# Appendix C: PG&E Transparency Proposal as Modified

## PG&E Proposal to Address Transparency and Uncertainty in IOU's Risk-Based Filings as Modified

Pacific Gas and Electric Co. (PG&E), after consultation with the Technical Working Group (TWG), presents for the consideration of the Commission a framework to address transparency and uncertainty of assumptions and estimates for risk-based ("RDF") filings, consisting of the two Elements below, and an associated Implementation Schedule.

1. *Standard Workpaper Templates*; comprised of three (3) data tables per Risk, corresponding to the input parameters, output calculations and the list of models used in quantifying the Risk.
2. *Estimate Quality Criteria*; a set of criteria, to be developed by the TWG, to objectively assess the Estimate Quality associated with the information presented in the data tables above.

Table 1: Implementation Schedule for the Transparency Guidelines Proposal

| Date | Milestone | Description |
|---|---|---|
| Q3-Q4, 2021 | Decision on Phase 1, R.20-07-013. | Tentative expected decision on Phase 1 issues. |
| Q3-Q4, 2021 | Updated Transparency Guidelines Proposal. | Reconvene TWG to discuss Cal Advocates' proposal and estimate ranges for sensitivity analysis. SPD to prepare updated Transparency Guidelines Proposal, as appropriate. |
| Q4, 2021 to Q2, 2022 | SCE to test drive the Transparency Guidelines Proposal. | SCE to test drive the Transparency Guidelines Proposal using risks in SCE's 2022 RAMP to be filed in 2022. |
| Q2 to Q3-2022 | TWG to discuss test drive results. | SPD to convene TWG meeting to discuss results of the test drive. |
| May 15th, 2024 | PG&E files RAMP application implementing Transparency Guidelines Proposal. | PG&E files its risk analysis in RAMP implementing the Transparency Guidelines Proposal. |
| May 15th, 2025 | Sempra files its RAMP application implementing Transparency Guidelines Proposal. | Sempra files its risk analysis in RAMP implementing the Transparency Guidelines Proposal. |

## Background

In the Assigned Commissioner's Scoping Memo and Ruling in R.20-07-013, Phase 1, Track 1 of the proceeding was established to "…consider whether there are discreet technical questions regarding the RDF that the Commission should clarify in the short term". While the ruling contained specific issues, it also noted, as Track 1: Clarifying RDF Technical Requirements, Item f.[1] "Other related clarifications as needed".

[1] R.20-07-013, Assigned Commissioner's Scoping Memo and Ruling, pp 4-5.

In PG&E's 2020 RAMP filing, A.20-06-012, Safety Policy Division (SPD), The Utility Reform Network (TURN) and other parties highlighted issues with understanding assumptions, calculations and outputs, and noted that the filing could benefit from increased transparency. PG&E likewise desires providing clarity and enabling parties to perform their own risk analyses using PG&E's data and outputs in order to produce more streamlined proceedings and reduce overhead surrounding each filing.

On March 10th, 2021, a session of the TWG was convened under Phase 1, Track 1 of R.20-07-013 in which TURN presented on "Transparency of Estimates and Assumptions". The presentation reiterated the Safety Model Assessment Proceeding (S-MAP) Settlement Agreement requirements, provided guidelines for addressing transparency and uncertainty, and proposed a "Streamlined Format for Reporting Estimates and Assumptions".

On the topic of uncertainty, while PG&E agrees in principle with TURN's approach to quantify it rigorously and mathematically, it is concerned that the necessary data and consistent policies to do so are lacking. Whether such an approach can be scaled up to deal with the large amount of information, technical computation feasibility, and interpretation of results are also areas of concern. Furthermore, PG&E agrees with Dr. Schulman's comment in the TWG meeting that in the process of quantifying too soon, many organizations end up losing information; and that the process of understanding uncertainty must begin not with formal numbers, but with narratives. The proposal in this document keeps with this approach and supplements it with the inclusion of a quantitative Sensitivity calculation to help parties understand the importance of specific assumptions to the risk analysis.

## Transparency Proposal Element #1: *Standard Workpaper Templates*

In the aforementioned TWG meeting, PG&E agreed to pilot the use of TURN's Streamlined Format on one of the existing Risks from its 2020 RAMP report. Based on this experience, PG&E recommends that Standard Workpaper Templates be developed as relational data tables, consisting of a Risk Results table, a Risk Sensitivity Analysis, and a Model Listing table. These tables would be amenable to analysis with Excel Pivot Tables or Filter to generate the report envisioned in pages 10 & 11 of TURN's presentation, as well as other reports.

Accordingly, the analysis results for each Risk would be captured in separate data tables as listed:

- Risk Results Table
- Risk Sensitivity Analysis Table
- Risk Model Listing Table

It is envisioned that the three tables be produced for each Risk modeled by the IOU using the S-MAP Settlement Agreement framework.

### Risk Results Table

The Risk Results Table collects the model outputs associated with a Risk. It also represents the epistemic uncertainty[2] (due to data quality, etc.) inherent in the calculations in the Estimate Quality field, which is

[2] "Epistemic uncertainties arise when making statistical inferences from data and, perhaps more significantly, from incompleteness in the collective state of knowledge ... The epistemic uncertainties relate to the degree of belief that the analysts possess regarding the representativeness or validity of the … model and in its predictions." *NUREG-1855, Guidance on the Treatment of Uncertainties Associated with PRAs in Risk-Informed Decision making, pp 12. United States Nuclear Regulatory Commission.*

determined based on the criteria described in the Estimate Quality section below. The Risk Results table contains one row per Tranche-Year-Mitigation-Attribute-Result Type. The columns of the table are:

Table 2: Risk Results Table

| Column | Description |
|---|---|
| Risk | Name of Risk |
| Tranche | Name of Tranche |
| Year | Year for which the Value pertains to |
| Mitigation | One of:<br>• Name of Mitigation<br>• "Baseline": The Values represent baseline estimates<br>• "All": Values are for Post Mitigation estimates assuming all the proposed mitigations are in place. |
| Attribute | One of:<br>• Name of MAVF Attribute: e.g., for PG&E, "Safety", "Electric Reliability"<br>• "Overall": Values represent the overall MARS score, or are not related to Attributes (e.g., likelihood estimates are not related to Attributes) |
| Value | Numerical value |
| Result Type | See table below for valid Result Types |
| Estimate Quality | "High", "Medium", "Low". The qualitative degree of certainty/confidence associated with the output. See discussion in the Estimate Quality section below. |
| Confidence Interval | Quantitative confidence interval of estimate/calculation. This field is only populated with numerical values if such values are applicable and can be readily determined based on available data and established statistical principles, otherwise "N/A". |

*Result Types*

PG&E proposes the following Result Types. Additional Result Types can be added as necessary.

Table 3: Illustrative example of Results Type proposed by PG&E.

| Result Type | Description |
|---|---|
| Risk Before | MARS value, present valued, before proposed mitigations are applied. If the Mitigation column is set to "Baseline", the value represents the Baseline risk score, calculated as *Present-Value (Attribute Weight x Program Exposure x LoRE Before x CoRE Before)* for a given Risk-Tranche-Year-Mitigation-Attribute. If the Attribute is "Overall", the Value is the same as the sum of Risk Scores over all Attributes. |
| LoRE Before | Likelihood of Risk Event before proposed mitigations are applied. If the Mitigation column is set to "Baseline", the value represents the Baseline Likelihood. |
| CoRE Before | Expected Consequence in Scaled Units. If the Mitigation column is set to "Baseline", the value represents the Baseline CoRE. |
| Exposure Before | Total # of units (miles, etc.) for the Risk/Tranche/Year in the Baseline. |
| Risk After | MARS value, present valued, after Mitigation is applied. This result is only available if Mitigation column is not "Baseline". This is calculated as *Present-Value (Attribute Weight x Program Exposure x LoRE After x CoRE After)* for a given Risk-Tranche-Year-Mitigation-Attribute. If the Attribute is "Overall", the Value is the sum of Risk Scores over all Attributes. |
| LoRE After | Likelihood after Mitigation is applied. This result is only available if Mitigation column is not "Baseline". Note that the LoRE here is different from Tranche LoRE when the mitigation is not implemented for the entire tranche. |
| CoRE After | CoRE after Mitigation is applied. This result is only available if Mitigation column is not "Baseline". |
| Exposure After | Total # of units (miles, etc.) for the Risk/Tranche/Year after Mitigation is applied. |
| Mitigation Program Exposure Scope | The # of units (miles, etc.) for the Risk/Tranche/Year that the Mitigation will be applied to. |
| Cost | Present valued expected cost for the Year. |

An example with illustrative values is provided in the Excel file titled "pge_std_wp_proposal_2.xlsx". Note that not all combinations of Mitigation, Attribute, and Result Type are valid. For example, the combination of "Baseline", "Safety", and "LoRE Before" is not valid and will not be reported, because the likelihood of a risk event is separate from the consequence in the S-MAP Settlement Agreement framework.

## Risk Sensitivity Analysis Table

The purpose of the Risk Sensitivity Analysis Table is to collect all the assumptions and input parameters used in Risk calculations. It also represents the epistemic uncertainty (due to data quality, etc.) inherent in the parameter in the Estimate Quality field, which is determined based on the criteria described in the Estimate Quality section below. Parameters are described in the "Parameter" field and grouped into two general types, Baseline or Mitigation Program, depending on whether they are used to calculate Baseline Risk Scores, or represent the effectiveness of mitigation programs (e.g., the amount of reduction, in percentages, that a mitigation will reduce the mean by). The negative and positive sensitivities of the Risk score to changes in the value of the parameter are also provided. These are obtained by determining Upper and Lower Test Values for the parameter (e.g., current value +/- 25%), calculating the Risk Score using these values, subtracting the risk score at the assumed value of the parameter from these resulting risk scores, and normalizing the difference in Scores:

$\varphi$: The reported parameter

$\varphi_l, \varphi_u$: Lower and Upper Test Values for the reported parameter, to be established by the IOU. The range reflected by the Lower and Upper Test Values should be wide enough to capture a variety of plausible scenarios for the parameter

$\varphi_A$: The assumed value of the reported parameter

$\lambda_1, \lambda_2, \ldots$: Other parameters used to calculate the Risk score

$R(\varphi, \lambda_1, \lambda_2, \ldots)$: Calculated Risk score

*Positive Sensitivity* = $\frac{R(\varphi_u, \lambda_1, \lambda_2, \ldots) - R(\varphi_A, \lambda_1, \lambda_2, \ldots)}{\varphi_u - \varphi_A}$, the change in the Risk Score per unit change in the reported parameter over the range established by the Upper Test Value and the assumed value

*Negative Sensitivity* = $\frac{R(\varphi_l, \lambda_1, \lambda_2, \ldots) - R(\varphi_A, \lambda_1, \lambda_2, \ldots)}{\varphi_l - \varphi_A}$, the change in the Risk Score per unit change in the reported parameter over the range established by the Lower Test Value and the assumed value

Table 4: Risk Sensitivity Table

| Column | Description | Changes |
|---|---|---|
| Risk | Name of Risk | |
| Tranche | Name of Tranche | |
| Outcome | Outcome or "Overall" | |
| Attribute or Driver/Sub-Driver | One of:<br>• Name of MAVF Attribute: e.g., for PG&E it can be "Safety", "Reliability – Electric"<br>"Overall": Values represent the overall MARS score,<br>Driver/Sub-Driver: Name of Driver/Sub-Driver | |
| Year | Year | |
| Mitigation | One of:<br>• Name of Mitigation<br>• "Baseline": The Values represent baseline estimates | |
| Distribution | E.g., "Poisson", "Log-normal", "N/A" | |
| Parameter | The type of parameter and what it applies to:<br>• Baseline LoRE mean<br>• Baseline CoRE mean<br>• Baseline CoRE stdev<br>• Mitigation LoRE Effectiveness<br>• Mitigation CoRE Effectiveness<br>• Etc. | |
| Value | Assumed value of the Parameter | |
| Negative Sensitivity | Numerical value representing the change in Risk score when the Parameter is decreased by an incremental amount | New Column J on the tab titled "eg_risk_sensitivity_analysis_tb" in the spreadsheet |
| Positive Sensitivity | Numerical value representing the change in Risk score when the Parameter is increased by an incremental amount | New Column K on the tab titled "eg_risk_sensitivity_analysis_tb" in the spreadsheet. This entry replaced the Sensitivity column. |
| Estimate Quality | "High", "Medium", "Low". The degree of confidence associated with the estimate/calculation. See discussion in the Estimate Quality section below | |
| Justification | Tag that contains the criteria that lead to the Estimate Quality determination. E.g., "Quantitative-Limited Internal Data". See Estimate Quality section below | |
| Reference | Text field providing reference to further documentation, if necessary. | |

| Column | Description | Changes |
|---|---|---|
| Comments | Column for SME input to allow information not otherwise captured, to be captured and shared, if available. This could include references to narratives in workpapers. For example, this may include SME concerns about the best way to use the data, or its limits, or opportunities to gather more or improve the data or its use. | |
| Confidence Levels | Quantitative levels of output expressed at 10th and 90th percentile confidence levels of the parameter. These fields are only populated with numerical values if such values are applicable and can be readily determined based on available data and established statistical principles, otherwise "N/A". | New Columns P and Q on the tab titled "eg_risk_sensitivity_analysis_tb" in the spreadsheet. These two columns replaced the Confidence Interval column on this tab. |

## Risk Model Listing Table

PG&E presented its initial proposal in the TWG workshop on Transparency, held on April 14th, 2021. During this meeting Utility Consumers Action Network (UCAN) stressed that model uncertainty[3] should be captured in any proposal to address transparency and data quality. PG&E believes that this issue can be addressed by listing all models (e.g., statistical distributions used for consequences) used for each Risk in a table.

Table 5: Risk Model Listing Table

| Column | Description |
|---|---|
| Risk | Name of Risk |
| Tranche | Name of Tranche |
| Outcome | Outcome or "Overall" |
| Attribute or Driver/Subdriver | One of:<br>• Name of MAVF Attribute: e.g., for PG&E it can be "Safety", "Reliability – Electric", "Overall": Values represent the overall MARS score, or are not related to Attributes (e.g., likelihood estimates are not related to Attributes)<br>• Name of Driver/sub-driver |
| Year | Year |
| Distribution | "Log-normal", "normal", etc. |
| Description | E.g., "Distribution of Safety Consequences" |
| Estimate Quality | "High", "Medium", "Low". The degree of confidence associated with the data inputs. See discussion in the Estimate Quality section below |

[3] "Model uncertainty is related to an issue for which no consensus approach or model exists and where the choice of approach or model is known to have an effect on the … model." *NUREG-1855, Guidance on the Treatment of Uncertainties Associated with PRAs in Risk-Informed Decision making, pp 15. United States Nuclear Regulatory Commission.*

| Column | Description |
|---|---|
| Justification | Tag that contains the criteria that lead to the Estimate Quality determination. E.g., "Industry Consensus Model" |
| Reference | Text field providing reference to further documentation, if necessary. |

### Recommended Approach for Standard Workpaper Templates

PG&E recommends the adoption of the tables described above, subject to technical, computability implementation concerns that might arise due to the Sensitivity (or other) calculation(s). This is addressed by a Prototyping period (incorporated into the Implementation Schedule) where the calculations will be developed and tested, and the results, together with modifications to calculations, if any, will be issued.

## Transparency Framework Element #2: Estimate Quality

PG&E proposes the use of a qualitative Estimate Quality to describe the uncertainty inherent in Risk models, calculations and input parameters. This is a valid incremental step towards a more rigorous treatment of data and modeling uncertainty and will provide parties with valuable experience and perspective for developing a more comprehensive and quantitative-based methodology. Accordingly, each input parameter, risk calculation, and model will be categorized as having a "High", "Medium", or "Low" Estimate Quality, based on pre-established, transparent, and objective criteria as described below.

### Discussion

In the aforementioned TWG workshop on Transparency, PG&E proposed the following sets of criteria for input parameters and risk calculations.

Table 6: PG&E's Original Proposed Criteria for Input Parameters

| Overall, How Parameter was Determined | Detailed Description of Method Used | Estimate Quality |
|---|---|---|
| **Quantitative** | Bayesian or other formal analysis incorporating industry data with internal data. | High |
| | Internal data only, no available industry data or industry data was not used. | High |
| | Limited internal data. | Medium |
| **SME-Judgment** | Multiple SMEs with consensus utilizing proxy data. | High |
| | Multiple SMEs with uncertainty, or single SME with high confidence in proxy data. | Medium |
| | Single SME with uncertainty or high level of interpretation of proxy data. | Low |

PG&E also envisioned that the criteria could be expanded by IOUs to incorporate other methods used to determine parameters.

Parties commented that PG&E's proposal would require refinement. For example, Dr Schulman pointed out that retrospective accident data shows that companies have been deceived by their own internal

data, and hence using only Internal data should not necessarily warrant a High Estimate Quality, per PG&E's proposal. PG&E agrees that refinement is needed and believes that instead of its original proposal, the objective criteria used to attribute the Estimate Quality to input parameters should be developed by the TWG. PG&E also subsequently supplemented the Standard Workpaper Templates to include a Risk Model Listing table (as documented above), which also includes an Estimate Quality categorization for all the models used for quantifying a Risk. This approach would entail a corresponding set of criteria to use in determining the Estimate Quality for models.

### *PG&E's Proposed Criteria for Risk Calculations*

PG&E's original proposal noted that the Estimate Quality of calculations that depend on input parameters are directly related to the Estimate Quality of the input parameters themselves. For example, if the CoRE of a Risk uses input parameters that have a Low Estimate Quality, the CoRE will have a Low Estimate Quality itself, i.e., the Estimate Quality of the CoRE will be the same as the lowest Estimate Quality of its input parameters. For Post-Mitigated Risk scores, the Estimate Quality depends on both the Mitigation program input parameters and the Baseline risk distribution parameters and is set to the lowest Estimate Quality of its inputs, as follows.

Table 7: PG&E's Proposed Criteria for Risk Calculations

| **Estimate Quality of Post-Mitigated Risk Scores** | **Type: Mitigation Parameter Estimate Quality** | | |
|---|---|---|---|
| **Type: Driver or Baseline Parameter Estimate Quality** | **High** | **Medium** | **Low** |
| **High** | High | Medium | Low |
| **Medium** | Medium | Medium | Low |
| **Low** | Low | Low | Low |

PG&E did not receive comments during the TWG session on its approach for output/calculations. Nevertheless, it recognizes that its approach here could require modifications based on how the development of criteria for inputs proceeds.

## Recommended Approach for Estimate Quality

Based on the discussion above, PG&E recommends that the Commission, in adopting the Estimate Quality proposal, establish future TWG working sessions to develop separate sets of criteria to categorize Estimate Quality associated with:

- Inputs
- Calculations; and
- Models.

The in-depth topics to be covered in such workshop(s) include, but are not limited to:

- Understanding the different ways in which input parameters are developed.
- Recognizing the limitations and pitfalls associated with the different ways that parameters are developed.

- Considering practices adopted by other industries, and situations that are specific only to the IOUs, if any.
- Whether to adopt the criteria PG&E proposed for determining the Estimate Quality *for calculations* based on the Estimates for the inputs. If not, to develop an alternative.
- Consider what factors (e.g., degree of industry adoption,) should be used to determine the Estimate Quality *for models*.
- Developing flow-charts, questionnaires, etc. to be used in the Estimate Quality determination.

Change Log

"Confidence Level" renamed to "Estimate Quality" per MGRA.

Sensitivity calculation changed to use large increments to incorporate higher order effects (i.e., incorporating 2nd, 3rd, and higher partial derivatives into calculation) per MGRA.

Added "Confidence Interval" column per Cal Advocates & MGRA.

Added "Comments" column per Cal Advocates & Dr. Schulman.

Replaced Confidence Level Tiered Criteria with proposal for the TWG to jointly develop objective criteria for categorizing data into "Estimate Quality" levels, per Dr Schulman & UCAN.

Added a Risk Model Listing table to address how Model Uncertainty should be factored into "Estimate Quality", which was brought up by UCAN.

Clarified (as requested by TURN) that Attribute Weights and Discount factors are included in the Risk Before and Risk After calculations.

Included Transparency Proposal and Background sections, including implementation schedule.

The following changes were made by the Proposed Decision:

Implementation Schedule Table was changed.

Defined $\varphi_A$ as the assumed value of the reported parameter.

Defined Positive Sensitivity and Negative Sensitivity.

Replaced Sensitivity with Positive Sensitivity and Negative Sensitivity in Risk Sensitivity Analysis Table.

Replaced Confidence Interval in Risk Sensitivity Table with Confidence Levels at 10th and 90th percentile confidence levels of the parameter.