STATE OF CALIFORNIA

GRANT REQUEST FORM (GRF)

CEC-270 (Revised 10/2015)

CALIFORNIA ENERGY COMMISSION

New Agreement FED-15-001 (To be completed by CGL Office)

Division	Agreement Manager:	MS-	Phone
ERDD	Susan Wilhelm	43	916-327-1545

Recipient's Legal Name	Federal ID Number
The Regents of the University of California, on behalf of the Berkeley campus	94-6002123

Title of Project
Extreme Weather-Related Vulnerability and Adaptation Options for California's Transportation Fuel Sector

Term and Amount	Start Date	End Date	Amount
	6/30/2016	2/28/2018	$ 1,684,999

Business Meeting Information

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

Proposed Business Meeting Date	6/14/2016	☐ Consent	☒ Discussion
Business Meeting Presenter	Susan Wilhelm	Time Needed:	5 minutes

Please select one list serve. Select

Agenda Item Subject and Description

UNIVERSITY OF CALIFORNIA, Berkeley. Proposed resolution approving Agreement FED-15-001 with the Regents of the University of California, on behalf of the Berkeley campus for a $1,684,999 grant to fund research to identify and assess vulnerabilities of California's transportation fuel sector to extreme weather-related events and identify options to promote resilience. (PVEA funding) Contact: Susan Wilhelm. (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":
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: 14 CCR 15306
   - ☐ Common Sense Exemption. 14 CCR 15061 (b) (3)

   Explain reason why Agreement is exempt under the above section:
   This grant will fund basic data collection, research, and resource evaluation activities by identifying and assessing vulnerabilities in California's transportation fuel sector to extreme weather related events and options to promote resilience, which will not result in a serious or major disturbance to an environmental resource.

   ☐ 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

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

Legal Company Name:	Budget
The Scalingi Group, LLC	$ 298,755
TBN	$ 50,000

STATE OF CALIFORNIA

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

Budget Information

Funding Source	Funding Year of Appropriation	Budget List No.	Amount
PVEA	15-16	401.008	$1,684,999
			$
			$
			$
			$
			$
R&D Program Area: EGRO: EA		TOTAL:	$1,684,999
Explanation for "Other" selection			
Reimbursement Contract #:		Federal Agreement #:	

Recipient's Administrator/ Officer		**Recipient's Project Manager**	
Name:	Jue Sun	Name:	Karlene Roberts
Address:	2111 Bancroft Way	Address:	8Th Floor Barrows Hall University of California
City, State, Zip:	Berkeley, CA 94720-4351	City, State, Zip:	Berkeley, CA 94720-0001
Phone:	510-642-6177 / Fax: - -	Phone:	510-225-5389 / Fax: - -
E-Mail:	juesun@berkeley.edu	E-Mail:	karlene@haas.berkeley.edu

Selection Process Used

- ☒ Competitive Solicitation — Solicitation #: GFO-15-320
- ☐ First Come First Served Solicitation

The following items should be attached to this GRF

Item	N/A	Attached
1. Exhibit A, Scope of Work		☒ Attached
2. Exhibit B, Budget Detail		☒ Attached
3. CEC 105, Questionnaire for Identifying Conflicts		☒ Attached
4. Recipient Resolution	☒ N/A	☐ Attached
5. CEQA Documentation	☒ N/A	☐ Attached

Agreement Manager	Date	Office Manager	Date	Deputy Director	Date

Exhibit A

Project Summary & Scope of Work

I. TASK ACRONYM/TERM LISTS

A. Task List

Task #	CPR[1]	Task Name
1		General Project Tasks
2	x	Project Requirements Delineation and Context
3	x	Assessment of Vulnerability and Resilience Options
4		Evaluation of Project Benefits
5		Knowledge Transfer Activities

B. Acronym/Term List

Acronym/Term	Meaning
CAM	Commission Agreement Manager
CAO	Commission Agreement Officer
CCRM	UC Berkeley's Center for Catastrophic Risk Management
CPR	Critical Project Review
DEAP	Distributed Evaluation and Assessment Program
DIF	Decision Informed Framework
SABER	Single Automated Business Exchange for Reporting
TAC	Technical Advisory Committee
TFS	Transportation Fuel Sector
XChangeCore	Open-source software originally developed by the U.S. Department of Homeland Security, now operated by a not-for-profit corporation, that fosters interoperability between applications to synthesize content from a variety of data sources, both geospatial and non-geospatial.

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

A. Purpose of Agreement

The purpose of this Agreement is to fund an initial assessment of the vulnerability of California's Transportation Fuel Sector (TFS) to extreme weather-related events, identify resilience options and implementation strategies, and finally identify topics for future refinement and study.

B. Problem/ Solution Statement

[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

Project Summary & Scope of Work

Problem

Although past and ongoing scientific research, including research supported by the Energy Commission, has identified extreme weather-related vulnerabilities and explored adaptation options for electricity and natural gas systems, and California's Department of Transportation conducts vulnerability and adaptation studies for the surface transportation infrastructure (e.g., state-owned highways and bridges), similar studies are not available for the state's transportation fuel sector (TFS). However, prior investigations of the electricity, natural gas, and surface transportation systems illustrate that without proper research and planning, California will be ill-prepared for impacts of future extreme events. Lack of preparation for extreme weather-related events would increase the likelihood of TFS interruptions that are both costly and hazardous.

Solution

The Recipient will provide an initial assessment of the vulnerability of California's transportation fuel sector (TFS) to extreme weather events (such as: flooding, wildfires, sea level rise, storm surge and wave dynamics, and saltwater intrusion) working in close collaboration with TFS stakeholders so that pragmatic resilience strategies can be identified and priorities established for further investigation. The work will leverage a multi-stakeholder engagement process and introduce and demonstrate a state-of-the-art distributed information sharing mechanism capable of sharing TFS mapped resources while protecting the proprietary and sensitive nature of their data. We will begin this process with the introduction of the U.S. Department of Homeland Security-developed, free Single Automated Business Exchange for Reporting (SABER)/XChangeCore system, which is currently being utilized by the California Earthquake Clearinghouse for more than 100 multi-sector stakeholders. This system allows high-detail, high-accuracy data to be shared on the sector basis, while maintaining privacy and confidentiality of stakeholder data that is required for detailed internal analyses, but need not be "exposed" when sharing outcomes of analytic scenarios. We will then introduce a Distributed Evaluation and Assessment Program (DEAP) that allows each member of the TFS to share their system wide infrastructure concerns while maintaining control and privacy of their proprietary data. We will assess and evaluate the effectiveness of these systems as a solution to understanding, measuring and mapping the vulnerability of the state's transportation fuel sector.

C. Goals and Objectives of the Agreement

Agreement Goals

The goal of this Agreement is to provide a vulnerability assessment of California's TFS with regard to extreme weather events with sufficient breadth, depth, and fidelity to inform identification and selection of resilience strategies. This will include:

- Conducting an evaluation of the California transportation fuel system's vulnerability to extreme weather-related events;
- Identifying and prioritizing mitigation solutions (proactive actions to reduce risk to their current or future infrastructure) and other resilience options into a risk reduction strategy for action;

- Delineating areas of further investigation; and
- Identifying a portfolio of costs to consumers associated with the identified vulnerabilities and needed resilience options.

Verification will be primarily accomplished via TFS stakeholder validation to confirm/refute the generated outcomes from this project, with representatives across the life-cycle of TFS elements. Stakeholders will include not just the transportation fuel sector, but end-users (interdependent critical customers such as first responders), as well. This approach provides a spectrum of viewpoints to assess, gauge the relevance of the developed outputs, and validate implementation feasibility across the life-cycle of the TFS.

Measurement metrics of the research will include: degree (percent) of stakeholder agreement with findings of the vulnerability assessment; engagement level of the primary TFS community and participation in the information sharing system that includes the DEAP tool noted in the "Solution" described above and the direct incorporation of industry-specific resilience measurement metrics identified through this study.

Agreement Objectives

The objectives of this Agreement are to:

- Undertake a sector-wide and multi-stakeholder engagement process through individual meetings, focus groups, workshops, and surveys to work with the TFS stakeholders to identify pragmatic solutions for addressing critical impacts and implementation strategies and barriers;

- Work with TFS entities to introduce and demonstrate a state-of-the-art distributed information sharing system *SABER/XChangeCore*, a data sharing system created to share diverse information on disaster impacts and other hazard-related data) and evaluate its potential for identifying vulnerabilities within TFS. The system allows high-detail, high-accuracy data to be shared on the sector basis, while maintaining privacy and confidentiality of stakeholder data that is required for detailed internal analyses, but need not be "exposed" when sharing outcomes of analytic scenarios;

- Work with TFS entities to incorporate the innovative Distributed Evaluation and Assessment Program (DEAP) tool, into an overall system of data sharing while allowing TFS organizations to maintain control over their proprietary data;

- Work with TFS entities to assess the effectiveness of the data sharing strategies for system wide collaboration in risk reduction strategies;

- Use analytic scenarios to map and examine vulnerabilities and resilience implications of extreme weather events such as: flooding, wildfires, sea level rise, storm surge and wave dynamics, and saltwater intrusion;

- Enhance and expand current models where necessary to extend to state-wide coverage; and

- Deliver to the TFS results from our extreme weather event models identifying vulnerabilities in the TFS system and request their response strategies and cost estimates to mitigate. We will work with the TFS to determine if it is possible to estimate the costs to consumers from failure to address identified impacts.

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:

- 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.

Project Summary & Scope of Work

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 <u>administrative portion</u> 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 <u>technical portion</u> 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.

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.

  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

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
- Approval of Final Report Outline

Subtask 1.6.2 Final Report

The Recipient shall:
- Prepare a *Final Report* for this Agreement in accordance with the approved Final Report Outline, Style Manual, and Final Report Template provided by the CAM with the following considerations:
  - Ensure that the report includes the following items, in the following order:
    - Cover page (**required**)
    - Credits page on the reverse side of cover 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.
    - 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.

  - o Ensure that the document omits subjective comments and opinions. However, recommendations in the conclusion of the report are allowed.
  - o 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

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)*

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.
- 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 and final 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, pipeline operators, and trade representatives);
- Public interest market transformation implementers;
- Local government officials 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;
- Petroleum sector representatives (e.g. owners or operators of refineries, marine terminals, pipelines);
- 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.
- Prepare *TAC Meeting Summaries* that include any recommended resolutions of major TAC issues.

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

IV. TECHNICAL TASKS

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

TASK 2 Project Requirements Delineation and Context
The goal of this task consists of articulating the research questions into a series of well-specified problem statements, and establishing the context in which the research questions are to be evaluated.

The Recipient shall:
- Plan, organize (generate a list of invitees, overview, invitation, agenda, and other materials as needed*)* and conduct two Public Research Priorities Workshops (one in Northern California and the other in Southern California) to Identify Priorities for Investigation of TFS Resilience to Extreme Events in close collaboration with the CAM;
- Prepare a *Proceedings of Public Research Priorities Workshops* that summarizes the presentations, discussions, and conclusions from the workshops;
- Prepare a *Formulation of the Problem Statement* with as much specificity as possible at this stage of the research, to focus on decision points that will need to be addressed in order to leverage resilience options and strategies to reduce undesirable vulnerabilities of the TFS to extreme weather-related events;
- Establish the context of the TFS system: organizations, procedures, hardware, structures, interfaces, operators, environments and associated relationships;
- Prepare a *TFS Context-Specific Glossary* of terms needed to describe the TFS system;

- Prepare a *Coarse System Schematic* identifying decision point metric(s) and the breadth (the parts of the system that need to be modeled and to what extent) , depth (level of hierarchy the model must encompass), fidelity (required level of detail), and type of analytic model (quantitative, qualitative or mixed) required to appropriately address the aforementioned decision points;
- Prepare a *Validation Memo* summarizing validation results from stakeholder workshops under Task 3. Validation of the methodologies employed in this research will be done by assessing convergent/discriminant validity across data sets. This is a qualitative logical approach to assessing validity in data sets (Jick, T. (1979) Mixing qualitative and quantitative methods: Triangulation in action. Administrative Science Quarterly, 24, 602-611).
- Prepare an *Outline of Decision Informed Framework (DIF) Memo* that will identify the aforementioned decision points;
- Leveraging the products above as well as input from the TAC and public workshops to identify priorities for investigation of petroleum sector resilience to extreme events, prepare:
  - *Inventory of Existing Best Practices from TFS Stakeholders Memo* that summarizes best practices that are currently being used by individual TFS organizations with respect to vulnerability assessment and resilience options for extreme weather events that are scalable and transferrable to other TFS organizations;
  - *Inventory of Known Gaps from TFS Stakeholders Memo* that summarizes existing TFS-wide challenges associated with data gaps, modeling gaps, understanding gaps, conceptual model gaps etc. with respect to vulnerability assessment and resilience options for extreme weather events.
  - *Inventory of Existing Data and Analytic Tools Memo* that summarizes existing data and analytic tools that are currently being used by individual TFS organizations with respect to vulnerability assessment and resilience options for extreme weather events that are scalable and transferrable to other TFS organizations.
- Participate in Critical Project Review Meeting

Products:

- Proceedings of Public Research Priorities Workshops
- Formulation of the Problem Statement
- TFS Context-Specific Glossary
- Coarse System Schematic
- Validation Memo
- Outline of Decision Informed Framework (DIF) Memo
- Inventory of Best Practices from TFS Stakeholders Memo
- Inventory of Known Gaps from TFS Stakeholders Memo
- Inventory of Existing Data and Analytic Tools Memo

TASK 3 Assessments of Vulnerability and Resilience Options

The goal of this task is to initiate stakeholder-engaged assessments, examining vulnerabilities and resilience strategies at a fine level of analysis. The assessments will be stakeholder validated through three workshops in which participants will review, discuss, refine, provide revisions and/or provide additional data. Two of the workshops will be sector-specific to the TFS and closed to the public. The third workshop, open to the public, is a multi-sector workshop comprised of selected utilities, other sectors, and government entities that are dependent on fuel. The workshops, that are closed to the public, will require non-disclosure agreements to address sensitive information. It is anticipated that using the Distributed Evaluation and Assessment Program (DEAP) Tool for data sharing will encourage private sector petroleum companies to participate since there is no risk of their proprietary/sensitive information being disclosed, and they stand to benefit from the exchange with industry partners. In addition, their participation provides an opportunity to guide the modeling research on measuring the potential impacts due to climate change and extreme weather events on their own infrastructure.

The Recipient shall:

- Perform an *Initial TFS Hazard Reconnaissance Assessment* to provide a starting point for discussions with TFS stakeholders. Coordinate scenarios of extreme events with scenarios used for California's Fourth Climate Change Assessment, where appropriate and available. (These scenarios will be made available by the CAM.) The *Initial TFS Hazard Reconnaissance Assessment* shall:
    - Assemble existing weather-related hazard information: identify increased-hazard risk areas and make a first cut at identifying infrastructure impacts.
    - A first approximation of this entire study can be done virtually immediately with the GIS data already in hand from Recipient's previous study (Radke et al 2016) with accurate and detailed SLR-Extreme-Storm-Event-affected coastal flooded areas already delineated in three spatial dimensions and current (NPMS, 2013) fuels-pipeline data. The simple overlay/intersection of these two datasets will provide Recipient with kilometers/miles of fuels pipelines that would be inundated in a range of scenarios representing various levels of sea level rise coupled with extreme storm events. This will be added to the results of several related studies such as: USACE study, DWR FloodSAFE, FEMA 100, 200, 500 year flood studies.
    - An analogous overlay analysis will be applied to production (refineries) and distributed facilities to calculate acreages of coastal inundated facilities under a range of scenarios.
    - Hydrodynamic three dimensional modeling will be applied in upland watersheds to predict river bank overtopping and flooding. An overlay analysis will be done to quantify inundation risks to the fuels infrastructure related to inland (river) flooding. Linear and acreage numbers will be calculated, drawing from existing flood data sources (local/state/federal). Scenarios for inland flooding will be coordinated with California's Fourth Climate Change Assessment.
    - Fire hazard (State Responsibility Area) maps will be used to initially identify potentially high fire risk areas near fuels-infrastructure and will then improve the spatial resolution of the data by incorporating NAIP 2012 data with NED surface data and other land use data within a fire model (FlamMap) to delineate fire hazard

zones. Wildfire scenarios for California's Fourth Climate Change Assessment will be used where available and appropriate.

  - Data development is necessary in some regions of California as some publically available data sources are incomplete or need further refinement.
  - Since a more significant GIS activity relates to Sea Level Rise (SLR) and extreme storm events, inland flooding, fire hazard zones, and levee subsidence impacts to support infrastructures (those interdependent industry sectors upon which the fuels-industry relies), the Recipient will specify a complete analytical model that draws on information and direction from sector specific technical advisors, operators and other personnel. Recipient will begin this process with the understanding that the transportation system (pipelines, roads, bridges, rail and waterways) is central to the TFS infrastructure.
  - A Critical Task Review will be undertaken with the TAC to insure that the proposed methodology covers all critical areas identified in the project.

- Conduct a series of confidential stakeholder workshops. We will hold workshops with various sectors of industry to identify, model and map impacted elements of these infrastructures. These data are necessary to inform what is the most challenging aspect of this task: that is interactively engaging the fuel-infrastructure operators, with their own deep understanding of engineering and operational dynamics of their own systems, to interactively respond to the information developed. We will seek their cooperation to identify: (a) impacted components, operations, management practices and interactions with other infrastructure systems and operations; (b) the nature and extent of the risks that these impacts represent to their operations; and (c) changes in operation, physical facilities (hardware), financing, regulations and other elements which meet the challenge of the identified higher-risk elements related to future enhanced weather-related events. Inputs will be elicited from sector, government, and other relevant stakeholders, including through meetings and workshops to secure necessary engagement and expertise, meet data requirements, and guide the project outcomes. A *Summary of Workshop 1*, *Summary of Workshop 2*, and a *Summary of Workshop 3* will be prepared. Additionally, an *Integrated Workshops Summary* will be prepared synthesizing the outcomes of all three workshops.

- Following the initial Hazard Reconnaissance and receipt of feedback from TFS stakeholders, as well as from the initial TAC meeting, we will refine vulnerability measures/thresholds that articulate the operational parameters of the TFS systems within 'normal' operations and 'abnormal/failed' conditions and that are reflective of the TFS. Metrics of the research will include: degree (percent) of stakeholder agreement with findings of the vulnerability assessment, degree of implementation of vulnerability thresholds across the TFS domain (established via poll surveys). Produce an *Inventory of Vulnerability Measures/Thresholds*.

- Summarize, based on vulnerability and resilience options assessments, primary resilience metrics that are cross-cutting throughout the TFS and measure (via surveys with participating stakeholders) the direct incorporation of industry-specific resilience measurement metrics identified. Produce an *Inventory of TFS Resilience Metrics*.

Project Summary & Scope of Work

- Develop a *Distributed Evaluation and Assessment Program (DEAP) Tool* to enable use of 'distributed analyses,' which consist of a suite of organization-specific analyses able to generate outputs that can be rapidly aggregated for further analysis. We will explore using these data in a system-wide decision support model -- without having to divulge sensitive information to outside organizations -- while still yielding high resolution, actionable, multi-jurisdictional results.

  The DEAP Tool will be the basis for conducting an initial assessment of the vulnerability of California's transportation fuel sector (TFS) to extreme weather events, working in close collaboration with TFS stakeholders so that pragmatic resilience strategies can be identified and priorities established for further investigation. We will leverage a multi-stakeholder engagement process and implement a state-of-the-art distributed information sharing framework. This structure will allow high-detail, high-accuracy data to be shared on the sector basis, while maintaining privacy and confidentiality of stakeholder data that is required for detailed internal analyses, but need not be "exposed" when sharing outcomes of analytic scenarios.

  Analytic scenarios will examine vulnerabilities and resilience implications of extreme weather events such as droughts, flooding (inland, flash or coastal), wildfires, drought-induced subsidence, sea level rise, storm surge and wave dynamics, and saltwater intrusion. (Our current models will be enhanced to include riverine effects, as well extended to state-wide coverage). The analytic scenarios will be the basis for working interactively with the TFS stakeholders to identify pragmatic solutions for addressing critical impacts and implementation strategies and barriers. Generate a *Summary of TFS Vulnerability Assessment* and *Summary of TFS Resilience Options/Strategies*.

- Explore the idea of developing, in coordination with the CAM and the Energy Commission's Transportation Data Fuels Unit, language requesting that for all confidential data that are shared with the Recipient through TFS stakeholder engagement, that the TFS (petroleum sector) stakeholders submit a copy of the data directly to the Energy Commission's Transportation Fuels Data Unit. Data submission would be subject to the Petroleum Industry Information Reporting Act (PIIRA) protocols, conventions, and protections. Recipient shall prepare a *Memo Describing Approach for Requesting Data* that describes the conclusion of deliberations related to data submission.

- Participate in Critical Project Review Meeting

- Under the direction of the CAM, submit results to a peer review process and respond to comments to the satisfaction of the CAM. (Publication of study results in a peer-reviewed journal can satisfy this requirement).

Products:

- Initial TFS Hazard Reconnaissance Assessment
- Summary of Workshop 1
- Summary of Workshop 2

- Summary of Workshop 3
- Integrated Workshops Summary
- Inventory of Vulnerability Measures/Thresholds
- Inventory of TFS Resilience Metrics
- Distributed Evaluation and Assessment Program (DEAP) Tool
- Summary of TFS Vulnerability Assessment
- Summary of TFS Resilience Options/Strategies
- Memo Describing Approach for Requesting Data

TASK 4 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 for users of California's transportation system. Examples of information that may be requested in the questionnaires include:
  - <u>For Research Studies:</u>
    - 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 petroleum sector resilience efforts, or has resulted in other non-energy benefits.
    - An estimate of energy and non-energy benefits.
    - Data on potential job creation, market potential, economic development, and increased state revenue as a result of project.
    - A discussion of project product downloads from websites, and publications in technical journals.
    - A comparison of project expectations and performance. Discuss whether the goals and objectives of the Agreement have been met and what improvements are needed, if any.
- Respond to CAM questions regarding responses to the questionnaires.
- Participate in a Critical Project Review Meeting.

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 5 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 *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, petroleum sector stakeholders, local governments, 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 knowledge transfer activities in accordance with the 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.
- Provide at least (6) six *High Quality Digital Photographs* (minimum resolution of 1300x500 pixels in landscape ratio) related to the project.
- Prepare a *Knowledge Transfer Report* on technology transfer activities conducted during the project.
- Create a website to enable dissemination of validated outcomes via *Website*.
- Dissemination of validated outcomes via *Publications.*
- Hold public dissemination Workshops and summarize workshop proceedings, including presentations and discussion, in a *Memo Summarizing Public Dissemination Workshops*.
- Participate in a Critical Project Review Meeting.

Project Summary & Scope of Work

Products:

- Initial Fact Sheet (draft and final)
- Final Project Fact Sheet (draft and final)
- Presentation Materials (draft and final)
- High Quality Digital Photographs
- Knowledge Transfer Plan (draft and final)
- Knowledge Transfer Report (draft and final)
- Website
- Publications
- Memo Summarizing Public Dissemination Workshops

V. PROJECT SCHEDULE

Please see the attached Excel spreadsheet.

RESOLUTION NO: 16-0614-15

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 FED-15-001 with the Regents of the University of California, on behalf of the Berkeley campus, for a $1,684,999 grant to fund research to identify and assess vulnerabilities of California's transportation fuel sector to extreme weather-related events and identify options to promote resilience; and

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

CERTIFICATION

The undersigned Secretariat to the Commission does hereby certify that the foregoing is a full, true, and correct copy of a Resolution duly and regularly adopted at a meeting of the California Energy Commission held on June 14, 2016.

AYE: [List of Commissioners]
NAY: [List of Commissioners]
ABSENT: [List of Commissioners]
ABSTAIN: [List of Commissioners]

Cody Goldthrite,
Secretariat