

GRANT REQUEST FORM (GRF)

CEC-270 (Revised 10/2015)

CALIFORNIA ENERGY COMMISSION

New Agreement EPC-17-024 (To be completed by CGL Office)

ERDD	Tanner Kural	916-327-1542
Southern California Edison		95-1240335
Electric Access System Enhancement (EASE)		
2/1/2018	12/31/2020	\$ 2,000,000

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

Proposed Business Meeting Date	1/17/2018	<input type="checkbox"/> Consent	<input checked="" type="checkbox"/> Discussion
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Business Meeting Presenter	Tanner Kural	Time Needed:	5 minutes
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Please select one list serve. EPIC (Electric Program Investment Charge)

Agenda Item Subject and Description

SOUTHERN CALIFORNIA EDISON. Proposed resolution approving Agreement EPC-17-024 with Southern California Edison (SCE) for a \$2,000,000 grant to support the development of an Industrial Internet of Things approach that can autonomously identify and authenticate distributed energy resources (DER) for streamlining integration to the utility control system and access to energy markets. The project will also develop a realtime constraint management control system to increase hosting capacity for DER. SCE will incorporate these findings into grid planning and operations to demonstrate reduced customer interconnection time for DER. The U.S. Department of Energy will be providing \$4,188,000 in cost share funding for this project.

1. Is Agreement considered a "Project" under CEQA?

 Yes (skip to question 2) No (complete the following (PRC 21065 and 14 CCR 15378)):

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

Explain reason why Agreement is exempt under the above section:

California Code of Regulations (CCR), Title 14, Section 15301 Existing Facilities exempts from CEQA operation of or minor alterations to existing facilities and mechanical equipment that involves no, or negligible, expansion of use. The activities funded by the agreement will involve planning activities included in the operation of existing offices of the recipient where similar activities are performed and no expansion of use will take place as well as the minor alteration of mechanical equipment at an existing recipient substation where no or negligible expansion of use will take place.

 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

Legal Company Name:	Budget
Smarter Grid Solutions	\$ 1,640,000
Advanced Microgrid Solutions, Inc.	\$ 360,000
Pandora Consulting Associates (Federal Cost Share)	\$
National Renewable Energy Laboratory (Federal Cost Share)	\$
	\$
	\$

EXHIBIT A Scope of Work

I. TASK AND ACRONYM/TERM LIST

A. Task List

Task #	CPR ¹	Task Name
1		General Project Tasks
2		Project Planning and Use Case Development
3		Distributed Energy Resources Interconnection Process Streamlining
4		Distributed Control Architecture Interoperability Testing
5	X	Self-Provisioning of Photovoltaic and Distributed Energy Resource Assets
6		Advanced Distribution Controls for High-Penetration Photovoltaic to Increase Hosting Capacity – Hardware-in-the-Loop Testing
7		Distributed Energy Resource Services in Support of High-Penetration Photovoltaic Scenarios – Refine Commercial Considerations and Testing
8	X	Expanded Field Trial – Definition and Commissioning
9		Integration of Distributed Control Framework with Advanced Distribution Management System Applications
10		Field Trial Measurement and Verification
11	X	Project Learnings and Commercialization Plan
12		Evaluation of Project Benefits

B. Acronym/Term List

Acronym/Term	Meaning
ADMS	Advanced Distribution Management System
CAISO	California Independent System Operator
CAM	Commission Agreement Manager
CAO	Commission Agreement Officer
CPR	Critical Project Review
DCA	Distributed Control Architecture
DER	Distributed Energy Resource(s)
HIL	Hardware-in-the-Loop
IOU	Investor Owned Utilities
M&V	Measurement and Verification
PV	Photovoltaic
TAC	Technical Advisory Committee

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

A. Purpose of Agreement and Project

The purpose of this Agreement is to provide Electric Program Investment Charge (EPIC) cost share funding for the Recipient's federally-funded project, which received an award under federal funding opportunity announcement DE-FOA-0001495. The purpose of the project is to integrate customer side resources to grid operations within one of the Recipient's substation

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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circuits. Energy Commission funds will contribute to the performance of all the tasks in this Scope of Work.

B. Problem/ Solution Statement

Problem

The Recipient has experienced significant increase in Solar Photovoltaic (PV) interconnection requests in recent years, and this trend is expected to continue. This high level of Solar PV adoption requires a host of grid modernization efforts to manage the substantial progress the Recipient envisions in decarbonizing the electricity provided on the electrical system.

The existing paradigm for integration of renewables is based around legacy enterprise control solutions (i.e. existing functions such as state estimation and optimization) and a relatively static distribution planning approach. Dynamic visualization of capacity, automation of the interconnection process, and self-discovery of new devices into distributed control subsystems as part of a hierarchical control paradigm are required to achieve scalable integration of Distributed Energy Resources (DER) in excess of 50% of peak load. These distributed control capabilities will enable distributed intelligence and control capability to support fast, automated decisions and improve overall resiliency of the distribution grid system.

Solution

The Recipient will implement a plug and play concept to facilitate service discovery from PV and batteries both under direct control and being controlled via aggregator (e.g. real and/or reactive power available in a certain area upon request) in order to streamline all interconnection types and rationalize multiple systems and processes. In addition, the Recipient will explore and demonstrate distributing the currently centralized enterprise functions (i.e., state estimation and optimization) out on the distribution system and to the edge (i.e., at customer premises), where necessary and desirable in order to securely operate the system closer to limits.

C. Goals and Objectives of the Project

Project Goals

The goal of the project is to demonstrate a Distributed Control Architecture (DCA) for DER integration and management, which is a scalable, interoperable, and cost-effective means of integrating a PV penetration of 50%.

Ratepayer Benefits:² The project will primarily result in the ratepayer benefits of lower costs and greater electricity reliability (secondary) by streamlining the DER interconnection process and the DER integration with utility control systems. The project will likely result in the ratepayer benefits of greater electricity reliability and increased safety by facilitating the integration of microgrids and by automating the interconnection of DER.

² California Public Resources Code, Section 25711.5(a) requires projects funded by the 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).

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Technological Advancement and Breakthroughs:³ The project will lead to technological advancement and breakthroughs to overcome barriers to the achievement of the State of California's statutory energy goals by forming an architecture and cooperative framework enabling a system of systems approach that streamlines the integration of DERs from planning to operations and enabling cross optimization between different participants (Investor Owned Utilities (IOU), third-party DER owners, California Independent System Operator (CAISO)) to allow exchange of services and improved utilization of assets.

Project Objectives

The objectives of the project are to:

- Demonstrate how increased control of high penetration renewables (penetration of at least 50%) will increase hosting capacity (findings will inform the California Public Utilities Commission's Integration Capacity Analysis proceeding).
- Demonstrate how DER can integrate with the distribution grid and be optimized locally and regionally.
- Demonstrate a reduction in customer interconnection time for <250kW DER to ten (10) days or less.
- Demonstrate a scalable architecture that allows PV and other DER (i.e. distributed generation, energy storage, and demand response) customers to access and share critical information about their interconnection applications to improve planning and operations.

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

- 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.

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- Submit the final product to the CAM once agreement has been reached on the draft. The CAM will provide written approval of the final product within 15 days of receipt, unless otherwise specified in the task/subtask for which the product is required.
- If the CAM determines that the final product does not sufficiently incorporate his/her comments, submit the revised product to the CAM within 10 days of notice by the CAM, unless the CAM specifies a longer time period.

For products that require a final version only

- Submit the product to the CAM for approval.
- If the CAM determines that the product requires revision, submit the revised product to the CAM within 10 days of notice by the CAM, unless the CAM specifies a longer time period.

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

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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);
- Permit documentation (subtask 1.7);
- Subcontracts (subtask 1.8); 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 1.9 and 1.10); and
 - Any other relevant topics.
- Provide an *Updated Project Schedule* and *List of Permits*, as needed to reflect any changes in the documents.

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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 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.

If the awarding federal agency conducts similar project review meetings, the Recipient will notify the CAM and invite him/her to participate (subject to the awarding federal agency's approval), either by teleconference or in-person. The federal agency's meetings may be used in place of the Commission's CPR meetings, at the discretion of 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; (2) includes recommendations and conclusions regarding continued work on the project; and (3) includes copies of any correspondence with the awarding federal agency that relates to the project's status. Examples of correspondence include reports, summaries, letters, or emails that discuss project performance or the results of project review meetings with the federal agency.
- 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.

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- Notify the CAM of any project review meetings conducted by the awarding federal agency, and invite the CAM to participate in the meetings by teleconference or in-person (subject to the awarding federal agency's approval).

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 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. If the awarding federal agency conducts similar project review meetings, the Recipient will notify the CAM and invite him/her to participate (subject to the awarding federal agency's approval), either by teleconference or in-person. The federal agency's meetings may be used in place of the Commission's CPR meetings, at the discretion of the CAM.

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.

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- 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. Include a copy of any federal agency correspondence (e.g., report, summary, letter, or email) that discusses project findings, conclusions, or recommendations.
- 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.
- Notify the CAM of any project review meetings conducted by the awarding federal agency, and invite the CAM to participate in the meetings by teleconference or in-person (subject to the awarding federal agency's approval).

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 all Agreement activities conducted by the Recipient for the preceding month, including 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.
 - Provide a synopsis of the project progress, including accomplishments, problems, milestones, products, schedule, fiscal status, and any evidence of progress such as photographs.
 - Include copies of any federal agency correspondence that relates to the project's status. Examples of correspondence include reports, summaries, letters, or

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emails that discuss project performance and the results of project review meetings with the federal agency.

- In lieu of the monthly progress report and with the CAM's approval, submit one or more progress reports submitted to the awarding federal agency. The federal report(s) must contain information similar to that required in the Energy Commission monthly progress reports.
- Submit a monthly or quarterly *Invoice* that follows the instructions in the "Payment of Funds" section of the terms and conditions. In addition, each invoice must document and verify:
 - Energy Commission funds received by California-based entities; and
 - Energy Commission funds spent in California (*if applicable*).

Products:

- Progress Reports
- Invoices

Subtask 1.6 Final Report

The goal of this subtask is to prepare a Final Report that discusses the results of the project, including energy benefits to California ratepayers. The CAM will review and approve the Final Report, which will be due at least **two months** before the Agreement end date.

The Recipient shall:

- Prepare a *Final Report* that follows the Style Manual provided by the CAM and includes the following items, at a minimum:
 - **Cover Page**
 - **Summary of Project Purpose and Results**
 - **Discussion** that includes the following, at a minimum:
 - a. Project goals and the approach to meeting the goals
 - b. Activities performed
 - c. Project results, including:
 - Success of the project as measured by the degree to which goals and objectives were achieved;
 - How the project has resulted in the ratepayer benefits and technological advancements and breakthroughs identified in the solicitation proposal and Part II of the Scope of Work;
 - Projected cost reduction impact and other benefits resulting from the project, including how the project has supported California's economic development in the near term and the number of jobs created or sustained;
 - How the project results will be used by California industry, markets and others
 - d. The project budget, including:
 - The total project cost and the cost share of all funding partners;
 - How the Energy Commission funding was spent on the project, including any unique products and benefits
 - e. Observations, conclusions, and recommendations for further RD&D projects and improvements.
- If a *Final Federal Report* is required by the federal agency:

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- Submit a draft of the report to the CAM on the date the draft is due to the federal agency (subject to the federal agency's approval).
- Submit the approved final version of the report and *Written Confirmation of the Federal Agency's Approval of the Final Federal Report* (e.g., email or letter), upon receipt of the written confirmation.

CAM Product:

- Style Manual

Recipient Products:

- Final Report (draft and final)
- Federal Agency Report (draft and final)
- Written Confirmation of the Federal Agency's Approval of the Final Federal Report

PERMITS, AND SUBCONTRACTS

Subtask 1.7 Permits

The goal of this subtask is to obtain all permits required for work completed under this Agreement in advance of the date they are needed to keep the Agreement schedule on track. Permit costs and the expenses associated with obtaining permits are not reimbursable under this Agreement, with the exception of costs incurred by University of California recipients. Permits must be identified and obtained before the Recipient may incur any costs related to the use of the permit(s) for which the Recipient will request reimbursement.

The Recipient shall:

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

The list of permits and the schedule for obtaining them will be discussed at the Kick-off meeting (subtask 1.2), and a timetable for submitting the updated list, schedule, and copies of the permits will be developed. The impact on the project if the permits are not obtained in a timely fashion or are denied will also be discussed. If applicable, permits will be included as a line item in progress reports and will be a topic at CPR meetings.

- If during the course of the Agreement additional permits become necessary, then provide the CAM with an *Updated List of Permits* (including the appropriate information on each permit) and an *Updated Schedule for Acquiring Permits*.
- Send the CAM a *Copy of Each Approved Permit*.
- If during the course of the Agreement permits are not obtained on time or are denied, notify the CAM within 5 days. Either of these events may trigger a CPR meeting.

Products:

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

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- Copy of each Approved Permit (*if applicable*)

Subtask 1.8 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 1.9 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;

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- 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 1.10.
- 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 1.10 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)

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- 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: PROJECT PLANNING AND USE CASE DEVELOPMENT

The goals of this task are to: (1) establish the project team and governance framework; and (2) kick off the project and allocate tasks.

The Recipient shall:

- Establish the project team and management office addressing DOE reporting requirements (including documents that detail the *Project Charter and Governance Structure, Project Plan, Data Management Plan, Communication Plan* (, *Software Distribution Plan (including Intellectual Property), Interoperability Plan*) and project collaboration, and include a cybersecurity review (*Cybersecurity Plan* ()) to ensure the target solution meets Recipient’s and government standards. The *Project Charter and Governance Structure, Project Plan, Data Management Plan, Communication Plan, Software Distribution Plan (including Intellectual Property), Interoperability Plan, and Cybersecurity Plan* will be DOE funded.
- Prepare a *Distribution Control Architecture (DCA) Framework* to describe the specific and detailed work efforts that go into achieving the higher-level tasks such as the DCA, DER interface descriptions and DER Lifecycle Management. The *DCA Framework* will be DOE funded.
- Prepare a *Scalability Strategy* document to describe how the DCA would achieve scalability across the service territory through high-level coordination with the Utility’s centralized control system. The *Scalability Strategy* will be DOE funded.
- Develop *Draft Use Cases* document for: DER Registration Portal; DER Self-Provisioning; Real-Time Constraint Management to Enhance Hosting Capacity; Distribution Substation Net Load Management; Distribution Voltage Management; Provision of Services (3rd party to ISO, 3rd party to IOU; and 3rd party to 3rd party if feasible); and Co-optimizing DER Capabilities and Services. The *Draft Use Cases* document will be CEC and DOE funded.
- Draft the *Draft Market Transformation Plan* describing how, when and where the technology demonstrated will be made available to the broader market.
- Publish the developed use cases to obtain industry comments. The *Draft Market Transformation Plan* will be CEC and DOE funded.
- Define and manage intellectual property issues and include in the Data Management Plan.

Products:

- Project Charter and Governance Structure (DOE funded)

EXHIBIT A

Scope of Work

- Project Plan (DOE funded)
- Data Management Plan (DOE funded)
- Communication Plan (DOE funded)
- Software Distribution Plan (including Intellectual Property) (DOE funded)
- Interoperability Plan (DOE funded)
- Cybersecurity Plan (DOE funded)
- DCA Framework (DOE funded)
- Scalability Strategy (DOE funded)
- Draft Use Cases (CEC + DOE funded)
- Draft Market Transformation Plan (CEC + DOE funded)

TASK 3: DISTRIBUTED ENERGY RESOURCES INTERCONNECTION PROCESS STREAMLINING

The goals of this task are to: (1) define the process for DER interconnection streamlining, and (2) assess its impact on Recipient's current business processes and activities.

The Recipient shall:

- Establish the DER Data Registration System, which is a DER Registration Portal to capture the attributes related to the DER interconnection application for back-end and operational systems necessary to identify and automate the provisioning process. This portal will assist DER developers/customers to simplify the interconnection application and automate the information exchange between Utility and local jurisdictions to streamline the DER interconnection process.
- Create *DER Registration Portal Technical Documentation* that describes how the DER Data Registration System is operated and used. This technical documentation will define the process for DER interconnection streamlining and include an assessment of the DER Data Registration System's impact on the Recipients current business processes and activities.

Products:

- DER Registration Portal Technical Documentation

TASK 4: DISTRIBUTED CONTROL ARCHITECTURE INTEROPERABILITY TESTING

The goal of this task is to bring together the components of the DCA system to demonstrate interoperability through end-to-end testing.

The Recipient shall:

- Create the end-to-end data exchange between the DCA, the aggregator systems (using Smart Energy Profile 2.0/IEEE 2030.5⁴ and/or Open Auto Demand Response), and end DER device.
- Create the end-to-end data exchange between the DCA and field-installed DER, identifying limitations to meet the use cases, in particular the self-provisioning functionality.

⁴ Smart Energy Profile 2.0/IEEE 2030.5 is a standard, interoperable communications protocol for connecting smart energy devices and services to the grid.

EXHIBIT A

Scope of Work

- Prepare an *Interoperability Test Plan* to document a set of tests that cross reference interoperability requirements for each of the nodes and DCA sub-systems.
- Demonstrate, in accordance to the Interoperability Test Plan, end-to-end interoperability among all of the partner systems using at least two protocols with two different types of DER utilizing the DCA in control lab environment. Results from these interoperability tests will be included in the *Interoperability Test Report*.

Products:

- Interoperability Test Plan
- Interoperability Test Report

TASK 5: SELF-PROVISIONING OF PHOTOVOLTAIC AND DISTRIBUTED ENERGY RESOURCE ASSETS

The goal of this task is to have the DCA utilize a unique identifier to recognize each aggregator or directly controlled DER device and use the messaging Industrial Internet of Things platform search for the new device.

The Recipient shall:

- Prepare *Self-provisioning and Automated Commissioning Test Plan* to define the steps in the self-provisioning process that need to be achieved for successful demonstration of the self-provisioning functionality, with reference to requirements.
- Implement the self-provisioning functionality, meaning that the aggregator or directly controlled DER asset will be “seen” by the DCA and automatically recognized by the DCA (e.g. data connectivity, data exchange, and controllability).
- Design and implement the process by which the self-provisioned DER asset can be automatically associated with an existing control application and tested to ensure that end-to-end control has been achieved.
- In accordance with the Self-provisioning and Automated Commissioning Test Plan, demonstrate the self-provisioning functionality and automated commissioning functionality of the DCA. Test results will be included in *Self-provisioning and Automated Commissioning Test Report*.
- Prepare a *CPR Report #1* in accordance with subtask 1.3 (CPR Meetings).
- Participate in a CPR meeting.

Products:

- Self-provisioning and Automated Commissioning Test Plan
- Self-provisioning and Automated Commissioning Test Report
- CPR Report #1

TASK 6: ADVANCED DISTRIBUTION CONTROLS FOR HIGH-PENETRATION PHOTOVOLTAIC TO INCREASE HOSTING CAPACITY – HARDWARE-IN-THE-LOOP TESTING

The goal of this task is to demonstrate the use of the self-provisioned DER asset into a DCA testing environment to increase hosting capacity within a substation area.

EXHIBIT A

Scope of Work

The Recipient shall:

- Set up the hardware-in-the-loop (HIL) test environment to replicate the target live environment.
- Prepare *Real-time Constraint Management Test Plan* to define the steps in real-time constraint management that need to be achieved for successful demonstration of this functionality.
- Integrate the self-provisioned DER asset into a real-time constraint management control system to demonstrate hosting capacity beyond conventional limits as a HIL simulation.
- Test the process for self-provisioning and integrating DER assets into control systems to prove the solution is scalable. Results from this test will be included in *Real-time Constraint Management Test Report*.

Products:

- Real-time Constraint Management Test Plan
- Real-time Constraint Management Test Report

TASK 7: DISTRIBUTED ENERGY RESOURCE SERVICES IN SUPPORT OF HIGH-PENETRATION PHOTOVOLTAIC SCENARIOS – REFINE COMMERCIAL CONSIDERATIONS AND TESTING

The goals of this task are to: 1) refine the Use Cases previously defined based on any changes within California; 2) define the technical requirements for the DER to provide energy services, identify the required data exchange amongst the parties, develop the baseline benefit assumptions of the energy services; and 3) demonstrate the energy services and perform field verification of energy services performance.

The Recipient shall:

- Prepare Services Commercial Model and a document of *Final Use Cases* to distinguish the CAISO services that will be provided by the self-provisioned DER from the additional services that may be available to the distribution grid and determine the implications and technical requirements to implement.
- Develop *Services Commercial Model Overview Document* that describes the model, including but not limited to:
 - List of input/output variables and their respective definitions
 - Example graphs produced by the model
 - Model assumptions
 - Any other relevant, non-sensitive information
- Prepare a *DER Service Provision HIL Test Plan* to define the steps in DER service provision HIL testing that needs to be achieved for successful demonstration of this functionality.
- Demonstrate the defined CAISO services in concert with the dynamic hosting control system already implemented, in accordance with the DER Service Provision HIL Test Plan. Results from this test will be provided in the *DER Service Provision HIL Test Report*.

Products:

- Services Commercial Model Overview Document
- Final Use Cases

EXHIBIT A

Scope of Work

- DER Service Provision HIL Test Plan
- DER Service Provision HIL Test Report

TASK 8: EXPANDED FIELD TRIAL – DEFINITION AND COMMISSIONING

The goals of this task are to: (1) implement the DCA as an expanded field trial for a substation with existing moderate to high PV penetration levels; and (2) demonstrate the self-provisioning in the field of new DER assets into the DCA and control systems.

The Recipient shall:

- Host controls software at the selected substation and create communication paths to DER assets required by the DCA to run the pilot.
- Prepare *Field Pilot Site Acceptance Test Specifications* to define the test procedure steps that output results to be compared with the expected communication performance and DCA functionality, as specified in Task 4.
- Demonstrate the full process of self-provisioning DER assets and integrating them to the control system algorithms for dynamic hosting and CAISO services.
- Refine the *Draft Market Transformation Plan* based on real project learnings, describing how, when and where the technology demonstrated through this project will be made available to the broader market.
- Present the project learnings at power industry conferences and industry advisory groups.
- Prepare a *CPR Report #2* in accordance with subtask 1.3 (CPR Meetings).
- Participate in a CPR meeting.

Products:

- Field Pilot Site Acceptance Test Specifications
- Draft Market Transformation Plan
- CPR Report #2

TASK 9: INTEGRATION OF DISTRIBUTED CONTROL FRAMEWORK WITH ADVANCED DISTRIBUTION MANAGEMENT SYSTEM APPLICATIONS

The goals of this task are to (1) integrate the DCA with Advanced Distribution Management System (ADMS) applications in order to coordinate with the capability provided by these tools; and (2) provide control room operators with the ability to visualize and interact with the self-provisioned DER.

The Recipient shall:

- Prepare *DCA Integration HIL Test Plan* to define the steps in DCA integration HIL testing that needs to be achieved for successful demonstration of this functionality, including operational limits defined in the control schema for the test circuit.
- Define and implement two use cases where the DCA can best benefit from utility back-office analysis including:
 - Reconfiguring to network topology changes (update DER-constraint associations following a manual or automated topology shift)
 - Operational flexibility (use threshold changes to throttle back DER generation in preparation for manual operations).

EXHIBIT A

Scope of Work

- Configure the ADMS or other Integrated Grid Project operator tools to visualize the operation of the DCA and allow operators to manually intervene by creating/specifying DER groups to participate in control applications.
- Perform DCA integration HIL testing in accordance with the DCA Integration HIL Test Plan. Results will be included in the *DCA Integration HIL Test Report*.

Products:

- DCA Integration HIL Test Plan
- DCA integration HIL Test Report

TASK 10: FIELD TRIAL MEASUREMENT AND VERIFICATION

The goal of this task is to commission and operate the DCA with additional DER connecting over 12 months to gather sufficient data through the seasons to verify the 100% feeder peak and 50% distribution system peak.

The Recipient shall:

- Commission the DCA at the field demonstration site.
- Develop *M&V Plan and Success Metrics* to define the data measurement requirements, verification steps, and metrics to define successful operation of the DCA framework, including results from DCA Integration HIL testing.
- Review the operational system at the half-year stage; if necessary, update the configuration to maximize the benefit and learning from the field trial.
- Conduct a full assessment of the DCA performance based on the M&V data and analysis, and produce the benefits accrued and extrapolated.
- Prepare a *Field Testing Report* to describe field testing results and system performance against objectives.

Products:

- M&V Plan and Success Metrics
- Field Testing Report

TASK 11: PROJECT LEARNINGS AND COMMERCIALIZATION PLAN

The goals of this task are to: (1) compile project learnings; and (2) complete the commercialization plan.

The Recipient shall:

- Prepare a *Project Learnings Analysis Report* to document learnings from the project stages to share with the wider community through published documents, working groups and industry events.
- Prepare a *Final Market Transformation Plan* based on real project learnings, describe how, when and where the technology demonstrated through this project will be made available to the broader market.
- Present the project learnings at power industry conferences and industry advisory groups.
- Prepare a *CPR Report #3* in accordance with subtask 1.3 (CPR Meetings).
- Participate in a CPR meeting.

EXHIBIT A Scope of Work

Products:

- Project Learnings Analysis Report
- Final Market Transformation Plan
- CPR Report #3

TASK 12: 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:
 - 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.

EXHIBIT A

Scope of Work

- 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

V. PROJECT SCHEDULE

Please see the attached Excel spreadsheet.

STATE OF CALIFORNIA

STATE ENERGY RESOURCES
CONSERVATION AND DEVELOPMENT COMMISSION

RESOLUTION - RE: SOUTHERN CALIFORNIA EDISON

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-17-024 with Southern California Edison (SCE) for a \$2,000,000 grant to support the development of an Industrial Internet of Things approach that can autonomously identify and authenticate distributed energy resources (DER) for streamlining integration to the utility control system and access to energy markets. The project will also develop a realtime constraint management control system to increase hosting capacity for DER. SCE will incorporate these findings into grid planning and operations to demonstrate reduced customer interconnection time for DER. The U.S. Department of Energy will be providing \$4,188,000 in cost share funding for this project; 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 January 17, 2018.

AYE: [List of Commissioners]

NAY: [List of Commissioners]

ABSENT: [List of Commissioners]

ABSTAIN: [List of Commissioners]

Cody Goldthrite,
Secretariat