



**CALIFORNIA
ENERGY COMMISSION**



Energy Research and Development Division

Comprehensive Open-Source Development of Next Generation Wildfire Models for Grid Resiliency

Workgroup 3: Near-term Risk Forecast Integration Workplan (Task 9)

The logo for PYREGENE™, featuring a stylized orange flame icon on the left, followed by the word "PYREGENE" in a bold, sans-serif font. The "PY" is in orange, and "REGENE" is in brown. A small "TM" symbol is at the end.



Gavin Newsom, Governor
March 2022

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Contract Number: EPC-18-026

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Contents

Introduction 4

Purpose of the PyreCast Integration Workplan 4

Tasks for Integrating PyreCast into Operational Practices 4

Pyregence Team and Roles 7

Summary of Schedule and Personnel Effort 8

Introduction

PyreCast is an open-source near-term wildfire forecasting tool being developed through the California Energy Commission EPIC grant funded Pyregence Project (Agreement #EPC-026-18). Although the tool is still a beta version, it is fully functional and offers three forecasts relevant for assessing near-term wildfire conditions and risk:

- **Fire Weather:** Provides eight-day forecasts, updated every six hours of key weather parameters affecting wildfire behavior, including temperature, relative humidity, winds, and several fire weather indices.
- **Risk:** Works by igniting hundreds of millions of hypothetical fires across the landscape and modeling their spread under forecast weather conditions over the next five days; the user interface shows which map areas are at greatest risk from rapidly spreading fires.
- **Active Fires:** Shows the locations of actively burning fires, as identified through satellite-based heat detection, and provides forecasts of where they are forecasted to spread over the next three days based on science-based fire spread models and algorithms.

The PyreCast tool offers an alternative science-based wildfire conditions and risk forecasting system in California. The tool has and is incorporating enhancements to wildfire risk modeling as one of the key objectives of the CEC EPIC funded research. As a result, there is an opportunity to transfer the new technology and integrate the tool into operational practices of Investor-Owned Utilities (IOU) and State agencies with a mandate to monitor wildfire risk to electric utilities.

Purpose of the PyreCast Integration Workplan

The purpose of this workplan is to describe the tasks and schedule to integrate the PyreCast near-term fire forecasting tool into operational practices of a select set of willing electric utilities and other key State agencies/institutions that assess/monitor wildfire risks to critical electric infrastructure and/or other valued assets and resources.

Tasks for Integrating PyreCast into Operational Practices

The tasks described below will help to guide the implementation of the PyreCast integration workplan. Figure 1 provides an overview of planned tasks.

Task #1 – Identify willing integration partners: The goal of this task is to identify a manageable list of willing participants for integrating PyreCast data, models, and/or tools into operational practices. Through already established relationships and additional user outreach/engagement, Workgroup #3 will work with CEC to select at least one IOU and at least two State agencies/institutions deemed appropriate for integration efforts. Those selected institutions will be the primary focus of integration efforts. The following institutions have expressed interest in integrating PyreCast into operational practices during Phase 1 on the project, including:

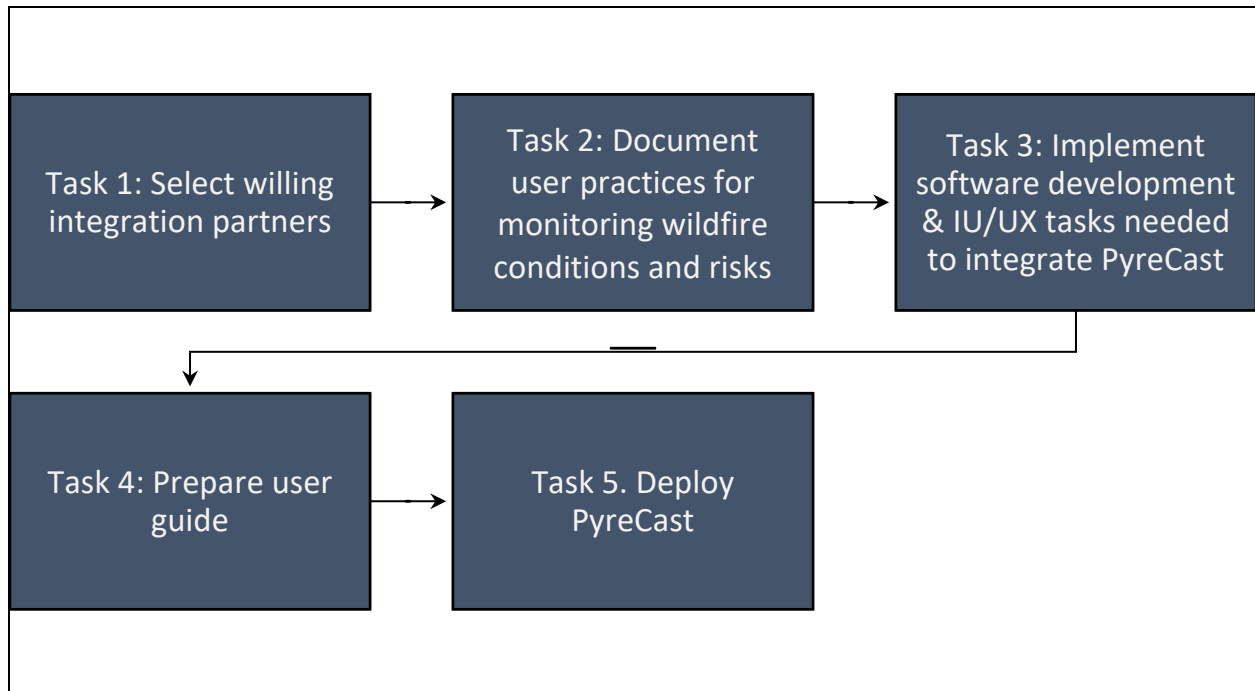


Figure 1. Generalized overview of proposed tasks for integrating PyreCast into IOUs and energy sector affiliated State agencies/institutions.

- State agencies/institutions with affiliation to or regulatory oversight of energy sector:
 - **California Energy Commission, Energy Assessment Division (EAD)** - The mission of EAD is to assess California’s energy systems and trends, providing information for decision-makers and the public that produce policies that balance the need for adequate resources with economic, public health, safety, and environmental goals. Within EAD, the Data Integration and Policy Office is likely the most appropriate target for integration of the PyreCast tool because of its role of collecting, analyzing, and reporting on energy industry data. The office provides essential statistics and facts used to assess and develop energy policy, including data on electric generation, electricity and natural gas consumption, refinery, and petroleum supply and because it participates in state emergency planning and response. Key Contact: Joseph Merrill
 - **California Independent System Operator (CAISO)** - A non-profit Independent System Operator (ISO)¹ serving a large portion of California. It oversees the operation of California's bulk electric power system, transmission lines, and electricity market generated and transmitted by its member utilities. The primary stated mission of CAISO is to "operate the grid reliably and efficiently, provide fair and open transmission access, promote environmental stewardship, and facilitate effective markets and promote infrastructure development. CAISO Contacts: Tim Beach and Amber Motley.
 - **California Office of Energy Infrastructure (OEIS), Energy Infrastructure Directorate, Data Analytics Division** – The Data Analytics Division supports the operational needs of the OEIS. The Division is focused on data analysis and GIS development to enable data-

¹ Coordinates, controls, and monitors the operation of the electrical power system

driven decision making and has a legislative remit over IOUs Wildfire Mitigation Plans.
Initial contact: Koko Tomassian, Andie Biggs

- Investor-owned Utilities
 - **Bear Valley Electric Services (BVES)** – is a small investor-owned utility that has served the fire prone Big Bear Valley since 1929. The utility currently provides electric power to approximately 23,000 residential and 2,500 commercial customers within their service territory. Initial conversation with BVES suggest the utility is interested in working with the project team to integrate forecasting tool into their PSPS operational practices. Key contact: Jon Pecchia
 - **Liberty Utilities** – is a relatively small IOU whose service territory include the fire-prone Tahoe region. In 2021, Liberty initiated steps to integrate PyreCast models and data via API (application programming interface – a connection between computers or between computer programs) into its own proprietary mapping system. Through additional engagement with Liberty, the Pyregeance team anticipates additional opportunities to further knowledge and technology transfer. Initial contact: Eliot Jones, Rick Dalton, and Jordon Parillo.
 - **NV Energy** – is an investor-owned utility which generates, transmits, and distributes electric service in primarily throughout Nevada, including a small operating footprint along the highway 80 corridor in California, near Truckee and Verdi. Through a separate wildfire advisory agreement held by Reax and SIG, NV Energy has been exposed to the PyreCast tool and its capabilities. NV Energy has expressed interest in potentially operationalizing PyreCast into their Public Safety Outage Management (PSOM) decision support system. Initial contact: Alex Hoon
- Other integration opportunities identified
 - **Federal Incident Management Team** - Taro Pusina from SIG is a Fire Behavior Analyst (FBAN) that is on the Pyregeance project team and serves on a federal interagency incident management team (IMT) during the fire season. His role as an FBAN on IMTs, Taro is responsible for collecting weather data, developing strategic and tactical fire behavior information, predicting fire growth, and interpreting fire characteristics for use by incident overhead. Taro’s role on the IMT provides a unique opportunity for exposing PyreCast to a potentially and relevant large user group. Although we do not anticipate getting the PyreCast tool incorporated into operational practices of the federal IMT, we do expect to work with Taro to lay out the steps that would be necessary for such an integration as part of the final report of the project.
 - **Lawrence Livermore National Laboratory (LLNL)** – We intend to continue to work with users at LLNL who are currently using PyreCast to inform the Department of Energy decision-makers on grid vulnerabilities.

Task #2: Document user practices for monitoring wildfire conditions and risks. The goal of this task is for the project team to develop a concrete understanding of practices currently used by different selected users to best direct the integration of the PyreCast tool. Included in completing this task is the identification and documentation of the different use cases for integration of PyreCast. This task will be accomplished through interviews with selected users and review of relevant decision support documents (for example, IOU filings to CPUC following a PSPS event will provide good insights into

wildfire risk monitoring and decision-making tools and procedures). At this stage, we can anticipate the following integration use cases:

- 1) A custom set up of PyreCast code, models, and/or data on a user organization's proprietary high-performance computer system.
- 2) The system is used "as is," where a user will interface with the features and functions of the on-line tool hosted at <https://pyrecast.org/>.
- 3) The user will use the PyreCast system log-in registration capability to host their own proprietary data on the project's secure servers.

Task 3: Implement software development & UI/UX tasks needed to integrate PyreCast. After interviews with selected users and review of decision support documents, we anticipate some modifications to the software and/or user interface will be needed to best accommodate user needs. Consequently, this task aims to identify and implement software or user interface updates identified by selected users.

Task 4: Prepare User Guide. The goal of this task is to prepare a user guide document that will provide guidance on deploying, running, analyzing, and visualizing the Near-Term Risk Forecast outputs per each of the use cases identified in Task 2. Completion of this task will also satisfy a product deliverable identified in the project's scope of work (under Task 6).

Task 5. Deploy PyreCast. The focus of this task will be for the project team to work with selected users to deploy and/or operationalize PyreCast per the user guide identified in Task 4 of this workplan and per each of the use cases identified in Task 2. Included in this task, the project team will provide personalized training to ensure proper functioning and understanding of the system. In addition, the project team will maintain on-going support and training to selected users through the end of the project.

Pyregence Team and Roles

Chris Lautenberger (Reax) - Technical lead of Workgroup #3, user training, and deployment

Mariko Geronimo (Lumen Energy Strategy) – User engagement lead

Shane Romsos (SIG) – User engagement support

Gary Johnson (SIG) – Software development update and user guidance lead

Oliver Baldwin Edwards (SIG) – Software development and user guide preparation

Joel Iniguez (SIG) – Software update support and user guide preparation

Andrea Raschke (SIG) – Lead UI/UX updates

Summary of Schedule and Personnel Effort

Tasks	Pyregence Responsible Party	Outcome(s) / Products(s)	Start Date	End Date	Person Days
Task 1: Select willing integration partners	Pyregence and CEC	Select 1 IOU Participant and 2 State Institutions	3/17/2022	4/8/2022	5
Task 2: Document user practices for monitoring wildfire conditions and risks	Lautenberger, Geronimo, and Romsos	Memo on user practices	3/24/2022	4/30/2022	5
Task 3: Implement software development & IU/UX tasks needed to integrate PyreCast	Raschke, Baldwin-Edwards, Iniguez, Johnson	Completed updates to UI/UX and software to meet user needs	4/8/2022	5/30/2022	5 to 10
Task 4: Prepare user guide	Raschke, Baldwin-Edwards, Iniguez, Johnson, Lautenberger, Romsos	Completed user guide	5/1/2022	6/27/2022	25
Task 5. Deploy PyreCast	Baldwin-Edwards, Iniguez, Johnson, Lautenberger, Johnson,	Full deployment of PyreCast at 1 IOU and 2 State Institutions	6/1/2022	8/30/2022, with support to end of the project	10