STATE OF CALIFORNIA

GRANT REQUEST FORM (GRF)

CEC-270 (Revised 12/2019) CALIFORNIA ENERGY COMMISSION

A) New Agreement # EPC-19-060 (to be completed by CGL office)

B) Division	Agreement Manager:	MS-	Phone
ERDD	Jeffrey Sunquist	43	916-327-1623

C) Recipient's Legal Name	Federal ID Number
The Regents of the University of California on behalf of the Merced Campus	27-0093858

D) Title of Project
Modeling of Long-Duration Storage for Decarbonization of California Energy System

E) Term and Amount

Start Date	End Date	Amount
6/30/2020	3/30/2023	$ 1,254,955

F) Business Meeting Information

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

Proposed Business Meeting Date 07/08/2020 ☐ Consent ☒ Discussion

Business Meeting Presenter Jeffrey Sunquist Time Needed: 5 minutes

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

Agenda Item Subject and Description:

THE REGENTS OF THE UNIVERSITY OF CALIFORNIA, ON BEHALF OF THE MERCED CAMPUS. Proposed resolution approving agreement EPC-19-060 with The Regents of the University of California, Merced for a $1,254,955 grant to understand the role and cost targets for long-duration storage options and evaluate actions that California could take to aid the state of California to reach zero-carbon and related goals by 2045 and adopting staff's determination that this action is exempt from CEQA. The project will improve existing grid expansion modeling tools, determine the role of emerging energy storage resources in the expansion of California's energy grid, and evaluate the cost targets for long duration energy storage under different scenarios.

G) 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.
      - ☐ 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: This project involves only computer modeling and paper studies of energy storage scenarios. No physical construction will occur as part of this project. Therefore, it falls under the common sense exemption.

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

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

Legal Company Name:	**Budget**
University of California, Berkeley	$ 505,137
	$
	$
	$
	$
	$
	$
	$
	$
	$

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

Legal Company Name:

STATE OF CALIFORNIA
GRANT REQUEST FORM (GRF)
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J) Budget Information

Funding Source	Funding Year of Appropriation	Budget List Number	Amount
EPIC	18-19	301.001F	$1,254,955
			$
			$
			$
			$
			$

R&D Program Area: ESRO: ETSI TOTAL: $ 1,254,955

Explanation for “Other” selection

Reimbursement Contract #: Federal Agreement #:

K) Recipient’s Contact Information

1. Recipient’s Administrator/Officer

Name: Fernando Alvarez

Address: 5200 N Lake Rd

Sponsored Reserach Services

City, State, Zip: Merced, CA 95343-5001

Phone: 209-382-4445

E-Mail: spo@ucmerced.edu

2. Recipient’s Project Manager

Name: Sarah Kurtz

Address: 5200 N Lake Rd

Sponsored Reserach Services

City, State, Zip: Merced, CA 95343-5001

Phone: 303)881-5085

E-Mail: skurtz@ucmerced.edu

L) Selection Process Used

☒ Competitive Solicitation Solicitation #: GFO-19-308

☐ First Come First Served Solicitation Solicitation #:

M) The following items should be attached to this GRF

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
Scope of Work

k

I. TASK ACRONYM/TERM LISTS

A. Task List

Task #	CPR[1]	Task Name
1		General Project Tasks
2	X	Baseline Development
3		Future Energy Technology Alternatives
4	X	Grid Scenario Development
5		Grid Scenario Analysis
6		Public Input
7		Evaluation of Project Benefits
8		Technology/Knowledge Transfer Activities

B. Acronym/Term List

Acronym/Term	Meaning
CAM	Commission Agreement Manager
CAO	Commission Agreement Officer
CEC	California Energy Commission
CPR	Critical Project Review
CPUC	California Public Utility Commission
DOE	Department of Energy
IOU	Investor-Owned Utility
POU	Publicly Owned Utility
TAC	Technical Advisory Committee

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

A. Purpose of Agreement

The purpose of this Agreement is to understand the role of and cost targets for long-duration storage options to aid the state of California to reach zero-carbon and related goals by 2045. Multiple technology options will be investigated. Scenarios will be proposed for down selection and further evaluation. The final analysis will include an evaluation of actions that California could take to successfully reach all goals.

B. Problem/ Solution Statement

Problem

The challenge is to meet all of California's clean-energy goals with low-cost solutions. Low-cost solar and wind electricity are a partial solution, but the public would also benefit from low-cost

[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.

electricity when solar and wind electricity are not available (at night and on calm days, respectively). While many new technologies show promise to provide the needed energy storage and demand management, none are firmly established.

Modeling of California's energy systems requires thousands of assumptions and the assumptions can vary widely. The state of California can implement time of use rates or demand management programs that can help to shift load to times when renewable electricity is available. These actions have the potential to greatly accelerate the adoption of new storage technology if they are well planned. Our challenge is to aid in identifying which actions to take and what the timing of those actions should be by studying the roles and cost targets of storage technologies.

Solution
The Recipient will model expansion of the grid, analyze relevant technologies, and define and analyze relevant scenarios. Past work has already been instrumental in setting goals for the state of California using the SWITCH model. The team's expertise will expand on the past work and compare results from SWITCH and RESOLVE to define the role and useful cost targets for long-duration storage. Additionally, the Recipient will improve inputs to the model based on interviews with industry experts (from its Storage Advisory Board) and analysis based on those interviews. For example, learning curves will be used to estimate the anticipated prices of promising technologies as they are scaled to gigawatt levels, and the potential for rapid scale up will be evaluated in light of the extent to which the new technology leverages existing supply chains and other attractive market opportunities.

C. Goals and Objectives of the Agreement

Agreement Goals
The goals of this Agreement are to improve existing grid expansion modeling tools, determine the role of emerging energy resources in the expansion of California's energy grid, and evaluate the cost targets for long duration energy storage. The modeling tools used in this Agreement will be able to model storage over multiple days to better understand an investment in long-duration storage for California-relevant weather patterns. Application of those modeling tools will identify the cost that a storage technology will need to hit in order to be widely adopted.

Ratepayer Benefits:[2] This Agreement will result in the ratepayer benefits of greater electricity reliability, lower costs, and reduced pollution by identifying the duration of storage needed to enable high penetration of solar and wind power plants at low costs. This identified pathway would reach California's clean-energy targets at the lowest possible cost. Cleaner air, low cost electricity and resilient electricity supply are all of high value to ratepayers. While it is already anticipated that grid-scale long duration energy storage will be critical for a decarbonized power system, it is not yet understood whether 2-4 hours of battery storage will be adequate or whether the decarbonized system may be reduced in cost by adding longer duration storage. This project will answer that question.

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

Technological Advancement and Breakthroughs:[3] This Agreement will lead to technological advancement and breakthroughs in grid expansion modeling, by enabling multi-day modeling of electricity generation and storage to meet the load during days when both sunshine and wind are in short supply. This multi-day modeling will enable evaluation of the cost targets for emerging long-duration energy storage and related technologies, thereby overcoming barriers to the achievement of the State of California's statutory energy goals.

Agreement Objective

The objective of this Agreement is to identify the actions that the State of California could take to meet it's clean-energy goals with long duration energy storage and increased penetration of zero carbon energy resources. Existing models will be modified to be able to handle multi-day modeling. Weather and load data will be identified and combined with the multi-day modeling capability in order to simulate times when solar and wind electricity would be stored over multiple days. The cost of the storage will be varied to identify the cost needed in order to show the value of being able to store electricity as a function of the number of hours of storage.

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

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:
        - 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.

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

The technical portion of the meeting will include discussion of the following:
- o The CAM's expectations for accomplishing tasks described in the Scope of Work;
- o An updated Project Schedule;
- o Technical products (subtask 1.1);
- o Progress reports and invoices (subtask 1.5);
- o Final Report (subtask 1.6);
- o Technical Advisory Committee meetings (subtasks 1.10 and 1.11); and
- o 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.)*

Exhibit A
Scope of Work

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

Products:

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

TECHNICAL ADVISORY COMMITTEE

Subtask 1.10 Technical Advisory Committee (TAC)

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

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

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

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

Exhibit A
Scope of Work

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. The list shall include the expertise of each proposed TAC member and the value to the project.
- 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.

The TAC shall:

- Help set the project team's goals and contribute to the development and evaluation of its statement of proposed objectives as the project evolves.
- Provide a credible and objective sounding board on the wide range of technical and financial barriers and opportunities.
- Help identify key areas where the project has a competitive advantage, value proposition, or strength upon which to build.
- Advocate on behalf of the project in its effort to build partnerships, governmental support and relationships with a national spectrum of influential leaders.
- Ask probing questions that insure a long-term perspective on decision-making and progress toward the project’s strategic goals.

Products:

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

IV. TECHNICAL TASKS

TASK 2: BASELINE DEVELOPMENT

The goal of this task is to develop a baseline description of the current electrical grid in California and planned expansion to use as a starting point for developing other grid expansion scenarios.

Subtask 2.1: Data Assembly for Baseline Development

The goal of this subtask is to collect and summarize data as the first step in developing a baseline description of the current electrical grid in California and planned expansion to use as a starting point for developing other grid expansion scenarios.

The Recipient shall:

- Gather publicly available information about existing and proposed electricity generating systems (including conventional and renewable and their distribution within the state) from the CEC, DOE, CPUC, IOUs, POUs, Community Choice Aggregators, industry associations and academic reports.
- Gather publicly available information about existing and proposed energy storage systems and their distribution within the state from the CEC, DOE, CPUC, IOUs, POUs, Community Choice Aggregators, industry associations and academic reports.
- Gather publicly available information about electricity demand and its distribution including information about EV density, EV charging locations, availability of demand response services, and use of microgrids for load management from the CEC, DOE, CPUC, IOUs, POUs, Community Choice Aggregators, industry associations and academic reports.
- Include in this data assembly process existing scenarios such as CEC-500-2018-012[4] and inputs from state agency staff regarding climate change and other relevant studies.
- Summarize commonalities and identified differences in data sets in the draft version of the *Baseline Description* which documents the current and anticipated electricity generating resources and storage resources, as well as existing loads and expected growing loads such as growth of EV ownership, locations of EV charging stations, demand response programs, and use of microgrids for load management.
- Update the final version of the *Baseline Description* based on feedback from the CEC.

Products:

- Baseline Description (draft and final)

[4] Deep Decarbonization in a High Renewables Future
https://ww2.energy.ca.gov/2018publications/CEC-500-2018-012/CEC-500-2018-012.pdf

Subtask 2.2: Confirmation of Baseline Data and Approach
The goal of this subtask is to achieve agreement with the CEC on the baseline data and approach for next steps.

The Recipient shall:

- Describe modeling and scenario development approach in the draft version of the *Modelling Approach Description*, which will include a definition and description of the model(s) that will be used to implement the baseline data into a baseline scenario as well as describing the approach to developing the scenarios, including assumptions used and model limitations.
- Update the final version of the *Modeling Approach Description* based on feedback from the CEC.

Products:

- Modelling Approach Description (draft and final)

Subtask 2.3: Implementation of Baseline Data into Model(s) to Create Initial Baseline Scenario
The goal of this subtask is to input the baseline data into the selected model(s) and create an initial scenario based on that data using the described approach with any revisions from CEC.

The Recipient shall:

- Implement baseline in SWITCH, RESOLVE, and other modeling software and prepare *Summary of Baseline Model Results* which enumerates the anticipated costs and other metrics that are predicted based on the agreed upon baseline data and scenario development approach.
- Prepare a *CPR Report #1* in accordance with subtask 1.3.

Products:

- Summary of Baseline Model Results
- CPR Report #1

TASK 3: FUTURE ENERGY TECHNOLOGY ALTERNATIVES
The goal of this task is to develop at least three alternative projections of potential energy storage technologies, with durations ranging from four or less hours to 100+ hours, and energy generation technologies to use in the detailed analysis of the selected scenarios.

Subtask 3.1: Evaluate and Document Future Energy Storage Technology Alternatives
The goal of this subtask is to gather data on the current status and projected potential of candidate storage technologies.

The Recipient shall:

- Document current status of candidate storage technologies ranging from well-known approaches as a baseline, such as compressed air energy storage to developing storage technologies such as lithium ion, to newer technologies like flow batteries, liquid air energy storage and other thermal-to-electricity approaches, gravity storage, thermophotovoltaic, and green hydrogen, using literature, data, and input from the Recipient's Storage Advisory Board.

- Project anticipated learning curves for each technology and compare with other estimates of potential cost at large scale for each technology to project probable prices as a function of time.
- Evaluate attributes of each technology including safety, reliability, life expectancy, development stage, ratio of installation to operating costs, impact on jobs, ability to leverage existing supply chains, and other market factors.
- Prepare the draft version of the *Storage Technology Summary*, which summarizes the current status and projected potential success of the storage technologies studied including summary of anticipated performance as a function of storage duration, safety, reliability, life expectancy, development stage, expected costs, impact on jobs, ability to leverage existing supply chains, and other market factors.
- Update the final version of the *Storage Technology Summary* based on feedback from the CEC and the Storage Advisory Board, and based on developments from the *Scenario Analysis* (Task 5), and identify storage technologies that have a realistic chance of being part of a 2045 solution.

Products:

- Storage Technology Summary (draft and final)

Subtask 3.2: Define Representative Future Energy Storage Technology Alternatives

The goal of this subtask is to represent candidate storage technologies in a set of three to six storage technology descriptions to be used for further analysis.

The Recipient shall:

- Identify descriptions of three to six scenarios that can represent the promising technologies, grouping technologies and selecting scenarios that differentiate according to the duration of the storage (from four or less hours to 100+ hours), the anticipated cost, and the anticipated achievable deployment capacity based on considerations such as the ability to overcome technical difficulties (e.g., reliability and performance issues), leverage existing supply chains and achieve costs low enough to be quickly mobilized.
- Prepare the draft *Proposed Storage Scenarios Summary*, which summarizes the attributes of three to six storage technology alternatives descriptions that can be used to assess the value of long-duration storage including the basis for each storage technology alternative and the assumptions made.
- Update the final version of the *Proposed Storage Scenarios Summary* based on feedback from the CEC and the Storage Advisory Board, and based on developments from the *Scenario Analysis* in (Task 5).

Products:

- Proposed Storage Scenarios Summary (draft and final)

Subtask 3.3: Evaluate and Document Future Electricity Generation Technology Alternatives

The goal of this subtask is to gather data on the current status and projected potential of candidate electricity generation technologies.

The Recipient shall:

- Document current status of candidate electricity generation technologies including all technologies that are relevant to California, including solar, wind, geothermal, natural gas power plants, microgrids, demand response aggregation, imports and exports of energy to neighboring states, and other energy service systems.
- Project anticipated learning curves for each technology and compare with other estimates of potential cost at large scale for each technology to project probable prices as a function of time.
- Evaluate attributes of each technology including safety, reliability, life expectancy, development stage, ratio of installation to operating costs, impact on jobs, ability to leverage existing supply chains and other market factors.
- Prepare the draft version of the *Electricity Generation Technology Summary*, which summarizes the current status and projected potential success of the electricity generation technologies studied including summary of anticipated performance as a function of location, safety, reliability, life expectancy, development stage, expected costs, impact on jobs, ability to leverage existing supply chains and other market factors, using inputs from literature (including CEC studies), the CEC, and industry experts.
- Update the final version of the *Electricity Generation Technology Summary* based on feedback from the CEC and the Storage Advisory Board, and based on developments from the *Scenario Analysis* (Task 5), and identify electricity generation technologies that have a realistic chance of being part of a 2045 solution.

Products:

- Electricity Generation Technology Summary (draft and final)

Subtask 3.4: Define Representative Future Electricity Generation Technology Alternatives

The goal of this subtask is to represent candidate electricity generation technologies to couple with the identified representative storage technology descriptions.

The Recipient shall:

- Identify descriptions of promising scenarios that can be paired with the storage technologies for further evaluation.
- Prepare the draft version of the *Proposed Electricity Generation Scenarios Summary*, which summarizes the attributes of electricity generation technologies that can be paired with the storage scenarios to assess the value of long-duration storage, where the value depends on the anticipated cost, the anticipated achievable deployment capacity based on considerations such as the ability to overcome technical difficulties (e.g. reliability and performance issues), the existence of relevant supply chains, and anticipated costs low enough to be quickly mobilized. Include the basis for each technology alternative and the assumptions made.
- Update the final version of the *Proposed Electricity Scenarios Summary* based on feedback from the CEC and the Storage Advisory Board, and based on developments from the *Scenario Analysis* (Task 5).

Products:

- Proposed Electricity Generation Scenarios Summary (draft and final)

TASK 4: GRID SCENARIO DEVELOPMENT

The goal of this task is to develop and select grid expansion scenarios to study in the model and analysis.

Subtask 4.1: Multi-Day Model Optimization

The goal of this subtask is to optimize the multi-day baseline model.

The Recipient shall:

- Finish revising SWITCH, RESOLVE and other modeling software to accommodate multi-day optimization to better understand the role of variable weather and multi-day storage as a critical element of the long-duration scenario development.
- Identify multi-day weather sets that describe times when 100+ hour storage may be useful.
- Prepare *Summary of Multi-day Baseline Model Results* which will compare the multi-day version of the model with the single-day baseline model to identify limitations of the revised software and identify any differences in the conclusions.
- Prepare a *CPR Report #2* in accordance with subtask 1.3.

Products:

- Summary of Multi-day Baseline Model Results
- CPR Report #2

Subtask 4.2: Grid Scenario Selection

The goal of this subtask is to work with the CEC to select from the proposed scenarios to guide future analysis.

The Recipient shall:

- Develop a minimum of three different proposed grid scenarios modeled to meet the 2030 and 2045 energy policies, based on information provided in the CEC's Integrated Energy Policy Report[5]. The scenarios will include different combinations of short- and long-duration energy storage and different combinations of energy generation.
- Prepare the draft version of the *Grid Scenario Summary*, which will describe developed scenarios defining different combinations of short- and long-duration energy storage and different combinations of energy generation as well as the multi-day models that will be used for evaluation.
- Update the final *Grid Scenario Summary* based on feedback from the CEC, the Technical Advisory Committee, and input from the *Public Workshop for Grid Scenario Selection (Subtask 6.2).*

Products:

- Grid Scenario Summary (draft and final)

TASK 5: GRID SCENARIO ANALYSIS

The goal of this task is to model and analyze the selected grid expansion scenarios to identify cost-effective pathways to meeting the state of California's clean-energy targets.

[5] Integrated Energy Policy Report
https://www.energy.ca.gov/data-reports/reports/integrated-energy-policy-report

Subtask 5.1: Preliminary Scenario Analysis
The goal of this subtask is to do the final analysis of the selected scenarios. The CAM, with input from the TAC, will provide direction for the final detailed analysis of the scenarios.

The Recipient shall:

- Analyze uncertainties in modeling results based on CAM directions and by comparing results from SWITCH and RESOLVE and by comparing baseline, optimistic and pessimistic versions of the selected scenarios.
- Evaluate effects of key assumptions such as the storage duration capability mix, type of electricity generation technologies included, and rate of electrification of the transportation and heating sectors.
- Evaluate effect of including different multi-day scenarios in the analysis of selected scenarios.
- Evaluate effects of actions that could be taken to affect outcomes such as adoption of rate structures that motivate adoption of storage technology, implementation of incentive programs to promote electrification, etc.
- Complete the draft version of the *Preliminary Analysis Summary*, which includes impacts of key assumptions on achievement of state goals including cost, reliability and resiliency.
- Update the final version of the *Preliminary Analysis Summary* based on feedback from the CEC, the Technical Advisory Committee, and input from the *Public Workshop for Preliminary Scenario Analysis (Subtask 6.3).*

Products:

- Preliminary Analysis Summary (draft and final)

Subtask 5.2: Final Scenario Analysis
The goal of this subtask is to complete the final analysis of the selected scenario.

The Recipient shall:

- Complete the draft version of the *Final Analysis Summary* which will include results and feedback from the Preliminary Analysis specifically, the effects of key assumptions and actions on results for the selected scenario for posting before the public meeting.
- Update the final version of *Final Analysis Summary* based on feedback from the CEC, the Technical Advisory Committee, and input from the *Public Workshop for Final Scenario Analysis (Subtask 6.4).*

Products:

- Final Analysis Summary (draft and final)

TASK 6: PUBLIC INPUT
The goal of this task is to gather input from the public through open meetings and to ensure strong communication with the public throughout the project.

Subtask 6.1: Initial Public Workshops
The goal of this subtask is to execute at least 2 public workshops in both Northern and Southern California to introduce the project and gather information early in the project.

The Recipient shall:

- Plan two public workshops with the CEC including the location, organizers, and presenters. One workshop will be in Northern and one will be in Southern California, to introduce the project and gather information from stakeholders to inform subsequent analysis.
- Prepare an *Opening Workshops Agenda* before these workshops including the locations, organizers, presenters, and surveys.
- Prepare *Opening Workshops Presentation Materials*, which will summarize input collected from public from the two workshops
- Prepare *Opening Workshops Summary*, which will summarize input collected from public from the two workshops

Products:

- Opening Workshops Agenda
- Opening Presentation Materials
- Opening Workshops Summary

Subtask 6.2: Public Workshop for Grid Scenario Selection

The goal of this subtask is to support the CEC's scheduling and planning for a public workshop to aid in the initial scenario selection.

The Recipient shall:

- Plan a public workshop with the CEC.
- Prepare a *Grid Scenario Selection Workshop Agenda* before this workshop including the location, organizers, presenters, and surveys.
- Prepare *Grid Scenario Selection Presentation Materials*, which include information from the *Scenario Summary* in a PowerPoint format to be reviewed by CEC in advance of the meeting with the TAC.
- Prepare a *Grid Scenario Selection Workshop Summary,* which will summarize input collected from public from the workshop.

Products:

- Grid Scenario Selection Workshop Agenda
- Grid Scenario Selection Presentation Materials
- Grid Scenario Selection Workshop Summary

Subtask 6.3: Public Workshop for Preliminary Scenario Analysis

The goal of this subtask is to support CEC's scheduling and planning for a public workshop to review preliminary scenario analysis.

The Recipient shall:

- Plan a public workshop with the CEC.
- Prepare a *Preliminary Scenario Analysis Workshop Agenda* before this workshop including the location, organizers, presenters, and surveys.
- Prepare *Preliminary Scenario Analysis Presentation Materials*, which include impacts of key assumptions on achievement of state goals including cost, reliability and resiliency for presentation at public meeting.
- Prepare a *Preliminary Scenario Analysis Workshop Summary* which will summarize input collected from public from the workshop.

Products:

- Preliminary Scenario Analysis Workshop Agenda
- Preliminary Scenario Analysis Presentation Materials
- Preliminary Scenario Analysis Workshop Summary

Subtask 6.4 Public Workshop for Final Scenario Analysis
The goal of this subtask is to support CEC's scheduling and planning for a public workshop to communicate the final results.

The Recipient shall:

- Plan a public workshop with the CEC.
- Prepare a *Final Scenario Analysis Workshop Agenda* before this workshop including the location, organizers, presenters, and surveys.
- Prepare *Final Scenario Analysis Presentation Materials*, which include results from the Preliminary Analysis, the effects of key assumptions and actions on results using inputs from public meeting.
- Prepare a *Final Scenario Analysis Workshop Summary*, which will summarize input collected from public from the workshop.

Products:

- Final Scenario Analysis Workshop Agenda
- Final Scenario Analysis Presentation Materials
- Final Scenario Analysis Workshop Summary

TASK 7: 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:

    - o <u>For Product Development Projects and Project Demonstrations:</u>
        - Published documents, including date, title, and periodical name.
        - Estimated or actual energy and cost savings, and estimated statewide energy savings once market potential has been realized. Identify all assumptions used in the estimates.
        - Greenhouse gas and criteria emissions reductions.
        - Other non-energy benefits such as reliability, public safety, lower operational cost, environmental improvement, indoor environmental quality, and societal benefits.
        - Data on potential job creation, market potential, economic development, and increased state revenue as a result of the project.

- A discussion of project product downloads from websites, and publications in technical journals.
- A comparison of project expectations and performance. Discuss whether the goals and objectives of the Agreement have been met and what improvements are needed, if any.
- Additional Information for Product Development Projects:
  - Outcome of product development efforts, such copyrights and license agreements.
  - Units sold or projected to be sold in California and outside of California.
  - Total annual sales or projected annual sales (in dollars) of products developed under the Agreement.
  - Investment dollars/follow-on private funding as a result of Energy Commission funding.
  - Patent numbers and applications, along with dates and brief descriptions.
- Additional Information for Product Demonstrations:
  - Outcome of demonstrations and status of technology.
  - Number of similar installations.
  - Jobs created/retained as a result of the Agreement.

o 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 8: 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.

Exhibit A
Scope of Work

The Recipient shall:

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

RESOLUTION NO: 20-0708-8b

STATE OF CALIFORNIA

STATE ENERGY RESOURCES
CONSERVATION AND DEVELOPMENT COMMISSION

RESOLUTION - RE: THE REGENTS OF THE UNIVERSITY OF CALIFORNIA, ON BEHALF OF THE MERCED CAMPUS

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

RESOLVED, that the CEC approves Agreement EPC-19-060 with The Regents of the University of California, Merced for a $1,254,955 grant to understand the role and cost targets for long-duration storage options and evaluate actions that California could take to aid the state of California to reach zero-carbon and related goals by 2045. The project will improve existing grid expansion modeling tools, determine the role of emerging energy storage resources in the expansion of California's energy grid, and evaluate the cost targets for long duration energy storage under different scenarios; and

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

CERTIFICATION

The undersigned Secretariat to the CEC 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 CEC held on July 8, 2020.

AYE:
NAY:
ABSENT:
ABSTAIN:

Cody Goldthrite
Secretariat