STATE OF CALIFORNIA
GRANT REQUEST FORM (GRF)
CEC-270 (Revised 12/2019) CALIFORNIA ENERGY COMMISSION

A) New Agreement # EPC-20-007 (to be completed by CGL office)

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

C) Recipient's Legal Name	Federal ID Number
Eagle Rock Analytics	42-2746064

D) Title of Project
A Co-Produced Climate Data and Analytics Platform to Support California's Electricity Resilience Investments

E) Term and Amount

Start Date	End Date	Amount
1/26/2021	3/31/2026	$ 3,500,000

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:
Eagle Rock Analytics
EAGLE ROCK ANALYTICS. Proposed resolution approving Agreement EPC-20-007 with Eagle Rock Analytics for a $3,500,000 grant to develop a stakeholder-informed, state-of-the-art climate data platform, generating actionable, user-informed climate data and analytics tailored for electricity sector climate adaptation and resilience planning, and adopting staff's determination that this action is exempt from CEQA. (EPIC funding) Contact: Susan Wilhelm

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":

   Agreement will not cause direct physical change in the environment or a reasonably foreseeable indirect physical change in the environment because

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: 14 CCR § 15306
      ☒ Common Sense Exemption. 14 CCR 15061 (b) (3)
      Explain reason why Agreement is exempt under the above section:

Cal. Code Regs., tit. 14, sec. 15061(b)(3) the "common sense exemption", provides that CEQA applies only to projects which have the potential for causing a significant effect on the environment. Where it can be seen with certainty that there is no possibility that the activity in question may have a significant effect on the environment, the activity is not subject to CEQA. Cal. Code Regs., tit. 14, sec. 15306 the "information collection exemption" provides that projects which consist of basic data collection, research and resource evaluation activities which do not result in a serious or major disturbance to an environmental resource are categorically exempt from the provisions of CEQA.

This Agreement is exempt under both the common sense and information collection exemptions because project activities are limited to the development of a data platform that provides access to climate projection data and analytics associated with specific use-cases that support electricity sector adaptation and resilience planning. The project will not involve any construction or installation activities or any other activities that may result in a significant effect on the environment.

Further, the project will not result in any cumulative impact to the environment that is significant, does not involve any unusual circumstances, will not result in damage to any scenic resources within a highway officially designated as a state scenic highway, none of the installation sites are included on any list compiled pursuant to Government Code section 65962.5, and the project will not cause a substantial adverse change in the significance of a historical resource. Therefore, none of the exceptions to exemptions listed in CEQA Guidelines section 15300.2 apply to this project.

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	$ 150,000
The Regents of the University of California, on behalf of the Berkeley campus	$ 1,720,160
Spatial Informatics Group, LLC	$ 369,025
Energy and Environmental Economics, Inc.	$ 25,000

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

Legal Company Name:

J) Budget Information

Funding Source	Funding Year of Appropriation	Budget List Number	Amount
EPIC	19-20	301.001G	$3,000,000
EPIC	20-21	301.001H	$500,000
			$
			$

R&D Program Area: EGRO: EA TOTAL: $ 3,500,000

Explanation for "Other" selection

Reimbursement Contract #: Federal Agreement #:

K) Recipient's Contact Information

1. Recipient's Administrator/Officer

Name: Owen Doherty

Address: 3119 63Rd St

City, State, Zip: Sacramento, CA 95820-1922

Phone: 631-766-7406

E-Mail: owen@eaglerockanalytics.com

2. Recipient's Project Manager

Name: Owen Doherty

Address: 3119 63Rd St

City, State, Zip: Sacramento, CA 95820-1922

Phone: 631-766-7406

E-Mail: owen@eaglerockanalytics.com

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		☒ 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
Eagle Rock Analytics

A. Task List

Task #	CPR[1]	Task Name
1		General Project Tasks
2		Open and Transparent Agile Project Management
3		Engaging Stakeholders for Co-Production of Decision Support Analytics and Metrics for Climate Resilience in the Electricity Sector
4		Climate Analytics and Metrics to Support Decision Making and Resilience Planning in the Electricity Sector
5	X	A Powerful, Accessible and User-Informed Data Platform to Empower California's Climate Resilience Efforts
6		Greater Ratepayer Benefits Through Outreach and Leveraging
7		Standards, Guidance and Training
8		Evaluation of Project Benefits
9		Technology/Knowledge Transfer Activities

B. Acronym/Term List

Acronym/Term	Meaning
Agile	An approach to project management that promotes speed and adaptability and is frequently used in software development. Agile project management involves iterations or incremental steps toward the completion of a project.
CAM	Commission Agreement Manager
CAO	Commission Agreement Officer
CCA	Community Choice Aggregation
CEC	California Energy Commission
CPR	Critical Project Review
DevOps	An internal team dedicated to systematically aligning Platform and analytics development ("Dev") with operations ("Ops"). Operations broadly coordinates with external partners and stakeholders.
EJ	Environmental Justice
Fifth Assessment	California's Fifth Climate Change Assessment, including energy-related vulnerability and resilience studies as well as (pending funding) other research efforts that extend beyond the energy sector
IOU	Investor Owned Utility
Jupyter	An open-source code development environment that supports data science and scientific computing across a variety of programming languages.
JupyterHub	A customizable, flexible, scalable, portable, cloud-based version of Jupyter that accommodates multiple users and facilitates collaboration (e.g., within and across research teams).
Platform	A data delivery platform designed to transform very large datasets portraying climate change in California to decision-making support for electricity sector resilience through development of stakeholder-informed analytics and provision of a computational resources and data products that provides information in a manner that is tractable for electricity sector stakeholders.

[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
Eagle Rock Analytics

POU	Publicly Owned Utility
Projections Team	The CEC-funded research team developing next-generation climate projections under EPC-20-006. The Projections research Team is a key partner to this Agreement.
Platform	A data delivery platform designed to transform very large datasets portraying climate change in California to decision-making support for electricity sector resilience through development of stakeholder-informed analytics and provision of a computational resources and data products that provides information in a manner that is tractable for electricity sector stakeholders.
PSPS	Public Safety Power Shutoff
TAC	Technical Advisory Committee

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

A. Purpose of Agreement

The purpose of this Agreement is to fund development of a data platform that transforms California's climate data enterprise from risk visualization to decision-making support, allowing for IOUs, electricity sector stakeholders, government decision makers, and researchers to utilize actionable, curated climate data tailored for resilience planning.

B. Problem/ Solution Statement

Problem

A warmer and more variable climate has challenged the reliability and safety of California's electricity grid and has contributed to, for example, rolling blackouts and public safety power shut offs (PSPS). Efforts to make California's increasingly renewable grid more resilient to further climate change are thwarted by a lack of actionable information that directly supports planning and decision making. Despite scientific advances improving the ability of models to describe regional impacts of climate change, the problem of the last mile—translating scientific data to actionable, impactful information for planning—remains to be addressed. Paradoxically, modeling advances have increased the size and complexity of data exponentially, which, while making the data potentially more useful for planning purposes, also makes the data significantly less accessible and intuitive for decision makers and practitioners.

Solution

The Recipient (Eagle Rock Analytics) will develop a stakeholder-informed, state-of-the-art climate data platform, generating actionable, user-informed climate data and analytics through co-production. Co-production provides critical advances in decision-supporting climate data, through facilitated conversations between scientists and the energy-sector practitioners, directly bridging climate expertise and grid resilience. Novel next-generation analytics will provide users with assessments of credibility and a range of possible outcomes, enhanced through metrics that convert climate data into electricity sector specific formulations and direct users to the most relevant scenarios for their specific applications. The cloud-based data platform (Platform)

developed under this Agreement will provide unprecedented computational resources to users, pre-loaded with easy-to-access capacity for the transformation of climate data into stakeholder identified formats, with supporting analytics guiding users to best practices and solutions for their question. Continual outreach will focus on educating and supporting users of the Platform, to ensure the Platform supports and benefits from user efforts.

C. Goals and Objectives of the Agreement

Agreement Goals

The goal of this Agreement is to transition California's climate data enterprise from risk visualization to decision support, providing foundational data, analytical capabilities and scientific leadership to support statewide electricity sector efforts to achieve California's various climate goals, including its 2030 and 2045 climate goals.

Ratepayer Benefits:[2] This Agreement will result in the ratepayer benefits of greater electricity reliability, increased safety and lowered costs. Stakeholder-informed use cases identified will allow IOUs to plan for and make scientifically-informed investments that target resources toward building a grid that is safer and more reliable in the face of future climate extremes (e.g., reduced PSPS from wildfire and brownouts during extreme heat). The Platform will allow vulnerability assessments and other analytics to be shared once developed, reducing climate adaptation costs for IOUs and ultimately ratepayers. This platform will leverage advances made in other EPIC and state-funded research efforts (e.g., California's Fifth Climate Change Assessment (Fifth Assessment)), further extending safety, reliability and cost benefits for ratepayers.

Technological Advancement and Breakthroughs:[3] This Agreement will lead to technological advancement and breakthroughs to overcome barriers to the achievement of California's statutory energy goals by co-producing the next generation of climate data, analytics and computational features alongside energy sector stakeholders, followed by deployment of a climate data Platform, capable of actualizing development and onboarding transformational next-gen analytics and climate data. This data platform and analytics to be provided by the Platform will provide direct support for CPUC's Adaptation Rulemaking (R.18-04-019) and are directly responsive to several recommendations of the 2019 Integrated Energy Policy Report, including "advance next-generation climate projections that improve understanding of uncertain parameters responsible for key climate-related impacts to the energy system," "continue to prioritize applied research and

[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.

action that support climate resilience in California's most vulnerable communities," and "identify resources needed to support enhanced technology and knowledge transfer between local jurisdictions and utilities to reduce emissions and enhance resilience."

Agreement Objectives

The objectives of this Agreement are to:

- Improve understanding of parameters responsible for key climate-related impacts to the energy system by: (1) using co-production engagement approaches to delineate the currently undefined, but necessary parameters needed for decision-making support and (2) identifying and prioritizing data products and analytics needed to translate climate data into actionable electricity sector metrics.
- Support climate resilience in California's most vulnerable communities by facilitating sharing of successful community level vulnerability assessments. By providing replicable examples, the Platform will thus reduce burdens and roadblocks to resiliency planning in climate-vulnerable communities, many of which lack financial and technological resources to perform such analyses *de novo*.
- Develop novel approaches to more intuitively convey uncertainties by providing users with guidance as to the best data sources (e.g., climate models) to use for their location and question, along with thoughtful representations of uncertainty that provide likely ranges of outcome and reduces the complexity of the data by presenting subsets of models that convey the majority of uncertainty.
- Transfer the next generation of climate data and analytics to electricity sector stakeholders in a manner that facilitates electricity sector resilience.
- Support energy-related research (e.g., EPIC research, Fifth Assessment) by providing foundational research products and working with researchers to onboard research products that will advance decision-making in the electricity sector.
- Empower resilience planning and vulnerability assessments by IOUs through development of a climate data platform, capable of applying "big data" solutions to make the use and acquisition of climate data possible for all stakeholders.
- Develop service-agnostic Platform architecture that can be transferred to other cloud computing systems (i.e. CEC's Open Data Platform), run at low cost to ratepayers, and be easily transferred at the conclusion of the Agreement. Match funding of cloud resources reduces Platform cost to ratepayers.
- Couple analytics that guide users toward good decisions with sustained and comprehensive user training, ongoing user experience reviews and dedicated outreach, to maximize potential utilization of the Platform and support stakeholder decision making.

II. TASK 1 GENERAL PROJECT TASKS

PRODUCTS

Exhibit A
Scope of Work
Eagle Rock Analytics

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.

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 or CD-ROM.

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.
- V# 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.
- SML (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

- 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.
- 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

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

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

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)*

Subtask 1.8 Permits

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

The Recipient shall:

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

  The list of permits and the schedule for obtaining them will be discussed at the Kick-off meeting (subtask 1.2), and a timetable for submitting the updated list, schedule, and copies of the permits will be developed. The impact on the project if the permits are not obtained in a timely fashion or are denied will also be discussed. If applicable, permits will be included as a line item in progress reports and will be a topic at CPR meetings.
- If during the course of the Agreement additional permits become necessary, then provide the CAM with an *Updated List of Permits* (including the appropriate information on each permit) and an *Updated Schedule for Acquiring Permits*.
- Send the CAM a *Copy of Each Approved Permit*.
- If during the course of the Agreement permits are not obtained on time or are denied, notify the CAM within 5 days. Either of these events may trigger a CPR meeting.

Products:

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

Subtask 1.9 Subcontracts

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

The Recipient shall:

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

III. TECHNICAL TASKS

TASK 2 OPEN AND TRANSPARENT AGILE PROJECT MANAGEMENT

The goals of this task are to: (1) maximize development efficiency, (2) reduce managerial burdens on the CAM, (3) create a transparent, open process for prioritization of features, (4) develop a team environment that enables each team member to focus on critical tasks as management removes obstacles for team members and (5) coordinate with project partners, including the CEC-funded research team developing next-generation climate projections under EPC-20-006 (referred to throughout this document as the Projections Team).

Subtask 2.1 Prioritization of Data Platform Features

The goal of this sub-task is to develop a systematic approach to evaluating the benefits from, and prioritizing the order of development for: features, analytics and data products for the data platform. The comprehensive stakeholder engagement and leveraging outreach of this project is expected to generate a wealth of potential features for the Platform requiring a thoughtful and systematic approach to development, to maximize project benefits to ratepayers.

The Recipient Shall:

- Prioritize Platform features and components:
    - Develop a Product Backlog of potential features. The Product Backlog is a living document that explicitly tracks proposed ideas for the Platform and supports following through on emergent priorities.
    - Ensure Platform features emerge in the order that provides the most impactful features with regard to resilience planning and decision support as early as possible through a "Utilize a Weighted Shortest Job First" approach. This approach iteratively reduces the long list of stakeholder requests and co-produced features by narrowing and prioritizing by project leadership, CAM, and team leads. A tractable targeted list is produced for the development team to build and deploy.
    - Review prioritization efforts with CAM on a bi-weekly schedule, to allow for realignment of product prioritization in line with emerging state priorities.
    - Weigh the perceived value and expected production effort to prioritize those that provide the highest ratepayer benefit with the lowest time to completion.
    - Evaluate success of this approach periodically through re-engaging stakeholders, sharing the movement of their requests through our process, and capturing stakeholder evaluations.
    - Provide *Product Backlog Memo* to CAM in the early, mid-term, and late stages of the Agreement as delineated on the Exhibit A-1 Project Schedule.

Products:

- Product Backlog Memo (initial, mid-term, and final)

Subtask 2.2 Efficient and Transparent Platform Development

The goal of this sub-task is to ensure that development incorporates prioritization, strategic vision and lessons learned from stakeholders. The Platform will be developed in an incremental and iterative approach while including stakeholder feedback into analytics and Platform features. Throughout this effort metrics related to ratepayer benefit and impact will be used internally by the team and shared externally to reduce risk and course-correct in a manner that fosters project success.

The Recipient Shall:

- Organize around two-week development sprints, culminating in *Quarterly Product Review Memos* (initial, mid-term, and final) for CAM evaluation;
- Use Product Backlog (see subtask 2.1) to facilitate identifying incremental steps towards feature development;
- Identify and refine, based on stakeholder input and other feedback, key performance indicators that evaluate the degree to which developed analytical, platform and climate data features meet articulated stakeholder needs;
- Provide a *Key Performance Indicators Memo* that describes the development of key performance indicators and the manner in which they serve as metrics to gage how analytical, platform, and climate data features developed by this research meet stakeholder needs;
- Develop the Platform through small iterations that incrementally provide value to users of the Platform thereby reducing risk of wasted efforts or ineffective features
- Visualize the research areas and stakeholders served with specific goals to accomplish monthly – this will create a visual and direct link between development activities and stakeholder engagement;
- Document the research areas and stakeholders served by specific, monthly goals through an *Information Radiator Memo*.
- Facilitate Team Ceremonies to align work items, goals, and progress. Regularly examine what is and isn't working to change how the teams are working to improve processes. Produce a *Record of Team Ceremonies Summaries* briefly documenting the participants and outcomes of key Team Ceremonies.

Products:

- Product Review Memos (initial, mid-term, final)
- Key Performance Indicators Memo
- Information Radiator Memo
- Record of Team Ceremonies Summaries

Subtask 2.3: Team Coordination and Project Leadership

The goal of this subtask is to develop an effective project leadership team, which identifies and removes hurdles to programmatic success and enables strategic engagement with the Projections Team and other key partners.

The Recipient Shall:

- Convene biweekly leadership team "Scrum of Scrums" ceremony to highlight progress, upcoming dependencies, risks, progress, and blockers for the various workgroups
- Establish collaboration channels to facilitate and focus cross-team questions and communication as well as questions and communication with the Projections Team. CAM is responsible for facilitating, as necessary and appropriate, interactions with other CEC-funded research groups.

- Invite Projections Team and CAM for a monthly review of progress to share progress and demonstrate the impact[s] of the data the Projections Team has generated.
- Leverage existing relationships, and shared team members with the Projections Team to allow for informal communication to reduce turnaround time
- Maintain short, medium, and long-term roadmaps that are shared with Recipient's team (including subcontractors and key partners), the Projections Team, and key stakeholders regarding upcoming work, medium-term tactical goals, and long-term vision (See also Task 7)
    - Include outputs of the Projections Team into these three horizons
- Develop a *Risk Log Memo* describing the team's approach to tracking and sharing risks, impact, and mitigation plan
- Support project leadership in developing draft *Platform Development Plans* that outline the trajectory of platform development, building on prioritization of features from Project Backlog, which are then passed to Task 3 for stakeholder review and finalization.

Products:

- Risk Log Memo
- Platform Development Plans (draft)

TASK 3 ENGAGING STAKEHOLDERS FOR CO-PRODUCTION OF DECISION SUPPORT ANALYTICS AND METRICS FOR CLIMATE RESILIENCE IN THE ELECTRICITY SECTOR

The goal of this task is to design, facilitate and implement the co-production engagements, and co-develop the use-cases and technical plans.

The Recipient shall:

- Produce a *Stakeholder Engagement Plan* that includes but is not limited to:
    - Outline of stakeholder needs arising between release of solicitation GFO-19-311 development and Agreement start, including needs related to CPUC rulemakings, changes in the Fifth Assessment timeline, etc.
    - Draft outline of statewide and regional workshops, including proposed agenda items, attendees and logistical concerns.
- Develop a *Stakeholder Map* and identify initial uses cases through:
    - Perform key informant (as identified by CAM, TAC, project team members, project partners) interviews to undertake the stakeholder mapping, and identify initial use-cases.
    - Define and differentiate categories of stakeholders including different departments within IOU's (planning, operations, emergency management, regulations), electricity sector regulatory and/or policy agencies, community-based or environmental organizations that influence the IOUs, Community Choice Aggregations (CCA), Publicly-Owned Utilities (POU), environmental

Justice (EJ) or community-based agencies serving disadvantaged populations within the IOUs service areas.

- Integrate electricity sector needs into the planning of a Statewide Climate Resilience Planning Workshop.
- Execute a Statewide Climate Resilience Planning Workshop that elicits data needs relevant to planning for a climate resilient electricity sector:
    - Conduct a statewide workshop to finalize and prioritize the use cases, solicit feedback on Draft Platform Development Plans (see subtask 2.3), and incorporate feedback into *Final Platform Development Plans*.
    - Identify analytic products from use cases, co-produce technical plans detailing analytic and technical requirements.
    - Capture stakeholder priorities for the Product Backlog (see subtask 2.1).
    - Generate *Use Case Tables:*
        - Identify metrics of relevance, variables, spatial and temporal scales, and other defining attributes.
        - Determine how metrics relate to actual decisions or use cases.
        - Evolve use cases over time to become increasingly well-defined, technically precise, and usable in response to information and Platform developments.
        - Conduct a more structured, post-workshop survey based on synthesis of workshop discussions for prioritization and refinement of use-case tables and the working groups that contribute to the fulfillment of this Agreement, e.g., stakeholder engagement, analytics, etc.
        - Convey use-case tables to Analytics team to inform development.
    - Co-Develop criteria for stress test selection.
    - Identify working group categories and members.
    - Develop *Open Research Questions for Fifth Assessment* from open research questions raised in the engagement process to inform the Fifth Assessment.
- Convene regular working groups meetings (prior to April 2022 launch of beta platform):
    - Conduct a series of regular working group to co-develop the *Final Platform Development Plans* for each of the prioritized analytic products and data platform features.
    - Iteratively refine initial features through incremental, continual engagement in the working groups as results and demonstrations become available.
    - Identify common elements of analytics and platform features across use cases.
    - Identify criteria for selecting and prioritizing stress-cases of interest.
- Conduct working groups meetings (as needed, post launch):
    - Gather in-depth and focused feedback on topics that are difficult to probe in the larger workshop setting (i.e. best practices for model selections).
    - Co-develop a user-guide and other guidance documents for Task 7 (e.g. Do-s and Don’t-s while using the platform, best practices for data or model selection).
- Hold Regional Workshops:

  - Conduct a series of regional workshops within the service territories of each IOU partner along with working group meetings as needed.
  - Share work in progress, test and pilot some analytics and Platform features with a large set of stakeholders (supporting Task 7).
  - Conduct a structured *Post Regional-Workshop Survey* to gather stakeholder preferences that would contribute to Product Backlog (see subtask 2.1) to refine & iterate features.
- Hold Final Workshop:
  - Showcasing analytics and the Platform
    - training stakeholders to use the data platform
    - finalizing user-guides & documentation for the platform
    - documentation of what was successful or not about the engagement process through *Lessons Learned Memorandum*
    - documentation of remaining research gaps and analytic needs to be shared with the broader community and state agencies to guide future investments.

Products:

- Stakeholder Engagement Plan (Draft and Final)
- Stakeholder Map
- Final Platform Development Plans
- Use Case Tables (Draft and Final)
- Open Research Questions for the Fifth Assessment
- Post Regional-Workshop Survey
- Lessons Learned Memorandum

TASK 4 CLIMATE ANALYTICS AND METRICS TO SUPPORT DECISION MAKING AND CLIMATE RESILIENCE PLANNING IN THE ELECTRICITY SECTOR

The goal of this task is to develop a library of interoperable analytic codes for conducting advanced processing of climate scenario data in support of stakeholder-informed use cases.

Subtask 4.1 Metrics & Foundational Products to Build Upon

The goal of this subtask is to develop analytic codes for computing stakeholder-informed metrics within user-defined regions and timeframes.

The Recipient shall:

- Develop electricity sector metrics:
  - Initial metrics from currently articulated IOU needs (e.g., this could include effective temperature, global wet bulb temperature, days above a given actionable threshold).

  - Through co-production at workshops, jointly develop additional supporting metrics with stakeholders.
  - Develop metric evaluation algorithms that formally and rigorously define the analyses, in mathematical terms, that support use cases within the shared development platform, so as to be incorporated into *Processing Toolkits for Data Platform* (see next set of sub-bullets).
  - Prepare a *Metric Evaluation Algorithm Memo* that describes the metric evaluation algorithms in mathematical terms and provides context describing potential uses (e.g., example use case or other application) for each algorithm.
- Generate foundational analytics that are tailored specifically to user-defined parameters and generated in real time:
  - Foundational, common analytics applicable to a wide range of applications (e.g., this could include 1-in-x formulations to support probabilistic interpretations of future climate, return periods, and more).
  - Through co-production at workshops, jointly develop additional analytics with stakeholders.
  - Incorporate machine learning capacities for identification of extreme events and/or categorization of events (i.e. Toolkit for Extreme Climate Analysis) as informed by stakeholder needs.
  - Develop *Processing Toolkits for Data Platform (*See Subtask 5.2), to be made available as an online, publicly available, open-source repository, which implement the Metric Evaluation Algorithms on the cloud-based data platform.

Products:

- Metric Evaluation Algorithm Memo

Subtask 4.2 Credibility Assessment for User-Defined Applications

The goal of this subtask is to develop analytic codes for evaluating the skill of climate projections using multiple metrics to support credibility assessment for stakeholder-informed use cases.

The Recipient shall:

- Develop analytic codes for evaluating and visualizing climate projection skill using user-defined metrics associated with specific use cases.
- Work with the leveraging and outreach team to procure scientifically vetted observational benchmark datasets as required for computing skills scores.
- Provide access to information about climate model biases computed by external research teams, such the Projections Team, which is expected to quantify regional biases in the Global Climate Models from which downscaled projections are derived.
- Using knowledge developed through development of analytic codes for evaluating and visualizing climate projection skill, development of observational benchmark datasets, and interactions with the Projections Team, develop credibility assessment algorithms as a foundation for assessing credibility of different models' data in stakeholder-defined

contexts. within the shared development platform as a basis for guiding appropriate data selection and so as to be incorporated into *Processing Toolkits for Data Platform.*

- Prepare a *Credibility Assessment Algorithm Memo* describing the credibility assessment algorithms and how they are used to assess credibility of different data sources in stakeholder-defined contexts.

Products:

- Credibility Assessment Algorithm Memo

Subtask 4.3 Uncertainty Quantification for User Specific Decision-Support

The goal of this subtask is to develop analytic codes for computing statistical properties of climate projection ensembles that inform the distribution of future climate conditions for user-defined metrics as a function of time, emissions scenario, and model as required for specific stakeholder-informed use cases.

The Recipient shall:

- Develop analytic codes that provide users with statistical information about the range of potential futures emerging from global and regional modeling:
    - Differentiate uncertainties arising from emissions scenarios, model differences, and internal model variability, and how these factors evolve over time.
    - Tailor codes to specific use cases based on stakeholder engagement, considering preferred methods for conceptualizing the emergence of extreme event likelihoods over time.
    - Produce uncertainty quantification algorithms to convey the range and sources of uncertainty. These algorithms will be developed within the shared development platform, so as to be incorporated into Processing Toolkits for Data Platform (see subtask 4.1).
    - Produce an *Uncertainty Quantification Algorithm Memo*, which describes these algorithms.

Products:

- Uncertainty Quantification Algorithm Memo

Subtask 4.4 Customized Scenario Selection

The goal of this subtask is to develop analytic codes that enable users to identify and select specific climate projections and time periods within climate projections that meet desired credibility and statistical criteria as defined through stakeholder-informed use cases.

The Recipient shall:

- Leveraging the credibility assessment algorithms developed in subtask 4.2, develop analytics for identifying and selecting projections based on specified performance relative to one or more skill score evaluations.
- Leveraging the uncertainty quantification algorithms developed in subtask 4.3, develop analytics for identifying scenarios or time periods within scenarios that satisfy user-specified statistical properties, including:
    - Develop analytics that simplify the number of models, ensembles and scenarios into a subset that captures the broad range of outcomes for specified metrics, timeframes, and regions of interest.
    - Develop analytics for identifying extreme events that exceed user-specified thresholds.
- Produce scenario selection algorithms to provide a basis for selecting specific climate projections and time periods that meet desired credibility and statistical criteria. These algorithms will be developed within the shared development platform, so as to be incorporated into Processing Toolkits for Data Platform (see subtask 4.1).
- Produce a *Scenario Selection Algorithm Memo* documenting the scenario selection algorithms and their application.

Products:

- Scenario Selection Algorithm Memo

Subtask 4.5 Stress Test and Climate-Data Threshold Based on Load Modeling

The goals of this subtask are to: (1) identify critical weather and climate threshold values from load modeling, and (2) identify specific stress-test cases of relevance to electricity sector resilience planning use cases.

The Recipient shall:

- Develop Climate-Data Thresholds Based on Load Modeling
    - Systematically examine the behavior of electricity sector planning models in response to a wide range of climate conditions in order to identify critical thresholds for defining extreme event conditions that stress the grid in different regional contexts.
- Develop stress-test cases specific to the needs of the electricity sector, based on stakeholder-informed use cases and critical thresholds identified through load modeling
    - For each use case, develop *Specific Criteria for Defining Stress Cases Memo* based on stakeholder input and load modeling as appropriate.
    - Leverage the scenario selection algorithms developed in subtask 4.4 to identify time periods within the large set of climate projections available on the platform that meet the criteria for stress cases.
    - Develop analytic codes that leverage the Uncertainty Quantification Algorithm (see subtask 4.3) to characterize each stress case relative to a larger distribution of

extreme events (e.g. characterize an event as a 99th percentile heat wave relative to the distribution for a given year and emissions scenario).

- Develop Stress Test Algorithms to facilitate use of stress cases and support resilient electricity sector planning. Stress Test Algorithms will be developed within the shared development platform, so as to be incorporated into Processing Toolkits for Data Platform (see subtask 4.1).
- Prepare a *Stress Test Algorithms Memo* based on data gathered during the stress cases.

Products:

- Specific Criteria for Defining Stress Cases Memo
- Stress Test Algorithm Memo

TASK 5 A POWERFUL, ACCESSIBLE AND USER-INFORMED DATA PLATFORM TO EMPOWER CALIFORNIA'S CLIMATE RESILIENCE EFFORTS

The goal of this task is to develop California's climate engine, an open-source and publicly accessible platform designed to: (1) transition the state's climate data enterprise from informing climate risk to decision support for electricity sector climate resilience planning and to (2) empower the energy-related studies that contribute to California's Fifth Climate Change Assessment.

Subtask 5.1 Develop Data Platform Architecture

The goal of this subtask is to build an open, cloud-based Platform to host and serve downscaled CMIP6 climate data from the Projections Team and enable access for users.

The Recipient shall:

- Design, code, and deploy a cloud-based Platform capable of hosting over 140 TB of climate data, augmented by foundational metrics and analytics products.
- Build the Platform to meet top priorities of IOUs and ratepayers as identified and documented in Task 3 (Engaging Stakeholders) related to access to climate data modeling and foundation climate data from the Projections Team. Document via *Launch of the Platform Memorandum* announcing availability of the Projections Team foundational climate data.
- Deploy Platform through cloud-based architecture.
- Develop user-friendly landing page to guide users to appropriate data, analytics, and training materials.
- Generate *Platform Documentation* in the form of a memo that conveys how to access and download foundational downscaled CMIP6 data.
- Ensure Data Platform compatibility with emerging state efforts (e.g., Open Data Initiative).

Exhibit A
Scope of Work
Eagle Rock Analytics

Products:

- Launch of the Platform Memorandum
- Platform Documentation

Subtask 5.2 A Distributed Computing Sandbox to Enable Co-Generation and Execution of Analytics

The goal of this subtask is to provide users with computational resources for decision support.

The Recipient shall:

- Design and build an open source framework enabling scalable analysis through cloud-enabled parallel computing capabilities.
- Code basic libraries allowing common data processing and analysis functions such as the development of simple climate metrics along with analytics team.
- Code more advanced libraries (i.e. machine learning, credibility assessments), develop and deploy JupyterHub-based interactive computing for users such that an integrated development environment is accessible through a web browser.
- Develop *Jupyter Notebooks* and code to address specific use cases, as identified through stakeholder engagement in support of training activities.
- Transfer knowledge and capacity of metrics externally through incorporation in *Open Source Code Repository* (e.g. GitHub or similar).
- Convert analytical algorithms from Task 4 into *Processing Toolkits.* Toolkits integrate code libraries, notebooks, and guidance materials to enable incorporation of advanced analytics into users' individual applications.
- Enable modular code sets allowing users to contribute analytics and code (i.e. co-generation).
- Develop system for tracking resource usage to determine if or when users need to continue processing using their own cloud resources.
- Execute tasks using Agile project management as informed through stakeholder engagement, to ensure deployments and developments are prioritized, and ratepayer benefits considered with each step.
- Prepare a *CPR Report #1* in accordance with subtask 1.3 (CPR Meetings).
- Participate in a CPR meeting.

Products:

- Jupyter Notebooks
- Open Source Code Repository
- Processing Toolkits
- CPR Report #1

TASK 6 GREATER RATEPAYER BENEFITS THROUGH OUTREACH AND LEVERAGING

The goals of this task are to: (1) enhance engagement through augmentation of stakeholder pool, (2) identify opportunities for expanding analytics through incorporation of external research efforts (e.g., datasets, code, key advances), (3) support platform development by facilitating outreach with users and contributors to Platform. The Recipient will work with researchers, state agencies and other key stakeholders to ensure Platform benefits from, and, supports key sector advances. Activities supporting this task will provide a clear pathway for external users to collaborate with the Recipient's team.

Subtask 6.1 Supporting Vulnerability Studies

The goal of this subtask is to aid vulnerability assessments responding to CPUC rulemaking.

The Recipient shall:

- Identify opportunities to make collective advances in vulnerability assessments.
- Seek out IOUs' needs related to adaptation planning (e.g., as specified in CPUC's adaptation rulemaking) and convey needs to team leadership.
- Maintain dialogue with IOU climate resilience teams, conveying opportunities the Platform can provide IOUs, and cultivate a cooperative culture of pooled resources.
- Identify opportunities for IOUs to benefit from advances from other vulnerability assessment efforts, bring new techniques and approaches to the Platform.
- Expand our user base by bring new stakeholders to the table (i.e. POUs, CCAs, NGOs) whose contributions to the Platform can benefit IOUs (and vice-versa).
- Produce a on *Contributions to IOU Vulnerability Studies by Non-IOU Entities Memorandum* to document the efforts described in the preceding bullets as well as impacts and benefits of the efforts.

Products:

- Contributions to IOU Vulnerability Studies by Non-IOU Entities Memorandum

Subtask 6.2 Incorporation of Benefits from Statewide Research Products into Platform

The goal of this subtask is to ensure successful deployment of advances made from Fifth Assessment researchers into the Platform through direct, sustained engagement with Fifth Assessment teams. Further goals of this subtask are to: (1) align projection scenarios across the Assessment, (2) identify fundamental and priority datasets for hosting, and (3) connect researchers with Platform resources to accelerate utilization and contributions to the Platform.

The Recipient shall:

- Engage with a broad spectrum of research initiatives with high potential to advance climate resilience in the electricity sector and which contribute to the Fifth Assessment throughout the course of the Agreement
- Develop an annual *Research Product Plan* that will include:
    - Data products needed for climate data Platform, informed by stakeholder mapping.

  - Current research initiatives and respective products to support Fifth Assessment including point of contact, timeline for product availability.
  - Gap analysis between needs and initiatives.
- Align various actors to deliver a uniform set of scenarios and datasets:
  - Coordination across agencies, stakeholders and researchers.
  - Inform stakeholder engagement and analytics development with feedback.
- Develop a DevOps setting:
  - Increase platform visibility and utilization by previewing what data is likely to be available for upcoming research.
  - Directly communicate Platform capabilities to external researchers.
- Serve as a gateway for statewide climate resilience efforts:
  - Help facilitate participation in Fifth Climate Assessment by making scenarios, data and computational resources known and advertised.
  - Raise awareness of Platform analytical, computational and support resources.
  - Transfer technical requirements (i.e. standards, Task 7) to external researchers to enable seamless transmission of research products and data onto the Platform.

Products:

- Research Product Plan

Subtask 6.3 Outreach with Agencies, Committees and Research Groups

The goal of this subtask is to treat policymakers and data producers as critical stakeholder groups to maximize long-term ratepayer benefits.

The Recipient shall:

- Produce and update a *Coordination Work Plan* outlining planned interactions, critical communication paths and opportunities for leveraging externally produced knowledge or data.
- Engage state agencies whom may producing or consuming climate data, resilience and other products for/from the Platform:
  - Incorporate agencies in Stakeholder Mapping exercises to identify opportunities
  - Establish a pathway for collaboration, and clear communication structure
- Support Task 2.3 by developing the *Coordination Workplan* to include coordination and outreach efforts of the Projections Team:
  - Develop an initial communication strategy, working agreement, and short-term common activities, timeline and deliverables
  - Jointly develop a description of future intermediate products to be produced using data from Projections Team to circulate to IOUs and other stakeholders relying on the grid including model outputs, intermediate products, historical data; timelines for deployment and potential use case for vulnerability and resilience strategies.

Exhibit A
Scope of Work
Eagle Rock Analytics

Products:

- Coordination Workplan

TASK 7 STANDARDS, GUIDANCE AND TRAINING

The goal of this task is to build user trust and confidence in the Platform, the quality of data and analytics presented, and provide guidance and training to empower successful decision making.

Subtask 7.1 Standards and Best Practices

The goal of this subtask is to build public and electricity sector trust in the data, analytics and platform capabilities through open, transparent review of features by the scientific community and the establishment of rigorous technological and scientific standards.

The Recipient shall:

- Develop and implement a *Data Quality Agnostic Test* based on FAIR (Findable, Accessible, Interoperable, Reusable) characteristics to establish quality minimums for inclusion.
- Convene a scientific advisory committee
    - Work with engagement working group (Task 3) and outreach working group (Task 6.3) to identify needs and members.
    - Convene quarterly or biannual meetings to evaluate Platform, data and methods.
    - Critical review of toolkit functionality and methods.
- Establish *Metadata, Analytical Standards and Formatting Conventions* required for data to be included on the Platform.
- Present advances to scientific community for evaluation (e.g., peer review).
- Provide scientific leadership to ensure Platform adopts and maintains best practices.

Products:

- Data Quality Agnostic Test
- Metadata, Analytical Standards and Formatting Conventions (Draft and Final)

Subtask 7.2 Usability Assessment, Training and Credibility Informed Guidance

The goal of this subtask is to improve the user experience and to provide guidance to users.

The Recipient shall:

- Perform usability testing during significant stages of product development, consisting of facilitated sessions and general online survey questions.
- Prepare *Training Materials* includes but not limited to:
    - Online documentation detailing platform features and usage.
    - Jupyter notebooks which help new users learn how to perform basic data analysis, transformation, and download steps.
    - Processing toolkits developed to address specific use cases which will include code libraries, notebooks, and related guidance documents.

  - Webinar introducing features and capabilities of the Platform.
  - Amazon-sponsored hackathon where attendees will work together in teams to develop innovative new approaches to building climate resilience in California.
  - Hands-on materials for a regional workshop (Task 3).
- For each use case developed through stakeholder engagement, provide a *Toolkit Guidance Package* that includes but is not limited to:
  - Summary of use case objectives and identified technical requirements.
  - Expert guidance on how to utilize the Platform and Processing Toolkits to achieve the objectives of the use case, including credibility assessment, uncertainty quantification, scenario selection, and identification of stress cases as appropriate to the use case.
  - A Jupyter notebook with example code that engages the platform to perform the technical requirements of the use case that can be readily modified.
  - Provide dedicated support staff for IOU and other electricity sector users.

Products:

- Training Materials
- Toolkit Guidance Package

TASK 8 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:

  - <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.

- 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 9 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.
- 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.

Exhibit A
Scope of Work
Eagle Rock Analytics

Products:

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

IV. PROJECT SCHEDULE

Please see the attached Excel spreadsheet.

RESOLUTION NO: 21-0125-5b

STATE OF CALIFORNIA

STATE ENERGY RESOURCES
CONSERVATION AND DEVELOPMENT COMMISSION

RESOLUTION - RE: EAGLE ROCK ANALYTICS

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-20-007 with Eagle Rock Analytics for a $3,500,000 grant to develop a stakeholder-informed, state-of-the-art climate data platform, generating actionable, user-informed climate data and analytics tailored for electricity sector climate adaptation and resilience planning; 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