CALIFORNIA ENERGY COMMISSION

CALIFORNIA NATURAL RESOURCES AGENCY

California Energy Commission
October 08, 2025 Business Meeting
Backup Materials for The Regents of the University of California, on behalf of the Los Angeles Campus

The following backup materials for the above-referenced agenda item are available in this PDF packet as listed below:

1. Proposed Resolution
2. Grant Request Form
3. Scope of Work

[PROPOSED]

RESOLUTION NO: 25-1008-XX

STATE OF CALIFORNIA

STATE ENERGY RESOURCES
CONSERVATION AND DEVELOPMENT COMMISSION

RESOLUTION: The Regents of the University of California, on behalf of the Los Angeles Campus

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

RESOLVED, that the CEC approves agreement EPC-25-032 with The Regents of the University of California, on behalf of the Los Angeles Campus for a $800,000 grant. This project will leverage prior EPIC-funded data to investigate and portray mid- and long-term bidirectional wildfire risks to and from electricity infrastructure on an open-source platform, enabling strategic grid expansion and wildfire mitigation planning; 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 October 08, 2025.

AYE:
NAY:
ABSENT:
ABSTAIN:

Dated:

____
Kim Todd
Secretariat

STATE OF CALIFORNIA
CALIFORNIA ENERGY COMMISSION

CEC-270 (Revised 01/2024)

GRANT REQUEST FORM (GRF)

A. New Agreement Number

IMPORTANT: New Agreement # to be completed by Contracts, Grants, and Loans Office.

New Agreement Number: EPC-25-032

B. Division Information

1. Division Name: ERDD
2. Agreement Manager: Aryana Sherzai
3. MS-:51
4. Phone Number: 279-226-1151

C. Recipient's Information

1. Recipient's Legal Name: The Regents of the University of California, on behalf of the Los Angeles campus
2. Federal ID Number: 95-6006143

D. Title of Project

Title of project: Wildfire Planning Tool for Bidirectional Long-Term Risk Quantification and Management

E. Term and Amount

1. Start Date: 11/5/2025
2. End Date: 3/31/2029
3. Amount: $800,000.00

F. Business Meeting Information

1. Are the ARFVTP agreements $75K and under delegated to Executive Director? No
2. The Proposed Business Meeting Date: 10/8/2025 .
3. Consent or Discussion? Discussion
4. Business Meeting Presenter Name: Aryana Sherzai
5. Time Needed for Business Meeting: 5 minutes.
6. The email subscription topic is: Electric Program Investment Charge

Agenda Item Subject and Description:

The Regents of the University of California on behalf of the Los Angeles Campus. Proposed resolution approving agreement EPC-25-032 with The Regents of the University of California, on behalf of the Los Angeles Campus for a $800,000 grant, and adopting staff's recommendation that this action is exempt from CEQA. This project will leverage prior EPIC-funded data to investigate and portray mid- and long-term bidirectional wildfire risks to and from electricity infrastructure on an open-source platform, enabling strategic grid expansion and wildfire mitigation planning. (EPIC funding) Contact: Aryana Sherzai

G. California Environmental Quality Act (CEQA) Compliance

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

   If yes, skip to question 2.

If no, complete the following (PRC 21065 and 14 CCR 15378) and explain why Agreement is not considered a “Project”:

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

2. **If Agreement is considered a “Project” under CEQA answer the following questions.**

   a) Agreement **IS** exempt?

      Yes

      Statutory Exemption?
      No

      If yes, list PRC and/or CCR section number(s) and separate each with a comma. If no, enter “None” and go to the next question.

      PRC section number: None

      CCR section number: None

      Categorical Exemption?
      Yes

      If yes, list CCR section number(s) and separate each with a comma. If no, enter “None” and go to the next question.

      CCR section number: Cal. Code Regs., tit. 14, § 15306 ;

      Common Sense Exemption? 14 CCR 15061 (b) (3)
      No

      If yes, explain reason why Agreement is exempt under the above section. If no, enter “Not applicable” and go to the next section.

      Cal. Code Regs, tit. 14, sec. 15306 provides that projects which consist of basic data collection, research, experimental management, and resource evaluation activities which do not result in a serious or major disturbance to an environmental resource are categorically exempt from the provisions of CEQA. This project will develop a software-based climate-informed wildfire planning tool, which will involve research and data analysis, data fusion, computer-based numerical modeling and simulations, and software development performed in existing office settings. The project does not require a permit and entails no direct changes to the environment. For these reasons, the proposed project will have no significant effect on the environment and is categorically exempt under CEQA under section 15306.

      This project does not involve impacts on any particularly sensitive environment; will not impact an environmental resource of hazardous or critical concern where designated, precisely mapped, and officially adopted pursuant to law by federal, state, or local agencies; any cumulative impacts of successive projects of the same type in the same place that might be considered significant; does not involve unusual circumstances that might have a significant effect on the environment; will not result in damage to scenic resources within a highway officially designated as a state scenic highway; the project sites are not included on any list compiled pursuant to Government Code section 65962.5, and the project will not cause a substantial adverse change in the significance of a historical resource. Therefore, none of the exceptions to categorical exemptions listed in CEQA Guidelines section 15300.2 apply to this project and this project will not have a significant effect on the environment.

b) Agreement **IS NOT** exempt.
IMPORTANT: consult with the legal office to determine next steps.

No

If yes, answer yes or no to all that applies. If no, list all as "no" and "None" as "yes".

Additional Documents	Applies
Initial Study	No
Negative Declaration	No
Mitigated Negative Declaration	No
Environmental Impact Report	No
Statement of Overriding Considerations	No
None	Yes

H. Is this project considered "Infrastructure"?

No

I. Subcontractors

List all Subcontractors listed in the Budget (s) (major and minor). Insert additional rows if needed. If no subcontractors to report, enter "No subcontractors to report" and "0" to funds. **Delete** any unused rows from the table.

Subcontractor Legal Company Name	CEC Funds	Match Funds
Earthbound.ai Inc.	$ 300,000	$0

J. Vendors and Sellers for Equipment and Materials/Miscellaneous

List all Vendors and Sellers listed in Budget(s) for Equipment and Materials/Miscellaneous. Insert additional rows if needed. If no vendors or sellers to report, enter "No vendors or sellers to report" and "0" to funds. **Delete** any unused rows from the table.

Vendor/Seller Legal Company Name	CEC Funds	Match Funds
No vendors to report	**$0**	**$0**

K. Key Partners

List all key partner(s). Insert additional rows if needed. If no key partners to report, enter "No key partners to report." **Delete** any unused rows from the table.

Key Partner Legal Company Name
No key partners to report

L. Budget Information

Include all budget information. Insert additional rows if needed. If no budget information to report, enter “N/A” for “Not Applicable” and “0” to Amount. **Delete** any unused rows from the table.

Funding Source	Funding Year of Appropriation	Budget List Number	Amount
EPIC	24-25	301.001L	$ 800,000

TOTAL Amount: $ 800,000

R&D Program Area: ESB: EA

Explanation for “Other” selection Not applicable

Reimbursement Contract #: Not applicable

Federal Agreement #: 101

M. Recipient’s Contact Information

1. Recipient’s Administrator/Officer

Name: Ummi Sayers

Address: 10889 Wilshire Blvd # 700

City, State, Zip: Los Angeles, CA 90024-4200

Phone: 310-794-7183

E-Mail: ummi.sayers@research.ucla.edu

2. Recipient’s Project Manager

Name: Enrique Droguett

Address: 404 Westwood Plz Ste 480A

City, State, Zip: Los Angeles, CA 90095-8357

Phone: 424-320-1340

E-Mail: eald@ucla.edu

N. Selection Process Used

There are three types of selection process. List the one used for this GRF.

Selection Process	Additional Information
Competitive Solicitation #	GFO-24-306
First Come First Served Solicitation #	Not applicable
Other	Not applicable

O. Attached Items

1. List all items that should be attached to this GRF by entering “Yes” or “No”.

Item Number	Item Name	Attached
1	Exhibit A, Scope of Work/Schedule	Yes
2	Exhibit B, Budget Detail	Yes
3	CEC 105, Questionnaire for Identifying Conflicts	Yes
4	Recipient Resolution	Yes
5	Awardee CEQA Documentation	Yes

Approved By

Individuals who approve this form must enter their full name and approval date in the MS Word version.

Agreement Manager: Aryana Sherzai

Approval Date: 8/21/2025

Branch Manager: Alexandra (Alex) Horangic

Approval Date: 8/29/2025

Director: Jonah Steinbuck (Delegated to Branch Manager)

Approval Date: 8/29/2025

Exhibit A
Scope of Work
The Regents of the University of California, on behalf of the Los Angeles campus

I. TASK AND ACRONYM/TERM LISTS

A. Task List

Task #	CPR[1]	Task Name
1		General Project Tasks
2		Stakeholder Engagement Plan
3	X	Development of the Cloud Computing Architecture
4	X	Development of the Wildfire Risk-Based Planning Framework
5		Development of the User Interface
6		Evaluation of Project Benefits
7	X	Technology/Knowledge Transfer Activities

B. Acronym/Term List

Acronym/Term	Meaning
API	Application Programming Interface
CAM	Commission Agreement Manager
CEC	California Energy Commission
CPR	Critical Project Review
EPIC	Electric Program Investment Charge
Fifth Assessment	California's Fifth Climate Change Assessment
IOU	Investor-owned Utility
MS	Microsoft
Recipient	The Regent of the University of California, on behalf of the Los Angeles campus or UCLA
TAC	Technical Advisory Committee
UI	User Interface
UX	User Experience

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

A. Purpose of Agreement

The purpose of this Agreement is to 1) leverage prior Electric Program Investment Charge (EPIC)-funded data portraying long-term wildfire scenarios to investigate mid- and long-term bidirectional wildfire risks, which are those posed both by (e.g. utility-caused ignitions) and to electricity infrastructure; and 2) support stakeholder-informed design and development of a software platform to quantify and manage mid- and long-term bidirectional wildfire risk, thus enabling the development of strategic plans for grid expansion and wildfire mitigation.

[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
The Regents of the University of California, on behalf of the Los Angeles campus

B. Problem/ Solution Statement

Problem

The increasing severity of wildfires has been linked to the effects of climate change on the environment. Electric Investor-owned Utility (IOUs) in California currently focus their risk mitigation efforts on relatively short timeframes, prioritizing operational improvements. While this approach has proven useful for short-term wildfire risk reduction, it limits the effective evaluation of grid expansion and long-term mitigation projects. This limitation is particularly important given the substantial capital investments such projects require that impact electricity ratepayer costs. Consequently, incorporating mid- and long-term climate trends into a risk quantification framework for IOUs—accounting for both the risks the environment poses to electric infrastructure and the risks that infrastructure poses to the environment—represents a critical gap that must now be addressed.

Solution

By integrating data produced by the Pyregence Consortium[2] for California's Fifth Climate Change Assessment (Fifth Assessment) through an optimized cloud architecture and modular software design, the Regent of the University of California, on behalf of the Los Angeles campus (Recipient) will develop a technology platform that electric IOUs can use to quantify mid- and long-term wildfire risk in a bidirectional manner.

To achieve this, risk quantification is divided into two distinct models. The first model quantifies the risk posed by the environment to electrical infrastructure, enabling IOUs to evaluate different grid expansion projects. The second model quantifies the risk posed by utility equipment to the environment and to communities across California, allowing IOUs to assess the risk profile of their operations under future scenarios that vary in climate patterns, vegetation landscapes, population distribution, the built environment, and—importantly—their own mitigation plans.

The solution offers several advancements that will ultimately enable more accurate quantification and improved management of wildfire risk by IOUs. From a scientific perspective, it supports the development of state-of-the-art models to estimate wildfire likelihood, consequences, and mitigation effectiveness while accounting for mid- and long-term environmental trends. From a technical perspective, it delivers a modular software platform that allows IOUs to customize and publish their own versions of the wildfire risk models and underlying data, promoting enhanced collaboration among California IOUs.

C. Goals and Objectives of the Agreement

Agreement Goals

The goals of this Agreement are to:

- Enhance IOUs' wildfire risk quantification and management capabilities, particularly over mid- and long-term timeframes, to support accurate evaluation of grid expansion and mitigation projects. This will contribute to safer, more reliable, and cost-efficient operations.

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[2] The Pyregence Consortium is a consortium of researchers, software developers, and designers from 18 institutions. Pyregence is largely funded by the CEC grant EPC-18-026 to produce open-source, web-based tools and data to support climate-informed wildfire forecasting in the near- and long-term.

- Advance modeling approaches for wildfire likelihood, consequences, and mitigation effectiveness by leveraging recent developments in causal inference, geospatial statistics, and remote sensing.
- Expand access to geospatial data produced by the Pyregence Consortium for the Fifth Assessment through the development of a scalable, cloud-optimized data architecture.
- Potential collaboration among IOUs in wildfire risk planning by developing an open-source technology platform that supports data sharing, model compatibility, and cross-utility validation.

<u>Ratepayer Benefits</u>:[3]
This Agreement will deliver ratepayer benefits by improving electricity reliability, reducing long-term costs, and enhancing safety. These benefits will be achieved by enabling utilities to accurately quantify and manage bidirectional wildfire risk while incorporating mid- and long-term climate trends. A justification for each benefit is provided below:

- The project will achieve increased safety by enabling utilities to reduce the likelihood of future wildfire events caused by their infrastructure. This will be accomplished through better-designed grid expansion projects and more effective mitigation strategies.
- The project will achieve lower costs and reduced ratepayer burden by improving the risk-spend efficiency of mitigation strategies and supporting utilities in renegotiating and securing lower insurance premiums, thanks to demonstrably lower wildfire risk. Both factors will translate into long-term savings for ratepayers, reducing the financial burden passed on to consumers.
- The project will achieve greater electric reliability by supporting a shift from short-term protective measures—such as fast trip settings and emergency power shutoffs—to permanent solutions like system hardening and undergrounding of lines. Moreover, incorporating future wildfire patterns into grid expansion planning will allow IOUs to design networks with enhanced spatial resilience, improving long-term system reliability.

<u>Technological Advancement and Breakthroughs</u>:[4]
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 enabling the estimation of risk reduction benefits derived from future climate-informed grid expansion and wildfire risk mitigation projects.

These benefits include the reduction of wildfire risk through the installation of microgrids serving isolated communities, and the evaluation of energy storage systems to mitigate the adverse effects of operational strategies such as emergency power shutoffs. Additionally, the project will improve the ability to accurately predict the impact of increased electrification on wildfire risk, allowing utilities to implement mitigation measures proactively before such risks materialize.

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

Finally, the technological platform developed as part of the project will serve as a central hub for climate researchers and energy sector stakeholders to access downscaled, cloud-optimized and climate-informed wildfire projection data, enabling the development of future initiatives aligned with other dimensions of California's statutory energy goals.

Agreement Objectives

The objectives of this Agreement are to:

- Vigorously engage key stakeholders on multiple occasions such as through meetings and workshops, to understand their needs, requirements, and technological barriers within their own infrastructures [**Task 2**].
- Design and implement an open-source cloud infrastructure capable of serving optimized geospatial data derived from the Fifth Assessment and the Pyregence Consortium [**Task 3**].
- Develop several data-driven models to quantify wildfire probability and consequence following a bidirectional conception of risk [**Task 4**].
- Develop a wildfire mitigation effectiveness module to estimate the impact of several mitigation techniques that IOUs are currently implementing/designing on ignition probability and customer reliability [**Task 4**].
- Develop and implement user interface that allows users to access, interact, and customize the developed analytics methods for decision support and wildfire risk management capabilities [**Task 5**].
- Evaluate the benefits of the project using quantifiable metrics [**Task 6**].
- Provide extensive documentation about all the products of the project. [**Task 7**].

III. TASK 1 GENERAL PROJECT TASKS

PRODUCTS

Subtask 1.1 Products

The goal of this subtask is to establish the requirements for submitting project products (e.g., reports, summaries, plans, and presentation materials). Unless otherwise specified by the Commission Agreement Manager (CAM), the Recipient must deliver products as required below by the dates listed in the **Project Schedule (Part V).** All products submitted which will be viewed by the public, must comply with the accessibility requirements of Section 508 of the federal Rehabilitation Act of 1973, as amended (29 U.S.C. Sec. 794d), and regulations implementing that act as set forth in Part 1194 of Title 36 of the Federal Code of Regulations**.** All technical tasks should include product(s). Products that require a draft version are indicated by marking **"(draft and final)"** after the product name in the "Products" section of the task/subtask. If "(draft and final)" does not appear after the product name, only a final version of the product is required. With respect to due dates within this Scope of Work, **"days"** means working days.

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.

<u>For products that require a final version only</u>

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

<u>For all products</u>

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

<u>Instructions for Submitting Electronic Files and Developing Software</u>:

- **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 MS 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:
  - MS ASP.NET framework (version 3.5 and up). Recommend 4.0.
  - MS 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).
  - MS SQL Server 2008, Stored Procedures. Recommend 2008 R2.

- MS SQL Reporting Services. Recommend 2008 R2.
- XML (external interfaces).

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

MEETINGS

Subtask 1.2 Kick-off Meeting

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

The Recipient shall:

- Attend a "Kick-off" meeting with the CAM, and other CEC staff relevant to the Agreement. The Recipient's Project Manager and any other individuals deemed necessary by the CAM or the Project Manager shall participate in 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., Teams, Zoom), with approval of the CAM.

  The Kick-off meeting will include discussion of the following:
  - The CAM's expectations for accomplishing tasks described in the Scope of Work;
  - An updated Project Schedule;
  - Terms and conditions of the Agreement;
  - Invoicing and auditing procedures;
  - Travel;
  - Equipment purchases;
  - Administrative and Technical products (subtask 1.1);
  - CPR meetings (subtask 1.3);
  - Monthly Calls (subtask 1.5)
  - Quarterly Progress reports (subtask 1.6)
  - Final Report (subtask 1.7)
  - Match funds (subtask 1.8);
  - Permit documentation (subtask 1.9);
  - Subawards(subtask 1.10);
  - Technical Advisory Committee meetings (subtasks 1.11 and 1.12);
  - Agreement changes;
  - Performance Evaluations; and
  - Any other relevant topics.

- Provide *Kick-off Meeting Presentation* to include but not limited to:
  - Project overview (i.e. project description, goals and objectives, technical tasks, expected benefits, etc.)
  - Project schedule that identifies milestones
  - List of potential risk factors and hurdles, and mitigation strategy

- Provide an *Updated Project Schedule, Match Funds Status Letter,* and *Permit Status Letter*, as needed to reflect any changes in the documents.

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

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

CAM Product:
- Kick-off Meeting Agenda

Subtask 1.3 Critical Project Review (CPR) Meetings

The goal of this subtask is to determine if the project should continue to receive CEC funding, and if so whether any modifications must be made to the tasks, products, schedule, or budget. CPR meetings provide the opportunity for frank discussions between the CEC and the Recipient. As determined by the CAM, discussions may include project status, challenges, successes, advisory group findings and recommendations, final report preparation, and progress on technical transfer and production readiness activities (if applicable). Participants will include the CAM and the Recipient and may include the Commission Agreement Officer 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 may 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 may 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. A determination of unsatisfactory progress This may result in project delays, including a potential Stop Work Order, while the CEC determines whether the project should continue.
- 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)
- 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 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* organized by the tasks in the Agreement.

Products:

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

MONTHLY CALLS, REPORTS AND INVOICES

Subtask 1.5 Monthly Calls

The goal of this task is to have calls at least monthly between the CAM and Recipient to verify that satisfactory and continued progress is made towards achieving the objectives of this Agreement on time and within budget.
The objectives of this task are to verbally summarize activities performed during the reporting period, to identify activities planned for the next reporting period, to identify issues that may affect performance and expenditures, to verify match funds are being proportionally spent concurrently or in advance of CEC funds or are being spent in accordance with an approved Match Funding Spending Plan, to form the basis for determining whether invoices are consistent with work performed, and to answer any other questions from the CAM. Monthly calls might not be held on those months when a quarterly progress report is submitted or the CAM determines that a monthly call is unnecessary.

The CAM shall:

- Schedule monthly calls.
- Provide questions to the Recipient prior to the monthly call.
- Provide call summary notes to Recipient of items discussed during call.

The Recipient shall:

- Review the questions provided by CAM prior to the monthly call
- Provide verbal answers to the CAM during the call.

Product:

- Email to CAM concurring with call summary notes.

Subtask 1.6 Quarterly 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 *Quarterly 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 reporting period, 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. Progress

reports are due to the CAM the 10th day of each January, April, July, and October. The Quarterly Progress Report template can be found on the ECAMS Resources webpage available at: https://www.energy.ca.gov/media/4691

- Submit a monthly or quarterly *Invoice* on the invoice template(s) provided by the CAM.

Recipient Products:

- Quarterly Progress Reports
- Invoices

CAM Product:

- Invoice template

Subtask 1.7 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 1.7.1 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 Products:

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

Subtask 1.7.2 Final Report

The Recipient shall:

- Prepare a *Final Report* for this Agreement in accordance with the approved Final Report Outline, Energy Commission Style Manual, and Final Report Template provided by the CAM with the following considerations:
    - Ensure that the report includes the following items, in the following order:
        - Cover page (**required**)
        - Credits page on the reverse side of cover with legal disclaimer (**required**)
        - Acknowledgements page (optional)
        - Preface (**required**)
        - Abstract, keywords, and citation page (**required**)
        - Table of Contents (**required**, followed by List of Figures and List of Tables, if needed)
        - Executive summary (**required**)

        - Body of the report (**required**)
        - References (if applicable)
        - Glossary/Acronyms (If more than 10 acronyms or abbreviations are used, it is required.)
        - Bibliography (if applicable)
        - Appendices (if applicable) (Create a separate volume if very large.)
        - Attachments (if applicable)
    - Submit a draft of the Executive Summary to the TAC for review and comment.
    - Develop and submit a *Summary of TAC Comments 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 SUBAWARDS

Subtask 1.8 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. 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 <u>no match funds</u> were part of the application 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 application that led to the CEC awarding this Agreement, then provide in the letter:

- A list of the match funds that identifies:
  - The amount of cash match funds, their source(s) (including a contact name, address, and telephone number), and the task(s) to which the match funds will be applied.
  - The amount of each in-kind contribution, a description of the contribution type (e.g., property, services), the documented market or book value, the source (including a contact name, address, and telephone number), and the task(s) to which the match funds will be applied. If the in-kind contribution is equipment or other tangible or real property, the Recipient must identify its owner and provide a contact name, address, telephone number, and the address where the property is located.
  - If different from the solicitation application, provide a letter of commitment from an authorized representative of each source of match funding that the funds or contributions have been secured.

- At the Kick-off meeting, discuss match funds and the impact on the project if they are significantly reduced or not obtained as committed. If applicable, match funds will be included as a line item in the progress reports and will be a topic at CPR meetings.
- Provide a *Supplemental Match Funds Notification Letter* to the CAM of receipt of additional match funds.
- Provide a *Match Funds Reduction Notification Letter* to the CAM if existing match funds are reduced during the course of the Agreement. Reduction of match funds may trigger a CPR meeting.

Products:

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

Subtask 1.9 Permits

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

The Recipient shall:

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

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

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

Products:

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

Subtask 1.10 Obtain and Execute Subawards and Agreements with Site Hosts

The goals of this subtask are to: (1) procure and execute subrecipients and site host agreements, as applicable, required to carry out the tasks under this Agreement; and (2) ensure that the subrecipients and site host agreements are consistent with the Agreement terms and conditions and the Recipient's own contracting policies and procedures.

The Recipient shall:

- Execute and manage subawards and coordinate subrecipients activities in accordance with the requirements of this Agreement.
- Incorporate this Agreement by reference into each subaward.
- Include any required Energy Commission flow-down provisions in each subaward, in addition to a statement that the terms of this Agreement will prevail if they conflict with the subaward terms.
- Submit a *Subaward and Site Letter* to the CAM describing the subawards and any site host agreement needed or stating that no subawards or site host agreements are required.
- If requested by the CAM, submit a draft of each *Subaward* and any *Site Host Agreement* required to conduct the work under this Agreement.
- If requested by the CAM, submit a final copy of each executed *Subaward* and any *Site Host Agreement*.
- Notify and receive written approval from the CAM prior to adding any new subrecipient (see the terms regarding subrecipient additions in the terms and conditions).

Products:

- Subaward and Site Letter
- Draft Subawards *(if requested by the CAM)*
- Draft Site Host Agreement *(if requested by the CAM)*
- Final Subawards *(if requested by the CAM)*
- Final Site Host Agreement *(if requested by the CAM)*

TECHNICAL ADVISORY COMMITTEE

Subtask 1.11 Technical Advisory Committee (TAC)

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

- Provide guidance in project direction. The guidance may include scope and methodologies, timing, and coordination with other projects. The guidance may be based on:
    - Technical area expertise;
    - Knowledge of market applications; or
    - Linkages between the Agreement work and other past, present, or future projects (both public and private sectors) that TAC members are aware of in a particular area.
- Review products and provide recommendations for needed product adjustments, refinements, or enhancements.
- Evaluate the tangible benefits of the project to the state of California, and provide recommendations as needed to enhance the benefits.
- Provide recommendations regarding information dissemination, market pathways, or commercialization strategies relevant to the project products.
- Help set the project team's goals and contribute to the development and evaluation of its statement of proposed objectives as the project evolves.
- Provide a credible and objective sounding board on the wide range of technical and financial barriers and opportunities.
- Help identify key areas where the project has a competitive advantage, value proposition, or strength upon which to build.
- Advocate, to the extent the TAC members feel is appropriate, on behalf of the project in its effort to build partnerships, governmental support, and relationships with a national spectrum of influential leaders.
- Ask probing questions that ensure 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 1.12.
- 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 1.12 TAC Meetings

The goal of this subtask is for the TAC to provide strategic guidance for the project by participating in regular meetings, which may be held via teleconference.

The Recipient shall:

- Discuss the TAC meeting schedule with the CAM at the Kick-off meeting. Determine the number and location of meetings (in-person and via teleconference) in consultation with the CAM.
- Prepare a *TAC Meeting Schedule* that will be presented to the TAC members during recruiting. Revise the schedule after the first TAC meeting to incorporate meeting comments.
- Prepare a *TAC Meeting Agenda* and *TAC Meeting Back-up Materials* for each TAC meeting.
- Organize and lead TAC meetings in accordance with the TAC Meeting Schedule. Changes to the schedule must be pre-approved in writing by the CAM.
- Prepare *TAC Meeting Summaries* for each TAC Meeting 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 ensure 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 1.13 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 section of 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.
- 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: STAKEHOLDER ENGAGEMENT PLAN
The goal of this task is to enable close collaboration with the project stakeholders. Leveraging solid relationships between the participants of this project and key interested parties, the following three Stakeholder Cohorts will be targeted:
- Cohort 1: IOUs, including Pacific Gas & Electric Company, Southern California Edison, and San Diego Gas & Electric.

- Cohort 2: Climate Researchers, Wildfire Specialists, and Risk Managers, including researchers from academic institutions, national laboratories, State agencies, and others.
- Cohort 3: Additional Stakeholders with Compelling Interests in Energy Sector Resilience and Adaptation Planning. The following types of organizations, among others, will be included: (a) Ratepayer and disadvantaged community advocates; (b) Local governments; (c) State and local agencies involved in energy and climate planning, safety, and emergency response; and (d) Private Sector Businesses.

Subtask 2.1: Conduct an Initial Workshop with IOUs

The Recipient shall:

- Organize and facilitate a workshop with IOUs with the objectives of:
  - Introducing the project.
  - Outlining the objectives of the project.
  - Gathering early inputs regarding user needs and requirements.
- Prepare the *IOU Workshop Findings Report*, which includes:
  - A description of IOUs' requirements and needs for the software platform, as well as a plan to incorporate these findings into the development of the project.

Products:

- IOU Workshop Findings Report.

Subtask 2.2: Conduct a General Meeting with Other Key Stakeholders

The Recipient shall:

- Conduct a general meeting with other key stakeholders from Cohorts 2 and 3.
- Capture additional user cases for the platform, user requirements, and additional datasets that could be incorporated in Task 3.
- Prepare the *Stakeholder Feedback Report,* which includes:
  - A list of relevant input derived from the conversation, and how the project's team plans to incorporate it into the software platform's design.

Products:

- Stakeholder Feedback Report.

Subtask 2.3: Regular Engagement with Key Stakeholders

The Recipient shall:

- Schedule, organize, and facilitate regular engagement with all key stakeholders through biannual progress meetings.
- Capture feedback and modifications to use cases to guide the development of the software platform.
- Prepare *Biannual Engagement Reports,* where:
  - Technical feedback is discussed.

Products:

- Biannual Engagement Reports.

Subtask 2.4: Progressive Delivery of Platform Functionalities.

The Recipient shall:

- Conduct Delivery Workshops, where sections of the software platform are released to the stakeholders for early testing and feedback.
- Prepare *Software Release Packages* at the end of the first and second year, where:
  - Software is released using agreed methods with CEC.
  - Complete documentation is generated for users to test the release.

Products:

- Software Release Packages

TASK 3: DEVELOPMENT OF THE CLOUD COMPUTING ARCHITECTURE

The goal of this task is to implement the cloud infrastructure to enable the usage of the optimized geospatial data derived from the Fifth Assessment and perform the cloud optimization of the long-term scenarios from the Pyregence Consortium. The main design principle driving this task is the ability to build repeatable, automated workflows with analysis-ready data.

Subtask 3.1: Design and Deploy the Scalable Cloud Infrastructure

The Recipient shall:

- Design a cloud infrastructure that fulfills the following core requirements:
  - Scalability to handle increasing data and user demand.
  - Cost-efficiency to ensure sustainable long-term operation.
  - Robust data handling capabilities tailored for geospatial applications.
- Develop the architecture with modularity, enabling flexibility and adaptability for different use cases.
- Support two primary use cases:
  - Use Case 1: IOUs and other stakeholders can utilize the platform as a data repository, integrating it seamlessly with their existing workflows.
  - Use Case 2: IOUs may choose to replicate the architecture within their own digital infrastructure, allowing for independent maintenance and future adaptation.
- Prepare the *Infrastructure Design Documentation*, which includes the services used, the software required to execute the infrastructure, the hardware requirements, and all the Application Programming Interface (API) endpoints used to connect with the platform.

Products:

- Infrastructure Design Documentation.

Subtask 3.2: Integration of Existing Datasets into the Platform

The Recipient shall:

- Data preprocessing, exploratory data analysis and data quality assurance of public and proprietary data to be integrated into the framework and software platform
- Integrate a comprehensive set of environmental datasets into the cloud platform, including:
  - Climate projection data developed to support the Fifth Assessment and long-term wildfire scenarios developed by the Pyregence Consortium.
  - Derived variables such as dead/live fuel moisture and the Palmer Drought Severity Index.
  - Dynamic vegetation datasets.
  - Topographic information.
  - Anthropogenic factors like projected population growth and road network expansion.
- Address security and privacy concerns by enabling local integration of proprietary utility data, including:
  - Transmission and distribution line locations
  - Equipment age
  - Maintenance records
  - Vegetation encroachment metrics
- Perform quality assurance and control tests to ensure proper functionality of the data integration.
- Explore the use of modern open-source data formats (e.g., Arrow, Parquet) to enable high-performance querying.
- Make data discoverable through various endpoints, including:
  - Hosting SQL-like query interfaces.
  - Hosting spatial map services.
  - Hosting and storing customized queries that users can save and access via business intelligence tools or Jupyter notebooks.
- Prepare the *Data Integration Report*, which includes a complete dictionary of the publicly available datasets integrated into the platform, in addition to detailed instructions to incorporate proprietary datasets locally, without having to upload them to the project's version of the cloud architecture.

Products:
- Data Integration Report.

Subtask 3.3: Geospatial Data Optimization

The Recipient shall:
- Preprocess large geospatial datasets to improve performance for querying and visualization.
- Conduct data cleaning and format conversion to standardize datasets.
- Implement APIs or data services to support efficient spatial and temporal queries, enabling:
  - Retrieval by location.
  - Retrieval by time range.
  - Retrieval by thematic filters.

- Leverage geospatial standards to ensure interoperability and system integration, including:
    - Open Geospatial Consortium APIs
    - Spatiotemporal Asset Catalog
- Prepare the *Data Optimization Report*, detailing the process used to enhance the retrieval of datasets integrated into the platform. The main objective of this report is to support the optimization of new data sources that may be integrated into the platform in the future.

Products:
- Data Optimization Report.

Subtask 3.4: Security and Access Management.

The Recipient shall:
- Develop comprehensive access control policies to manage platform security.
- Define user roles and permissions for different user types, including:
    - IOUs.
    - Researchers.
    - Other groups as designated by the CEC.
- Ensure appropriate access to sensitive geospatial and risk data based on user type.
- Prepare the *Access Security Protocol document*, outlining the findings of this task.

Products:
- Access Security Protocol Document

TASK 4: DEVELOPMENT OF THE WILDFIRE RISK-BASED PLANNING FRAMEWORK
The goal of this task is to develop the data-driven and machine-learning models required to quantify:
- Risk posed by the environment to the infrastructure's equipment in the mid/long-term, i.e., upcoming decades (first direction)
- Risk posed by the infrastructure's equipment to the environment in the mid/long-term, i.e., upcoming decades (second direction)

Subtask 4.1: Exploratory Data Analysis

The Recipient shall:
- Assess shifts in vegetation patterns and explore projected fire severity, size, and frequency.
- Identify potential future hotspots and compare them with historical ignition data.
- Examine the projected expansion of roads, population, and utility infrastructure.
- Overlay fire risk zones with infrastructure expansion to uncover emerging vulnerabilities.
- Prepare the *Exploratory Analysis Report*, summarizing the exploratory analysis of projected datasets, including climate trends, extreme events, vegetation shifts, fire risk projections, and infrastructure expansion, with supporting visualizations.

Products:

- Exploratory Analysis Report.

Subtask 4.2: Model Development and Calibration

The Recipient shall:

- Define and train models to quantify the likelihood of ignition caused by sources other than IOU equipment.
  - For this, average data produced by the Pyregence Consortium and incorporate results from other CEC-funded initiatives for the first model.
- Define and train models to the likelihood of ignition caused by IOU's equipment.
  - Apply machine learning techniques for predicting equipment failure probabilities and ignition probabilities using commonly employed algorithms such as:
    - Random Forest.
    - XGBoost.
    - Maximum Entropy (presence-only algorithm).
- Define and train models to estimate the effectiveness of mitigation strategies currently used by stakeholders including IOUs.
- Develop consequence prediction models based on:
  - Historical wildfire consequence metrics.
  - Environmental variables.
  - Simulating structures and populations at risk.
  - Housing value at risk.
  - Suppression costs.
  - Vegetation loss and recovery.
- Perform K-fold cross-validation to optimize hyperparameters.
- Evaluate model performance using area under the curve, precision-recall, F1 score, and other suitable metrics.
- Prepare M*odel Development Code and Documentation Report* that provides fully commented source code with detailed description of each class, methods, and functions required to run the code by third parties.

Products:

Model Development Code and Documentation Report

Subtask 4.3: Model Integration

The Recipient shall:

- Incorporate likelihood and consequence models into a comprehensive risk estimation model, considering both directions of influence:
  - Risk posed by the environment to the infrastructure's equipment (first direction).
  - Risk posed by the infrastructure's equipment to the environment (second direction).
- Assess the impact of climate scenarios on regional risk levels.
- Prepare the *Model Development and Integration Report,* which includes all the technical details required to replicate the models developed in Task 4.2 and 4.3. Additionally, the report contains the source code utilized to train and calibrate the models.

Products:
- Model Development and Integration (with source code) Report.

Subtask 4.4: Framework Validation

The Recipient shall:
- Perform quality assurance and control tests to ensure proper model functionality.
- Validate the integrated risk modeling framework by comparing model outputs with historical fire events and outcomes.
  - Assess the model’s ability to replicate observed fire behavior and consequences under past conditions.
- Compare outputs across different modeling approaches, including:
  - Presence-only methods.
  - Presence-absence methods.
- Evaluate model performance under multiple climate scenarios.
- Assess robustness and sensitivity to underlying assumptions and across climate and wildfire scenarios.
- Analyze feature importance across climate scenarios to identify opportunities for future model improvement.
- Prepare the *Framework Validation Report*, which includes a complete description of the validation process and fitness for use of the models developed in the project.

Products:
- Framework Validation Report.

TASK 5: DEVELOPMENT OF THE USER INTERFACE

The goal of this task is to design the user interface of the software platform, enabling IOUs to easily explore and utilize the software platform. The user interface will be designed considering best practices from the field of user experience (UX) and User Interface (UI).

Subtask 5.1: Design of User-Centered Interface

The Recipient shall:
- Conduct UX research in collaboration with IOUs to understand the needs and workflows of different stakeholders.
- Promote broad adoption and effective interaction with the platform by exploring the potential for a portal-like experience featuring:
  - A library of well-described datasets and metadata.
  - Text-based search capabilities.
  - Spatially enabled queries via an interactive map.
- Design an intuitive user interface that aligns with stakeholder requirements.
- Ensure the interface is accessible and usable by key users and stakeholders.
- Prepare the *UI/UX Specification Report*, documenting the design and capabilities of the user interface.

Products:

- UI/UX Specification Report

Subtask 5.2: Implementation of Visualization and Interaction Tools

The Recipient shall:
- Develop and deploy visualization capabilities of the platform that facilitate intuitive analysis and decision-making. For example, interactive maps, charts, and dashboards for exploring wildfire risk across spatial and temporal dimensions may be developed depending on stakeholder-identified interest, and at the direction of the CAM.
- Enable dynamic toggling between different climate and wildfire scenarios, infrastructure configurations, and risk layers.
- Perform quality assurance and control tests to ensure proper tool functionality and accurate data portrayal.
- Prepare S*ource Code and Documentation Report* that provides fully commented source code with detailed description of each class, methods, and functions required to run the code by third parties.

Products:
- Source Code and Documentation Report

Subtask 5.3: Model Plug-in and Customization Framework

The Recipient shall:
- Support advanced customization through user-defined scripts or configurable modules, allowing IOUs to incorporate proprietary data and tailor risk models to their specific needs.
- Develop a flexible framework that enables users to upload or integrate their own risk models and data layers.
- Prepare the *Software Documentation* and *User Instruction Manual* for the platform, specifying all its different capabilities.

Products:
- Software Documentation (including the modules built in Task 5.2)
- User Instruction Manual

TASK 6: 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 January 31st 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 (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 (www.energizeinnovation.fund), and provide *Documentation of Organization Profile on EnergizeInnovation.fund*, including the profile link.

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 7: 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* 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 will be utilized and adopted by the groups identified above.
  - Description of how the wildfire planning tool could be transferred to the CEC or its designee at the end of the agreement term, if directed by the CAM, including training, user guides, and documentation.
- 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* 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 a CEC- sponsored conference/workshop(s) on the project.
- When directed by the CAM, participate in the 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 and final)
- Summary of TAC Comments
- Technology Transfer Summary Report (draft and final)
- High Quality Digital Photographs

IV. PROJECT SCHEDULE

Please see the attached Excel spreadsheet.