

**DOCKETED**

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*Comment Received From: Max Henrion*  
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**Software for the risk decision framework for CEC, CPUC, and IOUs**

*Additional submitted attachment is included below.*



## **Electric Program Investment Charge 2026–2030 (EPIC 5) Research Concept Proposal Form**

*The California Energy Commission (CEC) is currently soliciting research concept ideas and other input for the Electric Program Investment Charge 2026–2030 (EPIC 5) Investment Plan. For those who would like to submit an idea for consideration, please complete this form and submit it to the CEC by **August 8, 2025**. More information about EPIC 5 is available below.*

*To submit the form, please visit the e-commenting link:  
<https://efiling.energy.ca.gov/EComment/ECommentSelectProceeding.aspx> and select the Docket **25-EPIC-01**. Enter your contact information and then use the “choose file” button at the bottom of the page to upload and submit the completed form. Thank you in advance for your input.*

### **Software to enable more effective use of CPUC’s new risk decision framework by all stakeholders**

- 1. Please provide the name, email, and phone number of the best person to contact should the CEC have additional questions regarding the research concept:*

**Max Henrion**  
[henrion@lumina.com](mailto:henrion@lumina.com)  
**408-335-2969**

- 2. Please provide the name of the contact person’s organization or affiliation:*

Lumina Decision Systems, Inc.  
Chief Executive Officer

- 3. Please provide a brief description of the proposed concept that you would like the CEC to consider as part of the EPIC 5 Investment Plan. What is the purpose of the concept, and what would it seek to do? Why are EPIC funds needed to support the concept?*

A major reason for the rising costs of electricity in California is the large investments IOUs are making to reduce risks — especially, to reduce the risks of their equipment igniting wildfires. For example, PG&E has proposed to put

10,000 miles of electricity lines underground to mitigate fire risks. This will effectively reduce wildfire risk, but at a substantial cost. A critical question is when and where such investments are cost effective.

To address this question, the California Public Utility Commission (CPUC) requires IOUs to submit RAMP (*Risk Assessment Mitigation Phase*) reports for review of their plans to mitigate risks every four years as input to the General Rate Case (GRC). The CPUC provides a Risk-Based Decision Framework (RDF) as guidance on how to structure the RAMP reports. The Commission recently replaced the Risk-Spend Efficiency (RSE) metric in the RDF with a Benefit-Cost Framework (BCF) as a clearer way to prioritize risk mitigation projects based on the degree of risk mitigation per dollar invested (based in part on recommendations from Max Henrion of Lumina Decision Systems, Inc and Level 4 Consulting.)

In past RAMP reports, IOUs have used a variety of methods and formats for reporting and explaining their RSE calculations. They have treated risks and uncertainties in various ways, sometimes with limited documentation of the underlying methods. These problems have made it challenging for CPUC staff, intervenors, and other stakeholders to understand the basis for proposed risk mitigations and investments. The Commission has recently adopted improvements to the RDF to address these problems ([Appendix A, Risk-Based Decision-Making Framework, A-2 R. 20-07-013, 7/25/2025](#)). Additions to the RDF include (29) Transparency in RAMP and GRC, (30) Sensitivity analysis, and (31) Data and SME judgments. These revisions to the RDF are to be implemented by IOUs for new filings starting on Jan 1, 2026.

Recently recommended further additions include

- (a) the use of probability distributions to represent uncertainty in the Likelihood of Risk Events (LoRE) and Consequences of Risk Events (CoRE),
- (b) portfolio optimization based on varying budget constraints
- (c) reporting the impact of mitigations on tail average risk in addition to average risk.

The Safety Policy Division of the CPUC is working with the IOUs and a proposal from Matthew Raphaelson of Level 4 Consulting, to develop a consolidated statement for risk mitigation plans and results, known as a “Risk Mitigation Accountability Report” or RMAR. The CPUC along with IOUs have developed a standard data template for reporting risk results from RAMP and GRC reports. It provides tabular formats to present risks and mitigations along with the value of key attributes (costs and effects on safety and reliability), and the underlying benefit-cost evaluations of portfolios of risk mitigations. These tables may contain up to ten dimensions, including equipment hierarchy, scenario, version, time, risk type, attribute, and risk measures.

Adoption of these extensions to the RDF along with RMAR and these templates could considerably improve the consistency and comprehensiveness of IOU risk reports. However, the volume and complexity of data in each report will be considerable. With up to ten dimensions, it will be intractable to manage them effectively with spreadsheets. So, it will still be challenging for CPUC, IOUs, intervenors, and other stakeholders to understand and assess the results in raw tabular form. There will be an urgent need for a software tool that can import the RMAR tables to validate, analyze, aggregate, and visualize the results in a variety of tabular and graphical forms.

Desirable features for such a software tool might include:

- Import the full range of standard RMAR data templates from CSV, spreadsheets, or other formats.
- Initial internal consistency and validation checks to make sure that the data meets key requirements and is in expected ranges.
- Store data into a database for ease of management and tracking.
- Provide access via the web for easy use by CPUC staff and stakeholders without having to install software on desktop computers.
- Aggregate tranches of risk-reporting units over regions, risk types, time periods and other dimensions to help reviewers visualize and compare portfolios of risk mitigations in terms of their benefit-cost ratios and other attributes.
- Compare portfolio results with cost against safety and/or reliability to visualize efficient frontiers to help prioritize portfolios.
- Conduct systematic sensitivity analysis of key parameters, including input numbers, value of a statistical life and value of reliability estimates that convert safety and reliability to costs, to see how far priorities might be affected by changes in assumptions.
- Explore and display uncertainties based on tail-average risks and compare with acceptable levels of risk tolerance.
- Display risk mitigations by location or region on a map to visualize geographic distribution of impacts.
- Compare versions of RMAR reports to visualize changes over time and compare projected against actual performance.
- Save summary and detail data as requested into CSV tables or spreadsheet files for further analysis.
- Use open source code to enable review and extension of the tool.

4. *In accordance with Senate Bill 96<sup>1</sup>, please describe how the proposed concept will "lead to technological advancement and breakthroughs to overcome barriers that prevent the achievement of the state's statutory energy goals." For example, what technical and/or market barriers or customer pain points would the proposed concept address that would lead to increased adoption of clean energy technology or innovation? Where possible, please provide specific cost and performance targets that need to be met for increased industry and consumer acceptance. For scientific analysis and tools, provide more information on what data and information gaps the proposed concept would help fill, and which specific parties or end users would benefit from the results, and for what purpose(s)?*

Such a tool should make it much easier for CPUC staff, intervenors, and other stakeholders to assess and evaluate the risk reports, and gain full value from the new RMAR formats. It is unlikely that development of such a tool to support California utilities and CPUC requirements would be commercially viable, especially if it is to be open source. For this reason, it will need to be supported by public funds, such as from EPIC.

5. *Please describe the anticipated outcomes if this research concept is successful, either fully or partially. For example, to what extent would the research reduce technology or ratepayer costs and/or increase performance to improve the overall value proposition of the technology? What is the potential of the innovation at scale? How will the innovation lead to ratepayer benefits in alignment with EPIC's guiding principles to improve safety,<sup>2</sup> reliability,<sup>3</sup> affordability,<sup>4</sup> environmental sustainability,<sup>5</sup> and equity?<sup>6</sup>*

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<sup>1</sup> See section (a) (1) of Public Resources Code 25711.5 at: [https://leginfo.ca.gov/faces/codes\\_displaySection.xhtml?lawCode=PRC&sectionNum=25711.5](https://leginfo.ca.gov/faces/codes_displaySection.xhtml?lawCode=PRC&sectionNum=25711.5).

<sup>2</sup> EPIC innovations should improve the safety of operation of California's electric system in the face of climate change, wildfire, and emerging challenges.

<sup>3</sup> EPIC innovations should increase the reliability of California's electric system while continuing to decarbonize California's electric power supply.

<sup>4</sup> EPIC innovations should fund electric sector technologies and approaches that lower California electric rates and ratepayer costs and help enable the equitable adoption of clean energy technologies.

<sup>5</sup> EPIC innovations should continue to reduce greenhouse house gas emissions, criteria pollutant emissions, and the overall environmental impacts of California's electric system, including land and water use.

<sup>6</sup> EPIC innovations should increasingly support, benefit, and engage disadvantaged vulnerable California communities (DVC). (D.20-08-046, Ordering Paragraph 1.) DVCs consist of communities in the 25 percent highest scoring census tracts according to the most recent version of the California Communities Environmental Health Screening Tool (CalEnviroScreen), as well as all California tribal lands, census tracts with median household incomes less than 60 percent

The key benefits of this tool (in conjunction with the improved CPUC risk-decision framework) for California ratepayers would be (a) affordability: to reduce the cost of electricity and gas to ratepayers by avoiding investments by IOUs in unjustified risk mitigation, and (b) safety: reducing unnecessary risk from wildfires, gas explosions, and other risks to ratepayers with appropriately cost-effective risk reduction. The tool will also provide greater transparency and clearer justifications for IOU investments in risk mitigation and CPUC regulation of risk spending.

6. *Describe what quantitative or qualitative metrics or indicators would be used to evaluate the impacts of the proposed research concept.*

The proposed tool, along with the CPUC's expanded RDF and RMAR risk reporting standards, will help CPUC along with IOUs and intervenors perform more effective prioritization of risk mitigations. The explicit benefit-cost assessments supported by this framework will make it practical (as it has not previously been) to compare the net benefits and benefit-cost ratios of the risk mitigations selected for investment with those that are rejected. In this way, it will be possible to quantify net savings compared to past methods of prioritization that may have resulted in investments that did not maximize net benefits.

7. *Please provide references to any information provided in the form that supports the research concept's merits. This can include references to cost targets, technical potential, market barriers, equity benefits, etc.*
8. *The EPIC 5 Investment Plan must support at least one of five Strategic Goals:<sup>7</sup>*
  - a. *Transportation Electrification*
  - b. *Distributed Energy Resource Integration*
  - c. *Building Decarbonization*
  - d. *Achieving 100 Percent Net-Zero Carbon Emissions and the Coordinated Role of Gas*
  - e. *Climate Adaptation*

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of state median income, and census tracts that score in the highest 5 percent of Pollution Burden within CalEnviroScreen, but do not receive an overall CalEnviroScreen score due to unreliable public health and socioeconomic data.

<sup>7</sup> In 2024 the CPUC adopted five Strategic Goals to guide development of the EPIC 5 Investment Plan. A description of the goals can be seen in Appendix A of CPUC Decision 24-03-007 available at:

<https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M527/K228/527228647.PDF>

*Please describe in as much detail as possible how your proposed concept would support these goals.*

The primary Strategic Goal supported by this project is e. Climate Adaptation. In recent years, climate change in California is causing higher temperatures, greater prevalence of high wind conditions, and consequent drier vegetation leading to more frequent and more severe wildfires, including fires ignited by faulty electrical equipment and impingement of vegetation on transmission and distribution lines. To adapt to this new climate reality, the IOUs are making considerable investments in vegetation management, line hardening and undergrounding. The proposed project would assist them and the CPUC in making sure that they select the most cost-effective risk mitigations, so that these climate adaptations reduce the new risks without unnecessarily increasing the cost of electricity.

By avoiding unnecessary investments in risk mitigation and resulting increase in the price of electricity, this project will also indirectly support the Strategic Goals a. Transportation electrification and c. Building Decarbonization, both of which would be hindered by dramatic rises in the cost of electricity.