

GRANT REQUEST FORM (GRF)

CEC-270 (Revised 10/2015)

CALIFORNIA ENERGY COMMISSION

New Agreement EPC-15-046 (To be completed by CGL Office)

Division	Agreement Manager:	MS-	Phone
ERDD	Consuelo Sichon	43	916-327-2222

Recipient's Legal Name	Federal ID Number
Siemens Corporation	13-2623356

Title of Project
Developing a Distribution Substation Management System

Term and Amount	Start Date	End Date	Amount
	5/24/2016	3/29/2019	\$ 500,000

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

Proposed Business Meeting Date	5/17/2016	<input type="checkbox"/> Consent	<input checked="" type="checkbox"/> Discussion
Business Meeting Presenter	Consuelo Sichon	Time Needed:	5 minutes

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

Agenda Item Subject and Description

SIEMENS CORPORATION. Proposed resolution approving agreement EPC-15-046 with Siemens Corporation for a \$500,000 grant to develop an operational dashboard for electrical distribution substations. This dashboard display would show the current grid state, display warnings for detected problems, and automatically suggest potential solutions to reduce the duration of power outages. The Recipient is providing \$455,000 in match funds.

California Environmental Quality Act (CEQA) Compliance

1. Is Agreement considered a "Project" under CEQA?
 Yes (skip to question 2) No (complete the following (PRC 21065 and 14 CCR 15378)):
 Explain why Agreement is not considered a "Project":
 Agreement will not cause direct physical change in the environment or a reasonably foreseeable indirect physical change in the environment because the proposed activities involve paper studies and laboratory research to design and implement software.
2. If Agreement is considered a "Project" under CEQA:
 a) Agreement **IS** exempt. (Attach draft NOE)
 Statutory Exemption. List PRC and/or CCR section number: _____
 Categorical Exemption. List CCR section number: _____
 Common Sense Exemption. 14 CCR 15061 (b) (3)
 Explain reason why Agreement is exempt under the above section:
- b) Agreement **IS NOT** exempt. (Consult with the legal office to determine next steps.)
 Check all that apply
 Initial Study Environmental Impact Report
 Negative Declaration Statement of Overriding Considerations
 Mitigated Negative Declaration

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

Legal Company Name:	Budget
N/A	\$

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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	\$500,000
			\$
R&D Program Area: ESRO: ETSI		TOTAL:	\$500,000
Explanation for "Other" selection			
Reimbursement Contract #:		Federal Agreement #:	

Recipient's Administrator/ Officer				Recipient's Project Manager			
Name:	Samuel Roods			Name:	Simon Mayer		
Address:	755 College Rd E			Address:	2087 Addison St		
City, State, Zip:	Princeton, NJ 08540-6632			City, State, Zip:	Berkeley, CA 94704-1268		
Phone:	609-734-3575 /	Fax:	- -	Phone:	510-316-2923 /	Fax:	- -
E-Mail:	samuel.roods@siemens.com			E-Mail:	simonmayer@siemens.com		

Selection Process Used	
<input checked="" type="checkbox"/> Competitive Solicitation	Solicitation #: GFO-15-313
<input type="checkbox"/> First Come First Served Solicitation	

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

Agreement Manager_____
Date_____
Office Manager_____
Date_____
Deputy Director_____
Date

EXHIBIT A Scope of Work

I. TASK AND ACRONYM/TERM LISTS

A. Task List

Task #	CPR ¹	Task Name
1		GENERAL PROJECT TASKS
2		EVALUATION OF PROJECT BENEFITS
3		TECHNOLOGY/KNOWLEDGE TRANSFER ACTIVITIES
4		EXTENSION OF THE SEMANTIC MODEL TO INTEGRATE OPERATIONAL SMART GRID DATA
5		SEMI-AUTOMATIC CLASSIFICATION OF DATA STREAMS
6	X	SELF-CONFIGURATION OF FSSN APPS
7		SEMANTICALLY INTEGRATED OPERATIONAL DASHBOARD
8	X	AUTOMATIC DEPLOYMENT OF APPS ACROSS FSSNS
9		EXTENSION OF THE OPERATIONAL DASHBOARD WITH GLOBAL MANAGEMENT CAPABILITIES

B. Acronym/Term List

Acronym/Term	Meaning
Apps	Applications for a small, specialized program downloaded onto a mobile device
CAM	Commission Agreement Manager
CAO	Commission Agreement Officer
CPR	Critical Project Review

¹ Indicate an "X" in the 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

Acronym/Term	Meaning
Energy Commission	California Energy Commission
FSSN	Future Secondary Substation. FSSNs represent the next generation of electrical distribution substations that transfer power from the transmission system to the distribution system of an area. FSSNs communicate with each other and with smart electricity meters to perform their functions.
Semantically integrated	This term refers to a piece of software whose functionality, rather than being hard-coded, is largely outsourced to a knowledge model. Semantic technologies are regarded as a means of integrating information technology systems across domains and application areas. Semantic integration would enable FSSNs to operate more effectively, resulting in more efficient grid management.
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 the development of a semantically integrated operational dashboard display for smart grid distribution substations that visualizes the current grid state, displays warnings for detected problems, and automatically suggests potential solutions.

B. Problem/Solution Statement

Problem

Necessitated by the increasing complexity of distribution networks, the distributed automatic monitoring and control of electrical substations constitutes one main element of the emerging smart grid. Existing controls use standardized communication protocols to connect substations to supervisory control centers where engineers continuously monitor the grid state and intervene if necessary. Interventions are mostly carried out manually after time-consuming examination of the problem at hand, which is costly and comparatively slow. In this project, the Recipient aims to achieve a greater degree of operational automation of distribution substations that enables the automatic resolution of many problems that often lead to grid faults such as outages.

To achieve the desired level of automation, it is necessary to semantically integrate the monitoring and control of grid substations. This means that distributed applications that run on substations share a common semantic model with management applications running in control centers. Such a model would contain information about the different functions performed by grid nodes, properties of the electric grid, and common grid problems. Using this information, the model would allow a computer program to automatically relate an occurring problem to its most reliable solution and execute that

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solution, thereby resolving the problem without manual intervention. Recent advances in semantic technologies and web technologies have only recently enabled the creation and efficient usage of such knowledge models in distributed systems. Furthermore, the generation of such models represents a large upfront investment and many industrial companies are not yet ready to develop software systems this advanced in nature.

Solution

In this project, the Recipient will create a semantically integrated operational dashboard display for electrical substations. This dashboard will allow operators to use an intuitive and real-time visualization of the current grid state and potential grid problems, and will permit further automation of routine and non-routine engineering and maintenance tasks performed on substations. By semantically integrating FSSNs, grid substations will achieve a common understanding of smart grid data streams, issues, and potential solutions, thereby making the increasingly complex smart grid more accessible for operators and semantically linking grid problems to potential solutions (e.g., particular configurations of grid nodes), this project will permit faster resolution of outages while requiring fewer manual interventions, thereby making the grid more maintainable and resilient, and optimizing asset utilization.

C. Goals and Objectives of the Agreement

Agreement Goals

The goal of this Agreement is to demonstrate that it is possible to achieve an unprecedented level of automation of the control of a smart grid by creating a knowledge model that is shared between algorithms on grid substations and control centers.

Ratepayer Benefits:² This Agreement will result in the ratepayer benefits of greater electricity reliability and lower costs by enabling a greater degree of grid automation.

Greater electricity reliability is achieved by allowing utilities to improve their operations including better outage management and reduced electrical losses through faster control decisions, better asset utilization through a reduction in manual effort for grid operation, and improved grid monitoring capabilities that enable better planning. These benefits will directly affect private, commercial, and industrial consumers who will profit from more reliable services and reduced business losses through improved grid resiliency as well as potential bill savings through a higher degree of automation and thus lower cost for grid operation.

Technological Advancement and Breakthroughs:³ This Agreement will lead to technological advancement and breakthroughs to overcome barriers to the achievement

² California Public Resources Code, Section 25711.5(a) requires projects funded by the Electric Program Investment Charge (EPIC) to result in ratepayer benefits. The California Public Utilities Commission, which established the EPIC in 2011, defines ratepayer benefits as greater reliability, lower costs, and increased safety (See CPUC "Phase 2" Decision 12-05-037 at page 19, May 24, 2012, http://docs.cpuc.ca.gov/PublishedDocs/WORD_PDF/FINAL_DECISION/167664.PDF).

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of California's statutory energy goals by demonstrating the potential of semantic technologies for increasing electrical grid automation. Increased grid automation will permit control interventions to happen much faster than possible with a manual approach, and directly translates into increased resilience of the distribution grid. The ability to act rapidly if problems occur in the distribution grid is one of the cornerstones that permit increasing the total share of distributed renewable energy sources without sacrificing grid stability. Ultimately, highly automated and efficient grid operation is required to achieve California's energy goals, in particular with respect to the Clean Energy and Pollution Reduction Act of 2015 (Senate Bill 350) that strives to reach 50 percent renewable energy resources and to further increase the number of vehicles that drive on clean electricity rather than gasoline.

Agreement Objectives

The objectives of this Agreement are to:

- Develop a semantic model in the form of a machine-readable document that integrates operational smart grid data and management data.
- Demonstrate the value of the developed semantic model within an operational management interface that facilitates the local operational control of individual distribution substations. This value will be measured in terms of a decrease in required manual control interventions performed on an individual substation.
- Demonstrate the value of the developed semantic model for automating operational control operations on a global level, across individual substations. This value will be measured in terms of a decrease in required manual control interventions performed on a portion of the electric grid that comprises multiple substations.

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.

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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The Recipient shall:

For Products that require a draft version, including the Final Report Outline and Final Report:

- Submit all draft Products to the CAM for review and comment in accordance with the Project Schedule (Part V). The CAM will provide written comments to the Recipient on the draft Product within 15 days of receipt, unless otherwise specified in the task/subtask for which the Product is required.
- Consider incorporating all CAM comments into the final Product. If the Recipient disagrees with any comment, provide a written response explaining why the comment was not incorporated into the final Product.
- Submit the revised Product and responses to comments within 10 days of notice by the CAM, unless the CAM specifies a longer time period or approves a request for additional time.

For Products that require a final version only

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

For all Products

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

Instructions for Submitting Electronic Files and Developing Software:

Electronic File Format

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

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- Microsoft Internet Information Services (IIS), (version 6 and up). Recommend 7.5.
- Visual Studio.NET (version 2008 and up). Recommend 2010.
- C# Programming Language with Presentation (UI), Business Object and Data Layers.
- SQL (Structured Query Language).
- Microsoft SQL Server 2008, Stored Procedures. Recommend 2008 R2.
- Microsoft SQL Reporting Services. Recommend 2008 R2.
- XML (external interfaces).

Any exceptions to the Electronic File Format requirements above must be approved in writing by the CAM. The CAM will consult with the Energy Commission's Information Technology Services Branch to determine whether the exceptions are allowable.

MEETINGS

Subtask 1.2 Kick-Off Meeting

The goal of this subtask is to establish the lines of communication and procedures for implementing this Agreement.

The Recipient shall:

- Attend a "Kick-Off" meeting with the CAM, the Commission Agreement Officer (CAO), and any other Energy Commission staff relevant to the Agreement. The Recipient will bring its Project Manager and any other individuals designated by the CAM to this meeting. The administrative and technical aspects of the Agreement will be discussed at the meeting. Prior to the meeting, the CAM will provide an agenda to all potential meeting participants. The meeting may take place in person or by electronic conferencing (e.g., WebEx), with approval of the CAM.

The administrative portion of the meeting will include discussion of the following:

- Terms and Conditions of the Agreement;
- Administrative Products (Subtask 1.1);
- CPR 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);

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- Progress Reports and Invoices (Subtask 1.5);
 - Final Report (Subtask 1.6);
 - Technical Advisory Committee Meetings (Subtasks 1.10 and 1.11); and
 - Any other relevant topics.
- Provide an *Updated Project Schedule*, *List of Match Funds*, and *List of Permits*, as needed to reflect any changes in the documents.

The CAM shall:

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

Recipient Products:

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

CAM Product:

- Kick-off Meeting Agenda

Subtask 1.3 Critical Project Review (CPR) Meetings

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

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

The Recipient shall:

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

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- Attend the CPR Meeting.
- Present the CPR Report and any other required information at each CPR Meeting.

The CAM shall:

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

Recipient Products:

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

CAM Products:

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

Subtask 1.4 Final Meeting

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

The Recipient shall:

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

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

- The technical portion of the meeting will involve the presentation of findings, conclusions, and recommended next steps (if any) for the Agreement. The CAM will determine the appropriate meeting participants.

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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.
 - 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.

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Products:

- Progress Reports
- Invoices

Subtask 1.6 Final Report

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

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- 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.
 - Identify which specific ratepayers can benefit from the project results and how they can achieve the benefits.
 - If it's necessary to use a technical term in the Executive Summary, provide a brief definition or explanation when the technical term is first used.
- Follow the Style Guide format requirements for headings, figures/tables, citations, and acronyms/abbreviations.
- Ensure that the document omits subjective comments and opinions. However, recommendations in the conclusion of the report are allowed.
- Include a brief description of the project results in the Abstract.
- Submit a draft of the report to the CAM for review and comment. The CAM will provide written comments to the Recipient on the draft Product within 15 days of receipt.
- Consider incorporating all CAM comments into the Final Report. If the Recipient disagrees with any comment, provide a written response explaining why the comment was not incorporated into the final Product.
- Submit the revised Final Report and responses to comments within 10 days of notice by the CAM, unless the CAM specifies a longer time period or approves a request for additional time.
- Submit one bound copy of the *Final Report* to the CAM along with *Written Responses to Comments on the Draft Final Report*.

Products:

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

CAM Product:

- Written Comments on the Draft Final Report

MATCH FUNDS, PERMITS, AND SUBCONTRACTS

Subtask 1.7 Match Funds

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

While the costs to obtain and document match funds are not reimbursable under this Agreement, the Recipient may spend match funds for this task. The Recipient may only spend match funds during the Agreement term, either concurrently or prior to the use of

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Energy Commission funds. Match funds must be identified in writing, and the Recipient must obtain any associated commitments before incurring any costs for which the Recipient will request reimbursement.

The Recipient shall:

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

If match funds were a part of the proposal that led to the Energy Commission awarding this Agreement, then provide in the letter:

- A list of the match funds that identifies:
 - The amount of cash match funds, their source(s) (including a contact name, address, and telephone number), and the task(s) to which the match funds will be applied.
 - The amount of each in-kind contribution, a description of the contribution type (e.g., property, services), the documented market or book value, the source (including a contact name, address, and telephone number), and the task(s) to which the match funds will be applied. If the in-kind contribution is equipment or other tangible or real property, the Recipient must identify its owner and provide a contact name, address, telephone number, and the address where the property is located.
- A copy of a letter of commitment from an authorized representative of each source of match funding that the funds or contributions have been secured.
- At the Kick-Off meeting, discuss match funds and the impact on the project if they are significantly reduced or not obtained as committed. If applicable, match funds will be included as a line item in the progress reports and will be a topic at CPR meetings.
- Provide a *Supplemental Match Funds Notification Letter* to the CAM 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

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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 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.

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- If required by the CAM, submit a draft of each *Subcontract* required to conduct the work under this Agreement.
- Submit a final copy of the executed subcontract.
- Notify and receive written approval from the CAM prior to adding any new subcontractors (see the discussion of subcontractor additions in the terms and conditions).

Products:

- Subcontracts (draft if required by the CAM)

TECHNICAL ADVISORY COMMITTEE

Subtask 1.10 Technical Advisory Committee (TAC)

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

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

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

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

EXHIBIT A

Scope of Work

- 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.
- 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

EXHIBIT A Scope of Work

TASK 2 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.

EXHIBIT A Scope of Work

- Number of similar installations.
- Jobs created/retained as a result of the Agreement.
- For Information/Tools and Other Research Studies:
 - Outcome of project.
 - Published documents, including date, title, and periodical name.
 - A discussion of policy development. State if the project has been cited in government policy publications or technical journals, or has been used to inform regulatory bodies.
 - The number of website downloads.
 - An estimate of how the project information has affected energy use and cost, or 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 are voluntary.

Products:

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

TASK 3 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.

EXHIBIT A

Scope of Work

- A description of the intended use(s) for and users of the project results.
 - Published documents, including date, title, and periodical name.
 - Copies of documents, fact sheets, journal articles, press releases, and other documents prepared for public dissemination. These documents must include the Legal Notice required in the terms and conditions. Indicate where and when the documents were disseminated.
 - A discussion of policy development. State if project has been or will be cited in government policy publications, or used to inform regulatory bodies.
 - The number of website downloads or public requests for project results.
 - Additional areas as determined by the CAM.
- Conduct technology transfer activities in accordance with the Technology/Knowledge Transfer Plan. These activities will be reported in the Progress Reports.
 - When directed by the CAM, develop *Presentation Materials* for an Energy Commission- sponsored conference/workshop on the results of the project.
 - Provide at least six *High-Quality Digital Photographs* (minimum resolution of 1300x500 pixels 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)

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 4 EXTENSION OF THE SEMANTIC MODEL TO INTEGRATE OPERATIONAL SMART GRID DATA

The goal of this task is to create an operational smart grid knowledge model (in addition to the recipient’s already existing knowledge model for smart grid management) by integrating metadata about operational grid data streams with the current engineering-centric implementation so as to streamline the operation of the grid.

EXHIBIT A

Scope of Work

The Recipient shall:

- Evaluate which aspects of a distribution substation's functions are best suited to demonstrate the merit of a semantic integration.
- Develop an Operational Smart Grid Knowledge Model that forms the basis for increasing the operational automation of distribution substations locally and globally across substations. This knowledge model will focus on the selected aspects of a distribution substation's functions. The model can be developed and extended over the entire duration of the project.
- Prepare an *Operational Smart Grid Knowledge Model Report* that describes the model development and its function.

Products:

- Operational Smart Grid Knowledge Model Report

TASK 5 SEMI-AUTOMATIC CLASSIFICATION OF DATA STREAMS

The goal of this task is to develop an interface that can be used by operators to create statistical classifiers for data streams whose origin and purpose are known to the operator and to apply these classifiers to new and/or unknown data streams so as to increase the operational knowledge of the smart grid and thereby facilitate automation and control thereof.

The Recipient shall:

- Develop a Classification Interface that allows an operator to generate new classifiers from electric grid data streams and apply them to unclassified data streams. Prepare a *Classification Interface Report* that describes its development and function.
- Prepare a *Classification Interface Test Plan* to be approved in writing by the CAM prior to beginning the test. Test the Classification Interface to assess whether the classification is suitable for usage in the context of an electric grid control center.
- Prepare a *Classification Interface Test Report* that describes the test results and conclusions.

Products:

- Classification Interface Report
- Classification Interface Test Plan
- Classification Interface Test Report

TASK 6 SELF-CONFIGURATION OF FSSN APPS

The goal of this task is to enable apps that run on future secondary substations (FSSNs) to automatically select relevant input and output streams.

The Recipient shall:

- Develop an FSSN Manager that uses the semantic model together with the classification interface to demonstrate the ability of deployed apps to self-configure with respect to their input and output streams. Prepare an *FSSN Manager Report* that describes its development and function.

EXHIBIT A Scope of Work

- Prepare a *CPR Report for Task 6* that describes the potential of using the semantic knowledge model to automate the operation of distribution substations on a local level.
- Participate in a CPR meeting for Task 6 per Subtask 1.3.

Products:

- FSSN Manager Report
- CPR Report for Task 6

TASK 7 SEMANTICALLY INTEGRATED OPERATIONAL DASHBOARD

The goal of this task is to integrate the results from Tasks 4 through 6 within an operational dashboard display for distribution substations.

The Recipient shall:

- Implement a Semantically Integrated Operational Dashboard display for distribution substations.
- Prepare a *Semantically Integrated Operational Dashboard Test Plan* to be approved in writing by the CAM prior to beginning the test. Test the Semantically Integrated Operational Dashboard to assess how it could be productively used in an electric grid control center.
- Prepare a *Semantically Integrated Operational Dashboard Test Report* that describes the test observations, results and conclusions.

Products:

- Semantically Integrated Operational Dashboard Test Plan
- Semantically Integrated Operational Dashboard Test Report

TASK 8 AUTOMATIC DEPLOYMENT OF APPS ACROSS FSSNs

The goal of this task is to demonstrate the possibility of managing the global state of all FSSNs within a specific domain by semantically defining an app deployment goal across FSSNs.

The Recipient shall:

- Extend the semantic model to allow modeling the global state of a specific grid domain, in particular with respect to the current and targeted deployment of apps. This extension will result in an Extended Operational Smart Grid Knowledge Model.
- Implement a Demonstrator for the Automatic Deployment of Apps across FSSNs that utilizes the Extended Operational Smart Grid Knowledge Model to manage the deployment state of apps across multiple FSSNs given a deployment goal. Prepare a *Demonstrator Implementation Report* that describes the development of the Extended Operational Smart Grid Knowledge Model and the implementation of the demonstrator.
- Prepare a *Demonstrator Test Plan* to be approved in writing by the CAM prior to beginning the test. Test the Demonstrator for the Automatic Deployment of Apps across FSSNs to assess how it could be productively used as an extension to the Semantically Integrated Operational Dashboard.

EXHIBIT A

Scope of Work

- Prepare a *Demonstrator Test Report* that describes the test observations, results, and conclusions.
- Prepare a *CPR Report for Task 8* that describes the potential of using the extended semantic knowledge model to automate the operation of distribution substations on a more global level.
- Participate in a CPR meeting for Task 8 per Subtask 1.3.

Products:

- Demonstrator Implementation Report
- Demonstrator Test Plan
- Demonstrator Test Report
- CPR Report for Task 8

TASK 9 EXTENSION OF THE OPERATIONAL DASHBOARD WITH GLOBAL MANAGEMENT CAPABILITIES

The goal of this task is to extend the Semantically Integrated Operational Dashboard with the capability to manage FSSNs on a more global level (i.e., manage multiple FSSNs within a specified domain).

The Recipient shall:

- Extend the Semantically Integrated Operational Dashboard to permit grid operators to intuitively define global deployment goals. This extended dashboard will be referred to as the Semantically Integrated Global Management Dashboard.
- Prepare a *Global Management Dashboard Test Plan* to be approved in writing by the CAM prior to beginning the test. Test the Semantically Integrated Global Management Dashboard to assess how it could be productively used in an electric grid control center.
- Prepare a *Global Management Dashboard Test Report* that describes the test observations, results, and conclusions.

Products:

- Global Management Dashboard Test Plan
- Global Management Dashboard Test Report

V. PROJECT SCHEDULE

Please see attachment A-1 Excel spreadsheet.

STATE OF CALIFORNIA

STATE ENERGY RESOURCES
CONSERVATION AND DEVELOPMENT COMMISSION

RESOLUTION - RE: SIEMENS CORPORATION

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-15-046 from GFO-15-313 with Siemens Corporation for a \$500,000 grant to develop an operational dashboard for electrical distribution substations. This dashboard display would show the current grid state, display warnings for detected problems, and automatically suggest potential solutions to reduce the duration of power outages; and

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

CERTIFICATION

The undersigned Secretariat to the Commission does hereby certify that the foregoing is a full, true, and correct copy of a Resolution duly and regularly adopted at a meeting of the California Energy Commission held on May 17, 2016.

AYE: [List of Commissioners]

NAY: [List of Commissioners]

ABSENT: [List of Commissioners]

ABSTAIN: [List of Commissioners]

Cody Goldthrite,
Secretariat