

GRANT REQUEST FORM (GRF)

CEC-270 (Revised 02/13)

CALIFORNIA ENERGY COMMISSION

New Agreement EPC-15-007 (To be completed by CGL Office)

Division	Agreement Manager:	MS-	Phone
ERDD	David Stoms	43	916-327-2381

Recipient's Legal Name	Federal ID Number
The Regents of the University of California, Los Angeles	95-6006143

Title of Project
Climate Change in Los Angeles County: Grid Vulnerability to Extreme Heat

Term and Amount	Start Date	End Date	Amount
	12/1/2015	9/30/2018	\$ 500,000

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

Proposed Business Meeting Date	10/14/2015	<input type="checkbox"/> Consent	<input checked="" type="checkbox"/> Discussion
--------------------------------	------------	----------------------------------	------------------------------------------------

Business Meeting Presenter	David Stoms	Time Needed:	5 minutes
----------------------------	-------------	--------------	-----------

Please select one list serve. Electric Program Investment Charge

Agenda Item Subject and Description

UC LOS ANGELES. Proposed resolution approving Agreement EPC-15-007 with the Regents of the University of California, on behalf of the Los Angeles campus for a \$500,000 grant to develop an in depth analysis of future electric grid demand and vulnerability due to increased (and prolonged) heat events in Southern California Edison territory under current and future climate scenarios. (EPIC funding) Contact: David Stoms. (Staff presentation: 5 minutes)

California Environmental Quality Act (CEQA) Compliance

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

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

Explain why Agreement is not considered a "Project":

Agreement will not cause direct physical change in the environment or a reasonably foreseeable indirect physical change in the environment because the proposed project is a paper research study that will identify grid vulnerability under climate scenarios through computer modeling but will not result in physical activities or installations with a physical footprint.

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

Arizona State University \$ 99,998

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

Legal Company Name: None

GRANT REQUEST FORM (GRF)

CEC-270 (Revised 02/13)

CALIFORNIA ENERGY COMMISSION



Budget Information					
Funding Source		Funding Year of Appropriation	Budget List No.	Amount	
EPIC		14-15	301.001B	\$500,000	
R&D Program Area:	EGRO: EA		TOTAL:	\$500,000	
Explanation for "Other" selection					
Reimbursement Contract #:			Federal Agreement #:		
Recipient's Administrator/ Officer			Recipient's Project Manager		
Name:	Julia Zhu		Name:	Zoe Elizabeth	
Address:	PO Box 11000 11000 Kinross Avenue, Suite 211		Address:	619 Charles E Young Drive E La Kretz Hall, Suite 300	
City, State, Zip:	Los Angeles, CA 90095-1406		City, State, Zip:	Los Angeles, CA 90095-1496	
Phone:	310-794-0155 /	Fax:	-	Phone:	310-825-2421 /
E-Mail:	jzhu@research.ucla.edu		E-Mail:	Zelizabeth@ioes.ucla.edu	
Selection Process Used					
<input checked="" type="checkbox"/> Competitive Solicitation		Solicitation #: GFO-15-303			
<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 ACRONYM/TERM LISTS

A. Task List

Task #	CPR ¹	Task Name
1		General Project Tasks
2	X	Baseline and Future Downscaled Global Climate Models for Heat Events
3	X	Electricity Demand Increases Under Climate Change
4	X	Vulnerability of the Electricity System and Adaptation Planning
5		Evaluation of Project Benefits
6		Technology/Knowledge Transfer Activities

B. Acronym/Term List

Acronym/Term	Meaning
CAM	Commission Agreement Manager
CAO	Commission Agreement Officer
CPR	Critical Project Review
CPUC	California Public Utilities Commission
EPIC	Electric Program Investment Charge
GHG	Greenhouse Gas
IOU	Investor-Owned Utility
km	Kilometer
LA	Los Angeles
RCP	Representative Concentration Pathway
TAC	Technical Advisory Committee
WRF	Weather Research and Forecasting Model

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

A. Purpose of Agreement

The purpose of this Agreement is to (1) Increase the resiliency of communities by identifying extreme heat events (very high temperatures lasting several days) at a local level; (2) Avoid disruptions in electricity distribution during extreme heat events; and (3) Identify adaptation options for Southern California Edison and Los Angeles County.

B. Problem/ Solution Statement

Problem

As California enters its fourth year of a record breaking drought, with accompanying increased temperatures, reduced snowpack and more frequent wildfires, the impacts of climate change are evident. At a more local level, Los Angeles County region is identifying important climate

¹ Please see subtask 1.3 in Part III of the Scope of Work (General Project Tasks) for a description of Critical Project Review (CPR) Meetings.

Exhibit A Scope of Work

and sustainability strategies, including conducting community greenhouse gas (GHG) inventories for every city within the County, developing a County Climate Action Plan, and creating a Framework for climate action for local governments. Because it is such a vast and geographically diverse region, the impacts of climate change will be experienced differently across neighborhoods. Until recently however, understanding the localized effects of climate change and the impacts on communities has been difficult to assess. The Los Angeles region has prioritized research to provide regionally relevant climate projections. Research predicts the Los Angeles region will be warmer by 3-5 °F annually by mid-century, and will have an increase in the number of “extreme heat days” varying regionally, with some cities experiencing up to 5-6 times their current levels. What is still unknown however, and what remains to be studied, is how these increases in temperature will affect the electric grid.

Solution

This project will develop a sophisticated and in depth analysis of future electricity demand, grid response, and grid vulnerability due to increased (and prolonged) heat events in Southern California Edison territory under current and future climate scenarios. It will enable innovative grid management and operation strategies and will identify adaptation guidance. Building on Dr. Hall’s prior climate modeling work in Los Angeles County², the Recipient will identify extreme heat events and develop statistical regressions and modeling to evaluate how electricity consumption and demand have varied and the impacts to the grid across Southern California Edison territory based on temperature changes. The Recipient will evaluate how these heat incidences lead to strain on stations and substations, and whether they trigger peaker plant generation (which causes greater GHG emissions, in-basin air pollution, and other related impacts). The Recipient will then use this analysis paired with future climate scenarios to predict increase in energy demand and identify future grid vulnerabilities under increased heat events. Ultimately, this research will prepare utilities, the State, and local governments to better prepare for the here-to-unknown (but inevitable) strain resulting from the demand in increased electricity consumption due to heat events caused by climate change.

C. Goals and Objectives of the Agreement

Agreement Goals

The goals of this agreement are to:

- Increase the resiliency of communities by identifying future heat events at a local level
- Identify grid vulnerability based on heat forecasts, demand forecasts and infrastructure
- Assist in avoiding disruptions in electricity distribution during extreme heat events
- Identify adaptation options for Southern California Edison and Los Angeles County

Ratepayer Benefits:³ This Agreement will result in the ratepayer benefits of greater reliability, increased safety, and lower costs as well as helping the state meet some of its climate and energy goals. These benefits will be realized by providing regionally specific information and

² Sun F, D Walton, and A Hall, 2015: A hybrid dynamical–statistical downscaling technique, part II: End-of-century warming projections predict a new climate state in the Los Angeles region. *Journal of Climate*, accepted.

³ 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).

Exhibit A Scope of Work

policy guidance to Los Angeles (LA) County, local governments, and Southern California Edison to meet electricity demand increases for cooling during extreme heat events.

Electricity Reliability: This research project will assess grid reliability and resilience in the face of extreme heat events caused by climate change. By evaluating the vulnerability of critical substations and transmission lines during future projected heat scenarios, the study will identify problem spots in the grid in the Los Angeles County region. This in turn will provide a greater, more accurate understanding to Southern California Edison of localized risk, such that they can plan for a more reliable energy system.

Increased Safety: By identifying the potential for and location of future power outage areas, these results can facilitate adaptation plans and increase ratepayer safety. The research team will utilize data resources (including U.S. Census, County Assessor, Cal EnviroScreen) to provide current information about vulnerable communities within the study area. Hazards associated with electricity distribution disruptions are varied, and will not be the subject of this study. However, identifying grid vulnerabilities can help utilities and decision-makers better plan for potential outages, and resultant ratepayer safety risks. As this analysis will be conducted and mapped out geographically, this study will facilitate the identification of and planning for those ratepayer communities at greatest risk.

Lower Costs: This study will not directly lower costs, but it provides the information to support decisions that would result in lowered costs for ratepayers, by providing utilities and policymakers with further information on where and how they can prioritize investments in the grid moving forward. Results from this project can inform more specific understanding of where and how renewables and distributed generation should be prioritized, and developing cost-effective models for transitioning to a more resilient grid. These measures would also contribute to meeting the state's GHG reduction targets and renewable portfolio standard requirements in a coordinated, and strategic manner achieving multiple co-benefits through the process.

Technological Advancement and Breakthroughs:⁴ This Agreement will lead to technological advancement and breakthroughs that will help overcome barriers to the achievement of the State of California's statutory and regulatory energy goals by providing information for adaptation under likely increased heat events caused by climate change. Local and regional governments as well as Southern California Edison will gain an understanding of the capacity of substations and transmission lines and how those capacities might be impacted by extreme heat events. Doing so will then create a greater level of understanding on where the grid is most vulnerable, which neighborhoods they serve, and what types of adaptation measures need to be taken by the utility as well as state, regional, and local actors going forward. It can equally help guide investments in distributed generation that could alleviate pressure on the conventional electricity generation system. Furthermore, the hybrid dynamical-statistical downscaling technique used in this research project, will allow the research team to create refined estimates of future changes in extreme heat days for Los Angeles County. This in turn can help shape climate change mitigation and resilience strategies at the state, local and utility level.

Agreement Objectives

The objectives of this Agreement are to:

⁴ 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

- Quantify and map extreme heat events at a 2 km scale between 2021-2040 and 2041-2060
- Identify grid vulnerabilities based on heat forecasts, demand forecasts and infrastructure capacity
- Assess electricity demand reduction and grid adaptation options for Southern California Edison, Los Angeles County, and local governments to pursue

III. TASK 1 GENERAL PROJECT TASKS

PRODUCTS

Subtask 1.1 Products

The goal of this subtask is to establish the requirements for submitting project products (e.g., reports, summaries, plans, and presentation materials). Unless otherwise specified by the Commission Agreement Manager (CAM), the Recipient must deliver products as required below by the dates listed in the **Project Schedule (Part V)**. Products that require a draft version are indicated by marking “**(draft and final)**” after the product name in the “Products” section of the task/subtask. If “(draft and final)” does not appear after the product name, only a final version of the product is required. With respect to due dates within this Scope of Work, “**days**” means working days.

The Recipient shall:

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

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

For products that require a final version only

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

For all products

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

Instructions for Submitting Electronic Files and Developing Software:

- **Electronic File Format**

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

Exhibit A Scope of Work

text of any Agreement data and documents in a format specified by the CAM, such as memory stick or CD-ROM.

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

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

- **Software Application Development**
Use the following standard Application Architecture components in compatible versions for any software application development required by this Agreement (e.g., databases, models, modeling tools), unless the CAM approves other software applications such as open source programs:
 - Microsoft ASP.NET framework (version 3.5 and up). Recommend 4.0.
 - Microsoft Internet Information Services (IIS), (version 6 and up) Recommend 7.5.
 - Visual Studio.NET (version 2008 and up). Recommend 2010.
 - C# Programming Language with Presentation (UI), Business Object and Data Layers.
 - SQL (Structured Query Language).
 - Microsoft SQL Server 2008, Stored Procedures. Recommend 2008 R2.
 - Microsoft SQL Reporting Services. Recommend 2008 R2.
 - XML (external interfaces).

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

MEETINGS

Subtask 1.2 Kick-off Meeting

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

The Recipient shall:

- Attend a "Kick-off" meeting with the CAM, the Commission Agreement Officer (CAO), and any other Energy Commission staff relevant to the Agreement. The Recipient will bring its Project Manager and any other individuals designated by the CAM to this meeting. The administrative and technical aspects of the Agreement will be discussed at

Exhibit A Scope of Work

the meeting. Prior to the meeting, the CAM will provide an agenda to all potential meeting participants. The meeting may take place in person or by electronic conferencing (e.g., WebEx), with approval of the CAM.

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

- Terms and conditions of the Agreement;
- Administrative products (subtask 1.1);
- CPR meetings (subtask 1.3);
- Match fund documentation (subtask 1.7);
- Permit documentation (subtask 1.8);
- Subcontracts (subtask 1.9); and
- Any other relevant topics.

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

- The CAM's expectations for accomplishing tasks described in the Scope of Work;
 - An updated Project Schedule;
 - Technical products (subtask 1.1);
 - Progress reports and invoices (subtask 1.5);
 - Final Report (subtask 1.6);
 - Technical Advisory Committee meetings (subtasks 1.10 and 1.11); and
 - Any other relevant topics.
- Provide an *Updated Project Schedule*, *List of Match Funds*, and *List of Permits*, as needed to reflect any changes in the documents.

The CAM shall:

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

Recipient Products:

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

CAM Product:

- Kick-off Meeting Agenda

Subtask 1.3 Critical Project Review (CPR) Meetings

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

CPR meetings generally take place at key, predetermined points in the Agreement, as determined by the CAM and as shown in the Task List on page 1 of this Exhibit. However, the

Exhibit A Scope of Work

CAM may schedule additional CPR meetings as necessary. The budget will be reallocated to cover the additional costs borne by the Recipient, but the overall Agreement amount will not increase. CPR meetings generally take place at the Energy Commission, but they may take place at another location, or may be conducted via electronic conferencing (e.g., WebEx) as determined by the CAM.

The Recipient shall:

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

The CAM shall:

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

Recipient Products:

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

CAM Products:

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

Subtask 1.4 Final Meeting

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

Exhibit A Scope of Work

The Recipient shall:

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

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

- The technical portion of the meeting will involve the presentation of findings, conclusions, and recommended next steps (if any) for the Agreement. The CAM will determine the appropriate meeting participants.
- The administrative portion of the meeting will involve a discussion with the CAM and the CAO of the following Agreement closeout items:
 - Disposition of any state-owned equipment.
 - Need to file a Uniform Commercial Code Financing Statement (Form UCC-1) regarding the Energy Commission's interest in patented technology.
 - The Energy Commission's request for specific "generated" data (not already provided in Agreement products).
 - Need to document the Recipient's disclosure of "subject inventions" developed under the Agreement.
 - "Surviving" Agreement provisions such as repayment provisions and confidential products.
 - Final invoicing and release of retention.
- Prepare a *Final Meeting Agreement Summary* that documents any agreement made between the Recipient and Commission staff during the meeting.
- Prepare a *Schedule for Completing Agreement Closeout Activities*.
- Provide *All Draft and Final Written Products* on a CD-ROM or USB memory stick, organized by the tasks in the Agreement.

Products:

- Final Meeting Agreement Summary (*if applicable*)
- Schedule for Completing Agreement Closeout Activities
- All Draft and Final Written Products

REPORTS AND INVOICES

Subtask 1.5 Progress Reports and Invoices

The goals of this subtask are to: (1) periodically verify that satisfactory and continued progress is made towards achieving the project objectives of this Agreement; and (2) ensure that invoices contain all required information and are submitted in the appropriate format.

Exhibit A Scope of Work

The Recipient shall:

- Submit a monthly *Progress Report* to the CAM. Each progress report must:
 - Summarize progress made on all Agreement activities as specified in the scope of work for the preceding month, including accomplishments, problems, milestones, products, schedule, fiscal status, and an assessment of the ability to complete the Agreement within the current budget and any anticipated cost overruns. See the Progress Report Format Attachment for the recommended specifications.
- Submit a monthly or quarterly *Invoice* that follows the instructions in the “Payment of Funds” section of the terms and conditions, including a financial report on Match Fund and in-state expenditures.

Products:

- Progress Reports
- Invoices

Subtask 1.6 Final Report

The goal of this subtask is to prepare a comprehensive Final Report that describes the original purpose, approach, results, and conclusions of the work performed under this Agreement. The CAM will review the Final Report, which will be due at least **two months** before the Agreement end date. When creating the Final Report Outline and the Final Report, the Recipient must use the Style Manual provided by the CAM.

Subtask 1.6.1 Final Report Outline

The Recipient shall:

- Prepare a *Final Report Outline* in accordance with the *Style Manual* provided by the CAM. (See Task 1.1 for requirements for draft and final products.)

Recipient Products:

- Final Report Outline (draft and final)

CAM Product:

- Style Manual
- Comments on Draft Final Report Outline
- Acceptance of Final Report Outline

Subtask 1.6.2 Final Report

The Recipient shall:

- Prepare a *Final Report* for this Agreement in accordance with the approved Final Report Outline, Style Manual, and Final Report Template provided by the CAM with the following considerations:
 - Ensure that the report includes the following items, in the following order:
 - Cover page (**required**)
 - Credits page on the reverse side of cover with legal disclaimer (**required**)
 - Acknowledgements page (optional)
 - Preface (**required**)
 - Abstract, keywords, and citation page (**required**)

Exhibit A Scope of Work

- Table of Contents (**required**, followed by List of Figures and List of Tables, if needed)
- Executive summary (**required**)
- Body of the report (**required**)
- References (if applicable)
- Glossary/Acronyms (If more than 10 acronyms or abbreviations are used, it is required.)
- Bibliography (if applicable)
- Appendices (if applicable) (Create a separate volume if very large.)
- Attachments (if applicable)
- 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
- Acceptance of Final Report

Exhibit A Scope of Work

MATCH FUNDS, PERMITS, AND SUBCONTRACTS

Subtask 1.7 Match Funds

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

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

The Recipient shall:

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

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

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

Products:

- Match Funds Status Letter
- Supplemental Match Funds Notification Letter (*if applicable*)
- Match Funds Reduction Notification Letter (*if applicable*)

Exhibit A Scope of Work

Subtask 1.8 Permits

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

The Recipient shall:

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

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

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

Products:

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

Subtask 1.9 Subcontracts

The goals of this subtask are to: (1) procure subcontracts required to carry out the tasks under this Agreement; and (2) ensure that the subcontracts are consistent with the terms and conditions of this Agreement.

The Recipient shall:

- Manage and coordinate subcontractor activities in accordance with the requirements of this Agreement.
- Incorporate this Agreement by reference into each subcontract.
- Include any required Energy Commission flow-down provisions in each subcontract, in addition to a statement that the terms of this Agreement will prevail if they conflict with the subcontract terms.
- If required by the CAM, submit a draft of each *Subcontract* required to conduct the work under this Agreement.
- Submit a final copy of the executed subcontract.

Exhibit A Scope of Work

- Notify and receive written approval from the CAM prior to adding any new subcontractors (see the discussion of subcontractor additions in the terms and conditions).

Products:

- Subcontracts (*draft if required by the CAM*)

TECHNICAL ADVISORY COMMITTEE

Subtask 1.10 Technical Advisory Committee (TAC)

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

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

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

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

The Recipient shall:

- Prepare a *List of Potential TAC Members* that includes the names, companies, physical and electronic addresses, and phone numbers of potential members. The list will be discussed at the Kick-off meeting, and a schedule for recruiting members and holding the first TAC meeting will be developed.
- Recruit TAC members. Ensure that each individual understands member obligations and the TAC meeting schedule developed in subtask 1.11.

Exhibit A Scope of Work

- 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

IV. TECHNICAL TASKS

TASK 2 Baseline and Future Downscaled Global Climate Models for Heat Events

The goal of this task is to develop downscaled climate models for historical and future heat projections.

The Recipient shall:

- Gather historical weather data for 2001 through 2013 from the National Centers for Environmental Prediction's North American Regional Reanalysis to be able to run the climate model for a longer historical period
- Perform a dynamical Weather Research and Forecasting (WRF) run to extend existing (1981–2000) baseline climate simulation through 2013, at 2-kilometer (km) resolution for the greater Los Angeles region, inclusive of LA County
- Validate the model using point measurements and gridded observational data
- Quantify extreme heat events during the 2006-2013 timeframe in the project domain
- Prepare visualizations (using ArcGIS or similar software) of the baseline frequency of extreme heat events
- Create projections of temperature and extreme heat events for 2021-2040 and 2041-2060 time slices under two GHG emissions scenarios: Representative Concentration Pathway (RCP8.5) and RCP2.6, as well as other forecasting scenarios, e.g., RCP4.5, as needed based on preliminary results
- Prepare visualizations (using ArcGIS or similar software) of projected future frequency of extreme heat events to enable the Investor-Owned Utility (IOU), local governments, and regional agencies to better understand the location and scale of projected heat events
- Produce *Future Extreme Heat Events in Los Angeles County Report*, characterizing change in frequency of extreme heat events across the study domain and including maps of the frequency of baseline and future extreme heat events
- Prepare a *CPR Report* in accordance with subtask 1.3 (CPR Meetings)
- Participate in a CPR meeting

Products:

- Future Extreme Heat Events in Los Angeles County Report (draft and final)
- CPR Report #1

TASK 3 Electricity Demand Increases Under Climate Change

The goal of this task is to develop a grid vulnerability assessment for LA County based on current and modeled future extreme heat events and current electricity consumption data.

The Recipient shall:

- Estimate how electricity demand will change with temperature change, at census tract scale across Los Angeles to 2060
- Develop calibrated prototypical models of current and future building electricity use
- Assess how building stock changes or greater densities will impact demand
- Analyze the effects of various global climate model 2 km results on electricity demand across climate zones
- Produce Electricity Demand Increases Report
- Develop an Electricity Demand Increases Fact Sheet

Exhibit A Scope of Work

- Develop an Electricity Demand Increases Policy Brief to assist partner organizations in dissemination of information for implementation
- Prepare a CPR Report in accordance with subtask 1.3 (CPR Meetings).
- Participate in a CPR meeting

Products:

- Electricity Demand Increases Report (draft and final)
- Electricity Demand Increases Fact Sheet (draft and final)
- Electricity Demand Increases Policy Brief (draft and final)
- CPR Report #2

TASK 4 Vulnerability of the Electricity System and Adaptation Planning

The goal of this task is to identify grid vulnerability in LA County in 2040 under projections of future heat events and consumption scenarios.

The Recipient shall:

- Use existing models that characterize how climatological and hydrological changes will impact electricity supply across the Western Electricity Coordination Council region to characterize how Los Angeles utilities might be impacted by climate change.
- Assess how electricity mix changes including local renewables (i.e., photovoltaics) will reduce the demand for centralized power systems.
- Estimate how transmission and distribution networks to Los Angeles County as well as substations will be impacted by hotter temperatures by evaluating the thermal ratings of the infrastructure
- Make recommendations for reducing vulnerabilities by suggesting local and regional energy mix changes and where utility providers can expect that more transmission and distribution capacity will be needed
- Prepare visualizations (using ArcGIS or similar software) of existing and potential future grid vulnerabilities to enable the IOU, local governments, and regional agencies to better understand the location and scale of projected heat events
- Prepare a *Future Grid Vulnerability Report* that describes the future vulnerabilities of the grid under extreme heat events throughout LA County at a substation level and include maps of grid vulnerabilities
- Develop a *Future Grid Vulnerability Fact Sheet*
- Develop a *Future Grid Vulnerability Policy Brief* to assist partner organizations in dissemination of information for implementation
- Prepare a *CPR Report* in accordance with subtask 1.3 (CPR Meetings).
- Participate in a CPR meeting

Products:

- Future Grid Vulnerability Report (draft and final)
- Future Grid Vulnerability Fact Sheet (draft and final)
- Future Grid Vulnerability Policy Brief (draft and final)
- CPR Report #3

Exhibit A Scope of Work

TASK 5 Evaluation of Project Benefits

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

The Recipient shall:

- Complete three Project Benefits Questionnaires that correspond to three main intervals in the Agreement: (1) *Kick-off Meeting Benefits Questionnaire*; (2) *Mid-term Benefits Questionnaire*; and (3) *Final Meeting Benefits Questionnaire*.
- Provide all key assumptions used to estimate projected benefits, including targeted market sector (e.g., population and geographic location), projected market penetration, baseline and projected energy use and cost, operating conditions, and emission reduction calculations. Examples of information that may be requested in the questionnaires include:
 - For Product Development Projects and Project Demonstrations:
 - Published documents, including date, title, and periodical name.
 - Estimated or actual energy and cost savings, and estimated statewide energy savings once market potential has been realized. Identify all assumptions used in the estimates.
 - Greenhouse gas and criteria emissions reductions.
 - Other non-energy benefits such as reliability, public safety, lower operational cost, environmental improvement, indoor environmental quality, and societal benefits.
 - Data on potential job creation, market potential, economic development, and increased state revenue as a result of the project.
 - A discussion of project product downloads from websites, and publications in technical journals.
 - A comparison of project expectations and performance. Discuss whether the goals and objectives of the Agreement have been met and what improvements are needed, if any.
 - Additional Information for Product Development Projects:
 - Outcome of product development efforts, such copyrights and license agreements.
 - Units sold or projected to be sold in California and outside of California.
 - Total annual sales or projected annual sales (in dollars) of products developed under the Agreement.
 - Investment dollars/follow-on private funding as a result of Energy Commission funding.
 - Patent numbers and applications, along with dates and brief descriptions.
 - Additional Information for Product Demonstrations:
 - Outcome of demonstrations and status of technology.
 - Number of similar installations.
 - 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 have resulted in other non-energy benefits.
- An estimate of energy and non-energy benefits.
- Data on potential job creation, market potential, economic development, and increased state revenue as a result of project.
- A discussion of project product downloads from websites, and publications in technical journals.
- A comparison of project expectations and performance. Discuss whether the goals and objectives of the Agreement have been met and what improvements are needed, if any.
- Respond to CAM questions regarding responses to the questionnaires.

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

Products:

- Kick-off Meeting Benefits Questionnaire
- Mid-term Benefits Questionnaire
- Final Meeting Benefits Questionnaire

TASK 6 Technology/Knowledge Transfer Activities

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

The Recipient shall:

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

Exhibit A Scope of Work

- When directed by the CAM, develop *Presentation Materials* for an Energy Commission-sponsored conference/workshop on the results of the project.
- 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)
- Technology/Knowledge Transfer Plan (draft and final)
- Technology/Knowledge Transfer Report (draft and final)

V. PROJECT SCHEDULE

Please see the attached spreadsheet.

STATE OF CALIFORNIA

STATE ENERGY RESOURCES
CONSERVATION AND DEVELOPMENT COMMISSION

RESOLUTION - RE: UNIVERSITY OF CALIFORNIA, LOS ANGELES

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-15-007 with The Regents of the University of California, on behalf of the Los Angeles campus for a \$500,000 grant to develop an in-depth analysis of future electric grid demand and vulnerability due to increased (and prolonged) heat events in Southern California Edison territory under current and future climate scenarios; 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 October 14, 2015.

AYE: [List of Commissioners]

NAY: [List of Commissioners]

ABSENT: [List of Commissioners]

ABSTAIN: [List of Commissioners]

Tiffany Winter,
Secretariat