



STATE OF CALIFORNIA

GRANT REQUEST FORM (GRF)

CEC-270 (Revised 12/2019)

CALIFORNIA ENERGY COMMISSION

A) New Agreement # EPC-20-006 (to be completed by CGL office)

B) Division	Agreement Manager:	MS-	Phone
ERDD	Martine Schmidt-Poolman	43	916-327-3424

C) Recipient's Legal Name	Federal ID Number
The Regents of the University of California, on behalf of the San Diego Campus's Scripps Institution of Oceanography	95-6006144

D) Title of Project
Development of Climate Projections for California and Identification of Priority Projections

E) Term and Amount

Start Date	End Date	Amount
1/30/2021	3/31/2026	\$ 1,500,000

F) Business Meeting Information

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

Proposed Business Meeting Date 1/25/2021 ☐ Consent ☒ Discussion

Business Meeting Presenter Alex Horangic 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, San Diego**

THE REGENTS OF THE UNIVERSITY OF CALIFORNIA, ON BEHALF OF THE SAN DIEGO CAMPUS'S SCRIPPS INSTITUTION OF OCEANOGRAPHY. Proposed resolution approving agreement EPC-20-006 with The Regents of the University of California on behalf of the San Diego Campus's Scripps Institution of Oceanography, for a \$1,500,000 grant to develop the next-generation of downscaled climate projections, guided by stakeholder engagement, to support electricity sector resilience by informing energy sector planning and research and adopting staff's determination that this action is exempt from CEQA. The data developed will also contribute to California's anticipated Fifth Climate Change Assessment (5th Assessment). (EPIC funding)
Contact: Alex Horangic. (Staff presentation: 5 minutes)

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: Cal. Code Regs., tit. 14, § 15306

☐ Common Sense Exemption. 14 CCR 15061 (b) (3)

**GRANT REQUEST FORM (GRF)**

Explain reason why Agreement is exempt under the above section: This project involves computer modeling and engagement with stakeholder to develop climate projections. The work will be completed using existing supercomputers and will not require any new infrastructure. This project is categorically exempt from environmental review pursuant to CEQA Guidelines section 15306 as basic data collection, research, experimental management and resource evaluation activities which do not result in a serious or major disturbance to an environmental resource. There will be no serious or major disturbance to an environmental resource. Therefore, this project is exempt from CEQA.

- 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
/The Regents of the University of California on behalf of the Los Angeles campus	\$ 639,999
The Regents of the University of California on behalf of the Berkeley campus	\$ 150,000
	\$
	\$
	\$
	\$
	\$
	\$
	\$
	\$
	\$

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

Legal Company Name:

**GRANT REQUEST FORM (GRF)****J) Budget Information**

Funding Source	Funding Year of Appropriation	Budget List Number	Amount
EPIC	19-20	301.001G	\$1,400,000
EPIC	20-21	301.001H	\$100,000
			\$
			\$
			\$
			\$

R&D Program Area: EGRO: EA

TOTAL: \$ 1,500,000

Explanation for "Other" selection

Reimbursement Contract #: Federal Agreement #:

K) Recipient's Contact Information**1. Recipient's Administrator/Officer**

Name: Judy Cheng

Address: 9500 GILMAN DR

City, State, Zip: LA JOLLA, CA
92093-0411

Phone: 858-534-0841

E-Mail: judycheng@ucsd.edu

2. Recipient's Project Manager

Name: Dan Cayan

Address: 9500 GILMAN DR

City, State, Zip: LA JOLLA, CA
92093-0411

Phone: 858-534-4507

E-Mail: Dcayan@ucsd.edu

L) Selection Process Used☒ Competitive Solicitation Solicitation #: GFO-19-311☐ First Come First Served Solicitation Solicitation #:**M) The following items should be attached to this GRF**

- | | |
|--|-----------------------------------|
| 1. Exhibit A, Scope of Work | <input type="checkbox"/> Attached |
| 2. Exhibit B, Budget Detail | <input type="checkbox"/> Attached |
| 3. CEC 105, Questionnaire for Identifying Conflicts | <input type="checkbox"/> Attached |
| 4. Recipient Resolution <input type="checkbox"/> N/A | <input type="checkbox"/> Attached |
| 5. CEQA Documentation <input type="checkbox"/> N/A | <input type="checkbox"/> Attached |

Agreement Manager

Date

Office Manager

Date

Deputy Director

Date

EXHIBIT A

Scope of Work

I. TASK ACRONYM/TERM LISTS

A. Task List

Task #	CPR ¹	Task Name
1		General Project Tasks
2		Stakeholder Engagement
3		Global Model Evaluation and Priority Projection
4		Dynamical Downscaling with Weather Research and Forecasting
5	X	Hybrid Statistical-Dynamical Localized Constructed Analogs Downscaling
6		Hydrologic Modeling of Climate Projections
7		Hourly Sea Level Projections
8		Targeted Downscaling
9		Evaluation of Project Benefits
10		Technology/Knowledge Transfer Activities

B. Acronym/Term List

Acronym/Term	Meaning
5 th Assessment	California's Fifth Climate Change Assessment
CAM	Commission Agreement Manager
CAO	Commission Agreement Officer
CEC	California Energy Commission
CMIP6	Coupled Model Intercomparison Project 6
CPR	Critical Project Review
EPIC	Electric Program Investment Charge
GCM	Global Climate Model
IOU	Investor Own Utility
LOCA	Localized Constructed Analogs
SLR	Sea Level Rise
SSP	Shared Socioeconomic Pathways
TAC	Technical Advisory Committee
WRF	Weather Research and Forecasting (model)

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

A. Purpose of Agreement

The purpose of this Agreement is to fund the development of next-generation downscaled climate projections, guided by stakeholder engagement, to support electricity sector resilience by informing energy sector planning and research. The data developed will also contribute to California's anticipated Fifth Climate Change Assessment (5th Assessment).

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

EXHIBIT A

Scope of Work

B. Problem/ Solution Statement

Problem

To plan for and adapt to climate change impacts requires state-of-the-art information at a fine spatial resolution. However, global climate projections are carried out at a coarse spatial resolution. To be useful for California applications, the global models' output must first be downscaled to a much finer scale to account for the complex topography and regional weather and climate of California's varied landscape. Many types of data are needed for these varied stakeholders, such as temperature, precipitation, wind, humidity, snowpack, runoff, streamflow and sea level rise (SLR). This work is timely as the international climate community has recently developed a new generation of global climate models (GCMs), termed the Climate Model Intercomparison Project Phase 6 (CMIP6).

In brief, the problem statement is that: 1) Investor owned utilities (IOUs) and other stakeholders must be brought into the climate change scenario process, 2) The most appropriate global models need to be selected, 3) The CMIP6 global models need to be downscaled to fine resolution over California, 4) Output from the global and regional models need to be bias corrected, 5) A diversity of variables needs to be produced for different stakeholders, 6) Specific, targeted scenarios need to be provided for particular stakeholder needs. Overall, addressing these problems will provide climate data that captures regional climate variability and change that is relevant for building climate resilience.

Solution

The dynamical and hybrid statistical-dynamical downscaling along with the hydrologic modeling, hourly sea level projections proposed here is unique. It will provide California stakeholders with one of the world's most comprehensive, high resolution climate data sets and by working with stakeholders the data developed will be regionally relevant. This project provides the climate projections that California IOUs and other stakeholders need to plan and adapt to such changes. Both a full and comprehensive set of data, and a reduced set of priority climate projections will be supplied. The project will supply data that can support the 5th Assessment and studies in agriculture, ecosystems, human health, water management, infrastructure planning, energy demand, and wildfire threats.

C. Goals and Objectives of the Agreement

Agreement Goals

The goals of this Agreement are to:

- Build a two-way communication between stakeholders, primarily the IOUs, to develop priority climate projections that the energy sector and California as a whole can use to anticipate changes and impacts and thus build a more resilient future.
- Combine dynamical and hybrid downscaling to produce comprehensive, high quality, regional relevant, climate projections to understand how climate change impacts the future of the energy sector as well as a multiple other sectors throughout California.
- Use the downscaling to run hydrologic models to produce associated water cycle-related projections, and to produce hourly sea level projections to support resilience planning.
- Based upon IOU and other stakeholder input, identify and downscale targeted climate extremes to assess future climate-driven hazards.

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- Make downscaled data, documentation and interpretation available for use by other relevant research projects, with coordination and support from CAM, such as for the building of a data and decision support platform.

Ratepayer Benefits:² This Agreement will result in the ratepayer benefits of greater electricity reliability, and increased safety by developing the data needed to assess how climate change will impact the energy sector, e.g. supply, demand, infrastructure, hazards, and customers. As mentioned previously, the engagement with the stakeholders will focus the downscaling efforts on high priority models, scenarios and targeted extreme event occurrences. The downscaled climate projections provide information to the IOUs and broader energy sector about how climate change may impact energy demand and supply based on changes in temperature, humidity, winds, and streamflow (hydroelectric). Additionally, the projections provide information and scenarios of how climate change could impact infrastructure affecting both reliability and safety. For example, the downscaled projections will provide data to analyze how fire weather conditions will change in frequency and intensity in the future enabling the IOU to prepare for the changes and therefore increasing safety. Additionally, the hydrological modeling and hourly sea levels developed from the downscaling will provide information of future flooding frequency which could impact infrastructure.

Technological Advancement and Breakthroughs:³ This Agreement will lead to technological advancement and breakthroughs to overcome barriers to the achievement of the State of California's statutory energy goals by significantly advancing the physical realism, spatial detail, frequency, completeness, applicability, and estimation of uncertainty of the climate data used by California IOUs and state agencies to understand the effects of climate change on their operations and environment. The production process of the data will also be improved in a critical way, by incorporating stakeholder input and feedback at the project's early stages so that the climate scientists and domain/application experts can together determine the information needed to meet statutory, operational, and environmental goals.

Specifically, compared to California's Fourth Climate Change Assessment: 1) a new cohort of GCMs and projections from the CMIP6 archive will be downscaled. 2) Physical realism will be increased by using full dynamical downscaling of key scenarios by the WRF numerical model followed by expanding WRF's results to numerous other models, realizations, and emissions scenarios by the LOCA-WRF hybrid statistical downscaling approach. 3) Spatial detail will be increased to a 3-km spatial resolution, compared to 6-km previously. 4) Data frequency will be increased to hourly for a number of variables (determined in conjunction with the stakeholders) rather than daily previously. 5) Greater completeness will be achieved since WRF computes essentially any atmospheric variable of interest, while in the previous assessment the output variables were limited to those with adequate observations to train the statistical model. 6) Applicability to stakeholders will be improved due to the significant, funded effort to work together

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).

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

with stakeholders and with relevant Electric Program Investment Charge (EPIC) funded research (through coordination and support from the CAM) to produce data best suited to address questions of interest. 7) Estimation of uncertainty will be enhanced by using multiple land surface models to understand model spread in important variables such as runoff, streamflow, and snowpack, compared to a single land surface model previously. Together these improvements represent a sweeping and ambitious effort to improve many aspects of the climate data and its applicability to users.

Agreement Objectives

The objectives of this Agreement are to:

- Establish collaboration and engagement with IOUs, other stakeholders and relevant research teams to enable two-way flow of information and in particular, develop a shared understanding of downscaling needs,
- Select set of GCM projections,
- Dynamically downscale a core set of GCM projections, 1980-2100 using the WRF model,
- Downscale full set of selected GCMs projections (1950-2100) under 21st Century climate forcing scenarios and ensemble members, using the LOCA statistical model employing a hybrid modeling scheme,
- Select targeted segments and sequences in the LOCA projections that represent climate and weather events that might cause substantial impacts of concern to IOUs and other stakeholders,
- Downscale the targeted event sequences using the WRF dynamical model,
- Develop daily hydrological model projections, driven by selected subset of WRF and LOCA downscaled meteorology, using at least two different hydrological models,
- Develop hourly SLR projections, 1950-2100, using State SLR guidance regional scenarios and weather and short period climate from a selected subset of LOCA downscaled climate projections,
- Deliver downscaled climate, hydrology and sea level results, along with salient data and data origin description, in a manner that data can be installed on data platform and embedded into decision support system.

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)**. All products submitted which will be viewed by the public, must comply with the accessibility requirements of Section 508 of the federal Rehabilitation Act of 1973, as amended (29 U.S.C. Sec. 794d), and regulations implementing that act as set forth in Part 1194 of Title 36 of the Federal Code of Regulations. All technical tasks should include product(s). 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.

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The Recipient shall:

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

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

For products that require a final version only

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

For all products

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

Instructions for Submitting Electronic Files and Developing Software:

- **Electronic File Format**

- Submit all data and documents required as products under this Agreement in an electronic file format that is fully editable and compatible with the California Energy Commission's (CEC) 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.

The following describes the accepted formats for electronic data and documents provided to the CEC 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.
- 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.

EXHIBIT A

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

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

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

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

- The CAM's expectations for accomplishing tasks described in the Scope of Work;
 - An updated Project Schedule;
 - Technical products (subtask 1.1);
 - Progress reports (subtask 1.5);
 - Final Report (subtask 1.6);
 - Technical Advisory Committee meetings (subtasks 1.10 and 1.11); and
 - Any other relevant topics.
- Provide *Kick-off Meeting Presentation* to include but not limited to:
 - Project overview (i.e. project description, goals and objectives, technical tasks, expected benefits, etc.)
 - Project schedule that identifies milestones
 - List of potential risk factors and hurdles, and mitigation strategy

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- Provide an *Updated Project Schedule*, *Match Funds Status Letter*, and *Permit Status Letter*, 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:

- Kick-off Meeting Presentation
- Updated Project Schedule (*if applicable*)
- Match Funds Status Letter (subtask 1.7) (*if applicable*)
- Permit Status Letter (subtask 1.8) (*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 CEC 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 CEC 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 CEC.

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 CEC, 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 and submit 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.
- 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* with 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.

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- 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)

CAM Products:

- CPR Agenda
- 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 CEC 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 procured equipment.
 - The CEC'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 copies of *All Final Products* on a USB memory stick, organized by the tasks in the Agreement.

Products:

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

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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 Funds 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. When creating the Final Report Outline and the Final Report, the Recipient must use the CEC 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 *Energy Commission Style Manual* provided by the CAM.

Recipient Products:

- Final Report Outline (draft and final)

CAM Product:

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

EXHIBIT A

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Subtask 1.6.2 Final Report

The Recipient shall:

- Prepare a *Final Report* for this Agreement in accordance with the approved Final Report Outline, Energy Commission 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)
- Submit a draft of the Executive Summary to the TAC for review and comment.
- Develop and submit a *Summary of TAC Comments* received on the Executive Summary. For each comment received, the recipient will identify in the summary the following:
 - Comments the recipient proposes to incorporate.
 - Comments the recipient does propose to incorporate and an explanation for why.
- 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.
- Incorporate all CAM comments into the *Final Report*. If the Recipient disagrees with any comment, provide a *Written Responses to Comments* explaining why the comments were not incorporated into the final product.
- Submit the revised *Final Report* electronically with any Written Responses to Comments within 10 days of receipt of CAM's Written Comments on the Draft Final Report, unless the CAM specifies a longer time period or approves a request for additional time.

Products:

- Summary of TAC Comments
- Draft Final Report
- Written Responses to Comments (*if applicable*)
- Final Report

CAM Product:

- Written Comments on the Draft Final Report

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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 CEC 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 CEC 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 CEC 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*)

EXHIBIT A

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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.

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- Submit a final copy of each 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.
- 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, to the extent the TAC members feel is appropriate, 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.

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;

EXHIBIT A

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- 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.

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.

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- Review and provide comments to proposed project performance metrics.
- Review and provide comments to proposed project Draft Technology Transfer Plan.

Products:

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

Subtask 1.12 Project Performance Metrics

The goal of this subtask is to identify key performance targets for the project. The performance targets should be a combination of scientific, engineering, techno-economic, and/or programmatic metrics that provide the most significant indicator of the research or technology's potential success.

The Recipient shall:

- Complete and submit the draft Project Performance Metrics Questionnaire to the CAM prior to the Kick-off Meeting.
- Present the draft Project Performance Metrics Questionnaire at the first TAC meeting to solicit input and comments from the TAC members.
- Develop and submit a TAC Performance Metrics Summary that summarizes comments received from the TAC members on the proposed project performance metrics. The TAC Performance *Metrics Summary* will identify:
 - TAC comments the recipient proposes to incorporate into the final *Project Performance Metrics Questionnaire*.
 - TAC comments the recipient does not propose to incorporate with and explanation why.
- Submit a final Project Performance Metrics Questionnaire with incorporated TAC feedback.
- Develop and submit a Project Performance Metrics Results document describing the extent to which the recipient met each of the performance metrics in the final Project Performance Metrics Questionnaire.
- Discuss the final Project Performance Metrics Questionnaire and Project Performance Metrics Results at the Final Meeting.

Products:

- Project Performance Metrics Questionnaire (draft and final)
- TAC Performance Metrics Summary
- Project Performance Metrics Results

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.*

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TASK 2: STAKEHOLDER ENGAGEMENT

The primary goals of stakeholder engagement will be identifying ‘use-cases’ for the scientific information (i.e. description of how stakeholders intend to use the data/tools to achieve their goals), and identifying the priority projections (i.e. a small (approximately four) set of projections stakeholders can use to span the downscaled results if they are not interested in or able to use the full data set). The aim is to regularly engage with stakeholders for ongoing refinement and iteration of the scientific results.

The Recipient shall:

- Prepare a *Stakeholder Engagement Plan*, which will outline in detail the plans to:
 - Develop one or more Stakeholder Map(s) -figure or flowchart- with different categories of stakeholders for the project.
 - Develop framework for stakeholder interviews and workshops, and convene and facilitate working group meetings on a yearly basis.
 - Develop four or more Use-Cases based on stakeholder interviews, workshops etc. and to be used in future interviews, workshops, etc.
 - Develop Use-Case Tables that would include the metrics of relevance, variables, spatial and temporal scales, etc. and how they tie to actual decisions or use cases.
 - Conduct one Workshop and one or more Stakeholder Surveys.
- Share, for review and input, the Stakeholder Engagement Plan with TAC and with appropriate stakeholders in collaboration with, and with support, from the CAM.
- Prepare a *Stakeholder Engagement Report*, which will report on the stakeholder engagement activities listed in the Stakeholder Engagement Plan and will identify 15 or more Stakeholder-informed Targeted Downscaling Cases (Task 8) and include a list of open research questions raised in the engagement process to guide further 5th Assessment investments.
- Determine, in collaboration with CAM, whether results of the analysis warrant a version of the Stakeholder Engagement Report to be prepared for peer reviewed journal submission, a *Stakeholder Engagement Manuscript*. This will be on the lessons learned from the process and how stakeholder engagement shaped the scientific outcomes.

Products:

- Stakeholder Engagement Plan (draft and final)
- Stakeholder Engagement Report (draft and final)
- Stakeholder Engagement Manuscript (pending consultation with the CAM)

TASK 3: GLOBAL MODEL EVALUATION AND PRIORITY PROJECTION

The goal of this task is to identify a subset of GCMs from CMIP6 that are most likely to produce downscaled representations of California regional climate and micro-climates that are most realistic and reliable for the stakeholders’ interests. GCMs will be selected based on their ability to represent the historical period across the globe and California and in coordination with stakeholders through the workshops and engagement process.

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The Recipient shall:

- Prepare an *Evaluation of CMIP6 GCMs Relevant for California Report* which will:
 - Outline the evaluation and selection processes that led to the selection of a suite of CMIP6 GCMs for further downscaling efforts. This will be based on an evaluation of the ability of GCMs to represent historical climate, with a focus on their performance in California.
 - Describe the selection metrics agreed upon through stakeholder engagement and feedback,
 - Describe the approach for selecting GCMs in coordination with stakeholders,
 - List of Four CMIP6 GCMs for dynamic downscaling to be done in Task 4.
 - List of a larger suite of CMIP6 GCMs appropriate for LOCA hybrid downscaling.
- Prepare a *Priority GCM Report* that describes the analysis and evaluation to determine the four priority models that capture the range of projections based on metrics determined from the engagement process.

Products:

- Evaluation of CMIP6 GCMs Relevant for California Report (draft and final)
- Priority GCM Report (draft and final).

TASK 4: DYNAMICAL DOWNSCALING WITH WEATHER RESEARCH AND FORECASTING

The goal of this task is to dynamically downscale the selected GCMs from Task 3 using the WRF model. Data will be produced at a 3-km resolution, hourly time-resolution from 1980-2100. Compared to coarse-scale GCMs, the dynamic downscaling provides data at a finer-resolution needed for informed decision and policy-making by California IOU's and other stakeholders. The WRF model runs will also serve as a training data set for statistical (LOCA) downscaling.

The Recipient shall:

- Produce *Dynamically Downscaled Projections of Four CMIP6 GCMs* with WRF across California. Dynamically Downscaled projection data will include
 - The 6-hour output of the WRF data stream (all 2-D and 3-D fields) on all grids from 1980-2100 (1980-2019 for ERA5).
 - Hourly output of 2-m temperature, 2-m specific humidity, surface pressure, 10-m horizontal winds, snow water equivalent, skin temperature, cumulus and large-scale precipitation, downwelled/upwelled surface solar and longwave radiation for all-sky and clear-sky conditions, and downwelled diffuse solar radiation. These data have been carefully selected to drive hydrologic model described in Task 6.
- Prepare a *Dynamically Downscaled Projections Memorandum* that describes the Dynamically Downscaled Projections including the methodologies to produce the data, the variables available along with the temporal resolution, and any associated meta-data.
- Prepare a *Dynamical Downscale Evaluation Report* that includes:
 - Evaluation of WRF's ability to represent the historical time-period by comparing against observational data of precipitation, snowpack, and temperature.
 - Evaluation of dynamically downscaled products (ERA5 and CMIP6 GCMs) via metrics agreed on via stakeholder engagement.
- Share the Dynamically Downscaled Projections Memorandum, the Dynamical Downscale Evaluation Report, and associated data with appropriate stakeholders, such as other funded EPIC research, state agencies, IOU, in collaboration with and with support from the CAM.

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Products

- Dynamically Downscaled Projections of Four CMIP6 GCMs
- Dynamically Downscaled Projections Memorandum
- Dynamical Downscale Evaluation Report (draft and final)

TASK 5: LOCALIZED CONSTRUCTED ANALOGS HYBRID STATISTICAL/DYNAMICAL DOWNSCALING

The goal of this task is to downscale the larger suite of CMIP6 GCMs appropriate for LOCA hybrid downscaling, as delivered in Task 3. LOCA downscaled daily minimum and maximum temperature, precipitation, vector wind, humidity, and surface solar insolation at 3-km resolution will be produced using a full hybrid approach using bias-corrected WRF output as training data.

The Recipient shall:

- Develop a *LOCA Hybrid Downscaling and Output Report* which outlines:
 - Work with stakeholders to determine what variables are needed and with what time resolution (daily or hourly). The LOCA available variables will include temperature, precipitation, humidity, vector wind, and surface incoming solar radiation.
 - Creation of methodology for bias correcting WRF output using observed station data and/or gridded data at different spatial/temporal resolutions than WRF.
 - LOCA hybrid downscaling of the WRF dynamically downscaled GCMs to understand what aspects of the full WRF solution are captured and missed by the hybrid methodology.
- Produce LOCA downscaled output resulting from the downscaling of the approximately fifteen CMIP6 GCMs using LOCA hybrid downscaling. The output will be described in a *Memorandum on LOCA Downscaled Output from 15 CMIP6 GCMs* and lead to a *LOCA Downscaled Output from 15 CMIP6 GCMs*.
- Produce LOCA downscaled output resulting from the selection of 2 GCMs for multi-ensemble member downscaling based on data availability, model quality, and stakeholder interest as expressed in the workshop, and downscaling of multiple (at least 5) ensemble members from the 2 selected GCMs. The output will be described in a *Memorandum on LOCA Downscaled Output from Multiple Ensemble* and lead to a *LOCA Downscaled Output from Multiple Ensemble*.
- Share with appropriate stakeholders, such as other funded EPIC research, state agencies, IOUs in collaboration with and with support from the CAM the following:
 - Memorandum on LOCA Downscaled Output from 15 CMIP6 GCMs and associated LOCA Downscaled Output from 15 CMIP6 GCMs.
 - Memorandum on LOCA Downscaled Output from Multiple Ensemble and associated LOCA Downscaled Output from Multiple Ensemble.
 - *LOCA Hybrid Downscaling and Output Report* and associated data.
- Prepare a *CPR Report* in accordance with subtask 1.3 (CPR Meetings).
- Participate in a CPR meeting.

Products

- Memorandum on LOCA Downscaled Output from 15 CMIP6 GCMs.
- LOCA Downscaled Output from 15 CMIP6 GCMs.
- Memorandum on LOCA Downscaled Output from Multiple Ensemble.
- LOCA Downscaled Output from Multiple Ensemble.

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- LOCA Hybrid Downscaling and Output Report (draft and final)
- CPR Report

TASK 6: HYDROLOGIC MODELING OF CLIMATE PROJECTIONS

The goal of this task is to model how atmospheric projections from WRF and LOCA will translate to changes in hydrologic variables of interest, including snowpack, soil moisture, evapotranspiration, and runoff at a daily time-resolution across the state of California and, for streamflow, at point locations of interest with at least a monthly time-resolution. This analysis will inform how flood risk and water availability for IOUs and other sectors will change from the historical to future simulation period (1980-2100).

The Recipient shall:

- Model hydrologic variables using two hydrologic models (VIC and NOAH-MP) of interest at a daily time-resolution and at least a monthly time-resolution for streamflow using WRF dynamical downscaling data and at least five LOCA Hybrid downscaling output as the atmospheric forcings. This will include streamflow data for at least at 6-point locations of interest agreed upon via stakeholder workshops determine in Task 2. These locations must have observed natural streamflow data to compare against and can be provided down to a daily or monthly time-resolution depending on the observational data time-resolution.
- Develop a *Hydrologic Modeling of Climate Projection Memorandum* which outlines:
 - The methodologies and models use to develop the hydrologic variables
 - Summarize the future projections of the hydrologic variables
 - Summarize the uncertainty based on difference and similarities between the output of the two hydrologic models.
- Produce *Hydrologic Model Output Data* from two hydrologic models using the dynamical downscaled data and five LOCA hybrid downscaled data.
- Share Hydrologic Modeling of Climate Projection Report and Hydrologic Model Output Data with appropriate stakeholders, such as other funded EPIC research, state agencies, IOUs, in collaboration with and with support from the CAM.
- Determine, in collaboration with CAM, whether results of the analysis warrant a *Hydrologic Modeling Manuscript*; a peer reviewed journal submission to include the following:
 - Synthesis and summary of future climate projections,
 - Summary of the uncertainty based on difference and similarities between the two hydrologic models.

Products:

- Hydrologic Modeling of Climate Projection Memorandum
- Hydrologic Model Output Data
- Hydrologic Modeling Manuscript (pending consultation with the CAM)

TASK 7: HOURLY SEA LEVEL PROJECTIONS

The goal of this task is to develop and deliver hourly total water level projections along California's coast based on state guidance and previously developed secular SLR projections. These projections will inform and support local policymakers and stakeholders in understanding

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how SLR will affect their operations and infrastructure, and what mitigation measures might need to accommodate in terms of future SLR.

The Recipient shall:

- Prepare an *Hourly Sea Level Projections Memorandum* which will summarize:
 - The processes to determine secular sea level rise to use based on latest scientific advances, State sea level rise guidance, and input from IOUs and other stakeholders in collaboration with the CAM.
 - The processes to determine the 6 GCMS to use to produce the hourly projections, informed by input from IOUs and other stakeholders.
 - Outline methodologies used to develop the hourly sea level projections.
 - Summarize results of the hourly sea level projections.
- Develop hourly sea level projection using at least two global SLR scenarios and downscaled weather and climate inputs from six GCMs and two SSP, develop the hourly projections for six locations along the California coast based on the method in Cayan et al., 2008.
- Develop *Hourly Total Water Level Projections Data* for at least two SLR scenarios, six GCMs and two SSPs for at least six locations along the California coast.
- Determine, in collaboration with CAM, whether results of the analysis warrant a version of the Hourly Sea Level Projections Memorandum to be prepared for an *Hourly Sea Level Projections Manuscript* - a peer reviewed journal submission.
- Share Hourly Sea Level Projections Memorandum and associated data with appropriate stakeholders (such as other funded EPIC research, state agencies, IOUs, etc.) in collaboration with and with support from the CAM.

Products:

- Hourly Sea Level Projections Memorandum
- Hourly Total Water Level Projections Data
- Hourly Sea Level Projections Manuscript (pending consultation with the CAM)

TASK 8: TARGETED DOWNSCALING

The goal of this task is to identify, in coordination with stakeholders (Task 2), extreme weather climate events identified in the downscaled data from LOCA Hybrid Downscaling (Task 5) that can be further evaluated via dynamical downscaling with WRF. This will allow for validation and further evaluation of rare, but plausible events (i.e. droughts, heat spells, atmospheric rivers) that could occur under the future climate, which is crucial to understand how operations and infrastructure may be stressed under the most extreme weather events that could occur in the future period.

The Recipient shall:

- Dynamically downscale WRF output data for 15 extreme weather events identified by LOCA-generated data. Note, these simulations include the gridded hydrologic variables from NOAA-MP across the state of California. The result will be *Dynamically Downscaled WRF Output Data from the Target Case Studies*.
- Develop *Streamflow Data from the Targeted Case Studies* for at least 4 targeted downscaling periods that are relevant for flood risk and/or drought conditions.

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- Provide a *Targeted Case Study Memorandum* that summarize the methodologies to produce the data, includes all the variables for each case study, and lists all the necessary meta data.
- Share Targeted Case Study Memorandum and associated data with appropriate stakeholders (such as other funded EPIC research, state agencies, IOUs, etc.) in collaboration with and with support from the CAM.

Products:

- Dynamically Downscaled WRF Output Data from the Target Case Studies
- Streamflow Data from the Targeted Case Studies
- Targeted Case Study Memorandum

TASK 9: EVALUATION OF PROJECT BENEFITS

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

The Recipient shall:

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

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- Additional Information for Product Demonstrations:
 - Outcome of demonstrations and status of technology.
 - Number of similar installations.
 - Jobs created/retained as a result of the Agreement.
- For Information/Tools and Other Research Studies:
 - Outcome of project.
 - Published documents, including date, title, and periodical name.
 - A discussion of policy development. State if the project has been cited in government policy publications or technical journals, or has been used to inform regulatory bodies.
 - The number of website downloads.
 - An estimate of how the project information has affected energy use and cost, or have resulted in other non-energy benefits.
 - An estimate of energy and non-energy benefits.
 - Data on potential job creation, market potential, economic development, and increased state revenue as a result of project.
 - A discussion of project product downloads from websites, and publications in technical journals.
 - A comparison of project expectations and performance. Discuss whether the goals and objectives of the Agreement have been met and what improvements are needed, if any.
- Respond to CAM questions regarding responses to the questionnaires.

The CEC 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 10: TECHNOLOGY/KNOWLEDGE TRANSFER ACTIVITIES

The goal of this task is to ensure the scientific and techno-economic analysis and tools developed under this agreement are utilized in the energy policy, and/or planning decisions at the state and/or local levels, academic community and/or commercial sector.

The Recipient Shall:

- Develop and submit a *Knowledge Transfer Plan (Draft/Final)* that identifies the proposed activities the recipient will conduct to meet the goal of the task. The *Knowledge Transfer Plan* should include at a minimum:
 - Specific policy and planning efforts this project is expected to inform.
 - Specific stakeholder groups and energy policy and planning practitioners who will utilize the results of this project.
 - Proposed activities the recipient will conduct to ensure the tools and results from this project be utilized and adopted by the groups identified above.
- Present the *Draft Knowledge Transfer Plan* to the TAC for feedback and comments.

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- Develop and submit a *Summary of TAC Comments* that summarizes comments received from the TAC members on the *Draft Knowledge Transfer Plan*. This document will identify:
 - TAC comments the recipient proposes to incorporate into the *Final Knowledge Transfer Plan*.
 - TAC comments the recipient does not propose to incorporate with and explanation why.
- Submit the *Final Knowledge Transfer Plan* to the CAM for approval.
- Implement the activities as described in the *Final Knowledge Transfer Plan*.
- Develop a *Knowledge Transfer Summary Report (Draft/Final)* that includes high level summaries of the activities, results, and lessons learned of tasks performed relating to implementing the *Final Technology Transfer Plan*. This report should not include any proprietary information.
- When directed by the CAM, develop presentation materials for an CEC- sponsored conference/workshop(s) on the project.
- When directed by the CAM, participate in annual EPIC symposium(s) sponsored by the California CEC.
- 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.

Products:

- Knowledge Transfer Plan (Draft/Final)
- Summary of TAC Comments
- Technology Transfer Summary Report (Draft/Final)
- High Quality Digital Photographs

V. PROJECT SCHEDULE

Please see the attached Excel spreadsheet.

STATE OF CALIFORNIA

STATE ENERGY RESOURCES
CONSERVATION AND DEVELOPMENT COMMISSION

RESOLUTION - RE: THE REGENTS OF THE UNIVERSITY OF CALIFORNIA, ON
BEHALF OF THE SAN DIEGO CAMPUS'S SCRIPPS INSTITUTION OF
OCEANOGRAPHY

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-20-006 with The Regents of
the University of California, on behalf of the San Diego Campus's Scripps Institution of
Oceanography, for a \$1,500,000 grant to develop the next generation of downscaled
climate projections, guided by stakeholder engagement, to support electricity sector
resilience by informing energy sector planning and research; 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 January 25, 2021.

AYE:

NAY:

ABSENT:

ABSTAIN:

Cody Goldthrite
Secretariat