 percent small/medium commercial customers.
 - 5 percent of customers with solar and/or storage.
 - Consistent with “Exhibit E Electric Program Investment Charge Special Terms and Conditions”, explains how the Recipient will interview potential participants and receive commitments to participate in the pilot, including how the Recipient will comply with the Information Practices Act (“IPA”) as codified in California Civil Code sections 1798 et seq.
- The CAM will review and approve the Stakeholder and Pilot Participant Report before the Recipient begins to recruit pilot participants.
- Prepare a CPR Report #1 and participate in a CPR meeting per subtask 1.3.

Products:

- Systems Requirements Specifications (SRS) Report (draft and final)
- Stakeholder and Pilot Participant Report (draft and final)
- CPR Report #1

TASK 3 – DESIGN, DEVELOPMENT, TESTING, AND CERTIFICATIONS

The goal of this task is to use the *SRS Report* (Task 2) as the basis for designing, developing, testing and certifying RATES as an end-to-end system that is built on the TeMIX Platform™.

The Recipient shall:

- Design RATES using:
 - The SRS Report from Task 2.
 - Existing prototype implementation of the RTEP based on the TeMIX Platform™.
- Develop:
 - The AESI by creating:
 - The hardware and firmware to support smart inverters.
 - The intelligent automation algorithms.
 - User interfaces for registration, subscription management, and transactions in addition to command, control, and monitoring of devices.
 - The communications protocols with RTEP.
 - The RTEP by creating the protocols and ability to communicate with:
 - VTN and the signal being developed by the grant recipient from Group 3 of GFO-15-311 to enable communication with DSOs, LSEs, and the AESI:
 - Develop mechanisms to receive TLM made available by TLM server; and
 - Process/Incorporate the TLM signal.
- Test RATES by:
 - Deploying in simulation mode within a staging environment.
 - Creating simulation test cases.
 - Testing integration of AESI with RTEP using simulation mode.
 - Testing with VTN, DSO, and LSE in real time mode in the staging environment and repeat test in production environment.

EXHIBIT A

Scope of Work

- Test the communication mechanisms with the TLM in real time in a staging environment
- Move to production environment and repeat above mentioned Test
- Certify by:
 - Conducting an OpenADR transactive certification for AESI.
 - If available, a Federal Communication Commission Certification for RF communications.
 - Conducting a cyber-security certification for RATES, including RTEP
 - Conducting an Underwriters Laboratory certification for large storage devices.
- Prepare and provide a RATES Design, Development, Testing, and Certification Report that describes how the Recipient designed RATES, developed the interfaces and communication protocols, tested RATES, and certified RATES. At the direction of the CAM, the report should include protocols, applicable test results and certifications.
- Prepare a CPR Report #2 and participate in a CPR meeting per subtask 1.3.

Products:

- RATES Design, Development, Testing, and Certification Report (draft and final)
- CPR Report #2

TASK 4 – PILOT DEPLOYMENT AND ANALYSIS

The goals of this task are to: (1) Pilot-test the RATES platform and two-way tariffs with actual customer devices and pilot distribution and energy tariffs for a California IOU; (2) Collect at least 12 months of technical and economic data, including documentation of installation issues, operational constraints, and operational performance.

The Recipient shall:

- Obtain approvals from an IOU and the CPUC to conduct the pilot test.
- Prepare a Regulatory Status Memo describing the steps taken to obtain approvals, including status and verification of regulatory approvals.
- Register pilot participants and schedule installation of hardware to participate in the RATES pilot test. Before collecting any pilot participant information and before registering pilot participants the Recipient will provide each pilot participant with a “Notice to Individuals” as shown in Attachment A of Exhibit E.
- Prepare a Pilot Participation Verification and Deployment Memo that describes how the Recipient verified pilot participation, including confirmation that pilot participants received a “Notice to Individuals”, and a pilot-test installation schedule.
- Utilize the Stakeholder and Pilot Participant Report (Task 2) to deploy pilot-test hardware by:
 - Installing AESI at each pilot participant location.
 - Identifying the need to install off-the-shelf devices (e.g. thermostats/load controllers) and smart inverters and where necessary install the off-the-shelf devices and smart inverters.
- Prepare and provide an Installation Summary that describes how the Recipient deployed the pilot hardware and documents lessons learned and recommendations for improving deployment to facilitate commercialization of RATES, including identification of barriers and solutions to deployment.
- Analyze performance and cost savings at least bi-monthly for a period of at least 12 months.
- Assess and make modifications to intelligent automation algorithms at least bi-monthly for a period of at least 12 months.
- Provide customer support to pilot participants.

EXHIBIT A

Scope of Work

- Conduct participant interviews, collect and document feedback specifically with respect to quality of life, ease of use, and any improvements and/or dissatisfactions and prepare a Customer Experience Report written from the pilot participant's perspective of how the project has provided or will provide value and benefits, including information from participant interviews.
 - The report will include aggregated data and statistics and will be anonymized so that the data is not linked to any specific pilot participant individual.
 - Consistent with "Exhibit E Electric Program Investment Charge Special Terms and Conditions", the pilot participant interviews and collection of pilot participant data will comply with the Information Practices Act ("IPA") as codified at California Civil Code sections 1798 et seq.
- Develop policy and business recommendations from the pilot and document those recommendations in a Policy and Business Use Case Report that specifies use cases that maximize the daily operating value to the owner of the project.
- Prepare and provide a Pilot-Test Summary Report that identifies and describes:
 - performance and cost savings
 - modifications made to algorithms
 - customer support provided
 - installation issues
 - operational constraints
 - lessons learned and best practices, including a design configuration that provides the highest value to customers, ratepayers, and utilities.
 - The report will include aggregated data and statistics and will be anonymized so that the data is not linked to any specific pilot participant individual.
 - Consistent with "Exhibit E Electric Program Investment Charge Special Terms and Conditions", the pilot participant interviews and collection of pilot participant data will comply with the Information Practices Act ("IPA") as codified at California Civil Code sections 1798 et seq.
- Prepare and provide a Project Performance Memo that documents the success of the project and discusses whether the goals and objectives from Section II. C were achieved by the project.

Products:

- Regulatory Status Memo
- Pilot Participation Verification and Deployment Memo
- Installation Summary
- Customer Experience Report
- Policy and Business Use Case Report
- Pilot-Test Summary Report (draft and final)
- Project Performance Memo

TASK 5 EVALUATION OF PROJECT BENEFITS

The goal of this task is to report the benefits resulting from this project.

The Recipient shall:

EXHIBIT A Scope of Work

- 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:
 - 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:

EXHIBIT A

Scope of Work

- 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 6 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.

EXHIBIT A

Scope of Work

- 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 (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)

TASK 7 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.

STATE OF CALIFORNIA

STATE ENERGY RESOURCES
CONSERVATION AND DEVELOPMENT COMMISSION

RESOLUTION - RE: UNIVERSAL DEVICES, INC.

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-15-054 from GFO-15-311 with Universal Devices, Inc. for a \$3,187,370 grant to develop and pilot-test a Retail Automated Transactive Energy System (RATES) that uses behind-the-meter energy management solutions. The goal is to minimize the cost and complexity of customer participation in demand response programs, while maximizing the potential participation of large numbers of small loads that can improve system load factor, shave peaks, integrate renewable generation and provide low opportunity-cost resources to the grid; 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