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OPENING COMMENTS OF THE UTILITY REFORM NETWORK ON WORKSHOP 2 ISSUES

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Pursuant to the December 10, 2024 Ruling of Administrative Law Judge Lakey,[1] The Utility Reform Network (TURN) submits these opening comments on the Safety Policy Division's (SPD) Workshop 2 Proposal regarding overall residual risk, risk tolerance and simple optimization ("SPD Proposal").[2]

1. INTRODUCTION AND SUMMARY

TURN commends SPD for grappling with the important issues addressed in its proposal. SPD correctly recognizes that improvements to the Risk-Based Decision-Making Framework (RDF) are needed to address a fundamental problem. As entities which spend ratepayer money (not shareholder money) to fund their operations, utilities have every incentive to maintain an extremely low tolerance for risk, without regard to the affordability of their risk mitigation proposals.[3] This problem is helping to contribute to what SPD refers to as an " 'affordability crisis' for access to energy."[4] SPD accurately points out that "there is a point at which reducing risk becomes excessively expensive, the costs of which can have life-threatening impacts to disadvantaged and vulnerable communities of California."[5] TURN agrees that improvements to

[1] *Administrative Law Judge's Ruling Entering Phase 4 Workshop #2 Materials and Related Staff Proposal Into the Record and Setting Comment Schedule,* Dec. 10, 2024, p. 6 ("ALJ Ruling").

[2] *Overall Residual Risk, Risk Tolerance and Simple Optimization*, R.20-07-013 Phase 4 Staff Proposal for Workshop 2, Nov. 6, 2024, Attachment 2 to ALJ Ruling.

[3] SPD Proposal, pp. 3-6, including noting (on page 6) Southern California Edison's (SCE) "troubling" response to TURN's data request indicating that SCE did not consider affordability constraints in developing its grid hardening proposal in its 2025 General Rate Case (GRC) filing.

[4] *Id.*, p. 5.

[5] *Id.*

the RDF can and should be made to improve the balance between affordability and risk reduction.

SPD proposes a package of three changes to the RDF to address this problem:

(1) Show trajectory of residual risk: require utilities in RAMP and GRC filings to report on their progress in reducing residual risk over time;[6]

(2) Determine and model risk tolerance: implement a working group process to determine the risk tolerance of the residents of California and require utilities to present "risk exceedance curves" to help determine the acceptable level of risk;[7] and

(3) Present optimal portfolios based on budget constraints: require utilities in RAMP and GRC filings to present a set of optimal portfolios for reducing risk based on budget constraints.[8]

TURN strongly supports the proposal regarding optimization based on budget constraints and recommends some changes to improve that proposal. TURN also fully supports the proposal to track success in reducing residual risk. TURN opposes SPD's second proposal relating to risk tolerance, as realistic progress on SPD's risk tolerance objectives can be better achieved through the other two proposals.

TURN believes that adopting the optimization and residual risk proposals will make significant headway in addressing the problem discussed above – the utility predilection to present portfolios without sufficient attention to affordability. By identifying optimal, enterprise level portfolios that provide the maximum risk reduction at various spending levels, these

[6] *Id*., p. 51 (Recommendation 1).

[7] *Id.*, pp. 55-58 (Recommendations 4 and 5).

[8] *Id.,* pp. 58-61 (Recommendations 6 and 7). In Recommendations 2 and 3, SPD also recommends changes to how risk and its components are depicted and measured.

reforms will provide the Commission with significantly improved information with which to carry out its responsibility to strike the correct balance between risk reduction and affordability.

With respect to risk tolerance, TURN understands the attraction of the goal of identifying a single, statewide level of risk tolerance for each of the risks that utilities face and to use that determination as the basis for deciding how much to spend on risk mitigation. However, SPD's effort to attribute a single, representative attitude toward risk to the diversity of California residents is unworkable and opaque, as will be discussed in Section 3. Moreover, for many (if not most) customers, their view of how much risk they can tolerate is highly influenced by how much their energy bill will increase to pay for the mitigations to reduce risk. Because risk tolerance is inextricably bound up with affordability, especially for the low-income communities targeted by the Commission's Environmental and Social Justice (ESJ) Action Plan,[9] the best and most feasible way to incorporate risk tolerance concepts into the CPUC decision-making process is to adopt a budget-constrained optimization proposal, as contemplated by Question 19 in the ALJ Ruling.

The remainder of these comments addresses each of Recommendations 1 through 7 in the SPD proposal, as follows: Section 2 addresses the Residual Risk Proposal (Recommendation 1); Section 3 addresses the Risk Tolerance proposal (Recommendations 4 and 5); Section 4 addresses the Budget-Constrained Optimization proposal (Recommendations 6 and 7); and Section 5 addresses proposed modifications to the RDF regarding use of probability distributions and tail risk measurements (Recommendations 2 and 3). In each of Sections 2 through 5, TURN

[9] CPUC Environmental & Social Justice Action Plan, Version 2.0, April 7, 2022 ("ESJ Plan").

first states and explains its position and then answers the questions in the ALJ Ruling relevant to that section.

Section 6 addresses TURN's support of SPD's conclusion[10] that BCR measures are most useful when based on risk-neutral scaling functions.

In Appendix A, TURN provides a redline of its recommended revisions to SPD's proposed modifications to the RDF.

2. TURN SUPPORTS SPD'S PROPOSAL TO REQUIRE UTLITIES TO PROVIDE THE TRAJECTORY OF RESIDUAL RISK IN THEIR RAMP AND GRC FILINGS

2.1 Summary of TURN's Position

TURN fully supports SPD's Recommendation 1 to require the utilities to report on their progress in reducing residual risk for each of their enterprise risks. The costs of risk reduction measures are contributing to surging utility rates. As a matter of accountability, the Commission and ratepayers need to know whether spending on risk mitigation measures is achieving the claimed risk reduction benefits.

2.2 Answers to Questions in ALJ Ruling

Question 1: How does requiring the utilities to present diagrams and workpapers of the trend of overall residual risk for each risk event help decision-makers and stakeholders determine if the utility's mitigation proposals in the Risk Assessment Mitigation Phase (RAMP) and General Rate Case (GRC) reduce risk to levels that are tolerable for ratepayers?

[10] SPD Proposal, p. 23; Workshop 2 Slide 38.

Answer to Question 1:

As noted in Section 2.1, the trend of residual risk is important information that shows the progress that has been made in reducing risk. Often in GRCs, utilities do not present this information and attempt to create the impression that the need for the spending they propose has never been greater. Graphs and charts of the trajectory of residual risk put such contentions into perspective. Because risk is generally concentrated in certain high-risk assets, utilities should and usually do prioritize risk reduction spending to focus on their riskiest assets first. As a result, the remaining residual risk is often relatively low compared to the risk that has already been reduced and more costly to address because it is spread out across a greater number of assets. Such graphs and charts can help to explain why extending a mitigation program deeper into a group of system assets may not be cost-effective.

As will be discussed in Section 3, risk tolerance is highly related to the cost and affordability of the proposed mitigation efforts. And, as will be discussed in Section 4, the residual risk trajectory would help to support Commission decisions regarding which budget-constrained, optimized portfolio is tolerable to customers who are struggling with the affordability of essential utility services and best balances the tradeoff between risk reduction and affordability.

Question 2: How would requiring the workpapers referenced in Question 1 to include calculations and diagrams of the following help in the evaluation of a RAMP and GRC:

a. Overall residual risk using a dollar value of risk;

b. Each of the three monetized attributes (i.e., Financial, Safety, and Reliability);

c. Each of the three attributes using natural units?

Answer to Question 2:

TURN supports requiring all three sets of information. TURN understands Recommendation 1 to be specifying that the trajectory of overall residual risk using a dollar value of risk (subpart a) should be required, which TURN supports. Under the framework adopted in D.22-12-027, risk is now expressed in dollar values. Providing a breakdown of how the residual risk values were calculated based on the attributes – both in natural units and dollar values – would be useful information to have in workpapers in order to check the assumptions and computations of the utilities. Providing such workpapers would serve the purpose of disclosing the work that the utilities would need to do anyway in order to calculate the residual risk values and thus would not add any new substantive work for the utilities.

Question 3: Should the Commission add the definition of overall residual risk to the Risk-Based Decision-Making Framework (RDF)? Explain your answer.

a. What amendments, if any, would you make to the language changes recommended by the Staff Proposal regarding overall residual risk?

Answer to Question 3:

TURN supports adding this definition to the RDF and suggests the following change to clarify what TURN understands to be SPD's intent -- that "overall" residual risk refers to the residual risk for each enterprise risk:

- Overall Residual Risk: all the risk on the utility's assets or systems *for a given enterprise risk* after taking account of the historical progress of risk reduction for every GRC cycle to date.

In addition, to clarify that the trajectory of "overall residual risk" needs to be shown for each enterprise risk, SPD's proposed new sentence in Row 9 of the RDF should be modified as follows:

- The output of Step 2A must include a calculation of Overall Residual Risk *for each enterprise risk*, along with a diagram and supporting workpapers demonstrating the change of Overall Residual Risk since the utility's first RAMP filing.

Question 4: For the calculation of overall residual risk, what data streams are available or able to be reconstructed for calculating overall residual risk for the risk events submitted to each utility's most recent RAMP application?

a. Do these data streams go back to when the utility filed its first RAMP application?
b. If these data streams do not go back to when the utility filed its first RAMP application, how far back do they go?
c. What can the utility do to still model the residual risk if one of the data streams is unavailable? Describe this process or method and explain why it is a valid approach.
d. Use the following table structure when answering Questions 4, 4a, 4b, and 4c (example data given):

Risk Event	Data Stream (4)	Used in First RAMP? (4a)	Date First Used (4b)	Alternative Method (4c)
Hypothetical Wildfire	GIS Data	Yes	1/1/2017	N/A
Hypothetical PSPS	GIS Data	No	1/1/2019	Estimate using Hypothetical Wildfire GIS Data

Answer to Question 4:

TURN looks forward to reviewing the responses of the utilities to this question and will respond in reply comments as appropriate.

3. TURN OPPOSES SPD'S RISK TOLERANCE PROPOSAL

3.1 Reasons for TURN's Position

The SPD proposal attempts to reflect in "exceedance curves" a view of risk tolerance that is somehow representative of "the residents of California," as determined in a working group process.[11] While TURN appreciates the theory of why achieving this outcome would be useful in Commission decision-making, the reality is that SPD's proposal is not workable, for the several reasons discussed below. The better approach for the Commission to understand how the risk reduction portfolios differ based on risk tolerance -- which for most residents is inextricably bound up with what those portfolios would cost and whether they are affordable – is to require optimized portfolios based on budget constraints, as contemplated by Question 19 in the ALJ Ruling.

3.1.1 Utilities Have Strong Incentives to Drive Risk Tolerance as Low as Possible

The first problem with the SPD proposal is that it seems to incorrectly assume that utilities would be unbiased participants in an effort to ascertain the risk tolerance of California residents. Investor-owned utilities (IOU) have a strong incentive to present GRC proposals that reduce risk as low as possible. In other words, their risk tolerance for purposes of GRC requests is as close to zero as they can get it.[12] There are two reasons.

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[11] The heading of SPD's Recommendation 5 is "Establish risk tolerance representing the residents of California." By "residents of California," TURN understands SPD to be proposing that the relevant risk tolerance is not the risk tolerance of the investor-owned utilities.

[12] This section addresses IOU incentives regarding the risk reduction proposals *to request* in GRCs. After the GRC decision is made and the amount of ratepayer funding for the GRC period has been determined, an IOU's incentives can change – and in a well-designed regulatory framework – would change. Once an IOU knows its GRC budget, it should have an incentive to carry out the approved work as efficiently as possible, as explained in D.96-12-066, 1996 Cal. PUC LEXIS 1111, *5, quoting D.85-03-042, 17 CPUC 2d 246, 254. TURN notes, however, that

First, the money that IOUs use to carry out their GRC proposals comes from ratepayers, not shareholders. In other words, IOUs are spending someone's else's money. In this respect the "Three Venturer" examples in SPD's proposal are irrelevant, as IOUs would not have to pay anything to avoid the risk event and so, in those examples, would always choose to pay for the helicopter. Because they are not spending their own money and have a virtually guaranteed funding stream resulting from their monopoly status,[13] utilities have an incentive to seek funding for activities – even if not cost-effective and unaffordable to many of their customers -- that provide an extra protective cushion against events that could have adverse effects on shareholders. For example, a utility may seek to underground its overhead wires in many locations not because it is more cost-efficient than alternatives like covered conductor, but because, by making tree trimming unnecessary, the utility reduces potential financial risks to its shareholders from performing vegetation management negligently.

Second, IOUs have an incentive to engage in capital spending, which increases rate base, which in turn increases profits. As a result, utilities are motivated to seek regulatory outcomes – such as a determination of an extremely low tolerance of utility risk – that would justify more capital spending.

Thus, utilities have every reason to state a preference for extreme risk aversion and extremely low risk tolerance. Mitigations that cost too much to be justified based on a risk-neutral attitude can be justified using a risk-averse risk attitude and a low risk tolerance. This

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this incentive is undermined by memorandum and balancing accounts that allow utilities the opportunity to recovery overspending of GRC authorized funding.

[13] And because of "decoupling" policies – decoupling utility revenues from sales -- long ago adopted in California for energy utilities.

would be true even though the actual consequences of the risk event are the same. The utility's preferred attitude toward risk would justify an otherwise unjustifiable expenditure.

For these reasons, IOUs cannot be expected to have an unbiased view of the risk attitude of the residents of California -- the ones who would be paying for the risk mitigations. It would be unreasonable to expect utilities to put aside their incentives and financial self-interests in any undertaking to adopt the risk tolerance standard that would shape how much risk utilities can avoid and how much profit they can make.[14] Indeed, it is precisely because investor-owned utilities have these incentives that regulation by the CPUC is necessary to achieve outcomes that benefit the public interest, not the financial interests of utility shareholders.

3.1.2 For Many Customers, Especially Low-Income Customers, Their Tolerance of Risk in Utility Operations Is Heavily Influenced By Affordability Considerations

For most California residents, their tolerance of utility risk is likely to be significantly influenced by how much utility spending they feel they can afford, for a service they cannot do without. The Commission has frequently articulated the tradeoff between risk reduction and affordability in its GRC decisions. In its decision on PG&E's test year 2023 GRC, the Commission quoted from a prior 2015 GRC decision:

> It is well-settled that 'One of the central tasks facing the Commission in this proceeding is to balance safety and reliability risks in comparison with cost. [The utility] is required by law to 'promote the safety, health, comfort, and

[14] In this respect, it is troubling that SPD's proposal sometimes uses language suggesting that risk aversion and risk tolerance should be matters of *utility choice*. For example, in the illustration given on page 43, whether the portfolio is acceptable or not based on risk tolerance depends on whether *the utility* "chooses" to be risk-neutral or risk-averse. As discussed, for their own understandable financially motivated reasons, IOUs can be expected to always state a preference for as much risk aversion as possible. But that utility preference should not be confused with the preference of the utility's customers, who are paying for the mitigation portfolios proposed by the utility.

> convenience of its patrons, employees, and the public' while including only 'just and reasonable' charges in its rates [*citing to* Pub. Util. Code Section 451]. Our fundamental challenge in many disputed areas of this case is to reach an outcome consistent with these twin objectives. This is a familiar challenge that has been present in countless previous GRCs and other proceedings, even though the approach, framework, and language surrounding the issues continue to evolve.' "[15]

Thus, the Commission has recognized that how much utility risk ratepayers can tolerate is bound up with the affordability of the costs to reduce utility risk, and acknowledged that striking a balance between risk reduction and affordability is a "familiar challenge" the Commission has faced in "countless previous GRCs."

Most of us understand and experience this tradeoff in our everyday decisions about how much risk to tolerate. Such choices are often heavily influenced by affordability -- such as how safe a car to buy or how safe a neighborhood to live in. Those who feel they cannot afford the safer car or the neighborhood with the low crime rate will necessarily have a higher tolerance for risk. Affordability also demonstrably affects California residents' tolerance of earthquake risk. In part because of cost concerns, only 13% of California homeowners have earthquake insurance even in the face of the potentially catastrophic impacts of an earthquake on their homes.[16]

In sum, risk tolerance is inextricably intertwined with the affordability of the measures to reduce risk, particularly when access to essential utility services is at stake.

The close relationship between risk tolerance and affordability of utility service is particularly true for the Environmental and Social Justice (ESJ) communities who are targeted by

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[15] D.23-11-069, p. 36, citing D.15-11-021, p. 9.

[16] "Why Only 13% of California Homeowners Have Earthquake Insurance", NPR, July 9, 2019 ("… basically it boils down to, people don't think it's going to happen to them, and they think it costs too much.)

the CPUC's ESJ Action Plan, which include low-income communities and households in low-income census tracts.[17] For ESJ low income households, affordability is the key determinant of how much risk they can tolerate, precisely because electricity and gas are essential services that households cannot live without. This fact is reflected in statute. Public Utilities Code Section 739(d)(2)[18] requires CPUC decisions to ". . . observ[e] the principle that electricity and gas services are necessities, for which a low affordable rate is desirable . . .." Similarly, Section 382(b) recognizes that "electricity is a basic necessity and that all residents of the state should be able to afford essential electricity and gas supplies . . .."

This is not to say that tolerance of utility risk is unaffected by other things. For example, one would expect the proximity of one's home or work to risky assets, such as power lines in high fire threat districts (HFTDs), dams, or power plants to lead someone to have a lower tolerance for risk associated with those assets than those living farther away. But, even so, part of what affects the tolerance for utility risk of those households is California's current policy of socializing the costs to mitigate those risks to all of a utility's ratepayers. If the localized beneficiaries of the risk mitigation efforts were required to pay most or all of the costs,[19] the risk tolerance of many people living near high risk utility assets would be likely to increase. This expectation is borne out by, as previously noted, the low take-up rate for earthquake insurance (for which each homeowner must pay the full cost of mitigating the risk). In the utility space, there is a similar low take-up rate for Rule 20B and 20C undergrounding programs, which enable

[17] CPUC, *Environmental & Social Justice Action Plan*, Version 2.0, April 7, 2022 (ESJ Plan), p. 2.

[18] All statutory citations are to the California Public Utilities Code.

[19] To be clear, TURN is not proposing such a change in these comments.

municipalities and customers who are concerned about the safety of overhead lines to pay most or all of the costs to move them underground. People in neighborhoods that have a history of wildfires, such as the Oakland and Berkeley hills, feel they must tolerate the risk of another wildfire rather than pay the high cost of undergrounding. The point here is that affordability is a key determinant of risk tolerance even for those who are located near high-risk utility assets.

Thus, most residents' risk tolerance will increase as the cost they will be asked to pay to mitigate the risk increases. For low-income customers, the amount of risk they can tolerate is determined by how much risk mitigation they can afford.

3.1.3 There Is a Broad Diversity of Views Regarding the Tolerable Amount of Risk from Utility Operations

Because affordability is a key factor in determining risk tolerance, it follows that people's perspectives regarding risk tolerance is likely to be highly influenced by their level of income and wealth. Because of the wide range of household income and wealth in California -- from extreme poverty to great affluence – tolerance of utility risk is likely to vary from very high for the lowest income residents to a much lower risk tolerance for wealthy residents who would find it easier to afford costly mitigations.

As discussed, proximity to risky utility assets is likely another factor that can be expected to influence risk tolerance. Because of California's size, there is also a huge range for this factor, running from households that live close to high risk assets to those that live several hundred miles away. In addition, this factor would lead to varying attitudes depending on the risk under consideration. Someone living in a wildfire HFTD may have relatively low tolerance of wildfire risks in her vicinity, but have a high tolerance for risks associated with gas transmission pipelines

or storage fields located far away. Personality characteristics that may affect risk tolerance are also likely to vary widely in the population of California residents.

The upshot is that there is likely to be an extremely broad range of tolerance of utility risk among California residents – varying based on income and wealth (the primary factor), geography, personality, and likely other factors. The premise of SPD's proposal – that there is such a thing as a "risk tolerance representing the residents of California" – conflicts with this reality.

3.1.4 SPD's Working Group Proposal Is Unworkable

SPD proposes that a "forum of key stakeholders" should be established "whose consensus on risk tolerance would represent the residents of California."[20] The working group members would include parties to this proceeding, which presumably would include representatives of each utility governed by the RDF. This proposal is unworkable, for the reasons discussed below.

The primary problem with the SPD proposal is the inclusion of the utilities as members of the working group, who presumably would need to be included for a consensus to be achieved. The working group should determine the risk tolerance of *ratepayers, the people who would be paying for the risk reduction activities*. In trying to reach such a consensus, utilities should not have a "vote." As noted in Section 3.1.1 above, because the utilities are able to use ratepayer money to pay for risk reduction programs, they would bring an entirely different perspective to the working group that is not grounded in the reality of having to pay for the work. Their duty to advance the interests of their shareholders would obligate them to pursue an

[20] SPD Proposal, p. 58.

extremely low risk tolerance. They would have no incentive to meaningfully consider anything but highly risk averse attitudes.

In addition, utilities would have a large resource and expertise advantage over the other non-utility members of the working group. Utilities would literally make it their business to understand the financial implications to their shareholders of any proposal the working group considers. As discussed below in Section 3.1.6, translating opinions about risk tolerance into exceedance curves and understanding the repercussions (*e.g.,* on rates) of any risk tolerance proposal under consideration is likely to be an opaque and challenging exercise. Utilities would be sure to find a way to master this challenge and would know how to best pursue their financial interests. Meanwhile, non-utility participants may not be able to determine the implications on rates and affordability of what they are considering and thus would be at a severe disadvantage.

Even if the utilities were not required to be part of the consensus, TURN is concerned with the challenge of making the working group sufficiently representative of the vast diversity of attitudes depending on the risk under consideration, as discussed in Section 3.1.3. No customer representative or group of customer representatives can confidently speak for all of the possible attitudes toward risk tolerance.

In fact, through the work of Nobel laureate Kenneth Arrow,[21] it has been shown that it would not be possible for a working group to come to a consensus on a matter such as the risk attitude for California residents, without violating conditions that we would want such a

[21] This work is now known as Arrow's Impossibility Theorem, which is discussed, *e.g.*, in this article.

consensus to satisfy.[22] Based on Dr. Arrow's work, it is unrealistic to expect a working group to be able to fairly and reasonably determine the attitude toward risk of the entire population.

For these reasons, it would be wrong to expect any working group, especially one in which the utilities were required to be part of the consensus, to agree on the right approach to risk tolerance to use in CPUC decision-making. The best that could be anticipated would be for the working group to have divided opinions that would need to be resolved by the Commission.

3.1.5 Decisions About How Much Utility Risk to Tolerate Must Be Made by the CPUC and Should Be Focused on the Needs of the Low-Income Communities Targeted by the Commission's ESJ Action Plan

For the reasons discussed above, issues related to how much utility risk should be tolerated are highly dependent on the impacts of risk reduction efforts on the affordability of utility service. These issues are best resolved by – indeed can only be resolved by -- the Commission. This has been the Commission's longstanding role and responsibility, as recognized by the GRC decisions quoted above in which the Commission has articulated the tradeoff between risk reduction and affordability.

We understand why the Commission would find appealing a proposal to transfer a key element of that responsibility to another entity, but SPD's risk tolerance proposal is not realistic, as discussed in Section 3.1.4. The Commission was created to serve as a regulatory check on the

[22] The conditions are: *Transitivity* (if x is preferred to y and y is preferred to z, then x is preferred to z); *Monotonicity*: If alternative x moves up in every individual ranking, then x cannot go down in the social choice; *Independence of Irrelevant Alternatives:* If the preferences between x and y are unchanged, then introducing alternative z cannot change the social preference between x and y; *Citizen Sovereignty*: choice depends on individual preferences (which leads to the Pareto principle: if everyone prefers x to y, then social choice must have x preferred to y); and *Non-dictatorship:* social choice does not depend only on one individual's preferences.

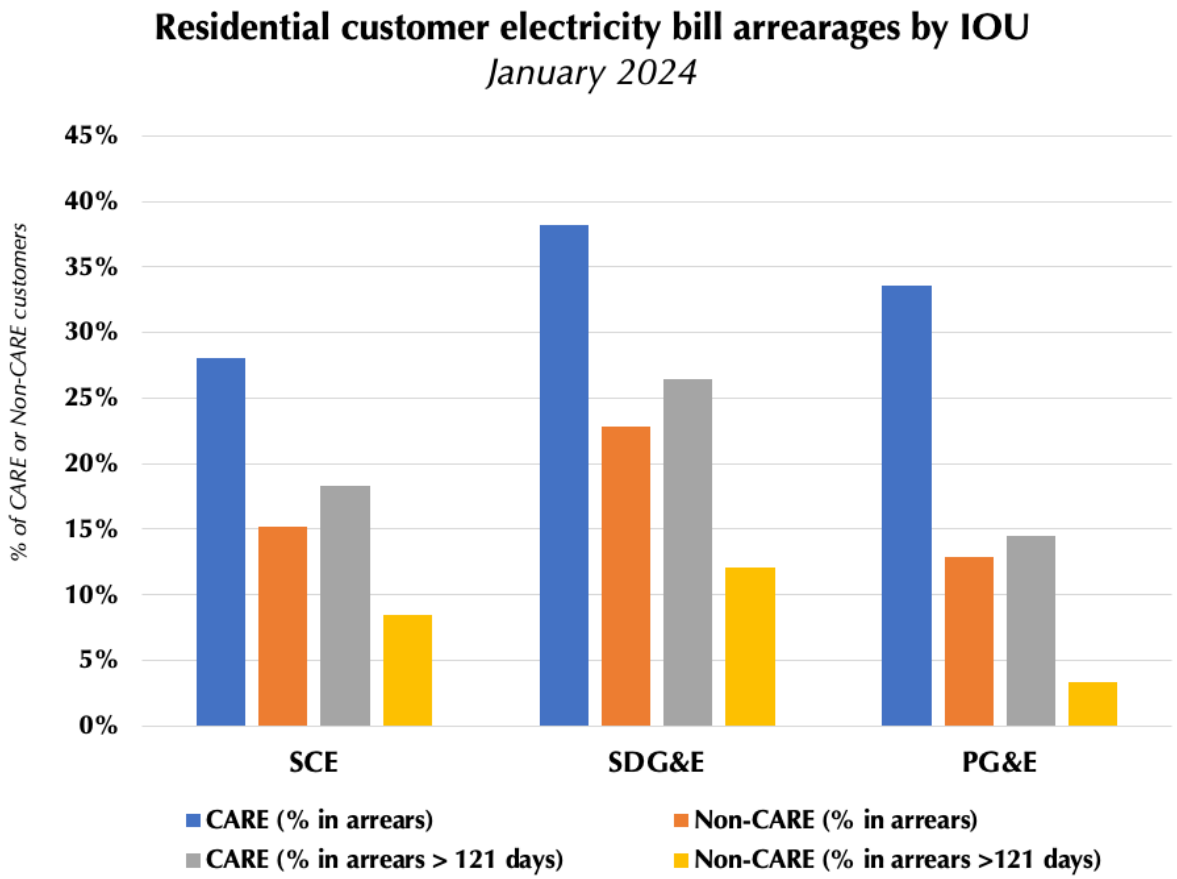
profit-maximizing incentives of investor-owned utilities with monopoly control of systems needed to deliver essential services. That is *the Commission's* fundamental regulatory responsibility, not the job of a working group that has no authority to regulate the utilities.

Consistent with the Commission's statutory responsibilities and its ESJ Action Plan, the Commission's resolution of the tradeoff between risk reduction and affordability should focus on the needs of low-income customers and other communities targeted by the ESJ Plan. In fact, protecting the ability of low-income customers to afford energy services is one of the Commission's key statutory duties. Public Utilities Code Section 382(b) states, ". . . recognizing that electricity is a basic necessity and that all residents of the state should be able to afford essential electricity and gas supplies, *the Commission shall ensure that low-income ratepayers are not jeopardized or overburdened by monthly energy expenditures*."[23] (Emphasis added.) Thus, any process the Commission adopts in this proceeding must focus on the affordability needs of low-income customers and not allow risk tolerance determinations to increase affordability challenges.

These challenges are real and widespread. One measure is the high level of customers who are in arrears in paying their utility bills, as shown in the chart below.[24]

[23] In addition, in Public Utilities Code Section 747, the Legislature stated its intent "that the commission reduce rates for electricity and natural gas to the lowest amount possible."

[24] Source: IOU monthly disconnect data reports in R.18-07-005.



The chart shows that *over one-third* of PG&E and SDG&E low-income CARE customers are struggling with affording their energy bills. Even for non-CARE customers, over 20% of SDG&E and approximately 15% of SCE customers are experiencing arrearages. Clearly, affordability challenges are threatening the access to essential energy services for far too many utility customers.

In addition to the Commission's statutory duties, the Commission's ESJ Plan documents the imperative to focus on the needs of ESJ communities. The Plan identifies the following

communities as its intended targets: disadvantaged communities;[25] all tribal lands;[26] low-income households;[27] and low-income census tracts.[28] The ESJ Plan makes a powerful case for why the needs of these ESJ communities must be prioritized:

> The CPUC is tasked with serving all Californians, and to do so equitably while reaching the state's climate goals, it must acknowledge that *some populations in California face higher barriers to access to clean, safe, and affordable utility services*. To fulfill its mission, *the CPUC acknowledges it must focus resources on communities that have been underserved, as this plan outlines*. Additionally, the CPUC acknowledges that its decisions have the potential to perpetuate and exacerbate existing disparities in ESJ communities. As such, the ESJ Plan serves as an ongoing commitment to mitigate and eliminate, harms to these communities.[29]

The ESJ Plan further states that it reflects a commitment to "embedding ESJ principles into [the Commission's] work."[30]

TURN submits that this proceeding, which directly implicates how the Commission will balance risk reduction and affordability, is precisely the type of case in which the Commission must focus its analysis on how to protect communities that have been underserved and face significant barriers to gaining and retaining access to affordable utility services. To fulfill its statutory mandates and the goals of the ESJ Plan, the Commission's revisions to the RDF should

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[25] Defined as census tracts that score in the top 25% of CalEnviroScreen 3.0, along with those that score within the highest 5% of CalEnviroScreen 3.0's Pollution Burden but do not receive an overall CalEnviroScreen score. ESJ Plan, p 2.

[26] Defined as land within any Indian reservation as defined in 18 U.S.C. 1151 subsection (a). *Id.,* p. 2, fn. 3.

[27] Defined as households with incomes below 80 percent of the area median income. *Id.,* p. 2.

[28] Defines as census tracts where aggregated household incomes are less than 80 percent of area or state median income. *Id.*

[29] ESJ Plan, p. 9 (emphasis added).

[30] *Id.*

put front and center the needs of ESJ communities to have access to essential electric and gas service. Unless service is affordable to the members of those communities, their needs are not being met.

Rather than pursue SPD's risk tolerance proposal, the best way for the Commission to honor the needs of ESJ communities is to adopt SPD's proposal for optimized risk reduction at various affordability levels, as discussed in Section 4.

3.1.6 The Mechanics of SPD's Risk Tolerance Proposal Are Highly Complex and Opaque Regarding How the Requisite Risk Exceedance Curves Would Be Determined and Potentially Allow for Utilities to Manipulate this Aspect of the Process to Their Advantage

In addition to the aforementioned problems, the Staff's Risk Tolerance proposal is complex, potentially opaque in how the utilities would implement it, and provides an opportunity for utilities to take advantage of their resource and expertise advantage to game the results of the process.

The SPD Proposal gives examples of risk exceedance curves and how they could be used once generated,[31] but does not explain the mechanics of how the curves would be derived. Proposed new Row 6.1 would require, *for each attribute for each risk event*, a curve depicting the maximum level of acceptable consequence for the associated probability that a given consequence occurs. This would be a highly complex undertaking with many unanswered questions. The Proposal does not explain how the maximums would be determined in these curves – both at the aggregated level for each risk event, and separately for each attribute for each risk event. It is extremely unrealistic to expect the working group members to understand

[31] SPD Proposal, pp. 13-16.

how to discern and express their acceptable tolerance levels for each attribute for each risk, let alone to reach agreement on those values.

Even if reasonable and thoughtful conclusions of such a detailed nature could be reached, how are such determinations to be translated into exceedance curves? Lay working group members representing the interests of different groups of California residents would not express their views in terms of exceedance curves. Only experts would be able to do that, in a way that would be opaque and non-verifiable by non-experts. As a result, this new exercise would provide opportunities for utilities to steer the development of these exceedance curves to achieve their desired interests, which as discussed should not be expected to coincide with the public interest.

In addition, intervenors with limited resources and without sophisticated modeling tools would have difficulty predicting the impact of risk tolerance exceedance curves on the Commission's decision-making process and the ultimate rates that would be adopted. Intervenors would find it difficult, if not impossible, to predict whether the GRC outcomes that would derive from different risk tolerance levels would actually be tolerable. In contrast, as noted, utilities would make it their business to know exactly how a given risk tolerance exceedance curve would affect their ability to pursue their goals. This disparity in ability to predict the impact of competing risk tolerance proposals would increase the likelihood that utilities would be able to exploit this process to serve their financial interests.

In sum, the risk tolerance process outlined in the SPD Proposal has many qualities of the dreaded black box, qualities that would hinder, rather than foster transparency. The Proposal would provide utilities another playing field on which to leverage their resource advantage, and

only exacerbate the challenges that overmatched intervenors face in trying to serve as watchdogs on behalf of ratepayers.

3.2 Responses to Questions in ALJ Ruling

TURN responds as follows to the questions in the ALJ Ruling related to the risk tolerance issue.

> Question 9: Should the Commission establish the California Utility Risk Tolerance Stakeholders (CURTS) Working Group whose recommendation on risk tolerance would represent the ratepayers of California and inform the utilities' RAMP and GRC filings? Explain your answer.

Answer to Question 9:

For the reasons given in Section 3.1, the Commission should not establish this working group. TURN does not believe it would be able to achieve the objective stated in SPD's Proposal.

> Question 10: What are the advantages and disadvantages of hosting the CURTS Working Group in the following proceedings:
>
> a. Each utility's RAMP proceeding.
> b. The RDF proceeding or its successor.
> c. A different proceeding not listed above.

Answer to Question 10:

As discussed in Section 3.1, TURN does not support creating this working group and therefore sees no advantages from pursuing this aspect of SPD's proposal.

> Question 11: Should the Commission require Southern California Edison (SCE) to integrate risk tolerance into its next RAMP application? Explain your answer.
>
> a. If so, under which proceeding should the CURTS Working Group be hosted to ensure that risk tolerance is properly addressed within SCE's RAMP application?

Answer to Question 11:

As explained in Section 3.1, TURN does not believe that any entity can determine a single representative risk tolerance for the residents of California. Accordingly, TURN does not recommend that this proposal be pursued as an element to be addressed in SCE's upcoming RAMP.

However, as discussed in Section 4, TURN believes that the best way to make progress on achieving the risk tolerance goals in the SPD Proposal is to require utilities to present budget-constrained mitigation portfolios at a range of affordability levels. TURN recommends that the Commission integrate the budget-constrained optimization requirement, as described by TURN in Section 4, in SCE's upcoming RAMP.

> Question 12: What method should be used by the CURTS Working Group to generate risk tolerance thresholds for use in RAMP and GRC applications? Explain why you recommend this method.

Answer to Question 12:

As discussed in Section 3.1, TURN recommends against creation of such a working group.

> Question 13: How does requiring the risk tolerance of ratepayers to be stated in a RAMP and GRC application help decision-makers determine if a utility's mitigation proposals are an appropriate strategy for reducing risk to acceptable levels?

Answer to Question 13:

As explained in Section 3.1, TURN does not believe a risk tolerance representing all ratepayers can be determined. Instead, as discussed in Section 3.1.5, the focus should be on

determining the risk tolerance of the low-income customers addressed in the Commission's ESJ Plan, which is based primarily on the affordability of essential energy services. The budget-constrained optimization proposal discussed in Section 4 below is the best way to make progress toward determining which portfolio of mitigations maximizes risk reduction within a budget that low-income customers can afford.

> Question 14: Should risk tolerance be established at the overall residual risk level in dollars? Should tolerance be set at the attribute level, in natural units and/or dollars? Explain your answers.

Answer to Question 14.

For the reasons given in Section 3.1, TURN does not believe there are risk tolerance values of the type contemplated by the question (at any level) that would be representative of the risk tolerance of all ratepayers. Accordingly, TURN recommends against pursuing this endeavor.

> Question 15: Should the Commission require risk tolerance be established for each risk event?
>
> a. If yes, explain if the Commission should immediately or gradually require risk tolerances be established for every risk submitted to a RAMP filing?
>
> i. If gradually, for which risks should a risk tolerance be established?
>
> b. If no, why not?

Answer to Question 15:

See the answer to question 14.

Question 22: What are the advantages and disadvantages of the process for developing a risk tolerance framework described by the Mussey Grade Road Alliance's proposal?

Answer to Question 22:

TURN agrees with MGRA's identification of problems with SPD's risk tolerance proposal. However, TURN does not believe the process MGRA proposes is worth pursing because the goal of the process is vague and the results are likely to be unsatisfying in improving how tradeoffs between risk reduction and affordability are made. The better use of the Commission's and parties time is the pursuit of budget-constrained optimization, as discussed in Section 4, which focuses risk tolerance attention where it belongs – on determining how much risk reduction can be achieved without jeopardizing access to affordable, essential utility services.

With respect to MGRA's identification of problems with SPD's working group-based proposal, TURN agrees with MGRA's list of concerns, which are very similar to the issues that TURN discusses in Section 3.1, namely: the fact that utilities' interests lie in a near-zero risk tolerance policy;[32] the broad diversity of views and divergent interests regarding risk tolerance;[33] the inability to convene a truly representative working group and to ensure that less-well funded representatives would have the resources to participate;[34] and the inability to reach a true consensus.[35]

[32] MGRA Proposal, pp. 4-6.

[33] *Id.*, pp. 7-8.

[34] *Id.,* pp. 6-7. TURN would add that the closer the working group came to representing the broad range of interests, the more unwieldy it would become.

[35] *Id.*, pp. 7-8.

MGRA proposes what it thinks would be a more workable process, one that ends in a CPUC determination. However, MGRA's proposal is extremely unclear about the objective of the process. MGRA describes the output as "both quantitative and qualitative guidelines for risk reduction and spending that can be incorporated by utilities into their RAMP filings."[36] This is extremely vague. The vagueness of the objective is encapsulated by the proposal's acknowledgement that one of the scoping questions in the proposed process should be: "What will the output of the risk tolerance proceeding look like?"[37]

MGRA is thus proposing a resource-intensive process without sufficient clarity about the goal and output. Without more clarity about the goal, the process will likely bog down and make little, if any, progress. Therefore, TURN does not see MGRA's process as a good use of the parties' and the Commission's resources. In contrast, the ultimately successful proceeding (R.08-11-005) to improve General Orders in relation to the wildfire risk and to adopt HFTD maps – which MGRA cites as inspiration for its proposal – had well-defined and achievable goals, modifying relevant CPUC General Orders and creating HFTD maps.

In addition, MGRA's proposal does not explain how its proposal would deal with the reality of the diversity of risk attitudes among California residents. As discussed above in Section 3.1.5, TURN recommends that we be honest about the fact that there is no such thing as a single representative risk attitude or risk tolerance in California (especially in a state as large as California) and that the Commission's statutory duties and its ESJ Plan argue for focusing on the

[36] *Id.,* p. 11.

[37] *Id.,* p. 16.

risk tolerance of the low-income customers who are in danger of losing access to essential energy services.

TURN submits that the budget-constrained optimization proposal discussed in Section 4 is much more focused than MGRA's proposal, with a clear view of the output of the process – a series of optimized portfolios that would provide the maximum risk reduction at the prescribed budget constraints. This invaluable information places the risk tolerance focus on affordability, where it belongs, and would provide the utilities and parties a clear choice regarding which affordability/risk reduction option represents the best tradeoff given the affordability needs of low-income customers. This would be significant and achievable progress in improving the risk-based decision-making process.

4. TURN SUPPORTS ADOPTION OF SPD'S BUDGET-CONSTRAINED OPTIMIZATION PROPOSAL, WITH MODIFICATIONS

TURN supports most aspects of SPD's Recommendation 6 to require utilities to present budget-constrained, optimized portfolios of mitigations. Below, TURN explains the benefits of SPD's proposal in providing important information to support the Commission's decision regarding how much risk reduction is affordable and tolerable, particular to the ESJ communities that the Commission has committed to prioritize in its deliberations. In addition, TURN recommends some modifications and clarifications to SPD's proposal that will improve the information that is provided to the Commission.

4.1 Requiring Utilities to Present Budget-Constrained Mitigation Portfolios that Optimize Risk Reduction at Each Budget Level Would Provide Valuable Information to Support the Commission's Efforts to Strike a Reasonable Balance Between Risk Reduction and Affordability

SPD's budget-constrained optimization proposal provides the best way for the Commission to make a well-informed determination of the portfolio of mitigations that achieves the maximum risk reduction at the budget level that the Commission finds most tolerable for the customers it is charged with protecting. As discussed in Section 3, tolerance of risk in utility operations will depend significantly on the affordability of the mitigations to reduce risk. Under the Commission's statutory obligations and the ESJ Action Plan, the Commission's choice of the appropriate budget level should prioritize the needs of the ESJ communities targeted in the Plan, as they are the communities who are most vulnerable to losing access to essential services if an unreasonably high budget level is chosen.

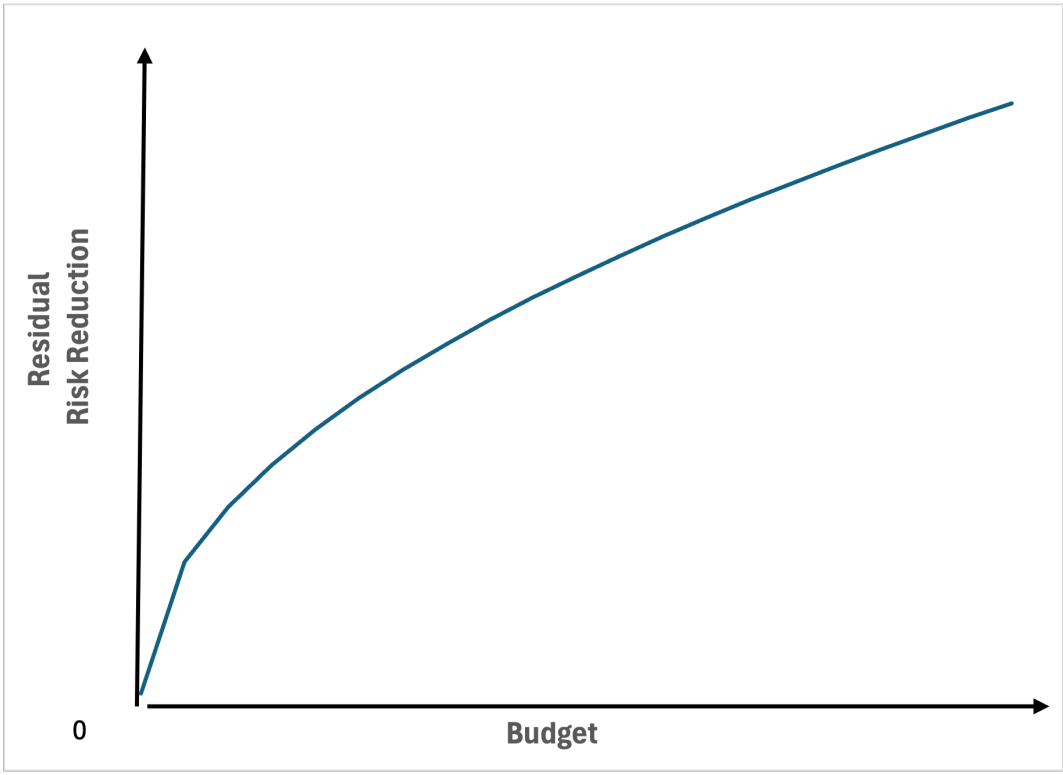
The output of the budget-constrained optimization process would be a set of portfolios optimized to provide the maximum residual risk reduction for each required budget constraint.[38] Put more technically, the optimization objective would be to maximize residual risk reduction (which can also be expressed as minimizing residual risk);[39] the variables would be whether a given mitigation is included in a portfolio of mitigations to be implemented; and the constraints would be the budget levels chosen by the Commission (about which TURN offers recommendations below).

As a result of this exercise, the relationship between residual risk reduction and budget level can be easily graphed, with budget level on the X-axis and residual risk reduction on the Y-

[38] As discussed in Section 4.2 below, the Commission, not the utilities, should determine the appropriate range of budget constraints.

[39] This objective can be approximated by maximizing risk reduction, the numerator of the BCR.

axis. An illustrative example of a potential graph, one that shows diminishing risk reduction returns as budget levels increase, is shown below.



Such a graph, whatever its shape and slope, should be extremely useful to Commission decision-makers and the parties to show how the goal of reducing residual risk is affected by different budget levels.

In addition, the optimization exercise would enable the Commission and parties to see how the portfolios change at the different budget levels. For example, the results would show which mitigations are removed, added or modified in scope depending on the budget level. This would be extremely valuable information for helping to inform the fundamental decision that must be made in GRCs -- which programs should be funded and at what scope and cost.

TURN submits that budget-constrained optimization – not the unworkable risk tolerance proposal -- is the best and most practical way to assess how mitigation portfolios would change

depending on residents' risk tolerance. Budget-constrained optimization focuses on the key determinant of risk tolerance -- affordability of the risk mitigation spending -- and allows the Commission and parties to see the impact of different budget choices on achievable risk reduction.

4.2 TURN's Recommended Clarifications and Modifications to SPD's Proposal

SPD presents its budget-constrained optimization proposal in Recommendations 6 and 7, with the specific changes to the RDF shown in Recommendation 6. TURN supports SPD's approach to addressing interrelations among mitigations in constructing portfolios, as reflected in proposed RDF Row 25.1. and the definitions of Mitigation Group and Mitigation Portfolio.[40] The remainder of this section discusses recommended clarifications and modifications to Recommendations 6 and 7. TURN's specific recommended language changes to SPD's proposal are provided in Appendix A.

4.2.1 The Commission, Not the Utilities, Should Specify the Budget Constraints

SPD's proposed Row 25.1 provides that utilities must construct portfolios "with a specified budget constraint." TURN recommends that the RDF modifications not leave it to the utilities to decide the budget constraints, as the utilities' incentives run counter to operating within meaningful limits on their desired portfolios and spending. Instead, in Appendix A, TURN recommends modifications to SPD's Proposal to specify the number and range of budget constraints that the utilities should use.

[40] However, as discussed below, TURN recommends changes to SPD's proposed language for Row 25.1, Row 26, and the definition of Mitigation Portfolio regarding the scope of the portfolio to be optimized.

The budget constraints should specify a range of increases over baseline spending and should be based on the expected inflation rate for the rate case period.[41] TURN recommends that the specified constraints include a range, starting at a low level below the inflation rate up to a top level above the inflation rate, *e.g.*, one-half of the forecast inflation rate ranging to double the inflation rate. Under this example, if the forecast inflation rate is 3%, then the budget constraints would be 1.5%, 3% and 6% increases over the utility's baseline spending. Of course, the Commission could require more than three budget constraints if it so desired. And if a utility chooses not to base its proposed optimized portfolio on one of the prescribed budget constraints, it could add the higher budget constraint that accommodates its proposal.

The purpose of the specified budget constraints would be to provide the Commission and parties with a range of optimized portfolios starting at an affordability level that would serve the access needs of low-income and ESJ communities and challenge the utilities to constrain their spending below what they would otherwise be inclined to propose. The precise number and range of budget constraints could be determined in a CPUC follow-up Resolution after the decision in this case.

4.2.2 The Budget Constraints Should Be Based on Expenditures, Not Revenue Requirement and Should Be Separately Applied to Expenses and Capital Expenditures

The SPD Proposal is silent on mechanics of the budget constraints, including whether they should apply to revenue requirement or to expenditures. TURN recommends that they apply to expenditures, both for administrative simplicity (avoiding the need to run the complex

[41] One source for expected inflation rates is the 10-year ahead Economic Outlook report provided by the Congressional Budget Office. The 2024-2034 report can be found here (see page 5).

and resource-intensive Results of Operations Model for each portfolio) and to avoid tax-related impacts that can distort the trajectory of revenue requirements associated with certain capital spending.[42]

In addition, there should be separate budget constraints and separate portfolios for capital spending and expenses. Otherwise, utilities would have an incentive to skew their portfolios toward capital spending in order to increase profits. Separate capital and expense portfolios subject to the same spending constraints would neutralize this IOU incentive.

4.2.3 The Optimized Portfolios Should Be at the Enterprise Level, With Risk-Level Sub-Portfolios

SPD appears to propose that optimization of portfolios be performed at the risk (e.g., Wildfire, Loss of Gas Containment) level.[43] This proposal likely follows from SPD's contemplation that a working group would determine a single risk tolerance of the residents of California for each risk. However, this risk tolerance proposal is unworkable, for the several reasons discussed in Section 3 above. Because it is more realistic to address risk tolerance based on affordability, the portfolios that should be optimized should reflect the total costs that

[42] For certain new capital spending, tax benefits, such as the tax repair deduction, can significantly change the timing of recognition of the capital costs in revenue requirement. Under normal tax ratemaking treatment, the benefit of the tax deduction "flows-through" to customers in the first year the capital asset is in service, with the tax benefit paid back over time as the utility receives revenue to amortize the capital asset (the "flow-back"). *As a result, the first-year revenue requirement impact of certain capital additions can be negative*. In a period of heightened capital spending, much of which is eligible for the tax benefits, the overall revenue requirement impact can be substantially dampened in the first year as a result, in a manner that will not persist through the remaining life of the new capital asset. As a result, revenue requirement is not a stable and reliable way to measure the impact of capital spending on customer rates and affordability.

[43] For example, SPD's proposed changes to Row 26 would require "a set of optimal portfolios for reducing each enterprise risk." SPD Proposal, p. 59.

ratepayers would pay for GRC-funded activities. This means the portfolios should include all programs across the enterprise that contribute to GRC costs. TURN's recommended revisions in Appendix A refer to the portfolios that should be optimized as "Enterprise Portfolios."

Moreover, unless optimization occurs at the enterprise level, the utility's flexibility to allocate resources in an optimal fashion would be hindered. With risk-level optimization, the resulting risk-by-risk optimized portfolios would almost certainly be inferior to the enterprise-level portfolios resulting from enterprise-level optimization. This is because each risk-level optimization has its own budget constraints. Therefore, the total budget available at the enterprise-level must be partitioned among the competing risk-level portfolios before any portfolio selection is done. Each risk-level portfolio is optimal for its given budget, but no risk-level tradeoffs across risks are permitted. Thus, risk-level optimization adds an arbitrary constraint that reduces the enterprise-level risk reduction. Optimization at the enterprise level avoids these pitfalls.

It should be noted, however, that in order to prepare enterprise-wide portfolios for optimization, the utilities could easily identify the risk(s) that each mitigation would address,[44] as well as the forecast risk reduction for each mitigation. As a result, for informational purposes, it would be easy to group the mitigations into sub-portfolios for each risk. Thus, if the Commission or parties wished to compare the different budget-constrained portfolios at the risk level, they would have that information via the risk sub-portfolios. TURN's Appendix A uses

[44] A column in the Excel spreadsheet would show which risk(s) the mitigation addresses and sub-portfolios based on Risk ("Risk Mitigation Portfolios") could be sorted based on this column.

"Risk Mitigation Portfolio," an adaptation of SPD's nomenclature, to identify these risk-by-risk sub-portfolios.

4.2.4 The Commission Should Reject the Notion of Optimizing Tail Risk

SPD's Recommendation 7 suggests that "tail average overall risk" can be optimized.[45] This is not accurate. As discussed further in Section 5.2 below, optimizing portfolios based on any measure of tail risk would require determining "tail risk reduction" from a mitigation and then adding these values to determine total "tail risk reduction." However, tail risks are not additive, so such addition and subtraction operations would be improper based on tail risk values. Accordingly, the Commission should reject the idea of optimizing portfolios based on tail risk.

4.3 Responses to Questions in ALJ Ruling

TURN responds as follows to the questions in the ALJ Ruling related to SPD Recommendations 6 and 7.

> Question 16. Should the Commission require the utilities to construct portfolios of risk mitigations for each risk event addressed in a RAMP or GRC filing? Why or why not?
>
> a. If yes, since the portfolio may include two or more mitigations, should the utility identify the mitigations as having a relationship that is synergistic or exhibits diminishing returns?

Response to Question 16.

As discussed in Section 4.2.3, TURN recommends that budget-constrained optimization be performed at the enterprise level ("Enterprise Portfolios"). In this process, utilities would identify portfolios based on each risk event (which TURN calls sub-portfolios) and the sub-

[45] SPD Proposal, p. 61 (discussion of "Scenario 2").

portfolios for each risk event ("Risk Mitigation Portfolios") would be provided as part of the optimized enterprise-wide portfolio.

The portfolios to be optimized should address the inter-relationships among mitigations as set forth in SPD's proposed RDF Row 25.1.[46]

> Question 17. Should the Commission require the utilities to present a set of optimal portfolios for reducing the overall residual risk of each risk event addressed in a RAMP or GRC filing? Why or why not?
>
> a. If yes, should the utilities be required to provide a justification for its portfolio selection and approach to optimization in a RAMP or GRC filing? Why or why not?

Response to Question 17.

In their RAMP and GRC filings, the utilities should be required to present a set of budget-constrained optimized portfolios, *i.e.,* one at each prescribed budget level, developed as described in Section 4.2. As discussed in that section, these portfolios should be at the enterprise level reflecting all programs to be funded in the utility's GRC.

In their RAMP and GRC filings, the utilities should be required to justify the optimized portfolio they propose. Their explanations should include an explanation of how the utility's chosen portfolio accommodates the affordability needs of low-income and ESJ communities.

> Question 18. Should the Commission require the utilities to demonstrate how its optimal portfolios help reduce overall residual risk down to a risk tolerance threshold? Why or why not?

Response to Question 18.

For the reasons discussed in Section 3, TURN does not recommend pursuing either the SPD or MGRA Proposals to attempt to identify a single risk tolerance threshold that supposedly

[46] In Appendix A, TURN proposes some modifications to proposed Row 25.1.

represents the threshold for all ratepayers. TURN's recommended approach for making progress toward basing Commission decisions on risk tolerance is described in Section 4 and also addressed in response to question 19.

> Question 19. Other than a risk tolerance threshold, are there alternative metrics that could place a bounding criteria upon an optimal portfolio?
>
> a. Could affordability metrics be used in place of risk tolerance to guide the optimization of risk mitigation portfolios? If so, how? If not, why not?

Response to Question 19.

TURN very much agrees with the thrust of this question. As discussed in Section 4.1, TURN strongly recommends that optimization of portfolios should be based on Commission-identified budget constraints, with the budget constraints based on a range of affordability levels (see Section 4.2.1). Because of the close connection between affordability and risk tolerance, especially for ESJ communities, as discussed in Section 3, each affordability-based budget constraint would reflect to a significant extent a different level of risk tolerance. The Commission and parties would be able to see how portfolios and risk reduction change in relation to budget (i.e., affordability) level. This would be extremely valuable information for the Commission's decision regarding the tradeoff between risk reduction and affordability that ratepayers, particularly those in ESJ communities, could tolerate.

> Question 20. Is taking account of tail risk an important way to optimize portfolios of risk mitigations? If so, what methods can be used to address both expected value and tail risk when determining the optimal selection of risk mitigations? If not, why not?

Response to Question 20.

For the reasons explained in Section 4.2.4, optimizing portfolios based on tail risk would be mathematically improper and should be rejected.

> Question 21. Should the Commission provide explicit guidance instructing the utilities how they should conduct the simple optimization of portfolios of risk mitigations? Why or why not?
>
> a. If yes, should the utilities be required to use linear programming to optimize their portfolios or risk mitigations? Why or why not?

Response to Question 21.

The Commission should provide the explicit guidance that TURN recommends in each subpart of Section 4.2. TURN's recommendations are also reflected in Appendix A, which provides TURN's modifications to SPD's proposed language in SPD's Recommendation 6.

The utilities should not be constrained to use linear programming to optimize their portfolios. The main reason is that this problem as discussed to date is not a linear programming problem. It is a zero-one integer programming problem with linear constraints and a possibly linear objective function. The choice of solution method depends on the formulation of the optimization problem to be solved. It is inappropriate to dictate a problem formulation and a solution method prior to the formulation of the problem. If the utilities are able to formulate the problem properly, then it is reasonable to believe that they can select an appropriate optimization technique. That formulation may or may not be a linear program and the solution method may or may not be a linear programming algorithm.

5. TURN HAS SIGNIFICANT CONCERNS WITH RECOMMENDATIONS 2 AND 3 IN THE SPD PROPOSAL

5.1 The Proposal to Use Probability Distributions for "Likelihood" and "Risk" Is Mathematically Incorrect and the Wrong Way to Address Uncertainty

SPD's Recommendation 2 is captioned, "Require use of probability distributions." Under this recommendation, SPD proposes the following changes to the RDF:

(1) In modifications to RDF Row 10, to represent the Consequences of a Risk Event as a probability distribution;

(2) In modifications to RDF Row 11 and in modifications the RDF definition of "Likelihood", to represent the Likelihood of a Risk Event as the average of the distribution of ones and zeros in simulation models; modified Row 11 also refers to "the probability distribution for Likelihood of a Risk Event"; and

(3) In modifications to RDF Row 12, to calculate Risk "by multiplying the probability distribution representing Likelihood of a Risk Event (LoRE) by the probability distribution of Consequences of a Risk Event (CoRE) and be represented as a probability distribution.[47]

TURN supports the first change. It is entirely accurate to state that Consequences of a Risk Event should be represented by a probability distribution. The purpose of this probability distribution is to provide complete information about the probability of each consequence in the full set of potential consequences. This does not mean that only one probability distribution of consequences is "right." Reasonable people may disagree about the correct probability distribution of consequences. In this case, as a matter of sensitivity analysis, the different

[47] SPD Proposal, pp. 53-54.

competing probability distributions for consequences can be used and a determination made of which one is most reasonable.

With respect to the second change, TURN has two objections. First, TURN does not support the modification to Row 11 regarding use of simulation models. The proposed modification that Likelihood "can be represented in simulation models as a distribution of zeros and ones, (the ones representing risk event occurrences)" describes how one might simulate the occurrence of an event with a given probability and is thus not inaccurate. But this statement is an artifact of one potential computation method, one that is not necessary for the solution of this risk problem. How Likelihood could be calculated using one of many different methods is not a fundamental principle (indeed the proposal could be read to require unnecessary use of simulation models) and does not belong in the RDF.

Second, and much more important, it is incorrect to state that Likelihood (synonymous with "probability") can or should be represented by a probability distribution. It simply makes no sense to talk about the probability of a probability. As a result, the notion of a probability distribution on a probability has no meaning. Again, if there is uncertainty or disagreement about the best Likelihood value to use for a given risk event, the way to address that uncertainty is to do a sensitivity analysis using different values for Likelihood and then decide which value is most reasonable.

TURN also objects to the third set of modifications, to Row 12, because it is also incorrect to state that Risk can or should be represented by a probability distribution. In decision-making theory, Risk is the product of the Likelihood of occurrence of the risk event (LoRE) and the expected value of the probability distribution of the Consequences of the risk event (CoRE). Risk is represented by a single number that enables us to make decisions about

whether to prefer the risky situation or to spend a known amount of money to mitigate or eliminate the risky situation. While a risky situation is indeed an uncertain situation, Risk is a number that one uses to describe the joint uncertainty in the occurrence of the risk event and its uncertain consequences. For the values of LoRE and CoRE that are chosen, there is no uncertainty in that number once LoRE and CoRE are specified. The single number called Risk is the mathematically correct way to represent an uncertain situation for the purposes of making decisions about that situation.

As discussed above, the fact that Risk is represented by a single number does not mean there is only one correct number to represent the risky situation. Again, if there are different views as to the best case to use for LoRE and CoRE, different values for Risk can be calculated via a sensitivity analysis and the preferred value for Risk can be selected based on this analysis. But it is not accurate to speak of a probability distribution for Risk, which as discussed above is a single number.

TURN's recommended changes to SPD's Recommendation 2 are set forth in Appendix A of these comments.

5.2 The Concept of Tail Risk Is of Limited Use in the RDF

SPD's Recommendation 3 is summarized as "Include and define tail risk as a risk measure."[48] SPD proposes that tail risk "should be formally added for risk evaluation," that the preferred measure of tail risk should be Tail Average, and that Tail Average "can be optimized using linear programming or other methods."[49]

[48] SPD Proposal, p. 54.

[49] *Id.*

SPD's proposal overstates the usefulness of the concept of tail risk for RDF risk evaluation. Tail risk, however measured, is not the same as the expected value, which is the value to be used in decision-making theory to choose between different potential courses of action in the face of a risky situation. By definition, tail risk only considers a small portion of the probability distribution of Consequences of a risk event, while the expected value takes into account the full probability distribution.

The SPD Proposal inaccurately states that Tail Average can be optimized.[50] This statement appears to contemplate that tail risk values can be added and subtracted, which is a necessary requirement in order to determine optimized portfolios based on budget (or any) constraints.[51] However, this is incorrect. The sum of tail risks or the sum of the tail average risks does not measure anything meaningful. In particular, the sum of the tail risks is not the tail risk of the combination of the risks.

Even if tail risk were used to measure risk, which we do not think is appropriate, there is no reason to optimize a quantity that does not measure actual risk. There is also no reason to believe that the sum of the tail risks is a good proxy for the tail risk of the combination of risks.

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[50] SPD Proposal, p. 54: "Tail average is preferred . . . because it captures the entire tail of the distribution, is stable, and *can be optimized* using linear programming or other methods." (Emphasis added.)

[51] In optimization of portfolios, values for risk reduction for each mitigation need to be calculated, which requires subtraction of the post-mitigation risk from the pre-mitigation risk. In addition, the risk reduction values need to be added for each mitigation in the portfolio. These addition and subtraction operations are not properly performed for tail risk values, however measured.

Note that this is not the case for the sum of the expected values. The sum of the risk reductions given by LoRE x CoRE is the risk reduction achieved by the collection of mitigations applied to the combination of the risks.

TURN also has concerns with the clarity and accuracy of the new definitions SPD proposes under Recommendation 3:

- SPD's definition of "Expected Value" is unclear and potentially incorporates the incorrect view (discussed in Section 5.1) that LoRE and Risk can be represented by probability distributions. TURN recommends the following definition instead: "The expected value of an uncertain situation is the weighted sum of all the possible consequences of that situation. Each weight is the probability of occurrence of the consequence."
- The definition of "Tail Average" is unclear. It is also incorrect in that it states that Tail Average can be calculated for Risk, which as discussed in Section 5.1, is a single number and cannot be represented as a probability distribution. TURN recommends the following definition instead: "Tail average is the conditional expected value given that the outcome is at least some specified percentile of the probability distribution of the random variable."
- The definition of "Tail Risk" is unclear because it does not state how to calculate tail risk from a probability distribution. TURN recommends that it be deleted.

TURN does not object to the proposed modifications to Row 5 of the RDF.

5.3 Responses to Questions in ALJ Ruling

TURN responds as follows to the questions in the ALJ Ruling related to SPD Recommendations 2 and 3.

Question 5. Should the Commission require the utilities to use probability distributions for calculating, identifying, and presenting:

b. The Consequence of a Risk Event (CoRE)?

c. The Likelihood of a Risk Event (LoRE)?

d. Pre- and post-mitigated risk?

e. For 3a – 3c, explain your answer.

Response to Question 5.

For the reasons expressed in Section 5.1 above, probability distributions should only be used for the Consequences of a Risk Event, not for the Likelihood of a Risk Event or for Risk (whether pre- or post-mitigation).

Question 6. What are the advantages and disadvantages if the Commission requires the utility to describe uncertainty within a model of a risk event as expected value of the probability distribution?

Response to Question 6.

If "uncertainty within a model of a risk event" means that a mathematical model or expert judgment is used to specify the likelihood of occurrence of a risk event (LoRE) as a probability distribution, then see Section 5.1 above, which explains that characterizing LoRE as the expected value of a probability distribution is incorrect. The notion of a probability distribution for a probability is mathematically and logically incorrect.

Question 7. What are the advantages and disadvantages if the Commission allows the utility to describe the uncertainty within a model of a risk event as the tail average of a probability of a distribution?

Response to Question 7.

As discussed in Section 5.2, tail risk is of limited value as a measurement of risk. The main reasons are: (1) tail risk ignores the rest of the probability distribution on consequences, which means that tail risk does not correspond to the actual risky situation (which exposes one to

the entire collection of outcomes, not just the tail); and (2) the sum of the tail risks is not meaningful because that sum is not the tail risk of the combination of risks.

One additional disadvantage is that ranking mitigations by tail risk will almost surely lead to contradictory and analytically unresolvable differences between tail risk rankings and rankings using risk based on LoRE x CoRE. Such contradictions can only be resolved arbitrarily, which is unsatisfactory.

> Question 8. Are there any other ways that the utility should be allowed to describe the uncertainty within a model of a risk event? What are the advantages and disadvantages if the Commission allows the utility to use these ways to describe uncertainty within a model of a risk event?

Response to Question 8.

The best way to address the uncertainty associated with the occurrence of a risk event and its consequences is to express Risk as the product of LoRE and CoRE. This well-accepted definition of Risk is currently reflected in the RDF. This definition addresses uncertainty in the following ways. First, it recognizes that the occurrence of the risk event is uncertain. That uncertainty is described by a probability, the likelihood of occurrence of the risk event, LoRE. Second, it recognizes that the consequences of the risk event are uncertain. That uncertainty is represented by a probability distribution of those consequences, from which the expected value can be calculated, expressed as CoRE.

6. TURN AGREES WITH SPD'S CONCLUSION THAT BENEFIT COST RATIO MEASURES ARE MOST USEFUL WHEN BASED ON RISK-NEUTRAL SCALING FUNCTIONS

SPD's Workshop 2 Slide 38 correctly states that "Scaled Average or Tail Average BCR[s] will always create the illusion of high cost-efficiency." This is because scaled values to reflect the risk-aversion that utilities will always prefer (in order to promote their financial

interests) can be used to change a BCR that would be below 1.0 using expected values to a BCR greater than 1.0, thereby creating the illusion of cost-effectiveness. As stated in SPD's Proposal, scaled value BCRs "could be used to justify almost all mitigations, resulting in over-investment."[52] SPD concludes that "BCRs only make sense if the benefits (numerator) are based on average risk reduction.

TURN strongly agrees with this conclusion. As discussed in Section 3.1, the utilities have a powerful incentive to use a highly risk averse scaling function in order to promote their financial interest in what SPD aptly calls "over-investment." To address this important concern, Row 7 of the RDF should be clarified to make clear that a utility that prefers a risk-averse scaling function (which, as discussed, will be all utilities, who are using ratepayer money to pay for mitigations) should be required to provide BCRs and associated workpapers based on a risk-neutral scaling function. TURN's recommended changes to Row 7 are shown in Appendix A.[53]

7. CONCLUSION

For the reasons set forth above, TURN urges the Commission to adopt SPD's proposals as described in Sections 2, 4, and 6 and to reject the SPD proposals as recommended in Sections 3 and 5. In addition, TURN urges the adoption of TURN's specific recommended changes to the RDF set forth in Appendix A.

[52] SPD Proposal, p. 23.

[53] SPD proposes changes to Row 7 as part of its Risk Tolerance proposal, Recommendation 4. Because TURN does not support Recommendation 4, TURN's recommended changes are to the current language in Row 7, as adopted in D.24-05-064.

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Respectfully submitted,

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APPENDIX A

TURN Mark-Up of Changes to the RDF

In this Appendix, TURN presents its recommended modifications to the changes to the RDF in Recommendations 1 through 6 of the SPD Proposal. Text in red-underline (deletions) and blue-underline (additions) represent **SPD's** proposed changes to the RDF. **TURN's** changes to the SPD proposal are indicated by *italics* (additions) and ~~strikethrough~~ (deletions) and are highlighted in yellow.

Recommendation 1:

Overall Residual Risk: all the risk on the utility's assets or systems *for a given enterprise risk* after taking account of the historical progress of risk reduction since the utility's first RAMP filing.

Residual Risk: Risk remaining after application of Mitigations, including Mitigations classified as Controls for a given GRC cycle.

9.	Risk Assessment	Using the Cost-Benefit Approach developed in accordance with Step 1A, for each Risk included in the Enterprise Risk Register, the utility will compute a monetized Safety Risk Value using only the Safety Attribute. The utility will sort its ERR Risks in descending order by the monetized Safety Risk Value. For the top 40% of 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 to determine the output for Step 2A. The output of Step 2A, along with the input from stakeholders described in Row 12 below, will be used to decide which risks will be addressed in the RAMP. The output of Step 2A must include a calculation of Overall Residual Risk *for each enterprise risk*, along with a diagram and supporting workpapers demonstrating the change of Overall Residual Risk since the utility's first RAMP filing. The Risk Assessment in preparation for RAMP will follow the steps in Rows 10 and 11.

Recommendation 2

Consequence (or Impact): the effect of the occurrence of a Risk Event. Consequences affect Attributes of a Cost-Benefit Approach and can be presented in the natural units of the attribute or monetized. Consequence is represented as a probability distribution.

Likelihood or Probability: the chance that an event will occur, quantified as a number between 0% and 100% (where 0% indicates impossibility and 100% indicates certainty). The higher the Probability of an event, the more certain we are that the event will occur. ~~Likelihood of an event will be represented in simulation models as a distribution of zeros and ones whose average is the chance that the event will occur.~~

Probability Distribution: *the assignment of a probability to each of the possible events that can occur as the outcome of an uncertain situation.* ~~the range and chance that a set of outcomes occurs, as used within datasets and model results~~.

Risk: *Risk is a number that characterizes ~~T~~the* potential for the occurrence of an event that would be desirable to avoid. ~~, often 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.~~

10.	Identification of Potential Consequences of Risk Event	The identified potential Consequences of a Risk Event should reflect the unique characteristics of the utility and will be represented as a probability distribution. For each enterprise risk, the utility will use actual results, available and appropriate data (e.g., Pipeline and Hazardous Materials Safety Administration data), and/or Subject Matter Experts (SMEs) to identify potential Consequences of the Risk Event, consistent with the Cost-Benefit Approach developed in Step 1A. The utility should use utility-specific data, if available. If data that is specific to the utility is not available, the utility must supplement its analysis with subject matter expertise. Similarly, if data reflecting past results are used, that data must be supplemented by SME judgment that considers the Benefits of any Mitigations that are expected to be implemented prior to the GRC period under review in the RAMP submission. For each enterprise risk, the utility must explain how they derived the probability distribution for Consequence of a Risk Event.

11.	Identification of the ~~Frequency~~ Likelihood of the Risk Event	The identified ~~Frequency~~ Likelihood of a Risk Event should reflect the unique characteristics of the utility. ~~and will be represented in simulation models as a distribution of zeros and ones. Likelihood of a Risk Event is the average of the distribution of the ones and zeroes.~~ Frequency is the number of *occurrences of a* risk event~~s~~ over a defined period. *The expected number of occurrences per year can be used as an alternative way of expressing LoRE.* ~~based on likelihood and can be presented for readability.~~ For each enterprise risk, the utility will use actual results and/or SME input to determine the *Likelihood or* annual Frequency of the Risk Event. The utility should use utility-specific data, if available. If data that is specific to the utility is not available, the utility must supplement its analysis with subject matter expertise. In addition, if data reflecting past results are used, that data must be supplemented by SME judgment that considers the Benefits of any Mitigations that are expected to be implemented prior to the GRC period under review in the RAMP submission. ~~For each enterprise risk, the utility must explain how they derived the probability distribution for Likelihood of a Risk Event.~~ The utility will consider all known relevant Drivers when specifying the ~~Frequency~~ Likelihood of a Risk Event. Drivers should reflect current and/or forecasted conditions and may include both external actions as well as characteristics inherent to the asset. For example, where applicable, Drivers may include the presence of corrosion, vegetation, dig- ins, earthquakes, windstorms, or the location of a pipe in an area with a higher likelihood of dig-ins.

13.	Calculation of Risk	For purposes of the Step 3 analysis for each enterprise risk assessed in the RAMP, pre- and post-mitigation risk will be calculated by multiplying the ~~probability distribution representing~~ Likelihood of a Risk Event (LoRE) by the ~~probability distribution of~~ Consequences of a Risk Event (CoRE). ~~and be represented as a probability distribution~~. The CoRE is the sum of ~~each of~~ the *expected values of the* ~~Risk-Adjusted~~ Attribute*s* ~~Values~~ ~~probability distributions monetized~~ using the utility's full Cost-Benefit Approach.

Recommendation 3

Expected Value: *The expected value of an uncertain situation is the weighted sum of all the possible consequences of that situation. Each weight is the probability of occurrence of the consequence.* ~~the sum of all values in the probability distribution divided by the count of values in the probability distribution (this value is equivalent to the first moment of the probability distribution function). Expected Value can be calculated for LoRE, Attributes of CoRE, and Risk.~~

Tail Average: *Tail average is the conditional expected value given that the outcome is at least some specified percentile of the probability distribution of the random variable.* ~~the sum of all the values in the probability distribution above a specified percentile divided by the count of values within that same specified percentile of the probability distribution. For example, Tail Average at the 95th percentile is the sum of all values above the 95th percentile in the probability distribution divided by the count of values above the 95th percentile in the probability distribution. Tail average can be calculated for Attributes of CoRE and Risk.~~

~~Tail Risk: a measure of low probability, high consequence occurrences, which are represented in the extremities of the probability distribution, known as the tail. The tail is typically defined as the values above a specified percentile, such as the 95th percentile. Tail risk can be evaluated for Attributes of CoRE and Risk.~~

5.	Cost-Benefit Approach Principle 4 – Risk Assessment	~~When~~ Attribute Levels that result from the occurrence of a Risk Event are uncertain.~~, assess the uncertainty in the Attribute Levels by using expected value or percentiles, or by specifying well- defined probability distributions, from which expected values and tail values can be determined.~~ This uncertainty must be represented as a probability distribution and must be described by using the Expected Value of the probability distribution and can also be described using the tail average above a specified percentile of the distribution if the utility so desires. Monte Carlo simulations, other simulations (including calibrated subject expertise modeling), and output from machine learning models, among other tools, may be used to satisfy this principle.

Recommendation 4

~~Constant Risk Exceedance Curve: the curve that results in the same Expected Value of Overall Residual Risk for every probability. For example, for an Expected Value of $10 risk, the Constant Risk Exceedance Curve would include the points 10% Likelihood of $100 Consequence; $1% Likelihood of $1,000 Consequence; and 0.1% Likelihood of $10,000 Consequence.~~

~~Exceedance Curve: A function that depicts the maximum level of acceptable Consequence for an attribute for a given probability that the Risk Event will occur.~~

Risk Tolerance: Maximum amount of Overall Residual Risk that an entity or its stakeholders are willing to accept after application of risk Control or Mitigation. Risk tolerance can be influenced by legal or regulatory requirements. *Especially for low-income customers, risk tolerance is closely related to the affordability of risk mitigation activities.*

~~6.1~~	~~Cost-Benefit Approach Principle 6: Attribute Exceedance Curves~~	~~Establish a Constant Risk Exceedance Curve for each attribute relevant to a given risk event. Each Attribute Level Constant Risk Exceedance Curve must depict the *maximum* level of acceptable Consequence for the associated probability that a given Consequence occurs. Each point on the curve represents the same Expected Value of risk. It will inform the establishing of the Constant Risk Exceedance Curves for Risk Events in Row 13.1.~~

7	Cost-Benefit Approach Principle 6 – Applying *Risk* ~~Risk~~ Scaling ~~Function to the Attribute Exceedance Curves~~	*Apply a Risk Scaling Function to the Monetized Levels of an Attribute or Attributes (from Row 6) to obtain Risk-Adjusted Levels.* ~~Apply a Risk Scaling Function to the Monetized Levels of an Attribute or Attributes (from Row 6) to obtain Risk-Adjusted Attribute Levels. For each enterprise risk included in the RAMP, the utility may apply a Scaling Function reflecting Risk Attitude to the Attribute Level Constant Risk Exceedance Curve (from Row 6.1) to obtain a Scaled Attribute Exceedance Curve. The Scaled Attribute Exceedance Curve (which represents Risk Tolerance, see Row 13.1) is obtained by dividing the Attribute Level Constant Risk Exceedance Curve by the Scaling Function.~~ The *Risk* ~~Risk~~ Scaling Function is an adjustment made in the *risk* ~~risk~~ model due to different magnitudes of Outcomes, which can *also* capture aversion or indifference towards those Outcomes. The *Risk* ~~Risk~~ Scaling Function can be linear or convexly non-linear. For example, the *Risk* ~~Risk~~ Scaling Function is linear to express indifference if avoiding a given change in the Monetized Attribute Level does not depend on the Attribute Level. Alternatively, the *Risk* ~~Risk~~ Scaling Function is convexly non-linear to express aversion if a change in the Attribute level results in an increasing rate of change in the *Risk* ~~Risk~~ Adjusted Monetized Attribute Level as the Level of the Attribute increases. ~~When completing Rows 5 and 24 in the RDF, *iIf* a utility chooses to address tail risk using the power law or other statistical approach and chooses to~~ present *Risk* ~~Risk~~ Adjusted Attribute Levels by relying on a convex scaling function, then it must supplement its analysis by also presenting *Risk* ~~Risk~~ Adjusted Attribute Levels *and benefit-cost ratios based on* ~~by relying on~~ a linear scaling function.

13.1	Risk Tolerance	Utilizing the Attribute Level Constant Risk Exceedance Curves from Row 6.1, establish a Constant Risk Exceedance Curve for each enterprise risk assessed in the RAMP. The Constant Risk Exceedance Curve must depict the *maximum* level of acceptable Risk for the associated probability that a given Risk Event occurs. Since each point on the curve represents the exact same level of risk, it is called the Constant Risk Exceedance Curve. Additionally, if the utility chooses to present tail average risk as stipulated in Row 5, then the utility shall also present the tail average risk value for the probability above the specified percentile on the Constant Risk Exceedance Curve. The goal of the RDF is to reduce Attribute Consequence Levels below each Risk Tolerance, which is the Scaled Attribute Exceedance Curve. No later than one month after the utility's pre-RAMP workshop, the utility must present its preliminary Attribute Level Exceedance Curves and Constant Risk Exceedance Curve for each enterprise risk assessed in the RAMP to the California Utility Risk Tolerance Stakeholder (CURTS) Working Group. Within 21 days of the conclusion of the CURTS Working Group discussion, stakeholders of the CURTS Forum should make recommendations to the utility for ensuring that the Attribute Level Exceedance Curves and Constant Risk Exceedance Curve appropriately represent the risk tolerance of the residents of California. The utility must submit these recommendations with its RAMP Application along with a justification explaining why the utility did or did not integrate the CURTS Forum recommendations into its RAMP Application.

Recommendation 5

~~13.2~~	~~Test Year Risk Tolerance~~	~~The utility must determine how much risk can be reduced in the next GRC cycle to approach the Constant Risk Exceedance Curve or Scaled Exceedance Curve for each enterprise risk assessed in the RAMP filing.~~

Recommendation 6

Enterprise Portfolio: a collection of activities within a specified Budget Constraint reflecting all of the programs to be funded in the utility's General Rate Case (GRC). Costs, benefits, and benefit-cost ratios can be calculated for each portfolio, and portfolios can be compared to one another. The Enterprise Portfolio will include Mitigation Portfolios derived from the Budget-Constrained Optimized Portfolios.

Risk Mitigation Portfolio: a collection of one or more risk mitigations with a specified *B*udget *C*onstraint for reducing the risk of a given enterprise risk. ~~Costs, benefits, and benefit-cost ratios can be calculated for each portfolio, and portfolios can be compared to one another.~~

Mitigation Group: the combining of two or more mitigations that exhibit either synergy, meaning the mitigations result in mutually reinforcing risk reduction efficiency, or diminishing returns, meaning as one mitigation reduces risk it limits the efficiency of the other mitigation to reduce risk.

Budget Constraint. A specified increase in expenditures above baseline test-year expenditures over the utility's GRC period, as determined by the Commission, to be used for budget-constrained optimization. The specified Budget Constraints will be based on expected increases in the rate of inflation for the GRC period and will include, at a minimum, an increase in expenditures that is one-half of the expected inflation for the GRC period and an increase that is above the expected inflation for the GRC period. The Budget Constraint will apply separately to capital expenditures and expenses.

Budget-Constrained Optimized Portfolios. Enterprise Portfolios that provide the maximum reduction of Residual Risk at each Specified Budget Constraint.

25.1	*Risk Mitigation* Portfolios ~~of Risk Mitigations~~	~~Utilities must construct portfolios of risk mitigations for each Risk as identified in Row 8 with a specified budget constraint. Mitigations in each~~ *Risk Mitigation* portfolio*s* should account for interrelationships between them, such as mutual exclusivity, synergies, and diminishing returns. • Mutually exclusive mitigations must be avoided, only one or the other can exist in the same portfolio. • Synergies and diminishing returns can be captured by combining two or more mitigations, called a *M*itigation *G*roup. Synergies or diminishing returns can be calculated for the *M*itigation *G*roup. For example, a wildfire mitigation portfolio could include for a given circuit segment: covered conductor as mitigation, vegetation management as a mitigation, or covered conductor with vegetation management as a mitigation—but not covered conductor and vegetation management as separate mitigations since their benefits are not additive (re: may exhibit diminishing returns).
25.2	*Budget-Constrained Optimized Portfolios*	*The utility's RAMP and GRC filings will present a set of Budget-Constrained Optimized Portfolios, separately for capital expenditures and expenses, for each Budget Constraint specified by the Commission. The Budget-Constrained Optimized Portfolios shall include the optimized Risk Mitigation Portfolios consistent with Row 25.1 for each enterprise risk based on the enterprise-level optimization.*

26	*Portfolio and* Mitigation Strategy Presentation in the RAMP and GRC	The utility's RAMP filing will provide a ranking of all RAMP Mitigations by ~~Cost~~ Benefit-Cost rRatios. Additionally, the utility *shall present the set of Budget-Constrained Optimized Portfolios required by Row 25.2. The utility may also* ~~must~~ present *its preferred Budget-Constrained Optimized Portfolio, which may be based on a different budget constraint, applied separately to capital expenditures and expenses, than the Commission-specified Budget Constraints.* ~~a set of optimal portfolios for reducing each enterprise risk. Mitigation Groups defined in Row 25.1 can also be ranked within each portfolio.~~ *If the utility's preferred Budget-Constrained Optimized Portfolio is based on a different budget constraint than the Commission-specified Budget Constraints, t*he utility must justify *its preferred* ~~the portfolio selection, optimization,~~ budget constraint~~, and structure~~ ~~of Mitigation Groups.~~ In the GRC, the utility will provide any updates to a ranking of Mitigations by ~~Cost~~ Benefit-Cost Ratios, as follows: (1) For Mitigations addressed in the RAMP, the utility will use risk reduction estimates, including any updates, and updated costs to calculate ~~Cost~~ Benefit-Cost Ratios and explain any differences from its RAMP filing; (2) For Mitigations that require Step 3 analysis under and consistent with Row 28, the utility will include the ~~Cost~~ Benefit-Cost Ratios, calculated in accordance with Step 3, in the ranking of Mitigations by ~~Cost~~ Benefit-Cost Ratios. In the GRC, the utility will provide an updated presentation of *the Budget-Constrained Optimized Portfolios required by Row 25.2 and, if elected by the utility, its preferred Budget-Constrained Optimized Portfolio* ~~a set of optimal portfolios for reducing each enterprise risk~~ if an update is necessary. Any differences in th*ese optimized* ~~set of optimal~~ portfolios from the RAMP filing must be clearly explained by the utility in its GRC filing. In the RAMP and GRC, the utility will clearly and transparently explain its rationale for selecting Mitigations for each enterprise risk ~~and for its selection~~ and *for its preferred Budget-Constrained Optimized Portfolio,*

		including a justification of its preferred budget constraint. ~~optimization~~ ~~of its overall portfolio of Mitigations for each enterprise risk~~. ~~The utility must explain how the budget constraint and other constraints factored into the utility's portfolio selection.~~ ~~The utility is not bound to select its Mitigation strategy based solely on the Cost-Benefit Ratios produced by the Cost-Benefit Approach.~~ *The utility's proposed Enterprise Portfolio, including its m*itigation selection ~~and Mitigation Portfolio optimization~~ can be influenced by *Budget-Constrained Optimized Portfolios,* Benefit-Cost Ratios and other factors including, but not limited to, funding, labor resources, technology, planning and construction lead time, compliance requirements, *ratepayer affordability* ~~Risk Tolerance thresholds~~, operational and execution considerations, and modeling limitations and/or uncertainties affecting the analysis. In the RAMP and GRC, the utility will explain whether and how any such factors affected the utility's *proposed Enterprise Portfolio, including its* Mitigation selections. ~~In the RAMP and GRC, the utility must also implement and justify a transparent and systematic way to integrate these other factors into the optimization of its Mitigation Portfolios.~~ GRC Post-Test Year Reporting: All Controls and Mitigation programs must include Benefit-Cost Ratios in each of the GRC post-test years as well as aggregate Benefit-Cost Ratios for the entire post-test year period and the entire GRC period, by Tranche.