# PG&E 2020 Risk Assessment and Mitigation Phase Overview

## S-MAP Settlement Overview and Feedback from 2017 RAMP

**November 14th, 2019**

# Agenda

| # | Agenda Item | Start Time | Time Allotted |
|---|---|---|---|
| 1 | Introduction | 10:00 | 15 min |
| 2 | PG&E 2020 RAMP Workshop Dates | 10:15 | 5 min |
| 3 | SED and Intervenor Feedback from 2017 RAMP | 10:20 | 30 min |
| 4 | S-MAP Implementation | 10:50 | 60 min |
|   | Lunch |  |  |
| 5 | PG&E Commitments | 1:15 | 30 min |

# 1. PG&E 2020 RAMP Workshop Dates

# PG&E 2020 RAMP Key Dates

| Date | Item |
|---|---|
| 11/14/19 | RAMP Workshop #1: S-MAP Settlement PG&E Implementation (Overview, Feedback from last RAMP) |
| 01/09/20 (tentative) | RAMP Workshop #2: S-MAP Settlement PG&E Implementation (MAVF, Tail Averages, Tranches, RSEs, etc.) |
| 02/04/20 (tentative) | RAMP Workshop #3: Present Enterprise Risk Register |
| 6/30/20 | File 2020 RAMP Application |

All workshop dates are tentative and subject to change. Dates are predicated on PG&E filing its 2020 RAMP on June 30, 2020.

# 2. Feedback from SED and Stakeholders

| Summary of Feedback from SED |
| --- |
| 1. Controls should have risk scores and RSEs. |
| 2. Model should have section with calculation results and output values that ties to results in RAMP filing. |
| 3. More clarity around cross-cutting risks and their relation to other risks is needed. |
| 4. More transparency into data sources is needed. Risk owner and subject matter expert inputs should be fully explained. A more rigorous review of the data, data sources, and data integrity should be done. |
| 5. Models should rely less on SME judgment and/or subjective assessment. |
| 6. RSE formula should more fully capture the delayed benefits of capital projects. |
| 7. More exploration needs to be done around optimization techniques to allocate mitigation spending across entire portfolio of risks. |
| 8. Full descriptions of how and what real-world constraints were considered in selection of mitigation plans are needed. |

# Feedback from Other Stakeholders

## Summary of Feedback from Other Stakeholders

1. PG&E should be more transparent in comparing the cost-effectiveness of mitigations.

2. PG&E needs to demonstrate how proposed portfolio of mitigations optimizes risk reduction in the face of affordability and other spending constraints.

3. RSE calculations should only consider risk reduction benefits from mitigations proposed for the upcoming GRC.

4. RSE calculations should capture the full risk reduction benefits attributed to the proposed expenditures for the rate case period.

5. PG&E should provide a ranking of its mitigations based on expected value risk reduction calculations.

6. The trust attribute should be excluded in future RAMP filings.

7. For infrequently occurring incidents, there is currently not enough data to project risk impacts without high uncertainty. PG&E should incorporate methods to help account for such uncertainty, such as sensitivity analysis.

8. PG&E-specific data should be given a greater weight than more general data.

9. Future RAMP filings should include some attempt to evaluate how mitigations affect the efficacy of one another.

10. PG&E should consider adopting risk tolerances, as well as an explanation of how the risk tolerance was determined.

# Feedback from Other Stakeholders

| Summary of Feedback from Other Stakeholders |
|---|
| 11. PG&E should submit alternative mitigations that are substantially different than the mitigations that are proposed or include an explanation of why it is unreasonable to do so. |
| 12. PG&E should not propose alternative mitigations that are infeasible to perform. |
| 13. PG&E should take a more holistic approach and attempt to optimize the RSE for the entire RAMP program. |
| 14. PG&E should evaluate the effectiveness of mitigation plans from its last GRC and use those results in the following RAMP. |

# 3. S-MAP Implementation

# S-MAP Settlement Agreement: PG&E Implementation

| S-MAP Settlement Agreement Matrix No. | Element Name |
| --- | --- |
| 2 | MAVF Principle 1 – Attribute Hierarchy |
| 3 | MAVF Principle 2 – Measured Observations |
| 6 | MAVF Principle 5 – Scaled Units |
| 7 | MAVF Principle 6 – Relative Importance |
| 8 | Risk Identification and Definition |
| 9 | Risk Assessment |
| 12 | Risk Selection Process for RAMP |
| 14 | Definition of Risk Events and Tranches |
| 16 | Expressing Effects of a Mitigation |
| 10 | Identification of Potential Consequences of Risk Event |
| 13 | Calculation of Risk |
| 24 | Use of Expected Value for CoRE; Supplemental Calculations |
| 22 | Measurement of Post-Mitigation Risk Score |
| 25 | Risk Spend Efficiency (RSE) Calculation |
| 28 | Step 3 Supplemental Analysis in the GRC |

# S-MAP Settlement Agreement: MAVF

| S-MAP Settlement Agreement Matrix No. | Element Name | PG&E Implementation |
|---|---|---|
| 2 | MAVF Principle 1 – Attribute Hierarchy | PG&E Attribute Hierarchy:<br>• Safety<br>    • Public Injury<br>    • Public Fatality<br>    • Contractor Injury<br>    • Contractor Fatality<br>    • Employee Injury<br>    • Employee Fatality<br>• Reliability<br>    • Customer Minutes Interrupted<br>    • # Customers Affected<br>• Financial<br>Environmental consequences will be subsumed into the Financial attribute. Trust and compliance attributes will not be included in the TY 2023 RAMP. |

# S-MAP Settlement Agreement: MAVF

| S-MAP Settlement Agreement Matrix No. | Element Name | PG&E Implementation |
|---|---|---|
| 3 | MAVF Principle 2 – Measured Observations | Attribute ranges based on the maximum ranges on worst historical outcomes.<br><br>In the TY 2020 RAMP model, the MAVF was applied to the sum of the consequences over a year.<br><br>Given the SMAP settlement, PG&E will now apply MAVF to each (simulated) Risk Event. |
| 6 | MAVF Principle 5 – Scaled Units | PG&E anticipates using non-linear scaling functions for lower attributes to convert them to scaled units. |
| 7 | MAVF Principle 6 – Relative Importance | The weights are currently being finalized and will be presented at a workshop in January. The safety attribute will be weighted at least 40% per the S-MAP decision. |

MAVF details will be presented at a workshop in January 2020.

# S-MAP Settlement Agreement: Risk Assessment

| S-MAP Settlement Agreement Matrix No. | Element Name | PG&E Implementation |
|---|---|---|
| 8 | Risk Identification and Definition | PG&E converted its TY 2020 RAMP and GRC Risk Register to an Event Based Enterprise Risk Register (ERR) in 2019, per intervenor feedback. This Event Based Risk Register will be shared at a workshop in February 2020.<br><br>Cross-cutting Risks (e.g. Climate Change, IT Asset Failure, etc.) will be represented as factors that affect underlying driver frequencies and consequences, etc. |
| 9 | Risk Assessment | Since PG&E's proposed MAVF consists only of Safety, Reliability and Financial Attributes, PG&E will implement this item by computing the MAVF for the top 40% of ERR risks with a Safety Risk Score > 0. |
| 12 | Risk Selection Process for RAMP | Tentative date to present to SED and other interested parties is February 2020. |
| 14 | Definition of Risk Events and Tranches | PG&E is currently working on determining the tranches for its risks. Since each risk has its own risk factors, the considerations that go into each tranche are risk-specific. PG&E will explain in each RAMP risk chapter how tranches are developed. |
| 16 | Expressing Effects of a Mitigation | Mitigations will be applied at the tranche level, and the net Risk Reduction will be calculated by aggregating over all the tranches. |

# S-MAP Settlement Agreement: Risk Assessment

| S-MAP Settlement Agreement Matrix No. | Element Name | PG&E Implementation |
|---|---|---|
| 10 | Identification of Potential Consequences of Risk Event | In PG&E's implementation, the probability distribution of CoREs can be different conditional on Risk Event Outcomes (i.e., Risk Drivers), and the overall CoRE distribution is obtained by summing across the outcomes. |

# Sample Bowtie with Tranches & Outcomes

| Drivers | Risk Event | Outcomes | Consequences |
|---|---|---|---|

## Drivers

**Subdriver Name | % of Driver Risk**

| Subdriver Name | % of Driver Risk |
|---|---|
| Conductor | 31% |
| Pole/Support Structure | 28% |
| Protection Equipment | 15% |
| Connector/Splice | 13% |
| Other | 6% |
| Secondary Conductor | 6% |
| Switches | 1% |
| UG - Connector/Splice | <1% |
| UG - Protection Equipment | <1% |

**Driver Name | Frequency | % of Risk**

| Driver Name | Frequency | % of Risk |
|---|---|---|
| Other | 7161.76117 | 29% |
| D-Line Equipment Failure | 5767.6215 | 24% |
| Vegetation | 4588.96533 | 19% |
| Other PG&E Assets or Processes | 3377.48667 | 14% |
| Animal | 2129.22667 | 9% |
| Natural Hazard | 1060.22833 | 4% |
| PG&E Activity | 152.04967 | <1% |
| Human Performance | 41.59667 | <1% |
| Customer Equipment Failure | 37.05533 | <1% |

## Risk Event

**Total Exposure**
**81,082** MILES

**Total Annual Frequency**
**24315.991**
24316 per year

Failure of Distribution Overhead Assets

**Total Risk Score**
EV | TA
**266.83 | 333.09**

## Outcomes / Consequences

| Outcome Type | % Occurrence | Safety (Injuries) PUB | Safety (Injuries) EMPL | Safety (Injuries) CONT | Safety (Fatalities) EMPL | Reliability ELEC | Financial |
|---|---|---|---|---|---|---|---|
| Asset Failure / Associated with Ignition | 1% | | | | | | |
| Asset Failure / Not associated with Ignition | 98% | ✓ | | | | ✓ | ✓ |
| Asset Failure - Human Induced / Not associated with Ignition | <1% | ✓ | ✓ | ✓ | ✓ | ✓ |

## 2 Tranches

EV | TA    Filter by Tranche Name

| # | Tranche (# Programs) | | % | Inherent RS | Baseline RS | Mitigated RS | Inj Pub | Inj Empl | Inj Con | Ftl Pub | Ftl Empl | Ftl Con | Environmental $ | Gas | Electric | Financial $ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Circuits w Low Likelihood of Failure [0] | B | 80.6% | 215.4 | | | 0.8556 | 0.0036 | 0 | 0 | 0.0002 | 0 | -- | | 474,331,066 | 32.08M |
| 2 | Circuits w High Likelihood of Failure [0] | B | 19.3% | 51.56 | | | 0.1684 | 0.0006 | 0 | 0 | 0 | 0 | -- | | 113,954,995 | 7.65M |

# S-MAP Settlement Agreement: Risk Scoring

| S-MAP Settlement Agreement Matrix No. | Element Name | PG&E Implementation |
|---|---|---|
| 13 | Calculation of Risk | PG&E will calculate the consequence distribution for each lower-level attribute for each tranche over the long-term. By combining these distributions appropriately we can calculate overall risk scores and any other aggregated number. |
| 24 | Use of Expected Value for CoRE; Supplemental Calculations | PG&E's risk management program is intended to shed light on high consequence, low frequency risks so that mitigations can be designed in a manner that benefits the "tail." PG&E currently is exploring how to best represent Tail Average calculations in its decision making process. |
| 25 | Risk Spend Efficiency (RSE) Calculation | PG&E will calculate the risk benefits over the long-term/life of the mitigation, incorporating the full set of benefits that are the results of the incurred costs. |

# 4. PG&E Commitments

# PG&E Commitments

| PG&E Commitments | Expected Implementation |
|---|---|
| PG&E will fully integrate the S-MAP decision into its next RAMP. | TY2023 RAMP Filing. |
| PG&E will refine its Risk Informed Budget Allocation (RIBA) process. | RET scoring will be replaced by Risk Reduction in the TY 2023 RAMP Filing, with on-going improvements thereafter. |
| PG&E will move to an event-based risk register where risks are mutually exclusive. Cross-cutting risks will become risk drivers and will not be modeled separately. | Largely complete now and will be represented in the TY2023 RAMP Filing. |
| PG&E will work internally and with stakeholders to develop an appropriate quantification approach for controls. | 2023 GRC Filing. |
| PG&E will continue to improve its probabilistic risk models and improve the data inputs. | TY2023 RAMP Filing. |
| PG&E will work with parties to define an appropriate risk tolerance standard. | As part of the S-MAP Long-Term Road Map, PG&E expects this topic to be in scope of a future S-MAP OIR. |
| PG&E is actively engaged in and expects to model all of its identified enterprise risks, not just the top safety-related risks. | 2023 GRC Filing. |