

**GRANT REQUEST FORM (GRF)****A) New Agreement # EPC-21-037 (to be completed by CGL office)**

B) Division	Agreement Manager:	MS-	Phone
ERDD	Alexandra Kovalick	43	916-776-0781

C) Recipient's Legal Name	Federal ID Number
Eagle Rock Analytics	47-2746064

D) Title of Project
Climate-Informed Generation Capacity Modeling to Support a Climate Resilient Transition to a Clean Electricity System

E) Term and Amount

Start Date	End Date	Amount
6/15/2022	3/31/2026	\$ 900,000

F) Business Meeting Information

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

Proposed Business Meeting Date 6/8/2022 ☐ Consent ☒ Discussion

Business Meeting Presenter Alexandra Kovalick Time Needed: 5 minutes

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

Agenda Item Subject and Description:**Eagle Rock Analytics**

Proposed resolution approving agreement EPC-21-037 with Eagle Rock Analytics for a \$900,000 grant to develop stakeholder-informed data products and research on climate-related changes to availability and distribution of solar, wind, and hydroelectric generation through mid-century; and adopting staff's determination that this action is exempt from CEQA. This research will leverage state-of-the-art climate projections and expand the understanding of climate-related phenomena that affect solar and wind resources in California, including climate extremes, compound and cascading events, and high-stress weather and climate events to support a high-renewables, reliable, and cost-effective electricity grid. (EPIC funding) Contact: Alexandra Kovalick.

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)

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Explain reason why Agreement is exempt under the above section: This a computer modeling project. The activity is covered by the general rule 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.

- 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
Kit Batten Consulting	\$ 20,000
Lawrence Berkeley National Laboratory	\$ 300,000
Naomi Goldenson	\$ 50,000
David Yates	\$ 15,000

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	21-22	301.001I	\$900,000

R&D Program Area: EGRO: EA

TOTAL: \$ 900,000

Explanation for "Other" selection

Reimbursement Contract #: Federal Agreement #:



GRANT REQUEST FORM (GRF)

K) Recipient's Contact Information

1. Recipient's Administrator/Officer

Name: Owen Doherty
Address: 3669 57th St
City, State, Zip: Sacramento, CA 95820-2352
Phone: 631-766-7406
E-Mail: owen@eaglerockanalytics.com

2. Recipient's Project Manager

Name: Owen Doherty
Address: 3669 57th St
City, State, Zip: Sacramento, CA 95820-2352
Phone: 631-766-7406
E-Mail: owen@eaglerockanalytics.com

L) Selection Process Used

- ☒ Competitive Solicitation Solicitation #: GFO-21-302
- ☐ First Come First Served Solicitation Solicitation #:
- ☐ Non-Competitive Bid Follow-on Funding (SB 115)

M) The following items should be attached to this GRF

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

Agreement Manager

Date

Office Manager

Date

Deputy Director

Date

Exhibit A

Scope of Work

Eagle Rock Analytics

I. TASK ACRONYM/TERM LISTS

A. Task List

Task #	CPR ¹	Task Name
1		General Project Tasks
2		Climate Data Gathering & Generation
3		Climate-Informed Resource Availability Modeling
4	x	Characterization of Climate Variability and Uncertainty for Electricity Sector Resilience Applications
5		Accessible, Climate-Informed Data Products for Grid Resilience Applications
6		Engagement to Increase Electricity Sector Capacity to Incorporate Climate into Planning and Rulemaking
7		Evaluation of Project Benefits
8		Technology/Knowledge Transfer Activities

B. Acronym/Term List

Acronym/Term	Meaning
CAISO	California Independent System Operator
CAM	Commission Agreement Manager
CAO	Commission Agreement Officer
CEC	California Energy Commission
CMIP6	Coupled Model Intercomparison Project v6
CPR	Critical Project Review
CPUC	California Public Utilities Commission
EAD	California Energy Commission Energy Assessments Division
EPIC, EPC	Electric Program Investment Charge
Fifth Assessment	California's Fifth Climate Change Assessment
GCM	Global Climate Model
GFO	Grant Funding Opportunity
Group 1	Group 1 of GFO-21-302: Assessing and improving the climate resilience of an electricity system in transition
Group 3	Group 3 of GFO-21-302: Cal-Adapt enhancements to support energy sector stakeholders
IOU	Investor-Owned Utility
IRP	Integrated Resource Plan
IRP/RA	Integrated Resource Plan/Regulatory Authority
Localization	Statistical techniques to downscale data from grid-average to point-scale
LSE	Electric Load-Serving Entities
MS	Microsoft
PVWatts	Electricity production of a photovoltaic system with crystalline modules using an hour-by-hour simulation over a period of one year.
Pyregence	Groundbreaking wildfire research conducted under EPC-18-026
RESOLVE	CPUC Capacity Expansion Model

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

Acronym/Term	Meaning
SAM	System Advisor Model
SB	Senate Bill
SQL	Structured Query Language
TAC	Technical Advisory Committee
WEAP	Water Evaluation and Planning
WECC	Western Electricity Coordinating Council
WRF	Weather Research and Forecasting Model
XML	Extensible Markup Language

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 stakeholder-informed data products and novel research on climate-related changes to availability and distribution of solar, wind and hydroelectric generation in support of a high-renewables future and ultimately a zero-carbon, reliable, cost-effective electricity grid. Research will leverage state-of-the-art climate projections (i.e., Coupled Model Intercomparison Project v6 (CMIP6)) and expand the understanding of climate-related phenomena that affect solar and wind resources in California, including climate extremes, compound and cascading events, and high-stress weather and climate events.

B. Problem/Solution Statement

Problem

Developing a zero-carbon, Senate Bill (SB) 100 compliant, resilient electric grid requires a climate-informed understanding of generation resource availability for today's climate and future climates. Investments in zero-carbon generation capacity are limited though fundamental misunderstanding of uncertainty regarding interactions between climate and California's electricity system, as well as through outdated and opaque energy system modeling and regulatory frameworks that are not climate-informed.

Solution²

The Recipient will produce climate-informed resource availability projections for today and future climates, supported by a comprehensive assessment of weather and climate (i.e., extremes and compound events) impacts on grid function and reliability, working together with policymakers and stakeholders to develop sector wide capacity to understand and use climate-informed data.

C. Goals and Objectives

Agreement Goals

The goals of this Agreement are to:

- Generate projected changes in solar, wind, and hydropower resource availability and variability over the next decade and through mid-century. This includes providing model inputs to the California Energy Commission's (CEC) supply analysis team in the form of hourly wind

² California Public Resources Code, section 25711.5(a) also requires EPIC-funded projects to "lead to technological advancement and breakthroughs to overcome the barriers that prevent the achievement of the state's statutory and energy goals..."

Exhibit A Scope of Work Eagle Rock Analytics

and solar generation profiles, as well as hydroelectric generation projections that account for climate change.

- Evaluate changes in each resource individually as well as spatial and temporal correlations among these resources, including the changing resource availability profiles during extreme events of relevance to electricity demand, electricity supply, and reliability planning.
- Leverage CMIP6-based climate scenarios, stakeholder-informed use cases and stress tests, and the data platform and analytics engine funded by EPC-20-006 and EPC-20-007, respectively.
- Expand consideration of climate-related phenomena that affect solar and wind resources in California, few of which are now accounted for in next-generation climate projections.
- Directly engage Investor Owned Utilities (IOU) and other electricity-sector stakeholders, such as the SB 100 Modeling Team and the CEC's Energy Assessments Division (EAD) supply analysis team, from project inception to completion, leveraging and coordinating with stakeholder engagement efforts or related grants (e.g., EPC-20-006 and EPC-20-007).
- Contribute to the development of methods for quantifying benefits to reliability of potential resilience strategies.
- Support further integration of climate variability, extremes, and changes in weather patterns and their effects on renewable resources into tools used for electricity planning and infrastructure-related decisions, with direct engagement of electricity-sector stakeholders.

Ratepayer Benefits:³ This Agreement will result in ratepayer benefits of greater electricity reliability, lower costs, and increased safety:

Reliability. The reliability of California's electricity grid is increasingly threatened by extremes in weather, potentially compounded as the grid transitions to cleaner but more variable zero-carbon electricity generation. This work will provide critical projections of future renewable availability, allowing for the next generation of energy system modeling needed to understand how the zero-carbon grid will function in a future climate, avoiding grid failures and power disruptions (i.e., brownouts and blackouts) and improving reliability. This work will produce a grid-wide analysis of how supply and demand will be impacted by extreme weather, co-occurring stressor events and large-scale climate induced trends. The data sets and analysis coming out of this work will allow for a climate-informed zero carbon electricity grid and enhance the capacity of the electricity sector to incorporate climate relevant information and data in decision making, planning, regulations and resilient investments - the combination of which will improve reliability of the current and future grid.

Lower Costs. Moving to a zero-carbon, solar, wind and hydroelectric focused grid will require investment estimated by the California Independent System Operator (CAISO) to be \$30.5 billion through transmission upgrades, and additional investments in wind, solar and storage. By characterizing future climate variability and extremes, and their spatial and temporal impacts, this project will enable a climate-informed, cost-effective deployment of generation capacity, ultimately lowering the cost of electricity to ratepayers. A grid developed without climate-informed investment could potentially need to be over-built to reliably function, increasing costs to ratepayers.

³ 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).

Exhibit A Scope of Work Eagle Rock Analytics

Technological Advancement and Breakthroughs: 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:

1. Filling in gaps in current climate projections to meet requirements of this project, through simplified, statistical transformations. Developing project data and computer resources to line up with the Cal-Adapt Analytics Engine, to allow for reproducibility, transparency, and easy transfer upon completion.
2. Generating hourly resource availability projections on hourly timescales, Western Electricity Coordinating Council (WECC)-wide for solar, wind and hydroelectric. Advance current siting approaches to be climate-informed so as to help drive investment in low-carbon generation that are informed by and comply with statutory goals, regulations and policy goals, including but not limited to, SB 100 and SB 423. This project will augment climate-informed products with state generated layers related to statutory priorities to filter and prioritize asset locations that are consistent with a reliable grid in future climates.
3. Providing scientific basis and guidance for advancing the next generation of energy system modeling, through approaches such as solar hot water or application of capacity factor coefficients across spatial fields or advancing hydroelectric modeling to utilize California's Fifth Climate Change Assessment (Fifth Assessment) work.
4. Assessing the role in which climate impacts the resource availability of zero-carbon resources while independent from and co-incidentally impacting demand. Uncoupling impacts from weather and climate extreme events and compound events (and/or cascading events). Supporting policy making and regulatory efforts to create a climate-informed, zero-carbon grid by performing climate analysis in support of state processes like integrated Resource Planning (IRP).
5. Supporting the development of a framework for decision making under conditions of uncertainty (hereafter decision making under uncertainty) that visualizes the components of such uncertainty (i.e., climate vs. grid structure vs. technological advances vs. future socio-economic projections) in a way that reduces decision-making inertia by creating confidence in climate-informed products and collaborates with EPC-22-xxx (the funded Group 1 agreement resulting from GFO-21-302).
6. Improving the quality and accuracy of generation potential estimates by performing bias-correction and asset specific localization.
7. Deeply engaging stakeholders throughout the project by identifying key gatekeepers who determine what (*if any*) climate-related data and approaches get incorporated into regulatory and policymaking guidance. Work with gatekeepers to identify opportunities to develop project deliverables in formats that are usable in today's processes and workflows, that can also support desired advances.
8. Help build capacity across the sector by supporting rulemaking approaches with custom analysis to ensure a climate-informed future grid.

Agreement Objectives

The objectives of this Agreement are to:

- Contribute to CEC-funded research that helps to:
 - Ensure that California's decarbonizing grid is resilient to future climate extremes and reliably distributes the benefits of clean energy to all Californians.
 - Support climate resilience planning for California's ongoing transition to a clean electricity system in accordance with SB 100 goals.

Exhibit A Scope of Work Eagle Rock Analytics

- Support climate resilience planning for a reliable and safe transition to a clean electricity system in accordance with SB 423 goals. Support the design of technology research that is responsive to climate impacts on electricity supply and demand and targeted to California's future electricity system versus the system of today.
- Provide a foundation for improvements in electricity system modeling of the effects of climate change and particularly climate extremes on electricity supply and demand over the next few decades, a period in which both electricity supply and demand are expected to rapidly evolve to achieve California's 2030 and 2045 decarbonization goals.
- Advance capacity to utilize climate-informed data and analysis by performing this work in a reproducible, transparent way, which will enable cost-effective replication of this work on future downscaled climate data, proprietary weather and climate data owned by stakeholders, and with other resource availability models.
- Improve current siting methodology to account for climate change in placement of new zero-carbon generating assets which is consistent with statutory goals (i.e., SB 100/423, environmental justice, conservation, land use) to enable investment in zero-carbon generation capacity.
- Support implementation of the California Public Utility Commission's (CPUC) climate adaptation rulemaking (R.18-04-019), by ensuring that resource availability data products and analytical methods are developed in line with IOU and other stakeholder needs, utilizing climate data projections consistent with those that R.18-04-019 directs IOUs to use.
- Advance energy system modeling capacity by developing data and methods that meet the needs of today's modeling frameworks while maintaining sufficient data richness to support evolution.
- Systematically and transparently prioritize stakeholder-informed project tasks and coordination with external research partners through integrated, stakeholder-informed Agile project management, which increases work efficiency and creates capacity for overcoming barriers as they emerge.

III. TASKS

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.

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

Exhibit A Scope of Work Eagle Rock Analytics

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.
- 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.

Exhibit A Scope of Work Eagle Rock Analytics

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*)

Exhibit A Scope of Work Eagle Rock Analytics

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(s)

Exhibit A

Scope of Work

Eagle Rock Analytics

- 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

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.

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- 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.

Exhibit A Scope of Work Eagle Rock Analytics

- Develop and submit a *Summary of TAC Comments on Draft Final Report* 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 on Draft Final Report
- 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

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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.

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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.

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- 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.

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- 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 finalize key performance targets for the project based on feedback from the TAC and report on final results in achieving those targets. 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 project performance metrics from the *Initial Project Benefits Questionnaire*, developed in the Evaluation of Project Benefits task, to the CAM.
- Present the draft project performance metrics 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 *Initial Project Benefits Questionnaire*, developed in the Evaluation of Project Benefits task.
 - TAC comments the Recipient does not propose to incorporate with and explanation why.

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- 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 Benefits Questionnaire*, developed in the Evaluation of Project Benefits task.
- Discuss the *Project Performance Metrics Results* at the Final Meeting.

Products:

- TAC Performance Metrics Summary
- Project Performance Metrics Results

IV. TECHNICAL TASKS

TASK 2 CLIMATE DATA GATHERING AND GENERATION

The goals of this task are to develop a computer/data architecture that allows for: coordination and data transfer to CEC-funded agreements EPC-22-xxx (Group 1) and EPC-22-yyy (Group 3); statistical gap filling from CMIP6 based climate scenarios, stakeholder-informed use cases and stress tests, coordination/integration with the data platform and analytics engine funded by EPC-20-006 and EPC-20-007; expanded consideration of climate-related phenomena that affect solar and wind resources in California; and support of Tasks 3-5 in a manner that is cost-effective for ratepayers.

Subtask 2.1 Framework for Coordinated and Integrated Research and Development

The goal of this task is to develop a cloud-based, open and transparent architecture to support resource availability modeling and analysis, enable collaboration with any or all Group 1 partner(s), transfer products to Group 3, leverage advances in Cal-Adapt: Analytics Engine and fill gaps in climate data products produced in EPC-20-006.

The Recipient shall:

- Develop an open and transparent cloud-based architecture that:
 - Seamlessly integrates with the Cal-Adapt Analytics Engine;
 - Leverages downscaled CMIP6 climate projections;
 - Provides computational resources to model resource availability, including, but not limited to:
 - hourly resource availability for solar and wind; and
 - resource availability profiles for hydroelectric.
 - Allows for analyzing the impact of extreme and compound climate events on zero-carbon energy production.
- Create a Data Catalog that:
 - Includes required CMIP6 downscaled climate projections from EPC-20-006;
 - Includes hourly, spatial fields of wind and solar resource availability;
 - Consistent handling of geospatial data with different resolutions, shapes and coverage (e.g., Global Climate Model (GCM) vs. hydrological units/Hydrological Unit Code);
 - Provides critical climate metrics for Group 1 modeling (such as heating- or cooling degree days);
 - Coordinates with the Cal-Adapt Analytics Engine Data Catalog;
 - Enables cloud-based access functionality for Group 1 & 3 partners; and
 - Supports the decision making under uncertainty framework (Task 4.4) via metadata.
- Deliver an Architecture and Data Catalogue Memo that describes how the open and transparent cloud-based architecture integrates with the Cal-Adapt Analytics Engine,

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identifies considerations germane to the prospect of transfer to CEC, and describes the data catalog.

- Develop an open and accessible Code Repository that:
 - Supports code developed elsewhere in the project:
 - Statistical methods for gap filling of climate record (Task 2.2);
 - Siting of resource assets (Task 3.1);
 - Resource availability modeling (Tasks 3.2.1 & 3.2.3);
 - Extension capacity to future climate advances (Task 3.4);
 - Climate variability, extremes and compound events on resource availability (Task 4.1);
 - Climate variability, extremes and compound events on grid reliability (Task 4.2);
 - Decision making under uncertainty framework (Task 4.4);
 - Localization of hourly zero carbon profiles (Task 5.2); and
 - Example code for engagement and workshops (Task 6.4).
 - Provides support for Group 1 to transform data to the format(s) they need.
 - Coordinates with the Cal-Adapt Analytics Engine Toolkits & Repositories in a manner that:
 - Allows for this project to leverage Analytics Engine capabilities; and
 - Contributes code to the Analytics Engine.
- Deliver a *Code Repository Memo* that describes key attributes of the Code Repository.

Products:

- Architecture and Data Catalog Memo
- Code Repository Memo

Subtask 2.2 Gap Filling of Missing Climate Data Through Statistical Methods

The goal of this task is to statistically generate climate data that are needed for technical tasks of this project as well as for successful execution of Group 1 tasks, but which are neither available nor forthcoming from the CEC-funded grants (EPC-20-006, EPC-18-026) that are developing climate projections and related scenarios to support the Fifth Assessment.

The Recipient shall:

- Identify missing climate data that is needed for resource availability modeling:
 - Review Localized Constructed Analogs products delivered by EPC-20-006;
 - Review Weather Research and Forecasting Model (WRF) products delivered by EPC-20-006; and
 - Review smoke emissions products delivered by Pyregence (EPC-18-026).
- Work with the CAM to prioritize which gaps and data challenges can be addressed by this effort. Based on CAM approval, one or more of the following will be done unless Recipient determines, with CAM's approval, that other priorities should take precedence:
 - Convert point-based smoke emissions to spatially complete fields for stress tests;
 - Estimate dust emissions across the WECC and/or spatial fields of dust aerosols for stress tests;
 - Correct WRF winds using thermodynamic scaling rather than linear interpolation; and
 - Address additional shortcomings and challenges identified in the above step(s).
- Produce a *Gap Filling Data Product(s) Memo* for dissemination via Data Catalog (Task 2.1).

Products:

- Gap Filling Data Product(s) Memo

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Subtask 2.3 Operationalize, Enhance, & Transfer

The goal of this task is to operationalize all project modeling and analytical methods in the environment developed in Tasks 2.1 and 2.2, enhance project workflow by leveraging the Cal-Adapt Analytics Engine (EPC-20-007) and develop interactive data pipelines to support Groups 1 and 3 of this grant funding opportunity (GFO) and reduce coordination requirements and/or the potential for collaborative friction.

The Recipient shall:

- Operationalize architecture designed in Subtask 2.1.
- Enhance code and data catalog with advances in the Cal-Adapt Analytics Engine including:
 - Ensure compatibility between Analytics Engine and this work; and
 - Ensure all resource modeling can be re-run on new climate scenarios and data, including future climate modeling efforts for future climate assessments.
- Transfer data to Group 1, Group 3 and other researchers identified by CAM:
 - Use Cal-Adapt Analytics engine application programming interface and data dissemination capacity to make this data available at no cost to public and partners; and
 - Support Group 1 with code development (Subtask 2.2) to ensure outputs are in useable formats.
- Track development and implementation with an Architecture Information Radiator for CAM to assess project progress in near real time.

Products:

- Architecture Information Radiator

TASK 3 CLIMATE-INFORMED RESOURCE AVAILABILITY MODELING

The goals of this task are to generate projected changes in solar, wind, and hydroelectric power resource availability and variability over the next decade and through mid-century. This includes providing model inputs to CEC's supply analysis team in the form of hourly wind and solar generation profiles, as well as hydroelectric generation projections that account for climate change through leveraging CMIP6-based climate scenarios, stakeholder-informed use cases and stress tests, data platform, and the Cal-Adapt Analytics Engine. This work will expand consideration of climate-related phenomena that affect solar and wind resources in California.

Subtask 3.1 Generation of Resource Availability Profiles from Climate Data

The goals of this task are to generate projected changes in solar, wind and hydroelectric resource availability and variability over the next decade and through mid-century; expand consideration of climate-related phenomena that affect solar and wind resources in California; and to provide model inputs to CEC's supply analysis team in the form of hourly solar and wind generation profiles that account for climate change.

Subtask 3.1.1 Climate-Informed, Hourly Solar Resource Availability

The goals of this task are to generate projected changes in solar resource availability and variability over the next decade and through mid-century; expand consideration of climate-related phenomena that affect solar resources in California; and to provide model inputs to CEC's supply analysis team in the form of hourly solar generation profiles that account for climate change.

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The Recipient shall:

- Create hourly projected changes in solar resource availability that include, but are not limited to:
 - Coverage of entire WECC-wide domain;
 - Projected changes for multiple downscaled CMIP6 GCMs (most likely WRF); and
 - Evaluate potential biases or systematic errors in WRF representation of solar; attempt to statistically correct.
 - Models consistent with current approaches (e.g., PVWatts for CPUC IRP);
 - Stress test evaluation to consider impacts of smoke and dust aerosols; and
 - Other stress tests run in support of Group 1 or Task 4.
- Create a *Climate-Informed Hourly Solar Dataset* that includes but is not limited to:
 - Temporal aggregations per decade through-mid-century;
 - Formats consistent with Group 3 and Group 1 preferences; and
 - Incorporation into project *Data Catalog* (2.1).
- Develop a Climate-Informed Hourly Solar Dataset Memo.
- Reproducible, open and accessible code that will allow this analysis to be:
 - Repeated on future climate scenarios and datasets in the future;
 - Repeated with other model approaches (i.e., alternatives to PVWatts) as needed to conform with other state regulatory processes; and
 - Altered so that stored data products can be transformed into alternative formats by/for stakeholders.

Products:

- Climate-Informed Hourly Solar Dataset in Excel format
- Climate-Informed Hourly Solar Dataset Memo

Subtask 3.1.2 Climate-Informed Hydroelectricity Resource Availability

The goals of this task are to generate projected changes in hydropower resource availability and variability over the next decade and through mid-century.

The Recipient shall:

- Apply the Water Evaluation and Planning (WEAP) model within the Fifth Assessment climate data framework:
 - Estimate hydropower resource availability at both run-of-river generators and multi-purpose reservoirs;
 - Model every major hydropower resource in the WECC domain;
 - Determine temporal resolution through stakeholder engagement and based on availability of appropriate calibration data; and
 - Repeat for each of the climate scenarios cited by regulators.
- Create a *Climate-Informed Hydroelectric Dataset* that includes but is not limited to:
 - Temporal aggregations per decade through-mid-century;
 - Formats consistent with Group 3 and Group 1 requirements; and
 - Incorporation into project Data Catalog (Subtask 2.1).
- Develop reproducible code that will allow analysis and data resulting from WEAP model runs to be transformed and altered into alternative formats as indicated by stakeholders.

Products:

- Climate-Informed Hydroelectric Dataset in Excel format

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Subtask 3.1.3 Climate-Informed, Hourly Wind Resource Availability

The goals of this task are to generate projected changes in wind resource availability and variability over the next decade and through mid-century; expand consideration of climate-related phenomena that affect wind resources in California; and provide model inputs to CEC's supply analysis team in the form of hourly wind generation profiles that account for climate change.

The Recipient shall:

- Create hourly projected changes in wind resource availability, that include, but are not limited to:
 - Cover WECC-wide domain;
 - Include estimates for multiple downscaled CMIP6 GCMs (most likely WRF);
 - Incorporate improvements in hub height wind as generated in Subtask 2.2;
 - Are developed in a consistent manner with current approaches (i.e., System Advisor Model (SAM) for CPUC IRP);
 - Stress test evaluation to consider impacts of wind droughts; and
 - Other stress tests run in support of Group 1 or Task 4.
- Create a *Climate-Informed Hourly Wind Dataset* that includes but is not limited to:
 - Temporal aggregations per decade through-mid-century;
 - Formats consistent with Group 3 and Group 1 requirements; and
 - Incorporation into project Data Catalog (Subtask 2.1).
- Develop reproducible, open and accessible code that will allow this analysis to be:
 - Repeated on future climate scenarios and datasets;
 - Repeated with other estimate modules (i.e., alternatives to SAM) as needed to conform with other state regulatory processes; and
 - Altered, so as stored data products can be transformed into alternative formats as indicated by stakeholders.

Products:

- Climate-Informed Hourly Wind Dataset in Excel format

Subtask 3.2 Iterative and Climate-Informed Asset Siting Approach Informed by Statutory Goals

The goal of this task is to begin the process of integration of climate variability's effects on zero-carbon electricity generation into siting approaches used for electricity planning and infrastructure-related decisions, by using future predictions of resource availability in conjunction with spatial information on land-use, conservation goals and vulnerable communities. This work will advance the ability of the energy sector to meet SB 100 and other climate-energy related rules, within the larger suite of state regulations on land-use, biodiversity conservation and environmental justice.

The Recipient shall:

- Build a siting algorithm within project computer and data architecture (Subtask 2.1):
 - Operationalize open-source software "Multi-criteria Analysis for Planning Renewable Energy"; and
 - Run model with project's climate-informed resource availability projections (Subtask 3.2), supplemented with constraints from fields enumerated below.
- Based on Stakeholder and CAM feedback identify supplemental datasets, such as:
 - Landscapes where asset sighting is unfeasible (i.e., topography);

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- Transmission and existing assets;
- Conserved and biodiverse areas (i.e., Areas of Conservation Emphasis); and
- Vulnerable and disadvantaged communities.
- Produce a WECC-wide Siting Algorithm:
 - Iterate with Group 1 to force the model with future scenarios; and
 - Pass siting information to Group 1 to help their model development.
- Develop a *Siting Algorithm Memo* detailing the efforts described by the prior three bullets and sub-bullets.

Products:

- Siting Algorithm Memo

Subtask 3.3 Climate-Informed Modeling Techniques - Next Generation of Resource Adequacy

The goal of this task is to introduce foundational climate data and knowledge into energy system models.

The Recipient shall:

- Work with CAM to prioritize areas to advance modeling capacity.
- Perform research and development on some (but not all) of the advances listed below, or alternatives thereto, but only as identified and specified by Stakeholders:
 - Incorporation of climate change on concentrated solar generation and/or solar water heating.
 - Using modeled changes in direct irradiance, air temperature, water characteristics from hydrological modeling, and proxies for physical environment such as global wet bulb temperature.
 - Extend wind generation analysis to include offshore infrastructure.
 - Modify WEAP to incorporate Assessment Hydrological predictions, rather than the current approach of using GCM fields of precipitation and temperature.
 - Implement potential technological advances in solar or wind technologies through application of spatially variant capacity factor coefficients.
- Perform sensitivity analysis with WEAP to understand how alternative climate adaptation measures in the water sector would impact the seasonality and magnitude of hydropower production, as well as water-related electricity demands for pumping and conveyance.
- Develop a *Climate-Informed Modeling Techniques Memorandum*, which describes advances pursued in this work, and which summarizes model advancement opportunities which were identified, but are beyond scope of this work.

Products:

- Climate-Informed Modeling Techniques Memorandum

Subtask 3.4 Extension Via The Cal-Adapt Analytics Engine

The goal of this task is to leverage the Cal-Adapt Analytics Engine capabilities in this project, and in turn provide the Analytics Engine with additional capabilities and data products that can be incorporated into existing and new workflows.

The Recipient shall:

- Support project tasks through incorporation of training and guidance products.
- Support through leveraging outreach activities performed by EPC-20-007

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- Create *Extension Jupyter Notebooks* that walk users through alternative climate data or statistical models to produce resource availability profiles (as in 3.2).

Products:

- Extension Jupyter Notebooks

TASK 4 CHARACTERIZATION OF CLIMATE VARIABILITY AND UNCERTAINTY FOR ELECTRICITY SECTOR RESILIENCE APPLICATIONS

The goals of this task are to evaluate changes in each resource individually; evaluate spatial and temporal correlations among these resources, including the changing resource availability profiles during extreme events of relevance to electricity demand and supply and reliability planning; leverage CMIP6-based climate scenarios, stakeholder-informed use cases and stress tests, data platform and analytics engine; expand consideration of climate-related phenomena that affect solar and wind resources in California; support further integration of climate variability, extremes, and changes in weather patterns and their effects on renewable resources into tools used for electricity planning and infrastructure-related decisions.

Subtask 4.1 Spatial and Temporal Co-Variability of Climate Impacts on Generation Potential

The goal of this task is to characterize the variability and extremes of zero-carbon generation potential in the historical record and in response to climate change, including understanding how compounding weather and climate impacts will impact generation potential.

Subtask 4.1.1 Historical and Future Climate Variability Impacts on Zero-Carbon Generation

The goals of this subtask are to characterize the historical spatial distribution, magnitude, frequency, and variability of extreme environmental variables related to solar, wind, and hydroelectric generation capacity; assess the spatial and temporal correlations of these variables; quantify their temporal occurrence to understand and describe the associated large-scale atmospheric environments and; understand implications to the future predictability of high-impact events relevant to supply and reliability planning by succinctly quantifying future scenarios of weather-related extremes and how they and the large-scale environments within which they form change.

The Recipient shall:

- Use hourly resource potential modeling from Task 3 alongside WECC-wide downscaled projections from EPC-20-006 to:
 - Characterize the historical spatial distribution, magnitude, frequency, and variability of extremes in environmental variables related to solar, wind, and hydroelectric generation capacity (e.g., wildfire smoke, wind droughts, and precipitation, respectively).
 - Quantify the temporal occurrence of extremes to understand and describe the associated large-scale atmospheric environments.
 - Support efforts of Group 1 to determine implications to the future predictability of high-impact events relevant to supply and reliability planning by succinctly quantifying future scenarios of weather-related extremes and how they and the large-scale environments within which they form change.
- Develop Interactive Python-based Notebooks detailing the methodologies used to quantify the impacts of environmental extremes on zero-carbon energy generation, and support Group 1 in understanding results from this research.

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- Deliver *Source Code for Interactive Python-based Notebooks*.
- Create *Wireframe for Cal-Adapt*, to provide a two-dimensional illustration of critical patterns that can be visualized through Cal-Adapt's web application to enable stakeholders and grid planners to assess future changes relative to historical representations.
- Support efforts to include the characterization of climate and weather drivers of zero-carbon resource availability in the decision making under uncertainty tool (Subtask 4.4), to provide support for infrastructure-related decisions.

Products:

- Source Code for Interactive Python-based Notebooks
- Wireframe for Cal-Adapt

Subtask 4.1.2 Co-occurring, Cascading, and Correlated Impacts to Renewable Resources

The goal of this subtask is to characterize the co-occurrence, cascading, or correlated extreme weather or climate events which can limit the potential for zero-carbon generation. Examples of these types of events include wildfire smoke following hydrological drought, wildfire smoke limiting PV(Photovoltaics) generation during wind lulls, autumnal wind-drought co-occurring with a delay in rainy season arrival, etc.

The Recipient shall:

- Develop novel approaches to characterizing the frequency, magnitude, spatial, and temporal characteristics of compound events, as analyzing correlated extremes is a new area of climate research.
- Utilize existing analytical tools (e.g., conditional, joint, and cluster analyses) to model the co-dependence of environmental variables and their relationships to zero-carbon energy generation.
- Leverage data produced in Subtask 4.1.1 to analyze the co-variability between extremes, their large-scale drivers, and impacts to zero-carbon generation potential in both historical and future periods.
- Develop probabilistic relationships between zero-carbon generation potential and weather extremes at local and regional scales, and subsequently quantify changes in those relationships and uncertainties introduced when scaling up to large-scale drivers and projecting into the future.
- Summarize findings in a *Presentation on the Impacts of Correlated Extremes on Zero-Carbon Resource Availability*, contribute Python code to repository described in Subtask 4.1.1, contribute visualization ideas to wireframe described in Subtask 4.1.1.
- Support efforts to include correlated extremes in the decision making under uncertainty tool (Subtask 4.4), to provide support for infrastructure-related decisions.

Products:

- Presentation on the Impacts of Correlated Extremes on Zero-Carbon Resource Availability

Subtask 4.2 Beyond Extremes: Demand Informed Modes of Climate Variability

The goal of this task is to characterize the variability and extremes of zero-carbon generation potential and electricity demand in the historical record and in response to climate change, including understanding how compounding weather and climate impacts will impact generation potential and electricity demand.

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Subtask 4.2.1 Characterization of Extreme Driven High-Demand, Low-Supply Periods

The goal of this subtask is to understand the impacts from the dual threat of extremes driving demand while simultaneously limiting the production of zero-carbon energy.

The Recipient shall:

- Utilize load profiles generated from Group 1 to define extreme events (rather than in Subtask 4.1 from a climate-informed generation potential perspective) from a grid demand/stress perspective by diagnosing the meteorological conditions associated with extreme events in the load profiles.
- Stress test data products from EPC-20-006 and EPC-20-007 will be used to identify extreme load events and characterize the meteorological (regional and large-scale) conditions under which they occurred.
- Classify events to understand the subtle differences in their characteristics that may lead to disproportionate responses in load demand.
- Beyond incorporating meteorological variables (e.g., temperature, precipitation, etc.) incorporate impact-related phenomena such as wildfires, smoke, and dust into the evaluation.
- Summarize findings in a *Presentation on the Characterization of Extreme Driven High-Demand, Low-Supply Periods*.
- Contribute Python code to repository described in Subtask 4.1.1 and visualization ideas to wireframe described in Subtask 4.1.2.
- Support efforts to include extreme driven high-demand, low-supply periods in the decision making under uncertainty tool (Subtask 4.4), to provide support for infrastructure-related decisions.

Products:

- Presentation on Characterization of Extreme Driven High-Demand, Low-Supply Periods

Subtask 4.2.2 Characterization of Compound Event Driven High-Demand, Low-Supply Periods

The goal of this subtask is to characterize the likelihood and potential for two non-extreme events co-occurring in a manner that negatively impacts zero-carbon resource availability, while driving increases in demand (e. g., mid-August 2020 weekend that was very warm, coinciding with drought and wildfire conditions). This subtask is designed to help characterize the co-occurrence of high demand, low supply periods during compound non-extreme climate events.

The Recipient shall:

- Following Subtask 4.2.1, utilize an “extremes in high-demand, low-supply” perspective and allow correlated non-extremes to define themselves.
- Establish a historical baseline of frequencies of compound events in demand and the conditions which cause them to understand and contextualize future changes.
- Periods of imbalance between demand and supply will be used to identify the large-scale conditions which allowed stressful conditions to occur.
- Identify whether single, co-occurring, or cascading events are more likely to result in grid failure.
- Evaluate future changes not only in their spatiotemporal aspects, but also which parts of their respective distributions are changing and which are projected to be the most impactful to grid demand.

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- Together with information produced in Subtask 4.1, the Recipient will identify meteorological conditions that impact supply, demand, and both simultaneously, and understand how their temporal frequency and spatial distributions change in a warming climate. Summarize these findings in a *Presentation of Beyond Extremes – Comprehensive Review of Conditions of Concern*, contribute Python code to repository described in Subtask 4.1.1, contribute visualization ideas to wireframe described in Subtask 4.1.2.
- Support efforts to include extreme driven high-demand, low-supply periods in the decision making under uncertainty tool (Subtask 4.4), to provide support for infrastructure-related decisions.

Products:

- Presentation of Beyond Extremes – Comprehensive Review of Conditions of Concern

Subtask 4.3 A Climate-Informed, Zero-Carbon Grid That Conforms to Statutory Requirements

The goals of this task are to support state agencies' implementation of SB 100, SB 423, and other legislation with cutting-edge research, data products, and scientific guidance; and to support the development of methods for quantifying benefits to reliability of potential resilience strategies.

The Recipient shall:

- Perform research and computations to support SB 100 Modeling team:
 - Translate data and research products into formats that support their models; and
 - Perform additional analysis based on SB 100 Modeling team needs.
- Perform research and computations to support CEC's response to SB 423:
 - Translate data and research products into formats that support their models; and
 - Perform additional analysis based on SB 423 related needs.
- Support efforts to quantify benefits to reliability of potential resilience strategies through:
 - Leverage Group 1's efforts to identify renewable lulls that co-occur with demand peaks to quantify impacts of weather conditions that impact grid reliance.
 - Use assessment of spatial correlation of single stressors and co-occurrence of multiple stressors in conjunction with siting efforts in Subtask 3.2 to provide Group 1 with high-level guidance as to where to place new assets.
 - Characterize uncertainty around extreme, compound, and other high impact events (see also Subtask 4.4) to provide Group 1 with quantifiable estimates.
 - Provide quantifiable metrics of changes in spatial extent of extreme/high-impact events, changes in probabilities or frequency of such events to enable robust optimization of location of renewable resources.
 - Use results from Subtasks 4.1 and 4.2 to support Group 1 efforts to ensure geographic diversity of generation.
 - Support Group 1 modeling efforts to assess cost reliability value added from the project's contributions.
- Prepare a *Quantifying Benefits to Reliability of Resilience Strategies Memorandum* which includes, but is not limited to:
 - High-level executive summary discussing:
 - Quantification of weather and climate events that lead to grid failure; and
 - Quantified results from above bullet points.

Exhibit A

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Products:

- Quantifying Benefits to Reliability of Resilience Strategies Memorandum

Subtask 4.4 Quantifying Climate Uncertainty Through a Grid Planning Lens

The goals of this task are to develop a framework that quantifies climate uncertainty in a manner that is relevant to the grid decision-making process; create visualizations to communicate uncertainty in grid-relevant climate phenomena and outcomes; and support Group 1's effort in evaluating robust grid design outcomes.

The Recipient shall:

- Identify distinct sources of uncertainty impacting grid performance under climate change and categorize those uncertainties based on whether they can be represented in a probabilistic or non-probabilistic manner (e.g., deep uncertainty vs shallow uncertainty).
- Evaluate how different sources of uncertainty represented within the range of available climate projections and data from Group 1 propagate through to grid-relevant outcomes including:
 - Examine impacts of climate uncertainty on renewable generation potentials;
 - Examine impacts of climate uncertainty on extreme events understood to cause grid stress; and
 - With sufficient data from Group 1 on demand forecasting, reliability, and cost metrics, further examine how uncertainty impacts future grid outcomes.
- Create visualizations to communicate how uncertainty affects grid-relevant outcomes including:
 - Develop a *Decision Making Under Uncertainty Python Notebook* to show the impact of uncertainty on grid-relevant outcomes;
 - Iterate on visualizations in consultation with stakeholders; and
 - Synthesize visualizations to support Subtask 6.4 and other outreach efforts.
- Prepare and provide a *CPR Report #1* in accordance with subtask 1.3 (CPR Meetings).
- Participate in a CPR Meeting.

Products:

- Decision Making Under Uncertainty Python Notebook
- CPR Report #1

TASK 5 ACCESSIBLE CLIMATE-INFORMED DATA PRODUCTS FOR GRID RESILIENCE APPLICATIONS

The goals of this task are to support development of a zero-carbon, resilient grid by translating data products generated in Tasks 3 and 4 into accessible, usable, stakeholder-informed data products and provide scientific leadership and statistical guidance to ensure smooth transfer into Cal-Adapt (Group 3) and to improve the quality and accuracy of resource availability profiles by localization to more directly relate to site specific assets.

Subtask 5.1 New WECC Wide Climate Data & Generation Profiles for Cal-Adapt

The goal of this subtask is to translate generation profiles and resource availability data into formats consistent with the Cal-Adapt: Analytics Engine as well as Group 3.

The Recipient shall:

- Coordinate with the lead entity of Cal-Adapt Enterprise (currently Cal-Adapt: Analytics Engine) and determine optimal data format and structure for transfer.

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- Leverage Cal-Adapt Analytics Engine engagement efforts to understand user needs.
- Deliver a *Generation Profiles Dataset* to Group 3.
- Deliver a *Presentation on Generation Profiles Dataset*. This presentation will describe the dataset delivered to Groups 1 & 3, including relevant information to support interpretation of the dataset.

Products:

- Generation Profiles Dataset
- Presentation on Generation Profiles Dataset

Subtask 5.2 Localization of Hourly Zero-Carbon Generation Profiles

The goal of this subtask is to improve quality of solar and wind resource availability estimates by utilizing in-situ local observations or performing bias-correction on GCM fields.

The Recipient shall:

- Develop an approach that allows for in-situ radiation or wind data to be utilized to bias-correct (i.e., localize) projections from grid-cell resolution to specific asset points.
- Build a *Localization Jupyter Notebook* to function on the Cal-Adapt Analytics Engine to allow energy sector stakeholders to provide their own data and localize gridded resource availability estimates.
- Assess quality of downscaled CMIP6 GCM products at representing hub-height winds and surface radiation and determine if bias-correcting these fields using reanalysis or other gridded products would improve the quality of resource availability estimates.

Products:

- Localization Jupyter Notebook

TASK 6: ENGAGEMENT TO INCREASE ELECTRICITY SECTOR CAPACITY TO INCORPORATE CLIMATE INTO PLANNING AND RULEMAKING

The goals of this task are to engage key stakeholders to align project deliverables with existing data needs and to provide them with scientific support to advance energy system modeling; engage secondary stakeholders who utilize derived products; collaborate with research partners; provide user support for developed products; and put on a workshop to share project results with the larger electricity sector.

Subtask 6.1 Stakeholder Engagement: Regulators & Policymakers

The goals of this task are to: deeply engage key stakeholders (i.e., gatekeepers) who determine what methods and data go into state rulemaking, regulation, and planning of California's electrical grid; develop consistency across various agency processes by producing a shared climate-informed data repository; align project research tasks and deliverables with gatekeeper needs; and develop the capacity of gatekeepers to understand and use climate-informed products in their work.

The Recipient shall:

- Deeply engage, through sustained conversation, gatekeepers who seek climate-informed data. Gatekeepers may include, but are not limited to, parties such as:
 - CPUC's Integrated Resource Plan/Regulatory Authority (IRP/RA);

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- CEC Integrated Energy Policy Report/Demand Forecast Office;
- CEC EAD;
- SB 100 Modeling Team;
- CEC staff working on responding to SB 423;
- Governor's Office of Planning and Research; and
- Additional key stakeholders identified by CAM.
- Begin to engage gatekeepers who do not presently utilize climate-informed data, but should, including but not limited to:
 - CAISO; and
 - Additional key stakeholders identified by CAM.
- Develop consistency across various agency processes by producing a *Shared Climate-Informed Data Repository*:
 - Develop capacity to provide unified and authoritative climate data and climate-informed resource availability profiles, using shared scenarios and practices, for the processes such as:
 - CPUC Capacity Expansion Modeling (i.e., RESOLVE);
 - CPUC IRP/RA Reference System plans;
 - CPUC Production Cost Modeling (i.e., SERVIM);
 - Reliability Metrics (Loss of Load Expectation, Loss of Load Hours, Expected Unserved Energy);
 - Hourly Generation Dispatch + Cost (Load Profiles);
 - CEC's Extended Producer Responsibility Energy Load Forecasts;
 - CEC's Hourly Climate Profiles;
 - Electric Load Service Entities (LSE) IRP's Production Cost Modeling; and
 - CPUC's Preferred System Plan.
- Prepare a *Key Stakeholder Engagement Log* which will be periodically updated to apprise CAM on:
 - Outcomes from engagement efforts;
 - How the project's research plans are responding to stakeholder feedback; and
 - Open questions or requests from stakeholders beyond the project scope.

Products:

- Shared Climate-Informed Data Repository
- Key Stakeholder Engagement Log

Subtask 6.2 Stakeholder Engagement: TAC and Impacted Parties (IOUs & LSEs)

The goal of this task is to engage IOUs, LSEs and other stakeholders whose activities are impacted by plans, regulations and rules which incorporate project research results.

The Recipient shall:

- Engage, through conversation during and after research tasks, stakeholders (i.e., IOUs and LSEs) who are impacted by plans, regulations, and rules which incorporate project research results, to:
 - Present preliminary findings and data products midway through the Agreement;
 - Incorporate stakeholder feedback into the research plans;
 - At conclusion of work, re-engage to inform stakeholders of results and data; and
 - Encourage collaboration to build capacity in stakeholders to use climate-informed data products.

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- Prepare a *Secondary Stakeholder Engagement Log* which will be periodically updated to apprise CAM on:
 - Outcomes from engagement efforts; and
 - Open questions or requests from stakeholders beyond project scope.

Products:

- Secondary Stakeholder Engagement Log

Subtask 6.3 Collaboration with Research Partners

The goal of this task is to create capacity for coordination with the research team that is funded by Group 1 and Group 3 of this GFO, and additional external research projects relevant to this work (i.e., EPC-20-006, EPC-20-007, PIR-19-006, etc.).

The Recipient shall:

- Engage in frequent, short, focused meetings with other researchers (i.e., Group 1 and Group 3) prioritizing removing obstacles, highlighting risks, and preparing for dependencies.
- Support CEC's efforts to have a well-coordinated research portfolio through:
 - Providing organizational support for the Climate Data Analysis Working Group (C-DAWG), cross-grant coordination meetings (as appropriate).
 - Apply agile management practices to help develop *Project Coordination Plans* (e.g., Quarterly Product Increments, Retrospectives, and Backlogs) which can be used by CEC to support planning, decision making, and transparency with prioritization.

Products:

- Project Coordination Plans

Subtask 6.4 Project Darkstorm Workshop

The goal of this task is to put on a highly visible, hands-on, and engaging workshop which walks stakeholders, policymakers, and decision-makers through a number of future scenarios which stress a future electric grid and examine resilience strategies that will allow for California's grid to be reliable in the face of future extremes.

The Recipient shall:

- Establish viability and interest in such a Workshop including:
 - Coordinate with Group 1 and Group 3 partners to assess their interest/support; and
 - Engage potential attendees about their needs/wants from such a workshop.
- Develop workshop materials in a *Darkstorm Workshop Materials Packet* (i.e., Agenda, Potential Attendees, Venue, etc.).
- Coordinate with CAM to align event with CEC priorities.
- Get CAM approval to event before proceeding further.
- Pursue federal funding opportunities to extend event to include outside of California, but within WECC stakeholders.
- Organize and execute workshop.

Products:

- Darkstorm Workshop Materials Packet

TASK 7: COORDINATION WITH RELATED GRANTS

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The goal of this task is to ensure clear and timely communication, as well as common understanding regarding products and activities that are shared between or impact grants (e.g., data products and/or activities of on grant that serve as inputs or impact another).

The Recipient shall:

- Coordinate with Recipients of other CEC-funded grants for which there are shared data products and/or activities (Groups 1 & 3) to identify and name inter-grant dependencies.
- Describe the nature and timing of products and/or activities that are shared between grants.
- Deliver to CAM an *Initial List of Inter-Grant Dependencies and Contingency Plan* which:
 - includes the names, describes, and indicates expected timing of products and/or activities that are shared between grants, and;
 - describes risk to the grant in the event that shared products and/or activities are not delivered as expected.
- Communicate with Recipients of related grants (Groups 1 & 3) at least quarterly throughout the grant period to ensure continued communication regarding inter-grant dependencies.
- Deliver a *Mid-term List of Inter-Grant Dependencies and Contingency Plan* to CAM, highlighting any changes from the initial versions of these products and/or activities.
- Respond to CAM feedback regarding mid-term products and/or activities.
- Deliver a *Final List of Inter-Grant Dependencies and Contingency Plan* to CAM.

Products:

- Initial List of Inter-Grant Dependencies and Contingency Plan
- Mid-term List of Inter-Grant Dependencies and Contingency Plan
- Final List of Integrant Dependencies and Contingency Plan

TASK 8: EVALUATION OF PROJECT BENEFITS

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

The Recipient shall:

- Complete the *Initial Project Benefits Questionnaire*. The Initial Project Benefits Questionnaire shall be initially completed by the Recipient with 'Kick-off' selected for the 'Relevant data collection period' and submitted to the CAM for review and approval.
- Complete the *Annual Survey* by December 15th of each year. The Annual Survey includes but is not limited to the following information:
 - Technology commercialization progress
 - New media and publications
 - Company growth
 - Follow-on funding and awards received
- Complete the *Final Project Benefits Questionnaire*. The Final Project Benefits Questionnaire shall be completed by the Recipient with 'Final' selected for the 'Relevant data collection period' and submitted to the CAM for review and approval.
- Respond to CAM questions regarding the questionnaire drafts.
- Complete and update the project profile on the CEC's public online project and recipient directory on the [Energize Innovation website](http://www.energizeinnovation.fund) (www.energizeinnovation.fund) and provide *Documentation of Project Profile* on EnergizeInnovation.fund, including the profile link.
- If the Prime Recipient is an Innovation Partner on the project, complete and update the organizational profile on the CEC's public online project and recipient directory on the [Energize Innovation website](http://www.energizeinnovation.fund) (www.energizeinnovation.fund), and provide *Documentation of Organization Profile* on EnergizeInnovation.fund, including the profile link.

Exhibit A Scope of Work Eagle Rock Analytics

Products:

- Initial Project Benefits Questionnaire
- Annual Survey(s)
- Final Project Benefits Questionnaire
- Documentation of Project Profile on EnergizeInnovation.fund
- Documentation of Organization Profile on EnergizeInnovation.fund

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.

Products:

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

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V. PROJECT SCHEDULE

Please see the attached Excel spreadsheet.

STATE OF CALIFORNIA

STATE ENERGY RESOURCES
CONSERVATION AND DEVELOPMENT COMMISSION

RESOLUTION: 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-21-037 with Eagle Rock Analytics for a \$900,000 grant to develop stakeholder-informed data products and research on climate-related changes to availability and distribution of solar, wind, and hydroelectric generation through mid-century. This research will leverage state-of-the-art climate projections and expand the understanding of climate-related phenomena that affect solar and wind resources in California, including climate extremes, compound and cascading events, and high-stress weather and climate events to support a high-renewables, reliable, and cost-effective electricity grid; and

FURTHER BE IT RESOLVED, that the Executive Director or their 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 June 8, 2022.

AYE:

NAY:

ABSENT:

ABSTAIN:

Liza Lopez
Secretariat