

**GRANT REQUEST FORM (GRF)**

CEC-270 (Revised 10/2015)

CALIFORNIA ENERGY COMMISSION

New Agreement EPC-15-086 (To be completed by CGL Office)

Division	Agreement Manager:	MS-	Phone
ERDD	David Chambers	43	916-327-2356

Recipient's Legal Name	Federal ID Number
The Regents of the University of California, on behalf of the Irvine campus	95-2226406

Title of Project
Substation Automation and Optimization of Distribution Circuit Operations

Term and Amount	Start Date	End Date	Amount
	6/22/2016	3/29/2019	\$ 932,718

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

Proposed Business Meeting Date	6/14/2016	<input type="checkbox"/> Consent	<input checked="" type="checkbox"/> Discussion
Business Meeting Presenter	Consuelo Sichon	Time Needed:	5 minutes

Please select one list serve. Select

**Agenda Item Subject and Description**

UNIVERSITY OF CALIFORNIA, IRVINE. Proposed resolution approving Agreement EPC-15-086 with the Regents of the University of California, on behalf of the Irvine campus for a \$932,718 grant to design enhanced substation controls to manage distributed energy assets as a single unit. A controller for utility substations will be developed that optimizes the dispatch and use of distributed energy resources and investigates the ability of these resources to participate in electricity markets.

**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, § 15306  
 Common Sense Exemption. 14 CCR 15061 (b) (3)  
 Explain reason why Agreement is exempt under the above section:

14 CCR Section 15306 Information Collection Exemption: This categorical exemption applies to basic data collection, research, experimental management, and resource evaluation activities which do not result in a serious or major disturbance to an environmental resource. These may be strictly for information gathering purposes, or as part of a study leading to an action which a public agency has not yet approved, adopted, or funded. This project aims to implement a generic microgrid controller at a Southern California Edison Substation. Different tariffs and interconnections would be assessed for a portfolio of scenarios to address the participation of distributed energy resources into the energy market, and a fictitious retail/distribution market would be developed and assessed. No physical changes to the environment will be made. Therefore, the project falls within section 15306 and will not have a significant effect on the environment.

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

Check all that apply

- |   |   |
|---|---|
| <input type="checkbox"/> Initial Study                  | <input type="checkbox"/> Environmental Impact Report            |
| <input type="checkbox"/> Negative Declaration           | <input type="checkbox"/> Statement of Overriding Considerations |
| <input type="checkbox"/> Mitigated Negative Declaration |   |

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

Legal Company Name:	Budget
OPAL-RT Corporation	\$ 103,608
Power Innovation Consultants LLC	\$ 95,000

**GRANT REQUEST FORM (GRF)**



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

Legal Company Name:  
N/A

Budget Information			
Funding Source	Funding Year of Appropriation	Budget List No.	Amount
EPIC	14-15	301.001B	\$932,718
			\$
R&D Program Area: ESRO: ETSI		TOTAL:	\$932,718
Explanation for "Other" selection			
Reimbursement Contract #:		Federal Agreement #:	

Recipient's Administrator/ Officer				Recipient's Project Manager			
Name:	Jeff Warner			Name:	G. Scott Samuelsen		
Address:	5171 California Ave Ste 150 University of California, Irvine			Address:	5171 California Ave Ste 150 University of California, Irvine		
City, State, Zip:	Irvine, CA 92697-3067			City, State, Zip:	Irvine, CA 92697-3550		
Phone:	949-824-3171 /	Fax:	- -	Phone:	949-824-5468 /	Fax:	- -
E-Mail:	warnerj@uci.edu			E-Mail:	gss@uci.edu		

**Selection Process Used**

Competitive Solicitation      Solicitation #: GFO-15-313

First Come First Served Solicitation

**The following items should be attached to this GRF**

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

\_\_\_\_\_  
 Agreement Manager      Date      Office Manager      Date      Deputy Director      Date

## EXHIBIT A Scope of Work

### I. TASK AND ACRONYM/TERM LISTS

#### A. Task List

Task #	CPR <sup>1</sup>	Task Name
1		GENERAL PROJECT TASKS
2	X	BASE MODEL DEVELOPMENT
3		SCENARIO DEVELOPMENT
4		CONTROLLER DEVELOPMENT
5		RETAIL/DISTRIBUTION MARKET
6		EVALUATION OF PROJECT BENEFITS
7		TECHNOLOGY/KNOWLEDGE TRANSFER ACTIVITIES

#### B. Acronym/Term List

Acronym/Term	Meaning
CAM	Commission Agreement Manager
CAO	Commission Agreement Officer
CPR	Critical Project Review
DER	Distributed Energy Resources
Energy Commission	California Energy Commission
GMC	Generic Microgrid Controller
TAC	Technical Advisory Committee

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

#### A. Purpose of Agreement

The purpose of this Agreement is to fund a project designed to enhance substation control over grid assets (including generating resources, energy storage and controllable loads) and improve the grid management at the distribution level through the modification, implementation, and simulation of a Generic Microgrid Controller at a substation.

---

<sup>1</sup> Indicate an "X" in CPR column corresponding to the Task in which the CPR Meeting will occur. Please see Subtask 1.3 in Part III of the Scope of Work (General Project Tasks) for a description of Critical Project Review (CPR) Meetings.

# EXHIBIT A

## Scope of Work

### B. Problem/Solution Statement

#### Problem

To meet California's energy and environmental goals, it is necessary to increase the penetration of distributed energy resources including both renewable and other energy resources. These resources are today controlled and operated individually and, as a result, may in the future fail to achieve their full potential and, even worse, create problems in the distribution system. This portends a need and opportunity to control and dispatch these resources, and operate them as a single controllable entity. This also portends the opportunity for distributed energy resources to participate into wholesale markets. To provide the management and control needed to achieve these capabilities, detailed modeling and simulation of the dynamics of the system at the distribution level is required.

#### Solution

The solution is to simulate enhanced control capabilities at the substation to improve the efficiency, reliability, and resiliency of the grid at the distribution level. The Recipient will use substation data to simulate a Generic Microgrid Controller (GMC) to optimize the operation of the assets available in the circuits served by that substation.

The project includes an assessment of different tariffs and interconnection agreements for a portfolio of scenarios to address the participation of distributed energy resources into the market, and the development and assessment of a fictitious retail/distribution market.

### C. Goals and Objectives of the Agreement

#### Agreement Goals

The goal of this Agreement is to establish the substation control capabilities necessary to manage distributed energy assets as a single unit in the context of high penetration of renewable generation and the emergence of electricity markets.

Ratepayer Benefits:<sup>2</sup> This Agreement will result in the ratepayer benefits of greater electricity reliability, lower costs, and increased safety. For reliability, the use of a controller at the substation provides visibility to the grid operators and thus they can better take advantage of the potential of distributed energy resources (DERs) to be realized, and the reliability and resiliency of the circuits to be sustained. The GMC is also capable of managing dispatchable loads and dispatchable generation and thus can reduce the stress on the grid by shedding unnecessary loads and dispatching generation as required. The GMC itself takes into account the reliability of the system when dispatching the assets.

The controller also helps lower the costs by optimally dispatching and utilizing available assets so they will neither be stranded nor under-utilized. Furthermore, only

---

<sup>2</sup> 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](http://docs.cpuc.ca.gov/PublishedDocs/WORD_PDF/FINAL_DECISION/167664.PDF)).

## EXHIBIT A Scope of Work

assets will be added that benefit the system. The GMC also includes an economic dispatch feature that determines the least expensive solution to serve all the loads.

Increased safety is achieved by communicating with all assets and the grid to identify and address safety issues with minimal interruptions.

Technological Advancement and Breakthroughs:<sup>3</sup> This Agreement will lead to technological advancement and breakthroughs to overcome barriers to the achievement of the State of California's statutory energy goals by developing a controller design to manage increasing penetrations of distributed energy resources including renewable energy resources and energy storage - contributing to the state of California's multiple energy goals. The project also helps the integration and management of smart grid technologies in the distribution system which has been shown to reduce criteria pollutant and GHG emissions if used.

### **Agreement Objectives**

The objectives of this Agreement are to:

- Maximize the penetration of renewable resources and distributed energy resources.
- Develop and assess viability of a retail electricity market.
- Develop strategies for a better distribution system management and use of smart grid technologies.
- Simulate and assess the deployment of fuel cells at the substation.

### **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.

---

<sup>3</sup> 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**

- Consider incorporating all CAM comments into the final Product. If the Recipient disagrees with any comment, provide a written response explaining why the comment was not incorporated into the final Product.
- Submit the revised Product and responses to comments within 10 days of notice by the CAM, unless the CAM specifies a longer time period or approves a request for additional time.

#### For Products that require a final version only

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

#### For all Products

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

#### Instructions for Submitting Electronic Files and Developing Software:

##### **Electronic File Format**

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

The following describes the accepted formats for electronic data and documents provided to the Energy Commission as Products under this Agreement, and establishes the software versions that will be required to review and approve all software products:

- Data sets will be in MS Access or MS Excel file format (version 2007 or later), or any other format approved by the CAM.
- Text documents will be in MS Word file format, version 2007 or later.
- Documents intended for public distribution will be in PDF file format. The Recipient must also provide the native Microsoft file format.
- Project management documents will be in Microsoft Project file format, version 2007 or later.

##### **Software Application Development**

Use the following standard Application Architecture components in compatible versions for any software application development required by this Agreement (e.g., databases, models, modeling tools), unless the CAM approves other software applications such as open source programs:

- Microsoft ASP.NET framework (version 3.5 and up). Recommend 4.0.
- Microsoft Internet Information Services (IIS), (version 6 and up). Recommend 7.5.
- Visual Studio.NET (version 2008 and up). Recommend 2010.
- C# Programming Language with Presentation (UI), Business Object and Data Layers.
- SQL (Structured Query Language).

## EXHIBIT A Scope of Work

- 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 Meeting(s) (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.

## **EXHIBIT A**

### **Scope of Work**

#### **The CAM shall:**

- Designate the date and location of the meeting.
- Send the Recipient a *Kick-Off Meeting Agenda*.

#### **Recipient Products:**

- Updated Project Schedule (if applicable)
- Updated List of Match Funds (if applicable)
- Updated List of Permits (if applicable)

#### **CAM Product:**

- Kick-off Meeting Agenda

#### **Subtask 1.3 Critical Project Review (CPR) Meetings**

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

CPR Meetings generally take place at key, predetermined points in the Agreement, as determined by the CAM and as shown in the Task List on page 1 of this Exhibit. However, the CAM may schedule additional CPR meetings as necessary. The budget will be reallocated to cover the additional costs borne by the Recipient, but the overall Agreement amount will not increase. CPR meetings generally take place at the Energy Commission, but they may take place at another location, or may be conducted via electronic conferencing (e.g., WebEx) as determined by the CAM.

#### **The Recipient shall:**

- Prepare a *CPR Report* for each CPR Meeting that: (1) discusses the progress of the Agreement toward achieving its goals and objectives; and (2) includes recommendations and conclusions regarding continued work on the project.
- Submit the CPR Report along with any other *Task Products* that correspond to the technical task for which the CPR meeting is required (i.e., if a CPR meeting is required for Task 2, submit the Task 2 Products along with the CPR Report).
- Attend the CPR Meeting.
- Present the CPR Report and any other required information at each CPR Meeting.

#### **The CAM shall:**

- Determine the location, date, and time of each CPR meeting with the Recipient's input.

## **EXHIBIT A**

### **Scope of Work**

- Send the Recipient a *CPR Agenda* and a *List of Expected CPR Participants* in advance of the CPR meeting. If applicable, the agenda will include a discussion of match funding and permits.
- Conduct and make a record of each CPR meeting. Provide the Recipient with a *Schedule for Providing a Progress Determination* on continuation of the project.
- Determine whether to continue the project, and if so whether modifications are needed to the tasks, schedule, Products, or budget for the remainder of the Agreement. If the CAM concludes that satisfactory progress is not being made, this conclusion will be referred to the Deputy Director of the Energy Research and Development Division.
- Provide the Recipient with a *Progress Determination* on continuation of the project, in accordance with the schedule. The Progress Determination may include a requirement that the Recipient revise one or more Products.

#### **Recipient Products:**

- CPR Report(s)
- Task Products (draft and/or final as specified in the task)

#### **CAM Products:**

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

#### **Subtask 1.4 Final Meeting**

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

#### **The Recipient shall:**

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

The technical and administrative aspects of Agreement closeout will be discussed at the meeting, which may be divided into two separate meetings at the CAM's discretion.

- The technical portion of the meeting will involve the presentation of findings, conclusions, and recommended next steps (if any) for the Agreement. The CAM will determine the appropriate meeting participants.
- The administrative portion of the meeting will involve a discussion with the CAM and the CAO of the following Agreement closeout items:
  - Disposition of any state-owned equipment.
  - Need to file a Uniform Commercial Code Financing Statement (Form UCC-1) regarding the Energy Commission's interest in patented technology.

## EXHIBIT A Scope of Work

- 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.

### Recipient 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.
- Submit a monthly or quarterly *Invoice* that follows the instructions in the "Payment of Funds" section of the terms and conditions, including a financial report on match fund and in-state expenditures.

#### Products:

- Progress Reports
- Invoices

### Subtask 1.6 Final Report

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

## **EXHIBIT A**

### **Scope of Work**

Agreement. The CAM will review and approve 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 a 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 *Subtask 1.1 for draft and final Product requirements.*)

##### **Recipient Products:**

- Final Report Outline (draft and final)

##### **CAM Products:**

- Style Manual
- Written 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 page 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 applicable)
    - Executive Summary (**required**)
    - Body of the report (**required**)
    - References (if applicable)
    - Glossary/Acronyms (If more than 10 acronyms or abbreviations are used, it is required.)
    - Bibliography (if applicable)
    - Appendices (if applicable) (Create a separate volume if very large.)
    - Attachments (if applicable)
  - Ensure that the document is written in the third person.
  - Ensure that the Executive Summary is understandable to the lay public.
    - Briefly summarize the completed work. Succinctly describe the project results and whether or not the project goals were accomplished.

## EXHIBIT A Scope of Work

- 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, recommendation in the conclusion of the report are allowed.
  - Include a brief description of the project results in the Abstract.
- Submit a draft of the report to the CAM for review and comment. The CAM will provide written comments to the Recipient on the draft Product within 15 days of receipt.
  - Consider incorporating all CAM comments into the Final Report. If the Recipient disagrees with any comment, provide a written response explaining why the comment was not incorporated into the final Product.
  - Submit the revised Final Report and responses to comments within 10 days of notice by the CAM, unless the CAM specifies a longer time period or approves a request for additional time.
  - Submit one bound copy of the *Final Report* to the CAM along with *Written Responses to Comments on the Draft Final Report*.

### **Products:**

- Final Report (draft and final)
- Written Responses to Comments on the Draft Final Report

### **CAM Product:**

- Written Comments on the Draft Final Report

## **MATCH FUNDS, PERMITS, AND SUBCONTRACTS**

### **Subtask 1.7 Match Funds**

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

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

### **The Recipient shall:**

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

## EXHIBIT A Scope of Work

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 upon 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:

## **EXHIBIT A**

### **Scope of Work**

- 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 five 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)

## EXHIBIT A Scope of Work

### **TECHNICAL ADVISORY COMMITTEE**

#### **Subtask 1.10 Technical Advisory Committee (TAC)**

The goal of this subtask is to create an advisory committee for this Agreement. The TAC should be composed of diverse professionals. The composition will vary depending on interest, availability, and need. TAC members will serve at the CAM's discretion. The purpose of the TAC is to:

- Provide guidance in project direction. The guidance may include scope and methodologies, timing, and coordination with other projects. The guidance may be based on:
  - Technical area expertise;
  - Knowledge of market applications; or
  - Linkages between the agreement work and other past, present, or future projects (both public and private sectors) that TAC members are aware of in a particular area.
- Review products and provide recommendations for needed product adjustments, refinements, or enhancements.
- Evaluate the tangible benefits of the project to the state of California, and provide recommendations as needed to enhance the benefits.
- Provide recommendations regarding information dissemination, market pathways, or commercialization strategies relevant to the project Products.

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

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

## **EXHIBIT A**

### **Scope of Work**

- Recruit TAC members. Ensure that each individual understands member obligations and the TAC meeting schedule developed in Subtask 1.11.
- Prepare a List of TAC Members once all TAC members have committed to serving on the TAC.
- Submit Documentation of TAC Member *Commitment* (such as Letters of Acceptance) from each TAC member.

#### **Products:**

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

#### **Subtask 1.11 TAC Meetings**

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

#### **The Recipient shall:**

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

#### **Products:**

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

## **IV. TECHNICAL TASKS**

### **TASK 2 BASE MODEL DEVELOPMENT**

The goal of this task is to model a substation and two circuits by using OPAL-RT<sup>®</sup> hardware and software.

#### **The Recipient shall:**

- Obtain OPAL-RT hardware and software licenses.
- Develop a model of a substation.

## **EXHIBIT A**

### **Scope of Work**

- Add two circuits served by the substation to the model.
- Prepare a *Base Model Report* that describes the following activities:
  - OPAL-RT hardware and software setup
  - Development and verification of the model (including the substation and circuits)

#### **Products:**

- Base Model Report

### **TASK 3 SCENARIO DEVELOPMENT**

The goal of this task is to develop a set of future viable scenarios to be assessed using the models and the GMC.

#### **The Recipient shall:**

- Assess various technologies to be added as DER to the circuits under study.
- Assess various smart grid technologies to further enhance controllability of the assets.
- Assess and develop demand response strategies to further optimize the operations.
- Assess and determine the maximum DER/renewable penetration that the circuits can handle.
- Assess the impacts of DER on the distribution circuits if the maximum penetration is surpassed.
- Devise a list of viable future scenarios to be further assessed using modeling.
- Prepare a *Scenario Development Report* that describes the following items:
  - The various technologies to be added as DER to the circuits under study.
  - The various smart grid technologies that further enhance controllability of the assets.
  - The demand response strategies to further optimize the operations.
  - The maximum DER/renewable penetration that the circuits can handle.
  - The impacts of DER on the distribution circuits if the maximum penetration is surpassed.
  - The viable future scenarios to be further assessed using modeling.

#### **Products:**

- Scenario Development Report

### **TASK 4 CONTROLLER DEVELOPMENT**

The goal of this task is to develop the controller from the GMC to be implemented and simulated at the substation.

#### **The Recipient shall:**

- Use the GMC specifications to define and select the controller requirements for development, implementation, and simulation.
- Implement the controller requirements on OPAL-RT software and hardware.

## **EXHIBIT A**

### **Scope of Work**

- Simulate and test the controller.
- Implement and assess the scenarios developed in Task 5 using the model and controller developed in OPAL-RT.
- Prepare a *Controller Development and Scenario Assessment Report* that describes the following items:
  - Controller requirements
  - Implementation of the controller in OPAL-RT.
  - Testing procedures for the controller and the test results
  - Analysis of the results from the scenario simulations

#### **Products:**

- Controller Development and Scenario Assessment Report

#### **TASK 5 RETAIL/DISTRIBUTION MARKET**

The goals of this task are to assess various tariffs and interconnection agreements, and to develop a fictitious retail/distribution electricity market.

#### **The Recipient shall:**

- Study the current tariffs and interconnection agreements for distributed energy resources.
- Develop and assess other possible tariffs which can help increase the penetration of distributed energy resources.
- Develop a fictitious retail/distribution electricity market corresponding to the areas under study.
- Assess the viability of a retail market in the state of California.
- Prepare a *Retail/Distribution Market Development Report* that describes the following items:
  - Analysis of current tariffs for distributed energy resources
  - Possible tariffs to increase the penetration of distributed energy resources
  - A viable retail/distribution electricity market

#### **Products:**

- Retail/Distribution Market Development Report

#### **TASK 6 EVALUATION OF PROJECT BENEFITS**

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

#### **The Recipient shall:**

- Complete three Project Benefits Questionnaires that correspond to three main intervals in the Agreement: (1) *Kick-Off Meeting Benefits Questionnaire*; (2) *Mid-Term Benefits Questionnaire*; and (3) *Final Meeting Benefits Questionnaire*.
- Provide all key assumptions used to estimate projected benefits, including targeted market sector (e.g., population and geographic location), projected market penetration, baseline and projected energy use and cost, operating conditions, and

## **EXHIBIT A**

### **Scope of Work**

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:
  - 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.

## **EXHIBIT A**

### **Scope of Work**

- The number of website downloads.
    - An estimate of how the project information has affected energy use and cost, or has resulted in other non-energy benefits.
  - An estimate of energy and non-energy benefits.
  - Data on potential job creation, market potential, economic development, and increased state revenue as a result of project.
  - A discussion of project product downloads from websites, and publications in technical journals.
  - A comparison of project expectations and performance. Discuss whether the goals and objectives of the Agreement have been met and what improvements are needed, if any.
- Respond to CAM questions regarding responses to the questionnaires.

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

#### **Products:**

- Kick-Off Meeting Benefits Questionnaire
- Mid-Term Benefits Questionnaire
- Final Meeting Benefits Questionnaire

#### **TASK 7 TECHNOLOGY/KNOWLEDGE TRANSFER ACTIVITIES**

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

#### **The Recipient shall:**

- Prepare an *Initial Fact Sheet* at start of the project that describes the project. Use the format provided by the CAM.
- Prepare a *Final Project Fact Sheet* at the project's conclusion that discusses results. Use the format provided by the CAM.
- Prepare a *Technology/Knowledge Transfer Plan* that includes:
  - An explanation of how the knowledge gained from the project will be made available to the public, including the targeted market sector and potential outreach to end users, utilities, regulatory agencies, and others.
    - A description of the intended use(s) for and users of the project results.
    - Published documents, including date, title, and periodical name.
    - Copies of documents, fact sheets, journal articles, press releases, and other documents prepared for public dissemination. These documents must include the Legal Notice required in the terms and conditions. Indicate where and when the documents were disseminated.
    - A discussion of policy development. State if project has been or will be cited in government policy publications, or used to inform regulatory bodies.

## **EXHIBIT A**

### **Scope of Work**

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

#### **Products:**

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

#### **V. PROJECT SCHEDULE**

Please see the attached Excel spreadsheet.

STATE OF CALIFORNIA

STATE ENERGY RESOURCES  
CONSERVATION AND DEVELOPMENT COMMISSION

RESOLUTION - RE: UNIVERSITY OF CALIFORNIA, IRVINE

**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-15-086 from GFO-15-313 with the Regents of the University of California, on behalf of the Irvine campus for a \$932,718 grant to design enhanced substation controls to manage distributed energy assets as a single unit. A controller for utility substations will be developed that optimizes the dispatch and use of distributed energy resources and investigates the ability of these resources to participate in electricity markets; 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 June 14, 2016.

AYE: [List of Commissioners]

NAY: [List of Commissioners]

ABSENT: [List of Commissioners]

ABSTAIN: [List of Commissioners]

---

Cody Goldthrite,  
Secretariat