

**GRANT REQUEST FORM (GRF)**

CEC-270 (Revised 10/2015)

CALIFORNIA ENERGY COMMISSION

New Agreement EPC-17-033 (To be completed by CGL Office)

ERDD	Susan Wilhelm	43	916-327-1545
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The Regents of the University of California, Berkeley	94-6002123
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Building on the Cal-Adapt Platform to Deliver Actionable Information in Support of Electricity Sector Resilience
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03/22/2018	12/31/2022	\$ 900,000
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☐ ARFVTP agreements under \$75K delegated to Executive Director.

Proposed Business Meeting Date	3/21/2018	<input type="checkbox"/> Consent	<input checked="" type="checkbox"/> Discussion
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Business Meeting Presenter	Susan Wilhelm	Time Needed:	5 minutes
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Please select one list serve. EPIC (Electric Program Investment Charge)

**Agenda Item Subject and Description**

UNIVERSITY OF CALIFORNIA, BERKELEY. Proposed resolution approving Agreement EPC-17-033 with The Regents of the University of California, on behalf of the Berkeley campus for a \$900,000 grant to build on the Cal-Adapt platform to provide enhanced tools, data services, and visualizations. Priority tools will address sea level rise and wildfire.

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 this Agreement will develop new and enhanced tools, data services (including outreach and training), and visualizations on the Cal-Adapt web platform that make peer-reviewed scientific research results on climate-related risks and electricity sector resilience actionable by energy sector stakeholders. The work is computer based and will be conducted in office and laboratory settings.

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☐ Negative Declaration☐ Mitigated Negative Declaration☐ Environmental Impact Report☐ Statement of Overriding Considerations

Legal Company Name:

Budget

\$

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

Legal Company Name:

Funding Source	Funding Year of Appropriation	Budget List No.	Amount
EPIC	16-17	301.001D	\$900,000
			\$
R&D Program Area: EGRO: EA			\$900,000
Explanation for "Other" selection			
Reimbursement Contract #:		Federal Agreement #:	

Name:	Shoshana Lavinghouse	Name:	Nancy Thomas
Address:	2150 Shattuck Ave	Address:	111 Mulford Hall, UC Berkeley
City, State, Zip:	Berkeley, CA 94704-1345	City, State, Zip:	Berkeley, CA 94720-3114
Phone:	510-643-3391 /	Fax:	- -
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- ☒ Competitive Solicitation
 Solicitation #: GFO-16-311  
☐ First Come First Served Solicitation

- |   |   |
|---|---|
| 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 <sup>1</sup>	Task Name
1		General Project Tasks
2		Cal-Adapt Site Hosting and Data Services
3	X	Enhanced Visualization and Custom Tool Development
4		Outreach and Training
5		Evaluation of Project Benefits
6		Technology/Knowledge Transfer Activities

#### B. Acronym/Term List

Acronym/Term	Meaning
API	Application Programming Interface
CAM	Commission Agreement Manager
CAISO	California Independent System Operator
Cal-Adapt	An interactive web-site, developed with funding from the California Energy Commission, to enable exploration and visualization of climate-related risks based on peer-reviewed data.
CAO	Commission Agreement Officer
CoSMoS	Coastal Storm Modeling System, a system of models developed by the United States Geological Survey to produce detailed projections of flooding associated with storms, coastal erosion, and changes in sea level.
CPR	Critical Project Review
Energy Commission	California Energy Commission
GIF	Geospatial Innovation Facility
HTTP protocol	Hypertext Transfer Protocol (HTTP), the foundation for internet data communication, which provides a data communication protocol for distributed, collaborative, and hypermedia information systems.
IOU	Investor-Owned Utility
NetCDF	Network Common Data Format, a data format that supports the creation, access, and sharing of array-oriented scientific data
SLR	Sea Level Rise
TAC	Technical Advisory Committee

<sup>1</sup> 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**

### **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 new and enhanced tools, data services (including outreach and training), and visualizations on the Cal-Adapt web platform that make peer-reviewed scientific research results on climate-related risks and electricity sector resilience actionable by energy sector stakeholders.

#### **B. Problem/ Solution Statement**

##### **Problem**

Electricity sector operations, risk management, and planning require best available and peer-reviewed data on projected climate and weather-related parameters to maintain safe, efficient, and reliable energy for California's current and future populations. California's energy infrastructure, including power generation facilities and transmission lines, is vulnerable to climate-related risks and extreme weather events that may differ significantly from historical records due to a changing climate. Understanding projected climate-related risks that may cause disruption and energy vulnerability is critical to energy sector resilience and planning. Research supported by the State of California has provided high-quality, peer-reviewed data and scientific analysis of many climate-related factors such as sea level rise, inland flooding, storm events, wildfire, and extreme heat events which can be integrated into energy sector decision-support and planning. Providing electricity system stakeholders with actionable information through easy to use visualizations and decision support tools that can identify vulnerable populations and infrastructure locations potentially at risk from climate-related factors is important for California's energy future.

##### **Solution**

Visualizations of many local climate-related risks including projected changes in temperature, wildfire risk, snowpack, sea level rise, and more that are critical to California's energy system have been made available through Cal-Adapt, the State's resource for exploring climate change research. Cal-Adapt is an extensive, interactive, publicly accessible web-based visualization tool that has been developed at the University of California, Berkeley's Geospatial Innovation Facility (GIF) with the support and oversight of the California Energy Commission (Energy Commission) to provide easy-to-understand visualizations of locally relevant climate-related risks that enable decision makers to turn research results and climate projections into effective adaptation decisions and policies.

The proposed work will further build on the Cal-Adapt platform to provide enhanced tools, data services, and visualizations that leverage the existing robust web infrastructure and features to improve usability to energy sector stakeholders. The GIF will collaborate closely with the Energy Commission and energy stakeholders including Investor-Owned Utilities (IOUs) and the California Independent System Operator (CAISO) to build on Cal-Adapt and to develop enhanced targeted visualizations and tools that allow for improved decision support that leverages projections of parameters associated with climate-related risk. These new tools will be designed in close coordination with stakeholders, as the requirements of each organization necessitates tools that are specific to their application needs. Targeted visualization tools will depict climate-related risks from a variety of stressors on electricity infrastructure, enabling improved planning for future reliability.

## **Exhibit A Scope of Work**

### **C. Goals and Objectives of the Agreement**

#### **Agreement Goals**

The goal of this Agreement is to further build on the Cal-Adapt platform to provide enhanced tools, data services, and visualizations that make peer-reviewed scientific research results on climate-related risks and electricity sector resilience actionable by electricity sector stakeholders. Climate science is quickly evolving and newer data sets and analysis generated by energy sector contributions to California's Fourth Climate Change Assessment are being made available and will be incorporated into visualizations and tools on an expanded Cal-Adapt.

Ratepayer Benefits:<sup>2</sup> This Agreement will result in benefits to California ratepayers through greater electricity reliability and increased safety by supporting electricity sector planning, management, and adaptation. These benefits are derived from enhanced Cal-Adapt visualization tools that allow integration of up-to-date, peer-reviewed scientific research pertaining to climate-related risk. This project aims to provide critical real data on the changing climate and its impacts on California's energy infrastructure through innovative web-based visualization and targeted outreach. Cal-Adapt.org provides a collection of integrated tools on one website that supports interactive visualization, decision-making, transparency of government data, and local and regional focus. These tools allow users to interactively understand the impact of their decisions in planning processes, to develop shared understandings of complex spatial data, and to support planners and managers as they protect and plan for future electricity infrastructure reliability and stability. Such integrated planning will contribute multiple benefits to California's electricity ratepayers by helping to stabilize the grid, improve service reliability, and reduce financial losses associated with power outages.

Technological Advancement and Breakthroughs:<sup>3</sup> The proposed project will lead to advancements and breakthroughs that help achieve the state's statutory energy goals by providing needed actionable information on climate change consequences on electricity generation and distribution to energy sector stakeholders. California's energy system will contend with a changing climate in the next century. Substantial changes in the climate are projected to occur within a timeframe that overlaps with the time horizons of a variety of electricity system planning decisions, such as siting of power generation facilities and transmission lines. The state has been at the forefront of climate science, funding and promoting numerous advances in climate modeling across a range of domains, generating newer and higher spatial resolution climate projections. These data are valuable resources to better plan electricity and energy infrastructure developments, adaptations, and future siting, however, they are not always made available to policy makers in a format that is easily understood or that facilitates decision making.

Technological advances in computer science and the Internet have increased our ability to produce and share large heterogeneous collections of spatial data. However, these datasets are often complex and not immediately useful for practical purposes by planners, stakeholders,

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

<sup>3</sup> California Public Resources Code, Section 25711.5(a) also requires EPIC-funded projects to lead to technological advancement and breakthroughs to overcome barriers that prevent the achievement of the state's statutory and energy goals.

## **Exhibit A**

### **Scope of Work**

managers and others. The new challenges introduced by increases in these data require the use of novel developments in data curation, integration, and visualization that rely on web services, open standards, and application programming interfaces (APIs) linked to structured spatial databases. Use of these developments make the interactions between managers, citizens and scientists and multiple diverse data archives easier and more relevant. The proposed project will continue to develop the cutting edge mapping toolkit that California has relied on with Cal-Adapt. The Recipient will build custom tools designed for energy sector users, making important peer-reviewed and best available data available to planners and managers of California's energy infrastructure. The Cal-Adapt energy tools will provide rapid identification of locations at risk and will bring this key information into a usable format that will help to make California's energy reliable, affordable and environmentally-sound.

#### **Agreement Objectives**

The objectives of this Agreement are to build on the Cal-Adapt web application to provide actionable information on climate-related risks in support of electricity sector resilience through:

- Cal-Adapt Site Hosting and Data Services focuses on improving usability and accessibility for electricity sector stakeholders by making new, high resolution and high fidelity data available in addition to enhanced capabilities for custom data downloading.
- Enhanced Visualization and Custom Tool Development focuses on building custom tools and features that are tailored to specific needs and requirements of electricity sector stakeholders to support planning and protection of energy infrastructure.
- Outreach and Training focuses on the interaction with a range of energy stakeholders, climate practitioners, planners, resource managers, educators and ratepayers of the state through targeted workshops, webinars, and presentations.

## Exhibit A Scope of Work

### 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 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:

## **Exhibit A**

### **Scope of Work**

- Data sets will be in MS Access or MS Excel file format (version 2007 or later), or any other format approved by the CAM.
  - Text documents will be in MS Word file format, version 2007 or later.
  - Documents intended for public distribution will be in PDF file format.
  - The Recipient must also provide the native Microsoft file format.
  - Project management documents will be in Microsoft Project file format, version 2007 or later.
- **Software Application Development**
- Use the following standard Application Architecture components in compatible versions for any software application development required by this Agreement (e.g., databases, models, modeling tools), unless the CAM approves other software applications such as open source programs:
- Microsoft ASP.NET framework (version 3.5 and up). Recommend 4.0.
  - Microsoft Internet Information Services (IIS), (version 6 and up) Recommend 7.5.
  - Visual Studio.NET (version 2008 and up). Recommend 2010.
  - C# Programming Language with Presentation (UI), Business Object and Data Layers.
  - SQL (Structured Query Language).
  - Microsoft SQL Server 2008, Stored Procedures. Recommend 2008 R2.
  - Microsoft SQL Reporting Services. Recommend 2008 R2.
  - XML (external interfaces).

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

#### **MEETINGS**

##### **Subtask 1.2 Kick-off Meeting**

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

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

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



## **Exhibit A**

### **Scope of Work**

- Subcontracts (subtask 1.9); and
- Any other relevant topics.

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

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

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

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

#### **Recipient Products:**

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

#### **CAM Product:**

- Kick-off Meeting Agenda

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

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

CPR meetings generally take place at key, predetermined points in the Agreement, as determined by the CAM and as shown in the Task List on page 1 of this Exhibit. However, the CAM may schedule additional CPR meetings as necessary. The budget will be reallocated to cover the additional costs borne by the Recipient, but the overall Agreement amount will not 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.

## **Exhibit A**

### **Scope of Work**

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

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

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

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

#### **Recipient Products:**

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

#### **CAM Products:**

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

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

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

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

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

## Exhibit A Scope of Work

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

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

### Products:

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

## REPORTS AND INVOICES

### Subtask 1.5 Progress Reports and Invoices

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

### The Recipient shall:

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

### Products:

- Progress Reports
- Invoices

## Exhibit A Scope of Work

### 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**)
    - 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.

## Exhibit A Scope of Work

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

### Products:

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

### CAM Product:

- Written Comments on the Draft Final Report

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

### **Subtask 1.7 Match Funds**

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

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

### **The Recipient shall:**

- 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

## Exhibit A Scope of Work

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.
- If different from the solicitation application, provide a letter of commitment from an authorized representative of each source of match funding that the funds or contributions have been secured.
- At the Kick-off meeting, discuss match funds and the impact on the project if they are significantly reduced or not obtained as committed. If applicable, match funds will be included as a line item in the progress reports and will be a topic at CPR meetings.
- Provide a *Supplemental Match Funds Notification Letter* to the CAM of receipt of additional match funds.
- Provide a *Match Funds Reduction Notification Letter* to the CAM if existing match funds are reduced during the course of the Agreement. Reduction of match funds may trigger a CPR meeting.

### Products:

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

### Subtask 1.8 Permits

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

### The Recipient shall:

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

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*.

## **Exhibit A**

### **Scope of Work**

- Send the CAM a *Copy of Each Approved Permit*.
- If during the course of the Agreement permits are not obtained on time or are denied, notify the CAM within 5 days. Either of these events may trigger a CPR meeting.

#### **Products:**

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

#### **Subtask 1.9 Subcontracts**

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

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

- Manage and coordinate subcontractor activities in accordance with the requirements of this Agreement.
- Incorporate this Agreement by reference into each subcontract.
- Include any required Energy Commission flow-down provisions in each subcontract, in addition to a statement that the terms of this Agreement will prevail if they conflict with the subcontract terms.
- If required by the CAM, submit a draft of each *Subcontract* required to conduct the work under this Agreement.
- Submit a final copy of the executed subcontract.
- Notify and receive written approval from the CAM prior to adding any new subcontractors (see the discussion of subcontractor additions in the terms and conditions).

#### **Products:**

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

### **TECHNICAL ADVISORY COMMITTEE**

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

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

- 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.

## **Exhibit A**

### **Scope of Work**

- Provide recommendations regarding information dissemination, market pathways, or commercialization strategies relevant to the project products.

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

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

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

- Prepare a *List of Potential TAC Members* that includes the names, companies, physical and electronic addresses, and phone numbers of potential members. The list will be discussed at the Kick-off meeting, and a schedule for recruiting members and holding the first TAC meeting will be developed.
- Recruit TAC members. Ensure that each individual understands member obligations and the TAC meeting schedule developed in subtask 1.11.
- Prepare a *List of TAC Members* once all TAC members have committed to serving on the TAC.
- Submit *Documentation of TAC Member Commitment* (such as Letters of Acceptance) from each TAC member.

#### **Products:**

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

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

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

#### **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.



## **Exhibit A**

### **Scope of Work**

- 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

*Products that require a draft version are indicated by marking “(draft and final)” after the product name in the “Products” section of the task/subtask. If “(draft and final)” does not appear after the product name, only a final version of the product is required. **Subtask 1.1 (Products)** describes the procedure for submitting products to the CAM.*

#### **TASK 2: WEB SITE HOSTING AND DATA SERVICES**

The goals of this task are to (1) improve usability and accessibility for electricity sector stakeholders by making new, high resolution and high fidelity data available and (2) to enhance capabilities for custom data download.

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

- Maintain storage for an estimated 200 Terabytes of data developed through a variety of research projects supported by the Energy Commission and/or identified by the Energy Commission to support electricity sector resilience needs. The Cal-Adapt Climate Data Server will allow users to download primary research data through HTTP protocol.
- Continue to host and serve key selected data through the Cal-Adapt API. The Recipient will also investigate whether Network Common Data Format (netCDF) will be an acceptable data storage format within the Cal-Adapt API without any loss of performance that the Recipient has achieved using Geotiff, a data storage and organization format that has enabled real-time calculation of data underlying complex visualizations on the interactive website.
  - Incorporate several new high-resolution data sets and algorithms developed by California’s Fourth Climate Change Assessment’s energy sector portfolio into Cal-Adapt. This task will include pre-processing these data and potentially creating spatially explicit data through implementing algorithms necessary to highlight these data on web-based visualization tools.
  - Reprocess these new *Fourth Climate Change Assessment* products as needed into formats suitable to ingest within the API and/or host these data on the Cal-Adapt Data Server to make accessible to researchers, energy sector stakeholders, and the public.
- Add modeled variables from recent, ongoing, and future research products including additional sea level rise and wildfire scenario projections as they become available to Cal-Adapt Data Server. Selected variables used for building tools and visualizations will be added to Cal-Adapt API.
- Prepare a *New Data Availability Memo* detailing significant new datasets as they become available through Cal-Adapt, which can be included in blog posts as well as the Newsletter, a quarterly electronic distribution providing information related to Cal-Adapt as well as resources that support electricity sector resilience efforts .
- Provide enhanced data services that enable electricity sector stakeholders to download select data in a variety of formats, including Geotiff, netCDF, and csv.
- Develop data downloading tools that more easily allow users to select regions of interest, temporal interval, and level of temporal aggregation, for example monthly, annual, or decadal averages.
- Develop a bulk download tool to bridge the middle ground between an API user with some programming skill and a power user with desktop software. Current users

## **Exhibit A**

### **Scope of Work**

identified this as a desired tool at the Cal-Adapt User Needs Assessment Workshop that was held in September 2017 to support agreement EPC-15-008.

- Prepare and provide a *Data Download Tools Memo* that describes the new download tools and guides users on how to download various types of data from Cal-Adapt.
- Improve information accessibility to researchers, the public, and State agency staff through migrating California's Climate Change Research Catalog to a format and location that is easier to access through Cal-Adapt 2.0.
- Be prepared to transfer Cal-Adapt if needed to future recipients of competitive solicitations or to the State. The flexible, open-source architecture of Cal-Adapt enables transfer if needed to another organization for continued hosting and maintenance of the site.

#### **Products:**

- New Data Availability Memo
- Data Download Tools Memo

#### **TASK 3: ENHANCED VISUALIZATION AND CUSTOM TOOL DEVELOPMENT**

The goal of this task is to develop web-based visualizations and tools depicting climate related risks from a range of stressors on California's electricity system using data and new understandings produced by recent, ongoing, or future energy-related research projects, including those that are part of California's Fourth Climate Change Assessment. The GIF will work closely with the Energy Commission and energy sector stakeholders to identify key visualizations and custom tools to be developed under this agreement. The September 2017 Cal-Adapt User Needs Assessment Workshop feedback from electricity sector stakeholders and other users will inform ongoing and future refinements in Cal-Adapt. Climate risks around projected sea level rise and wildfire risk are areas of particular interest and concern for these stakeholders.

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

- Work closely with the CAM, TAC, and electricity sector stakeholders to identify additional climate parameters of interest (e.g. wind, solar irradiation, relative humidity), for which downscaled projections are available, and provide data access to these selected variables and new visualization tools through the Cal-Adapt API.
- Incorporate new high-resolution data and algorithms generated by energy-related research, including energy sector contributions to the Fourth Assessment into new visualization and tools.
- Develop, in close collaboration with electricity stakeholders including IOU's, CAISO, and the Energy Commission, additional custom tools and data features as identified that energy stakeholders need to support electricity sector resilience. The Recipient will envision and design these features and tools through on-site meetings with key stakeholders such as IOUs, as the specific requirements of each organization will require tools and climate parameters that are unique to their application needs.
- Enable comparative viewing of multiple datasets related to sea level rise (SLR), including data associated with California's Fourth Climate Change Assessment.

## Exhibit A

### Scope of Work

The Recipient will collaborate with domain experts who will provide consulting services to build a new SLR tool. Development will include:

- Identify and add data relevant for interpreting probabilistic SLR projections as a function of time and emissions scenario to the Cal-Adapt API, e.g. hourly SLR projections for four different GCMs (Cayan 2016, Cayan 2016b), high resolution elevation data, localized tidal data, flood extent and depth from CoSMoS, etc.
  - Enable users to compare impacts associated with different SLR projections. The tool will include functionality for comparing SLR data from different hydrodynamic models visually, functionality for calculating area of impact, and ability to download results as tables and spatial layers that give the user flexibility to overlay SLR exposure with other layers on infrastructure, land cover, land use, etc. by users within GIS software.
- Enhance the Wildfire Tool with functionality to compare projected increase in area burned with baseline historical values, and with the following:
  - Add a data visualization using wildfire severity and number of fires data at monthly timesteps to enable users to explore the timing of wildfires throughout the year and projected changes to fire season.
  - Consult with expert[s] in interpretation and analysis of wildfire risks to the electricity system to incorporate projected wildfire risk models and data to expand the Wildfire tool. Depending on the complexity of the modeling and the effort required to convert this model into a spatial data layer, the data will be added as pre-calculated datasets or calculated on the fly using the Cal-Adapt API.
  - This tool would use existing Cal-Adapt functionality for spatial aggregation and proposed enhanced functionality for temporal aggregations to allow users to explore wildfire risk statistics for a geographical area and time period of their choosing.
  - Users can select areas from existing boundaries, upload their own boundary or draw an area of interest using the electricity infrastructure data layers in Cal-Adapt (transmission lines, substations and power plants) to visualize climate risks on supply lines for materials or services needed for the functioning of the electricity system.
  - Additional functionality within custom designed tools for querying the Wildfire Risk data would enable users to view and explore areas that meet some specified criteria, for example the selection of potential suitable areas for distributed generation.
- Prepare and publish a *Sea Level Rise Tool Memo* that describes the new Sea Level Rise tool developed for this project when it becomes available, to be shared with stakeholders through the *Cal-Adapt Newsletter* and the Cal-Adapt blog.
- Prepare and publish a *Wildfire Toolkit Update Memo* that describes major new improvements and additions to the Wildfire Tool to be shared with stakeholders through the Cal-Adapt Newsletter and the Cal-Adapt blog.

## **Exhibit A**

### **Scope of Work**

- Prepare and publish quarterly *Cal-Adapt Update Memos* that describe major new tools and features as they are made available, to be published on the *Cal-Adapt Newsletter* and the Cal-Adapt blog.
- Provide minor updates to the site that enhance its usability through linkages with other adaptation-related resources of importance to California, such as the Integrated Climate Adaptation and Resiliency Program (ICARP), Climate Resilience Toolkit, and Climate Console.

#### **Product:**

- Sea Level Rise Tool Memo
- Wildfire Toolkit Update Memo
- Cal-Adapt Update Memos

#### **TASK 4: OUTREACH AND TRAINING**

The goal of this task is to engage with a range of electricity sector stakeholders, including risk management and resilience practitioners, planners, resource managers, educators and ratepayers in California through targeted workshops, webinars, and presentations. Feedback from users forms a key component to the successful development of applications that provide actionable information to project stakeholders. Outreach and training will target a range of energy stakeholders along with interested planners, managers, climate practitioners, educators and California ratepayers through a series of presentations, workshops, and webinars.

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

- Engage key IOU stakeholders by offering on-site workshops designed to introduce new features and elicit feedback on energy sector needs for targeted custom tool development.
- Host and facilitate a minimum of two User Needs Assessment Workshops focused on the electricity sector and open to the public to introduce users to new tools and features and elicit stakeholder comments and insights to help guide web site development. The audience will be selected in consultation with the Energy Commission, our Technical Advisory Committee, and other energy sector partners.
- Provide the Workshop Presentation Materials to the CAM.
- Provide for outreach and training of potential new users by developing and facilitating a quarterly series of virtual workshops (Webinars) that will target practitioners involved in the electricity sector:
  - Develop one general webinar to introduce the many tools and features in Cal-Adapt that enable users to incorporate locally relevant climate considerations into their projects.
  - Develop additional webinars of interest to users, such as a training focused on using the Cal-Adapt API, and potentially training on using the proposed updated sea level rise and wildfire tools.
- Develop Webinar Presentation Visuals and graphics to support training and outreach efforts targeting electricity sector stakeholders.
- Present website development and results at applicable conferences to promote the new Cal-Adapt electricity sector visualizations and tools.

## **Exhibit A**

### **Scope of Work**

- Develop content for a quarterly Cal-Adapt Newsletter that provides stakeholders with information related to uses of Cal-Adapt, new features, and relevant resources such as research papers and documents illuminating utility sector resilience efforts.

#### **Products:**

- Cal-Adapt Newsletter
- Workshop Presentation Materials
- Webinar Presentation Visuals

#### **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.

## **Exhibit A**

### **Scope of Work**

- 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.
  - 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

## **Exhibit A**

### **Scope of Work**

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(s) on the project.
- When directed by the CAM, participate in annual EPIC symposium(s) sponsored by the California Energy Commission.
- Provide at least (6) six *High Quality Digital Photographs* (minimum resolution of 1300x500 pixels in landscape ratio) of pre and post technology installation at the project sites or related project photographs.
- Prepare a *Technology/Knowledge Transfer Report* on technology transfer activities conducted during the project.

#### **Products:**

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

## **V. PROJECT SCHEDULE**

Please see the attached Excel spreadsheet.



STATE OF CALIFORNIA

STATE ENERGY RESOURCES  
CONSERVATION AND DEVELOPMENT COMMISSION

RESOLUTION - RE: UNIVERSITY OF CALIFORNIA, BERKELEY

**RESOLVED**, that the State Energy Resources Conservation and Development Commission (Energy Commission) adopts the staff CEQA findings contained in the Agreement or Amendment Request Form (as applicable); and

**RESOLVED**, that the Energy Commission approves Agreement EPC-17-033 from GFO-16-311 with The Regents of the University of California, on behalf of the Berkeley campus for a \$900,000 grant to build on the Cal-Adapt platform to provide enhanced tools, data services, and visualizations. Priority tools will address sea level rise and wildfire; 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 March 21, 2018.

AYE: [List of Commissioners]

NAY: [List of Commissioners]

ABSENT: [List of Commissioners]

ABSTAIN: [List of Commissioners]

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Cody Goldthrite,  
Secretariat