R.20-07-013, Phase 3, Workshop #2: Pre-Workshop Planning Questions

July 5, 2023

Tail Risk: Consequence Modeling

Description of the Issue:

Phase I of this proceeding considered the question of whether the Commission should adopt best practices for investor-owned utilities (IOU) modeling of wildfire risks using the RDF. As low probability, high consequence risk events – also called "tail risks" or "tail values" events – the RDF allows the IOUs the flexibility to select their own risk modeling method for including wildfire risks in RAMP filings. Phase I discussions regarding tail risks focused on whether it was appropriate for the Commission to continue to allow this flexibility, or whether the Commission should identify a "best practice" for modeling wildfire risks in the RDF such as a practice called "the power law probability distribution function."

The Commission in D.21-11-009 declined to adopt any wildfire risk modeling best practices, including use of the power law probability distribution method. However, D.21-11-009 notes PG&E's intent to use the power law distribution function to model wildfire risk consequences and to share its findings. D.21-11-009 further states that it is the Commission's intent to continue to examine this issue "as part of exploring better ways for climate change risks, impacts, and uncertainties to be reflected in the RDF."[1] D.21-11-009 directs Commission Staff to continue to monitor this issue in their review of RAMP filings and to work to provide a follow-up recommendation in later stages of this proceeding. In line with this, the Phase III Roadmap proposal identified tail risk and related uncertainties as a high priority for further work.

Work on this issue in Phase III will center on understanding the IOUs' use to date of the power law probability distribution function to model wildfire tail risk, the results, strengths, and any weaknesses of use of this approach, and what further guidance by the Commission in this area may be needed. Specifically, work will address the question of whether the Commission should require use of the power law probability distribution function to model wildfire risk, whether the Commission should recommend use of this approach as a best practice, or whether the Commission should take some other course of action to ensure appropriate modeling of wildfire tail risk and communication of associated uncertainties in IOU RAMP filings?

Additionally, discussion in this area will consider how the IOUs have represented other low probability, high consequence risk events in their RAMP filings to date, including risks related to hydro dam safety and seismic events. Work in this area will ask, is additional guidance needed regarding modeling of low probability, high risk events more generally in the RDF and RAMP filings?

Planning Questions:

1. How is "tail risk" defined for the purpose of utility wildfire mitigation?

2. What might be the consequences of failing to adequately model tail risk in enterprise, planning, and operational models? How significant are these consequences?

3. Are there specific drivers of "tail risk" (catastrophic) events or are "tail risk" events simply the limit of a continuous distribution?

[1] D.21-11-009, pg. 33

4. What should be the appropriate cap, or method for determining the appropriate cap, in the case of a truncated power law probability distribution?

5. Currently, power law distributions are applied only to enterprise risk calculations. How can we represent tail risk in 1) planning and 2) operational risk models?

6. Does the power law probability distribution appropriately incorporate tail risk events in the wildfire risk, as compared to the use of other distribution functions?

7. Should the power law probability distribution be required as the baseline distribution function for modeling the consequences of wildfire risk? Should it be recommended as a best practice?

8. Should there be any additional reporting requirements or guidelines to accompany the application of the power law distribution to make the results accessible to the layperson? For example, Dr. Joseph Mitchell of MGRA submitted a table as part of a data request to SDG&E in its 2021 RAMP that shows Wildfire losses at each percentile of the power law probability distributions (See Table 1).[2]

Wildfire Loses $Billions	Gamma (3,0.8)	Power (-0.5)	Power Law, $40B Max
2.1	46.3814%	49.8813%	51.0296%
2.64	61.6927%	55.3316%	57.8912%
3.33	76.3285%	60.1893%	64.0067%
4.19	87.9305%	64.5187%	69.4570%
5.27	95.2107%	68.3772%	74.3147%
6.64	98.6246%	71.8162%	78.6440%
8.36	99.7388%	74.8811%	82.5026%
10.52	99.9707%	77.6128%	85.9415%
13.25	99.9983%	80.0474%	89.0065%
16.68	100.0000%	82.2172%	91.7382%
21.00	100.0000%	84.1511%	94.1728%
26.44	100.0000%	85.8746%	96.3426%
33.28	100.0000%	87.4107%	98.2764%
41.90	100.0000%	88.7798%	100.0000%

Table 1 – Probability of wildfire losses less than specified amount using gamma distribution (SDG&E), power law, and power law truncated at $40 billion (MGRA). The gamma function values were calculated using Microsoft Office Excel's GAMMA.DIST function and match the P95 and P98 values by SDG&E in its data request responses.

9. Should the use of the power law distribution be required (or other Commission guidance provided) to address other non-wildfire risk events that similarly have low probability, high consequence risk events (e.g., hyrdo dam failure, seismic events, etc.)?

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[2] Safety Policy Division Staff Evaluation Report on SDG&E's and SoCalGas' Risk Assessment and Mitigation Phase (RAMP) Application Reports (A.) 21-05-011, (A.) 21-05-014; November 5, 2021, (pp. 209-213/295) Appendix: MUSSEY GRADE ROAD ALLIANCE INFORMAL COMMENTS TO THE SAFETY POLICY DIVISION REGARDING SAN DIEGO GAS AND ELECTRIC COMPANY'S RAMP FILING; October 22, 2021; pp. 2-5.