SCE's Pre-Filing 2026 Risk Assessment and Mitigation Phase (RAMP) Workshop

December 18, 2025

- Approximately 160 holiday decorating-related injuries occur each day, leading to nearly 15,000 emergency room visits each season.
- Almost half of these decorating injuries involve falls.
- Other common injuries include cuts and burns.
- Fires related to Christmas trees cost an estimated $15 million in property damage annually.*

*National Fire Protection Association. (2024). *Home Christmas tree fires*. NFPA Research. https://www.nfpa.org

Agenda

Topic	Presenter	Time
Opening Remarks	Safety Policy Division	10:05 – 10:10 AM
SCE Opening Remarks	Seema Turner	10:10 – 10:15
Overview of Pre-RAMP Workshop and Key New RAMP Requirements	Daniel Komula	10:15 – 10:25
Risk Quantification	Gary Cheng/Bryan Landry	10:25 – 10:45
Preliminary List of Risks from Enterprise Risk register and Preliminary Risk Scores	Gary Cheng	10:45 – 10:55
Break		**10:55 – 11:05**
Tranching Approach	Gary Cheng	11:05 – 11:20
Wildfire Power Law	Bryan Landry	11:20 – Noon
Lunch		**Noon – 1 PM**
Climate Pilot Selection Process	Bryan Landry	1 – 1:25
Climate Integration Approach	Bryan Landry	1:25 – 1:55
Q/A & Closing Remarks	SCE Team	1:55 – 2:15

Safety Policy Division Opening Remarks

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SCE Opening Remarks

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Overview of Pre-RAMP Workshop and Key New RAMP Requirements

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Purpose of Pre-RAMP Workshop

In accordance with Decision 24-05-064 and the provisions in Appendix A[1], SCE is seeking to gather input from SPD, other interested CPUC staff, and interested parties regarding:

1) Our preliminary 2026 Risk Assessment and Mitigation Phase (RAMP) Risk assessments (risk selection and scoring metrics),
2) Our Tranching and Wildfire Power Law White Papers and,
3) Our Climate Pilot White Paper approaches.

Specifically, during today's presentation SCE will focus on:

- ✓ The selection of our 2026 RAMP Risks following the prescribed process in the RDF and the preliminary 2029 monetized baseline risk values.
- ✓ SCE's proposed tranching approaches for our selected RAMP Risks as outlined in our tranching Whitepaper submitted to parties on Nov. 3.
- ✓ A brief summary of SCE's application of a truncated power law into our Wildfire Risk Model that was submitted to parties on Nov. 3.
- ✓ SCE's Climate Pilot Risk selection process and proposed integration approach into our 2026 RAMP Application.

1) Appendix A, Step2B, Row 12

New 2026 RAMP Requirements

SCE's upcoming RAMP will include cumulative requirements from the Risk-Based Decision-Making Framework Order Institute Rulemaking (OIR).

Phase II	Phase III	Phase IV (Final Decision in Aug-2025)

• Monetization Framework
  • Interruption Cost Estimate (ICE) calculator to estimate Value of Reliability (VoR)
  • DOT to estimate Value of Statistical Life (VSL)
• Environmental and Social Justice (ESJ) Pilot
	• Tranching
	• Climate Pilot
	• Tail Risk
	• Power Law (Wildfire), or whitepaper
	• Risk Scaling of Consequences
	• Discount Rate Scenarios for Benefit-Cost Ratio (BCR) Calculations
		• Mitigation Portfolios/Groups
		• Portfolio Optimization
		• Risk Reporting Units (RRU)
		• Overall Residual Risk Reporting
		• Consequence Distributions
		• Data Templates/Reports
		• Risk Mitigation Accountability Reporting (RMAR)*

* RMAR will be not filed as part of SCE's 2026 RAMP Report.

Risk Quantification

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Value of Statistical Life (VSL)

Requirements D.22-12-027 Phase II*

- Investor Owned Utilities (IOUs) are required to apply the most current published Department of Transportation (DOT) VSL, adjusted for the base year of their respective filing, as the standard monetized value of safety impacts.
    - SCE's **VSL (2025 $) = $16.6 M.** This value reflects California specific price index, real income growth and inflation rates.**
- SCE is expressing the monetized value of serious injury equal to ¼ of a fatality

Potential-Serious Injuries and Fatalities (PSIF) in the Employee and Contractor Safety Chapters

- **Background** – Edison Safety has been tracking PSIF data for several years through their Incident Management System.
- **Why it Matters** – PSIF is a leading indicator that helps identify and address employee and contract safety incidents before they result in SIFs. Including these data into consequence estimates ensures our safety analysis provides a more complete picture of these risks.
- **Ratio Assumption** – SCE proposes a conservative equivalency of 10 PSIFs to 1 Fatality.

* Conclusions of Law – Row 10 - 12
** SCE currently-assumes a 2.3% inflation rate, based on the latest CBO long term budget outlook for CPI-U. The inflation rate as well as the VSL will be refreshed ahead of its 2026 RAMP filing.

Valuation of Reliability (VoR) / Interruption Cost Estimate (ICE) 2.0

Requirements D.22-12-027 Phase II*

- IOUs are required to adopt the use of the most recent Lawerence Berkeley National Lab (LNBL) ICE Calculator to determine a standard monetized valuation of electric reliability impacts.
- The most recent ICE replaces older methods with a dollar-based quantification.

SCE Participation in ICE 2.0

- SCE participated in the ICE 2.0 Survey, however these results may not be reflected in the current version of the ICE 2.0 calculator. We were recently notified by LBNL that the results of the ICE 2.1 calculator – inclusive of California IOU survey results - will be available sometime in Q1, 2026**

ICE 2.0 Methodology

Survey design

Residential

Assessed for willingness to pay to avoid an outage

Non-Residential

Evaluated for direct costs (e.g., lost production/revenue, interruption-related costs)

Scenario-Based Valuation

Interruption scenarios vary by duration, day of week, time of day, etc.

Customer segments analyzed by attributes such as income, age, backup generation ownership, electricity usage

Analytics

Regression analysis identifies key categorical drivers

Results inform $/CMI by residential and non-residential

* Conclusions of Law – Row 13

**memo On ICE 2.1 on Dec. 15, 2026. The values SCE used for this presentation are based on ICE 2.0 (Phase I) and are reflective of values estimated in August 2025. These estimates were derived by using SCE System-wide Customer Counts by Class: Residential 4,615,964, Non- Residential 710,039 (June 2025); as well as Outage Ratio: Summer 39%; Winter 61%; System-wide; SADI/SAIFI values from SCE 10 -year average from SCE Annual Reliability report, excluding MEDs.

Valuation of Reliability (VoR) (Cont.)

ICE 2.0 Results for SCE's Service Territory

- Residential VoR (2025$) per Customer Minute Interrupted (CMI) =$0.09
- Non-Residential VoR (2025$) per CMI = $27.00
- Blended (non-specific) VoR (2025$) per CMI = $3.68

SCE's Value of Reliability (VoR) Approach

- There are two ways in which SCE used these ICE 2.0 results to estimate Value of Reliability (VoR). These differ depending on whether it makes sense to spatially disaggregated these results.

- Option A: **System-wide, Blended (non-specific) VoR**: SCE applied blended, non-location-specific values to estimate VoR for RAMP risks where mitigations *are not* tied to a specific geography (e.g., cyber risk).

- Option B: **Location Specific, Differentiated VoR by Customer Class**: SCE applied a differentiated VoR, by customer class to estimate VoR for RAMP risks where mitigations *are* tied to a specific geography (e.g., wildfire).

Examples for Circuit XYZ

- Option A: **System-Wide, Blended**
  - Number of Customers 3300 x $3.68/CMI = **$12,144 per CMI**

- Option B: **Location Specific**
  - Number of Residential Customers 3,000 x $0.09/CMI = $270 per CMI
  - Number of Non-Residential Customers 300 x $27.00/CMI = $8,100 per CMI

  $8,370 per CMI

Preliminary List of RAMP Risks and Risk Scores

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Preliminary Risk Selection and Scores

On Dec 4th, SCE provided the service list with its preliminary RAMP risk selection and risk scores, ensuring stakeholders have the information 14 days prior to the Pre-RAMP Workshop and in compliance with the RDF requirements.

Risk scores represent risk neutral values as of SCE's upcoming General Rate Case (GRC) Test Year (2029)

	Top 40%	RAMP Risk?	Risk Name	Score Components ($M) Safety	Reliability	Financial	Total ($M)
1	☑	☑	**Public Safety Risk Not Attributable to Asset Failure**	443	136	47	626
2	☑	☑	**Wildfire[1] + PSPS**	162	592	5,398	6,152
3	☑	☑	**Contractor Safety**	120	0	0	120
4	☑	☑	**Employee Safety**	43	0	10	53
5	☑	☑	**Overhead Asset Failure**	15	845	120	980
6	☐	☑	**Major Physical Security**	8			
7	☐	☑	**Underground Asset Failure**	5			
8	☐	☑	**Seismic**	3			
9	☐	☑	**Cyber**	2			
10	☐	☑	**Hydro**	< 2			
11	☐	☐	Battery Energy Storage System (BESS)	<1			
12	☐	☐	Widespread outage [2]	-			
13	☐	☐	Environmental Incidents	-			
14	☐	☐	SONGS Decommissiong	-			
15	☐	☐	Subsea Asset Failure	-			
16	☐	☐	Substation Asset Failure	-			
17	☐	☐	Transmission Asset Failure (Exclude Wildfire)	-			

Beyond ensuring the safety of our employees and contractors, every other RAMP risk identified carries potential safety risks for the public.

RDF – Row 9:

1) The utility will **compute a monetized Safety Risk Value** using only the Safety Attribute.
2) The utility will **sort its Enterprise Risk Register (ERR) risks in descending order** by the monetized Safety Risk Value.
3) For the **Top 40%** of the ERR risks with a Safety risk value greater than zero dollars, the **utility will compute a monetized Risk value using at least the safety, Reliability and Financial Attributes**.

[1] Wildfire financial consequences reflects the broad toll on communities – including costs for repairs and replacements, fire suppression and acreage loss, property damage, and additional insured losses.
[2] SCE modeled widespread outage as a potential outcome to other risks such as cyber, seismic.

Break (10 min)

Tranching

Tranching Background and Requirements

Decision D.24-05-064 (Phase III) - Tranching Requirements*

- To enhance transparency, IOUs are required as a best practice to use homogenous Likelihood of a Risk Event / Consequences of a Risk Event (LoRE/CoRE) quintile tranches. The application of this method will result in a total of 25 LoRE/CoRE tranches.
- If an IOU uses a non-homogenous risk profile approach (not based on LoRE / CoRE quintiles or a percentile ranking approach resulting in greater than 25 reporting tranches), it must:
  - ✓ Submit a White Paper detailing its preferred tranching method and relevant workpapers to SPD no later than 45 days before the Pre-RAMP workshop
  - ✓ Serve the White Paper to the R.20-070-13 service list within the same timeframe
  - ✓ Discuss the tranching approach during the Pre-RAMP workshop
  - Include the While Paper in the RAMP filing, noting any changes from the previously served version

Decision D.24-05-064 (*pg. 27*)

- Staff and Parties may provide input on the IOU's White Paper within **21** days of submittal

SCE Compliance Timeline

- Nov 3, 2025 – Submitted Tranching White Paper to service list
- Nov 24, 2025 – No feedback received from Staff or Parties
- Dec 18, 2025 – Discussion on Tranching in Pre-RAMP Workshop

* Conclusions of Law – Row 11-15

Tranching Summary

Risk	2026 RAMP Proposed Tranching	2022 RAMP Tranching
Wildfire	25 Tranches, "5 x 5"* *[New]*	IWMS Tranche Groupings (3) **
PSPS	25 Tranches, "5 x 5"* *[New]*	Mitigation Program Level **
Overhead Asset Failure	25 Tranches, "5 x 5"* *[New]*	Mitigation Program Level **
Underground Asset Failure	25 Tranches, "5 x 5"* *[New]*	Mitigation Program Level **
Public Safety Unrelated to Asset Failure	Vehicle Hit Pole: 25 Tranches, "5 x 5"* *[New]* Aircraft Line Strike: 1 Tranche, system level *[New]* Dig-ins: 1 Tranche, system level Contact with overhead intact: 1 Tranche, system level	Modeled Overhead/Underground contact with Intact equipment: 2 Tranches (At Risk and General Public)
Cyber	5 Tranches: Admin, Grid, 3rd Parties and vendors, People, and Applications *[New]*	3 Tranches: Bulk Electric System, Distribution Grid, and Admin
Seismic	4 Tranches – Add additional tranche*[New]*	3 Tranches based on Seismic Resiliency Pyramid
Hydro Dam Failure	26 Individual Dams *[New]*	4 Tranches: (Embankment vs Concrete) x (greater or less than 100 ft)
Major Physical Security	5 Tranches: Tier 1-3 Facilities, Tier 4-5 Facilities, Generation – General, Generation-Hydro, Major Business Function *[New]*	3 Tranches: Grid Ops, Major Bus. Functions, Generation Capabilities
Employee Safety	3 Tranches: Office, Field (High Risk), Field (Other)	3 Tranches: Office, Field (High Risk), Field (Other)
Contractor Safety	3 Tranches: Electric Operations, Vegetation, Other *[New]*	2 Tranches: Tier 1 – High Risk, Tier 1 (Other)

* In this context, "5 x 5" refers to the best practice LoRE/CoRE quintile approach.

** Risk scores and RSE's were calculated at the asset / circuit-level and published in the workpapers. For reporting purposes, they were presented at the program level or Integrated Wildfire Mitigation Strategy (IWMS) tranche level (Severe Risk Area, High Consequence Areas, and Other HFRA) in the RAMP report.

Wildfire Power Law

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Wildfire Power Law Background and Requirements

Decision D.24-05-064 (Phase III) – Wildfire Power Law Requirements*

- If an IOU chooses to model tail risk, a truncated** power law distribution model is considered a best practice.
- If an IOU elects to use a method other than truncated power law to model wildfire tail risk pursuant to Row 24, in addition to presenting the required expected value, it must:
  - ✓ Submit a White Paper, and related workpapers, no later than 45 days before the Pre-RAMP workshop
  - ✓ Serve the White Paper to the R.20-070-13 service list within the same timeframe
  - ✓ Discuss the approach during the Pre-RAMP workshop
  - Include the While Paper in the RAMP filing, noting any changes from the previously served version

Decision D.24-05-064 (*pg. 55*)

- Staff and Parties may provide input on the IOU's White Paper within **21** days of submittal

SCE Compliance Timeline

- Nov 3, 2025 – Submitted Wildfire Power Law White Paper to service list
- Nov 24, 2025 – No feedback received from Staff or Parties
- Dec 18, 2025 – Discussion on Wildfire Power Law in Pre-RAMP Workshop

* Conclusions of Law – Row 21 - 23

** It is necessary to truncate a power law distribution when applying the Risk Distribution Framework (RDF) because power laws have infinite or undefined moments (like expected value) unless bounded, making it impossible to compute meaningful expected values, percentiles, or tail risk metrics without imposing an upper limit. Truncation helps ensure that the statistical measures used to evaluate cost-effectiveness and risk tolerance, such as expected loss, Value-at-Risk (VaR), or Conditional Value-at-Risk (CvaR) are mathematically well-defined and are interpretable from a practical standpoint.

Wildfire Integrated Model (WIM) Summary

SCE's Wildfire Integrated Model (WIM)

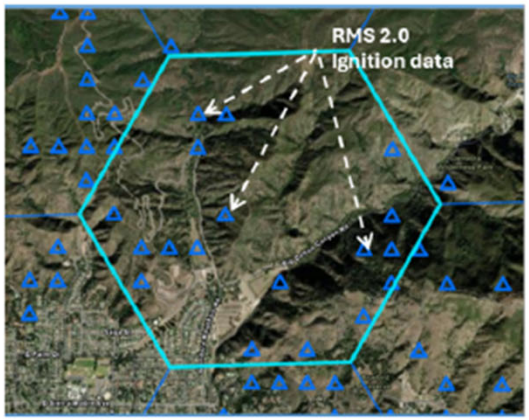
- While SCE intends to use a truncated power law distribution to model wildfire risk as required, SCE presents a method of truncation that is designed to reflect a broader range of potential future outcomes - including tail risk events - which may not be fully reflected by historical wildfire events.

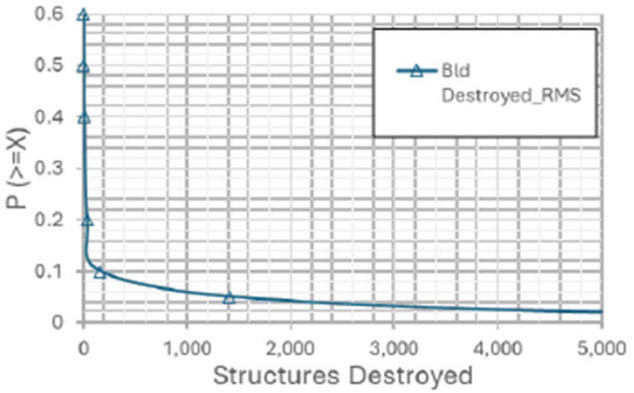
- This new model integrates SCE's existing Technosylva-based FireSight 8 deterministic simulations with stochastic ignition data provided by Moody's RMS U.S. Wildfire HD Model, version 2.0 (RMS 2.0).

  - ✓ It is not limited by the historical record of wildfire risk events in which there may be an insufficient record; nor deterministic simulation times (e.g., 8 or 24 hours), both of which under-represent potential tail risk events.
  - ✓ Maintains the asset-level spatial granularity of SCE's existing operational risk model, which is critical to comply with Risk OIR Phase IV guidance to represent risk at the Risk Reporting Unit (RRU).
  - ✓ Addresses Risk OIR Phase IV guidance to represent wildfire consequences as a probability distribution, from which expected value and tail risk values can be calculated.
  - ✓ Integrates a stochastic ignition data sets, which account for correlative factors that are more associated with tail risk events (e.g., proximity to WUI, structure type and density), and are widely used by the insurance industry, including the California Department of Insurance.
  - ✓ Uses well-known spatial aggregation and mathematical scaling techniques to ensure the distribution of potential consequences of simulated wildfire events are adequately represented at the most granular level practical.

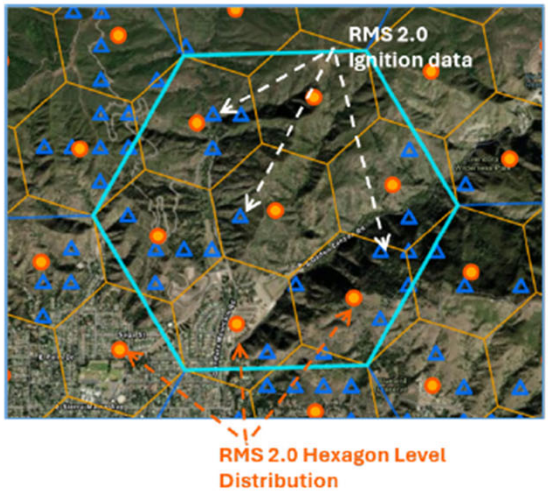
Wildfire Integrated Model (WIM) Summary

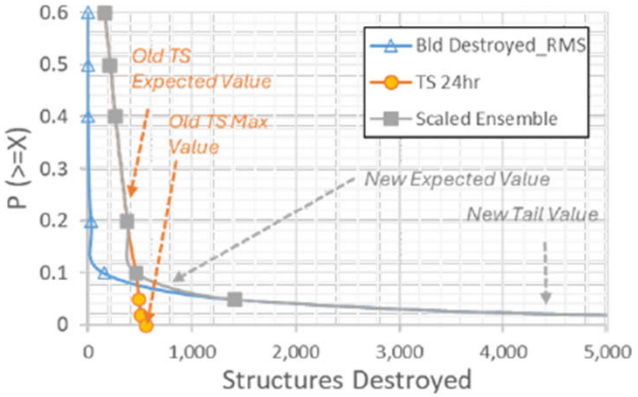
Illustrative Example of **Deriving Descriptive Statistics** using RMS 2.0 Ignition Data at the UH3 L7* Hexagon-Level***





Illustrative Example of **Scaling** Asset-Level** FireSight 8 24-hour Distributions based on **Hexagon-Level** Pareto Descriptive Statistics from RMS 2.0 Ignition Data***

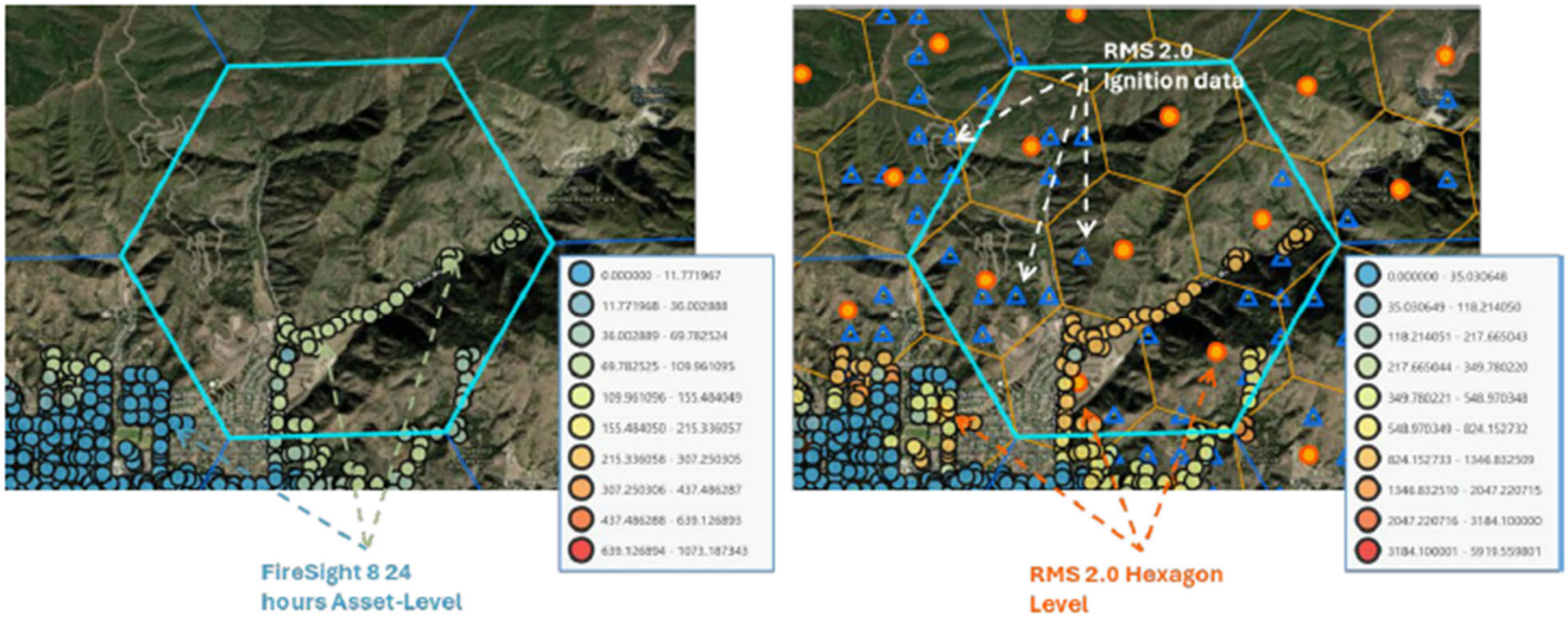




*L7 “Larger Hexagons” (RMS); L8 “Smaller Hexagons” (Technosylva FireSight 8)
** The scaling of two distributions should as in this case should not be confused with scaling to describe risk aversion to extreme outcomes, or scalars with are used to integrate social and/or location-based constraints into monetized risk scores.
*** See pg. 39 and 40 in SCE’s 2026 RAMP Wildfire Power Law White Paperfor additional information

Wildfire Integrated Model (WIM) Summary

Illustrative Example of Unadjusted FireSight 8 (Left) vs Adjusted (Rescaled*) WIM Asset-Level Values (Right)



- SCE calculated separate scalars for each level of aggregation, as well as each natural unit consequence (e.g., acres burned, buildings destroyed, and buildings damaged).
- The resulting re-scaled values from each of these distributions for each natural unit consequence, in turn, were used to derive monetized safety and financial values for the purpose of wildfire risk assessment.**

* The scaling of two distributions should as in this case should not be confused with scaling to describe risk aversion to extreme outcomes, or scalars with are used to integrate social and/or location-based constraints into monetized risk scores.
**Monetized reliability values are derived based of a different level of aggregation methodology as prescribed in Risk OIR Phase II guidance (e.g., ICE 2.0 values, SPD feedback on 2024 PG&E RAMP).

Lunch Break (1 Hour)

RAMP Climate Pilot

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RAMP Climate Pilot Background and Requirements

Decision D.24-05-064 (Phase III) – RAMP Climate Pilot Requirements*

- Directs IOUs to conduct climate pilots to consider how climate change may impact the risks selected for their Risk Assessment and Mitigation Phase (RAMP) filings.
- The Decision directs SCE to:
  - ✓ Hold a workshop in 2025 or 2026** to describe its planned approach to allow parties to provide feedback.
  - ✓ Facilitate opportunities for questions and input during the workshop;
  - ✓ Include party comments and their disposition in its RAMP Climate Pilot White Paper.
  - ✓ File its Climate White Papers no later than May 15, 2026.

Decision D.24-05-064 (*pg. 126*)

- Staff and Parties may provide input on the SCE's planned Approach no less than **10** days following the workshop.**

SCE Compliance Timeline

- Nov 18, 2025 – Submitted notice of workshop to service list
- Dec 18, 2025 – Discussion on Proposed RAMP Climate Pilot Approach, concurrent with Pre-RAMP Workshop
- Jan. 5, 2026 – Request parties provide written feedback by this date

* Ordering Paragraphs 3, 5
** Ordering Paragraph 6, "SoCalGas, SDG&E, and SCE shall each or jointly convene a workshop in 2025 or 2026 to describe their planned Climate Pilot White Paper approaches."

RAMP Climate Pilot Background and Requirements (Cont.)

Decision D.24-05-064 (Phase III) – RAMP Climate Pilot Requirements*

- The RAMP Climate Pilot White Papers should include (at minimum):
  - ✓ A detailed description of the approach taken by the IOU
  - ✓ The data sources used, the rationale as to why they were used
  - ✓ A description and discussion of the analysis undertaken
  - ✓ A reflection on lessons learned

- Additionally:
  - ✓ For SCE, SoCalGas and SDG&E, utilities are required to implement Staff Approach 2 as described in the decision
  - ✓ Consider risk reduction benefits of climate adaptation investments resulting previous CAVAs and funded by a previous GRC or similar application
  - ✓ Clearly identify the known climate hazards considered
  - ✓ Avoid, if possible, any long-term asset investment strategy that would be at risk in the future due to climate change impacts

* Ordering Paragraphs 3, 5

SCE's RAMP Climate Pilot - Integration Approach

Staff Approach 2: Step 1B – Row 8: Risk Identification and Definition

- Staff Approach 2, requires utilities to:
  - *"The ERR must consider any risks* that can be identified through the use of climate data, models and projections. See the Procedure for Incorporating climate data, models and projections in the RAMP for details."*
- For this step, SCE intends to appropriately leverage its most recently filed 2022 CAVA to identify any additional climate related risks* which are not already reflected in its ERR.

- The climate-related data, models and projections (i.e., climate hazards), SCE analyzed in its 2022 CAVA were:
  - **Temperature, Sea Level Rise, Precipitation and Historical Floodplain Regions, Wildfire (exposure),Cascading Events and Other Climate Considerations, Rain on Snow Events and Dam Safety, Heatwave and Wildfire, Catalina Island Vulnerability Assessment**
- Based on these climate-related data, models and projections (i.e., climate hazards), SCE added the following potential climate related risks to its ERR:
  - **Debris Flow, and Flooding (Fluvial, Pluvial, Coastal)**

- Neither of these additional climate related risks were selected for inclusion in SCEs 2026 RAMP.

* SCE notes that while the terms "Risk" and "Hazard," are used interchangeably, they are not the same. "Risk," as defined by the RDF, Phase IV, refers to "the potential for the occurrence of an event that would be desirable to avoid, expressed in terms of a combination of various Outcomes of an adverse event and their associated Probabilities. Risk is the product of LoRE and CoRE and represented as a probability distribution, from which an expected value or tail risk value can be calculated." While [Climate] "hazard, as defined in the Climate lexicon working group is defined as "The potential occurrence of a natural or human-induced physical event or trend that may cause loss of life, injury, or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, ecosystems and environmental resources." While hazard does indicate likelihood, it does not necessarily denote associated consequences, only potentially vulnerability.

SCE's RAMP Climate Pilot - Integration Approach (SCE Proposal)

Staff Approach 2: Step 1B – Row 8: Risk Identification and Definition

- In addition to requirements of Staff Approach 2, SCE proposed additional modifications* to further guide how climate could potentially impact any existing risk components (e.g., exposure, drivers, outcomes, consequence) for selected RAMP risks.
- SCE proposed an approach based on the **Intergovernmental Panel on Climate Change (IPCC)*** methodology to assess Confidence in the relationship between climate variables to individual RAMP risks, as well as their individual components.
    - The IPCC defines ***Confidence*** as a qualitative judgment of the relative change in climate impacts, based on amount, quality, and consistency of available scientific "evidence," as well as to what extent there is consensus agreement among experts regarding the relative change.
    - These confidence levels are expressed using a five-level scale (**Very Low, Low, Medium, High, Very High**) and are used to qualitatively communicate both the strength of that evidence as well as the level of consensus agreement within the relevant climate literature.
- SCE leveraged the **California Fourth Climate Change Assessment**** to identify the climate variables in scope, as well as make further modifications to the RDF definitions to facilitate this assessment.
- SCE used the results of this assessment to select risks for inclusion into its RAMP Climate Pilot.

* Mastrandrea, M. D., Field, C. B., Stocker, T. F., Edenhofer, O., Ebi, K. L., Frame, D. J., Held, H., Kriegler, E., Mach, K. J., Matschoss, P. R., Plattner, G.-K., Yohe, G. W., & Zwiers, F. W. (2010). Guidance Note for Lead Authors of the IPCC Fifth Assessment Report on Consistent Treatment of Uncertainties. Intergovernmental; This IPCC methodology is a structured and calibrated approach designed to ensure consistency and transparency across disciplines and working groups.

** Op5 states that utilities should align their analysis based on the most recent Statewide Climate Change Assessment; The CA Fifth Climate Change Assessment is still underway and is projected for completion in Mid-2026. SCE was, however, able to obtain early access to the raw climate data which will be used in the California Fifth Climate Assessment and used these data for its RAMP Climate Pilot.

SCE's RAMP Climate Pilot - Integration Approach (SCE Proposal)

Staff Approach 2: Step 1B – Row 8: Risk Identification and Definition

- Climate variables, future direction of change, and confidence in that future direction of change identified by the **California Fourth Climate Change Assessment**.*

Climate Variables	Historical Trend	Future Direction of Change	Confidence in Future Direction of Change
Temperature	Warming (last 100+ years)	Warming	**Very High**
Sea level	Rising (last 100+ years)	Rising	**Very High**
Snowpack	Declining (last 60+ years)	Declining	**Very High**
Annual precipitation	No significant trends (last 100+ years)	Unknown	Low
Intensity of heavy precipitation events	No significant trends (last 100+ years)	Increasing	Medium - High
Frequency of drought	No significant trends (last 100+ years)	Increasing	Medium - High
Frequency and intensity of Santa Ana winds	No significant trends (last 60+ years)	Unknown	Low
Marine layer clouds	Some downward trends; mostly not significant (last 60+ years)	Unknown	Low
Acres burned by wildfire	Increasing (last 30+ years)	Increasing	Medium - High

* See Bedsworth, L., Cayan, D., Franco, G., Fisher, L., & Ziaja, S. (2018). Statewide summary report. California's Fourth Climate Change Assessment. Table 3, pg. 22 https://www.energy.ca.gov/sites/default/files/2019-11/Statewide_Reports-SUM-CCCA4-2018-013_Statewide_Summary_Report_ADA.pdf,

SCE's RAMP Climate Pilot - Integration Approach (SCE Proposal)

Staff Approach 2: Step 1B – Row 8: Risk Identification and Definition

- To facilitate this assessment with risk owners and make them more relevant to potential future climate change impacts, SCE made slight modifications to existing RDF definitions* components.

- These modified definitions (*italics*) were:
  - **Exposure:** *In the context of climate change, exposure primarily refers to a change* in the measure that indicates the scope of the Risk, e.g., miles of transmission pipeline, number of employees, miles of overhead distribution lines, etc. Exposure defines the context of the Risk, i.e., specifies whether the Risk is associated with the entire system, or focused on a part of it.
  - **Driver:** *The extent climate change impacts* a factor that could influence the likelihood of occurrence of a Risk Event. A Driver may include external events or characteristics inherent to the asset or system.
  - **Outcome:** *The extent climate change impacts* the final resolution or end result of a Risk Event.
  - **Consequence (or Impact):** *The extent climate change impacts* the effect of the occurrence of a Risk Event. Consequences affect Attributes of a Cost-Benefit Approach.

- SCE also noted any instances in which there was not enough supporting evidence to assess climate impacts for any of the selected risks based upon the data standards outlined in the RDF Phase III Decision (see next slide)

* Seed RDF, Appendix A

SCE's RAMP Climate Pilot - Integration Approach (SCE Proposal)

Staff Approach 2: Step 1B – Row 8: Risk Identification and Definition

- Relevant climate variables and related confidence for each RAMP risk and risk component.

Enterprise Risk	Relevant Climate Variable	Exposure	Drivers	Outcomes	Consequences
Wildfire Associated w/ Utility Operations*	Temperature, Wind (Freq. and/or Int.), Prec. (Freq.), Drought	Unknown**	Low	Medium	**High**
Public Safety Power Shutoff	Temperature, Wind (Freq. and/or Int.), Prec. (Freq.), Drought	Unknown **	Medium	Medium	Medium
Cyberattack	Unknown**	_	_	_	_
Contractor Safety	Temperature	Low	_	_	_
Employee Safety	Temperature	Low	_	_	_
Public Safety	Unknown**	_	_	_	_
Major Physical Security Incident	Precipitation (Intensity)	Low	Unknown	Unknown	Unknown
Seismic	Unknown**	_	_	_	_
Hydro Asset Failure	Temperature, Precipitation (Intensity)	_	Medium	Low	Low
Overhead Asset Failure	Temperature, Precipitation (Intensity)	Low	Low	_	_
Underground Asset Failure	Temperature, Precipitation (Intensity)	Low	Low	_	_

*SCE notes that "Wildfire (Exposure)" is a climate variable in the California Fourth Climate Change Assessment, it does not necessarily directly translate into additional wildfire ignition risk; ** "Unknown indicated that there is not enough evidence from relevant sources to draw a connection.

SCE's RAMP Climate Pilot - Integration Approach (SCE Proposal)

Staff Approach 2: Step 1B – Row 8: Risk Identification and Definition

- Based on the results of this assessment, SCE categorized each RAMP risk into three categories.

		Excluded from Consideration	
	Category 1	**Category 2**	**Category 3**
Description	Risks where the highest confidence level across all components is **Medium**.	Risks where the highest confidence level across all components is **Low.**	Risks where there was not enough confidence (i.e., evidence and agreement) to assess climate impacts on either the risk or any of its components
RAMP Risks	• **Wildfire Associated with Utility Operations** • **Public Safety Power Shutoffs** • **Hydro Asset Failure**	• Contractor Safety • Employee Safety • Major Physical Security Incident • Overhead Asset Failure • Underground Asset Failure	• Public Safety • Cyber • Seismic

SCE's RAMP Climate Pilot - Integration Approach (SCE Proposal)

Staff Approach 2: Step 1B – Row 8: Risk Identification and Definition

- From the remaining Category 1, SCE selected two risks for this pilot for the following reasons:
  - **Wildfire Associated with Utility Operations** - Understanding the potential impacts of climate change on wildfires related to utility operations is critical, as these impacts may significantly influence SCE's long-term grid hardening strategy.*
    - SCE has developed a climate informed version of its most recent Wildfire Integrated Model (WIM) using approved sources that it intends to leverage for this pilot (see next slides).
  - **Hydro Asset Failure** - Assessing the potential impacts of climate change on hydro assets is essential, as these impacts may significantly affect the mitigations SCE proposes to fund within the RAMP period. Additionally, given that many of these facilities are in remote locations, it may be beneficial to bundle future incremental mitigations with existing projects in those areas.
    - SCE has selected a single hydro facility (Vermillion Dam) for the purpose of this pilot and developed a methodology using approved sources to develop an alternative Stochastic Event Flood Model (SEFM) for this pilot.

- SCE did not select the following Category 1 risk for these reasons:
  - **Public Safety Power Shutoffs (PSPS)** – Given that PSPS is a mitigation to wildfire associated with utility assets, SCE believes it is important to first understand the potential climate impacts on wildfire risk before separately analyzing future PSPS impacts.

* OP3 (d) "The IOUs should seek to avoid, if possible, any long-term asset investment strategy that would be at risk in the future because of climate change impacts."

SCE's RAMP Climate Pilot - Integration Approach (SCE Proposal)

Staff Approach 2: Step 2A – Row 10: Identification of Potential Consequences of Risk Event, and Row 11: Identification of the Frequency of the Risk Event

- Based on guidance indicated by Staff Approach 2A, for these risks, SCE:
  - Evaluated which climate change-related data, models, and projections were appropriate inputs for completing Step 2A, Row 10, to estimate the potential consequences of a risk event.
  - Evaluated which climate change-related data, models, and projections were appropriate inputs for completing Step 2A, Row 11, to estimate the frequency of a risk event.

- As acknowledged by the Commission in the Decision 24-05-064*, selecting suitable climate models required additional consideration, including:
  - The selection of appropriate **Global Climate Models (GCMs)** from the ones available (spatial granularity, downscaling approach, availability of relevant climate variables, etc.)
  - The post process is "raw" climate variables into a usable format so, they can be used with existing and often custom designed risk models to meet other requirements (see next slides)
  - Additional RDF and OEIS requirements (e.g., use of power law distributions for wildfire risk, the granularity of Risk Reporting Units, FERC requirements.).

- Although the **California Fifth Climate Change Assessment** is still in progress, SCE obtained early access to the raw climate data informing the assessment.
- Aside from being more up to date, these data were more granular and covered a wider range of climate variables than the previous **California Fourth Climate Change Assessment**.

* FOF 24 "Quantitatively considering climate hazards in RAMP filings is not a simple or straightforward task."

SCE's RAMP Climate Pilot - Wildfire Associated w/ Utility Operations

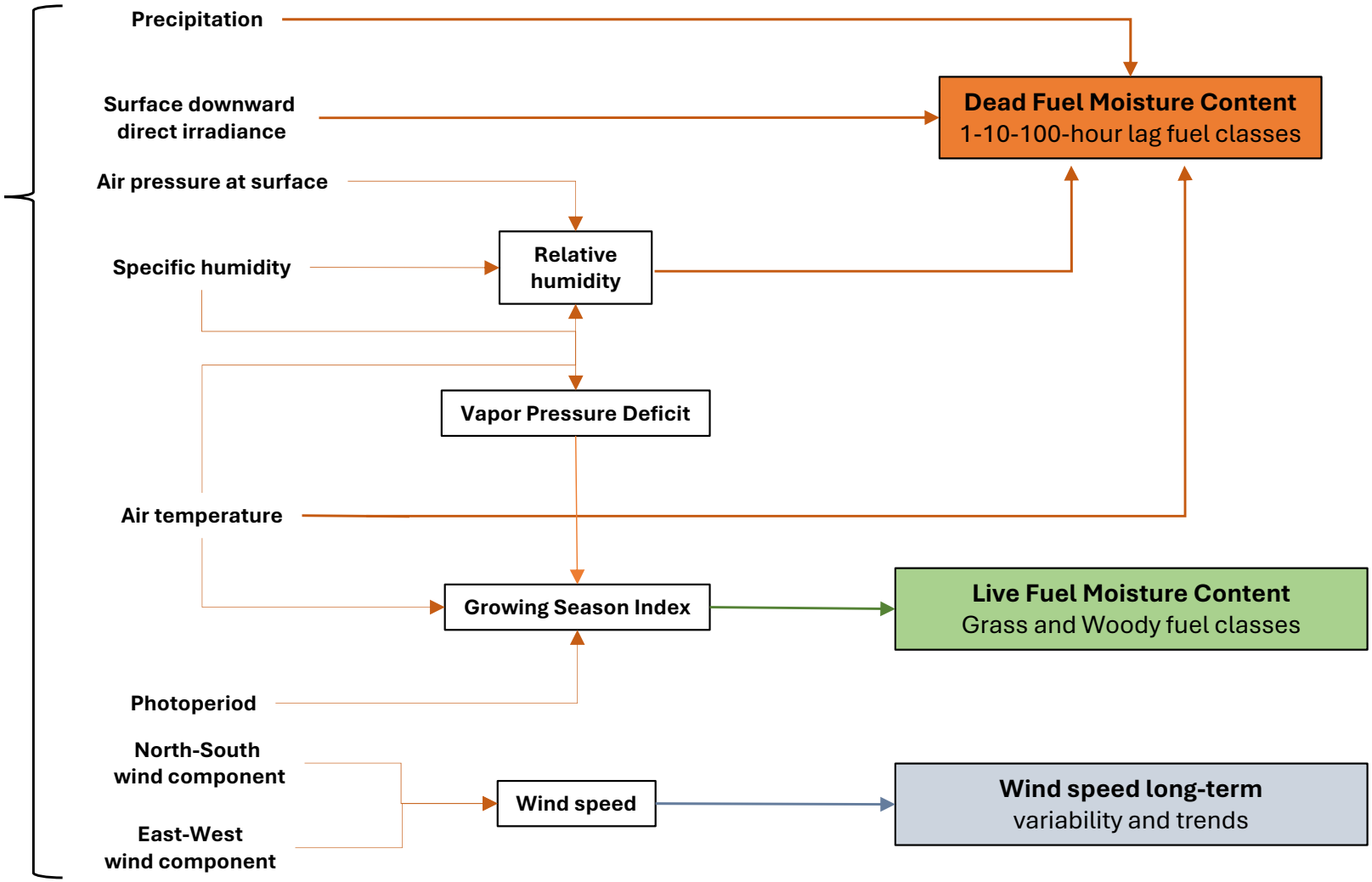
Staff Approach 2: Step 2A – Row 10: Proposed climate model selection, processing and integration process for **Wildfire Associated with Utility Operations**

Global Circulation Model (GCM) Selection

CAL-ADAPT
UCLA LOCA Downscaled WRF
SSP3-7.0
5 Global Circulation Models (GCMs)
30 years-hourly data
(3 km x 3 km)
~ 1.75 TB

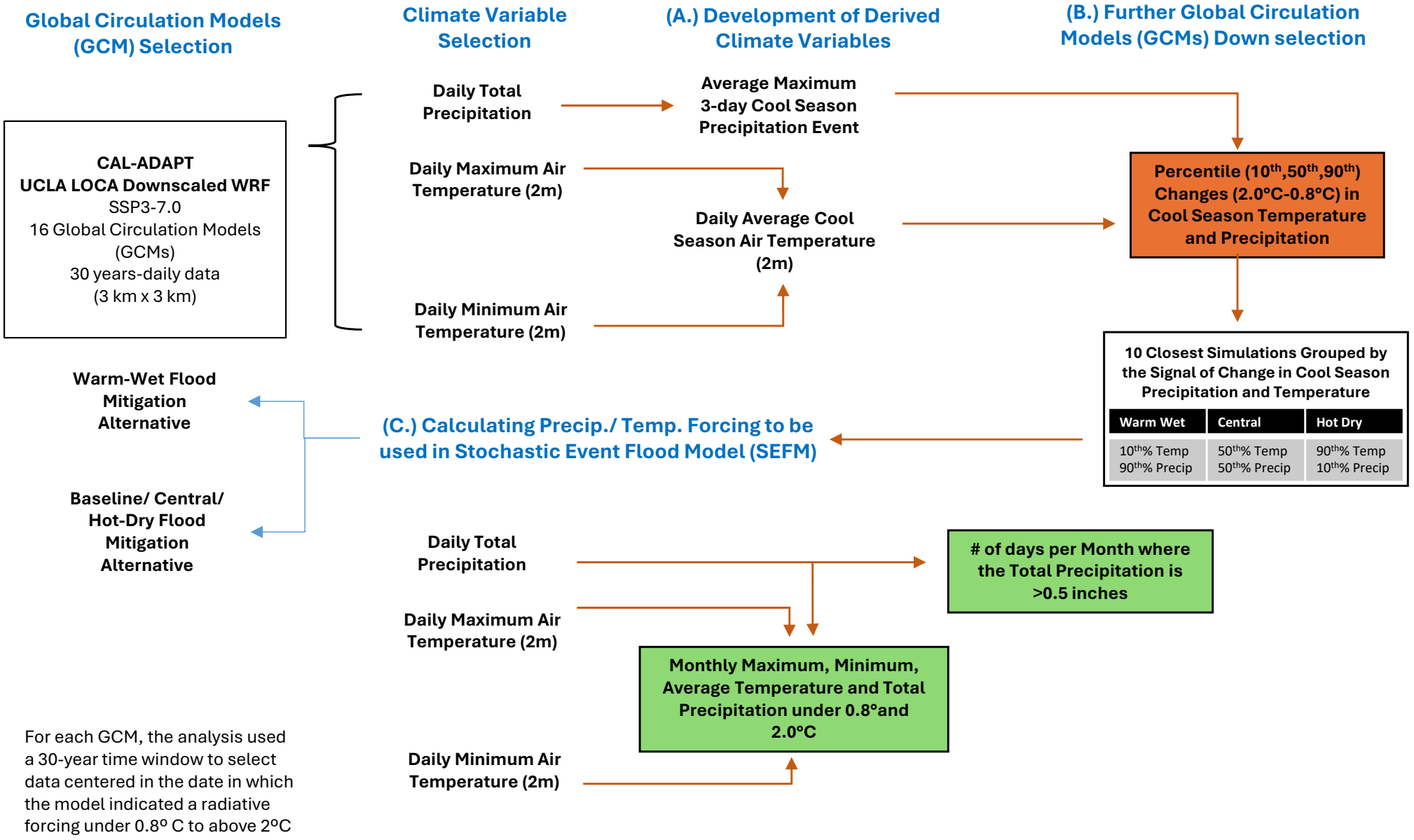
- **EC-Earth3** 2034-03-16
- **EC-Earth3-Veg** 2025-09-16
- **MIROC6** 2053-11-16
- **MPI-ESM1-2-HR** 2046-09-16
- **TaiESM1** 2040-08-16

For each GCM, the analysis used a 30-year time window to select data centered in the date in which the model indicated a radiative forcing of + 2 ºC



SCE's RAMP Climate Pilot - Hydro Asset Failure (Vermillion Dam)

Staff Approach 2: Step 2A – Row 10: Proposed climate model selection, processing and integration process for **Hydro Asset Failure**



For each GCM, the analysis used a 30-year time window to select data centered in the date in which the model indicated a radiative forcing under 0.8º C to above 2ºC

SCE's RAMP Climate Pilot Planned Approach – SCE Proposal

Implement remaining modifications to Staff Approach 2, including:

- Step 2B: Row 12, as outlined in the RDF
- Step 3: Rows 13-15 , as outlined in the RDF
- Step 2: Row 16, as modified by Staff Approach 2: Expressing Effects of a Mitigation
    - Calculate the risk reduction effects of the adaptation-related investments in Step 8 of this procedure that will continue to have an effect during the current four-year RAMP cycle
    - Include these adaptation-related investments within Step 3: Row 16 denoting them as a mitigation as outlined in the RDF and note in the narrative description of these mitigations that the associated costs will be excluded from consideration in this RAMP filing because their funding has already been approved by a previous GRC or other cost recovery venue
- Complete Step 3: Rows 17-25 as outlined in the RDF

How will the results of this analysis be used:

- Aside from complying with the RDF Decision, the results of this analysis may be to used for "climate informed" proposed and/or alternative mitigation portfolios for these selected RAMP risks

* FOF 24 "Quantitatively considering climate hazards in RAMP filings is not a simple or straightforward task." Op 24, 26

Q/A & Closing Remarks