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July 16, 2025

DATA REQUEST RESPONSE
LIBERTY UTILITIES (LIBERTY)

Data Request No.:	OEIS-P-WMP_2025-Liberty-003
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Date Received:	July 8, 2025
Due Date:	July16, 2025

Subject:
Q01. Regarding Unplanned Distribution System Outages from Jan 1, 2023, to Dec 31, 2024
Q02. Regarding Total Utility Risk
Q03. Regarding Probability of Ignition
Q04. Regarding SRP Risk
Q05. Regarding Risk Equations
Q06. Regarding Population Impact
Q07. Regarding Risk Spend Efficiency
Q08. Regarding Vegetation Risk

Q01. Regarding Unplanned Distribution System Outages from Jan 1, 2023, to Dec 31, 2024:

a. From January 1, 2023, to December 31, 2024, provide the following:
   i. A list and description of each distinct cause code attributed to an unplanned distribution outage.[1]
   ii. The average number of distribution poles in Liberty's service territory.
   iii. The total number of unplanned distribution outages in Liberty's service territory.
   iv. The number of unplanned distribution outages caused by vegetation contact.
      1. Provide the number of unplanned distribution outages caused by vegetation contact during major event days.
   v. The number of unplanned distribution outages caused by equipment failure.
      1. Provide the number of unplanned distribution outages caused by equipment failure during major event days.
   vi. In an Excel file attachment(s), provide the data Liberty used to determine the number of outages in tabular form.

Response:

i. Refer to attachment: "Liberty Response_DR-003-Q01.i"
ii. 25,000
iii. 634
iv. 105
   a. 6
v. 213
   a. 2
vi. Refer to attachments: "Liberty Response_DR-003-Q01.vi(1)" and "Liberty Response_DR-003-Q01.vi(2)"

Q02. Regarding Total Utility Risk:

On page 41 of Liberty's 2026-2028 Base WMP and page 7 of the Direxyon report (Attachment B1), there are two figures depicting the components of total Utility Risk.

a. Explain why Figure 5-2: RBDM Framework (Liberty's Base 2026-2028 WMP, page 41) includes an additional "Asset Failure Risk" while the Utility Risk calculation in Section 5.2.2.3 (Liberty's Base 2026-2028 WMP, page 49) does not include that risk.

[1] Number of unplanned distribution outages refers to the number of outages on the distribution system irrespective of the number of customers affected. For example, an outage that affected ten customers would be considered one outage. An outage that affected 5,000 customers would also be considered one outage. Exclude distribution outages resulting from transmission or substation outages.

b. Explain why Figure 5-2: RBDM Framework (Liberty's Base 2026-2028 WMP, page 41) and Figure 3: Overview of the Risk Framework for Liberty Utilities in DIREXYON (Attachment B1, Direxyon Report, page 7) seem to be depicting different frameworks for Liberty's risk modeling.

i. Describe the differences depicted, and why such differences exist.

ii. Which figure more accurately depicts Liberty's risk modeling framework?

Response:

a. Figure 5-2 presents a conceptual overview of the Risk-Based Decision-Making Framework, which includes Asset Failure Risk, Fire Risk, and PSPS Risk. Section 5.2.2.3 defines Utility Risk as the average of Fire Risk and PSPS Risk. Asset Failure Risk is not included in the utility risk formula, because its effects are already embedded in the components of Fire Risk and PSPS Risk. Asset Failure Risk is a supporting diagnostic tool, used to identify and prioritize mitigations that reduce Fire or PSPS Risk.

b. Figure 5-2 is broader and is a depiction of how Asset Failure Risk is a supporting diagnostic tool. Asset Failure Risk is used to support decision making for identifying and prioritizing mitigations that reduce Fire Risk or PSPS Risk. The figure in the DIREXYON Report is focused on the simulation logic, where Asset Failure Risk is not a standalone output but a driver of failure probabilities.

i. Asset Failure Risk is a foundational input, not a final output in the Utility Risk formula. The two figures reflect different layers of the same framework. Figure 5-2 of the WMP is a strategic overview outlining the full RBDM Framework. Figure 3 of the DIREXYON Report is more precise when considering computational modeling and simulation logic.

ii. Both figures are accurate, but for different purposes. Figure 5-2 of the WMP is more accurate for understanding the full strategic framework, including how Asset Failure Risk informs mitigation planning. Figure 3 of the DIREXYON Report is more accurate for understanding the computational model used to generate risk scores.

Q03. Regarding Probability of Ignition:

On page 43 of Liberty's 2026-2028 Base WMP, POI is noted as synonymous with "burn likelihood" and "WL," which Energy Safety assumes stands for Wildfire Likelihood. However, on page 64 of Liberty's 2026-2028 Base WMP, the WL row of the table says the Probability of Ignition is an input. On page 43 of Liberty's 2026-2028 Base WMP, the "Probability of Fire" (POF) is equated with "WC," which Energy Safety assumes stands for Wildfire Consequence.:

a. Provide clarification on the difference between POI and WL, as used in Liberty's WMP.

b. Clarify if the POI calculated by Technosylva is derived from the APF (probability of asset failure) and weather sampling from Technosylva (mentioned in the Direxyon report, Appendix B1, page 22).
c. Describe why scaling of the POF (formula from Liberty's 2026-2028 Base WMP, page 44) is based on the 80th percentile of the POF.

Response:

a. Probability of Ignition (POI) is derived from Technosylva FireSight. POI represents the likelihood that an ignition source, such as a failed asset, will result in a fire requiring suppression. It is a static metric calculated at specific ignition points. Wildfire Likelihood (WL) is a Direxyon Risk Asset Tool (DRAT) module that incorporates POI as an input to the WL module. WL also incorporates condition modifiers to produce a refined asset-specific version of POI that is adjusted for asset conditions and status of mitigation actions.
b. The POI from Technosylva is not derived from Probability of Asset Failure.
c. The scaling of POF is based on the 80th percentile of POF to increase the sample size of events that could occur. Liberty made the decision to make the risk model less risk adverse to show POF on a slightly broader spectrum to magnify risk. This decision was made for reasons due to the small pool of data relating to utility caused ignitions in Liberty's service territory.

Q04. Regarding SRP Risk:

On page 114 of Liberty's 2026-2028 Base WMP, the 2026 target for SRP implementation in the HFRA is listed as 100%. SRP is not currently included in the Utility Risk total but is included in a separate Outage Program total.

a. Clarify if that means SRP has already been implemented in 2025.
b. Explain why SRP risk was not included in Utility Risk at this time.
c. Is Liberty planning on including SRP risk in future iterations of its risk modeling?
    i. If so, provide an approximate timeline for when Liberty plans to have this completed.
    ii. If not, describe why not, including any existing road.

Response:

a. 100% of circuits will have SRP implemented by the end of 2025.
b. SRP (Sensitive Relay Profile) risk is included in Liberty's Utility Risk calculation, though it is not labeled explicitly as "SRP risk." Instead, it is represented as EPSS (Enhanced Powerline Safety Settings) availability within the PSPS Likelihood module of the

DIREXYON Risk Assessment Tool (DRAT). In the model, SRP is treated as a conditional circuit-level characteristic and is integrated into Utility Risk through its influence on PSPS Likelihood.

c. SRP is already included in Liberty's risk modeling.

Q05. Regarding Risk Equations:

a. On page 10 of the Direxyon report (Appendix B1), it describes how SMEs decided that PSPS and Wildfire should be each weighted 50% so that the final risk score ends up being the average. Explain why the PSPS and Wildfire risk scores are averaged instead of summed.

b. On page 47 of Liberty's 2026-2028 Base WMP, the consequence scores are described as averages. Explain why the Wildfire and PSPS consequence scores for each attribute are averaged instead of summed.

c. Page 45 of Liberty's 2026-2028 Base WMP lists the PEDS Outage likelihood equation. Provide a calculation example for this equation.

d. Explain why Liberty uses a PSPS safety factor of 1.5e-9 deaths per 30 minutes Customer Minutes Interrupted (CMI) (Liberty's 2026-2028 Base WMP, page 47).

e. Describe how the PSPS Safety Multiplier equation was developed (Liberty's 2026-2028 Base WMP, page 47).

f. On page 30 of the Direxyon report (Appendix B1) and page 47 of Liberty's 2026-2028 Base WMP, the formula for reliability consequence includes a "Customer Count." Clarify if this count is per circuit or total service territory count.

Response:

a. The approach of averaging the PSPS and Wildfire risk was chosen to provide equal weighting for balanced risk representation. It was determined that both PSPS and Wildfire risks are critical and should be treated with equal importance in Liberty's risk framework. Averaging the two prevents either risk type from disproportionately dominating the Utility Risk score. Because the two risks are calculated using different models and metrics, averaging provides a normalized Utility Risk score on a consistent scale, making it easier to compare across circuits and initiatives. Summing the scores could result in inflated values that exceed the intended scale of the model, especially since both components are already scaled independently. This would reduce the interpretability and usability of the risk scores in prioritization and planning.

b. The average is taken to normalize to a common scale from 0 to 1 so that the metrics can be implemented into the total risk without any circuit disproportionally influencing the

final score.

c. The formula for PEDS Outage Likelihood is:

$$1-(1-(\text{Avg APF x Probability of 95th Percentile Weather}))^{\text{Count of Assets}}$$

A sample calculation using hypothetical values is:

- Average Probability of Asset Failure (Avg APF) = 0.02
- Probability of 95th Percentile Weather = 0.05
- Count of Assets on the Circuit = 50

$$1 - (1 - (.02 \text{ x } .05))^{50} = 0.0488$$

d. Liberty uses a PSPS safety factor of 1.5×10^{-9} fatalities per 30 minutes of Customer Minutes Interrupted (CMI) to quantify the safety consequence of PSPS events in its Multi-Attribute Value Function (MAVF) model. The safety factor reflects the statistical likelihood of fatality due to power outages, particularly for vulnerable populations such as medical baseline or critical infrastructure customers. The safety factor enables Liberty to incorporate human impact into its PSPS risk modeling in a consistent, data-driven manner. It supports the calculation of expected fatalities as part of the safety attribute in the MAVF framework, which is then combined with reliability and financial impacts to produce a normalized risk score.

e. The PSPS safety multiplier equation was developed for Liberty by Arup, a risk modeling consultant, using their expertise in infrastructure resilience and quantitative risk assessment. The multiplier was designed using industry best practices and research on outage-related health impacts. It is consistent with values used by other California IOUs and aligns with the CPUC's Safety Model Assessment Proceeding (S-MAP) guidance, which requires utilities to quantify risk using standardized, comparable metrics.

f. The "Customer Count" used in the reliability consequence formula on page 47 of Liberty's 2026–2028 Base WMP and page 30 of the DIREXYON report refers to the customer count at the circuit level.

Q06. Regarding Population Impact:

On page 45 of Liberty's 2026-2028 Base WMP, the Safety Consequence for wildfire is listed as dependent on "Population Impact: the total population impacted by the simulation footprint" from Technosylva. In the Risk Modeling Working Group, other utilities have discussed using a linear multiplier to estimate fatalities per building destroyed within the simulation footprint.

a. Is Liberty planning on estimating fatalities as part of measuring the population impact?

i. If so, provide a plan or timeline for how Liberty will shift to estimating fatalities in the wildfire safety consequence.

ii. If not, explain why, including how such impacts are captured within Liberty's current risk assessment methodologies.

Response:

a. Liberty uses a linear approach of 1 fatality per 260 buildings structures destroyed in its MAVF model.
   i. Liberty is not currently planning to estimate fatalities based on population impact.
   ii. Fatalities are estimated using a linear multiplier applied to the number of structures destroyed within the wildfire simulation footprint. There is no plan or timeline to shift to a population-based fatality estimation method. The population impact metric is used to inform consequence severity but is not used directly in the fatality calculation.

Q07. Regarding Risk Spend Efficiency:

On page 50 of Liberty's 2026-2028 Base WMP, the Risk spend efficiency is listed as APF*ACF.

a. Is the ACF the same as the consequence described on page 36 of the Direxyon report?
   i. If not, describe how the two differ.

b. Describe why this consequence calculation is used for the risk spend efficiency instead of the wildfire consequence.

Response:

a. Yes
b. Liberty uses Consequence of Failure (ACF) in its Risk Spend Efficiency (RSE) calculation rather than wildfire consequence because RSE is designed to evaluate the cost-effectiveness of asset-level mitigations. This consequence is localized and asset-specific, making it appropriate for evaluating individual mitigation actions. In contrast, wildfire consequence is derived from fire simulation models and reflects system-level impacts, which are not directly attributable to a single asset.

Q08. Regarding Vegetation Risk:

On page 79 of Liberty's 2026-2028 Base WMP, it states that "DRAT incorporates vegetation as a separate asset."

a. Describe how vegetation is seen as an "asset" that has a "quantified risk score."

Response:

a. Within DRAT, the term "asset type" is used to describe items that are calculated into the risk score through a separate module. Vegetation is one of these modules allowing it to be

analyzed using the same methodology as traditional utility assets. Although vegetation is not a utility asset, it is treated as such in terms of inspection, maintenance, and its potential to degrade system reliability. Each vegetation segment is assigned a risk score based on factors like proximity to energized equipment, tree density, and historical inspection and maintenance data. This score incorporates the likelihood of vegetation contacting electrical infrastructure, the probability of ignition under given conditions, and the potential consequences of an ignition. By quantifying vegetation-related wildfire risk in this way, Liberty can effectively prioritize mitigation efforts, assess the impact of vegetation management initiatives, and support cost-efficiency analyses for vegetation management strategies.