



GRANT REQUEST FORM (GRF)

A) New Agreement # PIR-19-006

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

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

D) Title of Project
Climate Analytics to Support Natural Gas Sector Utilities: Actionable, Responsive and Open Solutions for Historical Climate Needs in California

E) Term and Amount

Start Date	End Date	Amount
6/10/2020	3/29/2024	\$ 1,000,704

F) Business Meeting Information

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

Proposed Business Meeting Date 6/10/2020 Consent Discussion

Business Meeting Presenter Martine Schmidt-Poolman Time Needed: 5 minutes

Please select one list serve. PIER NaturalGas (NG Research Program)

Agenda Item Subject and Description:

EAGLE ROCK ANALYTICS. Proposed resolution approving Agreement PIR-19-006 with Eagle Rock Analytics for a \$1,000,704 grant to produce a data assimilation platform that supports adaptation planning, and adopting staff's determination that this project is exempt from CEQA. The platform will be designed to support continuously updated historical weather and climate data and to support efforts to provide quality-controlled, high resolution, hourly climate data to the natural gas IOUs. Platform development will be informed by stakeholder engagement, and the data platform will pull in a mix of weather observations, remote sensing and reanalysis data. (Natural Gas funding) Contact: Susan Wilhelm.

G) California Environmental Quality Act (CEQA) Compliance

1. Is Agreement considered a "Project" under CEQA?

Yes (skip to question 2)

No (complete the following (PRC 21065 and 14 CCR 15378)):

2. If Agreement is considered a "Project" under CEQA:

a) Agreement **IS** exempt.

Statutory Exemption. List PRC and/or CCR section number:

Categorical Exemption. List CCR section number:

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



GRANT REQUEST FORM (GRF)

Explain reason why Agreement is exempt under the above section:

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.

All aspects of the project will be completed on a computer. This project involves advanced statistics, data assimilation, quality control of data, machine learning, and basic visualizations of data.

- 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
TBD- Market Outreach Contractor	\$ 50,000
	\$

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
NG Subaccount, PIERDD	18-19	501.001M	\$1,000,704

R&D Program Area: EGRO: EA

TOTAL: \$ 1,000,704

Explanation for "Other" selection

Reimbursement Contract #: Federal Agreement #:



K) Recipient's Contact Information

1. Recipient's Administrator/Officer

Name: Owen Doherty
Address: 3119 63Rd St
City, State, Zip: Sacramento, CA
95820-1922
Phone: 631-766-7406
E-Mail: owen@eaglerockanalytics.com

2. Recipient's Project Manager

Name: Owen Doherty
Address: 3119 63Rd St
City, State, Zip: Sacramento, CA
95820-1922
Phone: 631-766-7406
E-Mail: owen@eaglerockanalytics.com

L) Selection Process Used

- Competitive Solicitation Solicitation #: GFO-19-501
- First Come First Served Solicitation Solicitation #:

M) The following items should be attached to this GRF

- | | | | | |
|---|-------------------------------------|-----|-------------------------------------|----------|
| 1. Exhibit A, Scope of Work | <input checked="" type="checkbox"/> | N/A | <input checked="" type="checkbox"/> | Attached |
| 2. Exhibit B, Budget Detail | <input checked="" type="checkbox"/> | N/A | <input checked="" type="checkbox"/> | Attached |
| 3. CEC 105, Questionnaire for Identifying Conflicts | <input checked="" type="checkbox"/> | N/A | <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		Stakeholder Outreach and Engagement
3		Development of a Data Analysis Platform for Historical Weather Data at High Resolutions
4	X	Support and Operationalize Natural Gas Sector Climate Risk Research
5		Evaluation of Project Benefits
6		Technology/Knowledge Transfer Activities

B. Acronym/Term List

Acronym/Term	Meaning
CAM	Commission Agreement Manager
CAO	Commission Agreement Officer
CCAs	Community Choice Aggregations
CPR	Critical Project Review
IOU	Investor Owned Utilities
TAC	Technical Advisory Committee

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

A. Purpose of Agreement

The purpose of this Agreement is to fund the development of historical climate and geohazard data products that will improve natural gas system resilience to climate change.

B. Problem/ Solution Statement

Problem

In the context of energy sector vulnerability assessment and adaptation planning in California, the most commonly utilized information on projected climate, including temperature, is presently available on daily timescales at a resolution of 7 km. Stakeholders have clearly articulated the need for this projected data to be available at a locally resolving resolution (2 km) at hourly timescales. Further, risks from concurrent or sequential climate events (i.e. landslides in regions impacted by wildfire followed by extreme precipitation) are poorly understood and represent a major risk to natural gas system infrastructure. Historical climate data and climate related geohazards are not sufficiently resolved or assessed to elucidate critical dynamics between the natural gas system and the environment. Improvements in quantification of risk, along with

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

spatial and temporal resolutions are necessary to allow for climate resilience and adaptation planning to begin informing development in the natural gas system.

Solution

The Recipient will produce a data assimilation platform that pulls in a mix of weather observations, remote sensing and reanalysis data. The platform will be used to produce continuously updated historical weather and climate data, supporting efforts to produce high resolution, hourly climate data. This data assimilation platform can be extended to additional tasks to generate products that quantify risk from landslides triggered by extreme precipitation in areas where vegetation has been severely impacted by wildfire, and additional products to provide insights into climate – natural gas system dynamics. Once developed the data assimilation platform will be made available to other research projects and tasks, allowing for other CEC-funded projects to be made operational quickly, with lower costs to ratepayers. This flexibility is important, because state climate policies and regulations are changing, and responsiveness is important.

The Recipient intends for this work to be applied research – taking previous CEC-funded research relevant to natural gas sector resilience, making it functional, informed by feedback and guidance from stakeholders throughout the Agreement. In many cases the evolution of open sourced, peer-reviewed software allows for readily available code into data assimilation platforms to produce necessary climate and geohazard products. The project will make use of machine learning, advanced statistical techniques and other technical methods that are well established in the literature, and readily implementable by using open source software. The recipient's partnership with cloud computing providers allows ready access to a tremendous amount of climate and environmental data at no cost to ratepayers, and enables access to state-of-the art cloud computing resources to bring big-data, intelligent computing techniques to climate resilience planning problems in the natural gas system.

C. Goals and Objectives of the Agreement

Agreement Goals

The goal of this Agreement is to generate a data platform to support development of novel climate and geohazard risk products that lead to improved natural gas system reliability and safety. Such products will be utilized to elucidate climate – natural gas system dynamics, through applied stress tests and other risk assessment protocols. All products will be informed by comprehensive outreach and engagement activities, with the goal of producing data products that are actionable, leading to improved climate resiliency. The design and implementation of this work will ensure that the benefits of the project extend beyond the terms of the Agreement, and can be maintained at a low cost to ratepayers, consistent with the need for climate data and informatics in the natural gas sector to transition from theoretical to applied research.

Ratepayer Benefits: This Agreement will result in the ratepayer benefits of greater natural gas reliability and increased safety by enabling Investor-owned utilities (IOUs) to understand natural gas infrastructure vulnerability in the context of risk from compound climate events (i.e. wildfire followed by extreme-precipitation) and exposure to changing energy demands and use structures from changes in temperature. Informed deployment of infrastructure will increase reliability through reductions of damage, decrease costs through reduced losses, and increase safety of the delivery system. Further, by leveraging results from previously supported PIER

Exhibit A

Scope of Work

Eagle Rock Analytics

research and operationalizing it in a way that reduces operating expenses long-term, ratepayers will benefit from lower costs now and in the future.

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 providing new high-resolution historical temperature data on hourly timescales, and additional geohazard informatics (landslide risk from extreme precipitation following wildfire). The research team will build a data assimilation platform on the cloud that will enable technological advances that will provide value not only during the Agreement period but also after the project is complete. Sustained outreach throughout the Agreement, including communities and organizations not previously engaged, will help overcome barriers associated with a lack of representation in achieving statutory energy goals and in informing future policies. Broadly, this project supports a transition from academic, theoretical climate research towards applied research that is engineering friendly and leads to actionable climate resilience outcomes.

Agreement Objectives

The objectives of this Agreement are to:

- Produce actionable and useful climate and geohazard products informed by comprehensive outreach and user engagement that engages a diverse population of stakeholders, many of whom have not been previously engaged to understand their climate data needs.
- Meet the climate data needs articulated by IOUs, primarily through collection, archiving, and dissemination of hourly historical temperature and other weather data, such as risk proxies for wildfire-extreme precipitation induced landslides.
- Support the 2019 Integrated Energy Policy Report recommendation to “Continue to prioritize applied research and action that support climate resilience in California’s most vulnerable communities” by providing historical climate data at a resolution that informs community-level risks and by providing novel compound-risk calculations (e.g. landslides), to which many climate-vulnerable communities in California are highly exposed.
- Support the 2019 Integrated Energy Policy Report recommendation that “State agencies need to redouble efforts to coordinate actionable research that informs climate-resilient decarbonization” by engaging state agency staff outside of CEC in outreach and engagement efforts in the planning, execution, and deployment phases of the work.
- Support the 2019 Integrated Energy Policy Report recommendation to “Advance next-generation climate projections that improve understanding of uncertain parameters responsible for key climate-related impacts to the energy system” by accurately assessing uncertainties from sampling and statistical methods utilized. These measures of uncertainty will be used directly by natural gas stakeholders and applied in efforts to downscale climate models.
- Support the 2019 Integrated Energy Policy Report recommendation to “identify resources needed to support enhanced technology and knowledge transfer between local jurisdictions and utilities to reduce emissions and enhance resilience” by engaging community-based organizations like Community Choice Aggregations (CCAs) and involving them in the project design, to ensure that outputs from the work are actionable to them in their efforts to reduce emissions and enhance resilience.
- As climate resilience efforts are rapidly evolving, be ready and adaptable to meet

Exhibit A Scope of Work Eagle Rock Analytics

uncertain future needs and take advantage of new opportunities as new datasets and research results arise, and to allow for such advances to inform the development of products to better understand the interdependencies and dynamics between climate change and natural gas system operations.

- Meet aforementioned goals by applying pre-existing peer-reviewed research through open source software solutions on the cloud, with the ultimate goal of developing products that are produced in near real time.
- Develop computer architecture and software in a way that provides benefits to ratepayers well beyond the terms of the Agreement, without the need for expensive researchers or consultants to maintain the system.

III. TASK 1 GENERAL PROJECT TASKS

PRODUCTS

Subtask 1.1 Products

The goal of this subtask is to establish the requirements for submitting project products (e.g., reports, summaries, plans, and presentation materials). Unless otherwise specified by the Commission Agreement Manager (CAM), the Recipient must deliver products as required below by the dates listed in the **Project Schedule (Part V)**. Products that require a draft version are indicated by marking “**(draft and final)**” after the product name in the “Products” section of the task/subtask. If “(draft and final)” does not appear after the product name, only a final version of the product is required. With respect to due dates within this Scope of Work, “**days**” means working days.

The Recipient shall:

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

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

For products that require a final version only

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

For all products

- Submit all data and documents required as products in accordance with the following Instructions for Submitting Electronic Files and Developing Software:

- **Electronic File Format**

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- Submit all data and documents required as products under this Agreement in an electronic file format that is fully editable and compatible with the Energy Commission's software and Microsoft (MS)-operating computing platforms, or with any other format approved by the CAM. Deliver an electronic copy of the full text of any Agreement data and documents in a format specified by the CAM, such as memory stick or CD-ROM.

The following describes the accepted formats for electronic data and documents provided to the Energy Commission as products under this Agreement, and establishes the software versions that will be required to review and approve all software products:

- Data sets will be in MS Access or MS Excel file format (version 2007 or later), or any other format approved by the CAM.
- Text documents will be in MS Word file format, version 2007 or later.
- Documents intended for public distribution will be in PDF file format.
- The Recipient must also provide the native Microsoft file format.
- Project management documents will be in Microsoft Project file format, version 2007 or later.

- **Software Application Development**

Use the following standard Application Architecture components in compatible versions for any software application development required by this Agreement (e.g., databases, models, modeling tools), unless the CAM approves other software applications such as open source programs:

- Microsoft ASP.NET framework (version 3.5 and up). Recommend 4.0.
- Microsoft Internet Information Services (IIS), (version 6 and up) Recommend 7.5.
- Visual Studio.NET (version 2008 and up). Recommend 2010.
- C# Programming Language with Presentation (UI), Business Object and Data Layers.
- SQL (Structured Query Language).
- Microsoft SQL Server 2008, Stored Procedures. Recommend 2008 R2.
- Microsoft SQL Reporting Services. Recommend 2008 R2.
- XML (external interfaces).

Any exceptions to the Electronic File Format requirements above must be approved in writing by the CAM. The CAM will consult with the Energy Commission's Information Technology Services Branch to determine whether the exceptions are allowable.

MEETINGS

Subtask 1.2 Kick-off Meeting

The goal of this subtask is to establish the lines of communication and procedures for implementing this Agreement.

The Recipient shall:

- Attend a "Kick-off" meeting with the CAM, the Commission Agreement Officer (CAO), and any other Energy Commission staff relevant to the Agreement. The Recipient will bring its Project Manager and any other individuals designated by the CAM to this meeting. The administrative and technical aspects of the Agreement will be discussed at the meeting. Prior to the meeting, the CAM will provide an agenda to all potential meeting participants.

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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;
- 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 and invoices (subtask 1.5);
 - Final Report (subtask 1.6);
 - Technical Advisory Committee meetings (subtasks 1.10 and 1.11); and
 - Any other relevant topics.
- Provide an *Updated Project Schedule*, *List of Match Funds*, and *List of Permits*, as needed to reflect any changes in the documents.

The CAM shall:

- Designate the date and location of the meeting.
- Send the Recipient a *Kick-off Meeting Agenda*.

Recipient Products:

- Updated Project Schedule (*if applicable*)
- Updated List of Match Funds (*if applicable*)
- Updated List of Permits (*if applicable*)

CAM Product:

- Kick-off Meeting Agenda

Subtask 1.3 Critical Project Review (CPR) Meetings

The goal of this subtask is to determine if the project should continue to receive Energy Commission funding, and if so whether any modifications must be made to the tasks, products, schedule, or budget. CPR meetings provide the opportunity for frank discussions between the Energy Commission and the Recipient. As determined by the CAM, discussions may include project status, challenges, successes, advisory group findings and recommendations, final report preparation, and progress on technical transfer and production readiness activities (if applicable). Participants will include the CAM and the Recipient, and may include the CAO and any other individuals selected by the CAM to provide support to the Energy Commission.

CPR meetings generally take place at key, predetermined points in the Agreement, as determined by the CAM and as shown in the Task List on page 1 of this Exhibit. However, the CAM may schedule additional CPR meetings as necessary. The budget will be reallocated to

Exhibit A Scope of Work Eagle Rock Analytics

cover the additional costs borne by the Recipient, but the overall Agreement amount will not increase. CPR meetings generally take place at the Energy Commission, but they may take place at another location, or may be conducted via electronic conferencing (e.g., WebEx) as determined by the CAM.

The Recipient shall:

- Prepare a *CPR Report* for each CPR meeting that: (1) discusses the progress of the Agreement toward achieving its goals and objectives; and (2) includes recommendations and conclusions regarding continued work on the project.
- Submit the CPR Report along with any other *Task Products* that correspond to the technical task for which the CPR meeting is required (i.e., if a CPR meeting is required for Task 2, submit the Task 2 products along with the CPR Report).
- Attend the CPR meeting.
- Present the CPR Report and any other required information at each CPR meeting.

The CAM shall:

- Determine the location, date, and time of each CPR meeting with the Recipient's input.
- Send the Recipient a *CPR Agenda* and a *List of Expected CPR Participants* in advance of the CPR meeting. If applicable, the agenda will include a discussion of match funding and permits.
- Conduct and make a record of each CPR meeting. Provide the Recipient with a *Schedule for Providing a Progress Determination* on continuation of the project.
- Determine whether to continue the project, and if so whether modifications are needed to the tasks, schedule, products, or budget for the remainder of the Agreement. If the CAM concludes that satisfactory progress is not being made, this conclusion will be referred to the Deputy Director of the Energy Research and Development Division.
- Provide the Recipient with a *Progress Determination* on continuation of the project, in accordance with the schedule. The Progress Determination may include a requirement that the Recipient revise one or more products.

Recipient Products:

- CPR Report(s)
- Task Products (draft and/or final as specified in the task)

CAM Products:

- CPR Agenda
- List of Expected CPR Participants
- Schedule for Providing a Progress Determination
- Progress Determination

Subtask 1.4 Final Meeting

The goal of this subtask is to complete the closeout of this Agreement.

The Recipient shall:

- Meet with Energy Commission staff to present project findings, conclusions, and recommendations. The final meeting must be completed during the closeout of this Agreement. This meeting will be attended by the Recipient and CAM, at a minimum. The meeting may occur in person or by electronic conferencing (e.g., WebEx), with approval of the CAM.

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The technical and administrative aspects of Agreement closeout will be discussed at the meeting, which may be divided into two separate meetings at the CAM's discretion.

- The technical portion of the meeting will involve the presentation of findings, conclusions, and recommended next steps (if any) for the Agreement. The CAM will determine the appropriate meeting participants.
- The administrative portion of the meeting will involve a discussion with the CAM and the CAO of the following Agreement closeout items:
 - Disposition of any state-owned equipment.
 - Need to file a Uniform Commercial Code Financing Statement (Form UCC-1) regarding the Energy Commission's interest in patented technology.
 - The Energy Commission's request for specific "generated" data (not already provided in Agreement products).
 - Need to document the Recipient's disclosure of "subject inventions" developed under the Agreement.
 - "Surviving" Agreement provisions such as repayment provisions and confidential products.
 - Final invoicing and release of retention.
- Prepare a *Final Meeting Agreement Summary* that documents any agreement made between the Recipient and Commission staff during the meeting.
- Prepare a *Schedule for Completing Agreement Closeout Activities*.
- Provide *All Draft and Final Written Products* on a CD-ROM or USB memory stick, organized by the tasks in the Agreement.

Products:

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

REPORTS AND INVOICES

Subtask 1.5 Progress Reports and Invoices

The goals of this subtask are to: (1) periodically verify that satisfactory and continued progress is made towards achieving the project objectives of this Agreement; and (2) ensure that invoices contain all required information and are submitted in the appropriate format.

The Recipient shall:

- Submit a monthly *Progress Report* to the CAM. Each progress report must:
 - Summarize progress made on all Agreement activities as specified in the scope of work for the preceding month, including accomplishments, problems, milestones, products, schedule, fiscal status, and an assessment of the ability to complete the Agreement within the current budget and any anticipated cost overruns. See the Progress Report Format Attachment for the recommended specifications.
- Submit a monthly or quarterly *Invoice* that follows the instructions in the "Payment of Funds" section of the terms and conditions, including a financial report on Match Fund and in-state expenditures.

Products:

- Progress Reports
- Invoices

Exhibit A

Scope of Work

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Subtask 1.6 Final Report

The goal of this subtask is to prepare a comprehensive Final Report that describes the original purpose, approach, results, and conclusions of the work performed under this Agreement. The CAM will review the Final Report, which will be due at least **two months** before the Agreement end date. When creating the Final Report Outline and the Final Report, the Recipient must use the Style Manual provided by the CAM.

Subtask 1.6.1 Final Report Outline

The Recipient shall:

- Prepare a *Final Report Outline* in accordance with the *Style Manual* provided by the CAM. (See *Task 1.1* for requirements for draft and final products.)

Recipient Products:

- Final Report Outline (draft and final)

CAM Product:

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

Subtask 1.6.2 Final Report

The Recipient shall:

- Prepare a *Final Report* for this Agreement in accordance with the approved Final Report Outline, Style Manual, and Final Report Template provided by the CAM with the following considerations:
 - Ensure that the report includes the following items, in the following order:
 - Cover page (**required**)
 - Credits page on the reverse side of cover with legal disclaimer (**required**)
 - Acknowledgements page (optional)
 - Preface (**required**)
 - Abstract, keywords, and citation page (**required**)
 - Table of Contents (**required**, followed by List of Figures and List of Tables, if needed)
 - Executive summary (**required**)
 - Body of the report (**required**)
 - References (if applicable)
 - Glossary/Acronyms (If more than 10 acronyms or abbreviations are used, it is required.)
 - Bibliography (if applicable)
 - Appendices (if applicable) (Create a separate volume if very large.)
 - Attachments (if applicable)
 - Ensure that the document is written in the third person.
 - Ensure that the Executive Summary is understandable to the lay public.
 - Briefly summarize the completed work. Succinctly describe the project results and whether or not the project goals were accomplished.

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- Identify which specific ratepayers can benefit from the project results and how they can achieve the benefits.
- If it's necessary to use a technical term in the Executive Summary, provide a brief definition or explanation when the technical term is first used.
- Follow the Style Guide format requirements for headings, figures/tables, citations, and acronyms/abbreviations.
- Ensure that the document omits subjective comments and opinions. However, recommendations in the conclusion of the report are allowed.
- Include a brief description of the project results in the Abstract.
- Submit a draft of the report to the CAM for review and comment. The CAM will provide written comments to the Recipient on the draft product within 15 days of receipt
- Consider incorporating all CAM comments into the Final Report. If the Recipient disagrees with any comment, provide a written response explaining why the comment was not incorporated into the final product
- Submit the revised Final Report and responses to comments within 10 days of notice by the CAM, unless the CAM specifies a longer time period or approves a request for additional time.
- Submit one bound copy of the *Final Report* to the CAM along with *Written Responses to Comments on the Draft Final Report*.

Products:

- Final Report (draft and final)
- Written Responses to Comments on the Draft Final Report

CAM Product:

- Written Comments on the Draft Final Report

MATCH FUNDS, PERMITS, AND SUBCONTRACTS

Subtask 1.7 Match Funds

The goal of this subtask is to ensure that the Recipient obtains any match funds planned for this Agreement and applies them to the Agreement during the Agreement term.

While the costs to obtain and document match funds are not reimbursable under this Agreement, the Recipient may spend match funds for this task. The Recipient may only spend match funds during the Agreement term, either concurrently or prior to the use of Energy Commission funds. Match funds must be identified in writing, and the Recipient must obtain any associated commitments before incurring any costs for which the Recipient will request reimbursement.

The Recipient shall:

- Prepare a *Match Funds Status Letter* that documents the match funds committed to this Agreement. If no match funds were part of the proposal that led to the Energy Commission awarding this Agreement and none have been identified at the time this Agreement starts, then state this in the letter.

If match funds were a part of the proposal that led to the Energy Commission awarding this Agreement, then provide in the letter:

- A list of the match funds that identifies:

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- The amount of cash match funds, their source(s) (including a contact name, address, and telephone number), and the task(s) to which the match funds will be applied.
 - The amount of each in-kind contribution, a description of the contribution type (e.g., property, services), the documented market or book value, the source (including a contact name, address, and telephone number), and the task(s) to which the match funds will be applied. If the in-kind contribution is equipment or other tangible or real property, the Recipient must identify its owner and provide a contact name, address, telephone number, and the address where the property is located.
 - If different from the solicitation application, provide a letter of commitment from an authorized representative of each source of match funding that the funds or contributions have been secured.
- At the Kick-off meeting, discuss match funds and the impact on the project if they are significantly reduced or not obtained as committed. If applicable, match funds will be included as a line item in the progress reports and will be a topic at CPR meetings.
 - Provide a *Supplemental Match Funds Notification Letter* to the CAM of receipt of additional match funds.
 - Provide a *Match Funds Reduction Notification Letter* to the CAM if existing match funds are reduced during the course of the Agreement. Reduction of match funds may trigger a CPR meeting.

Products:

- Match Funds Status Letter
- Supplemental Match Funds Notification Letter (*if applicable*)
- Match Funds Reduction Notification Letter (*if applicable*)

Subtask 1.8 Permits

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

The Recipient shall:

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

The list of permits and the schedule for obtaining them will be discussed at the Kick-off meeting (subtask 1.2), and a timetable for submitting the updated list, schedule, and copies of the permits will be developed. The impact on the project if the permits are not obtained in a timely fashion or are denied will also be discussed. If applicable, permits will be included as a line item in progress reports and will be a topic at CPR meetings.

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- If during the course of the Agreement additional permits become necessary, then provide the CAM with an *Updated List of Permits* (including the appropriate information on each permit) and an *Updated Schedule for Acquiring Permits*.
- Send the CAM a *Copy of Each Approved Permit*.
- If during the course of the Agreement permits are not obtained on time or are denied, notify the CAM within 5 days. Either of these events may trigger a CPR meeting.

Products:

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

Subtask 1.9 Subcontracts

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

The Recipient shall:

- Manage and coordinate subcontractor activities in accordance with the requirements of this Agreement.
- Incorporate this Agreement by reference into each subcontract.
- Include any required Energy Commission flow-down provisions in each subcontract, in addition to a statement that the terms of this Agreement will prevail if they conflict with the subcontract terms.
- If required by the CAM, submit a draft of each *Subcontract* required to conduct the work under this Agreement.
- Submit a final copy of the executed subcontract.
- Notify and receive written approval from the CAM prior to adding any new subcontractors (see the discussion of subcontractor additions in the terms and conditions).

Products:

- Subcontracts (*draft 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.

Exhibit A Scope of Work Eagle Rock Analytics

- Review products and provide recommendations for needed product adjustments, refinements, or enhancements.
- Evaluate the tangible benefits of the project to the state of California and provide recommendations as needed to enhance the benefits.
- Provide recommendations regarding information dissemination, market pathways, or commercialization strategies relevant to the project products.

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

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

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.

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The Recipient shall:

- Discuss the TAC meeting schedule with the CAM at the Kick-off meeting. Determine the number and location of meetings (in-person and via teleconference) in consultation with the CAM.
- Prepare a *TAC Meeting Schedule* that will be presented to the TAC members during recruiting. Revise the schedule after the first TAC meeting to incorporate meeting comments.
- Prepare a *TAC Meeting Agenda* and *TAC Meeting Back-up Materials* for each TAC meeting.
- Organize and lead TAC meetings in accordance with the TAC Meeting Schedule. Changes to the schedule must be pre-approved in writing by the CAM.
- Prepare *TAC Meeting Summaries* that include any recommended resolutions of major TAC issues.

The TAC shall:

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

Products:

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

Exhibit A

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IV. TECHNICAL TASKS

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

TASK 2: STAKEHOLDER OUTREACH AND ENGAGEMENT

The goals of this task are to ensure that historic temperature, geohazard and risk assessment products are actionable, defined here as being designed in a manner that can be used by stakeholders to begin climate resilience planning and development for the natural gas infrastructure. Ultimately, this task aims to ensure that once data products are produced, follow up assessments are performed to identify opportunities to improve the utility of products produced. This work seeks to be informative beyond the project period itself, with lessons learned transferred to CEC and other researchers active in the field to improve CEC’s research to inform vulnerability and resilience options for a rapidly decarbonizing energy sector and other research efforts associated with California’s anticipated Fifth Climate Change Assessment (Fifth Assessment).

The Recipient shall:

- Prepare a *Stakeholder Outreach and Engagement Plan* that includes but is not limited to the following:
 - Identifies key stakeholder groups to engage; and
 - Formulates approaches appropriate to each stakeholder group; and
 - Charts a path forward that allows for evolution of engagement activities in concert with project development (i.e. transitioning from understanding stakeholder needs, to observing how they use the data, to responding to criticisms or new opportunities to ensure data products are effectively being utilized).
- Approach outreach efforts with the understanding that all ratepayers need to be represented, including vulnerable and disadvantaged ratepayers, and ensuring that data products are reflective of the needs of all ratepayers (including those who are transitioning towards a less carbon intensive energy future).
- Upon completion of the temperature-related elements of Task 3, engage Stakeholders on how they are using temperature data to ensure the product is working as needed, and then use this information to inform further development.
- Develop relationships with research teams involved in CEC’s broader portfolio of energy-related research as well as an anticipated Fifth Assessment to share lessons learned in outreach activities and to participate in their outreach efforts to leverage efforts efficiently.
- Perform outreach activities with the scientific community, identifying new developments in the rapidly evolving field of compound climate event risk assessment, and leveraging new open sourced software developments to improve our data products and ensure that climate data produced by PIER and EPIC funding is state-of-the-art.
- Use lessons learned from outreach efforts to inform the development and implementation of products in Tasks 4.
- Periodically revise the *Stakeholder Outreach and Engagement Plan* to ensure it is consistent with current policy (i.e. bi-annual updates to IEPR).
- Summarize lessons learned from above activities in a brief *Memorandum on Natural Gas System Needs for Climate and Geohazard Data Products*.

Exhibit A

Scope of Work

Eagle Rock Analytics

Products:

- Stakeholder Outreach and Engagement Plan (draft and final)
- Memorandum on Natural Gas System Needs for Climate and Geohazard Data Products

TASK 3: DEVELOPMENT OF A DATA ANALYSIS PLATFORM FOR HISTORICAL WEATHER DATA AT HIGH RESOLUTIONS

The goal of this task is to develop a data platform that archives historic climate data that resolves local features critical to representing California's complex and rugged topographies. This historical climate data will bring together peer-reviewed, quality assured data from a wide array of publicly available sources (i.e. remote sensing, weather stations, reanalysis products). This product will be designed to accommodate sustained, near-real time operation at low cost beyond the Agreement period. The data platform should take advantage of resources currently being made freely available by technology partners and developed in a way to reduce long term maintenance to reduce costs to ratepayers. This platform should be developed in a way that will allow for development of additional climate parameters that are of interest to the natural gas sector.

The Recipient shall:

- Develop a platform to ingest a vast array of climate and geospatial data.
 - Perform QA/QC on ingested data.
- Develop machine learning models to generate representative profiles of weather across California.
- Create a publicly accessible *Weather and Climate Data Platform*, containing high resolution (in time and space) weather data products as identified through stakeholder engagement.
 - Design the platform in a way that enables continuously updating weather and climate data products.
 - Quantify the accuracy and uncertainty of weather data at each location in California, and present this information in a manner that facilitates use by engineers and others involved with resilient infrastructure design and operations, using information gained in Task 2.
 - Design a platform that allows for additional historical analyses of weather and climate variables to be performed as needed, at low cost.
 - Engage and elicit input from federal (and other) researchers engaged in data assimilation, statistical modeling, spatial interpolation and downscaling techniques to ensure that best practices are incorporated into the development of the Database and to reduce operational costs.
 - Develop relationships with technology providers to ensure that the cost of producing the historical temperature product is minimized and remains low if and when transitioned to real time operations.
 - Perform work in a transparent, open way that enables straight forward technology transfer at the conclusion of the project.
 - Provide a *Public Webinar to Introduce Weather and Climate Data Platform*.

Products:

- Slides from *Public Webinar to Introduce Weather and Climate Data Platform*

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TASK 4: SUPPORT AND OPERATIONALIZE NATURAL GAS SECTOR CLIMATE RISK RESEARCH

The goal of this task is to operationalize improved methodologies of assessing risk from compound events, i.e. risk of landslides that occur when extreme precipitation follows wildfires. The goal of this work is to make other efforts operational, including those associated with other PIER NG-funded research as well as that from the broader research community, that assess changes in risk on short (i.e. seasonal) and long (i.e. climate) natural gas infrastructure planning timescales.

The Recipient shall:

- Produce an assessment of methods that assess risk in future climate conditions of landslides that arise from wildfire burns followed by extreme or heavy precipitation events. Such an assessment should include assessment of changes in the frequency and intensity of landslides.
- Identify and outline a plan to operationalize one or more methods on the data analysis platform. Generate a product entitled *Risk Informatics from Climate to Natural Gas Infrastructure*.
- Identify opportunities and cost to create a functional mesonet of California's increasingly high-density network of weather stations.
- To the extent appropriate and possible based on stakeholder needs and engagement, operationalize opportunities related to creation of a functional mesonet for California.
- The above landslide risk assessment shall be informed by extensive outreach in Task 2, focusing on how to make the final form of the output as actionable as possible (including a focus of understanding how best to match risk assessments to the timescales of infrastructure planning).
- Develop analytics leveraging previously funded research and open source solutions on a platform that can be maintained at low-cost.
- Leverage this approach so that risk from additional compound events can be similarly assessed, at low cost and effort, as additional data products are produced (from either this project, other energy-related research, or other efforts that contribute to California's Climate Change Climate Assessment process).

Products:

- Risk Informatics from Climate to Natural Gas Infrastructure

TASK 5: EVALUATION OF PROJECT BENEFITS

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

The Recipient shall:

- Complete three Project Benefits Questionnaires that correspond to three main intervals in the Agreement: (1) *Kick-off Meeting Benefits Questionnaire*; (2) *Mid-term Benefits Questionnaire*; and (3) *Final Meeting Benefits Questionnaire*.
- Provide all key assumptions used to estimate projected benefits, including targeted market sector (e.g., population and geographic location), projected market penetration, baseline and projected energy use and cost, operating conditions, and emission

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reduction calculations. Examples of information that may be requested in the questionnaires include:

- For Product Development Projects and Project Demonstrations:
 - Published documents, including date, title, and periodical name.
 - Estimated or actual energy and cost savings, and estimated statewide energy savings once market potential has been realized. Identify all assumptions used in the estimates.
 - Greenhouse gas and criteria emissions reductions.
 - Other non-energy benefits such as reliability, public safety, lower operational cost, environmental improvement, indoor environmental quality, and societal benefits.
 - Data on potential job creation, market potential, economic development, and increased state revenue as a result of the project.
 - A discussion of project product downloads from websites, and publications in technical journals.
 - A comparison of project expectations and performance. Discuss whether the goals and objectives of the Agreement have been met and what improvements are needed, if any.
 - Additional Information for Product Development Projects:
 - Outcome of product development efforts, such copyrights and license agreements.
 - Units sold or projected to be sold in California and outside of California.
 - Total annual sales or projected annual sales (in dollars) of products developed under the Agreement.
 - Investment dollars/follow-on private funding as a result of Energy Commission funding.
 - Patent numbers and applications, along with dates and brief descriptions.
 - Additional Information for Product Demonstrations:
 - Outcome of demonstrations and status of technology.
 - Number of similar installations.
 - Jobs created/retained as a result of the Agreement.
- For Information/Tools and Other Research Studies:
 - Outcome of project.
 - Published documents, including date, title, and periodical name.
 - A discussion of policy development. State if the project has been cited in government policy publications or technical journals, or has been used to inform regulatory bodies.
 - The number of website downloads.
 - An estimate of how the project information has affected energy use and cost, or have resulted in other non-energy benefits.
 - An estimate of energy and non-energy benefits.
 - Data on potential job creation, market potential, economic development, and increased state revenue as a result of project.

Exhibit A Scope of Work Eagle Rock Analytics

- A discussion of project product downloads from websites, and publications in technical journals.
- A comparison of project expectations and performance. Discuss whether the goals and objectives of the Agreement have been met and what improvements are needed, if any.
- Respond to CAM questions regarding responses to the questionnaires.

The Energy Commission may send the Recipient similar questionnaires after the Agreement term ends. Responses to these questionnaires will be voluntary.

Products:

- Kick-off Meeting Benefits Questionnaire
- Mid-term Benefits Questionnaire
- Final Meeting Benefits Questionnaire

TASK 6: TECHNOLOGY/KNOWLEDGE TRANSFER ACTIVITIES

The goal of this task is to develop a plan to make the knowledge gained, experimental results, and lessons learned available to the public and key decision makers.

The Recipient shall:

- Prepare an *Initial Fact Sheet* at start of the project that describes the project. Use the format provided by the CAM.
- Prepare a *Final Project Fact Sheet* at the project's conclusion that discusses results. Use the format provided by the CAM.
- Prepare a *Technology/Knowledge Transfer Plan* that includes:
 - An explanation of how the knowledge gained from the project will be made available to the public, including the targeted market sector and potential outreach to end users, utilities, regulatory agencies, and others.
 - A description of the intended use(s) for and users of the project results.
 - Published documents, including date, title, and periodical name.
 - Copies of documents, fact sheets, journal articles, press releases, and other documents prepared for public dissemination. These documents must include the Legal Notice required in the terms and conditions. Indicate where and when the documents were disseminated.
 - A discussion of policy development. State if project has been or will be cited in government policy publications, or used to inform regulatory bodies.
 - The number of website downloads or public requests for project results.
 - Additional areas as determined by the CAM.
- Conduct technology transfer activities in accordance with the Technology/Knowledge Transfer Plan. These activities will be reported in the Progress Reports.
- When directed by the CAM, develop *Presentation Materials* for an Energy Commission-sponsored conference/workshop(s) on the project.
- When directed by the CAM, participate in annual EPIC symposium(s) sponsored by the California Energy Commission.
- Provide at least (6) six *High Quality Digital Photographs* (minimum resolution of 1300x500 pixels in landscape ratio) of pre and post technology installation at the project sites or related project photographs.

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- Prepare a *Technology/Knowledge Transfer Report* on technology transfer activities conducted during the project.

Products:

- Initial Fact Sheet (draft and final)
- Final Project Fact Sheet (draft and final)
- Presentation Materials (draft and final)
- High Quality Digital Photographs
- Technology/Knowledge Transfer Plan (draft and final)
- Technology/Knowledge Transfer Report (draft and final)

Products:

- Production Readiness Plan (draft and final)

PROJECT SCHEDULE

Please see the attached Excel spreadsheet.

STATE OF CALIFORNIA

**STATE ENERGY RESOURCES
CONSERVATION AND DEVELOPMENT COMMISSION**

RESOLUTION - RE: EAGLE ROCK ANALYTICS.

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

RESOLVED, that the CEC approves Agreement PIR-19-006 with Eagle Rock Analytics for a \$1,000,704 grant to produce a data assimilation platform that supports adaptation planning. The platform will be designed to support continuously updated historical weather and climate data and to support efforts to provide quality-controlled, high resolution, hourly climate data to the natural gas investor owned utilities. Platform development will be informed by stakeholder engagement, and the data platform will pull in a mix of weather observations, remote sensing, and reanalysis data; and

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

CERTIFICATION

The undersigned Secretariat to the Commission does hereby certify that the foregoing is a full, true, and correct copy of a Resolution duly and regularly adopted at a meeting of the CEC held on June 10, 2020.

AYE:

NAY:

ABSENT:

ABSTAIN:

Cody Goldthrite
Secretariat